NM - 21

GENERAL CORRESPONDENCE

YEAR(S):
1987 - 1969

MADDOX, RENFROW & SAUNDERS
PROFESSIONAL CORPORATION
ATTORNEYS AND COUNSELORS AT LAW
POST OFFICE BOX 5370
HOBBS, NEW MEXICO 88241

DON MADDOX
JAMES M. MADDOX
JOHN M. RENFROW
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SCOTTY HOLLOMAN
JOHN PAUL WEBER
GARY L. CLINGMAN
THOMAS J. FARMER

THIRD FLOOR
BROADMOOR BUILDING
(505) 393-0505

August 5, 1987

Mr. Nick Black, Esq.
P.O. Box 1148
Santa Fe, NM 87504-1148

RE: Draft Business Lease No. BL-1186 by and between The State of New Mexico and Petro-Thermo Corporation

Dear Mr. Black:

This is to confirm our telephone conversation yesterday morning with regard to the draft Business Lease referred to above.

Based upon your comments, we have undertaken a diligent search to determine whether the Administrator, Environmental Protection Agency has promulgated final regulations identifying drilling fluids, produced waters and other waste associated with the exploration, development or production of crude oil or natural gas as a hazardous waste.

In this regard, Title 42, United States Code, Section 6921(b)(2) effectively exempts drilling fluids, produced waters and other waste associated with the exploration, development and production of crude oil or natural gas from federal hazardous waste regulations.

Should the Administrator, Environmental Protection Agency choose to take action with regard to this matter, the following steps must be taken before any final regulations listing such materials as hazardous wastes may take effect:

1. A detailed and comprehensive study together with its accompanying report must be submitted to the Committee on Environment and Public Works of the U.S. Senate and the Committee on Interstate and Foreign Commerce of the U.S. House of Representatives [42 U.S.C. Section 4982(n)];

2. Within six (6) months after completion and submission of the study, the Administrator, Environmental Protection Agency must, after public hearing and opportunity to comment, determine whether to promulgate regulations for the classification of drilling fluids, produced waters and other waste associated with the exploration, development and production of crude oil or natural gas as hazardous wastes [42 U.S.C. Section 6921(b)(2)(B)];

3. The Administrator, Environmental Protection Agency must then publish his decision in the Federal Register and must transmit that decision to both Houses of Congress together with any proposed regulations he deems appropriate [42 U.S.C. Section 6921(b)(2)(B) and (C)];

4. Any such regulations proposed by the Administrator, Environmental Protection Agency shall take effect only when authorized by Act of Congress [42 U.S.C. Section 6921(b)(2)(C)].

In this regard, it is our understanding that the Administrator, Environmental Protection Agency will submit a preliminary report to the committees referred to above not later than August 31, 1987. The detailed and comprehensive study will apparently be submitted as some later date.

By letter dated July 16, 1987, Mr. Rick Lopez requested that Petro-Thermo Corporation reassess its "proposed project giving particular attention to the new E.P.A. criteria regarding surface impoundment of hazardous wastes, ...". This request suggested that drilling fluids, produced waters and other waste associated with the exploration, development or production of crude oil or natural gas would soon be listed as hazardous wastes. We would be most appreciative if you could identify the source of this suggestion so that we might respond to your concerns in a meaningful manner.

In closing, we do not believe that the New Mexico State Land Office is being asked to allow a hazardous waste facility to be constructed on state lands or to assume any accompanying risks. Nevertheless, we welcome the opportunity to review and respond to any additional documents published under the auspices of the Administrator, Environmental Protection Agency which may have been made available to you.

Again, your assistance in this regard will be sincerely appreciated.

Very truly yours,

John Paul Weber

JPW:rm

xc: Petro-Thermo Corporation

bxc: David Boyer, Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87501-2088

PETRO-THERMO CORPORATION

P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557

HOBBS, NEW MEXICO 88241-2069

July 22, 1987

Mr. Rick Lopez
Planning and Development
New Mexico State Land Office
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: Application For Business Lease
Petro-Thermo Corporation
Oilfield Waste Disposal Facility

Dear Rick:

In reference to your letter, dated July 16, 1987, Petro-Thermo Corporation wishes to provide the New Mexico State Land Office with the following information:

We have been advised by the NMOCD and our Counsel that the EPA has not issued any regulations which classify the materials to be placed in the Petro-Thermo Corporation proposed disposal facility as hazardous waste. While there apparently have been some studies undertaken regarding this matter, the determination that oilfield liquids are hazardous waste remains at best, hypothetical. Petro-Thermo Corporation has made every effort to comply with the regulations and procedures promulgated by the State Agencies governing the oil and gas industry. Based on the Hydrogeologic Study and the Site Design Plan, the NMOCD has approved the installation of this oilfield waste disposal facility.

In the event a future determination is made designating oilfield waste as hazardous waste, it would have a dramatic detrimental effect on the oil and gas industry. Every existing waste disposal facility, drilling location, production facility, treating plant and petroleum storage facility would be shut down. The economic repercussions for the State of New Mexico would be enormous.

With regard to your request for determining a bond amount, the NMOCD currently provides regulations directed toward bonding requirements for treating plants. The NMOCD recently informed me that oilfield waste disposal sites <u>are</u> included in this category. Rule 312 (A) (6) states: A surety or cash bond in the amount of $25,000, in a form approved by the Division, conditioned upon compliance with statutes of the State of New Mexico and Rules of the Division and the satisfactory clean-up of site upon cessation of operation in accordance with Part (i) of this Rule. Part (i) states: The Director of the Division may suspend any treating plant permit when it appears that such suspension is necessary to prevent waste, to protect fresh water, or to assure compliance with Division Rules or Orders. In addition, SLO Rule 1.016 (A) and (B) relating to oil and gas leases, requires a bond amount of not less than $10,000 for each oilfield lease. In the event that a spill breached the boundary of the disposal facility, it is our position that clean-up costs would not exceed $25,000, and would be a reasonable bond amount.

Finally, it is our general feeling that Petro-Thermo Corporation has negotiated an equitable lease arrangement with the New Mexico State Land Office. To date, our firm has invested in excess of $40,000 in this disposal project. Based on current market conditions, it will take two to five years to recoup this amount.

I hope that this information will be helpful with regard to expediting the approval of our Application for a Business Lease. If you have any further questions, please do not hesitate to contact me.

Sincerely,

Petro-Thermo Corporation

Robt W. Abbott

Robert W. Abbott
President

RWA/dlb

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

RECEIVED
JUL 22 1987
OIL CONSERVATION DIVISION
SANTA FE

July 21, 1987

Honorable Bill Humphries
Commissioner of Public Lands
New Mexico State Land Office
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: Application For Business Lease
Petro-Thermo Corporation
Plata Disposal Facility

Dear Mr. Humphries:

With regard to the above referenced Application for Business Lease, Petro-Thermo Corporation wishes to provide the following information in response to recent BLM comment submitted to the New Mexico State Land Office.

Reference is made to BLM concern for the two archaeological sites (NMAS 5839 and NMAS 5840). Page 11 of the NMAS Archaeological Clearance Report provided to Mr. Thomas W. Merlan, SHPO, "suggests and recommends clearance for Petro-Thermo Corporation's proposed Tract "B"/Plata Disposal Project. As proposed the core area will embrace the 660' x 660' southwestern quadrant of Tract "B". Recorded archaeological sites NMAS 5839 and NMAS 5840 are well removed from the actual core area of the project." It further suggests that "men and material are to avoid the archaeologically sensitive areas altogether during all phases of work." This can effectively be accomplished by simply staking the two sites and providing quality management by Petro-Thermo Corporation during construction and operation. While it is our position that expensive fencing is unnecessary, as an accommodation to the New Mexico State Land Office, our firm will surround both archaeological sites with barbed wire type fencing.

Reference is made to the BLM suggestion to require disposal pits to be lined. Numerous studies have been undertaken regarding this general area of New Mexico. These studies including those prepared for the BLM, Pollution Control Inc., Sandia National Laboratory, N.M. Bureau of Mines and Mineral Resources and Petro-Thermo Corporation have concluded that this area supports large-scale mining and disposal activities because of the absence of potable waters. In addition, the area encompassing the proposed disposal facility has been previously exempted by NMOCD Order Number R-3221. The pit impoundments as planned, are designed to infiltrate salt water (brine) and water contained in drilling mud and cement through the soil and migrate slowly to the Laguna Plata. The salinity of the seepage will not exceed that of Laguna Plata, inasmuch as produced oilfield fluids are expected to have total dissolved solids concentrations in the range of 25,000 to 75,000 ppm. The total dissolved solids at Laguna Plata is 335,100 ppm. Thus, the seepage will dilute the concentration of the total dissolved solids in Laguna Plata. The total annual rate of evaporation from Laguna Plata is about 5360 acre-feet per year. Under anticipated normal operating conditions, the total rate of Group I waste disposal will be only about 93 acre-feet per year. Therefore, there is ample storage and evaporation potential in Laguna Plata to accommodate the waste seepage. No significant change in the hydrologic regime is expected as a result of the proposed discharge. The BLM has previously approved National Potash Corporation to dispose of "potash slurry" directly into Laguna Plata Lake. The proposed discharge of the Petro-Thermo Corporation facility would be insignificant in comparison to the potash discharge. The BLM suggestion to require lined pits would effectively redefine the disposal facility as a storage facility. Without an infiltration system, each pit impoundment would reach capacity and become useless. The relatively small surface area of each pit would not be conducive to rapid evaporation rates. The pit bottoms could not be serviced and cleaned on a routine basis. The number of pits would grow rapidly requiring the storage facility to expand indefinitely. It is our position that the infiltration method is the only logical solution for long term waste disposal.

Reference is made to the BLM suggestion to require a second berm to be constructed surrounding the entire disposal area. The existing design plan for the disposal facility incorporates a unique gravity system, whereby as each successive pit reaches capacity, a large diameter overflow pipe channels fluids into the adjacent pit (refer to design plan). This method maximizes infiltration time before pit levels begin to rise. In addition, the disposal facility includes a large overflow pit (refer to design plan pit #01) incorporated into the plan to exclusively and effectively provide insurance against unexpected volumes of fluids entering the system, such as large area thunderstorms. A qualified employee will be present at the disposal facility during business hours. While it is our position that a second berm constructed to surround the entire disposal area is unnecessary, as an accommodation to the New Mexico State Land Office, our firm will construct a second berm down slope of the disposal facility.

Reference is made to the BLM concern for a salt mining operation near Laguna Plata Lake. As stated above, the Hydrogeologic Study recommending clearance for this project expects no significant change in the hydrologic regime of Laguna Plata Lake as a result of the proposed discharge. Based on this study, the NMOCD has dismissed concern about this salt mining operation. In addition, the salt mining company has not taken issue against the project. The basis for the BLM concern of this particular issue is unclear.

Reference is made to the BLM suggestion to construct a 6 foot chain link fence to enclose the disposal area. The Hydrogeologic Study recommending clearance for this project points out that this area is very sparsely populated. The dwellings which comprise Halfway, New Mexico are abandoned. Except for Halfway, the only dwelling within two miles of the proposed discharge site is a ranch on the east side of Laguna Plata. In addition, edible vegetation is very scarce in this area. Domestic animals have not been sighted by our firm near the proposed disposal area since the inception of the project. It is our recommendation that fencing for this disposal facility should be similar (barbed wire) to other oilfield locations and tank batteries in remote areas. NMOCD Order Number R-8161-B provides for the proposed facility to "have adequate fencing, gates and cattle guards installed to preclude livestock and unauthorized persons from entering the facility". It is our position that the construction of a 6 foot chain link fence would pose an unnecessary expense.

Reference is made to the BLM suggestion for the pit impoundments to be netted. Similar NMOCD regulated disposal facilities are not required to place netting over the pit impoundments. In addition, netting is not required for drilling location mud pits or production facility emergency pits. The placement of netting over the disposal pits at the Petro-Thermo Corporation facility would be extremely impractical making it virtually impossible to routinely service, skim and clean the pits. For this reason "pit netting" is not a provision of NMOCD Order Number R-8161-B recommending clearance for this project. It is our position that "pit netting" is unnecessary.

The oil and gas industry and the State of New Mexico are partners in the development, conservation and perpetuation of the State's energy resources. Jobs, incomes and taxes generated from this industry are vital to our State's economy. With regard to world energy policies currently being implemented, the management of Petro-Thermo Corporation expects the demand for oil and gas to drastically increase by the early 1990's. Future drilling, secondary and tertiary recovery projects will depend heavily on the existence of facilities such as the one proposed by our firm. Presently there are only two such NMOCD approved sites in Lea County, a major oil and gas producing county. It is important to realize that any unnecessary stipulations or conditions imposed on this proposed disposal facility could conceivably increase the project expenditures beyond current cost effective levels and market conditions.

Petro-Thermo Corporation respectfully requests that the New Mexico State Land Office carefully consider the above information. We hope that it will be helpful with regard to expediting the approval process of our Application for a Business Lease.

Sincerely,

Petro-Thermo Corporation

Robert W. Abbott
President

RWA/dlb

xc: Mr. William J. LeMay, Director NMOCD

Mr. Dave Boyer, OCD

IN REPLY REFER TO

1703 (931)
3040
8100

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
Post Office and Federal Building
P.O. Box 1449
Santa Fe, New Mexico 87504-1449

JUL 10 1987

Mr. William R. Humphries
Commissioner
State Land Office
State of New Mexico
P.O. Box 1147
Santa Fe, NM 87504-1147

Dear Commissioner Humphries:

Thank you for the opportunity to comment on your draft Business Lease No. BL-1186 between the State of New Mexico and Petro-Thermo Corporation in Lea County, New Mexico, near Laguna Plata. The Bureau of Land Management (BLM) continues to be concerned about this potential development and its impact on the surrounding BLM administered lands. Our greatest concerns are for the integrity of the Laguna Plata Archaeological District and potential releases of hazardous substances to ground or surface waters. We are also concerned about protecting the visual and wildlife resources of the area.

The Federal land surrounding Laguna Plata has been studied by the BLM for its prehistoric archaeological significance and was found to warrant nomination to the National Register of Historic Places. It is very likely that sites found on this State section will yield important information in conjunction with the overall Laguna Plata Archaeological District. This point of view is also held by the State Historic Preservation Officer, as evidenced by a June 15, 1987, letter to Ms. Zilla Padilla of your staff. In light of the apparent significance of the State land and the documented significance of the surrounding Federal land, development of this area should proceed only with great caution, if at all. The BLM has identified this State section as land desirable for acquisition for purposes of consolidating the archaeological resources.

Your lease describes an area containing 80 acres, yet the completed archaeological survey only covered 40 acres. The entire area should be inventoried. If this discrepancy is as described, we believe this is a critical omission for such a significant area. We suggest your stipulation on cultural resources be worded as follows:

> 18. Class III Archaeological Survey. Because the surrounding Federal land is being nominated to the National Register of Historic Places as an Historic District, a Class III inventory shall be conducted on the State land which will be directly or indirectly affected by this action.

The two archaeological sites (NMAS 5839 and NMAS 5840) identified by the completed inventory are depicted on Map 1 (enclose map showing sites). These two properties shall be fenced and shall be completely avoided by the planned operations.

In the event that either of the sites are adversely affected by the operations, the affected property will be mitigated according to standards approved by the New Mexico State Historic Preservation Officer.

The disposal operation, as planned, is designed to release disposal liquids to the Laguna Plata Lake. Recent presentations by the New Mexico Environmental Improvement Division (EID) (Produced Water and Hydrocarbon Liquids Chemical Constituants of Hydrogeological Concern in New Mexico, 1986, Dennis McQuillan), and the New Mexico Oil Conservation Division (OCD) (Disposal of Produced Water and Oil Field Fluids, 1986, David C. Boyer) have reported that hazardous substances, as defined by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), typically occur in oil and gas drilling and production waste fluids. We are concerned that some of these substances will be released to the lake through groundwater or surface water routes. CERCLA carries liability for landowners such as the BLM and the State of New Mexico, as well as for operators. We realize there are confining beds beneath the disposal facility and the lake which should prevent deep seepage of wastes. However, lateral seepage above these beds toward the lake, and any attenuation of waste chemicals along this path, has not been defined. The rate volatile compounds will be volatilized, and the rate chemicals will be adsorbed onto soil particles have not been documented. The OCD's determination is based on a professional estimate backed by a safety net of monitoring wells. We have observed the movement of volatile organic compounds over greater distances than 1/4 mile in other areas.

The OCD has taken a position of proceeding with disposal and monitoring to ensure there is no off-site contamination. While monitoring wells are a necessary part of this type of disposal facility operation, it is a small consolation to catch pollutants in groundwater before they get to a more distant location. It only means you may be liable for a small fortune in cleanup costs, rather than a large fortune.

The only possible way to achieve an acceptable level of protection in this situation would be to require lined pits. According to OCD estimates (OCD Case No. 8781, Order No. R-8161, Finding No. 9), this would be feasible. In their analysis, they estimate that the evaporation from Laguna Plata is 60 times the volume of liquid wastes planned for disposal. It would be much more environmentally sound to put the wastes in lined pits and evaporate the liquids directly from the pits, instead of allowing the liquids to seep into the lake before evaporating. This would require a larger surface area, but the operation could be moved since the lake would no longer be needed as a disposal drain. The cost of lining the pits would be small compared to the costs of cleanup or the bond required to ensure cleanup.

Another way to catch contaminants before they get very far would be to require samples of the disposal pits on a quarterly basis. This should be required for either lined or unlined pits.

To further minimize the risk, we suggest the following minimum requirements:

o Enclose the entire disposal area with a 6-foot chain link fence with a lockable gate at all entrances. Keep all gates locked during nonoperating hours.

o Have an attendant on duty at all times during operating hours.

o Keep a log of all disposals, including the volume, type, and source of disposed materials, as well as the name and address of the disposer and truck driver.

o Do not allow any disposals of hazardous wastes. Any release of hazardous substances shall be reported as required by CERCLA, Section 102(b).

The OCD refers to these site security measures generally by requiring adequate facilities to preclude unauthorized persons from entering (OCD Case No. 8781 De Novo, Order No. R-8161-B, (1)), but we have found that these items need to be spelled out in detail.

The OCD requirements depend upon monitoring wells to detect contaminant movement through groundwater, but do not require a backup for surface spills. If a pit were breached due to some accident or a large thunderstorm, the contents of the pit probably could not be stopped before they entered the lake. If a second berm was required to surround the entire disposal area, the risk of damage due to a surface spill could be significantly reduced.

The OCD record shows that they have dismissed concern about a sodium mining operation that uses water from the Laguna Plata Lake because, "No party representing the salt mining company appeared at either the examiner hearing or the De Novo hearing to object to the proposed disposal operation." (OCD Case No. 8781 De Novo, Order No. R-8161-A, Finding No. 28). The BLM did raise a concern for this use of the lake water, and we continue to be concerned. We have recently received an expression of continuing interest in this mineral lease operation (Enclosure 1). Please feel free to examine our records if you need documentation of the operation.

We are pleased to see the requirement for a suitable bond to cover restoration costs. The amount of the bond is not specified but should be enough to cover any potential contaminant cleanup costs.

As a multiple use management agency, the BLM is also committed to maintaining the visual and wildlife resources of this area. A requirement to keep facilities low profile and painted sandstone brown will reduce visual impacts. This area does contain threatened and endangered wildlife species. All BLM leases in this area require pits containing hydrocarbons to be netted to prevent wildlife losses.

We hope you realize that OCD's responsibility is heavily influenced by the definition of fresh water being water with less than 10,000 parts per million total dissolved solids that has a present or reasonably forseeable beneficial use. Release to the environment as defined by CERCLA does not contain this restriction; therefore the lake and shallow groundwater would be considered the environment, regardless of its level of salinity or potential for beneficial use.

The OCD is a regulator in the business of protecting the higher quality water resources, and they have found that the use of these safety net features works well for their purposes. However, as landowner and land manager, the BLM has found that an ounce of prevention can save much more than a pound of cure. As you may be aware, we have had some experience with produced water disposal sites during the past few years, and we have put considerable thought into how we can protect public health and the environment, as well as protect the taxpayer from cleanup liability. We have identified these collective disposal operations as having a much higher risk than single source disposal pits. We feel it would be in the best interest of the State of New Mexico, as well as the BLM, to carefully consider the risks involved before committing to leasing land for this type of facility.

It is our opinion that this facility should have lined pits in order to reduce the risk of contamination to an acceptable level. If you agree with this, we request that you require lined pits and ask Petro-Thermo Corp. to move the proposed facility to other State land in the area to avoid impacts to the Laguna Plata Archaeological District.

Thank you again for your consideration of our concerns. Please notify the lessee that they will need to get a BLM right-of-way permit if access to the facility will be across public land. If you need any more information, please feel free to contact me or my staff.

Sincerely,
/s/ LARRY L WOODARD

Larry L. Woodard
State Director

1 Enclosure:
1 - Letter from Mississippi Chemical Corporation (2 pp)

10

Mississippi Chemical Corporation
We Make Things Grow

File 1614.4
CRMP (NM067)

May 14, 1986

Bureau of Land Management
Area Manager
Carlsbad Resource Area
PO Box 1778
Carlsbad, New Mexico 88220

Dear Sirs:

After careful review of your draft, Resource Management Plan, we would like to comment on several aspects of the new plan. First, we do not see the need to change the current plan. We feel the current plan provides adequate protection of all resources within the area. In addition, we feel your new plan leans away from the long-standing policy the BLM has on multiple use of federal lands. It is obvious that the new plan leans heavily towards recreation and away from mining and grazing. If a new plan is developed, it should seek to achieve better balance.

If the plan were to be implemented in its current form, Mississippi Chemical has two areas of critical concern. These two areas of concern relate to the proposed special management areas, Maroon Cliffs and Laguna Plata. Our concerns are as follows:

Maroon Cliffs:

10-1 Maroon Cliffs special management area lies directly east of our current plant site. The only map showing it's location is your management plan map, Map-D. There is no legal description of the Maroon Cliffs area, but it appears on your map to include our mine, mill, and tailings ponds. This is of great concern to us since the plan calls for no surface occupancy. We feel you should re-examine the area to insure that your special management area doesn't contain land already disturbed by MCC. Further, we feel there should be a buffer around the east side of our plant to allow for future expansion of our tailings pond.

I would like to remind you of the problems Maroon Cliffs have created for MCC and the BLM in the past. As you probably recall, MCC at one time wanted to build a new mine and mill in the Maroon Cliffs area. Due to bureaucratic delays the necessary permits were never obtained. If MCC could have obtained the necessary permits, we would have built a new facility from which to mine and mill our ore body. With this new facility we would have been able to mine at a higher rate and efficiency.

Box 101 - Carlsbad, New Mexico 88220 Phone (505) 887-5591

10-1

The boundaries for the Maroon Cliffs SMA were based on the boundaries established in the East Eddy-Lea Management Framework Plan for Maroon Cliffs. No legal descriptions or maps of the proposed Cultural Resource SMA's were published in the RMP because 36 CFR part 1215.20 prohibits public disclosure of this information except in very restricted circumstances. The Maroon Cliffs SMA boundary has been amended to exclude any areas presently disturbed by MCC's mining operation. A table of lease numbers that may be affected by the proposed cultural SMAs has been developed and is available for review at the Carlsbad Resource Area.

From this new facility we could have competed with an operation in the Carlsbad area and probably would be running today generating royalties for the BLM.

To aid you in evaluating the Maroon Cliffs area, please find enclosed a map showing our current facilities and approximate area of surface disturbance.

Laguna Plata:

10-2 In the Laguna Plata area, little mention is made of Williams Brine Co. which is mining salt under an agreement with National Potash or National's disposing of brine in Laguna Plata. We feel the plan should specifically address these two items. We would like the plan to state that it will allow Williams to continue to mine salt from Laguna Plata and that he has the right to maintain his access. Also, we feel the plan should state National can continue to dispose of brine in Laguna Plata and have surface access to maintain it's pipeline to the lake.

We appreciate this opportunity to comment on this plan. Also, we hope before the plan is finalized, we might be allowed to review it again.

Sincerely,

MISSISSIPPI CHEMICAL CORPORATION

Tillman Branch

Tillman Branch
General Manager

TB/bl

Enclosure

10-2

William's Brine Co. has the right to mine salt and maintain access to the operation under the provisions of the existing lease. Also under the existing lease, National Potash has the right to dispose of the clear brine in Laguna Plata under existing stipulations. Surface access to the pipeline cannot be denied because the pipeline is on State of New Mexico land and because the right to do so is protected by National's existing lease rights.

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

June 12, 1987

Honorable Bill Humphries
Commissioner of Public Lands
New Mexico State Land Office
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Re: Plata Oilfield Waste Disposal

Dear Mr. Humphries:

I appreciated your telephone call June 9 regarding the approval of our Application for a Business Lease.

Per your request at our meeting May 11, we performed and submitted to Rick Lopez a favorable Archaeological Clearance Report recommending installation of the disposal site.

The many delays in this project have seriously impeded the daily business operations of our firm, and the oilfield customers we serve. As I mentioned, Petro-Thermo Corporation has made temporary storage plans until this Business Lease is approved.

In an effort to expedite this matter please do not hesitate to contact me for any further questions you may have.

Sincerely,

Petro-Thermo Corporation

Robt W. Abbott

Robert W. Abbott
Manager of Operations

RWA/dlb

State of New Mexico

Commissioner of Public Lands

W.R. HUMPHRIES
COMMISSIONER

P.O. BOX 1148
SANTA FE, NEW MEXICO 87504-1148
(505) 827-5713

April 10, 1987

M E M O R A N D U M

TO: Rick Lopez, Director
Planning & Development Division

THRU: Art Waskey, General Counsel

FROM: Nick Black, Associate Counsel

SUBJECT: PETRO-THERMO BUSINESS LEASE

Pursuant to our recent conversation, I have reviewed the proposed lease with Petro-Thermo and your file in this matter. Attached are proposed language changes to the standard Business Lease form based upon our conversation and the review. Most of the changes are peculiar to the Petro-Thermo deal.

You will note I have incorporated the provisions of Exhibits "A" and "B" into the body of the lease and have tightened the language somewhat, especially in the area of maintenance of the facility and reclamation at the end of the lease term.

The issue of whether the site is to be a final destination solid waste disposal site or only a temporary holding facility for solid waste was not particularly clear from anything I have reviewed, including some OCD hearing transcripts. Consequently, Section 11 of the lease, regarding maintenance, has been modified to keep the proposed use in line with what I understand Commissioner Humphries' view is regarding the use of State lands for waste disposal. It now requires periodic hauling out of the solid waste material so as to reduce the problem of solid waste accumulation at the end of the lease term.

While the hauling cost may not have been anticipated by Petro-Thermo, I am not sure the State fee estimates based on production water disposal are adequate to support permanent storage of the solid waste. Neither is it clear that reclamation is feasible if the waste material is allowed to remain permanently.

We also need to address the need of providing an access easement as the lease site is not contiguous with a public road.

Rather than set out the reasons for the language changes in a lengthy memorandum, it might be more helpful after your preliminary review of the proposed changes that we discuss the matter further. Let me know when you want to discuss this further.

Nick Black

Nick Black

attachment

2. RENT *** REWRITE section entirely as: ***

"A. Lessee covenants and agrees to pay to Lessor an annual rent in the following amounts in advance during the term of this lease:

Year 1:	$960.00
Year 2:	5% of Adjusted Gross Income
Year 3:	5% " " " "
Year 4:	7% " " " "
Year 5:	10% " " " "

B. Said percentage rent shall be paid annually, in advance. The first payment of Percentage Rent shall be based upon Lessee's Adjusted Gross Income for the prior year of operations. If, at the end of any Lease Year, the total amount of Percentage Rent paid by the Lessee during said Lease Year exceeds, or is less than, the amount of the Percentage Rent actually due from the Lessee for such year, Landlord either shall credit such excess to the next rent obligation of Lessee or Lessee shall add such deficiency to the payment of the next rent obligation. In the case of the final Lease Year of the Term of this Lease, such excess or deficiency shall be paid to or by the Lessee on or before the 15th day of June next following the last day of the final year of said Lease Term.

Gross Income for any Lease Year shall be an amount equal to the gross revenues determined in accordance with generally accepted accounting principles consistently applied, derived by the Lessee from the operation of the subject premises.

Adjusted Gross Income shall mean Gross Income, less an annual operating expense deduction of $48,000.00.

C. Lessee shall utilize, and cause to be utilized, an accounting system in accordance with good oil and gas production water and related solid waste treatment and disposal practice which will accurately record all Gross Income; and shall keep for at least thirty-six (36) months after expiration of each Lease Year records conforming to such accounting system showing all Gross Income for such Lease Year, including all tax reports, cash register records, sales slips, sales checks, bank deposit records and other supporting data. Within thirty (30) days after the end of each calendar quarter included in the Lease Term, Lessee shall furnish Lessor a statement certified by Lessee of Lessee's Gross Income during such quarter; and within thirty (30) days after the end of each Lease Year, Lessee shall furnish Lessor a statement certified by a Certified Public Accountant of Lessee's Gross Income during the preceding Lease Year. Lessor shall have the right from time to time by its accountants or representatives to audit all statements of Gross Income and in connection with such audits to examine all of Lessee's records (including supporting data and excise and income tax returns) of Gross Income. If any such audit discloses a deficiency in the payment of Percentage Rent, Lessee shall forthwith pay to Lessor the amount of the deficiency together with Interest of 10% computed from the date when said payment should have been made. If any such audit discloses that the Gross Income by Lessee exceed those reported by more than three (3%) percent, Lessee shall pay the reasonable cost of such audit and examination.

D. If any Rent is received more than five (5) days after it is due, such shall bear Interest of 10% computed from such due date until the date of receipt of payment thereof by Lessor."

4. PERMITTED USE. *** <u>REWRITE</u> section entirely as: ***

"Lessee shall use the land granted in this lease only for the following purpose: treatment and disposal of water produced in conjunction with the production of oil or gas, or both and associated waste hydrocarbons and other related solids obtained in conjunction with the drilling and production of oil and gas into separate unlined pits adjacent to Laguna Plata in the SW¼SE¼NE¼ of Section 16, Township 20 South, Range 32 East, NMPM, Lea County, New Mexico, in compliance with Oil Conservation Commission Order No. R-8161, dated February 13, 1986; Order No. R-8161-A, dated May 20, 1986; and Order No. R-8161-B dated October 23, 1986. No other use shall be permitted unless Lessor, in written form, has previously granted his consent in writing.

5. IMPROVEMENTS AND RECLAMATION.

*** ADD after

"Necessary appurtenances" the following:

All as more particularly described in the above Division Orders and Lessee's evidence submitted in support thereof, the specifications of which must be approved by Lessor.

*** REPLACE the first clause of the third sentence with the following:

"Upon termination, cancellation or relinquishment of this lease,"

*** ADD the following at the end of that section:

"Upon execution of this Lease, Lessee shall post with the Commissioner a bond from a financial institution acceptable to the Commissioner in a form and an amount acceptable to the Commissioner to secure removal of any improvements and restoration of the land to its condition prior to the placement of Lessee's improvements. In the event Lessee fails to adequately restore the land within six (6) months following termination, cancellation, or relinquishment of the Lease the Commissioner shall proceed to remove any improvements it deems necessary and restore the land to such prior condition and utilize the proceeds of such bond to pay for such removal and restoration. This provision shall survive the termination, cancellation or relinquishment of this Lease.

Lessee shall construct the proposed improvements and commence operation of the facility within one (1) year from execution of this Lease, and continuously operate the facility for the full term of the lease."

7. ASSIGNMENT AND SUBLEASE.

*** ADD after the last sentence:

"Any assignment of this Lease or execution of a sublease of land shall not operate to relieve the Lessee from any obligation created herein."

8. HOLDING OVER. *** REWRITE this provision as follows:

"If, after termination, cancellation or relinquishment, Lessee occupies said land or any improvements remain thereon, or Lessee fails to restore the land to the condition prior to the placement of the improvements, Lessee shall pay as rent therefore at a daily rate of $__________, until such occupancy ends, the improvements are removed and the land restored as provided herein."

11. MAINTENANCE. *** INSERT the following at the end of the sentence:

", which shall include, but not be limited to:

A. Performance of regular on-going maintenance operation to prevent and remove the build-up of solids in the water disposal pits that might impede infiltration;

B. Periodic removal of accumulated solid wastes to an approved site off the land leased herein;

C. Protection of wildlife, including notification to Lessor of any wildlife loss and the taking of any steps adequate in the sole view of the Commissioner to prevent future wildlife loss;

D. An operable backhoe shall be maintained at the subject facility in order to repair any breach of the pit dikes; and any spills or breaches of dikes shall be reported to the Lessor immediately;

E. Device adequate to catch spillage at the unloading facility; and

F. Excavation of topsoil for the construction of the pits and stockpiling thereof for future restoration of the site, along with signage adequate to give notice of its future use."

12. RELINQUISHMENT.

*** ADD to the end of the first sentence: ***

", provided such relinquishment shall not be effective until Lessee has fully complied with the provisions of Section 9 herein."

15. COMPLIANCE WITH LAWS.

*** ADD the words:

"orders, judgments" after the word "ordinances" in line (2); and

*** REWRITE line 4 in its entirety to reads as:

..."been or may be enacted, promulgated, filed or entered in all matters and things affecting the..."

DANIEL B. STEPHENS & ASSOCIATES, INC.

CONSULTANTS IN GROUND-WATER HYDROLOGY SOCORRO, NEW MEXICO

UPDATE ON HYDROGEOLOGIC CONDITIONS NEAR LAGUNA PLATA, LEA COUNTY, NEW MEXICO,

FOR

PETRO - THERMO CORPORATION

SEPTEMBER 1986

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 3
Submitted by
Hearing Date

UPDATE ON HYDROGEOLOGIC CONDITIONS NEAR LAGUNA PLATA, LEA COUNTY, NEW MEXICO, FOR PETRO-THERMO CORPORATION

PREPARED BY

DANIEL B. STEPHENS & ASSOCIATES, INC.
P. O. BOX 740
SOCORRO, N.M. 87801

SEPTEMBER 1986

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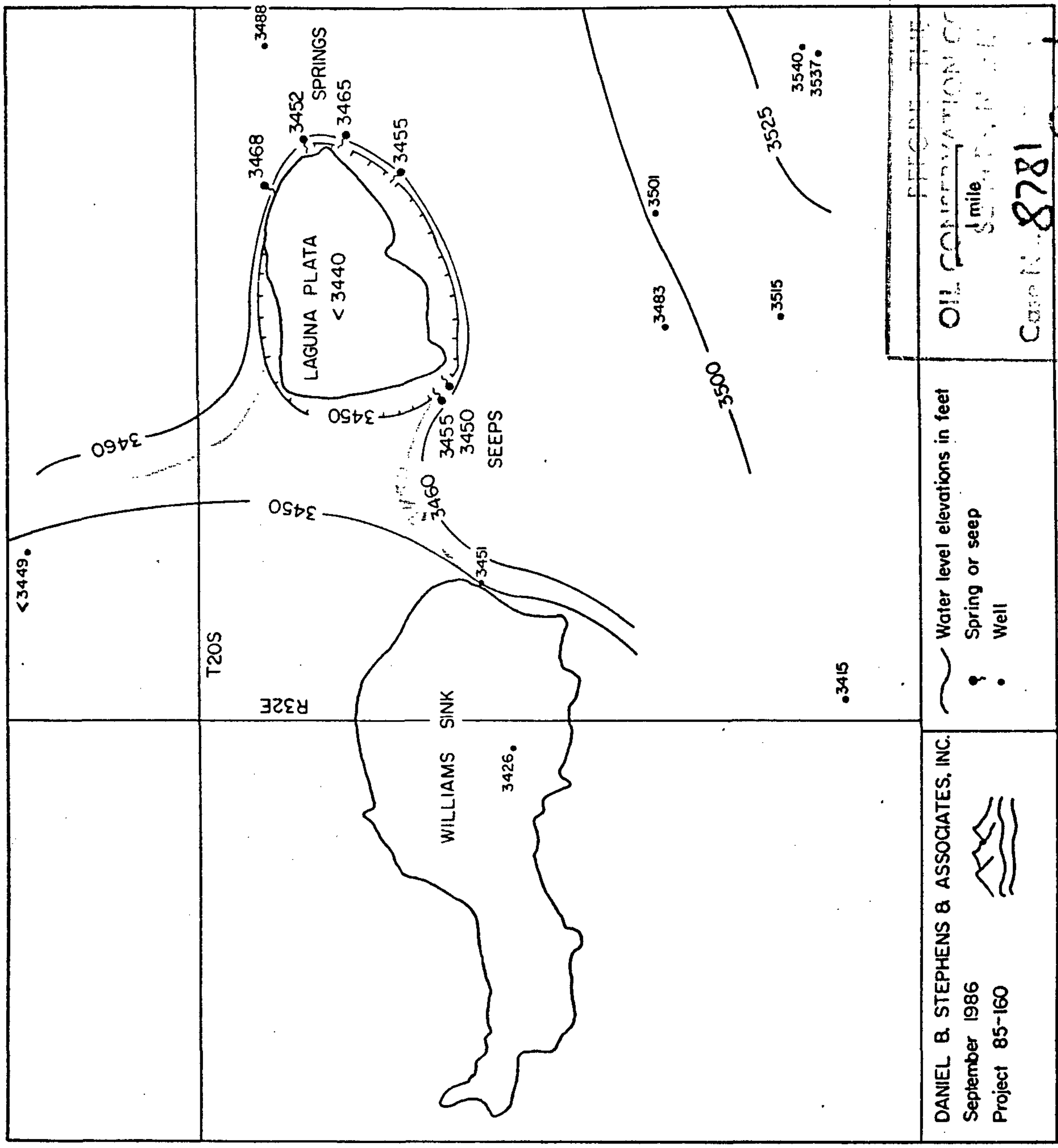
APPENDICES



OIL CONSERVATION ...
Case No. 8781
Submitted by Snyder
Hearing Date 9/18/86

Figure 2. Water Level Elevations

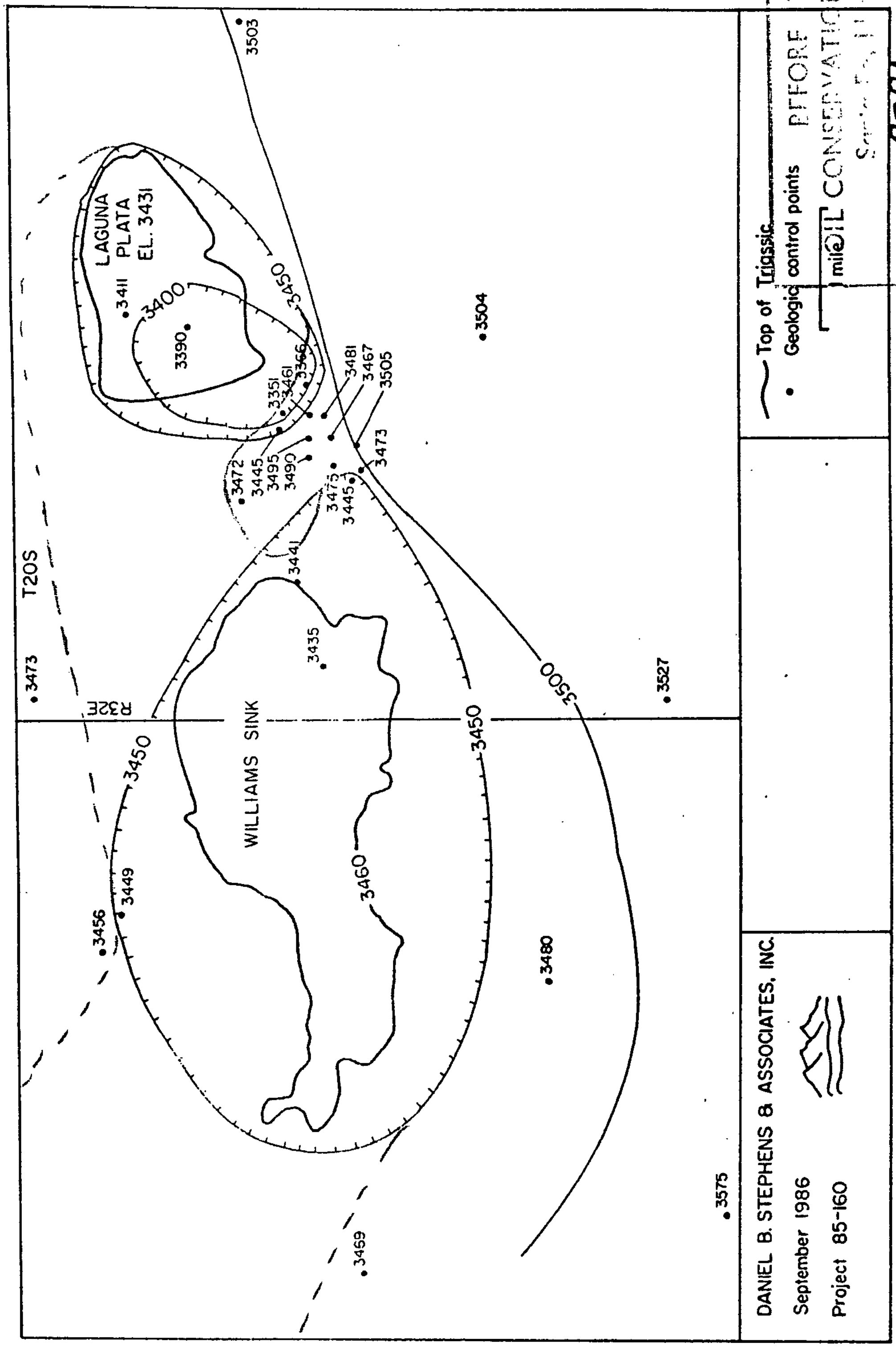


Figure 1. Structure Contour Map: Top of Triassic

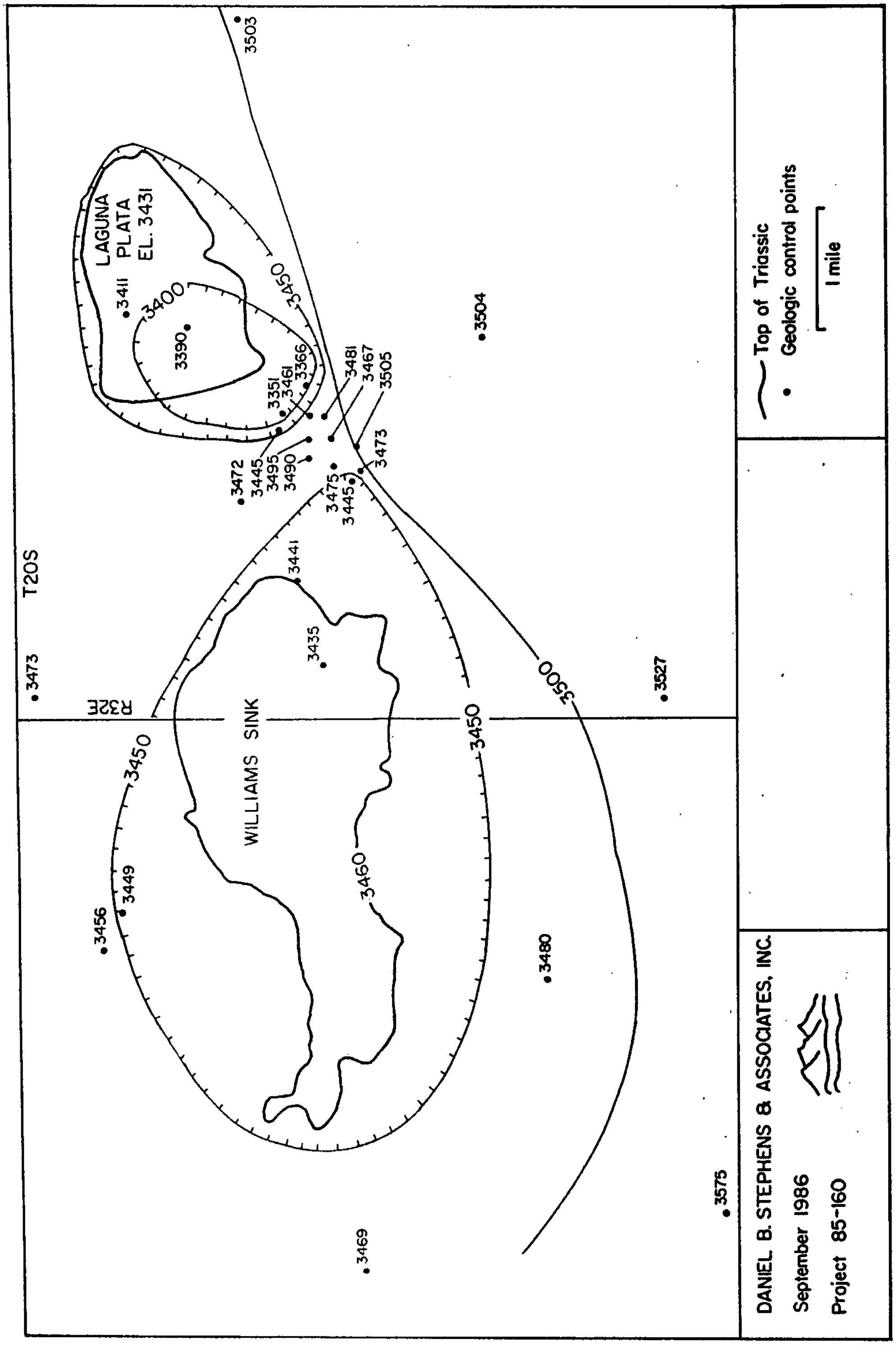


Figure 1. Structure Contour Map: Top of Triassic

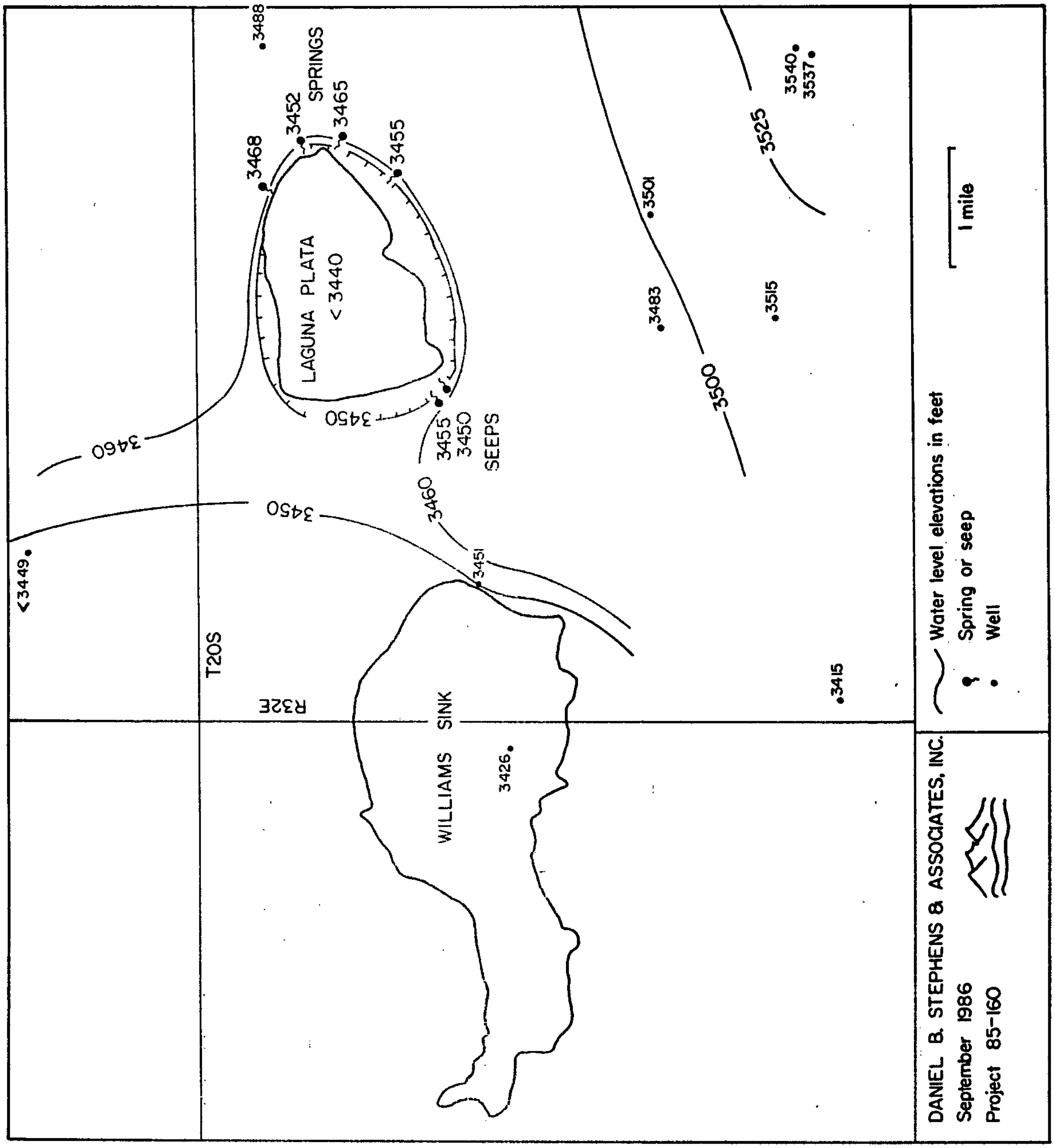


Figure 2. Water Level Elevations

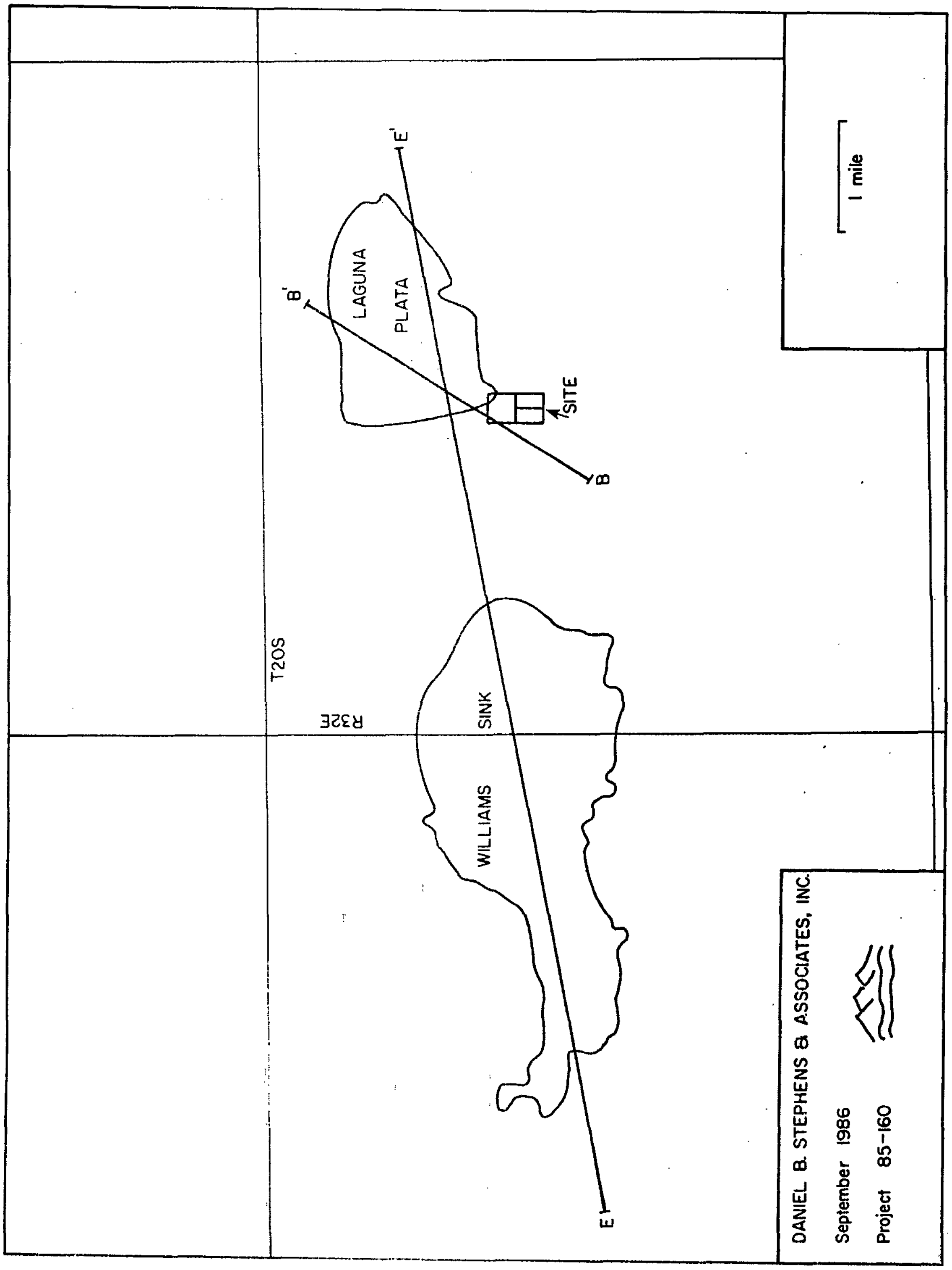


Figure 3. Map Showing Cross-Section Locations

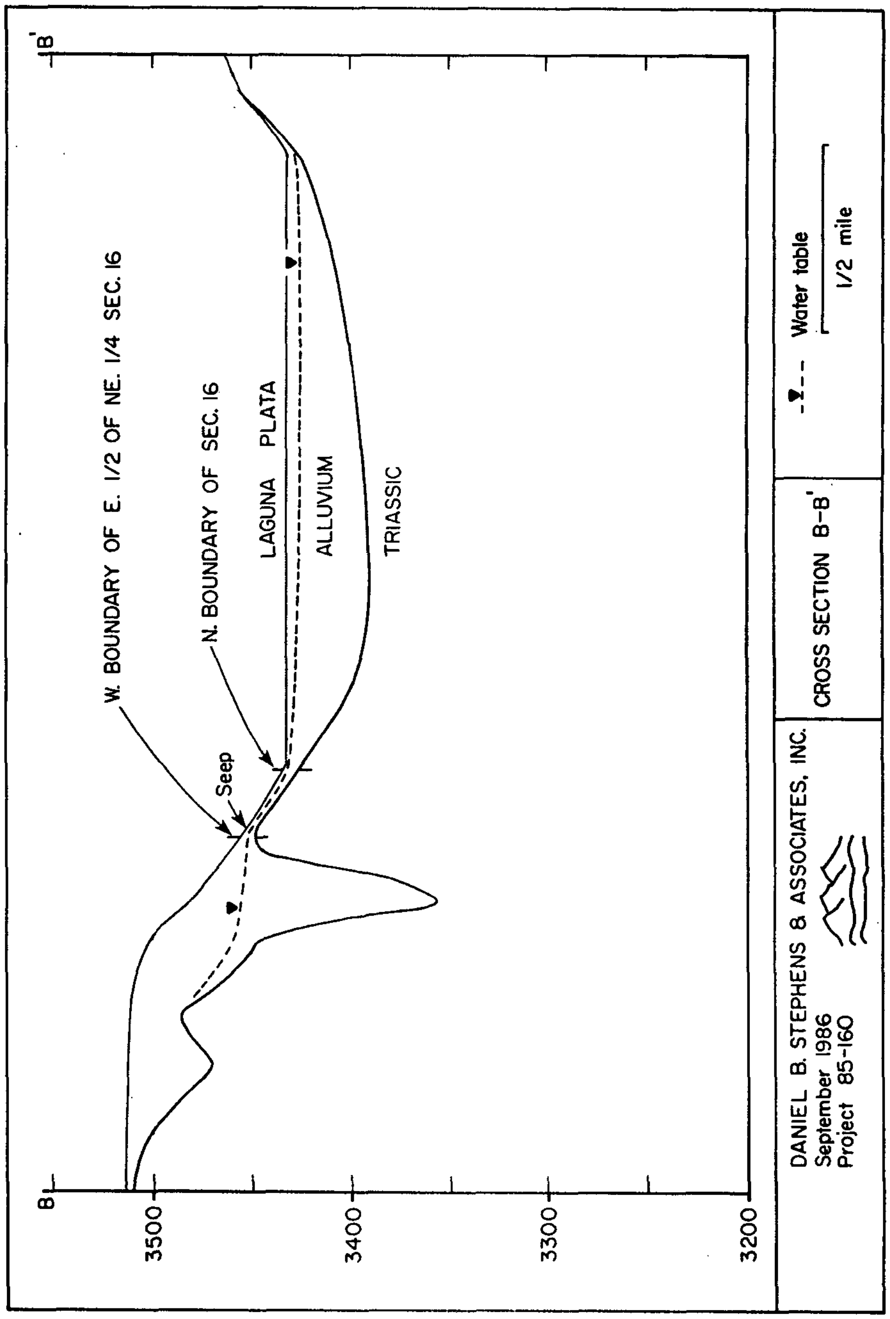


Figure 4. Cross-Section B-B'

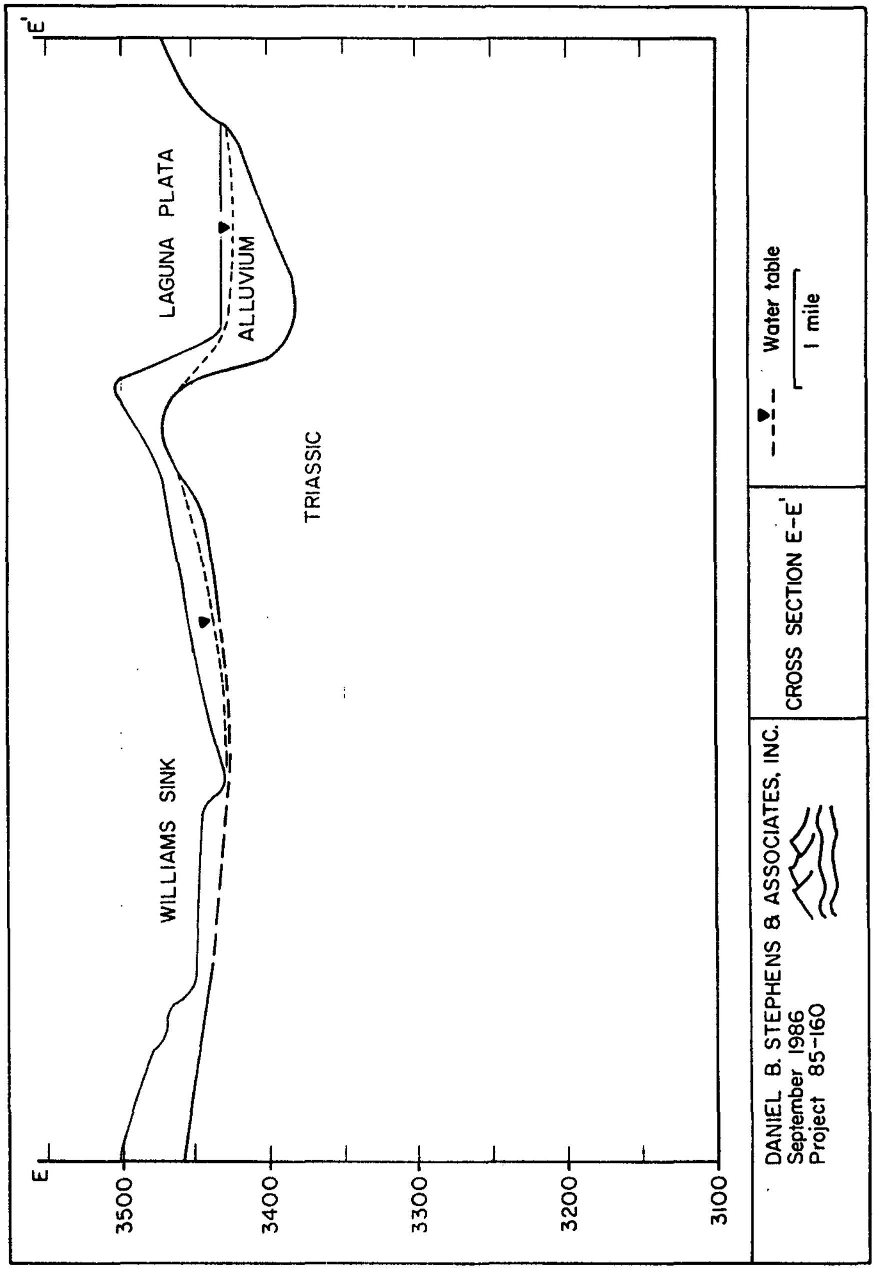


Figure 5. Cross-Section E-E'

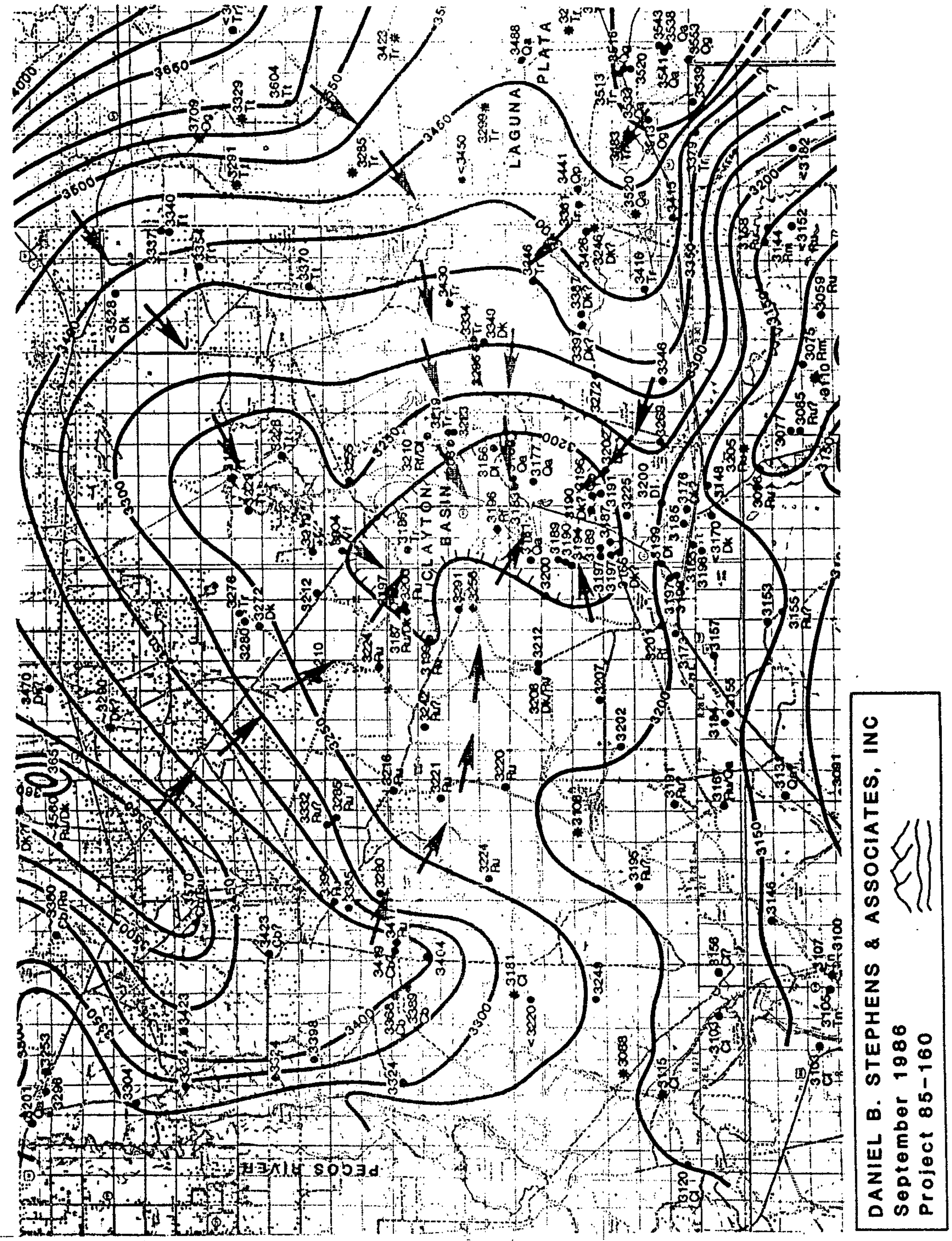


Figure 6. Ground Water Flow Towards Clayton Basin

APPENDIX 1 - WELL LOG

Log. No. 5295

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Eddy
FIELD Wildcat
COMPANY Culbertson & Irwin, Inc.
LEASE State L Well No. 1
LOCATION (¼) SW/4
SEC. 2 T. 20S R. 31E
1650 feet from South line and
330 feet from West line of Section
COMMENCED 5-12-47
COMPLETED 6-12-47
ABANDONED
REMARKS:

CASING RECORD

Diam., in	Bottom

ELEVATION 3481 FEET

INITIAL DAILY PRODUCTION:

Open bbls. Oil
Open cu. ft. Gas
Tbg. bbls. Oil
Tbg. cu. ft. Gas

FORMATION	BOTTOM, FEET
Sand	25
Sandy red shale	75
Red sand & lime shells	105
Sandy red shale	115
Red sand & lime shells	135
Red sand, water @140-160	165
Red Rock	280
Red sand	315
Red sand & red shale	420
Red rock	550
Red rock and gypsum	560
Red rock	665
Red sand & red shale	745
Red rock	786
Anhydrite	805
Red sand & anhydrite	840
Lime and anhydrite	875
Anhydrite	925
Lime	950
Anhydrite	970
Anhydrite & red sand	980
Red sand	1035
Salt and red sand	1070
Salt	1175
Anhydrite	1190
Salt	1275
Salt and anhydrite	1315
Salt	1365
Salt and Potash	1395
Salt	1540
Salt & Potash	1550
Salt	1660
Salt and Potash	1685
Salt	1865
Salt & potash	1900
Salt	1925
Anhydrite	1950
Salt	2025
Salt & anhydrite	2070
Anhydrite	2105
Lime	2160
Lime and anhydrite	2210
Brown lime	2220
Lime and sand	2270
Lime	2315
Sand	2325
Lime	2365
Lime and sand	2385
Lime	2420
Lime and sand	2440
Lime	2450
Lime and sand	2460
Lime	2488
Porous lime 1/4 bailer water pr.hr.	2492 T.D.
(S.L.M. 2492)	

APPENDIX 2 - WATER CHEMISTRY

[redacted] SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

NN

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 2/10/86	LAB NO. WC 567	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

C[redacted]ction DATE [redacted] 02 84

Collection TIME 1200

Collected by — Person/Agency Boyer/OCD

SITE INFORM-ATION ►

Sample location: Laguna Plata

Collection site description: E Side of Salt Lake at Salt mine
Dipped from W side of levee

Station/well code:

Owner:

SE[redacted]D FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

S[redacted]MPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level —	Discharge —	Sample type Grab
[redacted] (00400)	Conductivity (Uncorrected) µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments: Salt Lake is near saturation – High in TDS

S[redacted]MPLE FIELD TREATMENT — *Check proper boxes*

[redacted]o. of samples submitted: 1

☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

[redacted] NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

[redacted] NF, NA		Units	Date analyzed
[redacted] Conductivity (Corrected) 25°C (00095)		µmho	
[redacted] Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
[redacted] Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	68.8	mg/l	2/10
☒ Magnesium (00925)	821.8	mg/l	
☒ Sodium (00930)	165600.0	mg/l	
☒ Potassium (00935)	40677.0	mg/l	
☒ Bicarbonate (00440)	117.6	mg/l	2/18
☒ Chloride (00940)	174263	mg/l	2/20
☒ Sulfate (00945)	15989	mg/l	2/18
☒ Total filterable residue (dissolved) (70300)	225,430	mg/l	3/13
☐ Other:			

N[redacted] A-H_2SO_4		Units	Date analyzed
[redacted] Nitrate-N +, Nitrate-N total (00630)		mg/l	
[redacted] Ammonia-N total (00610)		mg/l	
[redacted] Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen [redacted] demand (00340)		mg/l	
[redacted] Total organic carbon ( )		mg/l	
☐ Other:			
[redacted] Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3/26/86	[signature]

Laboratory remarks

[redacted]

S[redacted]D 726 (12/84) *DISTRIBUTION:* WHITE — EID, GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555 NN

and NITROGEN ANALYSIS

DATE RECEIVED 2/10/86	LAB NO. WC 566	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 86/02/04
Collection TIME 1110
Collected by — Person/Agency ROYER/OCD

SITE INFORMATION ►
Sample location: South Seep
Collection site description: Sample from South Seep in NE NW 1/4 of NE 1/4 Sec 16 T 20 S, R 32 E m Arroyo

Station/well code
Owner

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501
Attn: David Boyer

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type Grab
pH (00400)	Conductivity (Uncorrected) µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments: Water seepage forms small pond/puddle at base of arroyo cut. Water seeping from thin sandstone lens at

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1 ☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	776.0	mg/l	2-10
☒ Magnesium (00925)	1507	mg/l	
☒ Sodium (00930)	11960	mg/l	
☒ Potassium (00935)	206.7	mg/l	
☒ Bicarbonate (00440)	422.8	mg/l	2/14
☒ Chloride (00940)	15276	mg/l	2/20
☒ Sulfate (00945)	11657	mg/l	2/18
☒ Total filterable residue (dissolved) (70300)	36428	mg/l	3/13
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3/24/86	C. Lem

Laboratory remarks

SLD 726 (12/84) *DISTRIBUTION:* WHITE — EID, GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

Lab Number: HM1141

Date Submitted: 6/20/86

By: Earp

Sample Code: Laguna Plata Seep

Date Analyzed: 6/30/86

Reviewed By: Jim Ashley

Date Reported: 8/11/86

Element	ICAP VALUE(MG/L)	AA VALUE(MG/L)
Aluminum	0.4	
Barium	0.2	
Berylium	<0.1	
Boron	2.1	
Cadmium	<0.1	
Calcium	890.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	0.3	
Lead	<0.1	
Magnesium	870.	
Manganese	0.31	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	4.5	
Silver	<0.1	
Strontium	16.	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		0.095
Selenium		
Mercury		<0.0005

DATE RECEIVED	LAB NO.	USER CODE	OTHER: 82235
Collection DATE 6/17/86	SITE INFORMATION	Sample location LAGUNA PLATA SEEP	
Collection TIME 1230		Collection site description SPRING IN ARROYO ON SW CORNER OF LAGUNA	
Collected by — Person/Agency BAILEY/SEAY/OCD			

AUG 2 9 1986
OIL CONSERVATION DIVISION
SANTA FE

SEND FINAL REPORT TO
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

Station/well code

Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type GRAB
pH (00400)	Conductivity (Uncorrected) 50,000 + µmho	Water Temp. (00010) 29 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added
☐ NA: No acid added	☐ Other-specify:	☐ A: 5ml conc. HNO_3 added	☒ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

~~NF, NA~~ NF, A HNO3		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☒ Other: ICAP			
☒ Other: As			
☒ Other: Hg			

F, NA		Units	Date analyzed
☐ Calcium (00915)		mg/l	
☐ Magnesium (00925)		mg/l	
☐ Sodium (00930)		mg/l	
☐ Potassium (00935)		mg/l	
☐ Bicarbonate (00440)		mg/l	
☐ Chloride (00940)		mg/l	
☐ Sulfate (00945)		mg/l	
☐ Total filterable residue (dissolved) (70300)		mg/l	
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	8/11/86	Jim Ashley

Laboratory remarks Digested.
Delayed due to matrix interference on As.

FOR OCD USE -- Date Owner Notified______ Phone or Letter?______ Initals______

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

5?7
997

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED [illegible]	LAB NO. [illegible]	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235
Collection DATE 6/17/86	SITE INFORMATION ►	Sample location LAGUNA PLATA SEEP
Collection TIME 1230		Collection site description SPRING IN ARROYO ON SW CORNER OF LAGUNA
Collected by — Person/Agency BAILEY/SEAY /OCD		

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

Station/well code

Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type GRAB
pH (00400)	Conductivity (Uncorrected) 50,000+ µmho	Water Temp. (00010) 29 °C	Conductivity at 25°C (00094) µmho

Field comments UP ARROYO FR. PREVIOUSLY SAMPLED SEEP

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added
☒ NA: No acid added	☐ Other-specify:	☐ A: 5ml conc. HNO_3 added	☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

N

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	972.0	mg/l	6-23
☒ Magnesium (00925)	915	mg/l	"
☒ Sodium (00930)	[illegible]	mg/l	"
☒ Potassium (00935)	200	mg/l	"
☒ Bicarbonate (00440)	115	mg/l	[illegible]
☒ Chloride (00940)	25,344	mg/l	7/11
☒ Sulfate (00945)	239	mg/l	7/15
☒ Total filterable residue (dissolved) (70300)	49,648	mg/l	6/30
☒ Other: CO_3	0		[illegible]

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	7/16/86	CS

Laboratory remarks

FOR OCD USE -- Date Owner Notified______ Phone or Letter?______ Initals______

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 0830	Date 9/16/86

Originating Party	Other Parties
R. ANDERSON - OCD	DAN WILLIAMS
	WILLIAMS BRINE SVC - 885-6514

Subject

MINING OF SALT FROM LAGUNA PLATA - HOW + WHERE USED?

Discussion

WILLIAMS BRINE SVC MINES DRY SALT FROM LAGUNA ~2 MONTHS OF THE YEAR. THEY STOCKPILE IT FOR THE OTHER 10 MOS. IT IS SOLD IN DRY FORM TO CULLIGAN DISTRIBUTORS AND IN SOLUTION TO EPNG, CHEVRON (El PASO) AND El PASO REFINING (El PASO). COMPOSITION OF SALT IS .02% MOISTURE, 96.597% $NaCl$ .038% Na_2O, .003% $FeO + Al_2O_3$, .954% $CaSO_4$, .035% $MgSO_4$, .572 Na_2SO_4 + 1.781 KCl

Conclusions or Agreements

Distribution Petrotherm File.

Signed RCAnderson

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 0845	Date 9/16/86

Originating Party	Other Parties
R. ANDERSON - OCD	D. Campbell - EPNG
	BRIAN Collier - EPNG

Subject
EFFECTS OF POSSIBLE DESOLVED HYDROCARBONS IN BRINE THEY RECEIVE FOR THEIR WATER SOFTENERS

Discussion
THEY ARE ALREADY INVESTIGATING THE BRINE PURCHASED FROM WILLIAMS DUE TO ITS POOR QUALITY. THEY HAVE SULFONATED POLYSTYRENE RESINS IN THEIR SOFTENERS. HYDROCARBONS MAY RENDER THESE RESINS INEFFECTIVE OR MAY DESTROY THEM. HOWEVER, THEY SEEM MORE CONCERNED WITH THE DILUTION EFFECT ON THE NaCl BRINE BY THE POSSIBLE INTRODUCTION OF Ca OR K BRINES.

Conclusions or Agreements

Distribution

Signed RCAnderson

STATE OF NEW MEXICO

OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 0930	Date 9/16/86

Originating Party	Other Parties
R. ANDERSON - OCD	EVERETT SEWELL
	CULLIGAN - 885-4044

Subject

EFFECT OF HYDROCARBONS ON THEIR RESINS

Discussion

THEY RECEIVE SALT FROM WILLIAMS IN SOLID FORM, REDESOLVE IN, ALLOW IT TO SETTLE AND PASS IT THROUGH THREE FILTERS. THIS SOL'N IS USED ONLY IN INDUSTRIAL APPLICATION, DUE TO ITS POOR QUALITY. IF ANY HYDROCARBONS ARE PRESENT IN THE DRY SALT THEY WOULD BE IN VERY LOW CONCENTRATIONS AND THEIR PROCESS WOULD PROBABLY VOLITIZE THEM. DISOLVED HYDROCARBONS IN VERY LOW CONCENTRATIONS WILL PROBABLY HAVE NO ADVERSE AFFECT ON THEIR SYSTEMS

Conclusions or Agreements

Distribution

Signed R. C. Anderson

STATE OF
NEW MEXICO

OIL
CONSERVATION
DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time	Date
	1000	9/16/86

Originating Party	Other Parties
R. ANDERSON - OCD	ERIC KLIN - REG MGR CONTINENTAL PRODUCTS - 915-337-4681

Subject EFFECTS OF DESOLVED HC ON THEIR WATER SOFTENER RESINS.

Discussion CONTINENTAL SUPPLIES THE SULFANATED POLY STYRENE RESINS. CONCENTRATIONS OF BENZENE OR TOLUENE OF 5-10% WILL HAVE AN ADVERSE AFFECT ON THEIR RESINS. Mr KLIN STATED THAT DUE TO THE VOLITILITY OF THESE HC's THE CONCENTRATION (IF ANY) OF THEM REACHING THE SALTS AT THE MINING LOCATION WOULD HAVE NO AFFECT. BY THE TIME THE SALT HAS DRIED ENOUGH FOR MINING VIRTUALLY ALL THE HC's WILL HAVE EVAPORATED

Conclusions or Agreements

Distribution

Signed R. Anderson

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

August 18, 1986

RECEIVED
AUG 19 1986
OIL CONSERVATION DIVISION

Mr. R. L. Stamets, Director
Oil Conservation Division
Energy and Minerals Department
State of New Mexico
Post Office Box 2088
Santa Fe, New Mexico 87501-2088

Re: Rescinding of Authorization
for Temporary Disposal Pit

Dear Mr. Stamets:

Reference is made to your August 12, 1986 letter rescinding temporary authority for the disposal use of the earthen pit located at the Blinebry-Drinkard Salt Water Disposal System, Well No. A-22, located in Section 22, Township 22 South, Range 37 East.

As you are aware, Petro-Thermo Corporation originally made application for a hearing before the Oil Conservation Commission to consider it's request for an exception to Order No. R-3221 November 19, 1985. In response to comprehensive testimony presented at two hearings, the Commission entered Order Numbers R-8161 and R-8161-A. In view of these Orders, it is apparent that the Oil Conservation Commission fully recognizes the importance of additional approved oilfield related waste disposal sites.

Presently, because of competitive reasons, Petro-Thermo Corporation has been effectively cut off from disposing at Parabo Inc. operated by Unichem International (Rowland Trucking) and Pollution Control, Inc. (General Petroleum) operated by Mr. Larry Squires. In addition, the New Mexico State Land Office has not yet acted on our December 6, 1985 Application for a Business Lease covering the Eastern one-half Section 16, Township 20 South, Range 32 East, N.M.P.M., Lea County, New Mexico.

In an attempt to comply with your request to remove all solid and liquid waste from our temporary disposal pit, I am forwarding today a proposal to Mr. Jim Baca requesting the New Mexico State Land Office expedite approval of our application for a Business Lease so that we may begin construction on the first series of earthen pits at Plata Disposal in accordance with the Disposal Site Plan previously submitted.

Petro-Thermo Corporation solicits the help of the Commission in overcoming the aforementioned obstacles to facilitate resolving this matter expeditiously. In this regard it is our desire to cooperate fully.

Sincerely,

Petro-Thermo Corporation

Robert W. Abbott
Vice President

RWA/aj

xc: Mr. Jim Baca
Mr. John Weber
Mr. Jerry Sexton
Mr. Ernest Padilla

STATE OF NEW MEXICO

ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

August 12, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Robert W. Abbott
Petro-Thermo Corporation
P. O. Box 2069
Hobbs, New Mexico 88241-2069

RE: AUTHORIZATION FOR TEMPORARY DISPOSAL IN PIT IN 22-T22S-R37E

Dear Mr. Abbott:

Authorization for the temporary disposal use of the earthen pit located at the Blinebry-Drinkard SWD System Well No. A-22 located in 22-T22S-R37E is hereby rescinded.

This pit was authorized for the temporary disposal of brine, fresh water-based drilling mud, and waste cement only. You were notified that authorization would be rescinded if there was evidence that the pit overflowed or if Water Quality Control Commission or Oil Conservation Division rules or regulations were violated.

OCD personnel have inspected the pit and obtained documentation that the pit overflowed in violation of the authorization. Disposal or storage of any fluids or solids into this pit will immediately cease. All solids and liquids will be removed to an OCD-approved disposal location within two (2) weeks, or by August 25, 1986.

Sincerely,

for R. L. STAMETS
Director

RLS:JB:dp

cc: OCD - Hobbs

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
HOBBS DISTRICT OFFICE

TONEY ANAYA
GOVERNOR

RECEIVED
AUG 12 1986
OIL CONSERVATION DIVISION
SANTA FE

August 11, 1986

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88240
(505) 393-6161

Mr. R. L. Stamets
Director
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

SUBJECT: Agua, Inc. Clean out pit at A-22 SWD

Dear Mr. Stamets:

Over a period of approximately two weeks, Agua has had a number of vent boot run-overs on their Eunice Blinebry/Drinkard SWD system. They are waking on the system, trying to clear up the problem. Water and oil which is being picked up at runovers are being hauled into cleanout pit. Out field inspector did witness vacuum truck dumping into pit, also the pit had been run over from excessive dumping.

On 8-6-86, Eddie Seay made inspection of area, found pools of salt water still on location from runovers, pit has approximately 2 feet of water, mud, and oil in it. We were not aware of what permission was granted for the use of pit, but would recommend that Agua be restricted from using such pit.

Pictures and Inspectors trip reports will accompany this letter.

Please advise us as to your decision.

Very truly yours

OIL CONSERVATION DIVISION

Jerry Sexton

Jerry Sexton
Supervisor, District I

JS:bp

NEW MEXICO OIL CONSERVATION COMMISSION
DAILY FIELD TRIP REPORT
DISTRICT I

NAME R A Sadler DATE 8/5/86 MILES 131
DEPARTURE 7 AM RETURN 4 PM CAR NO. 9229

In the space below indicate the purpose of the trip and the duties performed, listing wells or leases visited and any action taken.

Signature R A Sadler

CLASSIFICATION	FACILITY	HOURS	QUARTER HOURS	
U	I	4		1 Well - Oil Center Area - Chevron EMSU #199 WIW 5-21-36 - Trip in hole with packer - Packer set while going in hole - POH redressed packer & RIH - Packer would not set.
U (E)	S	3	X	15 Vent Boots - Eunice Area - Agua SWD - Housekeeping - checked 15 vent boots - 9 were OK & 6 were not - Chevrons Christmas C battery 18-22-37, Chevron Mattern battery, 1-22-37, Conoco Lockhart B battery, 1-22-37, Chevron Graham St battery 19-21-37, Chevron Mattern F battery 1-22-36, & Chevron Harry Leonard battery #10 3-32-36 Reported to Eddie Seay
U (E)	S	1	X	2 Facilities Eunice Area - Agua SWD #A-22 & H-35 - both had water in pits - also they were hauling water into A-22 pit. Pit had run over and grounds needed to be cleaned up. Reported to Eddie Seay

They were notified
8/5/86

Mileage		Per Diem		Hours	
UIC	131	UIC	6.00	UIC	8
RFA		RFA		RFA	
Other		Other		Other	

TYPE INSPECTION PERFORMED	INSPECTION CLASSIFICATION	NATURE OF SPECIFIC WELL OR FACILITY INSPECTED
- Housekeeping - Plugging - Plugging Cleanup - Well Test - Repair/Workover - Waterflow - Mishap or Spill - Water Contamination - Other	U - Underground Injection Control - Any Inspection of or related to injection project, facility, or well or resulting from injection into any well. (SWD, 2ndry injection and production wells, water flows or pressure tests, surface injection equipment, plugging, etc.) R - Inspections relating to Reclamation Fund Activity O - Other - Inspections not related to injection or The Reclamation Fund	D - Drilling P - Production I - Injection C - Combined prod. inj. operations S - SWD U - Underground Storage G - General Operation F - Facility or location

NEW MEXICO OIL CONSERVATION COMMISSION
DAILY FIELD TRIP REPORT
DISTRICT I

NAME Eddie W Seay DATE 8/6/86 MILES 188
DEPARTURE 7 AM RETURN 4 PM CAR NO. 7360

In the space below indicate the purpose of the trip and the duties performed, listing wells or leases visited and any action taken.

Signature Eddie W Seay

	CLASSIFICATION	FACILITY	HOURS	QUARTER HOURS	
H	U (E)	C	4		5 other - Caprock area Great Western and General Operating Caprock Queen area - checking leaks turned in by Rancher Mr. Caudill. Found small leak on Great Western Rock Queen Tr. 44-G 34-13-34. Approx. 10 to 15 bbls - Not leaking at this time. Leak at Tr. 26 #10, leak fixed. Approx. 5 - 10 bls covering 15 x 50 area. No major leaks were found as reported. Also on General Operating Tract 37 #3 leak with approx. 2 bls oil. Company man was notified.
H	U	S	4		1 other - Eunice area Aqua SWD A-22 Emergency cleanout pit had been used and run over onto location. Sample taken and pictures taken - will refer to Santa Fe for action.

Mileage		Per Diem		Hours	
UIC	188	UIC	6.00	UIC	8
RFA		RFA		RFA	
Other		Other		Other	

TYPE INSPECTION PERFORMED

H - Housekeeping
P - Plugging
C - Plugging Cleanup
T - Well Test
R - Repair/Workover
F - Waterflow
M - Mishap or Spill
W - Water Contamination
O - Other

INSPECTION CLASSIFICATION

U - Underground Injection Control - Any inspection of or related to injection project, facility, or well or resulting from injection into any well. (SWD, 2ndry injection and production wells, water flows or pressure tests, surface injection equipment, plugging, etc.)
R - Inspections relating to Reclamation Fund Activity
O - Other - Inspections not related to Injection or The Reclamation Fund
E - Indicates some form of enforcement action taken in the field (show immediately below the letter U, R or O)

NATURE OF SPECIFIC WELL OR FACILITY INSPECTED

D - Drilling
P - Production
I - Injection
C - Combined prod. inj. operations
S - SWD
U - Underground Storage
G - General Operation
F - Facility or location
M - Meeting
O - Other

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

June 20, 1986

Mr. Thomas Kellahin
Kellahin & Kellahin
Attorneys at Law
P. O. Box 2265
Santa Fe, N.M. 87504-2265

Dear Mr. Kellahin:

This letter will confirm the Commission's action on June 19, 1986, relative to the request for rehearing in Case No. 8781 De Novo filed by Snyder Ranches, et al., June 9, 1986.

This Case will be reopened on August 7, 1986, and additional testimony will be accepted in all or part of the Grounds for Rehearing set out in your application dated June 9, 1986, as set out below:

5. Additional evidence will be heard relative to the issues raised in this paragraph.

6. Additional evidence wil be heard relative to the issues raised in this paragraph.

7. The Commission will accept briefs by August 4, 1986, on the general issues raised in this paragraph and will accept testimony relative to the allegation that "migration of contaminated waste water will destroy the grazing grasses and vegetation under the ownership and control of Snyder Ranches, Inc." Based upon the briefs filed, the Commission may or may not choose to accept testimony as to any other issue raised in this paragraph.

The rehearing will be limited to the above-described issues only. Snyder Ranches et al., as applicant for the rehearing, will be expected to present their case first. This case will be scheduled first on the docket, and in keeping with current practice, the Commission would hope to make our decision immediately at the conclusion of the rehearing.

Exhibit C

If there are any questions on this matter, please do not hesitate to call me.

Sincerely,

R. L. STAMETS
Director

RLS:dp

cc: Jerry Sexton
Fran Cherry, BLM

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

859
999

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

DATE RECEIVED 6 / 20 / 86	LAB NO. WC-2785	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235

Collection DATE 6 / 17 / 86
Collection TIME 1230
Collected by — Person/Agency BAILEY / SEAY / OCD

SITE INFORMATION ►
Sample location: LAGUNA PLATA SEEP
Collection site description: SPRING IN ARROYO ON SW CORNER OF LAGUNA

Station/well code:
Owner:

SEND FINAL REPORT TO ►
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088
Attn: David Boyer
Phone: 827-5812

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type GRAB
pH (00400)	Conductivity (Uncorrected) 50,000+ µmho	Water Temp. (00010) 29 °C	Conductivity at 25°C (00094) µmho

Field comments: UP ARROYO FR. PREVIOUSLY SAMPLED SEEP

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify*: ☐ A: 5ml conc. HNO_3 added ☐ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

N

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	972.0	mg/l	6-23
☒ Magnesium (00925)	915	mg/l	"
☒ Sodium (00930)	15500	mg/l	"
☒ Potassium (00935)	803	mg/l	"
☒ Bicarbonate (00440)	115	mg/l	6/24
☒ Chloride (00940)	25,344	mg/l	7/11
☒ Sulfate (00945)	239	mg/l	7/15
☒ Total filterable residue (dissolved) (70300)	49,648	mg/l	6/30
☒ Other: CO_3	0		6/24

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	7 / 16 / 86	CG

Laboratory remarks

FOR OCD USE -- Date Owner Notified __________ Phone or Letter? __________ Initals __________

New Mexico Health and Env[redacted]ent Department
SCIENTIFIC LABORATORY [redacted]SION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505) 841-2555

ON HEAVY METALS

GE[redacted]RAL ~~WATER CHEMISTRY and NITROGEN ANALYSIS~~

RECEIVED AUG 29 1986 OIL CONSERVATION DIVISION SANTA FE

DATE RECEIVED 6 | 20 | 86 LAB NO. HM- 1141 USER CODE ☐ 59600 ☐ 59600 ☒ OTHER: 82235

Collection DATE 6 | 17 | 86

Collection TIME 1230

Collected by — Person/Agency BAILEY/SEAY/OCD

SITE INFORMATION ► Sample location LAGUNA PLATA SEEP

Collection site description SPRING IN ARROYO ON SW CORNER OF LAGUNA

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87504-2088

Attn: David Boyer

Phone: 827-5812

Station/well code

Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type GRAB
pH (00400)	Conductivity (Uncorrected) 50,000+ µmho	Water Temp. (00010) 29 °C	Conductivity at 25°C (00094) µmho

Field comments

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1 ☒ NF: Whole sample (Non-filtered) ☐ F: Filtered in field with 0.45 µmembrane filter ☐ A: 2 ml H_2SO_4/L added

☐ NA: No acid added ☐ Other-*specify*: ☐ A: 5ml conc. HNO_3 added ☒ A: 4ml fuming HNO_3 added

ANALYTICAL RESULTS from SAMPLES

~~NF, NA~~ NF, A HNO3 — Units, Date analyzed

- ☐ Conductivity (Corrected) 25°C (00095) ____ µmho ____
- ☐ Total non-filterable residue (suspended) (00530) ____ mg/l ____
- ☒ Other: ICAP
- ☒ Other: As
- ☒ Other: Hg

F, NA — Units, Date analyzed

- ☐ Calcium (00915) ____ mg/l
- ☐ Magnesium (00925) ____ mg/l
- ☐ Sodium (00930) ____ mg/l
- ☐ Potassium (00935) ____ mg/l
- ☐ Bicarbonate (00440) ____ mg/l
- ☐ Chloride (00940) ____ mg/l
- ☐ Sulfate (00945) ____ mg/l
- ☐ Total filterable residue (dissolved) (70300) ____ mg/l
- ☐ Other:

NF, A-H_2SO_4

- ☐ Nitrate-N +, Nitrate-N total (00630) ____ mg/l
- ☐ Ammonia-N total (00610) ____ mg/l
- ☐ Total Kjeldahl-N ( ) ____ mg/l
- ☐ Chemical oxygen demand (00340) ____ mg/l
- ☐ Total organic carbon ( ) ____ mg/l
- ☐ Other:
- ☐ Other:

F, A-H_2SO_4

- ☐ Nitrate-N +, Nitrate-N dissolved (00631) ____ mg/l
- ☐ Ammonia-N dissolved (00608) ____ mg/l
- ☐ Total Kjeldahl-N ( ) ____ mg/l
- ☐ Other:

Analyst | Date Reported 8 | 11 | 86 | Reviewed by Jim Ashley

Laboratory remarks Digested.
Delayed due to matrix interference on As.

FOR OCD USE -- Date Owner Notified________ Phone or Letter?________ Initals________

Lab Number: HM1141

Date Submitted: 6/20/86

By: Earp

Sample Code: Laguna Plata Seep

Date Analyzed: 6/30/86

Reviewed By: Jim Ashby

Date Reported: 8/11/86

Element	ICAP VALUE(MG/L)	AA VALUE(MG/L)
Aluminum	0.4	
Barium	0.2	
Berylium	<0.1	
Boron	2.1	
Cadmium	<0.1	
Calcium	890.	
Chromium	<0.1	
Cobalt	<0.1	
Copper	<0.1	
Iron	0.3	
Lead	<0.1	
Magnesium	870.	
Manganese	0.31	
Molybdenum	<0.1	
Nickel	<0.1	
Silicon	4.5	
Silver	<0.1	
Strontium	16.	
Tin	<0.1	
Vanadium	<0.1	
Zinc	<0.1	
Arsenic		0.095
Selenium		
Mercury		<0.0005

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505)[redacted]-2555 NW

GENERAL WATER CHEMISTRY a[redacted]NITROGEN ANALYSIS

DATE RECEIVED 2/10/86	LAB NO. WC 566	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235	
Collection DATE 86/02/04	SITE INFORMATION ►	Sample location: South Seep	
Collection TIME 1110		Collection site description: Sample from South Seep in NE NW 1/4 of NE 1/4 Sec 16 T 20 S, R 32E in arroyo	
Collected by — Person/Agency: BOYER/OCD			

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

Station/well code

Owner

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type: Grab
pH (00400)	Conductivity (Uncorrected) µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments: Water seepage forms small pond/puddle at base of arroyo cut. Water seeping from thin sandstone lens (?)

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA — Units, Date analyzed

		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA

		Units	Date analyzed
☒ Calcium (00915)	776.0	mg/l	2-10
☒ Magnesium (00925)	1507	mg/l	"
☒ Sodium (00930)	11960.	mg/l	"
☒ Potassium (00935)	206.7	mg/l	"
☒ Bicarbonate (00440)	4238	mg/l	2/18
☒ Chloride (00940)	15276	mg/l	2/20
☒ Sulfate (00945)	11657	mg/l	2/18
☒ Total filterable residue (dissolved) (70300)	36428	mg/l	3/13
☐ Other:			

NF, A-H_2SO_4

		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4

		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3/24/86	C. Allen

Laboratory remarks

New Mexico Health and Environment Department
SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (505)[redacted]-2555

NN

GENERAL WATER CHEMISTRY a[redacted]NITROGEN ANALYSIS

DATE RECEIVED	2 / 10 / 86
LAB NO.	WC 567
USER CODE	☐ 59300 ☐ 59600 ☒ OTHER: 82235
Collection DATE	86/02/04
Collection TIME	1200
Collected by — Person/Agency	Boyer/OCD

SITE INFORMATION ►

Sample location	Laguna Plata
Collection site description	E Side of Salt Lake at Salt Mine. Dipped from W side of Levee
Station/well code	
Owner	

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level —	Discharge —	Sample type Grab
pH (00400)	Conductivity (Uncorrected) µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments: Salt Lake is near saturation - High in TDS

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted: 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify:*

ANALYTICAL RESULTS from SAMPLES

NF, NA

		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

F, NA

		Units	Date analyzed
☒ Calcium (00915)	68.80	mg/l	2-10
☒ Magnesium (00925)	821.8	mg/l	"
☒ Sodium (00930)	165600.0	mg/l	"
☒ Potassium (00935)	40677.0	mg/l	"
☒ Bicarbonate (00440)	117.6	mg/l	2/18
☒ Chloride (00940)	174263	mg/l	2/20
☒ Sulfate (00945)	15989	mg/l	2/18
☒ Total filterable residue (dissolved) (70300)	225,830	mg/l	3/13
☐ Other:			

NF, A-H_2SO_4

		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, A-H_2SO_4

		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3 / 26 / 86	[signature]

Laboratory remarks

KELLAHIN and KELLAHIN
Attorneys at Law
El Patio - 117 North Guadalupe
Post Office Box 2265
Santa Fe, New Mexico 87504-2265

Jason Kellahin
W. Thomas Kellahin
Karen Aubrey

Telephone 982-4285
Area Code 505

June 9, 1986

HAND-DELIVERED

RECEIVED

JUN 9 1986

OIL CONSERVATION DIVISION

Mr. Richard L. Stamets
Oil Conservation Commission
Post Office Box 2088
Santa Fe, New Mexico 87504

Re: Application for Rehearing
Case No. 8781 DeNovo
Order No. R-8161-A

Dear Mr. Stamets:

On behalf of Pollution Control Inc. and Snyder Ranches, Inc. please find enclosed an Application for Rehearing of the referenced case.

Very truly yours,

W. Thomas Kellahin

WTK:mh
Enclosure
cc: John P. Weber, Esq., (w/enc.)
Maddox, Renfrow & Saunders
Post Office Box 5370
Hobbs, New Mexico 88214

Mr. Larry Squires (w/enc.)
Pollution Control
Post Office Box 1060
Lovington, New Mexico 88260

Mr. Joe Ramey (w/enc.)
Post Office Box 6016
Hobbs, New Mexico 88241

J. W. Neal, Esq., (w/enc.)
Post Office Box 278
Hobbs, New Mexico 88241

Tim Kelly (w/enc.)
Geohydrology Associates
4015 Carlisle, NE, Suite A
Albuquerque, New Mexico 87107

BEFORE THE
OIL CONSERVATION COMMISSION
NEW MEXICO DEPARTMENT OF ENERGY AND MINERALS

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE NO. 8781 DeNovo
ORDER NO. R-8161-A

APPLICATION OF PETRO-THERMO
CORPORATION FOR AN EXCEPTION
TO DIVISION ORDER NO. R-3221,
AS AMENDED, AND FOR AUTHORIZATION
TO DISPOSE OF ASSOCIATED WASTE
HYDROCARBONS AND OTHER SOLIDS,
OBTAINED IN CONJUNCTION WITH
THE DRILLING AND PRODUCTION OF
OIL AND GAS INTO UNLINED PITS,
LEA COUNTY, NEW MEXICO.

APPLICATION FOR REHEARING

COMES NOW POLLUTION CONTROL INC. and SNYDER RANCHES, INC., and pursuant to the provisions of Section 70-2-25 N.M.S.A., 1978, apply to the Oil Conservation Commission of New Mexico for Rehearing of the above captioned case and order, and in support thereof state:

STATEMENT OF FACTS:

On April 9, 1986, the New Mexico Oil Conservation Commission ("Commission") held a hearing on the application of Petro-Thermo Corporation for a permit to use the SW/4 SE/4 NE/4 of Section 16, T20S, R32E, NMPM, Lea County, New Mexico for the commercial disposal of waste material from oil and gas field operations, including produced salt water and solid wastes.

The disposal facility is to be located on State of New Mexico lands under the management and control of the Commissioner of Public Lands. At the time of the hearing, Petro-Thermo Corporation had not obtained a business lease from the Commissioner of Public Lands of New Mexico to use the surface for this purpose.

The application of Petro-Thermo Corporation was opposed at the Commission hearing by Snyder Ranches, Inc., which is the owner of federal grazing leases adjacent to the applicant's proposed facility and is an interested party affected by this application. In addition, the application was opposed by Pollution Control Inc. which has an approved surface disposal facility and is also an interested party affected by this application.

On May 20, 1986, the Commission entered Order R-8161-A which approved the application of Petro-Thermo Corporation.

Within twenty days of the date of that order, Pollution Control Inc. and Snyder Ranches, Inc., have filed this Application for Rehearing.

GROUNDS FOR REHEARING:

1. THE COMMISSION HAS FAILED TO MAKE AN ESSENTIAL JURISDICTIONAL FINDING CONCERNING THE PROTECTION OF CORRELATIVE RIGHTS.

Order R-8161-A fails to set forth the fundamental factual findings raised at the hearing on how, if at all, the approval of this application will protect the rights of Snyder Ranches, Inc. It was undisputed in the evidence that the contaminated waste water would migrate off the proposed Petro-Thermo Site. The Commission has made no finding that correlative rights will be protected. See Sims v. Mechem, 72 N.M. 186 (1963) and Faskin v. Oil Conservation Commission, 87 N.M. 292, 532 P2d 588 (1975).

2. LACK OF PROPERTY INTEREST IN APPLICANT AT THE TIME OF HEARING DENIES COMMISSION JURISDICTION TO ENTER ORDER.

Commission Order Finding (19) is erroneous. Petro-Thermo failed to establish a property interest in this case. That failure compels the Commission to deny the application in accordance with Division Rule 1203. Petro-Thermo has no lease, no ownership and no permission to utilize the proposed surface for this facility. The rights to this tract are vested in the Commissioner of Public Lands and in the absence of his prior approval, Petro-Thermo cannot bring a case before the Commission.

Under the definition section of the Division Rules and Regulations, an "Owner" is defined as the "person who has the right to drill into and to produce from any pool and to appropriate the production either for himself or for himself and another." An "Operator" is defined as a person "who, duly authorized, is in charge of the development of a lease or the operation of a producing property." Petro-Thermo Corporation under the Division's definitions is neither an owner or an operator.

3. COMMISSION HAS FAILED TO MAKE ESSENTIAL FINDINGS CONCERNING BENEFICIAL USE ("NEED") FOR THIS FACILITY AND HAS COMMITTED ERROR IN DENYING OPPONENTS AN OPPORTUNITY TO PRESENT EVIDENCE OF LACK OF NEED FOR THIS FACILITY.

The Division's Rules and Regulations define surface waste as "... the unnecessary or excessive surface loss or destruction without beneficial use, however caused..."

The Commission has committed reversable error in precluding or ignoring evidence of "need" for this facility during the hearing held on April 10, 1986. The extent to which the surface can be "wasted" is directly linked to the question of need. For example, if all existing facilities in the area do not have the capacity to handle the volumes Petro-Thermo proposed for this facility, then the use of the surface would be reasonable and waste of the surface would not occur. Conversely, in the absence of proof of need, any use of the eight acre tract would be unreasonable and therefore constitute surface waste. The Commission has erroneously precluded evidence on an essential element of proof.

4. THE COMMISSION ORDER LACKS SUFFICIENT FINDINGS OF ULTIMATE FACTS TO SUPPORT ITS APPROVAL OF THE DISPOSAL RATE OF 30,000 BARRELS PER DAY.

Petro-Thermo Corporation's testimony was that they anticipated to dispose of only 2250 barrels of produced salt water a day. (Petro-Thermo Exhibit 10, page 15).

There is not the faintest clue in any of the findings explaining the Commission's reasoning in approving 30,000 barrels a day disposal volumes when the applicant only anticipates needing 2,250 barrels a day. The Commission's Order on this issue violates the standards set forth in Fasken v. Oil Conservation Commission, 87 N.M. 292, 532 P2d 588 (1975).

5. THE FINDINGS OF ORDER R-8161-A ARE NOT SUPPORTED BY SUBSTANTIAL EVIDENCE.

Applicant has failed its burden to prove that the contaminated discharge water can be safely deposited into the facility without adversely affecting fresh water.

The evidence at the hearing was that if the seepage from the impoundments at the proposed waste facility migrated off-site towards Laguna Plata, the discharged water could migrate out the west side of the Plata into Nash Draw and on to the Pecos River. The conclusion from all of the hydrologic evidence is that, from current data, none of the experts know where and at what rate the discharged water will migrate.

The Commission violates Section 70-2-12B(15) by the approval of this application.

6. THE COMMISSION'S DECRETORY PARAGRAPH NO. (2) OF ORDER R-8161-A DENIES SNYDER RANCHES AND POLLUTION CONTROL INC. PROCEDURAL DUE PROCESS.

The Commission has only required that Petro-Thermo submit a revised plan acceptable to the Director of the Oil Conservation Division for the installation and sampling of monitoring wells. Such an order provision fails to afford Pollution Control Inc. and Snyder Ranches, Inc. with an opportunity to appear and contest the proposed monitoring system. This provision effectively removes the opponents from the essential process of participating in determining the method by which this monitoring system, yet to be proposed, is supposed to protect their correlative rights.

Further, previously approved monitoring systems agreed to by Petro-Thermo and the Division, as set forth in Division letter dated February 18, 1986, were contested at the Commission hearing by Pollution Control and Snyder Ranches hydrologist and the Commission has failed to make appropriate findings.

7. BY APPROVING THE DESIGN OF A DISPOSAL FACILITY THAT DOES NOT PROHIBIT THE MIGRATION OF THE DISCHARGED WASTE WATER BEYOND THE BOUNDARIES OF THAT FACILITY THE COMMISSION HAS EXCEEDED ITS STATUTORY AUTHORITY AND JURISDICTION AND THE COMMISSION ORDER R-8161-A IS VOID.

The Commission has failed to require adequate means to prevent the contaminated waste water from migrating off of the facility and onto the property of Snyder Ranches, Inc.

It is undisputed that the produced waste water that is to be disposed of in the unlined surface pits at the proposed Petro-Thermo facility will leak through the bottom and sides of the pits and migrate beyond the boundaries of the proposed facility. In fact, the applicant's entire design and plan for the facility is based upon that principal. The migration of contaminated waste water will destroy the grazing grasses and vegetation under the ownership and control of Snyder Ranches, Inc.

The Commission has granted to Petro-Thermo a disposal permit authorizing the disposal for profit of waste water which will migrate beyond the boundaries of that facility. Such action constitutes underground trespass, exceeds the jurisdiction of the Commission and its statutory authority. The order is void.

8. THE COMMISSION IS PRE-EMPTED BY FEDERAL LAW FROM ENTERING AN ORDER THAT AFFECTS THE MANAGEMENT OF THE BUREAU OF LAND MANAGEMENT AND CONTROL OF ADJOINING FEDERAL LANDS.

The Commission Order R-8161-A recites at length the concerns and statements expressed at the hearing by Bureau of Land Management District Director but then arbitrarily ignores those concerns and enters an order that adversely affects the right of the Bureau of Land Management to effectively manage and control the adjoining federal lands.

The Commission has attempted to exercise judgment and control over federal lands which exceeds the jurisdiction of the Commission.

9. THE COMMISSION ORDER FAILS TO MAKE ADEQUATE FINDINGS CONCERNING WASTE.

The New Mexico Supreme Court in <u>Continental Oil</u>

Co. v. Oil Conservation Commission, 70 N.M. 310 (1962) and in Sims v. Mechem, 72 N.M. 186 (1963) requires the Commission to make findings that are sufficiently extensive to show not only the jurisdiction but the basis of the Commission's order.

Order R-8161-A fails to make adequate findings concerning how the approval of this application will prevent waste.

10. THE FOLLOWING COMMISSION FINDINGS ARE ARBITRARY, CAPRICIOUS, CONTRARY TO LAW, AND ARE NOT SUPPORTED BY SUBSTANTIAL EVIDENCE.

1. Finding (15), (a) through (k).
2. Finding (19), after the phrase "said Section 16."
3. Finding (22).
4. Finding (23).
5. Finding (24).
6. Finding (25).
7. Finding (26).
8. Finding (29).
9. Finding (31).
10. Finding (32).
11. Finding (33).
12. Finding (34).
13. Finding (35).
14. Finding (37).
15. Finding (38).

WHEREFORE, Pollution Control Inc. and Snyder Ranches, Inc. respectfully request that the Commission grant a Rehearing in the above styled case and that after rehearing, the Commission vacate and set aside its Order R-8161-A and enter its Order denying the application of Petro-Thermo Corporation in this matter.

Respectfully submitted,

By: ______________________
W. Thomas Kellahin, Esq.
Kellahin & Kellahin
Post Office Box 2265
Santa Fe, New Mexico 87501

and

J. W. Neal, Esq.
116 N. Turner
Hobbs, New Mexico 88240

Rehearing request Snyder Ranches et al
Case 8781 De Novo R-8161-A

(1) Correlative Rights ~~[illegible]~~ defined in 70-2-33 H, Relate to production from a pool. Nothing to do with surface disposal issues in this case. Relates to protection of fresh water only. Agree ASB

(2) Lack of standing by Petro Thermo is alleged because PT had no property interest in Section 16. Findings No 19 and No 6 address this issue. I think we are right. What does Jeff think? PT is not a well owner or operator but would appear to be a person with a property interest. Petro Thermo was correct to bring case because OCD regulates disposal ASB

(3) Applicant suggests that unnecessary use of the ground surface for the PT facility is surface waste as defined in the law and OCD rules. The law 70-2-3 B and Rule 0.1 refer to surface waste of oil and/or gas only not the surface of the ground. Agree ASB

Applicant suggests OCC erred in not hearing testimony as to need for facility. Nothing I am aware of in the Oil & Gas Act requires or calls for us to consider need. To do so might well be (probably is) outside our statutory authority. Agree [illegible]

(4) Applicant states that ~~[illegible]~~ are insufficient findings in the order to show reasoning for approving 30,000 barrels per day capacity when regular expected volume is 2,750 bpd.

* There is only one finding as to this volume (Finding No 15 g). The record is good but if Snyder found a sympathetic judge this might be a problem. Transcript pg 25 - Facility designed for 30,000 [illegible]. Order limits disposal volume to design capacity.

(5) Applicant alleges the OCC did not have sufficient evidence relative to the geohydrology of the area to make findings that all fluid migration would be toward ~~[illegible]~~ ~~[illegible]~~ the lagune and that such ~~[illegible]~~ fluids could not move out of the Lagune to the West.

This allegation gives me more trouble than any of the rest. I feel PT's case was weakened because they were unable to put their hydrologist back on the stand to answer the issues raised by Snyder's hydrologist. While appropriate technical staff believe PT's case is right, I worry about the adequacy of the record in this regard. See comment on next page. [illegible]

(6) At the hearing, Snyder's hydrologist attacked the sampling and monitor well program. I do not believe they asked to be a party to any future program to be approved by the Director. Agree [illegible]

There could be a problem here in that only one finding (No 37) discusses the monitoring ~~[illegible]~~ plan. A ~~[illegible]~~ sympathetic judge could agree with Snyder on this. On the other hand, if the case is strong for approval of the system, the monitoring plan is extraneous and might not be considered worthy of overturning the order for.

Agree [illegible]

(7) Applicant suggests OCC cannot approve disposal operations when fluids will migrate from the property. Applicant also alleges that the fluid will migrate to their property and destroy grass and vegetation.

The statues (70-2-12 B 15) only requires us to regulate disposition of produced ~~water~~ and used water to protect fresh water. It does not require us to see that it [illegible] not leave the property on which it is disposed. This is a worrysome area though where a sympathetic judge could make bad law. There was testimony that the operation could hurt grass but none I remember saying that the grass harmed would be on Snyder's property.

*

No water harm to Snyder's grass since will move towards lake.

(8) Applicant argues OCC is preempted from affecting adjoining federal lands.

This is not an arguement made by the ~~[illegible]~~ BLM witness. I believe our findings 26 thru 31 address BLMs' concerns.

(9) Applicant suggests the order is invalid in that it does not address waste sufficiently. This is not a waste or correlative rights case but a fresh water protection case.

(10) This is a catchall complaint which seems to be addressed elsewhere ~~in the~~ above.

If there is any real question whether this order would be upheld by a judge, isn't it to PT's advantage to have a rehearing so that the case could be made airtight? It seems logical that altho PT would have extra expence, they would at least be assured of a permit. Without a rehearing, they could lose everything

The oil and gas act requires reasonable protection of fresh water supplies. Such reasonable protection is afforded when the preponderance of evidence shows that it is unlikely that fresh water will be impacted ~~and~~ adversely by the discharge. In this instance the record shows both ground water (a seep) and surface water (Laguna Plata) currently exceed protectable quality (10,000mg/L) and do not need further protection. The argument that discharge to the subsurface will reach Nash Draw and on to the Pecos River, ~~is fallacious~~ and this should cause the permit to be denied, is equally unreasonable. The amount of time to reach the river (if indeed it does) ap geologic time ~~most~~ intervals, and n

(both absolute and relative to other natural and manmade discharges) ~~is~~ will be minuscule.
Therefore, the OCD did not act unreasonably in granting the permit.

Specific comments on Kelly's eight points; and adequacy of record of hearing:

(1) The thickness of the alluvial cover at the site won't be known until Petrotherm drills. A rehearing won't help in that area if they can't get land office permission to drill. A rehearing will allow discussion and entry into the record of a contour map of redbed elevations near the site. This can be obtained from our well records.

(2) As mentioned above, a map would help show ~~this~~ that redbed ~~silty~~ surfaces slope towards Laguna Plata. Also, mapping of the location and strike and dip of the outcrops could be presented.

(3) Mapping from our records would provide this information also.

(4) Same as (3)

Comment on (2) (3) & (4), there is considerable discussion in the record as to whether fluids will migrate to Laguna Plata or to west, or to the Laguna then to the west. Both sides agree that either ~~interp~~ interpretation is possible. It does not matter since the issue is fresh water protection and, in general, no protectable fresh water is present between Laguna Plata and Nash Draw to the west. Even Kelly agrees that the water down by Loving ~~is~~ before discharge to the Pecos is in the 200,000 ppm TDS range.

(5) Since the ponds ~~on~~ are topographically on a hill, ~~and~~ any ground water mounding or seepage due to poor maintenance will be oriented in the direction of the Laguna, and not Squires' leased area to the East. Based on Pollution Control's experience, the area impacted by mounding or seepage was 10 acres, which would be within the

(6) Kelley agrees that evaporation in Laguna Plata is adequate for any seepage that reaches it. Since pond evaporation is not the primary disposal method this point does not need further discussion.

(7) A range of disposal fluid analyses is adequate in my opinion. The springs cited in the report are 7500-9000 ppm chloride (not TDS). Since then, Petrotherm sampled a spring and found it to be 196,000 TDS (The earlier springs were sampled in 1969). This evidence would be entered into the record and demolish Kelley's contention that their is significant difference ~~in~~ in water quality between Laguna's Gatuna & Plata

(8) My analysis shows 225,000, but no matter. Kelly admits that even the no.-potash playa's have TDS values in excess of 130,000 ppm

In summary, the record could stand on its own if the person reading or reviewing it understood ~~drawing~~ clearly the relationship between distances, times, volumes, concentrations, etc, of the locations and fluids involved. Since ~~a~~ that may not occur, it is better to have a rehearing and have it all spelled out, and add the new information.

PROBLEMS WHICH HAVE NOT BEEN ADEQUATELY ADDRESSED BY PETRO-THERMO REPORT

ESTIMATED 20' OF EXPOSED ARROYO

1. The thickness of the alluvial cover is unknown at the proposed site. Within Section 16, the thickness ranges from 0 to 130 feet, but it is completely unknown at the proposed site itself.

2. The upper surface of the redbeds is an erosional surface of considerable relief. There is no evidence presented by the report which confirms that the redbed surface slopes directly toward Laguna Plata.

3. The report does not disprove work by Reed (1969) which indicates a bedrock channel which would result in a westward migration of groundwater from Laguna Plata (illustration).

4. The report, Figure 3, shows that the 3,440-foot contour is closed, thus indicating that Laguna Plata is a closed depression. Data on the map shows no justification for closing the contour. The intrepretation shown in Figure 3 is not supported by work by Hunter (1985) or by Geohydrology Assoc., (1979). (illustrations)

5. No evidence is presented in the report which substantiates that the disposal ponds will function properly. In fact the very nature of drilling mud is to cause plugging of natural porosity in sediments.

6. Evaporation of fluids should be calculated for surface area of the disposal ponds and ~~NOT for~~ Laguna Plata.

7. The report does not contain any chemical analyses of water samples from the fluid which will be disposed. The TDS range is reported to be 25,000 to 75,000 ppm but springs at Laguna Plata have less than 9,000 ppm.

8. The concentration of 335,100 ppm reported in report for Laguna Plata is a concentrated brine resulting from evaporation on the lake floor or is a residual concentration from potash discharge by Kerr-McGee

ENGINEERING AND DESIGN

OF

PLATA DISPOSAL FACILITY

SECTION 16, TOWNSHIP 20 SOUTH, RANGE 32 EAST

LEA COUNTY, NEW MEXICO

PETRO-THERMO CORPORATION

HOBBS, NEW MEXICO

PREPARED FOR:

NEW MEXICO OIL CONSERVATION DIVISION
CASE NO. 8781

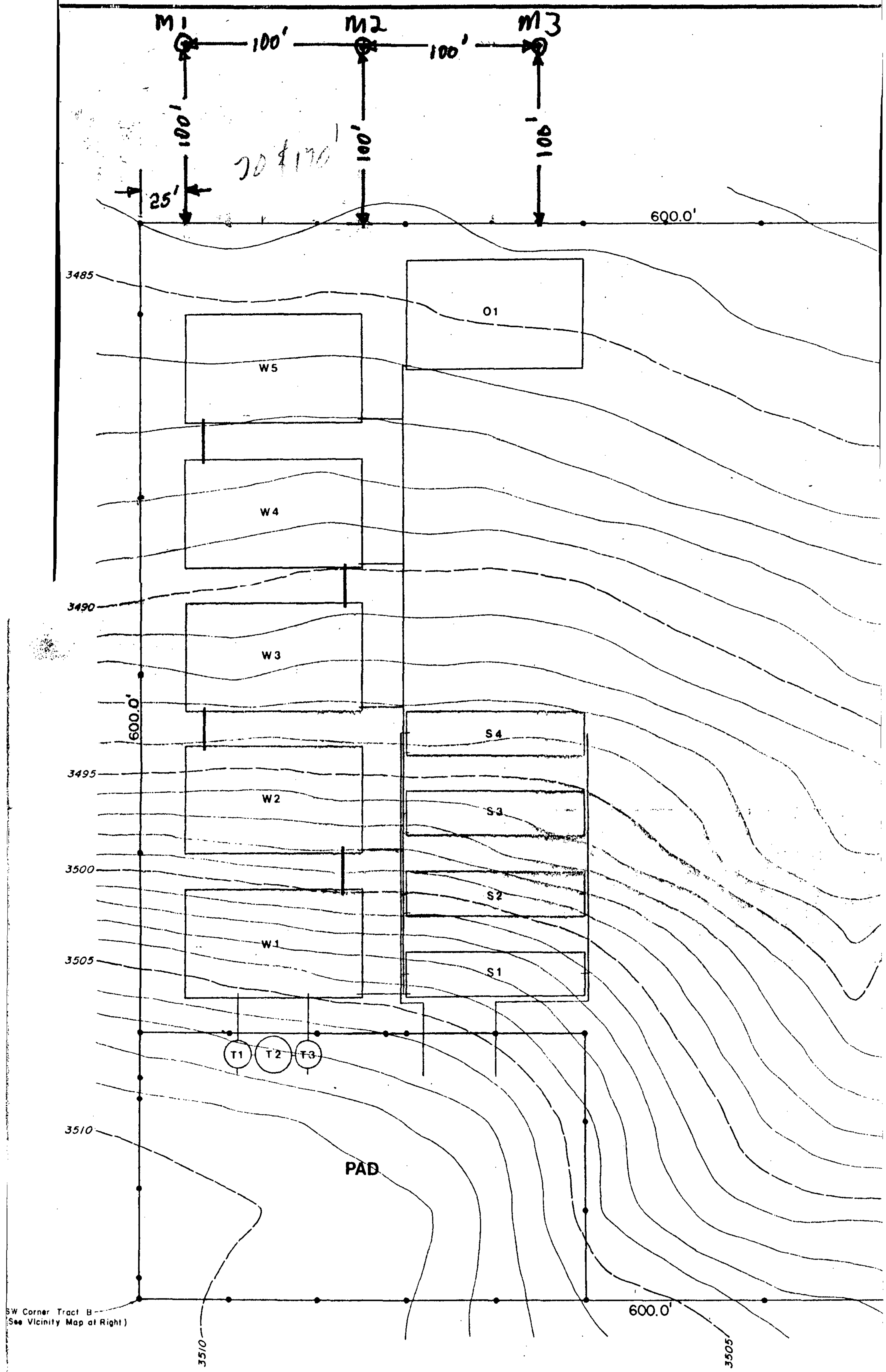
APRIL 9, 1986

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

Case No. 8781 Exhibit No. 8

Submitted by

Hearing Date



CAPACITIES (BARRELS):

O - OVERFLOW PIT
S - SOLIDS DISPOSAL PIT
W - WATER DISPOSAL PIT
T - TANK BATTERY
• - FOUR STRAND BARBED WIRE FENCE

W1 7480 (10686)	S1 3117 (4452)	O1 0 (3206)
W2 7480 (10686)	S2 3117 (4452)	
W3 6411 (9617)	S3 2671 (4 07)	
W4 5343 (8549)	S4 2226 (3562)	
W5 4274 (7480)		
30988 (47017)	11131 (16473)	0(3206)

* (MAXIMUM CAPACITIES)

Budget Bureau No. 42-R355.1.
Ap[illegible]al expires 11-30-49.

U. S. Land Office Las Cruces

Serial Number

Lease or Permit to Prospect

059000

[illegible] SE¼ Sec. 9

LOCATE WELL CORRECTLY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LOG OF OIL OR GAS WELL

Company Argo Oil Corporation Address Ft. Worth, Texas, Ft. Worth Natl Bank Bl

Lessor or Tract Byrl A. Burner Field Halfway State New Mexico

Well No. 3 Sec. 9 T. 20 R. 32E Meridian County Lea

Location 330 ft. {N. / S.} of S Line and 1980 ft. {E. / W.} of E Line of Sec. 9 20-S-32-E Elevation 3457 (Derrick floor relative to sea level)

The information given herewith is a complete and correct record of the well and all work done thereon so far as can be determined from all available records.

Signed /s/ M. E. Devan

Date August 31, 1941 Title Field Clerk

The summary on this page is for the condition of the well at above date.

Commenced drilling July 25, 1941 Finished drilling August 28, 1941

OIL OR GAS SANDS OR ZONES

(Denote gas by G)

G No. 1, from 2343 to 2346 Small Show Gas No. 4, from to

O No. 2, from 2504 to 2514 Small Show Oil No. 5, from to

O No. 3, from 2614 to 2618 Oil Filled Hole No. 6, from to

IMPORTANT WATER SANDS

No. 1, from to No. 3, from to

No. 2, from to No. 4, from to

CASING RECORD

Size casing	Weight per foot	Threads per inch	Make	Amount	Kind of shoe	Cut and pulled from	Perforated From—	Perforated To—	Purpose
10 3/4 od	40	8	Used	396	Tex.	396			Pulled after
8 5/8	[illegible]	8	New	890					set
7 od	20		New	2594	Cement Guide				
2"	6.4	8 rd	New	2515	Com. Barrel				

MUDDING AND CEMENTING RECORD

Size casing	Where set	Number sacks of cement	Method used	Mud gravity	Amount of mud used
8 5/8	887	50	Halliburton		
7" od	2594	100 sax cement 100 sax mud	Halliburton		Filled hole to top with mud outside 7" casing

PLUGS AND ADAPTERS

Heaving plug—Material Length Depth set

Adapters—Material Size

SHOOTING RECORD

FOLD | MARK

			Method used	Mud gravity	Amount of mud used
8 5/8	885	50	Halliburton		
7" od	2594	100 sax cement 100 sax mud	Halliburton		Filled hole to top with mud outside 7" casing

PLUGS AND ADAPTERS

Heaving plug—Material .... Length .... Depth set ....

Adapters—Material .... Size ....

SHOOTING RECORD

Size	Shell used	Explosive used	Quantity	Date	Depth shot	Depth cleaned out

TOOLS USED

Rotary tools were used from .... feet to .... feet, and from .... feet to .... feet

Cable tools were used from 0 feet to 2618 feet, and from .... feet to .... feet

DATES

August 31, 19 41 Put to producing August 28, 19 41

The production for the first ~~24 hours was~~ 20 bbl.s per hour -swabbing .... barrels of fluid of which 100 % was oil; ...... %

emulsion; ...... % water; and ...... % sediment. Gravity, °Bé. ....

If gas well, cu. ft. per 24 hours .... Gallons gasoline per 1,000 cu. ft. of gas ....

Rock pressure, lbs. per sq. in. ....

EMPLOYEES

Harold E. Martin, Driller ~~W. R. Perry~~, Driller

Fred A. Bond, Driller [illegible], Driller

FORMATION RECORD

FROM—	TO—	TOTAL FEET	FORMATION
0	20	20	Sandy Shale - Red
20	50	30	Red Shale
50	70	20	Red Rock
70	80	10	Gravel - (Water)
80	110	30	Red Sandy Shale
110	175	65	"
175	225	50	Sand-Red Rock
225	240	15	Sandy Shale
240	255	15	Red Rock
255	300	45	Red Sandy Shale
300	320	20	Red Rock
320	350	30	Sandy Shale
350	375	25	Red Shale
375	515	140	Red Rock
515	540	25	Red Shale
540	635	95	Red Rock
635	822	187	Red Shale
822	965	143	Anhydrite
965	1010	45	Salt
1010	1032	22	Anhydrite
1032	1035	3	Red Shale
1035	1075	40	Anhydrite

(OVER)

16—43094-2

Form 9-330
(Rev. 5-63)

SUBMIT IN DUPLICATE*
(See other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R355.5.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

5. LEASE DESIGNATION AND SERIAL NO.: LC 069060

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: --

7. UNIT AGREEMENT NAME: Plata Deep Unit

8. FARM OR LEASE NAME: Plata Deep Unit

9. WELL NO.: 1

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: 15, T-20-S, R-32-E

12. COUNTY OR PARISH: Lea

13. STATE: New Mexico

1a. TYPE OF WELL: OIL WELL ☒ GAS WELL ☐ DRY ☒ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: Phillips Petroleum Company

3. ADDRESS OF OPERATOR: Room B-2, Phillips Building, Odessa, Texas 79760

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface 1980' FS&W lines
At top prod. interval reported below
At total depth

14. PERMIT NO.: DATE ISSUED: 8-19-70

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (*Ready to prod.*)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
8-30-70	11-29-70	-- Dry - P&A	3513' DF,	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
13150' TD	P & A	--	→	0-13,150'	--

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: Dry

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN (Mailed direct by Schlumberger to USGS & NMOCC)
Schlumberger o en hole BHC, Sonic-GR-C, dual induction, LL, and Microlog

27. WAS WELL CORED: No

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
16"	65#	939'	20"	(450 sx Class C w/20% DD & 2% Ca Cl$_2$ & 300 sx Class H w/2% CaCl$_2$. Circ 120 sx.)	---
13-3/8"	54.5#, 61#	2618'	15"	(750 sx Class C w/2% CaCl$_2$, TOC @ 525'.)	
8-5/8"	32#	7528'	12 1/4" & 11"	(1st:2000sxTr.LW &300sxClassC cmt.DVC2890' **See Reverse Side	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
--				
--				

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
--	--	

31. PERFORATION RECORD (*Interval, size and number*)
--
--

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
--	
--	

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)
Dry		

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
			→				

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
		→				

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*)

TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records
Well P & A 12-5-70, See Form 9-331, dated 12-8-70

SIGNED W.J. Mueller TITLE Associate Reservoir Eng. DATE 12-8-70

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: "*Sacks Cement*": Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

* Lime, sand, shale	12074'	12134'
Shale	12134'	12160'
Shale lime	12160'	12808'
Lime, sand, shale	12808'	13150'

**Csg-Cont'd: Opened DV @2890' w/800Sx. Circ 300 sx to pit. WOC 24 hrs, Circ 8 hrs thru DV. 2nd: 900 sx trinity LW thru DV@2890' followed by 300 sx Class C cmt. Pumped plug down w/176 BW. Closed DV w/2000#, circ 200 sx cmt.

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
Redbeds	0'	602'	See DST Summaries attached
Redbeds, anhydrite	602'	939'	
Anhydrite	939'	1020'	
Anhydrite, salt	1020'	2366'	
Anhydrite	2366'	2529'	
Anhydrite, lime	2529'	2630'	
lime	2630'	7983	
Lime, shale	7983'	8338'	
Lime	8338'	8525'	
Lime, shale, chert	8525'	8618'	
Lime	8618'	8708'	
Lime, sand	8708'	8875'	
Lime	8875'	9213'	
Lime, shale	9213'	9582'	
Lime	9582'	9690'	
Lime, sand, shale	9690'	9777'	
Lime, shale	9777'	10483'	
Lime, sand	10483'	10550'	
Lime, sand, shale	10550'	10983'	
Lime	10983'	11091'	
Lime, shale	11091'	11181'	
Shale	11181'	11508'	
Lime, shale	11508'	11683'	
Lime, chert	11683'	11857'	
Lime, chert, shale	11857'	11897'	
Lime	11897'	11976'	
Lime, shale	11976'	12074'	

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Rustler	880 (&2633)	
Tansill	2525 (&988)	
Bone Springs	7618' (-4105)	
First Bone Springs Sand	8678	(-5165')
Second " "	" 9295'	(-5782')
Third " "	" 10340'	(-6827')
Wolfcamp Limestone	10850'	(-7337')
Strawn Lime	11668'	(-8155')
Atoka Sand	12070'	(-8557')
Morrow Limestone	12313	(-8800')
Morrow Sand	12728	(-9215')

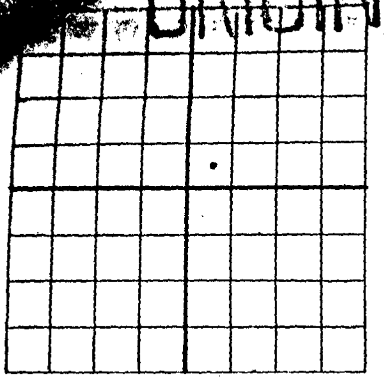
RECEIVED
1 1970
OIL CONSERVATION COMM.
HOBBS, N.

ORIGINAL

NEW MEXICO OIL CONSERVATION COMMISSION

RECEIVED JUL 12 1940 HOBBS OFFICE

Santa Fe, New Mexico



AREA 640 ACRES
LOCATE WELL CORRECTLY

WELL RECORD

Mail to Oil Conservation Commission, Santa Fe, New Mexico, or its proper agent not more than twenty days after completion of well. Follow instructions in the Rules and Regulations of the Commission. Indicate questionable data by following it with (?). SUBMIT IN TRIPLICATE.

Sam Weiner Box 297, Wink, Texas
Company or Operator Address

Wentz State Well No. #1 in SW.SW.NE. of Sec. 16 T. 20
Lease

R. 32 N. M. P. M. Halfway Field, Lea County.

Well is 2310 feet south of the North line and 2310 feet west of the East line of Sec. 16-20-32

If State land the oil and gas lease is No. 1919 Assignment No. B-7887

If patented land the owner is ____, Address ____

If Government land the permittee is ____, Address ____

The Lessee is Leigh Taliaferro, Address San Antonio, Texas

Drilling commenced May 30th 19 40 Drilling was completed July 11th 19 40

Name of drilling contractor Sam Weiner Address Wink, Texas

Elevation above sea level at top of casing ____ feet.

The information given is to be kept confidential until ____ 19__

OIL SANDS OR ZONES

No. 1, from 2495 to 2510 No. 4, from ____ to ____

No. 2, from 2556 to 2559 No. 5, from ____ to ____

No. 3, from ____ to ____ No. 6, from ____ to ____

IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from 280 to 300 feet. 50 feet from top

No. 2, from ____ to ____ feet. ____

No. 3, from ____ to ____ feet. ____

No. 4, from ____ to ____ feet. ____

CASING RECORD

SIZE	WEIGHT PER FOOT	THREADS PER INCH	MAKE	AMOUNT	KIND OF SHOE	CUT & FILLED FROM	PERFORATED FROM	PERFORATED TO	PURPOSE
8-5/8"	32	8	L.W.	936	T.P.				
7"	24	8	S.S.	2367	T.P.				

MUDDING AND CEMENTING RECORD

SIZE OF	SIZE OF		NO. SACKS

FORMATION RECORD

FROM	TO	THICKNESS IN FEET	FORMATION
0	15	15	Calechi
15	40	25	Red Sand
40	50	10	Sand & Gravel
50	200	150	Red Bed
200	240	40	Sand
240	360	120	Red Bed & Sand
360	400	40	Sandy Shale
400	500	100	Red Bed
500	530	30	Shale & Gyp
530	865	335	Red Rock & Red Bed
865	910	45	Anhydrite
910	920	10	Shale & Salt
920	1080	160	Salt & Anhydrite
1080	1110	30	Anhydrite & Potash
1110	2294	1184	Salt & Anhydrite
2294	2332	38	Anhydrite
2332	2394	62	Lime (Show of Gas at 2338)
2394	2405	11	Brown Lime
2405	2444	39	Lime
2444	2467	23	Grey Sandy Lime
2467	2482	15	Brown Lime
2482	2495	13	Brown & Gray Lime
2495	2520	25	Lime - Show of Oil
2520	2530	10	Broken Lime
2530	2556	26	Hard Gray Lime
2556	2559	3	Soft Lime - Hole filled with Oil
	2559		TOTAL DEPTH

NEW MEXICO OIL CONSERVATION COMMISSION

FORM C-128
Revised 5/1/57

WELL LOCATION AND ACREAGE DEDICATION PLAT

SEE INSTRUCTIONS FOR COMPLETING THIS FORM ON THE REVERSE SIDE

SECTION A

Operator	Lease	Well No.
I. W. Lovelady	Stout-State	1

Unit Letter	Section	Township	Range	County
	16	20-S	32-E	Lea

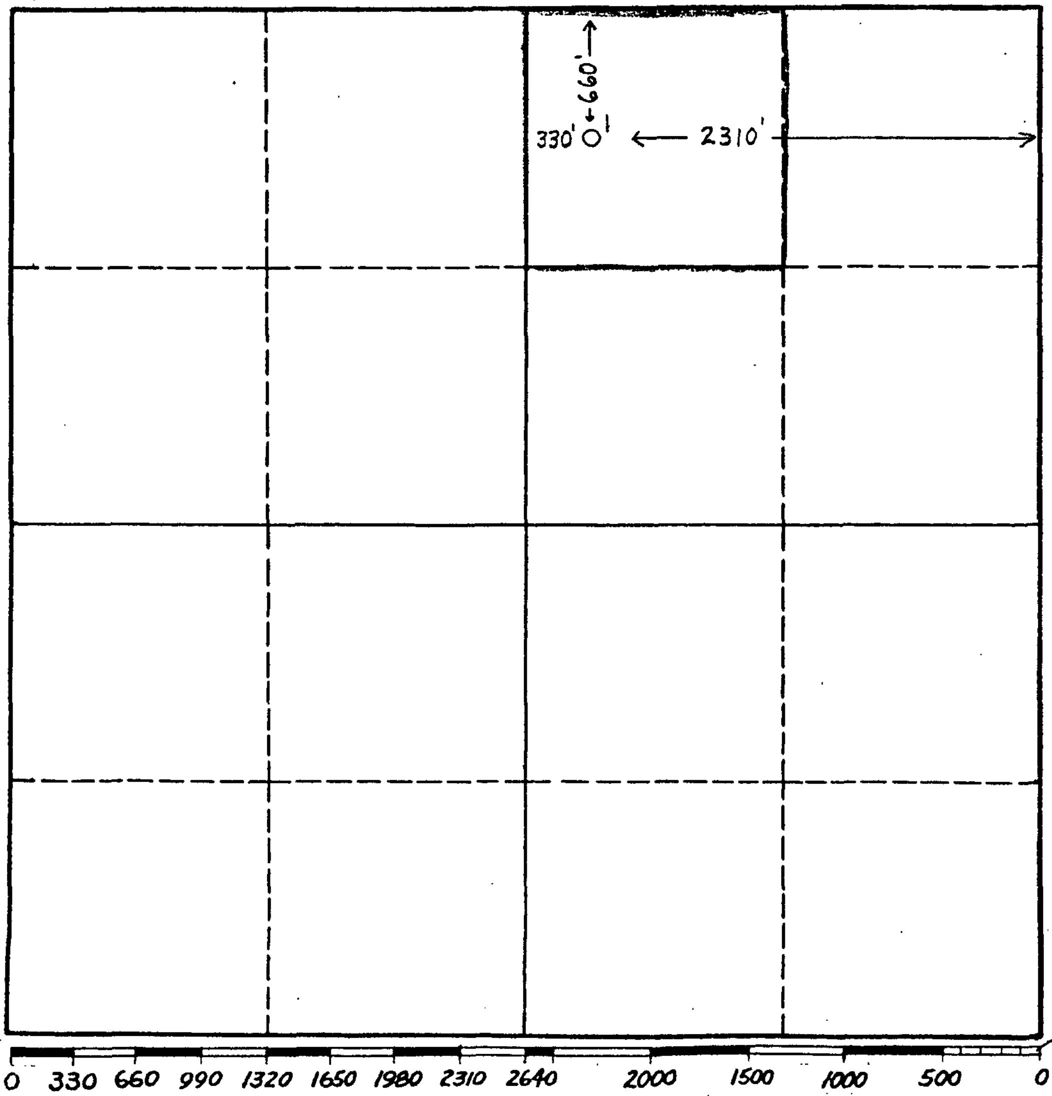
Actual Footage Location of Well:
660 feet from the North line and 2310 feet from the East line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
	Yates	Halfway	40 Acres

1. Is the Operator the only owner in the dedicated acreage outlined on the plat below? YES X NO ___. (*"Owner" means the person who has the right to drill into and to produce from any pool and to appropriate the production either for himself or for himself and another. (65-3-29 (e) NMSA 1935 Comp.)*
2. If the answer to question one is "no," have the interests of all the owners been consolidated by communitization agreement or otherwise? YES___ NO___. If answer is "yes," Type of Consolidation ___
3. If the answer to question two is "no," list all the owners and their respective interests below:

Owner	Land Description

SECTION B



CERTIFICATION

I hereby certify that the information in *SECTION A* above is true and complete to the best of my knowledge and belief.

Name

Position
Owner

Company

Date
April 11, 1960

I hereby certify that the well location shown on the plat in *SECTION B* was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed
April 8-1960

Registered Professional Engineer and/or Land Surveyor

Certificate No. 648

RECORD OF DRILL-STEM AND SPECIAL TESTS

If drill-stem or other special tests or deviation surveys were made, submit report on separate sheet and attach hereto

TOOLS USED

Rotary tools were used from 0 feet to 2697' TD feet, and from .... feet to .... feet.

Cable tools were used from .... feet to .... feet, and from .... feet to .... feet.

PRODUCTION

Put to Producing 6/10/60, 19.........

OIL WELL: The production during the first 24 hours was 33.95 BO 86 BW barrels of liquid of which ....% was was oil; ....% was emulsion; ....% water; and ....% was sediment. A.P.I. Gravity 29° @ 84

GAS WELL: The production during the first 24 hours was ............M.C.F. plus ....barrels of liquid Hydrocarbon. Shut in Pressure............lbs.

Length of Time Shut in............

PLEASE INDICATE BELOW FORMATION TOPS (IN CONFORMANCE WITH GEOGRAPHICAL SECTION OF STATE):

Southeastern New Mexico				Northwestern New Mexico
T. Anhy	850	T. Devonian		T. Ojo Alamo
T. Salt	1195	T. Silurian		T. Kirtland-Fruitland
B. Salt	2330	T. Montoya		T. Farmington
T. Yates	2475	T. Simpson		T. Pictured Cliffs
T. 7 Rivers		T. McKee		T. Menefee
T. Queen		T. Ellenburger		T. Point Lookout
T. Grayburg		T. Gr. Wash		T. Mancos
T. San Andres		T. Granite		T. Dakota
T. Glorieta		T.		T. Morrison
T. Drinkard		T.		T. Penn
T. Tubbs		T.		T.
T. Abo		T.		T.
T. Penn		T.		T.
T. Miss		T.		T.

FORMATION RECORD

2 c. elec logs

From	To	Thickness in Feet	Formation	From	To	Thickness in Feet	Formation
0	855	855	Red Bed				
855	1141	286	Gyp & Anhy				
1141	1152	11	Lime				
1152	1459	307	Potash & Salt				
1459	2351	892	" salt & Anhy				
2351	2380	29	Anhy				
2380	2410	30	Lime - 2410-2426-Anhy				
2426	2528	102	Any & sand				
2528	2628	100	Lime & Anhy				
2628	2697	69	Lime				

COPY TO O. C. C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See other instructions on reverse side)

Form approved. Budget Bureau No. 42-R355.5.

MAIN OFFICE OCC

1964 JUN 24 AM 7 47

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☐ DRY ☒ Other

b. TYPE OF COMPLETION: NEW WELL ☒ WORK OVER ☐ DEEP-EN ☐ PLUG BACK ☐ DIFF. RESVR. ☐ Other

2. NAME OF OPERATOR: W. N. Price

3. ADDRESS OF OPERATOR: c/o G. Kelley Stout, 606 W. Grand, Artesia, N. Mex.

4. LOCATION OF WELL (*Report location clearly and in accordance with any State requirements*)*
At surface 760' from South line and 1656' from East line of Section 9
At top prod. interval reported below Same
At total depth Same

5. LEASE DESIGNATION AND SERIAL NO.: NM 036259

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Federal-Burner

9. WELL NO.: 5

10. FIELD AND POOL, OR WILDCAT: Halfway

11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec. 9, T20S, R32E

14. PERMIT NO.: | DATE ISSUED:

12. COUNTY OR PARISH: Lea | 13. STATE: N. Mex.

15. DATE SPUDDED: 3/24/64 | 16. DATE T.D. REACHED: 4/24/64 | 17. DATE COMPL. (*Ready to prod.*): Dry hole | 18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*: 3436 DF | 19. ELEV. CASINGHEAD:

20. TOTAL DEPTH, MD & TVD: 2652 | 21. PLUG, BACK T.D., MD & TVD: | 22. IF MULTIPLE COMPL., HOW MANY*: | 23. INTERVALS DRILLED BY → | ROTARY TOOLS: | CABLE TOOLS: 0-2652

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: None | 25. WAS DIRECTIONAL SURVEY MADE:

26. TYPE ELECTRIC AND OTHER LOGS RUN: Gamma Ray and Neutron | 27. WAS WELL CORED: No

28. CASING RECORD (*Report all strings set in well*)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
10-5/8"	[illegible]	550	12"	Mudded	All
8-5/8"	28# used	935	10"	280 sx (cemented to	None
7"	23# used	2475	8"	300 sx surface)	None
				circulated	

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)

31. PERFORATION RECORD (*Interval, size and number*): Open Hole

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
	None

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (*Flowing, gas lift, pumping—size and type of pump*)	WELL STATUS (*Producing or shut-in*)

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)

34. DISPOSITION OF GAS (*Sold, used for fuel, vented, etc.*) | TEST WITNESSED BY

35. LIST OF ATTACHMENTS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED W. N. Price TITLE Owner DATE 5/15/64

*(See Instructions and Spaces for Additional Data on Reverse Side)

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.
If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.
Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.
Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.
Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.
Item 29: *"Sacks Cement":* Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.
Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

37. SUMMARY OF POROUS ZONES:
SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES

FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.
	0	200	Red bed, sand, anhydrite
	200	850	Red rock
	850	950	Anhydrite, shale
	950	2287	Salt, anhydrite, shale
	2287	2467	Grey lime (light S/G 2347-2375)
	2467	2475	Pink lime
	2475	2509	Lime
	2509	2530	Sand (light S/O&G 2509-2519)
	2530	2637	Lime
	2637	2648	Lime, shale (tr oil st 2637-52)
	2648	2652	Lime - sulfur water in hole

38. GEOLOGIC MARKERS

NAME	TOP MEAS. DEPTH	TOP TRUE VERT. DEPTH
Anhydrite	895	
Top salt	950	
Base sale	2285	
Yates	2430	

FORM C-128
Revised 5/1/57

NEW MEXICO OIL CONSERVATION COMMISSION

WELL LOCATION AND ACREAGE DEDICATION PLAT

SEE INSTRUCTIONS FOR COMPLETING THIS FORM ON THE REVERSE SIDE

SECTION A

Operator	Lease	Well No.
W.N.Price	Burner	5

Unit Letter	Section	Township	Range	County
	9	20 South	32 East	Lea

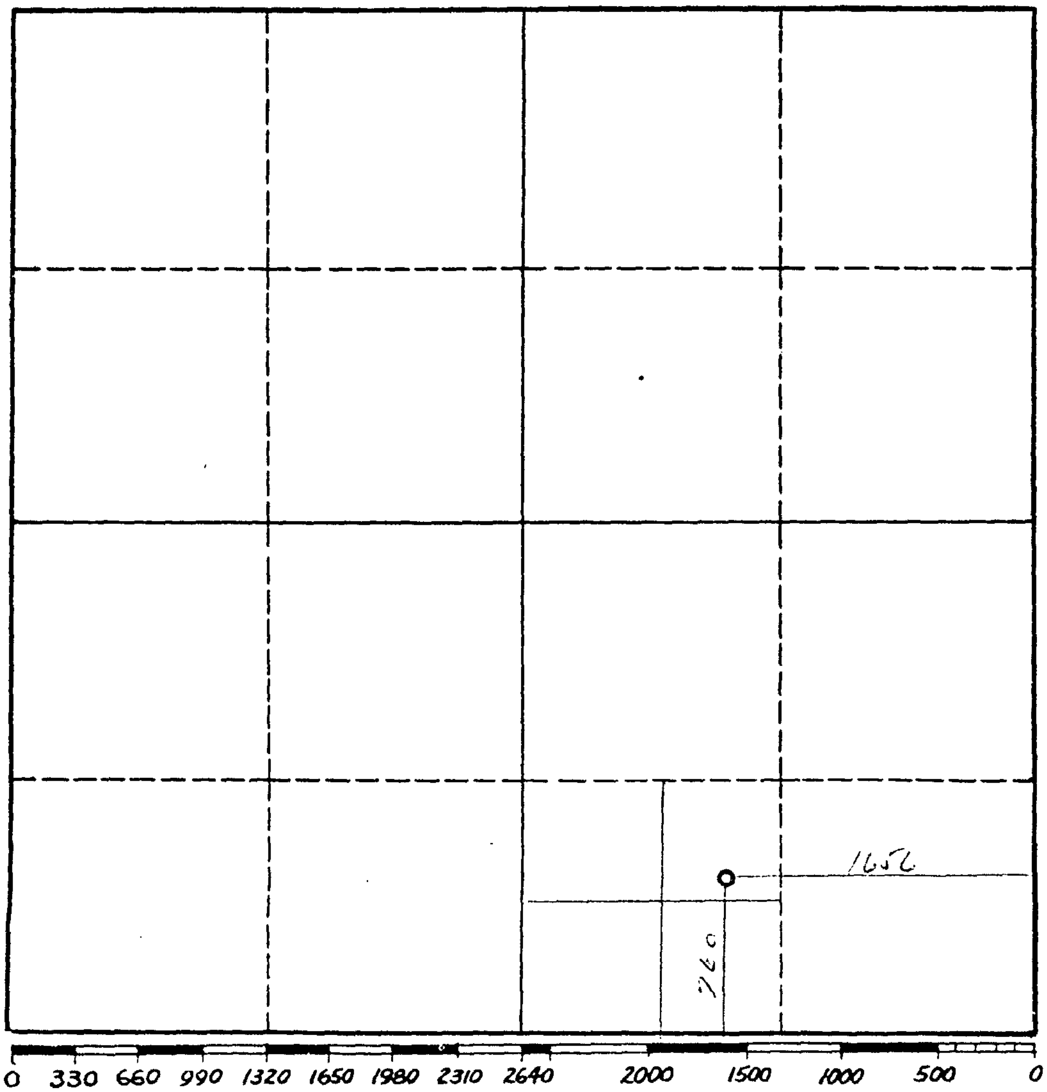
Actual Footage Location of Well:
760 feet from the South line and 1656 feet from the East line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
			Acres

1. Is the Operator the only owner in the dedicated acreage outlined on the plat below? YES ______ NO ______ . ("Owner" means the person *who has the right to drill into and to produce from any pool and to appropriate the production either for himself or for himself and another.* (65-3-29 (e) NMSA 1935 Comp.)
2. If the answer to question one is "no," have the interests of all the owners been consolidated by communitization agreement or otherwise? YES ______ NO ______ . If answer is "yes," Type of Consolidation ______
3. If the answer to question two is "no," list all the owners and their respective interests below:

Owner	Land Description
	NE¼SW¼SE¼

SECTION B



CERTIFICATION

I hereby certify that the information in *SECTION A* above is true and complete to the best of my knowledge and belief.

Name	W. N. Price
Position	Owner
Company	
Date	February 24, 1964

I hereby certify that the well location shown on the plat in *SECTION B* was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

Date Surveyed
February 14, 1964

Registered Professional Engineer and/or Land Surveyor

Certificate No.
1502

FORM C-105

N

AREA 640 ACRES
LOCATE WELL CORRECTLY

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

NOV 16 1940
HOBBS OFFICE

WELL RECORD

Mail to Oil Conservation Commission, Santa Fe, New Mexico, or its proper agent not more than twenty days after completion of well. Follow instructions in the Rules and Regulations of the Commission. Indicate questionable data by following it with (?). SUBMIT IN TRIPLICATE.

North Shore Corporation — Midland, Texas
Company or Operator — Address

Texas-State (Lease) Well No. 1-B in NE/4 of Sec. 16, T. 20S

R. 32E, N. M. P. M., Halfway Field, Lea County.

Well is 2310 feet south of the North line and 990 feet west of the East line of Section 16

If State land the oil and gas lease is No. B-3615 Assignment No.

If patented land the owner is ______, Address ______

If Government land the permittee is ______, Address ______

The Lessee is The Texas Company, Address Ft. North, Texas

Drilling commenced Oct. 7, 19 40 Drilling was completed Nov. 6, 19 40

Name of drilling contractor Peck & Croft, Address Midland, Texas

Elevation above sea level at top of casing 3496 feet.

The information given is to be kept confidential until ______ 19____

OIL SANDS OR ZONES

None

No. 1, from ______ to ______ No. 4, from ______ to ______

No. 2, from ______ to ______ No. 5, from ______ to ______

No. 3, from ______ to ______ No. 6, from ______ to ______

IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from ______ to ______ feet.

No. 2, from ______ to ______ feet.

No. 3, from ______ to ______ feet.

No. 4, from ______ to ______ feet.

CASING RECORD

SIZE	WEIGHT PER FOOT	THREADS PER INCH	MAKE	AMOUNT	KIND OF SHOE	CUT & FILLED FROM	PERFORATED FROM	PERFORATED TO	PURPOSE
12"	40#			420'					
10"	28#			930					
8"	17#			2400					

MUDDING AND CEMENTING RECORD

SIZE OF HOLE	SIZE OF CASING	WHERE SET	NO. SACKS OF CEMENT	METHOD USED	MUD GRAVITY	AMOUNT OF MUD USED

ORIGINAL

✓4459

RECEIVED
OCT 1 - 1940
HOBBS OFFICE

FORM C-105

N

NEW MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

WELL RECORD

Mail to Oil Conservation Commission, Santa Fe, New Mexico, or its proper agent not more than twenty days after completion of well. Follow instructions in the Rules and Regulations of the Commission. Indicate questionable data by following it with (?). SUBMIT IN TRIPLICATE.

AREA 640 ACRES
LOCATE WELL CORRECTLY

North Shore Corporation — Midland, Texas
Company or Operator — Address

Texas-State Lease, Well No. 1-A in SW NW/4 NE/4 of Sec. 16, T. 20S

R. 32E, N. M. P. M., Halfway Field, Lea County.

Well is 990 feet south of the North line and 2310 feet west of the East line of Section 16

If State land the oil and gas lease is No. B-3615 Assignment No.

If patented land the owner is ______, Address ______

If Government land the permittee is ______, Address ______

The Lessee is The Texas Company, Address Ft. Worth, Texas

Drilling commenced Sept. 1, 1940 Drilling was completed Sept. 28 1940

Name of drilling contractor Peck & Croft, Address Midland, Texas

Elevation above sea level at top of casing 3481 feet.

The information given is to be kept confidential until ______ 19__

OIL SANDS OR ZONES

No. 1, from 2503 to 2505 No. 4, from ______ to ______

No. 2, from ______ to ______ No. 5, from ______ to ______

No. 3, from ______ to ______ No. 6, from ______ to ______

IMPORTANT WATER SANDS

Include data on rate of water inflow and elevation to which water rose in hole.

No. 1, from ______ to ______ feet.

No. 2, from ______ to ______ feet.

No. 3, from ______ to ______ feet.

No. 4, from ______ to ______ feet.

CASING RECORD

SIZE	WEIGHT PER FOOT	THREADS PER INCH	MAKE	AMOUNT	KIND OF SHOE	CUT & FILLED FROM	PERFORATED FROM	PERFORATED TO	PURPOSE
10"	40#			420'					
8"5/8	28#			901'	9"				
5½"	17#			2494'					

FORMATION RECORD

FROM	TO	THICKNESS IN FEET	FORMATION
0	110	110	Sand & Caly.
110	130	20	Water sand
130	250	120	Red beds
250	800	550	Sand & red shales
800	840	40	Sand
840	875	35	Anhy.
875	890	15	Sand & Salt
890	910	20	Anhy.
910	925	15	Anhy. & Lime
925	975	50	Anhy.
975	1040	65	Salt
1040	1070	30	Anhy., shale & salt
1070	1100	30	Lime
1100	1110	10	Potash
1110	1120	10	Sand & Anhy.
1120	1140	20	Anhy.
1140	1170	30	Sand & Anhy.
1170	1200	30	Anhy. & Salt
1200	1275	75	Salt
1275	1330	55	Salt & Potash
1330	1345	15	Anhy.
1345	1470	125	Salt & Potash
1470	1540	70	Salt
1540	1765	225	Salt & Potash
1765	1785	20	Anhy.
1785	1930	145	Salt & Potash
1930	1980	50	Anhy. Potash & Salt
1980	2035	55	Salt
2035	2065	30	Anhy.
2065	2130	65	Salt & Anhy.
2130	2160	30	Anhy.
2160	2245	85	Salt
2245	2290	45	Anhy.
2290	2310	20	Lime & Anhy.
2310	2342	32	Brown Lime & Sand
2342	2388	26	Brown & Grey Lime
2388	2430	42	Sand & Lime
2430	2467	37	Brown & Grey Lime
2467	2490	23	Sand
2490	2505	15	Lime, TD.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 1
Submitted by ______
Hearing Date ______

STATE CORPORATION COMMISSION OF NEW MEXICO

Certificate of Public Convenience and Necessity

Docket No. ______ No. 21449

A Certificate of Public Convenience and Necessity is hereby granted
PETRO-THERMO CORPORATION,

whose office or place of business is at P.O. Box 2069, Hobbs, New Mexico,

to operate a Common Motor Carrier Freight Service over the route and by the schedules heretofore approved by this Commission, or which may hereafter be approved by this Commission, said route being as follows:

TRANSPORTATION OF WATER BETWEEN POINTS IN UNION, HARDING, MORA, SAN MIGUEL AND QUAY COUNTIES, NEW MEXICO, OVER IRREGULAR ROUTES, UNDER NON-SCHEDULED SERVICE.

****

This Certificate to remain in effect from and after date hereof, subject to applicable provisions of the New Mexico Motor Carrier Act, and Rules, Regulations and Requirements prescribed thereunder., and is issued pursuant to Order dated July 8, 1981.

Witness the signature and seal of the Commission at Santa Fe, New Mexico, this 8th day of July, 1981.

State Corporation Commission of New Mexico

By ______ Chairman

______

______ Commissioners

ATTEST:

______ Director

AUGUST 27, 1981 PAGE 2

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY NO. 21449

PETRO-THERMO CORPORATION

HOBBS, NEW MEXICO

E N D O R S E M E N T

With all necessary documents on file, and with the records of this Commission as authority, Certificate of Public Convenience and Necessity No. 21449 is hereby endorsed to include intrastate operating rights as follows:

Transportation of oilfield equipment and supplies (as defined in Order issued by the State Corporation Commission the 17th day of September 1947), between points and places in Lea and Eddy Counties, New Mexico, over irregular routes, under non-scheduled service.

Transportation of houses, between points and places in Lea and Eddy Counties, New Mexico, over irregular routes, under non-scheduled service.

Transportation of water and crude oil to and from wildcat wells to common carrier loading points and refineries, and residue oil from tank batteries, in Chaves, Lea, Eddy, Curry and Roosevelt Counties in New Mexico; over irregular routes and under non-scheduled service.

Transportation of all liquids in bulk, in tank trucks, used in, or in connection with, the discovery, development, production, refining, manufacture, processing, and storage of natural gas, and petroleum and their products and by-products, providing that all hauls of refined petroleum products be restricted to movements to oil well locations and the resultant salvage thereof from oil well locations, with points of origin and destination in each instance being within Chaves, Lea, Eddy, Curry and Roosevelt Counties, New Mexico only, with no diversion of shipment in transit to storage, over irregular routes, under non-scheduled service.

EFFECTIVE THIS 27TH DAY OF AUGUST, 1981.

NEW MEXICO STATE CORPORATION COMMISSION

ERIC P. SERNA, Chairman

JOHN A. ELLIOTT, Commissioner

JIMMIE W. GLENN, Commissioner

ATTEST:

F. B. SMITH, Director

CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY NO. 21449

PETRO-THERMO CORPORATION

E N D O R S E M E N T

Pursuant to the Commission's Order dated January 18, 1982, Certificate of Public Convenience and Necessity No. 21449 is hereby endorsed to include operations as follows:

> Transportation of fresh water, brine water (salt water) residue oil from tank batteries, oil base drilling mud and waterbase drilling mud in liquid form only, acid CO_2 liquid, drilling mud containing barite, hydraulic fracturing fluids, and basic sediments between points and places in Lincoln, Guadalupe and DeBaca Counties, New Mexico.

Effective this 10th day of February, 1982.

NEW MEXICO
STATE CORPORATION COMMISSION

Eric P. Serna, Chairman

ATTEST:

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

TABLE OF CONTENTS

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

APRIL 9, 1986

NEW MEXICO COUNTIES IN WHICH
PETRO-THERMO CORPORATION
HAS HAULING AUTHORITY

UNION
MORA
HARDING
SAN MIGUEL
GUADALUPE
QUAY
DE BACA
ROOSEVELT
CURRY
LINCOLN
CHAVES
LEA
EDDY

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 2
Submitted by ________
Hearing Date ________

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

50 YEARS
1935 - 1985

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

March 21, 1986

Mr. Robert W. Abbott
Petro-Thermo Corporation
P. O. Box 2069
Hobbs, N.M. 88241-2069

Re: Request for Extension of Time for Temporary Use of Pit

Dear Mr. Abbott:

This letter is to confirm a telephone conversation today between Jamie Bailey, OCD Field Representative, and John Weber regarding an extension of the permit for temporary disposal of brine, fresh water-based drilling mud, and waste cement in the emergency overflow pit located at the Blinebry-Drinkard SWD System Well No. A-22 in 22-T22S-R37E. Your latest temporary permit expired March 20, 1986.

Due to time restrictions associated with Case No. 8781 which was brought to hearing on December 18, 1985, and will be heard De Novo before the Commission on April 9, 1986, you are hereby granted an extension until April 10, 1986, for the specified temporary use of the pit.

An inspection of the area will be made on April 3, by OCD personnel, and they are authorized to order immediate closure of the pit if conditions warrant.

Authorization for the temporary use of this pit may be rescinded at anytime if there is evidence that the pit has overflowed or if Water Quality Control Commission or Oil Conservation Division rules or regulations have been violated.

Sincerely,

R. L. Stamets

R. L. STAMETS
Director

RLS:dp

cc: Jerry Sexton
David Boyer
Michael Stogner

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 3
Submitted by ____________
Hearing Date ____________

MAR 1986
RECEIVED

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

NUMBER OF WELLS
AS OF 1-1-85

	OIL	GAS	OIL AND GAS
LEA COUNTY	13897	1410	15307
EDDY COUNTY	5850	1390	7240
CHAVES COUNTY	1443	762	2205
	21190	3562	24752

HOBBS POOL

BLINEBRY	23
BLINEBRY, EAST	1
CHANNEL SAN ANDRES	0
DRINKARD	22
PADDOCK	3
G-SA	479
SAN ANDRES, EAST	20
	548

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 4
Submitted by
Hearing Date

natural resource engineering inc.

December 16, 1985

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

RE: Application for Solids and Produced Water Disposal Site

Gentlemen:

We have been advised that Petro-Thermo Corporation has applied to the Oil Conservation Division for authorization to operate a disposal site for oil field related solids and liquids in Section 16, Township 20 South, Range 32 East.

We understand that Petro-Thermo Corporation will undertake the disposal of oil field related solids and liquids in a manner that will afford reasonable protection against contamination of fresh water supplies.

It is in the public interest, convenience, and necessity to grant Petro-Thermo Corporation's application. Presently, there are only two approved waste disposal sites of this kind serving the entire southeastern New Mexico area. There is a need for additional approved waste disposal sites convenient to our currently operated oil and gas properties. Petro-Thermo Corporation's proposal will meet this need.

We also believe that the waste of valuable energy resources can be avoided by approving Petro-Thermo Corporation's application. Properties which would, from the standpoint of the production of crude oil, be otherwise uneconomical, could be more efficiently operated given a conveniently located waste disposal site.

Please consider our endorsement of this proposal as a positive step forward in the continued development of New Mexico's important energy industry.

Sincerely yours,

Joe T [illegible]

Joe T. [illegible], President
Natural Resources Engineering, Inc.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 5
Submitted by ______
Hearing Date ______

AMOCO

Amoco Production Company
Post Office Box 68
Hobbs, New Mexico 88240

L. R. Smith
District Manager

December 16, 1985

File: SGH-4211-594.5

Re: Petro-Thermo Corporation
Proposed Disposal Site

New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87504-2088

As a major producer of oil and gas in southeastern New Mexico, Amoco Production Company feels that the approval of the solids and produced water disposal site in Section 16, T-20-S, R-32-E in Lea County would benefit the oil and gas industry in this area of the state.

The site proposed by Petro-Thermo Corporation is located in an area which has been granted an exception under NMOCD Order R-3221-B to the no pit rule. Also, the proposed site is centrally located between Hobbs and Carlsbad and would provide convenient access from producing operations in both Lea and Eddy Counties.

L R Smith

LBG/sh
APRD01-H

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 6
Submitted by ______
Hearing Date ______

EN̶ ̶RADA HESS CORPORAT...

P. O. DRAWER "D"
MONUMENT, NEW MEXICO 88265

December 9, 1985

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504-2088

RE: Application for approved Waste Disposal Site

As a member of the oil and gas producing community in Lea County, we recognize the importance of adequate waste disposal facilities to the future economic development of our industry in Southeast New Mexico. With only two approved waste disposal sites in the area, the need exists for additional environmentally safe and NMOCD approved facilities both to inhance comp etition in the disposal segment of the industry and to provide additional waste disposal capacity. Future drilling, secondary and tertiary recovery projects will depend on the existence of such facilities.

The Petro-Thermo Corporation proposal for a waste disposal site in the NE4 of Sec. 16, T-20S, R-32E, Lea County, will help meet the disposal requirements of the oil and gas industry in Southeast New Mexico. Your prompt consideration of their application will be appreciated.

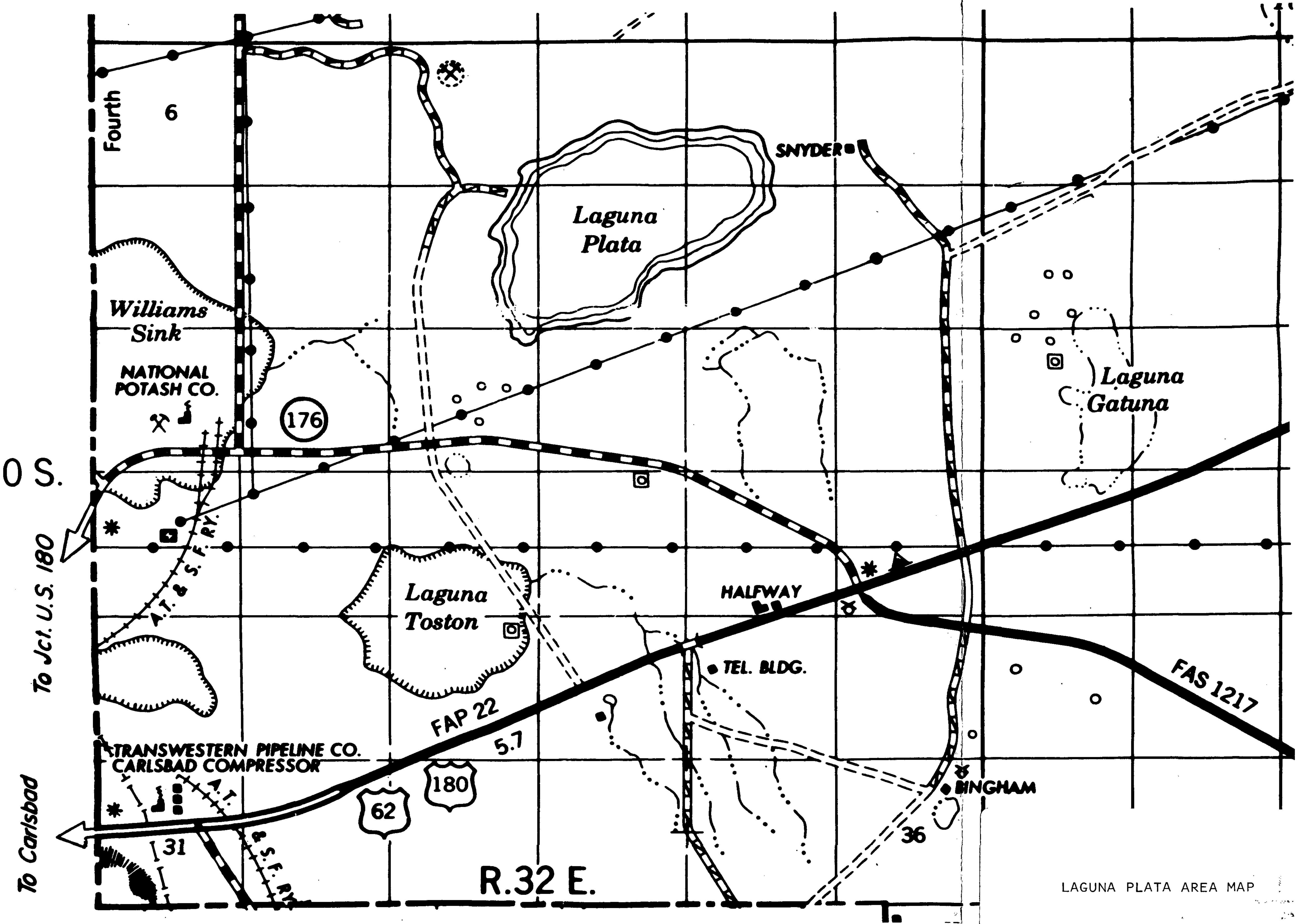
Yours very truy,

S.W. Small

S.W. Small
District Superintendent

XC: Petro-Thermo Corp.
P.O. Box 2069
Hobbs, New Mexico 88240
ATTN: Mr. R.W. Abbott

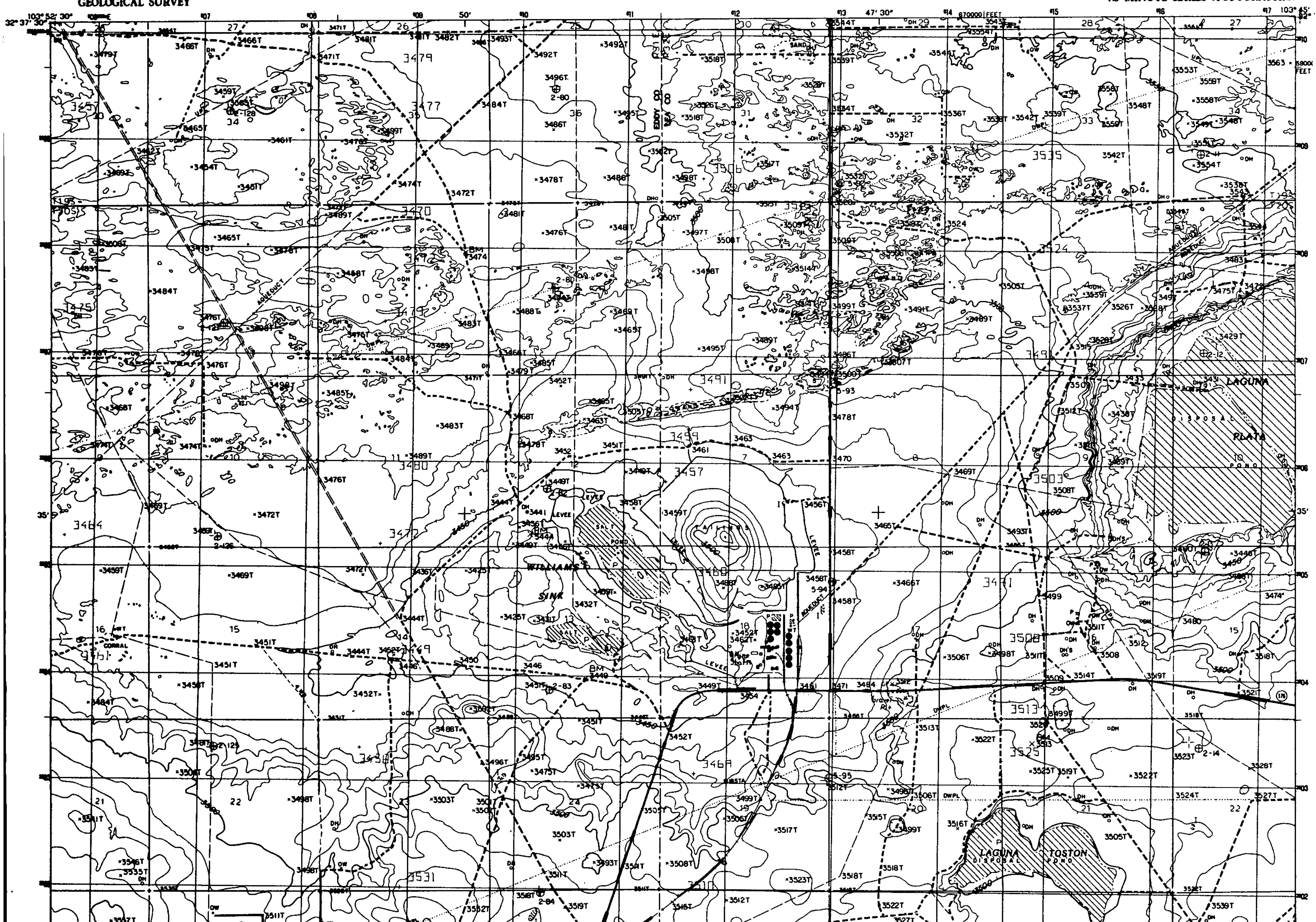
BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8781 Exhibit No. 7
Submitted by ____________
Hearing Date ____________



LAGUNA PLATA AREA MAP

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WILLIAMS SINK QUADRANGLE
NEW MEXICO
7.5 MINUTE SERIES (TOPOGRAPHIC)



WILLIAMS SINK USGS MAP

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check.

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225
OR RESTON, VIRGINIA 22092

WILLIAMS SINK, NEW MEXICO
PROVISIONAL EDITION 1985

32103-E7-TF-024

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

WATER ANALYSIS

SAMPLE: LAGUNA PLATA LAKE WATER

LOCATION: APPROXIMATELY 2500' FNL, 1800' FEL
SECTION 10, TOWNSHIP 20 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

DATE: DECEMBER 11, 1985

SPECIFIC GRAVITY AT $60^{0}F$	1.2205
p^{H}	7.34
CALCIUM	940 MG/L
MAGNESIUM	3,317 MG/L
SODIUM	124,644 MG/L
BICARBONATE	71 MG/L
CARBONATE AS $C_{A}CO_{3}$	16,000 MG/L
HYDROXIDE	NOT RUN
SULFATE	10,124 MG/L
CHLORIDES	196,012 MG/L
IRON	.25 MG/L
BARIUM	NOT RUN
MANGANESE	NOT RUN
TOTAL DISSOLVED SOLIDS	335,108 MG/L

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

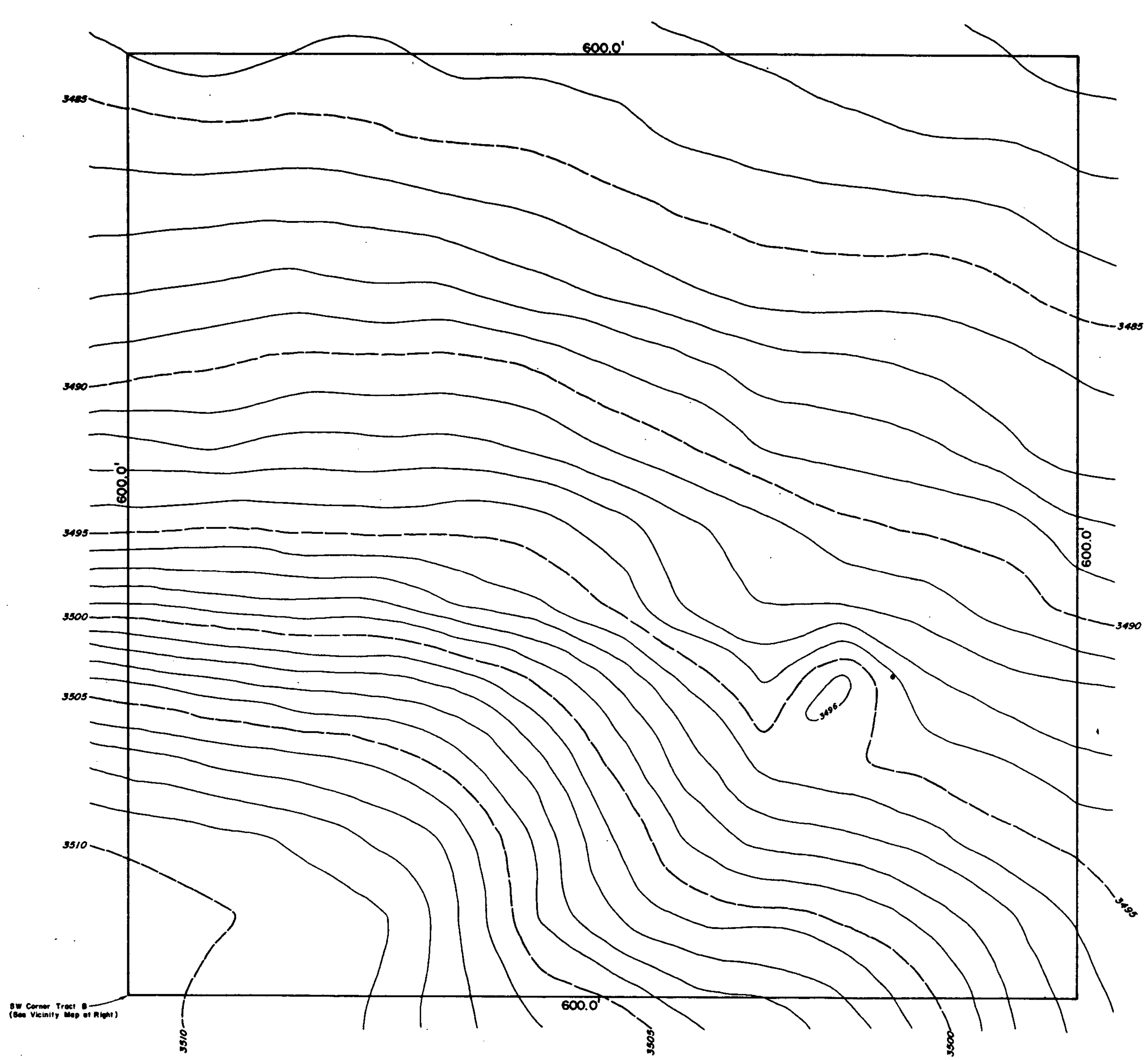
WATER ANALYSIS

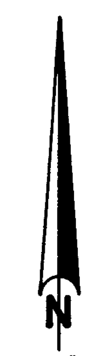
SAMPLE: SPRING DISCHARGE

LOCATION: APPROXIMATELY 1220' FNL, 1320' FEL
SECTION 16, TOWNSHIP 20 SOUTH, RANGE 32 EAST
LEA COUNTY, NEW MEXICO

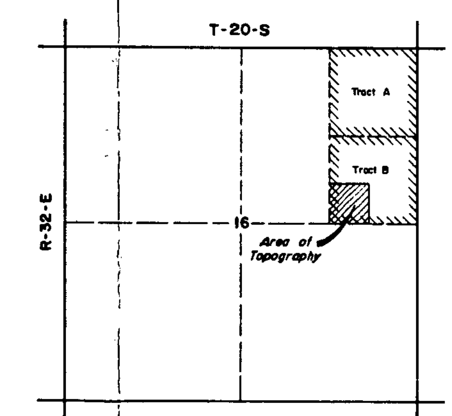
DATE: MARCH 27, 1986

SPECIFIC GRAVITY AT $60^{0}F$	1.035
P^{H}	8.21
CALCIUM	801 MG/L
MAGNESIUM	1,633 MG/L
SODIUM	15,594 MG/L
BICARBONATE	170 MG/L
CARBONATE	30 MG/L
HYDROXIDE	0 MG/L
SULFATE	16,375 MG/L
CHLORIDES	18,000 MG/L
IRON	.3 MG/L
BARIUM	0 MG/L
MANGANESE	NOT RUN
TOTAL DISSOLVED SOLIDS	52,605 MG/L





Scale: 1" = 40'
Contour Interval: 1 foot



VICINITY MAP
4" = 1 Mile

I HEREBY CERTIFY THAT THIS PLAT WAS MADE FROM NOTES TAKEN IN THE FIELD IN A BONA FIDE SURVEY MADE UNDER MY SUPERVISION, AND THAT THE SAME IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JOHN W. WEST, N.M. P.E. & L.S. No. 676
TEXAS R.P.S. No. 1138

AGUA, INC.

TOPOGRAPHY OF A 600' x 600' AREA OUT OF TRACT B, BEING THE SE 1/4 NE 1/4 OF SECTION 16, T 20 S, R 32 E, N.M.P.M., LEA COUNTY, NEW MEXICO.

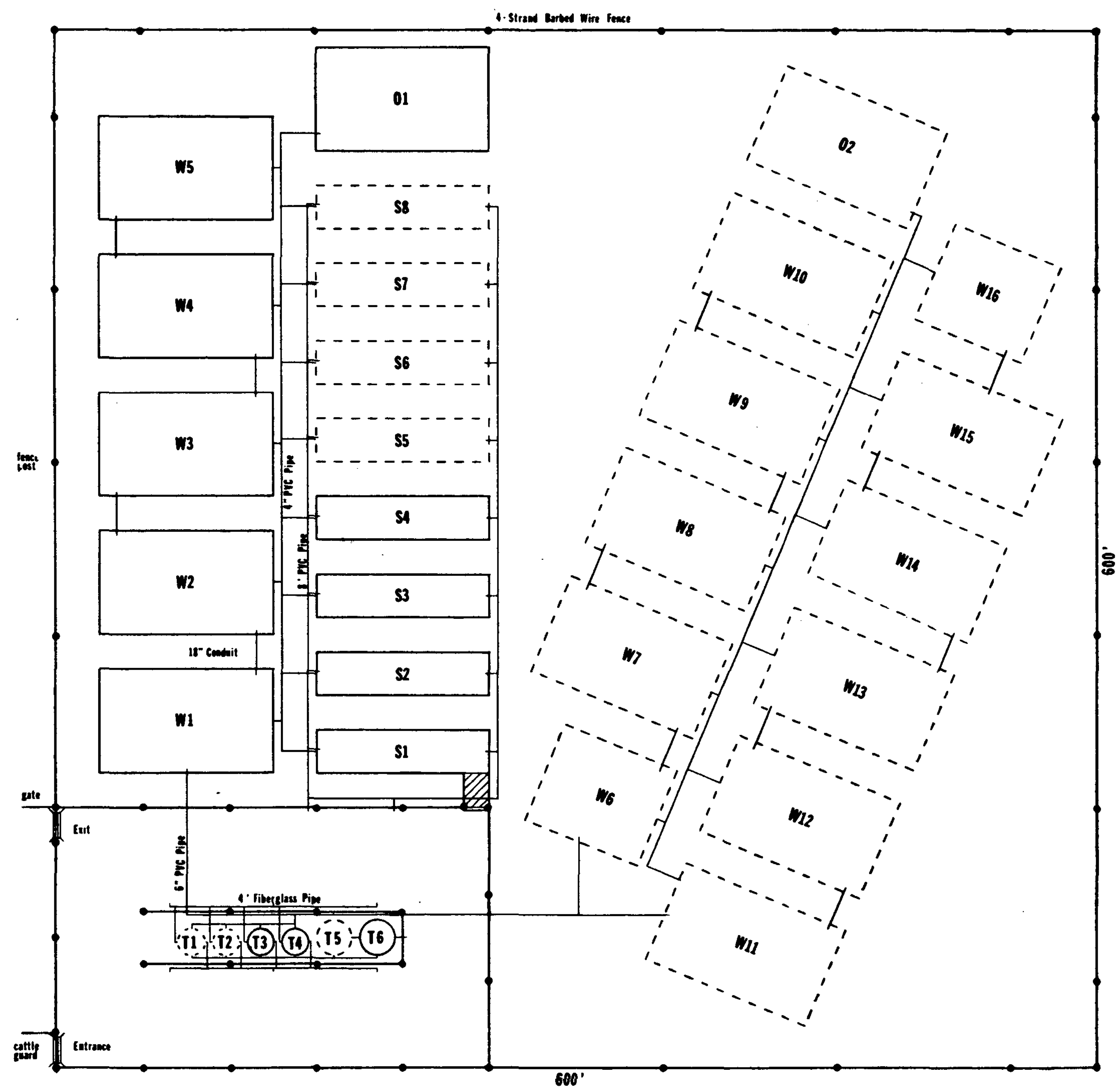
JOHN WEST ENGINEERING CO.
CONSULTANTS
HOBBS NEW MEXICO

Surveyed By D. Hicks	Drawn By M. Mitchell	Last Rev. Date	Drawing Number
Date Begin 10-11-85	Date 10/30/85	File No.	
Date End 10-18-85	Checked By G.J.	Sheet 1 Of 1	

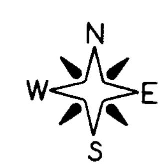
WELL NO. 1 WELL NO. 2

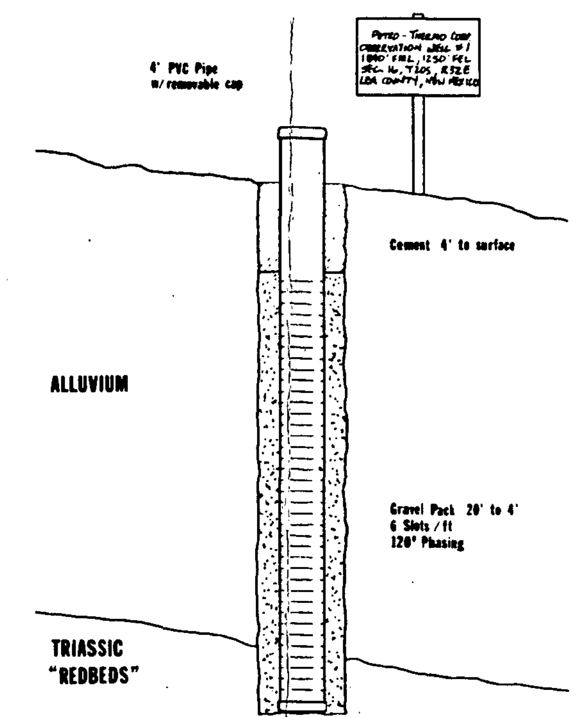
(See OBSERVATION WELL DIAGRAM)

W - WATER PIT
S - SOLIDS PIT
O - OVERFLOW PIT
T - TANK BATTERY

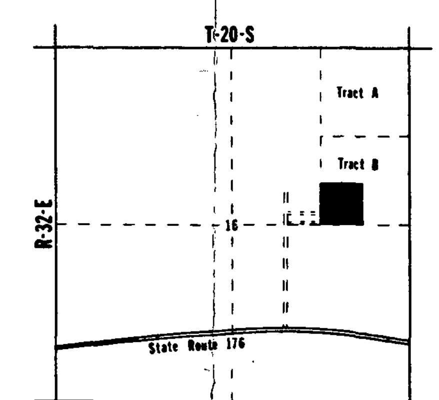


PHASE 1 - solid lines
PHASE 2 - dashed lines





OBSERVATION WELL DIAGRAM



VICINITY MAP

PLATA DISPOSAL DESIGN		
SCALE: 1" : 40'	APPROVED BY:	DRAWN BY IDT
DATE 4-9-86		REVISED
Section 16, Township 20 South, Range 32 East		
Lea County, New Mexico		DRAWING NUMBER

PETRO-THERMO CORPORATION

P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557

HOBBS, NEW MEXICO 88241-2069

APRIL 9, 1986

PLATA DISPOSAL

PIT AND TANK CHART

PIT OR TANK NUMBER	CAPACITY (BBLS)	LENGTH (FT)	WIDTH (FT)	DEPTH (FT)	BOTTOM ELEVATION (FT)
W1	7480	100	60	10	3496
W2	6411	100	60	9	3490
W3	4274	100	60	7	3487
W4	4274	100	60	7	3484
W5	4274	100	60	7	3481
W6	5236	70	60	10	3492
W7	5343	100	60	8	3488
W8	4274	100	60	7	3486
W9	4274	100	60	7	3483
W10	4274	100	60	7	3481
W11	5343	100	60	8	3492
W12	5343	100	60	8	3488
W13	5343	100	60	8	3487
W14	4274	100	60	7	3483
W15	4274	100	60	7	3481
W16	2778	65	60	7	3479
	77469				
S1	3117	100	25	10	3495
S2	3117	100	25	10	3491
S3	2671	100	25	9	3489
S4	2226	100	25	8	3487
S5	2226	100	25	8	3485
S6	2226	100	25	8	3483
S7	2226	100	25	8	3481
S8	2226	100	25	8	3480
	20035				
O1	4274	100	60	7	3478
O2	4274	100	60	7	3477
	8548				
T1	750				3509
T2	750				3509
T3	750				3509
T4	750				3509
T5	1000				3509
T6	1000				3509
	5000				

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

May 6, 1986

MEMORANDUM

TO: R. L. STAMETS, DIRECTOR

FROM: JAMI BAILEY, FIELD REPRESENTATIVE II DGB for JB
DAVE BOYER, ENVIRONMENTAL BUREAU CHIEF DGB

SUBJECT: PETRO-THERMO APPLICATION FOR EXEMPTION TO ORDER NO. R-3221 AND DISPOSAL PERMIT FOR LAGUNA PLATA - STEPHENS' REBUTTAL TO KELLY'S OBJECTIONS

At the OCC hearing on April 9 and 10, Tim Kelly submitted a list of problems (attached) which he said were not adequately addressed in the Petro-Thermo report. Our comments on Kelly's eight objections and Stephens' replies are as follows:

1. Stephens' report stated "The thickness of the alluvium ranges from 15 to 130 feet in the northeast quarter of Township 20 South, Range 32 East, Section 16, based on drillers' logs. Exposures in arroyos just north of the site suggest that the alluvial cover may be less than 10 feet thick beneath the site." Kelly objected that the thickness ranges from 0 to 130 feet, and that it is completely unknown at the proposed site itself. Stephens' rebuttal was that alluvium-bedrock contacts were observed in outcrops on the north side of the property at the west end of Laguna Plata, and the estimated 10-20 feet of alluvium beneath the site were based on extrapolations.

Bailey Comment: A drillers log for the well drilled in the Petro-Thermo 1/4 1/4 1/4 section had 100 feet of caliche underlain by 30 feet of sand. The drillers log for a well northwest of the site indicates 119 feet of sand and caliche underlain by 30 feet of water sand. (See Attachment 1) In my opinion, these logs indicate the possibility of (a) a redbed erosional channel, (b) a synclinal trough, or (c) block faulting associated with formation of the laguna. If a channel is indicated, it is justification for Reed's report (1969) that may have interpreted a bedrock channel which could result in northwestern fluid movement along the top of the the redbeds. However, redbeds outcropping west of the laguna show a southeast dip, possibly indicating closure of a synclinal trough. A trough was mentioned in Ed Reed's testimony in Case 4047 on March 19, 1969, in which he described the general area as structurally occupied by a broad synclinal trough reflected at the top of the Triassic, with the lowest part in the area of Laguna Plata. Laguna Gatuna and Laguna Tonto are in the central portion of the regional synclinal area.

If block faulting is responsible for the increase in alluvial cover, as is the opinion of Paul Kautz, District I Geologist, the fault block dip of the redbeds could be away from the laguna in the disposal site area. (For this possibility, see my next comment.)

Boyer Comment: I agree with Stephens on the point, but note that two logs in the report show 130 feet of alluvium. However, 14 other logs show 12-50 feet, a figure I believe to be more reasonable. The two wells having thick alluvium show an equivalent reduction in redbed thickness and were drilled by the same company and driller 30 days apart in 1940. To settle the point, the company should be required to submit logs and results from the monitor well drilling to OCD before operation.

2. Stephens' report cites work by Nicholson and Clebsch (1961) in which drill holes in Laguna Plata encountered red beds at 20 to 41 feet below the surface, or at an elevation between 3410-3389. Kelly objects that "there is no evidence presented by the report which confirms that the redbed surface slopes directly toward Laguna Plata." Stephens replied that "the surface slope of the redbeds logically must be toward Laguna Plata."

Bailey Comment: The drillers log of the well directly north of the site indicates a redbed elevation of 3445. The well in the proximity of the disposal site shows redbeds at 3366, indicating a southwest dip in that limited area, or a fault. Redbed elevation in the laguna is approximately 3410, indicating a gentle northeast dip into the laguna. I agree with Stephens.

Boyer Comment: The dip or surface slope of the redbeds is not as important as the water level gradient in determining direction of fluid movement. If there is water naturally occurring above the redbed surface at the site, seepage fluid will mix with it and flow down the hydraulic (potentiometric) gradient. If no water is present, seepage will follow the structural surface of the redbeds until water is reached, mix, and flow down the potentiometric gradient. In this case the potentiometric gradient is towards Laguna Plata as shown by Figure 3 of Stephens' report (Exhibit 9).

3. Kelly objected that Stephens report does not disprove Reed's work that indicates a bedrock channel which would result in westward movement of ground water from Laguna Plata. Stephens responded that there is no evidence for a bedrock channel noted in field reconnaissance work, and if one did exist, it could convey ground water toward Laguna Plata.

Bailey Comment: Reed testified in Case 4047 on 3/19/69 to the following: "Q: And you say there is a possibility that the water from the west side of that lake might flow west? A: (Reed) I just leave that as an open question. Q: You don't have information on it? A: No, Sir." Earlier, Reed had testified "It would be my judgment that it would be acceptable, and that no damage would occur to the quality of ground water presently existing in the area to use Laguna Gatuna and Laguna Plata for salt water disposal ...."

Boyer Comment: I agree with Stephens.

4. Kelly objected to closure of the 3440 water level contour line, which indicates Laguna Plata is a closed depression. Stephens responded with water level, lake, and spring elevations in the area.

Bailey Comment: Stephens' response indicated that he had sufficient control to indicate closure of the 3440 contour line.

Boyer Comment: The newest USGS topographic quadrangle (Williams Sink, 1:24,000, provisional, 1985) shows the lake elevation at less than 3430'. Two drill holes near the center of the lake are shown at elevations of 3431 and 3429 feet. The seep investigated by me on February 4, 1986 is approximately 750 feet north and west of the site. Drainage of the seep was to the north and east to Laguna Plata. Therefore, I agree with Stephens.

5. Kelly objected that the disposal ponds will plug with drilling mud and will not function properly. Stephens responded the ponds may require maintenance and that seepage is the preferred means of disposal.

Bailey and Boyer Comment: Seepage of fluids is preferred in order to tie up the heavy metals and degrade dissolved hydrocarbons which will be present in the waste fluid. Ponds that accept drilling fluid will require regular maintenance, and/or decanting of waters into adjacent ponds.

6. Kelly objected to the method of calculating fluid evaporation, stating that it should be calculated for the disposal ponds and not for the laguna. Stephens responded that there was ample data in the report to make the calculations, but that evaporation is not the primary means of disposal.

Bailey Comment: This is a moot point; Laguna Plata has 1,241 acres within the lowest closing contour.

Boyer Comment: I agree with Stephens. Also, slightly more evaporation would occur at the site than in Laguna Plata due to less salt being present in the disposal ponds.

7. Kelly objected that no chemical analysis of disposed fluids were presented and that springs at Laguna Plata have a TDS of 9,000 ppm. Stephens responded with figures that show that the TDS for the expected waste water was not less than the TDS of the springs.

Bailey and Boyer Comment: Kelly obviously made a mistake.

8. Kelly objected that the reported Laguna Plata TDS was due to concentration of brine or of potash discharges. Stephens responded that saline lakes were widespread in the area and that there were others that had not received waste waters from any source. The potash wastes have not had a significant impact on the composition of the evaporate minerals.

Bailey Comment: It is highly unlikely that given the size of the laguna and the infiltration method of disposal, that a waste disposal operation could have a significant detrimental impact on the salt mining operation in Laguna Plata.

Boyer Comment: I agree with Stephens. Also, due to the highly saline concentration of the water, heavy metals may already be in solution at relatively high concentrations.

Some additional remarks by Stephens were made in response to Kelly's contention that there are significant differences between Laguna Gatuna and Laguna Plata. The single comment is as follows:

Boyer Comment: I agree with Stephens' responses (except for the obvious error in his reporting chloride for TDS in my seep sample), and add that the required drilling at the site will determine the thickness of alluvium, depth to the redbeds, presence of water, and resolve most site geologic issues.

The following are our conclusions in this matter:

Bailey and Boyer:

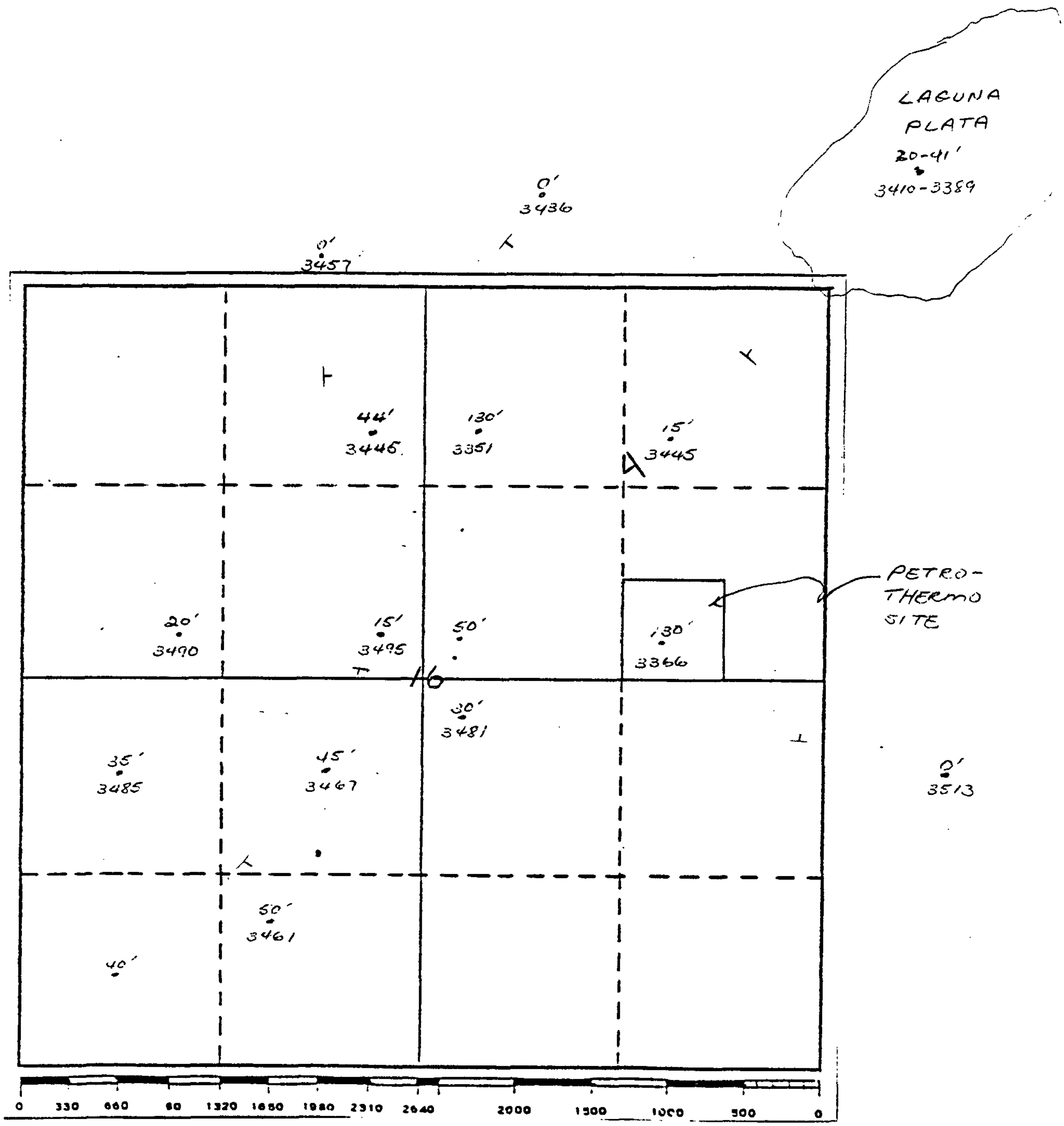
The central issue of the hearings on Case 8781 was to determine if Petro-Thermo should be granted an exception to Order No. R-3221 and a permit to dispose of waste hydrocarbons and other solids associated with oil and gas drilling and production. Given the evidence of no protectable fresh ground water at the site or in the lake, and further evidence that water flow is towards Laguna Plata and away from any potable water that could be affected by such discharges, an exception to order No. R-3221 should be permitted. Further, if there is a naturally occurring discharge from laguna Plata to the west, the effect that the proposed operation would have on such a discharge is miniscule since existing volumes of salt and concentrated brine far overwhelm any proposed Petro-Thermo contribution. The method of disposal of fluids into ponds which will allow infiltration of these fluids into the subsurface should prevent hydrocarbon and heavy metal contamination (beyond any existing levels) in the area of the salt mining operation. Damage to the surface at the facility site will no doubt occur, but the Petro-Thermo operation, as outlined in their reports, should not have an adverse effect on any fresh waters that may be located in the area, and should not impair any existing or future use of the waters in Laguna Plata.

JB:DB:dp

Attachments

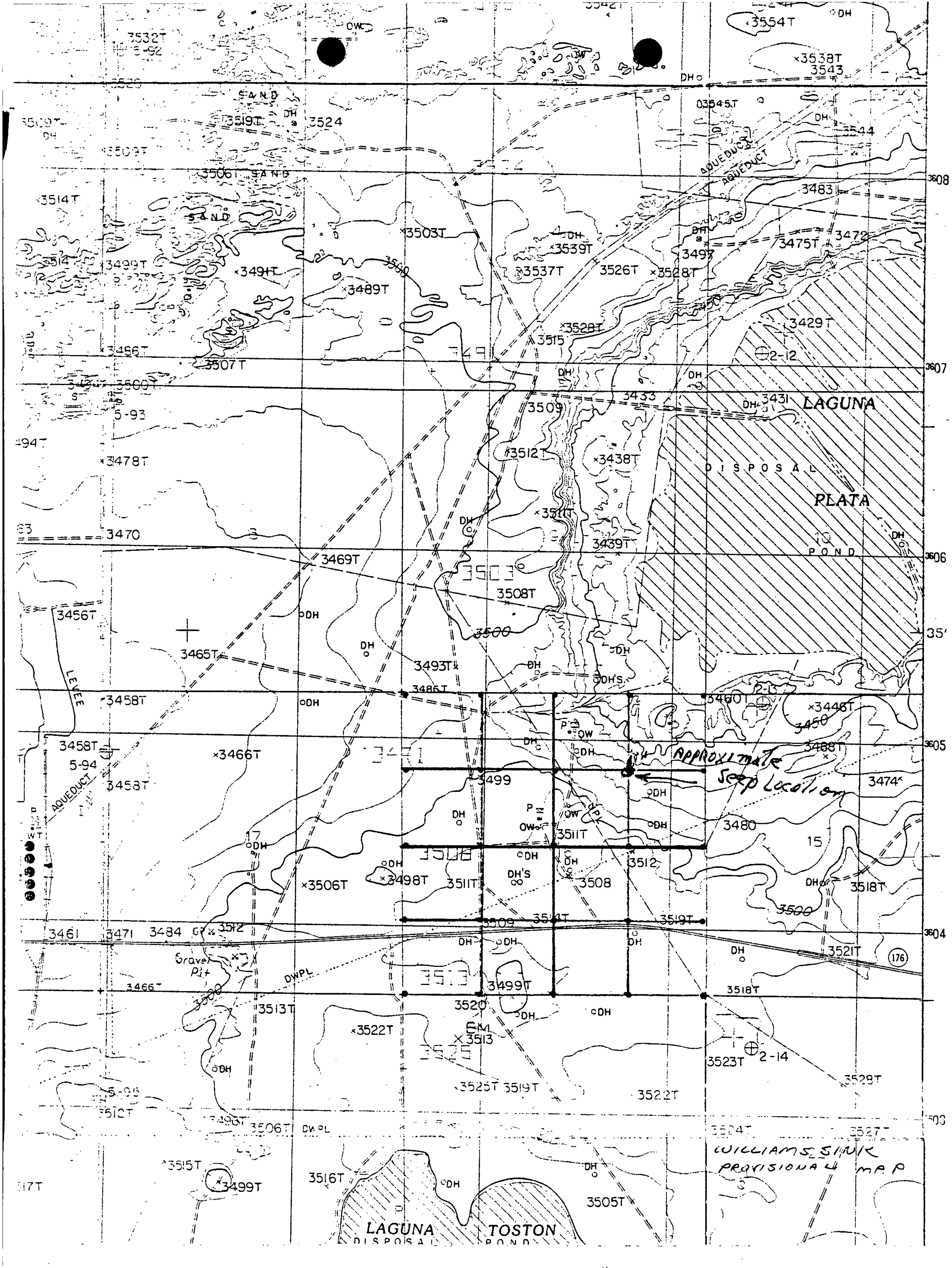
ATTACHMENT 1

PETRO-THERMO SITE PLAT



SEC 16 T 20 S R 32 E

THICKNESS of ALLUVIUM
RED BED ELEVATION



LAGUNA
DISPOSAL
PLATA
POND
APPROXIMATE Seep Location
WILLIAMS SINK
PROVISIONAL MAP
LAGUNA
DISPOSAL
TOSTON
POND
AQUEDUCT
LEVEE
SAND
Gravel Pit
DWPL
2-12
2-13
2-14
5-93
5-94
176
3608
3607
3606
3605
3604

DANIEL B. STEPHENS & ASSOCIATES, INC.
CONSULTANTS IN GROUND-WATER HYDROLOGY

• GROUND-WATER CONTAMINATION • UNSATURATED ZONE INVESTIGATIONS • WATER SUPPLY DEVELOPMENT •

April 22, 1986

Mr. R.L. Stamets
Director OCD
Energy & Minerals Dept.
P.O. Box 2088
State Land Office Bldg.
Santa Fe, New Mexico 87501

RECEIVED
APR 24 1986
OIL CONSERVATION DIVISION
SANTA FE

Dear Mr. Stamets:

Reference is made to your direction at the close of the hearing no. 8781 that any additional submissions by Petro-Thermo Corp. be made no later than April 24, 1986. This is to forward agreements regarding the testimony provided by Mr. Tim Kelly for Pollution Control, Inc. and Snyder Ranches.

Pollution Control Inc. contends that there are eight "Problems Which Have Not Been Adequately Addressed by Petro-Thermo Report". This is attached (Attachment 1) and my responses to each follow:

1. The 10-20 feet of alluvial cover thickness beneath the site is estimated from extrapolations of the alluvium - bedrock contacts easily observed in outcrops on the north side of the property at the west end of Laguna Plata. This depth is at the low end of the range of values reported in well logs shown for section 16 on page 6 of my hydrogeologic report to Petro-Thermo in December 1985.

2. There are obvious outcrops of red beds elevations above the water level of Laguna Plata in arroyos and along the shore just north of the site. As indicated in my report on page 5, there is approximately 60 feet of difference in elevation of the red bed surface between the site and Laguna Plata. The surface slope of the red beds logically must be toward Laguna Plata.

3. My hydrogeologic report indicates the presence of red beds along the west and southwest portions of Laguna Plata just north and west of the proposed site. Small Springs and seeps were observed to exist near the red bed-alluvium contact. No evidence for a bedrock channel in the vicinity of the site was noted in field reconnaissance work. If a channel exists at the site, it is possible that it conveys ground water toward Laguna Plata.

600 NEEL AVENUE SOCORRO, NEW MEXICO 87801 (505) 835-3162

4. In reference to the water level contour map Figure 3 on page 13 of my report, there is adequate justification for closing the 3440 contour. The work by Hunter (1985) and Geohydrology Assoc. (1979) is in error in this locale, partly because they did not include lake and spring elevations. The free water elevation of Laguna Plata is about 3431 feet (msl), (not 3440 as shown on Figure 3). A shallow well less than 2 miles west of the site indicates a water level of 3440 ft. The elevations of Laguna Toston southwest of the site is approximately 3476 feet. There are also springs and seeps which have been noted on the west end of Laguna Plata; in fact, one of these was sampled by Mr. Dave Boyer of NMOCD. Clearly, shallow water level data indicates an east and northeast component of flow near the site which, when combined with other data, provides ample hydrogeologic evidence to close the 3440 water level contour. It may be expected that a ground water flow divide exists somewhere west of Laguna Plata which isolates flow to Nash Draw.

5. The disposal ponds may require maintenance to function properly. The soils appear to be sandy and have the potential to allow for adequate seepage if a clogging layer is not present. However, seepage is a preferred means of disposal, in that the slow travel time of flow in the soil and shallow aquifer allow natural processes to filter and degrade hydrocarbons in the seepage before they enter Laguna Plata. It is not an uncommon practice to pipe discharge directly to playa lakes as a means of disposal.

6. There is ample data in the report which will allow one to easily calculate evaporation from the disposal ponds. Evaporation is not intended to be relied upon as a means of waste disposal.

7. Springs at Laguna Plata do <u>not</u> have TDS concentrations less than 9,000 ppm. Springs at the east end of Laguna Plata have <u>chloride</u> concentrations which range from 7446 to 8864 mg/l and sulfate concentrations which are approximately 12,000 mg/l. Thus, <u>TDS</u> is at least 20,000 mg/l.

At my suggestion, a seep at the east end of Laguna Plata (20.32.11.323) was sampled by Mr. Jim Thornton of Petro Thermo Inc. At this seep, TDS was 196,443 mg/l and chloride was 74,000 mg/l (Attachment 2A, 2B). The spring at the west end of Laguna Plata sampled by Mr. Dave Boyer had a TDS of 36,428 mg/l (Attachment 3). Therefore, the TDS range expected for the waste water is not less than that at springs.

8. The occurrence of saline lakes in depressions of the land surface overlying salt and anhydrite formations is widespread in eastern New Mexico. There are numerous other saline lakes in the region which have not received waste water from <u>any</u> known source in the past. Certainly, potash mining wastes have contributed to the mineralization of Laguna Plata. The fact that a commercial salt operation exists at Laguna Plata suggests that discharge from potash mining has not had a significant impact on

the composition of the evaporite minerals. The existing concentration of salt in the lake is not likely to be significantly affected by the proposed disposal operation.

Pollution Control Inc., in their exhibit 6 contends that there are significant differences when one makes a "Comparison of Gehydrologic Conditions at Laguna Gatuna with Laguna Plata" (Attachment 4). My comments in response now follow:

1. Natural Water Quality - The TDS, not chloride, concentration of waste water is expected to range from 25,000 to 75,000 ppm (see page 15 of my hydrogeologic report). The spring which is closest to the site, sampled by Dave Boyer (Attachment 3), has a chloride concentration of 36,428 mg/l. This falls within the range of values reported for Laguna Gatuna.

2. Ground-water Flow - There are seeps and springs at the west side of Laguna Plata which have been noted in my hydrogeologic report and inspected by NMOCD. The water level in Laguna Plata is at the lowest elevation of the lakes and shallow water levels in wells which are located in the area. Shallow water level date to the west of Laguna Plata do not support a mechanism of discharge to the west.

3. Distribution of Triassic Rocks - Red beds have been observed in outcrop in arroyos at the site. It is in this area in particular where the occurrence of red beds is relevant to the waste disposal operation.

I hope this communication clarifies the questions posed by Pollution Control Inc..

Please do not hesitate to call me if I can be of further assistance.

Yours very sincerely,

Daniel B. Stephens

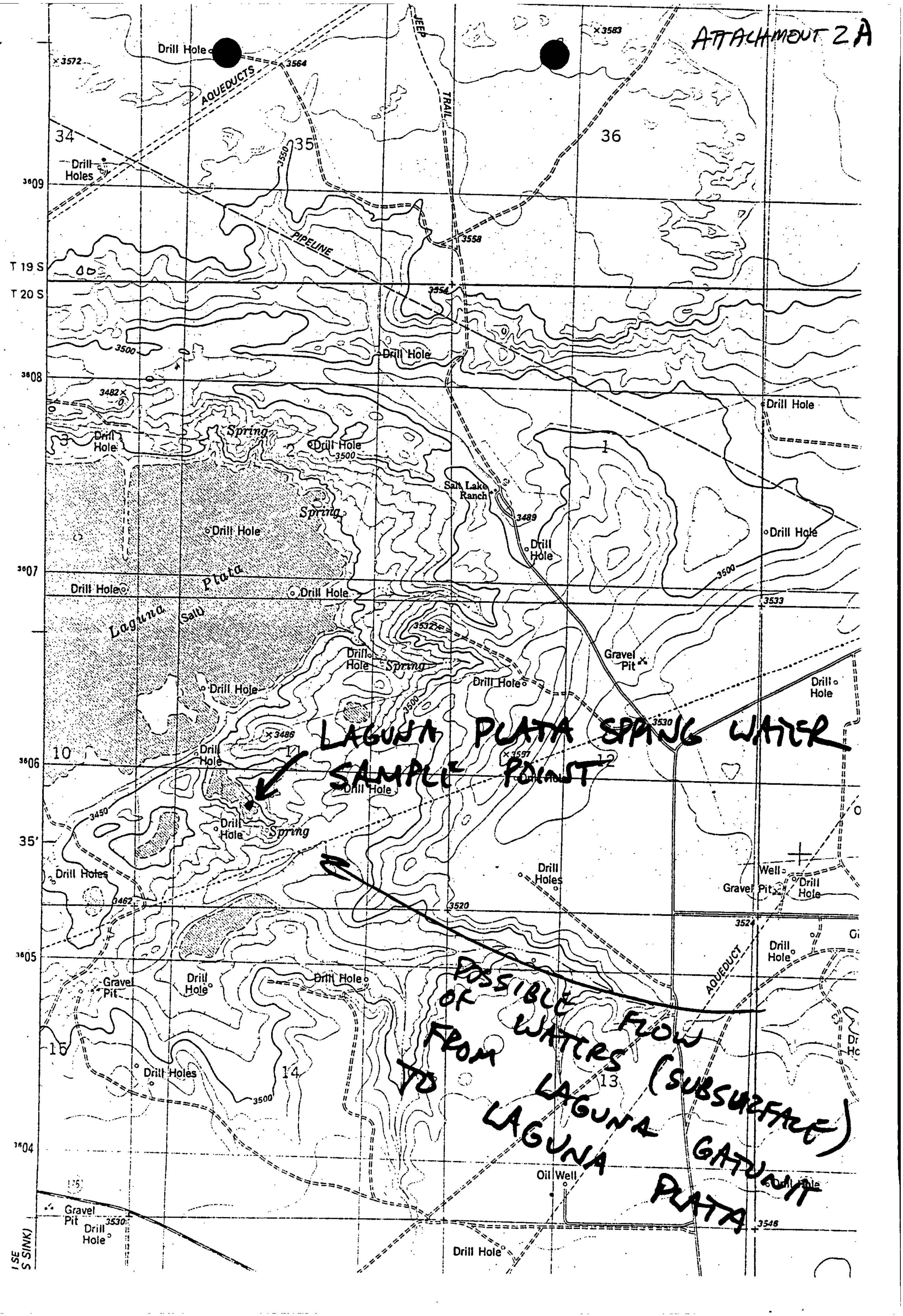
Daniel B. Stephens, PhD
President

DBS/mt

attachments

cc: J. Weber
J. Thornton

ATTACHMENT 2A



ATTACHMENT 2B

UNICHEM INTERNATIONAL

707 NORTH LEECH P.O.BOX 1499

HOBBS, NEW MEXICO 88240

COMPANY : AGUA INC.
DATE : 04/18/86
FIELD,LEASE&WELL : LAGUNA PLATA SPRING WATER
SAMPLING POINT:
DATE SAMPLED : 04/14/86

SPECIFIC GRAVITY = 1.133
TOTAL DISSOLVED SOLIDS = 196443
PH = 8.01

		ME/L	MG/L
CATIONS			
CALCIUM	(CA)+2	39.3	787.
MAGNESIUM	(MG)+2	298.	3625.
SODIUM	(NA),CALC.	2852.	65579.
ANIONS			
BICARBONATE	(HCO3)-1	7.4	451.
CARBONATE	(CO3)-2	0	0
HYDROXIDE	(OH)-1	0	0
SULFATE	(SO4)-2	1082.	52000
CHLORIDES	(CL)-1	2100	74000
DISSOLVED GASES			
CARBON DIOXIDE	(CO2)	NOT RUN	
HYDROGEN SULFIDE	(H2S)	NOT RUN	
OXYGEN	(O2)	NOT RUN	
IRON(TOTAL)	(FE)		3.6
BARIUM	(BA)+2	0	.28
MANGANESE	(MN)	NOT RUN	

IONIC STRENGTH (MOLAL) =4.176

SCALING INDEX	TEMP
	30C
	86F
CARBONATE INDEX	1.55
CALCIUM CARBONATE SCALING	LIKELY
CALCIUM SULFATE INDEX	28.3
CALCIUM SULFATE SCALING	LIKELY

IONIC STRENGTH IS TOO HIGH FOR CARBONATE METHOD

SCIENTIFIC LABORATORY DIVISION
700 Camino de Salud NE
Albuquerque, NM 87106 — (50[illegible]-2555 NN

GENERAL WATER CHEMISTRY and NITROGEN ANALYSIS

ATTACHMENT 3

DATE RECEIVED 2/10/86	LAB NO. WC 566	USER CODE ☐ 59300 ☐ 59600 ☒ OTHER: 82235 (PetroTherm)	
Collection DATE 86/02/04		SITE INFORMATION ►	Sample location: South Seep - Laguna Plata
Collection TIME 1110			Collection site description: Sample from South Seep in NE NW 1/4 of NE 1/4 Sec 16 T 20 S, R 32 E in arroyo
Collected by — Person/Agency: ROYER/OCD			Station/well code:
			Owner:

SEND FINAL REPORT TO ►

ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
State Land Office Bldg, PO Box 2088
Santa Fe, NM 87501

Attn: David Boyer

SAMPLING CONDITIONS

☐ Bailed ☐ Pump ☒ Dipped ☐ Tap	Water level	Discharge	Sample type Grab
pH (00400)	Conductivity (Uncorrected) µmho	Water Temp. (00010) °C	Conductivity at 25°C (00094) µmho

Field comments: Water seepage forms small pond/puddle at base of arroyo cut. Water seeping from thin sandstone lens at

SAMPLE FIELD TREATMENT — *Check proper boxes*

No. of samples submitted 1	☒ NF: Whole sample (Non-filtered)	☐ F: Filtered in field with 0.45 µmembrane filter	☐ A: 2 ml H_2SO_4/L added

☒ NA: No acid added ☐ Other-*specify*:

ANALYTICAL RESULTS from SAMPLES

NF, NA		Units	Date analyzed
☐ Conductivity (Corrected) 25°C (00095)		µmho	
☐ Total non-filterable residue (suspended) (00530)		mg/l	
☐ Other:			
☐ Other:			
☐ Other:			

NF, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N total (00630)		mg/l	
☐ Ammonia-N total (00610)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Chemical oxygen demand (00340)		mg/l	
☐ Total organic carbon ( )		mg/l	
☐ Other:			
☐ Other:			

F, NA		Units	Date analyzed
☒ Calcium (00915)	776.0	mg/l	2-10
☒ Magnesium (00925)	1508	mg/l	"
☒ Sodium (00930)	11960.	mg/l	"
☒ Potassium (00935)	206.7	mg/l	"
☒ Bicarbonate (00440)	4238	mg/l	2/16
☒ Chloride (00940)	15276	mg/l	2/20
☒ Sulfate (00945)	11657	mg/l	2/18
☒ Total filterable residue (dissolved) (70300)	36428	mg/l	3/13
☐ Other:			

F, A-H_2SO_4		Units	Date analyzed
☐ Nitrate-N +, Nitrate-N dissolved (00631)		mg/l	
☐ Ammonia-N dissolved (00608)		mg/l	
☐ Total Kjeldahl-N ( )		mg/l	
☐ Other:			

Analyst	Date Reported	Reviewed by
	3/24/86	[illegible signature]

Laboratory remarks

SLD 726 (12/84) *DISTRIBUTION:* WHITE — EID GW&HW Bureau CANARY — WS System PINK — EID Local Office GOLDENROD — SLD

ATTACHMENT 1

PROBLEMS WHICH HAVE NOT BEEN ADEQUATELY ADDRESSED BY PETRO-THERMO REPORT

ESTIMATED 20' OF EXPOSED ARROYO

1. The thickness of the alluvial cover is unknown at the proposed site. Within Section 16, the thickness ranges from 0 to 130 feet, but it is completely unknown at the proposed site itself.

2. The upper surface of the redbeds is an erosional surface of considerable relief. There is no evidence presented by the report which confirms that the redbed surface slopes directly toward Laguna Plata.

3. The report does not disprove work by Reed (1969) which indicates a bedrock channel which would result in a westward migration of groundwater from Laguna Plata (illustration).

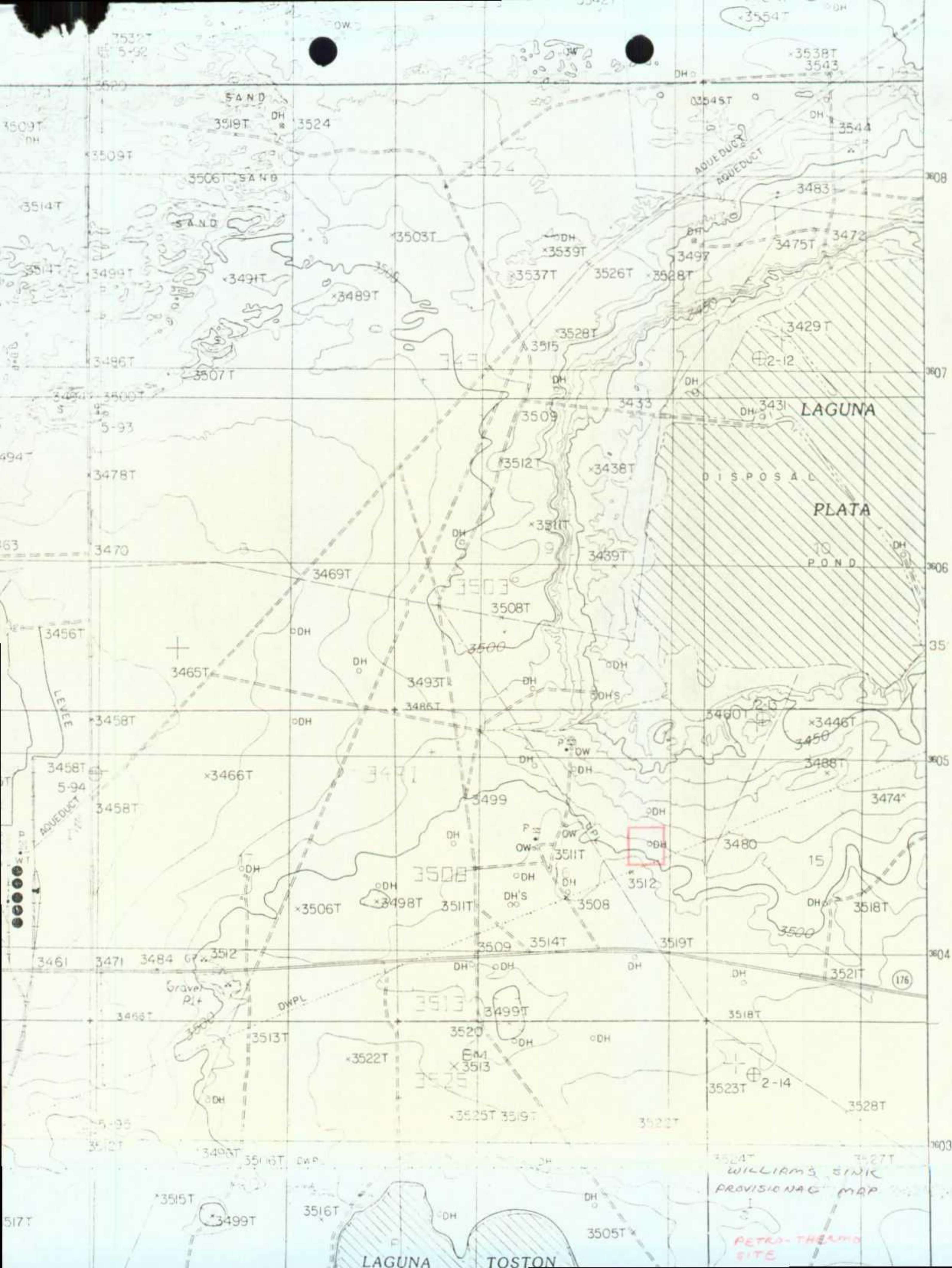
4. The report, Figure 3, shows that the 3,440-foot contour is closed, thus indicating that Laguna Plata is a closed depression. Data on the map shows no justification for closing the contour. The intrepretation shown in Figure 3 is not supported by work by Hunter (1985) or by Geohydrology Assoc., (1979). (illustrations)

5. No evidence is presented in the report which substantiates that the disposal ponds will function properly. In fact the very nature of drilling mud is to cause plugging of natural porosity in sediments.

6. Evaporation of fluids should be calculated for surface area of the disposal ponds and ~~NOT for~~ Laguna Plata.

7. The report does not contain any chemical analyses of water samples from the fluid which will be disposed. The TDS range is reported to be 25,000 to 75,000 ppm but springs at Laguna Plata have less than 9,000 ppm. *

8. The concentration of 335,100 ppm reported in report for Laguna Plata is a concentrated brine resulting from evaporation on the lake floor or is a residual concentration from potash discharge by Kerr-McGee


SAND
AQUEDUCT
AQUEDUCT
LAGUNA
DISPOSAL
PLATA
POND
LEVEE
AQUEDUCT
Gravel Pit
DWPL
LAGUNA
TOSTON
WILLIAMS SINK
PROVISIONAL MAP

50 YEARS

1935 - 1985

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

March 21, 1986

Mr. Robert W. Abbott
Petro-Thermo Corporation
P. O. Box 2069
Hobbs, N.M. 88241-2069

Re: Request for Extension of Time for Temporary Use of Pit

Dear Mr. Abbott:

This letter is to confirm a telephone conversation today between Jamie Bailey, OCD Field Representative, and John Weber regarding an extension of the permit for temporary disposal of brine, fresh water-based drilling mud, and waste cement in the emergency overflow pit located at the Blinebry-Drinkard SWD System Well No. A-22 in 22-T22S-R37E. Your latest temporary permit expired March 20, 1986.

Due to time restrictions associated with Case No. 8781 which was brought to hearing on December 18, 1985, and will be heard De Novo before the Commission on April 9, 1986, you are hereby granted an extension until April 10, 1986, for the specified temporary use of the pit.

An inspection of the area will be made on April 3, by OCD personnel, and they are authorized to order immediate closure of the pit if conditions warrant.

Authorization for the temporary use of this pit may be rescinded at anytime if there is evidence that the pit has overflowed or if Water Quality Control Commission or Oil Conservation Division rules or regulations have been violated.

Sincerely,

R. L. Stamets

R. L. STAMETS
Director

RLS:dp

cc: Jerry Sexton
David Boyer
Michael Stogner

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS
1935 - 1985

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
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Sincerely,

R. L. Stamets

R. L. STAMETS
Director

RLS:dp

cc: Jerry Sexton
David Boyer
Michael Stogner

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

50 YEARS
1935 - 1985

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

February 18, 1986

Mr. John Weber
Maddox, Renfrow & Saunders
Attorneys at Law
P.O. Box 5370
Hobbs, NM 88241

Dear Mr. Weber:

In accordance with Paragraph 2 of Division Order R-8161, a plan for the installation and sampling of monitor wells at the proposed Laguna Plata Petro-Therm site has been discussed by Environmental Bureau Chief David Boyer, Petro-Therm Engineer James Thornton, and consultant hydrologist Dr. Daniel Stephens. Agreement has been reached that three shallow monitor wells will be installed prior to operation, inspected monthly for fluids, and sampled every six months if fluids are detected. The particulars of well location, completion and type of sampling are provided below:

1) Two monitoring wells shall be located at a distance no greater than 200 feet north of the north boundary of the 8.264 acre area within Tract B as shown on the attached plat map. These two wells shall be located at distances of approximately 70 and 200 feet east of the west boundary line of Tract B. The third well shall be installed within Tract B to the north of the first two wells at a location to be agreed to after further surface inspection of topographic and geologic features.

2) Monitoring wells shall be drilled through the alluvium with the base completed in the first clay, claystone or shale in the redbeds. The wells shall be constructed of 4-inch diameter PVC pipe which is slotted or perforated from a distance of 4 feet beneath the surface to total depth, and shall be adequately gravel packed or otherwise completed to allow fluids to enter the well for sampling, but to prevent silting. The wells shall have the upper four feet cemented to prevent surface fluid entry.

3) The wells shall be checked monthly for fluids and the results reported monthly to the Division's office in Santa Fe.

4) Upon detection of fluids in any of the monitoring wells, sampling of these fluids shall take place and be repeated at six-month intervals. Samples shall be analyzed for heavy metals and purgeable aromatic hydrocarbons as listed on the attached sheet. A copy of the results shall be submitted to the Division office in Santa Fe for review as to the nature and threat to human health, if any, of allowing such seepage movement to continue towards Laguna Plata. This review will take into consideration the fact that Laguna Plata is not, and does not have the potential to be, a drinking water source.

The plan described above will satisfy the requirements of Paragraph 2 of the above order. As provided for in the order, the Director of the Division may by administrative order rescind the authorization and/or require additional conditions be met if it is determined that such rescission or additional conditions would serve to protect fresh water supplies from contamination, assure the protection of human health or livestock, and the prevention of waste.

If you have any questions on the monitoring and sampling aspects of this order, please contact Mr. David Boyer at the above address or at 827-5812.

Sincerely,

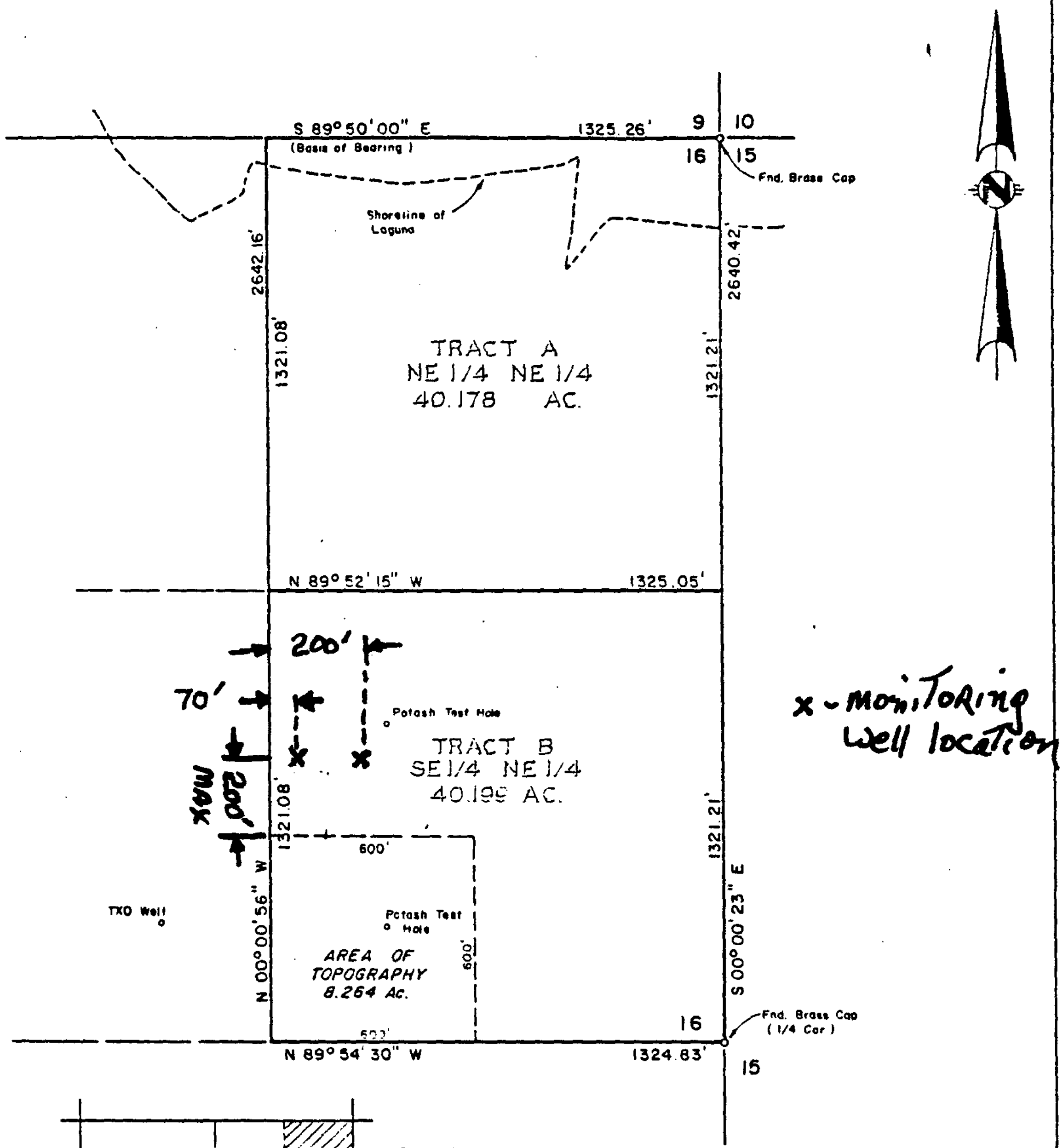
R. L. Stamets

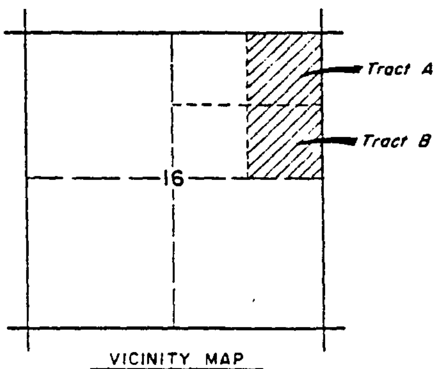
R. L. STAMETS
Director

RLS/DB/dp

cc: David Boyer, OCD Santa Fe
Jerry Sexton, OCD Hobbs
Fran Cherry, BLM Carlsbad
Daniel Stephens, Socorro

90618





VICINITY MAP
2" = 1 mile

I HEREBY CERTIFY THAT THIS PLAT WAS MADE FROM NOTES TAKEN IN THE FIELD IN A BONA FIDE SURVEY MADE UNDER MY SUPERVISION, AND THAT THE SAME IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JOHN W. WEST, N.M. P.E. & L.S. No. 676
TEXAS R.P.S. No. 1138
RONALD J. EIDSON, N.M. L.S. No. 3239
TEXAS R.P.S. No. 1883

AGPA, INC.

Two tracts of land being the SE¼ NE¼ and the SE¼ NE¼ of Section 16, T 20 S, R 32 E, N.M.P.M., Lea County, New Mexico.

JOHN W. WEST ENGINEERING COMPANY
CONSULTING ENGINEERS — HOBBS, NEW MEXICO

Scale 1" = 400'	Drawn By
Date	Ck GJ
Sheet of Sheets	

PETRO - THERM ANALYSIS
OF WATER SAMPLES

Water samples from the monitoring wells shall be analyzed for the following dissolved hydrocarbons (BTX):

Benzene	o-xylene
Ethylbenzene	m-xylene
Toluene	p-xylene

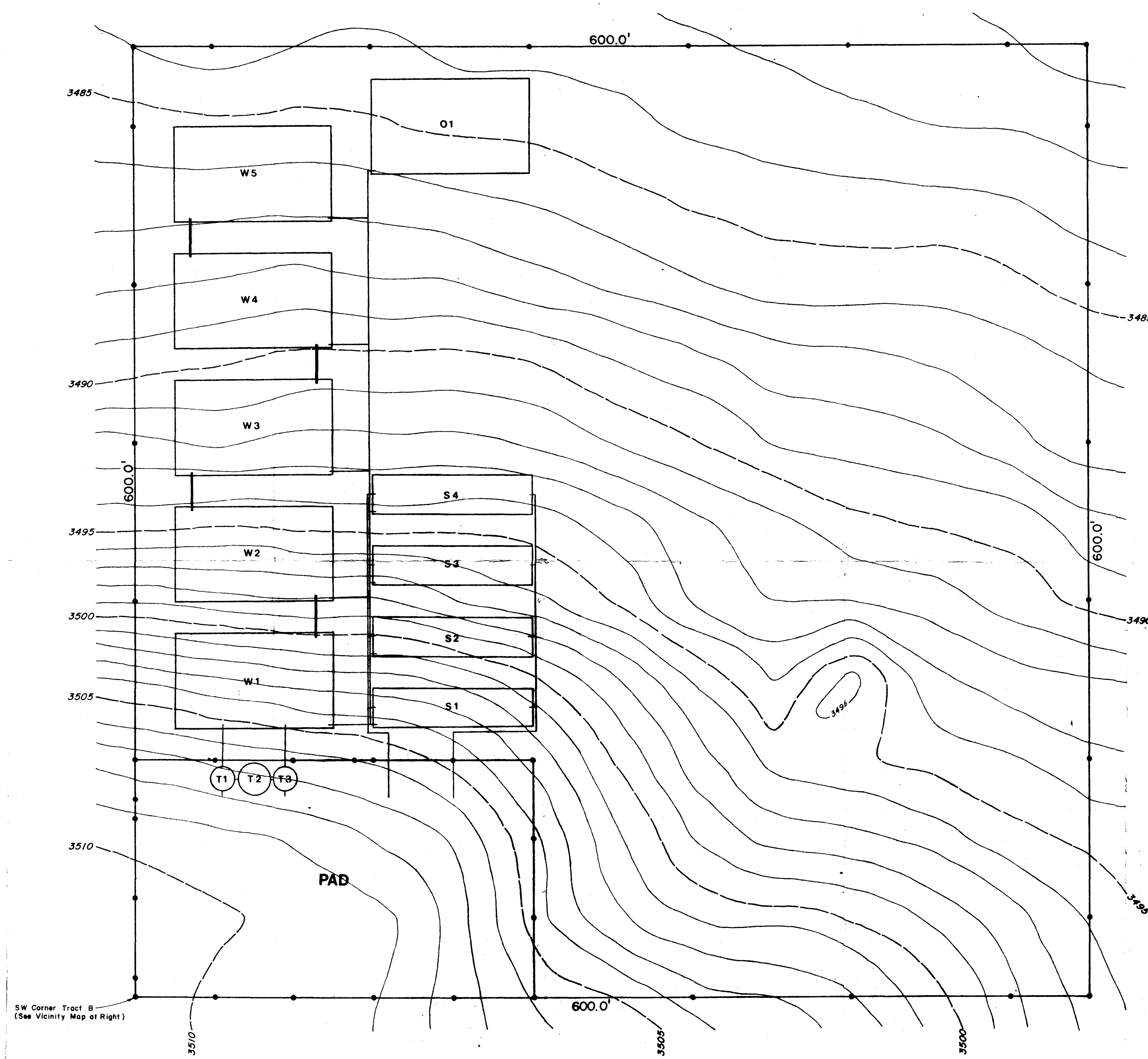
The suggested method is EPA Method 602 which is a purgeable aromatic scan and costs less than the use of a gas chromatograph/mass sprectrometer. Minimum detection limit should be 10 ppb (or 0.01 mg/l). The standard sample is 40 ml collected in a glass vial with a teflon septum seal. No air should be trapped between the water and the seal.

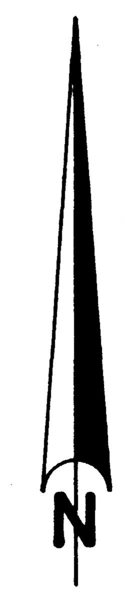
Water samples should be analyzed using an inductively coupled argon plasma scan (ICAP) with a minimum detection limit of 100 ppb (0.1 mg/l). One scan provides concentrations for the following elements:

Aluminum	Lead
Barium	Magnesium
Beryluim	Manganese
Boron	Molybdenum
Cadmuim	Nickel
Calcium	Silicon
Chronimum	Silver
Cobalt	Strontium
Copper	Tin
Iron	Vanadium
	Zinc

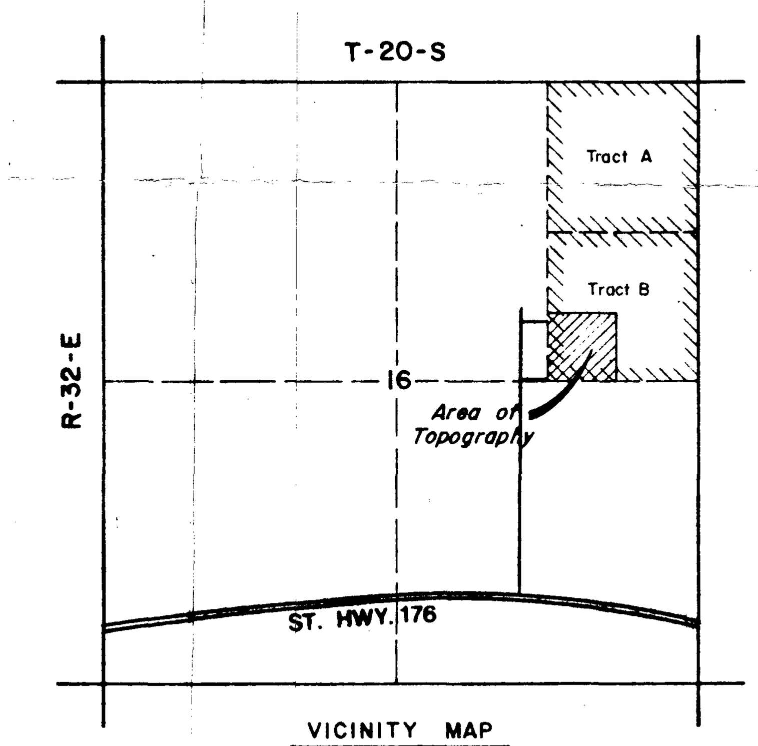
In addition samples shall be analyzed for arsenic, and mercury using atomic adsorption methods. Minimum detection levels should be 10 ppb (0.01 mg/l) for arsenic and 1 ppb (0.001 mg/l) for mercury. A single one quart plastic container should be sufficient for all of the heavy metal analyses. Samples should be preserved with 5 ml of concentrated nitric acid.

The use of scans will provide much information on contaminants but is very much less time consuming and expensive than individual analyses. Your consultant can provide you with the names of several laboratories that will provide these services at a reasonable cost. The laboratory selected should also provide further information on sampling and preservation procedures. Contact the OCD or your consultant for the desired method of sampling to prevent false results from being obtained.





Scale: 1" = 40'
Contour Interval: 1 foot



VICINITY MAP
4" = 1 Mile

CAPACITIES (BARRELS):

O - OVERFLOW PIT
S - SOLIDS DISPOSAL PIT
W - WATER DISPOSAL PIT
T - TANK BATTERY
● - FOUR STRAND BARBED WIRE FENCE

W1 7480 (10686)	S1 3117 (4452)	O1 0 (3206)	T1 750
W2 7480 (10686)	S2 3117 (4452)		T2 1000
W3 6411 (9617)	S3 2671 (4 07)		T3 750
W4 5343 (8549)	S4 2226 (3562)		
W5 4274 (7480)			
30988 (47017)	11131 (16473)	0(3206)	2500

* (MAXIMUM CAPACITIES)

I HEREBY CERTIFY THAT THIS PLAT WAS MADE FROM NOTES TAKEN IN THE FIELD IN A BONA FIDE SURVEY MADE UNDER MY SUPERVISION, AND THAT THE SAME IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JOHN W. WEST, N.M. P.E. & L.S. No. 676
TEXAS R.P.S. No. 1138

AGUA, INC.

TOPOGRAPHY OF A 600' x 600' AREA OUT OF TRACT B, BEING THE SE 1/4 NE 1/4 OF SECTION 16, T 20 S, R 32 E, N.M.P.M., LEA COUNTY, NEW MEXICO.

JOHN WEST ENGINEERING CO.
CONSULTANTS
HOBBS NEW MEXICO

Surveyed By D. Hicks	Drawn By M. Mitchell	Last Rev. Date	Drawing Number
Date Begin 10-11-85	Date 10/30/85	File No.	
Date End 10-18-85	Checked By G J	Sheet 1 Of 1	

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

18 December 1985

EXAMINER HEARING

IN THE MATTER OF:

The application of Petro-Thermo Corporation for an exception to Division Order No. R-3221 and for authorization to dispose of associated waste hydrocarbons and other solids obtianed in conjunction with the drilling and production of oil and gas into a disposal site on the surface, Lea County, New Mexico. — CASE 8781

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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A P P E A R A N C E S

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I N D E X

I N D E X

E X H I B I T S

MR. STOGNER: This hearing will come to order. We'll now call Case Number 8781.

MR. TAYLOR: The application of Petro-Thermo Corporation for an exception to Division Order No. R-3221 and for authorization to dispose of associated waste hydrocarbons and other solids obtained in conjunction with the drilling and production of oil and gas into a disposal site on the surface, Lea County, New Mexico.

MR. STOGNER: We'll now call for appearances.

MR. WEBER: Sir, my name is John Paul Weber. I'm with the law firm of Maddox, Renfrow, and Saunders in Hobbs, New Mexico.

I appear here today with Mr. Ernest L. Padilla, law firm of Padilla and Snyder, of Santa Fe, on behalf of the applicant, Petro-Thermo Corporation and its Aqua Division.

MR. STOGNER: Thank you, Mr. Weber. Any other appearances?

MR. KELLAHIN: Yes, Mr. Examiner. I'm Tom Kellahin of Santa Fe, New Mexico. I'm appearing on behalf of Snyder Ranches. Snyder Ranches has grazing leases in the area of the application.

In addition, I'm appearing on

behalf of Pollution Control, Inc., which is the current Oil Conservation Division permitted disposer of produced salt water into Laguna Plata, and so our -- Pollution Control's interest immediately offsets Mr. Abbott's acreage in Section 16. We are adjoining neighbors but we are appearing to see about the operations here.

MR. ABBOTT: Is he putting on testimony or introducing himself?

MR. KELLAHIN: Those are the parties I represent here today, Mr. Stogner.

MR. STOGNER: Thank you, Mr. Kellahin.

Are there any other appearances?

Are there any parties who wish to make any statements at this time?

Would you please stand up, identify yourself?

MS. WOOD: My name is Nancy Wood. I work with the State of New Mexico Historic Preservation Division. I'm an archaeologist.

MR. ABBOTT: Who do you repre sent?

MS. WOOD: The Historic Preservation Division.

MR. ABBOTT: And what part is that of --

MR. STOGNER: Please continue.

MS. WOOD: Okay. It's part of New Mexico Historic Preservation Division, Cultural Affairs.

Our concern is with the protection of archaeological sites in the vicinity. There's a number of known important archaeological sites around the vicinity of Laguna Plata.

Approximately fourteen of them were determined eligible for the Natural Register of Historic Places in approximately 1975.

I checked the State archaeological records. We don't know of any known sites that are on this specific area that's proposed for development but given the proximity to the lake margin there is a reasonably good probability that there may be sites (not clearly audible) particularly (not clearly audible).

The only way to tell if there are some is if an archaeological survey is done.

The other thing that I just wanted to point out is that under -- under the State Cultural Properties Act it is a violation of the Act to injure or destroy archaeological sites on State lands.

The other information that I

wanted to point out is that it's my understanding that the Bureau of Land Management has some interest in preserving the (not understood) Laguna Plata Area as an archaeological reserve.

There would be something more to take up with the Bureau of Land Management, but that's my understanding, and one of our -- one of our responsibilities under the law is to inform other State agencies and local governments of possible effects that their actions may have on (not audible clearly) resources.

Our usual recommendation for something like this is an archaeological survey should be done to try to protect these resources.

MR. STOGNER: Thank you, Ms. Wood. Is that everything you have?

MS. WOOD: Yeah, it is. Thank you.

MR. STOGNER: Are there any other statements?

MR. TAYLOR: Ms. Wood, is your agency recommending that a cultural survey be made? Is that a recommendation or are you just saying that's something you sometimes do?

MS. WOOD: Okay, it is a fairly standard recommendation that we do make. There is no requirement under State law that surveys be done but it is a recommendation that I would make in order to protect archaeological --

MR. TAYLOR: Are you making it, then? Is that what you're saying?

MS. WOOD: Yes, I am making that recommendation.

MR. TAYLOR: And you're with the Division of Cultural Affairs of the Historical Preservation -- what's the rest of the name of it?

MS. WOOD: Just Historic Preservation Division.

MR. TAYLOR: Historic Preservation Department?

MS. WOOD: Division.

MR. TAYLOR: Division of the Division of Cultural Affairs?

MS. WOOD: Office.

MR. TAYLOR: The Office of Cultural Affairs.

MS. WOOD: Yeah.

MR. TAYLOR: I have to get all these divisions and offices straight.

Okay, thank you. We'll make that a part of the record.

MR. STOGNER: Okay, are there any other statements at this time before we get started?

There being none, will all witnesses at this time please stand and be sworn?

(Witnesses sworn.)

MR. STOGNER: Mr. Weber, you may proceed.

MR. WEBER: Sir, I would like to make a brief opening statement.

MR. STOGNER: Okay.

MR. WEBER: Petro-Thermo Corporation comes here today to seek an exception to Division Order R-3221, the general "no pit" order which was entered on the 1st of May, 1967, by the Oil Conservation.

There has been a real need in southeastern New Mexico for additional approved sites for disposal of oilfield related liquids and solids. This need has been communicated to Petro-Thermo Corporation and they have very actively searched the area to find a suitable site, a site that would not contaminate any existing fresh water supplies.

We feel, and we'd like to review the regulatory history relating to this particular area and request that you take administrative notice of the various orders that have been entered with regard to this area in order to understand why we feel that this is the best possible site in southeastern New Mexico for this sort of a disposal facility.

By order dated July 25, 1968, that was Order No. R-3221-B in Case Number 3806, the Oil Conservation Commission exempted certain areas of Lea County, New Mexico, from the prohibition against disposal of production water in unlined surface pits.

Among the areas exempted was Range -- correction, Section 16, Township 20 South, Range 32 East.

The Commission at that time thought that the purpose of Order No. R-3221 would not be (not understood) by its enforcement in this area.

I would ask you to note that the proposed disposal site is located within the bounds of Section 16.

By letter dated April 16, 1969, the Oil Conservation Commission again considered this particular area. They considered it in Case Number 4047, resulting in Order R-3725.

By this order the Oil Conservation Commission specifically permitted the disposal of production water in an actual salt lake known as Laguna Plata in Lea County, New Mexico. The Commission found that the utilization of Laguna Plata for the disposal of production water would not constitute a hazard to existing fresh water supplies in the area.

That, Mr. Examiner, is the legislative history . We feel that there is a definite need, a need which we will show through the testimony of our witnesses.

We will show that we have developed detailed engineering plans to eliminate any possibility of contamination of existing fresh water supplies.

We have very carefully examined the geology the topography of the area, and have reached the conclusion that once again the disposal would not constitute a hazard to existing fresh water supplies.

Sir, at this point I would like to call as our first witness Mr. Abbott, the President of Petro-Thermo Corporation.

MR. STOGNER: Before we do that, Mr. Weber, let me make sure I've got this clear.

You referred to Case Number 3806 and 4047, I believe?

MR. WEBER: That is correct.

MR. STOGNER: I will take administrative notice of both of those cases.

Please continue.

WILLIAM G. ABBOTT,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. WEBER:

Q Sir, would you please state your full name?

A Yeah. My name is William G. Abbott and I live in Hobbs, New Mexico. I'm --

Q Sir, what is your -- sir, what is your profession?

A I'm a petroleum engineer.

Q From what institution did you receive your undergraduate degree, sir?

A I received by degree from the University of Texas in January of 1948.

Q Sir, what was your specialty or area of concentration?

A Actually my degree is in mechanical engineering but I specialized in petroleum engineering.

Q Sir, are you a member of any professional societies or organizations?

A Yes. I belong to the Society of Professional Engineers, Society of Petroleum Engineers, and API, American Petroleum Institute.

Q Sir, do you possess any licenses as an engineer?

A Yes. I'm licensed as a professional engineer in the State of New Mexico; also the State of Texas.

Q Sir, how long have you been a resident of Hobbs, New Mexico?

A I've lived in Hobbs, New Mexico since 1951.

Q Sir, could you please explain your work history?

A Yes. I was transferred to Hobbs, New Mexico, in 1951 with Amerada Petroleum Corporation, and I stayed with Amerada Petroleum Corporation until the middle of 1957 when I went to work as Manager of Rice Engineering in Hobbs, New Mexico.

Q Sir, what sorts of things does Rice Engineering do?

A Well, Rice Engineering specializes in salt water disposal and in 1967 I formed my own corporation, Agua, Incorporated, to specialize in the salt water disposal.

Q All right, sir. Sir, have you ever had an opportunity to testify before the Oil Conservation Commission?

A Yes, sir.

Q In what capacity did you so testify?

A With Amerada I was District Engineer and testified and then with Rice Engineering as Division Manager, and then with Agua as President.

Q Sir, were your qualifications accepted by the Oil Conservation Commission?

A Yes, they were.

MR. WEBER: Sir, I tender this witness as an engineer.

MR. STOGNER: Are there any objections?

MR. KELLAHIN: No, sir.

MR. STOGNER: Thank you. There being none, Mr. Abbott is so qualified.

Q Mr. Abbott, would you please describe in general terms the history of Petro-Thermo Corporation?

A Yes. We formed Petro-Thermo Corporation in 1970. We had a problem in -- during that time of disposing of oilfield waste, namely oil and BS, tank bottoms, and we formed Petro-Thermo to clean tanks and then later on we got authority to -- from the Corporation Commission to be permitted to haul oilfield waste.

Q Sir, is Petro-Thermo Corporation a common motor carrier operating under a Certificate of Public Convenience and Necessity issued by the State Corporation Commission?

A Yes, sir, they are.

Q And do you also have authorization to move produced water from the Oil Conservation Commission?

A Yes.

Q Sir, in what counties and if you could please use the maps which are posted on the wall as exhibits.

A I think Exhibit One shows our counties of authority cross hatched. You'll notice the full east side of New Mexico, starting up here in Union County. We have a trucking yard at Clayton, New Mexico, up in Union County, and then we have all these counties cross hatched and we have another terminal and main office at Hobbs, New Mexico.

Q Sir, do you also have a division of Petro-Thermo Corporation called Agua, do you not?

A Yes, sir.

Q And what does Agua do and where does it do it?

A Oh, well, we operate disposal systems.

We've been hired by the oil companies to dispose of their water in the various systems and Agua operates those systems, the largest being down at Eunice, the Blinebry-Drinkard salt water disposal system, with approximately 550 wells.

Q Sir, that particular system is covered by a temporary permit, is it not, sir?

A Well, we have a temporary permit in that area issued by the Oil Conservation Division to dispose of solids. I can't remember when it runs out. It was a temporary, about a sixty day permit, so we need to proceed and to get a permanent place for the disposal of solids or waste.

Q Sir, would you please describe the reclaiming operations that are undertaken by Agua, Incorporated?

A Yes. We -- we operate a reclaiming plant. It's called our Goodwin Reclaiming Plant where we treat the tank bottoms to try to get a merchantable oil to sell as pipeline oil.

We also sell from -- from that spot drilling fluid additives. That's low, low grade hydrocarbons that are used in the drilling industry when they drill a well to add to the drilling mud.

Q Sir, do the reclaiming operations that you undertake, or that Agua, Incorporated, undertakes result in the conservation of valuable energy resources?

A Yes. We produce a merchantable product and sell it, it's taxed, and we think it does prevent waste in the oilfield.

Q Sir, you've indicated that Petro-Thermo Corporation in its trucking operation serves Lea, Eddy, and Chaves Counties.

Will you please tell us the approximate number of oil wells in those counties?

A Yes, as you can see from this Exhibit Two, all these wells, most of them are in Lea County, coming from Hobbs and covering the whole of Lea County, Lea County is approximately 80 miles long and 40 miles wide and in the county there's over 15,000 oil and gas wells.

In Eddy County, they're growing. There's approximately 7200, over 7200 wells.

And in Chaves County there's about 2200 wells.

And if you'll notice, this proposed waste disposal site is right in the middle of all the wells. It can be reached by main highways and is a very good place to haul to.

Q Sir, could you, using Exhibit Number Two and the following exhibit, Exhibit Number Three, describe what is meant by the Hobbs Pool?

A Yes. The Hobbs Pool is a pool right surrounding and in the City of Hobbs. About one third of the wells are in the city limits of Hobbs. There are over -- there are about 480 wells right now in the Hobbs Grayburg-San Andres Pools.

Those -- that pool is unitized, the north end being operated by Shell Oil Company and the south end unitized and operated by Amoco.

And I -- I can see that in the future, within -- if the price of oil stays up. that this waterflood will expand into CO2 flood and also they'll probably double the number of wells drilled in the Hobbs Pool.

Q So these are what are called tertiary means of recovery?

A Yes, that's right. Of course, when they drill these wells in this area especially, all the cuttings and all the mud has to be hauled out; they can't be left in the pits, be covered over; they have to be hauled away and that's why a solids waste area is needed.

Q So where are they hauled away to?

A Well, right now there's only two authorized places that I know of. One is an area down north and east of Eunice called Parabo. Parabo is limited somewhat because of the geology and the hydrology. It will probably be shut down this -- this winter because the water level gets too high. When that happens they just have to shut it down.

The other site is out at the Laguna Gatuna.

Q Who operates that site, sir?

A Laguna Gatuna operates -- is operated by what do you call it -- I guess the Pollution Control, yeah, Incorporated.

Q Are there any limitations placed on the amount of waste which can be disposed of in Laguna Gatuna?

A Well, I think their order reads 30,000 barrels day, or something like that. I don't know if they could ever approach that capacity. I just don't have the knowledge.

Q Sir, have you received --

A I can point it out here. This is Laguna Gatuna, this area.

MR. STOGNER: What exhibit are you referring to?

MR. WEBER: Sir, that was Exhibit Four.

A Four.

MR. STOGNER: And on Exhibit Four what did you point to?

A Laguna Gatuna.

MR. STOGNER: It's on the far east side --

A Yeah, that's where Pollution --

MR. STOGNER: -- of the map.

A -- Control operates (not understood) site, or disposal site, and on the same Exhibit Four it shows Laguna Plata.

MR. STOGNER: Thank you, Mr. Abbott.

Q Sir, have you received from any other operators of oil and gas wells, or producers, any indication of need for additional disposal facilities in the southeastern portion of New Mexico?

A Yes, we've received copies of letter submitted to the Oil Conservation Division. I don't know the total number of them, since we haven't received copies of all of them.

Q Sir, I show you three letters which have been marked Five -- Exhibits Five, Six, and Seven, and ask you if you can recognize those?

A Yes. This first one is a letter from Amerada Hess Corporation; the second is a letter from Amoco Production Company; and the third one is Natural Resources Engineering, Inc..

Q Mr. Abbott, would you take Exhibit Number Five and read that letter into the record?

A This is the --

MR. KELLAHIN: I'm going to object, Mr. Examiner, to a letter being read into the record as part of the evidence in this case.

I think the typical way the Commission handles communications from nonparticipants in a hearing is to place them in your case file and read them as a practical matter, but we object to those things being introduced into evidence without a proper foundation, and none has thus far been made.

MR. WEBER: Mr. Examiner, I feel that a proper foundation has in fact been laid. These are letters from oil and gas operators in Hobbs, Lea County, New Mexico area. They have all, true, been sent directly to the Oil Conservation Division; however, carbon copies of those letters have been sent to Mr. Abbott in his capacity as President of Petro-Thermo Corporation.

MR. KELLAHIN: The letters speak for themselves, Mr. Examiner, there's no need to read them into the record to highlight Mr. Abbott's testimony. It's inappropriate.

MR. WEBER: Perhaps I can use them in a different way.

Q In very general terms, what factors have been indicated to you as the important factors with regard to the need for an additional disposal site?

A Well, the need, of course, is generated by the volume that will have to be disposed of and also, in the last two years, as the Conservation Division realizes, there have been some very serious salt water flows. In fact, we've been engaged to haul concentrated brine and Redbeds, and so on, from wells that are flowing out of control, and that -- that has to be disposed of right away because it's so -- so corrosive and so full of chlorides.

In fact on one -- one occasion, this well was flowing at such a high rate that there were over forth transports hauling 24 hours a day to keep up with the flow, and to my knowledge, I think the well is still flowing, but I think it's under control now, they're disposal downhole.

There is another area just recently, just south, I think it was mostly east of Lovington, same way, a drilling well, and salt water started flowing out of that well and that had to be hauled off.

Now this, this is very difficult because it isn't clean salt water. I mean it isn't water that you (not understood) a disposal well. It's water laden with Redbed solids and so on, and you couldn't use it to be disposed in a disposal system; it would plug up the wells.

So sites are needed such as this Laguna Plata site that we propose.

Q Sir, faced with the foreseen need in the oil and gas community, what steps did you take in determining the location of your proposed disposal site?

A Well, first of all, we -- we needed a centrally located area, one that we could see from our view it wouldn't pollute any water, and it would cause the least disturbance to -- to people, and that's why we selected this Laguna Plata.

Q Is this a very populated area?

A No, it's very, very sparsely populated.

Q What consideration did you give to the existing road map? Will the road map support the movement of transport trucks?

A Yes. I think the roads coming into this area, you have a 176 State highway coming up from the Eunice area, which is very, very important because there are a lot of wells in the Eunice area.

Then up from the north there's a road that ties into the area of Maljamar, which is being waterflooded at the present time and if one of those wells got away they'd have to take it some place and this would be centrally located.

It's also located close to the Eddy County wells.

Q And, sir, is there not an existing caliche road which leads almost up to the point of the disposal site?

A Yes. There was a dry hole drilled by TXO and they built a caliche road within just a short distance, probably 400-500 feet from this proposed site of ours.

Q Sir, to your knowledge has Laguna Plata been previously approved for the disposal of waste?

A That's what I understond, yes, sir.

Q Do you know if it's now being so used?

A No, sir.

Q Sir, for what capacity did you direct the design for the disposal facility?

A We designed it for 30,000 barrels a day of water. I don't know if we'll ever reach that, but it's over-designed as far as the pits that we -- and the tanks.

Q Sir, what is your actually immediate needs?

A I think probably around 2200 barrels a day of produced water.

Q Sir, how quickly could you put into place a disposal facility once the necessary approvals have been granted?

A I think we could do it in thirty to sixty days.

Q Sir, what sophisticated design features have you directed to be incorporated in your plans to avoid the possibility of contamination of existing fresh water supplies?

A Well, I think our engineer probably could go into more detail, and the hydrologist, but on the Exhibit Five is our layout of the pits. The pits on the left on this Exhibit Five are the water pits, and also on Exhibit Nine we have a model that shows those pits.

MR. STOGNER: Excuse me, I show Exhibit Five as being a letter.

Is that Exhibit Eight you're referring to, I believe?

MR. WEBER: That is correct, Mr. Examiner.

A Yeah, Exhibit Eight, excuse me.

MR. STOGNER: Thank you.

A Exhibit Nine is a model made from the topographic map of the area and as you can visualize, the tankage will be up here on this pad. The entrance to this area will be right up here.

MR. STOGNER: Now, are you referring to the extreme southwest portion of --

A Yes.

MR. STOGNER: -- Exhibit Number Eight, is that right?

A That's right. This -- this Exhibit Nine is a 600 by 600 foot plat and it's located in the northeast, it's in the east half of the northeast quarter of Section 16, 20, 30.

Q 2.

A 32, yeah, and if you'll notice on this model, we will locate the gunbarrels and oil storage tanks up on the pad. The water will go on into these pits and that will be described in detail from -- with our engineer.

The solids are roughly on the righthand side, the pits on the righthand side. That has been designed so that the solid pits can be cleaned out by dozers or backhoes.

MR. STOGNER: Before we leave Exhibits Eight and Nine, these contours that you show on both of these, are those one-foot intervals?

MR. THORNTON: Yes. Yes.

MR. STOGNER: Who is telling me that? Who are you?

A Mr. Jim Thornton.

A Our engineer.

MR. STOGNER: So this is somewhat exaggerated.

A Yes.

MR. STOGNER: I don't remember it being that steep out there.

Thank you, Mr. Abbott. You may continue.

A That's all right.

Q Mr. Abbott, do you presently have under consideration by the State Land Office an application for a business lease regarding this property?

A Yes. I understand we have applied for a business lease.

Q Sir, in your opinion will approval of the proposed disposal site satisfy existing need in the oil and gas industry?

A Yes, I think that site is needed, especially since Parabo is -- I don't think it will survive the winter and they'll -- they'll -- everybody needs another spot.

Q Given the fact that you have an oil reclaiming operation, will the use of this particular facility serve the needs of conservation of valuable natural resources?

A Yes. We've found that when produced water is hauled to a tank and separated properly, there will -- we will recover some waste oil.

MR. WEBER: Mr. Examiner, I have no further questions of this witness.

MR. STOGNER: Thank you, Mr. Weber.

Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you, Mr. Stogner.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Abbott, you've described for us your coprorate structure in terms of Agua, Inc. and Petro-Thermo, and you described those in terms of "we". Are there other principals besides you in either of those companies?

A Yes, it's incorporated. There are other stockholders.

Q Are you the principal managing executive for both of those companies?

A Yes.

Q Who are the other major principals, Mr. Abbott, that would participate with you in making decisions about the construction and location of this type of facility?

A Well, we have a management team working for Agua and Petro-Thermo: Myself, Jim Thornton, our engineer, and my two sons, Bob and Jim.

Q Is the proposed use of this facility one that is confined to allowing you and your trucking operation to have a facility to dispose of these solids and oilfield waste or do you propose to make this a public facility for the industry?

A No, we will make it a public facility for the industry. This is the oil industry.

Q I understand.

A Right.

Q Other truckers and haulers and --

A Yes.

Q -- other disposers on some financial basis --

A Yes, sir.

Q -- with your facility? Exactly what substances would be disposed of in the various pits as indicated on Exhibit Number Eight?

A Well, I -- the details I'll leave to my engineer, but roughly, the pits, as pointed out on the left of our exhibit, will be water pits, produced water pits.

The pits on the righthand side of the exhibit would be the solids pits; that is, cement, drilling muds, and that sort of thing.

Q Do you propose to utilize the facility for all of the produced water, tank bottoms, oil and BS that you now accumulate, do you propose to take all those substances and run it through this unit up to whatever the maximum requested is?

A Actually, we'll probably haul it off and haul any -- any merchantable oil to our treating plant.

Besides these pits we'll have tanks. We'll have two 1500 barrel gunbarrels or -- and then an oil storage tank for the BS and oil on location.

Q Are you familiar with the -- on Exhibit Number Four, Mr. Abbott, you've shown us the approximate location of your facility to the south and west of Laguna Plata.

A Yes, sir.

Q And you've identified for us the area to the east at Laguna Gatuna where Pollution Control operates a facility, a disposal facility.

A Yes, sir.

Q All right, are you familiar with the Pollution Control facility at Laguna Gatuna?

A No, I've never been out there. My engineers and other management have.

Q Are you aware, or have you been informed of how your operation compares or differs with the facility that's in place at Laguna Gatuna operated by Pollution Control?

A No, I'm not familiar at all with it.

Q Do you currently have trucking disposal commitments from Amerada Hess, Amoco, and this Natural Resources, Inc.?

A We disposed -- we've worked for all three of the companies, yes, sir, but we don't have any planned, steady work. We're just available for their hauling.

Q Currently, without this proposed facility, Mr. Abbott, what are you doing as a hauler with these solids and oilfield waste?

A Well, our -- right now our disposal water we have a disposal well in -- at our treating plant and we dispose of the produced water there.

We also haul in tank bottoms and any -- any BS, basic sediments, and use our -- our treating plant at -- that we -- at our Goodwin Treating Plant, but as far as the muds, Redbeds, and so on, we just have a temporary permit for a pit down at Eunice, which we're disposing in.

Q Do you propose to divert proposed water from any of your existing disposal facilities and move them to the Laguna Plata proposed site?

A No, sir, just emergencies, and I don't see any in the future.

Q Have you or your company utilized in the past the Pollution Control disposal facilities at Laguna Gatuna?

A Yes, sir, we've -- we've used them.

Q Do you know whether or not that existing facility continues to have the capacity to meet the need that you propose to fill with your facility?

A No, sir, I don't know.

Q You don't know that?

A No.

Q With regards to your facility, and I've lost the section, I think it was Section 16?

A Yes, sir.

Q All right, within Section 16, and we're looking at the northeast quarter and then again on Exhibit A it's approximately the east half of the northeast quarter, that 80-acre tract there --

A Yes, sir.

Q All right, when we look at that site, whose ownership is the surface subject to?

A That's the State of New Mexico.

Q Okay. You've talked about going through permitting procedures to acquire necessary permits to utilize this facility, Mr. Abbott. Apart from the Oil Conservation Division approval, what other permits or authorities are you aware are required of you before you commence operations?

A I don't know. There's probably others but I am not aware of them.

Q You've mentioned to us that you have filed for a business lease from the State of New Mexico to utilize the surface?

A Yes, sir.

Q I assume you're aware that that's a requirement for the site?

A Yes, sir.

Q Are there any permits that you are required from the Corporation Commission, to your knowledge?

A No, sir.

Q Your trucking permits from them are not affected by --

A No, sir.

Q -- this operation?

A Not that I know of.

Q All right. And I believe I understood you to tell us that at this point the business permit from the State of New Mexico has not been issued to you?

A We've applied.

Q In what name, sir, have you applied? Do you recall?

A No.

Q Do you currently have any knowledge as to what the surface of this tract is being used for now by the State of New Mexico?

A It's just a grazing lease, as far as I know.

Q Do you know, sir, who the current grazing lessee is for that tract?

A Yes. We -- I think we -- one of our management team contacted the present grazing lessee.

Q Do you know the name of the current grazing lessee?

A No, I don't remember his name.

Q With regards to the construction of the facility, as shown on Exhibit Eight, Mr. Abbott, where is that, those pits in relation to the high water mark for Laguna Plata?

A I think our engineer will show in his testimony.

Q Do you know of your own knowledge approximately where that might be?

A Yeah, it's probably the north one-sixth of the north tract, which we call Tract A; 40-acre Tract A.

Q Is the plan for construction of the facility one in which you propose to confine the produced waters and the discharges substances within the area of the pits shown in Exhibit Eight and Nine?

A Yes, sir, at the present time.

Q Are you seeking authority to dispose of salt water into Laguna Plata?

A No, sir.

Q You told us, Mr. Abbott, that the facility would be available for general use.

A Yes, sir.

Q Have you come up with some charges for the use of that facility at this point?

A No, we -- we haven't made any firm charges.

Q What is charged to you by the facility that you said was virtually full?

A At Parabo?

Q Parabo.

A Yeah.

Q That's it.

A I think the solids charge there is $1.00 a barrel.

Q Do the econmics of the cost to you as a hauler or to other haulers, to your knowledge, do those costs bear in the decision you've made about the siting of this facility?

A Yes. We're familiar with other areas in

Texas, and so on. The oil industry needs a place to -- to put these solids and I think this -- this -- the location of our proposed site is -- is -- will help the whole oil industry.

Q How long have you been in this type of business, Mr. Abbott?

A I've been in the disposal end of it since probably 1948 when I was working with Amerada. I worked on my first salt water disposal system down in the Gulf Coast with Amerada and then subsequently worked on some with Amerada in Lea County.

Q And in conducting your salt water disposal operations have you utilized for the waste disposal, the salt waste disposal, have you utilized any other sites other than Pollution Control or the Parabo sites?

A Yes, this temporary site down at Eunice. That's the only two sites that I know of.

Q And is the temporary site at Eunice the one that you're currently utilizing to hold the solids that are generated from your business?

A No, not from our business; generated by our hauling business from other operators.

Q So your business now for disposing of the solids, you're utilizing Pollution Control and the Parabo sites at present?

A No, we were.

Q Oh.

A But we're not now.

Q You've indicated to us that the Parabo site, and you think it has perhaps reachd its limit in terms of having water volumes that are too high --

A Yes.

Q Does that facility still have the capacity to take the solid wastes?

A I don't known about the solid wastes.

Q You've indicated to us that the Pollution Control site at Laguna Gatuna, that you're not aware that that's full?

A No, sir, I'm not aware of that.

MR. KELLAHIN: May I have a minute?

MR. STOGNER: I'm ready whenever you're ready.

MR. KELLAHIN: Thank you, sir.

Q Are you familiar enough with the operations at the site, Mr. Abbott, that you could take me through in a general way how the site is to be utilized by a trucker that brings salt water to you and tank bottoms? Can you give me a general idea of how it runs through the system?

A Yes, sir, I believe so in a general way.

The -- this is shown on Exhibit Eight. The produced water pits are shown here on the left. The entrance to our -- our facility is right here. This would be the entrance and the trucks would come in here and unload at the gunbarrels. They'd unload into two 1500-barrel -- or 750-barrel gunbarrels, excuse me, and the water would flow out of the syphons from these gunbarrels, there would be two unloading places, would flow into this pit.

MR. STOGNER: The pit marked W-1?

A Yes.

MR. STOGNER: Okay.

A This pit is designed so that the connection between W-1 and W-2 would be a large conduit below the waterline and the water would flow into W-2.

We've designed it so that the water would have to zigzag through these pits, which will slow the velocity down in the pits and the solids would drop out and also any oil that was trapped with the water could be removed.

Of course, most of the oil will come off right at the gunbarrels.

Our engineer can go into more detail but that's just generally --

Q Just a follow-up question, Mr. Abbott, once the water hits the W-1 and W-2, you build up, I assume, some solid sediments in those bottoms, you periodically clean them, and what do you do with the stuff after you clean them?

A We'll probably get some build-up. I don't know. We haven't -- we haven't -- I don't know how much build-up we're going to have, really.

Q Thank you, Mr. Abbott.

MR. STOGNER: Mr. Weber, any redirect?

MR. WEBER: Yes, sir, I have a few questions.

REDIRECT EXAMINATION

BY MR. WEBER:

Q Just to bring you to a point of reference, Mr. Kellahin in his questions asked whether or not Petro-Thermo Corporation and its trucking operations dealt with the three companies whose letters you have examined here today.

A Yes, sir.

Q Are these, to your knowledge, all the letters that have been sent?

A No, there may be more that they sent directly and failed to send us a copy. I have no knowledge.

Q Sir, if you could give us an estimate of the number of companies which have trucking operations carrying oil and gas field related waste?

A Well, in the immediate area of southeastern New Mexico there are probably forty different trucking companies. I have't added them up. They run all the way from Jal in the south up to Crossroads on the north and also to the west in the Carlsbad area and to the north at Maljamar, or west, northwest.

Q Is it usual that these transportation companies would be wedded to one particular producer of oil and gas for all their hauling of wastes?

A No, I don't believe so. From my knowledge of the trucking industry in Lea County, most of it's divided up and it's according to the best service in that they're the ones who get the business.

Q You talked about the very small number of approved waste disposal sites in southeastern New Mexico.

Assume for a moment that your temporary exception for the pit in Eunice expires. Assume for a moment that Parabo is no longer able to accept waste, and assume for one reason or another Laguna Gatuna is not available to you or to other of the 39, the 40 or so, truckers in the area.

What alternatives do they then have?

A The only alternative is to come to the Conservation Division and ask for approval of a site.

Q Are there any additional sites, say, in Texas or in other areas?

A I believe there are some sites in Texas but you'd have to have trucking authority to truck the waste to Texas, and we don't. We have some authority in Texas but not extensively.

Q What ramifications if all those things occur would that have on the oil and gas industry in south-east New Mexico?

A Well, it would be -- it would be disastrous. They'd have to shut-in some wells.

Q And what would happen to the 40 truckers?

A Well, they'd go broke.

MR. WEBER: I have no further questions.

MR. STOGNER: Thank you, Mr. Weber.

Mr. Kellahin, any more cross examination?

Are there any other questions of Mr. Abbott?

I'm going to waive cross examining Mr. Abbott at this time. I reserve the right to recall him at a future time.

MR. WEBER: Mr. Examiner, at this time I'd like to call Mr. James Thornton as our second witness.

JAMES D. THORNTON,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. WEBER:

Q Sir, would you please state your full name?

A James Douglas Thornton.

Q And where do you reside?

A Hobbs, New Mexico.

Q Mr. Thornton, by whom are you employed?

A Agua Division of Petro-Thermo.

Q And in what capacity are you employed?

A I'm an engineer.

Q How long have you been employed as an engineer with Petro-Thermo?

A Seven months.

Q What are your general duties and responsibilities at Petro-Thermo?

A Oh, the operation and engineering and design of several salt water disposal systems that Agua operates.

Q Mr. Thornton, where did you receive your undergraduate degree?

A Texas A & M.

Q And what degree did you receive and when did you receive it?

A Petroleum engineering degree in December, 1984.

Q And petroleum engineering was your specialty or area of concentration?

A Yes, sir.

Q Are you a member of any professional societies or organizations?

A Yes, sir, I'm a Junior Member of the Society of Petroleum Engineers.

MR. WEBER: Sir, at this point we would ask that Mr. Thornton be qualified as an engineer.

MR. STOGNER: Are there any objections?

MR. KELLAHIN: No objection.

MR. STOGNER: Mr. Thornton is so qualified.

Q Mr. Thornton, as part of your general

duties and responsibilities, were you responsible for developing the engineering plans for the proposed disposal facility at Laguna Plata?

A Yes, I was.

Q Are those engineering plans, are they shown by an exhibit which is on the wall?

A Yes, they are. It's Exhibit Number Eight.

Q Was that exhibit prepared by you or under your supervision?

A Yes, it was prepared by myself.

Q Did you also prepare a model?

A Yes, I did, a topographic model of the area.

Q And is that the model which has been numbered as Exhibit Nine?

A Yes, sir, it is.

Q In developing your engineering plans what sources of information did you rely upon?

A Well, first my task was to find a spot or two for disposal so we had to search the area and we came up with an exempted section and I did use material, books that have been previously written on the subject, such as the Groundwater Contamination Report in a book by the Environmental Protection Agency on brine disposal treatment practices relating to the oil production industry.

Q Did you actually get out on the ground of the proposed site before preparing your plans?

A Yes, I did.

Q Did you have an opportunity to visit other salt water solids disposal sites?

A Yes, I did.

Q Please describe the site that you have selected.

A The site is located in Section 16. It's the southeast quarter of the northeast quarter. It's 600 foot by 600 foot starting on the southwest side. The very southwest corner has a pad where trucks can enter and exit freely. There are tank batteries for use to separate and five water disposal pits, four solids pits, and an overflow or emergency pit.

Q Now, the topography of the site that you selected is rather unusual. Please describe the topography.

A Well, it's downward sloping hill caused by a sink, a sink in the area.

Q And to what feature does it slope towards?

A Laguna Plata.

Q And what is Laguna Plata.

A It's a large salt water lake.

Q And why did you design the pits in such a manner that each successor pit was on a lower level?

A So that movement between pits was much easier, easily accomplished.

Q What was your primary consideration in designing this facility?

A The evaporation rate of the fluids in Laguna Plata.

Q You spoke of the evaporation rate in Laguna Plata. Could you please tell us what that rate is?

A Mr. Dan Stephens, our hydrologist, knows more about that. I did read his report, however, and it was 4.4 feet per year.

Q What types and quantity waste materials did you design this site for?

A Would you repeat that?

Q What types and quantity of waste materials --

A Okay, well, we --

Q -- did you design the proposed site for?

A The quantities, the types and quantities were production water. There is oil associated with production water, and also drilling fluids and cement.

The -- we set a limit of 30,000 barrels per day. It's only 20 percent or less of what the evaporation of the lake will handle.

The quantities of each were 26,500 barrels would be water. 2500 barrels would be oil, and 1100 barrels would be the actual solids.

Q And how much of this 30,000 barrel capacity do you anticipate actually using?

A Only 2250 barrels per day is our expected initial rate.

Q What is the actual maximum capacity, assuming that you have steady stream of traffic up and down State Road 176?

A That would be 30,000, approximately 30,000 barrels per day, that's nothing else could possibly get into those pits, the number of unloadin lines.

Q Mr. Thornton, could you please step up to the map, and beginning with the unloading line, describe the flow of solids and liquid wastes?

A Okay. When trucks enter this pad they come up to either -- there are two sets of two unloading lines. One is for solids, meaning drilling fluid and cement, and the other is for production water.

The truck comes in here, hooks up to one of the two unloading lines which is connected to a 700-barrel gunbarrel. There are two of these.

Q What is the purpose and function of the gunbarrel tank?

A It is to separate the oil from the water before entering the tank.

Q How does that accomplish that?

A By gravity. The gunbarrels have a water leg attached to each one.

Q And to where do the usuable hydrocarbons go?

A Into the center tank, marked P-2, which holds 1000 barrels.

Q What will be done with the oil that comes from that tank?

A The oil will be taken from one of our trucks to our reclamation plant, the Goodwin Treating Plant, and we will re-treat this oil and recover some pipeline oil from that.

Q Now how is the tank battery connected to the disposal pits?

A The two gunbarrels are connected to the disposal pits through a water leg.

Q What's the purpose of setting up the five disposal pits that you have on succeeding lower levels?

A The purpose is to, number one, each pit is lower than the other, meaning that fluid can be transferred and controlled much easier.

The pipe, the conduit right here, which will be 12, at least 12 inches in diameter, are staggered such that the maximum amount of retention time or settling time can be accomplished.

Q That's why the conduits are offset?

A Yes, sir.

Q Now have you calculated the -- or designed the size and calculated the capacity of each of the salt water disposal tanks?

A Yes. I'll go ahead and -- the pit W-1, or water disposal pit, the first one holds 7480 barrels; that is at a level 3-foot from the top of the pit. It will actually hold 10,686.

The second pit will hold 7480.

The third pit will hold 6411.

Number four will hold 5343 barrels.

Fifth pit, 4274 barrels.

And total capacity of these water pits will be 30,988 barrels with -- go ahead.

Q Now, you indicated that you -- Mr. Thornton, I understand that you have established a 3-foot leeway between the top of the pit and the maximum water level.

Why did you do so?

A To protect against any spills that might occur from either extremely several 35-year rain in six hours or any other operational problem, such as maybe sediment that's cemented solid that are settling out into the pit from clogging the conduit.

Q Now, your salt water disposal pits are established or connected, rather, to an overflow pit. What is the purpose and function of that pit?

A Well, to further protect the -- any overflowing of the pit due to the same problems mentioned before.

Q Another over-design?

A Right.

Q What is the size of the overflow pit?

A It's 100 foot by 60 foot by 3 foot deep.

Q And what is its capacity in barrels?

A It is 3206 barrels.

Q How many solids pits have you included in your engineering plans?

A Four solids pits.

Q Can you please tell me the purpose and function of the solids pits?

A The solids pits are designed to handle any mud or cement that the trucks may haul in. The truck merely hooks up the line, either line, and disposes into a pit, into these pits on both sides because of build-up, unequal build-up if we just had one going, say.

Q What is the size of each of the proposed solids pits?

A It's 100 foot by 24 foot or 25 foot. They are designed that size so that it is easily accessible to backhoes or dozers and such to clean them out.

Q What is the capacity of each in barrels?

A Solid disposal pit number one is 3117 barrels, and again I've got a maximum. That's 3 foot from the top of the dike that will be built around each one of these pits. It's 4,452, actually.

Solid pit two is 3,117 barrels; solids pit three is 2,671; and solids pit four is 2,226. These give a total capacity of 11,131 barrels.

Q Would you please explain the conduit system that you have designed which links the solids pits?

A As I said before, the -- each unloading line is connected to one side of the pit so as to equalize the solids over the whole pit, because solids are viscous and tend to build up on one side, but we went ahead and got 6-inch conduit running through the pits on each side with valves on each one of the pits -- I mean one of the inlet lines to the pits.

The way it will operate is three of these valves will be closed; we'll use one pit at a time. When that is built up, we'll close that pit off and use the other one, and we'll continue down here until you get down here to the fourth pit and we need the first pit by the time we get to this one. This one should have dried out and we will be able to clean it out and then re-use it again.

Q Are the solids pits also connected to the overflow pit?

A Yes, sir, they're connected. The overflow pit has a series of 6-inch lines connected to each pit so the level of all pits will never exceed the height of the dike.

Q Is this another intentional --

A Yes, this is another over-design again.

Q What other improvements to this 600 foot by 600 foot area have you included in your design?

A Two roads coming into the site. The area will be fenced with a 4-strand barbed wire fence around the whole 600-foot area and the oading pad.

Q What impact, if any, will all your over-design features have upon any discharge into Laguna Plata?

A It will keep any solids from entering into Laguna Plata. These pits will contain everything they're designed to contain. It will operate so that it is over-designed for safety.

Q Why have you over-designed it?

A To provide safety for groundwater contamination. We don't want to --

MR. WEBER: I have no further questions.

MR. STOGNER: Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you.

CROSS EXAMINATION

BY MR. THORNTON:

Q Mr. Thornton, you said earlier in your direct examination that you had had an opportunity to visit other sites in coming up with a design for this facility?

A Yes, I did.

Q What sites have you visited in making your study to determine what type of design for this site?

A Pollution Control, Laguna Gatuna.

Q You have been at that facility?

A Yes, sir.

Q When did you examine that site, Mr. Thornton?

A There were a couple times. There was one just recently with Mr. Stephens.

Q How long have you worked on this particular design prospect for Agua, Inc.?

A Approximately three months.

Q Can you describe for us in what ways, if at all, your proposed facility here differs from the one at Pollution Control?

A Yes. The -- number one, we are using the topography of the area.

Number two, our pits, each of our pits are -- will not go, say, above the level of the dike. It will never be equal to the level of the dike.

Q This three-foot freeboard that you're talking about --

A Right. Right.

Q -- is the difference. When you said awhile ago that the evaporation rate given to you by the hydrologist was some number and the volumes used in this disposal facility were approximately 20 percent of the evaporation rate --

A Right.

Q -- in what context are you saying that? Have you calculated or has someone calculated the evaporation rate for the surface of the pits?

A No, of the lake itself.

Q Oh, I see, okay. When trucks come into the facility, do you propose that waste products run through your system will be in trucks that are equipped to either pump or discharge fluids through the tanks?

A Right.

Q Do you receive or do you propose to receive materials that will come in dump trucks?

A No, we will not. This is -- this is strictly oilfield waste. We do not -- we do not want any other solids at our disposal site.

Q Drill cuttings, I understand, sometimes come in dump trucks, that kind of thing, are you designed to handle that kind of disposal?

A I wasn't aware of that and the design can be -- I mean it can be altered but I don't -- I don't see any need to because there is -- I had never heard of such a thing.

Q All right. When -- when we have the capacity of the four solid pits and I think you gave us a number of a little over 11,000 barrels, is that the --

A 1100 barrels. Oh, I'm sorry. Yes, sir, you're right.

Q The capacity of the four solids pits?

A Right.

Q 11,000 barrels? Have you estimated how long it will take you to fill up those pits before you have to clean them out?

A That's depending -- that's largely depending on how much is disposed in there and that is not a definite quantity.

Q Once a solid pit becomes full or has to be cleaned out, what is your plan for the disposal or the storage of those solids?

A They will just be placed on the pit -- on the pad.

Q You would take the solids after all liquids have evaporated out of these solids pits, those solids that are left remaining after evaporation?

A Yes, the clays from the drilling mud and the cement itself.

Q You'd clean the pits and then take that solid material and place it on the pad.

A Right.

Q All right. Are any of the pits lined?

A No, they are not.

Q You've described for us a few ways in which your facility was different than Pollution Control. Are you aware of any other material ways that your facility is different than the one at Pollution Control?

A Yes. We do not separate our oil in the pits. We separate it in the tank.

Q In that first ank there?

A Right, the first two.

Q All right. Are there any other differences between your design and the facility at Pollution Control?

A They discharge into the -- into Laguna --

Q Gatuna.

A -- Gatuna directly. We do not. Ours is an indirect method.

Q Your proposal then would be that the water in the pits, it's your intent to have that water remain confined to the pit.

A It will seep towards Laguna Plata.

Q But in terms of a direct discharge into Laguna Plata, you haven't designed that nor do you propose to do that?

A No, we do not. We don't see a need for it.

Q All right.

MR. KELLAHIN: I wonder if we might take a few minute break?

MR. STOGNER: Now would be a good time to take about a ten to fifteen minute break.

(Thereupon a recess was taken.)

MR. STOGNER: The hearing will

come to order.

Mr. Kellahin, I believe you were ready to cross examine?

Q Mr. Thornton, just a few more questions about the operations at the proposed site.

A Uh-huh.

Q Do you propose to fence in the facility in any way to keep livestock and --

A Yes, sir.

Q Off the property?

A Yes, sir. These are steel posts I've got up here and between them we'll have four strands of barbed wire.

The entrance is -- both entrances, or the entrance and the exit will be -- will have a cattleguard so no cattle or livestock and enter into that area.

Q How will you handle the day to day operations in terms of manning the facility? Will this be staffed 24-hours a day or you going to open and close it during particular hours? What is the proposed plan?

A Any time the site is open there will a person on the site looking over the disposal area.

Q You propose to have it manned, then, so that when the compound is open there will a person in charge to direct the proper utilization of the facility by truckers?

A Yes, we will.

Q Have you done any kind of analysis of the chemicals or substances that will be removed from the solid waste pits and placed on the pad? Have you made any studies of those or analyses of those types of materials?

A No, sir, I have not, but it is -- they're probably the same composition as what is going into Pollution Control solids pits.

Q Do you propose to put these on the pad in such a way that they will remain confined either with some kind of liner underneath or that they'll be covered so that the salts and whatever else they are may not blow away or dissipate into the adjoining properties?

A No, we hadn't planned on putting anything there. We did not anticipate it blowing away.

A All right. Thank you.

MR. KELLAHIN: I have nothing further.

MR. STOGNER: Thank you. Mr. Weber, any redirect?

MR. WEBER: Yes, sir, just a few questions.

REDIRECT EXAMINATION

BY MR. WEBER:

Q You mentioned in discussing the difference between your proposed design and that presently employed by Pollution Control, certain differences.

Among those differences was the use of topography. What did you mean by using topography?

A The area is down -- has a downward slope towards Laguna Plata. Any -- any water disposal or solid disposal, whatever, it will run downhill to the -- into the pit.

Q Could you show us the flow using your model, which has been marked as Exhibit Nine?

A The flow will run downward, and the water pits, as I said, they were staggered, and it will be filtered through the -- the underlying sand layer that runs toward Laguna Plata.

Q What is the benefit of that filtering process?

A It cleans up all the -- any suspended particles that might be in the production water.

Q Are you indicating, then, that the eventual discharge into Laguna Plata will be cleaner than had you put a direct line?

A Yes, it will be much cleaner.

Q You talked about conduits. Do the conduits in your proposed design differ at all from the conduits presently in use by Pollution Control?

A Yes. They're larger.

Q What benefit, if any, does that provide?

A Any problems with lines plugging due to any build-up of suspended solids, as I mentioned to you before.

Q Is the possibility of plugging of conduit a real possibility?

A No, it's a remote possibility.

Q Have you developed any plans to deal with the remote possibility should it occur?

A Yes. The, number one, the design does incorporate the overflow pit and if we do have a build-up of solids in the bottoms of the pits, we can divert the water such that we can clean each pit separately.

Q Now with regard to cleaning of pits, there was some question with regard to the placement of solid materials on the pad that you will have constructed.

If any difficulty develops are your plans flexible enough to provide contingencies to handle that?

A I don't follow.

Q Is this a preliminary plan that you're presenting or is it a final --

A Yes, this is a --

Q -- plan?

A This is a preliminary plan. If we do need more pits we will dig more pits to insure that we can handle what we are getting.

Q And if you do need to employ other methods with regards to solids disposal, you can accomplish that as well?

A Yes.

MR. WEBER: I have no further questions.

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: No, sir.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Thornton, just a few basic questions here.

Let's go back to Exhibit Number Eight and your solids -- I'm sorry, the line into your solids pits you said was 6-inch conduit, is that right?

A Yes, sir. I'm sorry, that was 8-inch.

Q When you come in there an empty cement through these 8-inch lines, what would -- what will Petro-Thermo use to wash those lines out with?

A Gravity.

Q How much slope does these 8-inch lines have?

A Well, up on the pad the -- if you'll give me just a minute here I can give you height.

Q Well, I guess what I'm getting at, you don't think that cement is going to set up in those lines?

A No, if it does, we can put another line.

Q Okay.

A There, and there will be somebody there at all times to make sure that nothing happens.

Q Okay. Let's go over to your water pits. The conduit, the 12-inch diameter pipe between the two that's staggered, where are those actually set within the pit?

A Three feet below the level, below the dike.

Q Okay. When W-1, or Pit No. 1, when it fills up with solids, you propose to take those solids out and then spread it around the pad, is that correct?

A Yes, sir, that was S-1.

Q I'm talking about W-1.

A W-1 is a water disposal pit. It has production water only going to it. The whole west -- the west pits there are water disposal pits. The east ones are solids disposal pits, solids disposal pits with an overflow pit.

Q So you don't anticipate W-1 filling up with silt.

A No. The line that is connected between those two pits is located a food below the top of the dike. The water level will never reach that high to interconnect into each pit, and if it does, the water would flow down to overflow pit, the overflow pit.

MR. STOGNER: I have no further questions of Mr. Thornton.

Are there any other questions of this witness?

MR. WEBER: I have none.

MR. STOGNER: If not, he may be excused at this time but we may bring him back to answer some more questions.

A Thank you.

MR. WEBER: Sir, we'd like to call as our next witness, Mr. Dan Stephens.

DANIEL BRUCE STEPHENS,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. WEBER:

Q Mr. Stephens, will you please state your full name?

A My name is Daniel Bruce Stephens.

Q And where do you reside, Mr. Stephens?

A In Socorro, New Mexico.

Q And are you the principal of Daniel B. Stephens and Associates, Consultants in Groundwater Hydrology?

A That's correct.

Q How long have you had this consulting?

A I've been doing consulting in New Mexico for about six years.

Q Mr. Stephens, from what institution did you receive your undergraduate degree?

A I went to Penn State University.

Q And what degree did you receive and when did you receive it?

A Bachelor of Science and a degree in geological science in 1971.

Q Were you singled out for any honors?

A I graduated with honors and I was given an award as the outstanding senior in the College of Earth and Mineral Science.

Q From what institution did you recieve your graduate degree?

A A Masters degree in hydrology at Stanford in 1974 and a PhD in hydrology at the University of Arizona in 1979.

Q At those institutions were you singled out for any particular honors?

A No.

Q Are you a member of any professional organizations?

A Yes. I'm a member of the American Geophysical Union, the American Association of Groundwater Scientists, Soil Science Society of America, Sigma Xi.

Q What is Sigma Xi?

A It's a scientific honorary society.

Q Have you been published in any scientific or technical journals?

A Yes. I've published in the Water Resources Research, the American Society of Civil Engineers, General Hydraulics, Groundwater Journal, and General Hydrology, a number of things.

Q Have you delivered any papers at any scientific or technical meetings?

A Yes, commonly to several per year.

Q So then you estimate you delivered something in excess of a dozen papers?

A At least.

Q Have you been employed as a consultant to any state agencies?

A I'm a consultant to the State of Colorado's Department of Health and the State of New Mexico Environmental Improvement Division.

Q If you were to say you had a single specialty, what would that specialty be?

A Primarily in problems of seepage through materials towards -- as it moves towards the water table.

Q What practical experience have you had with regard to investigating problems of seepage in the State of New Mexico?

A Well, we had, in addition to some consulting to the State Environmental -- State of New Mexico's Environmental Improvement Division on uranium mill tailings, we've done a field investigation and laboratory study of seepage from an impoundment on the Ogallala area in the Clovis vicinity.

Q Have you ever had the opportunity to prepare a complete hydrogeologic -- hydrologic study?

A Yes.

MR. WEBER: Mr. Examiner, I would at this point offer Mr. Stephens as an expert hydrologist.

MR. STOGNER: Any objections?

MR. KELLAHIN: Dr. Stephens is so qualified.

Q Dr. Stephens, have you had the opportunity to study the hydrology of those tracts of land proposed by Petro-Thermo Corporaiton of use as a waste disposal site?

A Yes.

Q Have you had an opportunity to review those engineering plans prepared by Mr. Jim Thornton for Petro-Thermo?

A Yes.

Q Have you had an opportunity to actually visit the site of the proposed waste disposal facility?

A Yes, I did.

Q Have you prepared a report with regard to your findings?

A Yes.

Q I show you now what has been marked as Exhibit Number Ten in Case Number 8781 and ask you if you can recognize that?

A Yes, that's the report prepared by myself.

Q Please describe in very general terms the hydrologic conditions in the vicinity of the proposed disposal site.

A The water-bearing units that are of interest are usually above the Permian section, which is at a depth of 800 or so feet, and within the interval, the first 800 feet, there are notable occurrences of water in the redbeds formation, which comprises maybe 750 or more feet of that -- that interval, particularly in sandstone layers within the Chinle, which is the upper member, and also in the Santa Rosa sandstone in the lower portion of the Triassic Redbeds.

There's also an alluvial cover that may be variable thickness, perhaps at the site 20, 10 to 20 feet, maybe, and in places around the site there seems to be groundwater which occurs in the alluvium but is very discontinuous because of the irregular nature of the redbeds and the low rates of natural infiltration.

At the site there doesn't seem to be any significant amount of water in the alluvial section. Primarily water that occurs at the site is expected to be in the Triassic redbeds.

Q Does the site lead towards Laguna Plata and if you could, please explain what Laguna Plata is.

A Laguna Plata is a body of water which is located in the deepest portion of a collapse feature that created a number of other lakes in the area and it's regional sink for groundwater discharge at shallow depths and at greater depths in the Triassic section.

So at the site groundwater flows towards the -- towards Laguna Plata. On all sides of Laguna Plata there's convergent groundwater.

Q Now you indicated that Laguna Plata is a regional sink. We have in the very near vicinity Laguna Gatuna, Laguna Toston. What can you tell me about the relative elevations of these in relation to Laguna Plata?

A Laguna Plata is the lowest water surface of those several bodies you mentioned. It serves as a regional collection point for groundwater where most of the discharge from the system occurs.

Q Is both Laguna Plat and the proposed disposal site within the collapse feature?

A Yes, that's correct.

Q Where are the Triassic redbeds in relation to Laguna Plata and the proposed waste disposal plant?

A The redbeds occur, the interface between the redbeds and the alluvial material at the site is, oh, perhaps 20 to 30 feet below land surface.

In Laguna Plata the drilling that was done in the lake encountered the redbeds at, maybe, 30 feet below the surface of the redbeds, so there's in a sense an offset in the redbeds, possibly due to some deformation by faulting or actual folding into the collapse structure.

Q Did you have an opportunity to walk up and down arroyos and determine the general depth of the redbeds underneath the alluvial sands and what, if anything unusual did you discover?

A In walking through some of the arroyos it appears that the section that's visible there from land surface is a thin veneer of dune sand. It might be a foot to several foot thick.

Then there's a light red to tan sandstone with some green sandstone layers in it that appears to me to be a sandy member of the Chinle and that might be maybe 20 feet thick, and then there's a very noticeable contrast of the shale, a dark brown redbed shale that is very prominent and one of the features that struck me when I was there was that there seemed to be a line of seeps, a diffuse zone of discharge of groundwater that occurred just above this reddish horizon, which was very -- in a clay stone you'd call it a shale, and appeared to me as though it marked the -- it was an impeding horizon naturally, under natural conditions that caused discharge to leave at this contact, and we traced it for maybe 100 yards laterally to the north from the site.

Q In practical terms what does this mean?

A That any infiltration that falls from the permeable sand and surfacial deposits percolates down, perhaps it goes to 20, 30 feet, depending on particular locations at the site, and then moves laterally down dip, or down this interface to the north towards Laguna Plata and discharges.

The practical signiffcance that struck me is that if this is occuring under natural conditions, chances are that this is a very good barrier to downward percolation due to seepage from these pits.

Q Aren't Triassic redbeds generally considered to be virtually impermeable?

A In the vertical direction that's a very often assumed condition.

Q Do the Triassic redbeds act as a barrier to any seepage into sand stringers which may be found below them?

A That's my opinion, yes.

Q What is the direction of the major flow of surface and subsurface water from the disposal site?

A To the north.

Q To the north in the general direction of Laguna Plata.

A To the north towards Laguna Plata.

Q Tell me a little bit about Laguna Plata. What is it?

A It's a salt lake; a point of groundwater discharge; there are springs surrounding it, probably upward moving water. At the very shallow depths it comes into the adjacent areas and there's a high concentration of salt rocks occuring there at the present time.

Q What do you mean by a high concentration of salt? Could you give us a numer which would indicate how concentrated the salt is or --

A A chemical analysis recently done that was reported to me gives the total dissolved solids concentration of 335,000 milligrams, or parts per million chlorides. That would be about 192,000 parts per million.

Q Is that total dissolved solids number significant?

A It's much more concentrated than sea water by an order of magnitude.

Q About ten times as concentrated as sea water?

A Yes.

Q Is there any leakage of water from Laguna Plata into adjoining formations?

A Not that I have any evidence for. There is a vertical component of the hydraulic gradient that one could infer because of the pressures in underlying formations are less than the potential level of the lake, but there hasn't been demonstrated any significant amount of leakage based on water chemistry data.

Q Based upon your study and inspection, have you been able to formulate an opinion as to any reasonably foreseeable beneficial use of Laguna Plata?

A From my own -- my own point of view, I don't see any change in the current pattern of use of Laguna Plata.

Q Have you had an opportunity to measure the surface area of Laguna Plata and to calculate the evaporation which would occur on it?

A The surface area of Laguna Plata is approxiamtely two square miles. Based on studies that were done for the Bureau of Land Management in the potash district, they found that the evaporation rate from brine lakes is approximately 4.4 feet per year; over that two square miles gives an annual evaporation rate of about 5630 acre feet per year.

Q You have Petro-Thermo's proposed engineering plat. Have you been able to take their discharge of some, the maximum discharge of some 30,000 barrels a day of liquid and reduce that to acre feet so as to compare it with the evaporation rate?

A It would be about 1500 acre feet per year at the maximum.

Q In terms based upon the assumption that all the materials, waste in the proposed disposal facility would have flowed directly into Laguna Plata, would they be evaporated?

A Essentially the material that would seep in has a potential to evaporate. The normal operating condition, though, is much, much less than the 30,000 barrels a day. I believe the number is 2250 barrels a day, which if we look at the waste that would come from the salt water ponds, if all of that seeped into the lake, that, and assuming none evaporated, all of that went into Laguna Plata, it would be about 93 acre feet per year, or maybe less than 2 percent of the total inflow to Laguna Plata would be -- that would be the increase that would flow to Laguna Plata as a result of seepage from this operation, assuming no evaporation took place in the pits.

Q What would be the practical effect of this discharge of brine water into Laguna Plata?

A I think there would be no measurable consequence. From the practical standpoint, I don't think there would be consequence. From a mass balance standpoint there has to be a small increase in the stage, maybe on the order of tenths of feet and of course as the stage rose and the surface area expanded slightly, we would be looking at even more rate of evaporation on a larger water surface.

Q Based upon your study and inspection, have you been able to form an opinion regarding the effects on any discharge -- or on Laguna Plata from any discharge? That was basically negligible?

A That's correct.

Q Based upon your study and inspection have you been able to make any determinations as to the presence of fresh water at shallow depths in the vicinity of the proposed disposal?

A The nearest well we were able to located is up, up gradient about 2-1/2 miles near Halfway. Its quality is marginal for drinking. The little bar at Halfway is abandoned.

There's a windmill to the east approximately three miles distant from the site, which is used for stock watering, or had been used for stock watering; apparently abandoned now, and it does have water in thew alluvium that seems to be good quality.

Q Now you mentioned that these locations were up gradient from the proposed disposal site and I suppose up gradient from Laguna Plata. What difference does that make?

A Any -- any seepage from Laguna Plata

would be likely to move down gradient and there's no way possible for that seepage to contaminate wells that far up gradient.

Q Based upon your study and your inspection have you formed an opinion as to whether the discharge water and solids could move to subsurface in such a manner as to commingle in the reasonably foreseeable future with an un-contaminated water supply?

A I don't foresee that as a probability.

MR. WEBER: I have no further questions.

MR. STOGNER: Mr. Kellahin, your witness.

MR. KELLAHIN: Thank you, Mr. Stogner.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Dr. Stephenson, I'd like you to help me understand the relationship in this site specific area be-tween the potential for evaporation versus the infiltration rate of the liquids into the ground.

Let's assume some fact situations and then you tell me what will be the effect on this particular operation.

The first assumption I'd like you to make is let's assume that the infiltration rate of the fluids has been totally impaired. Let's assume that may have occurred with solids becoming deposited on the bottom of the ponds so that infiltration is minimal, if at all.

Should that occur what is the capacity of the proposed plan to by means of evaporation handle a certain volume of disposed liquids? My question is, without infiltration and using your evaporation rates from Laguna Plata, can you estimate for me what would be the capacity of the facility if they to rely solely on evaporation?

A Approximately, approximately three, three to four acre feet per year.

Q I need some help. How many barrels of oil are we talking about in relation to an acre foot?

A 7580, well, it's about 20 --

MR. ABBOTT: 7758.

A It's about 20 --

MR. ABBOTT: 7758.

MR. KELLAHIN: Somebody give me a number that everybody likes.

A I think there's about -- I don't know, about 22 or so thousand barrels per day in an acre foot per year.

Q All right. Have you taken into consideration the effect the evaporation rate -- well, let me start over.

Can you tell me or have you studied the effect that the oil skim or the oil slick on the surface of the ponds will have in terms of its effect on the evaporation rate?

A It's my understanding that one of the features of the pond is to recover any floating hydrocarbons that has been bypassed in the gunbarrels and that will be skimmed off.

If there were a cover of -- a veneer of oil slick on top, it would depress the rate of evaporation but as far as this site's concerned in order for it to operate it's got to be viewed essentially as an infiltration gallery rather than an evaporation system. Evaporation in my calculation is a negligible amount. This primarily should be viewed as an infiltration system which uses the soil as a filter, allows the retention in the settling bases and recovery of any floating product.

Q Assuming the operator on a regular basis attempts to skim the oil but we still have a small viscosity of oil on the surface, and assuming lack of infiltration, what effect does that have on your evaporation calculation of Laguna Plata using the salt brine evaporation calculation?

A The 4.4 feet per year?

Q Yes, sir, what effect will that oil skim on the evaporation have? Is there a way to estimate for us the impact?

A I can't do it here. I think one could look in the literature for some available studies. I believe there are some but I just don't have that one with me.

Q All right, now let's talk about the system the way you anticipate it to work, not as evaporation ponds --

A Right.

Q -- but as a mechanism whereby we have high rates of infiltration and we have the fluids then migrating down gradient into the Laguna Plata.

Have you calculated or estimated the rates of infiltration of the produced water in the absence of having the infiltration impaired by substances collecting on the bottoms of the ponds. Let's disregard that kind of problem for the moment.

A Okay. Let me rephrase your question so I can --

Q Okay.

A -- understand it. Are you asking me what the infiltration rate would be if there were no impeding layer?

Q Yes, sir, the impeding layer being something not physically there now. It would be oil or mud or some --

A We haven't done any field tests. That would be required in order to calculate the permeability of the subsoil.

It appears to me, based on preliminary calculations and inspection of the site that the soil has a potential permeability to allow that much water to infiltrate. I think the point about build-up of solids in the bottom of the pond is an important one and really will require, I think, as part of the plan a regular maintenance of the pit to allow infiltration to occur.

Q Let me interrupt you a moment, Doctor. You talked about a volume. What volume are we talking about? Is this still the 30,000 barrels a day?

A No. No, this would be the 2250 barrels a day --

Q All right.

A -- calculation. The other -- the other could be handled -- if the hydraulic conductivity of the formation underneath it is about 10 to the minus 3 centimeters a second, 1000 feet per year, I believe, it could handle it. I don't think it's quite that much but I -- we haven't done any field tests to determine it.

On the other hand if it's 10 to the minus 4 centimeters a second, you know, with the 2250 barrel a day rate, I think that's about what it is, without a clogging layer.

Q If we're using the 2250 barrels a day as the anticipated use for the facility, you've indicated that maintenance of the ponds in terms of scrapping the pond bottoms in order to maximize the ability of the fluids to infiltrate might be a prudent thing to do.

A Yes.

Q Can you give us -- can you give us some estimation as a hydrologist of how frequent that maintenance operation ought to be? How are we going to judge when we ought to start cleaning the bottoms of the ponds?

A That's a question I haven't thought about but it is an ongoing problem when people are doing artificial recharge along rivers, say, in Orange County, California, where they do this thing to get water into aquifers for re-use. It's an ongoing operation. I think one may want to -- a period of a couple of weeks, perhaps, maybe on that order, have one pit out of commission for drying and disking or removing some of the sludge or sediments, suspended materials, bypassing it, bypassing that particular pit and putting another one in use.

That's a guess. I've not scoured the literature for the experience that's available concerning this.

MR. KELLAHIN: May I have a moment, Mr. Stogner?

I'm through with Mr. Stephenson, thank you.

MR. STOGNER: Thank you, Mr. Kellahin.

Mr. Weber, anything --

MR. WEBER: Yes, sir, I have a few --

MR. STOGNER: -- further?

MR. WEBER: -- further questions for Dr. Stephens.

REDIRECT EXAMINATION

BY MR. WEBER:

Q Dr. Stephens, you were asked just a few moments ago to assume that the infiltration rate of fluids on the bottom of a disposal pit was totally impaired, was zero. What would the practical effect of that be?

A Well, a couple of things would have to happen. Either the pits would fill up; in order to prevent any spillage over the sides you'd cut back operations. That would be easy to do when the pits were not full and taking on any more water. They could be operationally shut down until they could be improved in terms of their infiltration characteristics.

Q So if this assumption actually occurred, a total -- the infiltration rate of the fluids would be totally impaired, that would be something entirely obvious to the operators, I guess you could say.

A I would think so. If it spilled over the sides the whole system would be eroded and there wouldn't be any -- wouldn't be any other recovery of hydrocarbon on the water surface, so its not to their advantage to have the water flowing over land into Laguna Plata.

Q And if the infiltration rate was such that there would be no flow, how difficult a job woud it be to improved the infiltration rate?

A Well, it's a common -- it's a common problem in artificial recharge studies but it's -- it's one that -- there's plenty of artificial recharge experience that can be relied upon to reclaim the permeability of the formation. It's an engineering problem that can be overcome with either disking and drying, actual removal of the some of the materials with, perhaps, a backhoe to get down to the basic formation.

MR. WEBER: I have no further

questions at this time.

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: No, thank you.

CROSS EXAMINATION

BY MR. STOGNER:

Q Dr. Stephens, I'd like to refer ot Figure 3 of your Exhibit Number Ten, which is your report, and this Figure 3 is Water Level Evaluations and Depths to Water, and in the center of your plat you show Laguna Plata and over to the east you have several circles and sqwiggley lines, what you show as being springs.

What is that water makeup and where is the water coming from that feeds those springs?

A The makeup of the water?

Q Yes, sir.

A Do you mean its chemical composition?

Q Chemical composition, salinity.

A Table 3, Page 8, tabulates the chloride concentrations at those springs. They're in the -- most of them are on the order of 8000 parts per million chloride.

Q Okay, what feeds these springs? Where is this water coming from?

A It appears to me that there's a couple of possible sources. One, it might be a mixture of different sources. We have dune material, limitless dune material in the north side of these lakes which is very good infiltration characteristics. I think there's some water which comes into Laguna Plata from the north and there's also some that comes from the east, possibly in drainage out of Laguna Gatuna, in that vicinity, and mixing and so there's possibly two, two sources, one would be areal infiltration through the surfacial deposits which are permeable, and also lateral flow from adjacent areas, which could be in the vicinity of Laguna Gatuna nearest to these (not audible because of coughing.)

Q This is contained in your report and needless to say, I haven't had a chance to look at it yet.

Let's talk about the redbeds for a little bit between Laguna Plata and back toward the proposed disposal site.

Over the disposal site itself how far down before you hit redbeds?

A My estimate is about 25 to 30 feet. That's for the clay, what you would call the redbed, that maroon clay layer that I described which was a barrier to seepage. That appears to be about 25 to 30 feet down.

Q And the thickness of the redbed in this general area?

A Approximately 800, 750, 800 feet. Total redbeds, including Dewey Lake, Santa Rosa, Chinle.

Q Okay, you mentioned that there is some sandstone deposits within the redbed, is that right?

A Within the Triassic generaly, that's correct, and the Santa Rosa, of course, is a sandstone.

Q Where is the Santa Rosa in respect to the redbed in here?

A The depth is probably several hundred feet below the site.

Q Okay, within the redbed itself is there any deposits of sandstone that are water bearing?

A Yes.

Q There is. Are those deposits inter-channeled with other sandstone deposits or are they layered, separated?

A They're layered. It's my feeling that it's the latter; not too much interfingering with Santa Rosa.

Q Do you know what the depth would be from the top of the Redbed to your first sandstone layer that has water in it?

A I really haven't had a study of that stratigraphy. There's a lot of drilling reports, which you'll find contained in the report and it's very difficult to use these types of drillers logs to correlate one, what might be called the water sand and one layer to another. I don't think there's that sufficient geologic control based on drillers logs to make a stratigraphic horizon, but you'll see that it does occur in the first couple hundred feet, 400 feet, there are occurrences of water in the -- in these units.

Regionally, however, the quality of water in the Triassic is poor.

Q What do you mean poor?

A High in chlorides; above drinking water standards.

Q So I can understand it, let's talk about Laguna Plata itself.

Is the -- is the redbeds present within the bottom of the lake or -- I guess they aren't.

Is there any percolation downward from Laguna Plat at, say, a maximum water level, at a flood stage, say?

A It would be very local, as it were, some going into the bank at the stage the Laguna Plata rose during a (not understood), there would be some lateral movement into the adjacent soil, but when the level fell it would move back in, the bank storage type in effect.

There's, in the subsurface contours on the deeper zones within the redbeds which show convergence of flow, even at great depth, that's been described in the report by Nicholson and Clebsch, 1961 on the hydrogeology in the area, and their map shows that the (not understood) metric surface slopes towards Laguna Plata and if there were any downward leakage, it would presumably be still contained within this zone of convergent flow. But if there were a lot of downward discharge under current conditions, the salinity of those zones that were receiving this discharge would be very, very high, Laguna Plata being a saline lake.

Q Again, just so I can understand, the water that accumulates in Laguna Plata is all evaporated; none of it migrates out, except, like you were saying, at a high flood stage it could go back and theoretically those waters would then --

A Come back in or themselves evaporate from the soil directly.

Q You referred to a Nichols and Clebsch?

A Nicholson and Clebsch.

Q Nicholson and Clebsch, I'm sorry.

A C-L-E-B-S-C-H.

Q Are those in your references?

A Yes, sir.

Q You stated that Laguna Plata was the lowest of the lakes within this area. What is the elevation of the lake bed?

A I recall looking at a benchmark out in the lake during the field survey. I believe it was 3431 feet.

Q And how much lower is that than Laguna Gatuna to the east?

A Probably 60 feet.

Q And Laguna Tonto up in the farther east and north?

A I'd have to look at the map. I don't know offhand. Looks like on the order of 100 feet.

Q Are you referring to a regular USGS map --

A That's correct. The Laguna Gatuna 7-1/2 Minute Quadrangle.

Q Okay, thank you. Okay, how about Laguna Toston, which is down south?

Tuston or Toston?

A It appears to be about 60 feet, also.

MR. STOGNER: I have no further questions of this witness.

Are there any questions of the witness?

All right, Mr. Weber.

MR. WEBER: If I could ask just one further question.

REDIRECT EXAMINATION

BY MR. WEBER:

Q Do the same Triassic redbeds underlie all the salt lakes which you've described, Laguna Gatuna, Laguna Plata, and Laguna Tonto, Laguna Toston?

A That's correct.

Q Thank you.

MR. WEBER: Nothing further.

MR. STOGNER: Are there any other questions of Dr. Stephens?

If not, he may be excused.

MR. WEBER: Mr. Examiner, I would like at this time to move the admission of Exhibits One through Ten.

MR. STOGNER: Are there any objections?

MR. KELLAHIN: I don't recall which letter was marked what exhibit number. Our only objection went to that exhibit. We have no objection to the others.

MR. STOGNER: I believe the Exhibits were Five, Six, and Seven, the letters from Amoco, Amerada, and another --

MR. KELLAHIN: Natural

Resources?

MR. STOGNER: Are those the letters that you refer to that --

MR. KELLAHIN: Yes, sir.

MR. STOGNER: Mr. Kellahin, I'm going to overrule your objection and allow those into evidence.

MR. WEBER: In this regard I would request that the copy of the letter from Bravo Energy, Incorporated, which was received by the Oil Conservation Division on 12-9, 1985 also be included in this file.

MR. STOGNER: Okay, the record will so show we did receive that, being we, the OCD, received that on December 9th, 1985, and it was made part of the case file at that time.

Mr. Weber, do you have anything further?

MR. WEBER: I have nothing further.

MR. STOGNER: Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Examiner. I propose not to put on any direct evidence on behalf of my client at this point and we are prepared to make a brief closing statement. We would like an opportunity to submit a proposed order in this case but I have no witnesses to call at this time.

MR. STOGNER: Thank you, Mr. Kellahin.

I believe if there is nothing else, then we are ready for closing statements.

MR. KELLAHIN: We seem to have a number of people here today. There perhaps is somebody here that wants to make a statement other than me and Mr. Weber.

Are there other parties here?

MR. STOGNER: Thank you for correcting me. Since there is a large contingency here, would anybody like to stand and make any kind of a statement? We'll start from this end of the room and work around.

Please stand and identify yourself.

MR. BILL TOM: Bill Tom from Andrews, Texas. We are the present lessee on the grazing lease concerned and we have not relinquished the grazing lease at the present time. We are against the proposal because of our ranching interest at this time.

MR. STOGNER: Okay, what was your name again, please?

MR. TOM: Bill Tom.

MR. STOGNER: Mr. Tom, the grazing lease that you're referring to is a grazing lease from the State?

MR. TOM: This is correct.

MR. TAYLOR: Is our understanding correct that your permission is needed to change the grazing lease to a business type lease?

MR. TOM: This is correct as I understand it.

MR. STOGNER: Per the rules and regulations of the State Land Office.

Any further statements?

There being none by any parties, we're ready for closing statements.

Mr. Kellahin, you may go first. Mr. Weber, you may go last.

MR. KELLAHIN: Mr. Stogner, I'll be quite brief.

We would, first of all, request that you grant us a week or ten days in which to submit to you a proposed order that we would believe appropriate for entry in this case.

The reason I suggest that is Dr. Stephens' report, his report that I have not read. I would like to review that and try to understand it before we attempt to suggest to you how the Division might want to enter an order for this particular site.

My client, as the testimony, has shown, operates Laguna Gatuna and Pollution Control, Inc.. There have been some comparisons made between this proposed site and the Pollution Control site. I'd like to examine what we've heard today in terms of what we do on our facility and see if I can't suggest an order to you that protects our interest.

Mr. Abbott has indicated, and I believe Mr. Weber told you in his beginning comments, that there had been an order approving the use of Laguna Plata for salt water disposal. He referenced Order No. R-3725 and that is an order that was issued back in '69 to Mr. Larry Squires, who is the principal of Pollution Control.

Because of the close proximity of this project to our approval of the use of Laguna Plata for salt water disposal it's important for us to recommend to you an order that minimizes the impact that this operation may have on our potential use of Laguna Plata.

As you can see from this Order 3725, this order only allows the use by Larry Squires of Laguna Plata for salt water disposal and does not allow him to use it for oilfield waste and solids.

This order has been subsequently amended in small part by providing for the use of Laguna Plata -- Laguna Gatuna in this order as the site for the use of the solid waste.

We want to try to suggest to you a proposed order that accommodates Mr. Abbott as best we

project may have on our interest in the area.

In addition, Mr. Squires is the Manager of Snyder Ranches, which is the surface owner not of this particular site but of the adjoining property.

We would appreciate the courtesy that you could extend to us to give us seven or ten days to give you an order so you could deal in specific substances about the nuts and bolts of the order itself.

In closing, the only point I see that gives me some concern in the presentation Mr. Weber has made, is that there may be fundamental jurisdictional defect in the application at this point. The Commission rules, as you know, require under 1203 that the initiation of a hearing can be done by the Division, the attorney general, any operator or producer, or anyone having a property interest may institute proceedings for a hearing.

I think it's apparent -- it's implicit upon your exercising of authority in this case to make a decision about the jurisdiction. The testimony was that Mr. Abbott has applied for a business lease from the State of New Mexico to utilize the surface. You have to resolve whether or not the filing of an application would vest Mr. Abbott's company with a sufficient property interest by which he could be an applicant today.

I would like an opportunity to search some of the other cases that we've put on here before the Commission before I give you what my opinion of the law is, but I want to raise that as an issue because my recollection is in the past the Commission has required that the applicant obtain a business lease from the State Land Commissioner before proceeding with his application.

Now, I say that with some qualification because I think it's incumbent upon myself and Mr. Weber to determine if in fact that does constitute a fatal flaw in the application. It might be possible to process the application here, contingent upon approval by the Land Commissioner, so I'm suggesting there may be other solutions but I raise that issue as one that is still before you in this case. It is that Mr. Abbott's companies don't own the surface. We know from Mr. Tom, Toms, that this ranch owns the grazing, and it may cause you the same concern it causes me that the party here lacks sufficient standing before the Commission to bring the application.

Having said all those things,

now, we would like to have an opportunity to submit to you a draft order.

MR. STOGNER: Thank you, Mr. Kellahin.

Mr. Weber?

MR. WEBER: Yes, sir. Petro-Thermo Corporation would also request the opportunity to present to you a proposed order within a ten day period and we would press for a speedy disposition of this particular matter in view of the fact that its temporary permit to dispose of solids near Eunice, New Mexico, will expire on or about the 19th of January of next year.

A quick decision might well minimize any adverse impact from the closure of one of the three available solids disposal sites in southeastern New Mexico.

I would like to now turn to that interesting jurisdictional question raised by Mr. Kellahin.

This is really not a new or a novel argument. Mr. Kellahin raised it on the 23rd of September, 1981, in the matter of Loco Hills Water Disposal Company. Loco Hills also wanted an exception to Order Number R-3221.

Loco Hills was also in the same

posture as Petro-Thermo Corporation. It had made but had not received final approval from the State Land Office with regard to its business lease. That was Case Number 7329. Mr. R. L. Stamets was the Examiner.

There, as here, the application had been made but had not reached its final approval. We would argue that here, as there, the jurisdictional objection should be dismissed. It's my understanding in that particular case Mr. Stamets that there was a sufficient property interest even though final approval had not been received.

Understanding full well the position of the present grazing lessee, it is our contention that it is not necessary to obtain a relinquishment of his grazing lease; that in accordance with the rules and regulations of the State Land Office it would be possible to grant that lease in the absence of a relinquishment.

Mr. Examiner, we have tried to show through our presentation today that a legitimate need exists in southeastern New Mexico for additional approved disposal sites. There are a limited number of disposal sites now and it's quite possible that an emergency could really have a significant impact not only on trucking operations but on oil and gas production within that section.

Mindful of the need to devoid

-- to avoid any possible of discharge into a reasonably foreseeable fresh water source, we have been very careful to select the site, a site which limits any possible -- possibility of contamination of adjacent fresh water sources. We have selected a site which the Oil Conservation Commission has exempted from the operation of its Order 3221, exempted in the sense that it permitted the disposal of production water in unlined surface pits.

We have selected an area by the Laguna Plata which -- into which the disposal of production water would not constitute a hazard to fresh water supplies in the area.

We feel that we have met the burden demonstrating the absence of the possibility of contamination, met the burden of showing that an exception to Order No. R-3221 should be granted to Petro-Thermo.

That's it.

MR. STOGNER: Thank you, Mr. Weber.

Is there anything further in Case Number 8781?

There being none -- before I take this case under advisement, I've been doing some figuring. If I allow seven days or a week it would be on Christmas, and if I allow ten days it would be on the 28th, which is on a Saturday, so I wish that rough draft orders from both you all be in here by the 30th of December, which is the Monday after Christmas.

So if there is nothing further in this case, this case will be taken under advisement.

(Hearing concluded.)

CERTIFICATE

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division (Commission) was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 8781, heard by me on 18 December 1985.

[signature], Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS

1935 - 1985

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

January 7, 1986

Mr. Robert W. Abbott
Petro-Thermo Corporation
P. O. Box 2069
Hobbs, New Mexico 88241-2069

Re: Request for Extension of Time for Temporary Use of Pit

Dear Mr. Abbott:

We have received your request dated December 23, 1985 for an extension of your 90-day permit for temporary disposal of brine, fresh water-based drilling mud, and waste cement in the emergency overflow pit located at the Blinebry-Drinkard SWD System Well No. A-22 in 22-T22S-R37E. Your current temporary permit expires January 19, 1986.

Due to time restrictions associated with Case No. 8781 which was brought to hearing on December 18, 1985, you are hereby granted a 60-day extension for the specified temporary use of the pit. The extension carries the following restrictions:

1) The pit will not be enlarged or allowed to overflow or breach.

2) By March 20, 1986, solid and liquid waste will be removed from the pit and disposed of in an approved manner.

3) There will be no further extensions of time for the specified temporary use of the unlined pit. Tanks or a lined pit may be authorized for continued disposal of brine, fresh water-based drilling mud, or waste cement at that location.

Authorization for this temporary use of the pit may be rescinded if there is evidence that the pit has overflowed or if Water Quality Control Commission or Oil Conservation Division rules or regulations have been violated.

Sincerely,

R. L. Stamets

R. L. STAMETS
Director

RLS/JB/dp

cc: Jerry Sexton
David Boyer
Michael Stogner

PETRO-THERMO CORPORATION
P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

December 23, 1985

Mr. R. L. Stamets
Oil Conservation Division
Energy and Minerals Department
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Stamets:

On October 21, 1985, a 90-day permit for temporary use of the emergency overflow pit located at the Blinebry-Drinkard SWD System Well No. A-22 was granted to Petro-Thermo Corporation.

As you are aware, Petro-Thermo Corporation has applied for authorization to dispose of produced water, associated waste hydrocarbons and other solids at a site in the E/2 NE/4 of Section 16, Township 20 South, Range 32 East. A hearing to consider this application was held on December 18, 1985 before Examiner Michael E. Stogner.

At the conclusion of the hearing, Petro-Thermo Corporation respectfully requested that an Order be issued prior to the expiration of its temporary permit.

Nevertheless, our attorneys have advised us that there is a possibility of a hearing de novo. Given this circumstance, it is possible that a final decision will not be reached prior to January 19, 1986.

In view of these developments, Petro-Thermo Corporation again requests that it be authorized temporary use of the permit for one full year. Please contact our office if you require further information.

Yours Sincerely,

Petro Thermo Corporation

By: Robert W. Abbott
Robert W. Abbott
Vice-President

WGA/sfp

HYDROGEOLOGIC CONDITIONS NEAR LAGUNA PLATA, NEW MEXICO, RELEVANT TO THE APPLICATION TO THE OIL CONSERVATION DIVISION TO DISPOSE OILFIELD WASTE BY PETRO-THERMO CORPORATION

Prepared for:

Petro-Thermo Corporation
P.O. Box 1978
Hobbs, New Mexico

By:

Daniel B. Stephens and Associates
600 Neel Avenue
Socorro, New Mexico

December 1985

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SUMMARY

Petro-Thermo Corporation is proposing to discharge oil field wastes at a site adjacent to Laguna Plata in southwestern Lea County. On the basis of available hydrologic data, an exemption to Oil Conservation Commission Order No. 3221 is requested.

At the site, ground water occurs at shallow depths in redbeds and possibly in alluvium. The direction of flow is northward toward Laguna Plata, a salt lake located within a collapse structure. Springs indicate that ground water discharges to Laguna Plata. The thickness of the very low-permeable redbeds beneath the site is about 750 feet.

After separation in a gunbarrel, brine and oilfield fluids will be diverted to unlined pits where additional free oil will be skimmed for recovery. Much of the waste water will seep into the subsurface and migrate toward Laguna Plata. The concentration of dissolved solids in the waste water is expected to be less than that of the native water in Laguna Plata. The average evaporation of Laguna Plata is more than 60 times the estimated average sustained rate of fluid waste disposal. Thus, seepage from the disposal operation will evaporate from Laguna Plata.

INTRODUCTION

This report was prepared at the request of Mr. Robert W. Abbott, Vice President of AGUA Inc., a division of Petro-Thermo Corporation. Petro-Thermo Corporation is applying to the NM Oil Conservation Division for a permit to discharge ground water from proposed oilfield waste disposal ponds to be constructed near Laguna Plata, New Mexico.

The purpose of this report is to evaluate present hydrogeologic conditions in this vicinity of the proposed waste disposal site. The scope of work of this report includes a brief review of available literature, survey of existing well records, compilation of existing chemical analyses of water samples, and a field reconnaissance of the site.

SITE DESCRIPTION

The proposed oilfield waste ponds comprise approximately 4 acres located in the SW 1/4 of the SE 1/4 of the NE 1/4 of Section 16, Township 20 South, Range 32 East, Lea County, New Mexico. This site is approximately 2.5 miles northwest of Halfway, New Mexico, which is about 37 miles west of Hobbs, NM on US Highway 180 (Figure 1). The site is about 0.15 miles south of Laguna Plata, a natural salt lake.

The land surface topography at the site slopes to the northeast with a gradient of approximately 230 feet per mile, toward Laguna Plata. Vegetation at the site is very sparse, consisting mostly of grasses and mesquite.

Mean annual precipitation in the area is about 9 inches per year, much of which falls in the summer months during intense thunderstorms. Average annual temperature for the nearby towns of Maljamar and Pearl is approximately 61 degrees Fahrenheit.

The average rate of evaporation from open bodies of fresh water is about 6.1 feet per year (Hunter, 1985); these rates are enhanced during the spring when the winds are strongest. A study in the potash mining district to the southwest of the site found that the evaporation rate from a brine pond ranged from about 10.9 feet per year in the summer to about 2.9 feet per year in the winter (Geohydrology Associates, Inc, 1979). In a previous study in the same area, the average evaporation rate from a brine lake was determined to be about 4.4 feet per year (Geohydrology Associates, Inc., 1978). The evaporation rate from brine is less than that for fresh water, owing to the lower vapor pressure of the brine. The annual rate of evaporation from Laguna Plata is

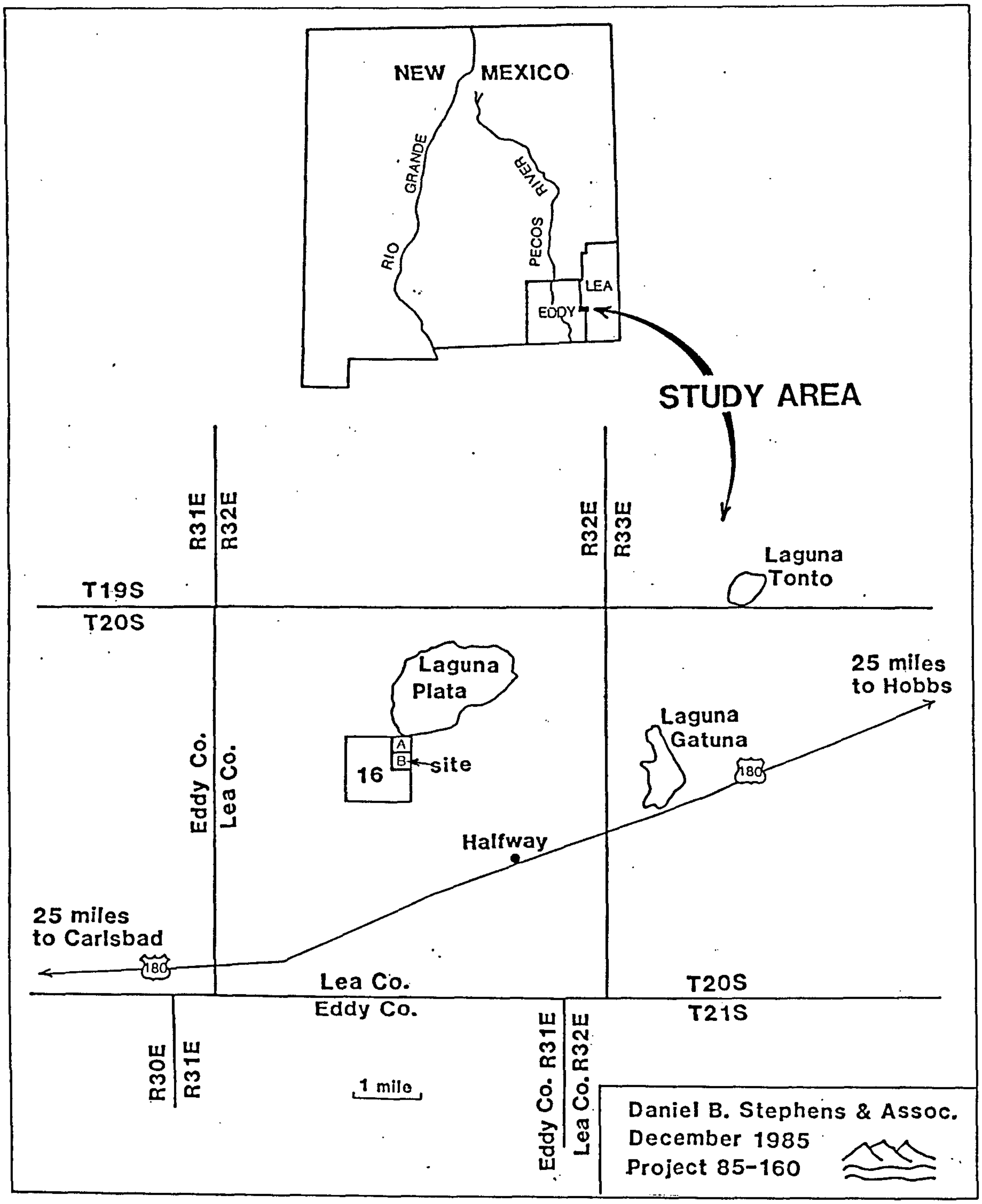

Figure 1 - Location Map

approximately 5630 acre-feet per year (3490 gallons per minute), based on a lake surface area of 2 square miles (1280 acres) shown on topographic maps and the 4.4 feet per year estimate of evaporation rate.

The area is very sparsely populated. The dwellings which comprise Halfway, New Mexico are abandoned. Except for Halfway, the only dwelling within two miles of the proposed discharge site is a ranch on the east side of Laguna Plata.

HYDROGEOLOGIC CONDITIONS

Geology

The site lies within the Permian basin, a subsurface structural feature, which has been a target of oil and gas exploration. The rocks within the basin include Precambrian to Recent age strata. The units which have hydrologic significance are of Triassic age and younger, inasmuch as no potable water is known to occur in older rocks anywhere in the basin.

The Paleozoic section which overlies the Precambrian basement is reported to be as much as 16,800 feet thick on the west side of Lea Co. (Nicholson and Clebsch, 1961). The geologic units in this section include mostly limestone and dolomite, however evaporite deposits of Permian age, such as salt and anhydrite, occur in the upper parts of the section. The youngest Paleozoic unit beneath the site is the Rustler formation, chiefly anhydrite with salt and "redbeds". Drill logs in T20S.R32E.Sec 16. (Appendix 1) indicate the depth to the top of the Permian section is approximately 800 feet below land surface.

The Dewey Lake red-beds, a Triassic or Permian age siltstone, shale and sandstone overlies the Rustler formation. Its thickness may range from 40 to 400 feet (Nicholson and Clebsch, 1961).

The Dockum group, which overlies the Dewey Lake formation, includes the Santa Rosa sandstone in the lower part of the section and the Chinle shale in the upper part. These two units comprise the "Triassic redbeds". The Santa Rosa sandstone is reported to include some shale, and the unit ranges in thickness from 140 to 300 feet (Nicholson and Clebsch, 1961). The Chinle formation consists of claystone and fine-grained sandstone. Gypsum is reported to be a common secondary mineral associated with the redbeds. At the site, the thickness of the Santa Rosa and Chinle is difficult to determine from drillers logs, owing to the interbedded nature of the shale and sandstone which occur within each formation. However, the available logs (Appendix 1) show that the combined thickness of redbeds is about 750 feet, consisting mostly of shale and sandstone.

The regional dip of the Triassic redbeds is approximately one to two degrees to the east or southeast. The Santa Rosa formation outcrops south of the Laguna Plata. A shale, assumed to be the Chinle, outcrops just north of the Laguna Plata, and the redbed surface is exposed in arroyos at the southwest end of the Laguna Plata at an estimated elevation of 3460 feet, about 30 feet above the lake surface. Drill holes in Laguna Plata indicate that the redbed surface is 20 to 41 feet below the surface of Laguna Plata (Nicholson and Clebsch, 1961). The surface of the redbeds is depressed in the vicinity of Laguna Plata, as well as near Laguna Gatuna, Laguna Tonto, and Laguna Toston. This structural feature is attributed to localized dissolution of the underlying Permian halite and anhydrite, with subsequent collapse of the overlying redbeds into the depression. Thus, the dip of the redbeds is locally reversed near the collapse depressions. The dip of the redbeds is northeast at the site.

In many parts of the region the Ogallala formation overlies the Triassic units. However, in the vicinity of the site this formation has been removed by erosion. Quaternary alluvium was deposited in the topographic depressions where the Ogallala was removed (Nicholson and Clebsch, 1961). The alluvium consists of poorly-sorted, unconsolidated sand with some clay. In places caliche occurs within the alluvium; the escarpment at the south edge of the site is underlain by a thick caliche layer. The thickness of the alluvium ranges from 15 to 130 feet in the northeast quarter of T20S.R32E.Sec.16 (Table 1), based on drillers logs. Exposures in arroyos just north of the site suggest that the alluvial cover may be less than 10 feet thick beneath the site. There is also a thin veneer of dune sand and small stabilized dunes at the site.

Principal Water-Bearing Units

Potable ground water is reported to occur in Triassic and younger units in parts of southern Lea County. However, there are only scattered occurrences of potable ground water in areas surrounding the proposed site of waste disposal (Tables 2 and 3). Regionally, the Santa Rosa sandstone is the principal water-bearing unit. Ground water may also occur in sandstone layers within the Chinle. Well yields are typically very low, owing to the low permeability of the formation. Nicholson and Clebsch (1961) report that well 20.32.18.233 which tapped the Santa Rosa had a specific capacity of 0.2 gallons per minute per foot of drawdown. Some of the well logs in Appendix 1 show the occur-

TABLE 1. Thickness of Geologic Units Determined from Well Logs

Well Number	Thickness of Alluvium (ft)	Thickness of Redbeds (ft)
20.32.6.22	40	826
20.32.8.44	12	828
20.32.12.44	25	1020
20.32.16.33	40	835
.16.144	15	860
.16.124	44	808
.16.411	30	835
.16.243	130	700
.16.213	130	710
.16.341	50	813
.16.233	50	815
.16.134	20	850
.16.31	35	840
.16.32	45	828
.223 .16.244	15	765
20.32.18.32	35	760

TABLE 2. Well Inventory Data

Location No.	Owner	Aquifer	Depth of Well	Altitude of Well	WT Depth Below LS	Date of Measurement
19.32.34.42322	Halfway Water Co.	TRS	575	3559.0	247.38	12/14/76
19.33.17.11224	-----	QAL	131	3650.0	116.84	2/05/84
19.33.26.42221	Mark Smith	QAL	100	3608.0	92.97	1/29/81
10.32.01.314114	W. N. Snyder	QAL	30	3452.0	89.2	3/24/54
20.32.17.13	-----	QAL	90	3449.0	9.0	2/28/79
20.32.18.233	Freeport Sulfur	TRS	400	3452.0	89.2	3/24/54
20.32.22.33	-----	TRC	160	3513.0	30.0	2/28/79
20.32.23.33132	-----	QAL	-----	3541.0	39.83	2/19/81
.23.43312	B. Stanford	TRC	78	3551.0	36.78	2/19/81
.24.3333	T. Bingham	QAL	65	3555.0	37.69	2/19/81
.27.14332	J. Frey	QAL	25	3539.0	23.32	2/19/81
.27.32322	T. Bingham	QAL	-----	3530.0	15.33	2/19/81
20.32.30.142	-----	QAL	-----	3505.0	9.94	6/11/54
20.32.31.13	-----	TRC	240	3550.0	135.12	3/15/79
.36.21442	B. Smith	QAL	50	3581.0	43.88	9/18/72
.36.22311	B. Smith	QAL	65	3586.0	45.82	2/19/81
20.33.04.43211	-----	QAL	58	3556.0	33.19	3/19/68
.05.34321	Pan Amer. Petr. Co.	TRS	680	3552.0	277.52	2/19/81
.15.22143	-----	TRS	-----	3582.0	335.10	4/20/55
.18.12322	-----	TRS	-----	3521.0	245.58	7/25/72
.20.22224	-----	QAL	52	3536.0	35.0	2/19/81
21.32.6.11	I. A. Allred	QAL	55	3597.0	46.21	3/10/81

TABLE 3. Chloride Concentrations
(Source: N.M. State Engineer's Office, Roswell, NM, and Geohydrology Associates, Inc., 1979, 1984)

Well Number	Geologic Formation	Chloride Concentration* (ppm)	Date Sampled	Use
19.32.08.22411	TRS	16	3/13/85	Stock
19.33.18.133223	TRS	312	2/15/83	OWD
.26.42221	QAL	326	1/16/78	Stock
.26.42221	QAL	306	10/08/76	Stock
20.31.13.412433	QAL	635	12/22/48	Stock
.13.414	Williams Lake	110,750	2/27/84	Lake
.13.414411	QAL	6,660	2/27/84	----
.16.234441	TRS	785	12/22/48	Stock
.16.24331	TRC	673	11/30/65	Stock
.16.421111	TRC	355	11/30/65	Stock
20.32.	Laguna Plata	196,012	12/13/85	Lake
20.32.17.13	QAL	172,828	12/22/78	----
.22.33	TRC	5,136	12/19/78	----
.23.43312	TRC	362	2/69	Commercial
.24.333	QAL	85	2/69	Windmill
.24.333	QAL	42	9/11/72	Stock
.36.21442	QAL	290	9/18/72	Stock
20.33.	Laguna Gatuna	158,000	2/69	----
20.33.04.43211	QAL	12,978	10/24/68	Stock
.21.22224	QAL	3,518	----	----
20.31.01.13143	QAL	57	8/18/72	Domestic
Spring #1	SE end of Laguna Plata	8,864	2/12/69	
Spring #2	E end of Laguna Plata	7,446	2/12/69	
Spring #3	E end of Laguna Plata	7,446	2/12/69	
Spring #4	E end of Laguna Plata	7,978	2/18/69	
Spring #5	S end of Laguna Gatuna	163,105	2/18/69	
Sample #6	Gatuna, in draw North of Highway	72,333	2/18/69	
Sample #7	Gatuna, NW end at oil well, NW of well in ravine	27,657	2/18/69	

TABLE 3 - continued

Well Number	Geologic Formation	Chloride Concentration* (ppm)	Date Sampled	Use
Sample #8	Gatuna, NW end at oil well NE of well in ravine	10,992	2/18/69	

Explanation: Aquifer - QAL = Quaternary Alluvium; TRS = Triassic Santa Rosa; TRC = Triassic Chinle.
Use - OWD = Oil Well Drilling Well

* Recommended drinking water standard is 250 ppm.

rence of ground water within sandstones of the redbeds. Where it is saturated, the alluvium also may yield water to wells. However, the areal extent of the saturated portions is limited as a result of the irregular nature of the redbed surface. Thus ground water in the alluvium near the site is not sufficient in volume to comprise a laterally extensive aquifer which has potential for development, except locally for domestic and stock watering uses. At the north end of the site and along the southwest side of Laguna Plata, there are a few seeps which occur at the contact between a dense red shale within the Chinle and an overlying sandstone member. This shale horizon apparently serves as a barrier to water which infiltrates the sandy surficial deposits. There is no evidence of an alluvial aquifer beneath the site, based on field reconnaissance. Any significant water-bearing unit beneath the site is expected to occur in the Triassic redbeds.

The depth to the water table is about 37 feet near Halfway and about 22 feet at the ranch one mile east of Laguna Plata. The depth to water decreases toward Laguna Plata. Topographic maps show that there are numerous springs on the east side of Laguna Plata which mark the intersection of the water table with the land surface. These springs also mark the locations of points of groundwater discharge to the Laguna Plata. This discharge presumably originates, in part, from seepage from Laguna Gatuna, which is about 60 feet higher in elevation. There are few available data on the chemical quality of ground water (Tables 3 and 4). No wells are known to produce potable ground water within approximately three miles of the site. A well in the alluvium (20.32.1.322) at the ranch northeast of Laguna Plata produces water which is not potable. East of Halfway, an alluvial well (20.32.18.32) yields potable water having chloride concentrations of 42 ppm (parts per million) (Table 2). This well is reported to be used to water stock. In the Triassic redbeds the chemical quality of ground water in wells is also variable, ranging from 21 to 785 ppm (Table 4 and Figure 2). Well 20.32.23.433, completed in the Chinle at Halfway, has a chloride concentration of 200 ppm.

Groundwater Movement

Based on available water level elevation data, shallow ground water in alluvium and upper redbed formations flows toward Laguna Plata (Figure 3). The springs also suggest that ground water moves toward this topographically low area. In the deeper Triassic units, ground water also moves toward the area containing the salt lakes (Nicholson and Clebsch, 1961). There is a vertical component of hydraulic gradient downward from the

TABLE 4. Chemical Analyses of Selected Wells Near The Site. Values in parts per million except pH and E (micromhos). (Source: Nicholson and Clebsch, 1961.)

Well #	Date	Depth (ft)	SiO_2	Ca	Mg	Na+K	HCO_3	SO_4	Cl	F	NO_3	TDS	E.C.	pH
Laguna Plata														
	12/13/85	0	----	940	3,317	124,644	71	10,124	192,012	__	__	335,108	----	7.34
Alluvium														
230.32.1.322	7/1/54	----	----	---	---	----	---	---	--	--	---	---	----	---*
Triassic Redbeds														
19.32.8.224	12/9/58	----	19	10	13	131	306	74	21	1.2	6.4	426	682	8.0
19.34.9.114	12/9/58	33	41	430	65	675	189	1,680	560	0.3	139	3,680	4,660	7.1
20.32.23.433	12/13/85	78	----	51.3	48.6	123	292	54	200	---	---	770	----	7.94
21.33.2.231	9/4/58	1150	----	----	----	---	336	95	20	---	---	---	3,370	----

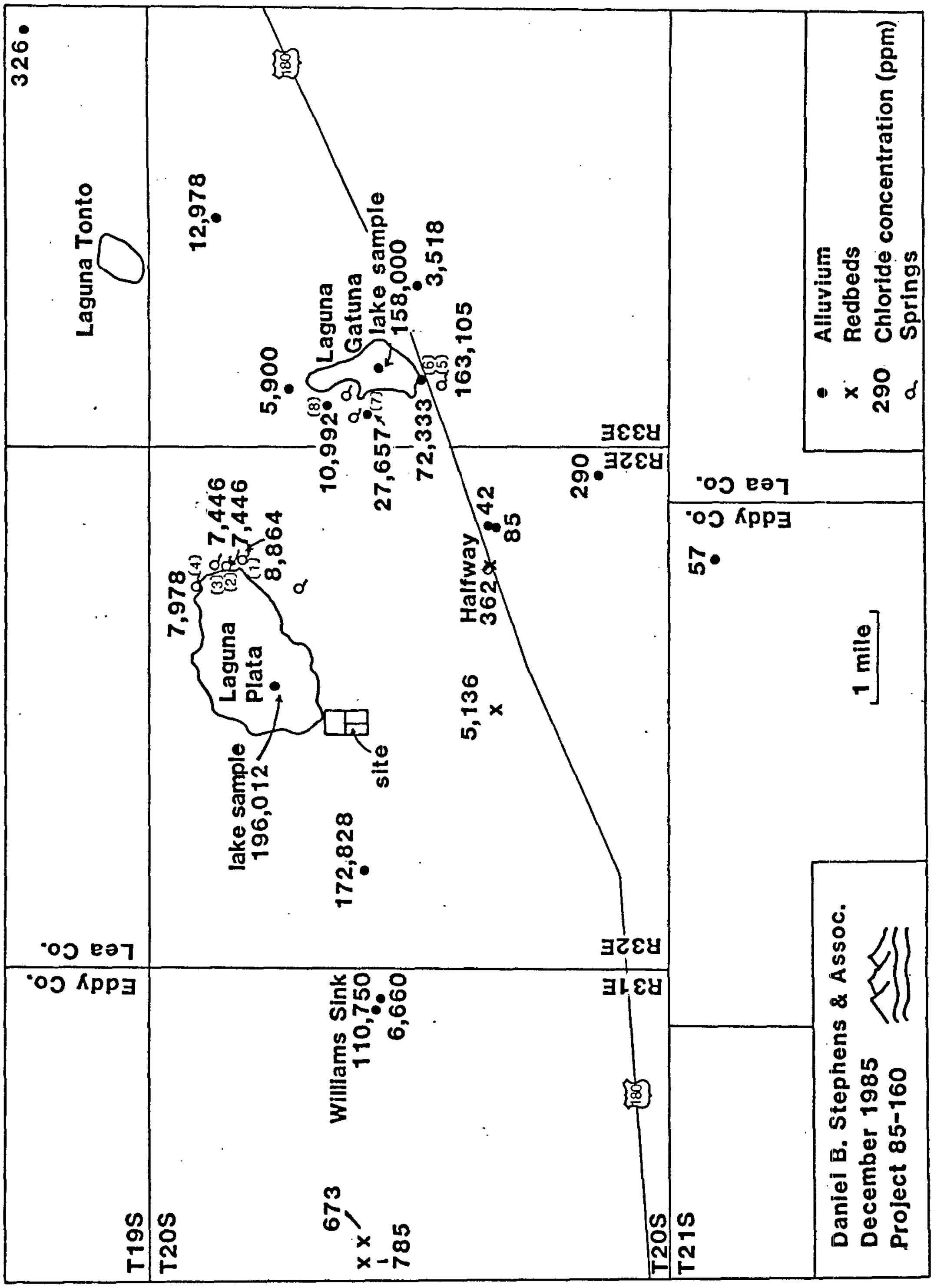

Figure 2 - Chloride Concentrations

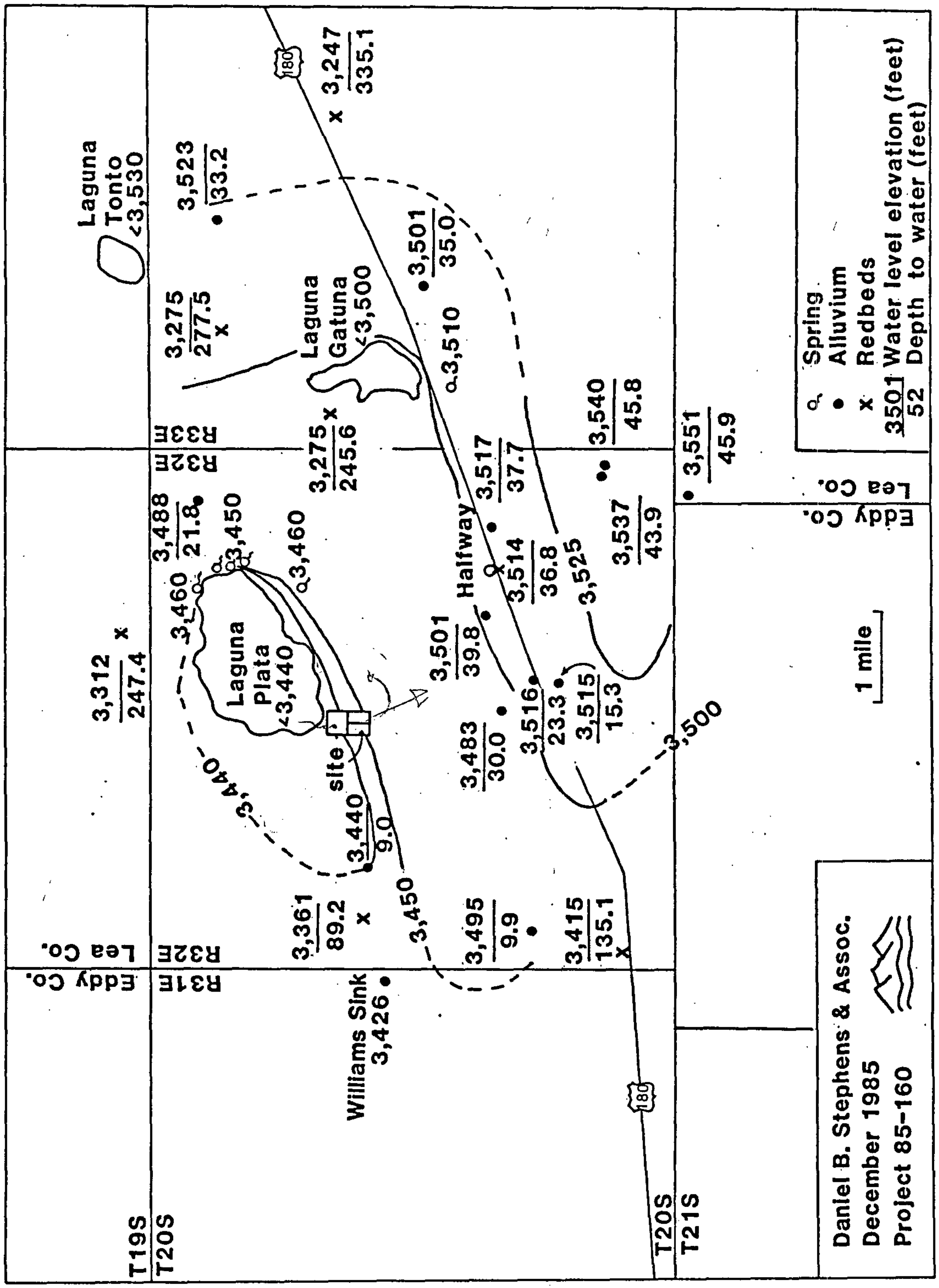

Figure 3 - Water Level Elevations and Depths to Water

shallow aquifer and Laguna Plata toward the deeper Triassic water-bearing units. If there were downward movement across the low-permeable shales, the quality of groundwater in the water-bearing Triassic sandstones would be poor, owing to the high salinity of Laguna Plata.

The proposed waste disposal site is situated within about 0.15 miles of the south shore of Laguna Plata. Seepage from the impoundments is expected to infiltrate through the underlying dune veneer, alluvium, and shallow sandstone toward the water table. The depth to the water table beneath the site is expected to be approximately 20 to 30 feet. Shallow ground water which may occur at present beneath the site may be perched on the Chinle shale layer observed in arroyos in the field reconnaissance. This layer would cause a ground water mound to develop beneath the waste pits and divert seepage northward and down-dip toward Laguna Plata or to an arroyo draining toward the lake.

The time for seepage to reach the Laguna Plata is difficult to estimate, owing to the absence of aquifer properties and water level data. However, the rate of ground water movement is likely to be on the order of not more than 100 feet per year; thus, the time for seepage to reach Laguna Plata would be on the order of 8 years. The shallow depth to the water table and the relatively permeable nature of the surficial materials will result in relatively rapid transport of seepage through the vadose zone.

There are no water users downgradient from the disposal site. After the seepage reaches the Laguna Plata, practically all of the seepage will evaporate. A minor amount of seepage may move downward toward the lower Triassic water-bearing units. However, regional ground water flow in these units also converges toward the salt lakes. There are no known sources of potable groundwater in sediments underlying the Triassic redbeds at Laguna Plata.

SUMMARY OF WASTE DISPOSAL PLAN

The disposal plan includes wastes which fall into three general groups. Group I includes brine, salt water, and water contained in drilling mud and cement. Group II wastes include oil and basic sediment (low quality oil which separates from gun barrels). Group III includes solid wastes. The estimated maximum possible volumes of wastes from these three groups are 26,500, 2250, and 1100 bpd (barrels per day), respectively, for a total of 30,000 bpd. However, on a sustained basis, under normal operating conditions, the total rate of waste disposal for all three groups is anticipated to be only about 2250 bpd (106 acre-feet per year) from all three waste types.

The wastes will be separated mechanically in a gunbarrel upon arrival at the site. The liquids from the separation, Group I, will be diverted to a series of five shallow ponds, 60 x 100 feet each. Their depths will range from about 7 to 10 feet. Oil which was not separated in the gunbarrel will be skimmed from the surface of the ponds and pumped to tanks. There is an additional pit downstream of the Group I and II waste pits to contain unexpected overflow.

A significant portion of seepage from the Group I pits will infiltrate the soil and migrate to the Laguna Plata. The salinity of the seepage is not likely to exceed that of Laguna Plata, inasmuch as produced oilfield fluids are expected to have total dissolved solids concentrations in the range of 25,000 to 75,000 ppm. The total dissolved solids at Laguna Plata is 335,100 ppm (Table 3). Thus, the seepage will dilute the concentration of the total dissolved solids in Laguna Plata. The total annual rate of evaporation from Laguna Plata is about 5360 acre-feet per year. Under anticipated normal operating conditions, the total rate of Group I waste disposal will be only about 93 acre-feet per year. Therefore, there is ample storage and evaporation potential in Laguna Plata to accommodate the waste seepage. No significant change in the hydrologic regime is expected as a result of the proposed discharge.

Group II wastes will be stored in tanks and removed from the site for reprocessing and recovery.

Group III solid wastes will be spread into a series of four shallow pits, each about 24 x 100 feet and ranging in depth from 6 to 8 feet. The solids will be alternately dried during the filling of the pits. The dried materials will be excavated and spread on a caliche caprock pad for long-term storage.

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Hunter, R., 1985, A preliminary regional water balance for the WIPP site and surrounding area, Sandia National Laboratory, SAND84-2233, 98 pp.

Nicholson A. and A. Clebsch, 1961, Geology and Ground-Water Conditions in southern Lea County, New Mexico, NM Bur. Mines and Mineral Resources, Ground-Water Report 6, 120 pp.

APPENDIX 1 - Well Logs

1644

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

NEW MEXICO WELL LOG DIVISION

Casing Record:
8¼" 1132'

I. P. Abandoned

New Mexico
Lea County
Argo Royalty Co.
Burner Well #1
Sec. 6 T. 20S R. 32E
750 N. L. - 990 E. L.
Elevation: 3513
Commenced: 1-31-35
Completed: 3-12-35

Formation	Bottom
Red sand	40
Red beds	100
Red sand	115
Red beds	125
Red sand & shale	190
Red beds	235
R. sand	280
R. water sand	290
Red sandy shale	335
Water sand	340
Red sandy shale	350
Red sandy shale	385
Red rock & red beds	730
Red rock and red beds	866
Anhydrite	890
Anhydrite	945
Gr. shale	955
Anhydrite	1005
Salt	1040
Salt and anhy.	1065
Shale, red	1075
Anhy.	1090
Gr. lime	1105
Anhydrite	1112
Brown shale	1117
Red beds	1128
Salt and anhy.	1130
Shale	1175
Salt	1190
Shale	1245
Salt	1255
Skip in Log	
Salt	1625
Salt	1870
Salt and anhy.	1880
Salt	2330
Anhy.	2510
Br. Lime	2534
Gray lime	2611
Hard gray lime	2639
Brown lime	2653
Broken gray lime	2664
Gray sand	2679
Gray sand	2700
Shale breaks	2704
Hard gray lime	2718
Lime and shale breaks	2727
Hard brown sandy lime	2754
White lime	2785
Sand	2805
TD	2725'

Note: Last report T. D. 2810
Lime fishing bit.

3317

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

NEW MEXICO WELL LOG DIVISION

COUNTY Lea
FIELD Wildcat
COMPANY Argo Royalty Company
LEASE Burner permit No. 2 Well
LOCATION (¼) C SE SE
SEC. 8 . T. 20S . R. 32E
660 feet from south line and
660 feet from east line of Section
COMMENCED 6-13-35
COMPLETED 7-23-35
ABANDONED
REMARKS: D&A.

CASING RECORD

Diam., in.	Bottom
10-3/4"	433'
8¼"	1155'

ELEVATION 3484 (L&S) FEET

INITIAL DAILY PRODUCTION:

Open		bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET
Rock	12
Red rock	195
Water sand	205
Red rock, sand, wtr.	230
Red rock	235
Red sand and shale, 10 BWPH	280
Red bed	315
Red bed and red rock	350
Red rock and sand	390
Red sand and rock	420
Red bed	515
Hard sand	545
Red rock	590
Hard sand	625
Red rock	670
Sand and red shale	710
Red rock and red shale	750
Red rock and gyp	795
Red rock	880
Anhydrite	915
Red rock and salt	935
Anhydrite	955
Blue shale	973
Anhydrite and lime	995
Anhydrite	1025
Salt	1065
Anhydrite and potash	1070
Potash	1075
Brown shale	1080
Anhydrite and lime	1085
Anhydrite	1118
Blue shale	1123
Red rock	1142
Salt	1155
Anhydrite	1160
Blue and red shale	1180
Red rock and salt	1200
Red rock, salt and anhydrite	1235
Salt and red rock	1290
Salt and potash	1330
Salt and red rock	1360
Hard anhydrite	1370
Salt and potash	1550
Salt	2060
Salt and potash	2080
Salt	2130
Salt and potash	2170
Salt	2215
Anhydrite and salt	2245
Salt	2330
Anhydrite and salt	2345
Anhydrite	2385
Lime	2417
Lime and red sand	2426
Hard lime	2517
Hard lime and blue shale	2527
Broken lime and sand	2540
Lime and red sand	2549
Red lime and red sand	2588
Lime	2610
Broken lime and blue shale	2618
Red and white lime, hard	2624
Hard white lime	2645
XXXXXXXXXXXXXXXXX	XX
Blue shale and lime	2676
Hard white lime and green shale breaks	2685
Lime	2798
Sand T. D.	2803

Log. No. 128

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Brewer Drilling Co.
LEASE Monroe Well No. 1
LOCATION (¼) SE SE
SEC. 12 T. 20 S , R. 32 E
660 feet from South line and
660 feet from East line of Section
COMMENCED 6-8-43
COMPLETED 7-16-43
ABANDONED
REMARKS:

CASING RECORD

Diam., in	Bottom
$8\frac{1}{4}$	1117

ELEVATION FEET

INITIAL DAILY PRODUCTION:

Open	P. & A.	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET
Lime	10
Red sand	25
Red bed	250
Red shale	300
Red rock	340
Red rock	415
Red shale	425
Sand	440
Red shale	465
Red bed	475
Sand	487
Red rock	500
Red bed	515
Red sand - water	535
Red rock	665
Shale, red	730
Red rock	1045
Anhydrite	1121
Red rock and shale	1135
Anhydrite and red rock3	1150
Shale	1180
Anhydrite	1210
Salt	1280
Anhydrite	1295
Salt and shale	1305
Anhydrite	1320
Gray lime	1340
Red shale	1350
Salt	1380
Anhydrite	1386
Salt and shale	1510
Salt	1715
Anhydrite	1725
Anhydrite and salt	1740
Salt	1805
Salt and potash	2330
Salt and anhydrite	2410
Salt and potash	2485
Anhydrite	2520
Salt amd anhydrite	2560
Salt	2610
Anhydrite	2620
Salt and potash	2650
Anhydrite	2690
Lime	2705
Pink lime	2720
White lime	2770
Lime	2815
Brown lime	2830
Gray lime	2845
Gray shale	2865
Lime	2870
Red bed	2875
Red shale and lime shells	2885
Lime	2910
Lime	2925
Shale and gypsum	2935
Lime and red shale	2945
Lime and shale breaks	2960
Lime	2992
Sandy lime	3022
Lime	3055
Lime, showing oil and gas	3056
Sandy lime	3120
Water sand	3126 T.D

Red beds 10 to 1045 ft

Log. No. 4633

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corp.
LEASE Texas-State "A" Well No. 2
LOCATION (¼) SW SW
SEC. 16 T. 20S , R. 32E
660 feet from South line and
660 feet from West line of Section
COMMENCED 6-11-41
COMPLETED 7-12-41
ABANDONED D&A
REMARKS:

CASING RECORD

Diam., in	Bottom
10 3/4"	459
8 5/8"	940

ELEVATION FEET

INITIAL DAILY PRODUCTION:

Open D&A bbls. Oil
Open cu. ft. Gas
Tbg. bbls. Oil
Tbg. cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Cellar	8	Anhydrite	1398
Caliche	40	Slat and Potash	1520
RedBed and Sand	70	Salt	2105
Sandy shale	80	Anhydrite	2120
Red Rock	120	Salt	2182
Sandy shale	125	Anhydrite	2205
Red Rock	155	Slat	2270
Red Shale	182	Salt and Potash	2290
Sand, Red	220	Salt	2292
Sandy Shale, Red	250	Anhydrite	2332
Red Rock	295	Lime-medium	2370
Sand	305	Red Rock-Soft	2372
Red Rock	355	Lime-hard-gray	2468
Sandy Shale, Red	385	Lime-Meduim-bronw	2505
Sand, Red	405	Lime-gray-hard	2520
Shale, Red	430	Lime-Sandy-Red-Medium	2525
Red Rock	470	Lime-hard-gray-show oil at 2530	2535
Shale, Red	505	Shale-soft-red	2545
Red Rock	545	Lime-hard-gray	2577
Shale, Red	640	Lime, brown	2581
Red Rock	745	Lime, gray, hard	2590
Shale, Red	810	Lime & sand-gray, meduim	2600
Red Shale	875	Lime, brown & gray-soft	2609
Anhydrite	900	Lime, gray-hard	2646
Red Rock	915	Lime, gray-medium	2666
Salt	930	Lime, pay-soft gray	2674
Anhydrite-hard	1020	Sand-gray-soft	2676
Salt	1070	Lime, gray-medium	2694
Anhydrite	1130	Sand, gray medium T.D.	2696
Red Rock	1140		
Salt	1170		
Anhydrite	1190		
Salt and Potash	1250		
Anhydrite	1265		
Salt and Shale	1290		
Salt and Potash	1380		

√

Log. No. 4574

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea.
FIELD Halfway
COMPANY Argo Oil Corp.
LEASE State Well No. 1
LOCATION (¼) S/2 E/2 NW/4
SEC. 16 - T. 20S , R. 32E
2310 feet from North line and
1980 feet from West line of Section
COMMENCED 1-7-40
COMPLETED 2- -40
ABANDONED
REMARKS:

CASING RECORD

Diam.. in	Bottom
10-3/4	450
8-5/8	946
7	2613

ELEVATION 3510 FEET

INITIAL DAILY PRODUCTION:

Open 25 per hr. bbls. Oil
Open cu. ft. Gas
Tbg. bbls. Oil
Tbg. cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Caliche	15	Anhydrite, hard	2195
Sandy shale, red	75	Salt	2300
Red rock	145	Anhydrite, hard	2325
Red shale	215	Lime, hard, gray	2366
Sand	225	Red rock	23699
Red rock	235	Limer, hard gray	2426
Red shale	245	Lime, hard, brown	2450
Water sand	260	Sandy lime	2478
Red shale	285	Lime, hard, brown	2486
Red rock, sandy	330	Lime, hard, gray	2497
Red sahle, sandy	400	Lime, hard, brown	2507
Red rock	455	Lime, hard, gray	2519
Red shale	610	Lime, hard, gray	2546
Red rock	630	Lime, hard, gray	2583
Red shale, hard	685	Soft sand, Show GAS	2625
Red rock	755	Gray lime, hard	2625
Red shale	800	Lime, soft, OIL T.D.	2627
Red rock	845		
Red shale	875		
Anhydrite	910		
Red shale	920		
Anhydrite	1020		
Salt	1070		
Potash, hard, red	1080		
Red rock	1090		
Anhydrite	1125		
Red rock	1140		
Salt	1160		
Anhydrite	1177		
Salt	1190		
Salt and red rock	1235		
Salt	1275		
Salt and potash	1325		
Salt	1380		
Anhydrite	1395		
Salt	1500		
Anhydrite	1517		
Salt	1990		
Anhydrite	2002		
Salt	2017		
Anhydrite	2030		
Salt	2175		

Log. No. 4555

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corp.
LEASE State Well No. 3
LOCATION (¼) NE NW
SEC. 16 T. 20S , R. 32E
990 feet from North line and
2310 feet from West line of Section
COMMENCED 2-9-41
COMPLETED 3-15-41
ABANDONED
REMARKS:

CASING RECORD

Diam., in	Bottom
10-3/4	431
8-5/8	920
7"	2547

ELEVATION 3489 FEET

INITIAL DAILY PRODUCTION:

Open	400	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Cellar	8	Anhydrite	1990
Caliche	15	Salt and potash	2172
Red sand	44	Anhydrite	2193
Red shale	100	Salt	2220
Red rock	183	Salt and potash	2265
Sand 5 BWPH @ 205'	214	Salt, white	2295
Red shale	220	Anhydrite	2330
Red sandy shale	300	Hard gray lime	2340
Red rock 12 BWPH	335	Lime	2355
Red sandy shale 18 BWPH	375	Gray lime	2366
Red sandy shale	435	Red shale	2370
Red rock	520	Gray lime	2382
Red shale	565	Blue shale	2385
Red rock	640	Gray lime	2387
Red shale	685	Hard gray lime	2397
Red rock	740	Gray lime	2423
Red rock and shale	780	Hard gray lime	2430
Red rock	810	Gray lime	2450
Red shale	852	Broken lime	2478
Anhydrite	875	Lime	2485
Red shale	880	Red lime	2494
Anhydrite	955	Gray lime	2547
Anhydrite, white	985	Brown lime	2550
Salt, white	1050	Gray lime	2584
Anhydrite	1098	Broken brown lime	2593
Red and blue shale	1105	Gray lime	2630
Red shale and salt	1115	Hard gray lime	2635
Salt and red shale	1135	Broken lime	2650
White anhydrite	1150	Lime	2663
Salt and red shale	1155	Total depth	2681
Salt and red rock	1255		
Salt and potash	1315		
Salt and anhydrite	1355		
Salt and potash	1475		
Anhydrite	1490		
Salt	1510		
Salt and potash	1560		
Salt	1575		
Salt and potash	1805		
Salt	1850		
Salt and potash	1980		

Steuch cut

Log. No. 4528

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corp.
LEASE Texas-State "B" Well No. 3
LOCATION (¼) NW NW SE
SEC. 16 T. 20S , R. 32E
2310 feet from South line and
2310 feet from East line of Section
COMMENCED 1-3-41
COMPLETED 2-2-41
ABANDONED
REMARKS:

ELEVATION 3511 FEET

INITIAL DAILY PRODUCTION:
Open In 8 hr. 85 bbl bbls. Oil
Open cu. ft. Gas
Tbg. bbls. Oil
Tbg. cu. ft. Gas

CASING RECORD

Diam., in	Bottom
10-3/4	456
8-5/8	932
7	2477

FORMATION	BOTTOM, FEET
Caliche	30
Red shale	45
Gravel	65
Red rock	105
Red rock sandy 1/2 bailer w.p.h,	125
Red rock	180
Sand	190
Red rock	200
Water sand	230
Red rock sandy	280
Sandy shale	345
Red rock	365
Sand with water	370
Red rock	390
Sand with 25 bailers water per hr.-	395
Red rock	459
Shale	485
Red rock	600
~~Shale~~ shale	615
Red rock	745
Shale	795
Red rock	865
Anhydrite	895
Shale, red	905
Anhydrite	939
Salt	945
Anhydrite	1012
Salt	1060
Anhydrite	1125
Salt and red rock	1155
Anhydrite	1170
Salt and red rock	1175
Anhydrite, salt and potash	1230
Red rock and salt	1275
Salt and potash	1365
Anhydrite	1400
Salt and potash	1425
Salt	1485
Salt and potash	1540
Salt	1630
Salt and potash	1700
Anhydrite	1710
Salt and potash	1820
Salt	1870
Salt and potash	1995
Anhydrite and potash	2010
Salt	2085
Anhydrdte	2135
Salt	2170
Anhydrite	2190
Salt---Base of salt	2285
Anhydrite	2322
Anhydrite	2322
Lime, gray	2445
Lime, broken, sandy	2462
Lime, brown	2497
Lime, gray	2516
Shale, gray	2519
Lime, broken sandy	2525
Lime, brown	2541
Lime, gray	2597
Lime, sandy - hole full OIL	T.D.2604

Log No. 4483

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY North Shore Corp.
LEASE Texas-State "B" Well No. 1
LOCATION (¼) SW SE NE
SEC. 16 T. 20-S R. 32-E
2310 feet from North line and
990 feet from East line of Section
COMMENCED 10-7-40
COMPLETED 11-6-40
ABANDONED
REMARKS:

ELEVATION 3496 FEET

CASING RECORD

Diam., in	Bottom
12	420
10	930
8	2400

INITIAL DAILY PRODUCTION:

Open	Dry	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Caliche	100		
Sand	130		
Red bed	400		
Sand and shale	770		
Sand and red bed	830		
Anhydite	870		
Anhy. sand and salt	892		
Anhydrite	900		
Lime	925		
Anhydrite	982		
Salt	1035		
Anhy. salt and sand	1065		
Lime	1100		
Anhy. salt and sand	1175		
Salt	1270		
Anhy. salt sand and potash	1355		
Salt	1445		
Anhy. salt and potash	1460		
Salt	1575		
Anhy. salt and potash	1725		
Salt	1785		
Anhy. salt and potash	1820		
Salt	1860		
Salt anhy. and potash	2020		
Salt	2180		
Anhydrite	2210		
Salt	2330		
Anhydrite	2371		
Lime	2410		
Lime and sand	2420 ~~2450~~		
Lime	2485		
Limeand sand	2535		
Sand	2585		
Sand and lime	2648		
Lime sand and benite	2700		
Lime	2705		
Limeand sand	2715		
Lime	T.D. 2728		

Log No. 4459

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY North Shore Corporation
LEASE Texas-State "A" Well No. 1
LOCATION (¼) SW NW NE
SEC. 16 T. 20-S, R. 32-E
990 feet from North line and
2310 feet from East line of Section
COMMENCED Sept. 1, 1940
COMPLETED Sept. 28, 1940
ABANDONED
REMARKS:

CASING RECORD

Diam., in	Bottom
10"	420
8-5/8	901'9"
$5\frac{1}{2}$	2494

ELEVATION 3481 FEET

INITIAL DAILY PRODUCTION:

Open	480	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET
Sand & Caly.	110
Water Sand	130
Red Beds	250
Sand & red shale	800
Sand	840
Anhydrite	875
Sand & salt	890
Anhydrite	910
Anhydrite & lime	925
Anhydrite	975
Salt	1040
Anhydrite Shale & salt	1070
Lime	1100
Potash	1110
Sand & Anhydrite	1120
Anhydrite	1140
Sand & anhydrite	1170
Anhydrite & salt	1200
Salt	1275
Salt & Potash	1330
Anhydrite	1345
Salt & Potash	1470
Salt	1540
Salt & Potash	1765
Anhydrite	1785
Salt & Potash	1930
Anhydrite Potash & Salt	1980
Salt	2035
Anhydrite	2065
Salt & Anhydrite	2130
Anhydrite	2160
Salt	2245
Anhydrite	2290
Lime & Anhydrite	2310
Brown Lime & sand	2342
Brown lime & grey	2388
Sand & lime	2430
Sand Brown & grey Lime	2467
Sand	2490
Lime T.D.	2505

stencil made

Log No. 4407

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corporation
LEASE Texas-State "B" Well No. 2
LOCATION (¼) [illegible] S.
SEC. 16 T. 20 , R. 32
990 feet from South line and
1650, feet from West line of Section
COMMENCED 3-12-40
COMPLETED 7-8-40
ABANDONED
REMARKS: Swabbed only water.

CASING RECORD

Diam., in	Bottom
10-3/4	450
8-5/8	883
7	2606

ELEVATION 3511 FEET

INITIAL DAILY PRODUCTION:

Open		bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Caliche	6	Salt	1845
Anhydrite & Red Rock	50	Salt & Potash	1920
Red Shale	115	Salt & Potash	2010
Red Rock	205	Anhydrite Salt & Potash	2050
Red Sand	215	Salt & Potash	2120
Red Rock	255	Salt & Anhydrite Shells	2150
Red Sand - water	280	Anhydrite	2210
Red Shale	325	Salt & Potash	2270
Red Rock	390	Salt	2275
Sand - water	400	Anhydrite	2325
Red Rock	410	Lime	2422
Red Shale	490	Lime	2460
Red Rock	550	Lime Red Sandy	2476
Sandy Shale	560	Lime	2491
Red Rock	570	Red Lime	2512
Red Rock & Shale	625	Sand-Show dead Oil 2518	2519
Red Shale	690	Lime	2521
Red Rock	820	Broken Sandy Lime	2533
Red Shale	863	Lime	2579
Anhydrite	868	Red Sandy Lime	2586
Red Shale	877	Lime -show oil 2629	2640
Anhydrite	915	Lime & Bentonite	2662
Anhydrite & Salt Shells	935	Lime - show oil 2685 T.D.	2688
Anhydrite	970		
Gray Anhydrite	1020		
Salt	1080		
Anhydrite (gray)	1135		
Anhydrite & Potash	1145		
Anhydrite & Salt	1170		
Anhydrite	1175		
Red Rock Broken	1225		
Salt - Potash	1295		
Salt & Red Shal-	1310		
Salt	1380		
Anhydrite	1400		
Salt-potash w/blue shells	1455		
Anhydrite, salt & Potash	1525		
Anhydrite Salt & Shells	1585		
Salt & Potash	1800		

/ stencil made

Log No. 4408

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Sam Weiner
LEASE Wentz State Well No. 1
LOCATION (¼) SW SW NE
SEC. 16 T. 20, R. 32
2310 feet from North line and
2310 feet from East line of Section
COMMENCED 5-30-40
COMPLETED 7-11-40
ABANDONED
REMARKS:

CASING RECORD

Diam., in	Bottom
8-5/8	926
7	2367

ELEVATION FEET

INITIAL DAILY PRODUCTION:

Open	360	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Caliche	15		
Red Sand	40		
Sand & Gravel	50		
Red Bed	200		
Sand	240		
Red Bed & Sand	360		
Sandy Shale	400		
Red Bed	500		
Shale & Gyp	530		
Red Rock & Red Bed	885		
Anhydrite	910		
Shale & Salt	920		
Salt & Anhydrite	1080		
Anhydrite & Potash	1110		
Salt & Anhydrite	2294		
Anhydrite	2332		
Lime (Show of Gas at 2338)	2394		
Brown Lime	2405		
Lime	2444		
Grey Sandy Lime	2467		
Brown Lime	2482		
Brown & Gray Lime	2495		
Lime - Show of Oil	2520		
Broken Lime	2530		
Hard Gray Lime	2556		
Soft Lime - Hole filled with Oil	2559	T.D.	

√

Log No. 4276

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corporation
LEASE State Well No. 2
LOCATION (¼) S½W½ NW
SEC. 16 T. 20-S . R. 32-E
2310 feet from North line and
4290 feet from East line of Section
COMMENCED 2-2-40
COMPLETED 3-17-40
ABANDONED
REMARKS:

ELEVATION 3510 FEET

INITIAL DAILY PRODUCTION:

Open	460	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

CASING RECORD

Diam., in	Bottom
10-3/4"	450
8-5/8"	950
7"	2026

FORMATION	BOTTOM, FEET
Caliche	20
Shale Soft Red	115
Red Rock	170
Sandy Shale Red	330
Red Rock	365
Sand	385
Sandy Red Shale	425
Shale Red	475
Red Rock	525
Red Shale	580
Sandy Shale Red	710
Red Rock	725
Anhydrite	735
Sandy Shale Red	805
Red Rock	870
Anhydrite	910
Shale Soft Red	915
Anhydrite & Shale	935
Anhydrite Hard	1018
Salt	1075
Potash	1080
Shale Blue Soft	1085
Anhydrite Hard	1125
Red Rock	1135
Salt	1160
Anhydrite Hard	1175
Salt & Potash	1260
Salt & Red Rock	1315
Salt	1375
Anhydrite Hard	1390
Salt	1500
Anhydrite Hard	1520
Salt	1900
Salt & Potash	1940
Salt	2000
Anhydrite	2010
Salt	2030
Anhydrite	2038
Salt & Potash	2070
Salt	2175
Anhydrite	2205
Salt	2300
Anhydrite	2315
Anhydrite & Brown Lime Hard	2333
Lime Hard Gray	2385
Shale Soft Blue	2388
Lime Hard Gray	2438
Lime Hard Brown	2449
Lime Hard Gray	2475
Lime HardBrown	2502
Lime Hard Gray	2509
Lime Hard Brown	2545
Lime Hard Gray	2589
Sand	2599
Lime Hard Brown	2610
Lime Hard Gray	2677
Lime Hard Brown	269779
Lime Soft Gray	2682
Lime Hard Gray	2688
Lime Med. Gray T.D.	2689'6"

Log No. 4018

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Coporation
LEASE Texas-State Well No. 1
LOCATION (¼) NW SW
SEC. 16 T. 20-S R. 32-E
1980 feet from Sth line and
660 feet from West line of Section
COMMENCED 10/17/39
COMPLETED 11/14/39
ABANDONED
REMARKS: Texas Co. farm-out

ELEVATION 3510 FEET

INITIAL DAILY PRODUCTION:

Open	240	bbls. Oil
Open		cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

CASING RECORD

Diam., in	Bottom
10-3/4	420
8-5/8	931
7"	

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
Caliche	35		
Red Rock Red Shale & Sand	165		
Red Shale & Sandy	454		
Red Rock and Shale	875		
Anhyd. & Red Rock	1025		
Salt Potash & Red Rock	1095		
Anhyd. & Salt	1185		
Red Rock & Salt	1230		
Salt & Anhyd.	2330		
Lime Hard Gray	2450		
Lime Med Gray	2475		
Lime Hard Gray	2527		
Soft Lime	2610		
Lime	2657 TD		

Log. No. 3924

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD Halfway
COMPANY Argo Oil Corporation *
LEASE Texas-State "B" Well No. 1 **
LOCATION (¼) NE SW
SEC. 16 T. 20S R. 32E
1980 feet from south line and
1980 feet from west line of Section
COMMENCED 9-13-39 - Deepened 5-25-4
COMPLETED 2-21-40 - Deepened 8-19-4
ABANDONED *Formerly West Lea Oil Co
REMARKS: *Formerly F. M. Farley.
**Formerly Tex-State No. 1-

CASING RECORD

Diam., in	Bottom
10 3/4"	421'
8 5/8"	1000'
7"	2590'

ELEVATION 3512 FEET

INITIAL DAILY PRODUCTION:

Open		bbls. Oil
Open	P. & A.	cu. ft. Gas
Tbg.		bbls. Oil
Tbg.		cu. ft. Gas

FORMATION	BOTTOM, FEET
Lime	10
Caliche	25
Yellow sandy shale	45
Red shale	85
Red shale and sand	190
Lime	200
Red shale and sand	215
Lime, sand and shale	265
Red sand; water	270
Red mud	290
Red sand	325
›d bed	355
ned shale	420
Red rock	421
Red rock and shells	455
Red shale and shells	530
Lime and red rock	670
Red rock and shells	760
Red shale and shells	873
Anhydrite	910
Red rock and salt shells	920
Anhydrite	938
Anhydrite and lime	1020
Anhydrite and salt	1040
Salt	1085
Red shale	1090
Anhydrite	1105
Lime	1135
Red rock	1140
Red rock, salt and shells	1250
Anhydrite, salt and red rock	1315
Salt	1390
Anhydrite	1405
Salt	1460
Salt and shells	1525
Salt	2000
Salt and anhydrite	2030
alt, white	2090
Anhydrite, salt and potash	2105
Salt and shells	2160
Anhydrite	2200
Anhydrite and salt	2225
Salt and shells	2285
Anhydrite	2320
Lime, brown	2360
Lime, gray	2380
Lime, brown	2452
Shale and shells	2470
Lime, red	2512
Shale and shells	2525
Lime	2575
Sandy lime	2595
Gray lime	2615
Cray lime	2629
Lime	2719
Sandy lime, sharp	2733
Lime, hard, gray	2765
Lime and gypsum	2780
Lime	3032
Sand, soft	3036
Lime; HFW	3763 T.D

Log No. 1129

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD
COMPANY Western Drilling Co.
LEASE State Well No. 1
LOCATION (¼) SE NE NE
SEC. 16 T. 20S. R. 32E
feet from line and
feet from line of Section
COMMENCED 1-29-31
COMPLETED 9-10-31
ABANDONED
REMARKS:
Abandoned and Plugged.

ELEVATION 3460 FEET

INITIAL DAILY PRODUCTION:

CASING RECORD Diam., in.	Bottom		
15½	455'	Open	bbls. Oil
12½	935'	Open	cu. ft. Gas
8½	2459'	Tbg.	bbls. Oil
6 5/8	3213	Tbg.	cu. ft. Gas

FORMATION	BOTTOM, FEET
Light gyp	15
Red beds	160
Water	165
Red rock	230
Water	235
Red rock	425
Water sand	430
Red rock	455
Red beds	505
Red rock	535
Red rock and gyp	615
Red rock	720
Red rock and red beds	755
Red rock	780
Anhydrite	925
Red beds	930
Salt	935
Anhydrite	940
Salt	950
Anhydrite	980
White salt	985
Anhydrite and salt	1020
Anhydrite	1035
Anhydrite and lime shells	1050
Red mud	1060
Salt and anhydrite	1125
Red shale	1135
Salt and anhydrite	1265
Salt	1285
Anhydrite	1295
Salt	1325
Salt and anhydrite	1390
Anhydrite and slat	1460
Salt and anhydrite	1705
Salt	1855
Salt and anhydrite	1975
Salt	1995
Anhydrite air pocket	2000
Salt	2105
Anhydrite and salt	2145
Salt	2170
White salt and anhydrite	2185
Salt	2190
Anhydrite	2210
Salt and anhydrite	2260
Salt	2300
Salt and anhydrite	2315
Anhydrite	2360
Gray sandy lime	2375
Gray hard lime S.G. 2390	2385
Gray lime	2405
Broken lime with red and brown shale	2410
Anhydrite	2425
Gray lime	2435
Gray lime and anhydrite	2445
Gray lime	2448
SLM	2459
Gray lime	2500
Gray lime and blue shale	2505
Lime and shale	2515
Red and green shale	2520
Hard lime and shale	2530
Lime shells and brown shale	2545
Gray lime	2555
Shelly lime and shale	2575
Gray sand S.dead O at 2575-80	2580
Hard white lime	2600
White lime	2625
Brown sandy lime and blue shale	2645
White lime	2655
White lime and bentonite	2705
White lime	2740
Gray lime 400' sulphur water in 1½ hours from 2745'	2750
White water sand and lime	2760
White lime	2780
Dark lime increase water	2790
Gray lime	2810
Dark gray lime	2820
Gray lime	2830
Blue sandy lime	2845
Gray sandy lime	2865 2865
Gray lime	2880

Log No. 1129
Page 2.

NEW MEXICO SCHOOL OF MINES
STATE BUREAU OF MINES AND MINERAL RESOURCES
SOCORRO, NEW MEXICO

WELL LOG DIVISION

COUNTY Lea
FIELD
COMPANY Western Drilling Co.
LEASE State Well No. 1
LOCATION (¼)
SEC. 16 T. 20 . R. 32
feet from line and
feet from line of Section

CASING RECORD

Diam., in.	Bottom

ELEVATION FEET
INITIAL DAILY PRODUCTION:
Open bbls. Oil
Open cu. ft. Gas
Tbg. bbls. Oil
Tbg. cu. ft. Gas

COMMENCED
COMPLETED
ABANDONED
REMARKS:

FORMATION	BOTTOM, FEET
White lime	2895
Gray lime	2910
White lime	2925'
Gray lime	2975
White lime	2990
Hard white lime	3010
White lime	3020
Gray sandy lime	3035
Gray lime	3045
White lime	3120
White lime	3166
Gray lime	3175
White lime	3184
Gray lime	3192
White lime	3200
SLM	3208
Gray lime	3213
White lime	3225
Gray lime	3248
White lime	3265
White lime	3275
Anhydrite	3282
Anhydrite and white lime	3303
Gray and white lime	3324
Brown lime	3411
Brown and hard gray lime	3431
White lime	3474
Gray lime	3505
White sandy lime salt water	3520
White lime	3638
White lime 1730' water	3705
White sandy lime increase water	3718
White lime and sand	3723
White sandy lime	3747
Gray sandy lime	3760
White lime	3769
Gray sandy lime and bentonite	3776
Gray lime	3857
Gray lime	3865
Gray sandy lime	3889
Gray sand	3900
Gray sandy lime	3905
Gray lime	3922
White lime	3945
Hard white lime	3955
White lime	3983
White lime	4013
SLM TD	4005

743

NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

NEW MEXICO WELL LOG DIVISION

COUNTY Lea
FIELD [illegible]
COMPANY The Texas Company
LEASE Humphreys No. 1 Well
LOCATION (¼) NE NE SW
SEC. 18 , T. 20 S , R. 32 E
2310 feet from S line and
2310 feet from W line of Section
COMMENCED 4-26-29
COMPLETED 7-11-29
ABANDONED
REMARKS:

ELEVATION 3475 Approx FEET (3465 SW)

INITIAL DAILY PRODUCTION:

Open bbls. Oil
Open cu. ft. Gas P. & A.
Tbg. bbls. Oil
Tbg. cu. ft. Gas

CASING RECORD

Diam., in.	Bottom
24	18
15½	434
12½	798
8¼	2540

FORMATION	BOTTOM, FEET
Gypsum and caliche	35
Red sandy shale	130
Red sand	210
Red Sandy shale	795
White and gray anhydrite	820
Red shale and salt	845
Gray and white anhydrite	865
Brown dolomite	875
Brown dolomite, little anhydrite	885
Gray and white anhydrite	945
Pure white salt	1005
Salt, anhydrite and gray shale	1015
Salty, red shale	1025
Pink salt	1035
Gray and white anhydrite	1055
Brown dolomite	1075
Salty red shale	1085
Pink salt	1105
Pink and white anhydrite	1115
Pink salt	1125
Pink salt; some red shale	1135
Red shaly sand	1155
Pink and white salt	1185
Pink salt	1305
Pink and white salt; some gray shale	1330
White salt	1350
Salt and red and gray shale	1360
Pink salt	1580
Red shale and salt	1590
Pink salt	1740
Pink salt, little red polyhalite	1850
White salt	1870
Brown dolomite and anhydrite	1900
Pink salt and polyhalite	2140
White salt	2200
Pink salt	2300
White salt; little anhydrite	2330
White salt; trace of brown shale	2425
White salt	2445
White salt and brown shale	2455
Brown and gray anhydrite	2470
White and gray anhydrite	2525
Tan and brown dolomite	2575
Gray sand, little lime	2585
Gray sand and green sandy shale	2595
Buff lime and bentonitic shale	2615
Light and buff lime	2630
Light and buff lime and green sandy shale	2640
Light and buff lime and black sandy shale	2660
Brown lime, some red and green sandy shale	2670
Gray and tan lime	2690
Red and green sand	2700
Red and green sand, little red shale, some gray lime	2710
White lime and dolomite, some red lime and red sandy shale	2770
White and red sandy shale	2795
Red sandy lime, little white lime	2816
White and pink dolomite	2840
Grayish white dolomite	2850
White dolomite, trace red shale	2885
White and red dolomite and red sand	2905
White dolomite	2910
Red and white dolomite	2919
White dolomite	2960
White dolomite and bulish gray bentonite shale	2985
White and red dolomite and bluish gray bentonitic shale	2995
Red sandy dolomite, white dolomite and green bentonitic shale	3000
Green bentonitic shale, red sandy dolomite and little white dolomite	[illegible]

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NEW MEXICO SCHOOL OF MINES

STATE BUREAU OF MINES AND MINERAL RESOURCES

SOCORRO, NEW MEXICO

NEW MEXICO WELL LOG DIVISION

COUNTY Lea
FIELD
COMPANY The Texas Company
LEASE Humphreys No. 1 Well
LOCATION (¼) NE NE SW
SEC. 18, T. 20 S, R. 32 E
3210 feet from S line and
3210 feet from W line of Section
COMMENCED 4-26-29
COMPLETED 7-11-29
ABANDONED
REMARKS:

CASING RECORD

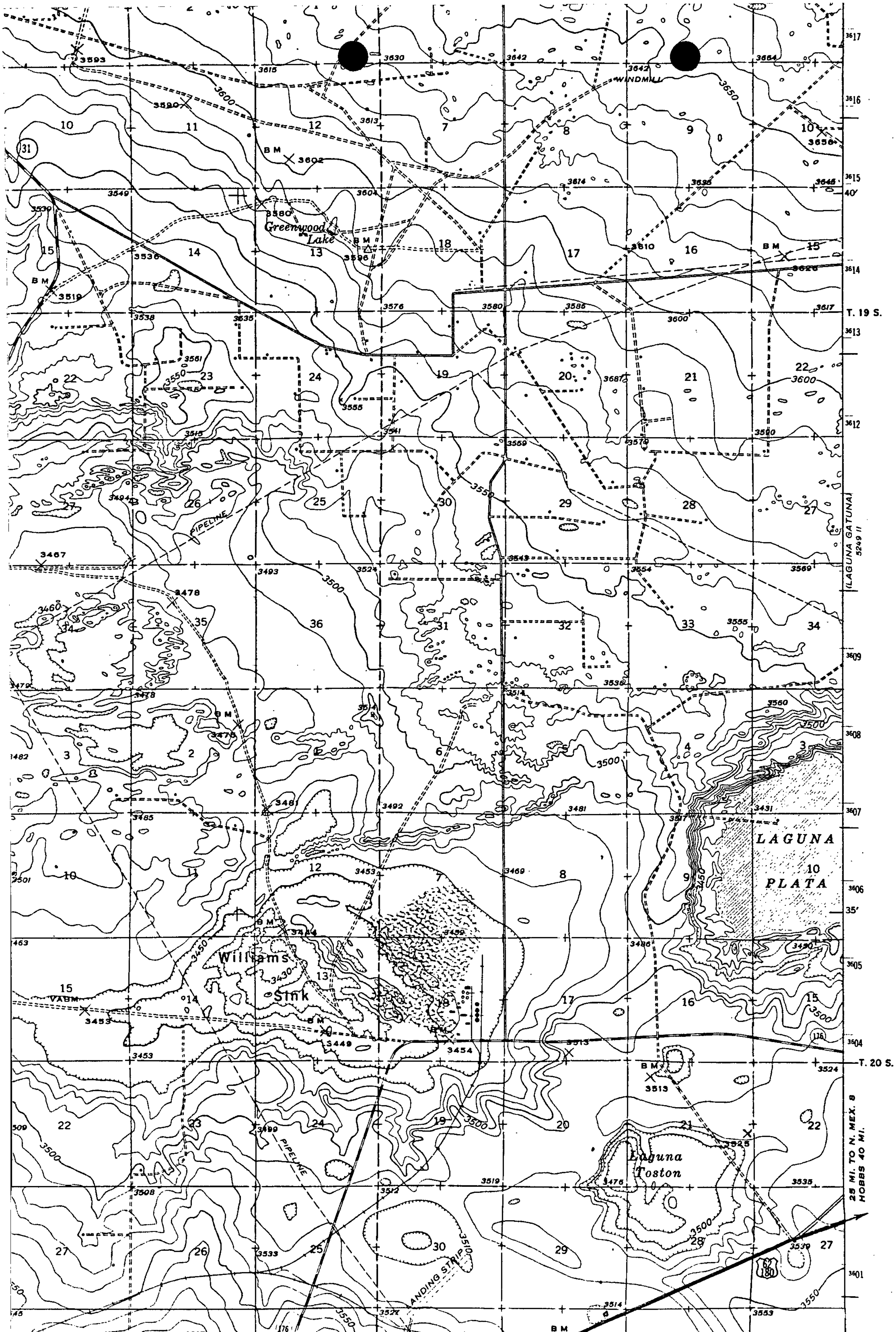
Diam., in.	Bottom
24	18
$15\frac{1}{2}$	434
$12\frac{1}{2}$	798
$8\frac{1}{4}$	2540

ELEVATION 3475 Approx FEET

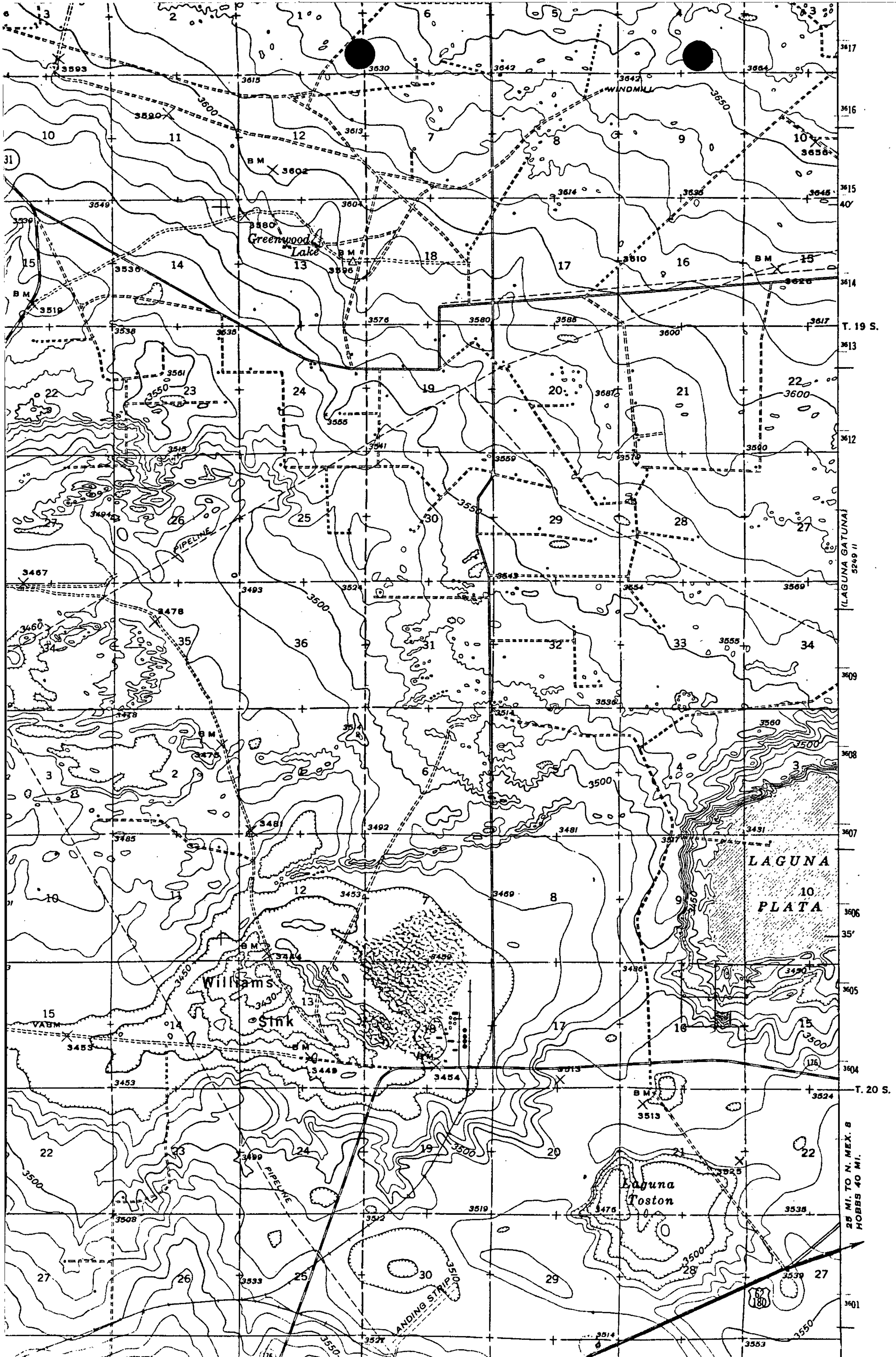
INITIAL DAILY PRODUCTION:

Open	bbls. Oil
Open	cu. ft. Gas
Tbg.	bbls. Oil
Tbg.	cu. ft. Gas

FORMATION	BOTTOM, FEET	FORMATION	BOTTOM, FEET
White dolomite, little green bentontic shale	3020		
White dolomite and green bentonitic shale	3028		
Green bentonitic shale, trace white sand	3031		
White dolomite, some green bentonite and little sand	3036		
White dolomite	3100		
White dolomite, porous and showing dead oil, hole full of sulphur water. Plugged and abandoned 7-10-28	3105		



Greenwood Lake
WINDMILL
PIPELINE
T. 19 S.
(LAGUNA GATUNA)
5249 II
LAGUNA PLATA
Williams Sink
T. 20 S.
Laguna Toston
25 MI. TO N. MEX. 8
HOBBS 40 MI.



WINDMILL
Greenwood Lake
T. 19 S.
40′
(LAGUNA GATUNA) 5249 II
PIPELINE
LAGUNA PLATA
35′
Williams Sink
T. 20 S.
Laguna Toston
PIPELINE
LANDING STRIP
28 MI. TO N. MEX. 8
HOBBS 40 MI.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

50 YEARS
1935 - 1985

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

October 21, 1985

Petro-Thermo Corporation
P.O. Box 2069
Hobbs, NM 88241-2069

Attention: Robert W. Abbott

Re: Permit for Temporary Use
Disposal Pit

Dear Mr. Abbott:

A 90-day permit for temporary use of the emergency overflow pit located at the Blinebry-Drinkard SWD System Well No. A-22 in Section 22, Township 22 South, Range 37 East is hereby granted. This permit authorizes the temporary disposal of brine and fresh water-based drilling mud and waste cement into the existing pit with the following provisions:

1) The pit will not be enlarged or allowed to overflow or breach.

2) Within 90 days, or by January 19, 1986, solid waste will be removed from the pit and disposed of in an approved manner.

Authorization for this temporary use of the pit may be rescinded if there is evidence that the pit has overflowed or if Water Quality Control Commission or Oil Conservation Division rules or regulations have been violated.

Sincerely,

R. L. Stamets

R. L. STAMETS
Director

RLS/JB/dp

cc: Jerry Sexton
David Boyer

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

[X] Telephone [ ] Personal	Time 10:30 AM	Date 10/21/85

Originating Party	Other Parties
Jami Bailey	Robt. Abbot - VP Petro-Thermo 393-2417

Subject
Temporary use of earthen pit @ 22.22S.37E for disposal of drilling mud + waste cement.

Discussion
I asked for details re letter of 10/9/85 requesting temporary use permit. Unlined pit is currently emergency overflow pit for aqua SWD Well A-22. It is approximately 15' x 30' x 8'. Trucks are currently being washed out into pit. Expected volume for temporary use is 300 bbls/week of drilling mud and waste cement.

Conclusions or Agreements

Distribution File

Signed Jami Bailey

PETRO-THERMO CORPORATION

P.O. BOX 2069 PHONES (505) 393-2417 — 397-3557
HOBBS, NEW MEXICO 88241-2069

October 9, 1985

Mr. R.L. Stamets, Director
New Mexico Oil Conservation Div.
Post Office Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Stamets:

Mr. Phil Baca has advised Petro-Thermo Corporation to seek your approval for the temporary use of an earthpit located in Section 22, Township 22, Range 37. Therefore, Petro-Thermo requests that the NMOCD provide a temporary one year permit to use this open pit for the purpose of washing out our transport trucks that have carried drilling muds and waste cement. No hydrocarbons (BS) will be put into the pit and all produced waters will be hauled to an approved salt water disposal well.

Currently Petro-Thermo is seeking approval for a large solids disposal site located near Laguna Plata in Section 16, Township 20 South and Range 32 East. Since this is a previously exempted area, approval should not take long after the hearing. We would appreciate any assistance you might give in acquiring proper approval for this project.

After such approval is given, Petro-Thermo will clean out the temporary pit and will wash out all trucks at the new solids disposal site.

Please contact our office if there is any further information you may require.

Yours Sincerely,

Petro-Thermo Corporation

Robert W. Abbott

Robert W. Abbott
Vice President

RWA/aj

AGUA, INC.
POST OFFICE BOX 1978
HOBBS, NEW MEXICO
88241

TELEPHONE: 505 393-6188

September 30, 1985

State of New Mexico
Oil Conservation Division
P.O. Box 1980
Hobbs, New Mexico 88240

Attn: Jerry Sexton

Dear Mr. Sexton:

This letter is in reference to your letter dated September 23, 1985 regarding repair of disposal wells, supplying requested information, and the use of unauthorized pits.

CATO SWD WELL P-5

Tubing was inspected and bad joints replaced June 4, 1985. A bottom hole pressure test was then run August 28, 1985. The results of this test indicated a pressure of 294 PSI should exist at the surface. A pressure of 320 PSI was reached when oil was pumped down the annulus June 21, 1985 and July 10, 1985 but dropped rapidly within an hour to 170 PSI. After several days the pressure on the casing reached 0 PSI. Because this well only injects an average of 4700 bbls/month, AGUA must give the operators a chance to decide if a casing repair is economically feasible. Therefore AGUA will send out an authority for expenditure form to all Parties of the Cato SWD System to seek approval for the suspected casing leak. Approximately 30 days will be required from October 1, 1985 to seek approval. An additional 14 days will be required to actually repair the suspected casing leak.

GOODWIN SWD WELL E-31

The annulus and tubing were bled down July 18, 1985. A tubing pressure of 1400 PSI and a casing pressure of 1300 PSI resulted. This indicated either obstructions or oil in the tubing. Therefore we have been trying to rid the tubing of both oil and/or obstructions by periodically bleeding down the tubing. Approximately October 21, 1985 the wellbore will be cleaned out and the annulus loaded with oil.

BLINEBRY-DRINKARD WELL NO. N-18

A bottom hole pressure test was performed August 15, 1985. Results of this test indicated no tubing or casing leaks existed. Mechanical integrity is excellent. Since the OCD judgement pertaining to the integrity of the well proved wrong, AGUA has had to proceed with extreme caution with requests to repair other wells or provide expensive information.

BLINEBRY-DRINKARD SWD WELL A-22

On July 1, 1985 a lightening storm caused an electrical outage at AGUA's well. Electricity is used to pump the water down the wellbore. When the electricity went out, the pump could no longer inject the produced water. When the tank level reached the top, several boards along the bottom of the redwood tank cracked. During this period, SWD Well No. N-18 or SWD Well No. H-35 could not be tested further until the repair was finished July 14, 1985.

BLINEBRY-DRINKARD SWD WELL NO. H-35

The annulus was bled off and reloaded with oil on June 11, 1985. The greatest differential recorded was 150 PSI. A small amount of oil was seen in the tubing and therefore repairs are scheduled to start September 26, 1985. The well will be cleaned out with a special chemical to determine if obstructions inside the tubing caused an inaccurate pressure differential. If the 300 PSI pressure differential is not achieved, the well will be bled down so that a pulling unit can be put on the well. At least 30 days will be required to bleed the pressure down. The water coming to the injection well as well as the water coming from bleeding the well down will be diverted to SWD Well No. A-22. The tubing will then be pulled and tested for leaks. Bad tubing will be replaced. At least 15 days will be required after the well is bled down to repair the tubing.

EMERGENCY PITS

The emergency pits at H-35 are currently being emptied. Recent problems with tank repairs and the electric motor being burnt out at A-22 have caused water to run into the pits at A-22 and H-35. The pit at C-2 has had water in it only after a rain storm. No production water of any kind has ever been in the pit at C-2. Any tracks found at the emergency pits at H-35 and A-22 were caused by trucks pulling water from the pits and not unloading into the pits.

AGUA suggests that the OCD contact Don Johnson of Conoco to clear up the matter of trucks dumping at the Goodwin SWD System.

BOOT RUNOVERS

Ninety percent of all boot runovers have been caused by excessive amounts of solid matter, basic sediment, and oil being delivered into AGUA's Systems. Faulty dump valves also contribute to adding excessive amounts of gas to the System causing boot runovers. AGUA's contractual agreement with the Parties of each System states "only water reasonably free from solid matter, basic sediment and oil shall be delivered to the System." Therefore AGUA feels responsible for only a small percentage of boot spills. Since most of our roustabout time is spent with oil and basic sediment clean up, correction of other problems becomes more difficult.

AGUA, Inc. is presently working on plans for a large solids disposal site. Our management has contacted Mr. Phil Baca, Environmental Engineer with the OCD in Santa Fe and the State Land Office on obtaining a suitable site and plans for this disposal.

Yours very truly,

AGUA, Inc.

W.G. Abbott

W.G. Abbott
Manager

JDT/dlb

xc: R.L. Stamets - OCD Director
Jeff Taylor - OCD Attorney

ST. NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

November 30, 1983

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

Mr. Charles S. Dahlen
Bureau of Land Management
Box 1778
Carlsbad, New Mexico 88220

Dear Mr. Dahlen:

The Oil Conservation Division would not object to Kerr-McGee disposing of tailings into Laguna Plata. Under Order No. R-3725 the Oil Conservation Commission approved brine disposal into Laguna Plata and Laguna Gatuna.

Laguna Gatuna is presently being utilized by Pollution Control as a disposal site for oilfield wastes and should not be considered for utilization by Kerr-McGee.

Since state lands are involved, I will forward your letter of November 2, 1983, to the State Land Office.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

8 August 1984

EXAMINER HEARING

IN THE MATTER OF:

Application of Pollution Control, Inc. for amendment to Division Order No. R3725, Lea County, New Mexico.

CASE 8292

BEFORE: Richard L. Stamets, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division:
W. Perry Pearce
Attorney at Law
Oil Conservation Commission
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant:
W. Thomas Kellahin
Attorney at Law
KELLAHIN & KELLAHIN
P. O. Box 2265
Santa Fe, New Mexico 87501

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EXHIBITS

MR. STAMETS: The hearing will please come to order.

We'll call next Case 8292.

MR. PEARCE: That case is on the application of Pollution Control, Inc. for amendment to Division Order No. R-3725, Lea County, New Mexico.

MR. KELLAHIN: If the Examiner please, I'm Tom Kellahin of Santa Fe, New Mexico, appearing on behalf of the applicant and I have one witness to be sworn.

MR. PEARCE: Are there other appearances in this matter?

(Witness sworn.)

TIM KELLY,

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Kelly, for purposes of the record would you please state your name and occupation?

A My name is Tim Kelly. I'm from Albuquerque and I'm a consulting hydrologist.

Q Mr. Kelly, as a hydrologist, have you

previously testified before the New Mexico Oil Conservation Division and had your qualifications as a hydrologist accepted and made a matter of record?

A Yes, they have been.

Q And have you prepared, pursuant to your employment by Pollution Control, a hydrologic assessment of the area involved in this application?

A Yes, I have.

MR. KELLAHIN: We tender Mr. Kelly as an expert hydrologist.

MR. STAMETS: He is considered qualified.

Q Mr. Kelly, let me refer to your package of exhibits, which we have simply marked as Exhibit Number One, and ask you to turn to page 28 of that report, and as an introduction for the Examiner, would you describe for us in a general way what has been the history of the Pollution Control operations in the Laguna Gatuna area?

A Yes, sir. In February of 1969 Pollution Control retained the services of Ed L. Reed of Midland, Texas, to prepare an assessment of the area referred to as the salt lakes in western Lea County. It included Laguna Gatuna, Laguna Plata, and Laguna Tonto. And an application was made at that time. I believe it's Case Number 4047; was heard on March 19th, 1969, in which Pollution Control requested the use of Laguna Gatuna and Laguna Plata and Laguna Tonto as a site for disposal of oilfield brine.

The application was approved for use at -- of disposal of oilfield brine in Laguna Gatuna and Laguna Plata, and subsequently, Pollution Control began operations at Laguna Gatuna, which is shown in detail on page 28 of Exhibit One.

This shows in the north half of Section 18 of Township 20 South, Range 32 East, the present site of their operations, which have -- which they have had in operation since 1969.

They have also proposed a new site on the southeast site of Laguna Gatuna, which is shown in Section 17.

Q All right, sir, if you'll turn to the first appendix following page 36 in the Exhibit Number One, is that the Commission Order R-3725 that you've made reference to that's approved the current operations of Pollution Control at Laguna Gatuna?

A Yes, it is.

Q All right, sir. Would you outline for us generally, Mr. Kelly, what Pollution Control proposes to do at its site in the southwest quarter of Section 17?

A They propose to use this site in addition to their existing site for disposal of oilfield brine and waste products from the oil industry at this site.

I might mention that the site has been selected because of the lease which they presently have and also its proximity to Highway 62/180, which makes it somewhat more accessible to trucks.

Q What was the purpose of having Pollution Control retain you as a hydrologist to study this area? What were you looking to study, Mr. Kelly?

A The plans by Pollution Control were to add the additional site in Section 17 and at the same time to update the hydrologic assessment of the area, since their operation had been continuing for fifteen years, to determine if there had been any adverse effects from their previous operations and what the effect of the new site might be on the hydrologic system.

Q In going about studying for that goal, what information did you review and what studies did you undertake?

A The first thing we did was review the Reed study in detail and the Reed study consisted primarily of one illustration or exhibit, which was used in 1969, and that is included in our report as a plate.

Q All right, let's look at that for a minute. Let's unfold one of those and look at it.

Let me try and understand what this is. This represents Mr. Reed's work as consulting hydrologist and is the basis upon which the 1969 order was entered approving Pollution Control's use of Laguna Gatuna for a disposal site?

A That's correct.

Q All right, sir, and this, then, was the basis where you started your review of this property.

A Right. We first of all reviewed the testimony from the hearing and then reviewed the map.

We then made a literature and file search of available data, of which a considerable amount had been collected in the past, both from work which we had done or the Bureau of Land Management in that area, and the WIPP site studies, which are nearby, and then we made an on-site evaluation in which we actually went into the field, updated the geologic map as best we could. We looked at the water quality information and the water levels which Reed had measured, as well as interviewed Mr. Snyder -- excuse me, Mr. --

Q Squires.

A Mr. Squires with Snyder Ranches, and to determine what the history of the water use in that area was. We also talked to some additional ranchers.

On the basis of this we prepared our report which is submitted here.

Q All right, sir, on Exhibit -- page 34 of Exhibit Number One, is that a tabulation of the reference material and other studies that you reviewed and included in your analysis of this area?

A Yes, it is.

Q Has a --

A I might -- I might mention that these references are the ones which are specifically referenced in our report. These are not necessarily all the ones we evaluated.

Q As an expert hydrologist, Mr. Kelly, do you believe that you had an adequate data base from which to reach certain conclusions with regards to the continued suitability of Laguna Gatuna as a disposal facility?

A Yes, I do.

Q Before we go into detail on the facts surrounding your conclusions, Mr. Kelly, I think it might be helpful if we simply turn to page 30 of your report and have you give us a general synopsis from page 30 and 33 of the six major conclusions you have reached based upon your study, and then we'll go back and talk about each one of those items.

A All right. Laguna Gatuna is a natural ground water discharge point. It is the site where the facility is now in operation. The information in that area indicates that the ground water is naturally discharging into Laguna Gatuna so that the flow is to the lake rather than away from it.

The same thing is true of Laguna Plata, which is also shown on this plate several miles to the northwest.

The second concludion we made was that natural discharge from springs at Laguna Gatuna and Laguna Plata is much more highly mineralized than the water that is being produced from wells in the area or from the water which is being disposed of by Pollution Control, Incorporated. So the natural water is worse than what is being put in there from the oilfield sources.

Q All right, sir.

A Our third conclusion was that the site of Laguna Gatuna is suitable for the discharge of as much as 30,000 barrels brine per day. This was what the original application was for.

The fourth conclusion was that after fifteen years of operation by Pollution Control there appears to be no adverse impacts on the hydrologic system in that area.

Our fourth is that the solid wastes which have been disposed of at Laguna Gatuna have not in any way been detrimental to the hydrologic system, and our final conclusion was that the facility which is proposed in the southwest corner of Section 17 would not adversely impact the hydrologic conditions, although we see no reason to increase the original allocation which was granted of 30,000 barrels per day combined from the two facilities.

Q All right, sir. Let's go back, then, Mr. Kelly, and follow your report using the order that you have placed them on the table of contents page, and have you first of all discuss for us in a general way the geology of the project area and focus in on the availability of any fresh water aquifers in the area.

A The significant structural control, Nash

Draw to the west, which is a result of the solution of brines from the Rustler formation and the top of the Salado formation, which has resulted in the collapse of Nash Draw and, in my opinion, Laguna Plata and Laguna Gatuna and Laguna Tonto are all extensions of Nash Draw. They simply are not physiographically or topographically joined.

Q All right, let's go to page three of the package of Exhibits and have you use that as a plat from which you can reference the geology.

A All right. The site itself is at Laguna Gatuna, which is shown in Township 20 South, Range 33 East, and about seven miles east of the Lea/Eddy County line.

Nash Draw is formed along the west edge of Lea County and -- but primarily in Eddy County, so that it is just off the margin of the map to the left.

These sites, then, are just to the north-east of Nash Draw, and the WIPP site, where there's been a considerable amount of drilling and testing performed.

The beds, then, in this area dip to the east beneath Eddy County and are controlled to a large extent by the Delaware Basin.

Q To the north and east on the plat is a line that says Mescalero Ridge. What is that?

A Mescalero Ridge is the west and the southwest boundary of the Ogallala formation. That is -- has a bearing on this particular project because the original ranchers in the vicinity of the salt lakes had a very difficult time finding water for stock and domestic purposes. Most of the water was brackish.

When the potash mines and the refineries for the potash industry went into Nash Draw, as a source of water they piped water from the high plains or north of Mescalero Ridge to the Nash Draw area.

The pipelines, as a trade off by the ranchers, were then tapped by ranchers to provide water for their use, primarily in this salt lake area.

So that many of the wells which were originally shown on the Ed Reed map have fallen into disrepair because of the better quality and more dependable supply which is obtained from the pipeline.

So he was able to measure some water levels but most of these wells are no longer in use simply because the water quality is much poorer than is available.

Q All right, sir, we'll come back in a minute to those wells that are still in use in the area, but let me have you go to page four of the Exhibit Number One and have you give us the -- cite specific geologic features at --

A All right.

Q -- Laguna Gatuna.

A Figure 2 on page 4 shows a cross section of Laguna Gatuna. The lowermost formation are the Dewey Lake Redbeds, which are shown by the horizontal lines. The Dockum Group forms the bedrock in that area beneath the lake itself, and then there is a think veneer of alluvial and playa deposits, both on the upper ridges and also in the base of the playa itself.

There is an intermittent lake in the playa and the fault zones indicated on both sides of this lake, or playa, are in my opinion the avenues through which ground water from the Rustler formation is moving upward and being discharged as springs along the boundaries of the playa itself.

Any discharge from Pollution Control facilities, which are diagrammatically shown on the left, come down into the lake itself from the northwest corner and from the left.

The new facility is illustrated by that tank and would also empty into the playa itself.

The --

Q As a hydrologist, do you see any adverse consequences of significance to the fact that the point of discharge for Pollution Control as at the higher ground areas adjacent to the laguna itself, rather than down in the laguna?

A The -- any water which is held up on the boundaries is confined in surface impoundments and may, in fact, enter to some extent into the very thin alluvium, but at that point it has an opportunity to evaporate so it's contained in the boundaries of the playa itself, rather than getting out into the middle of the lake.

Q Does it make any hydrologic difference whether or not the discharge is up at the points you've depicted on the schematic rather than down at the lake level?

A No, it doesn't.

Q All right. Let's go back, then, Mr. Kelly, and look at the Reed plat and have you identify for us any wells that Mr. Reed studied that continue to be used.

A To my knowledge none of the wells which Reed evaluated are still in use.

There are two which we were able to measure the water level in; however, they were not in a sufficient state of repair to actually pump a water sample from them, so we were able to measure the water level but not the -- but not collect a sample.

These two, one is located in the northwest corner of Section 25, which is southwest of Laguna Gatuna, and this shows a water level -- an elevation of 3555 and water level of 3516, or 38 feet, 38.6 feet below land surface. When we measured that the water level was less than a foot below the level that Reed measured, so the water level, the natural water table in that particular well had declined less than a foot in the fifteen years since Reed did his work.

Q What significance do you make of that fact?

A That there has certainly been no effect from water contributed to Laguna Gatuna and I would attribute it simply to a gradual decline in the water level with time.

Q Conversely, if the water level had been increased?

A The water level should have risen; would have had to have come from some source, either much more precipitation or some source such as water being emptied into Laguna Gatuna or some other source.

Q Is that well at a location hydrologically where it would be down gradient from water disposed of in Laguna Gatuna?

A No, it's up gradient. It's about, well, let me see, the water level in that well is about 21 feet higher than Laguna Gatuna but if the water in Laguna Gatuna had risen significantly it should have affected the regional ground water flow. There could have been some deline, but I would not have expected much, so in fact both of these wells that we were able to remeasure have a higher water level than the base of Laguna Gatuna. All of the rest of the wells were in disrepair.

Q You made reference to Nash Draw and to the potash operations. Is there a plat that shows the location of that area?

A The illustration on page 25, Figure Three.

Q Well, let's make sure everybody's got that.

All right, sir, let's discuss this plat.

A This shows in the very southeast corner of the map the topographic contours show a significant depression there. That is the northernmost edge of Nash Draw and it shows the proximity of Nash Draw to Laguna Tulston (sic), Laguna Plata, and Laguna Gatuna.

The rest of the draw is off to the left side; however, these water table contours show a regional flow of ground water from the 3525 foot contour towards to the west and northwest so that on the north and west side of Laguna Plata the water table is as much as a hundred feet below that to the east side of the project area.

Q All right, would you summarize for us your findings and conclusions with regards to the ground water movement?

A Yes, sir. We prepared this contour map based on the data which Reed had generated which we were able to measure and water levels which have been produced since the Reed study, and this shows a regional ground water flow essentially from east to west with local variations around Laguna Plata and also Nash Draw, where the 3425 foot contour makes a large swing back to the southeast.

The reason that we did this was it shows a more regional ground water flow, whereas Reed simply drew arrows showing what he supposed to be directions of ground water flow, but by working with a regional area we were able to see the large pictures, whereas Reed was looking at very minor changes in a small area and therefore I felt that the regional pictures would supplement the work that Reed had done.

Q All right, sir.

A So that there is no conflict from what we have done with what Reed did. We simply expanded his, as shown in Figure 3.

Q All right, sir, let's go on and have you summarize your findings with regards to the water quality data.

A The water quality which Reed evaluated indicates that the oilfield brine in the area is less highly mineralized than the natural discharge in Laguna Gatuna and Laguna Plata.

We have the information from Pollution Control and the data which they provided us, and we found no contradiction in this data. The conclusion being, then, that the highly mineralized water being discharged into Laguna Gatuna and Laguna Plata has to originate from some deeper source, presumably either the Rustler or more logically from the so-called Brine aquifer on top of the Salado formation, and the regional gradients are such that it would move up along joints and fault zones which would be associated with Laguna Plata and Laguna Gatuna.

Q Let's get sites specific now, Mr. Kelly, and have you give us your opinion as to the suitability of Laguna Gatuna, both in the northwest corner of the laguna and the southeast corner of the laguna as sites for the disposal of produced salt water brines and other waste products.

A Our conclusion was that Laguna Gatuna is an excellent site for the purposes with which Pollution Control is using it. The work by Reed was accurate. Due to highway construction in that area there were more exposures of the Dockum Group, which is shown on page 28, Figure 4, as TR. This substantiated our conclusions that the alluvial material is extremely thin in that area and the amount of brine which has been disposed of by Pollution Control in the past fifteen years has never resulted in a permanent pool of Laguna Gatuna. With its surface area of 383 acres it is adequate to evaporate all of the brine which is being disposed of in the lake by Pollution Control.

Q Let's go to page 29 and have you describe for us the evaporation studies that were conducted.

A We conducted some evaporation studies in the Nash Draw area, which is just a few miles to the west, and we concluded that the evaporation rate, the summer evaporation rate, from a brine surface in that area was approximately 6.69 gallons per minute, or roughly 229 barrels of brine per acre per day.

On the other hand, the winter evaporation loss was approximately 13 barrels of brine per acre per day. With the minimum surface area of Laguna Gatuna, there is the evaporation potential of 87,700 barrels per day during the summer and about 5000 barrels per day during the winter.

This is well within the annual disposal range of Pollution Control and clearly these evaporation calculations have shown that they are adequate to take care of the amount of brine being discharged by Pollution Control.

Q Let's go now, Mr. Kelly, to pages 31 and 32, which are the discharge rates recently used at Laguna Gatuna.

A Right. This is information which I believe has been submitted to the Oil Conservation Division, but they simply show the monthly disposal rate for 1983 and 1984, both as a graph and then on page 32 in the cumulative totals for the individual months.

And I might mention that the original application and grant was for 30,000 barrels per day, whereas if you'll look at the monthly totals on Table 3, page 32, it is considerably less than that, and I would assume that the discharges at the present time, in fact I believe that Mr. Foster told me that the highest discharge rate by Pollution Control occurred in the early eighties but are not much less than what you see here on -- on Table 3.

Q All right, sir, in addition to the conclusions that you've made on pages 31 and 33, I'd like to direct you back now to the Division Order of April of '69, and go through some of the findings that were made back in '69, and have you conclude for us whether you still concur or disagree with any of those findings.

Let's start with -- do you have the order?

A Yes, I do. You're starting on page one of that order?

Q Yes, sir, on Finding No. 3 they make reference to the areawide Order R-3229, which prohibits the disposal of produced salt water brines in unlined pits. It then goes on --

A Right. All right, there is -- as near as we have been able to determine there is no potable water in this area. By potable water I'm using the definition that the EID uses of 1000 parts per million.

Q That is also the State Engineer's definition on --

A Oh, yes.

Q -- Finding No. 4, page 2 of the order?

A Yes.

Q All right, sir.

MR. STAMETS: Mr. Kelly said 1000 and Finding 4 is 10,000.

A That's -- okay. The difference there, one, the State Engineer uses 10,000 as a definition of fresh water, whereas I'm using the definition of potable water, that is water suitable for human consumption.

Q So your standard is even higher than the State Engineer's standard --

A Yes.

Q -- for water to be protected?

A Right.

Q All right, and using your higher standard --

A We can find no evidence that there is any water in the area which could be considered potable, other than at one time there was a well at what was then called Midway. It was a bar and service station located on Reed's map in the south half of Section 23, and approximately two and a half miles southwest of Laguna Gatuna.

This shows a chloride of 362 parts per million. This water was potable, was used in the operation, but the facility has been destroyed and the wells are abandoned.

Q All right.

Q That was the only fresh water we were able to find, and this was verified by other ranchers in the area who are still in operation, who haul water or take it from the pipeline.

Q Let's go back to the State Engineer's standard of 10,000 parts per million.

Do you find any water in this area that is of that quality or greater?

A There is a lot of water in the area that's greater than 10,000.

Q I've got this backwards. I meant 10,000 or less.

A There is very little water in the area that's 10,000 or less.

Most of the water, and certainly the water from the springs, exceeds this -- this amount; water which is naturally discharged into the lake itself.

For example, at Laguna Gatuna you can see a lake sample identified by Reed which had chlorides of 158,000 parts per million and sulfates of 125,000.

Q All right, let me make sure I'm clear. Are there any waters in the area containing 10,000 parts per million or less of total dissolved solids which have a present or reasonably foreseeable beneficial use that might be impaired by the discharge of water in Laguna Gatuna as the applicant proposes to do?

A No, sir.

Q All right. Let's go down to Finding No. 7. I think you've concluded for us that this water is not fresh water in the lagunas?

A That's correct.

Q All right, sir, and Finding No. 8?

A The -- I conclude with this finding that the underlying Redbeds are virtually impermeable and the -- any seepage which would get into, or which would be -- any water which would be impounded in the lakes would not seep into the underlying formation.

Q All right, sir, and Finding No. 9?

A These -- the synclinal structure does exist and that the flow of surface and subsurface water into the boundaries is towards those lakes.

Q All right, sir, so you concur and believe the Finding No. 9 is supported by substantial evidence?

A Yes, I do.

Q Let's go to No. 10.

A I also agree with this finding, that there is no leakage from Laguna Plat and Laguna Gatuna, simply because, first of all, the hydrologic gradient indicates that it toward the lakes rather than away, but also, the evaporation surface at the bottom of each of these lakes is great enough to evaporate any natural or artificially discharged brine into those lakes.

Q Finding No. 11 is directed towards Laguna Tonto, which is not the subject of our application here.

A That's correct.

Q Let's go to Finding No. 12 with regards to utilization of Laguna Gatuna. Do you -- do you concur with that finding?

A Yes, I do. It does not constitute a hazard to fresh water supplies that may exist in the area.

I believe that most of these other findings pertain to the -- to Laguna Tonto to a large extent.

Q Yes, sir, I agree with you. I think that you have covered the essential findings in the prior order that would apply to the current application.

In conclusion, then, Mr. Kelly, do you believe the continued use of Laguna Gatuna as a disposal site for as much as 30,000 barrels of brine per day is still a suitable disposal site?

A Yes, I do.

Q And do you see any adverse consequences of changing or adding to the point of disposal by adding the southwest quarter of Section 17 to the disposal operation?

A No, sir.

Q Based upon your studies and knowledge of the area, Mr. Kelly, do you see any adverse consequences of the fifteen years, or so, operation by Pollution Control in this Laguna Gatuna as a disposal facility?

A No, we saw no evidence at all.

Q And do you see any adverse consequences hyrologically to the continued use of Laguna Gatuna as a repository for solid oilfield waste products --

A No, sir.

Q -- drilling cutting and drilling muds?

A No, sir. In my opinion it's probably one of the most suitable sites in the area.

Q Was Exhibit Number One prepared by you or compiled under your direction and supervision?

A Yes, it was.

Q All right, sir.

MR. KELLAHIN: Mr. Examiner, that concludes our examination of Mr. Kelly. We have concluded our examination of Mr. Kelly by discussion of oil well solid waste products. That is paragraph 3 of our application. It is also specifically addressed in the current -- now I've lost my place.

I'll admit I can't pick it out real quickly, Mr. Stamets, but the application in this case seeks to have a finding addressing the use of this disposal facility for -- as a repository for these oilfield waste products, including the drill cuttings and drilling muds.

As a practical matter, this site has been used for very many years for that purpose. Mr. Kelly has demonstrated that he sees no adverse consequences from continuing that to occur and we would request that a specific finding and approval for that part of the operation be included in the order.

We move the introduction of Exhibit Number One.

MR. STAMETS: Exhibit Number One will be admitted.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Kelly, is it your opinion that with the 30,000 barrels of water per day disposal limitation that no water can move out of the area of Laguna Gatuna?

A Yes, sir, it is. The summer evaporation rate would certainly more than cover that.

The winter evaporation rate would not, but the hydrologic conditions are such that even if a ponding occurred during the winter, it would be evaporated during the summer.

So it is my opinion that that would be the case.

MR. STAMETS: Are there other quesitons of the witness?

MR. BOYER: Yes.

QUESTIONS BY MR. DAVID BOYER:

Q My name is David Boyer. I'm a staff hydrogeologist with the Oil Conservation Division. I have a few questions of Mr. Kelly.

Mr. Kelly, am I correct in understanding you agreed with the finding of No. 11 on that 1969 order, that the evidence indicates that there may be some leakage of water into -- to the southeast and therefore southwestward toward Lagune Gatuna? Did I understand you correctly on that?

A Not in -- not in relation to Laguna Tonto. We did not discuss Laguna Tonto in the original findings.

Laguna Tonto was excluded from use by Pollution Control.

Q So you did not -- you did not investigate that particular --

A No.

Q -- thing. All right, I was -- getting back to Figure 3 on page 25, you showed the hydrologic contours and it would show a couple of things.

First off, that this -- it is my understanding that the water table contour map was prepared by you for inclusion in this report.

A That's correct.

Q Okay. It shows that, according to the contours, that you could have movement northwesterly out of Laguna Gatuna towards the northwest if the hydrologic flow lines are followed.

Is it a possibility also that you might have a closed contour around Laguna Gatuna that would move material into the laguna instead of to the northwest?

A Yes, sir, there is.

Q That was not investigated, though, and you don't have sufficient information?

A No, there's not sufficient information. These are 25 foot contours and certainly with additional drilling information we might be able to verify that, but I might mention that the water quality in Laguna Plata is generally worse than that in Laguna Gatuna, so I, if it did move to the northwest, I would assume that Laguna Plata would become the discharge point.

Q All right. On the -- on the map prepared by Reed, you went back and determined that the well in the northwest one-quarter of Section 25 to the southwest of Laguna Gatuna was able to be measured, is that correct?

A Yes.

Q Did you -- did you attempt to get a conductivity measurement to that well at all?

A No, the well had a windmill on it but the windmill was not operative, so we could not get a sample from it with the sucker rods. There was not enough room to sample it.

Q Nor was there enough room to get a conductivity probe down -- down inside it at all, losing it or possibly getting a conductivity measurement?

A Well, Mr. Boyer, our conductivity measure has a probe about six inches long and we wouldn't have reached the 16 feet, but I presume a downhole conductivity meter could have been used, yes, sir.

Q And one additional question, the well that is shown in the northwest one-quarter of Section 21, that shows that there was water that was probably greater than 1000 pps, but certainly less than 10,000 in the Reed map.

That was unavailable for any type of measurement or water level or anything like that?

A No, I thought that was the one I referred to as the other measurement. I could be wrong. Let me --

If you will refer to page 23, the fourth listing from the top in Table 2 identifies a windmill at location 20-33-21, 111, with a surface elevation of 3536.

That is the well in question here.

The water level on January 25th of 1984 was 35.42 feet below land surface.

When Reed measured the water level it was 36.6 feet.

Q And that well is also inoperable and you were unable to get a water level -- I mean a water sample?

A Right. Right.

MR. BOYER: That's the extent of my questions.

MR. STAMETS: Are there any other questions of this witness? He may be excused.

Is there anything further in this case?

The case will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 8292, heard by me on 8-28 1984.

, Examiner
Oil Conservation Division

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499
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Company Minerals, Incorporated Produced Water

Field

Lease Bass #1 Sampling Date 9/19/68

Type of Sample Wellhead

WATER ANALYSIS C 18-20-33

IONIC FORM	me/l*	mg/l*
Calcium (Ca++)	43.91	880
Magnesium (Mg++)	32.24	392
Sodium (Na+) (calc.)	180.70	4154
Bicarbonate (HCO_3-)	16.60	1012
Carbonate (CO_3--)	NOT	FOUND
Hydroxide (OH-)	NOT	FOUND
Sulphate (SO_4--)	54.13	2600
Chloride (Cl-)	186.12	6600
6.9 pH @ 68° F		
Dissolved Solids on Evap. at 103° - 105° C.		
Hardness as $CaCO_3$	76.15	3808
Carbonate Hardness as $CaCO_3$ (temporary)	16.60	830
Non-Carbonate Hardness as $CaCO_3$ (permanent)	59.55	2978
Alkalinity as $CaCO_3$	16.60	830
Specific Gravity @ 68° F	1.010	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 7A

SALT LAKE POOL
Lea County, New Mexico

OIL WELL
WATER ANALYSIS

Makes Wa

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION
OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499
HOBBS, NEW MEXICO 88240

Company Minerals, Incorporated Produced Water

Field

Lease Bass #2 Sampling Date 9/19/68

Type of Sample Wellhead

WATER ANALYSIS F 18-20.33

IONIC FORM	me/l *	mg/l *
Calcium (Ca++)	51.90	1040
Magnesium (Mg++)	32.24	392
Sodium (Na+) (calc.)	177.10	4072
Bicarbonate (HCO_3^-)	13.40	817
Carbonate (CO_3^{--})	NOT	FOUND
Hydroxide (OH^-)	NOT	FOUND
Sulphate (SO_4^{--})	64.54	3100
Chloride (Cl^-)	183.30	6500
6.9 ph @ 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	84.14	4207
Carbonate Hardness as $CaCO_3$ (temporary)	13.40	670
Non-Carbonate Hardness as $CaCO_3$ (permanent)	70.74	3537
Alkalinity as $CaCO_3$	13.40	670
Specific Gravity c 68° F	1.010	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 7B

SALT LAKE POOL
Lea County, New Mexico

OIL WELL
WATER ANALYSIS

Mabee ?Vo

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499

HOBBS, NEW MEXICO 88240

Produced Water

Company Minerals, Incorporated

Field Salt Lake Field

Lease Bass #3 Sampling Date 10/24/68

Type of Sample

WATER ANALYSIS

IONIC FORM		me/l *	mg/l *
Calcium (Ca^{++})		65.77	1318
Magnesium (Mg^{++})		53.13	646
Sodium (Na^{+})	(cal.)	728.10	16,739
Bicarbonate (HCO_3^-)		19.57	1194
Carbonate ($CO_3^{=}$)		NOT	FOUND
Hydroxide (OH^-)		NOT	FOUND
Sulphate ($SO_4^{=}$)		115.80	5562
Chloride (Cl^-)		711.63	25,235
6.7 ph c @ 68 °F			
Dissolved Solids on Evap. at 103° - 105° C			
Hardness as $CaCO_3$		118.90	5945
Carbonate Hardness as $CaCO_3$ (temporary)		19.57	979
Non-Carbonate Hardness as $CaCO_3$ (permanent)		99.33	4967
Alkalinity as $CaCO_3$		19.57	979
Specific Gravity c 68° F		1.030	

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

EXHIBIT NO. 7C

SALT LAKE POOL

Lea County, New Mexico

OIL WELL

WATER ANALYSIS

Mahos W.

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499

HOBBS, NEW MEXICO 88240

Company R. F. Montgomery, et al Produced Water

Field

Lease Brooks T-7-3 Sampling Date 9/19/68

Type of Sample Wellhead

WATER ANALYSIS Unit O 7-20-33

IONIC FORM	me/l *	mg/l *
Calcium (Ca^{++})	45.91	920
Magnesium (Mg^{++})	32.24	392
Sodium (Na^{+}) (cal.)	184.81	4249
Bicarbonate (HCO_3)	7.40	451
Carbonate (CO_3^{-})	NOT	FOUND
Hydroxide (OH^{-})	NOT	FOUND
Sulphate (SO_4^{-})	66.62	3200
Chloride (Cl^{-})	188.94	6700
7.8 ph c @ 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	78.15	3908
Carbonate Hardness as $CaCO_3$ (temporary)	7.40	370
Non-Carbonate Hardness as $CaCO_3$ (permanent)	70.75	3538
Alkalinity as $CaCO_3$	7.40	370
Specific Gravity c 68° F	1.010	

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

EXHIBIT NO. 7D

SALT LAKE POOL
Lea County, New Mexico

OIL WELL
WATER ANALYSIS

Makos 9V.

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION
OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499
HOBBS, NEW MEXICO 88240

Company R. F. Montgomery, et al Produced Water

Field

Lease Brooks T-7-4 Sampling Date 9/19/68

Type of Sample Wellhead

WATER ANALYSIS K - 7-20-33

IONIC FORM*	me/l*	mg/l*
Calcium (Ca^{++})	36.93	740
Magnesium (Mg^{++})	27.63	336
Sodium (Na^{+}) (calc.)	169.67	3901
Bicarbonate (HCO_3^-)	21.00	1281
Carbonate (CO_3^{--})	NOT	FOUND
Hydroxide (OH^-)	NOT	FOUND
Sulphate (SO_4^{--})	46.85	2250
Chloride (Cl^-)	166.38	5900
6.6 pH @ 68° F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	64.56	3228
Carbonate Hardness as $CaCO_3$ (temporary)	21.00	1050
Non-Carbonate Hardness as $CaCO_3$ (permanent)	43.56	2178
Alkalinity as $CaCO_3$	21.00	1050
Specific Gravity @ 68° F	1.005	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 7E

SALT LAKE POOL
Lea County, New Mexico

OIL WELL
WATER ANALYSIS

Makes Oil

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499

HOBBS, NEW MEXICO 88240

Company R. F. Montgomery, et al Produced Water

Field

Lease Brooks I-7-6 Sampling Date 9/19/68

Type of Sample Wellhead

WATER ANALYSIS Unit N 7-20-33

IONIC FORM	me/l*	mg/l*
Calcium (Ca++)	34.93	700
Magnesium (Mg++)	27.63	336
Sodium (Na+) (cal.)	163.29	3754
Bicarbonate (HCO$_3$-)	26.59	1622
Carbonate (CO$_3$--)	NOT	FOUND
Hydroxide (OH-)	NOT	FOUND
Sulphate (SO$_4$--)	38.52	1850
Chloride (Cl-)	160.74	5700
6.7 pH @ 68° F		
Dissolved Solids on Evap. at 103°-105° C		
Hardness as CaCO$_3$	62.56	3128
Carbonate Hardness as CaCO$_3$ (temporary)	26.56	1330
Non-Carbonate Hardness as CaCO$_3$ (permanent)	36.00	1800
Alkalinity as CaCO$_3$	26.56	1330
Specific Gravity c 68° F	1.005	

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

EXHIBIT NO. 7F

SALT LAKE POOL

Lea County, New Mexico

OIL WELL

WATER ANALYSIS

Makes Us

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. 3
Case No. 4047

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499
HOBBS, NEW MEXICO 88240

Company Minerals, Incorporated

Field

Lease Salt Lake Sampling Date 9/19/68

Type of Sample

WATER ANALYSIS Sec. 7,18 20-33

IONIC FORM		me/l*	mg/l*
Calcium (Ca++)		9.98	200
Magnesium (Mg++)		1667.17	20,272
Sodium (Na+)	(cal.)	5395.75	124,048
Bicarbonate (HCO₃)		14.80	902
Carbonate (CO_3 -)		NOT	FOUND
Hydroxide (OH-)		NOT	FOUND
Sulphate (SO_4 -)		2602.50	125,000
Chloride (Cl-)		4455.60	158,000
7.7 ph c @ 68 °F			
Dissolved Solids on Evap. at 103° - 105° C			
Hardness as $CaCO_3$		1677.15	83,858
Carbonate Hardness as $CaCO_3$ (temporary)		14.80	740
Non-Carbonate Hardness as $CaCO_3$ (permanent)		1662.35	83,118
Alkalinity as $CaCO_3$		14.80	740
Specific Gravity c 68° F		1.250+	

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

EXHIBIT NO. 8B

SALT LAKE POOL
Lea County, New Mexico

SURFACE LAKE
WATER ANALYSIS

Makes Wa

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499

HOBBS, NEW MEXICO 88240

Company Minerals, Incorporated

Field Salt Lake Field

Lease Salt Springs Sampling Date 10/24/68

Type of Sample

WATER ANALYSIS SW NE 19-20-33

IONIC FORM	me/l *	mg/l *
Calcium (Ca++)	27.59	553
Magnesium (Mg++)	586.62	7133
Sodium (Na+) (cal.)	2389.29	54,930
Bicarbonate (HCO_3^-)	4.80	292
Carbonate (CO_3^{--})	7.60	228
Hydroxide (OH^-)	NOT	FOUND
Sulphate (SO_4^{--})	1532.14	73,590
Chloride (Cl^-)	1458.96	51,736
8.4 ph c @ 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	614.21	30,711
Carbonate Hardness as $CaCO_3$ (temporary)	12.40	620
Non-Carbonate Hardness as $CaCO_3$ (permanent)	601.81	30,091
Alkalinity as $CaCO_3$	12.40	620
Specific Gravity c 68° F	1.115	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 8C

SALT LAKE POOL
Lea County, New Mexico

SALT SPRINGS
WATER ANALYSIS

Makes Wa

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH — P. O. BOX 1499

HOBBS, NEW MEXICO 88240

Company: Minerals, Incorporated

Field: Salt Lake Field

Lease: Well #3 Wells — Sampling Date: 10/24/68

Type of Sample: Water Well #24

WATER ANALYSIS ... 4-20-33

IONIC FORM	me/l *	mg/l *
Calcium (Ca^{++})	21.61	433
Magnesium (Mg^{++})	122.37	1488
Sodium (Na^{+}) (cal.)	561.94	12,919
Bicarbonate (HCO_3^{-})	4.60	286
Carbonate (CO_3^{--})	0.80	24
Hydroxide (OH^{-})	NOT	FOUND
Sulphate (SO_4^{--})	334.54	16,068
Chloride (Cl^{-})	365.98	12,978
8.3 ph c @ 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	143.98	7199
Carbonate Hardness as $CaCO_3$ (temporary)	5.40	270
Non-Carbonate Hardness as $CaCO_3$ (permanent)	138.58	6929
Alkalinity as $CaCO_3$	5.40	270
Specific Gravity c 68° F	1.030	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 8E

SALT LAKE POOL

Lea County, New Mexico

THREE WELLS

WATER ANALYSIS

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION
OF NEW MEXICO
601 NORTH LEECH P. O. BOX 1499
HOBBS, NEW MEXICO 88240

Company Minerals, Incorporated

Field Salt Lake

Lease Bass #1 Water Well Sampling Date 11/4/68

Type of Sample 18-20S-33E

WATER ANALYSIS Water Well #26

IONIC FORM	me/l*	mg/l*
Calcium (Ca^{++})	59.33	1189
Magnesium (Mg^{++})	105.68	1285
Sodium (Na^{+}) (calculated)	508.85	11,698
Iron		212
Bicarbonate (HCO_3^-)	0.20	12
Carbonate ($CO_3^{=}$)		Not Found
Hydroxide (OH^-)		Not Found
Sulphate ($SO_4^{=}$)	81.09	3895
Chloride (Cl^-)	592.57	21,013
5.9 ph c 68 °F		
Dissolved Solids on Evap. at 103°- 105° C		
Hardness as $CaCO_3$	165.01	8251
Carbonate Hardness as $CaCO_3$ (temporary)	0.20	10
Non-Carbonate Hardness as $CaCO_3$ (permanent)	164.81	8241
Alkalinity as $CaCO_3$	0.20	10
Specific Gravity c 68° F 1.025		

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

EXHIBIT NO. 8 F

SALT LAKE POOL
Lea County, New Mexico

BASS WATER WELLS
WATER ANALYSIS

Calcium Carbonate Scaling Index - Negative at 86°F
Calcium Sulfate Scaling Index - Negative

[illegible]

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499
HOBBS, NEW MEXICO 88240

Company Water Well # 33 Sec 12 - 20 - 32

Field

Lease Sampling Date

Type of Sample

WATER ANALYSIS

IONIC FORM	me/l *	mg/l *
Calcium (Ca++)	66.87	1340
Magnesium (Mg++)	18.67	227
Sodium (Na+) (calculated)	229.14	5268
Iron		13
Bicarbonate (HCO_3^-)	Not	Found
Carbonate (CO_3^{--})	0.60	18
Hydroxide (OH^-)	0.20	3
Sulphate (SO_4^{--})	39.10	1878
Chloride (Cl^-)	274.78	9744
9.2 ph c 68 °F		
Dissolved Solids on Evap. at 103° - 105° C		
Hardness as $CaCO_3$	85.53	4277
Carbonate Hardness as $CaCO_3$ (temporary)	0.80	40
Non-Carbonate Hardness as $CaCO_3$ (permanent)	84.74	4237
Alkalinity as $CaCO_3$	0.80	40
Specific Gravity c 68° F 1.015		

MOORE BUSINESS FORMS INC. LA

* mg/l = milligrams per Liter
* me/l = milliequivalents per Liter

Makes Water Work

TELEPHONE: HOBBS 393-6215

KE-TONE®

UNITED CHEMICAL CORPORATION

OF NEW MEXICO

601 NORTH LEECH P. O. BOX 1499

HOBBS, NEW MEXICO 88240

34

Company: Minerals, Incorporated

Field: Salt Lake Field

Lease: Bingham Well Sampling Date: 10/24/68

Type of Sample: NW NW NW 21-20-33

Water Well # 34

WATER ANALYSIS

IONIC FORM		me/l *	mg/l **
Calcium (Ca^{++})		19.86	398
Magnesium (Mg^{++})		17.19	209
Sodium (Na^{+})	(cal.)	84.21	1936
Bicarbonate (HCO_3)		3.21	196
Carbonate (CO_3^{--})		NOT	FOUND
Hydroxide (OH^-)		NOT	FOUND
Sulphate (SO_4^{--})		18.84	905
Chloride (Cl^-)		99.21	3518
7.5 ph @ 68 °F			
Dissolved Solids on Evap. at 103° - 105° C			
Hardness as $CaCO_3$		37.05	1853
Carbonate Hardness as $CaCO_3$ (temporary)		3.21	161
Non-Carbonate Hardness as $CaCO_3$ (permanent)		33.84	1692
Alkalinity as $CaCO_3$		3.21	161
Specific Gravity @ 68° F		1.005	

* mg/l = milligrams per Liter

* me/l = milliequivalents per Liter

EXHIBIT NO. 8D

SALT LAKE POOL

Lea County, New Mexico

BINGHAM WELL

WATER ANALYSIS

Mabee W.

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-25-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-18-69

Received from Mr. Ed L. Reed

Identification Marks As Shown

Lab. No.	Sample Description	Mg/L Chloride	Mg/L Sulfate
C-5151	No. 1-A, Soil sample, N end of Tonto (1:1 extract) ------------------------------	48931	37698
C-5152	No. 2, Spring, SW Gatuna, S of Highway --------	163105	24594
C-5153	No. 3, South side of Gatuna ------------------	66660	29728
C-5154	No. 4, Gatuna, in draw N of Highway -----------	72333	24273
C-5155	No. 5, Gatuna, NW end at oil well, NW of well in Ravine --------------------------------	27657	37979
C-5156	No. 6, Gatuna, NW end, NE of oil well, ravine flowing South ----------------------------	10992	13771
C-5157	No. 7, Spring No. 4, Plata ------------------	7978	12643
C-5158	No. 1, Salt crystals, Tonto (Moist): Chloride (Cl) 4.20% by weight; Sulfate (SO_4) 29.23% by weight		
------	No. 1-A --- No Sulfide or Sulfite detected.		

Exhibit No. 2
Case No. 4047

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. ----

FORM NO. 130-B

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-13-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-12-69

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Larry Squires, sampled by Joe Reed, Halfway Bar, from tap, 2 wells, WL. - 42.5'.

	Mg/L
Chloride	362
Sulfate	309
Conductivity	1861 Micromhos/cm @ 25° C.

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-5121

FORM NO. 130-B

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-13-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-12-69

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Larry Squires, sampled by Joe Reed, #16, Sec. 25-T20G, R32E, from waste trough, WL. - 39.58'.

	Mg/L
Chloride	85
Sulfate	82
Conductivity	837 Micromhos/cm @ 25° C.

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-5120

FORM NO. 130-B

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-13-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-12-69

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Larry Squires, sampled by Joe Reed, Spring #1, SE end of Laguna Plata at head water.

	Mg/L.
Chloride	8864
Sulfate	11930
Conductivity	10,000 + Micromhos/cm @ 25° C.

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-5122

FORM NO. 130-B

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-13-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-12-69

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Larry Squires, sampled by Joe Reed, Spring #2, due East of Laguna Plata at head water.

Mg/L

Chloride ------------ 7446

Sulfate ------------ 12743

Conductivity ------- 10,000 ≠ Micromhos/cm @ 25° C.

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-5123

FORM NO. 130-B

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 2-13-69 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 2-12-69

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Larry Squires, by Joe Reed, Spring #3, just North of #2, 200 ft., at head water.

	Mg/L
Chloride	7446
Sulfate	11755
Conductivity	10,000 ≠ Micromhos/cm @ 25° C.

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-5124

FORM NO. 130-B