NM - 0002

ORDER

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

Bob - See highlighted areas Dave

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION UPON ITS OWN MOTION TO PROMULGATE A NEW RULE 711 TO REGULATE COMMERCIAL SURFACE WASTE DISPOSAL FACILITIES AND TO REQUIRE A $25,000 BOND FOR SUCH FACILITIES:

CASE NO. 9378
Order No. R-8662

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9:00 a.m. on May 19, 1988, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 2nd day of June, 1988, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) Pursuant to the Oil and Gas Act, NMSA 70-2-12B (15), the Division is authorized to regulate the disposal of produced water or water used in connection with the drilling for oil or gas, in order to prevent the contamination of fresh water supplies.

(3) While specific orders have been entered, no statewide rule has been promulgated for commercial surface disposal of produced water and other oil field related wastes.

(4) The requirements imposed on commercial surface waste disposal facilities need to be specifically stated in a rule so that operators, bonding companies, and other interested parties have adequate notice of the potential cost of construction, operation and reclamation of the facility site.

(5) A $25,000 bond to provide for reclamation of the surface and proper closure of the facility site should be required, but (1) if a bond is in place for a contiguous treating plant, that bond should suffice for both facilities; or (2) if an adequate bond that satisfies the requirements of this rule is posted with another state or federal agency, no additional bond should be required.

We no longer use 7940-A for Commercial facilities in the Northwest

(6) An administrative approval process should be adopted to simplify the surface waste disposal permit process; permits should be transferable only upon Division Director approval; and an order of cessation of operations should be within the authority of the Director when such cessation is necessary to prevent waste, to protect fresh water, to protect public safety, or to assure compliance with Division rules or orders.

(7) To the extent that Rule 711 conflicts with the provisions of Oil Conservation Commission Orders R-3221, as amended, or R-7940-A, such orders should be superceded.

(8) The effective date of this order should be June 2, 1988.

IT IS THEREFORE ORDERED THAT:

(1) Rule 711 of the Division's Rules and Regulations is hereby promulgated to read as follows:

RULE 711
Commercial Surface Waste Disposal Facilities

A commercial surface waste disposal facility is defined as any facility that receives compensation for collection, disposal, evaporation or storage of produced water, drilling fluids, drill cuttings, completion fluids, and/or other approved oil field related waste in surface pits, ponds, or below grade tanks. Such facility will not be allowed to operate unless it has been permitted in conformity with the following provisions:

A. Prior to the construction, reconstruction or enlargement of a commercial surface waste disposal facility, application for a permit or a modification to an existing permit shall be filed in duplicate with the Santa Fe office of the Division and one copy to the appropriate district office. The application shall be accompanied by:

1. A plat and topographic map showing the location of the facility in relation to governmental surveys (1/4 1/4 section, township, and range), highways or roads giving access to the facility site, and watercourses, water wells, and dwellings within one mile of the site;

2. The names and addresses of the landowner of the disposal facility site and landowners of record within one-half mile of the site;

3. A description of the facility with a diagram indicating location of fences and cattleguards, and detailed engineering construction/ installation diagrams of any pits, liners, dikes, piping, sprayers, and tanks on the facility, prepared in accordance with Division "Guidelines for Permit Application, Design and Construction of Waste Storage/Disposal Pits;"

4. A plan for disposal of approved waste solids or liquids in accordance with Division rules, regulations and guidelines;

5. A contingency plan for reporting and cleanup of spills or releases;

6. A routine inspection and maintenance plan to ensure permit compliance;

7. A closure plan;

8. Geological/hydrological evidence demonstrating that disposal of oil field wastes will not adversely impact fresh water;

9. Proof that the notice requirements of this Rule have been met;

10. Certification by an authorized representative of the applicant that information submitted in the application is true, accurate, and complete to the best of the applicant's knowledge; and

11. Such other information as is necessary to demonstrate compliance with OCD rules and/or orders.

B. The applicant shall give written notice of application to the owners of surface lands and occupants thereof within one-half (½) mile and a copy and proof of such notice will be furnished to the Division. The Division will issue public notice by advertisement in a paper of general circulation published in the county in which the disposal facility is to be located. For permit modifications, the Division may issue public notice and may require the applicant to give written notice as above. Any person seeking to comment on such application must file comments with the Division within 30 days of the date of public notice. If there is objection by owners or occupants of adjacent lands, the Director of the Division may set any application for a surface waste disposal permit for public hearing.

C. All commercial surface waste disposal facilities shall have 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 satisfactory cleanup of the site upon cessation of operation, in accordance with Part J of this Rule. If a bond has been secured for a treating plant permit at the location, that bond shall be sufficient for the surface waste disposal portion of the facility, providing they are contiguous. If an adequate bond is posted by the applicant with a federal or state agency and the bond otherwise fulfills the requirements of this rule, the Division may consider the bond as satisfying the requirement of this rule. The applicant must notify the Division of any material change affecting the bond filed for the site and must, in any case, report the status of their bond annually to the Division;

D. The Director of the Division may administratively issue a permit upon a finding that a complete and proper application has been filed and that no significant objections have been filed within 30 days following public notice. All permits shall be revocable, after notice and hearing, upon showing of good cause and are transferable only upon written approval of the Division Director. The permit shall be consistent with the application and appropriate requirements of Division rules and The Oil and Gas Act.

E. All surface waste disposal facility operators shall file forms C-117-A, C-118, and C-120-A as required by OCD rules.

F. Each operator of a commercial surface disposal facility shall keep and make available for inspection records for each calendar month on the source, location, volume and type of waste (produced water, acids, completion fluids, drilling mud, etc.), date of disposal, and hauling company that disposes of fluids or material in their facility. Such records shall be maintained for a period of two (2) years from the date of disposal.

G. Disposal at a surface facility shall occur only when an attendant is on duty. The facility shall be secured when no attendant is present. When loads can be monitored or otherwise isolated for inspection before disposal, no attendant is required.

H. No produced water shall be received at the facility from motor vehicles unless the transporter has a valid Form C-133, Authorization to Move Produced Water, on file with the Division.

I. Additional requirements or restrictions may be imposed by a written finding by the Division, including but not limited to the following:

1. An operator with a history of failure to comply with Division rules, regulations, and orders, or

2. Site suitability limitations.

J. The operator shall notify the Division of cessation of operations. Upon cessation of disposal operations for six (6) consecutive months, the operator will complete cleanup of constructed facilities and restoration of the facility site within the following six (6) months, unless an extension of time is granted by the Director of the Division. Such closure shall be in accordance with the closure plan and any modifications approved by the Division Director and may include removal or demolition of buildings, removal of all tanks, vessels, equipment or hardware, containment and removal of fluids and chemicals, backfilling and grading of pits, removal of contaminated soil, aquifer restoration (if necessary) and reclamation of the general facility site. Prior to release of the bond covering the facility, a representative of the Division will inspect the site to determine that restoration is adequate.

K. Upon showing of proper cause, the Director of the Division may order immediate cessation of any surface waste disposal operation. The cessation will remain in effect until withdrawn, or until an order is issued after notice and hearing, when it appears that such cessation is necessary to prevent waste, to protect fresh water, to protect public safety, or to assure compliance with Division rules or orders.

(2) Existing permitted commercial surface waste disposal facilities shall be subject to Rule 711, however no new permit application will be required. After review of existing orders, requests of the facility operator will be made by the Division for additional information that fulfills the requirements of Rule 711. Such facility shall have 120-days from the date of receipt of the request to comply with these requirements. No existing facility shall be required to fulfill the bond requirement or to initiate the annual bond status report until December 30, 1988.

(3) Any existing permitted surface disposal facility not fulfilling the bond requirement by December 30, 1988 or not reporting the status of their bond annually to the Division, shall be closed until such bond is obtained or annual report made and may be required to conduct cleanup and restoration of the facility site in accordance with Division Rule 711 (J).

(4) Commercial surface waste disposal facility bond forms, both surety and cash, are hereby adopted as set out on Exhibits "A" and "B", respectively, attached to this order.

(5) The procedures for obtaining a commercial surface waste disposal permit contained in Rule 711 are the exclusive procedures for obtaining such permits. To the extent these procedures conflict with the provisions of Oil Conservation Commission Orders R-3221, as amended, or R-7940-A, such orders are superceded.

(6) The effective date of this order, Rule 711, and the new commercial surface waste disposal facility bond forms shall be June 6th, 1988.

(7) Jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

WILLIAM R. HUMPHRIES, Member

ERLING A. BROSTUEN, Member

WILLIAM J. LEMAY, Chairman and Secretary

S E A L

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 8800
Order No. R-7031-A

APPLICATION OF B & E, INC. FOR AN AMENDMENT TO DIVISION ORDER NO. R-7031, EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 a.m. on January 9, 1986, at Santa Fe, New Mexico, before Examiner David R. Catanach.

NOW, on this 11th day of March, 1986, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, B & E, Inc., seeks authority to increase the maximum allowable discharge of produced water into Laguna Cuatro to 15,000 barrels per day at their commercial salt water disposal facility located in Section 6, Township 23 South, Range 30 East, NMPM, Eddy County, New Mexico.

(3) The applicant further seeks authority to dispose of drill cuttings, drilling fluids, and other related solids obtained in conjunction with the drilling and production of oil and gas, and limited to non-petroleum products, into three unlined pits located at said disposal site.

(4) By Division Order No. R-7031, issued in Case No. 7612, and dated July 21, 1982, the applicant was given authority to construct and operate a salt water treating and disposal facility on the northeast side of a brine lake known as Laguna Cuatro located as described in Finding No. (2) above.

(5) Finding No. (9) of said Division Order No. R-7031 stated that the facility should be capable of handling up to 14,400 barrels of water per day but that 7,500 barrels of water per day was a reasonable limit to place on the facility at that time.

(6) The maximum allowable discharge of 7,500 barrels of water per day was placed on the facility in order to assure that there would not be any detrimental effects to the existing hydrologic system in said lake.

(7) A hydrologic study was conducted on the Laguna Cuatro site by Geohydrology Associates, Inc. in 1985 to determine the hydrologic impact of increasing the discharge of salt water to 15,000 barrels per day into said lake.

(8) The results of this study indicated that the evaporation rates in Laguna Cuatro are at least adequate to dispose of the additional volume of salt water and that there will not be any detrimental effects to the existing hydrologic system in said lake due to such increased volume.

(9) The discharge of 15,000 barrels of salt water per day into Laguna Cuatro should not create a hazard to any fresh water in the area for which a present or reasonably foreseeable beneficial use is or will be made.

(10) The applicant proposes to construct three unlined surface pits to be located in the vicinity of their salt water disposal facility for the purpose of disposing of drill cuttings and drilling fluids.

(11) Based on the hydrologic evidence presented at the hearing and in Division Case No. 7612, the use of unlined pits at this location to dispose of drill cuttings, drilling fluids, and other related solids should not create a hazard to any fresh water in the area for which a present or reasonably foreseeable beneficial use is or will be made.

(12) At the time of the hearing the applicant stated that the maximum fill level in all of the above mentioned pits is to be limited to a plane two feet below the crest of the dikes surrounding the pits.

(13) Said facility should have adequate fencing, gates, and cattle guards installed and maintained to preclude livestock and unauthorized persons from entering the property.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, B & E, Inc., is hereby authorized to increase their discharge to 15,000 barrels per day into Laguna Cuatro at their salt water disposal site, located in Section 6, Township 23 South, Range 30 East, NMPM, Eddy County, New Mexico, provided that the facility is operated in such a manner as to reduce insoluble oils from the disposal discharge stream to an average concentration of less than 15 parts per million.

(2) The applicant is further authorized to construct and operate three unlined pits at said disposal site for the purpose of disposing of drill cuttings, drilling fluids, and other related solids obtained in conjunction with the drilling and production of oil and gas, and limited to non-petroleum products.

PROVIDED HOWEVER THAT, the sizes and locations of said unlined pits shall be in accordance with the engineering data presented at the time of the hearing and marked as B & E, Inc. Exhibit No. "A".

PROVIDED FURTHER THAT, the facility shall have adequate fencing, gates, and cattle guards installed and maintained to preclude livestock and unauthorized persons from entering the facility.

PROVIDED FURTHER THAT, the maximum fill level in each of the above said pits shall be limited to a plane two feet below the crest of the dikes surrounding the pits.

(3) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L
fd/

LAW OFFICES
MAREK & YARBRO, P.A.
110 West Shaw – P. O. Drawer AA
Carlsbad, New Mexico 88221-AA

THOMAS L. MAREK
ROGER E. YARBRO
M. JANE SHULER
JOHN R. FUNK
Brenda

TELEPHONE
AREA CODE 505
885-6615

17 December 1985

Mr. Mike Stogner
Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87504

Case 8800

Re: B & E, Inc.
Application for Expansion of
Salt Water Facility
Case No. 7612, Order No. R-7031

Dear Mr. Stogner:

Enclosed is the original Motion, and two copies, for your consideration of the B & E, INC. request for expansion of its Salt Water Disposal Facility located at Laguna Cuatro.

If you have any questions, or further requirements, please contact me.

Sincerely,

Roger E. Yarbro

Roger E. Yarbro

/bw

Enclosures

cc: Phil Withrow,
B & E, INC.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

CASE NO. 7612
Order No. R-7031

APPLICATION OF B & E, INC., FOR THE EXPANSION OF ITS SALT WATER DISPOSAL FACILITY LOCATED AT LAGUNA CUATRO, EDDY COUNTY, NEW MEXICO.

Case 5570

MOTION FOR EXPANSION OF SALT WALTER DISPOSAL FACILITY

COMES NOW, B & E, INC., a New Mexico corporation, and requests authority to expand its commercial salt water disposal facility located at Laguna Cuatro, Eddy County, New Mexico, and for its reasons, therefor, states:

1. Finding No. (9), of Division Order No. R-7031, states that "said facilities should be capable of handling up to 14,400 barrels of water per day at each of the proposed sites, but 7,500 barrels per day is a reasonable limit to place on each facility at this time."

2. The facility at Laguna Cuatro is capable of handling 15,000 barrels per day.

3. The discharge of 15,000 barrels per day into the lake system will not affect or create a hazard to any fresh water, or otherwise adversely affect the existing hydrological systems in the lake system.

4. Finding No. (8), of Division Order No. R-7031, states that "... the applicant proposes to install and operate an effective system for the removal of oily and solid waste material from the waters to be disposed of, ..."

5. There is implied in the previous Order entered herein authority to dispose of assorted hydrocarbon waste products and related solids which are removed from the waters disposed at the Laguna Cuatro facility, and Applicant herein seeks authority for the use of such open waste pits.

6. The open waste pits are described as follows:

SEE ATTACHED EXHIBIT "A"

WHEREFORE, B & E, INC., requests approval for:

1. Expansion of its salt water disposal facility at Laguna Cuatro from the 7,500 barrel per day limit ordered by the Division, to 15,000 barrels per day.

2. Approval of open waste pits for the disposal of assorted hydrocarbon waste products and related solids in the exploration and production of oil and gas, which are removed from the waters disposed at the Laguna Cuatro facility.

MAREK & YARBRO, P.A.

By _____
Roger E. Yarbro, Esquire
110 W. Shaw - P. O. Drawer AA
Carlsbad, New Mexico 88221-AA
(505) 885-6615
Attorney for B & E, INC., a
New Mexico corporation

EXHIBIT "A"

PIT "A":

Location: Laguna Cuatro
North side of pit 250' South of highway 128 (Jal Highway)
NE corner 60' West of lease road
SE corner 90' West of lease road

Dimensions: 100' long, 70' wide
7' - 8' depth

(approximately 50' between Pit A and Pit B)

PIT "B":

Location: Laguna Cuatro
400' South of highway 128 (Jal Highway)
NE corner 30' West of lease road
SE corner 80' West of lease road

Dimensions: 200' long, 90' wide
7' - 8' depth

(approximately 300' from South side of Pit B
to Laguna Cuatro salt water lake)

PIT "C":

Location: Laguna Cuatro
700' South of highway 128 (Jal Highway)
NE corner at SE corner of facility pad
NW corner located at South line of facility pad

Dimensions: North side 40' wide
West side 110' long
South side 40' wide
East side 138' long
5' - 6' depth

The facility is located on land which slopes to the south. The pits have been excavated and the fill dirt is bermed up on each side of the pit to contain the waste materials, with the South side of each pit bermed up higher to create a "dike".

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

9 January 1986

EXAMINER HEARING

IN THE MATTER OF:

Application of B & E, Inc. for amendment to Division Order No. R-7031, Eddy County, New Mexico. CASE 8800

BEFORE: David R. Catanach, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Division: Jeff Taylor
Attorney at Law
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: Roger E. Yarbro
Attorney at Law
MAREK & YARBRO P. A.
P. O. Drawer AA
Carlsbad, New Mexico 88221-AA

I N D E X

MR. CATANACH: Call next Case Number 8800.

MR. TAYLOR: The application of B & E, Incorporated, for amendment of Division Order No. R-7031, Eddy County, New Mexico.

MR. CATANACH: Are there appearancss in this case?

MR. YARBRO: Mr. Examiner, Roger E. Yarbro, Marek and Yarbro, Carlsbad, New Mexico, Post Office Drawer AA.

I'll call two witnesses appearing for the applicant.

MR. CATANACH: Are there any other appearances in this case?

Will the witnesses please stand and be sworn in?

(Witnesses sworn.)

MR. YARBRO: Mr. Examiner, if I may, I'd like to call to the attention of the Commission that in Case Number 7612 this matter was taken up in considerable detail.

I have a copy of the transcript

in that hearing that was heard in 1982 and I would submit it to the Commission for administrative notice.

I would also like to point out that the order that came out of that hearing approved the application for the discharge at that time, set a capacity limit of 7500 barrels, and made a specific finding that the capacity of the systems to be built was 14,400 barrels per day.

The first witness that I will call is Mr. Tim Kelly.

T. E. (TIM) KELLY,

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

DIRECT EXAMINATION

BY MR. YARBRO:

Q Mr. Kelly, would you state your name for the record, please, sir?

A Tim Kelly.

Q And what's your employment?

A I am President of Geohydrology Associates, a water resources consulting firm in Albuquerque.

Q Have you testified before the Division before?

A Yes, I have.

Q And in what capacity?

A As an expert witness.

Q Concerning?

A Concerning the hydrologic conditions in Eddy and Lea County.

Q Okay, sir.

MR. YARBRO: Would the Division accept him as an expert or should I further qualify him?

MR. CATANACH: Mr. Kelly, when was the last time you testified, do you recall?

A I believe it was in 1984.

MR. CATANACH: Okay, the witness is considered qualified.

Q Mr. Kelly, at my request did you go to Eddy County, New Mexico, and review the hydrological conditions surrounding the group of salt lakes, including the Great Salt Lake , Laguna Tres, Laguna Cuatro, and other unnamed lakes in that area?

A Yes.

Q When did you go down there, sir?

A In November, 1985.

Q And at that time did you examine the area surrounding B & E's operating salt water disposal facility?

A Yes, sir.

Q Did you examine the areas of water where the system was discharging into the lake system?

A Yes, I did.

Q Let me ask you, did you notice anywhere in the lake system any type of petroleum products?

A No, sir.

Q All right, sir. Would you give the Division a brief description of the hydrological conditions that exist in this lake area system?

A The lake area system consists of a number of lakes, the largest of which is the Great Salt Lake, or La Sala Grande, and then there are a number of tributary lakes, Laguna Uno, Laguna Tres, up through Laguna Seis, as well as Lindsey Lake. All of these are in Nash Draw, which is a collapsed structure geologically that is presently occupied by the potash industry to a large extent.

The area may have had had fresh water years ago; however, since the potash industry began discharging in 1947 there's been no evidence of fresh water and many of the stock wells in that area have been abandoned.

The discharge from the potash refineries go into the ground or into these lakes. IMC, the largest discharger, is at the south end and immediately north of the B & E facility, and it discharges about 5000 gallons a minute into Laguna Uno. All of this is hydrologically con-

nected, both groundwater and surface water, with the major discharge point being surface evaporation off of these lakes and La Sala Grande.

The total surface area of these lakes is roughly 16,000 acres, of which about half is La Sala Grande and the other half are miscellaneous lakes in the system that drain into La Sala Grande.

Q Are there any fresh water systems that are threatened in any way by the disposal of brine water through B & E's facility?

A No, sir. As near as we were able to determine, the nearest fresh water is a stock well which is approximately two miles east of the facility.

Q And that isn't it a fact that that is upstream from where B & E is discharging?

A Yes, it is.

Q Okay. Did you also perform for B & E an evaluation of the lake system in 1982?

A Yes, I did.

Q Could you compare for the Division your findings in 1985 as compared to 1982?

A The -- the water levels in the lakes in 1985 were lower than they were in 1982, approximately 8 tenths of a foot, or 10 inches below the 1982 levels, so there is a connection between Laguna Cuatro and Laguna Tres

under a county road through a culvert, and we measured the discharge through that in 1982 and the discharge was about 500 gallons a minute. In November of '85 it was 470 gallons a minute.

So, basically, the system has improved rather than deteriorated since 1982.

Q Could you therefore give the Division your conclusion as to whether or not the system currently under operation by B & E, has it had any impact on the system?

A No, sir.

Q Okay, and no adverse impact?

A It's had no adverse impact on the system.

Q You understand, do you not, Mr. Kelly, that B & E is now seeking permission from the Divison to expand its authority to dispose of brine water into the system from 7500 barrels per day to 15,000 barrels per day, is that correct, sir?

A Yes, sir.

Q And have you reached a conclusion as to whether or not that would have any adverse impact on the water system?

A I don't believe it would have any adverse impact, no, sir.

Q All right, sir. And you've already tes-

tified that there's no impact on fresh water supplies in the area, is that correct?

A That's correct.

Q From a hydrological viewpoint, is there any reason that you are aware of that the Division should not grant the additional authority requested by B & E?

A No, sir.

Q B & E also has pending in this application a second matter in that B & E is seekign authority to use open pits for the disposal of solid waste products.

You have discussed with Mr. Withrow, have you not, sir, the system that he proposes to use and how he intends to put the solid waste into the pits?

A Yes, I have.

Q In your opinion, sir, would the establishment of solid waste pits in that area adversely affect the hydrological system?

A No, sir.

MR. YARBRO: Mr. Examiner, that's all the questions I have of this witness.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. Kelly, would the additional water being dumped into the lake, is this going to raise the

level?

A The, during the past two years the -- B & E has put in approximately 2500 gallons per day and there has been a decline in the water levels, so if they doubled that or went to their full capacity, in my opinion it might raise the level of the lake but it would not be detrimental to the surface.

Q Mr. Kelly, can you -- are you qualified to answer a question about the type of solids that are going to be disposed into this --

A Well, it's my understanding they're going to be the solids resulting from well drilling, the cuttings, the drilling mud, and so forth.

Q Do you know or -- okay, do you know if there is any fresh water in the immediate area? You said there was a well two miles away?

A Two miles away is the nearest stock well that we were able to locate that had fresh water. It was marginal as far as potability is concerned. It had nearly 1000 parts per million dissolved solids.

Q Even though there are some wells in the immediate area, do you know that there is not fresh water in the area?

A We've -- the study that we did for the Bureau of Reclamation in 1978, we drilled over 50 test holes

in Nash Draw itself and were unable to find any fresh water in Nash Draw itself, and that would certainly include this area.

I might also mention that the site is not far north of the WIPP site and the work down there, which we have been a subcontractor on, has failed to show any fresh water, either.

Q Do you have any information at this time about the construction of the pits, how many pits you're going to use?

A I think Mr. Withrow can address that. It's my understanding they're going to be unlined pits, but the fact that their content will be largely bentonite and drill cuttings suggests to me that there'll be very little water escape from these, and if so, it would be similar to the chemical composition of the brine being discharged, so it would have no effect on the system.

Q Mr. Kelly, do you know the capacity of the system as it is right now, your -- the capacity of your system?

A The design capacity --

Q Yes.

A -- is 7500 gallons -- or 7599 barrels per day.

Q But the maximum capacity?

A Of the lakes? I'm sorry, I don't understand.

Q Your disposal system?

MR. WITHROW: If I -- can I answer that?

MR. CATANACH: Oh, it's okay to wait till you testify.

MR. WITHROW: Okay.

MR. CATANACH: Okay. I have no further questions of Mr. Kelly at this time.

MR. YARBRO: If I might just clarify a couple of points.

REDIRECT EXAMINATION

BY MR. YARBRO:

Q The fresh water well that's some two miles away, that well is upstream, is it not, from the disposal facility?

A That's correct. The groundwater movement is from the well towards the facility.

Q Okay. Therefore, does the disposal of brine water into the lake system from the B & E facility, is there any reasonable probability that the water would flow back to the fresh water well?

A No, sir.

Q You testified that the B & E increased capacity might raise the level in the lake system, is that not --

A That's correct.

Q -- you testified to that. In your testimony in 1982 you also testified that it might raise the level of the lake system, isn't that correct, sir?

A Yes.

Q And as a matter of fact, since that time it has decreased, hasn't it?

A Yes, sir.

Q With regard to the system's capability, Mr. Kelly, you don't have any firsthand knowledge of the exact capacity of the system, do you, sir?

A No, we don't. Our calculations of the system were based on evaporation studies in one lake for one year, but it's a very complex area and I feel that the calculations that we made are conservative as far as the capacity of the system is concerned.

Q I'm not sure when the Examiner asked you if he was talking about the lake system or the B & E plant system.

Other than what Mr. Withrow has informed you, you have no firsthand knowledge of the capacity of the B & E plant system, do you?

A No, I don't.

Q Okay.

MR. CATANACH: Okay, I have no further questions.

MR. YARBRO: I'd like to call Mr. Withrow at this time.

PHIL WITHROW,

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

DIRECT EXAMINATION

BY MR. YARBRO:

Q Would you state your name for the record, please?

A Phil Withrow, President of B & E.

Q Mr. Withrow, you appeared before the Commission in 1982 seeking permission to establish the first salt water disposal facility on this lake system, is this correct?

A Yes, sir.

Q And the Commission, as a result of that hearing, actually granted you, or B & E, Inc., authority for two stations with a maximum capacity of 7500 barrels per day for each station. Isn't that correct?

A That's correct.

Q You've only put in one of the stations.

A That's correct.

Q That station is on private property, is it not, sir?

A Yes, it is.

Q At this time you've chosen not to use the other station because it's either on State land or BLM land and the facility that you have is taking care up to this point of the needs that you have.

A That's correct.

Q All right, sir. When you appeared before the Commission in 1982, you discussed with them about building a plant that would handle a maximum capacity of 14,400 barrels per day, isn't that correct, sir?

A That's correct.

Q Would you tell the Examiner what the actual capacity of the plant that was built was?

A We constructed a plant that basically will have twice the capacity of what we were granted authority to put water in the lake on a daily basis.

The reason that we built it twice as large is due to construction cost and standard size tanks we used, we were able to double the size of it for about the cost of building a plant that would just handle 7500 bar-

rels.

We used standard 750 and 1000 barrel tanks and we didn't have to build any special equipment or special size tanks to accommodate the number of barrels per day that we could (not clearly understood), so we wound up with a system that has a capability of putting 15,000 barrels a day through this system, and within a few dollars, we built a plant double the size of what we were granted authority to put in the lake.

Q C. E. Matco designed that system for B & E, Inc., didn't they, Mr. Withrow?

A Yes, they did.

Q And in preparation for this hearing, did you visit with the engineer for C. E. Matco who designed and supervised the construction of your plant?

A Several times.

Q Who was that individual, sir?

A Bill Ball.

Q And did Mr. Ball express an opinion to you, sir, as to whether or not the plant was capable of handling 15,000 barrels per day?

A In Mr. Ball's opinion it will handle 15,000 barrels a day and they built a little -- they were conservative in their estimate.

The truth of the matter is it will handle

close to 22,000 barrels a day.

Q That was Mr. Ball's opinion?

A Yes, sir.

A But conservatively, it will handle 15,000 barrels a day.

Q You heard me ask Mr Kelly about the disposal or whether or not he had observed any petroleum by-products in the lake system itself, Mr. Withrow.

First of all, let me ask you, you have a man at the scene of the disposal facility twice a day, is that correct, sir?

A Yes, sir, a minimum of at least two hours each visit.

Q Okay. Have you ever observed the disposal of any petroleum related products into the lake system from your disposal facility and has any of your employees responsible for the supervision of that disposal facility ever reported to you the observation of any petroleum related products coming from the plant?

A (Inaudible.)

Q Mr. Withrow, the other request that you have before the Commission under this same number relates to the use of open pits, is that correct, sir?

A Yes, sir.

Q Could you, first of all, tell the Exam-

iner what type of products you would like to dispose of in those pits?

A Primarily drilling mud that's hauled -- it is put in reserve pits at the drilling wells and they need to put that somewhere so they can close the pits at a drilling site.

And we've had calls to do that. There's no place in Eddy County to do that, so when we pick it up with vacuum trucks, we take it to over in Lea County. To my knowledge there's no place in Eddy County to dispose of drilling mud or cuttings that come from the well itself.

They're required to remove that sometimes, especially if it's an in-town drilling site.

MR. YARBRO: Mr. Examiner, attached to our application is a description of the process?

Do you desire me to have him go through them?

MR. CATANACH: No, sir, I may have some questions on it later.

MR. YARBRO: Okay.

Q Mr. Withrow, after the pits are within a certain feet of the surface, after you fill them up, how, first of all, how full or close to the surface do you propose to fill the pits?

A Within two feet.

Q And then after you get there, what would you do with the pits?

A Well, we'd allow them to dry for a long period of time; any moisture evaporate out of them; and probably we would break those pits or leave them set for a long time, and we would eventually cover them up and dig new pits, if necessary.

Q Have you observed the open pits being used in Lea County?

A Yes, sir.

Q And is there any significant difference between the open pits that you propose and the open pits that are being used in Lea County?

A No, sir.

Q Can you tell the Division the name of the location where the open pits are in Lea County?

A It belongs to Larry Squires. He owns a transport truck in Lea County, called General Petroleum.

Q So far as you know those pits are approved by this Division?

A Yes, for several years.

Q All right, sir. Mr. Withrow, is it your opinion that the pits are needed in Eddy County for the purposes of conservation?

A Yes, sir.

Q And with regard to your request to expand the capacity of your existing salt water disposal facilities, is it your opinion that that expansion is necessary for the purpose of conservation?

A Yes, sir.

MR. YARBRO: Pass the witness.

CROSS EXAMINATION

BY MR. CATANACH:

Q Mr. Withrow, the original plans for your system, were they submitted in the case -- in the cases referred to?

A Yes, sir.

Q Originally?

A Yes, sir.

Q Back in 1982?

A Yes, sir.

Q Are there any substantial differences between the way the plant was actually constructed and the plans that you submitted to the Division at that time?

A No, sir, there's not any.

Q Except the size.

A Except that when we built the plant it will handle a lot more than we've every put through it.

Q Mr. Withrow, are you aware why back in

1982 that you were limited to 7500 barrels a day at that time?

A As I read the hydrological report at that time, we were told that the lakes would probably evaporate 14-to-20,000 barrels -- 15-to-20,000 barrels a day, any one lake would.

But to be conservative, so that we -- in the case of a lot of cloudy weather or evaporation (not understood), we were limited to 7500 barrels at that time to stay well below the evaporation capacity.

Q Concerning your pits that you plan to construct, do you plan to dispose of any kind of drilling fluids that contain petroleum products?

A No, sir.

Q Mr. Withrow, will these pits be fenced in compliance with orders by the Division?

A The particular piece of property we're on now is fenced on two sides and it borders the lake on the other side, which it is covered by an outside fence.

Q So it is protected from --

A Yes, sir.

Q -- livestock getting in.

A Yes, sir.

Q The three pits that you plan to drill, is that sufficient for your -- for your needs at this time?

A Yes, sir, there may be point in time as we fill one of those pits with drilling mud we would need to add an additional pit. That's what is taking place in Lea County. When they fill one they just build another pit, as needed.

MR. CATANACH: I have no further questions of this witness.

Are there any other questions of this witness?

If not, he may be excused.

MR. YARBRO: Mr. Examiner, do you desire a copy of the transcript in the first hearing?

MR. CATANACH: I don't really need it. We have copies here.

Is there anything further in Case 8800?

If not, it 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 (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. 9800, heard by me on January 9, 1986.

David R. Catanach, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
23 June 1982

EXAMINER HEARING

IN THE MATTER OF:

Application of B & E, Inc., for salt water disposal, Eddy County, New Mexico. CASE 7612

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: Cass Tabor, Esq.
McCORMICK & FORBES
P. O. Box 1718
Carlsbad, New Mexico 88220

I N D E X

E X H I B I T S

MR. NUTTER: Call next Case Number 7612.

MR. PEARCE: That is the application of B & E, INc., for salt water disposal, Eddy County, New Mexico.

MR. TABOR: Mr. Examiner, I'm Cass Tabor, from McCormich and Forbes, and today we would call as witnesses, Gene Green, Mr. T. E. Kelly, and also Bill Ball.

(Witnesses sworn.)

MR. NUTTER: Are there other appearances in Case Number 7612?

Proceed, please.

MR. TABOR: We would ask Gene Green to testify first.

GENE GREEN

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

DIRECT EXAMINATION

BY MR. TABOR:

Q Would you please state your name, place of residence?

A I'm Gene Green. I live in Carlsbad.

Q. What is your present occupation?

A. I'm Vice President for B & E, Incorporated.

Q. Okay, B & E, Incorporated, have filed this application and have you been involved in the preparation and submission of the application to the Commission?

A. Yes, I have.

Q. This application concerns two sites, is that not correct?

A. That is correct.

Q. And in connection with the application B & E has contacted some experts, if you could tell us who these experts are?

A. Yes, sir, I have contacted a hydrologist, Mr. T. E. Kelly, and also the BLM, Mr. Jack Ragsdale with the Bureau of Land Management.

Q. Okay, and concerning the plant design, have you also contacted an expert in that regard?

A. Yes, we have. We've contacted C. E. Metco, their engineer, Mr. Bill Ball.

Q. In presenting this application could you tell the Examiner what the need is that you feel in this particular area? Why you need this?

A. We feel like there is enough wells producing disposal water in our area that there is a dire need for a

place to go with it in the southern part of the state. As there is now, there's just one commercial and one private, and the commercial doesn't -- they can't accept enough water to compensate everything that's being produced in that area right now.

Q. And are you aware of any dumping of salt water in the area?

A. I know there is some illegal dumping going on.

Q. You have in the application two sites proposed, and that's Section 12 in 23 South, Range 29 East, and also Section 6 of Township 23 South, Range 30 East. Are those two particular locations leased land, Federal land, or are they --

A. One is Federal and one is private land and we do have a lease on the private land.

Q. Okay, on -- do you know on which particular description that that is, that you have the lease?

A. I believe that the lease is on Section 12, Township 23 South, Range 29 East.

Q. Are you -- you do have a lease with the individual who owns the land, is that correct?

A. Yes, we do.

MR. TABOR: Mr. Examiner, if we could, as

far as exhibits are concerned, we've provided an application packet. Would you mind if we referred to page numbers and maybe numbered the page numbers in order to alleviate having to introduce specific exhibits, taking them out of the packet themselves?

MR. NUTTER: Yeah, we can refer to these in the booklet that was furnished with the application. You may make the booklet an exhibit, if you wish.

MR. TABOR: Okay. We'll have to do that through several witnesses and there are an assortment of data here.

MR. NUTTER: Okay, well, they can identify the portion that they prepared.

MR. TABOR: Okay, thank you, Mr. Examiner.

Q. In the event that this application is approved by the Commission, you will be dealing with the Federal people in order to obtain a lease, is that correct?

A. That is correct.

Q. In connection with your proposed site, have you contacted the State Highway Department?

A. Yes, we have. We have a signed letter from Mr. Downey stating to the fact that what we are doing in this area does not affect his drainage operation off of the highway.

Q. Okay, and this particular facility would be located near the highway, is that correct?

A. That is correct.

Q. I'd like to refer you to what is marked as page twenty-one in the application, and tell us what that particular document is.

A. That is a letter that we took to Mr. Cliff Downey and had his approval on, stating to the fact that the water that we would be putting into this salt water lake disposal system wouldin no way bother his drainage operation off of the highway.

MR. NUTTER: Mr. Tabor.

MR. TABOR: Yes, sir.

MR. NUTTER: You said page twenty-one of the application. From here on out let's refer to it as the exhibit, shall we?

MR. TABOR: Okay.

MR. NUTTER: And call that Exhibit Number One.

MR. TABOR: Sure, that will be fine.

MR. NUTTER: That will be page twenty-one of Exhibit Number One, then, is what you were just referring to.

MR. TABOR: Very well.

Q. Not going into a whole lot of detail, did you not assist in obtaining water samples from the proposed discharge site and area surrounding, in order to assist Mr. Kelly to comply with any provisions that the Water Quality Board would have as to the effects it would have in the water discharged?

A. Yes, sir, I did. I took four samples from various places in the lakes, in the lake system around the area, and had them analyzed.

Q. Okay, who did you forward these samples to in order to have the testing done?

A. Martin Water Lab in Monahans, Texas.

Q. I'd like to refer you to pages seventeen. eighteen, nineteen, and twenty of Exhibit One, and ask you if you can identify those particular documents?

A. Yes, I can. This is the analysis that we received from Martin Water Laboratory.

Q. Did you make use of these in any way in the preparation of the data that's in the exhibit?

A. Yes, we did. We -- we used them to determine that the water that we would be putting into the lake is as good or better than the water that is already in the lake as it is now.

Q. You did forward these to Mr. T. E. Kelly,

is that correct?

A. That is correct.

Q. We have an expert to testify as to the plan of operations, but could you go into detail and tell us, do you plan on having an individual at the plant site at all times in order to check the loading and unloading?

A. No, we do not. The design of the plant is so constructed that we felt like that a man could check on it once a day and it has safety devices built into it that would shut it down in the event of some bad water getting in.

Q. But you will have an individual checking sometime during each -- each day, is that correct?

A. That is correct.

Q. Is this part of the data contained in Exhibit One, to the best of your knowledge, the data which you submitted yourself, is it true and correct to the best of your knowledge and belief?

A. Yes, it is.

Q. I'd like to show you what is -- we're going to have to label this, it is in the packet in the back, Mr. Examiner, and ask you to identify -- shall we label this "A"?

MR. NUTTER: That will be Exhibit One-A.

Q. One-A. Can you identify what this parti-

cular document is and who prepared it?

A. Yes, sir, Mr. Jack Kennedy, an engineer from Carlsbad, prepared this plat for us. It shows the topography and where these two sites are located.

Q. Okay, it also shows, does it not, the proposed location of the storage tanks, et cetera, of the plant facility itself?

A. Yes, it does.

Q. At one time the original application did contain a site that is now different than yyou propose, is that correct?

A. That is right. The original site was on Bureau of Land Management and we have acquired a deeded lease so we have selected an alternate site, which is in Section 6.

Q. Okay, this has been noted on the application that the Commission has at this time, is that not correct?

A. That is correct.

Q. Okay.

MR. NUTTER: In other words, when the application was originally considered it was for disposal into two -- into one site, being in the southeast end of Laguna Tres in Section 12 and/or the northeast side of Laguna Quatro in Section 6.

Now do I understand correctly that one of

these is being dropped now?

MR. TABOR: I believe at one time there was -- on the southwest side of Laguna Quatro is where it originally -- I believe one of the maps in this particular exhibit --

A. Page ten.

MR. TABOR: Page 10 of the exhibit shows that to be the site reflected.

It is now on the northeast side of Laguna Quatro that this -- we have proposed the facility and as far as the rest of the application, it may be informative with that change, but this particular map on page ten is not.

MR. NUTTER: Okay, in other words, the original map here on page ten of Exhibit One shows two sites on Laguna Quatro.

MR. TABOR: That's correct.

MR. NUTTER: Private land on the northeast side and the BLM land on the southeast side.

MR. TABOR: It showed originally on Laguna Tres at the easterly edge of Laguna Tres was one site; the other site was on the southeast.

We now propose that the southeast side of Laguna Quatro be moved to the northeast.

If I may approach --

MR. NUTTER: This one stands.

MR. TABOR: Yes.

MR. NUTTER: Now this is the BLM site down here.

MR. TABOR: That's correct.

MR. NUTTER: On Laguna Tres, isn't it?

MR. TABOR: Originally both those sites were in the BLM.

MR. NUTTER: Oh, I see.

MR. TABOR: And now we have obtained a lease from an individual and have now been able to move that site that was on Laguna Quatro, the southeast side, to the northeast, because it is leased land, patented land.

MR. NUTTER: Okay, so the -- there's no change from what we've advertised here.

MR. TABOR: No, sir.

A. No, sir.

MR. TABOR: Other than this change on this particular map on page ten.

MR. NUTTER: Okay.

Q. Do you feel that in light of the experience and also the data which you compiled in connection with your experts, that this application, if granted, would be in the best interest of conservation and not adversely affect

any correlative rights?

A. Yes, I do.

MR. TABOR: I have nothing further of this witness at this time.

CROSS EXAMINATION

BY MR. NUTTER:

Q. Well now, Mr. Green, you had obtained the right to use the site on the private land, is that correct?

A. That is correct.

Q. What about the site on the BLM land down on Laguna Tres, is that still being negotiated?

A. Yes, sir, it is. We are in the process of acquiring it. They -- they were holding back, waiting to see what the Commission decides to do. They're kind of waiting on your decision as to whether to go ahead with --

Q. They won't issue the land unless they know you can use it.

A. That is correct.

Q. And so your application is for one site and/or the other site.

A. Yes, sir.

Q. But you're seeking really the "AND".

A. Yes, sir.

Q. Now, would you elaborate a little bit on why you obtained this letter from the State Highway Department? You mentioned their drainage --

A. Yes, sir, I did.

Q. -- program.

A. They are in the process of widening that highway and they were having to --

Q. Referring back to Exhibit Ten, now, tell me what the highway is there.

A. Okay, the highway is State Road 128.

Q. That's that line that's diagonally across over Laguna Quatro, is that correct?

A. That is correct. They -- they are in the process of widening that highway due to the WIPP site out there and the traffic that is imposed on it, and they have gone in and cut in surface drainage from one lake to the other and all of them to drain into the Great Salt Lake, and we -- I had seen them out there working and BLM informed me that we needed to probably talk to Mr. Kreb down there, he is the engineer for the Highway Department that was in -- in charge of that operation out there, and I contacted him by phone and took a letter to him, and he -- he was in agreement that no more water than what we would be putting in it, being south of the highway, it would not bother his operations.

Q. The drainage normally is from the north to south in this area, is it not?

A. That is correct.

Q. And so your proposal is south of the highway, so you're not creating any drainage problem through the highway or under the highway or over the highway.

A. Yes, sir, that's correct.

Q. And therefor he has given you a letter -- or he's signed a letter that you all sent to him.

A. He asked us to prepare the letter and he was in the field at the time and I took it to him and he read it and was satisfied with it and signed it for us.

Q. And you have agreed there in the letter that if you do interfere with their program of drainage in the area you'd discontinue operations until it is corrected.

A. That is correct, yes, sir.

Q. I see.

MR. NUTTER: Are there any further questions of Mr. Green?

MR. TABOR: We'd like to bring one point out and I think it is -- you haven't made it clear.

REDIRECT EXAMINATION

BY MR. TABOR:

Q. B & E is asking that approval be granted on both sides, is that not correct?

A. That is correct.

MR. NUTTER: Right. Okay, Mr. Green, I just happened to think.

RECROSS EXAMINATION

BY MR. NUTTER:

Q. You said you caught those four samples.

A. Yes, sir.

Q. Now give me the sites where you caught the samples and let me indicate them on one of these maps, if they haven't already been indicated on a map.

A. Okay, the sample from Lake --

Q. Wait a minute now, let me find the samples. They start on page 17, okay.

A. Yes, sir.

Q. Sample No. 1 is called Lake No. 1.

A. Yes, sir, that is from the Quatro Lake. I took that sample from where our site would be located on the -- on the lake.

Q. Now at one time you were proposing two sites on the Quatro Lake, which one?

A. Okay, that is -- the sample is from the

to his own operation, simplifying his administration of the entire facility some.

MR. GREEN: I might add something, that our second choice, which is the BLM land, we had selected it originally because of the topography of the land where centrifugal fource would help us. The tanks would be lower than what we would be unloading into; the other one wouldn't be.

I think that the deeded land where we already have the land leased, providing that we get the system, we can move on it and put it in, where BLM it might take as much as six months to procure their lease, and that was the reason for going ahead with this other, with the deeded lease.

A. I'd like to clear that up a little by saying as I looked at the plot plans, the BLM selection shows the initial tank at a higher elevation and we're stairstepping down to increase the head one from the next, which gives us some process advantage. The disadvantage is that the BLM land may not come available immediately and that is the provocation, apparently, for acquiring of deeded land lease, but that particular piece of property does show a level plot of land so that the stairstepping -- tank stairstepping design is absolutely necessary.

MR. NUTTER: Are there any further questions of Mr. Ball? He may be excused.

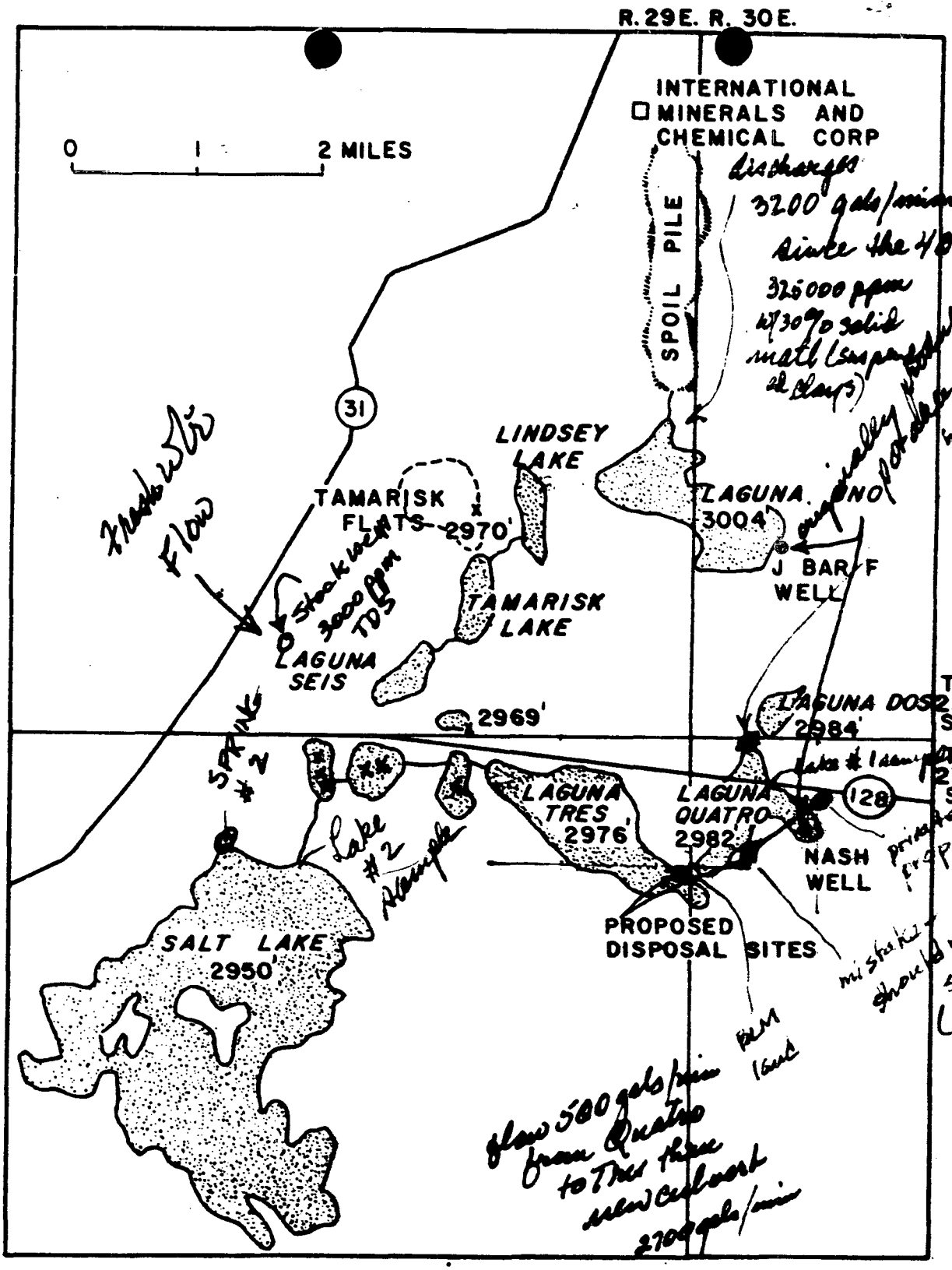


Figure 2. Distribution of lakes in the vicinity of IMC refinery and Salt Lake, with selected altitudes.

THE REPRODUCTION OF

THE

FOLLOWING

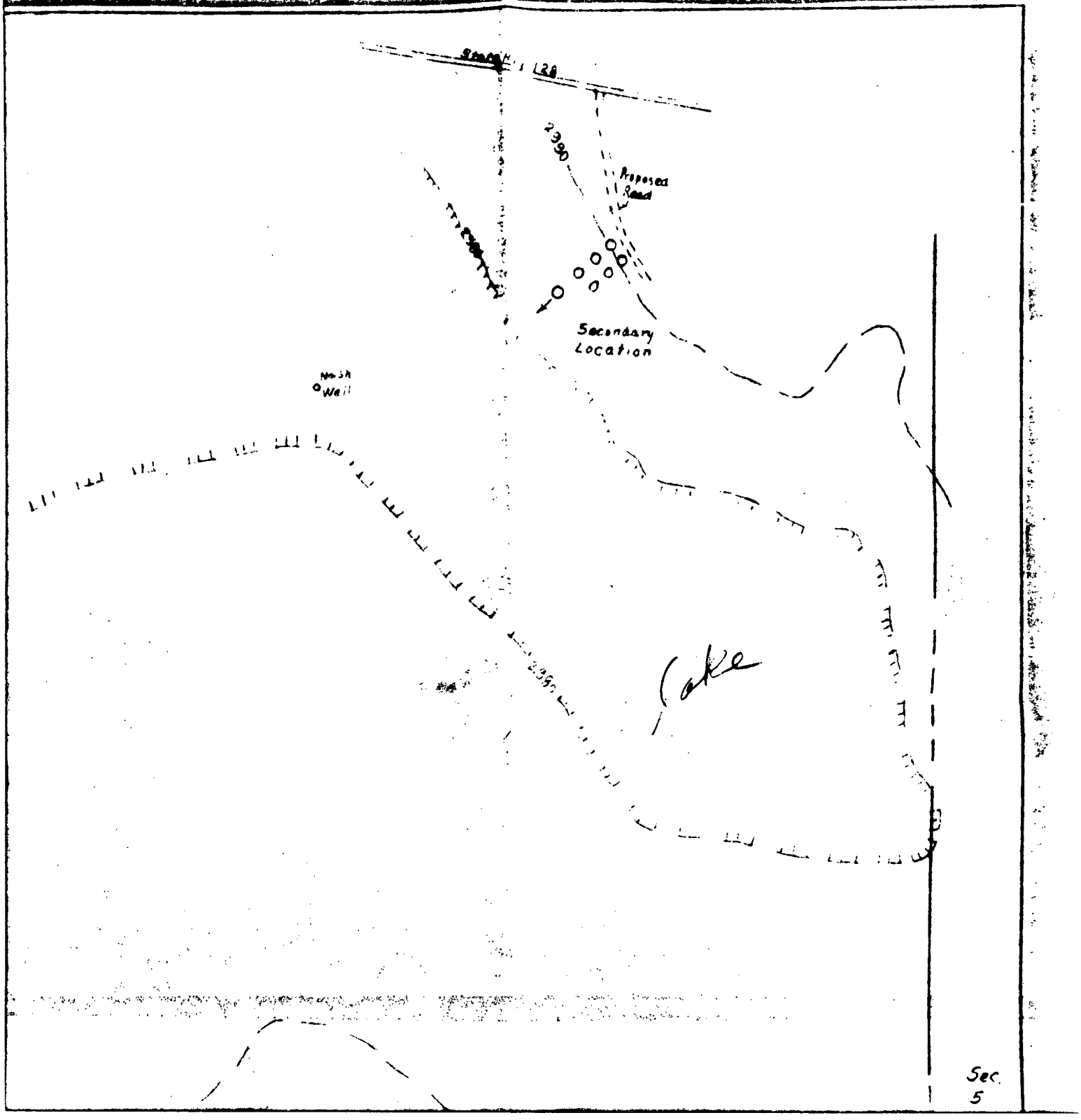
DOCUMENT (S)

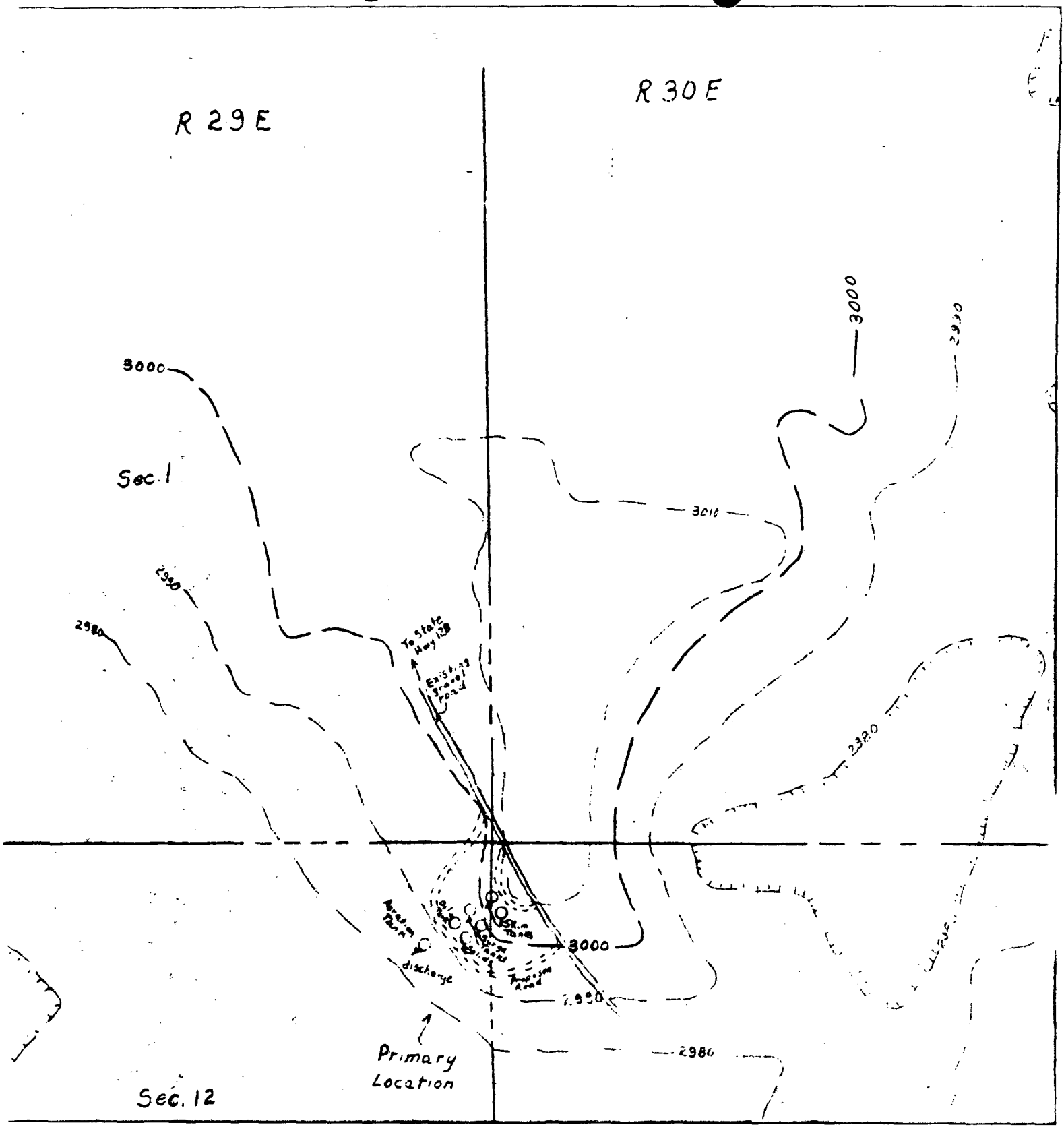
CANNOT BE IMPROVED

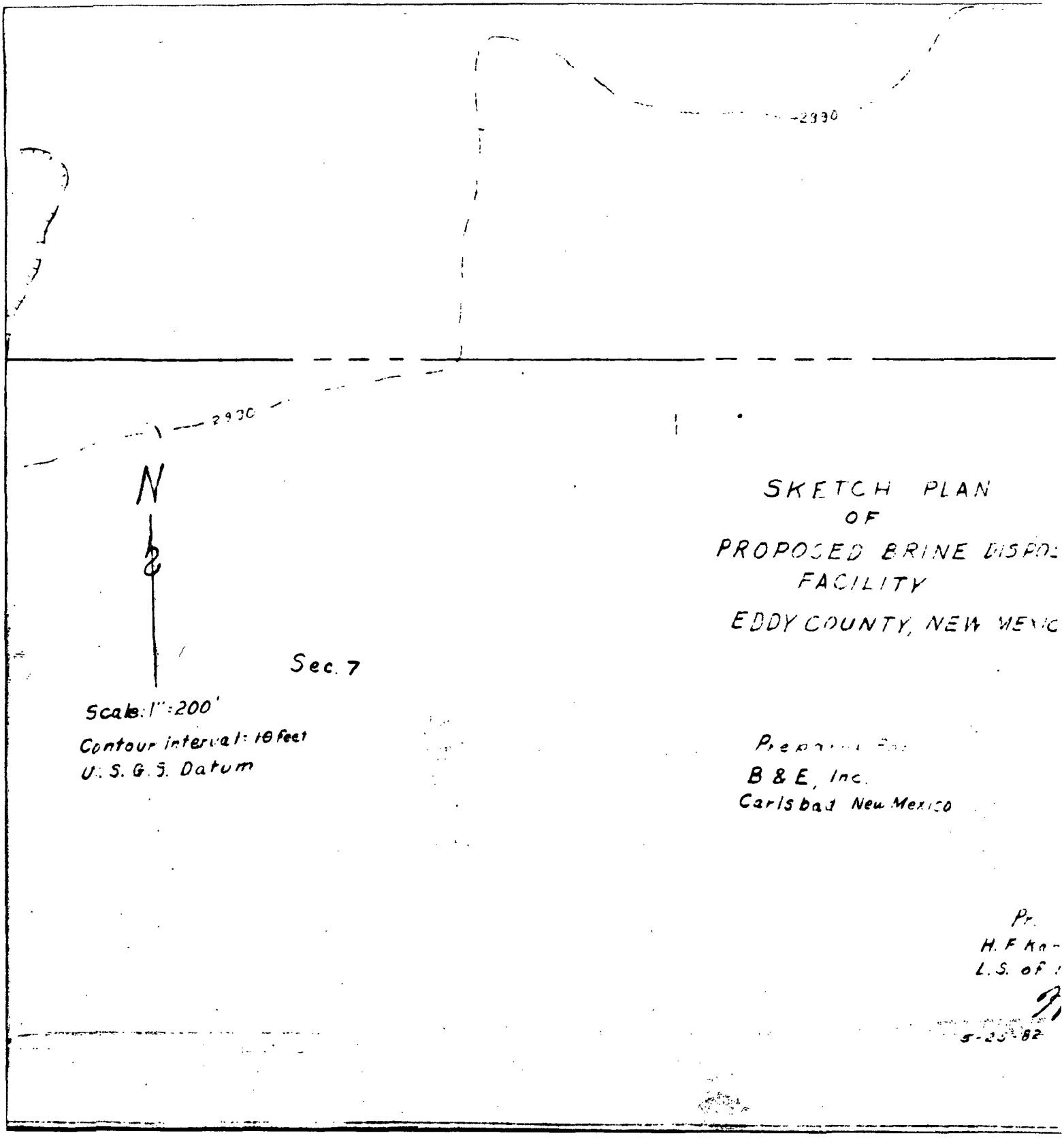
DUE TO

THE CONDITION OF

THE ORIGINAL


Stake
2390
Proposed Road
Secondary Location
Nash Well
Lake
Sec. 5


R 29 E
R 30 E
3000
2990
3010
2980
3020
Sec. 1
To State Hwy 128
Existing Gravel Road
3000
discharge
2990
2980
Primary Location
Sec. 12

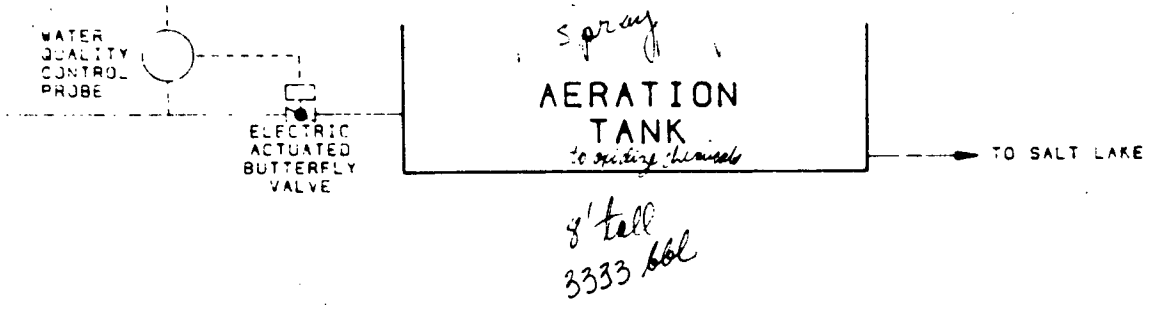


SKETCH PLAN
OF
PROPOSED BRINE DISPO
FACILITY
EDDY COUNTY, NEW MEXIC

Scale: 1" = 200'
Contour interval: 10 feet
U. S. G. S. Datum

Prepared For:
B & E, Inc.
Carlsbad New Mexico

Pr
H. F Ko-
L. S. of
5-25-82



8' tall
3333 bbl

Ex 1-B

DWG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

NATCO
COMBUSTION ENGINEERING INC.

MECHANICAL & PROCESS FLOW SHEET

HOBBS NEW MEXICO

DRAWN	SCALE	CH'K'D.	APP'D PROCESS
RHODES	NONE		
CUSTOMER PHIL WITHROW			APP'D MECH.

PRODUCT ID NO.

SHOP FAB. NO.

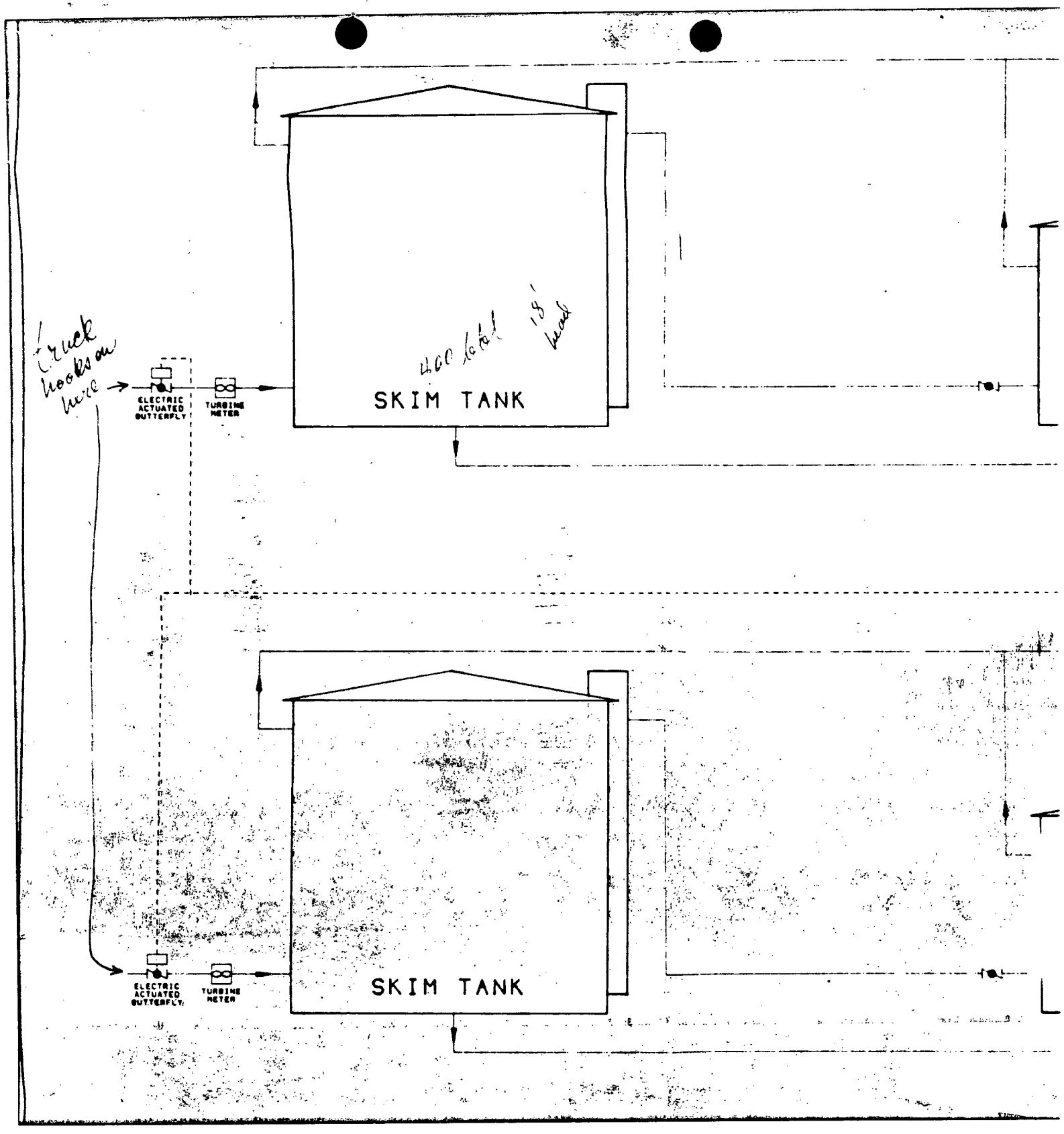
Date Drawn 02-08-01 | Rev'd. to Mail

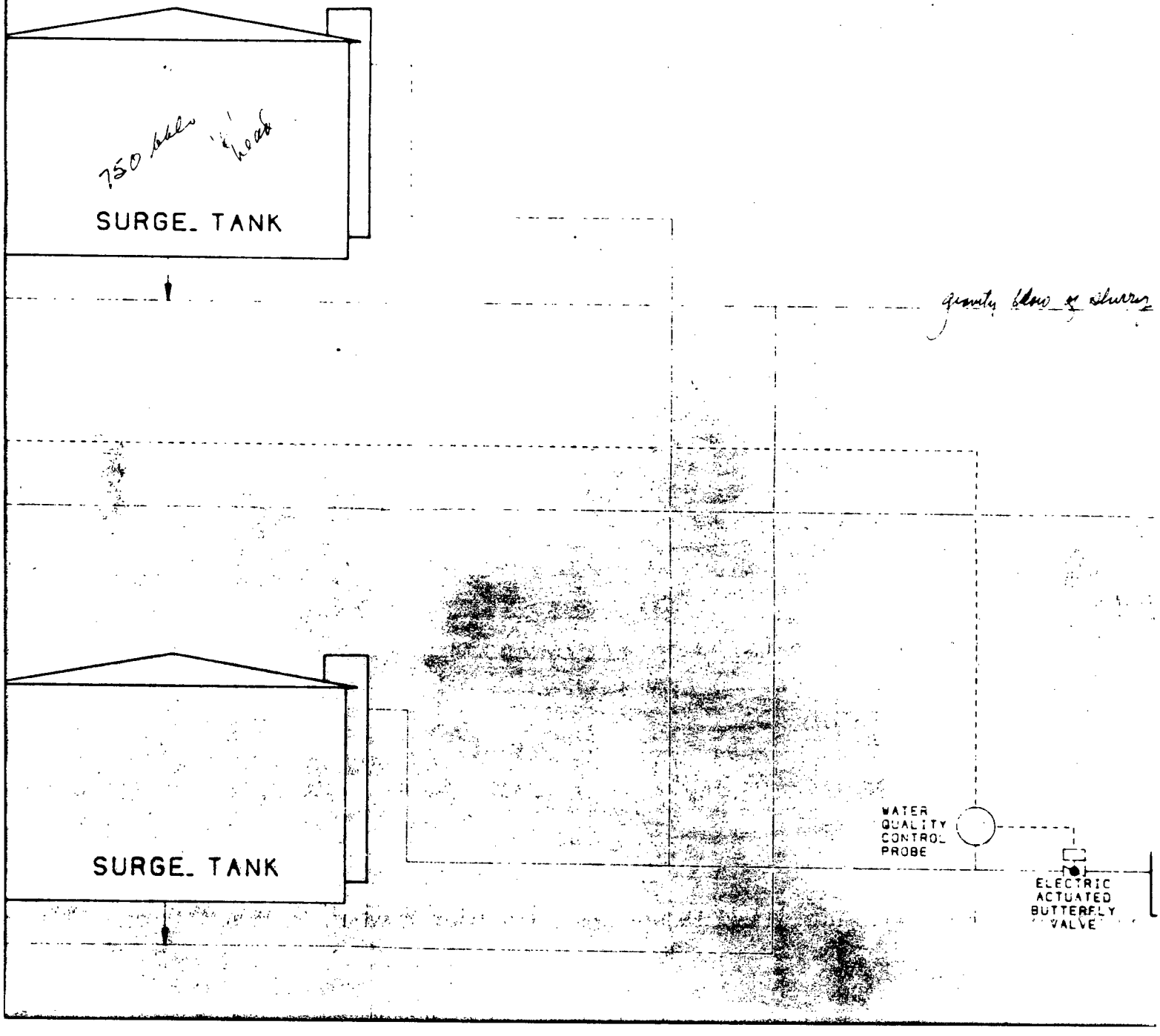
Revision No. | B.R. Yes ☐ No ☒

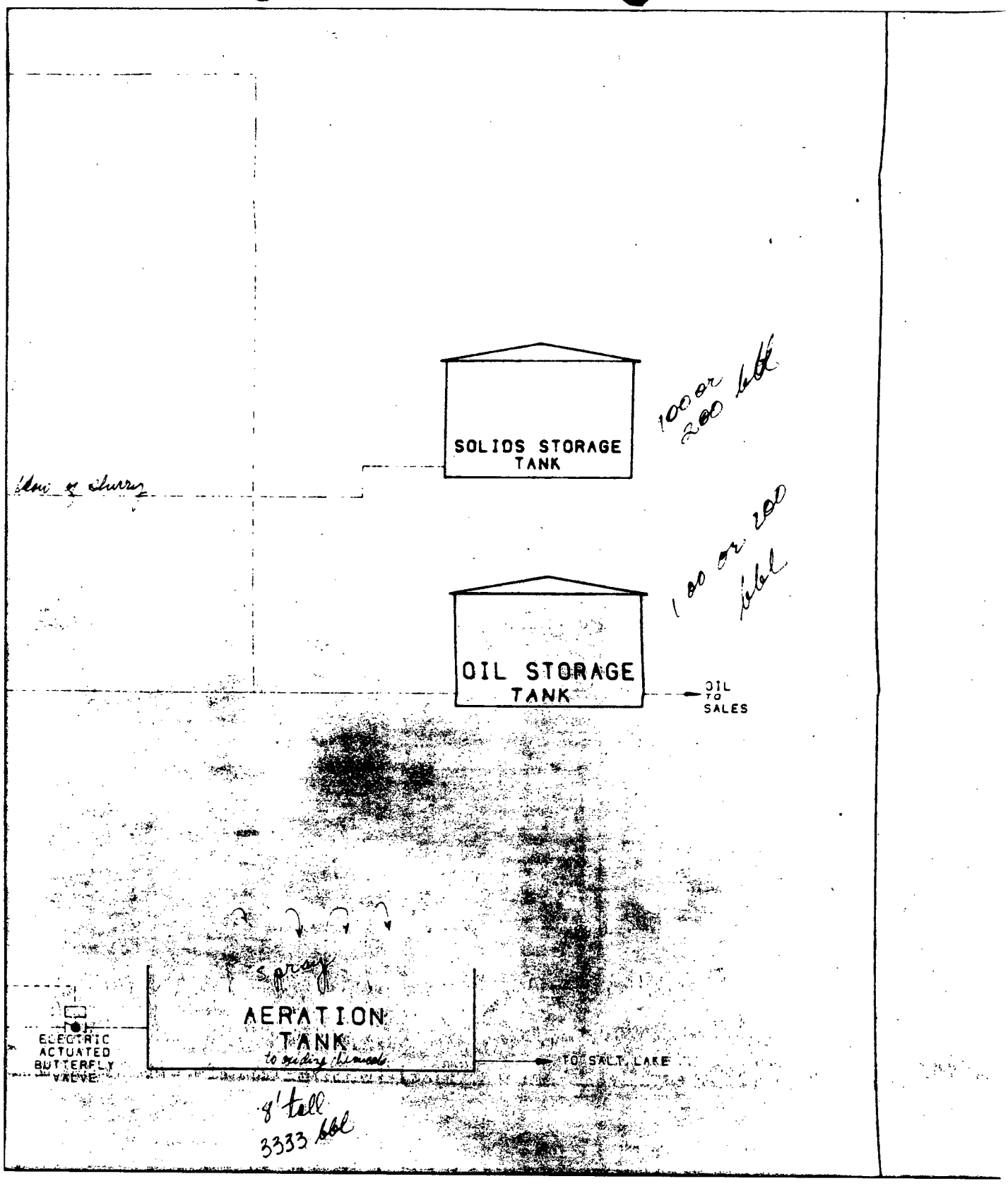
A-75747

SHEET 1 OF 1

DATE PLOTTED 30 APR 02


Truck hooks on here
ELECTRIC ACTUATED BUTTERFLY
TURBINE METER
SKIM TANK
460 bbl
13' head
ELECTRIC ACTUATED BUTTERFLY
TURBINE METER
SKIM TANK


750 tons
SURGE TANK
gravity flow of slurry
SURGE TANK
WATER QUALITY CONTROL PROBE
ELECTRIC ACTUATED BUTTERFLY VALVE


SOLIDS STORAGE TANK
100 or 200 bbl
slow x slurry
OIL STORAGE TANK
100 or 200 bbl
OIL TO SALES
Spray
AERATION TANK
to existing tanks
ELECTRIC ACTUATED BUTTERFLY VALVE
TO SALT LAKE
8' tall
3333 bbl

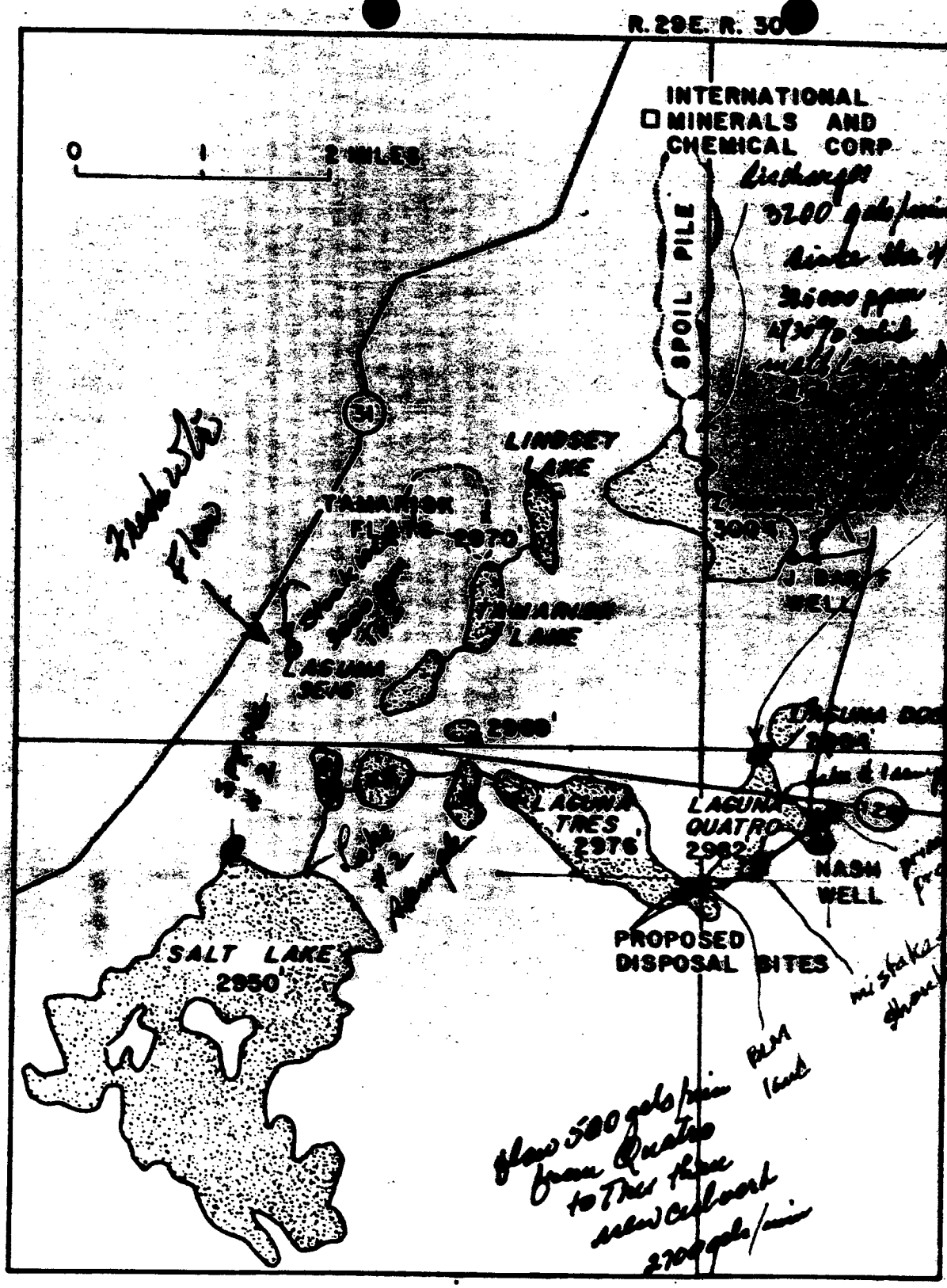


Figure 2. Distribution of lakes in the vicinity of IMC refinery and Salt Lake, with selected altitudes.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 7612
Order No. R-7031

APPLICATION OF B & E, INC. FOR
SALT WATER DISPOSAL, EDDY COUNTY,
NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on June 23, 1982, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 21st day of July, 1982, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, B & E, Inc., has certain rights to dispose of salt water in a brine lake known as Laguna Cuatro and is in the process of acquiring rights to also dispose of salt water in a brine lake known as Laguna Tres, both in Eddy County, New Mexico.

(3) That the applicant proposes to install and operate a commercial facility for the disposal of salt water into the Southeast end of Laguna Tres in Section 12, Township 23 South, Range 29 East and/or into the Northeast side of Laguna Cuatro in Section 6, Township 23 South, Range 30 East, both in Eddy County, New Mexico.

(4) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other

place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(5) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

(6) That the State Engineer has designated, pursuant to Section 65-3-11 (15), N.M.S.A., 1953 Compilation, all underground water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(7) That the applicant seeks an exception to the provisions of the aforesaid Order (3) of Division Order No. R-3221, as amended, to permit the commercial disposal of produced salt water into either or both of the aforesaid lakes at the sites described above.

(8) That the applicant proposes to install and operate an effective system for the removal of oily and solid waste material from the waters to be disposed of, said system being equipped to monitor the discharge stream and to automatically shut the facility down should water quality deteriorate below an accepted average level of 15 parts insoluble oils per million parts of water.

(9) That said facilities should be capable of handling up to 14,400 barrels of water per day at each of the proposed sites, but 7,500 barrels per day is a reasonable limit to place on each facility at this time.

(10) That the discharge of 7,500 barrels of salt water per day into either or both of the proposed salt lakes will not create a hazard to any fresh water in the area for which a present or reasonably foreseeable beneficial use is or will be made.

(11) That the surface area of each of the aforesaid salt lakes is sufficient to permit the evaporation of at least 7500 barrels of salt water per day, and the disposal of that amount of water into each of said lakes will not adversely affect the existing hydrologic systems in said lakes.

(12) That the commercial disposal of salt water into Laguna Tres and/or Laguna Cuatro in the amounts and manner described above will not impair correlative rights nor cause waste, and should be approved, provided however, that the Division Director should be authorized to suspend disposal operations by the applicant into either or both of said lakes if applicant fails to prevent oil or other deleterious wastes from escaping to the lakes in harmful quantities.

IT IS THEREFORE ORDERED:

(1) That the applicant, B & E, Inc., is hereby authorized to install and operate a commercial salt water treating and disposal facility at the southeast end of Laguna Tres in Section 12, Township 23 South, Range 29 East, NMPM, and/or at the northeast side of Laguna Cuatro in Section 6, Township 23 South, Range 30 East, NMPM, both in Eddy County, New Mexico, said systems being limited to the disposal of a maximum of 7,500 barrels of salt water per day at each site.

(2) That the operator shall install and maintain in good operating condition a salt water treating facility at each site utilized for salt water disposal, said treating facility being designed and operated in such a manner as to reduce insoluble oils from the disposal discharge stream to an average concentration of less than 15 parts per million.

(3) That each of the aforesaid salt water treating facilities shall be so equipped as to monitor the salt water disposal stream and automatically shut the facility down if disposal water quality should deteriorate to an unacceptable level.

(4) That the Division Director shall have authority to suspend operations at the facilities herein authorized upon failure of the applicant to prevent oil or other deleterious substances from entering Laguna Tres and/or Laguna Cuatro in harmful quantities.

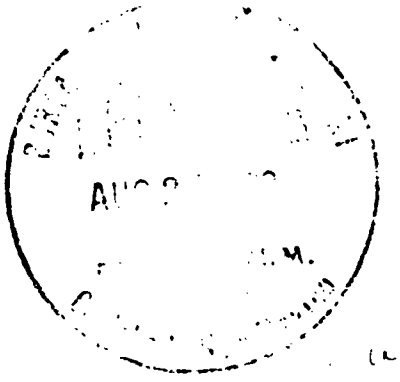
(5) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY,
Director

S E A L



Ex 1

APPLICATION FOR BRINE DISPOSAL FACILITY

OIL CONSERVATION DIVISION

MAY 2 8 1982

RECEIVED

by

B & E, INC.
CARLSBAD, NEW MEXICO

Submitted By:

McCormick and Forbes
P. O. Box 1718
Carlsbad, New Mexico 88220

INDEX

INTRODUCTION

I. STATEMENT OF APPLICATION

B & E, Inc., a New Mexico corporation, requests permission of the New Mexico Oil Conservation Commission to establish a surface disposal system of saltwater waste. The saltwater waste is generated from oil field product waste. The proposed system would provide a badly needed approved dumping station in Eddy County sufficient to take care of Eddy County and West Lea County's needs and hopefully eliminate unauthorized dumping in the area.

II. PLANT

The proposed plant will use the batch treatment method and will have a quality control safety system designed to prevent the discharge of unsuitable water into the environment.

III. LOCATION

B & E, Inc., proposes two alternate locations for the plant. The primary location is located on BLM land in the NE/4 of Section 12, Township 23 South, Range 29 East. BLM has advised B & E, Inc., that its application for B & E, Inc., land use will be considered upon approval of the New Mexico Oil Conservation Commission. The alternate location is on private property in the NE/4 of Section 6, Township 23 South, Range 30 East. Both locations are covered by this application.

IV. HYDROLOGY

B & E, Inc., proposes to dispose of the saltwater in a natural salt lake. The oil field brine being released into the lake is very similar to the saltwater in the lake and will not adversely affect the ecology of the lake.

HYDROLOGIC ASSESSMENT, LAGUNA TRES AREA

EDDY COUNTY, NEW MEXICO

by

Geohydrology Associates, Inc.
Albuquerque, New Mexico

May 1982

2

CONTENTS

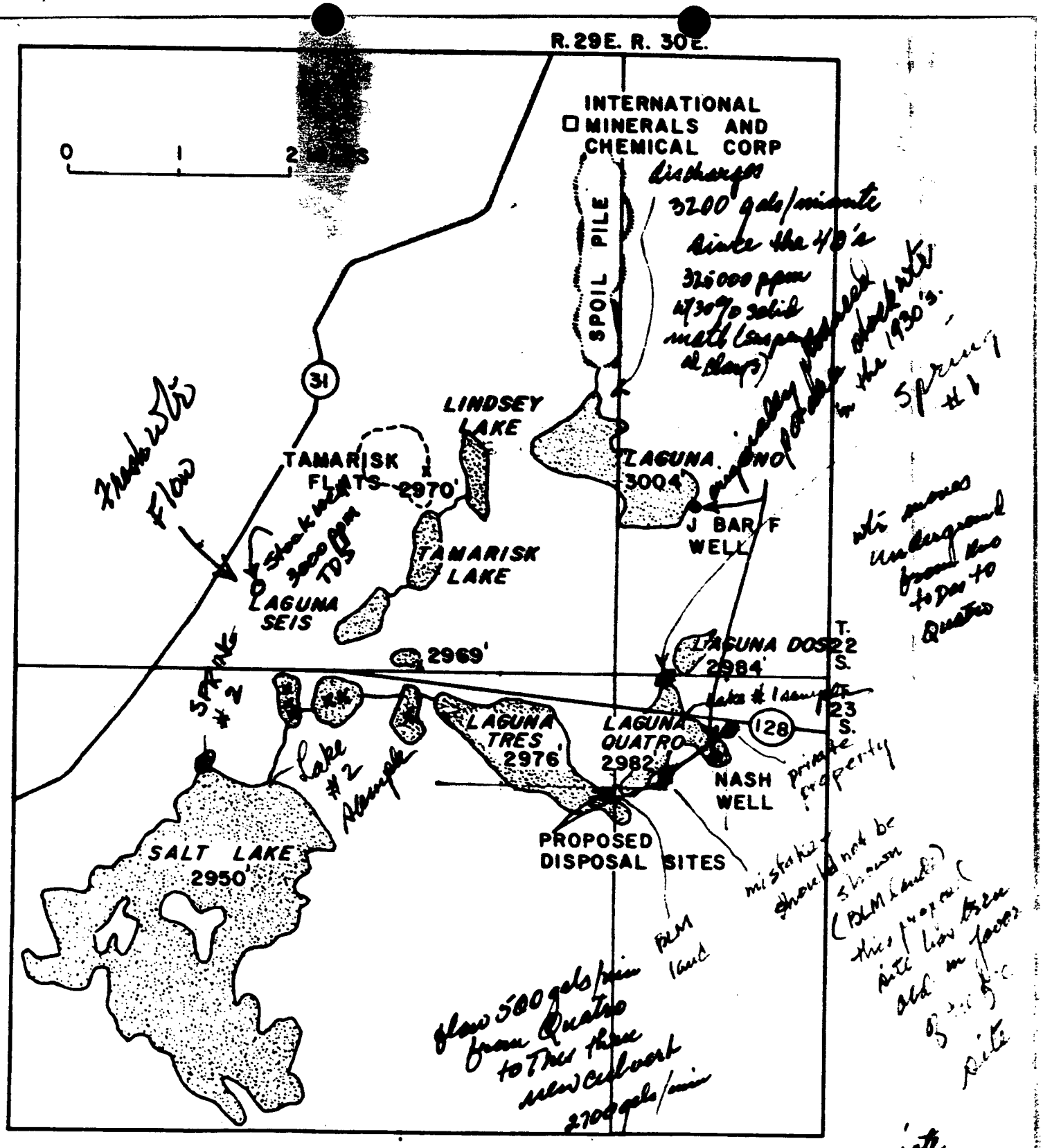


Figure 2. Distribution of lakes in the vicinity of IMC refinery and Salt Lake, with selected altitudes.

WATER QUALITY ASSURANCE FACILITY

B and E INCORPORATED
Carlsbad, New Mexico

I INTRODUCTION

In order to make available to industry an approved waste water disposal station, the design herein described and depicted is presented. This facility provides a proven method of removing oily and solid wastes from water of varying quality by the batch treatment method. Water will be hauled to the site in 150-barrel or less loads and discharged into the facility at a rate not exceeding 10 barrels per minute (420 GPM). The goal of the facility is to remove insoluble oils to below maximum concentration of 50 PPM with an average concentration below 15 PPM. Should an oil concentration higher than desired (and approved by the State of New Mexico) occur, an alarm system will close valving to stop the flow of fluid into and out of the facility

II FLUID FLOW

The fluids, a predominantly water with small quantities of oil and solids, enter the facility through an electrically actuated emergency shutdown valve and a key activated turbine flow meter into the first process vessel, a Skim Tank. The Skim Tank is designed to be predominantly filled with water to assure maximum residence time and correspondingly high water quality. A thin layer of oil is maintained near the top of the tank. This oil layer is near the level of the oily influent minimizing the distance this contaminant must travel to be absorbed into the oil blanket. Oil is skimmed off into a holding tank ready for sale to a waste oil reclaimer. Water flows to the Surge Tank, typically 30 percent larger than the Skim Tank. While the internals of the Surge Tank are not as complex as the Skim Tank, the flow and levels are similar. Oily wastes

are captured near the top and drawn off to storage. Water is removed from the bottom and flows to the Aeration Tank for final quality control. A portion of the water in the Aeration Tank is pulled off near bottom and pumped into an aeration nozzle. The aeration of this water has the effect of clarifying it prior to discharging it into the adjacent salt lake.

Each Skim Tank and Surge Tank is designed to process the influent from one transport truck at a time. The initial system will consist of a twin set of these vessels feeding one Aeration Tank as indicated on C-E Natco Drawing No. 75747. Therefore, two transport trucks can unload at the same time into separate process facilities.

III SYSTEM CAPACITY

Each of the twin systems described above will accept a load of waste water from one transport truck at a time. Each transport truck has a capacity of approximately 150 barrels. Trucks are equipped to offload via on-board pumping systems. The truck pumping capacities vary, but do not exceed ten barrels per minute. Therefore, the maximum influent rate is 10 barrels per minute. Each truck must position itself properly, connect to the influent nozzle, activate the key actuated valve/meter assembly, unload, disconnect and proceed out of the unload area. While unloading can occur in as few as 15 minutes, the entire process typically takes a minimum of 25 minutes. And, by the time a second transport is ready to unload, a minimum of 30 minutes has elasped. This equates to surges of 10 barrels per minute (420 GPM) and averaged maximum plant throughput of five barrels per minute (210 GPM) per unloading process train. Since the initial system concept consists of two trains, maximum averaged discharge capacity will be on the order of 10 barrels per minute total or 14,400 barrels per day

The actual discharge volume is anticipated at less than 6,000 barrels per month. This volume will be carried 50 percent by the owner/operator's transports and 50 percent by others.

6000 ÷ 200 bbls/day = 30

IV OIL PROCESSING

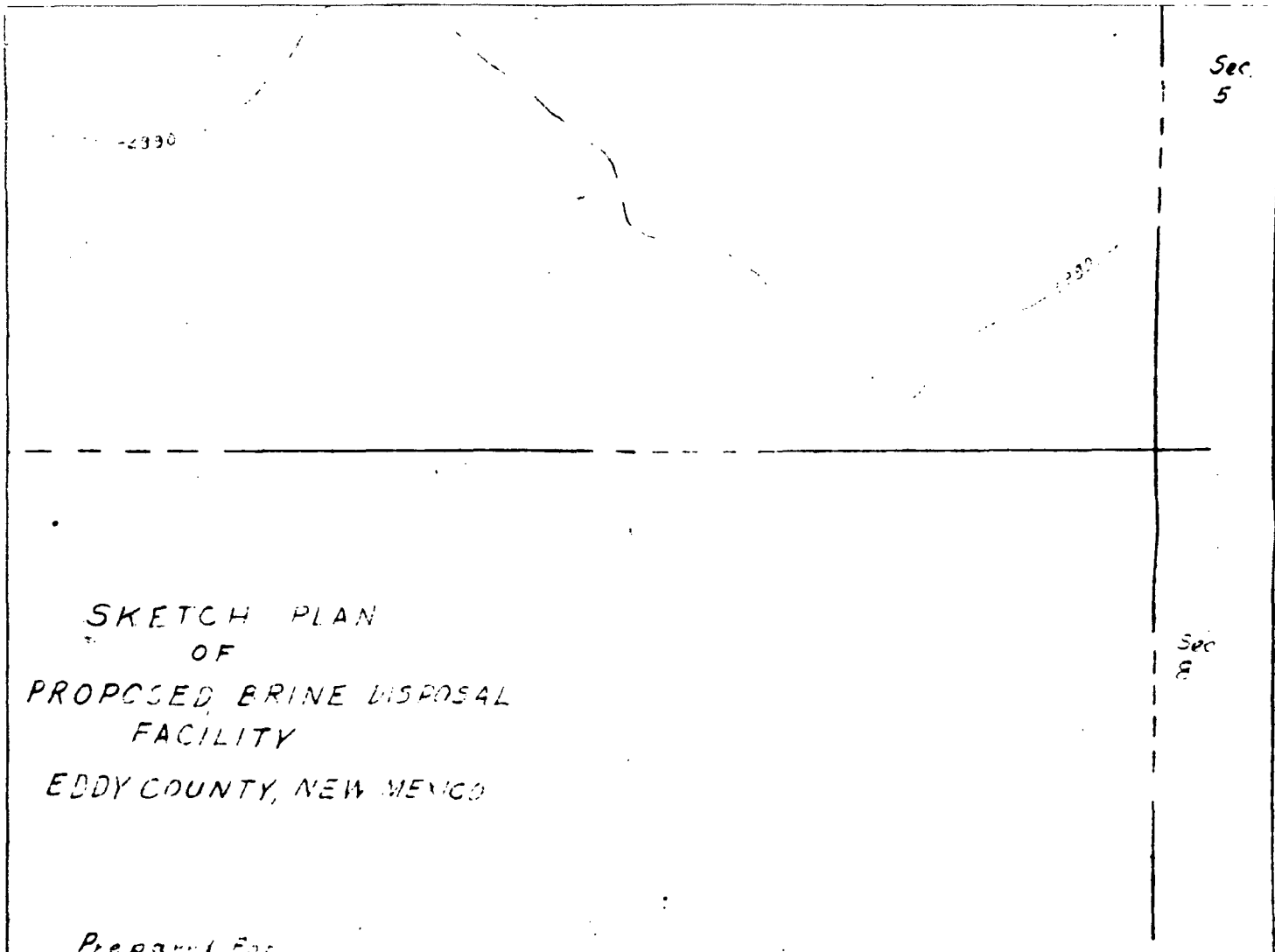
Waste oil will be collected and sold to a waste oil reclaimer. As the volume of this product justifies, a process addition designed to reclaim oil on-site may be added. This system will include a low pressure boiler and a larger process tank with steam coils for heat input.

VII SOLIDS

Minor amounts of solids will accumulate in the system. These solids will be decanted from the Skim and Surge Tanks via draw-off laterals. Solids will accumulate in the solids storage tank. Water separated from solids will be cycled back into the water process system.

VIII WATER QUALITY CONTROL

The implementation of appropriate design concepts for tank internals will assure a high degree of water quality under normal circumstances. However, to prevent the possibility of an upset, vandalism, or other cause resulting in an oil discharged, a water quality monitor continuously monitors the concentration of oil in water between the Surge Tank and the Aeration Tank. Should the concentration exceed preset limits, the automatic valving switches to the closed position to stop flow through the facility. The automatic valves are fail closed so that any loss of power causes a facility shut down. No manual override will be installed in this system.



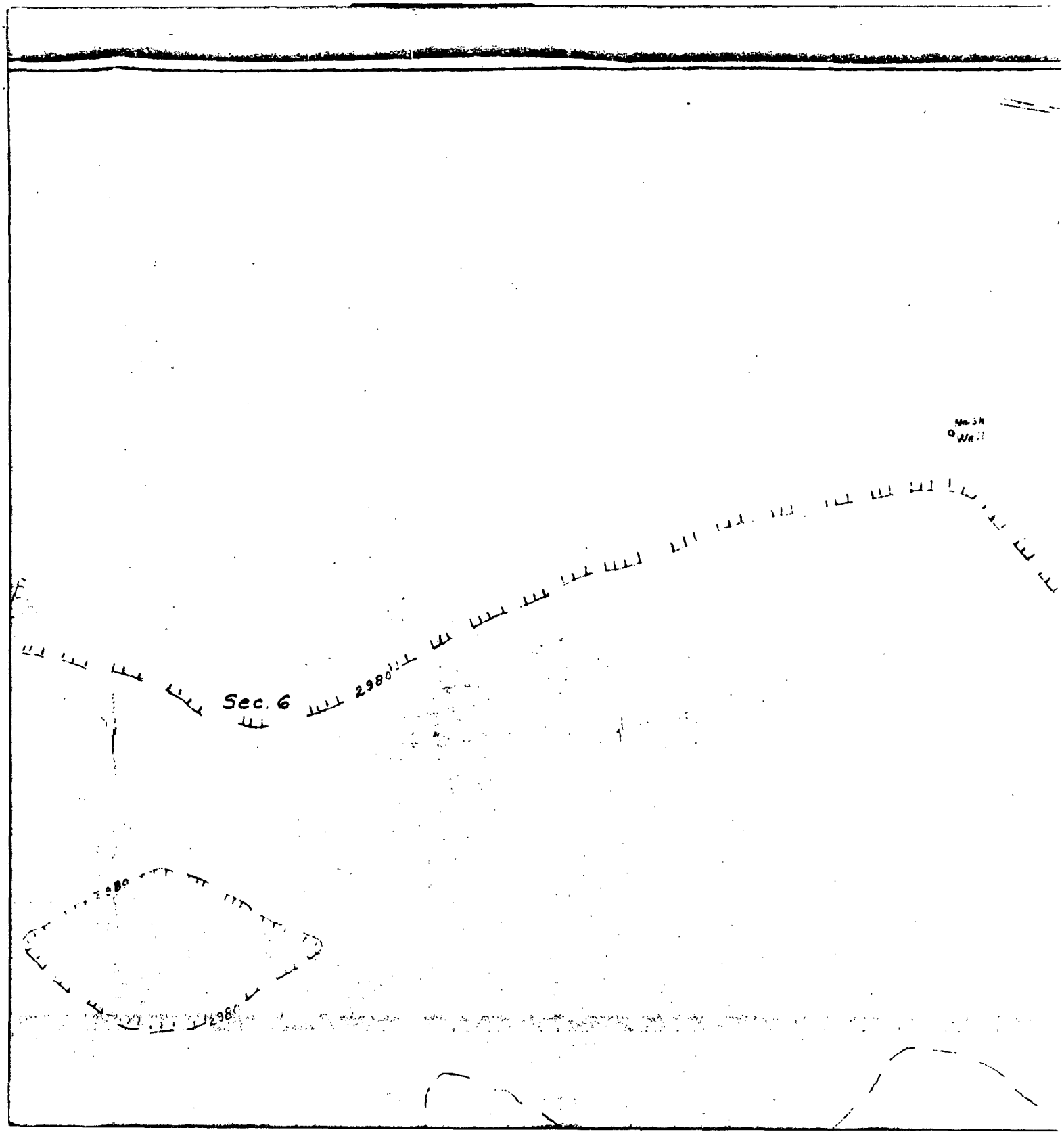
SKETCH PLAN
OF
PROPOSED BRINE DISPOSAL
FACILITY
EDDY COUNTY, NEW MEXICO

Prepared For
B & E, Inc.
Carlsbad New Mexico

Prepared by
H. F Kennedy Reg. P.E &
L.S. of New Mexico, No [illegible]
H. F Kennedy
5-25-82

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR NO 1140 NEW MEXICO H. F. KENNEDY

Ex 1-A


Sec. 6
2980'
2980'

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION UPON ITS OWN MOTION TO CONSIDER AN ORDER PROHIBITING THE DISPOSAL OF OIL FIELD BRINES IN SURFACE PITS IN LEA, CHAVES, ROOSEVELT, AND EDDY COUNTIES, NEW MEXICO.

CASE No. 3551
Order No. R-3221

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on April 19, 1967, at Hobbs, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 1st day of May, 1967, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That large amounts of water produced in conjunction with the production of oil or gas, or both, are being disposed of on the surface of the ground by means of unlined disposal pits located in Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(3) That said produced water contains high concentrations of chlorides.

(4) That fresh water supplies as designated by the state engineer exist in substantially all areas where there is surface pit disposal and in substantially all the area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(5) That the disposal of water produced in conjunction with the production of oil or gas, or both, on the surface of

the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, constitutes a hazard to existing fresh water supplies, as designated by the state engineer, in the vicinity of such disposal.

(6) That in order to afford reasonable protection against contamination of fresh water supplies as designated by the state engineer, the disposal of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies existing in Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, should be prohibited in said Counties.

(7) That the testimony indicates that the volume of water produced in conjunction with the production of oil or gas, or both, from the North Bagley-Upper Pennsylvanian, North Bagley-Middle Pennsylvanian, North Bagley-Lower Pennsylvanian, North Bagley-Wolfcamp, and Northeast Bagley-Wolfcamp Pools, Lea County, New Mexico, and being disposed of into unlined pits is so great as to constitute an imminent threat to fresh water supplies designated by the state engineer and the surface disposal of said water should, therefore, be prohibited after October 31, 1967, in the area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(8) That large amounts of water are produced in conjunction with the production of oil from active waterflood projects and active water pressure maintenance projects.

(9) That one or more injection wells are present in each waterflood project.

(10) That in order to afford reasonable protection against contamination of fresh water supplies designated by the state engineer, the surface disposal of water produced in conjunction with the production of oil from active waterflood projects and active water pressure maintenance projects should be prohibited after December 31, 1967, in the area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(11) That complete prohibition of surface disposal in Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, of water produced in conjunction with the production of oil or gas, or both, should be accomplished by December 31, 1968, unless specifically exempted.

(12) That the surface disposal in pits of not more than one barrel per day for each developed 40-acre tract served by said pits, but limited to a maximum of 16 barrels per day, is so insignificant as to present little hazard to fresh water supplies and should be allowed in order to prevent waste caused by the premature abandonment of wells.

(13) That in order to prevent waste caused by the drowning out of oil or gas wells or burdensome delay or expenses, the District Supervisor of the appropriate District Office of the Commission should be empowered to authorize temporary disposal in surface pits for a period not to exceed 30 days for such contingencies as injection system failures and evaluation of wildcat wells.

IT IS THEREFORE ORDERED:

(1) That effective November 1, 1967, the disposal of water produced in conjunction with the production of oil or gas, or both, from the North Bagley-Upper Pennsylvanian, North Bagley-Middle Pennsylvanian, North Bagley-Lower Pennsylvanian, North Bagley-Wolfcamp, and Northeast Bagley-Wolfcamp Pools, Lea County, New Mexico, or within one mile thereof, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies, is hereby prohibited in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(2) That effective January 1, 1968, the disposal of water produced in conjunction with the production of oil from any waterflood project or water pressure maintenance project on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies is hereby prohibited in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(3) That effective January 1, 1969, the disposal of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies and said disposal has not

previously been prohibited by Orders Nos. (1) or (2) above, or by Order No. R-1224-A, or by Order No. R-2526, or by Order No. R-2788, or by Order No. R-3164, is hereby prohibited in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(4) That in those areas subject to the provisions of Orders Nos. (1) and (3) above, surface pits may be utilized for the disposal of a maximum of one barrel of produced water per day for each developed 40-acre tract served by said pits, provided however, that in no event shall said surface pit disposal exceed 16 barrels per day, and provided further, that this authorization shall not apply to those areas affected by Orders Nos. R-1224-A, R-2526, R-2788, or R-3164.

Indicates main intent was for individual wells, not large disposal facilities

(5) That nothing contained in this order shall be construed as prohibiting the disposal of water produced in conjunction with the production of oil or gas, or both, in impervious lined pits presently in use, provided said pits were inspected and approved by a Commission representative prior to use, and for so long as said pits are properly maintained to ensure their continued imperviousness.

(6) That each unlined pit used for the disposal of water produced in conjunction with the production of oil or gas, or both, and not servicing a well exempt under the provisions of Order No. (4) above shall be filled, leveled, and compacted within six months after its use for the disposal of produced water is prohibited or by November 1, 1967, whichever date is later.

(7) That nothing contained in this order shall be construed as prohibiting the use and maintenance of mud pits or burn pits.

(8) That the District Supervisor of the approporate District Office of the Commission is hereby empowered to authorize temporary disposal in surface pits for a period not to exceed 30 days for such contingencies as injection system failures and evaluation of wildcat wells. Authority for said disposal shall only be granted on an individual case basis and only after the volume and quality of the water produced and the proximity of fresh water supplies have been taken into consideration.

(9) That the provisions of this order are in addition to the provisions of Order No. R-1224-A, Order No. R-2526, Order

No. R-2788, and Order No. R-3164 of the Commission and nothing herein contained shall be construed as abridging or altering in any manner the provisions of said orders.

(10) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
23 June 1982

EXAMINER HEARING

IN THE MATTER OF:

Application of B & E, Inc., for salt water disposal, Eddy County, New Mexico. CASE 7612

BEFORE: Daniel S. Nutter

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: Cass Tabor, Esq.
McCORMICK & FORBES
P. O. Box 1718
Carlsbad, New Mexico 88220

I N D E X

E X H I B I T S

MR. NUTTER: Call next Case Number 7612.

MR. PEARCE: That is the application of B & E, INc., for salt water disposal, Eddy County, New Mexico.

MR. TABOR: Mr. Examiner, I'm Cass Tabor, from McCormich and Forbes, and today we would call as witnesses, Gene Green, Mr. T. E. Kelly, and also Bill Ball.

(Witnesses sworn.)

MR. NUTTER: Are there other appearances in Case Number 7612?

Proceed, please.

MR. TABOR: We would ask Gene Green to testify first.

GENE GREEN

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

DIRECT EXAMINATION

BY MR. TABOR:

Q Would you please state your name, place of residence?

A I'm Gene Green. I live in Carlsbad.

Q What is your present occupation?

A I'm Vice President for B & E, Incorporated.

Q Okay, B & E, Incorporated, have filed this application and have you been involved in the preparation and submission of the application to the Commission?

A Yes, I have.

Q This application concerns two sites, is that not correct?

A That is correct.

Q And in connection with the application B & E has contacted some experts, if you could tell us who these experts are?

A Yes, sir, I have contacted a hydrologist, Mr. T. E. Kelly, and also the BLM, Mr. Jack Ragsdale with the Bureau of Land Management.

Q Okay, and concerning the plant design, have you also contacted an expert in that regard?

A Yes, we have. We've contacted C. E. Metco, their engineer, Mr. Bill Ball.

Q In presenting this application could you tell the Examiner what the need is that you feel in this particular area? Why you need this?

A We feel like there is enough wells producing disposal water in our area that there is a dire need for a

place to go with it in the southern part of the state. As there is now, there's just one commercial and one private, and the commercial doesn't -- they can't accept enough water to compensate everything that's being produced in that area right now.

Q And are you aware of any dumping of salt water in the area?

A I know there is some illegal dumping going on.

Q You have in the application two sites proposed, and that's Section 12 in 23 South, Range 29 East, and also Section 6 of Township 23 South, Range 30 East. Are those two particular locations leased land, Federal land, or are they --

A One is Federal and one is private land and we do have a lease on the private land.

Q Okay, on -- do you know on which particular description that that is, that you have the lease?

A I believe that the lease is on Section 12, Township 23 South, Range 29 East.

Q Are you -- you do have a lease with the individual who owns the land, is that correct?

A Yes, we do.

MR. TABOR: Mr. Examiner, if we could, as

far as exhibits are concerned, we've provided an application packet. Would you mind if we referred to page numbers and maybe numbered the page numbers in order to alleviate having to introduce specific exhibits, taking them out of the packet themselves?

MR. NUTTER: Yeah, we can refer to these in the booklet that was furnished with the application. You may make the booklet an exhibit, if you wish.

MR. TABOR: Okay. We'll have to do that through several witnesses and there are an assortment of data here.

MR. NUTTER: Okay, well, they can identify the portion that they prepared.

MR. TABOR: Okay, thank you, Mr. Examiner.

Q In the event that this application is approved by the Commission, you will be dealing with the Federal people in order to obtain a lease, is that correct?

A That is correct.

Q In connection with your proposed site, have you contacted the State Highway Department?

A Yes, we have. We have a signed letter from Mr. Downey stating to the fact that what we are doing in this area does not affect his drainage operation off of the highway.

Q Okay, and this particular facility would be located near the highway, is that correct?

A That is correct.

Q I'd like to refer you to what is marked as page twenty-one in the application, and tell us what that particular document is.

A That is a letter that we took to Mr. Cliff Downey and had his approval on, stating to the fact that the water that we would be putting into this salt water lake disposal system wouldin no way bother his drainage operation off of the highway.

MR. NUTTER: Mr. Tabor.

MR. TABOR: Yes, sir.

MR. NUTTER: You said page twenty-one of the application. From here on out let's refer to it as the exhibit, shall we?

MR. TABOR: Okay.

MR. NUTTER: And call that Exhibit Number One.

MR. TABOR: Sure, that will be fine.

MR. NUTTER: That will be page twenty-one of Exhibit Number One, then, is what you were just referring to.

MR. TABOR: Very well.

Q Not going into a whole lot of detail, did you not assist in obtaining water samples from the proposed discharge site and area surrounding, in order to assist Mr. Kelly to comply with any provisions that the Water Quality Board would have as to the effects it would have in the water discharged?

A Yes, sir, I did. I took four samples from various places in the lakes, in the lake system around the area, and had them analyzed.

Q Okay, who did you forward these samples to in order to have the testing done?

A Martin Water Lab in Monahans, Texas.

Q I'd like to refer you to pages seventeen. eighteen, nineteen, and twenty of Exhibit One, and ask you if you can identify those particular documents?

A Yes, I can. This is the analysis that we received from Martin Water Laboratory.

Q Did you make use of these in any way in the preparation of the data that's in the exhibit?

A Yes, we did. We -- we used them to determine that the water that we would be putting into the lake is as good or better than the water that is already in the lake as it is now.

Q You did forward these to Mr. T. E. Kelly,

is that correct?

A That is correct.

Q We have an expert to testify as to the plan of operations, but could you go into detail and tell us, do you plan on having an individual at the plant site at all times in order to check the loading and unloading?

A No, we do not. The design of the plant is so constructed that we felt like that a man could check on it once a day and it has safety devices built into it that would shut it down in the event of some bad water getting in.

Q But you will have an individual checking sometime during each -- each day, is that correct?

A That is correct.

Q Is this part of the data contained in Exhibit One, to the best of your knowledge, the data which you submitted yourself, is it true and correct to the best of your knowledge and belief?

A Yes, it is.

Q I'd like to show you what is -- we're going to have to label this, it is in the packet in the back, Mr. Examiner, and ask you to identify -- shall we label this "A"?

MR. NUTTER: That will be Exhibit One-A.

Q One-A. Can you identify what this parti-

cular document is and who prepared it?

A. Yes, sir, Mr. Jack Kennedy, an engineer from Carlsbad, prepared this plat for us. It shows the topography and where these two sites are located.

Q. Okay, it also shows, does it not, the proposed location of the storage tanks, et cetera, of the plant facility itself?

A. Yes, it does.

Q. At one time the original application did contain a site that is now different than yyou propose, is that correct?

A. That is right. The original site was on Bureau of Land Management and we have acquired a deeded lease so we have selected an alternate site, which is in Section 6.

Q. Okay, this has been noted on the application that the Commission has at this time, is that not correct?

A. That is correct.

Q. Okay.

MR. NUTTER: In other words, when the application was originally considered it was for disposal into two -- into one site, being in the southeast end of Laguna Tres in Section 12 and/or the northeast side of Laguna Quatro in Section 6.

Now do I understand correctly that one of

these is being dropped now?

MR. TABOR: I believe at one time there was -- on the southwest side of Laguna Quatro is where it originally -- I believe one of the maps in this particular exhibit --

A Page ten.

MR. TABOR: Page 10 of the exhibit shows that to be the site reflected.

It is now on the northeast side of Laguna Quatro that this -- we have proposed the facility and as far as the rest of the application, it may be informative with that change, but this particular map on page ten is not.

MR. NUTTER: Okay, in other words, the original map here on page ten of Exhibit One shows two sites on Laguna Quatro.

MR. TABOR: That's correct.

MR. NUTTER: Private land on the northeast side and the BLM land on the southeast side.

MR. TABOR: It showed originally on Laguna Tres at the easterly edge of Laguna Tres was one site; the other site was on the southeast.

We now propose that the southeast side of Laguna Quatro be moved to the northeast.

If I may approach --

MR. NUTTER: This one stands.

MR. TABOR: Yes.

MR. NUTTER: Now this is the BLM site down here.

MR. TABOR: That's correct.

MR. NUTTER: On Laguna Tres, isn't it?

MR. TABOR: Originally both those sites were in the BLM.

MR. NUTTER: Oh, I see.

MR. TABOR: And now we have obtained a lease from an individual and have now been able to move that site that was on Laguna Quatro, the southeast side, to the northeast, because it is leased land, patented land.

MR. NUTTER: Okay, so the -- there's no change from what we've advertised here.

MR. TABOR: No, sir.

A No, sir.

MR. TABOR: Other than this change on this particular map on page ten.

MR. NUTTER: Okay.

Q Do you feel that in light of the experience and also the data which you compiled in connection with your experts, that this application, if granted, would be in the best interest of conservation and not adversely affect

any correlative rights?

A Yes, I do.

MR. TABOR: I have nothing further of this witness at this time.

CROSS EXAMINATION

BY MR. NUTTER:

Q Well now, Mr. Green, you had obtained the right to use the site on the private land, is that correct?

A That is correct.

Q What about the site on the BLM land down on Laguna Tres, is that still being negotiated?

A Yes, sir, it is. We are in the process of acquiring it. They -- they were holding back, waiting to see what the Commission decides to do. They're kind of waiting on your decision as to whether to go ahead with --

Q They won't issue the land unless they know you can use it.

A That is correct.

Q And so your application is for one site and/or the other site.

A Yes, sir.

Q But you're seeking really the "AND".

A Yes, sir.

Q Now, would you elaborate a little bit on why you obtained this letter from the State Highway Department? You mentioned their drainage --

A Yes, sir, I did.

Q -- program.

A They are in the process of widening that highway and they were having to --

Q Referring back to Exhibit Ten, now, tell me what the highway is there.

A Okay, the highway is State Road 128.

Q That's that line that's diagonally across over Laguna Quatro, is that correct?

A That is correct. They -- they are in the process of widening that highway due to the WIPP site out there and the traffic that is imposed on it, and they have gone in and cut in surface drainage from one lake to the other and all of them to drain into the Great Salt Lake, and we -- I had seen them out there working and BLM informed me that we needed to probably talk to Mr. Kreb down there, he is the engineer for the Highway Department that was in -- in charge of that operation out there, and I contacted him by phone and took a letter to him, and he -- he was in agreement that no more water than what we would be putting in it, being south of the highway, it would not bother his operations.

Q The drainage normally is from the north to south in this area, is it not?

A That is correct.

Q And so your proposal is south of the highway, so you're not creating any drainage problem through the highway or under the highway or over the highway.

A Yes, sir, that's correct.

Q And therefor he has given you a letter -- or he's signed a letter that you all sent to him.

A He asked us to prepare the letter and he was in the field at the time and I took it to him and he read it and was satisfied with it and signed it for us.

Q And you have agreed there in the letter that if you do interfere with their program of drainage in the area you'd discontinue operations until it is corrected.

A That is correct, yes, sir.

Q I see.

MR. NUTTER: Are there any further questions of Mr. Green?

MR. TABOR: We'd like to bring one point out and I think it is -- you haven't made it clear.

REDIRECT EXAMINATION

BY MR. TABOR:

Q B & E is asking that approval be granted on both sides, is that not correct?

A That is correct.

MR. NUTTER: Right. Okay, Mr. Green, I just happened to think.

RECROSS EXAMINATION

BY MR. NUTTER:

Q You said you caught those four samples.

A Yes, sir.

Q Now give me the sites where you caught the samples and let me indicate them on one of these maps, if they haven't already been indicated on a map.

A Okay, the sample from Lake --

Q Wait a minute now, let me find the samples. They start on page 17, okay.

A Yes, sir.

Q Sample No. 1 is called Lake No. 1.

A Yes, sir, that is from the Quatro Lake. I took that sample from where our site would be located on the -- on the lake.

Q Now at one time you were proposing two sites on the Quatro Lake, which one?

A Okay, that is -- the sample is from the

one that we are asking for now, on the north side of the lake.

Q Now, if I go to Exhibit One-A, where is the lake on Exhibit One-A, Mr. Green?

A Okay, this is -- it's at the top right-hand corner. You can see State Highway 128 in the top right-hand corner.

Q Okay.

A And the lake is south, crosses the highway right there, and it's just south of our secondary location there.

Q Is this -- is this line that comes curving around through here that's marked 2980, is that the water level of the lake, the line with the little marks on it, the little hachures? Is that the lake?

A Yes, sir, that is.

Q This is the lake, okay.

A Yes, sir.

Q And then the Lake No. 1 sample was taken on what point?

A Okay, it was taken just off of the highway right there where it goes under the highway there.

Q Well, it doesn't seem to be -- it doesn't seem to go under the highway on this map.

A It's -- yes, let's refer to page ten in

the exhibit.

We can see there is Laguna Quatro.

Q Okay.

A We took that sample right where the -- where the lake crosses the highway on the east side there.

Q On the east side.

A Yes, sir.

Q Okay.

A Okay, in Lake No. 2, the sample on page seventeen, was taken from the north edge there of the Great Salt Lake.

Q North end of the Great Salt Lake.

A Yes, sir.

Q Whereabouts, where that inlet is, or what?

A Yes, sir, right where the inlet is into the lake.

Q Okay.

A Okay, and then the Spring No. 1 on page seventeen, that was taken at the very upper edge of the Laguna Quatro, the very north of that lake. There is an underground flow into the lake there at that point.

Q Okay.

A And also Spring No. 2 on page seventeen was taken at the north edge of the Great Salt Lake. There is

an underground flow into that lake, also.

Q That would be just a short distance west of the inlet there.

A Yes, sir, it is.

Q At the north tip there?

A That very north tip of that lake.

Q That's Spring No. 2 sample.

A Yes, sir.

Q And these are underground flows into the lakes, are they?

A These two are that we referred to as springs are underground sources. It comes up out of the ground.

MR. TABOR: But it's in the lake

A It is in the lake.

Q And how do you sample the spring flow?

A Took a bottle out there and put it down in the water where it's bubbling up and shook it two or three times.

Q You can see the water coming into the lake up there?

A Yes, sir, you can see it coming into the lake there.

Q I see, and you just shot the bottle down

in there and catch some of that water that's coming in.

A. Yes, sir.

QUESTIONS BY MR. JOHNSON:

Q. What procedures were used for sampling? What kind of containers? Did you do any acidizing, stabilization?

A. I sent it to Martin Water Labs and asked them to -- I think that you had given us a copy of what you had wanted us to run on the water and I just sent them that copy and had them run the analysis on that water.

We -- I used a plastic container to sample the water in a gallon jug, each one.

Q. Could you be more specific? What kind of gallon jug? Given by them or --

A. No, sir.

Q. -- a milk jug, or what?

A. It was a distilled water bottle, is what it was, one gallon distilled water, plastic water jug.

MR. NUTTER: Do you have any further questions?

MR. JOHNSON: No, sir.

MR. NUTTER: Are there any other questions of Mr. Green? He may be excused.

MR. TABOR: Call at this time Mr. Kelly.

T. E. (TIM) KELLY

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

DIRECT EXAMINATION

BY MR. TABOR:

Q. Mr. Kelly, would you state your full name for the record, please, and your present place of employment?

A. My name is Tim Kelly and I am President of Geohydrology Associates in Albuquerque, New Mexico.

Q. And have you testified before the Commission before?

A. Yes, I have.

Q. You were accepted as an expert hydrologist, is that not correct?

A. That's correct.

MR. NUTTER: Mr. Kelly, if I might ask you, what case did you testify on?

A. It was in behalf of the Michael Grace application.

MR. NUTTER: The one that was just recently heard, is that right?

A. Yes, sir, it was the 9th of June, I believe.

MR. NUTTER: Okay.

And that involved more or less this same area, didn't it?

A. Yes, sir.

MR. NUTTER: Okay.

MR. TABOR: We would tender him as an expert.

MR. NUTTER: Mr. Kelly, I presume, was previously qualified?

MR. TABOR: Yes, he has.

MR. NUTTER: Okay.

Q. Could you go ahead and tell us how you were initially contacted by B & E, Incorporated, and in connection with what?

A. B & E contacted our firm and asked us if we would make an evaluation of the proposed area. This contact, I believe, originated as a result of the work that we have done in the same area on a project that was funded in 1978 by the Bureau of Land Management, when we made a rather extensive study of the Nash Draw Area and the potash refining region.

We were able to make the study for B & E in March or April of this year, and that study entailed a lit-

erature and file search updating our information from previous work for the BLM and then we made a field investigation to verify the present conditions that exist in the area.

And then we prepared our report, which is included as part of Exhibit A.

Q And that particular report in Exhibit One is pages -- tell me if that is not what is pages six through fourteen, including page fifteen, which is the bibliography?

Can you identify those particular pages of Exhibit One?

A Yes, that's our report.

Q Also pages four and five, three, four, five, are also initial pages of that report, are they not?

A Right.

Q Could you tell us what the purpose of your hydrological investigation was in connection with B & E?

A Well, B & E explained to us what their intent was and they were -- they wanted us to determine what the impacts of that proposed system would be on the hydrologic environment and the -- the existing system as it exists.

Q Could you go ahead and give a description of the project area, mainly the geology of the project area?

A Well, the area is within a topographic depression referred to commonly as Nash Draw, which is a collapsed

feature associated with the removal of,the natural removal of salt from the Salado formation, which is fairly close to the surface at that point.

With the removal of the salt, the formation, which is primarily the Rustler formation, collapsed, creating a so-called rubble zone, and it is within this rubble zone that the potash refineries have been discharging their waste for a number of years.

Also, there is every indication that the natural flow of water in the area is also highly concentrated, in fact saturated brine.

So it was within this area that B & E proposed to locate their facility.

Q Referring to your report, is there anything -- is there anything that you would feel that is imperative that be noted regarding the geology? Would you --

A Well, perhaps this is best illustrated on page eight of Exhibit A, which shows the -- the undisturbed formation on either side of the -- of Nash Draw, with the rubble zone in the bottom and the brine aquifer, as well as the saline aquifer, on top, and then into this is the -- the surface flow of the brine potash waste, and the general flow in this area, both of surface water and ground water, is -- is to the south, from the north to south, with the ultimate dis-

charge point being Salt Lake.

MR. NUTTER: Well now, Mr. Kelly, if I may interrupt you here, you show the Salado formation extending under Nash DRaw, so the entire salt has not been washed away.

A. No, sir, the salt has -- I think at that point is approximately 2000 feet thick. It's only the upper portion of the salt that's been dissolved out.

MR. NUTTER: How thick would the salt be on the east and west sides here of Nash Draw?

A. I believe the estimates are that approximately 50 feet of salt has been dissolved out from beneath Nash Draw. In addition to that, there was also evaporite deposits and soluble deposits within the Rustler formation itself.

MR. NUTTER: And those were carried away.

A. So those were also removed, so that the composite collapse is in excess of 50 feet, but approximately 50 feet of Salado has been dissolved.

MR. NUTTER: Okay.

A. The area originally was tapped by several stock wells. These are shown on page ten of the Exhibit A. The two I'd like to refer to is the JBarF Well, located on the southeast corner of Laguna Uno, and also Nash Well, which is located in Laguna Quatro. And when these wells were con-

structed in the 1930ies, they were producing, reportedly potable water and water that was used for stock watering.

However, by 1958 Nash WEll was completely inundated and the JBarF Well was no longer in use; the water level was at approximately land surface, indicating that the water level in this area had risen approximately 150 feet.

The only source of water that can be attributed to creat this rise in the ground water is the discharge from the potash refineries and I'll point out International Minerals and Chenical Corporation, shown on that particular illustration, which discharges approximately 3200-acre -- excuse me, 3200-gallons a minute into Laguna Uno, and this has been going on since the mid-1940s. The discharge from IMC is a saturated brine of approximately 325,000 parts per million dissolved solid, and it contains approximately 30 percent solid material in the form of suspended clays.

The water goes into Laguna Uno, which has no natural discharge point; consequently, the water is either evaporated from Laguna Uno or enters the ground water system and moves to the southwest toward Salt Lake.

The -- there is no, as I mentioned, no surface connection between Laguna Uno and Laguna Dos; likewise, there is no connection between Laguna Dos and Lagun Quatro.

MR. NUTTER: I've lost Dos. Where is Dos?

A. It's --

MR. NUTTER: Oh, yeah, I found it.

A. It's just --

MR. NUTTER: It's the little one there.

A. Right.

Yet the connection between Laguna Quatro and Laguna Tres, which is recently constructed culvert put in by the Highway Department, has a natural flow of approximately 500 gallons a minute. This was in May of 1982, and since there is no surface inflow to Laguna Quatro, other than a few isolated springs, the only conclusion we can reach is that the natural -- it is a natural ground water discharge point for brine and it is coming to the surface in Laguna Quatro and then moving through the series of lakes to Laguna Tres, and ultimately into Salt Lake.

MR. NUTTER: Okay, it's going underground, then, from Laguna Uno to Laguna Dos, and going underground from Dos to Quatro, and then from Quatro over to Tres there's about 500 gallons per minute through this culvert.

A. Yes, sir.

MR. NUTTER: So there's 2700 gallons of it, then, that's still -- stays underground somewhere.

A. That's right, and we can't account for it.

MR. NUTTER: Okay.

A. The proposed sites by B & E would discharge water either into Laguna Quatro or Laguna Tres, and the amount of water tht would be discharged would be -- would range anywhere from 218 gallons a minute to as much as 480 gallons a minute, which is what the plant design is.

Our studies several years ago for the Bureau of Land Management indicate that the evaporation rates from these lakes, that is from Laguna Quatro, Laguna Tres, and several small unnamed lakes, is adequate to evaporate approximately 400 gallons a minute during the coldest part of the year, and during the -- during the summer months it could be as much as 8000 gallons a minute from these lakes.

MR. NUTTER: Now what lakes are you talking about?

A. The Lakes, Laguna Quatro, Laguna Tres, and the three unnamed smaller lakes between there and Salt Lake.

MR. NUTTER: Okay.

A. So that the total surface area of these that are shown on the map as well as several marshes and sloughs which are not shown on the map, would be capable of evaporating as much as 8000 gallons a minute during the summer.

Considering the fact that the operator proposes to discharge approximately 218 gallons a minute and that the discharge by the operator would be very similar to the water that's already in the natural system, it is our conclusion that this operation will not adversely impact the hydrologic system as it exists today.

MR. NUTTER: Now, in making your study, Mr, Kelly, did the applicants furnish you with some figures as to what they would be expecting to put into these lakes?

A. Yes, they did.

MR. NUTTER: And what amount of water was that?

A. It was 218 gallons a minute. I would like to refer you to page thirteen of Exhibit A, I believe it is, the discharge proposal, and it was their proposal to process approximately fifty loads -- yes, fifty loads of oil field brine of approximately 150 barrels each, which would constitute a continuous discharge of approximately 218 gallons a minute.

MR. NUTTER: Okay, so your minimum evaporation rate in the winter months you figured from the two named lakes and the three unnamed lakes, would be 400 gallons per minute.

A. Yes, sir.

MR. NUTTER: So you'd stay within that --

A. Yes, sir.

MR. NUTTER: -- that figure. Of course, the salt is not going to evaporate.

A. No, sir, the salt is not. However, you mentioned, there's a large quantity of water that can't even be accounted for that's moving through the area, and we feel that the system has now reached equilibrium. The study that we made for the BLM indicates that during the year these lakes really don't show a great deal of fluctuation in the water level from winter to summer, which indicates then that the water is being lost during the summer and it's being made up for in the winter, but there's also a great deal of water that's moving through the system that we can't account for, and probably only is going into Salt Lake itself.

MR. NUTTER: Well now, even prior to the time of the installation of the potash facilities out there, the underground movement of water was occurring and the collapse of the Salado and the -- and the rubble zone -- creation of the rubble zone and all that occurred before there was ever any potash operations.

A. Yes, sir. The area --

MR. NUTTER: So there's a natural flow notwithstanding oil field discharge and potash mine discharge.

A. That's correct. The potash mines have simply selected a good area to discharge their waste, because the area was already through natural acitivity highly saline.

As I mentioned, there were several stock wells and these were up on the flanks, which would actually intercept fresh water coming into Nash Draw, which would then mix with the existing brine and lose its identity. Some of these wells have been lost perhaps due to the potash discharge, but the system itself is a natural brine area.

MR. NUTTER: Now, when you stated that it's in equilibrium now, you're considering equilibrium with the natural flow as well as the flow that's coming from that IMC --

A. Right.

MR. NUTTER: -- installation, and I think there are other installations --

A. There are others.

MR. NUTTER: -- farther on up Nash Draw, aren't there?

A. Right. IMC is simply the furthest one south and the one that was shown on the maps. Mississippi Chemical and Duval and a number of others are -- I think there are a total of eight dischargers in the area.

MR. NUTTER: So it's all in equilibrium

now.

A. Yes, sir.

MR. NUTTER: And adding 218 gallons a minute is not going to take it out of equilibrium.

A. No, sir.

MR. NUTTER: Okay, go ahead.

Q. Have you had a chance to -- you were submitted the testing results on those samples that Mr. Green took, were you not?

A. Yes, we were, and we -- you can compare that data and you'll notice that the oil field brine on page eighteen and the -- excuse me, on page nineteen, and by comparing down near the middle of the bottom the total dissolved solids, you can see that the natural water is higher in mineralization than the amount of mineralization contained in the water samples from wells that were selected as indicative of the type of water that would be discharged.

So the actual oil field brine is less highly mineralized than the natural water in the system.

MR. JOHNSON: Where did you select these wells, these --

A. These were selected by Mr. Green. They have a contract hauling system at the present time and these are wells which they're currently haulting oil field brine

from. These are wells which would be used, or which would be discharged into the system. Also I might mention that these are from the Morrow and the Bone Springs, which are the major oil bearing zones in that area, so that they should be representative of those formations, as well as a large number of wells in the area.

MR. NUTTER: Well now, Mr. Green, there's also a considerable amount of Delaware production in this area. What kind of water is the Delaware?

MR. GREEN: We don't -- it's not in the process right now of hauling anything from the Delaware formation, so I couldn't -- couldn't tell you. I did not run a Delaware sample.

MR. NUTTER: Bone Spring and Morrow is what you principally are concerned with.

MR. GREEN: Yes, sir, that's what we're primarily hauling right now.

MR. NUTTER: Excuse me, Mr. Kelly.

Q Is there going to be any ground water effect as far as potable water; there's none in this area; there won't be any adverse effects by B & E's proposed plant site, either one of the plant sites, is that correct?

A That's correct. There is no potable water in the area and either site would fall within the criteria

that we analyzed and that is the total amount of evaporation from the surface area of the lakes. They are very close proximity to one another and it wouldn't make any difference which site was selected.

Q. On page thirteen of this Exhibit One, you have stated that the winter capacity is 443 gallons per minute. This did not take into consideration that the site would be on the northeast side of Laguna Quatro, is that correct?

The surface area encompassed as far as the evaporation level was for Tres, Laguna Tres, and the three unnamed, is that not correct?

A. The -- I believe in making that calculation we were using the area downstream from the site in Section 12, which would have been at the northeast end of Laguna Tres, so it did not include much of Laguna Quatro.

Q. So there is some --

A. That's correct.

Q. -- additional evaporative amounts of the capacity --

A. Right.

Q. You do not feel, then, that this proposed site will adversely affect any correlative rights in this area or the hydrology of the area?

A. No. Our conclusion is that the type of

operation proposed by B & E would not adversely affect the hydrologic system.

MR. TABOR: I have no further questions of the witness.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Kelly, in a number of instances where we've considered discharge of brines into natural salt lakes in southeast New Mexico there has been a situation where there was a natural flow from the Ogalalla or other fresh water sands into the lake bed, and that if the lake bed hydrostatic head exceeded a certain amount, the flow would be reversed and the salt water would flow into the fresh water sand.

A Yes, sir.

Q Does that situation exist here in any place around any of these lakes?

A No, sir. The -- all of the flow into the lakes is highly mineralized brine, as indicated by the two spring samples which Mr. Green collected.

The nearest fresh water -- I don't even want to call it fresh water -- source, but in the approximate position of the "L" of Laguna Seis on page ten, where it's --

Q Okay.

A. Where it states Laguna Seis, at the approximate position of the letter "L", there's a stock well located, which produces water that's approximately 3000 parts per million dissolved solids. For Nash Draw 3000 parts per million is almost considered potable. It is used as a stock well and the water from that, we have -- well, the ground water contours indicate that that flow is from the northwest -- excuse me -- yes, northwest to southeast into that particular stock well, but that's the only one where there is any water that could occur, any source of fresh water. Once it hits those lakes everything we see is highly mineralized, so that the evaporation consumes the amount of water coming in and certainly the amount of discharge proposed by B & E would not raise the level of those lakes because of their size to the point where the ground water gradient would be reversed to cause the type of reversal and flow that you're referring to.

Q. Okay.

MR. NUTTER: Are there any further questions of Mr. Kelly? He may be excused.

MR. TABOR: We call at this time Mr. Bill Ball.

WILL DEXTER BALL IV

being called as a witness and being duly sworn upon his oath,

testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. TABOR:

Q. Would you state your name, please, for the record and where you're from?

A. My given name is Will Dexter Ball IV, and I'm from -- and I was born in Long Beach, California.

Q. Where do you presently reside?

A. I reside in Tulsa, Oklahoma, presently.

Q. And also your present occupation?

A. I am Manager of Field Operations for C. E. Natco.

Q. Could you give the Examiner an idea of what your duties entail and any training and experience you've had in the particular area that you're intending to testify about today?

A. Yes, sir, I will. I am -- I was raised in the oil field. I'm third generation oil field. I started my career in the oil field with what is now Champlin Petroleum in southern California where I was in charge of designing and installing surface facilities to handle approximately half a million barrels of produce water a day discharging into the Pacific Ocean. I worked for that firm for six years, then was

employed by a small oil field chemical firm dealing with water equality improvement in the oil field, and subsequently was employed by C. E. Natco in the Los Angeles area and transferred to Hobbs, New Mexico, where I spent seven years as our branch manager and business agent- manager in the City of Hobbs.

In January of 1982, this year, I was promoted to Manager of Field Operations and transferred to Tulsa, Oklahoma.

Q As far as experience in the engineering design of water quality assurance facilities, could you tell us a little bit about how long you've done that, and any particulars?

A Well, since I began my career in this business, I think I've made the full gamut from -- I can give you a history of the beginnings of that, if you like, or in the late fifties in southern California the Los Angeles harbor had subsided some thirty feet and as a result of that the State of California dictated that any oil withdrawal would be proceeded, or at least thereby followed by water injection to minimize and thereby eliminate subsidence.

Up until 1959 all produced water to the tune of about 100,000 barrels a day had been discharged into the ocean with little or no care and breeding, if you will, of

water quality.

With the inception of water injection and water quality being tantamount to the effective and economic operation of that oil field, and some $4-1/2 million worth of facilities were designed by my group and installed to process the produced water and safely, economicly, and ecologically deposit that water back in the Pacific Ocean.

Some ten years later, with the improved quality standards that exist in -- existed in California in the late sixties, that system was upgraded to again refine the quality of that water to what we'll call the nth degree for the purpose of this discussion, and the systems were then -- existing systems were then revamped, expanded, and redesigned to effect a water quality far in advance of that which we'll consider here today.

Q. You were involved in the --

A. It was my responsibility to design that equipment and oversee its installation and function.

Q. Okay, you've been doing this work for --

A. For about twenty years.

Q. -- twenty years.

MR. TABOR: We would offer Mr. Ball as an expert.

MR. NUTTER: Mr. Ball is so qualified.

Q. Mr. Ball, you've been contacted by B & E, is that correct, in --

A. That is correct.

Q. -- order to design a plant, a water quality assurance facility, I believe you refer to it as. On pages 22 through 24 of Exhibit One, I'd like for you to identify, if you would that particular document.

A. That is the document which I prepared for this case, yes, sir.

Q. Okay, and I'd also like for you to identify what we'll mark as Exhibit One-B, which is in the packet at the back of the application, and ask if you can identify what that particular document is.

A. That is a flow sheet which I supervised our drafting department in fabricating, depicting the general scheme of flow through the proposed plant site in Carlsbad Disposal Station.

Q. Could you tell us, if you would, please, explain the system, that might be the easiest way to do it.

A. Certainly. The system is designed to, in essence, preclude the worst conditions and encompass them, embody them, and enfold them into a package that will preclude the discharge of what we'll -- what we'll describe as oily wastes into the previously described natural bodies of water.

The system functions to allow the discharge of hauled water into above ground steel storage facilities, in essence, two at a time at maximum. A brief description of how the system functions will be as follows: The typical 150-barrel transport truck will enter the location, make a connection to the inlet piping, activate an identification, an electronic identification keyed system.

Q What would be the purpose of that?

A The purpose in the -- the purpose if two-fold, both practical and economical. The system is simply an on/off system activated by a key to identify one of the several potential dischargers into this facility by company, and to thereby initiate or enact electrically controlled valves and an alarm system, which allow the system to begin the flow at the point of discharge from the truck.

MR. NUTTER: Okay, now, Mr. Ball, that would be at the extreme left of the Exhibit One-B, is that correct?

A That is absolutely correct.

MR. NUTTER: That would be upstream from the device labeled "electric actuated butterfly".

A That's correct.

MR. NUTTER: That's where the truck hooks up.

A. That is correct.

MR. NUTTER: Okay.

A. There would be a panel box there with a series of insert keys/locks. The driver will make his physical hose connection to this facility, turn the key on, a valve will open both on the front end and on the back end of the system, depicted just to the left of the tank described in the Exhibit One-B as "aeration tank", thus allowing flow to exist from, in essence on this drawing, from left to right.

Discharge will take place into the skim tank where the entrance of contaminated waters will begin. The separation of oily waste will take place in the top of the vessel, solids, being heavier than water, will by Stokes Law, sinck to the bottom and through a series of what are called in the industry sandpans, or inverted -- inverted cone drainoffs, solids will be removed to a separate solids storage facility, and oil waste will be skimmed from the top of the initial tank into an oil storage facility.

The then partially clarified water will flow from the tank referred to as the skim tank in the drawing, Exhibit One-B, to the surge tank, the center tank in Exhibit One-B, for secondary polishing and removal of solids and oily waste, which will be accomplished in the same manner as was described for the skim tank.

The water then predominantly clarified of oily wastes and solids will then flow by gravity to the third tank in the system, described in One-B as "aeration tank", where a -- where an aeration system will in essence create what appears to be from the novice standpoint, a fountain effect, to oxiginate the waters predominantly due to chemical and biological oxygen demand, and make them relatively consistent with the quality of water that exists in the lake, and further, to oxidize any remaining, what I'll refer to as inert contaminants, such as iron sulphide, to either colloidal sulphur or some sulphur compound.

Between the surge tank and the aeration tank exists a water quality monitoring device. It's an electronic device using ultraviolet light to monitor the -- the continuous amount of oily wastes flowing between the two facilities, on a go/no go basis such that when the level of oily wastes reaches the maximum concentration permitted by this Committee, which I believe is construed to be 50 milligrams per liter, or parts per million, if you will, the two motorized electrically actuated valves will close and the plant will shut in. The plant does not then automatically return to service but has to be manually returned to service by the manual reset of this alarm and should the quality of the water continue to be so poor that -- that the monitoring

device indicates an excessive level of oil, then of course, the plant does not go onstream.

By the physical phenomenon of gravity separation, with the sytem in total quiescence, the oily wastes that would contaminate the monitoring device will settle to the top in the two previous tanks, eventually, and at that point, then of course, a reset of the system would allow the system to go back into service.

MR. NUTTER: Now is that water quality control probe looking for anything except oil?

A. Only oil. It's a standard of the industry type device used typically by marine terminals in their clarification of ballast water with the recent laws and by most oil companies discharging into lakes and rivers throughout this country and countries abroad.

MR. NUTTER: So if the system works properly, when it gets to the aeration tank, there is no oil left.

A. That is correct. The purpose for the aeration tank is really twofold. Naturally, we hope to -- to minimize any contamination of this lake by the system and it was construed in the conceptual stage of this design that if we simply inserted the water quality control device downstream of the surge tank, discharging directly into either of

the lakes mentioned, that at the point of alarming we would have already put some oil in the lakes. It was that point we chose to eliminate and that is the firstfold reason for the aeration tank. The aeration is also open top and, as I mentioned previously, they're to aerate the water to provide some oxygen to that water.

Q As far as solids are concerned, they are also placed in steel containers, I guess you'd say.

A Yes, the concept of this system was to minimize any contamination of either surface or subsurface topography by the possible contamination of oily waste, so that the entire system is in steel aboveground storage vessels. There are no -- no pits construed for this system at the present time, and none contemplated for the future.

Q Mr. Green referred to earlier the fact that they were going to have a man go out there once or twice a day in order to check the system. In your opinion, based on the fact that you have this quality control device or alarm, is that going to be sufficient to protect the area, protect from a discharge?

A Yes, it is. The system is designed to have a nominal retention time, approximately 32 hours, such that a human being checking the plant once in any given 24 hour period would obviously be able to detect any failure of

the electronic water quality monitoring device.

That is to say, should we enter -- should we get an alarm condition but the alarm not find that condition through some fault, assumedly hit by lightening, act of God, that kind of thing, or failure of the instrument, that the retention time of the system is sufficient to allow it to store that contaminated water and not discharge any of it to the lake system prior to the next round of the employee that will be in charge of the responsibility of monitoring the system.

Q You've had occasion in the past to view systems in the area, have you not?

A Indeed I have.

Q Storage systems, discharge systems?

A That is right.

Q Can you see any particular advantages in this system as opposed to others used in the area, or not necessarily immediate area, but in the southeastern part of New Mexico?

A I see several advantages and without dwelling on the negatives of others, I'll dwell on the positives of this, because I think we as a group decided that our intent here is to protect the ecology of the surrounding -- of surrounding areas in total as much as it is possible, and certainly, within reason; thus, this system is again totally

contained in steel, welded storage tanks above the surface of the earth, rather than in lined or unlined pits, which may or may not contribute to contamination of -- of surface facilities.

There are no systems, to my knowledge, in the southeastern New Mexico that have any device to monitor the quality of water affluent to the discharge point, whatever it might be, and this system does employ that, and I might mention that that's quite, quite an expensive added component to this system to acquire, so that his concern is obviously to the quality of the water and not so much to his pocketbook.

Also, to my knowledge, there is no attempt in any -- of any existing system to aerate or thereby oxidize inert solids in any other system.

MR. JOHNSON: I have a question. In case something does fail and you do get an oily residue on one of these lakes, what precautions or procedures would be responsible?

A. I think that the likelihood of that is slim, but obviously, should that happen, standard offshore practices of excelsior skimming and small rowboats, and that sort of thing would be accomplished by human beings. That is oily contaminants are rather easily removed from waters, particularly quiescent waters, such as exist onshore and in lakes, so that the difficulty of accomplishing that sort

of a cleanup is not magnanimous, although expensive.

I'll suggest that with the recent rulings of the EPA, that we will probably not dispose of that kind of a -- of an unusual discharge by means of chemical disbursements, or that sort of thing, which further contaminate the lake, but by the physical removal of oil waste from -- from the lake itself.

MR. JOHNSON: What -- on your solid waste storage tank there, how are you going to dispose of the solid waste in there?

A. The solid waste in that tank will be in a slurry condition, such like we would envision drilling mud, and since the client here is in the hauling business, that -- that drilling mud sludge will be accumulated in that tank, clear water decanted off as possible, until the concentration of the -- of the mud approximates 14 or 15 pound mud, at which time it will be hauled to a solid waste disposal system extraneous to this plant.

MR. JOHNSON: Do you know where?

A. Probably Laguna Gatuna.

MR. JOHNSON: No other questions.

MR. TABOR: I have nothing further of this witness.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Ball, now you alluded there to the slurry that's going over to the solid storage tank. I presume there are some pumps here that aren't shown, also, aren't there?

A No, this is a gravity system and there -- there are no pumps in this system. It's --

Q And you've got enough gravity head there that these solids and the slurry containing the solids would flow from the skin tank and the surge tank over to the solids storage tank.

A Yes, sir.

Q Uh-huh.

A We're dealing with skim tanks at 20 feet total height with a water column of approximately eighteen feet; the surge tank at sixteen feet with a water column of approximately twelve feet; and solid storage tank at a total elevation of eight feet. So we have sufficient head to, in essence, flush or gravity drain from any of the two predominant treating tanks to the two storage tanks, yes.

MR. JOHNSON: What size lines are we talking about?

A. I have not gotten to that stage of design as yet; probably 3-inch, and probably fiberglass or plastic to keep the see values high and pressure loss low.

Q. Okay, then you mentioned something about decanting the liquid off the slurry. Would that liquid be placed back in the surge tank or somewhere?

A. Yes, it would be. That would be done by one of the client's trucks --

Q. It would be hand operation, then.

A. -- on a batch basis, just as if he were hauling from any other waste site.

Q. So we're not missing a pipeline coming back here.

A. No, we're not missing a pipeline.

Q. Okay, Now, what is the capacity of the skim tank, Mr. Ball?

A. Each of the skim tanks is sized for a capacity of approximately 200 gallons a minute maximum; well oversized for the quantity of discharge expected or anticipated by the customer.

Q. Well, I'm talking about the size of tank to hold water.

A. Oh, physical size.

Q. Right.

A. It's a 400 barrel tank, 12 by 20, 12 foot diameter, 20 feet tall.

Q. So we've got two 400 barrel skim tanks.

A. That's correct.

Q. The surge tanks are what size?

A. They are, each of them are 750 barrel tanks.

Q. So they're a lot bigger than the skim tanks although they're not as tall, so they must be wider.

A. That's right, they're shorter and taller -- shorter and wider than the --

Q. The solid storage tank, what size would that be?

A. They will either be 100 barrel or 200 barrel tanks; probably 100 barrel tank.

Q. And the oil storage tank?

A. The same. The premise is, if I can use an analogy, if we fill the room with flies and give everyone a flyswatter, it's easy for us all to get a few, and so the skim tank being rather small is capable of handling large quantities of contaminants. Once removed, those -- the water then is of a rather difficult mode to process; that is, it contains only a few number of flies and it's difficult for us to run around and get them, so that the retention time of the

water, were it contaminated largely, can be quite small, but where contaminated only slightly must be increases.

While my logic probably seems backwards, in practice, that's probably the reason we've been in business fifty-seven years.

It's that kind of expertise that has to be applied to these sorts of systems, I think, to make them function.

Q Okay, now the aeration tank, what size is that, Mr. --

A That would be an 8-foot tall, 3333 barrel tank.

Q 3333?

A Yes, sir, that's what we would call one-third of a 10,000 barrel tank.

Q Okay, now where aeration, you mentioned a fountain effect --

A Yes.

Q -- is that water actually sprayed?

A Absolutely, there'd be an on-site centrifugal pump throwing water off the bottom of this tank, not depicted in Exhibit One-B, but described in my addendum to this exhibit. There would be an on-site out of the tank centrifugal pump drawing the clarified water off the bottom

of the aeration tank and putting it through what amounts to a nodule system similar to a gas stove burner, to create a fountain aeration effect to that water in the center of the tank.

Q. Okay. Now this skim tank you've got, or these skim tanks that you've got are not just ordinary tanks without any insides to them, are they?

A. No, sir, they're not.

Q. Will you describe what's inside those tanks?

A. Be happy to. The -- I could have taken notes from our original meeting, because I think your -- your descriptive terminology was better than mine, but the tank internals consist of a center flume, which is a small diameter piece of pipe compared to the -- compared to the diameter of the vessel, into which enters the influent on a tangent. The bottom of that center column pipe is closed precluding flow downward and preeminating flow upward in a centfrigal motion effect. The flow then rises through that pipe and exits in an enlargment of that pipe which could be verbally described as an inverted cone, so that the flow exiting the center column must be directed toward the outside of the tank where the maximum capacity of the tank exists on a radial basis.

The flow then exits toward the top of the

tank so that any oily wastes have the minimum distance to travel to be accumulated in the -- in a shallow oil blanket and skimmed off to the oil holding facility.

Water then must change direction to flow vertically downward and underneath a secondary cone to exit the tank. Underneath that cone and to the sides of the cone on the bottom will be smaller cones, also inverted, out of the top of which will be water draw piping to the exterior of the tank, as indicated in One-B, flowing to the solid storage tank. Those lines will be interconnective and valved so that the operator of the plant will daily open each valve for a short period of time drawing off solids that have collected in the vicinity of that particular draw off. By design those draw offs allow horizontal flow in this vertical tank across the bottom of the tank to pick up any solid that exists and exit them to the solid storage tank.

Obviously, there's going to be an inordinate amount of water carried with the solids and the quantity of solids in that water will small by volume of weight, so the decanting of the water back into the system will be a requirement, probably semi-weekly, that sort of thing.

Water -- so the magic of that technology is to get the water flowing centrifugally and horizontally in a vertical tank and exiting in the tank as close to the oil

blanket as possible for the accumulation of oily waste, which is the predominant design emphasis on the plant.

The clarified water then exits the bottom of the tank through a conventional water leg device to the secondary surge tank, which is a simplification of the skim tank, using -- using a center column pipe again without the -- without either of the two cones top and bottom, but again using the small solid collection sandpan cones in the bottom of the tank for solids removal.

So again the entrance to the surge tank is a two-way center column in the very middle of the tank concentric with its circumference on a tangent to create centrifugal flow and vertical rise in that center column to in essence discharge the oil radially in the top of the tank, discharge the oily water radially in the top of the tank so that the oil can then be skimmed off and then the flow again inverts, flows downward, and out a water leg and finally to the aeration tank.

So that in all cases the two tanks, the skim tank and surge tank, are designed to maximize the retention time and take full advantage of -- of the retention volume of the tanks themselves.

The flow then goes through the water quality control probe and into another small center column in

the aeration tank so that the flow must be from center to -- to the wall edge, or shell edge, if you will, again to maximize the piston displacement or piston flow characteristics of the water in the tank.

Q Now, if a truck is not hooked up and pumping water into the system, it's all standing still, is it not?

A Absolutely quiet, that's correct.

Q So the only movement is caused by the pump pressure on the trucks.

A That is correct. It's a batch system and we -- from a real world standpoint, it's conceivable that we may have two trucks pumping into this system at the same time. That's by design conceivable, and each of those pump trucks is capable of discharging their 150 barrel load in approximately twenty minutes. So that if you extrapolate that, you can come to about a 14,000 barrel a day maximum, assuming that you don't ever have to move trucks or do any of that real world stuff, but the reality is that the trucks, of course, do have to move. They have to move in and move out. They have to come back and disconnect and they have to stick a key into this lock to turn it, and there are several chores that must be done to accomplish the discharge of water into this facility, so that the likelihood of us running more than about

two -- two loads per train of this system per hour, or four truckloads per hour, is not possible. It's just not possible to get more trucks full of water processed through this facility in that time frame, or about fifty loads a day, extrapolating four into -- into the day's frame.

It's likely, however, and anticipated on the basis of the client's typical daily work, that in fact something more on the order of 20 to 25 loads a day will actually be discharged through this facility.

Q So you feel confident you'll get your 32 hours of --

A Yes.

Q -- retention, then.

A That's correct.

Q Okay.

A I can say to you unequivocally that 32 hours is well more than is absolutely required but -- for proper separation and discharge.

Q Okay, now this is admittedly a rather sophisticated system. When the truckdriver inserts his magnetic key into the electric actuated butterfly switch pack over here, does it give a -- it takes a turbine meter reading of the amount that came out of that truck; does it provide a printout with the truck and the volume that came in from that

trucking company?

A. It's been decided that rather than accomplish that we will -- we will just simply record on a central trip counter the fact that that company had that truck there at that time.

Q. I see.

A. The sophistication of the system is greatly enhanced if we do it with -- if we do actual measurement and printing out, if you will, and probably not economically justifiable. In the original proposal metering was proposed and the client has determined that that's not the route we would --

Q. So the turbine meters won't be there, instead you have a counter for trucks.

A. That's correct.

Q. Okay.

MR. NUTTER: Are there any further questions of Mr. Ball?

MR. TABOR: We'd like to ask one question.

REDIRECT EXAMINATION

BY MR. TABOR:

Q. Do you realize there are two sites proposed?

A. Yes.

Q. You are aware of that?

A. Yes.

Q. Do either one of those sites propose any problems as far as your plant design is concerned?

A. Absolutely not, and I think we should point out for the benefit of the panel that in the event that both sites are used, then half of the stream depicted here will be used at each site, so that we're not going to double the capacity that we're asking you for, but rather split it in half and go on two different locations.

I think that's a valid point, a good question.

MR. JOHNSON: What is the reason for splitting it and (inaudible)

A. The client prefers, may prefer, to have a location exclusively for his own vehicles, and a secondary location exclusively for other contractors, so that he can assure himself of his own quality in the one and provide minimum maintenance and minimus sophistication electronically.

The desire for monitoring and -- of human beings and other monitoring for contractors is quite needy, and necessary, but he feels that there's some likelihood that if he uses the two facilities, that the one will be exclusive

to his own operation, simplifying his administration of the entire facility some.

MR. GREEN: I might add something, that our second choice, which is the BLM land, we had selected it originally because of the topography of the land where centrifugal fource would help us. The tanks would be lower than what we would be unloading into; the other one wouldn't be.

I think that the deeded land where we already have the land leased, providing that we get the system, we can move on it and put it in, where BLM it might take as much as six months to procure their lease, and that was the reason for going ahead with this other, with the deeded lease.

A. I'd like to clear that up a little by saying as I looked at the plot plans, the BLM selection shows the initial tank at a higher elevation and we're stairstepping down to increase the head one from the next, which gives us some process advantage. The disadvantage is that the BLM land may not come available immediately and that is the provocation, apparently, for acquiring of deeded land lease, but that particular piece of property does show a level plot of land so that the stairstepping -- tank stairstepping design is absolutely necessary.

MR. NUTTER: Are there any further questions of Mr. Ball? He may be excused.

Do you have anything further, Mr. Tabor?

MR. TABOR: No, sir, we do not.

MR. NUTTER: Does anyone have anything they wish to offer in Case Number 7612?

I don't think you offered your exhibits.

MR. TABOR: We would offer our exhibits into evidence, Exhibit One, One-A, and One-B.

MR. NUTTER: The Exhibits One, One-A, and One-B will be admitted in evidence.

If there is nothing further, we'll take Case Number 7612 under advisement and a fifteen minute recess.

(Hearing concluded.)

Case 1612

INDEX

INTRODUCTION

I. STATEMENT OF APPLICATION

B & E, Inc., a New Mexico corporation, requests permission of the New Mexico Oil Conservation Commission to establish a surface disposal system of saltwater waste. The saltwater waste is generated from oil field product waste. The proposed system would provide a badly needed approved dumping station in Eddy County sufficient to take care of Eddy County and West Lea County's needs and hopefully eliminate unauthorized dumping in the area.

II. PLANT

The proposed plant will use the batch treatment method and will have a quality control safety system designed to prevent the discharge of unsuitable water into the environment.

III. LOCATION

B & E, Inc., proposes two alternate locations for the plant. The primary location is located on BLM land in the NE/4 of Section 12, Township 23 South, Range 29 East. BLM has advised B & E, Inc., that its application for B & E, Inc., land use will be considered upon approval of the New Mexico Oil Conservation Commission. The alternate location is on private property in the NE/4 of Section 6, Township 23 South, Range 30 East. Both locations are covered by this application.

IV. HYDROLOGY

B & E, Inc., proposes to dispose of the saltwater in a natural salt lake. The oil field brine being released into the lake is very similar to the saltwater in the lake and will not adversely affect the ecology of the lake.

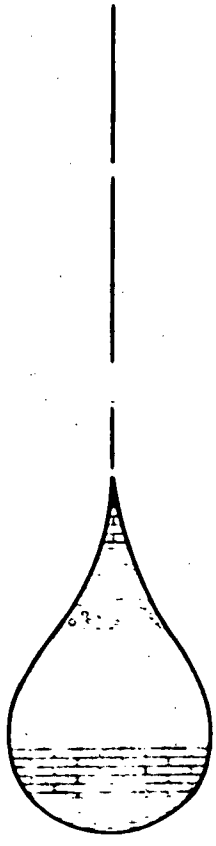
HYDROLOGIC ASSESSMENT, LAGUNA TRES AREA

EDDY COUNTY, NEW MEXICO

by

Geohydrology Associates, Inc.

4015 Carlisle, N.E. • Suite A • (505) 884-0580
Albuquerque, New Mexico 87107



May 1982

HYDROLOGIC ASSESSMENT, LAGUNA TRES AREA

EDDY COUNTY, NEW MEXICO

by

Geohydrology Associates, Inc.
Albuquerque, New Mexico

May 1982

CONTENTS

ILLUSTRATIONS

HYDROLOGIC ASSESSMENT, LAGUNA TRES AREA

EDDY COUNTY, NEW MEXICO

by

Geohydrology Associates, Inc.

In May 1982, B & E, Incorporated, of Carlsbad, New Mexico, requested that a hydrologic study be conducted in the vicinity of Laguna Tres in Eddy County, New Mexico. This area is located approximately 18 miles east of Carlsbad in Towship 23 South, Ranges 29 and 30 East. The study was made by representatives of Geohydrology Associates, Inc., of Albuquerque. T. E. Kelly was project leader.

The purpose of the hydrologic investigation was to determine the effects that might result from discharge of oil-field brines into existing brine lakes.

The regional pattern of ground-water flow had been described by earlier studies. However this northeast to southwest flow pattern has been changed locally by various factors, including the potash refineries, and various natural and man-made factors. Presently the State Highway Department is channelizing the local flow system near the proposed site.

Many of the earlier studies were devoted to the regional characteristics of the ground-water system. According to Robinson and Lang (1938), most of lower Nash Draw drains into the large, natural Laguna de la Sala Grande, commonly called Salt Lake. They also concluded that brine from the lake is not discharging into the Pecos River. Other investigations were made by Thomas (1963) and Mower and others (1964). However most of this work was completed before the major impacts of the potash refineries were exerted on the area.

Gilkey and Stotelmyer (1965) made one of the earliest detailed water-supply studies of the Nash Draw area. They concluded that brine-disposal ponds at the potash refineries contribute to the hydrologic system by leakage. A detailed study by Geohydrology Associates, Inc. (1979) identified significant quantities of brine entering the ground-water system, although much of this is confined to the Clayton Basin area which is north of Nash Draw and the project area. All of these factors have a bearing on the suitability of Laguna Tres as a brine-disposal site.

The study authorized by B & E, Inc., was based on a thorough literature and file search of existing data; it also drew heavily from the earlier reports by Geohydrology Assoc., Inc. which were prepared under contract with the Bureau of Land Management. A field reconnaissance was made which included a visual inspection of the area between Laguna Uno and Salt Lake, including Laguna Tres. An analysis of the data and the resulting conclusions are presented in this report.

DESCRIPTION OF THE PROJECT AREA

Geology

Owing to the mineral development of the region, a number of studies of the geology have been made. These include the work by King (1942), Hendrickson and Jones (1952), Vine (1963), Brokaw and others (1972) and Geohydrology Associates, Inc. (1978, 1978a, 1979). The reader is referred to these studies for more detailed information than is warranted in this report.

There are only two formations in the project area that are directly concerned by this study (fig. 1). These are the Salado Formation below and the overlying Rustler Formation. The Rustler generally is subdivided into a Lower Member, the Culebra Dolomite, the Tamarisk Member, the Magenta Member, and the uppermost Forty-niner Member.

Salado Formation

This formation is an areally extensive unit which underlies much of Eddy County east of the Pecos River and it extends far beyond the study area. The Salado consists of more than 75 percent salt deposits with minor amounts of clastic rocks, anhydrite, and dolomite. The Salado is the source deposit of the potash which is mined in the region.

The Salado exerts major control over the shallow and surficial structures in the area because it is readily soluble and underlies the entire potash area, including Laguna Tres. Collapse structures, such as Nash Draw, are widespread and control the deposition of eolian and alluvial material in the area.

Structure contours on the top of the Salado Formation show that the Nash Draw depression, in which Laguna Tres is located, reflects a similar trough in the top of the salt (Vine, 1963, pl. 1). These are closed depressions in the top of the salt in the area of Salt Lake and the chain of lakes which drain to the Salt Lake. The depth to the top of the Salado Formation in the vicinity of Laguna Tres is approximately 275 feet.

Rustler Formation

A leached zone approximately 60 feet thick separates the Rustler Formation from the Salado. This insoluble residue is regarded as basal Rustler Formation by some authors (Cooper and Glanzman, 1971) and as uppermost Salado Formation by others (Vine, 1963, p. 7). Regardless of the name used, this zone consists of an insoluble rubble of brecciated clastics and limestone which collapsed following the solution of the underlying evaporite deposits. This rubble represents material from the Lower Member, the Culebra Dolomite, and insoluble deposits from the Tamarisk Member. Because of the brecciated and unconsolidated nature of this material, it is a major zone of ground-water movement.

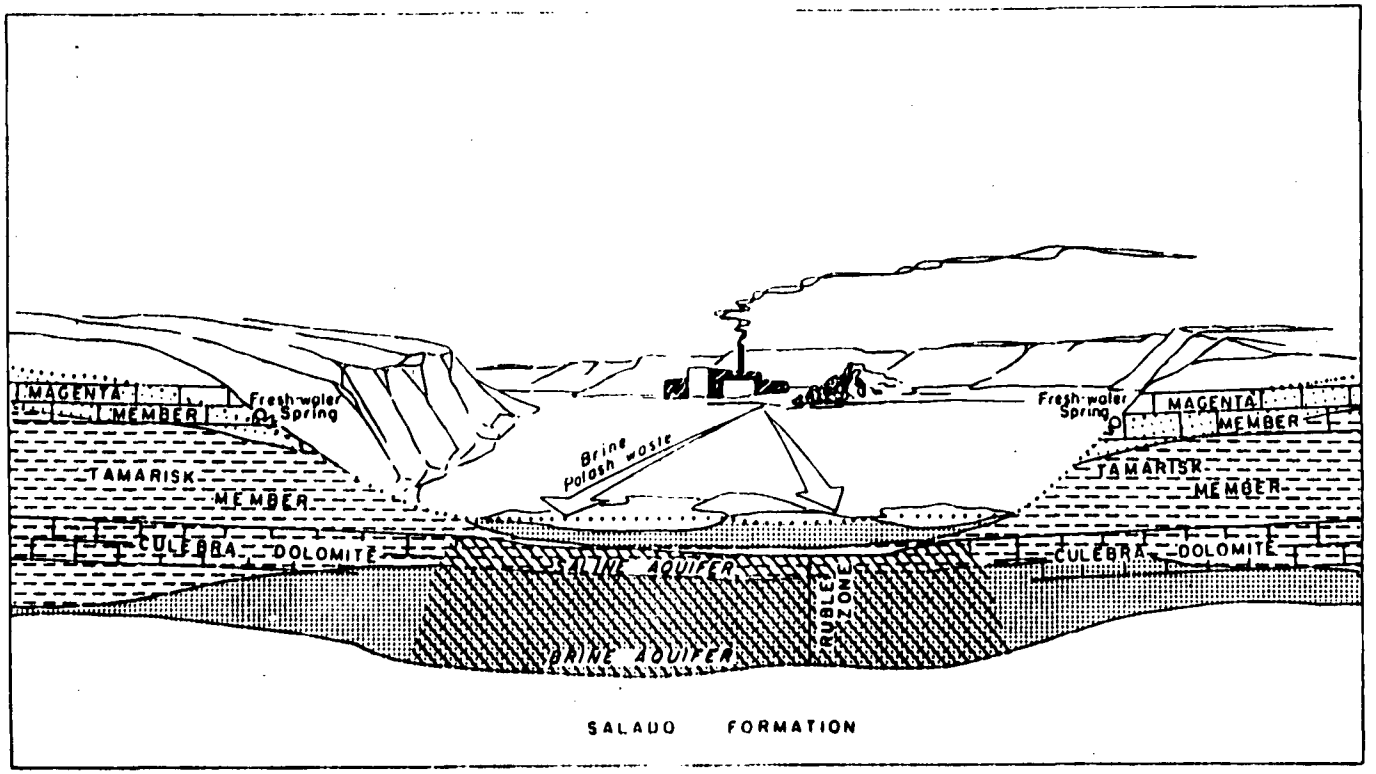


Figure 1. Diagrammatic east-west cross section through Nash Draw, showing stratigraphic units and ground-water relationships.

The Lower Member of the Rustler Formation consists of 60 to 120 feet of siltstone and fine-grained sandstone that locally contains gypsum, anhydrite, and halite (Brokaw and others, 1972, p. 50). It is overlain by the Culebra Dolomite which is a distinctive and persistent marker bed about 30 feet thick. Where tapped by wells, the Culebra produces large quantities of highly mineralized water, as in the vicinity of Mississippi Chemical Corporation in section 11, T. 21 S., R. 29 E.

The Tamarisk Member (Vine, 1963, p. 14) was named for its exposures at Tamarisk Flat about two miles northwest of the proposed disposal site. This member consists of about 115 feet of massive, coarsely crystalline gypsum in the outcrop but is chiefly anhydrite in the subsurface. Throughout most of the area of Nash Draw, the Tamarisk deopsits are blanked by a thin layer of silt and clay that has washed down from the rim of the Draw. However in the vicinity of Laguna Tres, there are massive exposures of deformed gypsum beds and large selenite crystals indicating recrystallization by the movement of ground water.

Brine from the potash refineries in and near Nash Draw is being deposited primarily into disposal ponds excavated in the Tamarisk Member.

The Magenta and Forty-niner Members of the Rustler Formation have been removed by erosion from Nash Draw, although some remnants of these members may be present in the rubble zone in the bottom of the Draw. Nevertheless, these two members generally do not affect the discharge of waste that is proposed by B & E, Inc., at Laguna Tres.

Topographic Setting

Nash Draw is the principal surface feature in the potash mining area of Eddy County. According to Vine (1963, p. B38), this feature is an undrained depression which resulted from regional differential solution of evaporite deposits in the upper Salado and/or lower Rustler Formations. The solution of these deposits resulted in large-scale collapse of the Lower Member, Culebra Dolomite, and the Tamarisk Members. Evidence for solution within the Rustler can be found almost everywhere that the formation is exposed at the surface.

Contour lines drawn on top of the massive salt in the Salado Formation show a high degree of similarity between the topography of Nash Draw and the top of the salt. The Salt Lake overlies a closed depression on top of the Salado. Likewise, there is a large closed depression northeast of Salt Lake which is ringed by a series of surface lakes, including Laguna Tres (fig. 2) which is the proposed disposal site.

Although the regional dip of the beds is toward the east, the rocks exposed along the margins of Nash Draw dip toward the depression. This also is true in Clayton Basin farther north. In addition, hydration of anhydrite to gypsum causes localized doming. Sinkholes and ones influence the direction of ground-water movement, which in turn controls the development of collapse structures through which ground water readily migrates.

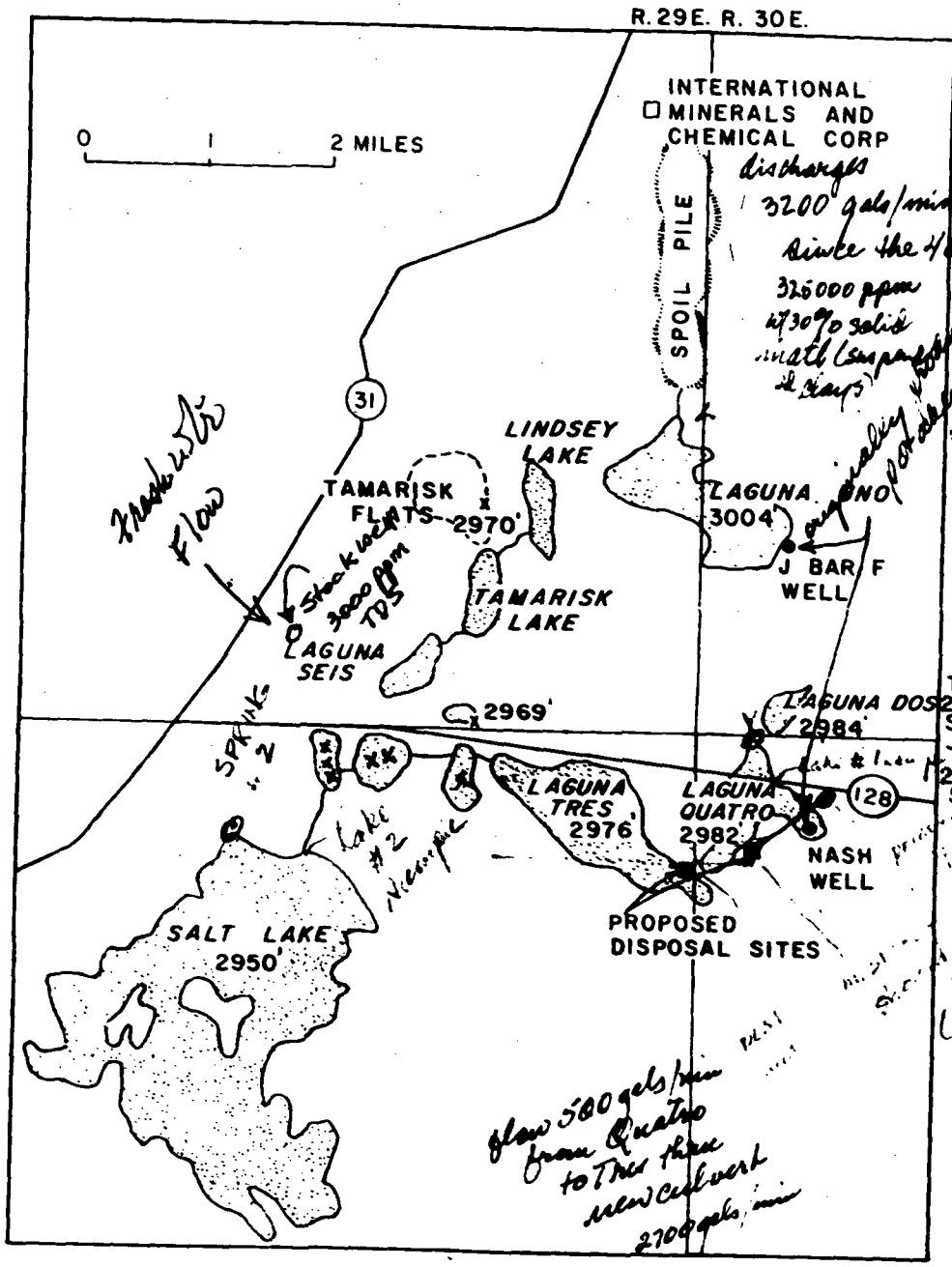


Figure 2. Distribution of lakes in the vicinity of IMC refinery and Salt Lake, with selected altitudes.

Hydrology

Ground Water

Two comprehensive studies of the hydrology of the potash area have been made by Brokaw and others (1972) and Geohydrology Associates, Inc. (1979). These studies have shown that the normal hydrologic system has been modified by collapse of Nash Draw and Clayton Basin. This has been further complicated by discharge from the various potash refineries in the area.

Hendrickson and Jones (1952, pl. 3) mapped the water table in Eddy County. East of the Pecos River the ground-water movement is predominately from north to south. Topographic divides exist along the Eddy-Lea County line and Quahada Ridge which tend to divert the regional flow into Nash Draw. The shallow ground water is potable to slightly saline in most areas. Wells outside Nash Draw generally produce adequate quantities of water to meet the stock and domestic requirements of the ranchers. However along the boundaries of Nash Draw, the regional water table intersects the land surface where ground water discharges as a series of seeps and springs (fig. 1). There is no known potable water within Nash Draw it' 'f.

Saline water is present in most of the deeper aquifers. as been shown that the regional dip of strata in the subsurface is from west to east. The Culebra Dolomite Member of the Rustler crops out along the Pecos River, and a few wells have tapped this strata in the subsurface. Highly mineralized water was produced from wells drilled by AMAX Corporation in T. 19 S., R. 30 E., and by Mississippi Chemical Corporation in T. 21 S., R. 29 E. The AMAX wells most likely were completed in the Culebra, although it is possible that they tap the shallower Magenta Member of the Rustler Formation. The Mississippi Chemical wells are known to tap the Culebra.

The so called "brine aquifer" has been identified by workers at the WIPP site as that zone of solution and collapse between the Salado and the basal Rustler. Although not present everywhere, it may be as much as 60 feet thick near Salt Lake and Laguna Tres. By the very nature of this zone, all of the water present is highly mineralized and probably is a saturated brine.

In addition to the natural ground-water flow into Nash Draw, there is a considerable amount of refinery waste released annually. Approximately 9,248 acre-feet per year is discharged as brine by refineries located in Nash Draw (Geohydrology Assoc., Inc., 1979, p. 60). In most cases this discharge is a saturated brine containing as much as 30 percent solids in the form of suspended clay.

The rubble zone, which represents the collapsed Rustler Formation in the bottom of Nash Draw, has produced potable water to wells in the past. Nash well (sec. 6, T. 23 S., R. 30 E.) was completed for stock use prior to 1935 (fig. 2). Subsequently the level of Laguna Quatro has risen to the point that this well was completely inundated by 1977. Likewise, the J Bar F well (sec. 20, T. 22 S., R. 30 E.) supplies water for stock at Laguna Uno.

According to Hendrickson and Jones (1952, p. 134-135), the water level in this well was 134.0 feet below land surface on March 17, 1948. The water level was at the land surface in 1979--a rise of 134 feet in 31 years. Since both of these wells are down gradient from IMC, it is probable that the rise in water level in the rubble zone can be attributed to discharge by IMC into Laguna Uno. The IMC refinery has been in operation since 1947.

Surface Water

All of the refinery discharge from International Minerals and Chemical Corporation is released into the headwaters of Laguna Uno which is in parts of sections 24 and 25, T. 22 S., R. 29 E., and adjoining sections. Discharge records of brine from the IMC refinery are not available. However, according to the New Mexico State Engineer Office in Roswell, the amount of water imported by IMC during 1977 was 5,233 acre-feet. This is equivalent to 3,244 gpm. Not all of this water enters Laguna Uno due to refining losses and evporation of water on the spoil pile. Nevertheless, the measured discharge into the lake is nearly equal to the quantity of imported water, thus indicating that the refining and evaporation loss are small.

The amount of water loss from Laguna Uno is difficult to determine. The size of the lake prevents the sediment-laden refinery discharge from spreading evenly across the lake. As as result, most of the sediment is deposited at the upper end of the lake, and the southeast end of Laguna Uno is characterized by relatively clear, sediment-free water. Thus there is no sealing effect at the fringes of the lake.

Studies at the lake determined that the summer evaporation rate at Laguna Uno was 6.69 gpm (gallons per minute) per acre and the winter evaporation rate was 0.369 gpm per acre (Geohydrology Assoc., 1979, p. 71). Inasmuch as the area of the lake is 710 acres, the summer loss would be about 4,750 gpm and the winter loss would be about 260 gpm. Therefore it is likely that virtually all of the refinery inflow during the summer is lost by evaporation from the lake. During the winter months the evaporation is only about 10 percent of the inflow rate. This surplus waste water then enters the lake chain which includes Laguna Dos, Laguna Tres, Laguna Quatro, and Salt Lake (fig. 2).

Lindsey Lake, Tamarisk Lake, and Laguna Seis also are topographically lower than Laguna Uno. Although there is no surface connection between Laguna Uno and this chain, it is likely that a subsurface connection exists.

In May 1982, a field reconnaissance was made of the area to assess the hydrologic connection between the IMC discharge point and Salt Lake. It was found that there is no surface connection between Laguna Uno and Laguna Dos; likewise there is no surface connection between Laguna Dos and Laguna Quatro. Laguna Quatro drains into Laguna Tres through a culvert and ditch system recently completed by the State Highway Department. At the culvert beneath Eddy County Road 793 which separates Laguna Quatro and Laguna Tres, the discharge is estimated to be about 500 gpm. With no surface inflow to the lake, this quantity of discharge can only originate from ground-water discharge.

Recent work by the Highway Department has provided a surface connection between Laguna Tres and several unnamed ponds south of Highway 128. The trenching has connected these lakes and ponds with Salt Lake. The total surface area of these surface-water bodies exceeds 1,200 acres. This would provide a summer evaporation capacity of 8,028 gpm and a winter capacity of 443 gpm.

WATER QUALITY

A number of water samples were collected by B & E, Inc., from springs and lakes in the vicinity of the proposed discharge point. The distribution of these samples and the total dissolved solids are shown in Figure 2. Virtually all of the water exceeds 200,000 mg/l (milligrams per liter) dissolved solids. This level of mineralization is very similar to that in oil-field samples that are likely to be discharged at the proposed site. (Appendix A.)

DISCHARGE PROPOSAL

B & E, Incorporated, estimates that the discharge facility will have the capacity to process approximately 50 loads of oil-field brine per day. Each load would be approximately 150 barrels. This represents a daily discharge of about 315,000 gallons, or a continuous discharge of 218 gpm.

The brine will be processed through a processing facility which will remove all hydrocarbons and solids. Only the oil-field brine will then be released to the hydrologic system. This facility will be located in the northeast quarter of section 12, T. 23 S., R. 29 E. This would be the upper end of Laguna Tres which presently has a natural inflow of about 500 gpm. The alternate site would be located near the center of section 6, T. 23 S., R. 30 E., along the south edge of Laguna Quatro.

Most of the oil production in the vicinity of the proposed facility produces from the Bone Springs and the Morrow Formations. Chemical quality within these formations does not vary significantly, and it is believed that the analyses given in the Appendix are representative of these two zones.

150
50
7500

CONCLUSIONS

1. The discharge system proposed by B & E, Inc., will not adversely impact the existing hydrologic system in the vicinity of Laguna Quatro and Laguna Tres.

2. The surface area of the lakes between Laguna Tres and Salt Lake are adequate to totally consume the total discharge proposed for the system.

3. The continued natural discharge of ground water into this lake system will provide sufficient brine to mask any quality change that might originate from the oil-field brine.

BIBLIOGRAPHY

Brokaw, A. L., Jones, C. L., Cooley, M. E., and Hays, W. H., 1972, Geology and hydrology of the Carlsbad potash area, Eddy and Lea Counties, New Mexico: U. S. Geol. Survey, Open-file rept., 4339-1.

Cooper, J. B., and Glanzman, V. M., 1971, Geohydrology of Project Gnome site, Eddy County, NM: U. S. Geol. Survey Prof. Paper 712-A, 24 p.

Geohydrology Assoc., Inc., 1978, Collection of hydrologic data, Eastside Roswell Range EIS Area, NM: Consultant report prepared for Bureau of Land Mangement, 97 p.

_____, 1978a, Ground-water study related to proposed expansion of potash mining near Carlsbad, NM: Consultant rept prepared for Bureau of Land Management, 127 p.

_____, 1979, Water-resources study of the Carlsbad potash area, NM: Consultant rept prepared for Bureau of Land Mangement, 91 p.

Gilkey, M. M., and Stotelmyer, R. P., 1965, Water requirements and uses in New Mexico industries: U. S. Bur. Mines Infor. Circ. 8276, 113 p.

Hendrickson, G. E., and Jones, R. S., 1952, Geology and ground-water resources of Eddy County, NM: N. Mex. Bur. Mines and Min. Res. Ground-Water Rept. 3, 169 p.

King, P. B., 1942, Permian of west Texas and southeastern New Mexico: Amer. Assoc. Pet. Geol. Bull., V. 26, no. 4, p. 535-763.

Mower, R. W., Hood, J. W., Cushman, R. L., Borton, R. L., and Galloway, S. E., 1964, An appraisal of potential ground-water salvage along the Pecos River between Acme and Artesian, NM: U.S. Geol. Survey Water-Supply Paper 1659.

Robinson, T. W., and Lang, W. B., 1938, Geology and ground-water condtions of the Pecos River valley in the vicinity of Laguna Grande de la Sal, NM: N. Mex. State Eng. 12th and 13th Bienn. Rept., 1934-1938, p. 77-100.

Thomas, H. E., 1963, Causes of depletion of the Pecos River in New Mexico: U.S. Geol. Survey Water-Supply Paper 1619-G.

Vine, J. D., 1963, Surface geology of the Nash Draw Quadrangle, Eddy County, New Mexico: U.S. Geol. Survey Bull., 1141-B, p. B1-B46.

APPENDIX

P. O. BOX 1468
MONAHANS, TEXAS 79756
PHONE 943-3234 OR 563-1040

Martin Water Laboratories, Inc

709 W. INDIANA
MIDLAND, TEXAS 79701
PHONE 683-4521

RESULT OF WATER ANALYSES

LABORATORY NO. 482226
SAMPLE RECEIVED 4-9-82
RESULTS REPORTED 4-22-82

TO: Mr. Gene Green
P.O.Box 756, Carlsbad,NM

COMPANY B & E Transport LEASE

FIELD OR POOL

SECTION ___ BLOCK ___ SURVEY ___ COUNTY ___ STATE ___

SOURCE OF SAMPLE AND DATE TAKEN

NO. 1 Lake #1. 4-8-82
NO. 2 Lake #2. 4-8-82
NO. 3 Spring #1. 4-8-82
NO. 4 Spring #2. 4-8-82

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.1996	1.2363	1.1784	1.2352
pH When Sampled				
pH When Received	7.48	7.47	6.99	7.50
Bicarbonate as HCO_3	234	312	210	307
Supersaturation as $CaCO_3$				
Undersaturation as $CaCO_3$				
Total Hardness as $CaCO_3$	27,500	45,750	25,000	44,500
Calcium as Ca	590	390	620	390
Magnesium as Mg	6,324	10,880	5,698	10,577
Sodium and/or Potassium	111,428	125,222	100,599	123,801
Sulfate as SO_4	22,313	23,375	20,400	22,100
Chloride as Cl	174,707	208,086	157,662	205,955
Iron as Fe	0.16	0.16	0.23	0.09
Barium as Ba	0	0	0	0
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	315,596	368,265	235,189	363,130
Temperature °F				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler				
Hydrogen Sulfide	0.0	0.0	0.0	0.0
Resistivity, ohms/m at 77° F	0.066	0.039	0.067	0.040
Suspended Oil				
Filtrable Solids as mg/l				
Volume Filtered, ml				
Carbonate, as CO_3	0	0	0	0
Fluoride, as F	6.0	6.0	6.0	6.5
Nitrate, as NO_3	5.0	0.0	0.0	0.0
Results Reported As Milligrams Per Liter				
Additional Determinations And Remarks				
Arsenic, as As	0.000	0.006	0.006	0.009
Cadmium, as Cd	0.00	0.00	0.00	0.00
Cyanide, as CN	0.00	0.00	0.00	0 0.00
Lead, as Pb	0.00	0.00	0.00	0.00
Total Mercury, as Hg	0.000	0.000	0.000	0.000
Selenium, as Se	0.00	0.00	0.00	0.00
Silver, as Ag	0.00	0.00	0.00	0.00

Form No. 3

The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

By

Waylan C. Martin, M. A.

Locations from which foregoing samples were taken:

Lake #1: Quatro

Lake #2: Great Salt Lake

Spring #1: Upper end of Lake

Spring #2: Upper Great Salt Lake

P. O. BOX 1468
MONAHANS, TEXAS 79756
PHONE 943-3234 OR 563-1040

Martin Water Laboratories, Inc

709 W. INDIANA
MIDLAND, TEXAS 79701
PHONE 683-4521

RESULT OF WATER ANALYSES

TO: Mr. Gene Green
P. O.Box 756, Carlsbad, NM 88220

LABORATORY NO. 58240
SAMPLE RECEIVED 5-4-82
RESULTS REPORTED 5-7-82

COMPANY B & E Inc. LEASE As listed

FIELD OR POOL

SECTION BLOCK SURVEY COUNTY Eddy STATE NM

SOURCE OF SAMPLE AND DATE TAKEN

NO. 1 Produced water - taken from Brantley. 5-3-82

NO. 2 Produced water - taken from Ember State. 5-3-82

NO. 3 Produced water - taken from SCB #4. 5-3-82

NO. 4 Produced water - taken from Southland State. 5-3-82

REMARKS:

CHEMICAL AND PHYSICAL PROPERTIES	NO. 1	NO. 2	NO. 3	NO. 4
Specific Gravity at 60° F.	1.0904	1.1760	1.1368	1.1720
pH When Sampled				
pH When Received	6.46	5.86	6.83	5.91
Bicarbonate as HCO_3	1,488	561	1,708	744
Supersaturation as $CaCO_3$				
Undersaturation as $CaCO_3$				
Total Hardness as $CaCO_3$	13,600	67,000	2,300	43,000
Calcium as Ca	3,440	21,200	564	14,100
Magnesium as Mg	1,215	1,402	216	1,883
Sodium and/or Potassium	52,034	80,055	87,956	90,318
Sulfate as SO_4	312	234	1,775	381
Chloride as Cl	88,774	170,446	134,936	169,035
Iron as Fe	441	155	48.3	169
Barium as Ba	0	0	0	0
Turbidity, Electric				
Color as Pt				
Total Solids, Calculated	147,263	275,898	227,155	276,461
Temperature °F				
Carbon Dioxide, Calculated				
Dissolved Oxygen, Winkler				
Hydrogen Sulfide				
Resistivity, ohms/m at 77° F	0.0	0.0	0.0	0.0
Suspended Oil	0.071	0.048	0.059	0.048
Filtrable Solids as mg/l				
Volume Filtered, ml				
Carbonate, as CO_3	0	0	0	0
Fluoride, as F	0.3	0.0	0.0	0.0
Nitrate, as NO_3	0.0	0.0	0.0	0.0
Results Reported As Milligrams Per Liter				
Additional Determinations And Remarks				
Arsenic, as As	0.000	0.000	0.000	0.000
Cadmium, as Cd	0.20	0.20	0.80	0.20
Cyanide, as CN	0.00	0.00	0.00	0.00
Lead, as Pb	0.00	0.00	0.00	0.00
Total Mercury, as Hg	0.000	0.000	0.000	0.000
Selenium, as Se	0.00	0.00	0.00	0.00
Silver, as Ag	0.00	0.00	0.00	0.00

The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

Form No. 3

By

Waylan C. Martin, M. A.

19

Martin Water Laboratories, Inc.
WATER CONSULTANTS SINCE 1933
BACTERIAL AND CHEMICAL ANALYSES

P. O. BOX 1468
MONAHANS, TEXAS 79756
PH 943-3234 OR 563-1040

709 W. INDIANA
MIDLAND, TEXAS 797
PHONE 683-4521

To: Mr. Gene Green
P.O.Box 756
Carlsbad, NM

Laboratory No. 482226-A
Sample received 4-9-82
Results reported 5-11-82

Company: B & B Transport

Subject: To determine the radioactivity (radium 226 and 228) and uranium content of submitted water samples. Samples taken 4-8-82.

Source of sample	Radium 226 pico curie/liter	Radium 228 pico curie/liter	Uranium ug/l
1. Lake #1	less than 0.6	less than 1.0	0.099
2. Lake #2	9 (+or-1)	less than 1.0	0.051
3. Spring #1	less than 0.6	less than 1.0	0.081
4. Spring #2	9 (+or-1)	less than 1.0	0.051

Remarks: The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

Waylan C. Martin, M. A.

McCORMICK AND FORBES
ATTORNEYS AT LAW
BUJAC BUILDING
P. O. BOX 1718
CARLSBAD, NEW MEXICO 88220

TELEPHONE 885-4171
AREA CODE 505

DON G. McCORMICK
JAY W. FORBES
THOMAS L. MAREK
ROGER E. YARBRO
JOHN M. CARAWAY
CAS TABOR

26 May 1982

New Mexico State Highway Department
P. O. Box 1457
Roswell, New Mexico 88201

Attn: Mr. Cliff Downey

Re: Proposed Location of Salt Water Disposal System
by B & E, Inc.

Dear Mr. Downey:

It is my understanding that Mr. Gene Green, of B & E, Inc., has discussed with you at some length the proposed locations for their proposed salt water disposal system. Both of these locations are located in Eddy County with the first or primary location being in the NE/4 of Section 12, Township 23 South, Range 29 East, and the secondary location being in the NE/4 of Section 6, Township 23 South, Range 30 East.

It is my understanding that you have reviewed these proposed locations with Mr. Green and on behalf of the State Highway Department, you are willing to state that the locations and the system proposed will not interfere with the use and operation of Highway 128 and the current draining operation, which you have underway along said highway as it leaves the intersection with State Highway 31. In the event the drainage of Highway 128 is interfered with, the salt water disposal system will terminate until arrangements can be made to correct the problem.

If you agree with the terms set forth herein, please return the signed copy of this letter to me for our records and for filing with the New Mexico State Oil Conservation Commission.

Sincerely,

Roger E. Yarbro

REY:lld

APPROVED BY:

Cliff Downey Maint. Supt.

WATER QUALITY ASSURANCE FACILITY

B and E INCORPORATED
Carlsbad, New Mexico

I INTRODUCTION

In order to make available to industry an approved waste water disposal station, the design herein described and depicted is presented. This facility provides a proven method of removing oily and solid wastes from water of varying quality by the batch treatment method. Water will be hauled to the site in 150-barrel or less loads and discharged into the facility at a rate not exceeding 10 barrels per minute (420 GPM). The goal of the facility is to remove insoluble oils to below maximum concentration of 50 PPM with an average concentration below 15 PPM. Should an oil concentration higher than desired (and approved by the State of New Mexico) occur, an alarm system will close valving to stop the flow of fluid into and out of the facility

II FLUID FLOW

The fluids, a predominantly water with small quantities of oil and solids, enter the facility through an electrically actuated emergency shutdown valve and a key activated turbine flow meter into the first process vessel, a Skim Tank. The Skim Tank is designed to be predominantly filled with water to assure maximum residence time and correspondingly high water quality. A thin layer of oil is maintained near the top of the tank. This oil layer is near the level of the oily influent minimizing the distance this contaminant must travel to be absorbed into the oil blanket. Oil is skimmed off into a holding tank ready for sale to a waste oil reclaimer. Water flows to the Surge Tank, typically 30 percent larger than the Skim Tank. While the internals of the Surge Tank are not as complex as the Skim Tank, the flow and levels are similar. Oily wastes

are captured near the top and drawn off to storage. Water is removed from the bottom and flows to the Aeration Tank for final quality control. A portion of the water in the Aeration Tank is pulled off near bottom and pumped into an aeration nozzle. The aeration of this water has the effect of clarifying it prior to discharging it into the adjacent salt lake.

Each Skim Tank and Surge Tank is designed to process the influent from one transport truck at a time. The initial system will consist of a twin set of these vessels feeding one Aeration Tank as indicated on C-E Natco Drawing No. 75747. Therefore, two transport trucks can unload at the same time into separate process facilities.

III SYSTEM CAPACITY

Each of the twin systems described above will accept a load of waste water from one transport truck at a time. Each transport truck has a capacity of approximately 150 barrels. Trucks are equipped to offload via on-board pumping systems. The truck pumping capacities vary, but do not exceed ten barrels per minute. Therefore, the maximum influent rate is 10 barrels per minute. Each truck must position itself properly, connect to the influent nozzle, activate the key actuated valve/meter assembly, unload, disconnect and proceed out of the unload area. While unloading can occur in as few as 15 minutes, the entire process typically takes a minimum of 25 minutes. And, by the time a second transport is ready to unload, a minimum of 30 minutes has elapsed. This equates to surges of 10 barrels per minute (420 GPM) and averaged maximum plant throughput of five barrels per minute (210 GPM) per unloading process train. Since the initial system concept consists of two trains, maximum averaged discharge capacity will be on the order of 10 barrels per minute total or 14,400 barrels per day

The actual discharge volume is anticipated at less than 6,000 barrels per month. This volume will be carried 50 percent by the owner/operator's transports and 50 percent by others.

IV OIL PROCESSING

Waste oil will be collected and sold to a waste oil reclaimer. As the volume of this product justifies, a process addition designed to reclaim oil on-site may be added. This system will include a low pressure boiler and a larger process tank with steam coils for heat input.

VII SOLIDS

Minor amounts of solids will accumulate in the system. These solids will be decanted from the Skim and Surge Tanks via draw-off laterals. Solids will accumulate in the solids storage tank. Water separated from solids will be cycled back into the water process system.

VIII WATER QUALITY CONTROL

The implementation of appropriate design concepts for tank internals will assure a high degree of water quality under normal circumstances. However, to prevent the possibility of an upset, vandalism, or other cause resulting in an oil discharged, a water quality monitor continuously monitors the concentration of oil in water between the Surge Tank and the Aeration Tank. Should the concentration exceed preset limits, the automatic valving switches to the closed position to stop flow through the facility. The automatic valves are fail closed so that any loss of power causes a facility shut down. No manual override will be installed in this system.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 3570
Order No. R-3238

APPLICATION OF STOLTZ AND COMPANY
FOR SALT WATER DISPOSAL, LEA COUNTY,
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on May 17, 1967, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 29th day of May, 1967, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That effective on certain dates, Order No. R-3221 forbids the disposal of water produced in various areas in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any water course, or in any other place or in any manner which will constitute a hazard to any fresh water supplies in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico.

(3) That the applicant, Stoltz and Company, seeks, as an exception to said Order No. R-3221, authority to dispose of water produced in conjunction with the production of oil or gas, or both, into a playa lake located in Sections 12 and 13, Township 10 South, Range 32 East, and in Sections 6 and 7, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico.

(4) That the evidence indicates that fresh water exists in both the Ogallala and Triassic formations in the vicinity of said playa lake.

(5) That the water in the lake is not fresh water.

(6) That that portion of the Triassic red beds underlying the lake is virtually impermeable and therefore will prevent seepage from said lake into the Triassic sands which underlie said red beds and contain fresh water.

(7) That in that portion of the Ogallala formation east and southeast of the subject lake and in communication with said lake basin, the water table dips to the northwest thereby reversing the direction of the normal flow of Ogallala water and causing said water to flow into the subject lake.

(8) That the water level in the lake is normally lower in elevation than the water table in the Ogallala formation that is in communication with the lake basin.

(9) That water will not flow or seep from the subject lake into the Ogallala formation so long as the water level in the subject lake remains at a lower elevation than the water table in that portion of the Ogallala formation in communication with the lake.

(10) That the apparent high water level in the subject lake is at an elevation of 4141 feet referenced to the elevation of the Sun Oil Company State "F" Well No. 1, located near the northeast bank of said lake at a point 657.4 feet from the South line and 511.7 feet from the East line of Section 6, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, the ground elevation of said well being 4177 feet above sea level.

(11) That the applicant should be authorized to dispose of a maximum of 30,000 barrels per day of produced salt water into the subject lake provided the water level of the lake does not exceed an elevation of 4142 feet as determined by suitably placed markers.

IT IS THEREFORE ORDERED:

(1) That the applicant, Stoltz and Company, is hereby authorized, as an exception to Order No. R-3221, to utilize a playa lake known as Lane Salt Lake and located in Sections 12 and

13, Township 10 South, Range 32 East, and Sections 6 and 7, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, for the disposal of water produced in conjunction with the production of oil or gas, or both.

(2) That the water hereby authorized for disposal into said Lane Salt Lake shall be limited to a maximum of 30,000 barrels per day as determined by continuous measurement with a corrosive-resistant meter equipped with a non-reset counter.

(3) That in no event shall disposal of water into said Lane Salt Lake be permitted when the water level of said lake is 4142 feet or more above sea level as referenced to the elevation of the Sun Oil Company State "F" Well No. 1, located near the northeast bank of said lake at a point 657.4 feet from the South line and 511.7 feet from the East line of Section 6, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, the ground elevation of said well being 4177 feet above sea level.

(4) That the applicant shall drill three observation wells to the top of the red beds for the purpose of monitoring the quality of the water in the vicinity of said lake.

Said wells shall be located as follows:

TOWNSHIP 10 SOUTH, RANGE 33 EAST, NMPM
LEA COUNTY, NEW MEXICO

One well to be located approximately 400 feet from the North line and 400 feet from the West line of Section 17;

One well to be located approximately 2640 feet from the North line and 1320 feet from the East line of Section 18; and

One well to be located approximately 800 feet from the North line and 660 feet from the West line of Section 18.

That the surface elevation and depth to the top of the red beds of each observation well shall be reported to the Commission prior to use of the lake for water disposal purposes.

That water samples shall be taken from each observation well, analyses made thereof, and water levels measured by an

independent laboratory or governmental agency and filed with the Commission prior to disposal of produced water into the lake and quarterly thereafter.

(5) That the applicant shall erect permanent water level markers, graduated in feet and tenths of feet, at the following locations:

LEA COUNTY, NEW MEXICO

One marker to be located approximately in the center of the SW/4 SE/4 of Section 6, Township 10 South, Range 33 East;

One marker to be located approximately in the center of the SE/4 NW/4 of Section 7, Township 10 South, Range 33 East; and

One marker to be located in the SE/4 SE/4 of Section 12, Township 10 South, Range 32 East, and not closer than 300 feet to the high water mark in said quarter-quarter section.

(6) That Form C-120-A, Monthly Water Disposal Report, shall be filed each month in accordance with the provisions of Rule 1120 of the Commission Rules and Regulations, and such report shall also state the water level of said lake on the last day of the month.

(7) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 3607
Order No. R-3238-A

APPLICATION OF STOLTZ & COMPANY
FOR AN AMENDMENT TO ORDER NO.
R-3238, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on June 28, 1967, at Santa Fe, New Mexico, before Examiner Elvis A. Utz.

NOW, on this 11th day of September, 1967, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That by Order No. R-3238, dated May 29, 1967, the applicant, Stoltz & Company, was authorized to utilize a playa lake located in Sections 12 and 13, Township 10 South, Range 32 East, and Sections 6 and 7, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, for the disposal of produced salt water.

(3) That Order (4) of said Order No. R-3238 provides for the drilling and location of three observation wells.

(4) That Order (5) of said Order No. R-3238 provides for the erection and location of three water level markers.

(5) That the applicant seeks an amendment to said Order (4) to permit the drilling of the three observation wells at the

following locations:

TOWNSHIP 10 SOUTH, RANGE 33 EAST, NMPM
LEA COUNTY, NEW MEXICO

One well to be located 300 feet from the South line and 1100 feet from the West line of Section 7;

One well to be located 600 feet from the South line and 1410 feet from the East line of Section 7; and

One well to be located 2400 feet from the South line and 1100 feet from the East line of Section 7.

(6) That the applicant also seeks an amendment to said Order (5) to permit the location of one marker on the North shore of the lake in lieu of the marker required in the SW/4 SE/4 of Section 6 and one marker on the East shore of the lake in lieu of the marker required in the SE/4 NW/4 of Section 7.

(7) That the applicant has been unable to receive permission to locate the aforementioned observation wells as ordered.

(8) That the alternate locations sought by the applicant will provide as good or better locations for monitoring purposes than the locations provided by said Order (4).

(9) That the composition of the lake bed is such as to make the location of markers in the SW/4 SE/4 of said Section 6 and in the SE/4 NW/4 of said Section 7 extremely difficult.

(10) That the alternate locations sought by the applicant will provide as good or better locations for measuring purposes than the locations provided by said Order (5).

(11) That Orders (4) and (5) of Order No. R-3238 should be amended as requested by the applicant.

IT IS THEREFORE ORDERED:

(1) That Order (4) and Order (5) of Order No. R-3238, dated May 29, 1967, are hereby amended to read as follows:

"(4) That the applicant shall drill three observation wells to the top of the red beds for the purpose of monitoring the quality of the water in the vicinity of said lake.

Said wells shall be located as follows:

TOWNSHIP 10 SOUTH, RANGE 33 EAST, NMPM
LEA COUNTY, NEW MEXICO

One well to be located 300 feet from the South line and 1100 feet from the West line of Section 7;

One well to be located 600 feet from the South line and 1410 feet from the East line of Section 7; and

One well to be located 2400 feet from the South line and 1100 feet from the East line of Section 7.

That the surface elevation and depth to the top of the red beds of each observation well shall be reported to the Commission prior to use of the lake for water disposal purposes.

That water samples shall be taken from each observation well, analyses made thereof, and water levels measured by an independent laboratory or governmental agency and filed with the Commission prior to disposal of produced water into the lake and quarterly thereafter."

"(5) That the applicant shall erect permanent steel water level markers at least four inches in diameter set in concrete graduated in feet and tenths of feet at the following locations:

LEA COUNTY, NEW MEXICO

One marker to be located on the extreme North end of the lake in Section 6, Township 10 South, Range 33 East;

One marker to be located on the East side of the lake approximately in the center of Section 7, Township 10 South, Range 33 East; and

One marker to be located in the SE/4 SE/4 of Section 12, Township 10 South, Range 32 East, and not closer than 300 feet to the high water mark in said quarter-quarter section;

PROVIDED HOWEVER, that each of the aforesaid markers shall be installed at a location designated by an authorized representative of the Hobbs District Office of the Commission."

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 3663
Order No. R-3238-B

APPLICATION OF STOLTZ & COMPANY
FOR AN AMENDMENT TO ORDER NO.
R-3238, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on October 4, 1967, at Santa Fe, New Mexico, before Examiner Daniel S. Nutter.

NOW, on this 11th day of October, 1967, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That by Order No. R-3238, dated May 29, 1967, the applicant, Stoltz & Company, was authorized to utilize a playa lake known as Lane Salt Lake and located in Sections 12 and 13, Township 10 South, Range 32 East, and Sections 6 and 7, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, for the disposal of produced salt water.

(3) That Order (3) of said Order No. R-3238 prohibits the disposal of water into said Lane Salt Lake when the water level of said lake is 4142 feet or more above sea level as referenced to the elevation of the Sun Oil Company State "F" Well No. 1,

located near the northeast bank of said lake at a point 657.4 feet from the South line and 511.7 feet from the East line of Section 6, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, the ground elevation of said well being 4177 feet above sea level.

(4) That the evidence presented in Case 3663, from which Order No. R-3238 issued, showed the ground elevation of the aforementioned reference well to be 4177 feet above sea level and the apparent high water level in the subject lake to be 4141 feet above sea level.

(5) That a re-survey of the subject lake shows the correct ground elevation of the aforementioned reference well to be 4176 feet above sea level and the correct elevation of the water level of the lake during average conditions to be 4143.5 feet above sea level.

(6) That the applicant seeks the amendment of the aforesaid Order (3) of Order No. R-3238 to correct the maximum permitted water level for disposal purposes in said lake and to correct the ground elevation of the reference well in said Order No. R-3238.

(7) That in order to permit the utilization of the subject lake for disposal purposes, within the intent of Order No. R-3238, Order (3) of Order No. R-3238 should be amended to reflect the aforementioned corrected elevations.

IT IS THEREFORE ORDERED:

(1) That Order (3) of Order No. R-3238, dated May 29, 1967, is hereby amended to read as follows:

"(3) That in no event shall disposal of water into said Lane Salt Lake be permitted when the water level of said lake is 4145.26 feet or more above sea level as referenced to the elevation of the Sun Oil Company State "F" Well No. 1, located near the northeast bank of said lake at a point 657.4 feet from the South line and 511.7 feet from the East line of Section 6, Township 10 South, Range 33 East, NMPM, Lea County, New Mexico, the ground elevation of said well being 4176 feet above sea level."

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

S E A L

esr/

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
May 17, 1967

REGULAR HEARING

IN THE MATTER OF:

Application of Stoltz and Company for salt water dispcsal, Lea County, New Mexico. Case 3570

BEFORE: A. L. Porter, Jr., Secretary-Director
Guytcn B. Hays, Land Ccmmissicner
George M. Hatch, General Counsel

TRANSCRIPT OF HEARING

oh, 350 and 500 barrels per day per well.

Q Three hundred and fifty to five hundred barrels of salt water per day, per well?

A Yes, sir.

Q And how many wells did you say were in there?

A There are 53 or 4.

Q These are all in the North Bagley Pool?

A Yes, sir.

Q What is the production formation?

A The Pennsylvanian, we have upper, lower and middle Pennsylvanian Pools and there are also a few wells in the Wolfcamp.

MR. PORTER: Does anyone have a question of Mr. Brown? You may be excused.

*****

(Witness excused.)

MR. KELLAHIN: We will call as our next witness Mr. Reed, please,

MR. PORTER: How do you spell your name? R double e d?

MR. REED: Yes, sir.

*****

ED L. REED, called as a witness on behalf of the Applicant, first having been duly sworn, was examined and

testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A My name is Ed L. Reed.

Q What business are you engaged in, Mr. Reed?

A I am a Consulting Hydrologist.

Q Where are you located?

A Midland, Texas.

Q Mr. Reed, have you had any special training in the field of Hydrology?

A Yes, sir.

Q Would you outline for the Commission your education and experience as a Hydrologist?

A I have a Bachelo or Science degree from Texas Tech in Geological Engineering in 1939. I did graduate work at Tech in 1949 and 1950 in fields realted to Hydrology. I worked for major oil companies from 1939 to 1952. Ten years with Pan American as Geologist and District Geologist and Consulting Geologist. I have been in Consulting Hydrology since 1952. I am a member of the Fellow of the Geological Society of America, I am a member of the Society of Civil Engineers. That's all.

Q Have you done any work in the State of New Mexico as a Hydrologist?

A Yes, sir.

Q And in connection with the application before the Commission did you make an investigation for Stoltz and Company?

A Yes, sir, I did.

Q Now, what did you do in connection with that investigation, Mr. Reed?

A I examined the published literature on the North Lea County area. I examined the Lake itself, it's borders on the ground. I examined the outcrops of bedrock that exist along the margins of the Lake. We have measured the depth to water in the wells, the water wells in the area. We have had the surveyor, Mr. Sherman, run elevations to the measuring point of the water wells in the area and also prepare a limited topograhic map of the Lake and the margins of the Lake which has been submitted, and the elevation of the springs or seeps that discharge into the Lake.

We have examined seismic shot-hole drillers' logs in the area covered by the map and from this study we have prepared a topographic map of the top of the triassic redbed surface. We have contoured the water table of the Ogallala portion of this area. We have taken samples of water from

all of the wells from three points within the Lake and from three springs discharging intermittently into the Lake, have examined the chemical analyses data which is prepared in Exhibit form and have posted the data upon the map and we have prepared the exhibit which is now upon the board.

Q Did you make any study of the surface flow of water into the Lake area?

A We made a very preliminary examination of the watershed area of the Lake and of the inlets into the Lake of which there are two principal ones.

Q Did you examine the rainfall records for the vicinity?

A We examined the rainfall records for the Tatum Station. We examined the Class A Land Pan evaporation records for Portales, Bitter Lake and Lake Avalon and made determinations of monthly evaporation from this data.

Q On that basis did you prepare any calculations to show the effect of discharge of water into the Lake at varying rates?

A Yes, sir, I did.

Q Now, turning to what has been marked as Exhibit Number 2, a twenty-five page exhibit, would you identify that, please.

A These are original copies of chemical analysis

sheets prepared by Southwestern Laboratories in their Midland office of water samples taken during this investigation. All of these being normal water samples with one exception. A sample of the lakebed material in one part of the Lake was sampled and a one-to-one extract prepared and a chemical analysis made of that extract material.

Q And that is the data which is posted on the plat that is on the board?

A That's correct, yes sir.

MR. PORTER: Mr. Reed, may I ask you, you mentioned that you had ten years experience with Pan American, I believe, and possibly some other major oil company experiences. Where were you located when you had this?

THE WITNESS: I was with Atlantic in Midland and Pan American in Midland, ten years, except for two years in Wichita Falls.

MR. PORTER: Some of your experience was in Southeast New Mexico then as an engineer, geological engineer?

THE WITNESS: About seven years in Southeastern New Mexico as an area geologist and Southeast New Mexico and Northwest New Mexico, and there years as District Geologist including Southeast, New Mexico, yes, sir.

MR. PORTER: Thank you.

MR. HAYS: These springs that you examined, is

that sweet water or salt water?

THE WITNESS: Well, we can get into that in a description of this Exhibit, if you wish. I think I can lay the background for this and perhaps explain that question to you.

Q (By Mr. Kellahin) Now, Mr. Reed, turning to what has been marked as Exhibit Number 3, would you first identify that exhibit, Please?

A Yes, sir. Exhibit Number 3 is a map of Township 10, South Range 33 East and a few sections bordering to the north and to the west. This map has been prepared by me. It shows upon the map the position of Lane Lake occupying a portion of Section 6 and 7 of 10 South 33, a portion of 12 and 13 in 10 South 32.

On this map I have shown the locations of the existing water wells, all that we know or can find. I have shown the chloride concentration in milligrams per liter or parts per million in the pressure samples, the salt lake concentration of the waters from these water wells. I have shown the sea level elevation of the water table as determined from measured depths to water and elevations determined by the surveyor.

I have shown the quality of the water in the Lake at two points and in the soil at one point, the quality

of spring water, seep water in three areas. On this large map, the yellow dotted lines represent the topography of the triassic surface. The heavy dashed lines represent the attitude of the water table.

Now, on the map on the wall, I have indicated three of the wells in the northeast part of the area as water being derived from the triassic. These are the only three wells that we can identify that are not producing from the Ogallala.

Basically, Lane Lake is a closed basin. It is a water table lake in that the surface of the lake is at the water table and is maintained at the water table by wind action blowing the sediment out and creating a mound ridge of alluvium deposits on the eastern side of the Lake.

Surface water going from the watershed area to the northwest which is rather extensive, but much of which is non-contributory I believe, surface water comes into the lake in a ravine at the northeast corner where the triassic is at the surface, in a ravine in the southwest side of the Lake in the east, along the east quarter corner of Section 12 where the Ogallala is exposed in lesser amounts in smaller gullies on the west and southwest side of the Lake.

The Lake is completely enclosed topographically so the water cannot flow out of the Lake, surface water can not flow out of the Lake.

Bedrock is exposed along the northeast and north-northwest margins of the Lake, in this case being triassic redbed material. Cretacious, I have examined exposed in the bluffs in two places on the west side of the Lake, Section 7 and the northwest corner of Section 13, a thin section of bright yellow, yellowish-orange sandy clay. Ogallala is exposed in one patch, the east side of Section 12 in the bluffs and the base of which cannot be determined on the ground. In this case, the upper part is a gravelly, clichy, underlain by sands and gravelly sand and silty clays, light colored, gray to buck.

On the east side of the lake there are no exposures that I can find in examining that carefully. The bluffs on the east side are composed of wind-blown material. Largely gypsum crystals and sand grains blown out ot the Lake from the nearby sandy areas on the west side.

On the west side in the sand dune area there are many places that I have seen blow outs in the sand dune with residual Ogallala gravel, indicating that in portions of this area, the Ogallala has also been removed.

Looking at the quality of water in Lane Lake and in the vicinity we will look first at the wells. Ogallala water generally in the area covered by this map, is of good quaiity. The chlorides are low to moderate in concentration

forty parts per million, forty-two parts per million, for example, in a well in Section 20. A maximum, other than some consideration, that I am not sure of, 322 in the southwest corner of Section 12, there are two exceptions, there are two wells, one in Section 16 and one in Section 7 in the Township to the East which have high chloride concentrations. The one in section 7 I have no explanation for because I didn't study that area and I am of the opinion that this is not related to any of the hydrolic system involving Lane Lake. The well in Section 16 could possibly represent seepage water from the triassic, from a brackish water-sand in the triassic, since this well is very near the northern limits of Ogallala deposition.

Q Which well is that you're pointing to?

A In Section 16, Northeast corner of Section 16, 10 South 33 East.

MR. PORTER: What are the parts per million in that well?

THE WITNESS: Chlorides are 666 and sulphates are 746. This is a brackish water, the true source of which I cannot tell you because we don't have enough data. The triassic water, where it has been developed, is of good quality and completely unlike this --

MR. PORTER: Is that water being use for anything?

THE WITNESS: Stock purposes, I believe, yes, sir.

Going to the Lake itself, a sample of water from the Lake in the northern part of the Lake in Section 6 has a chloride concentration of a 120, 696 and a sulphate concentration of 43, 909. In the southwest corner of Lane Lake, in the southeast Section of 12, a surface sample of water, the chloride concentration is 157,883, the sulphate concentration is 99,748. The highest sulphate concentration I have encountered.

MR. PORTER: Are these different pockets of water?

THE WITNESS: Yes, sir.

MR. PORTER: They are not connected on the Lake?

THE WITNESS: No, sir, there are dried areas in between, these are residual pockets of water.

MR. PORTER: Low places?

THE WITNESS: Yes, sir, I believe, they are not permanent pockets of water, they may come or go in response to the humidity and wind action.

MR. PORTER: You mean, they rise and fall?

THE WITNESS: They rise and fall --

MR. PORTER: The surface level of the water goes up and down?

THE WITNESS: Yes, sir. This is true all over the

Lake in response to the rate of evaporation, the inflow is a fairly constant figure, I believe, and the amount of discharge from the Lake is a function of humidity and wind.

MR. PORTER: And that inflow is from seepage of these springs that you were talking about?

THE WITNESS: Yes, sir, and probably some seepage from other areas under the surface of the lake that we can't see, but there is other seepage.

MR. PORTER: Thank you.

A A one-to-one extract of soil in the central part of the Lake, this would be about a one-to-one dilution since the saturation of the soil was about 50 percent as to its water content. The chloride concentration was 33,283, sulphate concentration 16,458. The sample three seepage areas, two in the northeast corner of Section 7 with chlorides 15,000, suphates 16,000 in one sample, chlorides 12,788 and sulphates of over 19,000 in the other sample.

The third seep flowing sufficiently in volume to carry the water in the defined channel out into the Lake, perhaps a hundred or so feet. Chlorides, 12,262 and sulphates 6842. By comparison, the brines, two samples of brines which are proposed to be put into the lake, are represented by analyses shown to the right of the Lake, and labeled "Brines". Chlorides of 28,904, sulphates 517 in one sample,

chlorides 31,707 and sulphates 452 in another sample.

Going, now unless there are questions at this point, going now to the other --

Q (By Mr. Kellahin) Mr. Reed, at this point, you mentioned these seeps in response to the question that was asked by Mr. Hays. Can you state what the source of this salt water is that is going into the Lake at the present time?

A Yes, sir. Going to the question of the water table and this is fundamental, I think, in answering your question of the source of this water, we have contoured the water table elevation as determined in the well and in the springs. Generally, we find the water is very near the western limits of the Ogallala as it is disposed into the escarpment, which would be just a few miles to the west.

MR. PORTER: That is what is referred to as the Caprock?

THE WITNESS: Yes, sir. As a matter of fact, a State map shows a large valley coming in from the west called a sand gap and indicates that there is no Ogallala in this area? This is, I think, not quite true, there is a large valley coming in at a re-entrant into the Caprock, so the edge of the Ogallala is closer to Lane Lake in this position than it would be to the north and south, but we are near the outcrop, near the edge of the Ogallala, the water

table is quite, dipping quite seeply to the east, toward the Lake.

MR.. HAYS: This is dipping toward the east?

THE WITNESS: Yes, sir. The regional dip is to the southeast and in this particular area, I think in response to the Lake, the dip is to the east. The regional grade is to the south, all across Lea County.

The water level is at ~~4559~~ 4259, approximately in this well and this is plus or minus a few feet because this is not a tide elevation.

MR. PORTER: This well, would you identify that by number?

THE WITNESS: Yes, sir. In the northwest corner of Section 14, 10 South ~~33~~ 32.

MR. PORTER: Thank you.

A The water level is higher than 4189 and a well in the southeast part of Section 36 right on the township line, 36, between 32 and 33 East, this is a pumping level. The water level is 4257 in the well in the center of the southwest quarter of Section 25, 10 South, 32. T9S R32E

By comparison with these relatively high water table elevations, the water table up through the balance of this township with the exception of the Lake, is fairly flat, ranging from 4163 to 4164, 4170, 68, 66, 65, 58, a questionable

figure here, 60 and 65, 4165.

MR. PORTER: This township you are referring to 10, 33?

THE WITNESS: 10, 33.

MR. PORTER: Thank you.

A The water level in the triassic wells is substantially deeper as we normally find than the water level in the Ogallala.

Of interest and of importance in examining the hydrolic system made up by Lane Lake is the fact that there is reversal in the hydrolic gradient between a well in the northeast corner of Section 19, 10 south 33, two wells in the southwest corner of Section 18 of the same township and the elevation of the spring on the east side of the Lake, in Section 7.

The water table is 4170 in this water well; in 19, 4164, 4163 in 18; 4142.5 on the east side of the Lake, so there is northwest dip at least in this area, northwest dip of the water table into the lake with a difference in elevation of approximately 28 feet from the well in Section 19 to the water level on the east side of the Lake, and this water level is about one and a half feet higher than the average level of the lake bed itself. The spring is up on a little bench at the base of a break in the escarpment and

about one and a half feet above the elevation of the Lake itself. We do not have lake bed elevation because at this time we could not get in there. It was too muddy.

Based upon this reversal in the hydrolic grading and further based upon a ridge on the red bed surface which comes up through the southwest part of the area studied, can be identified into Section 19. Another ridge coming through the central part of the study area from the north and coming southwesterly at least into Section 8 and 17 of 10 South, 33. There being no control in this particular area to connect these two ridges, it seems most probable to me that there is a regional ridge, northeast and southwest trending ridge on the red bed surface, in about, diagonally, about the central part of the mapped area. We have good control for all of this northern part of the triassic surface and good control for this part. No control in the center.

MR. PORTER: Good control for the southwest part?

THE WITNESS: For the southwest part, yes, sir. A combination then of a ridge on the base of the aquafer, low permeability of the Ogalla as indicated by a 19 foot decline in the water level in a well in Section 19, 10 South, 33, as between the static level and the pumping level of a windmill which is pumping relatively small quantities

of water, probably under 5 gallons per minute, would suggest that the discharge of this lake, acting as a pump, as a large pump covering 340 acres, has created a continuous depression in the water table surface of some magnitude measured in feet, The exact amount, we can't testify to because there is no control on the southeast side of the Lake except for these three wells immediately south, but it would appear that since there is no spring discharge on this side observable, there is spring discharge on the southeast side observable, there is a depression in the water table surface of a permanent nature which we have indicated to have a relief of some 19 feet.

The water then from the springs would represent the movement of what we think is Ogallala water in a northwesterly direction satisfying the demand of this Lake for discharge of some magnitude. The springs then are derived from probable Ogallala settlements in response to this reversal in the hydrolic gradient and the quality probable is determined by the amount of evaporate material that has blown up historically over many thousands of years from the lake bed itself, depositing both sodium chloride, calcium chloride, magnesium sulphate and other salts in this illuvial ridge, water moving through that ridge over a substantial distance couldn't have this quality.

I have shown a water table divided somewhere near

I have shown a water table divided somewhere near the central part of the map with a 4160 contour on the elevation, on the water table in Section 18. A similar 4160 contour in Section 28, 22 and so forth in the southeast part of the map, a flat area in the central part of the map and a postulated 4150 without control. It has to be here somewhere because beyond this divide there is regional hydrolic gradiant to the Ogallala water table.

MR. PORTER: May I ask you, at this point, you have indicated that the seepage at this point is salt water. Do you have any information as to whether these were ever fresh water springs?

THE WITNESS: I have no information that these were ever fresh water springs. I have been told that some years ago the fresh water did seep into the southwest side of the lake. I can see how this patch of Ogallala could well have been a source of --

MR. PORTER: There is no seepage in the Ogallala?

THE WITNESS: No. There is no seepage of water in the Ogallala at this time and I see no evidence that it has been there in the recent past.

MR. PORTER: You also referred to the three wells south of the lake here. I see the chloride content in one there at 154 and one at 182.

THE WITNESS: Yes, sir.

MR. PORTER: Do you have any history of the chloride content of the wells, other than the present samples that have been taken?

THE WITNESS: No, sir, I have none and the survey, USGS, when they made their study of this area, did not collect any samples in this particular area.

MR. PORTER: What is that water used for?

THE WITNESS: Stock and domestic. These aren't domestic wells they are stock wells.

MR. PORTER: Ranch house supply?

THE WITNESS: Yes, sir, in the northeast corner of 19.

MR. HAYS: Do you think there is any connection between the lake and those wells?

THE WITNESS: No, sir, in this respect, this particular lake is substantially different from other salt lakes that we have examined.

MR. HAYS: How do you explain that draw-down in that one well then?

THE WITNESS: In the Ranch well?

MR. HAYS: You have one well there, didn't you say there was a draw-down right in here?

THE WITNESS: Yes, sir, 19, northeast, corner of 19.

MR. HAYS: How do you explain that draw-down?

THE WITNESS: Low permeability.

MR. HAYS: Did you examine it just as a turn well and then you saw that the draw-down went down 19 feet?

THE WITNESS: No, sir, I measured, when it was pumping and my field man measured later after it had been shut-in. The difference, one of the differences in this lake and other salt lakes that I have examined, is this question of material reversal of hydrolic gradient on the southeast side. In other lakes that we have examined in Texas, we have found that the lakes do, under natural conditions, periodically discharge water from the lake into the ground water zone, into the Ogallala in response to run-off into the lake, rising depth of water in the lake, overcoming the reversal in the hydrolic gradient and discharge of poor quality water into the Ogallala, which has had the result of the creation of wide areas down the hydrolic gradient of brackish water, in some cases, extending for a good many miles. But I would add that these lakes are in areas where the Ogallala has a high permeability and is substantially thick. This is an area of relatively thin Ogallala. The maximum depth perhaps 60 or 70 feet in the above areas, may be a hundred feet in the lower parts, but in the areas, we have examined on the order of 5 to 30 feet in thickness and obviously low permeability. So it

seems to me, and it is my opinion that this is a closed hydrolic system in which both surface water and ground water is discharging into the lake and, or flowing into the lake, I should say, and all of the discharge from the lake is by evaporation.

MR. HAYS: If you flow the amount of water into this, brackish water into this lake, like you are wanting to do, how much of it will raise the level of the lake into the area that you are figuring on?

THE WITNESS: We have made a number of calculations based upon the average evaporation, net evaporation in the area which amounts to 61.14 inches according to our calculations. This is --

Q (By Mr. Kellahin) That's per year?

A Per year. This is lake evaporation, less rainfall.

MR. HAYS: Go over that once more for me.

THE WITNESS: We have calculated the net evaporation under average conditions to be 61.14 inches per year.

MR. HAYS: 61 --

THE WITNESS: The gross evaporation amounts to 76.82 inches, based upon pan co-effecients and correcting the evaporation for an evaporation rate of 50,000 parts per million brine. The rainfall is 15.68 inches average, so the net evaporation would be 61.14 inches. We have examined the

performance of this lake under --

MR. PORTER: By way of explanation here, Mr. Reed, you have testified that the net evaporation here, I believe, would be 61.14 inches, per year?

THE WITNESS: Yes, sir.

MR. PORTER: In other words, if you had this lake filled to a depth of 61.14 inches, in twelve months it would dry up?

THE WITNESS: It isn't quite like that because you are not adding any rainfall back to that.

MR. PORTER: I mean, assuming there is no recharge or anything.

THE WITNESS: Assuming no rainfall, the gross evaporation is 76.82 inches.

MR. PORTER: Oh, I see.

THE WITNESS: But I have taken the rainfall from this.

MR. PORTER: If you add in rainfall, or no change of conditions, it would evaporate up to 76 inches then?

THE WITNESS: This is correct, yes. The average pan evaporation is 99 inches. We made corrections for the co-efficient to the pan evaporation and the co-efficient for brine at 5,000 parts per million.

MR. PORTER: Mr. Kellahin, I'm not quite sure who

is conducting the direct examination?

MR. KELLAHIN: You are doing fine.

MR. HAYS: That is kind of rapid evaporation for fresh water?

THE WITNESS: Salt water. We have reduced the pan evaporation by a point of 97 to yield evaporation of 50,000 parts per million brine. Now the more concentrated, the more reduction would have to be applied.

MR. HAYS: Do you ever run tests on this kind of stuff and actually evaporate that much water?

THE WITNESS: I will quote to you the Bureau of Reclamation figures in a few minutes. Yes, it will.

MR. HAYS: That is sure a lot of water.

THE WITNESS: That's a lot of water. Based upon these figures we have made calculations of performance of this reservoir starting with the water year of October, because this is the beginning of the low evaporation period of a year. We have assumed average conditions. We have assumed a lake to be dry at the time of beginning the input of water. From this data and assuming an input of 30,000 barrels per day, which amounts to about 4 and a quarter inches per month, depending upon the number of days and beginning in October, the first of October, with a dry lake, the depth to water at the end of February, would amount to 6.95 inches.

MR. PORTER: You say 30,000 barrels per day would raise the water level 4 and a quarter inches per month?

THE WITNESS: Would put that much into the lake. Let me back up a little bit. We have prelimetered Mr. Sherman's map of the closing contour of the maximum depth to water that has been observed in recent months and this amounts to three hundred and forty surface acres. 30,000 barrels per day amounts to 3.87 acre feet per day and on a monthly basis, this would amount to about 4 and a quarter inches or a little less per month. Evaporation rates range from a low of 1.94 in December to a high of 8.67 in June, so going through an input discharge balance calculation or reservoir performance calculation, we have come up with a maximum depth to water by the end of February of 6.95 inches.

MR. PORTER: Excuse me, just a moment, Mr. Reed. Would you give me that December and June figure again?

THE WITNESS: Yes, sir. The evaporation?

MR. PORTER: Evaporation.

THE WITNESS: December would be 1.94, the June figure would be 8.67. Those are the extremeties.

MR. PORTER: Thank you.

THE WITNESS: Yes, sir. Beginning in March, the evaporation rate, now exceeds the input rate by a gradually increasing amount, not taking into consideration surface inflow

at all at the present time, by the end of April, the lake is now dry, and by the end of April, we have accumulated an amount equal to 319 acre feet, that would be available for future evaporation of the inflow water into the lake. Both surface inflow and ground water discharge which will continue to come in concurrently with the input of brine, we now have an amount equal to 319 acre feet, which in my opinion is adequate to take care of the total inflow both of ground water and surface water into this lake. So that at the rate of 30,000 barrels per day there is no accumulation and in an average year, from year to year of water in the lake. Similar calculations at 35,000 barrels per day, indicate defficiency or a net value totaling 89 acre feet for inflow of surface water and ground water discharge. Under these conditions, there could be a carryover of some magnitude in an average year.

Q (By Mr. Kellahin) In other words, if you raised the input to 35,000 barrels a day, evaporation would not keep up with it, is that what you are saying?

A Would not keep up with the inflow itself. It would keep up with the amount being put into the lake, but not with the inflow.

Q Now, under the circumstances you have outlined, if for example a total of 30,000 barrels per day were discharged into the lake, would that have any effect on the

hydrolic system and reverse the flow of water as you have outlined previously, where you say the water is flowing into the lake rather than out of it?

A In my opinion, it would not.

Q Under those circumstances then, Mr. Reed, in your opinion would there be any possibility of contamination of fresh water supplies in the vicinity of Lane Lake, in the event this volume of water is put into it?

A In my opinion, there would not be any possibility of contamination of ground water because I don't believe that this amount of water would begin to balance the amount of reversal of hydrolic gradient into the lake.

Q Now, you outlined some details of the situation as to the Ogallala water. Does the same situation prevail as to triassic water in the northern portion of the plat shown as Exhibit 3?

A I think not.

Q What is the situation as to the triassic, how would it be protected from any inflow of water?

A The triassic water occurs in sand at considerable greater depths than the Ogallala. The overlying material is generally considered to be an impermeable red silty clay, the fact that there is a difference presently in the water table of the triassic and of the Ogallala and of the lake,

would indicate there is no leakage from the Ogallala into the triassic. In this respect the conditions agree with other areas for which other detailed studies have been made, where we find no hydrolic communication between the Ogallala and the triassic. In only very limited areas do we find this to occur. We have substantial differences in depth to water. As a matter of fact, the triassic water in the northeast corner of Section 3, 10 South, 33 East, is of better quality than any of the other wells we have examined.

It is my judgment that the base of Lane Lake underneath the evaporate of which are unknown at the present time, but which could be of substantial thickness, is upon the triassic and it is my personal opinion that this has an impermeable bottom brine of the fact that the triassic is still of good quality adjacent to the Lake. Had there been hydrolic communication between the two, we would have had substantial different quality at this time in the wells adjoining the lake and it is my judgment that if the hydrolic system is not materially modified by the disposal of water into the lake, there will be no deterioration in the quality of water, only by completely upsetting this hydrolic system by high of the grade into the lake can we cause damage.

MR. HAYS: Mr. Reed, if you flow this amount of water into this Lake, which you are anticipating, how long

would it take for communication between this lake and the wells? How long would it take, if it is going to contaminate them, would it take for it to show up, in your opinion?

THE WITNESS: We have not run any real pumping tests of the aquafer in this area and I don't know what the permeability is, but based upon the little data that we do have, the permeability appears to be quite low and would expect the rate of movement under normal conditions at 10 or so feet to the mile of hydrolic gradient, to be less than one hundred feet per year. Now, I can't give you a figure that has any real meaning because we don't have the data to make the calculation, but I think it would be of this order of magnitude of less than a hundred feet per year. Of course, in order to do this, we don't know precisely the amount of total reversal into this Lake. We do know that it is substantial, but to the degree that the water does not rise above the depth of the Ogallala in the adjacent area, there could be no contamination, in my opinion.

Q (By Mr. Kellahin) Now, as I understand your testimony, if you put 30,000 barrels a day in that Lake, the level will not rise above the Ogallala?

A This is my opinion, yes, sir. Above the point at which it is now escaping into the Lake, above the spring elevation.

Q The spring elevations are actually somewhat above the lake bed?

A One and a half feet.

Q One and a half feet?

A Yes, sir.

Q In your opinion then, would it be a safe procedure to use the Lane Lake for disposal of salt water as proposed by Stoltz and Company?

A Yes, sir, within some limitations, yes, sir, I believe it would be.

Q Now, what limitations are you talking about, Mr. Reed?

A In my opinion, at this time, and with what we know of conditions, I think 30,000 barrels a day would be a safe figure. The amount to which this could be increased depends upon data that we do not now have and further, it would depend upon the reaction of this Lake under these conditions and confirmation of the data, and I can't say how much more can be put in. Some more probably could be put into the Lake without raising the water level to the point where pumping wells, existing pumping wells could intercept this water surface. This may be a matter of one, two, three or four feet, I can't answer the question at this time.

Q Would you be able to answer that question after

some experience with water disposal in the lake?

A And with additional data, yes, sir.

Q Would you recommend, then, to this Commission that some Administrative procedure be set up whereby the amount of water that may be disposed of in Lane Lake, could be increased at a future date in the event the Lake would take it?

A Yes, sir, I believe this would be practical.

Q And just basically, in summary, what type of data would be required to support such an application?

A Continued and periodic measurements of water levels to determine the range which they might have from month to month a nd from year to year, examination of input evaporation rate data into the lake, continued observance of springs and continued observance of the quality of water, perhaps some additional water table data would be desirable.

Q Mr. Reed, Exhibit Number 2, the twenty-five page exhibit composed of water analyses, were furnished to you by a laboratory, is that correct?

A That's correct.

Q And Exhibit Number 3 was prepared by you, is that correct, or under your supervision?

A That's correct, yes.

MR. KELLAHIN: At this point, I would like to offer in evidence, Exhibits 2 and 3.

MR. PORTER: If there are no objections, the Exhibits will be admitted.

(Whereupon, Applicant's Exhibits 2 and 3 were admitted into evidence.)

Q (By Mr. Kellahin) Do you have anything to add to your testimony, Mr. Reed, at this time?

A I believe not.

MR. KELLAHIN: That completes my direct examination. Have you completed yours?

MR. PORTER: We will take a ten minute recess.

(Whereupon, a short recess was taken.)

MR. PORTER: The hearing will come to order. Mr. Kellahin has indicated he either has another question on direct or he wants to begin the cross examination.

Q (By Mr. Kellahin) Mr. Reed, in your direct testimony, you made mention of "pan evaporation? as being the basis of your computations on evaporation from this lake. Would you give us a little more information on just how this calculation was arrived at?

A Yes, sir. The Westher Bureau has maintained what is called a "Class A Land Pan" which is a standard method of determining evaporation in three locatities in this general area. One at Portales, one at Bitter Lake and one at Lake Avalon. There are carefully controlled water surfaces from

which total evaporation rates are determined. It is customary to apply a co-efficient to the pan evaporation records ranging from seven tenths of the actual record in a large lake, to nine tenths in a small lake, which more nearly duplicates the conditions of the pan. In large lakes we customarily use seven tenths.

In the studies by the U.S.G.S. Cox and Haven's report, at Malaga Bend in the salt water diversion project on the Pecos River, they have used nine tenths because this is a small lake covering fifty-two acres of land and shallow water.

In this case with a little larger lake, but with probably shallower water, I have used a co-efficient of eight tenths of the actual pan record. The average annual evaporation from the pan of these three stations is ninety-nine inches. To that ninety-nine inches we have applied a factor. Eight tenths to correct for fresh water and .97 to correct for the lower evaporation rates of a brine of the concentration which we are here considering. This yield, a co-efficient of .776 applied to the gross evaporation from the pan records. This yields an evaporation of 76.82 inches. From this we have subtracted the rainfall to derive a net evaporation height under average conditions of 61.14 inches as the vertical height of water that would under average conditions be evaporated from a

relatively small shallow lake.

To compare this tabulation, we went to the U.S.G.S. report by Cox and Havens, their analysis of the performance of the storage area in the so-called northeast depression at Malaga Bend which has now been in operation since July of 1963. Eliminating the question of leakage from the lake, which is of some question and examining only their calculations of the net evaporation from the 52.8 acres in the northeast depression for twelve months and applying this -- I believe eleven months -- applying this on the basis of evaporation, in acre feet, per acre of surface covered to Lane Lake, we have come up with 35,509 barrels per day as representing the same degree of evaporation from Lane Lake with it's three hundred and forty acre surface, compared to the northeast depression with it's 52.8, which is very close to the fires that we derived at 35,000 barrels a day showing an availability of 89 acre feet for inflow and surface runoff.

Q As I understand, then, your figures from Malaga Bend are based on actual experience?

A Yes, they had their weather data at the site and made what I feel, are accurate calculations of the actual evaporation from the Lake.

Q And in making your calculations, you have assumed it will rain again?

A Yes, sir. I have.

MR. HAYS: Have you ever been in this Lake when it was dry?

THE WITNESS: Yes, sir, I have.

MR. HAYS: And you could walk across it?

THE WITNESS: Well, I couldn't quite walk -- I didn't think I could walk across it. I didn't try it. It was a humid day and water was right at the surface of the lake, Mr. Hays.

MR. HAYS: And the information you have given us, you have got that sixty-one inches of water on this surface, that is over four feet of water and that much water would evaporate, right?

THE WITNESS: If it were available, yes. Now the evaporation rate of the Lake under its present conditions will be substantially less than 61 inches, for the reason that during much of the year the water that is evaporated from the lake must move up by capillary action and be evaporated from the surface. We do not have a free water surface much of the year.

MR. HAYS: With all these figures and everything you have been using, and everything, four feet of water will evaporate off of that Lake in a year?

THE WITNESS: A little more than that, about five

feet.

MR. HAYS: Off the record.

(Whereupon, an off-the-record discussion was held.)

MR. PORTER: Back on the record.

Q (By Mr. Kellahin) Mr. Reed, if the 30,000 barrel figure is used and that amount of water is put on the lake, at any time, would the depth of the water be four feet?

A No, sir.

Q The evaporation would be continuous, actually it would be considerably less than that, wouldn't it?

A In my opinion, it would, yes, sir.

A Have you made a study of the red beds in this area of this lake?

Q Yes, sir.

A Do you have a map showing that?

Q Yes, sir, I do. It is a work map, I bring this only to show the amount of detail that was available for the preparation of the triassic red bed map. It is not in form to be submitted as an Exhibit but does show the density of control and the absence of control in those areas for which there is no data, but it is available to me. That is only for information purposes. We have examined the driller's logs and the elevation of each of the shot-holes for which the data was

available.

MR. KELLAHIN: That's all I have of the witness.

MR. PORTER: Mr. Reed, I am sure there will be some other questions, but at this point I would like for Mr. Hatch, our attorney, to read a letter which we have received from the office of the State Engineer and I want to ask you your opinion concerning this letter. Would you read that letter, Mr. Hatch?

MR. HATCH: It is a letter from the State Engineer's office dated May 17th, 1967. Addressed to the Secretary-Director of the Oil Conservation Commission. "I have reviewed with considerable detail an exhibit to be entered in Case 3570 made on behalf of Stoltz and Company. The exhibit is a planametric map of Township 10 South, Range 32 and 33 East, labeled "Ground Water Conditions, Lane Salt Lake and Vicinity."

"The contours representing the red bed structure to the southeast of the subject lake, indicate a channel in this direction which is overlain with more recent deposits. I feel that there may be some transmission of the brines, which will be disposed into the Lake through this channel if the application is granted. I have no criticism of the exhibit or the conclusions which the witness Ed Reed will present. However, I feel that it would be wise to require the applicant to provide one or two observation wells in Section 17, or near

that Section, drilled to the red beds and that these wells be equipped and monitored for water quality changes. By such observations, it could be readily determined if the brines from the lake are migrating southeastward into the fresh water Ogallala formation. The depth of land surface to the red beds would be approximately fifty feet. Very truly yours, S. E. Reynolds, State Engineer, by Frank E. Irby, Chief of the Water Rights Division."

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Reed, the question I wanted to ask you, what is your opinion as to the desirability of a couple of wells which will be used for the purpose of monitoring the chloride content?

A I think it would be desirable.

Q You think it would be desirable?

A Yes, sir.

MR. PORTER: How deep did he indicate those wells to be? Fifty feet or --

MR. HATCH: Well, he said the depth from the land surface to the red beds would be approximately fifty feet. I assume he means in this Section 17, that he is speaking of, but that I don't know.

MR. PORTER: Does anyone else have a question now

f Mr. Reed? Mr. Nutter?

CROSS EXAMINATION

Y MR. NUTTER:

Q Mr. Reed, how many of these water wells that are shown on this map are triassic water wells?

A Three.

Q Now, the one in the northeast corner of Section 3, you mentioned was, what are the other two, please?

A One in the southeast quarter of Section 34 and one in the east central part of Section 5 of 10 South, 33.

Q The one that has the water level of 4093?

A Yes, sir.

Q And all the rest of them are Ogallala water wells?

A I believe so, yes, sir. there is some possible question about the well in Section 16, but I believe from its water level, it is an Ogallala water well.

Q Well now, you mentioned a difference in water elevation of some 19 feet from an Ogallala water well to the water level of the seep on the southeast side of the Lake?

A Yes, sir.

Q What would that 19 feet be? Between the seep and

hich well?

A I'm sorry, it would be 28 feet. I was subtracting in my head.

Q I see.

A It would be 28 feet, Mr. Nutter.

Q It would be the well in Section 19?

A 19, yes, sir. That happens to have the highest water level of any wells we measured in the area southeast of the Lake.

Q And according to this then, the water table in the Ogallala would probably be dipping to the northwest?

A That's correct, yes, sir.

Q Now, what is holding the level of the lake bed at its present level, is it the existence of water just below the surface?

A I believe it is side inflow from the --

Q No, I mean what is holding the level of the lake bed?

MR. PORTER: You mean the water level in the lake bed?

A The physical surface of the lake bed?

Q What is holding the sand on the bottom, in other words? Is it moisture coming up from the bottom?

A In part, yes, sir. The fact that there is a

balance -- well, there is really not a balance, I believe the lake bed is probably declining.

Q As the general area declines, the lake bed would decline, would it not?

A Yes, sir, under periods when evaporation exceeds the discharge into the lake, and the top two or three inches is dry and we have windy weather, I believe there is some reudtion of the surface of the lake elevation.

Q Now, you said that there was one area on the west side where the Ogallala formation is exposed and there is a couple of cretacious sections and one triassic section shown on your map. You mentioned also, that the east side of the lake was covered with wind-blown debris, so how can you tell that seep on the southeast side of the lake would be coming from the Ogallala?

A Only by inference. The Ogallala is present south-east of the lake at some position. The water in the triassic is deeper in this position and it is either water in the surficial alluvial material of creternia age or Ogallala and I rather suspect it is Ogallala.

Q Do you suspect the Ogallala formation is presently under the surface of the lake?

A I don't believe it is, no, sir.

Q But it has all been erroded off and that triassic

rocks would underlie the alluvial sand?

A Yes, sir, I believe the cretacious has probably been removed underneath the lake, also.

Q Now, when you were calculating your evaporative rate at being approximately four inches -- when you were calculating that if you put 30,000 barrels per day in, this would be approximately four inches per month and would be covered by the evaporation. What area of evaporation were you considering, three hundred forty acres?

A Three hundred and forty acres, yes, sir.

Q Is the lake bed uniform enough on the surface that three hundred and forty acres of the area would be covered by water discharging in there at an average of four inches per month?

A There seems to be less than a foot of relief between the contour that Mr. Sherman drew on the ground and the average level out in the lake. It may be a little more, but I have assumed, to be conservative, that there was less than a foot of relief, so that there would be uniform thickness of water. This may not be quite true, it may be a foot and a half in the lowest spot which would take some of the water. It would then mean, of course, a smaller surface area exposed, but it also would mean that the same volume of water would not cover the same number of surface acres.

Q But there is less than a foot of relief throughout the lake bed?

A I think so, and Mr. Sherman has expressed the same opinion to me.

Q How thick is the sand in the lake bed?

A I don't know, it has not been tested. I suspect, based upon thicknesses we have determined in other lakes of about the same age and with the same geological conditions, that it would be measured at several feet, perhaps several tens of feet, but I can't answer the question.

Q And below this sand would be impermeable red beds?

A This is my opinion, yes, sir.

Q Now, the nearest Ogallala water well to the southeast would be this one, with the water level at 4163, Section 18 that is the top of the water in the Ogallala, isn't it?

A Yes, sir.

Q Do you know what the depth of the Ogallala or the thickness of the Ogallala is there?

A Yes, sir. The base of the well -- let me see, I believe we measured the depth of that well as being 46.2 feet. The water level was 19 feet, so that would mean --

MR. PORTER: You mean a hundred and something, don't you?

A Depths to water, I am speaking about now. Twenty-

five feet of water.

Q Twenty-five feet of water?

A I believe this is correct.

Q So, the bottom of the water then would still be higher than the lake bed?

A This is correct, yes, sir. We have taken this into consideration.

MR. PORTER: I see, thank you.

THE WITNESS: Yes, sir.

CROSS EXAMINATION

BY MR. PORTER:

Q Mr. Reed, you have testified that in your opinion, after your study, that both the surface and the ground water flows to the lake?

A Yes, sir.

Q And that the only discharge is through evaporation?

A Yes, sir.

Q Now, this would be true, I believe you state, in your opinion up to a volume of 30,000 barrels per day being put into the lake?

A Yes, sir.

Q But that something substantially above 30,000 might upset this situation?

A I don't know what the upper limit will be because

we don't have that type of data to determine.

Q But in the event the Commission should consider the granting of the application, you would recommend the exercising of caution in going above this volume of 30,000?

A Yes, sir.

MR. PORTER: Does anyone else have a question? The witness may be excused.

(Whereupon, the witness was excused.)

MR. PORTER: Mr. Nutter, were you through?

MR. NUTTER: I believe so.

MR. KELLAHIN: I would like to recall Mr. Brown briefly, if I may.

MR. PORTER: Yes, I have a question of Mr. Brown too. Would you take the stand, Mr. Brown?

J. G. BROWN, recalled as a witness on behalf of the applicant, first previously having been duly sworn, was examined and testified as follows:

Q You are the same Mr. Brown that previously testified in this Case?

A Yes, sir.

Q Mr. Brown, you testified as to the alternatives to use of Lane Lake for a water disposal as consisting of the drilling of Devonian wells for water disposal. Are there any

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-22-67 File No. C-1902-R1

on Water

Mr. Ed L. Reed Date Rec'd. 4-20-67

Mr. Ed L. Reed

Marks Lea County, New Mexico, Deane Stoltz, West side of Lake (50 ft. in from shore) Section 7-10S-33E

	Mg/L
Chloride 1:1 extract	33283
Sulfate 1:1 extract	16458

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. 9
Case No. 3570

Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES
Jack H Burton

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS AND TESTING ENGINEERS

Midland, Texas 4-28-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed

Received from Mr. Ed L. Reed Date Rec'd. 4-24-67

Identification Marks Deane Stoltz, Seep East side of lake 900 ft. South of sun dry hole, middle S.E./4, S.E./4 Section 6-10S-33E.

	Mg/L
Chloride	12,788
Sulfate	19,265
Total dissolved solids (evap.)	48,290

Copies: 3cc Mr. Ed L. Reed

Lab. No. C-2617

SOUTHWESTERN LABORATORIES

Jack H Barton

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-28-67 File No. C-1902-R1

: of tests on Water

Mr. Ed L. Reed

:d from Mr. Ed L. Reed Date Rec'd. 4-24-67

:cation Marks Deane Stoltz, Seep East side of lake 730 ft. South of sun dry hole middle S.E./4, S.E./4 Section 6-10S-33E

	Mg/L
Chloride	15,240
Sulfate	16,232
Total dissolved solids (evap.)	48,860

3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H. Barton

-2619

SOUTHWESTERN LABORATORIES
FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA
CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-28-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 4-24-67

Received from Mr. Ed L. Reed

Identification Marks Deane Stoltz, Pond below dry seeps, south end of lake S.W./4 Section 7-10S-33E.

	Mg/L
Ions of:	
Calcium	116
Magnesium	23716
Sodium (calc.)	105757
Bicarbonate	1446
Sulfate	99748
Chloride	157833
Total	388616

Hypothetically combined as:

Calcium bicarbonate	469.0
Magnesium bicarbonate	1312.7
Magnesium sulfate	116189.2
Sodium sulfate	10441.5
Sodium chloride	260203.5

Total dissolved solids (evap.) --- 399620

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Boulton

Lab. No. C-2613

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-28-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 4-24-67

Received from Mr. Ed L. Reed

Identification Marks Deane Stoltz, Lake water

	Mg/L
Ions of:	
Calcium	384
Magnesium	9923
Sodium (calc.)	80195
Bicarbonate	181
Sulfate	43907
Chloride	120696
Total	255286
Hypothetically combined as:	
Calcium bicarbonate	240.5
Calcium sulfate	1102.5
Magnesium sulfate	49069.2
Sodium sulfate	5894.5
Sodium chloride	198979.4
Total dissolved solids (evap.)	260140

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Baxter

Lab. No. C-2616

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-28-67 File No. C-1902-R1

ort of tests on Water

Mr. Ed L. Reed Date Rec'd. 4-24-67

ived from Mr. Ed L. Reed

ification Marks Deane Stoltz, water well hydrant at house, S.W./4 Section 31-9S-33E.

	Mg/L
Chloride	133
Sulfate	239
Total dissolved solids (evap.)	720

cc: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

No. C-2620

SOUTHWESTERN LABORAT
FORT WORTH DALLAS HOUSTON MIDLAND BEAU
CONSULTING, ANALYTICAL CHEMIST
AND TESTING ENGINEERS

Midland, Texas 5-11-67

Report of tests on Water

To Mr. Ed L. Reed

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Deane Stol
T9S, R33E, Stock windmill, McGuffi
Chester Skrabacz

	Mg/L
Chloride ---------	112
Sulfate ----------	132

Copies: 3cc Mr. Ed L. Reed

SOUTHWEST

Jac

Lab. No. C-2700

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 5-11-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 5-9-67

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Deane Stoltz, NW/4/NW/4 Sec. 14 T10S, R32E, Stock tank, 5-8-67, sampled by Chester Skrabacz.

	Mg/L
Chloride	21
Sulfate	74

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Benton

Lab. No. C-2597

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 5-11-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 5-9-67

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Deane Stoltz, Sec. 25, T10S, R32E, Stock windmill, 5-8-67, sampled by Chester Skrabacz.

	Mg/L
Chloride	112
Sulfate	158

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. C-2703

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 5-11-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 5-9-67

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Deane Stoltz, NE/NE/4 Sec. 3 T10S, R33E, Stock windmill, 5-8-67, sampled by Chester Skrabacz.

	Mg/L
Chloride	28
Sulfate	83

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES
Jack H Barton

Lab. No. C-2599

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 5-11-67 File No. C-1902-R1

Report of tests on Water

To Mr. Ed L. Reed Date Rec'd. 5-9-67

Received from Mr. Ed L. Reed

Identification Marks Lea County, New Mexico, Deane Stoltz, NE/SW/4 Sec. 7, T10S, R33E, Seep, 5-8-67, sampled by Chester Skrabcz

	Mg/L
Chloride ---------	12262
Sulfate ----------	6842

Copies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES
Jack H Barton

Lab. No. C-2695

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 4-22-67 File No. C-1902-R1

Water

Mr. Ed L. Reed Date Rec'd. 4-20-67

Mr. Ed L. Reed

Marks Lea County, New Mexico, Deane Stoltz, Water well tank, NE/corner, Sec. 16-10S-33E

	Mg/L
Chloride	666
Sulfate	746

Sec Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TE

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 5-11-67 File No. C-19

rt of tests on Water

Mr. Ed L. Reed

ved from Mr. Ed L. Reed Date

cation Marks Lea County, New Mexico, Deane Stoltz, Sec. 23
T 10S, R33E, Windmill, 5-8-67, Sampled by Chester S

	Mg/L
Chloride	210
Sulfate	523

3: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

Jack H Barton

-2702

SOUTHWESTERN LABORATORIES

FORT WORTH DALLAS HOUSTON MIDLAND BEAUMONT TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 5-11-67 File No. C-1902-R1

rt of tests on Water

Mr. Ed L. Reed Date Rec'd. 5-9-67

rted from Mr. Ed L. Reed

ication Marks Lea County, New Mexico, Deane Stoltz, Sec. 33, T10S, R33E, Windmill, 5-8-67, sampled by Chester Skrabacz.

	Mg/L
Chloride	140
Sulfate	262

pies: 3cc Mr. Ed L. Reed

SOUTHWESTERN LABORATORIES

No. 3-2727

R. 32 E

R. 33 E

T 10 S

WL 4160

WL. 4259±
Cl. 21
SO_4 74

WL. 4157±
Cl. 112
SO_4 132

WL. 4136
Cl. 28
SO_4 83

WL. 4189
Cl. 133
SO_4 240

WL. 4093
Cl. 49
SO_4 83

Cl. 120,696
SO_4 43,907

Cl. 15,240
SO_4 16,232

Cl. 12,788
SO_4 19,265

El. 4141
1:1 Extract
Cl. 33,283
SO_4 16,458

WL. 4142.5
Cl. 12,262
SO_4 6842

Cl. 157,833
SO_4 99,748

Brines: Cl. 28,904
SO_4 517

Cl. 31,737
SO_4 452

WL. 4165
Cl. 666
SO_4 746

WL. 4159?
4182?

Cl. 1654
SO_4 3091

Cl. 322
SO_4 419

WL. 4163
WL. 4164
Cl. 154
SO_4 371

WL. 4170
Cl. 182
SO_4 394

WL. 4168
Cl. 42
SO_4 162

WL. 4165
Cl. 196
SO_4 439

WL. 4158
Cl. 210
SO_4 523

WL. 4157
Cl. 112
SO_4 158

WL. 4175
Cl. 91
SO_4 285

WL. 4166
Cl. 154
SO_4 291

TOP OF TRIASSIC

WATER TABLE CONTOURS

GROUND WATER CONDITIONS
LANE SALT LAKE AND VICINITY
LEA COUNTY, NEW MEXICO

LEGEND

- Domestic or stock well
- WL4160 — Sea level elevation of water table
- Cl. 154 — Chloride ion concentration, mg/l
- SO_4 394 — Sulfate ion concentration, mg/l

SCALE

0 1000 2000 4000 6000 8000 10,000 FEET

4-67

Ed L. Reed
CONSULTING HYDROLOGIST