NEW MEXICO OIL CONSERVATION COMMISSION

COMMISSION HEARING

SANTA FE, NEW MEXICO

Hearing Date APRIL 10, 1986 Time: 9:00 A.M.

Continued From 4/9/86

NAME	REPRESENTING	LOCATION
R.W. Abbott	Petro-Thermo Corp.	Hobbs, N.M.
W.G. Abbott	AGUA	Hobbs
Daniel B. Stephens	Petrothermo	Socorro NM
JAMES D. THORNTON	AGUA, INC.	HOBBS, NM
John Paul Weber	Maddox, Renfrow / Sanders	Hobbs, NM
Francis R Cherry	BLM	Roswell NM
C. KENNEDY	INDEPENDENT	ALBQ, N M.
Michael E Stogner	OCD	Santa Fe, NM
Bob Huber	Bynum	Santa Fe
Eddie Seay	OCD Hobbs	Hobbs, Fe
ROBERT H LANE	NEW MEXICO POTASH CORP	HOBBS
W T Kellahin	Kellahin & Kellahin	Santa Fe

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

10 April 1986

COMMISSION HEARING
VOLUME 1 OF 2 VOLUMES

IN THE MATTER OF:

Application of Petro-Thermo Corporation for an exception to Division Order R-3221, Lea County, New Mexico. CASE 8781

BEFORE: Richard L. Stamets, Chairman
Ed Kelley, Commissioner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

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E X H I B I T S

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MR. STAMETS: The hearing will come to order.

We'll call Case Number 8781.

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

MR. STAMETS: Call for appearances.

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

I appear today on behalf of Petro-Thermo.

MR. KELLAHIN: Mr. Chairman, I'm Tom Kellahin of Santa Fe, New Mexico, appearing in association with J. W. Neal of Hobbs.

We are representing Snyder Ranches and Pollution Control, Inc.

MR. STAMETS: Any other appearances?

How many witnesses will we have

today?

MR. WEBER: Sir, Petro-Thermo Corporation has four witnesses to be sworn.

MR. KELLAHIN: I anticipate having two witnesses, Mr. Chairman.

MR. STAMETS: And are all those present now?

MR. WEBER: Yes, sir, they are.

MR. STAMETS: Will they all stand and be sworn at this time.

(Witnesses sworn.)

MR. KELLAHIN: Point of inquiry, Mr. Chairman.

I recognize that there is a gentleman from the BLM here. Perhaps the Chair could inquire as to whether or not he wants his testimony under oath or if he proposes to make some statement at the conclusion of the case.

I have not talked to the gentleman; I do not know.

MR. CHERRY: The gentleman just proposes to read a prepared statement that we've prepared on the situation.

MR. STAMETS: Thank you.

MR. WEBER: Sir, if I might inquire further into this matter. Will we be afforded the opportunity to question the representative from the Bureau of Land Management with regard to this statement?

MR. STAMETS: Well, let's wait till we get to that --

MR. WEBER: Very fine, then.

MR. STAMETS: -- and we'll see what he has to say and whether or not there are any questions (not clearly understood.)

Mr. Weber, you may proceed.

MR. WEBER: Sir, if I might begin with a preliminary statement.

May it please the Commission, Petro-Thermo Corporation appears today in this hearing de novo to apply for an authorization to dispose of produced water and associated oilfield waste in unlined pits adjacent to Laguna Plata, a naturally occurring salt lake in Section 16, Township 20 South, Range 32 East, in Lea County, New Mexico.

We appear in support of the Division Director's order of February 13, 1986, and we would request that the Commission take administrative notice of the order, the transcript of the Examiner Hearing held on

December 18, 1985, and all exhibits attached thereto.

Petro-Thermo Corporation is prepared today to demonstrate that there is a substantial need for an additional approved disposal site in southeast New Mexico.

At the outset it must be recognized that there are only a limited number of such sites where disposal will not constitute a hazard to existing fresh water supplies. Petro-Thermo Corporation has gone to great length to locate such a site, a site suitable for its proposed disposal facility.

In searching the decisions and orders of the Division and Commission it has discovered a considerable body of support for the siting of its facility in this area or reginal sink west of Hobbs, where are found a number of naturally occuring salt lakes.

The formations underlying this regional sink, underlying the salt lakes, are virtually impermeable and effectively seal off the salt water from existing supplies of fresh water.

We would request that the Commission take administrative notice of certain of these orders, the first being Order No. R-3221-B in Case Number 3806, dated July 5th -- 25th, rather, 1986.

By that order the Oil Conserva-

tion Commission exempted certain areas in Lea County, New Mexico, from the prohibition against the disposal of production water in unlined surface pits.

We should point out that the proposed site of Petro-Thermo Corporation's disposal facility is located within that exempt area.

We would also ask that the Commission take administrative notice of Order No. R-3725 in Case Number 4047, dated April 16, 1986.

By this order the Oil Conservation Commission specifically permitted the disposal of produced water in the natural salt lake known as Laguna Plata. Once again, Laguna Plata is immediately adjacent to the disposal site proposed by Petro-Thermo Corporation.

We would also request that the Commission take administrative notice of Order No. R-3725-A in Case 8292, dated August 20, 1984.

By that order the Division authorized the disposal of oil field waste products, including drill cuttings, drilling mud, in the vicinity of the nearby salt lake known as Laguna Gatuna in Lea County, New Mexico.

Petro-Thermo Corporation is also prepared to demonstrate that it is uniquely qualified to understake a project of this nature and that it has a strong

financial incentive to recover the maximum amount of valuable hydrocarbons which would otherwise be waste and which might otherwise pollute the environment.

Petro-Thermo Corporation is a common motor carrier operating under a Certificate of Public Convenience and Necessity issued by the State Corporation Commission. It routinely engages in the transportation of oil field related liquids in counties throughout southeastern New Mexico.

Of particular note, however, is its Agua Division. Agua Division is engaged primarily in the reclamation of valuable hydrocarbons which would otherwise be wasted.

They propose to use this facility in conjunction with that reclaiming operation to further prevent waste.

Petro-Thermo Corporation is also prepared to demonstrate that it has gone to extraordinary lengths to designa disposal facility which will not only permit the reclamation of these valuable hydrocarbons and thus prevent waste, but will also provide significant protection to the environment. We believe that this facility, as the plans have been revised to improve various monitoring procedures, will stand as a model for future disposal (inaudible).

That ends my preliminary statement.

MR. KELLAHIN: Mr. Chairman, on behalf of Snyder Ranches and Pollution Control, Inc., I have a brief statement of my clients' respective positions in this case.

Pollution Control is operated by Mr. Larry Squires. Pollution Control is a produced wate disposal facility at Laguna Gatuna. It's shown on one of the exhibits that's on the plat that shows the area.

Laguna Gatuna is also a repository for solid waste produced in the oilfield operations.

The laguna that's the subject of this hearing is the one farther to the west. It's the larger one to the northwest, identified as Laguna Plata on that exhibit.

Mr. Abbott and Petro-Thermo propose to establish a surface disposal facility for waste products produced out of oil and gas operations. It is our understanding that the facility is to dispose of produced water in unlined pits.

We believe the evidence will show, and we are prepared to prove, that there are significant differences between Gatuna and Plata in terms of the hydrology. We are in a position to prove that there is a

significant environmental risk with regards to the utilization of the surface that Mr. Abbott proposed to use. We believe that there is no need or necessity for this facility that Mr. Abbott proposes to install.

We believe that there will be an unreasonable, excessive waste of the surface.

We believe that the design and proposed operation of this faciity is inadequate and it poses a significant risk to approve this facility.

We believe that under the circumstances, once the evidence is all in for you, that you will have no other choice but to deny the application based upon significant differences between the two hydrologies of the two properties.

In addition, I believe the principal concern of Mr. Abbott is that there is a need. We believe the need does not exist. It does not offset the environmental risks that were exposed in this case.

That is our position in this case.

With regards to Snyder Ranches, Snyder Ranches has a valuable proporty interest immediately adjacent to the Petro-Thermo site. They are the Federal grazing lessee adjacent to that property. There are valuable grasses. They run cattle in this area; that the effect

of disposing of produced water on the surface, we believe, will migrate beyond the control of this operator and it will pollute and condemn a significant amount of the surface from any other use.

We believe the risks are significant and that is our position with regards to the ranching operation.

MR. STAMETS: You may proceed, Mr. Weber.

MR. WEBER: Sir, if I may call Dr. Dan Stephens as our first witness.

DANIEL BRUCE STEPHENS,

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

DIRECT EXAMINATION

BY MR. WEBER:

Q Dr. Stephens, will you please state your full name?

A Daniel Bruce Stephens.

Q And where do you reside, sir?

A Socorro, New Mexico.

Q And in what capacity are you presently employed?

A I have a consulting business that I am working on this project through.

Q And what is the name of that consulting business?

A It's Daniel B. Stephens and Associates, Inc.

Q And how long has this business been in business?

A We've been doing consulting since 1979.

Q And from what institution did you receive your undergraduate degree?

A Penn State University.

Q And what was your specialty or area of concentration?

A Geological science.

Q Were you singled out for any particular honors?

A I received an award for being an outstanding senior that year in the college.

Q And from what institutions did you receive your graduate degree?

A Masters degree in hydrology at Stanford and a PhD in hydrology at the University of Arizona.

Q Are you a member of any professional organizations and if so, what are they?

A Yes. American Geophysical Union, Soil Science Society of America, American Association of Groundwater Scientists and Engineers, Sigma Xi, a scientific society.

Q Have you been published in any scientific or technical journals?

A Yes. Published a dozen or more articles in scientific journals.

Q Have you delivered any papers at scientific or technical meetings?

A Dozens.

Q If you had a single specialty, what would that specialty be?

A Hydrogeology and seepage problems.

Q Have you had any practical experience in investigating seepage problems and hydrogeology in the State of New Mexico?

A Yes. I've had several clients request this service of us in the high plains area; particularly one project near Clovis; done this sort of consulting work for the State of New Mexico Environmental Improvement Division.

Q Have you ever had occasion to testify before the Oil Conservation Division?

A Yes.

MR. WEBER: Sir, at this point

I would like to tender Dr. Stephens as an expert hydrologist.

MR. STAMETS: Without objection he will be considered qualified.

Q Dr. Stephens, have you ever had an occasion to prepare a complete hydrology report?

A Yes.

Q Have you had an opportunity to study the hydrology of those tracts of land identified by Petro-Thermo Corporation as its proposed disposal site?

A Yes.

Q Did you have an opportunity to review the revised engineering plans presented by Mr. Jim Thornton?

A Yes.

Q In beginning your study of this area, what research materials did you consult?

A Our study was principally a literature review of publications in the general area. These publications included studies by Nicholson and Klebsch and several reports by GeoHydrology and Associates, Consultants.

We also looked at available data from the New Mexico State Engineer, from the U. S. Geological Survey.

Q What were the materials you reviewed from GeoHydrology Consultants?

A There were two reports that they prepared

for the Bureau of Land Management in 1978 and 1979 and a third report, which was prepared for Pollution Control, Inc. in July, 1984.

Q Did you have an opportunity to personally visit the proposed disposal facility site?

A Yes.

Q Have you prepared a report documenting your findings and conclusions with regard to the hydrology study that you undertook?

A Yes, I have.

Q I show you now what has been marked as Exhibit Number Nine and ask you if you can identify that?

A That's the report that was prepared by my firm.

Q Would you please for the Commission describe the hydrogeologic conditions in the vicinity of the proposed disposal site?

A The aquifers, or water-bearing units, which are of interest in this -- in this area are those which lie above the Permian section. Generally these are redbed formations. The lower unit would be the Dewey Lake; then there is the Santa Rosa sandstone, and overlying that is the Chinle shale.

The Santa Rosa sandstone is a water-bearing unit, the primary water-bearing unit in the area. It is

not widely used because its quality is variable and often not adequate for most drinking water purposes. The yields in wells are relatively low making it a poor source for irrigation water, and expensive development.

The depth to water beneath the site is approximately 20 feet. Groundwater flows from the site northward toward Laguna Plata and most of the groundwater is in the shallow redbed formations. We see very little water in the alluvium. Alluvium water is apparently discontinuous and confined to relatively local areas.

Q Could you expand your view to the regional area, the naturally occurring salt lakes, and any collapse features that --

A Yes. The salt lakes, Laguna Plata, and the surrounding salt lakes, appear to lie within a collapse feature caused by dissolution of salt in the Permian Section. As a result of that collapse the redbed formations have a local slope to them at the site to the north and collapse structures control this slope of the redbed surface towards the Laguna Plata area.

The groundwater at shallow depths appears to flow towards Laguna Plata, which is a regional groundwater discharge area.

At greater depth there's poor data available to characterize the hydrologic system; however, one can

say that there appears to be a tendency for water levels at shallow depths to be greater than those at greater depths.

The Nicholson and Klebsch report indicates groundwater at the greater depths appears to converge towards Laguna Plata.

Q Now you mentioned movement of water to the Laguna Plata throughout this regional sink. What is the reason for that movement?

A Laguna Plata, being perhaps the lowest of the -- in elevation of the major collapse features and associated lakes, controls the movement of water from higher elevations to lower elevation. As evidence for this, the number of springs on the bank of the west and east sides of Laguna Plata, indicating that at shallow depths there's discharge.

The water level contour maps also indicate that groundwater flows towards Laguna Plata.

Q Would groundwater flow, say, from the vicinity of Laguna Gatuna towards Laguna Plata?

A Yes.

Q Please describe the underlying Triassic redbeds and their relationship with the naturally occurring salt lakes in this regional collapse feature.

A Total thickness of the redbeds is at 700-5800 feet thick. These redbeds consist of interbedded sand-

stones in the Santa Rosa, mostly sandstone.

Overlying that is the Chinle, which is a claystone, siltstone, with some sandstone. The sandstones in the -- in the Chinle are probably discontinuous; that is, they do not extend over one -- excuse me, one individual layer does not extend to a great -- cover a great area.

The redbed surface slopes towards the north at the site and slopes towards Laguna Plata and other areas surrounding the site.

Q Do these Triassic redbeds underlie all the naturally occurring salt lakes?

A Yes.

Q Are they generally considered to be virtually impermeable?

A That's a phrase which has been attributed to the redbeds because of the preponderance of claystone materials which occupy the Chinle especially.

Q Does this general characteristic prevent seepage into sand stringers which may underlie Laguna Plata and these other naturally occurring salt lakes?

A The low permeability of the claystones coupled with their -- with their gentle slope towards the north would enhance the lateral movement of seepage towards Laguan Plata.

Q Have you had an opportunity to investi-

gate the quality of water in the sands or the salt springs as well as in Laguna Plata itself?

A Available data indicate that the springs which discharge into Laguna Plata contain high concentrations of chlorides, which indicate that the water would not be suitable for drinking purposes and available data in the sandstone stringers in the redbeds indicate that the quality of water is variable.

Shallow wells, which may communicate with some of the alluvium in places could have good quality water. In general, the area is not known to be a water-producing area. To the best of my knowledge the redbeds are not considered to be major aquifers.

Q Have you sampled or had sampled the water quality in Laguna Plata?

A The water quality in Laguna Plata is such that the concentration of chlorides and salt is perhaps an order of magnitude more saline than sea water.

Q What do you mean by an order of magnitude more saline?

A Ten times more concentrated, approximately.

Q Based upon your study and your inspection, have you been able to form any opinion regarding the reasonably foreseeable beneficial use for the waters of La-

guna Plata?

A It's my opinion that there's no likely change in the use of water at Laguna Plata at the present time.

Q What is the surface area of Laguna Plata?

A Approximately two square miles.

Q And have you been able to calculate the evaporation rates?

A The evaporation rates are based on data determined by Geohydrology Consultants in an area to the west in the vicinity of the potash mining district and the rates of evaporation range from, perhaps, 20,000 to 350,000 barrels per day, depending on the season.

Q How does this compare with the proposed utilization rates as they have been presented to you?

A The proposed average sustained rate of disposal into the ponds would be on the average approximately 60 times less than the average rate of evaporation.

Q Now, have you had an opportunity to study those detailed plans prepared by Mr. Jim Thornton?

A Yes.

Q If you can explain the hydrologic effect of the proposed manner of disposal of produced water, if you would, please.

A The water will be disposed into a series

of five unlined ponds which have berms to create an impounded area.

Water will seep from those ponds into the underlying sandy soils which cover the area to a depth of perhaps several -- to 10 or 20 feet.

Water would then mound on top of the redbed, low permeable formation and move laterally off site toward Laguna Plata.

Q What would be the effect of this seepage through the alluvium insofar as materials are concerned?

A The water which would be disposed into the pits would be containing some amounts of hydrocarbon. Floating hydrocarbon would be skimmed off and recovered for recycling.

Other hydrocarbons, which may enter the soil, could become filtered through the soil. They could be degraded by biological processes. They could be vaporized in route and diminished in concentration because of dilution.

Q Have you had any conversations with employees of the Oil Conservation Division with regard to monitoring any possible contaminants in the seepage from the pits?

A Yes, I've spoken with Mr. Dave Boyer, an hydrologist on the staff, and he and I agreed that a

monitoring plan for groundwater seepage is appropriate, and I believe Mr. Thornton will explain the locations and construction details of those monitor wells. I believe those monitor wells will adequately determine the arrival time of seepage which would be moving on top of the redbed formation and would be sampled periodically for determining organic chemical concentrations and serve as a means by which the Oil Conservation Division can determine whether or not the system is properly functioning as designed.

Q You mentioned arrival times. Have you made any calculation of arrival times based upon seepage from the pit location to Laguna Plata?

A I guessed at a rate of travel to Laguna Plata. I would not do any more than indicate that it's a very rough, rough calculation, but it could be on the order of several, maybe 8 years. It depends on the exit point of the seepage whether or not the seepage moves into an arroyo that happens to intercept the mound which develops underneath the ponds. If that occurs, then the travel time would be shorter.

Q Now, in your inspection of the site did you notice any indication of drilling activity through -- throughout the perimeter of Laguna Plata?

A There's a number of wells in the area, drilling pads, well casings, roads going to the abandoned

sites, yes.

Q Have you been able to make any estimate of the possible contamination of Laguna Plata from seepage from reserve pits?

A I would say that during the time that pits were used for drilling operations there would be expected to be seepage through the soil moving downward along the redbeds towards Laguna Plata. The extent of that I have not analyzed.

Q Assuming that Pollution Control operates a facility at Laguna Gatuna and it discharges hydrocarbons directly into the waters of Laguna Gatuna, what would the flow of any contaminants be from Laguna Gatuna?

A It's my understanding based on previous studies that water would move from Laguna Gatuna westward toward Laguna Plata.

Q Based upon your study and your inspection, have you been able to formulate any opinion regarding the effect of any discharge from the proposed disposal site on the waters of Laguna Plata?

A It's my opinion that the hydrologic regimen in the vicinity of Laguna Plata is in many ways very similar to that at Laguna Gatuna. A study which I referenced earlier that was done for Pollution Control indicated that after fifteen years of operation there was no signifi

cant hydrologic impact to that lake. Based on that analogy, it's my opinion that after fifteen years of operation in an operation in which there would be some seepage through soil and skimming of hydrocarbons, that the impact would certainly be less.

Q Is there any other monitoring means that you might suggest to absolutely avoid any possible --

A After seepage is detected by the monitor wells, it would be a prudent idea to monitor the quality of water in Laguna Gatuna itself and the associated salt deposits which may be mined on Laguna Plata's shoreline, thereby establishing a baseline data network for which we can measure any impacts in the future.

Q In conclusion, based upon your study and outside inspection, have you formed an opinion as to whether the discharge water and solids could move in the subsurface in such a way as to commingle, in the reasonably foreseeable future, with an uncontaminated source of water supply and thus impair its use?

A It's my opinion that seepage from the impoundment would not degrade fresh water supplies in the area anywhere.

Q Thank you.

MR. WEBER: I have no further questions.

MR. STAMETS: Are there questions of this witness?

MR. KELLAHIN: Yes, Mr. Chairman.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Stephens, you've referenced Exhibit Number Nine in this hearing as being the hydrogeologic report that you have prepared for Petro-Thermo.

Is this the identical report that you submitted to the Division at the Examiner Hearing on December 18th of '85?

A Except for the cover, that's correct.

Q All right. There have been no amendments, changes, deletions, revisions, other than changing the cover?

A No, not that I'm aware of.

Q Let's turn to page 12 of your report, Mr. Stephens.

In the approximate center of the plat there is a word "site" and there is an arrow identifying a rectangular shaped area to the south of Laguna Plata. Does that reference the proposed disposal facilities?

A Yes.

Q You said you've examined Mr. Thornton's detailed proposed plans for that facility. Can you tell me what the surface acreage area is that this facility will utilize? How many acres are involved?

A Excuse me, do you refer to the pits or the entire pad, the boundary of the area?

Q Let's first talk about the boundary of the area.

A May I?

Q Certainly.

A As I recall, it's on the order of 60 to 80 acres. I don't remember exactly the boundary of the property that they're trying to lease.

Q From the -- from the edge of the facility to the Laguna Plata, I believe your report has indicated to us it's approximately .15 miles.

A Approximately.

Q Is that correct?

A Approximately.

Q You've walked this area out there on the ground, have you, Mr. Stephens?

A Yes.

Q Okay. Is there a distance between the facility on the north side and the southern edge of the Laguna Plata that will not be within the outer boundary of the

facility?

A I'm sorry.

Q All right, what I'm trying to ask you, is the outer boundary of the facility as shown on the exhibit contiguous with the lake edge, or is it not? Or do you know?

A The Tract A, I believe, is very close to the shoreline. It's my understanding that the sites of seepage will be in the southernmost part of Tract B.

Q With regards to the surface area of the disposal pits, do you have a surface area calculated for those pits?

A For the five -- five pit areas which will be the primary receivers of liquids, the surface area is approximately 30,000 square feet.

Q Mr. Weber asked you if you knew what the proposed average sustained rate of disposal at the facility was in relation to the evaporation rate at Laguna Plata, and you said that it was 60 times less, the disposal volume was 60 times less than the evaporation rate at the Plata?

A Approximately.

Q What is the average proposed, sustained disposal rate in barrels on a daily basis that you've been working with?

A 2,250, I believe, is the number. That

would be from all three; 2,250 barrels per day is anticipated under average, sustained conditions. That would be for all three types of waste; approximately 88 percent of the waste total would be the liquids which would go into those first five ponds.

Q Is the rate of evaporation at the surface of those pits such that by evaporation you can dispose of that volume of liquids?

A No.

Q So this is not intended to be an evaporation means of removal of the liquids.

A No.

Q If I understand your report, the system is designed based upon your opinions that the -- it will be an infiltration disposal system.

A Correct.

Q Whereby the liquids will be placed in the pit; they will seep into the area below the surface to different points and then they will migrate, as you've told us, towards Laguna Plata at some particular rate.

A That's the design which has been indicated to me.

Q And that the liquids then would migrate and eventually be discharged in Laguna Plata where they're subject to evaporation.

A That's correct.

Q In terms of establishing some background analysis, Mr. Stephens, have you taken any chemical analysis of the water that exists in Laguna Plata now?

A There have been chemical analyses done, I believe as recently as February by Mr. Boyer of the Oil Conservation Division, which I saw yesterday and I believe indicated that the concentration of chloride was approximately 170,000 milligrams per liter, which is slightly less than what was indicated from a previous sampling.

Q Did you take any sampling yourself in preparation of this report?

A No, I did not.

Q Does your report constitute a complete hydrology report on this subject?

A What do you define as being a complete hydrology report?

Q Mr. Weber asked you earlier had you done complete hydrology reports and you said yes, and then he went on to ask you about your report here.

What is a complete hydrology report in terms of what you've done?

A This is a complete hydrology report based on available information.

Q Have you conducted any field tests to

determine the depth and the permeability of the soil underlying the pit are down to the redbeds?

A No field work was done with the exception of inspecting an arroyo which transects the sections, and at that time I estimated the thickness of sandy alluvial materials, which I walked on, to be as much as 20 feet. No confirmation borings were done for this particular project on site.

You said you had made some rough guesstimates on the arrival time of the discharged fluids from the facility to Laguna Plata and you were guessing anywhere from 10 to 8 years?

A No, I said several to 8 years, perhaps.

Q I'm sorry, you did say several to 8 years. All right. How would you as a hydrologist go about establishing to a reasonable scientific probability how long that rate will be?

A I guessed based on water movement and sandy materials that it could be as much as 100 feet per year, and that is an estimate.

Q To remove the guess from it, Mr. Stephens, what would you do in terms of gathering additional data or doing field studies to give you a reasonably accurate number for the rate of movement?

A One would determine the NC-2 water con-

tent and permeability of the formation and evaluate the velocity of groundwater travel from the pit to the point of discharge.

Q And in order to accomplish that study how long do you estimate it would take to do that kind of work?

A For me to go out and do the necessary field tests, establish the thickness of the saturated -- or excuse me, the thickness of the sandy surficial materials, probably could be done within 30, 30 days to complete a report and field investigation.

Q In terms of the chemical analysis that you saw from Mr. Boyer's report or study, did the chemical analysis test for the presence of hydrocarbons in Laguna Plata?

A Not to my knowledge.

Q Do you know, sir, from available information and literature whether or not Laguna Plata contains any hydrocarbons?

A No, I do not.

Q Let's turn to the next page of your report, which is page 13, and would you identify what Figure 3 is on page 13?

A Figure 3 is entitled Water Level Elevations and Depths to Water.

Q Is this the information you used to reach

the conclusion that the discharged fluids would seep and migrate towards Laguna Plata?

A This information and that which exists in the reports upon which this is based.

Q In looking at the contour line that intersects the site at the 3450 interval, do you find that?

A Yes.

Q All right, sir. And then the next contour to the north and west is a 3440 contour line.

A Correct.

Q All right. Am I correct in understanding that you have concluded that the fluids will migrate at right angles to those contour lines?

A I think it's fair to say that the water level elevations are poorly defined along that south boundary, but based on field inspection I would say that water will move to the north towards the lake. It may be that the equipotential lines shown here indicate discharge to the very north -- excuse me, to the very west end of Laguna Plata, but in essence discharge would go into the Plata itself.

Q You've told us that you believe that the discharge fluids would percolate or migrate generally vertically down to the redbeds and then move horizontally generally toward the Plata?

A Primarily that will be the preferred path.

Q Can you tell us based upon what you know now what will be the area of influence or saturation around these pits?

A I have not done that calculation.

Q Can you tell us within a reasonable probability that these discharge fluids in fact are going to migrate off the facility site, the outer boundary of this site?

A I would say that the primary path will be to the north from Tract A towards Tract B. The property boundary, or lease boundary, I'm not that familiar with. I can tell you that it's my professional opinion that the center of mass would move northward and what the lateral extent would be, and whether or not that's off the lease, I don't know at this time.

Q How would you as a hydrologist making that type of study? How would you go about investigating where the water would migrate?

A During operations, sir?

Q Well, at any time. I assume you'd have to do it during operations.

A One could predict before that --

Q Ah, well, how would you --

A -- if there was a groundwater mound, perhaps.

Q How would you predict?

A Based on field studies that you had suggested. One would have to use a very sophisticated computer code to estimate what was likely to occur in terms of lateral migration. The expense of that could be considerable and the data would have to be rather extensive to justify the result. So --

Q Is there any field --

A -- operations on the other hand, one could use the monitor wells. Two monitor wells are in place and those will be presented subsequently. A third monitor well is in the plan to be located at a site designated with the cooperation and approval of Oil Conservation Division personnel and a field inspection of all parties.

Q So there is an alternative method other than actual field operations by which a person of your qualifications and experience can make studies and reach conclusions about the probable migration of these fluids before we start the disposal.

A It can be done. It's not normally part of a geotechnical investigation of this nature.

Q The infiltration system that you have discussed here for us, does that take into any consideration

the potential impact or effect that having these particles suspended in the discharge water becoming a barrier or clogging the filtration system?

A That's a maintenance, an operational maintenance problem which undoubtedly will occur. It's my understanding that the water can be shut off or shifted to other ponds while one pond is being dried and raked to enhance the permeability of the foundation material.

Q Have you made any studies or conducted any procedures to aid Mr. Thornton in determining how often he has to maintain those pits?

A No.

Q How will the direction and rate of flow, Mr. Stephens, be affected by these materials that would accumulate on the bottoms of the disposal pits?

A The rate of seepage would be smaller than there would occur if there were no clogging layer, and as a result the impact to the seepage would be diminished.

Q You said that perhaps one of your areas of specialties or expertise is the seepage of fluids through different and various soils?

A Yes.

Q Have you conducted hydrogeologic studies of -- for other people with regards to the disposal of hydrocarbon waste?

A Yes, sir.

Q And where has that occurred, Mr. Stephens?

A The one project, that was in the Clovis area, where the discharger was placing effluent in an unlined surface depression. It was more saline water rather than hydrocarbon of this nature, although there was some hydrocarbon associated with it. It was primarily not a hydrocarbon waste disposal problem.

Q Mr. Stephens, do you know whether or not there is any relationship between the 30,000 barrels of fluids a day disposal rate set forth in the Examiner order, any relation that number has to the proposed anticipated use of 200 -- I'm sorry, 2,250 barrels a day?

A I've no knowledge of why those numbers were selected.

MR. KELLAHIN: May I have a moment, sir?

MR. STAMETS: Do you have any additional questions, Mr. Kellahin?

MR. KELLAHIN: Thank you, Mr. Chairman.

Q Mr. Stephens, if we could turn to page 14 of your report, sir, you report in the first full paragraph that the proposed waste disposal site is situated within

about .15 miles of the south shore of Laguna Plata. I calculate that to be about 800 feet.

A That sounds about right.

Q All right?

A Yes, sir.

Q If I understood from looking at the surface topo map that the surface disposal pits are going to be higher in elevation than the topography as it approached the lake.

A That's correct.

Q All right. If this fluid, this contaminated waste water, is close to the surface it's not going to be compatible with any of the vegetation in this area, is it?

A No.

Q And if the adjoining properties owners off-site of this site don't want this water near their surface or under their surface, do you see any geologic or hydrologic way to stop it?

A There are engineering designs which could be placed to minimize such a lateral movement of seepage but under present conditions there would be water movement from the pits towards Laguna Plata to the north.

Q Wouldn't it be -- we're using the Plata as the place of evaporation, Mr. Stephens. Isn't it just as

feasible to design a disposal facility with some lined pits, separate out what solids you could, skim off the oil, and lay a pipeline and put it in the lake? Wouldn't that be more effective?

A Putting the water directly into the lake without lined pits would probably be effective also.

Q Do you know any reason why this facility is not sited directly at the lake?

A It's my understanding that the engineers were concerned about the environment and tried to maximize the natural processes that could diminish the impact to the lake by allowing slow movement of water through the soil rather than direct discharge.

I believe that they are sincere in trying to make best use of the subsurface for the disposal. The operation could be run by direct discharge into the lake and that would just make the impact, whatever impact, if any, to the lake occur more quickly.

Q But the mechanism of filtration is not simply confined to the facility itself but will involve the subsurface of other owners.

A I don't know what other owners. I'm sorry, I don't know the land ownership status.

Q Well, apart from the ownership, the site the facility, the 60 or 80 acres we've identified --

A Yes.

Q -- is in a different location from the actual Plata itself.

A Yes.

Q There's some distance between the two.

A Yes, yes, yes.

Q All right. Whoever has that area between the two, that property is going to be subject to being used as part of this filtration mechanism.

A That's correct, and it's my understanding that most of all this area you are concerned about would be part of the lease.

Q Does -- does that include Laguna Plata itself? Do you know?

A I believe the northern end of Tract A may include part of Laguna Plata. It depends on what the shoreline elevation position is, how much is actually on Tract A, to the best of my knowledge.

Q Well, the point is that there is no way to restrict the contaminated water to whatever portion of the lease facility that Petro-Thermo has the ownership of.

A If it were piped directly into the lake you could be certain that the pipeline could be laid on the lease.

Q All right. Under the proposed plan for

disposal, the one that Mr. Thornton's prepared --

A Yes.

Q -- then there is no geologic barrier. There is nothing to keep that water, the contaminated water, within the facility itself.

A That's correct.

Q Nothing further.

CROSS EXAMINATION

BY MR. STAMETS:

Q Dr. Stephens, have you -- you said you've examined this area, are there any indications of any fresh water in the immediate vicinity of these -- to the proposed disposal site?

A No, sir. All the records that I've been able to look at indicate that potable water is generally not available.

There are different definitions of fresh water that one can impose and (not understood clearly) under definition of fresh water you could say that there is fresh water and you could say that there is no fresh water. It depends on what you are willing to drink, but the water is generally poor, as evidenced by the fact that almost all the water that's used for domestic purposes in the area is piped in from miles and miles away at great expense.

If there were potable water at shallow depths, or even at deep depths, where they've drilled to several hundred feet, I'm certain it would be used on site from the aquifers rather than piped in.

Q In the area that you expect to be impacted by this disposal, would you anticipate there would be any water having total dissolved solids of 10,000 parts per million or less?

A In the aquifers, or -- I'm sorry, --

Q In the area that you expect to be impacted by this disposal; that would be in the subsurface under the -- under the site, where the water might reasonably be moving on its way to west.

A The spring that was sampled by -- I believe Dave Boyer sampled the nearest spring which we expect may be a point of discharge and as I recall, there were 17,000 parts per million at that spring, which is the shallowest water that I know of that discharges into the lake.

At depths up dip in the redbeds, there is lower concentrations, concentrations less than 10,000, but where the groundwater apparently discharges nearest the site of springs, it's 17,000, to the best of my knowledge.

Q So you don't anticipate water having TDS of 10,000 or less to be impacted.

A Not -- not to a significant extent. I

don't know whether there is -- the best we know, the redbeds confine the water to move laterally. The water quality below the site is probably of very poor quality because of the springs and the hydrogeology is couched with many uncertainties and it's my opinion that there will be no water used in the site in the future which could be impacted and that water concentration would probably be unpotable.

MR. STAMETS: Any other questions of the witness?

MR. KELLAHIN: I'd like to pursue the question you just asked, Mr. Stamets.

RECROSS EXAMINATION

BY MR. KELLAHIN:

Q Looking on Exhibit Number Twelve, Mr. Stephens --

A Exhibit?

Q I'm sorry, Figure 2 on page 12.

In Laguna Plata there are identified historically certain springs that show the chloride concentrations that you've depicted on this exhibit.

A Yes.

Q Do you know historically what use has been made of those springs prior to the installation by the potash operators of the fresh water pipeline?

A No, I do not.

Q Are there waters within the area of Laguna Plata that would have a water quality of less than 10,000 parts per million TDS?

A Those springs on the east side are 7-to-8,000 parts per million, as shown in the figure.

The spring, however, closest to the site, is much greater than that and there are probably small differences in the hydrogeologic conditions which control the origin of those springs and they're totally different.

Q If the contaminated water is migrating into Laguna Plata, will it not change the TDS numbers for the entire lake area, including these springs?

A No, it will not.

Q How do you know that to be true?

A The concentration of water likely to be produced is similar to that in oilfield brines, which is much less than the salinity of the lake, and once that water gets in the lake, it will again evaporate, reach maximum saturation which is what is achieved in the lake and won't get any higher than what's already in there. You can only get so much salt into solution.

Q What is the TDS number of the produced water at the site? Do we have a number for that?

A I believe it's on the order of 30,000

milligrams per liter, maybe more. Let me -- my report on page 15 indicates that total dissolved solids concentrations are expected to be in the range of 25-to-75,000 parts per million.

The springs will not impacted.

MR. KELLAHIN: Thank you.

MR. KELLEY: I have one question.

CROSS EXAMINATION

BY MR. KELLEY:

Q Between the site and the Laguna Plata, what kind of vegetation is growing there, do you remember from your walking there?

A Very sparse vegetation in --

Q Grass?

A -- clumps of grass, a few scattered mesquite, or creosote bush; very, very sparse vegetation that wouldn't be called grassland or pasture or anything lush.

Q The soil material is primarily what, dunes?

A Fine dune sand and the coppice (sic) dunes appear to be what I might characterize as surficial deposits.

Q How deep would you say that is?

A The total thickness of sandy materials could be as much as 20 feet based on my view of an exposure in the arroyo and walking across the site looking back into the projected pond areas from the Plata itself.

Q Thank you.

MR. STAMETS: Any other questions of this --

MR. LYON: May I ask one question, please?

MR. STAMETS: Yes, Mr. Lyon.

QUESTIONS BY MR. LYON:

Q Dr. Stephens, on -- referring again to page 12, your Figure 2, there's one thing in here that I'm a little curious about.

There at halfway you show an X and I don't know whether that's a circle or a symbol for a spring.

A I believe it's a drafting error. It's probably an X to indicate that the water is obtained from the redbeds.

Q I see, so there isn't a spring there.

A Not to my knowledge.

MR. LYON: I believe that's all.

MR. STAMETS: Yes, sir.

MR. WEBER: Sir, if I may cross

examine based upon Mr. Kellahin's cross examination and the questions asked by members of the Commission.

REDIRECT EXAMINATION

BY MR. WEBER:

Q Mr. Stephens, you were asked a question with regard to the symbol at halfway. Could you describe that location in terms of elevation with respect to the proposed disposal site?

A Halfway is topographically higher in elevation and also up dip with regard to the surface of the redbeds.

Q Would you expect any migration in that direction?

A None.

Q Where might the water reasonably be migrating?

A Northward.

Q Why?

A The hydraulic gradient that we have indicates that it's moving primarily in the north direction. The hydrogeologic evidence suggests that it does so because of the springs which occur along the western margin of the Laguna Plat.

I think those springs are very important

to recognize that water must be moving from some point west of Laguna Plata eastward toward Laguna Plata and seepage which may be moving off "property" would eventually be diverted back into Laguna Plata, in my opinion.

Q Now, you talked in terms of off property. Is it more reasonable to expect that you estimate with mathematical certainty that particular area of seepage or could that not be more reasonably done by a system of effective monitor wells, to determine that?

A I believe that the monitor wells would be most reliable in making the determination of the extent of seepage laterally.

Q We've talked about damage to existing fresh water supplies. If we took all the production water and disposed it directly into Laguna Plata, what sort of hazard would that present to existing fresh water supplies?

A None.

Q We've talked in terms of differences between Laguna Plata and Laguna Gatuna. What are the similarities of those two features?

A Both are within collapse features. Both are underlain by the same lithologic units comprised of low permeable redbed claystones and shales. Both receive the same amounts of precipitation. Both have similar surficial deposits, and they're very similar in many respects.

Q What differences, if any, are there?

A The Laguna Plata is at a lower elevation. It's more saline. It appears to be the regional sink of all the surface drainage, and also for groundwater discharge that we know.

Q In practical terms what does it mean, that Laguna Plata is the regional sink?

A In my opinion it means that waters which enter the Laguna Plata could exit only by evaporation.

Q Now, I'm talking about the concentrations of the proposed fluids to be disposed. You estimated those at between 25-to-75,000 parts per million. How does that compare with total dissolved solids in Laguna Plata?

A Total dissolved solids in Laguna Plata is 350,000 parts per million.

Q So then the production water to be disposed is considerably, if we can use that term, purer than the waters in Laguna Plata.

A Yes.

MR. WEBER: Sir, I have no further questions.

MR. STAMETS: Any other questions of the witness?

MR. KELLAHIN: Yes, sir, I have some recross, Mr. Chairman.

RECROSS EXAMINATION

BY MR. KELLAHIN:

Q The location of the proposed monitoring wells are where, Mr. Stephens?

A Monitor Wells 1 and 2 are shown on Exhibit Number Eight, page 6, on the wall, located north of the proposed area of Tract B, the two wells shown there.

Q If the monitoring wells to the north of the facility detect contaminated water, does that define the entire area of seepage?

A No.

Q Can you predict for us whether the information derived from those two monitoring wells can tell you what the area encompassed by that saturation is?

A It would tell you the down slope time of arrival of seepage from the impoundment, which is of interest. It would tell you what the concentrations are but two points would not define -- would not define the entire area.

Q Once the monitoring wells have detected the presence of this contaminated water --

DR. KELLEY: Mr. Kellahin.

MR. KELLAHIN: Yes, sir.

DR. KELLEY: Could I interrupt

for a minute?

MR. KELLAHIN: Yes, sir.

DR. KELLEY: I want to clarify for the record what you mean exactly by contaminated water.

MR. KELLAHIN: You can't drink it. I'm talking about water that's potable. I'll go back and see if we can define with the witness --

Q We're talking about water that is migrating through the filtration system that is still going to be discharged into the Plata at a quality that is less than those parameters used to define drinking water.

A The spring which we know that was sampled is -- is not within drinking water standards. That was closest to the site. It was, as I recall, 17,000 milligrams per liter of chloride.

Q Are we going to have soluble organic hydrocarbons in the water that will be detected by these monitoring wells?

A They'll be sampled. The wells will be sampled for hydrocarbon.

Q Do you have any difficulty as a hydrologist with the characterization of this water as contaminated water?

A The water will have hydrocarbon in it.

Q Once the contaminated water is monitored

at these monitoring wells, in fact at that point the damage has occurred and there's no way to remove the water, is there?

A The impact to the Plata does not necessarily depend on the concentration of those -- the chemical in those -- that observation well. There's a number of processes which will occur in the soil and once that -- and once hydrocarbons, if they did get to the lake, they may be at concentrations which are less than those which are State standards as proposed by, say, the Environmental Improvement Division. I don't know, but I would say that my professional opinion is that there will be detectable amounts of hydrocarbon. Whether they exceed standards, I don't know.

What concentrations are going to be in the lake I can't predict. That's why the monitoring program is in there, is why I suggested that the lake could be monitored and so could the salt that's in the lake.

Q The monitoring program is simply one for gathering information to tell you, first of all, how long it's going to take the water to get to the lake; what the quality of the water is going to be at the point that it intersects the monitoring well; and it does not provide any safeguard in the event the contamination levels are such that the Commission determines it's environmentally unsafe to continue with disposal. You can't take the water back

out, can you?

A The wells could be used for pumping if the seepage were of sufficient thickness, a pump could be placed in the wells, that are of sufficient diameter, that in my opinion, one could pump the water back out.

Q Would the two monitoring wells as proposed be adequate to remove all the water discharged to keep it from reaching the lake if the Commission found that that was an appropriate preventative measure?

A No, but they would be indicators of -- at least give the Commission some idea of how organics or heavy metals or other salts are moving through the soil, whether the soil is doing an effective job within a short distance. They're very close to the northern perimeter. There are still, perhaps, several hundred feet more of soil through which the seepage could move to the lake and by getting an idea of the amount of degradation which has occurred in, perhaps, say, 200 feet of travel, one might infer that the seepage would even be further degraded in another 600 feet of travel, plus once that water gets in Laguna Plata, there's a substantial amount of dilution. The lake is 2 square miles area. The area which may be of concern for salt mining is far to the east part of the lake, and I believe that prudent monitoring of the lake could be very valuable in guiding the Commission to determine whether or not

there is any reason to cause discontinuance.

Q You said there's salt mining operations on the lake?

A That's my understanding.

Q Approximately where are those taking place, do you know?

A Approximately in the center and eastern part of the lake.

Q What is your opinion of the impact upon the salt mining operations if the produced water that's discharged into that lake contains significant levels of hydrocarbons?

A I do not know what the use of the salt is so it's very difficult for me to predict what concentrations thre would be, but I would -- it's my opinion that with a prudent monitoring plan, impact could be completely avoided because of the very slow nature of the process.

Q Well, I'm confused now, Mr. Stephens, you said the monitoring process is going to tell you when you have contamination levels that exceed whatever standard is to be applied.

How does that keep you from getting -- keeping the fluids from getting into the Plata if that's not what you want to do with it? You can't keep them from getting there with the monitoring wells?

A The monitoring wells themselves could be used for withdrawal purposes, but they would be used for perhaps designing a plant in the future which, if necessary, by remote possibility would require remedial action. Engineering plans can be made to, for example, just to cease operations; to withdraw the water by pumping, for example.

Q All right. Thank you.

RECROSS EXAMINATION

BY MR. STAMETS:

Q Dr. Stephens, what happens to the soluble hydrocarbons once they get out on the surface of the lake?

A Soluble hydrocarbos may very easily be biodegraded. Some are broken up by cosmic rays from the sun. Some are volatilized into the atmosphere, and some get absorbed onto particulate matter, clays, for example, which may have some organic matter as part of them, can absorb hydrocarbons and in many instances of offshore pollution, of oil spills, the sites which have been contaminated have completely been renovated by natural processes.

MR. STAMETS: Any other questions of the witness?

He may be excused.

MR. WEBER: Thank you, sir.

Sir, we'd like to call as our

next witness Mr. Jim Thornton.

Sir, once again I'd like to point out that we have reversed the order of our exhibits.

JAMES D. THORNTON,

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

DIRECT EXAMINATION

BY MR. WEBER:

Q Sir, would you please state your full name?

A James Douglas Thornton.

Q And where do you presently reside?

A Hobbs, New Mexico.

Q By whom are you employed?

A Agua, a Division of Petro-Thermo.

Q How long have you been so employed?

A Approximately ten months.

Q And in what capacity are you employed?

A I'm an engineer.

Q What are your general duties and responsibilities as an engineer for?

A The engineering, design, and supervision of several salt water disposal systems.

Q From what institution did you receive your undergraduate degree?

A Texas A & M University.

Q What degree did you receive and when did you receive it?

A Bachelor of Science in 1984.

Q What was your specialty or area of concentration?

A Petroleum engineering.

Q Have you done any further studies in this particular area?

A Yes, I have.

Q Where?

A New Mexico Junior College.

Q And what courses have you taken?

A Petroleum technology courses.

Q Are you a member of any professional societies or organizations?

A Yes, I am. I'm a junior member of the Society of Petroleum Engineers.

Q Have you previously testified before the Oil Conservation Division?

A Yes, I have.

Q Were your credentials accepted at that point?

A Yes, they were.

MR. WEBER: Sir, at this point I tender Mr. Thornton as a petroleum engineer.

MR. STAMETS: If there are no objections he is considered qualified.

Q Sir, as a part of your general duties and responsibilities at Petro-Thermo were you responsible for developing the initial engineering plans --

A Yes.

Q -- for the proposed disposal site near Laguna Plata?

A Yes, I was.

Q What was your primary consideration in developing those plans?

A The avoidance of fresh water contamination.

Q What were secondary considerations?

A The maximum recovery of hdyrocarbons that are associated with produced water.

Q Why was that important to you?

A It is in our economic interest to recover as much oil as we can.

Q Why is that?

A When we recover the oil, we sell it.

Q Who is engaged in the reclamation operation?

A We are, Agua is engaged in the reclamation operations. We have the Goodwin Treating Plant, an approved, OCD-approved site.

Q Now, before beginning your plans for the proposed disposal facility, did you consult any reference literature?

A Yes, I have. I looked at Groundwater Report Number Six: Geology and Groundwater Conditions in Southern Lea County, New Mexico by Nicholson and Klebsch, and Brine Disposal Treatment Practices Relating to the Oil Production Industry put out by the Environmental Protection Agency. The book is EPA 660/2-74-037.

Q Now, Mr. Thornton, before developing your plans, did you have an opportunity to inspect other approved disposal sites in the area?

A Yes, I have. I've inspected two such sites, one of which is located around the Eunice, New Mexico area. It's Parabo, operated by UniChem International.

And the site at Laguna Gatuna, owned by Pollution Control and Mr. Squires, which is located approximately four miles to the east of our proposed site.

Q Did you have an opportunity as well to view new possible sites and select a site for the proposed Petro-Thermo disposal facility?

A Yes, I have.

Q Based upon your research and personal inspection did you then design the plans which were presented to the Oil Conservation Division?

A Yes, I did.

Q Have you had an opportunity to revise those plans?

A Yes, I have.

Q Why did you revise thase plans?

A To incorporate the monitor wells; to clearly show compliance with the fencing gates and cattleguards, with regard to the previous order, and to depict future development of the site.

Q Have you prepared an exhibit setting forth the revised plans?

A Yes, I have.

Q Is that the exhibit presently before you?

A Yes, it's entitled Engineering and Design of Planned Disposal Facilities, Section 16, Township 20 South, Range 32 East, Lea County, New Mexico.

Q And that has been marked as Exhibit Number Eight?

A Yes, it has.

Q Would you please identify for the Commission the contents of this exhibit?

A Okay. On page one of the exhibit I have

included the Laguna Plata area map.

Q Now, is that area map the same map as appears on the wall closest to the Commission?

A Yes, it is. It's the first map on the wall.

It shows the geologic features, such as Laguna Gatuna, Laguna Plata, Laguna Tostin, and the Williams Sink.

It also shows the extensive road network that is present around this area.

Our proposed facility is located on the southwestern portion of Laguna Plata in approximately the southwest quarter of the southeast quarter of the northeast quarter of Section 16, Township 20 South, Range 32 East, and Pollution Control's facility is located over by Laguna Gatuna in Section 18, Township 20 South, Range 33 East.

The next page is entitled Williams Sink USGS Map. It's a United States Geological Survey map.

Q When was that map completed?

A The map was completed in 1985. It's a very recent edition. This map was included to show the elevations of the area and point out that Laguna Plata is the lowest elevation at approximately 3429 or 3430 feet.

The -- in the vicinity of the disposal site the slope is towards the lake, as depicted on this map.

Also the map indicates a great deal of past drilling activity. There are approximately 40 drill holes shown on this map, several producing wells, and there salt water disposal ponds are indicated on this map.

Q Have you had an opportunity to personally confirm the presence of these reserve pits as well as the operating wells and the drill holes?

A Yes, I have. The wells that were visited did have a salt water disposal pond, such as we're using, or we're proposing in this design.

The Laguna Plata is also pointed out as a disposal pond on this map.

The next page, page 3 of Exhibit 8, is the water analysis of Laguna Plata lake water. I took the sample on December 11th, 1985, and took it to Martin Water Laboratories to be analyzed. This is merely a reproduction of their results.

The chlorides were quite high. They were indicated at 196,012 parts per million and the total dissolved solids was 335,108 parts per million.

This analysis I gave to our hydrologist, Dan Stephens.

Page 4 is the water analysis of the spring discharge, which is located approximately 1500 feet north from our proposed site towards Laguna Plata. I took

the sample on March 27th, 1986, and the sample, I took the sample into UniChem International to be analyzed. This is merely a reproduction of their analysis. The chlorides were quite high. By EPA drinking water standards they are -- it's unpotable water. The chlorides were at 18,000 parts per million and the total dissolved solids of this spring was 52,605 parts per million.

Page 5 of Exhibit 8 I've included to show the topography of the facility. It is generally sloping towards Laguna Plata, which is located toward -- in the north.

This is important because the pits in the engineering design were designed to use gravity to transfer the water from one pit to the next.

And this brings me to page 6 of Exhibit 8, which are the Plata disposal -- which is entitled the Plata Disposal Design.

Q Mr. Thornton, are those plans shown on page 6 the same which appear on the wall?

A Yes, they are.

Q I was just wondering if you could step to the map and use that to describe your engineering plans?

A Okay.

Q Now I note initially that you have certain features outlined in solid lines and other features in dotted lines. Could you please explain to the Commission?

A Yeah. The Phase I are the solid lines on this design. They are used to -- they are plans that we intend to incorporate just after the approval of this order.

The dashed lines, or Phase II, shows the future development of the site.

Q Now in general terms, could you please explain those engineering plans -- design?

A Okay, the design of this is so the -- has four basic components. These are the tank batteries, the water disposal pits, the solids disposal pits, and the overflow, or emergency pits.

Q Would you please explain how a truck containing production water would come to the facility and unload its cargo?

A The tank trucks enter in down at the -- down through -- into the pad area and they hook up to one of the unloading lines.

Q What is the general capacity of the typical tank truck you have unloading?

A That's approximately 150 barrels.

Q And if we assume that all three unloading lines were connected to a tank truck, what is that capacity?

A The maximum possible unloading rate would be 21,600 barrels per day for the three unloading lines.

Q Is that assuming a continuous flow of

trucks, one truck would unload and depart and another would immediately take its place?

A That is assuming that three trucks will unload at the same time right after one another for 24 hours.

Q Now, the liquids have entered the unloading line. Where do they go from that point?

A The unloading lines are connected to the gunbarrels, which are shown Tanks T-1 through T-4.

Q What is a gunbarrel?

A A gunbarrel is an oil/water separator.

Q And why are you doing that?

A To separate the hydrocarbons that are associated with production water so that they may be diverted into a holding tank.

Q Now where is that holding tank and what is its capacity?

A The holding tanks are labeled T-5 and T-6. The capacity of these holding tanks is 1000 barrels apiece.

Q Will they be emptied? If so, how often?

A They will be emptied as needed.

Q And what will be done with the reclaimable oil?

A The oil will be hauled to our Goodwin

Treating Plant to be reclaimed and sold as pipeline quality oil.

Q Once you have piped off the usable hydrocarbons, what happens to the remainder?

A The remainder enters into the waterleg. Each waterlog is associated with a corresponding gunbarrel.

After it enters into the waterleg it goes into a manifold which controls which pit the water will be diverted to. This pipe that connects from the manifold to the pits is made out of 6-inch PVC pipe and is connected to the first set of pits.

Q How many pits do you have in a series?

A In Phase I we have five pits. In Phase II we have an additional five plus six, which is eleven pits.

Q Could you use your topography overlay --

A Yes.

Q -- to show the relative elevations?

A Yes. This will indicate -- this will show you the reason the pits to the east end were designed at an angle. They're designed so the flow is perpendicular towards the general direction of the topographic lines.

Q So each successive pit is lower than the previous pit.

A Yes, they are.

Q Will you please explain your conduit system? It appears that the pits are interconnected.

A The water pits are connected with an 18-inch conduit staggered from each previous pit to allow the maximum retention time.

Q How does that maximize retention time and what is the practical effect of maximizing retention time?

A The flow of water will be much longer through the pits than if you had a straight line drawn throughout the pit. This will also allow for solid settling in the first couple pits, where by the time it reaches the fifth pit there should be no problems with plugging due to solid build-up.

Q You have another conduit system as well, do you now, connecting the three salt water pits?

A Yes, I do. The five salt water pits are connected to an overflow or emergency pit. This is connected by way of 4-inch PVC pipe located approximately one foot from the top of the dike. This is to prepare for any contingency such as rain or plugging of a line, of the lines between pits.

Q Have you calculated the capacity of each of the water pits as well as the overflow pit?

A Yes, I have, and that's on page 7 of Exhibit 8.

This is entitled Plat of Disposal Pit Disposal Pit and Tank Chart. It has the capacities, length, width, depth, and bottom elevation of each of each of these pits.

The capacities are calculated to incorporate a 3-foot freeboard, or level water level from the top of each pit.

Q What do you mean by a freeboard and what is the purpose of leaving so much room from the top of the pit to the surface of the liquids?

A This is to further insure that the pits do not overflow.

Q Have you established any sort of regular or periodic maintenance plan with regards to the salt water disposal pits and the overflow pit?

A Yes, I have. We will routinely scrape or rake the bottoms of each of the pits and if there are any amounts of hydrocarbons located on the first two pits, or all of the pits, we wil skim and recover these.

Q What is the purpose of raking the bottoms of the pits?

A To stimulate the permeability so that a greater seepage rate will be accomplished.

Q Let's go now to the solids area. When we talk of solids, what are we speaking of?

A We are talking about drilling muds, drill cuttings, and cements.

Q And how are they to be unloaded?

A They are to be unloaded into two unloading lines, located on the north end of the pad.

Q And?

A The fluid is then piped by a series of conduits running on each side of the pits with valves so that one pit may be used at a time and that there -- the level of the pit will maintain an equal level across the whole pit due to the two solid lines from each side.

Q Why is that true? What would happen if there was only a single (not clearly understood)?

A Fluids or solids would build up towards one end of the pit and cause premature closing of one pit.

Q I notice the solids pits are also connected to the overflow pit and why is that so?

A Yes, they are. That is to further establish any problems such as rain or -- well, that's about it with the solids pits would be rain.

Q How will the solids pits be cleaned out and how will materials taken from those pits be handled?

A The solids pits will be scooped out after they have been dried in the particular pit. They will be bladed into the pad and the access roads that access this

facility and a thin layer of fill will be placed over the top of these.

If the amount of solids becomes too great, we tentatively plan to dig dry solids pits in these areas and cover with -- and return the contours to the original slope of the land.

Q What are the differences between the plans that you have designed and those of actual, existing disposal sites?

A I have over-designed in many ways.

Q How have you over-designed?

A The pit, each pit, has a freeboard to allow for any contingencies. It also, in the even that the level does reach a great height, the overflow pits are designed to further solve this problem.

Q Did you have an opportunity to consult with the Environmental Bureau Chief David Boyer?

A Yes, I have.

Q And what did you -- when did you meet with him and what did you discuss at that point in time?

A I met with him approximately two months ago, one and a half to two months ago, out at the site, proposed site, and we discussed the monitor wells that were to be placed on this facility.

Q Do you have a schematic design of a sam-

ple monitor well?

A Yes, I do. It's the observation well diagram. The wells that Mr. Stephens pointed out are located right here. This is approximately 70 feet from the west boundary and 200 feet from the edge of the facility to the Well No. 1.

The Well No. 2 is located at 200 feet from the west boundary and 200 feet from the north boundary of the facility.

The well diagram, we have a hole that is drilled down to the top of the Triassic redbeds. Four inch PVC pipe is then placed in the hole that is slotted with six, approximately six slots per foot, 120 degree phasing (sic). It is then gravel-packed and it is cemented from four feet to the surface.

There are caps on each end of the pipe. The well will be sampled every six months for aromatic hydrocarbons and heavy metals.

Q And what will be done with the results of those samples?

A They will be sent to the OCD.

MR. WEBER: Sir, I have no further questions of this witness.

MR. STAMETS: Are there questions of Mr. Thornton?

MR. KELLAHIN: Yes, sir.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Stephens, in his report, Mr. Thornton, says that on a sustained basis under normal operations -- I'm sorry, under normal operating conditions, the total rate of waste disposal for all three groups, meaning the water, the oil, and the solids, is anticipated to be only about 2250 barrels per day.

Did he get that information from you?

A Yes, he did.

Q What is the number 2250 barrels a day based on?

A It's based on 15 loads a day.

Q And is that what Petro-Thermo is currently trucking for other operators in terms of water disposal facilities?

A That is a -- that is a figure that is adjusted for our other salt water disposal wells and -- but yes, it is.

Q Do you anticipate that with the total operations of Agua, Inc. and Petro-Thermo that for this particular facility you see a need for 15 truckloads a day?

A Yes, I do.

Q And what is -- what is the total volume of water trucked by Petro-Thermo a day? What does this 15 relate to?

A 2,250 barrels.

Q Yes, sir, what percentage of that is of the capacity or the current operations of Petro-Thermo in terms of trucking these fluids?

A I could not tell you that number. I do not have that number available.

Q Can you make some estimates for us? Is this half of your volume as a company or is it something more or less?

A It would be one-half of one --

Q All right. In a given day on an average basis, Mr. Thornton, Petro-Thermo moves or transports what volume of produced water in terms of truckloads?

A That is varied and I cannot give you a number.

Q Can you give me any range?

A No, I cannot. All I can say is that I talked with one of our -- some of our management and their needs of this site and that's how I came up with the number.

Q All right, somebody said, Mr. Thornton, we have 15 truckloads of water produced that we've got to dispose of. Design a facility for that.

A Right.

Q All right. When we look at the 2250 barrels of fluids a day, Mr. Stephens said about 88 percent of that volume represented water.

A Yes, it did.

Q Okay, that gives me about 1980 barrels. What constitutes the balance?

A Solids and hydrocarbons associated with the production water.

Q In terms of recoverable oil that you can skim off or siphon through the gunbarrels, what portion of the 2250 barrels do you estimate is going to be recoverable oil? I know it's going to be an approximation but what have you calculated, if any?

A That would take me a couple minutes to come up with. I did, of the 30,000 barrels that was approved, we had stated that 26,500 barrels of it was to be production water, or waters, 1100 barrels to be solids, and 2250 barrels to be the oil. The rest would be the actual solid material. That proportion would hold true for the 2250 barrels average sustained rate.

Q In terms of the project area, that defined by the fenced perimeter on Exhibit Number 8 --

A Yes.

Q -- what is the acreage contained within

the fence boundary?

A Approximately four acres.

Q We have one of those diagrams in your exhibit booklet, I believe, Mr. Thornton. It's page six, is it?

A Yes.

Q When we look at the vicinity map on that Exhibit Number Six, there is a square that's shaded in black. Does that represent the four acres that are then shown on a larger scale?

A Yes, it is. That is not four acres. That is -- I've got approximately 8.26 acres.

Q All right. When we look at the little vicinity map --

A Uh-huh.

Q -- on this exhibit and we look at the tract that's labeled B, how many acres are in that tract?

A That would be 40.

Q All right, so you've got Section 16 here divided into Tract B, which is a 40-acre tract, and then on top of that is Tract A, that's also another 40-acre tract?

A Yes, it is.

Q All right. Can you use the vicinity map to draw for me, Mr. Thornton, the approximate lake margin for Laguna Plata?

A The lake margin is sort of hard to define and it approximately comes in like that.

Q All right, you've drawn a red line on the larger exhibit on the wall. North of the red line is the approximate location of the lake margin?

A Yes, it is.

Q And then south of that we're out of the lake margin.

A Yes, we are.

Q From the northern fenceline along the 8-acre tract, the facility, to the lake margin, approximately how far is that distance?

A Approximately 3500 feet. No, that's not correct.

Approximately 1500 feet.

Q All right.

A These figures I can't double check.

Q I understand.

A I'm just --

Q But it's about 1500 feet from the north fenceline of the facility to the lake margin.

A Yes, it is.

Q Your estimated expected use of the facility is 2250 barrels a day. Why have you designed it for 30,000 barrels a day, Mr. Thornton?

A Because from day to day operations do not take into consideration heavily traffic times during the month. A waterflow that could happen could have trucks lined up unloading at this rate for several days during the month.

Q And so to get the 30,000 barrel a day number you have looked at the unloading facility and you said we can accommodate three trucks at a time?

A Yes.

Q And you've multiplied the unloading time, what's the unloading time?

A 30 minutes.

Q Times the hours in a day and that's how you got your 30,000 barrels.

A Yes, I did.

Q That represents the simple mathematical extreme of trying to have three trucks unload at the same time every 30 minutes 24 hours a day.

A Yes.

Q All right.

A That's correct.

Q With regards to the solid pits that are depicted on this schematic, you said you have planned to implement a routine maintenance program for those pits.

A For the solids pits?

Q Or was it the waste water pits?

A The one that I had mentioned previously was the waste water pits.

Q Those are the pits that you're going rake and skim the surface.

A Yes, they are.

Q All right. On the solids pits have you made any calculation of the drying times or how often you're going to have to unload each of those pits in order to maintain the facility in operation?

A No, I have not. That's why I've provided the future development plans. We will dig more pits as needed.

Q Are you seeking in this particular order approval of Phase II at this point or are your requests based upon the Phase I facility?

A Phase II will be put in operation as needed. We will -- we will comply with the OCD order with the maximum production rate of 30,000 barrels a day and so on.

Q The -- the Examiner order makes specific reference to the schematic that was used in December which showed only Phase I, did it not?

A Yes, it did.

Q All right. Are you proposing for purposes

of this Commission decision that that approval in terms of the specific location of these pits be the same as you requested back in December?

A Yes, I am. The previous design was not approved by the Commission completely. That's why I have included a map which shows the compliance with the OCD order.

Q That compliance required some discussion about monitoring wells.

A Monitoring wells and fence -- fences and gates and cattleguards.

Q It didn't require you to relocate or resize the Phase I pits.

A No, it did not.

Q So I'm clear, then, what we're seeking to do today from your perspective is simply to have Phase I as designed approved up to a capacity of 30,000 barrels a day.

A No, that's not correct. We had the Phase II pits presented to allow for any contingencies under the order.

Q You're telling me that you want this Commission in this order to approve Phase II at this time?

A Yes, we do.

Q Well, what is the capacity of the facility if Phase II is constructed?

A It is the same, 30,000 barrels per day.

Q On what anticipated need, Mr. Thornton, have you based the request for 30,000 barrels a day?

A Could you say that again?

Q Yes, sir. You say you have designed the facility to handle up to 30,000 barrels a day. That's the capacity of running the trucks through here. What is the need that has caused you to design up to that capacity?

A It is an over-design, which I have stated previously, to allow for any contingencies, such as rain or plugging of the lines, and so on.

Q So the need, as best you know, is the 15 truckloads a day that you've got to find something to do with.

A That is an initial assumption.

Q Do you have any other assumption?

A Such as what?

Q About your anticipated need? Well, what is your anticipated need?

A My anticipated need is 2250 barrels a day initially.

Q In order to meet that need, Mr. Thornton, how did you determine that you needed four solid waste pits and five water pits?

A The volumes that was to be disposed of

each of the fluids.

Q All right, how come with this volume you anticipate you couldn't have done it with four water pits as opposed to five?

A Because I needed a certain amount of space to contend with rain and overflow lines.

Q And how have you determined that you needed four solid waste pits to handle the 2250 barrels a day?

A They were determined by the pits -- the operation of the solids pits is different than the water pits in that one is used at a time. The next one is then used and the previous one dried out and that cycle continues. So that was based on that assumption.

Q You said you had searched or made a search for other suitable sites in which to place this facility?

A Yes, we have.

Q And have you found any other sites available to your company?

A No, I have not. This is the -- this is the best spot for this type of operation.

Q What experience have you had, Mr. Thornton, in designing and operating a facility such as this?

A None whatsoever.

Q Do you have any experience with regards to how often you have to clean and remove the solids from these solids pits?

A No, I have not.

Q Have you made any calculations of the drying times of those solid materials placed in those pits?

A That is very difficult to calculate because the solids pits will be skimmed of all water as the solids settle out, and evaporation, also, has some effect.

Q Are you in agreement with Mr. Stephens about the mechanism by which the facility is going to function in terms of being an infiltration system as opposed to an evaporation system?

A Yes, I do.

Q The water analysis that you've given to us in your package of documents, the water analysis for Laguna Plata, was that sample analyzed for any hydrocarbon?

A No, it was not.

Q And was the -- was the water analysis for the spring discharge over at -- let me make sure I understand this water analysis.

What spring discharge did you sample where?

A It is approximately 1500 feet from our proposed site towards Laguna Plata.

It is approximately located around in that area and I've got a photograph of the spring discharge itself.

Q Let's -- let me show you Mr. Stephens' Figure No. 2 on page 12 and ask you if that spring is identified on his plat.

A No, it is not.

Q The water sample, then, from the spring discharge, is the one that is in the southwest corner of Tract A on the design plat.

A Yes, it is.

Q Okay. Am I correct in understanding that the design that you're attempting to implement is one that is predicated or based upon the fact that the liquids, the water, are intended to percolate or migrate subsurface and to be discharged into Laguna Plata?

A I am not the hydrologist but that was my understanding.

Q That's the whole concept or mechanism by which you have then attempted to design the facility.

A Yes, it is.

Q The surface capacity of these pits to evaporate these substances is certainly not adequate to do it that way, is it?

A Right.

Q Okay. Mr. Thornton, do you have the consent of the owners of the property located within that fenced area to conduct this operation?

A That is a matter which is currently being discussed with the State Land Office.

Q Your understanding is that that Commissioner of Public Lands controls that -- that acreage?

A Yes, he does.

Q Has the Commissioner of Public Lands issued to Petro-Thermo any type of lease or consent to authorize this facility?

A As of date, no.

Q With regards to the Plata where the water will be discharged, Mr. Thornton, do you have any easements, right-of-ways, leases, or contracts that entitles you to utilize the Plata for the discharge?

A No, we do not. This is a State Land Office problem.

Q Does the Laguna Plata, is that a part of State Land Commissioner properties under his jurisdiction?

A No, it is not. The BLM owns the land underneath Laguna Plata.

Q Between Laguna Plata and the State acreage, what -- tell me, Mr. Thornton, where do you understand the State acreage to be on your vicinity map?

A Directly north of Section 16. That would be the area of interest.

Q Is Section 16, to the best of your knowledge, State of New Mexico acreage?

A Yes, it is.

Q And that the sections, then, in Laguna Plata, it's your understanding that that is property under the control and management of the Bureau of Land Management?

A Yes, it is.

Q And do you have the approval of the Bureau of Land Management with regards to this facility and the discharge into the lake?

A We have discussed with the BLM some of the stipulations which have been placed on this discharge plan, such as the monitoring wells.

Q Do you have written authority from the Bureau of Land Management that approves the discharge plan as you propose it?

A No, I have not.

MR. KELLAHIN: Nothing further.

MR. STAMETS: Any other questions of the witness?

MR. LYON: I have some questions.

DR. KELLEY: Mr. Lyon, if I

could go first, I just have one question.

CROSS EXAMINATION

BY DR. KELLEY:

Q Mr. Thornton, you were discussing freeboard on your design, and I was wondering how you arrived at the amount of freeboard necessary for these ponds.

A It was required.

Q Well, I mean what did you use, a storm event, or --

A A 75-year 6-hour rain.

Q That's what I meant, thank you.

A Okay.

MR. STAMETS: Mr. Lyon, do you have any questions?

MR. LYON: Yes.

QUESTIONS BY MR. LYON:

Q Mr. Thornton, your -- your plat of the facility, that's page --

A Page 6.

Q -- 6, shows the plan view of your -- of your proposed pits.

Will the edge of those pits be at ground level or will you make a berm around each of these from the

removed material?

A The way I designed these pits was to go on the water pits approximately five feet from the lowest elevation down. The pit is then raised up with berms to make a level top, a level dike.

MR. KELLEY: But above the original surface of the ground?

A On the back side of the pit, no. On the -- on the south side, I mean, no, but the sides will have an angle dike and the south side of the pit will have a (not clearly understood).

Q So you -- you're saying that the elevations will be bermed and the top of your berm will be at a common elevation, is that what you're saying, be level?

A Yes. Pretty much so. The topography is not perfect as in they're not straight lines as the pits are, but that is generally true.

Q So the removed material will be put into -- into berms? You're going to --

A Right, the berms and the -- and the pad that we designed.

Q And will your conduit, your overflow lines be essentially at ground level?

A They will be placed at three feet below the top of the previous pit, and put into the next pit to

insure that the water level stays at 3 feet below the top of the dike.

Q I see. Now, as you fill water pit number one and the hydrocarbons gather at the top, as the level of that total fluids get to the level of the conduit leading to pit number two, then that material could likely be oil, could it not?

A There's a remote --

Q In fact the first material to go into pit number two would probably be oil.

A No, it will not probably be oil. The gunbarrels will separate most of the hydrocarbons in the gunbarrels.

Q So you're not expecting any increase in your hydrocarbons to get into the these water pits.

A No, I'm not expecting but I'm prepared to skim these. We -- we have -- part of our maintenance on these water pits is to skim the pits of any hydrocarbons that may appear.

Q You don't think there's any likelihood that any oil would get as far as (not clearly understood.)

A There is a remote possibility, very remote possibility.

Q If that were to occur and pit number two were dry, wouldn't you get a saturation of hydrocarbons in

in the bottom of that pit?

A If there were enough hydrocarbons to escape from pit one to pit two, that is a possibility, but, as I have said, we would routinely, or as needed, skim these water pits so that the oil does not reach the next pit.

Q I just thought that there might be some arrangement to put some -- keep some water level in pit number two just in case there was some hydrocarbon overflow.

A If we discover that we have these problems, we will place an elbow on the conduit so that oil which floats on top of water does not enter into the next pit.

MR. LYON: I think that's all I have.

MR. STAMETS: Other questions of Mr. Thornton.

He may be excused.

The hearing will be recessed until 1:00 o'clock.

(Thereupon the noon recess was taken.)

MR. STAMETS: The hearing will please come to order.

MR. KELLAHIN: Mr. Chairman,

Mr. Neal had to return back to Hobbs to attend a funeral and asks your permission to be excused this afternoon.

MR. WEBER: May it please the Commission, Petro-Thermo's next witness will be Mr. Abbott.

W. G. ABBOTT,

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

DIRECT EXAMINATION

BY MR. WEBER:

Q Sir, would you please state your full name?

A My full name is William Gordon Abbott.

Q And where do you presently reside?

A Hobbs, New Mexico.

Q And where are you currently employed?

A I'm currently employed by Petro-Thermo Corporation.

Q In what capacity, sir?

A I'm President of Petro-Thermo Corporation.

Q And what is your profession?

A I'm a petroleum engineer.

Q And from what institution did you receive

your undergraduate degree and when did you receive it?

A I got a degree in mechanical engineering from the University of Texas in January of 1948.

Q Are you licensed as a professional engineer?

A Yes, sir.

Q In what states are you so licensed?

A I'm licensed in New Mexico and Texas.

Q Are you a member of any professional societies or organizations?

A Yes. I belong to the Society for Petroleum Engineers, the API. I'm also secretary of the New Mexico Oil and Gas Association. I mean not secretary, treasurer of the New Mexico Oil and Gas Association.

Q Sir, would you please relate for the Commission your work history in the oil and natural gas industry?

A After graduation from the university I went to work for Amerada Petroleum Corporation in south Texas, east Texas, west Texas and New Mexico.

After I'd been with Amerada Petroleum Corporation for ten years, I went to work for Rice Engineering and Operating, Inc., in Hobbs, New Mexico. I worked for them for about nine years and then I formed Agua, Inc., in December of 1966.

Most of my experience has been in salt water disposal and production work in the oil industry.

Q Sir, have you also had some experience in the disposal of solid waste related to the drilling for oil and gas?

A Yes. Solid wastes are more recent. It came about because the oil companies cannot dispose of solid waste in pits and cover up the pits. Most areas they have to haul off the solids are in the pits that they drill -- used to drill their wells, and they have to haul off the cuttings and the cement.

And so you have a problem of disposal of the solids.

Another problem of solids disposal in New Mexico and Lea County, especially, is caused by flows of salt water and Petro-Thermo has been involved with three different salt flows where the saturated brine is flowing usually from -- from a drilling well through the redbeds, heavily laden with solids and has to be disposed.

Q What does this require?

A Well, it requires a solid disposal area. You can't dispose of that type of salt water in disposal wells because it will plug up the disposal wells.

Q Given this experience have you had the opportunity to testify before the New Mexico Oil Conserva-

tion Commission on prior occasions?

A Yes, sir.

Q Were your credentials accepted as a professional engineer?

A Yes, sir.

MR. WEBER: At this point I would tender Mr. Abbott as a professional engineer.

MR. STAMETS: This witness is considered qualified.

Q Sir, will you please explain the structure of Petro-Thermo Corporation and its components?

A Yes. As I stated, we organized Agua, Inc., as a corporation in New Mexico in December of 1966.

We got involved with the disposal, commercial disposal of water and we found that we needed another corporation. So we organized Petro-Thermo Corporation in 1970.

Then that -- the development of Petro-Thermo was along the lines of trucking, tank cleaning, pit cleaning, and operation of a -- of a disposal or a treating plant.

In April of 1982 we reorganized and made Agua a division of Petro-Thermo Corporation and that's how it is today.

Q Sir, has Petro-Thermo Corporation been

issued a Certificate of Public Convenience and Necessity from the State Corporation Commission?

A Yes. We have been issued a Certificate of Public Conveyance and Necessity.

Q Sir, is that what has been marked as Exhibit Number One?

A Yes, sir.

Q Sir, in what counties does Petro-Thermo Corporation have authorization to transport and what does it have authorization to transport?

A We are authorized to transport produced water, mud, oil, tank bottoms from thirteen counties in New Mexico.

They are, starting from the north, they're all on the east side of New Mexico: Union County, Mora, Harding, San Miguel, Guadalupe, Quay, DeBaca, Roosevelt, Curry, Lincoln, Chaves, Lea and Eddy Counties.

Q Does Petro-Thermo Corporation also possess an authorization from the Comission to move produced water?

A Yes, we do.

Q Is the oilfield water hauling business a very competitive business?

A It's very competitive.

Q About how many competitors do you have?

A I think we have probably thirty competitors.

Q In the Lea, Eddy, and Chaves County area, how about the number of competitors that you have in those areas?

A We probably have twenty competitors in this area.

Q What business is Petro-Thermo Corporation's Agua Division primarily engaged in?

A Agua is in the business of designing and operating salt water disposal systems.

Q How much experience and how long has Agua operated salt water disposal systems?

A We had our first system in operation, I think it was in 1967.

Q So for nearly twenty years you've operated salt water disposal --

A Yes.

Q -- sites. Doesn't Agua also dispose of solid oilfield waste?

A Yes. We are disposing of solid waste disposal at the present time.

Q Under what authority is Agua disposing?

A We have a temporary use of a pit at this time to dispose of solid waste. It's -- it's down south of

the City of Eunice in Section 22, Township 22 South, Range 37 East.

Q And when does that temporary authority expire, sir?

A It expires today.

Q What impact will expiration of this temporary permit have?

A Well, we'll have to shut down the pit unless we get an extension from the OCD.

Q Now, you also mentioned that Petro-Thermo Corporation is engaged in reclaiming operations. Could you please describe the nature of those reclaiming operations?

A Yes. We have a permit issued by the OCD for a treating plant. That requires a special permit. Our treating plant is located west of Hobbs in the area of the Goodwin Pool. That's where we treat tank bottoms, remnant oil that 's been hauled in by the trucks, and pit cleaning, and so on. We have a semi-sophisticated treatment in that we have two large treaters and we have an expert oil treater. So we treat out pipeline oil that can be treated by the use of these heater-treaters plus chemicals and sell that oil as pipeline oil.

Q Sir, do these activities tend to prevent waste and result in the conservation of valuable energy resources?

A Yes, sir, they do.

Q Can you indicate for the Commission the extent of oil and gas activity in Lea, Eddy, and Chaves Counties?

A Yes. We -- we're -- our permits and our operations mostly in an area in Lea, Eddy, and Chaves Counties. This area in Lea County, there are 15,307 wells at the present time. Eddy County, there are about 7240 wells; Chaves County, there are 2205 wells, for a total of 24,752 oil and gas wells in operation.

Now, this -- that figure is as of the first of '85, so actually, there's more than that. There's about 25,000 active wells in these three counties.

Q And you're indicating that information from the Exhibit numbered Four, which has been presented to the Commission.

A Yes, sir.

Q On that exhibit there is also a separate listing for oil and gas wells in the Hobbs Pool Area. Could you please explain what's meant by the Hobbs Pool and its impact upon your operations?

A Well, the Hobbs Pool, of course, was discovered in 1927, and that's -- the City of Hobbs is right on the top of the Hobbs Pool. About one-third of the wells are in the city limits of Hobbs and it encompasses about seven

different fields, the Hobbs Blinebry, Blinebry East, the San Andres, the Drinkard, the Paddock, and Glorieta, and the -- or the Grayburg and the San Andres, for a total of 548 wells.

Q Sir, what potential is there for increased activity within the Hobbs Pool and the impact upon Petro-Thermo Corporation's business?

A Well, the Hobbs Pool Grayburg-San Andres has been unitized. The north end of the pool is operated by Shell Oil and the south end by Amoco, and they're actively engaged in the secondary recovery operations, waterflooding, and it's a very active area.

I see in the future that -- that -- I'd say within the next five years, or less, they will go to tertiary flooding and tertiary recovery in this pool with the use of CO2.

Q Sir, what impact would -- would such activity have upon the oil and gas operators insofar as the disposal of solid and liquid waste is concerned?

A Well, I believe they'll probably infill drill the whole Hobbs Pool, probably double the number of wells, which would make over 800 wells, 800 or 900 wells in the -- this Hobbs Grayburg-San Andres.

That means that all the waste will have to be hauled off, the solid waste. Very few earthen pits

would be dug. They'll be steel pits and if they are allowed earthen pits they'll be lined and then all the mud, cuttings, chemicals, and so on, will be hauled off from that area.

Q Are you saying, then, that there are limitations on the number of available sites where disposal operations can be conducted, where contamination of fresh water supplies would not occur?

A Yes. At the present time there are just two authorized solid waste disposal, one down in the Eunice area, Parabo, it's called, and then the facility at Laguna Gatuna, operated by Mr. Squires' Pollution Control.

Q And, sir, based upon your experience, is the need for authorized safe disposal sites met by these two facilities?

A It's questionable. Most -- most of my questions with be with the Parabo disposal. I don't think it's a viable disposal and some of the larger operators, major operators, do not like to dispose there. They don't think it's viable.

Q Have you received any indications from the these operators that there is a need for additional facilities?

A Yes. I -- I received a --

MR. KELLAHIN: Mr. Chairman,

excuse me. Mr. Chairman, I'm going to object to Mr. Abbott's testifying from letters that are tendered as an attempt to document a need when the authors of those letters are not here to be cross examined. It is a classic violation of the hearsay rules and we'll object to Mr. Abbott testifying or to having the letters introduced in evidence.

MR. WEBER: Sir, it's our position that those letters are already part of the administrative record of this particular case. We have not attempted to elicit from Mr. Abbott the contents of these letters, other than the fact that he has received some indications from oil and gas operators in the Hobbs, New Mexico, area of the need for additional disposal facilities.

We will, however, proceed on.

MR. STAMETS: You're talking here about Exhibits Five, Six, and Seven?

MR. WEBER: Yes, Mr. Chairman, we are.

MR. STAMETS: These are all letters which have been sent to the Oil Conservation Division?

MR. WEBER: Yes, sir, with carbon copies to Mr. Abbott.

I believe there is one additional letter which was sent directly to the Oil Conserva-

tion Commission, administrative notice of which was taken during the Examiner Hearing on December 18th, and which is also part of the record.

MR. STAMETS: And this is not a hearing determining whether or not there is need, and so I don't believe that the evidence is either needed or improper.

If Mr. Abbott wishes to enter these exhibits, I see no reason why he should not be allowed to, and so I'll overrule the objection.

MR. KELLAHIN: Point of clarification, Mr. Chairman.

The applicant, in his opening statement set forth as one of his proof factors the need for this facility. Am I understanding from the Commission that you don't require or don't want testimony about need? I think both parties have come to discuss need if that is not an issue for consideration, maybe we need to rethink our presentation.

MR. STAMETS: I believe we're all agreed at the head of the table here that need is not one of the issues in this case, so the ruling remains the same.

MR. WEBER: We will continue on that premise, sir.

Q Mr. Abbott, what steps did you take to determine the location of Petro-Thermo Corporation's proposed disposal facility?

A We started looking for a proper site back on July of 1985. We -- we needed -- we used the criteria that we needed a central location. We needed it available to the oil and gas field. We needed a network of highways, and also we wanted a place to put this waste where there was no potable water.

Q Did you find such a place, sir?

A Yes. We found it at -- at the Laguna Plata site.

Q Did you investigate further to determine the ownership of lands?

A Yes. We -- we had telephone call after telephone call with various agencies, including the BLM, and evidently the Federal wells don't produce any waste because we had to find a location to locate this on State lands.

Q And so the lands are in State ownership. What steps, if any, did Petro-Thermo Corporation take to acquire an interest in these lands?

A We applied -- we -- well, first of all, we contacted the grazing lessee of this State land. At that time it was a rancher that lived over in Andrews. I think his name was Thoms. I think he actually sub-leased it from

another grazing lessee.

So we contacted him and tried to interest him in this disposal and his demands were so unreasonable that we -- we dropped that and went to the State Land Office and applied for a business lease.

Q When did apply for that lease, sir?

A We applied for this lease, business lease, December 6th, 1985.

Q Did you subsequently make a deposit of the initial year's anticipated rental?

A Yes. This -- this lease that we applied for was the east half of Section 16, Township 20 South, Range 32 East, and we wrote a check for that -- the proposed business lease and that check has been -- was accepted by the State Land Office at that time.

Q Are you aware of the status of that business lease application?

A Yes. We had a meeting with Mr. Jim Baca, Commissioner of Public Lands, a meeting with my son Bob, myself, and our attorney, Mr. Ernie Padilla. We met approximately the middle of March on this business lease and as far as I know, they're taking it under advisement.

Q Yes, sir. If the necessary approval is granted, will Petro-Thermo Corporation's proposed disposal site serve to promote competition, avoid contamination of

existing fresh water supplies, and serve to conserve valuable energy resources?

A Yes, it will.

MR. WEBER: Sir, I have nothing further.

MR. STAMETS: Any questions of the witness?

MR. KELLAHIN: Yes, Mr. Chairman, thank you.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Abbott, under the Certificate of Public Convenience and Necessity that's marked as Exhibit One, and which you've identified earlier, are you authorized by the Corporation Commission of New Mexico to deposit anywhere within this site or within five miles of this area any produced water or solid waste?

A I don't know what you mean by that.

Q Does this Certificate of Public Necessity and Convenience give you the right to dispose of produced water at the proposed facility?

A Yes. It's the hauling of water, not the disposal. Yes, it does give that.

Q I asked you whether it gave you the right

to dispose and you said it give you the right to haul.

A Yes, it gives you the right to haul.

Q It does not give you the right to dispose of --

A No, that's right.

Q -- produced water at this facility.

Does it give you the right to dispose of solids at this facility?

A No, it doesn't.

Q With regards to the facility do you have an executed written business lease from the Commissioner of Public Lands at this date?

A No, they're -- they've taken it under advisement.

Q With regards to the utilization of Laguna Plata for the produced waters that will migrate from this facility to that Plata, do you have the written approval and agreement of the Bureau of Land Management?

A No, but under a discussion with -- of our attorneys, anything the State Land Office wants to do the BLM will -- will go ahead and do it. That's their position.

Q And who's informed you that that was their position?

A I don't know who it was.

Q With regards to the property adjacent to

the facility, can you tell us who the current owners are of the property or property rights adjacent to this facility?

A Adjacent which way?

Q Well, let's start off to the east side.

A I don't know. That's BLM land. I don't know who it's leased to.

Q All right, and how about to the south of the facility, is that still State land or is that Federal lands?

A That whole section is State land.

Q You said that there was a grazing lease issued for the surface at this facility to someone named Thoms?

A Yes.

Q Is, to the best of your knowledge, that State grazing lease still in full force and effect for that property?

A I -- I have heard from our legal advisor that they are working on a relinquishment of the grazing lessee --

Q Has that --

A -- of the State.

Q Has that relinquishment been obtained as of this point?

A Not that I know of.

Q Now, within Tract B outside of the 8 or 9 acres for the facility, is that also a grazing lease from the State of New Mexico to Mr. Thoms? Is that the same grazing lease?

A Yes. I think he has the whole half section.

Q Meaning the east half of the section?

A Yeah, he may have the whole section. I don't know just what he has.

Q Mr. -- Mr. Thornton has identified for us in his testimony that he was instructed the need for the design was to accommodate 15 truckloads of produced water a day or about 2250 barrels a day.

A Yeah, that would -- that would be the average. Uh-huh.

Q What are you currently doing with that volume of produced water now, Mr. Abbott?

A We -- we actually are not hauling that much water but what we do haul we dispose of in a disposal well at our Goodwin disposal well.

Q The produced water that you currently haul through Petro-Thermo, all that water now is being disposed of and processed at the Goodwin reclaiming plant?

A Yes, uh-huh.

Q What are you currently doing with the

solids that you gather?

A The solids, we're using a temporary pit down south of Eunice.

Q The temporary pit at Eunice has received what volumes of solids, Mr. Abbott?

A I don't know exactly a total. I would say 1000 to 2000 barrels of solids in the past year.

Q I didn't understand whether or not you are currently utilizing the Eunice solid disposal --

A Yes, we are --

Q -- facility.

A -- utilizing it.

Q Have you in the past utilized the Pollution Control's facility at Gatuna for the produced water and solids that you've trucked?

A We have previously had hauled to Laguna Gatuna, but they refused to do business with us and won't allow us to haul there.

Q What's the reason for that refusal, Mr. Abbott?

A They are in direct competition with us in the trucking business and they just didn't want us to succeed in hauling the solids.

Q And upon what information do you reach that opinion?

A That's obvious. They did the same thing with a brine well they operated.

Q My question to you, sir, is you said they refused you access to the facility. What --

A That's what I answered, they did.

Q What individual with that company has --

A I don't know.

Q -- refused you access?

A We got a letter from -- from their people refusing.

Q Isn't the reason that you were refused access to that facility because you would not timely pay your trucking bills to that facility?

A No, that isn't -- that was the reason that they said they cut us off, but that wasn't the reason.

Q At that point, when you received that letter, were you in fact delinquent in the payment of your bills to that facility?

A No, we paid them up in full except for that one month.

Q Only as a result of litigation with that company --

A No, no. We paid up in full. Then we were served by litigation later.

Q What factors did you use to determine the

economic viability of the particular facility at Laguna Plata, Mr. Abbott?

A Well, one, we need a spot to dispose of brine and also solids. We've designed this, we thought this was the best place in the area to dispose of produced water and solids and we can construct this and operate this facility and we believe we can make money from it.

Q Mr. Abbott, what do you anticipate to be the total capital cost of the construction of the facility as proposed?

A The Phase I we figure will be from 75-to-100,000 -- $75,000 to $100,000.

Q And will this also be a facility that is open to the general public?

A Yes, it will be.

Q And how do you propose to man the facility to determine how the facility is to be used by the truckers?

A Well, we plan to, in the beginning, to man it during the daylight hours with a man on the location.

Q Will operators or truckers be allowed to utilize the facility in the absence of having authorized personnel of Petro-Thermo in charge of that facility?

A No. It may be that we'll have to keep it open 24 hours a day, but we don't plan on it from the start.

Q At this time, Mr. Abbott, have you come up with a projection on the costs or fees to be charged for the utilization of the facility?

A No, we'll -- we'll be competitive with the going rates. We haven't gotten into that -- the fee schedule, as yet.

Q What is the general fee schedule charge for the utilization of a facility of this type?

A Well, usually the produced brine is anywhere from 15 cents a barrel to 25 cents a barrel.

Q How does Petro-Thermo handle the ownershp of the materials when they obtain them from the operator and then dispose of them at a facility such as this?

A What, what materials?

Q The oil that can be reclaimed, the produced water, and the solids, do you take ownership of that from the operator?

A Yes. Right.

Q You charge him a fee; you pick it up; it then becomes your property and then you dispose of it at a facility.

A Yes, that's right.

Q Have you been involved directly, Mr. Abbott, with the design and the proposed operation of the facility?

A Yes. It's been a joint effort. While Mr. Thornton did most of the work, we all acted as advisors and consultants and we've come up with the best design we -- we thought we could.

Q Are you in agreement with Mr. Thornton and Mr. Stephens that the method or means by which the material will be disposed is an infiltration process?

A Yeah. We think that the produced brines will percolate through the sands, hit the redbed and go into the lake as -- as Mr. Stephens has proposed.

Q The proposed utilization of the facility at the 2250 barrels a day, Mr. Abbott, is based upon what information that you have derived?

A Well, that was based on the oil patch back in December of last year when we had our hearing. Now there's probably not that much water to dispose of. I mean the operators, oil operators, have shut in a bunch of high water producers, and I don't know if that 2250 will be a valid place to start or not; I have no idea.

Q That change is directly brought about of the drop in oil price from $20-and so down to $10 or $11 or --

A Right.

Q -- $13 we're experiencing now?

A That's right. Yeah.

Q What effect has that oil price had on the drop in actively drilling oil and gas well rigs in Eddy and Lea County in terms of producing solids for disposal?

A Well, it's cut that down considerably, too.

Q Notwithstanding those drops in prices and activities in the industry, are you still considering going ahead with Phase I of the project at this time?

A Yes, we'll start out on Phase I. We don't know how far we'll go because we don't know if all the pits will be needed.

We'll probably start along the lines of Mr. Thornton's Phase I plan.

Q Have you had experience operating an unlined surface disposal facility similar to the one that's proposed here?

A No, sir.

Q As a petroleum engineer, Mr. Abbott, do you have any estimates of the manner in which the solid waste disposal pits will have to be maintained, how long it will take them to dry out, and how you'll rotate that material?

A No. I don't know. It would -- it will take some time. You'd fill one pit and go to the next one, and I don't know how long it will take till they dry out.

Q Are you in agreement with Mr. Thorton's calculation about the surface area that's included within the fenced boundary for the facility?

A Yes. It's 600 by 600 feet. If it were 660 by 660 it would be 10 acres, so 600 by 600, about 8-1/2 or 9 acres.

Q Based upon your experience and education, Mr. Abbott, are you aware of any geologic or other barriers that will keep the produced water confined to the facility?

A No, I think the -- our hydrologist has given a good description of how that water will move through the media.

Q What is the ownership of Petro-Thermo Corporation, Mr. Abbott?

A I'm the largest stockholder. I own, my wife and I have about 54 percent.

The Robert Moran Estate has about 14 percent. Moranco has about the same and Ken McPeters (sic) has about 12 percent, and three employees have 5 percent apiece.

Q With regards to bonding or insurance arrangements by your company in order to insure or protect against environmental contamination, what, if anything, have you done as a corporation, Mr. Abbott?

A We have liability insurance and also

bonds to operate on State lands and Federal lands.

Q Are those bonds sufficient and broad enough to include potential environmental claims?

A Probably not. We have an umbrella policy. We had $5-million in the umbrella but this year we had to cut it down to a million because of the cost of the insurance.

Q Does the umbrella coverage, is that large enough to include environmental contaminations?

A I don't know. I have no idea.

Q I don't mean in amount. I meant in the type of coverage?

A No, I don't know.

Q Okay. Am I correct in understanding that Petro-Thermo has never operated a similar facility such as this?

A That's right. Petro-Thermo has operated a treating plant but not a solid disposal.

Q And a salt water disposal well --

A Yes. We've operated that.

MR. KELLAHIN: May I have just a moment?

Q Is it correct, Mr. Abbott, that as of to-day neither you nor your company have obtained any property interest within the area defined by the fenced boundary for

this facility?

A That's right. It's taken under advisement with the State Land Office.

Q And that would also apply to any portion of the property between the north fence line to Laguna Plata?

A No, that State land actually runs into the lake, as shown by the red line that Mr. Thornton drew on that exhibit.

That State land does run into the lake.

Q That distance outside the facility as outlined to the margin of the lake, you do not have a property interest in that interval as of yet?

A No.

Q And with regards to the lake itself, you have no property interest in the lake.

A No, I understand it's BLM land.

Q Do you have an explanation for us, Mr. Abbott, as to why, when your project needs are 2250 barrels a day, that you're requesting 30,000 barrels a day, or approximately 15 times more?

A No. As I stated, we've been involved in three different emergency situations and one, especially, that I remember, was a Texaco well blowing out salt water in redbeds in the Buckeye area, and there were forty trucks

hauling day and night for a week, and, of course, we couldn't handle all that -- those fluids, but we could help the State get out of a pickle by having this facility.

Q When did that occur, Mr. Abbott, do you recall?

A I think it was about two years ago.

Q Was the last occurrence of that type where there was an emergency need for excess capacity to dispose of produced water?

A No, there -- there was another one up east of Lovington within the last ten months where -- the same situation, where the flow of brine was flowing out of the wellbore, they couldn't control it, and it had to be hauled off.

Q Was that the V-F Petroleum well?

A No, this was -- I don't know who; I can't remember who drilled it.

Q In both of those instances, where did you truck the produced water?

A I think at that time we trucked it to La-guna Gatuna.

MR. KELLAHIN: Thank you, Mr. Chairman.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Abbott, I'd like to follow up on some questions of Mr. Kellahin's there about your operations.

A Uh-huh.

Q At night, when the facility is unattended, will there be a locked gate?

A Yeah, we'd publicize it to the truckers when the facility is to be closed, and again, we'd just have to lock, lock the gate up.

Q Presumably if your own drivers had -- needed to get in there they'd be given a key where they could get in.

A That's right, yeah.

Q How about another company, if they --

A Well, if they made prior arrangements, we'd -- we'd open a gate.

Q Are we putting in a facility here whereby it would be easy for some midnight hazardous waste dumper to drive in and load you up with something that you don't want?

A Well, I've thought of that, but it's -- it's in a pretty desolate area. I mean there are not -- there's not a lot of activity, commercial activity in that area. I just don't know. I don't know what the -- the only thing I recognize, that there is a need in the oil patch for

more facilities for disposal.

I read in the Oil and Gas Journal the past year where ARCO had to haul about 180 barrels of BS & W from Alaska to Chicago in 55 gallon drums to dispose of it because there are no facilities in Alaska. I mean they're frozen or there's nothing there.

So I don't think we want to get in that predicament in New Mexico, that we need, we definitely need a place for disposal.

MR. STAMETS: Other questions of Mr. Abbott?

He may be excused.

MR. WEBER: Sir, that is Petro-Thermo Corporation's last witness.

MR. STAMETS: Mr. Kellahin? Oh, we were wondering, Fran, would it be more appropriate for you to make your statement now or at the end?

MR. CHERRY: I think we just want to point out the Bureau's concerns in opposition to the facility as a statement.

MR. KELLAHIN: This gentleman has waited two days to be heard. I have no objection to having him heard now.

MR. STAMETS: Fran, why don't you go ahead and make your statement at this point?

MR. CHERRY: My name is Fran Cherry, and I'm the Roswell District Manager for the Bureau of Land Management.

I'm responsible for the management of all BLM lands and resources in Lea, Chaves, Eddy, Roosevelt, Curry, Quay, Guadalupe, DeBaca, and Lincoln Counties within the State of New Mexico and for certain mineral operations in the southwest part of the State of Texas.

BLM is concerned regarding Petro-Thermo Company's application for an oilfield waste disposal facility on State land adjacent to the proposed Laguna Plata National Register Archaeological District.

As you know, the proposed facility will be located in the east half of the northeast one-fourth of Section 16, Township 20 South, Range 32 East, directly adjacent to and upstream from the surrounding Federal lands.

We will attempt today to delineate for your consideration the value and sensitivity of the archaeological, wildlife, geologic, hydrological, economic, and visual resources contained on the Laguna Plata District, the probable effects of the present application on these resources, the history of BLM's management of this area, and our proposed future management of these resources.

A major concern is a surface

sodium mining operation operated -- located on the Laguna Plata in the southeast one-fourth of Section 10, Township 20 South, Range 32 East. This operation is authorized under a potash -- Federal potash lease, LC-068397, issued to the National Potash Company, a wholly owned subsidiary of the Mississippi Chemical Corporation.

In this operation an independent contractor removes sodium chloride from the bottom of the Laguna Plata and deposits it near the edge of the lake.

At intervals the raw salt is transported by truck to market for industrial use, which includes use for water softeners, livestock, and roads.

Production records of quantities sold are proprietary and confidential but can be obtained if the State wishes and is willing to bind itself to maintaining confidentiality.

MR. STAMETS: Water softeners, what, and roads?

MR. CHERRY: Livestock. I understand it's used as salt cake or blocks for them.

Laguna Plata is the best preserved example of the Dune-Playa ecosystem within the region. As you know, the Laguna Plata was formed by local subsidence in the Mescalero Pediment. The playa margins are

formed by 40-foot embankments on the north and west with a less distinct margin on the south and east. Stable and active dunes surround the playa margin extending up to the surrounding plain.

Several springs are found on the margins of Laguna Plata. The water quality of these springs varies from briny to potable. In one instance dune formation has blocked one spring's discharge into the playa forming a small pond which is used by local wildlife populations and migratory water fowl.

In addition, there are several smaller playas on the southeastern margin of Laguna Plata which hold water on a seasonal basis.

Given the rich and varied nature of this ecosystem, the prehistoric peoples of southeastern New Mexico made extensive use of the Laguna Plata area. Taken together the numerous sites surrounding the area form a mosaic of information about prehistoric lifeways which promise to add significantly to our present store of knowledge, if protected and properly studied.

For this reason, the proposed Laguna Plata Archaeological District was determined to be -- determined eligible for the National Register of Historic Places by the Secretary of the Interior in 1975.

Since that time BLM has consis-

tently acted to manage the area so as to protect the resource values at Laguna Plata. A brief synopsis of previous management decisions on Laguna Plata, as well as relevant excerpts from the East Eddy-Lea Management Framework Plan, are provided for your information. These documents demonstrate BLM's consistently protective stance regarding the natural and cultural values contained within the Laguna Plata.

The area is closed to the use of off-road vehicles and, in addition, no new roads are permitted. In 1982 a no-surface occupancy stipulation was included in the five Federal oil and gas leases issued in Laguna Plata. A stipulation requiring the fullest consideration of cultural resource values is included in Federal potash leases in the area.

Recently the Carlsbad Resource Area of the Bureau of Land Management has completed a Resource Management Plan Draft EIS. As part of this plan the Laguna Plata has been identified as a Special Management Area, with additional protective management stipulations to protect the archeaological, visual, wildlife, and geologic values found there.

The preferred alternative proposes acquisition of Sections 2 and 16, Township 20 South, Range 32 East, from the State of New Mexico to consolidate

land ownership within the proposed archaeological district. Consolidation of land ownership patterns within the Laguna Plat District would permit BLM to protect the cultural and evironmental values in this district with maximum effectiveness.

Consequently, approval of Petro-Thermo's application would hinder our management of the Laguna Plata District as a whole.

It is our understanding that the proposed facility is projected to become a major disposal site for oilfield waste in Chaves, Lea, and Eddy Counties. The Bureau believes that this type of disposal facility with unlined pits aligned to channel by-products into the playa poses a significant threat to surrounding Federal lands and resources.

As you know, public lands surround Section 16. Downstream contamination of these lands may occur if the proposed facility is built. We are particularly concerned about the possible release to the air, surface water, or groundwater, of hazardous waste, as listed in 40 CFR 261.30 by the Environmental Protection Agency, that may be disposed of in the proposed site.

We already know that in other areas of New Mexico oilfield wastes contain volatile organic compounds. Release of these compounds can be a threat to

the public health, wildlife, and the nearby salt mining operation.

We are particularly concerned that any hazardous materials entering Laguna Plata could eventually enter both animal and food chains via this commercial salt mining operation.

Given the natural resource values present at Laguna Plata and the potential for serious damage to those resources by the proposed facility, we are concerned about damage to public lands or injury to persons resulting from approval of Petro-Thermo's application.

BLM fully recognizes the need for adequate oil field disposal facilities in southeastern New Mexico. We further recognize hydrologically closed basins, such as Laguna Plata, are rare in this area. Nevertheless, not only are there -- is there an extant disposal facility within four miles of the proposed facility, but BLM is also currently considering a proposal for a similar facility at Williams Sink. In view of the current decline in oil and gas production, there is a serious question as to whether the location of three oil field waste disposal facilities within six miles of one another is environmentally and economically justifiable.

Further, the natural and cultural resource values at Williams Sink and Laguna Gatuna

have been significantly altered because of other land uses, and these areas are at least as accessible as Laguna Plata.

We believe it is in the best interest of the State of New Mexico and the BLM to work together in selecting an alternative location, which will serve the needs of industry without needlessly risking the public safety or damage to natural resources.

We ask that the State of New Mexico deny Petro-Thermo's application in Section 16; however, if the State elects to grant the lease, then we strongly suggest that certain stipulations be included in the lease, these stipulations that we have previously supplied to the State Land Board and NMOCD.

In addition, we feel that the State should clearly outline responsibilities and liability for resource damage to the public lands or injury to person arising from the approval of Petro-Thermo's lease.

MR. STAMETS: I presume we've got a copy of that.

MR. CHERRY: I haven't got one here. I've just got this computer printout. I'm talking about making copies of it, though.

MR. STAMETS: If you will talk to the young lady at the front desk, she'll make a --

MR. CHERRY: Sure.

MR. STAMETS: -- copy for us.

Mr. Cherry is here at least at my invitation, and he is not a sworn witness in this case but he is here to supply us with information from another governmental agency as -- as has been the policy of the Commission for a number of years.

Mr. Cherry, I'd like to ask you just a couple of questions about what you've had to say.

It's unclear to me that if the facility is approved and operates as proposed and as theorized, that the archaeological sites in the area would be impacted, those on Federal land.

MR. CHERRY: That is correct. I don't -- they would not be impacted unless employees or users of the facility were to go on Federal lands and that is not a concern of Petro-Thermo's nor would we attempt to have you put anything in a lease or constrain them in any way. That's simply our business to try and control or constrain uses.

MR. STAMETS: You indicated you were considering a facility at Williams Sink. How long is that consideration apt to go on?

MR. CHERRY: I'm afraid it's going to go on for quite awhile. We've just be enjoined by the Natural Wildlife Federation from taking any action on

Federal lands.

MR. STAMETS: Okay.

DR. KELLEY: Wouldn't that also create a problem since it is in the potash mining area? The potash industry may be against having such a disposal area above their mining operations?

MR. CHERRY: That's very possible. It's also -- the same company is also putting brine wastes into the Laguna Plata, so the same argument could be made, probably, for both sides.

MR. STAMETS: And you indicated that you have been, or were thinking about working with the State Land Office relative to trying to acquire those two sections. Has that action begun?

MR. CHERRY: The first step in that process is finalizing our resource management plan for the area. That is in draft stages. We are holding our public hearings next month on the subject and we hope to finalize our plan in December.

We have set some preliminary informal negotiation with the State on the subject.

MR. STAMETS: Okay, in that regard we're both dealing, talking about an agency over which neither of us have any control.

MR. CHERRY: That's right and

to be perfectly candid with you, we may not have the money to go ahead and acquire in a short time frame, anyway.

MR. STAMETS: Are there other questions of Mr. Cherry while he's here and available?

DR. KELLEY: I have one more question for Mr. Cherry.

On Laguna Plata, the main concern with disposal of any kind of material into that playa would be for the salt; other than that (not understood).

MR. CHERRY: Primarily that's our primary concern.

We have some concern about the wildlife in the area. We're responsible for providing a habitat for wildlife and --

MR. KELLEY: Isn't that primarily those other areas outside the boundary of --

MR. CHERRY: Yes, and I think, again, our primary concerns are some of the hydrocarbons that may get into the lake. The brine disposal is absolutely no problem at all.

MR. STAMETS: Any other questions of Mr. Cherry?

MR. LYON: I have a couple of questions for him.

MR. STAMETS: Go ahead, Vic.

MR. LYON: Mr. Cherry, can you be a little more specific about the archaeological treasure that people are trying to protect?

MR. CHERRY: I'm not an archaeologist, and my people have primed me for this, so it will come out third hand.

The Dune-Playa ecosystem is particularly unique in southeast New Mexico. We're dealing with an area of limited water, limited fresh water. This system earlier in prehistoric times had more potable water around the margin of that lake.

The dune system there also provided shelter from the winds; therefore, this became a major cultural site in association with availability of water, the protection, and the wildlife that also used the sink. Salt was also a valuable commodity that they surface mined in (not clearly understood.)

Therefore there's all kinds of structures, midden rings, lithic scatters, whatever you want to call it, a heavy concentration around the margins.

MR. STAMETS: Anything else, Vic?

MR. LYON: I believe that's all.

MR. STAMETS: Tom?

MR. KELLAHIN: Mr. Cherry, at one time Pollution Control had oral Division approval to utilize Laguna Plata for the disposal of produced salt water. Am I correct in understanding that notwithstanding that approval from the OCD that the BLM denied to Pollution Control that plata for disposal of produced salt water?

MR. CHERRY: I cannot verify that for sure since that happened before my time, but that is the -- my -- my understanding.

MR. KELLAHIN: You said in your prepared statement that there was potable water? Where?

MR. CHERRY: On the southeast portions. Again, this gets to the definition, if I could refer to what Dr. Stephens said this morning, it's all in your definition of what potable water is, but at least that water falls under that range of 10,000 parts per million. It's not good water by any means, but at least it is drinkable by the wildlife in the area.

MR. KELLAHIN: And that is still present in the Plata?

MR. CHERRY: Yes, it is still present.

MR. KELLAHIN: And what --

MR. CHERRY: From the seeps. Of course it loses its (not clearly understood.)

MR. KELLAHIN: And what use is being made of that water now?

MR. CHERRY: To my knowledge it's only being used by wildlife.

MR. KELLAHIN: Supports wildlife that inhabit the area?

MR. CHERRY: Yes.

MR. KELLAHIN: What, if any, concern do you have about the introduction of hydrocarbons in the Plata and its impact upon that potable water?

MR. CHERRY; We have not done the detailed hydrologic studies that all sides in this case have been concerned about.

Our hydrologist has been out there with Mr. Boyer from the NMOCD. We feel, at least in the foreseeable future, potable water, since it's so far away, would not be impacted for several years and it would come directly from the southwest or -- yeah, southwest to the northeast into the Plata.

DR. KELLEY: You did say that the water in the pond you weren't concerned about that was coming from the springs.

MR. CHERRY: That's right.

MR. KELLAHIN: Have you made any investigation by you or your staff to determine what im-

pact there will be if hydrocarbons are introduced in the Plata on the surface vegetation?

MR. CHERRY: No, we have not.

MR. KELLAHIN: Do you have any preliminary indications of how hydrocarbons introduced in the Plata might migrate within the Plata itself?

MR. CHERRY: No, we don't.

MR. STAMETS: Mr. Weber.

MR. WEBER: Sir, I have a series of questions, if I may.

Mr. Cherry, when was the last archaeological inventory or survey of Laguna Plata undertaken, and by whom was it undertaken?

MR. CHERRY: We have had several surveys of the area. The last, what I think you would call a formal survey, was completed in 1979 as an area-wide survey.

We have on various occasions gone out as individual sites are looked at, gone back to the area and the individual sites.

MR. WEBER: Yes, sir, since it was an area-wide survey, have any sites been identified in Section 16 which have been eligible for inclusion in the Natural Register of Historic Places?

MR. CHERRY: Absolutely not.

We have no authority to deal with State lands and therefore have not looked on State lands at all.

MR. WEBER: So you don't know what is in this particular area?

MR. CHERRY: Absolutely not. We have an occurrence map that indicates most of the archaeological values are found on BLM lands on the northern and eastern sides of the -- of the area, away from Section 16.

MR. WEBER: With regard to this historic area, what contact, if any, have you had with the Advisory Council on Historic Preservation?

MR. CHERRY: We are working with the -- we have formally applied to the council for eligibility. It has been determined to be eligible. We have not followed up yet to actually make the determination that is a district. We have been in close contact with the SHPO's office, and as soon as the plan is finished we intend to follow that up and try to get formal designations.

MR. WEBER: Now when you talk in terms of "it" you're talking only in terms of BLM lands?

MR. CHERRY; Yes, sir. Unless we can arrange to purchase or trade with the State.

MR. WEBER: Now, prior to the leasing for the salt mining operation was an environmental

impact statement prepared?

MR. CHERRY: Yes, sir. Not an impact statement; an environmental analysis was prepared.

MR. WEBER: Is that a statement of no impact?

MR. CHERRY: That was the final conclusion -- we did an environmental assessment and the finding was a statement of no significant impact.

MR. WEBER: With regard to the lease itself, is there a dike or a road across the laguna?

MR. CHERRY: I don't believe that there's a road all the way across the Laguna. There is a road into the salt operations.

MR. WEBER: Did the construction of this particular road have an impact on the archaeological features?

MR. CHERRY: The road was put in quite some time before the mining -- or the archaeological district was approved. However, any road construction, any development that takes place is cleared with 100 percent archaeological survey.

MR. WEBER: Sir, to what extent did you investigate the quality of the water in the laguna prior to leasing the salt?

MR. CHERRY: These salts were

leased many, many years ago before the Bureau or anyone was worried about these types of incidences.

MR. WEBER: Sir, I'm just wondering, have you done any recent investigative study of the quality of the water?

MR. CHERRY; I do not know the name of the study but we were involved in that study that was mentioned earlier, and entered as an exhibit earlier today, in '79.

MR. WEBER: Sir, do you know if the presence of reserve pits around the periphery of Laguna Plata or the possible migration of hydrocarbons from Laguna Gatuna has had any impact on the waters of Laguna Plata?

MR. CHERRY: No, sir, I don't.

MR. WEBER: Is it possible that they may have had some impact?

MR. CHERRY: It's possible.

MR. WEBER: Sir, are any other organizations holders of Bureau of Land Management permits to discharge wastes of any sort into Laguna Plata?

MR. CHERRY: No, sir. Excuse me, with one exception. National Potash does have a disposal permit at least to put brines, waste brines, into it.

MR. WEBER: So there's another discharge into that lake.

MR. CHERRY: Yes, there is a discharge.

MR. WEBER: What is the quality of the water being discharged into that lake?

MR. CHERRY: I don't know the exact quality. It's essentially brines and tailings from the mine, clean but salty brine.

MR. WEBER: You indicated that the State presently has title to the lands.

MR. CHERRY; Yes, sir.

MR. WEBER: What are the Bureau of Land Management's procedures for acquisition of State lands?

MR. CHERRY: We have -- the primary mechanism is through an exchange proposal worked out with the State.

MR. WEBER: Who makes these final decisions?

MR. CHERRY: The State Land Commissioner and the State Director of the Bureau of Land Management.

MR. WEBER: On the part of BLM who makes those decisions?

MR. CHERRY: Our State Director makes the final decision based on my recommendations.

MR. WEBER: Sir, has the State Director made a decision in this case?

MR. CHERRY: No, sir.

MR. WEBER: Have funds been earmarked for this project?

MR. CHERRY: No, sir.

MR. WEBER: Is there reasonable expectation that funds will be made in the foreseeable future?

MR. CHERRY: If you would define foreseeable future?

MR. WEBER: Well, is the Federal government presently engaged in an active program of land acquisition?

MR. CHERRY: Yes.

MR. WEBER: Are reports of investiture certain Federal lands overstated?

MR. CHERRY: Yes.

MR. WEBER: Given that information, what would you estimate the probability of the BLM acquiring these lands to be?

MR. CHERRY: In the short time frame of the next five years, very low.

MR. WEBER: In the short time frame of the next twenty years?

MR. CHERRY: They would probably be quite high.

MR. WEBER: Thank you. I have no further questions.

MR. STAMETS: Any other questions for Mr. Cherry?

I'd like to thank him for coming today and sharing his concerns.

I would point out to him that the law under which we operate certainly is different from that under which he has the good fortune to operate.

MR. CHERRY: Thank you.

MR. STAMETS: Mr. Kellahin.

MR. KELLAHIN: Mr. Chairman, at this time we'll move to dismiss the applicant's case in this matter.

The method of initiating a hearing under your rules of procedure are outlined in your rule book under Rule 1203. It is without dispute and it is a well proven fact in this case that the applicant, by his own admission, has told us that he had no property interest within the area that he proposes to place this facility.

You have no other choice but to dismiss the application at this time.

Mr. Abbott has got the cart be-

fore the horse and before he can bring this type of case before this Division there are some jurisdictional predicates that he must fulfill, and it is paramount and essential that he obtain a business lease from the Commissioner of Public Lands for this facility and having not done so, and having given him every opportunity to have accomplished that by this point, he still does not have it.

You can ignore your rule and let this go to a decision or you can require this applicant to comply with this rule as you require all others to comply with this rule.

It certainly doesn't single this company out for special treatment. It's consistent with how we do business before this Commission to require applicants to have a property interest and the simple fact of filing an application for a business lease does not vest in this company a sufficient property interest to bring this case forward.

It would be like anyone coming before this Commission and asking you to do anything without having an interest, either a leashold interest or an ownership interest in the minerals or some other property interest by which they could proceed with that case. Can you imagine what chaos you would create for yourself if anyone without a property interest can come in here and start force

pooling acreage in which they don't have an interest? You can think of all the cases you do hear and in every one of them a property interest is required.

This rule is simply not just a rule for rules sake, it's got a foundation and a substance in law and it's one you're obligated to abide by.

We believe the applicant has failed to meet his burden of proof and you have no choice but to dismiss the case.

MR. STAMETS: Mr. Weber?

MR. WEBER: Sir, Petro-Thermo Corporation would like to respond.

We believe that we do have a sufficient property interest. We believe that we have the same properaty interest Loco Hills Water Disposal Company had when it applied for an exception to this order on the 23rd of September, 1981. That was Case Number 7329. I believe Mr. Stamets was the examiner in that case. There, as here, the application had been made but had not yet been -- but had not yet reached it's final approval.

We would argue that there, as here, the jurisdictional objection should be dismissed.

We understand and we believe there has been testimony with regard to the fact that the State Land Office had obtained a relinquishment and is in

the preliminary stage of acting upon Petro-Thermo Corporation's application for an exception.

We believe that that is an appropriate interest to go forward to obtain the necessary approval.

MR. KELLAHIN: May I respond in closing, sir?

Mr. Commissioner, just because the Oil Conservation Division in the past in the Loco Hills ran one of those jurisdictional stop signs, you've done it once in the past, you should take no comfort in the fact that you can run that jurisdictional stop sign again. Having done it once in the past doesn't give you any reason to violate the rule before this Commission.

(Thereupon a brief recess was taken.)

MR. STAMETS: Mr. Kellahin, we've looked at the rule and believe it's clearly broad enough to allow for the application we have before us today and we overrule your motion to dismiss.

MR. KELLAHIN: I'm going to call my hydrologist, Tim Kelly.

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

10 April 1986

COMMISSION HEARING
VOLUME 2 OF 2 VOLUMES

IN THE MATTER OF:

Application of Petro-Thermo Corporation for an exception to Division Order R-3221, Lea County, New Mexico. CASE 8781

BEFORE: Richard L. Stamets, Chairman
Ed Kelley, Commissioner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division:	Jeff Taylor Legal Counsel to the Division Oil Conservation Division State Land Office Bldg. Santa Fe, New Mexico 87501
For Petro-Thermo:	John Paul Weber Attorney at Law MADDOX, RENFROW & SAUNDERS P. O. Box 5370 Hobbs, New Mexico 88241
For Snyder Ranches and Pollution Control:	W. Thomas Kellahin Attorney at Law KELLAHIN & KELLAHIN P. O. Box 2265 Santa Fe, New Mexico 87501

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. KELLAHIN:

Q Mr. Kelly, would you please state your name and occupation?

A My name is Tim Kelly and I'm a consulting hydrologist with Geohydrology Associates in Albuquerque.

Q Mr. Kelly, will you summarize your educational background and your work experience in the field of geohydrology?

A I have a Bachelor's degree from the University of Dayton in 1959 and a Master's degree from the University of Kansas in 1981, and I have additional graduate work at the University of Alaska, University of North Dakota, and University of Wisconsin.

After graduating from the University of Kansas I was employed as a development geologist by Standard Oil of California for approximately two years and was then employed by the Water Resources Division of the U. S. Geological Survey, first at the North Dakota District and later at the New Mexico District.

I resigned in May of 1975 at the time I

was a supervisory hydrologist, and established a consulting firm of Geohydrology Associates in Albuquerque at that time, and I've been in consulting since 1975.

Q Would you describe for us what work you have done as a hydrologist in this portion of Lea and Eddy County that is the general subject matter of the application today?

A Well, we've done a number of studies. We did a very comprehensive study beginning in 1978 under contract with the Bureau of Land Management to assess the water resources in a three county area of Eddy, Lea, and Chaves Counties. That report was subsequently published by the New Mexico Bureau of Mines and Mineral Resources and is available from them.

We then did a follow-up study, which was a detailed study of the water resources in the Nash Draw area and we --

Q Which is the Nash Draw in relation to Laguna Plata?

A Nash Draw is the topographic -- major topographic feature occupied by the potash companies, approximately six to eight miles west of Laguna Plata. Our study area included Laguna Plata.

Q What other hydrologic assessments or studies have you made of this general area, Mr. Kelly?

A We've made approximately three studies for disposal of oilfield brines in the Nash Draw area. We made a study for Pollution Control on the use of Laguna Gatuna as a disposal area, and then we've also done additional work for the Sandia Corporation as part of the WIPP site and a regional overview which included this area, and then we've also worked further east for other industrial clients.

Q Where is the WIPP site area in relationship to Laguna Plata?

A Oh, it's approximately ten miles south/southeast, I would estimate.

Q Is it in the same hydrologic system that Laguna Plata is tied into?

A Yes, it is.

Q Have you testified before the Oil Conservation Commission as an expert hydrologist?

A Yes, sir.

Q Did you appear as a consulting hydrologist for Pollution Control at a hearing back in 1984?

A Yes, I did.

Q For approval of Laguna Gatuna as a disposal facility?

A Yes, sir.

Q Have you had an opportunity review and

examine the information and opinions of Dr. Stephens that he's presented on behalf of his client?

A Yes, I have.

Q And are you appearing today as a paid consultant by Pollution Control for review of the hydrology of this application?

A Yes, sir.

MR. KELLAHIN: We tender Mr. Kelly as an expert hydrologist.

MR. STAMETS He is considered qualified.

Q Mr. Kelly, before we get into the nuts and bolts of the Petro-Thermo application, I would like for you as an expert to give us an overview opinion of the general hydrology in which we find Laguna Gatuna, Plata, Toston, on through Williams Sink to Nash Draw and on to the Pecos La Sala Grande at the south and the town of Lovington is shown from these area with the Pecos River cutting across the southwest corner of the map.

MR. KELLAHIN: You mean Loving.

A Loving, excuse me.

Exhibit One is identified as Plate I with water levels in the uppermost aquifer. This is Plate I from a report that was published by the Sandia Corporation by R. L. Hunter, which shows generally a -- generally the same

area somewhat expanded of the Nash Draw area, and this particular report is referenced by Dr. Stephens. The complete reference is in his report.

By way of the hydrology, basically the Nash Draw area and particularly the various platas to the east, are all collapse features as a result of groundwater flow in what is sometimes referred to as the rubble zone, which is at the base of the Rustler formation or at the top of the salt beds, and as a result of solution of the salt, this entire area has collapsed. It is the source of water for groundwater discharge at La Sala Grande and is also the source of much of the salt in the Malaga Bend area entering the Pecos River.

These, our water table contours on both maps and in general the groundwater flow is normal to the contours so that it flows at right angles to the contours, as shown.

The various platas to the east side are all assumed to be small collapse features similar to Nash Draw and in fact this one elbow in Nash Draw lines up very well with Laguna Toston, Laguna Plata, Laguna Gatuna, and Laguna Tonto, and it is a safe assumption that at some point in time this entire area may become a part of the collapse feature of an extended Nash Draw.

The hydrologic system is very complex be-

cause of the collapse features and the amount of salt that not only has been removed from the rubble zone on top of the salt itself, but also from within the Rustler formation, so that water at any given place is really a function of the amount of fracturing that has occurred along the collapsed zones.

Many of the springs associated with the various platas indicate a source of groundwater that is fairly deep and yet we have been able to determine, Link (sic) has determined, our studies have shown, that all of these platas were not created equal. They are all somewhat unique and so that while they have the same general origin because of the local geology, groundwater conditions, the hydrology of each individual site must be considered in detail and it is not a safe assumption that what happens at one plata is going to happen at the other.

Ultimately any water from the east side of Nash Draw is going to end up in the Pecos River. None of us will live to see it, but certainly that is the general direction of groundwater flow. It is to the west in this area; it is to the southwest in this area; again to the west here, but once you get into Nash Draw, it all pretty much channels in towards La Sala Grande or to the Pecos River.

Q If you are ready at that point now where you would like to discuss Dr. Stephens' report, we can go

then to Laguna Plata and talk about what his study shows and what your comments are about the information in the study. Are you prepared to do that now?

A Yes.

Q All right, let's do that.

Do you have a copy before you, Mr. Kelly, of Dr. Stephens' report that he submitted in evidence today --

A Yes.

Q -- as Exhibit Number Eight?

A Yes, I do.

Q All right.

MR. STAMETS: Eight or Nine?

MR. KELLAHIN: I believe it's Nine.

Q All right, sir, let's turn to Figure III on page 13 and at the same time I would like to reference you, sir, to the exhibit we have marked as Pollution Control Exhibit Number Three.

A Yes, sir.

Q Do you have one of these? I'm not sure Mr. Weber's got one. Do we have one for him?

A I bet we can find one. Yes, sir.

Q What is the source of the information by which Mr. Stephens has prepared Figure No. III, shown on

page 13?

A Most of the information, it's my understanding from reading his report and from his testimony, that this is information that came from various published sources, which are given in his list of references.

Q Have you checked his references to determine the accuracy of the information depicted with regards to Laguna Plata?

A The data seems to be plotted reasonably accurately, yes, sir.

Q Let me show you what we've marked as Exhibit Number Three and have you, using Figure No. 3 and your Exhibit Number Three, talk about Mr. Stephens' conclusio that Laguna Plata constitutes a closed structure whereby produced water disposed of on the surface at the proposed facility is going to migrate and be contained within Laguna Plata.

Do you have any comments or opinions with regards to his conclusion on that issue?

A Yes, sir. His conclusion is not consistent with the data that is available.

On Figure 3 of his report he has closed the 3440 foot contours. That is a contour on the water table but, in fact, the two illustrations, Pollution Control Figures 1 and 2, or Exhibits One and Two, both show the same

area marked in black on your particular copy in front of you, and nobody felt that there was sufficient control to close any contours in that area, so the people who've worked ont he area, with the exception of Dr. Stephens, did not find that to be a closed groundwater basin.

Also, the illustration, Exhibit Number Three, which you referred to, is a Xeroxed copy of a larger plate which was included in the 1974 report for Pollution Control entitled Lea County, New Mexico, Salt Lakes Area, Western Lea County by Ed L. Reed, and this is a contour map. The heavy contours on this illustration, on Exhibit Three, are contour maps drawn by -- contours drawn by Mr. Reed on the top of the redbeds, and as you can see, the 3450 foot contour does not close around Laguna Plata but in fact is open to the west, which would indicate that there is a bedrock low on the top of the Triassic which would be draining towards the west and towards Nash Draw and Williams Sink.

Q Using the available data that you have, what conclusion do you draw about the migration of the water disposed of at the surface of this facility towards Laguna Plata?

A There are two things. One is the contours on both of these illustrations show that the general direction of groundwater flow is from east to west and the springs, as shown on all of the publications, have the

springs located on the east side of Laguna Plata, which is also consistent with Mr. Cherry's information.

That is the exact position in which you would expect the springs to be located with an east to west direction of groundwater flow. In other words, groundwater is moving into the east side of Laguna Plata. The absence of springs on the west side suggests to me that there is groundwater flow out the west side of Laguna Plata, and again continuing towards Williams Sink and Nash Draw.

That is consisten with all of the other work that's been done in the area.

Q What significance does that have to you as a hydrologist and what significant should that have to the Commission in deciding disposition of this case?

A That Laguna Plata is not a closed groundwater sink but rather simply a surface exposure of the water table, and that the general direction of groundwater flow is from the east to the west and out of Laguna Plata towards Nash Draw.

In other words, it's not going to stay in Laguna Plata but it may well move to the west.

Q As the discharge water moves to the west, what is the ultimate, eventual outcome of that discharge?

A The Pecos River.

Q Let me direct your attention now to what

I have marked as Exhibit Number Four. With regards to Exhibit Number Four, Mr. Kelly, were you requested by your client to make an evaluation and study of Dr. Stephens' report to determine what, if any, issues were unaddressed by his report?

A Yes, I was.

Q And were you further asked to make an examination of his report to determine whether or not in your opinion you felt his report was complete and adequate?

A Yes, I have.

Q Have you done such a review?

A Yes, sir.

Q Does Exhibit Number Four represents your opinions and summary conclusions about the deficiencies of that report.

Q Let's start --

A It also includes my typing, for which I accept the responsiblity or credit.

Q Let me direct your attention to that issue, and ask you, sir, as a hydrologist to go through and identify for us those significant issues in which you feel that Petro-Thermo's report has not adequately addressed the problems before the Comission today.

A Well, I have listed on this exhibit eight different items which I feel are either shortcomings or dif-

ferent interpretations of the data presented in Petro-Thermo's report.

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

I think that the testimony that has been presented here today has shown that there has been no drilling at the site; that Mr. Stephens walked out one arroyo and estimated that there was 20 foot of exposed alluvial material, but we do not in fact have any idea how thick the alluvial material is at the proposed site itself.

We don't know whether it is greater than -- less than 20 feet or whether it is more than 130 feet. This is information which is taken from Dr. Stephens' report. We simply don't know how much alluvial material is there to be saturated.

Q Why is it important to know the thickness, the permeability, the composition of this alluvial cover before a project of this type is undertaken?

A Well, it's critical because if you don't know how thick a zone you're dealing with, if you don't know what the elevation of the water table is, then you have -- and also if you don't know what the lithologic composition is, you don't have any idea what type of a zone you're

dealing with as far as saturation, direction of movement, or rate of groundwater flow is.

Anything beyond that, as Mr. Stephens pointed out, is just a guess on his part, such as the rate of movement.

Q Does it aid you in making a determination of the direction and rate of the movement of the discharged water to look at the topography of the surface and determine the slope of the surface?

A None whatsoever. The surface of the redbeds, which is the impermeable zone to which the waste product will move, is -- was formed by erosion prior to deposition of the overlying alluvial material under entirely different geologic conditions. All we know is that it is an erosional surface with considerable relief.

Mr. Reed's attempt to contour it shows that there is a bedrock low draining to the west.

Q You've indicated a second issue that gives you a problem with Dr. Stephens' report. What is that?

A Well, that pertains to the erosional surface and the lack of information of the redbed surface. We don't know what the redbed surface is. It could be dipping to the south for all we know, in which case the water would not move towards Laguna Plata but it would move to the

south. We simply don't know.

Q Let me ask you to again address number 3. I believe you commenced your testimony with a discussion of the general migration of the water from east to west.

Would you amplify for us your problem number 3?

A Yes, sir. The report by Petro-Thermo does not disprove any of the work that Reed did in 1969, which indicates that there is a bedrock channel which woould result in the westward migration of groundwater to -- from Laguna Plata, and in fact, the Stephens' report Figure III, where the contour 3440 has been closed, in itself shows no control.

So, again, we do not know what is happening other than from Mr. Reed's earlier work in 1969 on the bedrock surface the pollution will move to the west and not be contained by Laguna Plata.

Q I direct your attention to your point number 4 shown on Exhibit Number Four, and ask you to address the next issue.

A This pertains, again, to the 3440 foot contour. Neither of the illustrations on the wall, nor any work that I have seen, show justification for closing the 3440 foot contour as has been done by Mr. Stephens and which is essential in order to establish that Laguna Plata is a

groundwater discharge point.

The absence of any control leads one to conclude that the dashed line used by Mr. Stephens is certainly of a questionable nature and that it may in fact not be valid.

Q In the absence of data to show Laguna Plata is a closed depression, could you as a hydrologist recommend that Plata be used as part of this infiltration disposal system as proposed by the applicant?

A No, sir.

Q Why not?

A Because it's not -- Laguna Plata is not going to hold the discharge if the discharge ever gets there.

Q Let's go to Number Five, Mr. Kelly. Would you identify that isswe for us?

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

I haven't heard any testimony either by Mr. Stephens or Mr. Thornton that address this particular problem. I have been in attendance at OCD hearings when a similar type of operation came before the Commission from Loco Hills requesting that they be given additional evapora-

tion ponds because they were not functioning as -- as they had presupposed would happen.

The surface area, as described by Mr. Thornton, is about 6/10ths of an acre, which is in itself enough to evaporate about 130 barrels of water per day if all of the pits were filled, but it seems to me somewhat contradictory because at one point they want to put the water in and use it for an infiltration system so that they don't have to deal with evaporation, and then they turn around and compute evaporation rate for Laguna Plata where they're not putting the waste in the first place. They're just assuming it's going to get there; the subsurface information doesn't establish that.

Q Let's turn to Item No. 6, Mr. Kelly, and have you explain to us your concerns as identified by No. 6.

A Well, the evaporation of fluids should be calculated for the surface area of the disposal ponds and not Laguna Plata.

Once the water is put into the ponds and we assume that it's going to go into the ground, their assumption is that it's going to go to Laguna Plata. There is no evidence presented which will establish that; therefore, they are incorrect in using the evaporation rate off of Laguna Plata unless they intend to pipe the water directly to Laguna Plata from their holding system, which they do not.

Q Let me have you address problem No. 7 identified on that exhibit.

A The report does not contain any chemical analyses of water samples from the fluid which will be disposed. The TDS range, as reported by Dr. Stephens, is between 25 and 75,000 parts per million, but the springs at Laguna Plata are less than 9,000 parts per million, as indicated by the Petro chemical report Figure II, which in fact shows that the concentration is less than 9000 parts per million.

So, in fact, if the best water that they put into the system is 25,000 parts per million, it is, in fact, about three times greater than the natural discharge because these springs are, in fact, the natural discharge to Laguna Plata.

Q Let me direct your attention to Item No. 8, Mr. Kelly, and have you identify and describe that issue.

A The concentration of 335,100 parts per million reported in the report for Laguna Plata is a concentrated brine resulting from evaporation on the lake floor or it is a residual concentration from potash discharge by National. I've said on this exhibit it's Kerr-McGee; it is, in fact, National.

If a sample had been collected from La Sala Grande, which is a known groundwater discharge point

where there is no potash slurry being discharged, or from Laguna Tonto, they would have found that the concentrations on the bed of the lake is in fact about 200,000 parts per million, and, in fact, this number shows up in Figure II, where the Stephens' report shows a concentration of 196,000. This is the general concentration of total dissolved solids in the bottom of any of the lakes, the salt lakes in this area, which have not been contaminated by potash brine.

On the other hand, the potash brine consistently runs between 325 and 350,000 so that the number which Mr. Thornton got from his sample is in my opinion consistent with that which would be expected from discharge from National Potash and not from evaporation of salts on the floor of Laguna Plata.

Q Based upon the current status of Dr. Stephens' report for Petro-Thermo on this project, would you recommend that the Commission approve this application?

A No, sir.

Q Let me take you to another subject, now, and ask you to show us the differences, if any, between Laguna Gatuna as a disposal facility for produced water, and have you compare it to Laguna Plata.

In order to make that comparison I have taken out of your July '84 hydrology report for Pollution Control, introduced in that hearing in Case 8292, and I have

made copies, sir, of your Figure No. 4 on page 28.

A Yes, sir.

Q Do you have that before you?

A Yes, I do.

Q That represents a drawing showing Laguna Gatuna?

A Yes, sir.

Q All right. Now if you'll go back and take the drawing, Pollution Control Exhibit Number Three for Laguna Plata, we'll have before us a schematic of both of the platas from which to make some comparisons.

Before you make those comparisons, I want to ask you, Mr. Kelly, were you asked in preparation for your testimony, to make a comparison between those two lagunas of the geohydrologic conditions?

A Yes, I was.

Q And have you done so?

A Yes, sir.

Q And have you resulted that -- have you taken that comparison and reduced it to an exhibit, a summary exhibit?

A Yes, sir.

Q I show you Exhibit Number Six and ask you if that is your work product and whether that represents your summary.

A Yes, sir, it does.

Q Taking Exhibit Number Three, which is the schematic on Laguna Plata, and schematic number five on Laguna Gatuna, would you identify for us the significant differences between those two platas in terms -- lagunas in terms of whether those features are closed or not?

A Yes, sir. First I should perhaps direct your attention to a couple of typos on this Exhibit Six. One, in the first section under Laguna Gatuna, it states "similar to water water". That should, in fact, read "waste water".

And also under Laguna Plata, the third -- excuse me, the second section, the word should read "outflow" not "ourflow".

In comparing the two sites I felt that there were three criteria which were most significant -- which showed significant differences between the two platas -- the two lagunas.

These are the natural water quality, groundwater flow, and the distribution of Triassic rocks, all of which are critical to an understanding of the geohydrologic conditions at the two and also for making the comparison.

At Laguna Gatuna the chloride concentrations from the natural springs, and these are shown in Fi-

gure II of the Petro-Thermo report, range from 27,657 to 163,105 parts per million chlorides.

For -- I would also like to point out that most of the brine being discharged in Laguna Gatuna by Pollution Control is similar in concentration to that which would be discharged by Agua, Incorporated, in range from 25 to 75,000 parts per million chloride.

As you can see at Laguna Gatuna the natural discharge from the springs is very similar or even higher than the concentrations in the oilfield brines which are being discharged at Laguna Gatuna in the Pollution Control facility.

On the other hand, the -- at Laguna Plata, as we pointed out, the concentration is about three times as high in the best water proposed to be discharged by Agua, Incorporated, as compared with the natural spring discharge into Laguna Plata, and this does not take into consideration the statements made by Mr. Cherry today in which there is potable water, certainly water which is suitable for strock watering in the Laguna Plata area.

The next criteria of groundwater flow I have alluded to to some extent, and that is in Exhibit Six you will note that the springs, the natural springs, in Laguna Gatuna are on the -- basically on the west side of Laguna Gatuna.

Q I think you misspoke. We're looking at Exhibit Number Five; you called it Six.

A I'm sorry, Exhibit Number Five.

Q All right, sir.

A The springs are on the west side. Since all of the regional groundwater flow is from east to west, in order for the springs to be present on the west and not on the east, there has to be a reversal in the groundwater flow from the regional to a local phenomenon at Laguna Gatuna, indicating then that Laguna Gatuna is in fact a groundwater discharge point because the springs flow from west to east rather than from east to west.

The opposite is true, as shown by Exhibit Number Three, in which all of the springs that have been confirmed by the Petro-Thermo report and by Mr. Cherry, that the springs are on the east side, which is consistent with a ground -- regional groundwater flow from east to west. There are no springs on the west side, therefore the groundwater flow from the west end of Laguna Plata in all probability is towards the west and it is not a closed groundwater basin.

The third criteria which I would like to address your -- address my attention is the distribution of Triassic rocks. It has been well established by Dr. Stephens and by all of the work that has been done there

that the Triassic rocks, that is the redbeds, are impermeable to groundwater movement for all practical purposes in a downward direction; therefore, the distribution of the bedrock is critical to the direction of groundwater flow.

In Laguna Gatuna, as shown by Exhibit Number Five, there are outcrops of Triassic rocks on virtually all sides of the lake.

Q How is that shown by the exhibit?

A That is shown by the identification "TR" and the black, dark areas.

Q What do you conclude from those outcrops?

A From this we can concludes that the Triassic rocks are very near the surface; that there is a very thin to lacking, or absent, alluvial fill and therefore any movement from the Pollution Control facilities are going to be within a very short distance of the bedrock, that is the redbed, and move directly into Laguna Gatuna, at which these two sites are located on the brink of the lake itself.

However, at Laguna Plata the only Triassic rocks, again shown the dark band in Exhibit Three, keep me honest --

Q Three.

A -- are on the north side, so that for probably 60 to 70 percent of the -- of Laguna Plata, we have no idea where the Triassic rocks are, which is consistent

with the work by Reed that we don't have any idea what the bedrock configuration looks like, other than his subsurface map, which shows a westward drainage channel.

But for all practical purposes at the proposed site, which has been presented at this hearing, there is a complete absence of Triassic rocks and therefore a total unknown as to the depth or direction at which this surface slopes.

Q Without knowing the contours of the red-bed within the area of Laguna Plata, can you predict as a hydrologist the direction at which the disposal water will migrate?

A No, sir.

Q Can you as a hydrologist tell us something about the specific site that Petro-Thermo proposes to use in terms of how the discharge water will enter the surface? Will it go vertically down? Will it saturate horizontally? What happens?

A What is going to happen once it leaks from the ponds or the pits is purely conjectural. Since we have no subsurface information, we have no idea what direction it's going to go, how far down it's going to go, or how fast it's going to move. It would depend on the lithology of the alluvial material. It would depend on the gradient of the water table and it would depend on the configuration

of the bedrock, the redbed.

Q What, in your opinion, is the potential risk to vegetation, surface plants, root systems, with regards to the approval of this facility with the current state of the information?

A Well, I would say the lack of information would lead me to conclude that -- that it could be assumed that these -- that the surface or vegetation, and so forth, would be in danger.

Q Do we know whether or not the redbeds are those impermeable layers upon which the disposal fluids will be caught, whether that is uniform and consistent in any direction?

A No, sir, we don't.

Q Is it reasonable to expect that that discharged water could percolate to the surface at various points within and without the facility?

A Yes, sir, that's -- that's entirely possible. In fact, I'd say it's highly likely because from our experience throughout this area caliche is a very common subsurface occurrence. Once a discharge reaches that caliche zone it's -- it's going to do one of three things.

If the caliche is a solid, impermeable zone the water will simply follow along the top of the caliche until it reaches a discharge point and it may be

far above the redbeds. If the caliche is in fact fractured, as it frequently is, then it will essentially pipeline the waste products in whichever direction the fractures go. This is impossible to predict, but it could greatly accelerate the rate at which water would move toward Lagauna Plata and virtually eliminate any of the infiltration process which they are depending on to clean up their waste.

If the water moves through the caliche zone vertically, it could encounter underlying permeable material and then act the way they are predicting, but until there is subsurface information, we have no idea.

Q In making your review of the hydrology underlying the application were you asked to make a review of the hydrologic findings of fact that the Division made pursuant to an Examiner order?

A Yes, I was.

Q I show you a copy of the Examiner order, Mr. Kelly as a reference point.

I would ask you, sir, to turn to the Examiner order to page two, and starting with Finding No. 9, if you'll commence with subparagraph A, and give us your opinions with regards to whether or not you believe the current information available supports that finding.

A Item 9-A states Triassic redbed comprised of the Chinle shale, Santa Rosa sandstone, and the Dewey

Lake formation underlies both Laguna Plata and the proposed water disposal site.

I believe that's a correct statement.

MR. STAMETS: If you agree with these, if you'll just say you agree, that will save us some time.

Q Let's go to 9-B, Mr. Kelly.

A 9-B, I agree with.

Q Let's look 9-C.

A 9-C, I agree with in part. There is no question that the -- no, excuse me, Item 3, the surface of the Triassic redbeds is depressed in the vicinity of the waste disposal site in Laguna Plata, thus creating a collapse feature.

We have no -- we have insufficient subsurface data to establish this. Inasmuch as the Triassic redbeds are only exposed on one side, we have no surface expression throughout most of the perimeter, and we also have very little or no subsurface information. Therefore, I don't believe that that conclusion can be reached with the data that has been presented.

Q All right, sir, let's go to 9-D on page 3 and ask you whether or not you believe as a hydrologist that item.

A Item 9-D, I concur that the surface flow

is towards the boundaries of Laguna Plata; however, I do not agree that the subsurface flow is towards Laguna Plata.

We know that a groundwater mound will be created but in the absence of any subsurface information, we have no idea what its direction of migration might be and in fact it may be towards the west, as indicated by Reed's earlier work.

Q All right, sir, let's go to Finding 9-E, I believe.

A Again, Item E, there is no evidence to support this conclusion because we don't know. We have no subsurface information to reach that conclusion.

Q All right, sir, and F?

A In Item F, this assumes that it is going to get into Laguna Plata. This would be a correct statement if in fact the water was piped to Laguna Plata, but since it's not going to, we don't know how much is going to get there and therefore what the evaporation would be.

If the total amount were piped to the lake, then it would be a true statement.

Q G?

A Is correct.

Q H?

A That's incorrect. The data has shown that the -- that there is not only potable water but that

the maximum natural groundwater discharge is less than 10,000 parts per million.

Q All right, sir, and I?

A Item I refers again to the sample which was collected by Mr. Jorgenson (sic) and is -- is your name Jorgenson?

MR. WEBER: No.

A I apologize, Mr. Thornton. I apologize. And is much more in agreement with what type of sample would be expected from a potash refining waste product rather than a natural evaporation brine.

Q J.

A This is probably correct.

Q Okay, and K?

A And K is an overall conclusion which I do not believe is supported by the documentation.

Q Mr. Kelly, I'd like to direct your attention now to the question that has developed subsequent to the last hearing and that is the suitability of the plan that has been discussed between Petro-Thermo and the OCD staff hydrologist in terms of monitoring wells. You have heard described in today's hearing a system of monitoring wells. What is your comments and conclusions with regards to the adequacy of the location, first of all, of the proposed monitoring wells?

A I believe that they are located in the direction which you would expect in a perfectly uniform, hydrologic system but at a distance which would require a considerable amount of contaminant to get into the ground before it was ever identified.

Therefore I feel that the two sites proposed by Petro-Thermo are not only inadequate but probably poorly located.

Q Where would you locate proposed monitoring wells?

A First of all, I would locate them at the boundary of the property so that -- or the boundary of the facility, so that as soon as the material showed up you would be able to begin to monitor it rather than wait until a large amount of area had been saturated in the subsurface.

Second of all, we have no knowledge whatsoever of the redbeds or of the water table. Those locations are compatible with a monitoring well of a surface spill but not of a subsurface groundwater mound. Therefore I would propose a minimum of three wells, one directly to the north of the first unit; one to the northeast; and one to the northwest, and that would be a minimum.

Q Would you locate the wells that close together between 1 and 2?

A No, sir.

Q What purpose is served by having the wells located that close together?

A I don't know of any purpose.

Q What is the purpose of having a monitoring well, Mr. Kelly?

A It's to keep track of the changes that are occurring in the subsurface.

Q Is the monitoring well system a method that could be converted into a reclamation operation or a clean-up procedure in the event contamination levels at the monitoring wells exceed the standards the Commission desires to apply?

A While small capacity submersible pumps could be put into these units, since we do not know what the transmissivity of the aquifer is, we have no idea what the magnitude of the cone of depression would be as created by pumping these, therefore I would say that a facility of this type might enable the operator to pull some of the contaminant out of the ground but there could be 90 percent bypass and they would never know it.

Q Rather than use a system of monitoring wells, is it an accepted method of your discipline and profession to model the groundwater movement or projected movement to predict it with comprehensive computer modeling?

A That is a technique which is generally

accepted when there is a large amount of data available.

Q What data would you have to have available in which to program a computer model to determine the direction and rate of flow of the produced water at the point of introduction into the ground?

A You would have to know the configuration of the water table, the configuration of the bedrock surface. This would give you the amount of saturation.

You would have to know the transmissivity and the coefficient of storage of the aquifer material, and this throughout the area, this information would have to be available throughout the area over which the modeling was going to be performed in order to predict the movement of a waste plume.

I might mention that we are presently in the -- we are presently modeling such a problem in southeastern New Mexico, in Lea County, in fact, and we have approximately 40 monitoring wells which have been measured, sampled, and tested over a period of four years.

Q I think it's generally assumed, Mr. Kelly, that there is not an abundance of fresh drinking water available in this area. Are you comfortable with the current state of information as a hydrologist that you would recommend the Commission to approve this facility, even knowing that there is a lack of abundant fresh water which

to protect?

A No, sir. I think that based on our studies down there, not only local but region wide, the distribution of fresh water in that area, as presented in the Petro chemical report, and to some extent in our own reports, is misleading.

There are -- there is ample evidence of numerous windmills which have fallen into disrepair in the area. The presence of the windmill indicates that in the past water has been used for stock watering and in many cases, such as the item shown on one of the exhibits, at the Snyder Ranch, where the water was in fact consumed as potable by inhabitants.

Contrary to what Mr. Stephens said, it is not tremendously expensive to pipe water in. In fact, the water is given to these operators, to these landowners, by the potash refineries, who are piping water across the land, and most of these landowners were smart enough to make the concession that they could tap the pipeline for water; therefore, the reason that there are no fresh water wells down there is simply because they've fallen into disrepair because it's a lot easier to turn on a tap than it is to operate a windmill.

So I believe that there is a lot more fresh water down there than is commonly supposed.

Q Upon reflection and having re-examined the hydrology for this area, are you still comfortable with the conclusions and recommendations that you made this Commission for the utilization of Laguna Gatuna by Pollution Control as a surface disposal facility?

A Yes, sir.

Q With regards to the information available to you and that information study and the conclusions you've made, do you believe that that it is reasonably justified to use Gatuna Plata -- Laguna Plata as an area in which we could have surface disposal of produced water from oil and gas wells?

A No, sir, I don't. There are -- there are basically four well known platas there and our studies have indicated that Laguna Gatuna is the best of the four as a disposal site. Laguna Plata is the poorest of the four, and Laguna Tonto and Laguna Tostin are probably somewhere in between.

Q You characterized the hydrology in this particular area the other day has having a domino effect. Could you reiterate for us that type of characterization of the collapse structures in here?

A Well, as I mentioned in my earlier testimony, and in reference to what you're saying, the water, basically the groundwater flow is from east to west and ul-

timately into the Pecos River.

The farther away you are from Nash Draw the farther you are away from the Pecos River, so that in the event that there was a problem at Laguna Gatuna, you are -- you still have several miles in which to clean up an area before it's going to get into Laguna Plata. Once it gets into Laguna Plata there's no doubt in my mind that it's going to go to Williams Sink and then to Nash Draw.

So I feel that the domino effect simply means that the farther you are away the more time you have to clean up if you have a problem.

MR. KELLAHIN: That concludes my examination of Mr. Kelly.

We move the introduction of his Exhibits One through Six.

MR. STAMETS: These exhibits will be admitted.

(Thereupon a recess was taken.)

MR. STAMETS: The hearing will please come to order.

I presume there are questions of Mr. Kelly.

MR. WEBER: Yes, sir, there

are.

MR. STAMETS: You may proceed.

CROSS EXAMINATION

BY MR. WEBER:

Q Mr. Kelly, you have indicated that you're a consulting hydrologist employed by Pollution Control, Incorporated. Is that correct?

A Yes, sir.

Q And you have also indicated that you testified on behalf of Pollution Control, Incorporated, at a number of hearings of the Oil Conservation Division and Oil Conservation Commission, is that correct?

A I believe twice in their behalf.

Q Could you tell me what those cases were?

A One was Case -- in about 1982 pertaining to a site up near PCA somewhere, as I recall.

The other was in the application by Pollution Control for an expansion of their existing facilities at Laguna Gatuna and that was in 1984.

MR. STAMETS: Excuse me, Tim, wasn't that one -- you had one for what, C & E, down in the potash area?

A Well, I -- but that was not -- B & E.

MR. STAMETS: B & E.

A But that was not for Pollution Control, in response to his question.

I've appeared about four times before the Commission but for Pollution Control I think twice.

Q Yes, sir. My question was did you -- were you aware that Pollution Control had authority from the Oil Conservation Division to dispose of produced water in Laguna Plata as well as Laguna Gatuna, and did you so testify on their behalf with regard to that authorization or any subsequent actions which related -- with relation to that?

A No, sir. The one in which they obtained authorization for discharge into Laguna Plata, I believe, was one in 1969, their first application; whereas, my appearance in their behalf was for the expansion of their existing facility in Laguna Gatuna in '84.

Q Given the fact that they did have authorization to dispose of produced water in Laguna Plata, was the hydrologist who testified at that point in time in error in saying that there would be no reasonable expectation of contamination of existing fresh water supplies?

A That was in -- as far as I know, that occurred in 1969 when I was employed with the U. S. Geological Survey and I have no idea what the testimony was.

Q Now at the very first you discount Dr.

Stephens conclusion that Laguna Plata is a closed collapse structure. Is that a correct statement?

A I believe that my statement was that there is no evidence presented in his report to verify that.

Q But you're not discounting the fact that it might be a closed collapse structure.

A No, sir.

Q Are you familiar with the text Geology and Groundwater Report Conditions in Southern Lea County, New Mexico by Nicholson and Klebsch?

A Yes, sir.

Q Is that a generally recognized text?

A Yes, sir.

Q Is it generally accurate?

A Yes, sir.

Q If this text read "evidence for a collapse structure is found in Laguna Plata", would that be a correct statement?

A I would accept that, yes, sir.

Q If it also stated that several other depressions are indicated in the redbed surface in other areas, Lagunas Plata, Gatuna, Tostin, and Tonto, at the south end of Querecho Plains appear to be similar origin to San Simon Swale but of smaller size, would that be a correct statement?

A Yes, sir.

Q Now, you have based your determination that it's not a collapse structure based upon distribution of Triassic rocks, the absence of springs in the west corner of Laguna Plata, is that correct?

A Yes, sir.

Q Were you here present when Dr. Stephens testified as to his investigation of the arroyos in the vicinity of the proposed disposal site which clearly show the layer of alluvium underlain by the Triassic redbeds?

A Yes, sir.

Q Was that testimony also provided in the transcript which was given to you for your evaluation and consideration?

A What transcript?

Q Were you provided a transcript of the Examiner Hearing and Dr. Stephens' testimony at that time?

A No, sir.

Q You have not reviewed that testimony?

A No, sir.

Q So you discount his personal observations.

A No. I base my conclusion on the work that has been done since Nicholson and Klebsch published their report, primarily by our firm for the Bureau of Land

Management.

The -- and also Dr. Stephens testified that his study was based primarily on a review of the literature. The literature he's referring to is to a large extent that that was performed by my firm.

The Nicholsen and Klebsch study is a good study but it is a regional USGS study which did not make an attempt to thoroughly analyze the hydrologic conditions at this area.

Also, the Nicholson and Klebsch study, if you'll notice in the title, is in Lea County. The problem does not end at the county line. It continues into Eddy County with Williams Sink and Nash Draw.

So it's not surprising that Nicholson and Klebsch would have referred to the portion in Lea County because that's all they were getting paid to analyze.

In our study for the Bureau of Land Management we were looking exclusively at the area of collapse with a detailed study which included a great deal of test drilling, all of which post dates the work done by Nicholson and Klebsch and which was available to Dr. Stephens but was -- but he was only basing his study on the literature, whereas mine, I feel, is firsthand experience over an eight year period.

Q Sir, what kind of firsthand experience

have you had? Have you visited the proposed disposal site?

A Yes, sir.

Q Have you noticed any evidence of Triassic redbeds on the western side of the laguna?

A Laguna Plata?

Q That's right.

A No, I have not.

Q Have you noted any springs on the western side of Laguna Plata?

A No, sir.

Q Were you here when testimony was received that there was a spring located on the southwestern edge of Laguna Plata? An analysis of that particular spring was provided on page four of the detailed engineering and design plans?

A I would assume that that is an intermittent spring, which are quite common in that area. It is certainly not shown on the -- on Figure 2.

Q Are you saying that it's not there or --

A I'm saying that it's not a perennial stream -- excuse me a perennial spring, which is indicative of the water table.

I'm simply saying that it may be an ephemeral spring discharging from a caliche zone or a discharge point for local precipitation. I don't know. I

haven't been to the spring. It's not shown on this map. It's not shown on the USGS topographic map. It's not shown on any of those maps. I'm not saying the spring is not there. I'm simply saying that it is probably a localized discharge point which flows periodically.

Q Could it also probably not be a localized discharge point?

A Your guess is as good as mine.

Q But you've been on the ground.

A Yes, sir.

Q And you have not seen that spring.

A No, sir.

Q Have you walked the arroyos in the vicinity of the proposed disposal site?

A Yes, sir. I even got my truck stuck in them.

Q How long ago was that, sir?

A In 1984.

Q Did you prepare on behalf of Pollution Control, Incorporated, a hydrologic assessment of the salt lakes area in western Lea County, New Mexico?

A Yes, I did.

Q And this report is dated July, 1984?

A Yes, sir.

Q And is this the report that you made re-

ference to as suggesting that this report might be misleading?

A I don't --

Q Did you make that statement at all?

A I don't think it's misleading. I think it's a good report.

Q Very fine, sir. Did you indicate in this report that it's possible that the salt lakes of Laguna Gatuna, Laguna Plata, Laguna Tonto, --

MR. STAMETS: Excuse me a minute. Let me get this where I can take a look at it and then we can proceed when we can all hear.

Q -- and Laguna Tostin occupy collapse structures associated with a northwest -- northeastward extension of the brine aquifer? Is that a correct statement?

A I believe it is. What page are you on?

Q I'm on page 15. Is it a collapse structure?

A The statement is, it is possible that the salt lakes occupy collapse structures associated with a northeast trending extension of the brine aquifer.

Q Do the Dewey Lake redbeds underlie these features?

A Yes, they do.

Q As is indicated on page 15?

A Gee, I'd have to go back and look at the geologic section in that area, but I think that's a correct statement.

Q Now on page 18 you indicate in his case before the Oil Conservation Division, Case Number 4047 on March 19, 1969, Mr. Larry C. Squires stated there was no fresh water in the vicinity of the salt lakes.

A Where are you reading, on page 18?

Q Yes.

A And where is that?

Q About the middle of the page, sir.

A Yes, sir, that statement was read correctly.

Q Now you indicated in the last sentence of that page that Laguna Gatuna is at least 60 feet higher than Laguna Plata.

What is the impact of the relationship between the surface water elevations of the two lakes?

A What is -- would you repeat the question?

Q What is the impact, what is the effect of the difference in the surface elevation of the two salt lakes?

A Well, the sentence stands. They're 60 feet higher. I'm not sure that I'm prepared to draw any conclusions as to the differences in elevations of the sur

faces.

Q That has absolutely nothing to do with it.

A The inference could be made that the direction of groundwater movement would be from the higher point to the lower point but that would simply be an inference which is not supported by documentation.

Q Now on page 26 you seem to suggest that Laguna Plata is a natural groundwater discharge point and I thought you said in your testimony that that was not the case.

A No. My testimony was that there is natural groundwater discharge along the east side of Laguna Plata. The springs are evidence of natural groundwater discharge on the east side.

There is natural groundwater discharge into Laguna Plata but there is no evidence presented by the applicant that the water doesn't in turn go out the west side.

Q Except for his, Dr. Stephens' conclusions.

A That's right, which don't agree with anybody else's.

Q Have you done any investigation into the brines that are found when you dig deeper wells in the

vicinity? Are the deep brines, so to speak, more saline than the brines at Laguna Plata?

A The chemical quality of the water in that area ranges under natural conditions from potable, that is less than 500 parts per million, and there's not much of that, to approximately 200,000 parts per million for the brine aquifer and what is sometimes found in the bottom of the platas, and it can fall anywhere in those ranges.

Q Is the brine aquifer, as you call it, more or less saline than Laguna Plata?

A About the same, based -- excuse me. It's about the same as shown by Figure 2 of your report, 196,000.

And I might mention that nothing is as concentrated as the slurry from the potash refineries, which is always on the order of 325 to 350,000 parts per million.

Q Yes, sir, you talked about discharge from the potash.

A Yes, sir.

Q And suggested that the saline condition of the waters of Laguna Plata was due to a potash discharge. Is that correct?

A That's correct.

Q Have you done any studies, any samples of the water in Laguna Plata to determine what the content of the water is?

A I would have to refer to our 1979 report for the Bureau of Land Management in which we analyzed the discharge from all of the potash companies, including National, and their discharge points.

I assume that there are some analyses in that report, or in our 1978 report, which do give a chemical analysis of the discharge of the slurry from the potash mine.

Q What would you expect the composition of the water to be if it was a discharge from a potash mine?

A It's almost totally sodium chloride with, as I said, concentration in excess of 325,000 parts per million.

Q Would the discharge from the potash mine not be potassium chlorides rather than sodium chlorides?

A I'm not sure. I would have to go back -- I wouldn't -- I would assume that since the purpose of a potash refinery is is to reclaim the potassium, that there wouldn't be much in the discharge, but I don't know. I'd have to go back and look.

Q Would you anticipate that samples from Laguna Plata would show a very high rate of potassium if they were discharges from a potash mine?

A As I said, I would have to examine some analyses of the discharge from a potash mine to make that

conclusion.

Q I have here what appears to be a general water chemistry and nitrogen analysis done for the Environmental Bureau, New Mexico Oil Conservation Division -- I'm sorry I have no copies -- I believe this is a matter of public record, and ask you if you -- to take a look at that and tell me what those analytical results from the sample indicate with regard to the origin of the salts in Laguna Plata.

A This -- am I to understand that this sample is from a small seep in Laguna Plata?

Q That is my understanding.

A Well, it appears to me that the principal cation is calcium, followed closely by sodium, and the principal anions, the principal anion is sulfate.

Q Is that --

A Potassium is quite low.

Q Is that consistent with discharge from a potash mining operation?

A I don't know.

Q If there were absolutely no discharge from a potash mine in Laguna Plata, would those waters still be as saline as they are today, from evaporation, if nothing else?

A As my testimony has shown, in the lakes which -- for which there is no record of potash slurry being

discharged, such as La Sala Grande, although it was many years ago, but Laguna Tonto, these lakes, and also Laguna Gatuna, generally do not exceed 200,000 parts per million dissolved solids.

The potash discharge is a slurry which is too thick to stir and to soft to walk on, and it is primarily in excess of 325,000. As far as the total, or the anion/cation balance, I can't address that.

Q Did you hear the testimony of Mr. Cherry from the Bureau of Land Management to indicate only clear brine could be introduced into Laguna Plata?

A Well, I'm not exactly sure what he read, he read it so fast. He may have made that statement.

I would not know what he defined as clear brine.

Q Sir, I'm not sure I quite understand your large map. What are the contour lines?

A Are you referring --

Q Could you please identify the contour lines and what the meaning of those lines is?

A Those are water table contours, or excuse me, those are equipotentametric contours or water table contours in the project area.

Q In this particular area the contour lines are not completed in the vicinity of Laguna Plata, is that

correct?

A That's correct.

Q Is there any reason why they have not been completed on your map?

A Yes, sir, because this map is based on test hole data and the three nearest test holes to Laguna Plata are shown at these three sites and identified with the numbers less than 3450, 3440, and 3483.

Q What is this contour level? What does it mean insofar as the --

A That is the --

Q -- test holes are concerned?

A That is the elevation of the potentiametric surface above sea level.

Q In layman's terms what do you hit when you hit 3450 --

A Water.

Q -- anywhere along the line?

A Water.

Q What kind of water, sir?

A Any kind of water.

Q Will you please identify this exhibit for me, please?

A This is Exhibit Number One from the Hunter report and it shows water levels in the uppermost aqui-

fers and it also is a contour map on the uppermost aquifers showing the level of the water table or the potentiametric surface relative to sea level.

Q The contours have been generalized, have they not, sir?

A Yes, sir.

Q I notice a 3299 number just north of Laguna Plata. What significance does that have? Is that an aberration?

A According to the explanation it is a water level measurement with anomalously high or low altitude, and it is completed in the Triassic rocks undivided.

Q Would that particularly low rating at that point be consistent with Dr. Stephens' conclusion that this was a collapse structure entirely closed and surrounded and sealed off by Triassic redbeds?

A I do not think that Dr. Stephens would draw that conclusion because it's at least a mile north of Laguna Plata and it is north of the outcrop of the Triassic rocks. If in fact it was a collapse feature the Triassic rocks would not be exposed on the north side of Laguna Plata.

Q Are the uppermost waters shown here above or below the Triassic redbeds?

A This map purports to show the water

levels in the uppermost aquifer regardless of what the water-bearing unit is and the aquifers are identified as everything from Quaternary Alluvium to the Culebre dolomite member of the Rustler formation.

Q Is it possible then that there are no fresh water aquifers or any water aquifers at a point above a Triassic redbed at that particular level, then?

In other words, do you have to go down through the Triassic redbed to reach your first level of water?

A I don't know the -- are you referring to this Well 3299?

Q I'm referring to the general area.

A This map was to a large extent prepared from published data or data which Mrs. Link collected and is the best available data. It does not necessarily tell you what the purpose of the test hole or the well was, so that if, in fact, a potash company was looking for water they might drill 300 feet and claim that anything less than 10 gallons a minute was a dry hole whereas a rancher looking for a stock well might be satisfied with half a gallon a minute and therefore stop very shallow.

So this is simply a generalized map which interrelates all of the aquifers and the water level in the shallow zone. It doesn't really tell you anything about the

potability of the water or at any site where there is not control, what would happen there.

Q Are you saying then the information set forth on this map is not inconsistent with what Dr. Stephens indicated was a regional sink or collapse structure completely underlain with Triassic redbeds?

A I'd say that neither this report nor Mr. Stephens prove it either way. That would be my conclusion.

Q If there were a perennial spring on the southwestern side, would that change your mind about Dr. Stephens' conclusion?

A It would -- it would tell me that there was northward flow of groundwater into Laguna Plata.

Q If your subsequent analysis of the water indicates that the source of the total dissolved solids in Laguna Plata was not from potash brine, would that be consistent with Dr. Stephens' theories?

A You're asking me to assume it's a perennial stream -- a perennial spring?

Q No, sir, we're talking about discharge and the quality of water in Laguna Plata.

A Okay, would you repeat the question?

Q If -- if the water analysis that you (not clearly understood) and if your subsequent study of the quality of the discharge from a potash mine is later corre-

lated and you determine that this discharge could not have been from a potash mine, would this be consistent with Dr. Stephens' conclusion?

A Conclusion that what, that it is a sink?

Q Original sink underlain by Triassic redbeds, where total dissolved solids and sodium is concentrated because of evaporation and will flow into that sink and for that reason alone.

A The argument here, the discussion here, is whether or not it's going out the west side, not where it's coming in or what its origin is.

Q If it is a collapse structure, if the collapse structure is entirely underlain by Triassic redbeds, and would that not mean that there would be no westward flow of the liquids?

A No, that doesn't tell you anything about the direction of groundwater flow in the alluvial material.

Q If, as Dr. Stephens has testified, the alluvial material overlays the Triassic redbeds it is a collapse feature because of faulting along the sides, you have effectively sealed off Laguna Plata --

A By what means?

Q -- then it would not seem that -- by any means -- that westward movement of the water would be precluded by that circumstance -- situation?

A No, sir. Either you and I are not on the same -- same wavelength or my answer is no, and I'm not sure which is the case.

Q Now, are you indicating to us that Dr. Stephens is no necessarily wrong but the evidence presented is not sufficient to convince you that that is the case?

A Yes, sir.

Q Now in talking about the suitability of the findings, you spent some time talking about monitor wells, and you indicated that if monitor wells were established that would tend to confirm or deny Dr. Stephens' conclusions with regard to the direction of the movement. Is that a correct statement?

A Well, in reference to the monitorin wells, they are important. The other -- the information that would be obtained during the drilling of the monitoring well is also important, and I'm assuming that subsurface information would be obtained at the same time.

If -- if a person were to give me a water level and a water sample out of a monitoring well and told me nothing about the situation, nothing about the condition, I could not draw any conclusion. I have to understand the hydrologic conditions associated with the installation of the monitoring well.

So, if the monitoring wells were put in

and additional subsurface information was collected, then I think that it's conceivable that you would at least know when you had a problem.

Q Now, you indicated that you had a better location for the three monitor wells that are to be located in and about the disposal facility.

Where would you locate those wells?

A I believe that my testimony was that I would not locate them at the same place you did -- that you did. I did not say that it was a better location.

Q Where would you locate them, sir?

A I would locate one directly to the north, one to the northwest, and one to the northeast, and I would put them very near the boundary of the facility.

Q Would that be sufficient to determine the subsurface flow of groundwater or seepage from the pits?

A Not really. It would just tell you when it got to those observation wells.

Q It would provide you no clue as to subsurface migration of water?

A Oh, yes, it would provide you some information but it wouldn't tell you whether or not it was actually flowing back to the south, which in fact is -- is not unreasonable to assume. It would not tell you it was -- whether or not it was moving directly west, which is suppor-

ted by Reed's work. The redbed surface is an erosional surface with -- in which there are buried stream channels, regional trends, and all Reed has attempted to do is show the regional trend, but there could be buried channels there, such as are common beneath the Ogallala formation, and channel water in a total different direction away from Laguna Plata, and if your -- one of your three observation wells did not encounter that channel, then you would have no idea where that water was going.

Q In your survey of the general natural salt lakes that occur, did you find any such channels?

A We didn't drill with sufficient density to verify that except at the site which I referred to in my testimony in Lea County, where we had close to 40 test holes. Here we did find channeling, yes, sir.

Q Where was that location?

A Near Monument.

Q Is that some distance north?

A It's some distance east but it's dealing with the same redbed surface --

Q Are there any --

A -- overlain by alluvial material, so it's the same geologic sequence.

Q Are there any naturally occurring salt lakes in that vicinity?

A Not to my knowledge. It's north of San Simon Swale -- San Simon Sink.

Q In your particular report you said there are certain problems which have not been adequately addressed by Petro-Thermo.

First you say the thickness of the alluvial cover is unknown at the propose site. Do you discount Dr. Stephens personal visit to the site and his observations there?

A No, sir. He said that he personally observed 20 feet of alluvial fill. I'm sure that's a true statement, but he doesn't know if he was standing on 130 feet, either.

Q You have indicated there is no evidence presented by the report which confirms that the redbed surface slopes directly towards Laguna Plata. Do you discount Dr. Stephens' testimony that it did in fact slope directly towards Laguna Plata?

A He presented no evidence to support that statement.

Q Other than his personal observation.

A He can't see the redbeds. The redbeds are only exposed on the north side. He could not draw the conclusion that the redbeds slope to the north; he's on the south side where they aren't exposed.

Q Third you say his report does not disprove the work by Reed, which indicates a bedrock channel, which results in a western migration. But if there was in fact a collapse feature there, that would prevent the westward migration, would it not?

A Not necessarily. The -- the collapse structures are associated with an undermining of the redbeds by solution out of the brine aquifer. The redbead surface is an erosional feature, which has an entirely different qeologic history. If the collapse structures are simply superimposed on the geologic conditions that are in the area at this time, there is no geologic relationship between the erosion of the Triassic redbed surface and the collapse structures.

Q Then the collapse structure does not join with the Triassic redbeds to form a regional sink?

A The Triassic redbeds are collapsed as a result of undermining by the brine aquifer and if -- if and when they happened to collapse, it may have been before or it may been after the erosion of the Triassic surface, prior to or following deposition of the alluvial material. There is no correlation between the collapse of the redbeds and the erosional surface on the Triassic surface.

Q Let me show you a photograph -- once again I'm sorry I do not have additional copies of this --

of spring discharge in the southern portion. Can you draw any conclusions from that particular photograph?

A It's clearly a spring.

Q It is clearly a spring?

A Well, there, you know, I'm taking your -- it says here "spring discharge". You know, somebody might have piped that water in there. I'm just taking your word for it.

Q Does it have features which are (not clearly understood) with the existence of a spring at that location?

A I've never seen a spring in this location so I don't know.

All of the springs which I have seen are on the east side and most of these are simply seeps, begin as seeps, out of the alluvial filled channels on the east side of the -- of the Laguna Plata, and they gradually pick up discharge as they flow towards the (not understood).

MR. WEBER: Sir, I have no further questions of this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Kelly, on your Exhibit Number Three, I think, this one --

A Yes, sir.

Q -- that's taken from an Ed Reed report which you mentioned several times.

In that Reed report did he reach the conclusion that Laguna Plata was not closed on the west side and that fluids would move to the west?

A I do not believe that I have ever seen a copy of that report. This map was given to me at the time that I was retained by Pollution Control for my 1984 study, and I was given the map. I don't believe I was ever given the report. I don't know what conclusions he reached.

Q Let me ask --

A Oh, I -- excuse me, it just occurred to me, I got a copy of this. Pollution Control did not have the map. I got a copy of the map from your office, which os on file in your office, and was originally filed with the 1969 application, and I -- but I did not get a copy of the report.

Q Your Exhibit Number two shows, oh, maybe 40 or 50 feet of elevation on the west side of Laguna Plata. What's the nature of the formation that makes up that 40 or 50 feet?

A I'm not sure that I can answer that with certainty. The Gatuna formation is quite extensive in this area. It's a Tertiary Continental formation. There is also

a lot of dune development and I would assume that that's the material which you're referring to which makes up that topographic high.

Q If indeed the spring that there have been a lot of questions about here at the end, the one which is shown on the Petro-Thermo exhibit, what's that number?

MR. THORNTON: Exhibit Number Eight, H-6.

Q It's been drawn on the one that's up on the wall with a red circle. Even if that is an ephemeral spring, would that not indicate that in that area the drainage that one would expect in the subsurface would be towards Laguna Plata?

A Well, not if it's -- not if the spring is originating from a caliche zone, for example. It could be 100 feet above the redbeds and, in fact, since the spring is discharging at least as a ephemeral spring on the south side, and there is no outcropping Triassic rocks, it would indicate to me that it may well be caliche controlled and certainly not redbed controlled.

Q Back on Exhibit Number Three we have this big, bold line that crosses the southwest corner of Laguna Plata that says Triassic, and are you saying that that line is not necessarily really there?

A I have no reason to question Reed's data.

If, in fact, the -- if you compare the elevation of this contour at 3450 with the elevation of Laguna Plata at 3431, this would lead me to conclude that the Triassic did in fact outcrop in the southwest corner of the lake.

Q But you were there and did not observe that.

A No, sir.

Q If Mr. Reed has drawn this line correctly, would that help explain why that small spring is there as shown on the Exhibit Eight, Petro-Thermo Exhibit Eight?

A Yes, sir, it would.

Q On your Exhibit Number One you've shown cross hatched the area of Laguna Plata and you have -- I'm not sure if the point you were making on Exhibit Number One was that there's no closure around --

A No.

Q -- Laguna Plata?

A My point is there is no closure shown by Link, I believe that's the Link map, around Laguna Plata. The reason that the area is identified is simply on that blue line it was very difficult to pick out Laguna -- the location of Laguna Plata, so I simply drew it in in black and and cross hatched it.

Q Okay. Would it not also be correct that

there is no closure shown around Laguna Gatuna.

A That's true.

Q So this map isn't really useful in showing closure.

A This map is -- is intended by Link to show the regional direction of groundwater flow, which is the purpose that I referred to it, in that it is a control or shows the direction of groundwater flow but not on a localized basis.

Q And in your Exhibit Number Five, where you do show the closure on Laguna Gatuna, it would appear as though you used a 10-foot contour to do that.

A Yes, sir.

Q And if we had this whole area contoured on 10-foot contours it might show closure around Laguna Plata?

A Well, it might. The significance here is that there is enough control at Laguna Gatuna by the outcropping Triassics to have that kind of control. That kind of control does not exist, nor has it been presented, for Laguna Plata.

MR. STAMETS: Other questions of this witness?

DR. KELLY: I have one concerning the springs.

CROSS EXAMINATION

BY DR. KELLY:

Q What in your -- since you've been on the ground and you've studied that area a long time, what is the geologic control there bringing this water up to surface water instead going underground? There has to be some kind of a geologic control.

A In my opinion its a regional potentiametric head on the brine surface which is driving salt water up along the concentric fractures bordering the slump structures and forcing it to the surface.

Q So then the slump structure, the springs on the west side of Laguna Tonto would mean the regional water flow is coming past that slump and then coming up?

A It may be.

Q And on the other one, the regional, if everything is moving west as you have presented, and the water coming into Laguna Plata would be properly on the east side of that and any water discharged to the southwest part of that high would never affect this spring because of location.

A Would not affect the springs on the east, that's correct.

MR. STAMETS: Any other ques

tions of the witness?

MR. LYON: Let me ask one question, if I may.

QUESTIONS BY MR. LYON:

Q If I understand your testimony, Dr. Kelly, the -- you're not -- you're not contesting that Laguna Plata is -- is a (not understood) lake and is containing water that comes into that lake. You're not saying that there's any seepage from the lake. Your concern is that the placement of water in the alluvium above the lake may not flow into the lake.

A That's my major concern, yes, sir.

Q Why would you -- if Reed portrays the flow of groundwater to the west, why would you not recommend a monitor well west of the site?

A I would. I would -- I would recommend, in addition to monitor wells at the site itself, along the west side of Laguna Plata, or certainly along the west side of this facility, but I, by Mr. Weber, I was limited to three wells.

I would put in a bunch of them.

Q Also, in the drilling of those monitor wells, if they are drilled as the two that they have proposed, you would get a datum on top of the redbed, is that true?

A Yes, sir.

Q And then that would give us an indication as to whether or not that flow actually would go in the direction that Petro-Thermo believes that it would.

A Yes, sir, that's correct.

Q Okay.

MR. LYON: I believe that's all. Thank you.

MR. STAMETS: Any other questions of this witness?

He may be excused.

MR. KELLAHIN: What's the pleasure of the Commission?

MR. STAMETS: Do you have a short witness?

MR. KELLAHIN: I'll be happy to expedite the testimony and see if we can finish today.

MR. STAMETS: Good.

MR. KELLAHIN: Mr. Chairman, we'd call at this time Mr. Larry Squires.

LARRY SQUIRES,

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

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Mr. Squires, would you please state your name and where you reside?

A My name is Larry Squires. I reside in Hobbs, New Mexico.

Q Would you describe what your relationship is with Snyder Ranches, Mr. Squires?

A Yes, sir. I'm the partial owner and operator, manager, and president of the Snyder Ranches.

Q How long have you been involved with Snyder Ranches, Mr. Squires?

A I've been involved with Snyder Ranches since the death of Mr. Snyder in July of 1967.

Q Would you describe for the Commission what has been your educational background?

A Well, my educational background is, of course, I graduated from high school in 1950 in Hobbs. I went from there to -- to the service. In 1953 I entered agricultural school at New Mexico State University and attended school there for three years and transferred to Colo-

rado State University and obtained a Bachelor of Science degree in biological science; continued on for four more years and obtained a degree in Doctor of Veterinary Medicine.

And I have been -- I moved back to Hobbs in 1960 and have practiced veterinary medicine there from 1960 till 1968.

Q I'd like for you, sir, to take a moment, walk around the table, and let's go the plat of the area over here on the far corner of the room.

A Okay.

Q The number of which I cannot see from here. Is that number one?

A This one?

Q Yes, sir.

A Page one.

Q Is that page number one of an Exhibit Number Seven?

A Eight.

Q All right.

A Page one, Number Eight.

Q All right. You're going to have to speak up so she can record your testimony, Mr. Squires.

Would you identify for us what is depicted just east of Laguna Plata and identified as Snyder? What is that?

A This is what we call our Snyder Ranch salt lake house. We have a ranch house here and it's been there since the early thirties.

Our ranch includes all of Section 15 adjacent to the proposed site, Petro-Thermo's proposed site, which is Federal land and we own the grazing permit that involves this. Our grazing permit also encompasses approximately 60 sections north and completely surrounding and containing all of Laguna Plata except for this westerly boundary right here.

For practical purposes we have fenced this lake out, like this, because the old fence we had down through there, salt water got it pretty fast, pretty hard to maintain, so we just turned that over to our adjoining neighbors; we couldn't graze it anyway.

This area of the ranch right here, contrary to what's been said, I would like to describe the surface around this. This pasture right here is what we call a hard land pasture, or grama grass pasture.

Q In Section 15?

A Yes. And all the way up to here.

Q When you say "here" would you describe for the record, Mr. Squires --

A All the way up to the Snyder Ranch house along the southerly and westerly edge of this lake.

Q All right, now take your seat, please.

A There are some high dune areas in through here but this area is generally pretty flat and pretty grassy and lots of grass and no shinnery (sic), and we describe or divide these pastures with shinnery pastures to the north and non-shinnery pastures to the south.

Shinnery is usually associated with deep sand country and the better grasslands are not within deep sands.

Now, Mr. Stamets asked a minute ago about these highs right in through here.

Q You're talking about the north edge of Laguna Plata?

A The north and the east, between our house and the lake, these highs are giant sand dunes. They're real high on this side. They are not on this side. It's -- it's a gradual gradient down through the lake, which is -- which is commonly called hard land as contrary to sand lands on the southern edge of the lake.

Q Within the area adjacent to the facility on the east side in Section 15, would you describe more specifically the character of the vegetation?

A Oh, it's excellent grassland in that area.

Q What, if any, use do you make of that

surface?

A We graze cattle on it.

Q Would you identify for the Commission the location of Pollution Control's facility at Laguna Gatuna?

A Yes, sir. It is located approximately in this area here where my finger is in Section 18, I believe this is, in the northwest quarter of Section 18.

Q Do you make any use of Laguna Gatuna by Pollution Control at other sites on that laguna?

A Yes. We have another disposal location located off the four-lane highway on the southern edge of the Laguna Gatuna.

Q All right, sir. Why don't you have a seat?

With regards to the ranching operations adjacent to Laguna Plata and in Section 15, Mr. Squires, how long have you been utilizing that surface for grazing purposes?

A Since the late thirties.

Q In your opinion does that surface continue to be usable for grazing purposes at this point?

A Very definitely does.

Q Would you describe for us now, Mr. Squires, what has been your involvement with Pollution Control in terms of the utilization of any portion of this area

for the disposal of produced water or solids?

A My involvement with Pollution Control begun back in 1968 when Representative Harold Runnels called me one day and suggested to me that some people from Midland that were involved with an oil company were very interested in using Laguna Gatuna as a salt water disposal site. And he indicated to me that they were going to do this and I indicated to him, I said, well, we don't want a waste disposal site on our ranch. And he said, "Well, there's probably not much you can do about it."

At that time I reviewed the situation and decided that I would hire my own hydrologist, that we would study the area, we would come up with our own conclusions, and if it was an acceptable site, if it would not do any environmental damage to the area, then I would obtain the permit myself simply because we would own the permit and we could control the use of the surface and prevent any abuse of the surface in the area since we had substantial financial interest in the surface and wanted to maintain it.

We had the hearing. I hired Mr. Ed L. Reed, who we've referred to his work here now. He made extensive studies within the area. He determined at the time, in his opinion that brines deposited in Laguna Gatuna and Laguna Plata wouldn't bother the environment.

He also suggested at the time that Laguna

Gatuna would be the most ideal way to deposit water in.

The results of the hearing was that the Commission, we asked for Laguna Tonto, Laguna Gatuna, Laguna Plata. The Commission at that time -- and by the way, I might add, at that time we had received a special land use permit from the Bureau of Land Management that encompassed the whole lake bottom of Laguna Plata.

We also had a business lease in the southwest quarter of Section 2, or the business lease covered the south half of Section 2, which is State land. We -- we obtained a business lease and a special land use permit from the State of New Mexico -- or from the Bureau of Land Management.

We also decided that it was better to put our facility on Laguna Gatuna because we -- the lake was better situated. We had some facilities located on the edge of the lake, which was on some land that we had a state purchase contract with the State, and that it would be a much more ideal place to do it, more easily accessible from the major highways in the area.

Q With regards to Laguna Gatuna, are the facilities that you operate there on that laguna operated on land that is deeded land into Pollution Control or its owners?

A It is no longer a State purchase con-

tract. We have exercised the right to pay the contract off. We own 940-some acres Section 13 and in Section 18, which we have a patent on at the present time.

Q Is all of the area that is being subject to the disposal facilities as Pollution Control within property that is owned in fee by either you or the company?

A No, not all of it. We have a 40-acre business lease on the south edge of the lake adjacent to the four-lane highway. There we have some new facilities which we've constructed that's on a State business lease.

The rest of the facility up on the north end, where we do our oil treating, reclaiming, and where we dispose of semi-solids and oilfield waste solids, is -- is on land that we own.

Q How long have you operated Pollution Control?

A I've operated Pollution Control solely since 1980. We -- after I received the permission from the various agencies to go into this business back in 1968, I was a practicing veterinarian, or had just been a practicing veterinarian and was a ranch manager. I was very busy. I didn't know anything about the salt water disposal business. I took this permit to some people that I trusted and had respect for that would recognize and respect my property and asked them if they thought they would like to go into the

salt water disposal business, and that person was -- was primarily Jack Maddox and James Murray.

They said that they would like to very much. I sold them the whole permit for $20,000 and retained 20 percent. They at that time put in some gunbarrels and some tanks and started the business of Pollution Control, Incorporated.

We had an excellent relationship for several years until the water began to seep out of the pits and destroy some adjacent grasslands and whenever other operators, other trucking outfits began to haul drilling muds, bottoms, tank bottoms and assorted oilfield solid wate into our facility, choking the facility off, I had a running argument with the management because we did not have a permit to dispose of it, because it was destroying our land, destroying the grass, destroying mesquite on it. The -- we finally, instead of fighting all the time, I just bought them out and since that time in 1980, since I bought them out, we have been -- we came back into the Commission in '84. We updated our permit. We got permission from -- to dispose of waste solids, and we've been trying to maintain and keep it in an environmentally accepted manner.

At that time also we did execute the State land contract and purchased the lands.

Q What has happened or occurred with that

process which you at one time had the authority to dispose of produced salt water, I assume it wasn't the solids, just the salt water, into Laguna Plata?

A No, I beg your pardon, say again?

Q All right. You said in your testimony that at one time your initial permit from the Oil Conservation Division in '68 or '69 did include Laguna Plata.

A Yes, it did.

Q What happened with the development of that as a potential disposal facility?

A We -- in 1975 the Bureau of Land Management nominated the area as a Historical Society area and they revoked our special land use permit. At that time I, you know, the facility wasn't needed on that lake. The lake was not as good to put water in as the other lake. We had never intended to use it anyway, so we didn't argue with them and we dropped all our permits and leases and bowed to their decision. It was their land and we had never put any salt water in it, and we let the permits go.

Q Let's go back to what is currently occurring at Laguna Gatuna in terms of the capacity at which that facility is running. I understand you have a permitted approval for a maximum of 30,000 barrels of produced fluids a day.

A That's correct.

Q All right. What is currently the volume of disposal rates, approximately, for that facility?

A It varies very dramatically. We may go along in 5-6 loads a day for a month or two weeks, and then, as Mr. Abbott testified to, at these tremendous waterflows that Texaco had and at the other Vacuum waterflow that was produced there along the Buckeye Road, there was continuous trucks day and night, and we supervised the unloading of all this water. We were able to handle it without any problems at all.

And he's correct when he says that there were 40 trucks running continuously day and night for almost three or four days. We were completely able to handle this whole volume of water without any particular problems but the day to day usage and since -- since natural gas prices have slumped as much as they have, a lot of -- back two years ago, or three, whenever it was, the water disposal -- the need for a water disposal facility in that area is not as great. The number of barrels of water has dropped dramatically and it's dropped dramatically again since the price of oil has dropped.

We're not disposing near as much water there now as we were in '81-'82.

Q Can you give us an approximation of the perhaps average monthly volumes of disposal for the first

portion of this year?

A The first portion of this year approximately 10 to 15,000 barrels a month, somewhere in that neighborhood.

Q Is this a facility that is accessible to the public for a fee?

A Oh, yes, very much so.

Q Has Mr. Abbott and Petro-Thermo disposed of produced water and solids at your facilities in the past?

A Yes, sir, they sure have.

Q Is that facility available to Mr. Abbott and Petro-Thermo currently?

A No, it is not.

Q Under what circumstances have you denied Mr. Abbott the opportunity to utilize this facility?

A Sometime in June of this last year Mr. Abbott owed us a total of close to $40,000, and it was 90 to 120 days arrears and it had been like that for three or four years, that every 90 days I'd have to call and beg for money, which I'd get a check. I got tired of it so I told him that I would like for him to pay up and pay what he owed me; that we were competitors. I did not like to subsidize my competitors, and I felt like he ought to be prompt in paying his bill, and I told him he had till July the 1st to pay -- pay his bill.

On July the 10th we received approximately $40,000 which was a combined amount that he owed me from Salty Dog and from Pollution Control. The July bill from -- was not included in that and I was tickled to death to get the money and then on July the 15th I decided that I wasn't going to get in that situation again because $40,000 is a lot of money to me.

Q What were --

A I needed it to pay my bills, so I wrote Mr. Abbott, or told his organization that we didn't want to get in that situation any more and that we didn't want his business any more.

Q Under what terms and conditions, Mr. Squires, would you make Pollution Control's site at Laguna Gatuna available to Petro-Thermo for disposal?

A If he pays very promptly and -- and the people that use our facility that are employed by him do a good job in our area and they clean up their messes, we have no problem with him using our facilities, if he pays timely.

Q Have you had experience with regards to difficulties in the operation of your facilities in terms of the handling of solids and waste products?

A Yes, sir, on numerous occasions we've had problems with mud being put in the wrong place by drivers that didn't care or didn't understand or for whatever

reason. These -- these accidents create a mess and a clean up and an expensive for you. They -- they need to be supervised on a continuous basis to supervise the unloading of the -- especially the solid materials.

Q You've heard the testimony today about Petro-Thermo's application for a disposal facility at this site. Were you present at the December 18th hearing before the examiner of this case?

A Yes.

Q And do you understand how they propose to construct and operate this facility at Laguna Plata?

A Basically I think I understand what they're --

Q Based on your experience and knowledge of the operations at Laguna Gatuna by your company, Pollution Control, and your experience and knowledge in the immediate area, what are your concerns as, first of all, an owner of grazing property immediately adjacent to the disposal facilities?

A My concerns are that the pits will leak. In my opinion I feel that they will leak in a radial direction. They will create a bog. They will create a salt water seepage out there and destroy the grass.

These pits will filtrate and leak, I'm sure, very well for a period of time until -- and I'm talk-

ing about the water pits, they'll leak very well, and the water, we don't know where it's going to go, but wherever it goes, it will destroy the vegetation in front of it and around it and will create a bog and a swamp.

The pits will eventually seal off by particles of iron sulfate, bentonite, mud particles, and eventually, the pits will eventually fill -- seal the bottom and it will start to overflow if they're continued to be used, and when they overflow on the surface, well, of course, they'll migrate to the lake.

Q Is that opinion based upon your experience and knowledge of the operations at Pollution Control?

A Yes, it's -- that's exactly what's happened to us. Of course, we -- we discharge directly into the lake but the -- whenever we have built -- whenever we've built some new pits at Pollution Control, or whenever -- the former management had built some new pits back in the seventies, the water sub-irrigated and migrated in a circular fashion and killed quite a bit of vegetation and in fact destroyed approximately ten acres. We had a debate about it being ten acres. I thought it was more than ten acres; my partners said that -- had it surveyed and I believe Don and Jim Maddox were my partners in Pollution Control at that time, and they had this survey done by Mr. West, which de-

picts the destroyed acreage adjacent to our pits, and which is in a south and easterly flow from the pits migrating down towards the lake, and all the grass and vegetation was completely destroyed in this area.

MR. STAMETS: I think now is kind of a good time to figure out where we are in this case.

How much longer do you anticipate Mr. Squires testimony is going to be?

MR. KELLAHIN: Oh, about ten minutes, I would assume, then I'll be finished.

MR. STAMETS: Mr. Weber, how much time in cross examination?

MR. WEBER: Sir, I would anticipate about fifteen to twenty minutes. I would like, if at all possible, to take the opportunity to consult with my clients with regard to how to approach this further. There's a possibility of some rebuttal evidence and I'd like to consider how we proceed from here, but I'd like to take a moment to decide if that would not be inappropriate.

MR. STAMETS: Why don't we just take a short break and do that.

(Thereupon a short recess was taken.)

MR. STAMETS: You may proceed,

Mr. Kellahin.

Q Mr. Squires, with the knowledge you have of the area as a rancher and as an operator and manager of a disposal facility, do you have an opinion as to whether the proposed Petro-Thermo facility can be operated by Mr. Abbott, by you, or by anyone else, successfully as it is designed and proposed by the applicant?

A No, sir, I don't think it can be. I think the pits will seal up and prevent (not clearly understood) and the particles in the drilling mud will seal the pits off and I think if the pits continue to be used they'll overflow and they'll destroy all the vegetation that's surrounding the site and I think they'll be over on the Federal land and I think they'll be over on my ranch and I think the water will overflow directly into Laguna Plata.

Q With regards to the propose method by which Mr. Thornton recommends that he will handle the solid waste material by placing it in a series of solid waste pits and then rotating the use of those pits, drying that material and removing it from the pits and placing it on the loading pad, what has been your experience and what, in your opinion, is the likelihood of the success of that design?

A We have some pits that have been drying now for a year and a half and we cannot walk on them without bogging out of sight. It would be impossible. The only way

you can get that material out of there is with a dragline and we've seriously considered using a dragline.

You cannot get a piece of equipment in there; it will -- it will sink out of sight.

The top six or eight inches of these mud pits will dry and crust and they'll appear to be dry. We continually vacuum some fluid off of these pits in an effort to dry them and the more we vacuum the fluid off of the top, the more it shrinks down, but we find that a foot below the surface of the pits is still extremely boggy down to 15 feet, and these pits are 15 feet deep.

Q Mr. Squires, I'll put it pretty bluntly, is this simply an effort by you to control and discourage competition --

A No.

Q -- in the area for the disposal of waste products and produced salt water?

A No, it is not. I have been consistent in protecting the environment since 1968. The only reason we're in the water disposal business in the first place is because we own a rather unique area that happened to be on our ranch and we wanted to own it and control it and be able to control this situation.

MR. KELLAHIN: I have nothing further.

MR. STAMETS: Mr. Weber?

MR. WEBER: Sir, if I may.

CROSS EXAMINATION

BY MR. WEBER:

Q You indicated before that you retained Mr. Ed Reed, your own hydrologist, to do an acceptable study and he indicated that disposal of brines in Laguna Gatuna and Laguna Plat would not be harmful to the environment, is that correct:

A Yes, sir.

Q And you indicated that Petro-Thermo Corporation is one of your competitors. In what area are you competitors?

(Due to faulty reproduction on the tapes this portion is not transcribed.)

A The pit was right here. The material leaked laterally to this area and then towards the arm of the lake.

Q All right, sir. So in other words, the -- the leaking was towards Laguna Gatuna.

A To begin with the leaking was laterally and then as the water increased, it created salt water

springs all along this whole area that we have depicted here. There would be outcroppings of water along there 300 yards from the surface of the lake itself and flow over the top of the (not clearly understood.)

Q Yes, sir. You operate a disposal system where you directly discharge into the waters of Laguna Gatuna, is that not correct?

A That's correct.

Q Would you not concede that the proposal by Petro-Thermo Corporation to use infiltration would be a more environmentally safe method?

A No, I would not. I think the filtration system would plug up with bentonite and clays and -- and particles associated with produced water.

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

MR. STAMETS: All right, this witness may be excused.

MR. WEBER: Sir, at this point if we can reach stipulation as to admissibility into evidence of these photographs, which are described on the back, a description of spring discharge, photograph of Pollution Control's disposal facility, photograph of the dunes south of Laguna Plata, and the arroyos and looking north to show the nature of the vegetation around the proposed disposal

site.

At this time I would move to introduce Petro-Thermo Corporation's Exhibits One through Ten.

(REPORTER'S NOTE: Petro-Thermo's tendered photographs were numbered Exhibits Eleven through Fifteen and all Petro-Thermo Exhibits were admitted in evidence.)

At the hour of 5:30 o'clock p. m. the hearing was adjourned.

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY 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