NEW MEXICO OIL CONSERVATION COMMISSION

EXAMINER HEARING

SANTA FE, NEW MEXICO

Hearing Date APRIL 24, 1985 Time: 8:00 A.M.

NAME	REPRESENTING	LOCATION
Karen Aubrey	Kellahin + Kellahin	Santa Fe
Mark Mahoney	Mabee Petroleum Corp.	Midland Tx.
Mitch Elkins	Union Oil Co. of California	Midland TX
Rick Brakey	Parabo	Hobbs, N. Mex.
Charles Boyce	Amoco	Denver
Steve Reed	Parabo	Corpus Christi
William F. Carr	Campbell and Black	Santa Fe
Steve Ring	Amoco	Denver
R. E. Richards	Parabo	Hobbs
C. Verquer	Caulkins oil Co	Farmington
Bob Fisher	Byram	Santa Fe
Leon Romero	MAR O+G	Santa Fe
W. R. Lewis	HNG Oil Co	Midland
Jim Britton	Unichem Int	Hobbs
Wayne Price	"	"
W. Kellahin	Kellahin + Kellahin	Santa Fe
U. C. Kennedy	Independent	Albuquerque
Ken Baltemon	White Koch Kelly & McCarthy PA	Santa Fe, N.M.

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NAME	REPRESENTING	LOCATION
Ernest L. Padilla	Atty at Law	Santa Fe
EK Williams	Texaco Inc.	Midland, Tx.
Dave Brewster	EPNG Co.	El Paso, TX.
O.R. Matthews	HNG Oil Co.	Midland, Tx.
G.R. Kern	Texaco Producing Inc	Midland
Jerry L. Pennington	HNG Oil Co.	Midland
B. Craig Jr.	" "	"

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

24 April 1985

EXAMINER HEARING

IN THE MATTER OF:

Application of Parabo, Inc., for amendment of Division Order No. R-5516, as amended, Lea County, New Mexico. CASE 8582

BEFORE: Michael E. Stogner, Examiner

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: Maryann Lunderman
Attorney at Law
Energy and Minerals Department
Energy and Minerals Division
Santa Fe, New Mexico 87501

For the Applicant: R. E. Richards
Attorney at Law
P. O. Box 761
Hobbs, New Mexico 88241

I N D E X

E X H I B I T S

MR. STOGNER: Call next Case 8582, which is the application of Parabo, Incorporated, for amendment of Division Order No. R-5516, as amended, Lea County, New Mexico.

Call for appearances in this matter.

MR. RICHARDS: Attorney for the applicant, Parabo, R. E. Richards, Law Offices of R. E. Richards, P. A., Post Office Box 761, Hobbs, New Mexico, Zip Code 88241.

MR. STOGNER: Are there any other appearances in this matter?

Mr. Richards, do you have any witnesses?

MR. RICHARDS: I do. Mr. Steve Reed, and I ask that he be sworn.

MR. STOGNER: Is he the only witness you have?

MR. RICHARDS: Yes, he's the only one.

MR. STOGNER: We'll ask that he stand and be sworn.

(Witness sworn.)

MR. STOGNER: You may proceed,

Mr. Richards.

V. STEVE REED,

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

DIRECT EXAMINATION

BY MR. RICHARDS:

Q Please state your name, sir.

A My name is Steven Reed.

Q Mr. Reed, with whom are you associated?

A I'm employed by Ed L. Reed and Associates, Consulting Hydrologists, with offices in Corpus Christi and Midland, Texas.

Q Mr. Reed, have you testified before this Commission on numerous prior occasions?

A I have.

Q Has that been not only in the matter of Parabo, Incorporated, in salt water disposal operations, but other situations?

A Yes, sir.

Q Have your qualifications and opinions been accepted heretofore by this Commission?

A They have.

MR. RICHARDS: Ask that the witness' qualifications be noted and he be permitted to enter opinions herein.

MR. STOGNER: He may.

MR. RICHARDS: Thank you.

Q Mr. Reed, are you particularly familiar with the operation of Parabo, Inc., as described on Exhibit Number Two, shown on the map?

A Yes, I am.

Q Are you the consulting hydrologist that has worked with that operation since its inception some eight or nine years ago?

A Yes. I did the preliminary site investigation and the work on the -- on the facility itself from that time.

Q At the time of the original operation were there certain freeboard requirements established by the predecessor of this Division, the Oil Conservation Commission?

A There were.

Q And what were those freeboard requirements?

A Initially the freeboard requirements were four feet.

Q Have those freeboard requirements subsequently been modified in certain of the areas?

A They have.

Q Are you familiar to what depth?

A The freeboard modifications were -- were made to a three foot level in those ponds for which dikes

completely encircle the pond and were left at four feet for those that were not entirely surrounded by levees.

Q Are you famiiar with the application here today?

A I am.

Q Does it seek to further freeboard relief to two feet of freeboard in certain of the pits?

A It does.

Q And which of those pits are they, is the relief sought?

A The relief is sought in Pit Nos. 2, 3, 5, 6, and 7.

Q In conjunction with the application for two foot freeboards, have you made an investigation of the various components which would go into a determination by the Division of the propriety of such freeboard requirements?

A Yes, I have.

Q What have you done in that regard?

A I looked basically at the strength of the structures to maintain an additional one foot of water in the lagoons.

I have looked at the effects of rainfall occurring on and in the drainage areas of the lagoons to insure that significant rainfalls would not create overtopping, and I have also looked at the generation of waves on the face of the dike.

Q All right, sir. In that regard I direct your attention to an exhibit you have before you marked Exhibit Number One.

Can you tell the hearing examiner and the Division what that is?

A This is a schematic diagram essentially of the southwest corner of Pit No. 6. Again I'll point out on this map on the wall that Pit No. 6 is the southernmost one. The schematic goes across the southwest corner. The purpose of selecting that location for the diagram, that is the area where the -- it's the highest freestanding dike on the property. Most of the dikes have been completed inside of mined out gravel pits and so the dikes reside directly against the walls of those pits.

Pit No. 6 has a freestanding dike around a goodly portion of it and this is where that dike is the highest and has the most water behind it.

Q What is the significance of the choice of the highest freestanding dike for your calculations?

A For the calculations, particularly the strength of the dike, that's where the dike is the highest and has the most potential for failure.

Q Do you care to elaborate any more on the particulars of Exhibit Number One after you've described its location?

A No, I do not.

Q All right, sir. You also have before you

on the wall a copy of exhibit, marked Exhibit Number Two.

What is that and how does it relate to your testimony?

A Exhibit Number Two is a survey prepared at my direction of the pits as they now stand, particularly with reference to the amount of drainage area that allows runoff to flow directly into the -- into the pits themselves.

The significance of drainage diversion, where it has been done over the years at this facility and the dashed line on Exhibit Number Two represents that portion of the area outside the dikes that currently drains into the pit itself.

The hard line, the solid line, represents the -- essentially the inside of the dike.

Q Let me ask you specifically if within each of the pit areas there is a description of the acreage to hundredths of a foot of their -- each of their capacities.

A That is correct.

Q And in each of the pit areas which are in question here today, is there an additional designation of area to hundredths of a foot which is drained?

A Yes, there is.

Q What is the highest drainage area to surface area ratio pit?

A The highest drainage to surface area

ratio pit is No. 6 again. Basically the -- the ratio is one of 20 percent; that is to say 20 percent is in the drainage area of the total area of that pit.

Q In that regard have you again chosen Pit No. 6 for certain calculations as to rainfall effect?

A I have.

Q Is that reflected on Exhibit Number Three?

A Yes, it is.

Q Please explain to the hearing examiner what you have calculated and demonstrated on Exhibit Number Three.

A For Pit No. 3 -- No. 6 on Exhibit Three, the drainage area being 2.3 acres, the surface area of the pit being 11.5 acres, we've calculated the -- the total impact in rise of fluid level in the pit from a 100-year 24-hour recurring storm of half a foot.

Assuming no absorption in the materials in the drainage area, which of course is unrealistic, but it's the conservative approach, we see a total rise in fluid level in the pit after the 100-year storm of .6 feet.

In addition to that I doubled the 100-year storm rainfall to a 12-inch storm and see there is direct relationship, a total rise of fluid level expected at 1.2 feet as a result of a 12-inch storm.

Q That is true only of Pit No. 6, is it not?

A Yes, that's correct.

Q And would the rise be relatively less on each of the other pits in question because of the ratio of drain area to total pit area?

A That is correct.

Q Let me direct your attention, Mr. Reed, to Exhibit Number Four and as if you'd describe to the hearing examiner and the Division what that is?

A I will. Exhibit Number Four is a calculation designed principally to show the relative strength of the dike versus the forces acting against the dike to insure that the structures themselves are sufficiently strong to maintain the water behind them.

Essentially what we have at the facility are dikes that are 15 feet across at their crest. I used a 10-foot high dike and the 35-foot base width with a water elevation of 8 feet behind the dike.

Now if you would refer back to Exhibit Number One you'll see that we expect in the southwest corner of Pit 6, where the dike is the highest and the water is deepest, is 5 feet, but I chose 8 feet again to be somewhat conservative, could be areas in the pit where the water level is deeper than the 5 feet, so I chose 8 feet as the more conservative approach.

I've used 100,000 parts per million sodium chloride water and 200,000 parts per million sodium chloride water to calculate the pressures on the face of the

dike itself.

The horizontal pressures identified as PX on the first page of Exhibit One, is calculated 267 pounds per square foot. It's the horizontal pressure on the dike.

The total hydrostatic force against the dike is therefore calculated at 2138 pounds per linear foot of dike. That's the force along each foot of the dike itself.

Q Is that at totally static pond conditions?

A That is true.

Q Have you made other calculations to determine what other horizontal hydrostatic forces might exist given changes in the pond condition?

A We did. We also calculated what hydrodynamic forces would be exerting themselves on the dike assuming a very strong wind and the fetch that we expect, again, principally at Pit No. 6, which is the largest of the pits.

Q Are those hydrodynamic forces actually those forces that are variant and changeable and add to the statis horizontal forces?

A That is correct.

Q All right, pleae continue.

A We used a wind velocity of 50 miles per hour, a fetch of 500 feet, which is appropriate for the Pit No. 6, an average water depth of 5 feet, which again probably is the conservative approach. The average water depth

probably is not quite that high because it varies from zero on the upper side of the pits to 5 feet towards the dike, but I still used the 5-foot average depth, and we calculate a wave length and a breaking depth, and more importantly, a wave height.

The wave height is shown on the bottom of page one, Exhibit Four. It's .875 feet. That's the total wave height from peak to valley.

Therefore, as shown in the diagram up on the top of page one, Exhibit Four, the wave height on the dike itself, if I assume a water depth 8 feet above the base, is 8.44 feet from the base of the dike, or .44 feet higher than the still water elevation.

Q Why is the increased elevation of the wave only approximately one-half of the total wave height?

A Because the wave is developed on the still water surface and half rises above and half is below the still water depth as the wave is developed.

Q Okay. Please continue with Exhibit Four.

A On page two of Exhibit Four are the calculations that basically show that the strength of the structure to maintain the water behind it. I'm calculating the shearing forces of the structure, which takes into account the weight of the structure and other uplift forces.

The weight of the structure, we have from previous experience and measurements of material in the dike itself, which is 112 pounds per foot, actually in several

instances we've seen weights of the structure to be in terms of -- or densities to be in terms of 114 per foot, but I've used 112, so the total weight of that particular structure is 28,000 pounds per linear foot of dike.

The weight of the water using 100,000 parts per million of sodium chloride water is 2138 pounds per foot, as we described in the previous page.

Uplift forces, that is to say the counter-balancing forces acting from below the dike upward, and other vertical forces, we do not anticipate there to be any, so we have discounted any other outside forces.

I therefore calculated a safety factor, which is very simpling the shearing force ratioed against the horizontal, total horizontal forces. The shearing -- the safety factor, therefore, is the number we've previously described of 12,000 divided by the, again, the weight of the water on the dike, 2138, which gives a safety factor of 5.64.

Q At this point let me ask you a couple of questions, Mr. Reed.

Did you reach any conclusion as to the impact of the hydrodynamic forces on the dikes? I notice you've said on the dikes that the horizontal hydrostatic force was 2138 pounds.

A That's right.

Q And you've again in this calculation on shear factor used 2138 pounds. Did the hydrodynamic forces

impact on that?

A No. Because of very, very low wave height of .4 feet, the hydrodynamic forces are negligible.

Q Given a -- with that calculation of the -- you have said that there was a safety factor of 5.64. What is -- can you tell the hearing examiner and the Division what the impact in terms of normal design and operation is when you have a safety factor of 5.64?

A Well, that is -- it exceeds the minimum design criteria. Normally one is looking to a safety factor of something around 2, so this exceeds that by -- by an additional factor of 2.

Q All right, sir, please continue.

A I also made the same calculations, safety factor calculations using a sodium chloride concentration of 200,000 parts per million, which we expect ultimately to -- to be the concentration near the base of the structures, and again, even using that additional weight of water, we still have in excess of a safety factor of 5.

Q Is that shown on page 3 as 5.27?

A Yes, sir.

Q And is that again to be related to a design safety factor using industry standards of 2.0?

A Yes, it is.

Q All right, please continue.

A The last page of Figure 4, we can go into it if need be.

Basically, I indicated before it's part of the calculations of the hydrodynamic stresses that the breaking wave depth is -- in one foot. These calculations are those calculations reflecting that one foot breaking depth, which is to say that is the depth that the water has to be before that wave will break. That's essentially at the dike itself, so there is virtually no -- no breaking of waves in the pits themselves.

Q Mr. Reed, after you had completed your work and based upon the information presented in Exhibits One, Two, Three, and Four, do you have an opinion based on your training, background, and knowledge of this operation, specifically Parabo, Inc., whether or not the permitting of a 20-foot freeboard in the pits described in the application would be consistent with the orders heretofore entered in terms of containing, disposing of, and evaporating produced oil pit brines and other liquids totaly within the Triassic Redbed area, which has been defined and heretofore permitted?

A Yes, it is consistent with that, yes.

Q All right. Is it your opinion that the relief to a 2-foot freeboard would be proper?

A Yes, it is.

Q Would you recommend that to this Division and to the hearing examiner?

A Yes, I would.

MR. RICHARDS: Move the intro-

duction of Exhibits One, Two, Three, and Four, and tender the witness for cross examination, Mr. Stogner.

MR. STOGNER: Exhibits One through Four will be admitted into evidence.

CROSS EXAMINATION

BY MR. STOGNER:

Q Mr. Reed, when was the last 100-year ran we had out in Lea County?

A Pardon?

Q When was the last 100-year rain we had out in Lea County?

A I don't recall; have not looked at it.

Q How long have you lived in Hobbs, or do you live in Hobbs?

A No, I do not live in Hobbs.

Q Okay. Let's go to Exhibit Two. On the pit that you want to raise the water level in, could you show me on the exhibit hanging on the wall where the actual dikes are built around this?

A Okay. There are, of course, maps in the files of the Oil Conservation Division that show exactly where those dikes are, but I will point them out.

Pits 2 and 3, the dikes conform with the hard, solid line on the -- on this Exhibit Two.

Pit No. 5, the dikes simply are along the west side, along the south side, and along the east side.

The Redbed elevation itself goes quite high north of Pit No. 5 and forms a natural barrier at that point.

And Pit No. 6 essentially has dikes all the way around it, actually goes through the area between the two pits on the west, these two dots tied together and these two dots tied together, and then goes all the way around east and west, east and south sides.

Q So essentially for all intents and purposes we've got dikes all the way around the -- the pits that we're here today, is that correct?

A Yes, sir.

MR. RICHARDS: Pit No. 7.

A Pit No. 7 also essentially has a dike all the way around it. A portion of that dike is now completed. The southern half and the northern half will ultimately be completed.

Q Mr. Reed, what are the prevailing winds out here?

A Prevailing winds, I believe, are from the southwest.

Q Let's go to Exhibit One.

A All right.

Q The dike that you show on here, what is the material that it's made of?

A The dike is constructed of Triassic Red-bed material, which is -- which is essentially a silt and

sand free clay.

Q All this was covered in previous cases, were they not, Mr. Reed?

A Yes, it was.

Q At this time we'll take administrative notice of those cases previous to today, and I believe those were Case No. 5899, Case No. 7156, and Case No. 7986.

Is that what you have, Mr. Richards?

MR. RICHARDS: Yes, that's my recollection, Mr. Stogner.

Q What -- this information may be in those but however I'd like to bring it up.

What is the compaction method used when you built these dikes?

A The compaction method was to lay the material down at something very close to optimum moisture, which is approximately 20 percent, and we have measured that. Lay the material down in 6-inch lifts, either with a scrapper or with a tractor vehicle, dozer, or a front end loader; lay it down in approximately 6-inch lifts, as I said, and compact it either with a sheep's foot roller or a grid roller.

The densities that we are getting, as I said, are 112 to 114 pounds per cubic foot.

We have measured those in the field.

Q And what kind of maintenance is done on these dikes regularly?

A Regular maintenance is done. As a matter of fact, one of the things that Exhibit Number One does not show is that all of the dikes are covered with one to two feet minimum of material such as the overburden material that has been removed in this area, to protect, not only protect the dikes from erosion, but to keep them -- keep the moisture content up in the dikes, as well.

On a regular basis Parabo maintains those dikes in as erosion-free state as they can. They have the equipment on site and they regularly maintain those structures.

Q In what way? Explain to me that method.

A The dikes are, if there is erosion along the -- particularly in the fill along the dikes, the fill material being that material that has been placed on the dikes, a maintainer is brought in and that erosion spot is fixed by filling it in and regrading.

Also all the diversion structures are maintained the same way. If there is a deterioration in dikes that divert runoff around the pits, they are maintained.

Q What kind of an influx of the water level do you have? Do you have enough that, say it drops down to about 3 foot, that you can actually see the dike and make sure that the subsurface or is the stuff below the waterline?

A You cannot see the dike itself because it

is covered, but we can see the material that's been placed on the dike and when that deteriorates we don't want the dike to be exposed so that is -- that is repaired.

Q Okay. On Exhibit Four you show the top of the dike being 15 foot in width.

A That's correct.

Q Does that hold true for most of the dikes?

A It does, yes, and that again is essentially the clay portion thereof.

Q And not the over fill.

A Right.

Q You said the dike that's represented on Exhibit One is your highest one in the area. What was the height of that one again?

A Refer back to Exhibit Number One. The elevation of that dike is 3450. The ground level is 3443, approximately.

Q Okay. So it's about 8 foot.

A Correct.

Q Has any of these dikes ever broke through?

A In terms of overspill?

MR. RICHARDS: Actual breaching of the dikes?

Q Actual breaching --

A No.

Q How about actual erosion pulling back the water? Do you have a bad erosional problem of wave action on any of your present dikes?

A No.

Q Okay, your figures in Exhibit Four, you show the wave height as being .875 feet.

A Right, total wave height, crest to valley.

Q And your water level as being 8 foot, which would be --

A Up on the dike, yes.

Q Right, 2 foot, your maximum, in other words.

A Right.

Q That's your average spill.

Now, then, you said the 100-year rain out here would maybe add an extra half foot at the most?

A Yes, sir, a little over a half foot, 6/10ths of a foot.

Q Okay, so that would mean, let's say you had 8.5 feet and we had a wind come up about 50 mile an hour, which is not unusual out there, how would -- how would those conditions affect the calculations on the dikes, if you had your 100-year rain, a maximum fill level, with a maximum amount of wind?

A It would still, even before the spill point of the Redbed itself would essentially have a foot of

freeboard left, not counting the material that we have placed on the dike itself to cover it up.

Q What kind of equipment is out there on the grounds itself to -- if one would see something breaking loose?

A There's a large Caterpillar tractor with a 12-foot wide blade on it. There's a backhoe and there's a compactor, all on location.

Q Do you feel that would give you somewhat of a relief if one was seeing a dike giving away to have immediate --

A Yes, I do.

Q -- have that equipment available out there on site to deter any -- any possible -- at least somewhat deter some possible erosion?

A Yes, I do.

Q Okay. Back on Exhibit Number Two, I'm curious about No. 6, since that particular lake -- I'm sorry, pond is on the, essentially on the outskirts, I might say.

A Yes.

Q What is on the back side of that dike?

A By the back side do you mean the north side?

Q No, the south, further south. What's further south of the dike?

A This is open -- open country down off the

dike. The material has been pushed up on the dike and over the dike and covered, and then mesquite, sandy soil, terrain beyond that.

Q Is that leased for -- is that leased for grazing purposes?

A I do not know.

Q On Exhibit Two you shows some pit areas. Is that the increased volumetric pit, pit area?

A No, Mr. Examiner, that's basically a line of shots taken pretty close to -- to the -- just off the inside of the dike, best we can tell without following the water very closely, the line of elevation inside those structures.

It's essentially, under your normal operating conditions, that's essentially the evaporating zone.

Q Will that evaporating surface be affected very much by raising the --

A Actually it would be enhances, but very slightly, because the slopes on these dikes are -- are one to one, or a little over one to one, so the actual increase there will be very slight..

Q Okay.

MR. STOGNER: Are there any other questions pertaining to this particular subject, dike construction, or anything like that?

Okay. Mr. Reed, Mr. Richards, in preparing for this case today I was reading over the old

case files and I see that Order No. R-5516, which originally approved this, approved unlined surface pit locations on the southwest quarter of Section 29.

MR. RICHARDS: Yes, sir.

MR. STOGNER: And I never show anything else after that, you know, a map or anything to show that we have pits covering the southeast section, the southeast of Section 29, has the southwest, and a little bit up there in the northeast.

MR. RICHARDS: Mr. Stogner, I did not bring my whole file cabinet. I will, that has been modified in subsequent proceedings.

I will dig that out and indicate where you can find it. I believe it's in one of the subsequent cases.

MR. STOGNER: I would appreciate that, sir.

MR. RICHARDS: Yes, sir.

MR. STOGNER: That way I can be better --

MR. RICHARDS: It has grown from there and it may be in 5516. I'll have to check my file.

MR. STOGNER: Okay, and --

MR. RICHARDS: And I will do so.

MR. STOGNER: Will you get back

with me on that, in case we have to --

MR. RICHARDS: Sure.

MR. STOGNER: -- or I have to do any changes on this?

MR. RICHARDS: Sure.

MR. STOGNER: So I can get that squared away.

I have no further questions of Mr. Reed.

MR. RICHARDS: May I inquire of Mr. Reed just a couple of questions?

REDIRECT EXAMINATION

BY MR. RICHARDS:

Q Mr. Reed, what is the average annual rainfall in that part of Lea County?

A The average annual rainfall is something between 11 and 12 inches.

Q Within your use of the term and simply for the record, what is the definition of 100-year rainfall?

A Well, --

Q How is that determined?

A -- basically it means that any particular year there's a one percent probability of having a rainfall of that magnitude occurring up for a 24-hour period.

Q And your calculations are based upon -- are based on actually there being a 2-foot freeboard, the

pits full, and there being no absorption in the runoff area.

A Right, so it's a very conservative calculation.

Q Thank you, sir.

MR. RICHARDS: Nothing further.

MR. STOGNER: Anybody else have any questions for this witness?

If not, he may be excused.

Is there anything further in Case Number 8582.

MR. RICHARDS: If I have not done so, I again tender the exhibits.

MR. STOGNER: If not, we'll enter Exhibits One through Four.

And there being nothing further in this case, it will be taken under advisement.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 8582, heard by me on 24 April 1985.

Michael E. Stogner, Examiner
Oil Conservation Division