BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 31, 1974

COMMISSION HEARING

IN THE MATTER OF:	
Application of Leland A. Hodges, Trustee, for the extension of the Potash-Oil Area, Eddy County, New Mexico.	CASE 5276 (Cont.)

BEFORE: A. L. Porter, Secretary-Director

I. R. Trujillo, Chairman

Alex J. Armijo, Member

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the New Mexico Oil Conservation Commission:	William Carr, Esq. Legal Counsel for the Commission State Land Office Building
For William A. & Edward R. Hudson, Skelly Oil Co., Phillips Petroleum Co., Belco Petroleum Corp., Sun Oil Co.:	Jason W. Kellahin, Esq. KELLAHIN & FOX 500 Don Gaspar Santa Fe, New Mexico

APPEARANCES (Continued)

For Exxon Corporation:	Paul Eaton, Jr., Esq. HINKLE, BONDURANT, COX & EATON Hinkle Building Roswell, New Mexico
For Leland Hodges, Trustee, and Potash Company of America:	R. H. Blackman, Esq. 1009 E. Riverside Carlsbad, New Mexico

I N D E X

E X H I B I T S

MR. PORTER: The Hearing will come to order, please. The Commission will consider Case 5276.

MR. CARR: Case 5276 application of Leland A. Hodges, Trustee, for the extension of the Potash-Oil Area, Eddy County, New Mexico. This Case is continued from July 17, 1974 Commission Hearing.

MR. PORTER: Although this is a continued case, I think we will call for appearances again.

MR. KELLAHIN: If the Commission please, I would like to enter an additional appearance on behalf of William A. and Edward R. Hudson.

MR. PORTER: All right. Mr. Kellahin, who else are you representing this morning?

MR. KELLAHIN: If the Commission please, I am also representing Skelly Oil Company, Phillips Petroleum Company, Belco Petroleum Corporation and Sun Oil Company.

MR. PORTER: Thank you. Mr. Kendrick?

MR. KENDRICK: El Paso Natural Gas Company represented by H. L. Kendrick.

MR. EATON: Paul Eaton for Exxon Corporation.

MR. PORTER: Mr. Blackman.

MR. BLACKMAN: R. H. Blackman appearing for Hodges, Trustee, and Potash Company of America, a division

of Ideal Basic Industries Incorporated.

MR. CARR: Anyone else?

MR. PORTER: The Case was continued from two weeks ago. The application as read is: A request for the extension of the Oil-Potash Area as described in Commission Order R-111-A, as amended. I believe at the last Hearing we pretty well laid the ground rules that the evidence must go toward the proving that commercial potash exists or does not exist in the area under consideration. The Commission wants to hear all of the evidence that is relevant to the Case and proposition. We do want to stress that we would like to have the evidence presented as expeditiously as possible without repetition, and on cross examination, please confine your cross examination to matters that have been testified to by the witness. I think if we observe those rules we will save some time, and also have a better record of the proceedings.

At this time the Commission will recognize Mr. Blackman, counsel for the applicant.

MR. BLACKMAN: Mr. Donegan, will you resume the stand, please?

MR. DONEGAN: Yes, sir.

(Whereupon, a discussion was held off the record.)

MR. PORTER: Let the record show that Mr. Donegan was previously sworn during the proceedings two weeks ago.

BEN DONEGAN

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BLACKMAN:

Q Now, Mr. Donegan, I have just distributed to the parties and to the Commission a package of exhibits which begins with Exhibit Number 6 which was identified in the last session. I will point to it on the wall; is this Exhibit Number 6?

A Yes, sir.

Q Would you please identify that and state what it is?

A Exhibit Number 6 is a cross section of potash-core-test logs and oil-test logs from the area immediately southeast of the Hodges lease area, the Leonard State Well located in Section 32. This cross section shows the potash ore zones in the area of the Hodges leases and the truncation of those ore zones along the west side.

Q Next, Mr. Donegan, will you kindly identify on the wall, the Commissioner's Exhibit Number 11, and state what

that is, just identify it, please?

A Exhibit Number 11 is a map showing the potash resources in the Hodges area in the 10th ore zone.

Q Next on the wall you have a document marked for identification as Exhibit Number 12 in this Case; would you identify that, please?

A Exhibit 12 is a map similar to Exhibit 11 showing the potash resources in the 4th ore zone.

Q And, next, a document which has been distributed to all parties and has been marked as Exhibit 13. Would you please identify that?

A Exhibit Number 13 shows the potash resources in the 3rd ore zone.

Q And, next please, Exhibit Number 14 in the same series?

A Exhibit Number 14 shows the 2nd ore zone.

Q Then Exhibit Number 15 in the same series?

A Exhibit Number 15 shows the 1st ore zone.

Q And, Exhibit Number 16?

A Exhibit Number 16 is a composite of the potash resources in the five ore zones that we have on these previous four exhibits.

Q Mr. Donegan, if I understand you, all of these maps

with the exception of Exhibit Number 6, are the same print and on which same print you have identified the different ore zones, is that correct?

A Yes, sir.

Q This is all of the area in the area which we seek here to be included in R-111-A, is that correct?

A Yes, sir.

Q Now, Mr. Donegan, you have previously testified that you have made an extended study of the potash deposits in this ore zone, and would you kindly at this time please, tell the Commission the study that you have made in as much detail as you can and the results that you have attained and how you have identified those on each of the maps?

A Exhibits 11 through 15 show on each map the core tests by a small circle, the potash core tests. Beside each circle, where the potash data is available, the first numbers indicate the potash ore zones. If we look at, for example, potash test Number 832 in about the center of the map in Section 2, we will see the 10th ore zone indicated by "10"; to the right of that is the thickness, 5.8 feet, this is just an example. The percent of K_2O as langbeinite, and the percent of K_2O is sylvite. In addition, other abbreviations on the map are shown in the legend. For instance,

the abbreviations for leonite, kainite, and glaserite, and in those holes where the sulphates were not individually identified, sulphate. Slightly mineralized holes or ore zones are indicated by "SM", and holes that are not mineralized are indicated by "NM". Holes that do not have information on all of the five ore zones indicated on the map, either have certain of the ore zones truncated, for instance, this line indicates the truncation of the 10th ore zone, so no data west of there is shown for the 10th ore zone, or in some cases where we only have information on one or more ore zones because the zones were not analyzed, the cores were scrambled, or various other reasons that cause the information not to be available, no information is shown on the map.

The west solid line is the truncation of the 1st ore zone, and is shown on the cross section. The truncation of the 2nd, 3rd and 4th ore zones are between the truncation of the 10th and 1st. Since the 4th, the 3rd, and 2nd are immediately above the 1st, the truncation of those ore zones is close to the west margin, rather than near the truncation of the 10th ore zone.

The basis for the color scheme on each of the five maps is shown in the legend, two areas called high-grade-

times-thickness areas in red, and in yellow, intermediate-grade-times-thickness areas. Now the criteria for indicating these particular boundaries are arbitrary. We used a number of different bits of data. In particular, for purposes of making a map, in other words, a presentation gives a better idea of the shape of these potash resource areas and the nature of the grades and thickness without having to go through each individual hole. We picked these arbitrary boundaries, and the arbitrary boundaries in general are based on an intermediate high boundary at a point of 60 percent K_2O percent feet K_2O as sylvite, or 32 percent feet K_2O as langbeinite, or combinations of the two equivalents in proportion. This is not true in every case, because there are certain areas where there are other considerations that have to be taken into account that I will point out.

Now, the yellow area represents K_2O equivalents of sylvite between 16 percent feet and the 60 percent feet line, or in the case of langbeinite -- I made an error there I would like to correct -- I said 16 for sylvite, the sylvite cut-off is 40 and the langbeinite cut-off is 16.

It is important at this point to emphasize and to remember in any considerations of these maps that when we say 16 K_2O percent feet or 40, that's a cut-off. We are

actually talking about an area higher than that intermediate, between, that's cut-off and 60 percent.

The areas in red are something greater than 60, or in the case of langbeinite, 32. Another consideration in making these maps, and this is arbitrary, it is an important thing, or I should say it is an area of influence decision was used, and in making a decision about areas influenced or individual holes, our projection from holes since we are dealing with highly erratic ores, we have made, in this case, a determination that an ore hole or a hole of any grade over the minimum cut-off can be safely be assumed by geological inference to represent a half-mile-radius circle around that particular hole. That doesn't always work because in an area like this where we have three non-mineralized holes less than a half-mile away, we have a cut-off less than a half-mile from that particular hole.

I will run through these maps quickly, just in general. The 10th ore zone that you can see is developed up to the truncation in four areas.

Q Mr. Donegan, may I interrupt you here just one minute? Note also this appears to me, the northeast boundary of your ore zones has been cut off at the R-111-A boundary so that you have not bothered to color in either red or

yellow north and east of that R-111-A boundary just for convenience.

A Yes, sir, Mr. Blackman, and also we have stopped on some of the maps at the edges of our land where we think that potash resources continue south of the area, or southeast of the area that we have asked for extension of Rule 111-A as amended.

These four red areas represent four areas of high-grade-times-thickness potash resources in the 10th ore zone, and I think to speed things up I'll use the term GT for grade times thickness instead of going through K_2O percent feet, and this is the 4th ore zone.

Q Now, referring to Exhibit 12 as the 4th ore zone.

A The 3rd ore zone map shows a situation that applies to the other maps that shows it maybe a little more specifically by geological inference and projection. It is so important to understand what is in the area where holes are not as densely located as, say, in this north area. This 3rd ore zone is a sylvinite ore with minor langbeinite. The A-4 hole has 5.7 feet of 20.8 sylvite, or something over 100 percent K_2O. The nearest hole to the south had 4.3 feet of 13.7 K_2O sylvite, and 5.3 feet as langbeinite.

Now, if you will observe on that map, the only areas of

3rd ore zone development is in this north-south trend, similar to the trend we showed on our earlier maps of the major ore bodies of the Carlsbad Potash District. With no hole in between, or even if there were holes there, I believe the information we have indicates that they would be similar holes to these two.

MR. PORTER: Mr. Donegan, may I interrupt at this point?

MR. DONEGAN: Yes, sir.

MR. PORTER: There is a gentleman in the back of the room who says it is urgent to see you.

(Whereupon, a discussion was held off the record.)

A (Continuing) I was pointing out that by geological projection this area in here between these two areas of sylvite or sylvinite.

(Whereupon, a discussion was held off the record.)

A (Continuing) The 2nd ore zone is shown in yellow without any areas that we have encountered yet of the high-grade high GT's. As you will note there is a big area here that probably some are to the 3rd ore zone, probably contained. Some are 2nd ore zone potash resources.

Q Now, referring to Exhibit Number 14.

A Yes, sir. Exhibit Number 15 shows the area of the 1st-ore-zone development. Exhibit Number 16 is a composite map showing the data of these five ore zones, plus geological projections and inferences similar to what I was describing in this case to connect areas like this area in here, three good holes in the 4th ore zone, in the vicinity of the Skelly well. We infer that high GT potash in the 4th ore zone is present and that is shown on this map, and in any individual area we show how we arrived at that particular projection.

Q Now, Mr. Donegan, would you explain Exhibit 6 and how it bears out or affects the conclusions you have reached?

A Exhibit 6 is a cross section from Leonard No. 1 State Well located in the northwest of Section 32 at this point, through the Skelly Well Forty-Niner, Unit Number 1 located at this point, through Potash Core Test Shell No. 17 at this point, and on to Atlantic Richfield Potash Core Test Number 4 at this point, and on into the truncated area of A-14 at this point. As you will note on the cross section, the potash ore zones occur mainly between the USGS No. 126 bed, polyhalite mainly, and then the Vacatrieste sandstone. There are a few other ore zones in this area, but the five

that we show on these five exhibits are the principal ones in this area.

MR. BLACKMAN: If the Commission please, I think Mr. Donegan has explained all of his maps and showed where he thinks these ore boundaries exist, and I would submit him at this time for cross examination.

(Whereupon, a discussion was held off the record.)

DIRECT EXAMINATION (Continued)

BY MR. BLACKMAN:

Q Mr. Donegan, I'll hand you a document marked for identification as Exhibit Number 9. I see that it bears Exhibit Number 9 on all copies, but it has not been stamped.

A It is stamped inside, Mr. Blackman, the first page inside.

Q Would you please identify that document?

A Exhibit Number 9 is a gamma compensated neutron formation density log of the Skelly Oil Company Number 1 Forty Niner Ridge Unit Well.

Q Will you please examine that exhibit, Mr. Donegan, and tell us what it shows?

A Exhibit Number 9, I think shows what our real problem is in the Hodges area. The Skelly Forty-Niner Ridge

Ridge Unit Well was drilled on State of New Mexico lands, not in the area of Rule 111-A. Although there is a potash core test, or actually two potash core tests in the section, both of which encountered potash resources in several ore zones, this well was drilled without our having a right of hearing under Rule 111-A. The well was drilled and encountered, as I would like to show you on the log, several potash ore zones. Unfortunately, this particular log was run inside of casing. Gamma ray logs which are used to determine percent K_2O, and I might point out that in our log in drilling we ran gamma ray logs in practically all of our holes, open holes, and we found that in open holes using the Schlumberger charts that we could determine the grade with reasonable accuracy before the chemical analysis, and it gives us a quick check on what sort of K_2O we have. After the analysis we learn the breakdown of the different K_2O minerals, All we can tell from a gamma ray log is that it is K_2O in some form.

When you run a log inside of casing, in the case of the Skelly Well, inside of thick cement, a 17½-inch hole, you attenuate the gamma ray curve so that you only see minimum values, and the minimum values that we see in this hole, without considering corrections for the casing and cement,

and the large diameter hole, would tell us that these three zones indicated in red, and on that log are about 6 percent K_2O or more, and the probable corrections are in the range -- an accurate correction would probably be in the range of 12 or 13 percent. Now, to arrive at that 12 or 13 percent, and I would like to point out the method that we used that Charlie Hicks used also when he studied the oil tests in the Permian-potash area, the langbeinite area east of us, and in a hearing I read the -- had an opportunity to see that Charlie Hicks was doing the same thing there that we are here, to try to guess at the K_2O in an inadequate log.

The polyhalite beds, the known marker beds, and there is a bunch of them in there in this area, typically are mixed polyhalite, halite and anhydrite. Pure polyhalite would be 18.9 percent K_2O. From experience in the area, in the multiple polyhalite zones present in this hole, and I would like to give you some examples then you can compare what you might think K_2O would come up in these three ore zones. Under the 10th ore zone you see a thin polyhalite bed. Typically the mixed polyhalite beds in this area would run 12 or 13 percent K_2O. We have analyzed, we have an analysis of polyhalite in a number of holes in here and if you look at that 10th ore zone, I mean that polyhalite under

the 10th ore zone, you will see that they are about the same. The zone I am talking about is about 935 feet for the 10th, and 950 feet for the polyhalite. Now, we have some other thin polyhalite, each one of those gamma ray kicks, or most of them are polyhalite. The lithologies in this area, except for a few siltstones, very few, to give you an example, at 800 feet is the Vacatrieste siltstone. Now that gamma ray kick there is a slightly porous siltstone, but there are very few of those kinds of beds that are porous. There is practically no porosity in these lower beds so that most of the gamma ray deflections there are due to polyhalite. And, look at the polyhalite at 1100 feet to get an idea of one of the richer polyhalite beds in the area, that is approximately the 123 bed. Then below look at typical polyhalite beds at 1240, 1295, and 1425. I think you can see from looking at those beds that we are safe to say that we have in these three ore zones K_2O considerably above 6 percent, but even at 6 percent these zones would come under what we call intermediate GT, depending on the thickness.It would certainly be in this classification, and probably when we correct them we are dealing with high-grade potash resources.

Now, I understand that Skelly is -- well, Skelly has announced a location and they may be drilling now, three-

quarters of a mile south of this hole, and I would like to show you where that hole comes out, it is on United State's land or Federal lands, and unfortunately Skelly was able to get permission to drill before the USGS completed their potash study of this area for purposes of the enclave map.

The well that I'm talking about is shown on Exhibit Number 16 as Skelly with a "2" and a double circle. The Number 1 well three-quarters of a mile north is also shown on the map. You will note that by our interpretation that the Skelly well will be drilled in a high GT area of the 10th ore zone potash. The holes immediately south and immediately north had high GT potash in the 4th ore zone. The 8th ore zone shown on the log is not well developed in the area, and would not be an important consideration about the Skelly location. I should say as we get more holes we find that there seems always to be more potash than we thought there was, and if we drill that area out I wouldn't be surprised if we have an 8th ore zone resource area there also.

Q Mr. Donegan, in your references you explained in the testimony in the previous hearing that you are using the U. S. Geological Survey designation for ore zones, the

first being on the bottom, and running the survey upward. Would you tell us, please, the approximate depth of the potash bearing zone on these exhibits beginning at the west side, approximately how deep is the 10th ore zone, for instance, as shown on Exhibit Number 11?

A Mr. Blackman, the shallowest occurrences of potash in the Hodges area are near the 3rd ore zone truncation in this area where the 3rd ore zone sylvinite occurs at a depth just slightly below 300 feet, between 3 and 4 hundred feet. That would be the shallowest occurrence, except, however, much shallower it is as it approaches truncation. The 10th through the 1st ore zone in the central area here are approximately 450 to 700 feet deep, and these are mainly deeper -- I mean, mainly shallower than the producing areas to the north. The farther east, in the extreme southeast corner, the ore zones that we have been discussing are at their maximum depth of approximately 16 to 17 hundred feet.

Q Very well.

(Whereupon, a discussion was held off the record.)

MR. BLACKMAN: Thank you, Mr. Donegan.

CROSS EXAMINATION

BY MR. PORTER:

Q One question, Mr. Donegan, in connection with that last question you answered. Is there any mining in the Carlsbad area now at a depth of 16 to 17 hundred feet?

A Well, the deepest mine is the Kermac Mine, or the two mines in that Kermac area, and they approach that depth, or are approximately that depth, but I don't remember the exact depth, it is comparable though.

Q I see.

A And I think in answering your question, I should further state that the drilling that is taking place now, and the contemplated new developments in the area by companies like Noranda, Noranda has announced exercise of an option on the property they have been drilling on for sometime. It involves a tremendous expenditure because they are deep for the drilling part; they apparently are headed for a deep mine. The Day Mines Company has announced plans to develop the Permian-potash ore body which is even deeper and already in Rule-111-A. That was this area, and they are having a rig problem. It seems that they have already done quite a bit of drilling. All of the available potash rigs that we know of in that area are tied up and I

understand, I heard today that Mines may start drilling, may have a rig soon.

MR. PORTER: Thank you.

Mr. Kellahin do you have some questions?

MR. KELLAHIN: Yes, sir, I do.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Donegan, I wanted to get a few things straight on these exhibits, if I may. This, as I understand, is a composite of all of the other exhibits to show what you say is a criterion.

A Well, it is a composite of what is shown on those, plus projections using geologic information and trends that are not shown on these. For instance this map does not show the 3rd ore zone connection between those as it most likely does. This map takes that into account.

Q You have no information that would connect those zones, do you?

A We have good geologic reasoning that anticipates that they connect.

Q Well, do you have any solid evidence that they do connect, like cores?

A There are no core holes located between those two

areas.

Q Now, on your Exhibit Number 16 within the area that is supposed to be included, the area there that is uncolored, does that mean that you do not have sufficient information to put them in your projection of the potash area?

A Only on that particular map because of the 25-mile long trend of ore bodies to the north. I would anticipate that area not colored probably has potash resources, but I did not include it;we were not able to project between ore holes as we have done in the other ore areas.

Q So, at this time, based on the information you presently have, you cannot say there is or is not potash there, is that correct?

A I cannot say positively that it is not there, but I could say there is a good chance that it is there.

Q But, you have no information to show that it is?

A No, and on that map I didn't show it; it is probably there. I think you might look at the red areas as probable when you get away from where we actually have core tests, and I would like to explain that further.

The ore zones in this area are so complicated, can change so fast, that it is very important that you do not

try to consider, or make company decisions on any one hole. A blank hole in the middle of the ore body doesn't knock you out. We know there are blank areas, weak areas in the mineralized area. We have to use an average of a number of holes. This is one of the dangers in langbeinite of trying to use engineering methods, say, of a certain circle or certain areas of influence and between two holes, say, the average grade is the average between the grade in one hole and the grade in the other or GT of one and GT of the other; it just doesn't work out that way. You may have two holes, and you may have a barren hole between, or you may have a hole of much higher grade than you would predict trying to use areas of influence.

Q In other words, your ore bodies are somewhat erratic, is that correct? Did you testify to that?

A Yes, sir, and when I say erratic, I say erratic to the extent that when you mine out the whole area you mine out an ore body. In mining that helps you take several kinds of areas out.

Q Mr. Donegan, let's keep in mind what we are trying to show here today is the presence of commercial deposits of potash. To say you are going to mine it, that's pretty far down the road. What I'm asking you is: Can you, for example,

take a high-grade ore body, how far can you project it for purposes of showing commercial deposits of potash?

A I don't understand your question.

Q Well, for example, you have got an area right here, you have got one core hole there, is that correct?

A Yes, sir.

Q I understood your testimony was to the effect that from that basis you would project a half-a-mile?

A Actually I was trying to be conservative there; I would project it a mile.

Q You have projected it more than a mile, haven't you?

A I said a radius of a half-a-mile, and I would project the radius of a mile. This is a conservative --

Q (Interrupting) Is that what this is, a mile?

A A mile in diameter.

Q And, you have got another core hole here?

A Two now with Skelly's well.

Q But you have projected -- how far apart are those? For the purposes of this Exhibit you have projected clear across that area?

A Right. As I pointed out, the last map shows the benefits of geological trends and projections not limited to

A (Interrupting) 10th ore zone, no that is in the 4th ore zone.

Q The 4th ore zone, what exhibit is that on?

A That's this exhibit. This is the hole we were talking about.

Q That hole right there?

A Yes, sir.

Q You don't have anything down in here, nor down in here on any of those zones?

A Not in the 4th ore zone.

Q Nor in any of the other zones?

A Well, in this hole we have mineralization in the 10th.

Q Do you show it on there?

A Yes, sir, this hole here.

Q One point in your answer to my question you made reference to commercial ore, why do you characterize that as commercial ore?

A I didn't make a reference to commercial ore, but I think you did.

Q I thought you used the term also.

A I think commercial is a -- well, as a matter of fact, when we had our order from Mr. Porter at the last

what is in a hole. Actually the only information we have, and the only information that IMC has, and the only information Duval has where they are mining is the actual ore they are mining, plus a two-inch area where that drill hole is. Everything else between those is speculation, until you actually mine it.

Q Mr. Donegan, if you are going to mine it, you don't go on one core hole per section, do you; don't you use 6 or 8?

A No, sir, we would use one hole to cause us to think there is commercial ore there, and to follow it out and find the boundary, and that's what we are doing. We have an area here of extensive development of several ore zones, and we are in the process of hunting for the boundary. We have not found the boundary in this area. We haven't found the boundary of this area, and we don't know if it covers a much larger area, but we anticipate that it does from geological projections.

Q You have no information on any of your zones in this area, right in here, do you?

A Well, there is a hole there that you passed over, hole D-10 does have rich langbeinite in that area.

Q You didn't include it in your --

Hearing, the last meeting we had, I thought I would see what some of the specialists call commercial ore, and I looked up a lot of definitions, and I found out it is kind of like these ore bodies, each expert has a little different idea about what is commercial, and I think the reason for that is commercial changes from moment to moment. It is my guess that what is being developed was not commercial just a short time ago, and if the FPC continues to have to cause the prices to be low, the gas that is being sought to be drilled in this area may not be commercial at a near date in the future, but if we use the term "commercial", the price of a product today I think an important consideration, in my opinion, as far as commercial is taken into account, not only what is taking place today, but what we predict for the future. In other words, when you block out an ore body and sink a shaft, you are basing it on the price today, but you have to look into the future. If you thought the price was going down in a short time in the future, you wouldn't be projected into the future, so that is why I think these areas which are near the cut-off are important to consider because these probably are commercial ores, depending on what you have come up with for commercial of the very near future, and are commercial now in several instances. Let me

give some examples of: If you are mining an area of ideal grade, and we all hope to be mining the best grades and making the best profits, and we encounter areas like this, we will certainly take that, and I'm talking about down to the cut-off. When we mix those with very high grades, we may be making commercial ore out of the two. If we have a mill that requires a certain intermediate grade, we may need ores like these to mix to make that other ore feasible for the mill or for maximum recovery. I would like to elaborate: This thing about commercial involves a lot of other things. It is a real problem and worries me that we are going to be too restrictive about what we say is commercial, because as we all know, Federal and State regulations can make an ore body not commercial. Our royalties, unlike oil royalties, can be changed by the USGS and the BLM, and if they changed those up, they could make a mine that is commercial today not commercial tomorrow. Inflation, of course, may make an ore body that is commercial today not commercial in the future. I think a good example of the extreme in what is commercial is the oil interpretation that a commercial well is one that pays the cost of the electricity to run the pump.

Q Mr. Donegan, I think there are those who do not

agree with you there and I want you to bear in mind that we are dealing with New Mexico Statutes, it is not my terminology which says this Commission shall protect commercial deposits of potash. Now, have you in your study made any analysis whether or not this area or any portion of it contains commercial deposits of potash?

A Yes, sir, I have. We have, and when I say we I'm talking about the Hodges group and the whole trust, we have had a number of market studies made, we have worked with a lot of specialists and we have used our own information and our own analysis of the situation and the operations of the other companies, the information that is available, and we have made the decision that we have a commercial deposit, and that we probably have commercial deposits under a substantial part of this area. We have also worked with PCA, Potash Company of America, for over a year and they have made detailed studies, three months in market studies, international studies, months of studies of feasibility and metallurgy of our cores, and PCA apparently has made the same determination we have, that we have a commercial potash area.

Q Is that detailed information available here?

A Well, which part of it, or all of it?

Q Any of it you are referring to , either yours or

PCA's.

A Well, mine is available because I have been involved in this in every phase, almost every phase, and I am probably as well acquainted with it as anybody in the whole Trust, and I joined in the decision to continue to develop this property because we considered it commercial.

Q You considered it commercial, but you don't have the figures here to show this?

A No, sir, because we haven't found any boundaries to this thing yet; we don't know how big this is going to be when we finally get through drilling in there.

Q Let's get back then to your cut-off point, you say 16 feet of 40 percent ore, and for what you call intermediate grade ore, and 32 feet of 60 foot percent; 32 as langbeinite, and 60 percent as sylvite for the hydrogens, is that correct?

A 60, yes.

Q Now, what is the economic basis for this cut-off?

A That's an arbitrary cut-off for the convenience of this meeting to show the picture of these ore bodies. We could have used 50 or we could have used 70.

Q Then it has no economic basis?

A It does to the extent that it is considerably

higher grade than what we have used as the minimum cut-off.

Q All right, is your minimum cut-off, does this have an economic basis?

A Yes, sir, in my opinion, the cut-off point today, not necessarily the cut-off in the future; we may be looking at lower grades than that; the cut-off today that we would anticipate blocking out for future production after we have mined out the high-grade areas.

Q Are you aware that Kerr-McGee in a recent case testified that 63 percent was the cut-off point for sylvite?

A Kerr-McGee has a deeper mine, they also have an insol problem that we don't have here, and, of course, you are talking about sylvite. Most of our area is langbeinite, and I think when we consider sylvite, we have to consider it in two cases. One, our 3rd ore zone is our rich sylvinite ores, and they are extremely shallow, shallowest in the entire district and have low insols. The other sylvite ores are sylvinite ores that were considered here, are mainly mixed langbeinites and sylvite.

Q In connection with your calculations did you take into consideration the price of potash?

A Yes, sir, we tried to watch potash -- we went through the potash depression at the same time the gas companies

went through it when they weren't drilling in this area because the price of gas was low, and we see the price of potash accelerating now.

Q For the purpose of this hearing, what price did you use?

A Well, the price is changing and I wouldn't be able to quote any particular price today; I would just say it is higher than it was when we started our drilling in the area.

Q Mr. Donegan, how can you calculate a cut-off point if you don't have any price to take into consideration?

A Well, I think, number one, we can use grades that are being mined to the north by IMC, and thicknesses.

Q What are those grades?

A In the recent hearings, Mr. Childers, I don't remember what particular hearing, talked about 4 feet of 6 percent. That was at the time when langbeinite was, and I'm talking about langbeinite, was selling for considerably less than it is today.

Q That was in an existing mine, was it not?

A Yes, sir, and we're talking about the same thing here. We are talking about low-grade ores that will be mined after we get the high-grade ore, or low-grade that will

be mined as we go from high-grade to high-grade. I say low-grade, we don't know what that cut-off is going to be, I just mean by low-grade, lower grade than the higher GT areas.

Q In arriving at a cut-off point, Mr. Donegan, where you have no mine, don't you have to take into consideration the cost of sinking your shaft and mining this ore?

A Yes, sir, and we do that in the high-grade areas. In other words, in this area that we are drilling here, the cost of amortizing a mine is the minimum tonnage. We have to develop a minimum tonnage to amortize the mine and give a decent profit. All of the ores in there, whether they are higher grade or lower grade -- I shouldn't say all other ores -- but, the lower grade ores in that area I believe will be part of the profits out of that mine. They are not necessarily the ones that cause us to sink the shaft and get those immediate higher grades.

Q What figures did you use in that connection, at arriving at your cut-off point?

A For most of these maps it is 32 percent feet K_2O.

Q Mr. Donegan, my question is: What figure did you use to amortize the cost of your mine?

A Well, the price of a mine is changing so fast that

whatever figure we were using to figure it certainly would be substantially more, and I can't give you a figure, but it was a figure that looked like we could make some good profits.

Q You can't give me a figure on the cost of the mine, and you can't give me a figure on the cost of the ores?

A No, sir, and I hope, Mr. Kellahin, that you will remember that I am an exploration geologist. I don't like to talk vague about these things, but these are things that we have other people, I hope, that are here that will be able to give a satisfactory answer for you. In other words, my main job in this was to discover the reserves and develop them and with a general knowledge of our cut-off and grades that we are looking for, to present on these maps, not necessarily the exact cut-offs of ore that we are going to mine, but a general picture to show the patterns and the location of the potash resources in this area.

MR. KELLAHIN: Would you have another witness who could testify on this, Mr. Blackman?

MR. BLACKMAN: Yes, Mr. Kellahin.

BY MR. KELLAHIN:

Q Mr. Donegan, it has been called to my attention,

that your Exhibit 16 on the board here differs from the Exhibit 16 which was handed to us in that there is no colored area through the center of the exhibit furnished to us.

A That is a mistake. Mr. Kellahin, I apologize for that error, we gave you a different map. The map that you have there now is Exhibit 16.

Q Well, frankly, we prefer this one.

Mr. Donegan, would you tell us just what you found in some of these grades cores if you have the information available, I would like to go through this particular area?

A Yes, sir. If you look at the other map, each hole has all of the data for all of the ore zones. The particular map you are looking at does not show the specific hole data.

Q It is shown on the other four or five?

A Yes, sir.

MR. PORTER: I think, Mr. Kellahin, this was the thing we were trying to avoid at the last hearing when we asked him to prepare exhibits howing this, and they have done that.

MR. KELLAHIN: If we have the information that is all I want.

BY MR. KELLAHIN:

Q Mr, Donegan, on your Exhibit 16 there appears to be a contour running up through Section 28 and running up past the Skelly well, there is a contour, what is the significance of that?

A You mean the pencil line under the red?

Q Yes.

A Those pencil lines are compilations of all of the lines on the other five maps made under the red to give you an idea so that you could look at this composite map and know where every line that we are looking at up here, or however, relates to this map.

Q Now, on these various zones you have shown on the five exhibits, and your composite on Number 16, how do you classify these zones; are those zones proven commercial ore, or do you want to avoid that question?

A No, sir, they are not proven commercial ore, they are areas of probable commercial ore.

Q Would you call them a geological inference?

A Not in every instance. For instance, we have a number of holes in the middle of the area that have high GT's, but in between the holes with high GT's we are talking about geological projections or inferences.

Q What is your definition of probable ore?

A I did not use that in an engineering sense, or the USGS classification; I'm using that word "probable" as the likely nature of these ore bodies, or the likely occurrences based on the data that we have available, our experience in the area, and comparison of similar areas that have been drilled out more extensively to the north.

Q In making your projections from these core holes, you are talking about the probable ore rather than the proven ore?

A Not in every case, we have areas of close-space drilling, I wouldn't say there are proven reserves of a certain tonnage because as I pointed out before these things are complicated enough that you don't actually know that until you are mining. You don't know what grade, you speculate even with engineering methods of close-space drilling, you are still speculating what the grade is. You hope that you approach it, and if it is a simple blanket-like body you may approach it very closely; if it is a complicated body, you can miss it some.

Q Is this a complicated or simple body here?

A We would anticipate complicated.

Q So it is very difficult to project any ore reserves

in this area, is that correct?

A I would say that it is no more difficult than the projections that were used by Duval, and I would like to tell you about those and the IMC drilling. Duval drilled about four holes per section in the area that they are mining.

Q Is that in the area we are talking about?

A Immediately adjacent to it, and it is the same ore zone that we are talking about immediately to the south. They found ores in some instances were higher than they anticipated and in other areas lower than anticipated, but the overall picture, like I'm trying to show here, turned out to be -- in other words, the individual holes didn't have any influence like they thought they did, but the average of all that data proved out to what they expected.

Q That was an average of all the holes?

A Right, and that is a generalization, it may not apply to every acre of potash.

Q Now, does all of your red area have four holes per section?

A No, sir, and I should point out that a lot of Duvall doesn't either; some areas that are right next to the shaft has zero up to less than four.

Q How far do you project; you say you have proven

ore right where the core is, two inches, how far out do you project proven ore?

A I used all the available information to arrive at what I think is the best answer; we don't just arbitrarily take those at a half mile. We consider trends, the presence of other holes, but we feel like from geological inference and experience in the area with closer spaced drilling that it is safe to anticipate the influence of an area of a half-a-mile to a mile. Also that we are not saying that entire area is of the same grade as that particular hole; we are saying that hole is proving an area of that size of probable potash of similar grade.

Q A core hole in between could disprove, could it not?

A No, sir.

Q It couldn't?

A No, sir. To give you an example, look at this hole right here, a barren hole, Number 28, if you remember I talked to you about salt horses a couple of weeks ago. We know that when we are drilling in the middle of the best development of potash in that area we are going to have zero holes because they are characteristic of this area to the north. There are bodies of almost barren potash up to 500

feet in diameter, up to 500 feet in diameter.

Q Your probable designation is not an economic designation is it, as such proven ore?

A Well, again that's a term that depends on what your definition is. I would say the Potash Company of American has determined that it is economic.

Q That is based on testimony that will be offered here?

A Well, I don't know about that, but I know PCA has made a contract with us that requires such a substantial investment that they would have to consider that we have an economic situation and we are not just speculating on the ground without high potentials.

Q Mr. Donegan, could you define specifically the area where you feel these commercial deposits of potash exist as opposed to your overall interpretation?

MR. BLACKMAN: Mr. Chairman, I think that Mr. Kellahin has gone quite far afield in this exploration of commercial. I very carefully didn't ask Mr. Donegan any questions about commercial potash when I was asking him on direct examination. I have a witness who understands this situation who will be able to do it. I don't mind him doing it, if it is all right with the Commission.

MR. KELLAHIN: If the Commission please, I think we will come back to the reasons of the New Mexico Statutes and the Rules and Regulations of this Commission and the Order entered by the Commission at the previous hearing. We are talking about commercial deposits of potash, and clear up to the present I have been trying to help this Witness to arrive at some conclusion that there is commercial deposits of potash which he has consistently refused to do. If there are commercial deposits of potash in any area here we would like to know it.

MR. PORTER: What is your question, Mr. Kellahin?

MR. KELLAHIN: I asked him with reference to Exhibit 16 to point out on there where, in his opinion, there are actually commercial deposits of potash as opposed to his projections of probable ore bodies to which he has been testifying.

MR. PORTER: Mr. Kellahin, we feel that this question should be deferred to the next witness. We feel this witness told where he feels there are potash -- the existence of potash is known to be, and the Commission will expect the applicant to show where this commercial potash, in their opinion, is located, and I believe they intend to do that with the next witness.

MR. KELLAHIN: That's all the questions I have of this witness.

MR. PORTER: Does anyone else have a question of Mr. Donegan? You may be excused.

(Whereupon, a short recess was taken.)

MR. PORTER: The Hearing will come to order please. Mr. Blackman, would you call your next witness?

MR. BLACKMAN: If the Commission please, I have been informed by the U. S. Geological Survey that their Mr. Van Sickle will identify the potash enclave map that was prepared by them. He is not my witness, he is not appearing on behalf of either party, except on behalf of the Geological Survey, and I think that since we are talking about the location of the ore zones and things of this kind. This is the same map which is identified as Exhibit 6 on the previous hearing. This is just prints of it; we had smaller prints made for convenience. But the Geological Survey, Mr. Van Sickle can come forward just to make it easier for the record I will ask you to identify the map and make a statement about it, unless you would prefer to do it.

MR. PORTER: You have another witness?

MR. BLACKMAN: I have another witness on the basis of the commercial side of this thing.

MR. PORTER: Yes, sir.

MR. BLACKMAN: He will be a witness on both of those maps, and I thought I would prefer to have both of them in.

MR. PORTER: You feel it's in order now that the USGS witness be called at this time?

MR. BLACKMAN: I think it would be more in order to do it that way.

MR. PORTER: Yes, sir.

(Whereupon, a discussion was held off the record.)

MR. PORTER: Is there any objection to Mr. Van Sickle being sworn at this time and appearing in this case?

MR. KELLAHIN: We have no objections.

MR. PORTER: Don, would you take the stand at the end of the table, please, and be sworn?

(Whereupon, the witness was sworn.)

MR. PORTER: Mr. Van Sickle, you have a map in your hand, would you like to post that on the wall and tell us what it is?

(Whereupon, a discussion was held off the record.)

MR. PORTER: The Exhibit has been posted, now

Mr. Blackman, why don't you go ahead and question the witness?

MR. BLACKMAN: All right.

D. M. VAN SICKLE

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. BLACKMAN:

Q Would you state your full name, please?

A Donald Van Sickle.

Q Your occupation?

A Area Geologist, Conservation Division, Southern Rocky Mountain Area, U. S. Geological Survey.

Q How long have you been Area Geologist?

A Seven years.

MR. BLACKMAN: I don't present Mr. Van Sickle as an expert witness, but I think it would be in order that he be accepted as such.

MR. PORTER: The Commission recognizes Mr. Van Sickle as a qualified geologist.

BY MR. BLACKMAN:

Q Mr. Van Sickle, has the Geological Survey under your jurisdiction prepared a map which is now posted on the

on the board behind Mr. Porter?

A Yes.

Q Is that map identified as USGS Exhibit Number 1 in this Case?

A Yes, it is.

Q Do you have a statement that you care to make concerning that map, Mr. Van Sickle, the auspices under which it was made?

A Yes, I do.

Q The basis under which it was made and anything else you might care to add?

A The title of the map is, "Map Showing Distributions of Potash Deposits in the Carlsbad Area, New Mexico", dated May, 1974. This map was prepared under my supervision on orders from the Chief Conservation Division, U. S. Geological Survey. The Director of the U. S. Geological Survey and the Secretary of the Department of Interior concurred with this order. The map, as directed in the memorandum was made available to the public June 3, 1974. Areas shown as measured for emphasis"Mineable Potash Reserves" and indicated emphasis "Mineable Potash Reserves" were determined from core hole and log data on file with the U. S. Geological Survey in Carlsbad, New Mexico, in conjunction with reserve

maps submitted by potash lessees, using the following guidelines: Mineable potash ore, minimum quality and thickness greater than 4 feet at 10 percent K_2O as sylvite, or 4 feet of 4 percent K_2O as langbeinite or equivalent combinations of the two. The criteria used for measured reserves: (a) Measured ore will be delineated by data points no more than one-half mile apart if geologic inference shows these projections to be reasonable. (b) Measured ore will not be delineated by less than three data points that meet all other distance and thickness and grade criteria. (c) Measured ore will not be projected farther than one-half mile from a data point which meets thickness and quality standards where no projection or geologic inference data exists. Indicated reserves: That area where spacing of data points does not meet measured ore criteria yet data points show mineralization higher than minimum thickness and quality. The minimum quality and thickness criteria corresponds to the U. S. Geological Survey classification standard in use for several years which identifies those U. S. lands that must be leased competively.

Although this map is a composite of all ore zones, these criteria were confined to each individual ore zone, that is three data points no more than one-half mile apart

with potash of greater quality and thickness in separate ore zones did not qualify as measured. Separate overlays were prepared for each of the major ore zones; combined overlays were prepared for the other ore zones.

The Geological Survey definitions that are currently being used for measured reserves or resources for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes, and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling and measurement are spaced so closely that the geologic character is so well defined that size, shape, and mineral content are well established. The computed tonnage and grade are judged to be accurate within limits which are stated, and no such limit is judged to be different from the computed tonnage or grade by more than 20 percent.

Indicated reserves or resources for which tonnage and grade are computed partially from specific measurements, samples, ore production data, and partially from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade

established throughout.

(Whereupon, a discussion was held off the record.)

BY MR. BLACKMAN:

Q If the Commission pleases, Mr. Van Sickle, I hand you a document which has been marked for convenience, Exhibit Number 4, and ask you if this is the Interior Department order under which you prepared this map? I submitted that and identified it the last time.

A Yes, sir.

MR. KELLAHIN: If the Commission please, maybe I misunderstood Mr. Van Sickle, but I thought he was proposing to give just the criteria, is that correct, Mr. Van Sickle; the basis for your map rather than this order?

MR. VAN SICKLE: That is what I just read.

MR. KELLAHIN: Yes, sir. Do you have copies of it?

MR. VAN SICKLE: Oh, yes.

MR. KELLAHIN: I thought that was what you were proposing to offer and we would like to have that if we could.

MR. PORTER: Do you have some extra copies?

MR. VAN SICKLE: I have three extra copies.

MR. PORTER: Give those to Mr. Kellahin.

(Whereupon, a discussion was held off the record.)

MR. PORTER: Mr. Kellahin, do you have some questions; I believe Mr. Blackman has made the witness available now?

MR. KELLAHIN: Yes, I do.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Van Sickle, on your Exhibit which is the same as PCA's Exhibit Number 5 offered in this Hearing or Hodges' Exhibit Number 5, in the area that is proposed to be included in the potash area which is down in the lower left-hand portion, you have an area marked as no data, is that correct?

A Yes.

Q Now, when you prepared this map did you have available hole Number 824, Section 31?

A I'm sure we did.

Q Would that hole show "ore" or "no ore"?

A I'm not sure; I don't have our individual ore zone maps here, and this map, as I said, was prepared under my supervision, and I reviewed it, but I didn't prepare the whole map.

Q Now, the holes are shown on Mr. Donegan's Exhibit, so they were available, were they not?

A Yes.

Q How about hole Number S-23 in Section 32?

A I'm sure that was available. Of 23, 30?

Q 32.

(Whereupon, a discussion was held off the record.)

BY MR. KELLAHIN:

Q In 23, 30, yes, sir.

A I believe that those core holes didn't meet our criteria for"measured"or"indicated", therefore, we show it as unmapped or no data.

Q Well, actually they show "no ore", do they not, or "barren", or do you know?

A I don't have our core-hole records here.

Q But if the cores were available, they would probably show no data?

A Well, this map just depicts the "measured" and "indicated".

Q Well, then there was no "measured" or "indicated" in those holes, is that what you are saying?

A Apparently not.

Q Would the same be true of hole S-20, Section 30, as in 23, 30?

A In Section 30?

Q Yes, sir, in 23, 30? Immediately north of the other holes that we are talking about.

A Are these holes located on -- they should be on this map here, right?

Q Yes, sir, they are.

A I would say that would be the case.

Q And the same is true of S-22 in Section 25 in the 29th there, which would be adjacent to that?

A Yes.

Q Your map does not show the KPA boundary, does it?

A No.

Q Are you aware of it?

A The none potash?

Q Yes, sir, the known-potash area?

A Yes.

Q You didn't see fit to include it on this one?

A No, because this map will change the known-potash area boundary.

Q Have you changed the known-potash area map as yet?

A In effect, this is the known-potash area boundary

now.

Q This is it?

A Yes.

Q It follows around through the white area where it says, "no data"?

A Yes, this map will essentially become, or delineate between those U. S. lands which must be leased competively.

Q Now, as I understand your testimony was that you have, under your directions, you had to have data points no more than a mile-and-a-half apart?

A Right.

Q Is that throughout the area you have included in showing mineable or, or indicated mineable ore?

A For mineable the data points had to be at least three data points no lmore than one-half mile apart showing more than the minimum in the same ore zone.

Q What is the basis for your mile-and-a-half projection; is that an arbitrary standard you have established?

A Yes, this we discussed with the mining supervisor and we determined that in this potash area that we could delineate these areas using this criteria.

Q Delineate it with what degree of certainty?

A Well, for the degree of certainty for which we

prepared the map.

Q Well, we will come to that in a moment. You made another statement about projecting no more than a half-a-mile where there is no other criteria available?

A That is correct.

Q How many of those do you have within the area you show here?

A Well, it is just how many wells, core holes, data points.

Q You projected only a half-a-mile?

A That's all primarily around the outside edge.

Q You projected, in other words, a circle in a diameter of one mile, is this what it would amount to?

A Correct.

Q Now, you made reference to the Chief of the Conservation Division, Wayland's direction for the preparation of this map. I would like to call your attention to Part 2, Paragraph C on Page 3 where you are directed to delineate on this map the presently unmined areas which are considered to contain mineable reserves of one or more ore zones, ie., those areas enclaves where potash is known to exist in sufficient thickness and quality to be mineable under present day technology and economics. Did you do that?

A We considered that we have done it, yes.

Q What present-day-technology considerations did you have?

A Well, those were the mining supervisor's input into this map; I prepared it in conjunction with the mining supervisor.

Q Is he present, and will he testify?

A No, he is not present.

Q What economics did you consider?

A There, again, that's in the mining supervisor's area of expertise.

Q And, you can't testify as to the economics of mining this area?

A No.

Q Now, the order further directs that the potash lessee will be responsible for submitting sufficient data to justify any area which is proposed as a mineable reserve; the area geologist in consultation with the mining supervisor will review the information furnished in this regard and make any division in the boundary, and so forth. Did you do that?

A Yes.

Q Did the potash companies, in your opinion, furnish

sufficient data?

A Yes.

Q Did all the companies furnish the data requested?

A Yes, they did.

MR. KELLAHIN: Thank you, Mr. Van Sickle.

MR. PORTER: Any further questions? Mr. Nutter?

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Van Sickle, I have heard discussions in this Hearing and other hearings on the potash area about salt horses; I would like to ask you a couple of questions about salt horses.

Now, if you have a salt horse, is that salt horse used -- or let's say first of all that we are in an area where there is indicated or proven reserves of ore in several different zones. Now, if you have a salt horse, will that salt horse extend through more than one zone, or is it confined to one zone?

A I think it generally is in all zones.

Q It would come up and penetrate through the --

A (Interrupting) No, it doesn't penetrate. A salt horse is an area of no potash mineralization. In other words, you are in ore, then all of a sudden there is no ore,

but the clay beds continue right on through the non-mineralized, non-potash mineralized halite.

Q If you have mineralization in an off-setting well, or hole, in the 1st ore zone and mineralization in the 10th ore zone, and then you suddenly run into the salt horse in the 1st zone, is it likely that salt horse will be present in the 10th zone also?

A Well, I don't think I would want to answer that with any good certainty because as Mr. Donegan explained, the ore zones are quite -- they are not all coextensive, and so it is just difficult to say that this would happen in all cases.

Q Now, when you were making your study, I think you said that the criteria was 4 feet of 10 percent sylvite or 4 feet of 4 percent langbeinite, or a combination of the equivalents; would this be safe to say you are in an area of langbeinite only, you have this langbeinite, this 4 feet of 4 percent scattered through 4 zones, and you just had one foot in each of these various zones, it would come up to the 4 percent, would you consider that mineable then?

A No.

Q There would have to be 4 feet of 4 percent in one bed?

A That's right. It can be 3 feet of 16 percent K_2O as langbeinite, and we would then divide and bring the 3 feet up to 4 feet, and lower the percentage, but it would still be equivalent to.

Q But you couldn't have one foot of 4 percent in one bed, and one foo of 4 percent in another bed, and so on in order to arrive at 4 feet of 4 percent?

A No, sir.

MR. NUTTER: I just wanted to make sure that I understood that. That's all.

MR. PORTER: Anyone else have a question?

Does anyone want to formally offer USGS Exhibit Number 1 into the record?

MR. BLACKMAN: I would offer USGS Exhibit Number 1 into the record, and at the same time offer PCA's Exhibit Number 5.

MR. PORTER: All right, Mr. Kellahin?

MR. KELLAHIN: If the Commission pleases, we would object to the introduction of the Exhibit for the reason that it purports to show measured, but mineable potash reserves in one or more ore zones or indicated mineable potash reserves in one or more ore zones, and it purports to have been prepared in accordance with the directions

contained in Exhibit Number 4, Mr. Williams letter, where to show where potash ore is known to exist in sufficient thickness and quality to be mineable under present day technology and economics, and the witness supporting this Exhibit has testified that he is unable to testify either as to the technology used or the economics used. There has been no sufficient foundation made for the Exhibit, and we would object to its introduction.

MR. BLACKMAN: If the Commission pleases, it seems to me that this Exhibit having been prepared under some circumstances with which the Commission is familiar, that is that there is a substantial conflict between the Oil and Gas Association and the so-called potash group which ended up in hearings in Washington and Albuquerque and eventually this order was entered. Now, we are in a real peculiar position here in New Mexico, something that I can't really identify exactly as the problem of jurisdiction of the Oil Conservation over Federal lands, and it seems to me under these circumstances when the Geological Survey, as was testified to, has requested information from all of the potash companies, and, of course, as you well know, they already had all of the basic information already because all of the core holes are always filed with the Geological

Survey, but they have delineated an area here which Mr. Van Sickle testified to as to what it is supposed to be and that then it is entitled to be accepted into evidence as their opinion, and you can give it what weight you wish to. It does seem to me that it should be accepted into evidence, and based on the fact that they have more information than all the potash companies put together, I think it would have substantial weight.

MR. KELLAHIN: If the Commission please, I quite agree they have more information than anybody else, and that is what we are trying to get. The witness testified that the criteria used on this map I understand is by Mr. Fulton and not by himself. We could defer admission of the exhibit until they produce Mr. Fulton for a cross examination as to exactly what criteria was used, but we are still back to the same question we started with; we're talking about commercial deposits of potash, and there is no evidence here to show commercial deposits of potash. Certainly to offer this exhibit as some indication that part of this area is commercial denies us the right of cross examination, and we object to it.

MR. PORTER: The Commission will sustain the objection and deny admission of USGS Exhibit Number 1 and

excuse the Witness.

Call your next witness, Mr. Blackman.

MR. BLACKMAN: If the Commission please, I would like to make a request here, and it is a bit unusual. In the preparation of all of these exhibits Mr. Donegan was operating with his assistants and people in Albuquerque; they were operating down in Carlsbad and it wasn't possible for Mr. Rice to be the next witness and testify from these, he didn't see them at all except for the first time here this morning. I would like to request, even if it is a little bit early, if we could break for lunch now. I think it would save time. We could come back in a few minutes to put together the testimony, and I think it would go a lot faster.

MR. PORTER: Do you think you can be back by one o'clock, Mr. Blackman?

MR. BLACKMAN: Oh, yes, easily.

MR. PORTER: The Commission will recess the Hearing until one P.M.

(Whereupon, a recess was taken for lunch.)

(Afternoon Session)

MR. PORTER: The Hearing will come to order please. Mr. Blackman, do you have another witness to come forward?

MR. BLACKMAN: Yes, sir. Mr. Rice will you take the stand, please?

(Whereupon, the witness was sworn.)

DAVID RICE

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

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

A David Rice.

Q Mr. Rice, what is your occupation?

A By profession I am a mining engineer; I'm Vice President of Potash Company of America.

Q Mr. Rice, would you please give us an outline of your education and experience?

A I hold a degree in mining engineering from the University of California, Berkeley, Class of 1940; gold mining for Dumont Mining in California; Beauette Mining in the Philippine Islands; Consolidated Copper Mines in Ely, Nevada; Western Gold Mines in Arizona; Potash Company of

America since 1950.

Q Since 1950 what positions have you held with Potash Company of America?

A I joined the Potash Company of American as a mine engineer, subsequently, into various mining supervision jobs as face boss, mine foreman, mine superintendent, operations manager, and Vice President of the Company since November of 1973.

Q How long have you been operations Manager, Mr. Rice?

A Since December, 1960.

Q In the course of your duties as operations manager, and since then as Vice President, you would have participated in marketing conferences and decisions on a regular basis?

A Yes, I have.

MR. BLACKMAN: Will the Commission accept Mr. Rice's qualifications as an expert in this area?

MR. PORTER: Yes, sir.

BY MR. BLACKMAN:

Q Mr. Rice, are you familiar with the current prices at which potash is being sold?

A Yes, I am.

Q Would you testify for the record as to what those

prices are, and how they compare with prices, say a year ago?

A Now, you are talking about --

Q (Interrupting) Let's talk about muriate.

A Muriate of potash?

Q Yes.

A Well, I should, Mr. Blackman, go back to perhaps 1969, 1970 which was a terribly depressed period in our industry, and potash was selling in this country, as well as in Canada at lows ranging from $10 to $12.50 a ton. Since then, beginning about two years ago, the situation has reversed. Potash is in an extremely low supply both in Canada and in the United States. Potash prices have answered the supply and demand and prices, fortunately, have increased where instead of selling for $12.50 a short ton, it gradually moved up into the $27 to $39 range, depending on the type of potash sold. This is for the muriate of potash.

Q In several grades, and what was the highest grade price of the muriate of potash according to current price lists?

A On the agricultural grade, the soluable muriate of potash, the white crystalline material, which sells on the price list close to $35 a ton.

Q How about the granular grades?

A Granular grades have also moved up. Of course, the standard continues to be the lowest price, and that is selling for around $25 a short tone with the course and granular perhaps in the $27 to $28 range.

Q The average prices at which muriate of potash would be sold then would depend upon the weighted average of the several products making up the muriate grades?

A Of the three major grades, yes.

Q Are you familiar, Mr. Rice, with the market for sulphate of potash?

A Sulphate of potash has been in even shorter supply. As you know, there are only two world producers of sulphate of potash, the Sulpha-Mag and the High-K, Duval and International Minerals.

Q You are now referring to suphate of potash magnesia?

A Correct.

Q Which we have called here variously SPM, and IK, and Supha-Mag, and as we have referred to it here, langbeinite.

A Langbeinite, that is correct. It has a certain number of trade names and generic names. That material which is solely produced in the Carlsbad area, and the entire world

at the present time by two producers, Duval and International Minerals, and I think they have been out of inventory for a long time. As a result the market price of these materials has climbed astronomically in the last few years from perhaps in the $17 range and now selling $27 to $29; I believe the standard grade sells for $27 and the granular at $29.

Q I think the record will show that Mr. Elders, an employee of Duval who do make and sell this product; he testified two weeks ago that the current price was $27 for standard and $29 for the granular grade.

Do you have an opinion as to whether substantial additional quantities of langbeinite could be sold at the current spot price?

A I have no question in my mind, knowing the general shortage throughout the world for the potassium sulphate in various forms.

Q Would you explain, if you can, why it is that the demand for sulphate potash materials has accelerated faster that it has for muriate?

A First, the supply is very limited, and limited to the two Carlsbad producers mentioned. To date there have been no discoveries of langbeinite in Canada or any major

deposits anywhere in the world, so the supply is limited to the capacity of Duval and International Minerals to produce. The need for potassium sulphate is on the increase as the soil becomes saturated with chlorides which are somewhat detrimental to certain crops. The traditional crops, of course, are tobacco, potatoes, and a number of crops that cannot tolerate a high level of chloride, so these crops continue to expand and require a greater amount of potassium sulphate. In addition, many farmers lean towards using potassium sulphate rather than potassium chloride since all plants need potassium, but not all plants need chloride, and in time the soil becomes saturated with chloride and they switch to the langbeinite-type materials. In addition, the magnesium and the sulphur play an important role in the fertilization of the plant, both the magnesium and the sulphur are important plant nutrients. So the demand for these things keep on increasing with the quantity that is being produced at the present time rather fixed.

Q Do you know of any other deposits of langbeinite in the northern, or western hemisphere?

A I know of no deposits other than in the Carlsbad area, Mr. Blackman.

Q This is not a potash that is being worked or

exploited, but one which is known geologically to exist, is that correct?

A That is correct.

Q Mr. Rice, are you generally familiar with the grades and thicknesses of ore which are currently being mined in the Carlsbad basin?

A Yes, Mr. Blackman.

Q By several companies?

A Right, I do.

Q Are you generally familiar with the processes which are in use by the several companies to beneficiate the ores that they have?

A Mr. Blackman, as you know, a lot of this information is proprietary and held pretty tightly by most companies as their private process, but on a general basis I think all of the producers have a general idea of what the other fellow is doing. Yes, I have a general knowledge.

Q Well, let me put it a little more specifically: Let us say that you know, for instance, that Amax Chemical Corporation uses the flotation process?

A That is correct.

Q And you know that they use a mean as a reagent for the purpose of separating the potash from the salt?

A That is a fact.

Q And, you know that they use other reagents for the purpose of blinding the clay in order to keep from wasting the mean on the clay?

A That is correct.

Q Now, what specific information -- you said generally you know -- specifically do you know how much of each reagent and possibly the exact kind or combination of reagents those companies are using?

A I have some knowledge of the reagents that they use. I don't really know specifically about how much of each reagent.

Q I think the patents generally describe it as a usable amount?

A That is correct.

Q Whatever that means. Mr. Rice, I will hand you a document which has been marked for convenience as PCA's Exhibit 18, and ask you if you will describe this document?

A You have handed me two sheets of tabulations, Carlsbad Basin Tonnage, and Grade for the Years 1973 and 1974, listing the then producers of potash in Carlsbad outlining their ore tonnage hoisted and the ore grade of that tonnage by months.

Q Now, would you explain how this report came into being; is this report made on a regular monthly basis?

A This is made on a regular monthly basis.

Q And how is it made?

A Currently Amax Chemical has volunteered to tabulate the information for us and at the end of the month each company calls to the Chief Clerk at Amax and we provide the information, the tonnage, and the ore grade hoisted, and his has been done for quite a few years.

Q You note on there, Mr. Rice, that in the case of International Minerals and Chemicals and Duval Corporation they report only the tonnage of sylvinite?

A That is correct.

Q They do not report their tonnage and grade of langbeinite?

A That is correct.

Q And, the other companies on the list do not mine or process langbeinite, so the report covers their sylvinite only, also?

A That is correct.

Q So that the note on the report here, "That IMC and Duval only report sylvinite" really applies to everybody, it applies only to sylvinite?

A That is correct. That was at the request of the other companies, Mr. Blackman, that did not produce langbeinite. At that time we were only interested in sylvinite and both IMC and Duval averaged out the langbeinite and the sylvinite and came up with one single value which meant nothing to the rest of us, and so at the request of one company we asked them to only report the sylvinite grade.

Q Mr. Rice, is this report part of the ordinary business record of the Potash Company of America?

A Yes, it is.

Q Mr. Rice, you heard the testimony given today by Mr. Donegan, and also by Mr. Van Sickle regarding the geology of the area that is in question in this Hearing and is sought to be brought within the boundaries of our 111-A; will you please comment on the viability of the mineralized zone in the area as they have described it, and refer as you wish to any of the exhibits that you find on the wall; make what general comments that you can with respect to the geology as it is within your experience and the commercial nature of the deposits as it is within your experience?

A Mr. Blackman, do you want to explain your understanding of viability?

Q Well, make it probability then, commercial and leave

out the word "viable".

MR. KELLAHIN: If the Commission please, unless the Witness is testifying to studies and information that he has made of his own or based on information that has been supplied him when he came in here today, on the commercial-ability of this ore then we object to his testimony on it. I don't think the Witness is qualified.

MR. BLACKMAN: Well, Mr. Porter, the Commission, the best evidence that can be obtained with respect to what constitutes a commercial body of ore is by somebody who is at the present time in charge of mining a commercial body of ore and who is familiar with the general operations in the Carlsbad district. This is the type of testimony which the Commission should have on which to base its decision as to what constitutes a commercial deposit of ore. Now, Mr. Rice concurred in the testimony as to grades and thicknesses of ore within the area that we are talking about, and I am now asking him, based upon his experience which is many and varied in the potash business and in the marketing end of it and in the mining end of it where he has had the job of meeting payrolls, to comment upon what he considers to be reasonable cut-off grades as to the potash deposits in the district, and with specific reference to this part.

I'm not asking him to comment about, or to testify as to what grades and thicknesses are profitable to International or some other company; I'm asking him for his opinion with respect to this particular property. I don't know where I would get anybody with any better information on which to do it.

MR. PORTER: Objection overruled, Mr. Kellahin.

MR. RICE: Would you like to repeat that question, Mr. Blackman, I lost it in this discussion?

BY MR. BLACKMAN:

Q Will you please comment on the non-commercial nature of the ore bodies that have been delineated on the maps here by Mr. Donegan and Mr. Van Sickle? First of all background, and as you are going into it tell us all the details.

A Well, I'll tell you what I know about this project and I have been at the inception, and where we finally went to our Board of Directors and requested permission to go ahead. If I may digress, Potash Company of America has been in the potash business since 1930 which gives us about 44 years experience in the mining, processing and marketing of potash. We don't say we are any bigger or any smarter than anybody else; each company has its own techniques, both

in mining and in processes, but we have been desirous of entering into the langbeinite business for many years, and we have watched the development of the various lands that became available in Carlsbad; and we have watched the world-growing shortage for the langbeinite material, and we have worked very closely with our sales department as to the marketability of langbeinite and in what tonnages could they sell initially and finally as the operation grew. So the desire to enter the langbeinite business is not the whim of the moment; it was the result of considerable research both in marketing and in mining and processing.

When the Hodges Trust area became available or became known to us that perhaps it could be obtained, we again redoubled our research in this matter. Our sales department assured us that they were most anxious to enter into the business just as rapidly as they could; that our customers were wanting to know why PCA was so large in the muriate business, but was not in the langbeinite. We explained to them that the only known-langbeinite reserves to date in the world were in the Carlsbad area, and we were investigating and when we found a block of land big enough to sustain a mining operation we would enter it. And, so after many months of negotiations between our legal department and the

Hodges people we entered into an agreement to explore the possibility of developing a langbeinite operation on the Hodges ground.

The question has come up time and time again as to the viability or the commercialability of the operation. PCA has not been known to be easy with the dollar; we are investing a considerable sum currently in a drilling operation to delineate the ore body as completely as we can; we are following the known geological and mining procedures with our drilling program. We have found some very encouraging results from the seven holes that we have now drilled in addition to the 75 that have already been on the property; some drilled by the Hodges people and others drilled by other people. We are awaiting the results from our seventh hole, still in the laboratory, and we are now drilling our eighth hole, and it our intention to continue drilling the entire property until our information of the outlines of the ore body is as complete as it is humanly possible. The indications of the holes that are on the property, and also those that we have drilled so far, is that we do have a commercial langbeinite ore body. We believe a good part of that is commercial; we have gone to our directors and they have authorized us to spend what monies are necessary once

we have finished our drilling program, to sink two shafts which would be necessary to develop the operation; to build a railroad to that location to transport that ore to our existing plant which would have to be enlarged and modified to treat the langbeinite ore. Therefore, I feel that with the authority given us by our directors we are well on the way to developing a third langbeinite operation in the United States.

The holes which we have drilled, which are on the maps, show langbeinite of excellent quality. Some holes are marginal; one of the few we have drilled, but we have enough indication now to encourage us to proceed with a drilling campaign as actively as possible. We would employ more drill rigs, if we could get them. We have hired Pennsylvania Drilling who has done most of the potash drilling in the basin, and we have urged them to bring another rig in, but those of you in the petroleum business realize the scarcity of rigs. We are very impatient to get ahead if this development and we are doing it as rapidly as possible in the belief that we have a viable langbeinite operation, and we hope to be the third producer of langbeinite in the entire world as soon as we can get our business going and as orderly a fashion as we can.

Is there anything else you need, Mr. Blackman?

Q Would the drilling of indiscriminate oil and gas holes throughout this area interfere with that orderly development, Mr. Rice?

A The answer, of course, is a very definite "yes." We have had to live with a number of oil and gas wells in our existing potash operation which pre-dated the potash mine, and they continue to present a continuous hazard; we leave valuable potash around it to protect the mine from any possible incursion of gas, oil, or water. I will recall to you, Mr. Blackman, that not very long ago we gave up 10 thousand acres of potash leases in Lea County that we have held for many a year, and have made a number of economic studies, and just a very short while ago decided because of the great number of wells existing in that property from our standards was no longer economical, and we surrendered those leases.

Q Do you have any figure on the amount or the value of the potash which was lost out there in second mining because of the presence of those oil wells?

MR. KELLAHIN: If the Commission please, I don't think it has any bearing on the question. We don't know how many wells there are to a section in that particular

area; we don't know any of the other facts. I don't think it has any bearing on this question.

MR. BLACKMAN: It is extremely important and very relevant to this case. The question as to what happens here when oil wells are drilled, I intend to ask Mr. Rice about the potash loss to second mining and the details of that, perhaps in reverse order as to what happens when an oil well is drilled, a substantial amount of potash is lost. Whether the Oil Conservation Commission -- let's put it this way: The Oil Conservation Commission has the obligation here of making a decision. We have two people who are on opposite sides of the fence, and it seems to me that you need all the information that you can possibly get with respect to that.

Now, here is an actual incidence in which a very large amount of money has been lost to the State of New Mexico by reason of the fact that the oil wells have been drilled through potash deposits, causing us to abandon the potash deposits. It seems to me that the details of that are pertinent.

MR. PORTER: Mr. Blackman, are you asking the question as to the value of the potash that has been lost as a result of the surrendering of the Lea County leases?

MR. BLACKMAN: It is not exactly that way, it is pretty close to that.

MR. PORTER: As I understand it you surrendered the leases.

MR. BLACKMAN: We didn't surrender the leases, no. Somebody else has the leases now, but we decided to pass them up, because we didn't think they were worth carrying anymore.

MR. PORTER: And that was because of the presence of oil and gas development on them?

MR. BLACKMAN: Yes. Well, I would rather ask Mr. Rice that question. In my opinion it is "yes", but --

MR. PORTER: (Interrupting) I thought you had.

MR. KELLAHIN: If the Commission please, my objection is simply this: We are talking about potash leases that have been turned to somebody else; they haven't been abandoned apparently, so the State hasn't lost anything yet. The question is predicated on his evaluation of ore reserves underlying an area remote from this, over in Lea County which hasn't been developed by the potash company, so we open up a whole new area, can we get the expert, Mr. Donegan, back on the witness stand to testify to the value of this ore too. We have no basis for this question, and

we think it is objectionable.

MR. PORTER: Objection sustained.

BY MR. BLACKMAN:

Q Mr. Rice, are you familiar with other -- you said you were familiar with other operations in the area, the potash area, are you familiar with the new operations in the potash area; what is going on down there with respect to new developments, besides this Potash Company of America development?

A As I mentioned earlier, Mr. Blackman, there has been a tremendous turnabout in the affairs of the potash industry in Carlsbad, where in a few years various experts predicted the demise of the Carlsbad-potash industry in face of Canadian competition because of their higher-grade ores, thicker deposits. The potash business in Carlsbad is in a remarkably good health, rather than dropping dead in the face of Canadian competition. The old existing operations are indeed very healthy, making a little money, and in addition to the operations of two companies, have announced entry into the Carlsbad area. Announced just 30 days ago in the Carlsbad papers and in technical journals, Mississippi Chemical has announced a possible investment of 50 million dollars into the rehabilitation,

the construction of a new refinery, a plant, and they have purchased lock,stock,and barrel the Teledyne Potash which was the old U. S. Borax, which was the old U. S. Potash. Mississippi Chemical is one of the large farm co-ops that we have in this country; they operate in the southeastern states with their headquarters in Yazoo, Mississippi. They are interested in the potash business as they, themselves, are users and very good customers of the Potash Company of America of up to 4 hundred thousand tons of potash a year. They have been having problems in meeting their demands and needs from their regular suppliers, including our company, and in order to insure a steady source of supply of one of their basic materials they will spend in the area of 50 million dollars, so they have announced, they are right now, in just a bear 30 days since acquiring the property, beginning the rehabilitation of the mine, and they have employed various consultants and experts to assist them in their venture.

A second announcement, which was only last week, in the Carlsbad current Argus, our local paper, Noranda of Canada, one of the great mining companies of the world, Canada's largest mining company, who also mines potash in the Province of Saskatchewan, Canada, has announced that they

have exercised their option to take up the leases in Lea County just east of National Potash, and towards Kerr-McGee. How much they will spend, and whether they will go into operation, I don't know, but they have exercised their option, they have bought up the leases from the present owners for an unknown sum of cash.

I should go back to Mississippi Chemical, in addition to the 50 million dollars that they have announced as a plant investment, it is our educated guess, although they have not announced, that they paid in the area of 20 to 22 million dollars for the old U. S. Potash properties.

I believe those are two companies that have announced entry into the potash business in addition to the six of us that are now operating.

Q Do you have any information about the operations of Day Mines or Permian Potash?

A Day Mines, I'm sorry it slipped my memory, to digress a little bit, Carlsbad, we had many, many, many dire predictions a few years ago as to the continued health of the community, not only of the industry, now we are concerned about the lack of housing, with the oil and gas, Becker Industries have moved in, Mississippi Chemical, Noranda, and Day Mines have announced.

KELLAHIN: If the Commission please, this is all very interesting, but I don't think it has anything to do with wnether there are commercial deposits of potash underlying the areas proposed to be brought into R-111-A. The Day Mines, I don't know where they are, certainly Teledyne and now Mississippi is a way north of here; it has nothing to do with what we are talking about, and I think in the interest of time we should stick to the subject.

MR. BLACKMAN: Gentlemen, I think that the general situation with respect to the potash industry is certainly pertinent. If we are going to have to go on the basis of what is brought forth in this Commission we should have a general picture.

MR. PORTER: Mr. Blackman?

MR. BLACKMAN: I would like to make an additional statement, if you please. I believe that the question of what is commercial, at any particular time --

MR. PORTER: (Interrupting) Mr. Blackman, I believe we are working in the dark.

(Whereupon, a discussion was held off the record.)

MR. PORTER: Go ahead.

MR. BLACKMAN: I think the question of whether

a particular ore deposit is commercial or not depends upon principally three things: economics, politics, and technology. I'm here to attempt to show something of the economic situation. I can show you something through this witness, again, about a political situation which has an effect on the potash industry, and Mr. Rice is familiar with the technology, and I believe this is what the basic question is, so I think that the economics of an area or something of this kind are quite important to the consideration. You just can't decide that "X" feet of "Y" percent is commercial; I don't think you can draw a positive line of that kind. You are in an area, you can say that something below this is probably not commercial at this time, and something above this certainly is; then you have a gray area.

MR. PORTER: The Commission will sustain Mr. Kellahin's objection. We recognize that changing conditions have stimulated interest in the area, but we have to get back to the question. This decision is going to have to be made on evidence concerning the particular area in question here as to whether or not additional acreage is to be included in R-111-A, so the objection is sustained.

BY MR. BLACKMAN:

Q I will then be able to, since I need to put in other evidence, what other people are able to do, since whether something is commerciel or not depends upon the available techniques -- what people can do -- not necessarily what we're doing; what other people can do is important. For instance, I'll ask Mr.Rice to refer to PCA Exhibit Number 18, and if he will note thereon and verify for me the fact that the highest ore grade noted in that period of time which is 18 months, is 10.03 percent, and the lowest is 7.71 percent. Would you verify that for me, Mr. Rice, from that Exhibit?

A Will you repeat that again, Mr. Blackman?

Q I asked you to refer to Exhibit 18 with respect to tonnage and grades mined by International Minerals during the 18-month period, and verify that the highest was 10.03, and the lowest was 7.71?

A That is correct.

Q Those, Mr. Rice, are average grades represented by that report, is that correct?

A That is correct.

Q Now referring to Mr. Donegan's testimony with respect to the exhibits on the board, particularly

Exhibit 16, the perimeter lines surrounding the colored areas on that map are cut-off lines, are they not, and not average grade lines?

A That is correct.

Q The proposed operation of PCA in this area you testified was principally valuable for its langbeinite deposit, are there also valuable deposits of sylvinite ore in that area?

A Yes, Mr. Blackman, we are very much interested in the sylvinite horizons, especially in the 10th ore zone that shows considerable thicknesses of sylvinite, some running in the area of 10 percent K_2O.

Q Mr. Rice, based on your study of this area, and the evidence Mr. Donegan and Mr. Van Sickle have put in this morning, do you consider that the cut-off points that were used by Mr. Donegan in the preparation of Exhibit Number 16 are reasonable?

A Very reasonable.

Q Are you familiar in general terms with the political situation in Saskatchewan, and in Ottawa as it affects the potash industry and as it might affect the potash industry in New Mexico?

A Yes, I am, Mr. Blackman, only in general terms

in what is available to the public media.

Q Will you just explain a little bit about what you know is going on there as of now?

A I'll try to keep it as briefly as possible, Mr. Blackman. A basis for considerable interest in the Carlsbad potash industry by Noranda and others, including companies operating in Carlsbad and in Canada is due to the very uncertain political situation now existing in the Saskatchewan Province as exhibited by the Saskatchewan Provincial Government.

MR. PORTER: Mr. Blackman, I don't believe the Commission would consider this testimony pertinent to a determination concerning this particular area.

MR. BLACKMAN: You are making a ruling to that effect?

MR. PORTER: Yes, sir.

MR. BLACKMAN: Then I will offer, as an offer of proof, if the Commission please, that the political situation in Canada is extremely important with respect to the potash situation in New Mexico, and in particular to this area as to what constitutes a commercial body of potash. The Federal government in Canada, and I propose to prove this by this witness, and hereby offer him as taking the

position that the Province of Saskatchewan does not have the authority to tax both potash and oil, as a matter of fact, on an income tax basis. The Saskatchewan government, on the other hand, has taken the position that they do, and they have also taken the position that both potash companies and oil companies up there are entitled only to a reasonable rate of return on their investment, and, therefore, the government will tax them the difference between what constitutes a reasonable rate of return and what they sell it for. The Federal government has taken the position that that tax which Saskatchewan has proposed will not be allowed as a deduction. Therefore, the potash companies in Canada will -- they are threatened with a tax of substantially more than 100 percent of the profits. The oil companies have published something that they estimated would be in the neighborhood of 130 percent of their profit. Now the obvious result of something of this kind is an increase of value to potash in New Mexico. The political situation is extremely important and I intend to argue in my closing that we should have, in the United States, control of our potash sources. We should control our fertilizer sources to the extent possible, and, therefore, the Commission should take into consideration the political situation in addition to the economics and that.

Now, that is the extent of my offer with respect to that particular thing.

BY MR. BLACKMAN:

Q Mr. Rice, do you know the approximate value of the total potash production up to approximately the present time, since the beginning of time in New Mexico?

A In the area of one and one-half billion dollars.

Q Do you have an estimate of what you feel we might expect as an -- I don't know if you do or not, but if you don't just say, "no" -- estimate of what the gross sales value on the present prices might be on potash contained in Exhibit 16, that might be mined within, let's say a period of 20 years?

A The figures we have worked up for a 20-year operation at the rate of production that we had estimated would bring in a gross return in the area of about 30 million dollars.

MR. PORTER: I would like to ask Mr. Rice a question. I think I missed the question. Now, you were testifying as to the expected value of potash in this particular area?

MR. RICE: Yes, sir.

MR. PORTER: Thirty million dollars?

MR. RICE: Thirty million dollars for a 20-year life.

MR. BLACKMAN: That's all I have.

MR. PORTER: Any questions of the witness? Mr. Kellahin?

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Rice, at the beginning of your testimony you testified as to some prices for muriate of potash and granular grades, and sulphate of potash, those are all refined products, are they not?

A Yes, that is correct.

Q It has nothing to do with what it cost to get them there?

A That is correct.

Q Are those spot prices, or contract prices, or what are they?

A Those are list prices, sir, as published in our list price.

Q Are those prices which your company sells potash for?

A Very close to that, sir.

Q How close?

A Oh, I would say if the list price for a product was in the area of $28, perhaps $25 would not be a bad figure.

Q You would be selling it at $25?

A Yes, sir.

Q Is that a spot sale?

A We sell very little potash on spot sales, we have to anticipate production over a year basis and some over long periods of time. So, if a customer calls up and says, "I need a carload of potash right away," and he is not a contract customer the chances are that he would not get a spot purchase; we do not have that kind of inventory on hand.

Q Your product then is sold on a long-term contract?

A On an annual contract, sir.

Q What are the prices on those contracts?

A That is proprietary information, I'm sorry Mr. Kellahin.

Q You are testifying as to the value of the potash, Mr. Rice, you are not willing to give us the information of what you are selling it for?

A No, sir, I'm not. I look in this room and I see some competitors here, and this information is of general

knowledge, sir, and the information that I have, I must apologize, has to remain proprietary.

MR. KELLAHIN: If the Commission please, I move that Mr. Rice's testimony as to the price of potash, and his testimony as to the value of the potash in this area be stricken from the record.

MR. BLACKMAN: Mr. Chairman, I think Mr. Rice answered the question when he said that if the price list showed $28, the $25 would be in the park as to the amount of realization that you could get.

MR. KELLAHIN: If the Commission pleases, he testified that is not what he is selling it for, though.

MR. BLACKMAN: He testified that was what he was getting.

MR. RICE: I said that if the price list stated $27, $25 would not be far from the figure that we sold it. Now, the selling of potash, as you well know, is a very complicated business. The quantity that you buy, the length of the contract, and so it varies from customer to customer depending upon the quantity that he purchases, or the time that he purchases it, so I cannot give you any one figure as a price for any single quality.

MR. KELLAHIN: Can you give us an average figure?

MR. RICE: I would say the $25 is not far.

MR. KELLAHIN: Not far, is it the average?

MR. RICE: It could well be, sir.

MR. PORTER: Incidentally, Mr. Kellahin, the Commission will deny your motion to strike the testimony.

BY MR. KELLAHIN:

Q Then the best price you could give us is $25?

A I would say that would be in the ball park, sir.

Q That is not necessarily what you are selling it for?

A Not necessarily so, it is a good average figure.

Q Now, you testified that the gross revenues in this area, in your estimation, will amount to 30 million dollars; what do you base that on?

A The existing core-hole information that we have, the rate of production that we might perhaps be contemplating, and again that would depend on market conditions and the existing price of potash, of langbeinite. Now, what it will be 10 years from now, five years, two years, or even next year, I have no knowledge, sir.

Q How much potash is there in this area?

A We are looking for about -- in the area of about 15 million ton initially.

Q What grade of potash?

A The best possible.

Q What I'm asking in connection with your 30-million-dollar figure, what grade did you use in making this estimate?

A I would say that about a 6 percent would be in the ball park. We would mine some lower than that, and we would certainly hope to mine some higher than that.

Q The amount of potash and grade are based solely on the core information which appears on these various exhibits that you have?

A That is all we have, sir.

Q That's all you have?

A Yes, sir.

Q You are still coring?

A We are still coring as rapidly as we can.

Q Now, you testified that your Board has authorized the sinking of two shafts, is that correct?

A If the drilling justifies the expenditure.

Q And, you don't know yet whether it will or not?

A No, sir, I don't.

Q Have you exercised your option on this property yet?

A We are exercising the option in steps.

Q A piece at a time?

A Yes, sir.

Q Have you exercised it on any portion of this property as yet?

A We are in the first part of our contract which is to drill 15 holes, and we are required to drill 15 holes, and if those warrant further capital expenditure we will proceed.

MR. PORTER: Fifteen holes in the area on Exhibit 16?

MR. RICE: That is correct, sir.

BY MR. KELLAHIN:

Q And if the 15 holes don't show proven reserves you won't exercise your option?

A No, sir.

Q Then it is your testimony, as of today?

A That is correct.

Q You don't know whether you have got commercial potash here or not?

A We have in a considerable area in which our first 8 holes along with the information of the 75 pre-existing holes, so there is a considerable delineated area that we do know commercial langbeinite does exist.

Q Do you consider that proven commercial ore?

A Yes, sir.

Q How many cores to a section?

A Right now we are spot moving along; we've got 8, I think within a 4-section area, and as you know the way these things are done, I'm not an exploration geologist who will step out in the areas where most favorable holes are and eventually cover most of that area.

Q Well, if this is a commercial ore body, are you prepared today to go ahead and sink a shaft and build your railroad?

A Absolutely.

Q But you haven't elected to do it yet?

A We haven't finished our drilling program, sir. If we knew exactly where the ore body was, and the exact quantities and position then we would be foolish to drill 40 or 50 more holes.

Q Well, let's talk about the 52 sections that are proposed to be included in this area. You don't know whether that overlays commercial deposits of potash throughout the entire area or not, do you?

A I'm pretty sure it does not cover the entire area, but there are many promising enclaves that we must

drill further to fully delineate the ore body, sir.

Q On your Exhibit 18 you were asked as to the highest and lowest percentage of ore shipped by IMC, and you gave the figures 10.3 percent and 7.71 percent, what is that figure?

A That is the K_2O or the potash content of their sylvinite ore.

Q In other words, a ton of ore would contain that percentage of potash?

A That is correct.

Q Now, in the mining operation itself, do you know what foot percent they were mining?

A No, the information I have does not provide the thickness of their ore body, but having visited their mine, I have not visited that area specifically, in general they are mining in a height of six to seven foot thickness.

Q But the foot percent would be a very determinative factor as to whether a deposit is commercial or not, would it not?

A Very definitely.

Q You don't have any figures?

A I don't have any for IMC, no, sir.

MR. KELLAHIN: Thank you, Mr. Rice, that is all

I have.

MR. PORTER: Any further questions, Mr. Blackman?

MR. BLACKMAN: Let Mr. Nutter ask the questions.

CROSS EXAMINATION

BY MR. NUTTER:

Q Mr. Rice, when you mentioned that you felt like you had mined 30 million tons in 20 years, what percent depletion would you have in this area at that point, do you have any idea?

A We have no idea, or I don't have any idea, sir.

Q I see.

MR. NUTTER: Thank you, that's all I have.

MR. PORTER: Mr. Blackman, I believe you had some more questions.

MR. BLACKMAN: I wanted to clarify that same thing.

REDIRECT EXAMINATION

BY MR. BLACKMAN:

Q As I understood it, perhaps I understood it wrong, you were talking about two-hundred-thousand tons per year of product out of this area, were you not?

A I am talking about product, yes, sir.

Q And two-hundred-thousand tons per year over a period of 20 years would amount to 4 million tons, wouldn't it?

A Of product?

Q Of product.

A Yes, sir.

Q And, the four million tons of product would be multiplied by a price of product using Mr. Elder's figure of 27 to 29, taking an average of 28 you would have four million tons times $28?

A That is correct.

Q It would be something over a hundred million dollars, rather than the 32 million dollars, as I believe you used?

A I used that figure erroneously, Mr. Blackman.

MR. PORTER: Any further questions? No further questions, the Witness may be excused. Do you have any more witnesses, Mr. Blackman?

MR. BLACKMAN: No, that's all I have, Mr. Porter, with the possible exception of something in rebuttal, but that's all.

MR. PORTER: Mr. Kellahin, are you ready to call your first witness?

MR. KELLAHIN: I would like to call Mr. Edmonson.

(Whereupon, the witness was sworn.)

(Whereupon, a short recess was taken.)

MR. PORTER: The Hearing will come to order, please. Mr. Edmonson was sworn as the first witness, I believe, but it develops that Mr. Blackman has not offered his exhibits, so at this time you may do so, Mr. Blackman.

MR. BLACKMAN: Mr. Chairman, at this point I would offer in evidence Exhibit 1 which is a lease map, put in two weeks ago; Exhibit 2 which is the R-111-A map, it shows the two secondary areas in the R-111-A map; Exhibit 3 which is the 1965 order of the Department of the Interior; Exhibit 4 which is the 1974 order of the Department of the Interior.

I might ask if Mr. Kellahin has any objection to those four exhibits.

MR. KELLAHIN: If the Commission please, I don't feel that either Exhibit 3 or 4 has any bearing on the Case before the Commission, and the Commission, of course, is already familiar with it, so we won't make an objection.

MR. PORTER: The Commission will admit Exhibits 1, 2, 3, and 4.

(Whereupon, Exhibits 1, 2, 3, and 4 were admitted into evidence.)

MR. BLACKMAN: Next I would offer Exhibit 5 which is the U. S. Geological Survey map. You have already ruled on that that you will not accept it; I will offer it again

so that you will again turn me down.

MR. PORTER: Yes, sir.

MR. BLACKMAN: I will offer at this time Exhibit 6 which is a cross section of a map on which several potash area holes which appears on the wall.

MR. PORTER: Yes, sir.

MR. BLACKMAN: Then I will offer again, Exhibit 7 which is a report on the 5th ore zone, and a map prepared by the U. S. Geological Survey which I introduced two weeks ago, offered two weeks ago, and was objected to; you ruled that it was not acceptable, and I don't have any hopes that you would change your ruling right at this minute. I will offer Exhibit 9 which was identified this morning as a gamma neutron log of the Skelly well. I have one which is Exhibit 8 which I will offer later as I have not identified it yet, but I will. Then I will offer Exhibits 11, 12, 13, 14, 15, and 16 which are the large maps appearing on the wall, prepared and identified by Mr. Donegan; and Exhibit 18 which is the Carlsbad basin tonnages and grades which was identified recently by Mr. Rice.

One exhibit, Exhibit Number 8 is a Permian Basin Potash deposit report which is another Geological Survey report prepared by Mr. Charles Jones, and I would anticipate you

would make the same ruling on that as you did with the other since Mr. Jones is not here. I did hand it around, I'll simply offer it in evidence and you will rule against it, and that will complete the record at that point.

MR. KELLAHIN: Was there an Exhibit 10?

MR. BLACKMAN: There is not an Exhibit 10.

MR. PORTER: I don't recall a 10.

MR. BLACKMAN: No, I had an Exhibit 10 that I decided not to put in. Thank you.

MR. PORTER: All right, Mr. Kellahin, do you have objections to any of these exhibits?

MR. KELLAHIN: Yes, we renew our objection to 5 and 7, and we would object to the most recent one, 8.

MR. PORTER: Any objection to the other exhibits?

MR. KELLAHIN: No.

MR. PORTER: From anyone? All of the exhibits will be accepted, 5,7 and 8 will be admitted.

(Whereupon, Exhibits 5, 7 and 8 were admitted into evidence.)

MR. PORTER: Mr. Kellahin, would you proceed with your witness?

MR. KELLAHIN: If the Commission please, we had prepared our testimony at the outset with Mr. Edmonson to

show the presence of a oil reservoir in the potash area which has been developed and is being developed by Skelly Oil Company. In view of the objections which I have made and the rulings that the Commission has made, perhaps you would prefer we confine our testimony to matters bearing on the presence of potash and nothing else, in which case we can modify our testimony at this point and confine it simply to potash.

MR. PORTER: I believe the Commission would direct you to place that limitation upon your testimony, Mr. Kellahin.

MR. KELLAHIN: Thank you.

JON T. EDMONSON

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A My name is Jon T. Edmonson.

Q By whom are you employed and what position, Mr. Edmonson?

A I'm a technical specialist for Skelly Oil Company.

Q Where are you located?

A Midland, Texas.

Q As a technical specialist what are your duties?

A My primary field of endeavor is geology, but I am utilized in other fields.

Q Have you ever testified before the Oil Conservation Commission or one of its examiners and made your qualifications as a geologist made a matter of record?

A I have.

Q In connection with the case presently before this Commission have you made a study of the area included within Order Number R-111-A?

A Yes, sir.

Q And all of the various extensions that have been made to that Order?

A Yes, sir.

Q Have you also made an investigation to determine the location of potash mines within that area?

A Yes, sir.

Q Now, referring to what has been marked as Skelly's Exhibit Number 2 which is the first exhibit to the right on the board, would you discuss that exhibit, please?

A Yes, sir. I'll read from a short paragraph here. (Reading) Exhibit Number 2 is a map depicting all of the enlargements of the original R-111-A boundary as shown by

Exhibit Number 2. Thousands of acres have been included in R-111-A by amendments B through H beginning in 1959, 15 years ago, and the vast majority of the acreage has not been mined at present. Some of it is even now around presently abandoned mines. (End of reading.)

Q How are those extensions shown on the exhibit?

A They are color coded, beginning in 1959 with B, down through H which I think is in around '70. They began in '59 here, which is purple; that was the B amendment. C was also in '59, shown here, also B, a little part of it is over here; D is the green; E is the brown; F, which was in '61, is an orange; G is here in '69; and H was in '70 here. The only two areas that have been adequately or even touched with a mine is this area here, that was D, the area in 1959, and an area up in this area here in 1960.

Q Now, your area G and H lies immediately north of the area proposed to be included in this Case, does it not?

A Yes, sir.

Q Has there been any mining there?

A No, sir.

Q Is there any anywhere near there?

A The closest mine is a Duval mine, say a mile to the north, a mile-and-a-half to the north of G.

Q Mr. Edmonson, was Exhibit Number 2 prepared by you or under your supervision?

A It was prepared under my supervision.

Q Is the information depicted on it derived from orders entered by the Oil Conservation Commission of New Mexico?

A Yes, sir, directly.

MR. KELLAHIN: At this time I would like to offer Exhibit Number 2.

MR. PORTER: Are there any objections to the admission of Exhibit Number 2?

MR. BLACKMAN: No objection.

MR. PORTER: We will admit it.

(Whereupon, Skelly's Exhibit Number 2 was admitted into evidence.

MR. KELLAHIN: That is all I have of this witness.

MR. PORTER: Any questions, Mr. Blackman?

MR. BLACKMAN: No questions.

MR. PORTER: The witness may be excused.

MR. KELLAHIN: I would like to call Mr. Warnock.

(Whereupon, the witness was sworn.)

GEORGE WARNOCK

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q Would you state your name, please?

A George Warnock.

Q What business are you engaged in, Mr. Warnock?

A I am a consulting geologist.

Q Where are you located?

A Albuquerque.

Q In connection with your work as a consulting geologist have you made an investigation of the potash areas generally?

A Yes, sir.

Q Have you testified in a previous case involving the area included within R-111-A?

A Yes, sir.

Q Have you ever testified before this Commission and made your qualifications a matter of record?

A Yes, sir.

Q In connection with the Case before the Commission have you made a study of the Hodges lease area proposed to

be included within R-111-A in this case?

A Yes, sir.

MR. KELLAHIN: Are the witness' qualifications acceptable?

MR. PORTER: Yes.

BY MR. KELLAHIN:

Q You have heard the testimony of the witnesses that has been offered by Mr. Hodges and the Potash Company of America; do you have any comments on their testimony or would you rather proceed to your exhibit first?

A Well, I think we will just proceed and we will see the differences as we go on.

Q Would you then refer to what has been marked as Skelly's Exhibit Number 3; define that exhibit and discuss the information shown on it? As you go along you might perhaps compare it to the information shown on the other exhibits.

A Fine. Exhibit Number 3 is an attempt at a polygonal-type blocking of existing commercial potash reserves in the Salt Lake area, the Leland Hodges Trust area, a blocking of a probable area under the technical definition of the problem, and then to know, you might want to before I started, to take testimony from

Mr. Donegan principally about the erratic or complex nature of the sulphate-type potash deposits, and in general I concur one hundred percent with that. The much more difficult problem than the northern sylvite areas is even starting with the interpretation of the logs. I will briefly take Mr. Donegan's base map and this map and with a brief look at the basic hole information which appear to be in agreement, so we are starting off on the same base and the whole debate or the rest of the debate is going to revolve around how far should these things be projected, and what is commercial ore under the R-111 definition.

Just a quick explanation on the two maps: Exhibit Number 3 purports to show, as I would block them, a probable ore reserve, not proven. The criteria that we have projected probable ore, 15 hundred feet from a data point, and just for the Commission's benefit I would compare that with the similar map they saw in the Kerr-McGee case where we projected sylvite ore, proven ore 15 hundred feet, and probable ore for 2 thousand feet. Here we would project proven ore a thousand feet and probable ore 15 hundred feet, and this is simply a rationalization that the langbeinite-type mineralization tends to be more erratic principally.

The numbers of the ore zones, the hole numbers are on

the map, generally to the upper right. The explanation should be relatively straightforward, the first number on all of these rows is the ore zone. Now another big difference with Mr. Donegan's presentation is that we tried to put it all on one map, all of the various zones from the 1st through the 10th that are mineralized in the area.

Any given hole, if you will take A-15 in the Section 5, for instance, it says the 3rd ore zone, 10th ore zone, 4th ore zone, moving left to right. As the explanation indicates, the first number is thickness, the 3.1 LA in this case is the percent K_2O as langbeinite; the 12.2 is the feet percent which is just the thickness times the percent K_2O as langbeinite; the 2.4 SY is the percent K_2O as sylvite; the 9.7 is the feet percent K_2O as sylvite; and the 16.2 E is the total foot percent equivalent measured in langbeinite, and particularly in the 4th ore zone, principally langbeinite.

Yes, the colors -- as I said, we made the attempt of putting these all on one piece of map. The purple represents intercepts in the 10th ore zone; the orange in the 4th ore zone; and the yellow in the 1st, 2nd, and 3rd ore zones. I should point out in the case where we also concentrated on the 4th ore zone, this contour map when we get to it is also on the 4th ore zone. As a result we have first plotted the

4th ore zone, and in many cases there are stacks, as is common in the district. You have to go to the number to know whether in this case, for instance, the second ore zone is underneath the 4th ore zone so that you didn't have a confusion of colors. Some of these -- this one here -- 89, for example, has what I am going to later argue is a modest intercept in the 4th ore zone, has also a good intercept in the 3rd ore zone and has a fair intercept in the 2nd ore zone. We could only color it one color so we chose to use the color pattern of the 4th ore zone, but the point that this isn't yellow doesn't mean there isn't a 2nd ore zone underneath it. The same thing in the case of purple for the 10th.

Q The fact that this 2nd ore zone is present is shown in the figures?

A That is correct.

We have put on here, the Secretary's oil-potash area which we are all familiar with. The heavy, solid dash, the R-111-A as a limited area, the slanted dash and the USGS KPA area, which I think are all on Mr. Donegan's map with the exception of the KPA area which is important to us because it very clearly elites certain areas in here.

Q What is KPA?

A Known potash area as defined by Mr. Van Sickle, 16 feet percent, langbeinite 40 percent, 3 percent sylvinite.

Q What does KPA mean, though?

A Known potash area.

Q What is the significance of it?

A That the USGS has determined that the foot percent cut-off which I just quoted, Mr. Van Sickle quote, exists inside of it and doesn't outside of it.

Q Does that have anything to do with the leasing operations?

A Yes, right. The known potash area, I have been told, was, is -- I heard testimony this morning that changes that -- was principally promulgated to make a decision on what lands, Federal lands, would have to go to competitive leasing and what lands could be administratively awarded to an applicant without bids. This question came up, as a matter of fact, at the debate last year on what the feet percent, economic feet percent cut-off in any part of the district should be. In several discussions and I can quote them, two which I can quote, representing what the USGS told me, that the KPA was not promulgated to show current commercial outlines, but just that area that contains enough potash where the government felt that the administrative

matter should go to bid rather than be awarded without bid. Now, Mr. Van Sickle testified this morning that by inference, that is the Secretary's new ruling which he read, says it must be currently commercial under today's technology and economics; and Mr. Van Sickle, I think, testified that the map which wasn't allowed is going to be the new KPA, and they are going to use the 16 feet percent as langbeinite and 40 foot percent cut-off as sylvinite. While I thought that was straightened out, we are now back onto that debate: What should the cut-off be in the known potash areas? And, it is the same debate obviously that we are going to have here, where should be the cut-off from an economic point of view? That is the significance of the KPA.

Q Will you continue with the exhibits then, please?

A Okay. I think we can just go through this basically fairly quickly, because I'm sure there will be lots of debate on it.

First of all, the explanation of "probable ores". Now, Mr. Donegan when asked what probable ore was, testified he was using as a general term and not in a technical sense; Mr. Van Sickle read us a definition of "indicated ore" which in the old terminology used to be "probable ore". The USGS uses "measured", "indicated", "inferred", some other people

use "proven", "probable", "possible" as analogous, so this is the indicated ore classification that Mr. Van Sickle was talking about. Therefore, it is projected 15 hundred feet from a data point, and not a thousand.

Now, the question of projected. Mr. Donegan testified that he is willing to project a half-a-mile radius or a four-mile diameter. In other words, this hole here in the middle would cover the whole section in essence, that is D-10 on 20 for the record.

I say, and testified before the Commission before to this effect, that the R-111 terminology says, "Commercial indicated reserves." Now, commercial indicated reserves are not a hypothetical outline that the USGS would put up which would put forward saying, "Yes," over the next 20 years as the economics change, this may be about the low side. These blockings are what one would take as mismanagement, with a recommendation to spend major amounts of money. You heard Mr. Rice, for instance, testify that the drilling in this area, this is the ore block they are drilling out, that they don't yet have enough data to call that proven and to now say to their management --

MR. KELLAHIN: (Interrupting) If the Commission pleases we would like to have the exhibits left up as we

are going to make reference to them.

(Whereupon, a discussion was held off the record.)

A (Continuing) First of all, I am the first one to admit that there are variances in this, there are variances in how far you can project the geological inference, as Mr. Donegan mentioned with regard to his map, but the real crux of this thing is that at what point you have enough data to go to your management and say, "I lay my reputation on the block; I recommend that you spend 40 to 50 million dollars for a complete new mine, new plant, whatever the case may be." I say, I advocate that you cannot go in with holes one mile apart, as these three roughly are, and say this is now ready for that decision, sign the check, and I am willing to submit that if Mr. Rice's geologist came to him and said, "This block here is now "X" tons of proven ore, give me the money," he would fire him. I am willing to suggest that.

In this area, based on what information we have, there is a good ore body starting to develop, and it is too bad for Skelly, but that is the way it is. Now, incidentally on the details of this blocking, we had just this 8.38 to the known hole since this polygonal system of blocking has

included the PCA holes which I do not have the data on, but on the basis of all of these other holes that were in here good, there is a pretty good bet that the fill-in drilling would hold up, and I wanted to be prepared to calculate it any way they came with their data, and it is not the least bit surprising to me that Mr. Rice testified that the drilling did, I think he said with one exception, held up, and this now is drilled down to about one thousand to 15 hundred foot centers, as you can see, and can take the category of proven ore. They have a small proven ore body here and they will keep drilling and stepping out from it and trying to enlarge it as he testified.

Now, the problem is: what about these areas? Here is a hole a mile-and-a-half apart. We saw later testimony that the USGS was projecting from three data points a mile-and-a-half apart, and that is just at a mile-and-a-half apart.

For measured ore, the technical definition is that is proven ore that you would recommend your management spend their money on. Now, there are no holes in between there, 7 thousand feet langbeinite, erratic minerals, there is just no way of knowing whether this thing will hold up or not. I think Mr. Rice made the statement that it was all drilled out, and they were firm about it, they wouldn't drill anymore

holes, why would they if they were ready to recommend to make a management decision. This must be drilled to see what is there, and I was shocked to hear today that the USGS has used a mile-and-a-half between data points in the langbeinite area. It is sufficient for measured ore with a technical deposition, but if they were working for most mining companies they would be fired.

Now, okay, there is the debate on how far you can project from a hole, how many holes do you need per section, and so forth? Now, we have put on these maps, we didn't color them because we didn't want to confuse them with all the other colors, the open mines, openings of IMC and Duval. I believe I heard testimony from someone this morning that Duval was mining out an area with very little data, okay, very little data relatively speaking. You see the density of drilling here, we put every hole that we had on it; I don't have the data on it, of course, so they are just locations, but there are up to 12 holes per section here in places. Specifically in Duval's case they are starting out here in an area that they don't particularly have a lot of holes, not this density, but, look, there are 1, 2, 3, 4 holes within a radius of 2640. I beg your pardon, just the radius from each of those holes is about 12 hundred feet, is it not?

I'm sorry, I'm not supposed to ask questions. The point is, with their experience underground that thousand to 12 hundred foot projection out from a given hole is probably valid, after they started on the tighter drilling and found out what their problems were. Now, this roughly follows the 12 hundred foot radius is what we are working with here, we are working with a 15 hundred foot for probable, and one thousand foot proven. I havn't tried to show exactly what is proven, but again to just stay with one category of ore. Now, the other thing is: How many holes and so forth to block proven and probable ore under the set definition. These things out here which I have circled and used the same color on because they are lone holes would not really be probable ore, but we want to show them as well mineralized holes, that is mineralized to some degree. Incidentally, I should have said that everything that is colored has an economic intercept in one zone or another. The white holes that are not colored, in our opinion, do not have an economic intercept in any zone. So anyway, these are colored to show that they're contained in an economic intercept in one or more mineral zones, the 4th in this case, it's orange. The point is, you really wouldn't call it probable ore with only one hole to go on; if you had two or three in here, such as

something like this, you can then start to form a block out of it. Now, these are the IMC holes, incidentally, out here to the east and there has been made a record in front of the Commission. I don't have the logs on them, they go strictly on the -- well, I beg your pardon, we do have the logs on the ones that have the details, we don't on the ones that just have the langbeinite feet percent. We put them on principally for use on this map, and now we are going to get over to geological inference. Now on, let me summarize this map by simply saying that on a calculation where I have to go to management, W. R. Grace, if you like, and say, "Now, my people have drilled this, it looks like this now, the orange areas where there are two or more holes, I could call probable ore." If I came in and told them that this area here was ready to be mined in the 10th, I would be fired also, in my opinion. A hard, economic, commercial ore that I can calculate for this area is indicated on the map. Now, it comes out into the area under discussion, it covers about two sections of it, roughly, and we will get to the trend map with fill-in drilling, it will probably be expanded because we've got good holes roughly all the way around it, so you can expect that they are going to have a nice little ore body there in the 4th ore zone. But, right now, that

exactly is what you could calculate as probable commercial ore reserves in this area. There is another small block here. Mr. Donegan mentioned this area, they have got a problem, they have a high hole, they filled in four holes around it and everyone of them were very low. The best you can give it is the one hole, in my opinion, is the one-hole designation as you see it there, and it is disconnected, it will probably never me mined as it too small an area to get at, depending on whether they should develop some more over in here somewhere or not.

One other point, in preparing the red areas over there, to these areas here, more specifically to this area, this map is a comparison of these, and not this one. This is a restricted-formal-ore-reserve-calculation-type development for what is now commercial, that you could make a recommendation to make a major investment on. In any case, in evaluating the hole we have used the straight polygonal system, cut the distance in half between the holes, and so forth, we went into some detail of how it works. That then results in equal weight in terms of spacing to a negative hole, unmineralized hole, as it gives to a positive hole. And this unmineralized hole in here, A-28, cuts the distance in between exactly in half. I think you will see on some of

these maps over here that this particular low hole, A-28, has just a little bit of an area right around it, and he makes the potential in between. We don't have so much of an argument here when we get over in to this map, but certainly for an oil reserve calculation, I think any engineer in the room would agree, you have to cut the difference between the holes for a formal ore reserve calculation. Well we go back and forth between the two, let me move to --

Q (Interrupting) Go right ahead, sir, with Exhibit Number 4.

A Exhibit 4 is the same base, and we left on it the ore reserves calculations on it, so the contours you see here are simply added to this one. This is the foot-percent-contour method used to try to determine geological trends to the mineralization. In other words, we are no longer restricted by geometric guidelines; we can just go so far, the geometric guidelines being guided by economics as we know them, of course.

Now, the foot-percent method, I think, there is no doubt that the method is accepted. Well, briefly what this is, you can see it is a contour of the feet percent on the 4th ore zone only; we have not tried to confuse the map by contouring every zone, we have indicated, in the purple,

the mineralized areas on the 10th ore zone, and over here, one here, one here, and they agree essentially with Mr. Donegan's except for how far you project them.

Generalized trends in the one, two and three, all put together as yellow, and when putting them together they make quite a body running along, cut out to the west, the yellow dashes in this case. They are not contours, they are just generalized areas covering mineralized holes.

Okay, now, I have already had some comments about the geometrical method of projecting foot percent versus just saying, based on the fact that we know the ore, the big ore zone is trending north, and northwest, which is quite true, and I basically agree with it. Therefore, it is going to generally run down through here. I agree with that also, with the exception in this case, we have enough holes out in here, roughly one per section, with a few exceptions. This one, and this one in here is a problem just for a lack of data. We know this thing is already fragmenting and breaking up, and Mr. Donegan pointed out the salt horses are occurring here as they occur throughout the district, very true, I agree with it. Anyway may interpretation of this area, as you know, has been cut out by erosion all across the bottom, was one of Mr. Donegan's previous exhibits

that showed that. This then is the lower termination of this mineralization, apart from the fact that it definitely goes over here, and we know there is some in the Permian-Potash grounds, so essentially what you have, in my opinion, is a termination, a fingering or an ending out of the potash contents of these salt beds chemically to some degree on the south along with some eroded holes. Okay, so the geological inference that this is a continuation of the big, northwest trending zone that all the potash mines are in, and while true, also it is, I think most people would agree, the termination of it, it is where it is running out.

So, the idea to say, "Well, it is coming through, and we will ignore the bad hole or put a very low area of influence on them." It is just not valid, it would be more valid up in the center of the mineralized zone as opposed to down here. Now, anyway to just quickly review this, these are just contours on the foot percent equivalent, both langbeinite and sylvite in these holes. I don't think there is too much to be said about it, this is the way it looks, plus 30 feet percent we have contoured in the brown, plus 40 in the light green, plus 50 in the blue, plus 60 in the pink, and so forth up in the very high foot percent hole of IMC over on the far east.

interpretation of the geological trend to the mineralization in this area.

Now, what's "ore", what is "commercial"? Mr. Kellahin has tried to draw this out of the other witnesses, there is the usual continuing problem here that the data is basically propriatary, everybody recognizes that, there is no doubt about it. There is some general information available by heresay among the industry, there is some general of these average figures that the U. S. Bureau of Mines puts out. They take the whole area, average them so that any given mine cannot be identified and then publish it. So, this then is really the source of the information, it is complicated in the case of langbeinite, because as Mr. Rice pointed out in his testimony, these people have a unique situation there and they are very guarded with the information as to operating costs caused by the erratic nature of the langbeinite,grades, variances along headings and so forth. This data is not available, at least it is not available to me, so we have, again, as we did previously, attempted a pro forma type calculation, we used the published-average-operating costs, I increased them modestly I think about 10 percent, 15 percent, to take in the fact that it is langbeinite, I increased them 7 percent over last year in terms of inflation, it came out

of an operating cost, pro forma, obviously estimated operating costs for langbeinite deposits down in this area. We then, of course, with that data and assuming again a four-foot thickness, not a 4.5 necessary for the bigger continuous miners, assuming a 4 percent thickness we could calculate what we think is a cut-off value in terms of feet percent if we, of course, start with the product price. This is again what Mr. Rice testified about this morning. Mr. Elders testified two weeks ago, and until sometime late last year it was fairly steady in the 1850 range for standard grades. I took this in preparation of these maps, I took this and accelerated it 20 percent to 2230, I think it was. This is in recognition that I have no firm data; this is in recognition of the fact, as Mr. Rice testified that the potash industry along with the gas industry and so forth are generally on better days these days than it was a year ago, and it is an accepted fact, I have contacted potash consumers that they are paying higher prices for lists. Some of them are living on long-term contracts, but the contracts will run out, some of them are two-year contracts, some one-year, some, rarely, five-year contracts. They are going to run out and the price trend is up; I don't have specifics, but I wouldn't argue with the contention

that the price trend is obviously up. Now, using the 2230-average-product price for langbeinite, I came out to approximately a 25 foot percent cut-off. As a comparison Mr. Rice testified that in the case of sylvite they are running about a 25 dollar average. We weren't quite successful in knowing the average of what exactly, but the sylvite increased over the 22, the 2074, 21 of the same price period, then is roughly about 25 or 30 percent, so this tells me that I am at least in the ball park, if conceivably a hair low. Maybe if PCA made this calculation they would calculate out to 22, 23, 24, in this range.

Now this map is contoured on the 30, but keep in mind that it is not an ore reserve map, it is a geological trend map. What this says is: We can expect high grade, higher grade plus 30, plus 40, plus 50 in this area, but in this area, this area, some in here, some in here, and a bit out here. A plus 30, it was put one way that if I were forced to -- one way to put it is: If you are going in here to drill you obviously drill in the brighter colors, in this case if you would drill the pink in preference to the blue, in preference to the green, in preference to the brown. So this then would be my interpretation by inference where one might expect that future ore reserves might be developed over

in here, and certainly in here, and, of course, PCA meanwhile is drilling that area. We don't have the PCA data so this is contoured on the data we had prior to PCA's drilling, and what that tells the geologist is: "Yes, I want to drill it in here." That is where they drilled and they testified that they got -- that they tightened up the ores -- probably moved it to the proven category over in an area something like that. Okay, now, using the same concept, there is some hope for a smaller ore body down here and in the 40-foot-percent range. Now, prior to those four holes this would have looked like a good area to drill, the obvious place to go in there and try to fill it out, and in this case, as can happen in this business, they were just unlucky, the ore wasn't there. Here, brown only, it only gets up to, well, this is 41 foot percent, there is a touch of the green there, it is above 40, I notice, but it happens that the 30, plus 30 zone where one can argue that after he has tried all of these and developed what ore there is, he might take a high-risk-drilling program down in here. That is my interpretation, of course. I am so far talking only about the 4th ore zone. Incidentally, I should say I told you how I arrived at my 25-foot percent for the langbeinite cut-off; I used a 60-feet percent sylvite cut-off,

which is a 2.4 ratio between the two then, and I used it on the basis of there is testimony before the Commission that Kermac uses 53 for ore reserves, I calculated 70 using pro forma average data. Again, prices are increasing, I think that 60, which percent is probably a pretty valid cut-off. Of course, it is interesting to note that on Mr. Donegan's maps that what he has colored red, and what I haven't colored at all here are the same foot-percent criteria, 30-foot percent, I think he said 32, and langbeinite at 60-foot percent of sylvite. He then goes ahead and has the yellow areas which he says is intermediate grade I think, going down the USGS cut-offs, and I am saying that based on the pro forma type calculations, the USGS calculations,cut-offs at 16 and 40 as commercial,mineable ore is unfounded. That is the argument we have going here today apparently, so you can draw a comparison between what's colored here and what's colored red on Mr. Donegan's maps.

The fact that the color here is much more restricted again is the fact that we have not painted with quite as broad of a brush, we have contoured again using a standard contour method between various holes, and, for instance, the 20 must fall, the 30 must fall in here just on a calculation between the two holes. As opposed to saying, well, based on

geological knowledge, A-28 should not take the same weight as A-18 and A-17 because of good trends and so forth. We have done it mathematically in that sense by simply contouring between them, and, of course, where there is a value in the lower-grade holes that value has been used to set the contours as opposed to assuming there is nothing there.

We might just make mention, you see that there are white, what we call probable ore except that you can't have probable ore with one hole outside of the colored area. This, then, are the holes that have less than 30, but more than 25 percent feet.

Q What hole is that, Mr. Warnock?

A This one I'm looking at is A-3 which I have 28.8, there is langbeinite in it in the 4th ore zone. The same thing here, D-4, I get out to 27.4 equivalent. Incidentally that is the basis for information that Mr. Elder gave us two weeks ago; I do not have that log, but it comes out 27.4, so it's above the 25 at the circle around it on this map, but it is outside the 30. That question, of course, being where exactly will this foot percent cut-off fall?

I think I roughly summarized other than I would be willing here to add again, we're talking about langbeinite, just the calculation of the balance of the mineral break out

is difficult to start with. There are variances between log calculations between people. It is known to be more erratic. Any mathematical or geological inference is on shakier ground than with pure sylvite, I feel, but this is what the data would look like properly calculated, in my opinion. There is a good ore body up here in Sections 11, 3, probably going to extend into 10, we don't know that yet, though, 11 may extend, it probably will extend into 12. This area has an ore body in the 4th ore zone, and it has multiple zones as indicated here; some small hope down in here, lesser hope in this area, and to my opinion, that is the only material hope for the district.

I shouldn't, but I glossed over the 10th ore zone over here in Section 13, 8, 17, 18 and 30 and 13, 29. The purple outline is, to my mind, is a fairly marginal area mineralized in the 10th ore zone. Again this is not an attempt to contour foot percent, I'm just outlining four holes, each a mile apart, or a little more or a little less, that do contain mineralization. I'm not sure how serious this 10th ore zone is here; every hole we have is fairly marginal, again using my calculations, cutting off sylvite , this is fewer sylvite, at 60, this is 61, this is 69; cutting off langbeinite at 25 or 30. This is 31, essentially this is 32.

Certainly there is no way to block anything in the way of proven ore among those holes; they are too far apart, whether you would drill in there for the 10th ore zone, I have very serious doubts on that data, but, you know, these things are continuing projects; five years from now it could look different.

Q Mr. Warnock, based on the information that is presently available, in your opinion is the entire area that is sought to be included in R-111-A underlayed by commercial deposits of potash?

A You said the whole area?

Q Yes, sir, the whole area?

A No, sir, even on the composite map of Mr. Donegan there are blank areas not purported to have commercial reserves on them, and there a lot of them on my map.

Q Yes. On the basis of your interpretation you referred to possible ore, or probable ore in Sections 11, 3, 10 and 12 in the north area?

A Assuming that the PCA holes are good, as they say they are, most of this would now be in a proven category, in my opinion.

Q Would you call those proven commercial ore deposits?

A Yes, sir.

Q Do you find proven commercial ore deposits elsewhere on your exhibit?

A Proven?

Q Yes, sir.

A Here is some, these three IMC holes.

Q I'm talking about within the --

A (Interrupting) Within the area?

Q Yes, sir.

A Proven, no.

Q Nowhere else?

A No proven as opposed to probable. Probable, you have a good development of a quarter of a section of probable here, and this is a trend developing here in the probable, and I think you could say these holes here are -- they are stretching the 15-hundred-foot radius a bit.

Q Would you give the sections you are talking about, please?

A Sections 26, 7 and 35. There is certainly still a lot of hope of developed ore there.

Q That would be probable?

A Probable class ore now, and hope to develop it, yes, based on this contour here, as I mentioned, an area that will no doubt be eventually drilled for potash.

Q Now, on the basis of your experience and your study of this area, is it valid to project geological trends over an area as wide as this as has been done on the Exhibit 16 that has been offered by Potash Companies of America?

A Well, keep in mind that that is a composite of all of the zones.

Q Yes, sir.

A To compare them you have to compare the purple areas and the yellow areas to get a closer comparison. The area running up in here, for instance, is a low-grade area which does include, which runs up to about here, in my opinion, comes right on up as you see it here about like that, so speaking exactly to answer your question: no. I think that there are areas of red on Mr. Donegan's map that don't justify the red color, if that is your question.

Q Yes, sir.

A That is the obvious debate we have going here today. This is a pretty typical one, this is in part a lack of data, but on the other hand drilling around the area with a few exceptions is quite low grade, so you can understand that they didn't drill in there. Of course, the same problem over here, Mr. Donegan has this low here so we are basically in agreement there. I did run the low up through

here because that is where it plots, based on the data I have, and Mr. Donegan has closed that up there, just a difference of opinion obviously.

Q Were Exhibits 3 and 4 prepared by you or under your direction?

A Yes, sir.

MR. KELLAHIN: At this time I would like to offer into evidence Exhibits 3 and 4.

MR. PORTER: Any objection?

MR. BLACKMAN: No objection.

MR. PORTER: No objection to Commission Exhibits, Exhibits 3 and 4 will be admitted.

(Whereupon, Commission Exhibits 3 and 4 were admitted into evidence.)

MR. KELLAHIN: That is all we have on direct examination.

CROSS EXAMINATION

BY MR. BLACKMAN:

Q Mr. Warnock, you testified to essentially two different areas here which you denominated proven commercial ore, and probable commercial ore, would you say that the indiscriminate drilling of oil and gas holes within either one of those areas would interfere with the orderly develop-

ment of those commercial potash areas?

A Any --

Q (Interrupting) I said indiscriminate drilling within those areas.

A Which areas?

Q Well, within the proven areas?

A The proven areas to start with --

MR. KELLAHIN: If the Commission pleases, I would like a definition of what "indiscriminate drilling" is. That's a drilling that I don't understand.

MR. BLACKMAN: Well, drilling without regard to the location of the potash majors. In other words, drilling solely upon the criteria of the most advantageous drilling location for oil and gas possibilities. In other words, without regard to whether there is any potash, that is what I mean by indiscriminate drilling.

BY MR. BLACKMAN:

Q Would you feel --

A (Interrupting) Yes, I would say the petroleum well would obviously cut the potash section.

Q Right.

A Now, the degree in monetary or otherwise of the damage done thereby, I don't feel like I am competent to say.

Q How about in the probable potash area, do you think that such drilling would interfere with the orderly development of the probable areas that you have testified to as a probable into proven areas, by your definition?

A I don't believe that I have testified that the drilling of petroleum wells would interfere in the commercial.

Q No, I'm not asking you that. You testified that on your probable areas, if I understood you correctly--correct me if I didn't--but in the probable areas that more drilling shows good possibilities of developing into what you class as a proven area?

A That is correct. Fill-in drilling in the case of proven ore, yes.

Q Right. Now, what I am asking you is: If oil and gas wells are drilled in that area without regard to the possibilities of potash, without any consideration to it, just using oil and gas locations, an oil and gas criteria, would that interfere with the orderly commercial development of that?

A Well, again I want to ask you --

MR. KELLAHIN: (Interrupting) If the Commission pleases, this is improper cross examination. The Witness didn't cover the question of the effect of oil drilling in

a potash area, and at the outset of this Hearing today it was my understanding we were restricted on cross examination to matters raised on direct examination.

MR. BLACKMAN: I think the Witness has sufficiently indicated that he feels it would so I will withdraw the question.

A (Continuing) The distinction of interfering, it would intercept or cut potash reserves, yes.

Q Yes, it would.

A How much the interference is, it's a --

Q Now, just to make sure that it is perfectly clear here, your Exhibit Number --

A (Interrupting) Three on the left, four on the right.

Q Four?

A Yes, sir.

Q Our contour is on the 4th ore zone?

A Correct.

Q Would the contours on the 10th ore zone be shown in purple?

A They are not contours.

Q Okay.

A They are not foot percent contours, they are

general outlines showing where the area is mineralized.

MR. BLACKMAN: That's all.

MR. PORTER: Does anyone else have a question of Mr. Warnock? You may be excused.

Mr. Kellahin, do you have anymore witnesses?

MR. KELLAHIN: No, we don't, Mr. Porter.

MR. PORTER: Does anyone else desire to present testimony in the Case? Don Allen? Mr. Allen, we will call on all those present in a moment for statements.

Mr. Blackman, would you like to go ahead with your closing statement, and then I would like Mr. Kellahin to proceed.

MR. BLACKMAN: I would like to call Mr. Rice back for just a few question.

MR. PORTER: Oh, you have some additional testimony?

MR. BLACKMAN: A few questions on rebuttal.

MR. PORTER: All right.

MR. BLACKMAN: Mr. Rice, will you take the stand again?

DAVID RICE

called as a witness, having been previously sworn, was examined and testified as follows:

BY MR. BLACKMAN:

Q Mr. Rice, you have been sworn before and I wanted to ask you to testify concerning the possibilities of mining more than one ore zone through one shaft. Would you explain how that is done and how it would affect, in your opinion, with respect to this particular series of ore bodies or just this ore body in this territory?

A The mining of multiple seams, or veins, or beds through one shaft is a well-known fact, Mr. Blackman, it is certainly possible, it has been done; International Minerals and Chemicals, I believe, does it in the Carlsbad area. What does it do to the economic picture? Certainly if you have more than one bed and they are all economic, certainly it answers the economic picture.

MR. BLACKMAN: I think that's all.

MR. PORTER: Any questions, Mr. Kellahin?

MR. KELLAHIN: No questions.

MR. PORTER: The witness may be excused. Thank you. At this time we will ask for closing statements.

We will take a very short recess, maybe ten minutes.

(Whereupon, a short recess was taken.)

MR. PORTER: The Hearing will come to order, please. Who would like to go first? Do you want that

privilege, Mr. Blackman?

MR. BLACKMAN: Do you suppose Mr. Kellahin would consider going first this time?

MR. PORTER: I think he would.

MR. KELLAHIN: If the Commission please, I do want to be as brief as possible. At the outset I entered an appearance for Skelly Oil Company, Phillips Petroleum Company, Belco Petroleum Corporation, Sun Oil Company, and today I entered an appearance for William A. and Edward R. Hudson all of whom have interest in these area proposed to be included in the R-111-A Order.

Now, we have been wrangling somewhat really over what we are trying to prove here, and as I pointed out when I objected to the original testimony offered by Mr. Blackman, what we are really here for is to determine the area which contains commercial deposits of potash, that's what the Statute says. It says: The drilling and producing operations of oil and gas in an area containing commercial deposits of potash where such operations would have the affect of unduly reducing the total quantity of such commercial deposits.

All the way through we are talking about commercial deposits. I think it is highly significant that in the presentation that has been made on behalf of the proponent

of this Case. Nobody has testified that here are commercial deposits of potash. They painted the whole area red and said, "Well, we think maybe there are commercial deposits of potash here; hands off until we can drill it out and find out." They're talking about 50-some-odd sections of land here when the evidence offered, and I think Skelly was quite kind in offering this evidence. The evidence offered by Mr. Warnock shows there is probable ore in a small portion of this area, and that being the case that is really all the Commission can consider. There is nothing else, nothing has been offered in the way of projection of ore bodies, nothing in the way of analyzing the commercial deposits in any particular area here except by Mr. Warnock, and nobody else, and under those circumstances we don't feel that the Commission anything, anything at all, on which they can make a determination that there are possible, probable, or proven commercial deposits of potash underlying these 50 sections. The only evidence, as I said, was that offered by Mr. Warnock, and certainly we would have to concede there is probable ore in the little portion which is shown on his Exhibits 3 and 4.

Under those circumstances we feel that the application should be denied. Just as an example, the broad-brush

approach that has been followed by these potash people. We have to remember that Mesa got the permit to drill on Sections 13 and 23, 29 right in the middle of their red area. Now, if they're correct, Mesa shouldn't be drilling there, but the owner of the potash lease apparently had no objection, and the well is presently drilling.

The Commission's duty is, I think, quite clear, and if it follows the Statute and its Order R-111-A then it will consider only the area which Mr. Warnock has shown to be possibly productive of potash. Certainly they should have the right to continue their checking of that area and see if it is productive. Now, as to the balance of the tract, they haven't made any core holes and they have included in the area, areas where core holes are more than a mile apart and which show they are not productive of potash, apparently, as Mr. Warnock testified. They have attempted to project interpretations of a mile and a mile-and-a-half in order to say that this area is possibly productive of potash, and that is not a valid projection as Mr. Warnock testified. If the Commission includes more than the small area in the northern portion of the proposed area, I feel they would have an order that is not supported by the evidence and we recommend that the application of the potash companies and

the lease owners be denied.

MR. BLACKMAN: Mr. Chairman and gentlemen, the law, it seems to me, provides that no drilling should be conducted which would interfere with the orderly commercial development of potash deposits, and I would like here to state that we have presented, in this Case, the best type of information that is available. There is a difference of opinion on geological projections between Mr. Donegan and Mr. Warnock, and Mr. Rice is in contravention to what Mr. Kellahin was saying and did testify that in his opinion the cut-offs as stated by Mr. Donegan were valid cut-offs, and the testimony is, without objection in many places here, that the cut-off point utilized by Mr. Donegan constitutes commercial potash.

Nobody can stand up here and state that in any certain area commercial potash exists and in any other area it doesn't. We're dealing in inferences and the question is: How far are you going to follow your inference? I think the Commission has been dealing with this particular problem long enough that it has made up its mind about what rules is is going to follow in dealing with those inferences. It is perfectly clear from Mr. Warnock's testimony that all of the areas that even he introduced has probable potash areas,

would be interfering with, as far as their commercial development is concerned, by -- the words I used was "indiscriminate oil and gas drilling" -- that may not be the best words that could be found in there, but it points up the problem of the difficulty in which the Commission faces in a situation of this kind. Here we have, and this ore body and the one immediately to the east, the only known langbeinite deposits in the, the testimony is the world, I don't know of any others, but the testimony is the world. This is it. The enormous drilling activity in the salt sections, which is where these things occur, and nobody else has brought up anything, so we are dealing with something that is a wasting asset, and it is the only one that is left. The basis of that which I think the Commission should take into consideration is not the short view, but the long view, because we have the possibility here of developing a very substantial addition to the potash industry, and I call your attention to Mr. Rice's testimony which kind of shocked me when I looked it up to verify it that over a billion-and-a-half dollars in potash has been produced from this area since the early 30's. It is absolutely fantastic in comparison with other mining areas. It is an enormous addition to New Mexico's economy when it is considered in

comparison with just almost any industry. There has been a good deal of time in which the potash industry has been barely able to keep its nose above water, and all of the money that has come in has gone out in terms of wages and expenses for salaries and utilities and supplies, so that an enormous amount of this money has gone into New Mexico's economy.

I don't downgrade the oil and gas proposition at all; we stand on the same basis. Some party has an oil and gas lease and another party has a potash lease; the government has caused this difficulty; whether it is the Federal government or the State government, they are both guilty, and they both say, "Here is a lease and you take out the potash, and the other fellow, you take out the oil and gas, and the devil take the hindmost." That is about the way it is, because somebody is going to get hurt; there isn't any way out of it, and this Commission is in a position of being the body that is going to have to make the decision.

Now, one of the things that kind of disturbs me about the general trend, and the general view of this thing, from the point of view of the oil and gas industry, is that if this ore body, this area is placed within our 111-A there won't be any further drilling, that ends it. When that is

not the case at all. There have been many, many wells drilled in R-111, and to my personal knowledge a large number of them in the area we haven't objected to. Out to the east, as you well know, Mr. Porter, this has been the situation. This is disturbing to me because it seems to me that there should not be that misunderstanding about the effect of R-111; it doesn't say you can't drill in the area, it just simply says: If you have a lease in this area you have to give the potash lessee notice so he can protest and then you have an arbitration meeting and if you can't get it settled you have a hearing. I think to require a potash lessee to first prove commercial ore before being entitled to notice places an extremely unfair burden upon the potash industry. In other words, I don't have any quarrel with the proposition that when you want to have a hearing and controversy about whether or not you should drill that particular well, that there is no argument about the fact that the Statute provides that you have to have commercial ore to protect. That is what it is saying, it says it in so many words that you have to prove commercial ore or prove an interference with the development. What I am saying is: That in the situation in which we find ourselves, with our R-111-A not providing, we are not arguing whether you can drill any wells

out there or not. What I think we are talking about is whether indiscriminate drilling will be permitted, because if you are going to drill on the sole criteria of what is best indicated, most indicated, most favorably indicated for oil and gas without regard to any of the testimony which has been presented on both sides here as to the substantial potash deposits that exist in this area, you are placing a very uncomfortable burden, and unfair and an inequitable burden on the potash lessee, because he doesn't get any notice of it, he doesn't get any opportunity to do it. In addition to that, you are placing an unreasonable restraint on the Oil Conservation Commission itself. We have introduced substantial testimony and Mr. Warnock has stated it himself that this is a constantly changing proposition. What is commercial today might not be commercial tomorrow, or vice versa, what is not commercial today might be commercial tomorrow; it depends upon economics, technology, and politics.

We are now looking at a difficult situation in which these things are happening so fast that it just isn't even funny. Mr. Warnock didn't agree that he should take up the langbeinite prices, up to 28 dollars on the average, but Mr. Rice's testimony was, based on his experience, it could

all be sold at that price if you could get it now. We have a worldwide food shortage and a fertilizer shortage that is substantial in this country. This is costly, these increases in prices. It looks like we are going to be the bread basket, at least in part of the world, and we need the fertilizer, particularly we need the potash, particularly we need potassium sulphate. These things should be considered by the Commission at the same time.

Technology is another one that brings it down here. I don't believe that the averages that are utilized by, reported by the Bureau of Mines are the figures that should be considered in here. You should consider the best evidence of the best technology that is available.. International has been in here to testify in one of their Phillip's cases, and I don't have that evidence to put in here, but I think the Commission might well take judicial notice of it as to the low grades they are able to handle in the mixed ore. If it is expected that anybody, whether it is PCA, or Day Mines, or anybody else, or Noranda, or anybody decides to open a new project around here, they will do just what everybody else has done as far as new operators coming in, they will take advantage of the very best technology that is available and they will beat the blazes out of the old

fellows because they always do. They take advantage of everybody's mistakes.

I think the very best evidence was stated by Mr. Rice with respect to this political situation. The one that comes along from Canada is Noranda coming into this country to get a position when they have an enormous position in Canada. I may be repeating here a little bit, but I say that I think that the Oil Conservation Commission should change it rules, if necessary, to provide that some form of notification is given to a potash lessee if the potash lessee has a lease within an area which has, let's say, good commercial possibilities because if wells are just drilled in the area,they are obviously going to intersect potash majors and losses are going to occur. This can result in the difference between a commercial ore body and a non-commercial ore body. It can be rendered non-commercial by drilling within it. I don't think that where the Oil Conservation Commission makes a decision granting the right to drill it should be on the best possible information that is available at that time. That is to say, let's suppose here that the Oil Conservation Commission makes an order here eliminating a substantial portion of this ore body which has been requested by Mr. Warnock, and six months

down the road, or a year down the road somebody applies for permission to drill, that is routinely approved, and if in the meantime, the economic situation or the political situation or the technology situation has changed, and we haven't had time to come in and re-apply on the basis of new evidence, a substantial amount of very valuable mineral is going to be lost, and it seems to me the Oil Conservation Commission here is in a position of representing the State. They are representing the people of the State, not the potash companies, and not the oil companies; you sit in judgment on the economy of the State, and a viable addition to the potash industry would be a tremendous asset as far as the State of New Mexico is concerned. As you well know, the OCC doesn't have the facilities to keep up with this, you don't have the staff to do it, and don't have the budget if you could hire any additional staff, so you are dependent upon today the best information that is available today and six months from now in this particular case you probably won't have any better information than you have today, even though it may change. I think that that is the situation which, and I appreciate your rules are different in this case, but I think they should be changed.

Let's look at this for a moment: Does a notice to a

potash lessee constitute a burden on an oil and gas lessee? Well, an oil and gas lessee can say in justification that this means that we have to take time out for notice; this means we have to take time out for a hearing before the Commission if the potash lessee objects. I don't feel in today's market and today's economy that the mere fact that holding a hearing or giving notice is a burden which ought to be recognized as being unconscionable; I don't think it is unconscionable at all; I don't think it is unreasonable. I don't think it is unreasonable at all to ask them to give notice, and give notice in all cases where a potash lessee has a lease. In all cases where a potash lessee does have a lease, he has paid, he has drilled a hole, or if it has gone on a known-potash area and somebody else has drilled a hole, a lot of work has gone into the thing before he ever gets a lease. It is valuable property and the delay, a little bit of delay on the part of the oil and gas lessee, is the only burden I can think of that is involved in the thing, because for everything else they can come before the OCC and ask to have it changed to fit the particular situation.

Mr. Kellahin made an allusion to the Mesa Petroleum hole which was permitted. I don't think that was in the evidence anywhere along the line, but it was in there that it

was permitted. I beg your pardon, Mr. Kellahin, it was in there that it was permitted. This happened to be a compromise proposition, and I prefer to think about it as in evidence on our behalf as we weren't trying to be dogs in the manger. The situation with respect to that was this, Mr. Kellahin, that Mesa on the basis of their initial, original location, felt that they might have severe difficulties in proving it since it was coming up for a tested location. We have previously indicated that we would be willing to compromise the matter, and the matter was compromised on the basis of the hole, I think about probably a half or three-quarters-of-a-mile to the south, I am not exactly positive of that, but that is the basis upon which it was. Now, had we not compromised there, had we not been willing to take a chance on losing some potash in the bargain, in the 10th ore zone because it is mineralized there. They might well have lost their lease because it was running up on the first of August and there was not time to advertise a new unconventional location.

I have said that I don't think that it constitutes an unreasonable burden on the oil and gas industry to give notice, and I feel that is true, but I also in addition to the possibilities of just simple misunderstanding on the part of the oil and gas industry, I can understand why they may feel

that in some instances, I don't know of any instances, it may have constituted an unconsionable burden, and I say at this point that that should not be. It should not be utilized in such a fashion that it would be a burden on the oil and gas industry; it wasn't intended in the first instance for that and it should not be solely intended now, and we don't so intend it to work out that way. If it is working out that way, in any way working out in that area, I think it would be in order, very much in order; we haven't had any meetings on this proposition since, we could go clear back to 1965 with our R-111-A -- 1955 -- I meant to say 1955. It goes clear back there and there haven't been any changes in the rules; it might be in order. We certainly stand ready to get together with the oil and gas industry and try and work it out. It think it is really encumbent on the Commission to try and work out this dilemma because I feel very strongly that the denial of notice under these circumstances, and I was over this in detail before, does constitute a denial of due process of law. I mean, we are, in the event a well location is approved without a hearing, and if we would like to have a hearing, we got no notice of it, so there is no doubt in my mind that it is a denial of due process of law. Now, what can we do about it? Well, it

is pretty difficult to figure out how to get any recompense if that sort of thing has happened to you, and I think the only answer to it is to give notice, and if necessary, change the rules of the Commission around to the point where you can assure that nobody is going to be unreasonably disadvantaged.

I believe that I would like to have the Commission give very careful consideration to the proposition of changing its rules to, in some fashion, give notice to the potash lessee, because if you do, you will transfer from the Commission to the oil and gas lessee the obligation to give some kind of a notice because I think the Commission under due process of law probably has that obligation before it makes a decision. But it will also transfer from the Commission to the potash lessee the burden of proving evidence, or the burden of proving the existence of potash at that time, because it may be quite difficult and down the road a little bit. Both the potash lessee and the oil and gas lessee will have due process of law under that sort of circumstance, and the Commission will have absolved itself from any possibility of their conduct having been arbitrary or capricious.

As you know, the Geological Survey doesn't have any

provisions for making any of these hearings, and over a period of years it has been customary to hold them before the OCC, and I can see no reason for not doing that. I do think that the Commission ought to give very careful consideration to that part of it. I realize that we have here an excellent possibility for a very good potash mine which could be substantially injured if we don't get any notice. Thank you.

MR. PORTER: Anyone else have a comment to make on the Hearing?

MR. EATON: Mr. Chairman, members of the Commission, Paul Eaton. I would like to read a statement prepared by Exxon Corporation. I have furnished the Commission with copies of the statement. I might say before reading the statement that Exxon would have been an active participant in this Hearing, but for some strange reason because of the Company bureaucracy they were totally unaware of this application for the extension of the potash area until sometime last week.

(Reading) The Applicant has requested that the presently designated potash area be extended to include additional lands in Eddy County, New Mexico. Since December, 1964 Exxon Corporation has acquired and presently holds approximately six thousand acres of Federal and New Mexico State oil and gas

leases, half of which lie within the area of the proposed potash extension. As of this date, Exxon has expended in access of five hundred thousand dollars in the acquisition and evaluation of said leases and considers them a valuable and irreplaceable assest and plans to proceed with the development of said leases toward the ultimate production of oil and gas or both.

Exxon opposes the granting of said application and in support of such opposition, we respectfully ask the Commission to consider the following: Exxon considers the area included within its referenced oil and gas leases to be geologically attractive and potentially productive. In order to fully develop the area, including the operations, it requires the area be considered as an entirety with freedom to explore, drill and conduct lease operations at geographical locations calculated to produce the more accurate geological data and hopefully the greatest amounts of oil and gas. This cannot be done on a piecemeal basis. Granting of the application will have a substantial impact on Exxon's ability to study and develop the area in a manner most likely to obtain oil and gas production.

Most of Exxon's leases were taken prior to the date of the application and were bought and paid for in good faith

with the belief that the rights therein acquired could be fully exercised. The granting of the application could result in material loss of these rights and even in a complete denial of the drilling operations could be prohibited.

In either event, the attractiveness of the area insofar as potential productiveness is concerned, will be greatly diminished by the granting of the application by the reason Exxon will not be able to know where in the area it can plan to drill or even if it could drill. Exxon submits such is not in keeping with the terms and considerations of the lease contracts. If the area is not properly studied and developed, both the State of New Mexico and the United States could be deprived of valuable royalty income. In addition, it is possible that valuable and much-needed oil and gas reserves could be left in the ground undiscovered or un-produced.

Exxon is willing to cooperate with both State and Federal agencies in developing its leases in such a manner that the owners of the potash rights are not deprived of their right to produce their minerals and submit the rights of all parties may be preserved without the granting of subject application. This is in keeping with the principals of multiple use. Accordingly Exxon submits that the proposed

potash extension is unnecessary and constitutes a deprivation of its rights and would arbitrarily grant one mineral owner superior rights over another. Therefore, Exxon respectfully submits that the application be denied. (End of reading.)

Mr. Chairman, a couple of remarks which I would like to make, aside from this statement. As I understand it the Commission by Statute has the power to determine the limits of any areas containing commercial potash deposits and from time to time re-determines such limits. Also, the Commission has the power by Statute to regulate and where necessary prohibit drilling or producing operations for oil or gas within any area containing commercial deposits of potash where such operations would have the effect to unduly reduce the total quantity of such commercial deposits of potash which may reasonably be recovered in commercial quantities or where such operations would interfere unduly with the orderly commercial development of such potash deposits.

It appears to me that with respect to setting the limits of the area containing commercial potash deposits, the Commission must set those limits on the basis of satisfactory evidence of the existence of commercial deposits and in the future as subsequent developments are either brought to the attention of the Commission by potash companies or by oil

companies through logs and its drilling activities would suggest the existence of commercial potash deposits elsewhere, then the Commission must re-define the limits of the potash area. Certainly here, observing this hearing, it appears to me that the applicant has not established that the entire proposed-extended area does contain commercial potash deposits. I think there is evidence that certain portions of the proposed area contain commercial deposits, and I should think that the Commission, as it is required to do, would have to extend the potash area to include those portions, and as the future goes by perhaps continue to re-define and extend the boundaries of the potash area to include possibly much of the area colored in red on the Applicant's Exhibits and shown in white on the Protestant's Exhibit 3. With respect to the"notice"argument made by Mr. Blackman, he asked what can the potash companies do. It appears to me that certainly they can receive notice of all applications filed before this Commission for unorthodox locations; they can receive notice of all notices of intention to drill either by maybe requesting the Commission to send them copies of those notices or by monitoring the OCC records or the records in the OCC's office in Artesia. What I am saying is that if the potash companies are interested in receiving notice of future drilling activities it is within their power

to get that notice and if they feel that a proposed well outside of a potash area will drill through commercial deposits, at that time they can institute a proceeding before this Commission to oppose the drilling of that well. In any event, I do feel that the potash companies do have the means available to them of being notified of all potential drilling within and outside of the present existing potash area. Thank you.

MR. PORTER: Mr. Allen, did you have a statement?

MR. ALLEN: Mr. Chairman, you have in your hand a statement of Mr. Peter Hanagan of the New Mexico Oil and Gas Association; he couldn't be here this afternoon. My name is Don Allen and I am Associate Executive Director of the New Mexico Oil and Gas Association. I would like to just read the brief statement you have before you, plus a couple of other points, Mr. Chairman.

(Reading) The New Mexico Oil and Gas Association respectfully requests the Commission to scrutinize this application with great care, and to ascertain if it does in fact warrant extension of the potash area, and in view of the need to balance the competing interest of the potash and the oil and gas industries the petition should not be granted where it is clearly shown that the coexisting rights of both industries are fairly protected. This showing would include

proven propositions that there are indeed commercial deposits in all of the requested areas. After all, the oil and gas operators have made large investments on the leases in the area with the expectation of being allowed to develop them concurrently in harmony with potash operations. (End of reading.)

Mr. Chairman, I would like to stress that point because most of these large investments I just referred to were made in good faith and were made outside the then existing areas with boundaries as they existed at that time. This is a very important point. There exists a natural need to explore for and develop all the various natural resources, not just potash, but also this Commission knows that that oil and gas today are furnishing somewhere in the neighborhood of 78 percent of the total energy of this country and there is certainly a need to develop and explore all possible new supplies in existence as far as what we know about. In a word, potash exploration and development should not be afforded preferential treatment so as to amount to in effect dis-enfranchising the oil and gas industry.

There is one closing note, Mr. Chairman, that is not in the written statement here, but I might just pass along the suggestion that we did receive, and in view of Mr. Blackman's

comments that how very easy it is to obtain permits from the officer-type of leaseholder, I might just pass on one suggestion and that is that if the designation of the area is to be made that perhaps the Commission should consider designating it an oil and gas area.

MR. PORTER: Does anyone else have a statement to make? Mr. Kendrick?

MR. KENDRICK: H. L. Kendrick of El Paso Natural Gas Company. El Paso Natural Gas Company opposes the extenion of the potash-oil areas as asked for in this application and recommends that the extension as asked for be denied.

MR. PORTER: Mr. Carr, I believe, has some comments he would like to have read.

MR. CARR: Mr. Chairman, we have received letters in opposition to the extension of the potash-oil area from Bass Enterprises Production Company and Perry R. Bass, from Phillips Petroleum and from Belco Petroleum Corporation.

MR. PORTER: Does anyone else have a statement? If there are no further statements the Commission will take the Case under advisement and the Hearing is adjourned.

(Whereupon the Hearing was adjourned at 4:35 P.M.)

STATE OF NEW MEXICO)
) SS.
COUNTY OF SANTA FE)

I, RICHARD L. NYE, Court Reporter, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me, and the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

RICHARD L. NYE, Court Reporter

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