Case No. 5193

Application, Transcripts, Small Exhibits, Etc.

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

April 2, 1974

Re: CASE NO. 5193
ORDER NO. R-4759
Applicant:
BELCO PETROLEUM CORP.

Mr. James Bullabin
Attorneys at Law
Post Office Box 1769
Santa Fe, New Mexico

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Copy of order also sent to:

Hobbs OCC X
Artesia OCC
Aztec OCC

Other Mr. John Robb, Mr. Joe Peacock, Phillips Petroleum, Odessa,
Mr. C. E. Childers, International Minerals

WILLIAM A. SLOAN
JACKSON B. AKIN
JOHN D. ROBB
CHARLES B. LARRABEE
JAMES C. RITCHIE
JOHN P. EASTHAM
WILLIAM C. SCHAAB
WILLIAM C. BRIGGS
RAY H. RODEY
ROBERT D. TAICHERT
ROBERT M. ST. JOHN
JOSEPH J. MULLINS
LUANNE C. GILKEY
MARK B. ADAMS
DUNCAN L. SCARBOROUGH
PETER B. RINNA
BRUCE D. HALL

JOHN P. SALAZAR
WILLIAM B. GIXON
JOHN P. BURTON
REX D. THROCKMORTON
ROBERTO CORREA RAMO
JONATHAN W. NEWCB
JAY R. GENTRY ORTIZ
GENE C. WALTON

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.
COUNSELLORS AND ATTORNEYS AT LAW
FIRST NATIONAL BANK BUILDING-WEST
WEST CENTRAL AVENUE AT THIRD
P. O. BOX 1888
ALBUQUERQUE, NEW MEXICO 87103

OF COUNSEL
DON L. DICKASON

PEARCE C. RODEY
1868-1956

TELEPHONE 243-1301
AREA CODE 505

April 8, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter, Jr., Secretary

File

Dear Mr. Porter:

Re: Case No. 5193 - Belco-Kerr-McGee

You are requested to return to Kerr-McGee at your earliest convenience the thirteen core hole logs which were turned over to Belco by Kerr-McGee under the compulsion of the subpoena issued by the Commission. We previously advised George Warnock, Consulting Engineer to Belco, that these logs contained privileged information; that he was not to reproduce or use information therefrom for any purpose other than the hearing before the Commission, and that they were to be returned to us as soon as the hearing was completed. Instead, Mr. Warnock turned these logs over to Mr. Kellahin, attorney for Belco who had advised him that the logs should be filed with the Commission.

These logs are not a part of the record and therefore we request that they be returned to us.

Sincerely yours,

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.

By: John D. Robb
John D. Robb

JDR/sa

Called Jason Kellahin 9:30 am 4/9/74 He advises that the logs have already been sent to Kerr-McGee in Carlsbad & a copy of the cover letter sent to John Robb
JDR

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 5193
Order No. R-4759

APPLICATION OF BELCO PETROLEUM
CORPORATION FOR A DRILLING PERMIT
IN THE POTASH-OIL AREA, LEA COUNTY,
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on March 15, 1974, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission".

NOW, on this 2nd day of April, 1974, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Belco Petroleum Corporation, seeks authority to drill its proposed Bass-Federal Well No. 2 to test the Pennsylvanian formation at an unorthodox location 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake-Morrow Gas Pool, Lea County, New Mexico, said location being within the boundaries of the Potash-Oil Area as defined by Commission Order R-111-A, and having been objected to by the owner of potash leases in the Area. This unorthodox location was previously approved by the Commission by Order No. R-4699.

(3) That the entire S/2 of said Section 30 may reasonably be presumed to be productive of gas from the Morrow formation.

(4) That a well drilled at the proposed location would not be in sufficient proximity to commercial deposits of potash to impose a hazard to the mining of such deposits.

(5) That approval of the application is necessary to prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That Celco Petroleum Corporation is hereby authorized to drill its proposed Bass-Federal Well No. 2 in the Potash Oil Area at an unorthodox location 660 feet from the South line and 1980 feet from the East line of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake-Morrow Gas Pool, Lea County, New Mexico.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

I. R. TRUJILLO, Chairman

ALEX J. ARMIJO, Member

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

S E A L

jr/

Kerr-McGee

EX's - Computer out

Case 5193

heard March 15 & 16

1974

OIL CONSERVATION COMMISSION
OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF BELCO PETROLEUM COMPANY FOR A DRILLING PERMIT IN THE POTASH AREA, SECTION 30, TOWNSHIP 20 SOUTH, RANGE 33 EAST, LEA COUNTY, NEW MEXICO

Case No. _____

STATEMENT BY KERR-McGEE CORPORATION

HISTORY

(a) Kerr-McGee and Other Operations

Kerr-McGee Corporation is one of the major potash operators in the Carlsbad Potash Basin with a capital investment in mining and milling plant and equipment exceeding $35,000,000. It employs approximately four hundred employees in this operation. Its annual payroll has increased from 2 2 million dollars in 1966 to approximately 5 million dollars in 1973. Kerr-McGee and its predecessors have conducted exploration, development and mining in the Carlsbad Potash Basin starting in 1952. Large scale mining and milling operations have been continuously conducted there by Kerr-McGee and its predecessors since 1965.

Major potash mining has been conducted in the Basin since 1932 and has continued to the present time. The Basin is the only major source of potash in the United States. For many years it has been well known that subsidence has been a normal and inevitable result of the only economically feasible mining method in the district.

(b) New Mexico and Federal Restrictions on Drilling

Oil and gas drilling in this area have either been prevented or restricted since 1939 when the Secretary of the Interior reserved the potash deposits from oil and gas leasing. In 1951 the Secretary enlarged the potash area but permitted oil and gas leasing where it would not result in undue waste of or hazard to the potash.

In the same year this Commission issued its Order R-111 which permitted oil and gas operations under certain conditions. This order has been amended a number of times. On May 11, 1965, the Secretary of the Interior issued an order further enlarging the potash area and permitting potash and oil and gas operations where no waste of or hazard to mineral deposits existed. Furthermore, the United States Geological Service (USGS) has established, outlined and maintained an area where potash is known to exist which has been aptly described as the "known potash area".

(c) Events Leading Up To Present Controversy

In 1973, following increasing controversies between potash and oil and gas operators, the New Mexico Oil and Gas Association applied to the Secretary of the Interior for modification of his 1965 order. In August 1973 both Kerr-McGee and the other potash companies responded separately to this application by submitting memoranda to the Secretary, copies of which are also attached to this statement as Exhibits I and II respectively.

In its presentation Kerr-McGee took the position that potash mining should be accorded a priority because:

1. There is risk both of losing large quantities of valuable potash and of recurring hazards to the men and the mining operation if oil and gas drilling should precede mining operations, whereas there is no such danger to the oil and gas deposits if potash mining should precede oil and gas drilling operations.

2. The relatively small area involved contains the major source of potash in the United States and is thus of enormous importance to the nation as well as to the potash industry.

3. Within this area the economic values of the potash, and of large stable mining and milling payrolls, coupled with the huge investment in mining and milling plants, outweigh the potential for oil and gas in this area.

In supporting these contentions, Kerr-McGee stated in Exhibit I:

> "The risk of losing large quantities of valuable potash and the potential hazards to mine employees and mining operations from prior oil and gas drilling result primarily from subsidence of overlying beds above areas where potash has been extracted. Subsidence is a well known occurrence in the Carlsbad mining area. Stresses result from subsidence, posing a serious threat of damaging or collapsing well casings and releasing hydrocarbons into adjacent potash beds and into active mine workings. The consequent hazards to miners working in such areas would be great. Apart from possible death or injuries to miners, it would not be economically feasible to convert potash mining equipment to operate under gaseous conditions. In order to avoid the risk of subsidence, it would be necessary to leave large pillars of unmined ore around oil and gas wells to provide support. The diameter of such a pillar in the eastern portion of Kerr-McGee's reserves is estimated at approximately 4,000 feet or a large portion of an entire section of land. The amount of ore left in such a pillar would vary between 3 and 6 million tons, depending upon whether or not first mining could be economically conducted. This is equal to approximately one to two years of Kerr-McGee's present annual production. The economics might well prevent keeping access available to these pillars after other mining operations in the area had ceased thus making it likely that a large portion of the ore in these pillars would be lost forever.

"There is no corresponding risk involved to the oil and gas deposits, if any, should potash exploration, development and mining operations precede oil and gas operations. Oil and gas operations would simply be deferred until potash operations have been completed in the particular area. Experience has shown that all but insignificant amounts of subsidence occur within five years after the termination of mining operations.

"The economics of potash versus oil and gas in this limited area finds the balance weighted heavily in favor of potash. The potash industry is a stable and important one. Large scale potash operations have been conducted in the Carlsbad Basin since the early 1930's. . .

"The Bureau of Business Research of the University of New Mexico has compiled data on the economics of the potash industry, attached to this memorandum as Appendix A. This shows that for 1970 (the last year for which official statistics are available) the potash industry accounted for approximately 2,600 jobs and generated an annual payroll of about $21,000,000. The Bureau applied its own income and employment multipliers to produce a real value of approximately $32,000,000 annually, or approximately 28.6% of the total earnings and 34.6% of the entire employment in Eddy County, New Mexico for that year.

"Further, the employment provided by the mining of such an ore pillar, if not required to support an oil or gas well casing, would amount to approximately 95,000 man days as compared to the employment provided by the drilling of a deep oil or gas well of approximately 6,000 man days, a ratio of approximately sixteen to one in favor of potash payrolls. Employment afforded by oil and gas operations tends to be confined to the exploration and development stages over a relatively short time. Producing wells in a field can be serviced by relatively few employees.

"Likewise the retail value of the potash product in the pillar of ore necessary to support an oil or gas well casing amounts to approximately $15,000,000, (assuming first mining can be conducted).

"The investment in plant and equipment by the major potash companies in the Carlsbad mining area is conservatively estimated to exceed $200,000,000, of which $35,000,000 is represented by the capital investment of Kerr-McGee alone. The major portion of the capital investment by the oil and gas operators in or directly relating to the Secretarial Order area is the aggregate amount paid to acquire their leases. Moreover these oil and gas leases were acquired with knowledge by the lessees of existing potash deposits and of the conditions in the leases limiting the rights to drill for oil and gas in the event of conflict with potash deposits.

"The foregoing payrolls, valuable potash deposits and capital investment all could be seriously jeopardized were oil and gas drilling permitted in this area without restrictions suggested below."

The Secretary of the Interior has just issued a decision in this matter which will prohibit drilling through potash reserves except under extraordinary circumstances, a copy is attached hereto.

STATEMENT OF POSITION AND CONTENTIONS

Position

Kerr-McGee's position is that the application of Belco should be denied; that drilling at its proposed location would result in undue waste of commercial potash deposits, unduly reduce the total quantity of such deposits which may reasonably be recovered in commercial quantities, would constitute a hazard to other Kerr-McGee deposits and its mines and would seriously interfere with

the commercial development of ore deposits; further that these effects are wholly unnecessary in that Belco could drill directionally under the deposits from adjacent locations at modest increase in cost.

Statutes

Section 65-3-5 of the 1953 N.M.S.A. gives the Commission jurisdiction and authority over all matters relating to "the prevention of waste of potash as the result of oil or gas operations in this state". Sections 65-3-3F and 65-3-11(17) provide that drilling or producing operations for oil and gas in areas containing commercial deposits of potash constitute waste and are to be regulated or if necessary prohibited by this Commission where the effect of such operations would "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". This Commission's Order No. R-111-A is designed to implement the provisions of these governing New Mexico Statutes..

Contentions

1. Belco Proposal Constitutes Undue Waste of Commercial Potash Deposits and Undue Reduction Thereof

(a) Commercial Ore Deposits

The location proposed to be drilled contains commercial deposits of potash ore. It is within the "known potash area" designated by the USGS. Furthermore, it is an integral part of the potash ore body which Kerr-McGee is presently mining. Although Kerr-McGee's operations are presently several miles away it is advancing to this area. The ore deposit which it is presently mining together with the ore in the vicinity of the proposed Belco drill site constitutes approximately 80 per cent of Kerr-McGee's overall potash reserves in the Carlsbad Potash Basin.

Kerr-McGee estimates that there is probably ore of 6.48 feet in thickness with a grade of 14.7 per cent. This is within the range of ore grades now being mined by Kerr-McGee.

If the proposed well is drilled, Kerr-McGee could do no second mining of any kind within a 4,200 foot diameter circle of the drill site and no mining of any kind within 150 feet. Indeed, it might not even be economic to conduct first mining at all. This enormous pillar, comprising the better part of an entire section, contains enough ore to sustain Kerr-McGee's entire mining operation for a period of one to two years. This ore would have to be left in place and wasted in order to prevent subsidence with the consequent risk of escape of methane gas from the well into the potash formation. The waste involved involves a total of approximately 472,000 final product potash tons at the posted price of $33.89 a ton or a total

retail value in excess of $15,000,000. These dangers of subsidence are real. They are analyzed and described in the report of John Boyd, an extremely well qualified mining engineer whose findings and report are attached as Exhibit H to the potash companies' report (Exhibit II) attached hereto and also Exhibits B, C, D, E, F and G (Exhibit II).

In addition, this potash pillar would have to left because escaping methane gas might impregnate not only the portion of the ore deposits immediately surrounding the well but also adjacent portions of the ore body located within Kerr-McGee's present federal leases. Such impregnation would also impose a serious hazard of explosion and fire to the men working in Kerr-McGee's mine (see John Boyd report, supra).

(b) Loss and Reduction of Ore Deposits Are Unnecessary

Directional drilling could be undertaken by Belco from adjacent sites. For example, its Bass federal #1 site is approximately 3,800 feet away. Directional drilling is feasible up to at least 5,000 feet. The additional costs of directional drilling in this vicinity are approximately 22% according to the studies and experience of Mr. Roy Williamson of Sipes, Williamson, Runyan and Aycock, Consulting Engineers (who have testified frequently before this Commission).

These studies are Appendix C to Exhibit I attached hereto. On a deep well costing approximately $750,000 this adds only

$165,000 to the expense. This is less than 1-1/2% of the $15,000,000 worth of potash ore which would be preserved by directional drilling. Thus the damage and destruction of the ore deposit contemplated by Belco's application is wholly unnecessary.

2. Belco Application Would Unduly Interfere With the Orderly Development of Potash Deposits

The proposed Belco drill site is less than a mile from Kerr-McGee's existing federal potash leases. Kerr-McGee presently has no lease on the area covered by the drill site. However, it has an orderly plan for development of its existing lease areas and for that portion of its ore body beyond the limits of its present leases to the northeast including the area in question. Kerr-McGee has filed a proposed five year mining plan with this Commission showing that it anticipates being within approximately a mile and a half of the proposed drill site within that period of time. Kerr-McGee holds the only federal potash leases in this immediate vicinity and the proposed Belco location is a logical and natural extension of its present lease. Kerr-McGee expects in the normal course of its operations to apply for federal leases on this area. Because of its existing operations in the area, Kerr-McGee would appear to be the only company which could economically develop and mine the ore. Complete mining of this area of course would require some arrangement with Teledyne which owns a small state potash lease.

Assuming we obtain the federal lease, it is Kerr-McGee's present intention and plan to mine this area within ten years. Thus Belco's proposed location would not only unduly interfere with the orderly development of the potash deposits in this vicinity; it would obliterate them.

Respectfully submitted,

KERR-McGEE CORPORATION

By John O. Cobb
Attorney

STATEMENT OF TELEDYNE POTASH COMPANY

Teledyne Potash Company holds a State of New Mexico mining lease which includes all of Sec. 36, all of Sec. 32, the north half of the north half of Sec. 31, the southeast quarter of the northeast quarter of Sec. 31 and the west half of the east half of Sec. 30 in Township 20, South Range 33 East, Lea County, New Mexico.

Jim Walls, General Manager of Teledyne has authorized John D. Robb, Jr., attorney, to advise the New Mexico Oil Conservation Commission that Teledyne is opposed to any intrusion of or any well location that would penetrate a commercially valuable potash deposit and particularly to the intrusion of its above leased area including the present Belco application to drill a gas well in Sec. 30 immediately adjoining its holdings.

Teledyne has granted Kerr-McGee a sub-lease to mine other potash properties in this area; and it is willing to enter into negotiations with Kerr-McGee for a sub-lease to mine potash under the above state leases.

Dated this 14th day of March, 1974.

TELEDYNE POTASH COMPANY

KERR-McGEE CORPORATION

KERR McGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 73102

August 7, 1973

JAMES A. KELLY
PRESIDENT

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exh. No. I
Submitted by Kerr-McGee
Hearing Date 3-15-74

Hon. Stephen A. Wakefield
Assistant Secretary of the Interior
for Energy and Minerals
Washington, 25, D. C.

Re: Potash Area - Eddy & Lea Counties, New Mexico

Dear Mr. Wakefield:

This letter has been prepared for presentation to you in conjunction with the August 7th meeting at which you have invited the potash companies to submit their recommendations pertaining to oil and gas drilling in the potash area of Southeastern New Mexico recognized in the Secretary's 1951 and 1965 Orders. We have been informed that certain potash companies have jointly prepared for you a similar letter and supporting data. We prefer however to present our own statement of position that potash mining be accorded priority in this area.

Kerr-McGee Corporation urges you to take two steps:

1. To accord potash mining priority over oil and gas drilling in this area; and

2. To provide the potash companies with an opportunity to select sites where oil and gas drilling will not damage or prevent extraction of these valuable potash deposits and will result in the least interference with the orderly exploration, development and extraction of potash.

Within the relatively small area previously designated in the Secretary's Orders, potash mining should be accorded a priority because:

1. There is risk both of losing large quantities of valuable potash and of recurring hazards to the men and the mining operation if oil and gas drilling should precede mining operations, whereas there is no such danger to the oil and gas deposits if potash mining should precede oil and gas drilling operations.

2. The relatively small area involved contains the major source of potash in the United States and is thus of enormous importance to the nation as well as to the potash industry.

Exhibit I not admitted

3. Within this area the economic values of the potash, and of large stable mining and milling payrolls, coupled with the huge investment in mining and milling plants, outweigh the potential for oil and gas in this area.

Attached hereto is a brief memorandum supporting and amplifying the reasons listed above.

We recommend and urge that if action by the Secretary is contemplated at the present time, any guidelines or order recognize the integrity of the potash deposits and include the following:

1. That persons holding Federal and State potassium leases on lands within the potash area recognized in the Secretary's Orders be required to designate to the Secretary in writing within 180 days after a date set by the Secretary all land within the area where drilling for oil and gas could be conducted without significantly interfering with present or future potash exploration, development and mining. Oil and gas drilling could be freely conducted thereafter in the designated areas but no oil and gas drilling could be conducted outside of said areas except through a showing by clear and convincing evidence that such activities would not damage potash ore deposits or interfere with the development and mining of such deposits or pose a risk of injury to persons employed in potash operations.

2. In the event a showing is made to justify oil and gas drilling in undesignated areas, that the widest possible spacing be required and that the sites be selected to permit directional drilling from the approved sites.

3. To the extent feasible, unitization of oil and gas leases be required.

Sincerely,

James J. Kelly
President

MEMORANDUM OF KERR-McGEE CORPORATION IN SUPPORT OF RECOMMENDATIONS FOR LIMITING OIL AND GAS DRILLING IN POTASH AREA

This memorandum is submitted in support of a letter dated August 7, 1973 from Kerr-McGee Corporation to Stephen A. Wakefield, Assistant Secretary of the Interior for Energy and Minerals.

Potash Should Be Accorded Priority

The risk of losing large quantities of valuable potash and the potential hazards to mine employees and mining operations from prior oil and gas drilling result primarily from subsidence of overlying beds above areas where potash has been extracted. Subsidence is a well known occurrence in the Carlsbad mining area. Stresses result from subsidence, posing a serious threat of damaging or collapsing well casings and releasing hydrocarbons into adjacent potash beds and into active mine workings. The consequent hazards to miners working in such areas would be great. Apart from possible death or injuries to miners, it would not be economically feasible to convert potash mining equipment to operate under gaseous conditions. In order to avoid the risk of subsidence, it would be necessary to leave large pillars of unmined ore around oil and gas wells to provide support. The diameter of such a pillar in the eastern portion of Kerr-McGee's reserves is estimated at approximately 4,000 feet or a large portion of an entire section of land. The amount of ore left in such a pillar would vary between 3 and 6 million tons, depending upon whether or not first mining could be economically conducted. This is equal to approximately one to two years of Kerr-McGee's present annual production. The economics might well prevent keeping access available to these pillars after other mining operations in the area had ceased thus making it likely that a large portion of the ore in these pillars would be lost forever.

There is no corresponding risk involved to the oil and gas deposits, if any, should potash exploration, development and mining operations precede oil and gas operations. Oil and gas operations would simply be deferred until potash operations have been completed in the particular area. Experience has shown that all but insignificant amounts of subsidence occur within five years after the termination of mining operations.

The economics of potash versus oil and gas in this limited area finds the balance weighted heavily in favor of potash. The potash industry is a stable and important one. Large scale potash operations have been conducted in the Carlsbad Basin since the early

1930's. The annual payroll for Kerr-McGee employees has increased from 2.2 million dollars in 1966 to 3.8 million dollars in 1972, with utilities and local purchases by Kerr-McGee exceeding these figures for each year.

The Bureau of Business Research of the University of New Mexico has compiled data on the economics of the potash industry, attached to this memorandum as Appendix A. This shows that for 1970 (the last year for which official statistics are available) the potash industry accounted for approximately 2,600 jobs and generated an annual payroll of about $21,000,000. The Bureau applied its own income and employment multipliers to produce a real value of approximately $32,000,000 annually, or approximately 29.6% of the total earnings and 34.6% of the entire employment in Eddy County, New Mexico for that year.

Further, the employment provided by the mining of such an ore pillar, if not required to support an oil or gas well casing, would amount to approximately 95,000 man days as compared to the employment provided by the drilling of a deep oil or gas well of approximately 6,000 man days*, a ratio of approximately sixteen to one in favor of potash payrolls. Employment afforded by oil and gas operations tends to be confined to the exploration and development stages over a relatively short time. Producing wells in a field can be serviced by relatively few employees.

Likewise the retail value of the potash product in the pillar of ore necessary to support an oil or gas well casing amounts to approximately $15,000,000, (assuming first mining can be conducted).

The investment in plant and equipment by the major potash companies in the Carlsbad mining area is conservatively estimated to exceed $200,000,000, of which $35,000,000 is represented by the capital investment of Kerr-McGee alone. The major portion of the capital investment by the oil and gas operators in or directly relating to the Secretarial Order area is the aggregate amount paid to acquire their leases. Moreover these oil and gas leases were acquired with knowledge by the lessees of existing potash deposits and of the conditions in the leases limiting the rights to drill for oil and gas in the event of conflict with potash deposits.

The foregoing payrolls, valuable potash deposits and capital investment all could be seriously jeopardized were oil and gas drilling permitted in this area without restrictions suggested below.

Selection of Drill Sites by Potash Companies

The New Mexico Oil and Gas Association has suggested that the potash area be redefined to eliminate portions which may

---

* based upon calculations and letter dated July 26, 1973 from Sipes, Williamson, Runyan & Aycock, Inc. Consulting Engineers, attached as Appendix B.

contain only marginal mineralization of potash. This proposal would create problems. In the first place substantial portions of the potash area have never been drilled adequately to rule out the presence of commercial ore. Secondly, an adequate drilling program must be conducted in an economic and orderly fashion over a period of time. At present, the New Mexico Oil Conservation Commission and the Department of Interior occasionally permit oil and gas operations unless mining operations are planned to be conducted within a period of five to ten years. This time standard fails to meet the needs of adequate planning and conservation. The large capital investment in the mining equipment and milling plant cause many companies to base their initial plans on an ore supply of twenty-five to thirty years in order to produce an economic operation. Kerr-McGee, for example, erected its plant commencing in 1965 based upon projections of a thirty-year supply or ore. That supply should be protected for the planned life of the facilities and not be limited or disrupted by an arbitrary five or ten year rule. furthermore, mining plans tend to change from time to time based upon economics, occasional erratic occurrences of the ore and other factors.

An alternative to this arbitrary five to ten year time standard is available. To preserve the integrity of the valuable ore deposits and to prevent unnecessary interference with mining plans each mining company could be required to designate areas in which drilling would not involve a hazard to either. This would diminish potential conflicts between the potash and the oil and gas operators. It would lighten the burden on the New Mexico Oil Conservation Commission and upon the Secretary to resolve them. If necessary, additional designations could be requested by the Secretary, perhaps at five to ten year intervals as the mining operations progressed and the potash companies acquired additonal information which would make possible additional designations.

Where feasible, oil and gas operators would be required to unitize their lease holdings to embrace both designated and undesignated areas. Drilling in undesignated places would be permitted only after a clear showing by the oil or gas applicant of no substantial likelihood of damage to the ore deposit, interference with development or mining operations or hazard to potash employees. Where such exceptions are made, the widest possible spacing should be observed and directional drilling employed.

NEW MEXICO OIL AND GAS PRESENTATION

It would serve no useful purpose to make a point-by-point refutation of the arguments of the New Mexico Oil and Gas Association or in the report of Mr. Warnock submitted in connection therewith. For example, the economics of potash mining, which occupied a large portion of the Association's presentation, is not here involved. Irrespective of future industry profits, the potash companies have invested a large amount of capital in plant and equipment and are actively pursuing exploration, development and mining operations on a major scale.

A proposal to permit wide-spread oil and gas drilling in the potash area without regard to the potash reserves is unreasonable, unwise and potentially devastating in the development and mining of the potash. The claim that the effect of subsidence upon well casings poses no threat to the potash reserves, mines and operations has not been substantiated. The claim that directional drilling is not feasible has not been supported and is directly refuted by the opinion of Sipes, Williamson, Runyan & Aycock, Inc. attached hereto as Appendix C. Its only disadvantage is increased cost. The interpretation of the prior orders of the Secretary and the Oil Conservation Commission by the U.S.G.S. and by the OCC, although failing to give sufficient protection to the potash reserves, clearly demonstrate that both have recognized the need to protect the integrity of the potash reserves.

The elaborate and unsubstantiated presentation by the New Mexico Oil and Gas Association on the question of the economics of potash mining is wholly irrelevant to the issues here presented. What is clear, however, is that adoption of the oil and gas position would lead inevitably to economic distress not only for the potash industry but likewise to communities whose welfare depends upon that industry.

TABLE 1

EDDY COUNTY

Income
(thousands of dollars)

	1966	1967	1968	1969	1970
Total Earnings	$102,789	$102,303	$98,770	$105,474	$112,384
*Farm	10,805	9,866	11,044	11,925	12,352
*Government	14,216	13,749	16,059	17,242	18,213
*Manufacturing	4,399	4,304	4,496	5,122	5,364
*Mining	34,952	34,994	27,049	28,378	31,237
*Contract Construction	4,132	4,135	5,106	5,495	5,547
Trade, Wholesale & Retail	13,429	13,488	13,382	13,624	13,690
Finance, Insurance & Real Estate	3,185	3,399	3,434	3,248	3,242
Services	12,529	13,186	14,085	16,258	17,417
Other	589	399	397	443	442

Employment

Total Employment	NA**	16,342	15,140	15,279	15,144
Number of Proprietors		1,798	1,802	1,821	1,807
Farm		520	509	502	495
Nonfarm		1,278	1,293	1,319	1,312
Wage & Salary Employment		14,544	13,338	13,458	13,337
*Farm		727	664	666	589
*Government		2,256	2,218	2,143	2,086
*Manufacturing		615	603	656	644
*Mining		2,934	3,632	3,189	3,237
*Construction		562	484	412	417
Transportation, Communication, & Public Utilities		756	752	749	695
Trade		2,623	2,497	2,396	2,349
Finance, Insurance & Real Estate		462	436	416	397
Services		2,540	2,589	2,763	2,853
Other		69	63	68	70

*Basic or export sectors

**Not Available

Source: Unpublished data, Bureau of Economic Analysis, U. S. Department of Commerce, March 8, 1973.

TABLE 2

INCOME AND EMPLOYMENT MULTIPLIERS

	1966	1967	1968	1969	1970	Income and Employment Multipliers
Total Earnings / Basic Earnings	1.500	1.526	1.548	1.547	1.524	1.529[a]
Total Employment / Basic Employment		1.905	2.016	2.019	2.028	1.992[b]

Potash Payroll, 1970 — $21,000,000[c] x 1.529 = $32,109,000 or 28.6% of 1970 Total Earnings

Potash Employment, 1970 — 2630[d] x 1.992 = 5239 or 34.6% of 1970 Total Employment

---

[a] 5-year average
[b] 4-year average
[c] Carlsbad Chamber of Commerce statistical data
[d] Annual average of covered employment in nonmetalic mining, Employment Security Commission of New Mexico.

TABLE 3

ECONOMIC IMPACT OF OIL WELL DRILLING IN POTASH AREA

Deep Well:

6 months drilling time, 5,965.5 man days required to drill & complete[1]

Shallow Well:

30 days drilling time. 1,000 man days required to drill & complete[1]

Mine 1400-foot Circle (area around well in which mining would be restricted):

380 workers, 1 year to complete[2]/approximately 95,000 man days[3]

Net "Base" Loss (assuming a deep well):

95,000 - 5,965.5 = 89,034.5 man days

Gross Loss (assuming a deep well):

89,034.5 x 1.992[4] = 177,356.7 man days or approximately 709 man years[3] of employment

---

[1]Roy C. Williamson, correspondence April 19, 1973
[2]Kerr McGee
[3]Assumes 250 man days per year per worker
[4]Employment multiplier from Table 2

TABLE 4

ECONOMIC IMPACT OF OIL WELL DRILLING IN POTASH AREA

Net "Base" Loss (assuming a deep well):

95,000 - 5,965.5 = 89,034.5 man days or 356 man years[1]

Using 1972 Average Wage Figures:

$\frac{\$21,500,000}{2579}$ = 8337, the net dollar loss is $2,967,972

The Gross Dollar Loss (assuming a deep well):

$2,967,972 x 1.52)[2] = $4,538,029

---

[1]Assumes 250 man days per year per worker
[2]Income multiplier from Table 2

APPENDIX 3

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.
CONSULTING ENGINEERS
Midland, Texas

500 OHLS TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713 228-8146

July 26, 1973

Kodey, Dickason, Sloan, Akin & Robb, P. A.
First National Bank Building - West
West Central Avenue at Third
P. O. Box 1888
Albuquerque, New Mexico 87103

Attention: Mr. John D. Robb

Dear Mr. Robb:

Subject: ~~Kerr-McGee Versus Belco~~
Economic Impact of Oil and Gas
Industry on the State of New Mexico
Kerr-McGee Potash Area
Lea and Eddy Counties, New Mexico

I have prepared the attached Table No. 1 for the purpose of examining the service and people requirements for drilling both a deep and a shallow well in the subject area. These data provide a qualitative look at the economic impact that drilling a well of either type described would have on the State of New Mexico. In addition to estimating the various costs involved in drilling both a deep and shallow well, an attempt was made to define the number of people and the number of days that they would be employed as a result of this drilling activity. As can be seen on the table, a deep well will cost over $750,000 and a shallow well will cost over $100,000. The costs are broken down between intangible and tangible items. The intangible items are service-oriented whereas the tangible items are equipment or pipe. Most of the intangible items will be provided by local service companies and it is hard to determine exactly how many wells would be required to maintain any one particular service office. These offices are often rather transient and when a local area becomes dormant as to drilling activities, some service locations will be shut down and services provided from a more centrally located office.

The majority of the drilling contractors having rigs capable of drilling deep holes are in Texas. There are some in New Mexico and, of course, their utilization would provide additional economic support to New Mexico.

Considerable expense is involved in the casing and tank battery equipment, but the majority of this equipment, even though ordered locally, is manufactured outside the state. Here, again, ordering this equipment helps to maintain various supply outlets, but at the same time, this service could be provided from a remote office by means of a traveling salesman, etc.

A deep hole is estimated to require approximately six months to drill and, as shown on Table No. 1, would require approximately 5,965.5 man days for drilling and completing. A shallow well is estimated to take approximately thirty days to drill and would require 1,009 man days for drilling and completing.

It is obvious that the potential oil and gas industry effort in this area will create a very minor economic impact as far as goods and personnel are concerned. Please let me know if you need any expansion of the above comments.

Yours very truly,

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.

Roy C. Williamson, Jr., P. E.

/lm

attachment

TABLE NO. 1

ESTIMATE OF COSTS FOR DRILLING AND NUMBER OF PEOPLE INVOLVED
LEA AND EDDY COUNTIES, NEW MEXICO

	Deep Test 10,000 psig Equipment - $	People Involved	Number People	Days Employed	Man Days	Shallow Well Costs - $	Number People	Days Employed	Man Days
INTANGIBLES									
Location and Roads	10,000	Local Contractor	2	5	8	5,000	2	3	6
Damages	1,000	Land Owner	1	-	-	1,000	1	-	-
Drilling - Footage Basis	163,350	Drilling Contractor - Outside N. M.*	-	-	-	** 22,500	-	-	-
Drilling - Day Work	100,800	Drilling Contractor - Outside N. M.*	-	-	-	** -	-	-	-
Cementing Operations	23,000	Local Service Company	7	2	7	7,000	4	1	4
Mud and Chemicals	50,000	Local Service Company	1	100	100	5,000	1	30	30
Logging	11,200	Local Service Company	4	2	6	2,500	3	1	3
Drill Stem Tests	4,500	Local Supplier	2	4	8	-	-	-	-
Water	5,000	Local Company	3	3	9	1,000	3	3	9
Trucking	2,500	Local Company	5	5	25	1,000	2	2	4
Mud Logger	5,600	Local Supply Company	1	90	90	-	-	-	-
Rigs and Runners on Day Work	25,000	Local Service Company	-	-	-	-	-	-	-
Perforating	2,200	Local Company	3	1	3	1,000	3	0.5	1.5
Roustabouts	1,000	Local Company	5	10	50	500	5	4	20
Rental Equipment	10,000	Local Service Company	-	-	-	1,000	-	-	-
Treatment (acid)	3,500	Drilling Contractor Employee - Outside N. M.*	3	0.5	1.5	1,000	3	0.5	1.5
Supervision	10,000		1	100	100	1,500	1	30	30
SUBTOTAL INTANGIBLES	428,650					50,000			
20% Contingencies	87,500		-	-	-	10,000	-	-	-
TOTAL INTANGIBLES	516,150					60,000			
TANGIBLES									
Casing	173,000		-	-	-	32,250	-	-	-
Tubing	32,000		-	-	-	6,000	-	-	-
Wellhead & Tree	25,000		-	-	-	1,000	-	-	-
Liner Hanger	3,000		-	-	-	-	-	-	-
Tank Battery & Installation	10,000		-	-	-	7,500	-	-	-
TOTAL TANGIBLES	243,000					46,750			
Drilling Crews			30	180	5,400		30	30	900
GRAND TOTAL	759,150				5,965.5	106,750			1,009

* Most deep rigs come from Texas

** More shallow rigs available in New Mexico

TABLE NO. 1

SIPES, WILLIAMSON, ENRYAM & AYCOCK, INC.
1100 GINLS TOWER WEST MIDLAND, TEXAS 79701
ROY C. WILLIAMSON, JR., P. E./ln JULY 26, 1973

Appendix "C"

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.

CONSULTING ENGINEERS

Midland, Texas

July 31, 1973

800 GIBLS TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713 228-8146

Rodey, Dickason, Sloan, Akin & Robb, P. A.
First National Bank Building - West
West Central Avenue at Third
P. O. Box 1888
Albuquerque, New Mexico

Attention: Mr. John D. Robb

Dear Mr. Robb:

Subject: Feasibility and Additional Cost of Drilling a Whipstock Hole to a Vertical Depth of 13,500' Lea and Eddy Counties, New Mexico

In accordance with your request, we have investigated the feasibility and cost for drilling a deviated hole to a vertical depth of 13,500' with a directionally controlled horizontal displacement of one mile between the top and bottom of the drilled hole.

Mr. Foy W. Boyd, a drilling consultant here in Midland with considerable experience in drilling deep holes in Southeast New Mexico, and Mr. H. G. Pruett, District Manager of Eastman Whipstock, Inc., have assured me that a deviated hole such as described above presents no serious technical problems. Below is an estimate of the increased cost required to achieve the required deviation.

Tangible and Intangible Costs to Vertically Drill and Complete a Well at a T. D. of 13,500', $		710,000
Incremental Tangible and Intangible Costs for Achieving a One Mile Directionally Controlled Horizontal Displacement of the Bottom of the Hole, $	87,000	
Cost of Special Equipment and Services From Eastman Whipstock for 4 Hole Direction Corrections, $	64,871	
Cost of Increase, $	151,871	

Percentage Cost Increase = $151,871/$710,000 = 21.39%

Mr. Pruett assures me that this proposed deviation would be considerably less than the maximum angle of deviation that Eastman has achieved. Attached is an estimate of costs from Eastman. There is a "no hole correction" estimate and a "4 correction" estimate. The "4 correction" estimate was chosen as a reasonable estimate of additional cost in this situation. Also shown is a cost breakdown for each additional hole correction that might be required. Such corrections may be necessary to keep the bottom hole location within the preset limits as the hole deviation angle is built. As can be seen from the Eastman proposal, the maximum deviation angle required is 41°14'. Eastman's maximum deviation achieved in hard rock was 68° in Holland where a horizontal displacement of 9,251' was achieved in a vertical depth of 7,000'.

A deviated hole such as described in this letter should present no serious technical problems and the increased cost is modest when compared with the potential hazard that a vertical hole drilled through the potash deposit would create.

Please let me know if you need elaboration on any part of this discussion.

Yours very truly,

SIPES, WILLIAMSON, RUNYAN & AYCOCK, INC.

Roy C. Williamson, Jr., P. E.

/cr

attachments

SIPES, WILLIAMSON & AYCOCK, INC.
CONSULTING ENGINEERS
Midland, Texas

800 GIRLS TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713-659-8146

July 31, 1973

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. I-A
Submitted by Kerr-McGee
Hearing Date 3-15-74

Rodey, Dickason, Sloan, Akin & Robb, P. A.
First National Bank Building - West
West Central Avenue at Third
P. O. Box 1888
Albuquerque, New Mexico

Attention: Mr. John D. Robb

Dear Mr. Robb:

Subject: Feasibility and Additional Cost of Drilling a Directionally Controlled Hole to a Vertical Depth of 13,500', Lea and Eddy Counties, New Mexico

In accordance with your request, we have investigated the feasibility and cost for drilling a directionally controlled hole to a vertical depth of 13,500' with a horizontal displacement of one mile between the top and bottom of the hole.

Discussions with technical personnel knowledgeable in directional drilling techniques indicate that drilling this type of hole presents no serious technical problems. Below is an estimate of the cost for a nondirectional well and the increased cost required to achieve the required deviation assuming no serious difficulties are encountered.

Tangible and Intangible Costs to Vertically Drill and Complete a Well at a T. D. of 13,500', $	710,000
Incremental Tangible and Intangible Costs for Achieving a One Mile Directionally Controlled Horizontal Displacement of the Bottom of the Hole, $	87,000
Cost of Special Equipment and Services that Would be Required for 4 Hole Direction Corrections, $	64,871
Cost of Increase, $	151,871

Percentage Cost Increase = $151,871/$710,000 = 21.39%

I-A not admitted

Directional drilling experts assure me that the herein required proposed deviation would be considerably less than the maximum angle of deviation that has been achieved. The directional control cost is based on a "4 correction" estimate (i.e., 4 changes in the direction of drilling). The "4 correction" estimate was chosen as a reasonable estimate of additional cost in the current situation. Additional corrections may be necessary to keep the bottom hole location within the preset limits as the hole deviation angle is built. Additional cost would be incurred based on the number of additional corrections required. The maximum deviation angle required in this case is 41°14'. A deviation of 68° is on record in hard rock in Holland where a horizontal displacement of 9,251' was achieved in a vertical depth of 7,000'.

Directional drilling can present the opportunity for increased drilling costs and such contingencies should be considered in the planning stages. If no serious problems are encountered, the additional cost of directional drilling where needed could be modest as compared to alternatives such as delayed drilling or prevention of drilling.

Please let me know if you need elaboration on any part of this discussion.

Yours very truly,

SIPES, WILLIAMSON & AYCOCK, INC.

Roy C. Williamson, Jr., P. E.

/lm

SIPES, WILLIAMSON & AYCOCK, INC.

CONSULTING ENGINEERS

Midland, Texas

March 9, 1974

1100 OIL'S TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713 228-8146

Rodey, Dickason, Sloan, Akin & Robb, P. A.
First National Bank Building - West
P. O. Box 1888
Albuquerque, New Mexico

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5143 Exhibit No. I-B
Submitted by Kerr-McGee
Hearing Date 3-15-74

Attention: Mr. John D. Robb

Dear Mr. Robb:

Subject: Proposed Location
Belco Bass Federal No. 2
Section 30-20S-33E, 660' FSL
and 1,320' FEL
Lea County, New Mexico

In accordance with your request, we have calculated reserves, producing life and product value for mature producing wells in the vicinity of the proposed location and have discussed various questions concerning this area as posed in your letter dated March 15, 1973.

The attached Exhibit No. 1 is an area plat showing the subject proposed location circled in red. The well in Section 25 shown as "Proposed Location" is a previously announced location by Belco. Also shown on this plat is the trace of a cross section, A - A'. Exhibit No. 2 is a portion of the log from the Texaco Audie Richards No. 1 covering the interval in the geologic section from the top of the Strawn to the top of the Barnett shale. The included zones are the Strawn, Atoka, and the Morrow. Exhibit No. 3 is a cross section A - A' from the Phillips No. 1 well in Section 15-20S-32E, through the Belco No. 1 Bass Federal, the Texaco No. 1 State "CH", the Texaco No. 1 State "CM", and ending with the Phillips No. 1 Hat Mesa in Section 11-21S-32E. The correlated intervals on this cross section are the Strawn, Atoka, and Morrow zones. Shown alongside each log are drill stem tests and completion data. Shown alongside the depth measurements on the log are the perforated intervals as obtained from the public record. The cross section points out that general geologic sections are correlable, but that individual zones of porosity cannot easily be traced from well to well. This indicates that the producing intervals are stratigraphic in nature having the porous, permeable zones randomly distributed throughout the gross section.

not admitted

I-B

Recent completions in the area further point out the random distribution of reservoir quality and producing interval:

Operator	Lease and Well	Location	Zone and Perforations	AOF, MCF/D
Amini Oil Co.	New Mexico Federal No. 1	4-21S-32E	Morrow, 13,640-671	16,200
Amini Oil Co.	New Mexico "SL" State No. 1	32-20S-33E	Strawn, 13,106-116	6,248
Amini Oil Co.	Aztec-State No. 1	33-20S-33E	Morrow, 13,808-893	517

Belco's proposed location is in the SE/4 of Section 30-20S-33E, and is located 660' from the south line and 1,320' from the east line of the section. Since the Atoka - Morrow zones are stratigraphic in nature, a volumetric determination of reserves from a pore volume study is very hazardous, therefore, no attempt was made to determine the reserves to be expected from Belco's Bass Federal No. 1 in Section 30-20S-33E, Amini's wells in Section 32 and 33-20S-33E and Section 4-21S-32E, or from Phillips' Hat Mesa No. 1 in Section 11-21S-32E, which is the right hand well on the cross section A - A'. Production performance has been analyzed, however, for Texaco's Audie Richards No. 1 in Section 25, State "CH" No. 1 in Section 36, and State "CM" No. 1 in Section 31. Three types of performance curves were prepared for each of these wells: 1) a plot of bottom hole pressure divided by the compressibility factor versus cumulative gas production, 2) a plot of gas producing rates versus time, and 3) a plot of gas producing rates versus cumulative gas production. By analyzing the three performance curves for each well, the estimated ultimate recovery and remaining primary were determined as outlined below:

	Texaco - Audie Richards No. 1	Texaco - State "CH" No. 1	Texaco - State "CM" No. 1
Ultimate Recovery, MMCF	2,192	2,913	7,340
Cumulative as of 1-1-74, MMCF	1,811	2,461	5,610
Reserves as of 1-1-74, MMCF	381	452	1,730
Average Expected Life, Years	23	21	26
Cumulative Condensate Yield, BBLS/MMCF	18.5	11.8	23.7

As can be seen by the above figures, a large percentage of the expected ultimate gas recovery from these wells has already been produced, thus establishing sufficient production history from which to make an extrapolation of expected remaining reserves. It can be assumed that a projected well in the southeast quarter of Section 30 would have an ultimate gas recovery equal to the average expected ultimate from the above three wells, or 4,150 MMCF. The average producing life would be 23 years with an average condensate yield of 18 barrels per MMCF. "Old" gas in southeastern New Mexico generally sells for $0.20 to $0.27 per MCF. For purposes of this evaluation, we have estimated that the maximum price for "new" gas in this area would be $0.55 per MCF. This could be an optimistic number but certainly gives the upper limit of the gas price. Estimated operating costs for this well are $600 per month. Using the above parameters, 4,150 MMCF of gas at $550 per MMCF less severance and ad valorem taxes of 5.6 percent, and assuming a 1/8 royalty, future net income would be $1,885,345. The value of the condensate is calculated by 4,150 MMCF times 18 barrels per MMCF at $10 per barrel (which could be rolled back) less severance and ad valorem taxes of 5.6 percent, and assumption of a 1/8 royalty. The calculated value is $617,022. The operating costs for 23 year life utilizing a constant cost of $600 per well per month, provides total operating costs of $165,600. Therefore, the sum of the value from the gas and the condensate less the operating costs yields undiscounted future net revenue of $2,336,767. If rather than taking an average of the three wells, we looked at the individual wells, percentages would indicate that recovery from this proposed well would be nearer the two to three billion cubic feet of gas range than the 4.15 billion cubic feet that we have estimated. If this were the case, of course, the undiscounted future net profit would be proportionately reduced.

If drilling is deferred in an area that is mined for potash until after the mining is completed and subsidence of the overburden has occurred, it should be possible to drill through the subsided area. Considerable care and preparation would be needed in order to overcome the severe loss circulation problem that would surely occur in the mined-out area. Successful drilling operations have been conducted through severe loss circulation zones and through cavernous formations unexpectedly encountered while drilling. With proper planning, it is reasonable to assume that the mined-out area could be successfully penetrated without excessive costs.

It would appear to be technically and economically feasible to directionally drill the subject location from Belco's Bass Federal No. 1 location in the northwest quarter of Section 30. Directionally drilled holes have been successfully completed in the southeastern New Mexico area. The main considerations of such a contemplated operation are the technical feasibility and the additional costs incurred for directionally drilling a well. The increased AFE cost can be calculated by the additional footage that must be drilled in the directionally controlled hole, plus the cost of the equipment required to make the necessary hole direction corrections. The increased cost for directionally drilling a 13,500' hole with the bottom of the hole horizontally displaced one mile, including little contingency costs for unexpected trouble, is estimated to be $170,000, or approximately 22 percent of the estimated straight hole cost of $781,000. It must be considered, however, that a directionally controlled hole can potentially cause more trouble and thus more costs than an attempted straight hole. This is certainly not always the situation since a directional hole could be drilled with no trouble, whereas, conversely, a straight hole could have considerable trouble. The most prudent approach would be to provide more contingency money for unexpected problems while drilling a directionally controlled hole than would be provided for drilling a nondirectionally controlled hole.

Please advise me if you need additional elaboration on any points covered in this report.

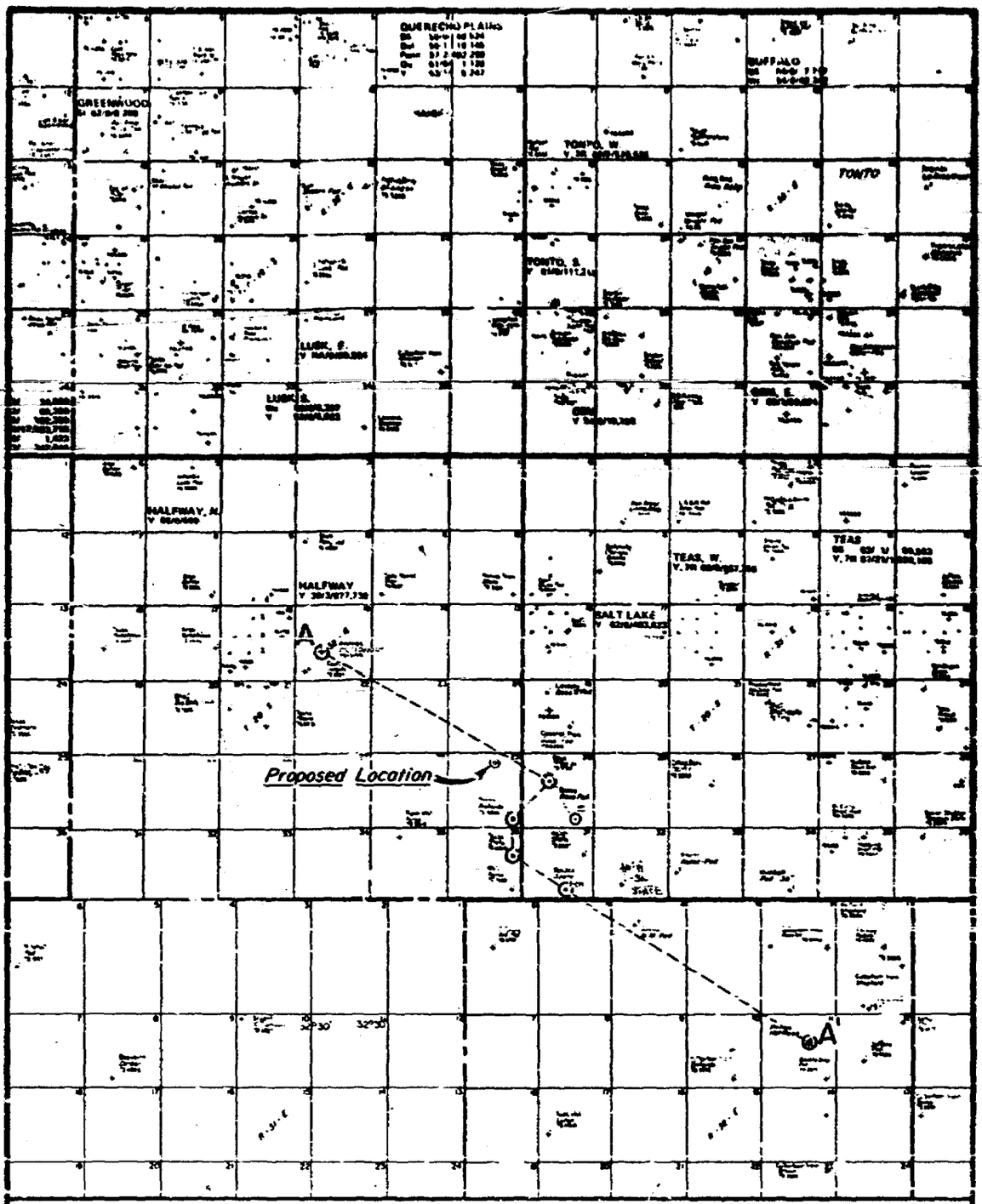
Yours very truly,

SIPES, WILLIAMSON & AYCOCK, INC.

Roy C. Williamson, Jr., P. E.

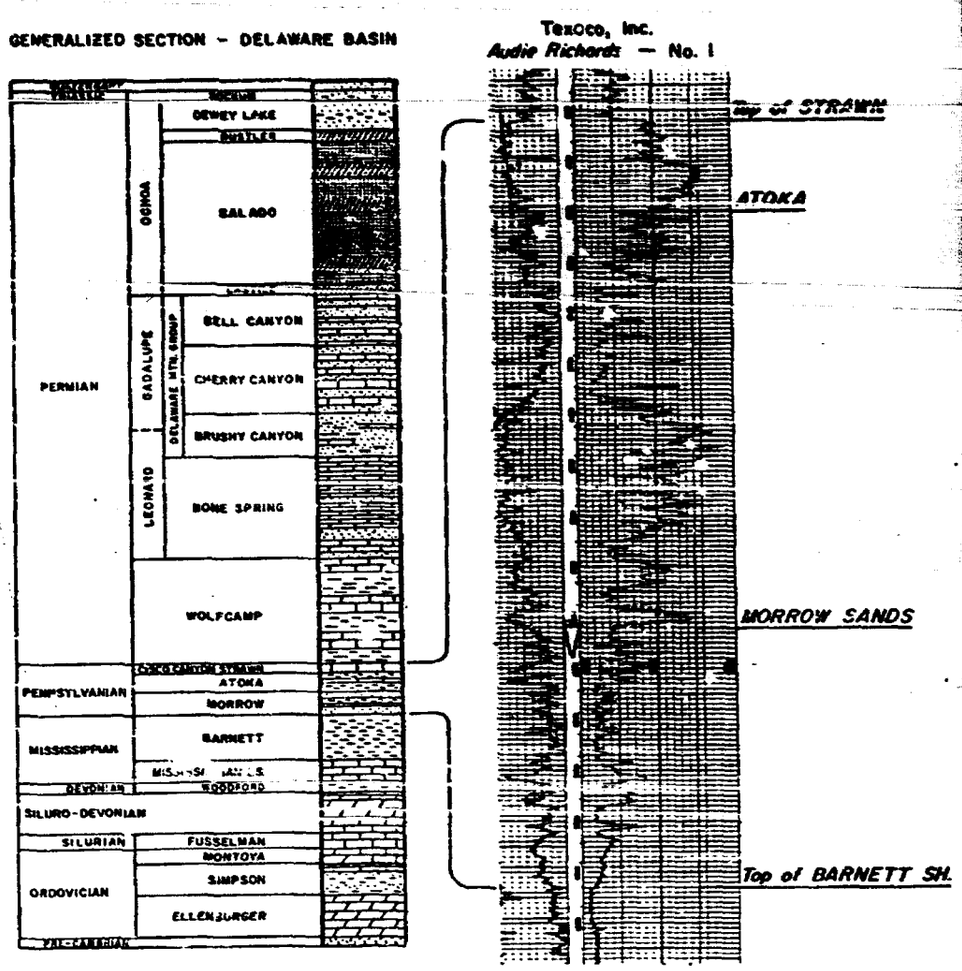
/lm

Attachments



AREA PLAT

FIELD SALT LAKE (Morrow & Atoka)		County LEA	State NEW MEXICO
Engineer J. J. K.	Drwn. By Del	Date 3-12-74	File SALT LAKE
SIPES, WILLIAMSON & AYCOCK, INC.		Ref. No.	EXHIBIT NO. 1
Consulting Engineers	Midland - Houston, Texas	3.605	



TYPE LOG

FIELD SALT LAKE (Morrow & Atoka)	County LEA		State NEW MEXICO
Engineer J. J. K.	Drwn. By Del	Date 3-12-74	File SALT LAKE
SIPES, WILLIAMSON & AYCOCK, INC.		Ref. No.	EXHIBIT NO. 2
Consulting Engineers	Midland - Houston, Texas	3.606	

POTASH COMPANY OF AMERICA

A DIVISION OF IDEAL BASIC INDUSTRIES, INC.

MINE AND REFINERY: P. O. BOX 31 • CARLSBAD, NEW MEXICO 88220 • AREA CODE 505 • 887-2844

R. H. BLACKMAN
RESIDENT COUNSEL

August 7, 1973

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5143 Exhibit No. II
Submitted by Lur-McBee
Hearing Date 3-15-74

Hon. Stephen A. Wakefield
Assistant Secretary, Energy and Minerals
United States Department of the Interior
Washington, D. C. 20240

Your Reference: ECS

not admitted although several pages were admitted as Exhibits 11, 12

Dear Mr. Secretary:

We are grateful for the opportunity to present to you the position paper of the New Mexico potash industry relating to whether oil and gas drilling should be permitted through known potash ore bodies in the Secretary's potash area.

Ex B to this Ex II was admitted as K-McG Ex 11

The paper is divided into three sections: (1) the Outline which briefly states each principal proposition treated, (2) the Report which enlarges upon each proposition with our reasoning and proof and (3) supporting Exhibits. Should you wish any further information will you please advise us.

3rd page (photographs) of Ex F of this Ex II was admitted as K-McG Ex 12

For your convenience we enclose two additional copies.

Ex 13 denied
Ex 14 denied (Boyd Co. Report)

Respectfully submitted

On Behalf of the Potash Committee
of the New Mexico Mining Association
and
the New Mexico Potash Industry

By _____
R. H. Blackman

RHB/jm

II

OUTLINE

1. Subject

   Waste of potash resulting from drilling through known potash deposits.

2. Issues

   Will drilling through known potash deposits cause damage and waste of potash?

   Can any waste of potash be justified to accelerate the production of gas or oil in the Carlsbad basin?

3. Extent of the Problem

   If absolutely no drilling were permitted through known potash deposits which the New Mexico Oil and Gas Association desires to open to drilling, the area denied to drilling would not exceed four or five townships.

   The value of an average grade and thickness sylvinite ore body one township in area is about $1.5 billion.

4. (a) Drilling through a potash deposit will cause waste since protective pillars of potash ore will be left in place to insure that an oil or gas well which passes through the deposit will not be ruptured which would create an enormous safety hazard.

   (1) If second mining operations were conducted, subsidence would occur causing both lateral and vertical movements of enormous power in the strata above the ore removal zone.
   (2) The vertical and lateral movements would probably rupture or severely damage the casing and production string of a well.
   (3) The damage could result in the escape of gas into the potash mine since the salt section has sufficient permeability and porosity to transmit oil and gas. Oil seeps, probably from leaking wells, have been exposed in the potash zone in two mines in the Carlsbad area. However, no dangerous gas leaks have occurred in any New Mexico potash mine.
   (4) Gas escaping into a mine would expose employees to unreasonably dangerous conditions since the vast open areas of each mine are interconnected.
   (5) Because of this danger no prudent potash mining executive will perform second mining (total mining) operations in the protective pillar surrounding an active producing well.

(6) Protective pillars will therefore be left to protect the well and thus insure that no gas escapes into the mine. If second mining is not possible the value of protective pillars lost under average conditions is about $2.1 million. It can be much higher in deeper than average ore bodies and in ore bodies having adverse strength-weakness characteristics.

(7) A well having any residual pressure is potentially as dangerous as a producing well.

(b) The protective pillars will not be recovered unless the physical condition of the mine has not changed adversely and mining operations are still economically feasible when the well is depleted and assuredly adequately plugged.

(c) Certainly a large percentage will not be recoverable and will, in fact, be lost forever.

5. (a) Such waste is preventable since if the potash is fully produced before oil and gas operations penetrate the ore body, no waste will occur. The oil and gas operations will be postponed temporarily.

(1) Oil and gas exploration can be conducted elsewhere, whereas the potash industry cannot be moved. There will be no appreciable reduction in exploration drilling operations, since there is certainly no dearth of good gas prospects at present prices.

(b) Future generations will still require gas and oil.

6. (a) The best interests of the United States would certainly not be served by waste of potash because:

(1) Increased cost can result in export of more of the potash industry to Canada.
(2) We should not be dependent on a foreign source (even Canada) for any necessary resource.
(3) Mining to remove protective pillars after a period of time has passed is more hazardous than removal contemporaneous with first mining.
(4) No natural resource should be wasted.

7. (a) Value of the potash industry.

(1) The value of the industry is estimated at about one-third of the Eddy County, New Mexico business output.
(2) Royalties, taxes, salaries and wages.
(3) Comparison with gas production industry.

August 7, 1973

Hon. Stephen A. Wakefield
Assistant Secretary, Energy and Minerals
United States Department of the Interior
Washington, D. C. 20240

Re: Multiple Use - Waste of Potash
Resulting from Drilling through
Known Potash Deposits

The following report is presented on behalf of the potash producing companies in the Carlsbad basin in Eddy and Lea Counties, New Mexico, by the Potash Committee of the New Mexico Mining Association.

1. Subject

This report presents the position of the New Mexico potash industry concerning the problems associated with oil and gas drilling in the Secretary's potash area. It urges that rules be promulgated prohibiting either exploratory or development drilling through any known potash deposit.

2. Issues

Will drilling through known potash deposits cause damage and waste of potash?

The answer is an absolute unqualified yes. It is only a matter of degree.

Can any waste of potash be justified to accelerate the production of gas or oil in the Secretary's potash area?

We think not.

3. Extent of the Problem

The presentation by the New Mexico Oil and Gas Association recognizes that drilling into and through open mine workings would not be feasible at least until all operations have ceased and the mine has been abandoned.

If the recognized potash deposits of currently mineable grade, thickness and depth were gathered together into one solid body, the area would not exceed about four or five townships. This includes known potash deposits held under federal lease by operating companies and others.

The value of an average grade and thickness sylvinite potash ore body one township in area is about $1.5 billion. Areas having dual deposits have much higher values.

4. (a) Drilling through a known potash deposit will cause waste since protective pillars of potash ore will be left in place to insure that an active oil or gas well or any well not assuredly adequately plugged which passes through the deposit will not be ruptured which would create an enormous safety hazard.

It is the considered unanimous position of the New Mexico potash industry members that first mining will not be conducted in the primary protective pillar and second mining will not be conducted in the secondary protective pillar surrounding an active oil or gas well.

The Primary Protective Pillar is a pillar of solid potash ore having a radius of at least 100 feet left in place surrounding the

well. This allows for surveying and operational errors in the mine and well.

The Secondary Protective Pillar is an area surrounding the well having a radius equal to the depth of the potash deposit from the surface. First mining only will be conducted in the Secondary Protective Pillar by mining out rooms leaving pillars for support to prevent subsidence. (Second mining would remove the pillars permitting subsidence.)

The amount of potash left in these two pillars will range from about 25% to about 40% of the total depending on mining methods used and underground conditions encountered. The value of lost potash is about $2.1 million for each drill hole under average conditions for sylvinite ore. It can be much higher in ore bodies of greater than average depth and with weaker strength characteristics, such as carnallite which requires much larger pillars to support the overlying strata, and in areas having more than one ore zone.

Exhibit A attached presents value calculations in several assumed conditions.

(1) If second mining operations were conducted, subsidence would occur causing both lateral and vertical movements of enormous power in the strata above the ore removal zone.

Exhibit B attached by Earl S. Miller and Frank Pierson reports on the horizontal and vertical subsidence movements at the U. S. Potash mine. Limiting angles up to 51° from the vertical were noted. In some instances surface stations were observed to rise and fall during overall descent in a pattern resembling a corkscrew. The horizontal and vertical forces inferred from the movements observed are obviously enormous.

Exhibit C attached is a map showing the area of total mining at the U. S. Potash mine on which is superimposed the area of surface deformation.

Exhibit D attached is a graph of the movement of a survey station at the old U. S. Potash mine which illustrates the corkscrew movement of the survey point actually observed on the surface.

(2) The vertical and lateral movements would probably rupture or severely damage the casing and production string of a well.

Exhibit E attached is a report of subsidence action at the Duval sulphur property in Culbertson County, Texas.

(3) The damage could result in the escape of gas into the potash mine since the salt section has sufficient permeability and porosity to transmit oil and gas. Oil seeps, probably from leaking wells, have been exposed in the potash zone in two mines in the Carlsbad area; however, no dangerous gas leaks have occurred in any New Mexico potash mine.

It seems obvious that if there were any oil or gas in the well it would be released into the strata by any rupture of the well casing. The section overlying the potash zone is laminated. It consists of several different materials, principally salt, clay, polyhalite and anhydrite, some of which are permeable to oil and gas. This stratification and its attendant permeability also exists in the Salado formation which includes the potash zone.

In the Potash Company of America mine, oil seeps or showings have been encountered four times in the potash zone itself, one of

which is in a vertical crack. A similar oil seep was encountered in the Eddy mine of National Potash Company.

> Exhibit F is a report which details the several instances including color reproductions from photographs taken in the south tunnel area of the Potash Company of America mine which show the oil stains in the anhydrite layer just above the potash zone.
>
> Exhibit G is a report which details an instance where oil seepage was encountered in the National Potash Company mine in Eddy County, New Mexico.

Small pockets of dead air under pressure have been encountered in all of the mines. Extensive sampling of the escaping gas reveal it to be mostly nitrogen and carbon dioxide. No significant amounts of methane or other explosive or flammable gases have ever been detected.

Case No. 862 before the New Mexico Oil Conservation Commission contains the testimony of Mr. S. J. Stanley, staff engineer for the Commission, at a hearing April 20, 1955, that:

> "It has been definitely proven in the oil business that the salt section is charged in the Monument and Hobbs Pool and charged with gas. The charging of oil and gas in these pools was probably man made by casing leaks. The point I am trying to make is that I feel that porosity and permeability exists in the salt section throughout Lea County, that the extent of charging the zone, and that is the salt zone, from one well would depend on the amount of gas present, and, of course, the pressure of that particular gas."

(4) Gas escaping into a mine would expose employees to new and unreasonably dangerous conditions since the vast open areas of each mine are interconnected.

As an example, the Potash Company of America mine contains over 1,200 miles of interconnected tunnels about 28 feet wide and 6 feet high on the average. Other mines are both larger and smaller. All are similarly structured.

Most of the gas produced near the potash area is odorless. Gas leaking into a potash mine would produce a huge bomb. Employees could be smothered or poisoned if a major leak occurred although the principal hazard is the possibility of explosive mixtures accumulating undetected.

(5) Because of this danger no prudent potash mining executive will perform second mining (total mining) operations in the protective pillar surrounding an active producing well.

(6) Protective pillars will therefore be left to protect the well and thus insure that no gas escapes into the mine.

> Exhibit H is a report by the John T. Boyd Company, a mining engineering firm of international repute, of Pittsburgh, Pennsylvania, which approves and elaborates on the statements and conclusions set forth herein.

(b) The protective pillars can only be removed by mining after the well has been abandoned and plugged in such manner that it can be absolutely assured that no gas can ever escape into the mine.

This may not occur until it is too late for economically profitable mining. It is obviously more expensive to remove mining and transportation machinery out of an area after first mining and then move it back in again for second mining.

After passage of a period of time the mining conditions may have changed to such a degree that a lesser overall percentage of ore can be removed than would have been possible had second mining been conducted coincidentally with first mining. Under such conditions hazards to employees will be increased.

The amount of ore so wasted is difficult to estimate, but it is surely substantial.

> Exhibit I attached is an internal memorandum from Amax Corporation which furnishes some information on the character and extent of such losses. The memorandum is supported by photocopies of monthly reports in 1968 and 1969 in which the Amax mine superintendent points out the difficulties encountered and comments on the increased costs incurred and the pillars left in place to minimize hazards to employees and therefore, unavoidably at that time, wasted.

If the changed conditions are sufficiently hazardous, the second mining operation may not be conducted at all. This waste would be substantial.

At some point in time when either changed mining conditions interdict second mining, second mining will not yield a profit, or mining operations in the mine have ceased, all protective pillar ore will be lost.

The elements of delay and uncertainty introduced by the well will cause some losses. Depending on the length of the delay and the degree of uncertainty, the waste can range up to all ore in the protective pillar system.

Even if a well is located outside the subsidence area it cannot be

guaranteed that no damage will occur since if a blow-out occurs or if the well is improperly plugged when it reaches the uneconomic state, the gas could penetrate the mine through permeable strata. Wells which contain so little gas that they will not produce against gathering line pressure still contain sufficient pressure and volume to contaminate a mine.

Wells in the Getty field which is in the Potash Company of America west ore body have been plugged and abandoned under U.S.G.S. supervision, but because of the condition of the wells after many years of production, it cannot be assured that the plugging was successful. The potash ore in the protective pillars around those wells has probably been permanently lost.

Even if wells could be properly plugged, primary protective pillars would be left. Attempting to mine around these pillars would seriously affect efficiency and the normal mining cycle and make mining of the ore in that area uneconomical.

The possibility of ultimate recovery of some of the potash by solution mining is too remote for consideration. Solution mining in the thin potash beds in the United States has thus far been unsuccessful. However, one company in Canada appears to have a sustainable operation. They are producing from ore beds from 80 to 100 feet thick with average grade over 20% K_2O, reserves totally unlike those in the Carlsbad area which would average less than 8 feet in thickness and less than 20% K_2O.

In a study comparing solution with conventional potash mining prepared by W. H. W. Husband, head of the Engineering Division, and Selim Ozsahin, Associate Research Officer, both of the Saskatchewan Research Council, for presentation at the March 1967 annual general meeting of the Canadian Institute of Mining in Ottawa, the authors reached the following conclusions:

> "The results indicate that solution mining and refining of potash is economically feasible in Saskatchewan at current market prices if reasonable production rates are maintained and a suitable deposit is used. Ore grade has to average at least 20% K_2O over a thickness of 50 feet.
>
> The cost of the potash produced by the solution mining and refining method is greater than the cost of potash produced from the conventional method. This is due mainly to costlier surface recovery installations and operations. Great quantities of water have to be evaporated in the refining stage and this requires complex equipment and large amounts of fuel."

(c) Certainly, a large proportion of the ore in protective pillars will not be recoverable and will, in fact, be wasted.

(d) As illustrated by the Boyd report, Exhibit H, whether second mining can or cannot be performed can mean the difference between profit and loss operations.

5. (a) The waste described is preventable since if the potash is fully produced before oil and gas operations penetrate the ore body, no waste will occur. The oil and gas operations will be postponed temporarily.

(1) Oil and gas exploration can be conducted elsewhere, whereas the potash industry cannot be moved. There will be no appreciable

reduction in exploratory drilling operations, since there is certainly no dearth of good gas prospects at present prices.

(b) Future generations will still require gas and oil.

6. (a) The best interests of the United States would certainly not be served by waste of potash because:

(1) Increased cost can result in export of more of the potash industry to Canada.

(2) We should not be dependent on a foreign source (even Canada) for any necessary resource.

(3) Mining to remove protective pillars after a period of time has passed is more hazardous than removal contemporaneous with first mining.

(4) No natural resource should be wasted.

7. (a) Value of the potash industry.

(1) The value of industrial output and related and supported industries of the potash industry is estimated at about one-third of the Eddy County, New Mexico business output.

(2) Royalties, taxes, salaries and wages - During the 15 year period from 1958 through 1972, the potash industry has paid out ove $440 million in salaries and wages to their employees; over $50 million in ad valorem, severance and other taxes to the State of New Mexico; and approximately $55 million in State and Federal royalties. The turnover of these dollars

in wages and salaries as well as the support businesses that supply the potash industry has made and will continue to make a very significant contribution to the economy of southeastern New Mexico.

(3) Wages and salaries generated from potash production exceed wages and salaries from gas production by a ratio of about 17.5 to 1. Production of potash values of $10 million would generate about $3.5 million in salaries and wages. As per the following calculation, production of $10 million of gas would generate about $200,000.

Reserve:
20 billion cubic feet at $0.50 - $10 million

Production:
10 million cubic feet per day average for 2,000 days, 5-1/2 years

$0.01 per MCF for labor cost - $100 per day for 2,000 days - $200,000

One of the best wells in the potash area is about one mile from Potash Company of America's ore body. This well originally estimated at a production of 6 billion cubic feet has already produced about that amount and probably will produce an additional 6 billion cubic feet over a period of 12-18 years. Using today's prices, at $0.50 per MCF, it would have a gross value of $6 million. Were that well drilled through an average potash deposit, the value of the protective pillars, almost certainly lost because of its lengthy production period, would be $2.1 million.

If we take into consideration the average productive well in the

area (we estimate 2-5 billion cubic feet for the average good producer), the lost potash would probably exceed in value the gas produced.

How can this be said to best serve the interests of the United States?

A schedule prepared by the New Mexico Bureau of Business Research of the University of New Mexico for Kerr-McGee Corp., tables 1-4, is attached as Exhibit J.

8. History and Applicable Regulations

From time to time beginning in the 1920's, substantial federal acreage in New Mexico was withdrawn from oil and gas leasing. Secretary's order dated October 16, 1951, 16 F.R. 10669 revoked previous withdrawals and established regulations concerning drilling in the newly released area. That order was superseded by the Secretary's order of May 11, 1965, 30 F.R. 6692 which contains the currently applicable drilling regulations.

1951 ushered in a period of intense controversy between the two industries over the serious questions of safety and conservation created by reopening the area to oil and gas activity.

Representatives of the potash and oil and gas industries held many meetings and many problems were aired. However, the only significant accord reached is embodied in New Mexico Oil Conservation Commission Order R-111-A, October 13, 1955, providing for notification to the potash lessee of notice of intention to drill by the oil and gas lessee and if objection is made, for a full record hearing before the New Mexico Oil Conservation Commission. Other provisions of Order R-111-A

were more or less imposed on both industries by the Commission.

A more complete paper prepared by International Minerals & Chemical Corporation for the potash group is attached as Exhibit K.

9. Miscellaneous Items

Sylvinite ore is a mechanical mixture of KCl and NaCl. Langbeinite ore is a similar structure but it is a double salt of potassium and magnesium.

These ores lie in bedded deposits. It is mined like coal with coal machinery but there the similarity ends.

Potash ore is non-toxic, non-explosive, non-flammable, has no inherent vices; the dust is harmless - potash miners have breathed it for over thirty years with no ill effects. The mines are clean and dry. About 95% of the finished product is used as fertilizer.

Before World War I, we were dependent on Germany for our potash and during that war, prices of potash rose to $500 per ton.

The present prices are about $21 per ton for both KCl and Sulphate of Potash Magnesia, less than before World War II. We know of no other commodity that can match that price record.

Almost complete automation of mining and processing is the reason. At its peak, the New Mexico industry produced about 5 million tons of finished product annually having a value in excess of $105 million. Current production is about 4 million tons having a value of about $78 million.

The potash industry has a substantial effect on the economy of Lea County, New Mexico and also supports a salt industry of about $1.4 million annually.

About 800 wells have been drilled in the Secretary's area - about 200 of them since 1950 without objection from the potash industry. There have been six contested cases which went to hearing before the New Mexico Oil Conservation Commission. In four, the potash industry position prevailed and drilling was denied. In one there was failure of proof of the existence of potash ore, and in the other drilling was permitted in the old Getty field which was discovered and drilled out before the potash industry was established in New Mexico, on the theory that the potash there was already lost due to the presence of the old oil wells. Later plugging operations on those wells were not successful.

10. Conclusion

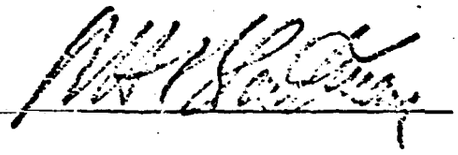
The potash industry has not objected to drilling in the Secretary's area arbitrarily or capriciously, and respectfully urges that the current system of proceeding through objection to hearing and decision under New Mexico Oil Conservation Commission Order R-111-A be continued and recognized. Drilling through known potash deposits with its resultant waste of potash must continue to be prevented.

To the extent that the statements of fact made in this report are in conflict with statements made in the New Mexico Oil and Gas Association presentation, we respectfully urge that the evidence produced herein substantiates the validity of our position.

We shall be pleased to submit additional evidence or conduct studies and surveys on any matter herein treated concerning which you may desire additional information.

Respectfully submitted

On Behalf of the Potash Committee
of the New Mexico Mining Association
and
the New Mexico Potash Industry

By 

5.5 ft. of 16% K_2O Sylvinite Potash Ore

43,560	
5.5	
15/239,580	cu. ft.
15,972	tons
.9	extraction
14,374.8	
.82	recovery
11,787.34	

11,787	
16%	
188,592	units
.35	per unit
$ 66,000	per acre
640	
$42,240,000	per section
36	
$1,520,640,000	

At 1,250 ft. depth the value of the protective pillar would be about $2,100,000.

Value of Protective Pillars - Sylvinite

Value of 16% potash ore at 82% refinery recovery and $0.35 per unit assuming that thickness is 5.5 feet:

Value per ton = Grade x Recovery x Unit Price x 100
= .16 x .82 x 0.35 x 100
=$4.592

I. If well were not drilled, 90% of the ore within a 1,250 ft. radius circle would be mined, or:

$$\text{Tons} = \frac{3.1416 \times 1250 \times 1250 \times 5.5}{15}$$

$$= \frac{4,908,750 \times 5.5}{15}$$

$$= 1,799,875^{(1)} \times .90 = 1,619,887$$

Value of ore that could be mined, no well:

1,619,887 x $4.592 = $7,438,521

II. If well were drilled, the ore in a solid 100 ft. radius barrier would be lost, and the remainder of the ore outside the 100 ft. radius circle and a circle 1,250 ft. in radius would be only 65% extracted.

Tons in 100 ft. radius barrier:

$$T = \frac{3.1416 \times 100 \times 100 \times 5.5}{15}$$

$$= 11,519 \text{ tons}$$

Total tons in 1,250 ft. radius circle - 1,799,875
- 11,519
1,788,356 tons, of which only 65% could be mined or:

1,788,356 x .65 = 1,162,431 tons, the value of which is:

1,162,431 x $4.592 = $5,337,883

Value if no well	$7,438,521
Value, if well	5,337,883
Lost, due to well	$2,100,638

7/31/73

Exhibit B
PREPRINT NO. 5619F

UNDERGROUND MOVEMENT AND SUBSIDENCE OVER
UNITED STATES POTASH COMPANY MINE

E. H. Miller
Resident Manager

F. L. Pierson
Senior Geologist

U.S. Potash Company
Carlsbad, New Mexico

Ex B p.1 admitted as Kerr McGee Ex [illegible] 14

This paper is to be presented at the Annual Meeting of the American Institute of Mining, Metallurgical, and Petroleum Engineers, New York, February [illegible], 19[illegible]. Permission is hereby given to publish with appropriate acknowledgements, excerpts or summaries not to exceed one fourth of the entire text of the paper. Permission to print in more extended form subsequent to publication by the Institute must be obtained from the Secretary of the Society of Mining Engineers of A.I.M.E.

If and when this paper is published by the Institute, it may embody certain changes made by agreement between the Technical Publications Committee and the author, so that the form in which it appears here is not necessarily that in which it may be published later.

-1-

UNDERGROUND MOVEMENT AND SUBSIDENCE OVER UNITED STATES POTASH COMPANY MINE

By

Earl H. Miller, Resident Manager 53:979

And

Francis L. Pierson, Senior Geologist

The United States Potash Company was the original discoverer and first producer of underground mined potash ore in North America and commenced active production of potash in 1931. In July 19[illegible], the company merged with United States Borax & Chemical Corporation and is now a Division of that corporation.

The mine is located twenty-five miles east of the city of Carlsbad and the refinery is located [illegible] miles south of the mine. The mine was placed where the ore was found and the refinery placed where there was sufficient water for a dissolving and re-crystallization plant.

For twenty-three of the last twenty-six years, the potash ore was mined with the room and pillar method, taking approximately sixty percent extraction and leaving forty percent in pillars. These pillars are generally fifty-eight feet by fifty-eight feet square. Three years ago, it was decided that removal of as large an extraction as possible from these pillars should be commenced.

The first visible evidence of subsidence on the surface is by small hairline cracks which rapidly develop into [illegible] measuring up to approximately one inch wide and one hundred feet long. As the face [illegible] the ground, these tension cracks disappear. About the boundaries of the final mined area which have been unmined for any length of time, these cracks spread and become larger. With continued strain and erosional effects, some of the cracks develop into measurable openings measuring six inches to two feet wide and with an unknown depth. With continued erosion, the walls of the cracks fall into the bottom, thus widening and filling the openings.

In the present stage after two years, some of the openings appear as slump holes measuring some six to eight feet across, ten to thirty feet long, and five to fifteen feet deep. The geologic structure through which these forces are transmitted is rather typical of bedded salt deposits in the area. The buff dolomite section at approximately four hundred feet below the surface is a water zone of considerable magnitude over quite an extensive area. The fact that both the salt and potash are highly soluble makes it imperative that the section between this buff dolomite and the underground salt and potash beds below must not be ruptured. The potash bed, which varies from five to fifteen feet in height and lies more or less horizontal, is approximately one thousand feet below the surface and is normally overlain by a salt section some five hundred feet thick. The shale and clay strata below the water zone and above the salt section form the impervious layer which protects the salt section from the water above.

The effects of subsidence over the surface area are much larger than the actual final mined area underground. In those places where final mining has been carried to the limits of the orebody, subsidence effects have been observed some seven hundred feet beyond the limits on the surface. In those places where final mining stopped in a first mined area, subsidence has been noted for distances as great as one thousand two hundred feet beyond the limits of final mining. Principally for this reason,alarge zone about the hoisting shafts has been prohibited to final mining activities until all other mining is completed.

In present operations, there are two types of mining in use. The first is known as conventional mining which utilizes undercutters, drills and blasting, after which the ore is moved from the face with loaders and shuttle cars. The other method is with continuous mining machines, using extensible and mainline haulage belts. In both of these operations, final mining is being carried on. T e conventional final mining system is used generally in high ore in which it would be uneconomical to use a continuous mining machine.

In cases where a mud seam or zone of weakness occurs in a pillar, it will, of course, crush and fail at this point. Frequently when the mud seam is just above the back or just under the floor, the pillar will punch through into the work zone. Additional effects caused by the mud seam just above or just below an entry are frequent sags and falls of roof slabs and heaving of the floor.

Ex B p 2

Even in the event that roof slabs begin to fail over haulage ways, an attempt is made to control their subsidence until the haulage way is abandoned. In controlling roof slabs, cribbing, stulls and roof bolts are often used. These measures usually suffice to keep the haulage ways

open but occasionally it is necessary to blast down a slab and remove it.

It is thought that roof slabbing and floor heaving are caused by the vertical pressure and [illegible] forces. [illegible] tendency for the floor to rise in the entry and the back to sag. The other resulting forces are thought to be the movement of clay in the [illegible] seams from above and below the pillars out into the floor and back in the entries. It is also thought that "end pressure" exerted on the [illegible] planes from the [illegible] pillars helps to cause the initial separation of the [illegible].

The second type of mining in our operations is in the continuous miner sections. Two five years ago we commenced the use of continuous miners, and in this operation a different type pillar was necessary due to the limitations of the machine. The general mining pattern with this method leaves pillars one hundred feet long and thirty-five feet wide after first mining. In final mining, these pillars are reduced to such size that from ninety-five to ninety-eight percent extraction is being obtained. The back stands well immediately after mining but with such a large percentage of extraction, subsidence is relatively rapid.

In graphically plotting subsidence, the total amount of movement underground is estimated to be approximately twelve feet, while the major subsidence on the surface is approximately eight and one-half feet. This would appear to indicate that very little breaking is taking place in the strata above the mined-out area and that the overlying beds are more or less [illegible] uniformly.

In plotting the movement of one particular station on the surface and underground in [illegible] final mined area, it was found that for approximately thirty days subsidence was extremely rapid. The total height of the mined-out [illegible] was originally 12.[illegible] feet. For the first thirty days after final mining, there was apparently little movement; but between thirty and sixty days, the underground workings at this point had subsided 3.[illegible] feet, while the point above on the surface had dropped .7[illegible] feet. At the end of one hundred days, the back had come down a total of six feet, while subsidence on the surface measured 2.[illegible] feet. After one hundred and forty days, the station underground had dropped a total of seven and one-half feet, while the point on the surface had moved down three and one-half feet. Due to the bad conditions of the back underground at this time, observations were discontinued. On the surface, however, the point continued downward, measuring six feet total drop after two hundred days. It was at approximately this point that the sharp rate of subsidence changed abruptly. At the end of one thousand days, the surface station had subsided a total of 7.50 feet, an increase of 1.50 feet in the last eight hundred days.

In graphing the movement of this station, it was found that the line was not continuously downward but indicated that subsidence, both underground and on the surface, came in waves or intervals, and in some cases the ground actually rose from the previous month's reading. From our closest observation in a single instance, it appeared that surface subsidence became measurable approximately thirty-five days after subsidence was noted underground.

In the first study of subsidence movement, a grid was set over the area to be mined with stations on five-hundred foot spacing, both east-west and north-south. These stations were triangulated in each month and a record of their movement was noted. From this date an approximate limiting angle of 51 degrees - 30 degrees has been calculated, the limiting angle, of course, being measured from a line drawn vertically up from the edge of advance and a second line drawn upward from the edge of advance to the outermost point where subsidence was observed on the surface. This limiting angle is important in determining where surface structures will be affected by subsidence. There are many factors which contribute to the degree of the angle. Those principally responsible are:

(1) The overlying strata through which subsidence takes place, this angle being relatively small for strong rocks and relatively large for weaker members, the total limiting angle, of course, being the sum of the various limiting angles up through the differentstrata.

(2) It has been observed that the limiting angle is greater in areas where final mining operations are bordered by first mining operations. Strictly speaking, this is not a true limiting angle because extraction outside the area affects an increase of the angle. However, from the practical point of view, it is quite necessary to take this influence under consideration. We have observed in some cases a limiting angle as large as 51 to 30 degrees. It may be when the

Ex B
p3

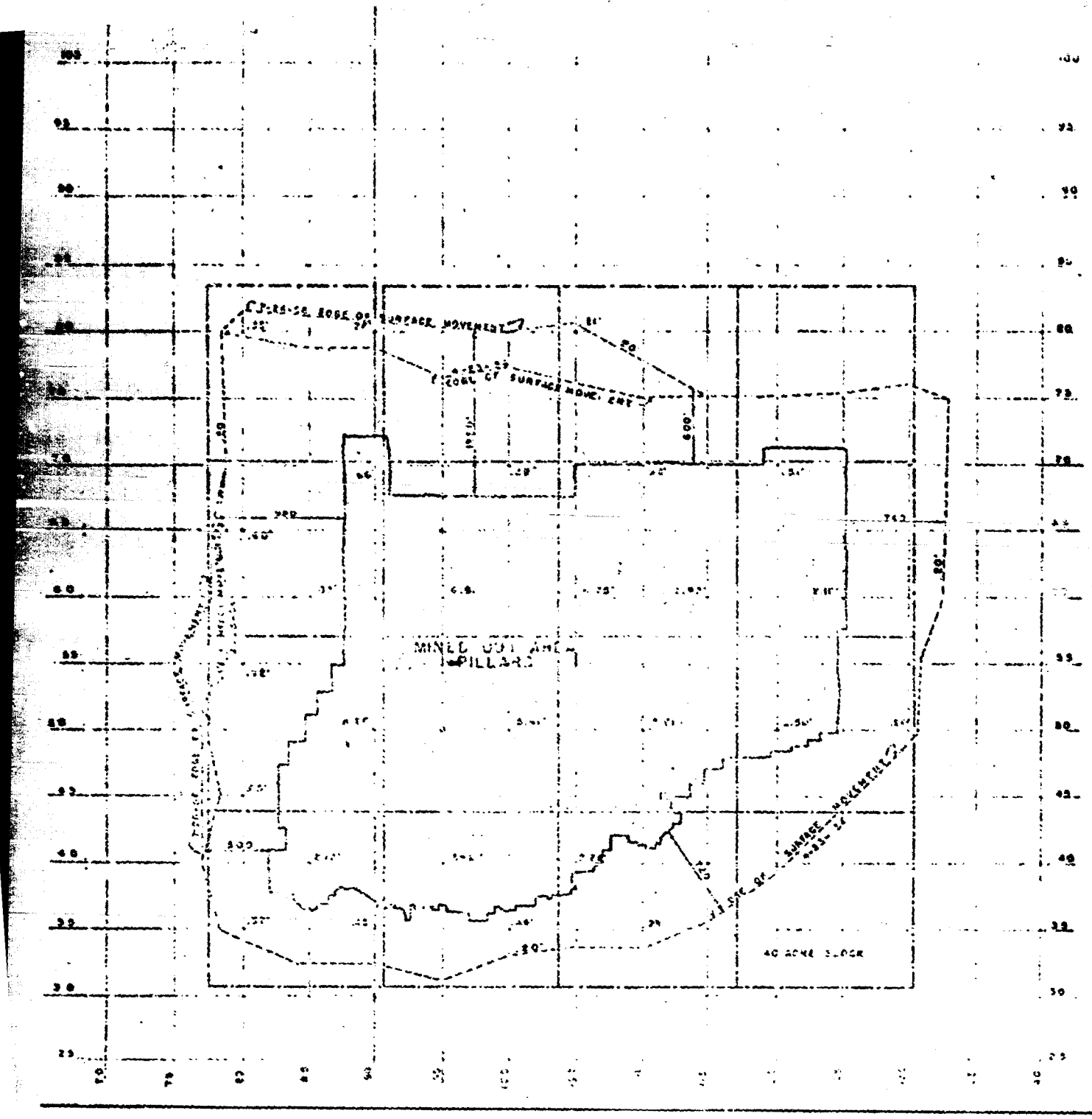
ground completely stabilizes that this angle will become somewhat greater.

The limiting angle, of course, can only be measured well after final mining has been completed and the ground has more or less become stabilized. Up until that point there is a definite lag of subsidence behind actual mining operations.

Recently a line of stations on one-hundred foot centers was placed over the center of an area which was to be [illegible]. In addition to giving much closer control on subsidence data, [illegible] the amount of strain (elongation and compression) between these points. This method of computing will give a more accurate limiting angle and an angle of repose which is the complement of the limiting angle, and the angle of break. The angle of break is of considerable interest as it is the line through which the greatest force of shear is exerted. This angle is measured from the horizontal to a line which is drawn from the edge of extraction of the [illegible] face underground up to a point of maximum tension strain, as plotted from the field data.

It is expected that with continued study, more detailed information on the characteristics of ground movement, as applied to salt-bedded deposits in the Carlsbad district, will become available.

Ex B
p4



KEY

MINED OUT AREA - PILLARS

EDGE OF SURFACE MOVEMENT

OUTLINE OF ACRE BLOCKS

UNITED STATES POTASH COMPANY

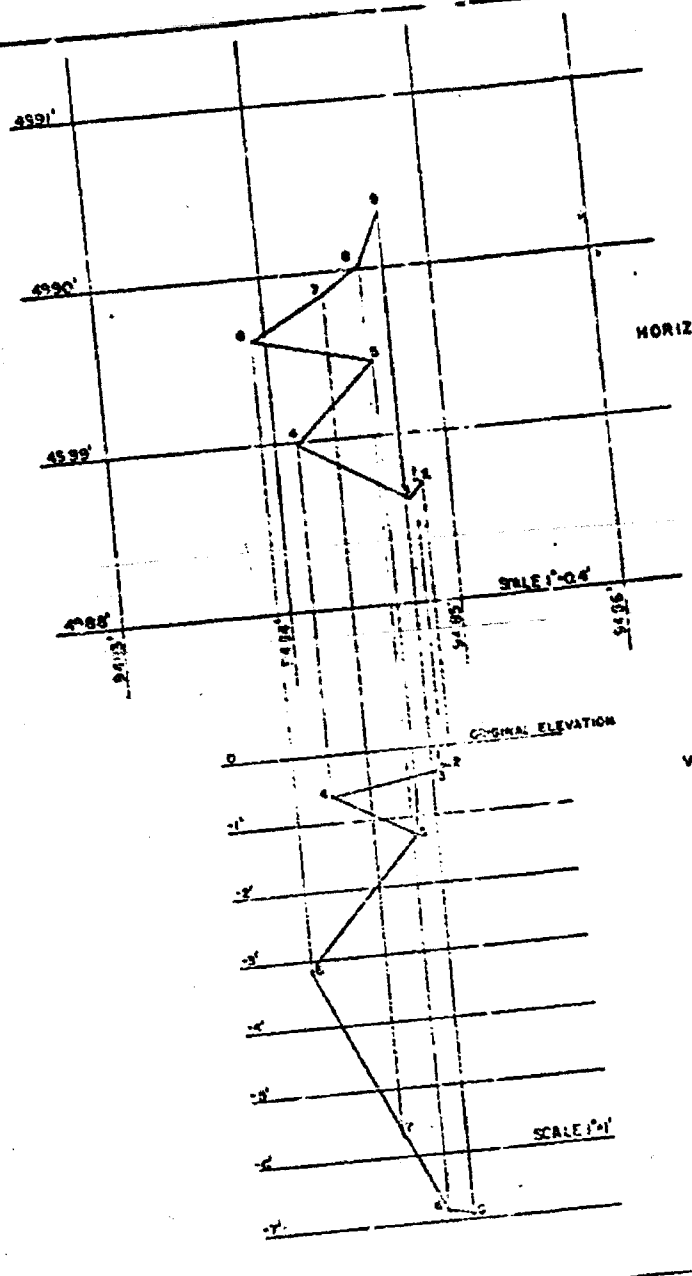
CARLSBAD, NEW MEXICO

MAP SHOWING VERTICAL SUBSIDENCE

STATION 50N-95E

DATE

1. 9-10-55
2. 11-29-55
3. 12-21-55
4. 1-25-56
5. 2-24-56
6. 3-24-56
7. 4-25-56
8. 5-29-56
9. 6-25-56



UNITED STATES POTASH COMPANY

MAP SHOWING HORIZONTAL AND VERTICAL SUBSIDENCE OF STATION 50N-95E

Scale as shown

POST OFFICE BOX 511 CARLSBAD NEW MEXICO 88220

CONSERVATION

Exhibit E

Duval Corporation is currently producing sulphur by the Frasch Process in Culberson County, Texas. The plant was originally designed to produce 2.5 million tons annually. However, sulphur supply conditions at the time of startup limited production to 1.5 million tons annually. Initial production plans called for producing sulphur from three contiguous areas, but such good results were achieved that only one area was steamed for about the first year. As a result of the subsidence due to sulphur production, previously drilled and equipped adjacent wells were damaged beyond use and/or casing recovery. This damage was discovered when attempts to inject superheated water into fully equipped wells failed and when three inch tubing would not pass through seven inch casing in the installation of the final production equipment. Failure to recover 7 inch uncemented casing and uncemented 3 inch tubing accured in over 45 wells.

The sulphur bearing limestone host rock, up to 400 feet thick, occurs at a depth of approximately 300 feet and is of Permian age: The Castile and Rustler formations of the Ochoa Series.

J. W. Magraw

J. W. Magraw
Mine Superintendent

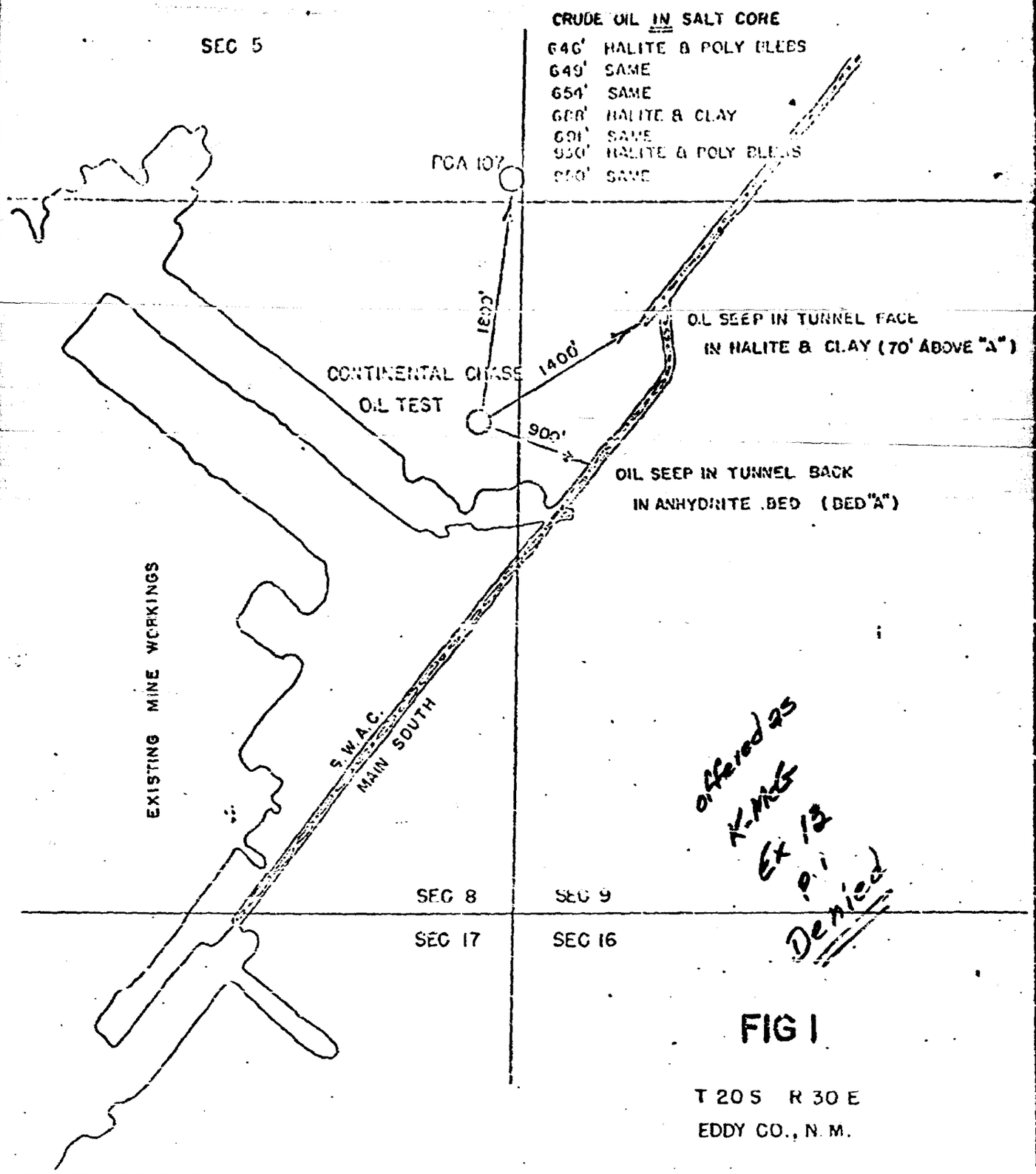


FIG 1

T 20 S R 30 E
EDDY CO., N. M.

PPROVED BY	SHOWING CONTINENTAL CHASE OIL TEST AND THE AREAS WHERE CRUDE OIL HAS BEEN ENCOUNTERED IN SALT.	POTASH COMPANY OF AMERICA CARLSBAD, NEW MEXICO	
		DRAWN BY LFC	DRAWING NO.
		CHECKED BY	
	SCALE- 1" = 1000' DATE- MARCH 64	DIRECTED BY JBC	

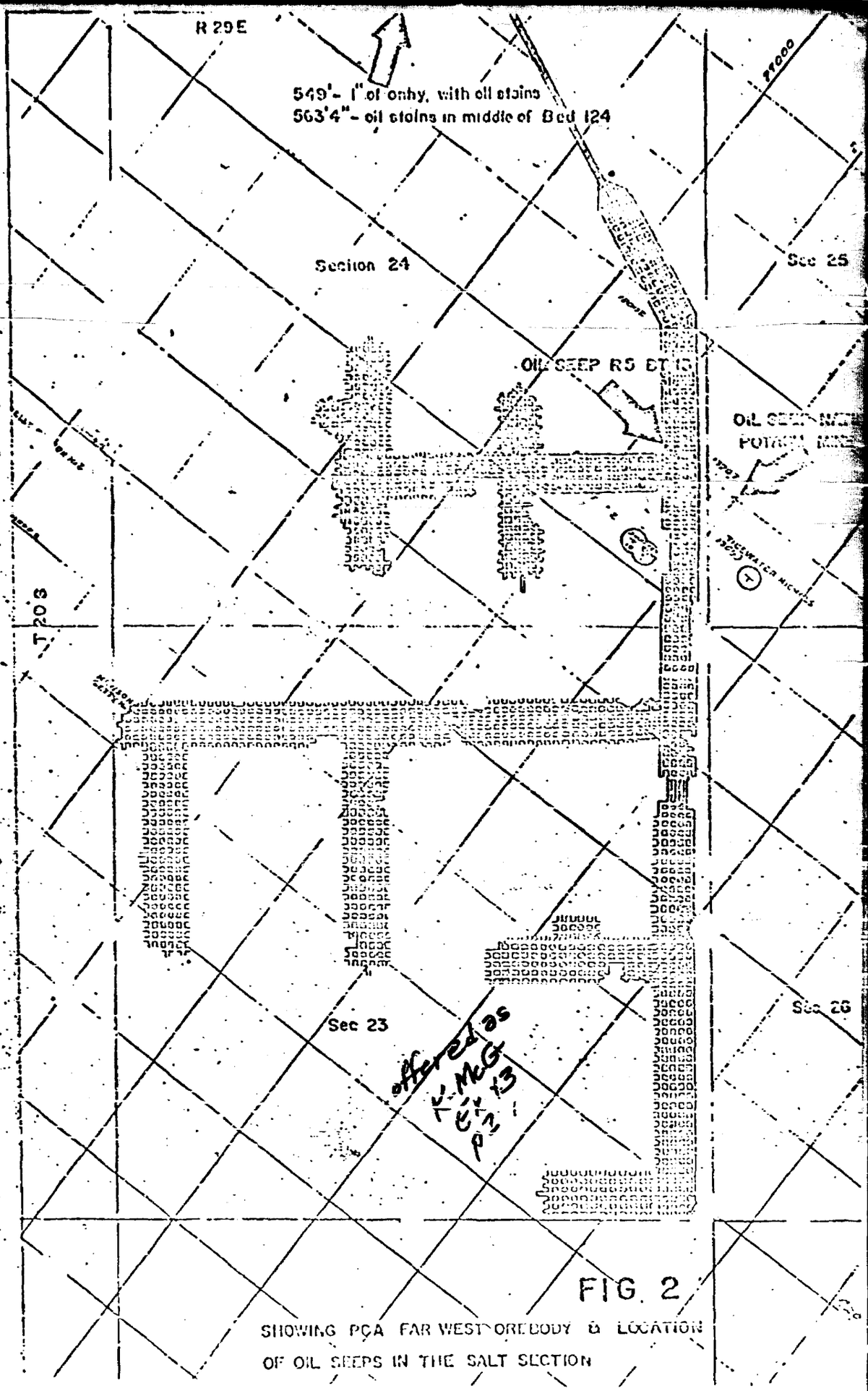


FIG. 2

SHOWING PCA FAR WEST ORE BODY & LOCATION OF OIL SEEPS IN THE SALT SECTION

POTASH COMPANY OF AMERICA

Photographs of Main South Entries Showing Oil Seep Near Abandoned Oil Well

January 18, 1962

Tension crack in anhydrite filled with salt showing oil seep in Main South.

Anhydrite bed - Main South showing oil seep.

Oil seep in rib of Main South Entry.

Face of Main South. Red is polyhalite and salt. Oil covers most of face.

G

NATIONAL POTASH COMPANY

P. O. BOX 731
CARLSBAD, NEW MEXICO

August 1, 1973

Mr. Roy H. Blackman
Resident Counsel
Potash Company of America
P. O. Box 31
Carlsbad, New Mexico 88220

Dear Mr. Blackman:

This pertains to an incident in the spring of 1965 in which we encountered evidence of oil seepage in operations at our Eddy Mine. The location where this occurred was approximately 1,000 feet from the west line and 100 feet from the north line of the NW-1/4, Sec. 25, T. 20 S., R. 29 E. Altogether there were some three or four oil stains present, and two separate entries in the panel were affected.

The material involved at the site was horizontally bedded consisted of 5 feet of sylvinite overlaid by 1 to 1-1/2 feet of clay. No particularly unusual physical conditions were present other than the fact that it was a salt dome area in which the seeps were encountered.

Mining operations in the area were discontinued immediately in order that the seep conditions could be investigated. This, of course, necessitated transfer of operations, including removal of all equipment by the production crews involved, to another area of the mine.

Since the nearest well was the Getty No. 1, which was approximately 700 feet from the location of the seeps, it was suspected as their source. The U. S. G. S. investigated and determined that this well had not been properly and adequately sealed. So the owner was required to reseal it in an approved manner. It is my understanding that this led further to a check of several other wells in the Getty pool in which the findings of such inadequacy were essentially the same and in which similar corrective action was also taken.

If, for any reason, additional information in regard to this matter is needed, I am sure it can readily be obtained from the U. S. G. S. office in Roswell, New Mexico, as personnel from there were involved in the incident.

Very truly yours,

Orland Foster
Industrial Relations Manager

OF:ca

H

JOHN T. BOYD COMPANY

MINING ENGINEERS AND GEOLOGISTS

PITTSBURGH, PENNSYLVANIA
DENVER, COLORADO

July 27, 1973

Potash Committee
New Mexico Mining Association
Post Office Box 31
Carlsbad, New Mexico 88220

Attention: R. H. Blackman, Esquire
Resident Counsel, Potash Company of America

Deor Sirs:

Herewith are our findings on the effects oil or gas wells drilled in potash reserve areas would have on the actual mining operation.

The safety of the underground physical property and personnel operating the mine have been taken into consideration.

I have a working knowledge of the Carlsbad Potash Basin dating back to 1952. Included in this report is Exhibit I showing my professional background and specific consulting work in potash mining.

Very truly yours,

John T. Boyd

Offered 8S
K-McG Ex 14
Denied
not admitted

PLEASE REPLY TO: ☒ 430 Oliver Building
Pittsburgh, Pennsylvania 15222

☐ 1028 Lincoln Tower
Denver, Colorado 80203

GENERAL

The Potash Basin of Lee and Eddy Counties, New Mexico, covers approximately 270,000 acres of land; a high percentage has been mined over. There are seven active operations in the basin, namely,

Amax Corporation
Duval Corporation
International Minerals and Chemical Corporation
Kerr McGee Corporation
National Potash Company
Potash Company of America
Teledyne Potash Company

Refer to Exhibit 2 for general location of the operations.

The general geology of the Carlsbad Potash District is similar over the general area. The surface is covered with sand, caliche and gypsite for several feet then the Rustler Formation of the late Permian Age lies unconformably on the Salada (salt) Formation. The Rustler Formation consists of limestones, anhydrites, water-bearing dolomites, clays and shales.

The Salada Formation is approximately 1600 ft. thick with beds of potash ore (sylvite) within a 150 ft. to 250 ft. zone approximately in the center of the formation. In the western half of the Potash Basin, No. 4 (or 28) Bed is mined and is approximately 1000 ft. below the surface.

In the eastern portion of the Potash Basin the mineable potash ore is known as the 10th Ore Zone and ranges from 1600 to 2100 ft. below the surface, or 650 to 750 ft. into the Salada Formation. The Salada Formation consists principally of beds of halite with bands of anhydrite, polyhalite, thin layers of clay and beds of potash ore (sylvite).

With the underground mining of potash ore or halite (salt), stresses originally distributed throughout a large area are concentrated in the pillars. These stresses are relieved as the pillars undergo continuous permanent deformation without fracture; a process commonly called "plastic flow". As mining continues, pressure on the pillars increases and plastic flow continues indefinitely or until the pillar crushes. A salt grain in an aggregate surrounded on all sides by other salt grains cannot change its shape in an arbitrary manner as the single salt crystal tends to act like the aggregate as a whole with plastic flowage the result.

Potash ore is a combination of halite and sylvite with the same characteristics. The higher the percentage of sylvite, the weaker the potash ore becomes. A second factor which tends to weaken the potash ore is the amount of clay within the ore zone.

The bedded potash ore in the Carlsbad Basin with a 15 to 20 percent K_2O content and the roof salt have the following characteristics when a force is applied perpendicular to the planes of stratification:

	Potash Ore 15 to 20% K_2O	Salt
Compressive Tests (PSI)	3,300	4,400
Yield Strength (PSI)	2,000	2,500

The mineable ore zones in the Carlsbad Potash Basin range from 1000 to 2100 ft. below the surface.

Following is a tabulated comparison of pillar loads for different percentages of recovery.

Mining Recovery %	Overburden Thickness 1,000 ft. PSI	1,600 ft. PSI	2,100 ft. PSI
30	1,430	2,285	3,000
40	1,667	2,670	3,500
50	2,000	3,200	4,200
60	2,500	4,000	5,250
70	3,333	5,330	7,000
80	5,000	8,000	10,500
85	6,600	10,670	14,000
92	12,500	20,000	26,250

Experience at the Amax operation shows that it requires 92% recovery for the remaining ore pillars to crush out and the salt back to bend down and meet the buckled floor. Exhibit 3 shows a generalized section of the manner in which the Salado Formation flows and bends while the shales, clays, limestone and dolomite strata above in the Rustler Formation shear. This is substantiated by the visible surface cracks above an underground pillared area.

The salt back starts to flow and bend when 60% mining recovery is reached with 1000 ft. of cover and 20% mining recovery at 2100 ft. of cover. The potash ore pillars start compressing with 50% mining recovery at 1000 ft. of cover and when first mining starts at 2100 ft. of cover.

Experience has shown that the first layer of salt roof does not always break as represented on Exhibit 3; the breaking depends on the location of the clay seams. In many cases the immediate salt roof will bend or break off in large slabs.

With pillar mining in potash, the surface will subside 65% of the mining height underground directly above the mined out areas and taper off to 0 at the edge of the 45 to 50 degree angle of draw (see Exhibit 3).

With a normal pillar recovery system in mining a 10 ft. seam, the salt back will move as much as 12 to 14 ft. The salt becomes plastic and flows as a mass. The forces that would build up against any oil or gas well casing in a subsidence area would be uncontrollable.

EFFECTS OF OIL AND GAS WELLS IN POTASH MINING AREAS

1. The mine operators in the Carlsbad Potash Basin have definite proof that the angle of draw or area affected by pillar mining ranges from 45 to 51 degrees from the edge of the caved area at the ore level (see Exhibit 3).

2. With pillars removed, the 400 to 600 ft. of salt back above the potash ore zone becomes plastic and flows. This is substantiated as the dolomites in the Rustler Formation above the salt are water-bearing and would enter the mine in large quantities if the salt would fracture.

3. The limestone, clays dolomites and shales above the Salado (salt) Formation fracture and subside when pillars are removed. This has been proven by visual evidence and surveys by the potash mine operators.

4. Any oil or gas well drilled in the Carlsbad Potash Basin would require the mine operator to first mine only in an area around the well with the diameter of the area equal to twice the depth of the surface to the ore zone. The amount of first mining permitted would depend on the

4. (continued)

depth of the ore zone from the surface and could range from 35 to 50 percent mining recovery. The ore lost due to first mining only could range from 460,000 to 3,400,000 tons per well.

5. In the Carlsbad Potash Basin two mine operators, namely, PCA and National, have witnessed oil seeps. Gas has been known to migrate through salt strata and could readily migrate along the mud seams in the Salado Formation.

6. Pillar mining within a minimum of a 45 degree angle of draw area of any oil or gas well (see Exhibit 3) could result in the shearing of the casing. Methane gas entering the mine could cause a violent explosion which would damage equipment and take the lives of the miners. The explosive range of methane gas is 5 to 15 percent mixture with air.

7. If methane gas is detected in any operating mine, the United States Bureau of Mines would classify the mine as "gaseous". This would require the mine to operate under different mining conditions. The main changes would be,

(a) Mining equipment would become obsolete and would be replaced with permissible electrics.

(b) Each operating section would operate on a separate ventilating split of air.

7. (continued)

(c) Ammonia nitrate explosives would be replaced with permissible explosives.

(d) Total capital cost would depend on the size of the mine, but operating costs could increase 25 percent.

8. The oil and gas reserves would not be wasted as it is my opinion that 5 years after pillar mining is completed complete subsidence would occur and the areas could be penetrated with wells.

9. Comparing a pillar mining versus first mining only operation in the Carlsbad Potash Basin, the net profit per ton of product drops from $3.20 before taxes to a net loss of $0.12. Thus, a mining system limited to first mining only would result in an uneconomical operation. See Schedule 1 following this text for detail.

Respectfully submitted,

JOHN T. BOYD COMPANY
By:

John T. Boyd

SCHEDULE 1

CARLSBAD POTASH INDUSTRY

Example of Effect of Restricted Mining Recovery on Production Costs

By
John T. Boyd Company
Mining Engineers
July 1973

Basic Assumptions:

Total Reserves, Ore in Place, net tons (000's)	135,000
Average Mining Depth	2,000 ft.
Mine Production per Year, net tons (000's)	3,600
K_2O Grade	15%
Product Grade, Percent K_2O	62%
Mill Recovery	82%
Total Recovery - Millfeed to Product, $\frac{0.15 \times 0.82}{0.62} \times 3{,}600{,}000$	714,000 tons
Sales Value per Ton Product	$21.70

	Case 1	Case 2
Mining Plan	Pillar Mining	Partial Mining
Mining Recovery	80%	35%
Recoverable Ore to Mill, net tons (000's)	108,000	47,250
Total Recoverable Product, net tons (000's)	21,400	9,400
Annual Product, net tons (000's)	714	714
Life of Mine, years	30.0	13.2
Investment per Annual Ton Product	$72.00	$72.00
Depreciation per Ton Product		
Mining	$ 2.50	$ 2.75
Milling and Processing	2.35	3.55
Total	$ 4.85	$ 6.30
Depreciation per Year $(000's)	$3,463	$4,498
Increase in Depreciation Charges	-	$1,035
Depreciation per Unit K_2O Equivalent	$ .078	$ .102
Cash Cost per Unit K_2O Equivalent	.220	.250
Total Cost per Unit K_2O Equivalent	$ .298	$ .352
Total Cost per Ton Product, Before Taxes and Return on Investment	$18.50	$21.82
Estimated Sales Price	21.70	21.70
Profit Before Taxes per Ton of Product	$ 3.20	$ (0.12)
Estimated Mine and Mill Investment per Annual Ton of Product	$72.00	$72.00

PROFESSIONAL BACKGROUND AND EXPERIENCE

John Thomas Boyd
Mining Engineer

Born: Elyria, Ohio, January 14, 1913.

Education: The Ohio State University, B.E.M. – 1935

Memberships: American Institute of Mining, Metallurgical and Petroleum Engineers; American Mining Congress; Coal Mining Institute of America; Ohio Society of Professional Engineers; National Society of Professional Engineers; etc.

Registrations: Registered Professional Engineer in Kentucky, Ohio, Pennsylvania and West Virginia.

Experience:

(1) John T. Boyd Company, Consulting Mining Engineers, Oliver Building, Pittsburgh, Pennsylvania. Chairman and Chief Executive Officer. (1968 to date)

(2) John T. Boyd & Associates, Consulting Mining Engineers, Oliver Building, Pittsburgh, Pennsylvania. Owner. (1964 – 1968)

(3) J. W. Woomer & Associates, Consulting Mining Engineers, Oliver Building, Pittsburgh, Pennsylvania. Partner. (1944 – 1963)

(4) From engineer trainee to production engineer. (1935 – 1943)

Nature of Consulting Work:

Geological work on coal (deep and strip), potash, limestone, clays, sand and gravel, copper and iron ore.
Proved mining properties, both metallic and non-metallic.
Designed modern plants and modern mining systems.
Installed modern machinery in underground and opencast operations.
Presented forecasts of costs, production and financial returns.
Designed rock tunnels and supervised their installation.
Made many specific project studies on drainage, hoisting, maintenance, etc.
Made valuations and appraisals for banks, railroads, utilities, and various companies.
Represented utility companies on coal combustion matters.
Appeared as expert witness in legal controversies.

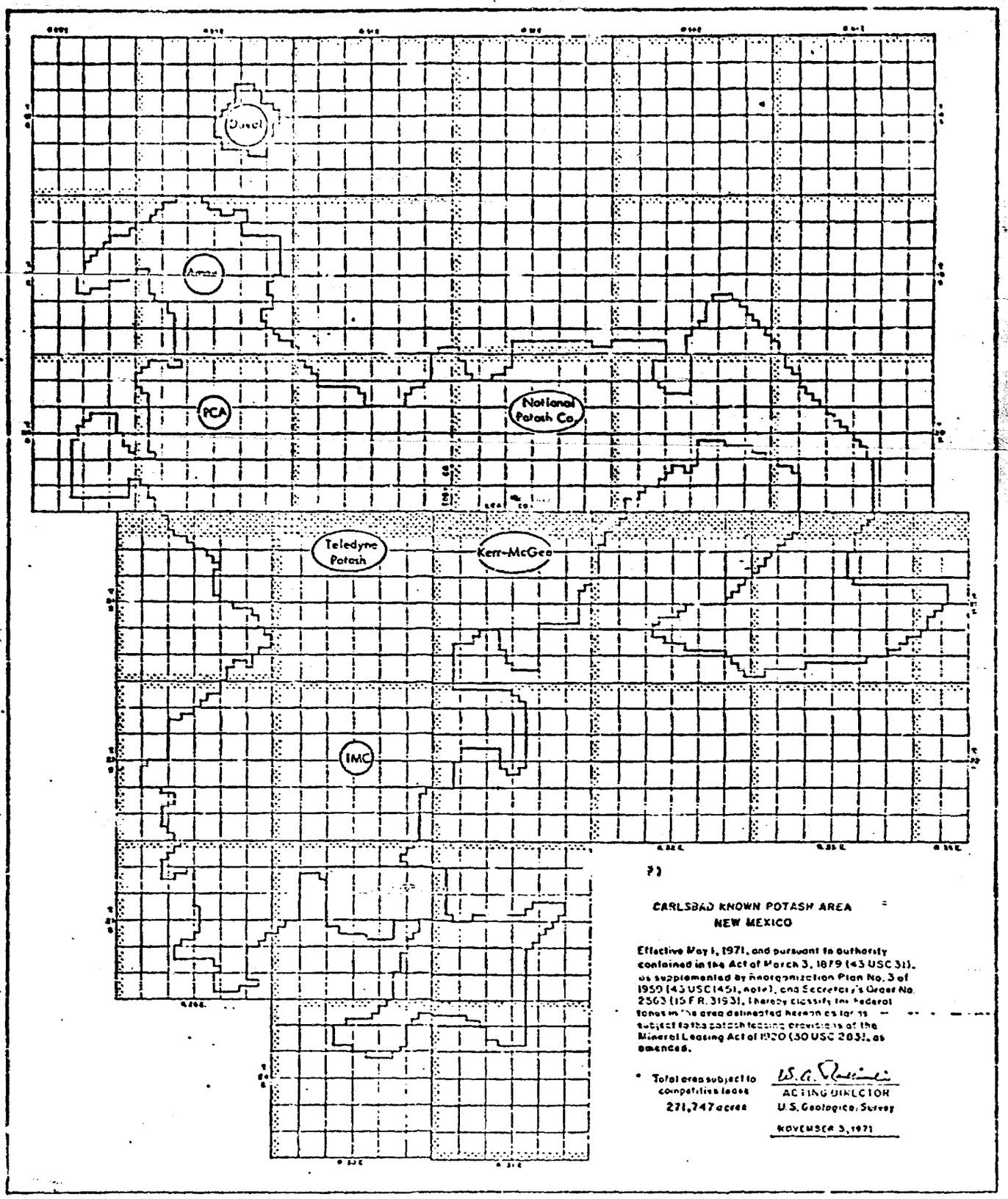
Foreign Mining Experience:

Australia	Ethiopia	Israel
Canada	France	Mexico
Chile	Greece	Philippines
Dominican Republic	Japan	United Kingdom

Consulting Work in Potash:

Southwest Potash Corporation
Carlsbad, New Mexico
Bredenbury Potash Reserve, Saskatchewan, Canada
Musley Sylvite Study, Danakil, Ethiopia
Superior Oil Limited
Canberra Potash Study, Saskatchewan, Canada
Consolidated Mining & Smelting Company of Canada Limited
Vanscoy Potash Study, Saskatchewan
Noranda Mines Limited
Noranda Potash Study, Saskatchewan
Sentry-Rainbow Oil Limited
Potash Mining Study, Saskatchewan
United States Steel Corporation
Kolle Potash Study, African Congo
National Potash Company
Potash Studies in Lee and Eddy Counties
Continental Minerals Inc.
IMC Reserve Study Saskatchewan
Potash Company of America
Carlsbad, New Mexico
IMC
Carlsbad, New Mexico

Exhibit 1



CARLSBAD KNOWN POTASH AREA
NEW MEXICO

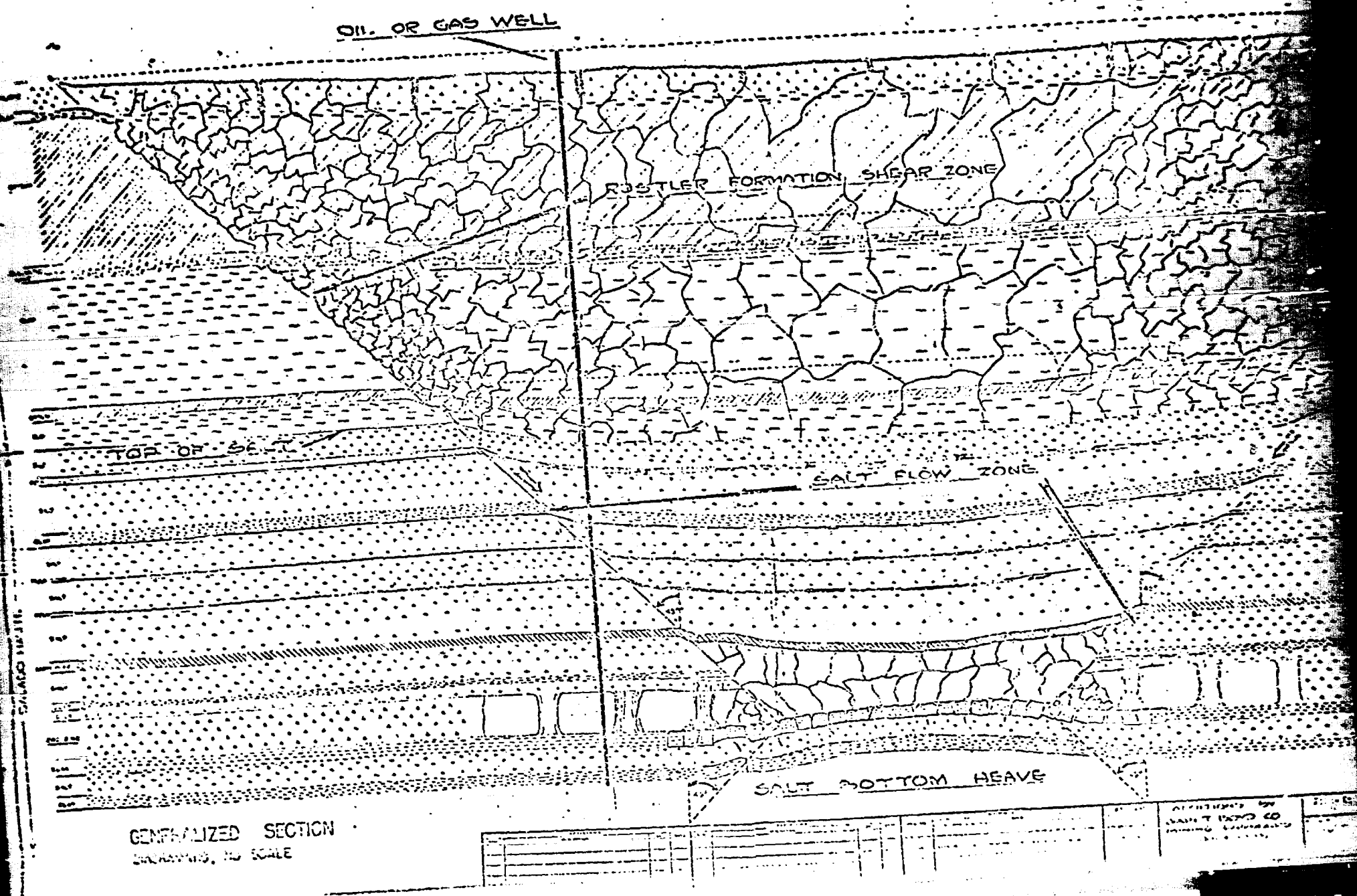
Effective May 1, 1971, and pursuant to authority contained in the Act of March 3, 1879 (43 USC 31), as supplemented by Reorganization Plan No. 3 of 1950 (43 USC 1451, note), and Secretary's Order No. 2563 (15 F.R. 3193), I hereby classify the Federal lands in the area delineated hereon as land is subject to the potash leasing provisions of the Mineral Leasing Act of 1920 (30 USC 203), as amended.

* Total area subject to competitive lease
271,747 acres

W. A. Radlinski
ACTING DIRECTOR
U.S. Geological Survey

NOVEMBER 3, 1971

Exhibit 2



GENERALIZED SECTION
NO SCALE

Form 102.

I

MEMORANDUM

AMAX Chemical Corporation
A SUBSIDIARY OF AMERICAN METAL CLIMAX, INC.
P. O. BOX 270, CARLSBAD, NEW MEXICO 88220 (505) 885-3157

July 6, 1973

To: Mr. R. D. Brown

From: C. C. Curry

Subject: Increased Cost of Second Mining After Passage of Time

During the period February 1968 through May 1970, we reentered several sections of our mine in which first mining had been completed for periods of from four to sixteen years.

Attached are excerpts from reports of the Mine Superintendent to the General Manager during that period in which pertinent comments have been underlined in red. In each instance where an item is so identified, the area identified was a reentered area as explained above.

From the attached report and our accounting records, the following conclusions are presented:

1. Productivity in reentered sections was approximately 22% lower than if the second mining had been performed contemporaneously with first mining.

2. The additional cost per ton of product produced from a reentered area is estimated at $0.35.

3. Ore which could not be removed on delayed second mining which probably could have been produced contemporaneously with first mining was substantial. In 59-West that extraction was only 76.5% compared with our current extraction rate of 91%.

C. C. Curry

West Mains - The ore bed remains regular and good grade. Some localized rolling of the bed was encountered on the northern portion of the section.

2 South-West - The ore bed is slightly improved as to thickness and grade.

East Region

59 West - Second mining was completed with a total extraction of 76.5%. The lower extraction was due to necessity of leaving three rows of partially crushed pillars along the old 59 West second mined area.

10 South - Men and equipment were moved from 59 West and second mining operations started in fringe ore.

2 South-East - Second mining is progressing satisfactorily in thick, good grade ore.

6 East - Production from the continuous miner was 3,238 tons, with the remaining 516 tons from ore left in section from previous mining. The ore bed is thick, good grade, with some sharp rolling.

Continuous Miner

The machine operated 16 shifts and produced 3,238 tons with the following evaluation:

Effective machine utilization = 18.5%
Effective cutting rate = 128 tons/hr.

The remaining lost time of 81.5% is distributed as follows:

Miner	
Mechanical, electrical, etc.	18.5%
Service & change bits	8.6%
Moving, position, trimming	14.1%
Total	41.2%
Other	
Ventilation	2.2%
Back-up equipment	32.6%
Travel and lunch	24.0%
Total	58.8%

The higher mechanical down time was mainly due to considerable trouble with hydraulic jacks.

Safety

There were a total of 3 lost time accidents consisting of electrical burns, sprained shoulder and bruises to arm and leg.

Production from State and Federal Leases

	July		Year-to-Date	
	Tons	% K_2O	Tons	% K_2O
Federal	77,309	17.4	1,063,056	18.1
State	63,197	18.0	648,709	19.4

Efficiency Rate (Based on Tons Hoisted)

	Man-Shifts		Tons per Man-Shift		
	July	June	July	June	Year-to-Date
Production Crews - Hourly	1577.81	2058.19	89.05	95.31	89.56
Total Hourly	3662.09	4209.81	38.37	46.60	45.72
Salary	769.00	807.00	182.72	243.09	248.44
Total	4431.09	5061.81	31.71	39.10	38.62

Ineffective manpower for July was 5.56% as compared with 5.13% for June.

General Comments

The mine grade of 17.7% K_2O fell below the plan grade of 18.2% K_2O. This low grade can be attributed to the following:

1. Excessive heights in the two 1st mining sections caused unnecessary dilution of the potential ore grade.

2. Degradation of the ore bed in a localized area of 2 Southwest.

3. Extremely heavy ground conditions in the 2 Southeast and 45 West 2nd mining sections which, among other things, contributed additional dilution.

The degradation in 2 Southwest is showing a natural improvement and steps are being taken to improve grade control in the other areas.

Production efficiency dropped from 95.31 tons per man-shift in June to 89.05 in July. This in part explains the 12.2¢ per ton increase of mining costs over the projected standard costs. There are existing conditions in 45 West which are not conducive to high production efficiency. Back conditions are causing excessive rehandling of material and the original low mining height plus the fact that this section has been dormant for 6-1/2 years causes numerous additional problems. As a result, this section produced 8.9% of the total ore and required 13.4% of the total production manpower for an efficiency rate of 58.9 tons per man-shift compared with the overall average of 89.05.

Production from State and Federal Leases

	August		Year-to-Date	
	Tons	% K_2O	Tons	% K_2O
Federal	128,255	18.6	1,191,311	18.2
State	124,183	18.6	772,892	19.3

Efficiency Rate (Based on Tons Hoisted)

	Man-Shifts		Tons per Man-Shift		
	August	July	August	July	Year-to-Date
Production Crews - Hourly	2940.00	1577.81	85.86	89.05	89.06
Total Hourly	5746.59	3662.09	43.93	38.37	45.48
Salary	1046.00	769.00	241.34	182.72	247.51
Total	6792.59	4431.09	37.16	31.71	38.42

Ineffective manpower for August was 4.73% compared with 5.56% during July.

General Comments

The average grade of 18.6% K_2O for August exceeded the plan grade of 18.4% K_2O. The year-to-date average is 0.5% K_2O below the planned average. It is doubtful that the four remaining months will average the required 19.5% K_2O needed to meet the year end planned average of 18.9%.

Production efficiency dropped from the previous month to 85.86 tons per man-shift. Overall efficiency also dropped when compared to the last full month (May) of operation. This loss in production is primarily attributed to the following:

1. Completion of 5 South and 3 North second mining during the month and the resulting preparation of two new working sections.
2. Adverse ground conditions and restricting mining conditions in 2 Southeast and 45 West.
3. Extraordinary loss on mainline haulage due to derailments.
4. Equipment breakdowns.

The mining cost of $1.485 per ton was $0.165 over the standard of $1.320.

West Region

3 North - Second mining operations were completed for the present. Extraction was 92.6% under satisfactory ground conditions. Crews were moved to 80 West.

West Region

3 North - 2nd mining operations continue under satisfactorily controlled conditions in very low grade ore.

2 Southwest - 1st mining intersected a localized area of salt inclusions which affected the overall grade. This condition appears to have improved and the section is back to normal.

5 South - Some of the gauges installed at the 14 and 17 Breaks to record convergence are no longer visible. It is assumed that, at these points, convergence has exceeded the 2-1/2 ft. range of the gauge.

West Mains - Ore grade and thickness continue to be satisfactory.

East Region

45 West - This section is operating under adverse conditions in respect to low height, back conditions and maneuverability with the section which have resulted in low grade and low tonnage. Steps have been taken to improve this condition by selectively mining the more accessible pillars, thereby sacrificing overall percent extraction in favor of higher grade and efficiency.

2 Southeast - Conditions are similar to 45 West and warrant the same approach.

Cost Analysis

1. Unfavorable variance of $7,846 in salaries and fringes reflects the difference in manpower for the planned production level and the actual production level achieved, also increased cost of fringe benefits granted after the plan was formulated.

2. Unfavorable variance of $7,645 in hourly labor is due to the low production efficiency and increased maintenance employees.

3. Favorable variance of $3,627 in production bonus reflects the low tonnage levels.

4. Unfavorable variance of $11,651 in hourly fringe benefits results from unfavorable labor variance.

5. Favorable variance of $7,949 in ordinary and lubricating supplies was offset by overexpeditures of $7,413 in repair supplies This overexpenditure is due chiefly to overhauling major mine equipment as a preventive measure.

George Carrico

George Carrico
Mine Superintendent

30 West - A new first mining belt section was set up off the 3 North Main immediately south of 89 West. Experimental innovations with respect to work cycle, equipment combinations, shooting patterns, and height-grade control are being set up and evaluated on this section.

5 South - Second mining operations were completed during the month and the crews are being moved to 14 South, a new first mining section on the east side immediately north of 23 West. Extraction in 5 South, from 19 to 4 break, averaged 92.0% with good second mining conditions. It has been recommended that the second mining pattern adopted in this section after the last major fall should be continued on future second mining operations.

West Mains - Ore grade and thickness continue satisfactory in this first mining section.

2 Southwest - The salt horse reported last month was a localized condition as predicted and all entries returned to good ore. However, this condition was only temporary and during the latter part of the month, the entries again intercepted what appears to be a major salt horse. As of the end of the month, 5 of the 11 entries were in salt. All entries have been narrowed down and it may become necessary to probe through with a minimum number of entries to sustain haulage and ventilation.

East Region

45 West - This section continues to operate in very low constricting height and heavy ground conditions. The southern end of the adjacent 1 South Main is being prepared for operation and will hopefully alleviate these conditions to some extent.

2 Southeast - Ground conditions and maneuverability continue to plague this section. The low production from this section is somewhat counteracted by the high grade.

Cost Analysis

Ore Grade Variance - Unfavorable variance of $8,055 due to the year-to-date averaging 0.48% below the plan.

Production Volume - Unfavorable variance of $2,861 due to low level of ore mined.

Mining Cost - Unfavorable variance of $41,480 due to the following:

1. Unfavorable variance of $8,383 in salaries and fringes continue to reflect increased personnel over planned estimate as well as increased cost of fringe benefits granted after standard costs were formulated.

2. Unfavorable variance of $30,002 in hourly labor due to low average daily tonnage with the manpower projected to achieve a higher level. Also, increased maintenance employees over planned estimate.

3. Favorable variance of $5,676 in production bonus reflects the 85.86 versus 97.0 tons per man-shift projection.

SOUTHWEST POTASH CORPORATION
REPORT OF OPERATIONS
Month of October, 1968

To: Mr. C. A. Arend, Jr., Vice President By: J. S. Mitchell, General Manager

General Summary

The mine hoisted 258,708 tons of ore as compared with the forecast of 283,650 tons. A fatal accident in the mine on October 24th resulted in a twenty-four hour production delay, thus accounting for 9,000 tons of the 25,000-ton shortage.

Muriate production amounted to 65,558 tons as compared with the anticipated 77,000 tons. The shortage of 11,500 tons is attributable to general failure to produce mine tonnage and the average ore grade of 18.1% K_2O as compared with 19.5% in the forecast. The grade problem resulted primarily from encountering a "salt horse" of unknown size in the 2 South-West section. Efforts to probe this area also adversely affected production. Productivity index for mine production crews averaged 89.7 tons per man-shift which is the same as the previous month. Productivity in the three West sections of the mine averaged 98.5 tons per man-shift versus 80.8 TPMS for the three sections in the East.

Mill recovery averaged 85.8 percent which reflects an improvement of 0.5% over September's performance. Carnallite content of the feed ore averaged 3.90% for the second straight month. This material is coming from the West Mains in the mine. Tailings losses averaged 4.4% of the mill feed K_2O values. The CCD complex losses averaged 6.1% reflecting the high carnallite content of the feed ore.

Muriate production was 65,558 tons with a product mix of 29% Standard, 42% Coarse, 26% Granular, and 3% Unisereen. Total product inventory decreased approximately 11,400 tons to a month-end value of 87,000 tons.

Muriate shipments totalled 77,003 tons. Export shipments amounted to 10,900 tons or 14.2% of the total. Sales estimates indicated 56,000 tons for domestic and 13,000 tons of export for a total of 69,000 tons.

Cost Analysis

Total expenditures for the month were $828,237 for an average of $12.63 per ton of product. Overall variance exceeded plan by approximately $7,500. This is the result of an unfavorable variance of $31,630 for production costs that were nearly offset by favorable variances of $2,564 for storage and shipping and $21,584 for plant administrative costs.

Mining costs averaged $1.485 per ton of ore, thus exceeding standard costs by $.167 per ton. Salary, hourly labor and fringes exceeded standard costs by $40,943. Mine repair supply costs exceeded standard costs by $12,612. This supply account for the year to date exceeds standard by $109,443. Of this amount, some $46,224 or 1.9¢ per ton represents non-recurring items such as Nordberg hoist gear, rotary car dump repair, Goodman loader conversions, etc.

West Region

38 East - First mining in this new section continues in high grade ore without intersecting any additional salt horses. Productivity levels were low due to equipment failures.

West Main - Productivity from this section remains high despite the unnatural rolling of the ore body. Grade dropped drastically during the month as a result of excessive heights and displacement of sylvite with carnallite in the ore body. The higher carnallite concentrations are becoming a problem to recovery in the mill.

80 West - The ore in the section continued to thin and finally dropped below the economic cut-off. Development was stopped and second mining operation initiated on November 27, 1968. This section was stopped even with the adjacent section, 89 West.

East Region

1 South - Second mining in this section is experiencing adverse roof conditions. The nature of the roof coupled with the time lapse between first and second mining have created conditions that restrict production and lower efficiency.

2 South-East - Mining conditions and productivity showed some improvement during the month in this second mining section. The grade of the ore continues to be exceptionally good.

14 South - First mining continued to be hampered by dipping of the ore body. Grade improved during the month.

Cost Analysis

Mining Costs - Unfavorable Variance of $40,652

1. Unfavorable variance of $2,517 in salaries and fringes continues to reflect increased personnel and increased fringe costs not anticipated when the plan was formulated.

2. Unfavorable variance of $30,316 in hourly labor, bonus and fringes is due to lower efficiency of the production crews and total manpower levels keyed to 9,400 tons per day and a resulting 8,675 tons per day

3. Unfavorable variance of $13,520 in repair supplies continues to reflect condition of the mining equipment.

4. Favorable variance of $5,386 in blasting supplies results from an increased efficiency of materials used and a reduction in cost of materials.

George Carrico
Mine Superintendent

East Region

1 South - Second mining in this section continues at a very slow rate. Deteriorating roof conditions have not improved.

2 South-East - Ground conditions have improved now that one side of the section is adjacent to solid ground. Second mining production is still a problem in this area. The present mining and haulage systems being used are not compatible with the methods that were used to develop this area years ago.

14 South - The ore grade has continued good with less rolling of the ore bed.

Cost Analysis

Mining Costs - Unfavorable Variance of $16,023

1. Unfavorable variance of $2,653 in salaries and fringes continues to reflect increased personnel and fringe benefit costs not anticipated when the plan was formulated.

2. Unfavorable variance of $25,622 in hourly labor, bonus and fringes is partially due to low production efficiency and manpower levels set up for 9,450 TPD with a resulting production of 9,139 TPD. Two Saturday midnight shifts on overtime rates also contributed to this variance.

3. Favorable variance of $8,507 in ordinary and lubricating supplies reflects a $2,224 credit refund on lubricating taxes.

4. Unfavorable variance of $7,248 in repair supplies continues to reflect condition of the mining equipment.

5. Favorable variance of $10,553 in blasting supplies is due to reduction in price of ammonium nitrate and more efficient use of materials.

George Carrico
Mine Superintendent

3 North - Four rows of blocks were skipped in the 3 North Mains due to low grade. Four ows were second mined and completed February 25th. Production in this area will resume after the new mainline belt set-up is completed.

East Region

1 South - Second mining operations are experiencing very heavy ground conditions. The ore grade continues good and uniform. Production efficiency failed to improve.

2 South-East - Second mining in very good grade was increased during the month, however, the production efficiency dropped.

14 South - This first mining section is now heading east, attempting to complete development of the very irregular shaped area. Limited working places dictates the use of half crews. Ore of very good grade was diluted due to difficulties in following the rolling ore body.

Cost Analysis

The unfavorable mining cost of $1.501 was due to the overall low efficiency causing a variance of $36,323 in salaries and labor. Favorable variances mainly in supplies, fringes and bonuses defrayed $16,019 of these costs.

The low production efficiency combined with increased back-up labor continue to escalate mining costs.

Blasting supplies showed a small increase during the month due to the following:

1. The last two sections, 14 South and 2 South-East, were converted to the new blasting pattern.

2. This required the removal of approximately 15,000 8-ft. leg wires already charged to the mine, and their replacement with higher priced 12-ft. leg wires.

A credit for these caps will be reflected in the March cost. An overall 3.5% price increase of caps from the supplier went into effect March 1st. Due to the changes taking place with respect to blasting, it will be April before a stabilized cost is available and the savings effects of this change can be evaluated.

George Carrico
Mine Superintendent

West Region

38 East - Production from this first mining section was increased during the month due to absence of 3 North production. The ore bed continues regular and uniform but at a lower grade.

West Mains - Carnallite content dropped some from 12.4% to 11.4% with a slight overall grade improvement. Hole #37 was intersected during the month. This hole penetrated an irregular ore body with respect to grade and carnallite content at a location which produced erroneous results. A regular mine sample, 13 feet away was cut in ore of completely different ore averaging 19% K_2O and 25% carnallite. In addition to ore grade, the dip of the ore body continues to be a problem for rail haulage.

3 North - Conversion of the haulage system was completed and ready for operation March 31st. The first production panel will drive east to old 2 North and be designated 70 East.

East Region

2 Southeast - Second mining operations were completed in this section on March 30th. Production crews from this section will move into 6 East first mining operations.

1 South - Heavy ground conditions and restricted haulage facilities which contribute to low production in only average grade ore present some question as to the economics of continuing this section.

14 South - First mining operations were completed and second mining initiated on the 24th of March.

Cost Analysis

The unfavorable mining cost of $1.508 was composed of a variance in salaries, labor and fringes of $56,759. Low production from the total mine force sized for a much higher production level produced this discrepancy. All other expense accounts showed a favorable variance of $21,947 which defrayed the labor cost and resulted in a total unfavorable variance of $34,812.

George Carrico
Mine Superintendent

Production from State and Federal Leases

	April		Year-to-Date	
	Tons	% K_2O	Tons	% K_2O
Federal	131,360	21.0	498,195	20.5
State	136,396	15.8	577,895	16.5

577,495

Efficiency Rate (Based on Tons Hoisted)

	Manshifts		Tons per Manshift		
	April	March	April	March	Year-to-Date
Production Crews - Hourly	3239.63	3072.94	82.65	84.92	83.80
Total Hourly	6369.53	6434.80	42.04	40.55	42.37
Salary	1000.00	1065.00	267.76	245.03	265.21
Total	7369.53	7499.80	36.33	34.79	36.53

Ineffective manpower for April was 5.3% compared with 4.2% during March.

General Comments

The mine operated a total of 90 production shifts during the month which included four (4) Saturday night shifts. Production efficiency dropped to 82.65 tons. However there was an improvement shown in overall efficiency for the month. Mainline haulage problems, particularly in the 6 East section, drastically affected production.

The average mine grade dropped from 18.6% to 18.3% K_2O. This drop in grade reflects the degradation in the West Mains and resumption of mining in the 3 North area.

West Region

38 East & 9 South - This first mining section had advanced eastward to the 1 South workings. The production crews are now in the process of turning south from this point and working the 9 South section. The ore continues to be regular and good grade.

70 East - This belt section was turned east off the 3 North Mains at 70 break. The ore is relatively flat lying and reasonably uniform. Mine samples indicate that the overbreak is excessive in this belt section. Height control to 64" could yield a +19% grade.

West Mains - This section continues to produce high tonnage at very low grade. The carnallite content continues to be relatively stable, averaging 11.8% for the month, however the sylvite content appears to be weakening.

East Region

1 South - Second mining conditions have improved some during the month. This section is now operating with first mined ground to the west and a sizable barrier pillar to the east. The average ore grade has also improved considerably.

14 South - Second mining operations are being affected by severe rolling of the ore. This is in an area that created difficulty during first mining. These severe rolls cause numerous problems including excessive overbreak which reflects this month's drop in grade.

6 East - First mining operations were resumed in 6 East. Except for minimum production from the continuous miner, this section has been dormant since April, 1965. The ore is thick and good grade but extremely irregular. Adverse haulage grades from the loading points are seriously affecting production.

Cost Analysis

Mining Costs - Unfavorable Variance of $30,368.

Major unfavorable variances were as follows:

1. Unfavorable variance of $4,092 in salaries was due to $1,303 payments to mine foremen working their vacation, $1,350 to foremen working extra Saturday shifts, $396 to temporary foreman upgraded, and $1,878 severance pay to a foreman who was terminated.

2. Unfavorable variance of $1,160 in salary fringes was due to increase in salaries over standard estimates.

3. Unfavorable variance of $31,107 in hourly labor, bonus and fringes is due to low production efficiency. The production efficiency averaged 82.65 tons per manshift and total hourly averaged 42.04 tons per manshift versus 97.00 and 47.26 respectively estimated in the plan for standard costs.

4. Unfavorable variance of $4,700 in supplies reflects overexpenditures in these categories as compared to the production level.

The only significant favorable variance this month was $11,680 in blasting supplies and this reflects a variance in deliveries to the mine.

George Carrico
Mine Superintendent

West Mains - The challenge of pitching ore versus rail haulage continues. A slight improvement in grade and reduction in carnallite from 11.8 to 10.5% occurred during the month. This put the year-to-date average at 417,042 tons - 15.1% K_2O - 11.7% carnallite.

East Region

1 South - At month's end this section was working in No. 13, the last row to be mined from this section. Equipment and crews will move to 6 South off the West Mains.

14 South - Extremely heavy ground is seriously affecting extraction, production, and grade. The angular attack of weight from the completed 2 South-East section is exerting extraordinary force on the remaining pillar in this section.

6 East - During the month it was necessary to change the rail haulage layout from the conventional mainline and stub-track to an independent track to each loading point in order to maintain grades that could be negotiated by the haulage motors. These severe grades are also drastically affecting production and ore quality.

Cost Analysis

Mining Cost - Unfavorable Variance of $20,301.

Major variances were as follows:

1. Unfavorable variance of $25,112 in hourly labor, bonus and fringes continues to reflect lower than planned average tonnage and decreased efficiency of the total work force when compared to the standard estimates.

2. Unfavorable variance of $4,491 in ordinary and lubricating supplies was due mainly to advance purchases of lumber in the amount of $4,186 for use in ventilation.

3. A favorable variance of $10,364 in blasting supplies continues to reflect implementation of new blasting techniques.

The overall improvement from an unfavorable variance of $30,368 last month to the current variance of $20,301 can be fully attributed to the increased production efficiency during the month.

George Carrico

9 South - The anticipated return of good ore reported at the end of last month was shorted. Conditions reverted and worsened during October. The ore bed is very erratic with sudden facies changes from ore to salt with no apparent relief in sight.

East Region - Second mining operations are progressing satisfactorily with the exception of a severe haulage problem. Revision of the haulage has been considered and dismissed on a basis of the work entailed for little or no improvement and the short life of the section remaining.

Cost Analysis

The unfavorable mining cost of $1.487 per ton of ore was $0.100 over the standard cost. Gross unfavorable variances of $42,454, comprised principally of labor, fringes and supplies, was partially offset by favorable variances of $15,193 in salaries, blasting materials and bonuses.

The net unfavorable variance of $27,261 represents the difference in planned production efficiency of 97 TPMS and the actual production efficiency of 89 TPMS.

George Carrico
Mine Superintendent

6 South - First mining operations continue satisfactorily in good ore. The ore grade, although showing some gradual decline, is agreeable with estimates derived from the adjacent 5 South section.

9 South - During the month, the ore in this section has displayed more stability than it has during the two previous months. As a result, the grade improved to 16.1% K_2O. Development is approximately 400 feet from the southern lease boundary of State Section 16.

East Region - Second mining operations are being conducted under heavy ground conditions. Converging weight from three directions dictates extreme caution and in some cases sacrificing a small percent of extraction in the interest of safety.

Cost Analysis

Mining Cost - Favorable Variance of $3,153

This is the first monthly mining cost in 34 consecutive months that has come within the estimated standard costs. Reasons for this favorable mining cost are as follows:

1. Unfavorable variance of $20,319 in hourly labor was substantially decreased from the previous months and reflects the increased production efficiency.

2. Favorable variance of $2,273 in production bonus was due to an efficiency rate lower than the 1969 projected standards.

3. Favorable variance of $15,809 in hourly fringe benefits was due to not expensing the hourly pension plan for the month of November and crediting this expense from overaccruals in earlier months. The net effect on mine costs amounted to $13,991.

4. Unfavorable variance of $4,465 in ordinary and lubricating supplies was due primarily to expensing $7,200 of belt hardware for the West Mains.

5. Favorable variance of $11,375 in blasting supplies reflects modifications to the blasting operations.

6. Unfavorable variance of $1,765 in power purchased coincides with a production level lower than 1969 estimates.

George Carrico
George Carrico
Mine Superintendent

3. 30.7% more places cut per grinding with Carboloy bits.

4. 33.4% more footage cut per grinding with Carboloy bits.

5. 36.2% less broken bits per 1,000' cut with Carboloy bits.

6. 18.8% reduction in bit cost per foot cut with Carboloy bits.

The cutting operation, which is a bottleneck in the production cycle, is affected by more than the type of bits being used. Results of this test are limited to data taken from one production crew and limited to the cutability on one section and therefore does not present conclusive evidence to support a sudden or radical change in cutter bits. The test does however suggest that improvements are possible and continuation of this project will be continued if and when time allows.

A capital expenditure progress chart is attached depicting the anticipated arrival and installation of major mining equipment included in the 1970 Capital Program. This chart will be updated and included in ensuing reports.

West Region

West Mains - Ore grade dropped during the month to 19.0% K_2O. This was caused by a rapid degradation which occurred during the last week. The ore bed which is satisfactory grade and relatively clean, averaging 6.2% carnallite, has suddenly thinned out. Current advance is approximately 1,000' from the projected ore limits.

71 West - Average ore grade improved as second mining retreats. Ground conditions remain satisfactory.

70 East - Second mining operations are progressing satisfactorily. Convergence of approximately 20" has been recorded 4 rows behind the working row.

6 South - First mining continues in good grade ore. Production efficiency dropped during the month by a factor of 4.2 TPMS.

9 South - During the month the ore has again become very spotty and inconsistent. The average grade dropped to 14.4% K_2O. Back conditions resembling the adjacent 1 South area are presenting problems. Production efficiency dropped 7.5 TPMS during the month.

East Region

Row 7 was completed on the 23rd, crew and equipment were moved to an area immediately north to recover a small block of pillars originally mined in 1953. Production was resumed December 29th. Production from this area will be limited to one loading point set ups.

Cost Analysis

An unfavorable mining cost of $1.489 per ton of ore before adjustment was $0.094 over the standard cost. A gross unfavorable variance of $46,390, comprised principally of labor,

Production from State and Federal Leases

	May		Year-to-Date	
	Tons	% K_2O	Tons	% K_2O
Federal	236,340	18.86	1,021,493	19.77
State	85,645	18.43	408,918	16.88

General Comments

The mine operated a total of 89 shifts during May. Production averaged 10,387 tons per day or 3,618 tons per shift, an increase of 101 tons per shift over April.

The efficiency of the mine production crews averaged 100.82 tons per manshift with the total mine efficiency including salaried personnel averaging 45.19 tons per manshift.

The average mine grade dropped from 19.66% K_2O in April to 18.75% K_2O in May. This was as expected and was caused primarily by the completion of 6 East section and starting 62 South at a lower grade. There was also a general decline in grade in all sections, the greatest change being in 17 West which dropped 1.4% K_2O.

The East hoist rope on the #1 shaft was replaced on May 21, with the West rope scheduled for replacement the second week in June. This is a planned replacement when each rope has hoisted 4 million tons of ore.

Surface hole No. 85 was completed on May 22. Core analysis showed 9.9% K_2O at a 5.6' mining height. Hole #86 is now being drilled and core analysis should be completed by June 8th.

Installation of the new 6,000-ft. belt conveyor in the West Mains is for all practical purposes completed. The second panel belt in the West area is being installed in 272 break for the 272 North section. This section will be worked with equipment and crews from the 62 South section following the four-day shutdown in July.

Mining Regions

6 East - Second mining was completed on May 10, 1970, and equipment and crews were moved to the new 62 South section.

17 West - First mining continued in poor to fair grade ore. The ore bed is of good thickness but varies in grade from poor to only fair. The average ore grade dropped from 16.0% K_2O in April to 14.7% in May.

6 South - First mining continued in good ore. The average grade dropped from 18.0% in April to 17.9% K_2O in May. However, some weakening of the ore grade was apparent on the Nos. 1 and 2 entries adjacent to 5 South section at month's end. Continued deterioration of the ore bed is expected as we are 150 feet beyond the 5 South extremity. Better control of mining heights is still needed in this section.

TABLE 1

EDDY COUNTY

Income
(thousands of dollars)

	1966	1967	1968	1969	1970
Total Earnings	$102,789	$102,303	$98,770	$105,474	$112,384
*Farm	10,805	9,866	11,044	11,925	12,352
*Government	14,216	13,749	16,059	17,242	19,213
*Manufacturing	4,299	4,304	4,496	5,122	5,384
*Mining	34,952	34,994	27,049	28,378	31,237
*Contract Construction	4,132	4,135	5,106	5,495	5,547
Trade, Wholesale & Retail	13,429	13,488	13,382	13,624	13,690
Finance, Insurance & Real Estate	3,185	3,399	3,434	3,248	3,242
Services	12,529	13,186	14,585	16,258	17,417
Other	589	399	397	443	442

Employment

Total Employment	NA**	16,342	15,140	15,279	15,144
Number of Proprietors		1,798	1,802	1,821	1,807
Farm		520	509	502	495
Nonfarm		1,278	1,293	1,319	1,312
Wage & Salary Employment		14,544	13,338	13,458	13,337
*Farm		727	664	666	589
*Government		2,256	2,218	2,143	2,086
*Manufacturing		615	603	656	644
*Mining		3,934	3,032	3,189	3,237
*Construction		562	484	412	417
Transportation, Communication, & Public Utilities		756	752	749	695
Trade		2,623	2,497	2,396	2,349
Finance, Insurance & Real Estate		462	436	416	397
Services		2,540	2,589	2,763	2,853
Other		69	63	68	70

*Basic or export sectors

**Not Available

Source: Unpublished data, Bureau of Economic Analysis, U. S. Department of Commerce, March 8, 1973.

TABLE 2

INCOME AND EMPLOYMENT MULTIPLIERS

	1966	1967	1968	1969	1970	Income and Employment Multipliers
Total Earnings / Basic Earnings	1.500	1.526	1.549	1.547	1.524	1.529[a]
Total Employment / Basic Employment		1.905	2.016	2.019	2.028	1.992[b]

Potash Payroll, 1970 — $21,000,000[c] x 1.529 = $32,109,000 or 28.6% of 1970 Total Earnings

Potash Employment, 1970 — 2630[d] x 1.992 = 5239 or 34.6% of 1970 Total Employment

[a] 5-year average
[b] 4-year average
[c] Carlsbad Chamber of Commerce statistical data
[d] Annual average of covered employment in nonmetalic mining, Employment Security Commission of New Mexico.

TABLE 3

ECONOMIC IMPACT OF OIL WELL DRILLING IN POTASH AREA

Deep Well:

6 months drilling time, 5,965.5 man days required to drill & complete[1]

Shallow Well:

30 days drilling time, 1,609 man days required to drill & complete[1]

Mine 1400-foot Circle (area around well in which mining would be restricted):

380 workers, 1 year to complete[2]/approximately 95,000 man days[3]

Net "Base" Loss (assuming a deep well):

95,000 - 5,965.5 = 89,034.5 man days

Gross Loss (assuming a deep well):

89,034.5 x 1.992[4] = 177,356.7 man days or approximately 709 man years[3] of employment

[1]Roy C. Williamson, correspondence April 19, 1973
[2]Kerr McGee
[3]Assumes 250 man days per year per worker
[4]Employment multiplier from Table 2

TABLE 4

ECONOMIC IMPACT OF OIL WELL DRILLING IN POTASH AREA

Net "Base" Loss (assuming a deep well):

95,000 - 5,965.5 = 89,034.5 man days or 356 man years[1]

Using 1972 Average Wage Figures:

$\frac{\$21,500,000}{2579}$ = 8337, the net dollar loss is $2,967,972

The Gross Dollar Loss (assuming a deep well):

$2,967,972 x 1.529[2] = $4,538,029

---

[1]Assumes 250 man days per year per worker
[2]Income multiplier from Table 2

EXHIBIT K

REPORT TO POTASH COMMITTEE

CONCERNING

PROSPECTING FOR OIL & GAS

IN THE POTASH AREA

JULY 1973

EXHIBIT K

TABLE OF CONTENTS

ISSUE:

Should prospecting for oil and gas be conducted in or through potash-bearing land without satisfactorily establishing that such drilling would not interfere with the mining and recovery of potash deposits or cause undue waste of potash or constitute a hazard.

SUMMARY:

The Potash Area, as designated by the Secretary of the Interior, is an area of land in the southeastern part of the State of New Mexico covering 420,212 acres. Within this approximate same area, the United States Geological Survey has described an area covering 271,747 acres that is known as the Known Potash Area. The Potash Area is a multiple-use land. A study of the area shows that within the Secretary's area as it is now designated, there are over 800 oil and/or gas wells, and approximately 30,000 acres of open mine workings. See attached map.

Potash, as well as oil and gas activity, in this area is governed by the Secretary's Order dated May 11, 1965. Parts of this area are also governed by New Mexico Oil Conservation Commission Order R-111-A. It is the feeling of International Minerals & Chemical Corporation that the present regulations have proven to be adequate.

Carlsbad area potash reserves are the only significant potash reserves in the United States that have been economically mined. In the southern portion of the Potash Area, the only langbeinite potash reserves known in the Western Hemisphere exist. The United States government in 1911 appropriated funds to explore for possible potash sources in the United States. The New Mexico deposits were located in 1925. Mining of this ore began in the early 1930's. These valuable

deposits have been protected by the laws and regulations of the United States government. The capital investment and future planning of any mining operation is contingent upon ore reserves. After an investment in a plant and mine and the capital expenditures in locating and delineating an ore body, a mining company must have adequate protection of those reserves in order to properly protect their investment.

There is no way oil and gas wells can be drilled through valuable potash deposits without resulting in a possible hazard or causing undue waste of these deposits. It seems unreasonable to approve a wildcat location for oil and gas exploration through a delineated, proven potash deposit. A wildcat location cannot be considered development or production when it is not even known if oil and/or gas is present at that location. There are many millions of acres of land where oil and gas exploration can be conducted while potash is being mined. Some of those acres are within the Secretary's Area where valuable deposits of potash are not known to exist. On the other hand there are no other places to mine potash in these United States.

Proper conservation procedures call for the mining of potash and then the recovery of oil and gas.

RECOMMENDATIONS:

1. Present regulations should remain in effect.
2. Allow wildcat locations in the Secretary's Area when the well will not penetrate a valuable potash deposit.
3. Disallow any wildcat location that would penetrate a delineated, proven potash ore reserve.
4. Solve any disputes between oil and gas operators and potash producers by following the procedures set forth in the New Mexico Oil Conservation Commission Order R-111-A.

APPLICABLE REGULATIONS & HISTORY OF REGULATIONS:.

The current applicable regulations are the Order signed by the Secretary of the Interior, Stewart L. Udall, dated May 11, 1965, and the New Mexico Oil Conservation Commission Order R-111-A. The Secretary's Order of 1965 superseded an Order of 1951 which superseded an Order of 1939. In 1939, 42,245 acres were reserved from oil and gas leasing to protect the then-known potash deposits. In 1951 the area was increased to 298,345 acres with new rules which did not reserve any areas but put stipulations on the leases so that there would be no waste and no hazards would result from oil and gas activity. In 1965 the Secretary's Area was again enlarged; this time to 420,212 acres and the rules were modified somewhat, but the concept of no waste, no hazard, remained.

In 1951 the New Mexico Oil Conservation Commission issued Order R-111, which dealt with the rules concerning the area referred to by the Order as the Potash-Oil Area. This Order was revised as R-111-A in 1955. Extensions of the Area described in R-111-A have been made in Orders R-111-B through R-111-H. The main difference between the Federal Order and the State Order is the State established a procedure which requires the oil and gas operators to notify all potash lease holders within one mile of the proposed location of the intent to drill. If a potash lease holder within one mile of the proposed location has an objection to the location, an arbitration meeting is held to discuss the location. If agreement is not reached in the arbitration meeting, a full hearing is conducted before the Commission.

The Secretary of the Interior Order places the responsibility for the decision as to whether an oil or gas well will be approved upon the Regional Oil & Gas Supervisor of the Geological Survey. The Order calls for the Regional Oil & Gas Supervisor to take into consideration recommendations of the Regional Mining Supervisor of the Geological Survey and the applicable

conservation rules and regulations of the Oil Conservation Commission of the State of New Mexico. The Order states "no wells will be drilled for oil or gas except on the approval of the Regional Oil & Gas Supervisor of the Geological Survey, it being understood that drilling will be permitted only in the event that it is satisfactorily established that such drilling will not interfere with the mining and recovery of potash deposits or the best interests of the United States would best be subserved thereby." It further states "no wells will be drilled for oil or gas at a location which in the opinion of the Regional Oil & Gas Supervisor of the Geological Survey would result in undue waste of potash deposits or constitute a hazard to or unduly interfere with mining operations being conducted for the extraction of potash deposits." The Order places the responsibility for mining activities upon the Regional Mining Supervisor of the Geological Survey. The requirements are that no mining or exploratory operations will be conducted that in the opinion of the Regional Mining Supervisor of the Geological Survey would constitute a hazard to oil or gas production or that would unreasonably interfere with the orderly development and production under any oil or gas lease issued for the same land.

RULES REGARDING LEASING OF FEDERAL LANDS:

Potash leases may be obtained by one of two methods. If the land is in the Known Potash Area as described by the USGS, the land is available for competitive leases. Land outside the USGS Known Potash Area may be taken as a prospecting permit. These permits are issued for two years and if at least one test hole is drilled on the permit land, the prospecting permit may be extended for a period of two years. A permittee who discovers potash on a prospecting permit is entitled to a preference right lease. Leases are issued for an indeterminant period subject to readjustment at the end of the first 20 years.

There are two types of oil and gas leases. The first is known as a competitive lease. This is a lease covering land that is included within the known geologic structure and these leases can be obtained by competitive bidding in units of not more than 640 acres. Non-competitive leases are for areas that are not within a known geologic structure and are issued to the first qualified offerer, and may not exceed 2,560 acres. A maximum of 246,080 acres may be held by one company. A non-competitive oil and gas lease compares to a prospecting permit for potash. One of the main differences between an oil and gas lease and a potash lease is that potash must be proven or known to exist before a potash lease will be issued, whereas non-competitive oil and gas leases are issued whether oil and/or gas is known to exist or not. Another important difference is that potash lease holders are restricted to a maximum of 25,600 acres, while oil and gas leasees may hold a maximum of 246,080 acres.

HISTORY OF POTASH IN NEW MEXICO:

The German potash industry was the major source of potash for American agriculture and industry until the outbreak of World War I. Loss of this essential commodity during the war and escalating potash prices by the German cartel emphasized the absolute necessity of discovering low-cost American reserves of this ore. After several years of exploration by both the USGS and by private industry, potash was identified in drill cutting from a well being drilled by Snowden & McSweeney Company near Carlsbad, New Mexico. Following the initial discovery in 1925, subsequent core drilling operation over a great many years has established the only significant potash reserve in the United States.

Seven companies are now in operation in the Carlsbad potash basin:

	Initial Production
Teledyne Potash Company (formerly United States Potash)	1932
Potash Company of America	1935
International Minerals & Chemical Corporation	1940
Duval Corporation	1952
Amax Chemical Corporation (formerly Southwest Potash)	1952
National Potash Company	1957
Kermac Potash Company	1965

Two types of potash ore are mined in the Carlsbad basin. The primary potash ore contains the potassium chloride mineral called sylvite. This mineral is mined by all producers in the basin and is also being mined from the vast Canadian ore deposits. In addition to sylvite, a double salt of potassium magnesium sulphate, called langbeinite, is being mined by two companies,

Duval and IMC, in the southern portion of the Secretary's area, to supply the rapidly increasing market demands for animal feed ingredients and for chloride-free fertilizers containing the essential ions of both magnesium and sulphur. The langbeinite deposits, covering a small section of the Secretary's Area, are the only known commercial reserves in the Western Hemisphere, and possibly the only commercial reserves in the world.

The Secretary of the Interior issued an Order in 1939 which reserved the known potash deposits from oil and gas leases. The successful exploration for potash in the late 1940's made it quite clear that the area reserved by the Secretary's Order of 1939 was not large enough to protect the potash deposits. As a consequence and after some controversy between the two industries, the Secretary issued an Order in 1951 which increased the area of the 1939 Order seven-fold. However, a new approach was taken that would allow oil and gas leasing in the area with stipulations that drilling would not be permitted if it would result in undue waste or result in a hazard to any of the potash deposits. This same year, the New Mexico Oil Conservation Commission issued its Order R-111, which was designed to allow for both potash and oil and gas production from the area described in that Order, yet giving the Commission the power to determine which wells would be drilled as to best conserve both minerals. It seems quite clear, in both the Federal Order and the State Order, that deposits of oil and gas, as well as deposits of potash, should be protected and not interferred with by exploration for the other. Both Orders refer to the orderly development and production of oil and gas and not the exploration for oil and gas. It seems clear that potash deposits as well as mines should be protected from exploratory wells for gas and oil. The potash deposits which the US government was attempting to protect from undue waste remain to be the only potash deposits in the United States to be successfully and economically mined.

In 1955 the Oil Conservation Commission of the State of New Mexico issued Order R-111-A as an Order revising Order R-111. Since that time various Orders, R-111-B through R-111-H, have amended the area described in R-111-A. The objectives of those rules and regulations were to prevent waste, assure maximum conservation of the oil, gas, and potash resources and permit the economic recovery of said minerals within the defined area.

Cooperation between the potash and petroleum industries has been extremely good until recent months. Since 1955, 122 oil and/or gas wells have been drilled within the R-111-A area without protest from the potash operators. Similarly, the petroleum industry has accepted suspension of some 64 Federal oil and gas leases totaling 19,380 acres where well locations would have constituted a hazard to mining operations or potash deposits.

Only in six cases have the potash lease holders and the oil and gas lease holders been unable to reach an agreement, thereby resulting in hearings before the New Mexico Oil Conservation Commission. On five of these occasions the disputed location was on Federal lands. There has been an unwritten agreement between Federal and State officials that the procedures set forth in Order R-111-A would be followed since it called for a hearing where both sides could present their testimony. Although conducted by the chairman of the OCC, the USGS officials have always played a large part in making the decisions by offering advice and, in earlier cases, testimony.

Although profits have been reduced and increased efficiencies have been necessary to remain in operation, the New Mexico potash industry is a viable part of the economy and will remain so for many years if offered adequate protection for its reserves.

REVIEW OF CASES HEARD BY THE OIL CONSERVATION COMMISSION:

In the New Mexico Oil & Gas Association report presented to the Secretary, many assumptions were made to support the contention that oil and gas wells would pose no interference or hazard to the potash industry. Expert testimony by both potash industry engineers with many years of actual experience and by eminent consulting engineers and USGS officials, such as Don Libbey and Bob Fulton from the USGS, Daniel M. Bass, Jr., Petroleum Department Head at the Colorado School of Mines, Mr. J. W. Woomer, recipient of the AIME Man of the Year Award, Lewis C. Raymond with Ford, Bacon & Davis, and John Boyd, an independent consultant, tend to discount many of these assumptions. In the six cases heard before the OCC, these witnesses have established the following facts that must be given careful consideration:

1. An oil and/or gas well presents a hazard, in that no guarantee can be given that gas or oil will not escape and leak into the potash deposits. Even an abandoned or non-commercial gas well could have enough pressure to result in a leak. There can be no question of the danger that results from methane gas in a mining atmosphere. Any student of mine disasters is well aware of the many catastrophes caused by methane explosions. Although most of these disasters have occurred in coal mines, a methane explosion in the Texas Gulf & Sulphur Cane Creek potash mine resulted in several deaths and the subsequent gassy-mine classification. High production costs materially increased by gassy-mine classification eventually resulted in termination of underground operations. No gas or oil operator will agree to guaranteeing that gas will not escape from one of their wells, thereby resulting in extreme hazards to anyone mining through those deposits. Potassium deposits in Carlsbad are methane free and the potash producers and their employees are emphatic in maintaining that condition. In addition to the unwarranted hazards, the high capital requirement for conversion to gassy mine conditions and high operating costs would result in the closure of some of the potash mines.

2. When such a well exists and mining is carried on around it, the mine operator must leave protective pillars around the well. This consists of a solid pillar around the well of a minimum radius of 100 feet. In some cases, operators have indicated a larger radius would be required. Secondary mining cannot be completed for a distance from the well equal to the depth of the potash deposit. This results in a waste of potash ore. The resultant waste will vary with the depth of the deposit and the strength of the ore; that is to say, whether the ore is primarily a sylvinite or langbeinite ore. In the recent IMC-Phillips Petroleum case, testimony showed that the potash which would have to be left because of a gas well would have the value of approximately $9,000,000.

3. State and Federal lands must be treated in a like manner as they adjoin each other and the efficient recovery of any ore deposit or oil and gas reservoir will, at times, require development of both State and Federal lands.

4. The salt section containing the potash reserves contains permeable members that can be charged with gas leaking from ruptured or perforated casings.

The information leading to the establishment of the above facts has been attested to by many prominent mining people throughout the history of the OCC hearings. In 1956, in the OCC hearing concerning Case #1130, testimony was given relating to the pillar-pulling experience at the US Potash mine and of the extensive records that had been kept of the measurements, both underground and on the surface, to delineate subsidence. Information from US Potash, which at that time had more pillar-pulling experience than any of the other potash operators, proved the subsidence angle to be 45°. In addition, the USGS testified as to the government requirements of 100-foot solid pillar with no pillar pulling or secondary mining within a radius of 750 feet. At the requested location, the potash depth was 750 feet.

In April 1957, OCC Cases #1233 and #1234 concerned locations requested by Yates and Carver on land owned by Southwest Potash. Southwest Potash engineers testified to the effect of subsidence at the Southwest Potash mine. Pictures taken in a timed sequence of pillars underground gave pictorial proof of the massive forces at work when pillars left were squeezed down showing the effect of subsidence in an area where second mining had taken place. Pictures of large surface cracks as a result of secondary mining were shown indicating the subsidence line as it appeared and the results of this subsidence on the surface.

In 1964 Case #3029, when Pan American Petroleum Corporation had requested a location in a deposit owned by PCA, expert testimony substantiated the danger of gas wells in potash deposits and the 45° subsidence line. Lewis C. Raymond, a consultant with the firm of Ford, Bacon & Davis, testifying for Pan American, also stated that pillar pulling would not be allowed around an operating well. Lowell Page, Senior Geologist for United States Potash, testified that the Washington office of the USGS would not allow pillar pulling within 1,250 feet of the US Potash #1 & #2 shafts, where the deposit was 1,000 feet deep.

In February of this year, John Boyd, an independent consulting mine engineer of the John Boyd firm, testified in the IMC-Phillips case as to the danger of a gas well located in a potash deposit and testified from his firm's own studies that subsidence would result in failure of casing and that the subsidence would be in effect for an angle of 45° and that prudent mining procedures would call for protective pillars around any oil or gas well.

Although conducted by the New Mexico Oil Conservation Commission, cooperation between State officials and the USGS officials has been noted in each of the cases. John Anderson, former Regional Supervisor for Oil & Gas for the USGS, in 1961 suggested at the end of the hearing on Case #2432 an unorthodox location which would move the proposed location further

from PCA's projected ore line. The decision by the OCC followed Mr. Anderson's suggestion. In the 1964 hearing between Pan American and PCA, Mr. Fulton of the USGS made a statement at the conclusion of the hearing that the well, in his opinion, should not be allowed. Mr. John Anderson stated that although the proposed location was on State land, proper development would require locations on Federal lands. He urged the Commission to disallow the location. The decision of the Commission followed the request of Mr. Fulton and Mr. Anderson.

In the years of successful potash mining in the Carlsbad basin, many records have been kept and many facts have been established. The complete mining of a potash deposit requires secondary mining. The proper conservation of such deposits requires secondary mining. It is a policy of the USGS in carrying out their responsibilities of conservation of this valuable ore to require efficient and complete mining as safely as possible. The subsidence that is a result of secondary mining cannot be questioned. The records and measurements that have been kept and studied by competent mining engineers at the potash properties have shown the subsidence angle to be 45°. The effects of the subsidence not only underground but also on the surface are a documented matter of record. Independent, nationally-known consulting mining engineering firms have made studies and have found and have so testified in hearings before the OCC that subsidence does take place and does result in a subsidence angle of 45°.

There has been much said about the possibilities of gas escaping from an oil or gas well. There is ample proof that this can and has happened. In Case #862 before the New Mexico Oil Conservation Commission, Mr. S. J. Stanley, an engineer for the Commission, stated:

> "It has been definitely proven in the oil business that the salt section is charged in the Monument and Hobbs pool and charged with gas. The charging of oil and gas in these pools was probably man-made by casing leaks. The point I am trying to make is that I feel porosity and permeability

exist in the salt section throughout Lea County, that the extent of charging the zone, and that is the salt zone, from one well would depend on the amount of gas present and, of course, the pressure of that particular gas."

To assume gas leaking from a casing would follow the hole to the surface and escape by that route as opposed to permeating a potash deposit is pure speculation. It is well known that although casing schedules may be improved, procedures for cementing and plugging may be improved, and elaborate testing valves may be installed, things often happen that are not planned. The business of Mr. Red Adair is based on accidents. Blow-outs can and do occur. Contention that pressure monitors on production wells will detect casing leaks and thereby offer protection to the potash deposits is valid only for major breaks that could well saturate the deposit before preventive measures could be taken. Equally or possibly even more hazardous conditions could be created by small casing leaks, undetectable by pressure monitors, which could saturate an unmined reserve over a period of time. If a gas or oil well exists, there is the possibility that gas could escape from such well, resulting in the extreme hazard of methane in a mine atmosphere. The industry and its employees are unwilling to take this risk.

It seems ironic that in the face of the multitude of new and restrictive Federal Mine Safety Laws initiated by catastrophes resulting from methane explosions, the potash industry is now called upon to defend its contention that gas and oil exploration through methane-free reserves constitutes an unwarranted hazard to both the life and economic well-being of the potash industry and its employees.

CURRENT CONTROVERSY BETWEEN POTASH AND OIL & GAS INDUSTRIES:

In September 1972, El Paso Natural Gas Company requested a location in Section 29, T23S, R31E. The location was protested by Teledyne Potash. An arbitration meeting was conducted in the offices of the USGS in Roswell, New Mexico, by Mr. Pete Porter, Chairman of the New Mexico Oil Conservation Commission. Although agreement was not reached, and a hearing should then have been held before the Oil Conservation Commission, the location was approved by the USGS. This was in variance with past accepted procedures and was a matter of great concern to the potash producers.

Following the decision on the El Paso Natural Gas Company well, Phillips Petroleum Company immediately requested a location in Section 13, T23S, R30E. The location was protested by International Minerals & Chemical Corporation since it would have penetrated the heart of a high grade langbeinite reserve. An arbitration meeting was conducted and as with the El Paso well, no agreement was reached. This time, however, the past accepted practice of following the procedure set forth in R-111-A was followed and a hearing was held before the OCC on February 21, 1973. The evidence presented at that hearing resulted in a decision by the OCC to disallow the location. This decision was in keeping with past decisions of the OCC in cases held in the 1950's and early 1960's. Phillips has now filed suit in District Court to overrule this decision.

Immediately following the OCC decision on the Phillips well, the Oil & Gas Association of New Mexico initiated a hearing before the Department of the Interior protesting recent OCC rulings. Apparently the Oil & Gas Association felt as though the past policies of the OCC, that have successfully governed the operation of both potash and oil for many years, have been modified to favor the potash industry. In their resolution submitted to the Department of the

Interior they state:

> "Whereas not withstanding such intent it now appears that a policy or practice has been formulated and put into effect whereby the development of potash deposits are being given preferential treatment over oil and gas deposits and the owners of oil and gas leases within the potash area are being denied approval of many well locations projected to test and develop oil and gas deposits lying at depths greatly in excess of the formation in which potash deposits occur..."

The potash industry does not object to oil and gas exploration in the potash area. We object only to those wells that would penetrate an established ore reserve or wells that are drilled in such close proximity to a reserve so as to constitute a hazard to the recovery of an established potash reserve. As stated previously, 122 oil and gas wells have been drilled since 1955 in the R-111-A areas without protest from the potash industry.

Concurrent operations in the Secretary's Area to the potash producers means that within the Secretary's Area there will be potash mining and oil and gas wells. The potash producers and the decisions handed down in the few cases where agreement could not be reached have shown that concurrent operations has never meant oil and gas wells and mining for potash could be conducted at the same time in the very same area.

The Oil & Gas Association, when being denied a location for a wildcat well on a non-competitive lease that is not within a known geologic structure, but is within a proven potash deposit, would point to the Secretary's order and claim that they were being unreasonably prevented from orderly development and production of their lease. A wildcat well cannot be considered orderly development and production.

The Oil & Gas Association has pointed to the closing of four potash mines as an indication that economic conditions are very poor and the potash producers are going out of business. The Wills-Weaver and the Saunders mine of the Duval Corporation were closed because the ore deposit was mined out. This is the same as shutting down a well after all the oil or gas has been recovered. Because Phillips Petroleum has completed the recovery of a particular reservoir does not mean that Phillips Petroleum is going out of business. In fact, the Duval Corporation has sunk two new shafts and is recovering ore from their Nash Draw mine. The Lea mine of National Potash was temporarily shut down to concentrate on recovering the ore from the Eddy mine. Teledyne #3 mine was shut down for the same reason as the Duval mines: the deposit of ore for which the #3 shaft was sunk to recover has been recovered. National Potash plans to reopen the Lea mine in the near future and IMC will be required to sink a new shaft for future recovery of high grade langbeinite ore.

The Oil & Gas Association has stated that the rules of the Commission are strict with respect to running and cementing of casing and testing when wells are drilled in the potash area through the salt or potash formation. They have stated this method of completion of wells has so far proven very satisfactory and has never been questioned by the potash companies. The fact is, in each of the cases heard before the Oil Conservation Commission, one of the prime concerns of the potash company has been the ability of the oil and gas operators to guarantee that the cementing and casing of wells would not result in oil or methane migrating to the potash beds.

The Oil & Gas Association has stated that it would appear that the only limitation on drilling wells for oil and gas under the regulations is where such drilling would interfere with mining operations being conducted. It would appear to them that there is no limitation on drilling when it will not interfere with actual mining operations being carried on. When in fact, the

regulations state no wells will be drilled for oil and gas except upon approval of the Regional Oil & Gas Supervisor of the Geological Survey, it being understood that drilling will be permitted only in the event that it is satisfactorily established that such drilling will not interfere with the mining and recovery of potash deposits. A gas well which produces for ten years can result in interference with mining and recovery of potash deposits that do not start in that area for a period of five to eight years from the time the well was first drilled. The regulations further state no wells will be drilled for oil or gas that would result in undue waste of potash deposits or constitute a hazard to mining operations. It does include interference with mining operations being conducted. If, however, the restrictions for oil or gas wells were held to areas presently being mined, potash deposits that are to be mined in the near future would have no protection whatsoever. Certainly mining through an area where an oil or gas well is located will result in undue waste and interfere with the mining and recovery of said potash deposits and could result in a hazard to the operation of the mine and to the miners who work the mine.

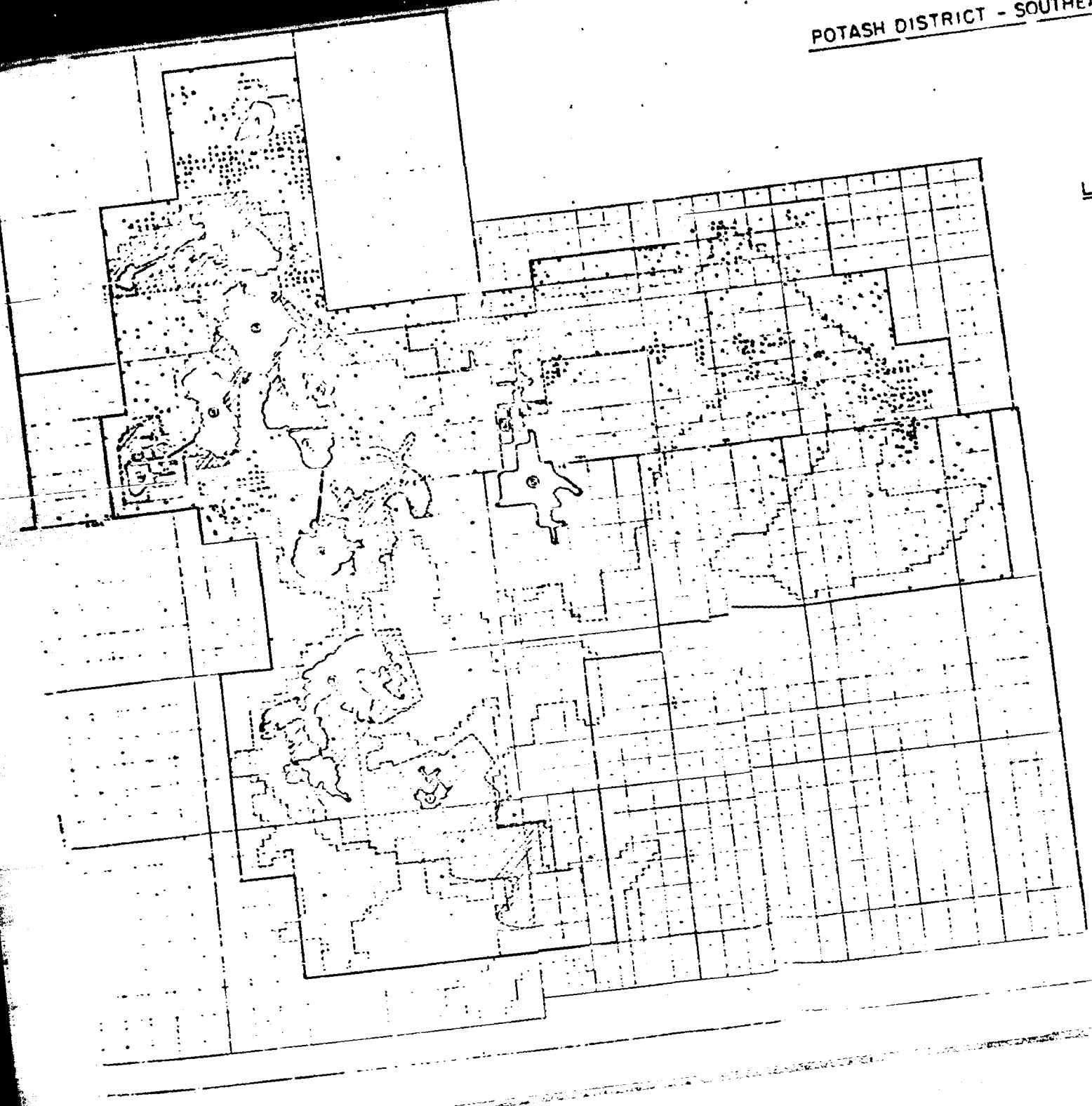
Federal regulations allow for suspension of oil and gas leases when drilling is denied. This is an important consideration to the oil and gas lease holders. Non-competitive gas leases may be held for a period of ten years with no exploration and no expense whatsoever to the oil and gas leasee. If after ten years oil or gas is not being produced from the lease, the lease must be given up by the lease holder. If this lease is suspended, the lease holder does not lose his lease after ten years and he is allowed to retain the lease at no rental costs whatsoever. The Oil & Gas Association has stated the potash companies can obtain suspension of their leases when the drilling of wells for oil and gas would interfere with projected development of the potash area. This is not quite the same, however, as potash leases are not for ten years and are not even issued unless it has already been proven that the area contains a potash deposit. The potash lease holder is limited to 25,000 acres and cannot afford to have much of this area held in suspension. Whereas

the oil and gas lease holders are allowed by the government to hold almost ten times this amount and, therefore, a suspension would not materially affect the area in which they have to explore.

Potash mines and refineries cannot be moved around like an oil well rig. The initial investment required by a potash operation is in the neighborhood of 50-70 million dollars before production can begin. He must have sufficient, protected reserves to earn a return on his capital. Once ore is bypassed the extreme cost of returning (if physically possible) to a bypassed area could very well prevent the recovery of that ore.

The Oil & Gas Association has suggested that American potash is not important because of high grade deposits in Canada. Although a similar rationalization could be drawn with the vast oil and gas reserves in the Near East, it is sufficient to say that past experience emphasizes the danger in this concept.

POTASH DISTRICT - SOUTHEASTERN NEW MEXICO



LEGEND

- OIL OR GAS WELL LOCATION
- OPEN MINE WORKINGS:
  1. DUVAL
  2. AMAX
  3. PCA
  4. NATIONAL
  5. KERMAC
  6. TELEDYNE
  7. IMC
- APPROXIMATE ORE RESERVES, ALTHOUGH LEASED AREAS *
- SECRETARY OF INTERIOR - ALTHOUGH
- USGS POTASH AREA
- NMOCC POTASH AREA

* DATA SUPPLIED BY THE INDIVIDUAL COMPANIES. ESTIMATED ORE RESERVES FOR TELEDYNE, KERMAC & IMC OPERATING COMPANIES ARE NOT SHOWN.

United States Department of the Interior
GEOLOGICAL SURVEY
12201 SUNRISE VALLEY DRIVE
RESTON, VIRGINIA 22092

FEB 15 1974

Memorandum

To: Secretary of the Interior
Through: Assistant Secretary - Energy & Minerals

From: Director, Geological Survey

Subject: Drilling of oil and gas tests in the Secretary's Potash Area, New Mexico

As you will recall, several recent controversies as to whether to permit the drilling of certain oil and gas tests in the Secretary's Potash Area precipitated a review of Departmental policy with respect to operations in this multiple use area.

The Conservation Division has now completed its study of the situation. Items such as (1) the stated position of the potash and oil and gas industries; (2) past approval actions; (3) the need to maintain a harmonious relationship with the State of New Mexico; (4) the Nation's requirements for additional energy sources; and, (5) the conservation of our most important domestic potash supply have been considered. Based on this study, the Chief, Conservation Division believes that action is required if we are to avoid similar conflicts in the future, and the Division has made certain recommendations as set forth in the enclosed memorandum.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. III
Submitted by Kerr-McGee
Hearing Date 3-15-74

III not admitted

If you concur in these recommendations, please indicate in the space provided, and the Conservation Division will prepare the necessary implementation papers.

Acting Director

Determination is hereby made that adoption of the recommendations contained in Chief, Conservation Division's memorandum of February 14, 1974, would be in the public interest and authority to proceed as recommended is hereby granted.

Date MAR 1 1974

SIGNED, JOHN C. WHITAKER

Acting Secretary of the Interior

Enclosure

200643

United States Department of the Interior
GEOLOGICAL SURVEY
12201 SUNRISE VALLEY DRIVE
RESTON, VIRGINIA 22092

FEB 14 1974

Memorandum

To: Director, Geological Survey

From: Chief, Conservation Division

Subject: Drilling of oil and gas tests in the Secretary's Potash Area, southeastern New Mexico

By order of October 16, 1951, the Secretary of the Interior delineated an area embracing 298,345 acres in southeastern New Mexico as a designated potash area. This order revoked the Secretary's Order of February 6, 1939, thereby eliminating the ban on oil and gas leasing which had been in effect on 42,285 acres of these same lands. Since that time, there have been periodic differences of opinion between the potash mining companies and the oil industry as to whether a particular oil and gas well should be drilled in the Area. Secretarial Order of May 11, 1965, expanded the Secretary's Potash Area to include 420,212 acres and eased some of the restrictions previously imposed on oil and gas drilling in the Area. The discovery and development of extensive and very valuable langbeinite potash deposits, and the currently escalating price of oil and gas which has given impetus to exploratory activity in the Area by the oil and gas industry have resulted in a situation where conflicts of interest between the two industries are inevitable. In each of the several recent controversies, neither side has seemed willing to compromise, and each new confrontation appears to magnify the differences of opinion.

As to Federal lands in the Secretary's Potash Area, the Area Oil and Gas Supervisor, in consultation with the Area Mining Supervisor, is charged with the responsibility of deciding which proposed oil and gas tests may be drilled. These have never been easy decisions, but with today's energy shortage and the need to protect our most important source of domestic potash, these decisions have become more difficult.

Accordingly, a complete policy review was initiated in April of 1973. As a part of this study, Assistant Secretary Wakefield and other Departmental representatives met with delegations from the New Mexico Oil and Gas Association and the seven potash operating companies in

Washington, D.C., on May 8 and August 7, 1973, respectively. The Area Oil and Gas Supervisor and the Area Mining Supervisor reviewed the position documents presented by both industries and submitted a joint report dated August 24, a copy of which is enclosed. The Conservation Manager, Central Region, supplied his comments and recommendations in a memorandum of September 6, a copy of which is also enclosed.

The results of this study indicated that action should be taken to assure that the decisions of our Supervisors reflect Departmental policy, are made as fairly as possible, result in proper conservation of both of these important mineral resources, and do not unduly impede the development of either resource. It was concluded (1) that certain facets of Departmental policy affecting operations in the Secretary's Potash Area should be reaffirmed; (2) that more clear-cut procedures to assist the two Supervisors in their decision-making processes should be adopted; and (3) that guidelines to implement the new procedures should be developed. Based on these conclusions, certain proposed recommendations were submitted for your consideration by our memorandum of December 7, 1973, and, upon your concurrence, those recommendations were forwarded by memorandum of December 10 to the Office of the Assistant Secretary - Energy and Minerals for further consideration. Subsequently, copies of the December 7 memorandum were furnished to representatives of the New Mexico oil and gas and potash industries for their review. On January 31, Deputy Assistant Secretary Rigg and other Departmental personnel conducted a meeting in Albuquerque, New Mexico, to discuss the proposed new procedures. Approximately 50 people attended the meeting, of which 35 were representatives of the two industries. A copy of the attendance list is enclosed. The discussions at that meeting were very productive. They not only disclosed the need for revision of some segments of the proposed procedures but also seemed to promote a spirit of cooperation between the two industries. As a result of this further review, we now recommend that:

Part 1. The Department reaffirm its position that the Secretarial Order of May, 1965, adequately protects the rights of the oil and gas and potash industries. However, the Area Mining Supervisor is to initiate action to bring about the expansion of Secretary's Potash Area to include those known potash deposits in T. 22 S., R. 31 E., T. 23 S., Rs. 29 and 31 E., and T. 24 S., Rs. 30 and 31 E., N.M.P.M., presently outside the designated Area.

Part 2. Each potash lessee will be required by April 15, 1974, to file with the Mining Supervisor a map or maps on which has been delineated the following information with respect to the Federal potash leases which it then holds:

a. The areas where active mining operations are now in progress on one or more ore zones.

b. The areas where mining operations have been completed on one or more ore zones.

c. The presently unmined areas which are considered to contain a minable reserve in one or more ore zones, i.e., those areas (enclaves) where potash ore is known to exist in sufficient thickness and quality to be minable under present day technology and economics.

d. The areas within these enclaves which are believed to be barren of commercial ore.

These maps are to be updated effective January 1, 1975, and thereafter on an annual basis. The Area Geologist, in consultation with the Mining Supervisor, will prepare the data required in subparts c. and d. above for unleased Federal lands in the Secretary's Potash Area.

The potash lessee will be responsible for submitting sufficient data to justify any area which is proposed as a minable reserve. The Area Geologist, in consultation with the Mining Supervisor, will review the information furnished in this regard and make any revision in the boundary of a proposed minable reserve (potash enclave) which is considered to be consistent with the data available at the time of each such analysis. All maps which are developed pursuant to this Part will be updated between the required revision dates whenever new information becomes available.

The Area Geologist and the Area Mining Supervisor will complete the analysis of the initial data supplied by the potash lessees and commit their total findings to a map or maps of suitable scale by June 1, 1974. These maps will be revised as necessary to reflect the latest available information. Copies of such map(s) will be available to all interested parties through map reproduction companies located in Roswell, New Mexico.

Part 3. After April 15, 1974, it will be Departmental policy to deny approval of most applications for permits to drill oil and gas tests from surface locations within the potash enclaves established in accordance with Part 2 hereof. Two exceptions to this policy will be permitted under the following conditions:

a. Drilling of vertical or directional holes will be allowed to take place from barren areas within the potash enclaves when the Mining Supervisor determines that such operations will not adversely affect active or planned mining operations in the immediate vicinity of the proposed drillsite.

b. Drilling of vertical or directional holes will be permitted to take place from a drilling island located within a potash enclave when: (1) there are no barren areas within the enclave or drilling is not permitted on the established barren area(s) within the enclave because of interference with mining operations; and, (2) the objective oil and gas formation beneath the lease cannot be reached by a well which is vertically or directionally drilled from any permitted location within the barren area(s); or, (3) in the opinion of the Oil and Gas Supervisor, the target formation beneath a remote interior lease cannot be reached by a well directionally drilled from a surface location outside the potash enclave. Under these circumstances, the Mining Supervisor will, in consultation with the Oil and Gas Supervisor, establish an island within the potash enclave from which the drilling of that well and subsequent wells will be permitted. The Mining Supervisor in establishing any such island will, consistent with the data supplied by the Oil and Gas Supervisor regarding present directional drilling capabilities, select a site which will minimize the loss of potash ore. No island will be established within one mile of any area where approved mining operations will be conducted within three years. To assist the Mining Supervisor in this regard, he may require potash mining operators to furnish a three-year mining plan.

Part 4. In order to protect the equities between oil and gas lessees while at the same time reducing the number of oil and gas wells which operators propose to drill in the Potash Area, the Oil and Gas Supervisor will make greater use of his prerogative to require unitization. Unitization will be mandatory in those cases where completion of the proposed well as a producer would result in the drainage of oil and gas from beneath other Federal lands within a potash enclave. In other words, unitization will be a prerequisite to the approval of any well which is (1) located adjacent to an enclave (within a quarter of a mile if an oil test or one-half mile if a gas test) and which is to be drilled vertically to the prospective formation; (2) to be directionally drilled from an adjacent surface location to bottom in a formation beneath an enclave; or (3) to be vertically or directionally drilled from a barren area or island within an enclave.

Part 5. The Department reaffirm its intent to cooperate with the New Mexico Oil Conservation Commission (NMOCC) in the implementation of that agency's rules and regulations. In that regard, the potash lessees shall continue to have the right to protest to the NMOCC the drilling of a proposed oil and gas test on Federal lands provided that the location of said well is within the State of New Mexico's "Oil-Potash Area" as that Area is delineated by NMOCC Order No. 111, as amended.

Part 6. The Department reassert its prerogative to make the final decision of whether to approve the drilling of any proposed well on Federal oil and gas leases within the Secretary's Potash Area.

Part 7. Applications for permits to drill vertical tests for oil and gas at locations that are in the Secretary's Potash Area but outside the State of New Mexico's Oil-Potash Area and which do not directly offset an enclave (within a quarter mile if an oil test or within one-half mile if a gas test) will be routinely approved by the Oil and Gas Supervisor after review by the Mining Supervisor.

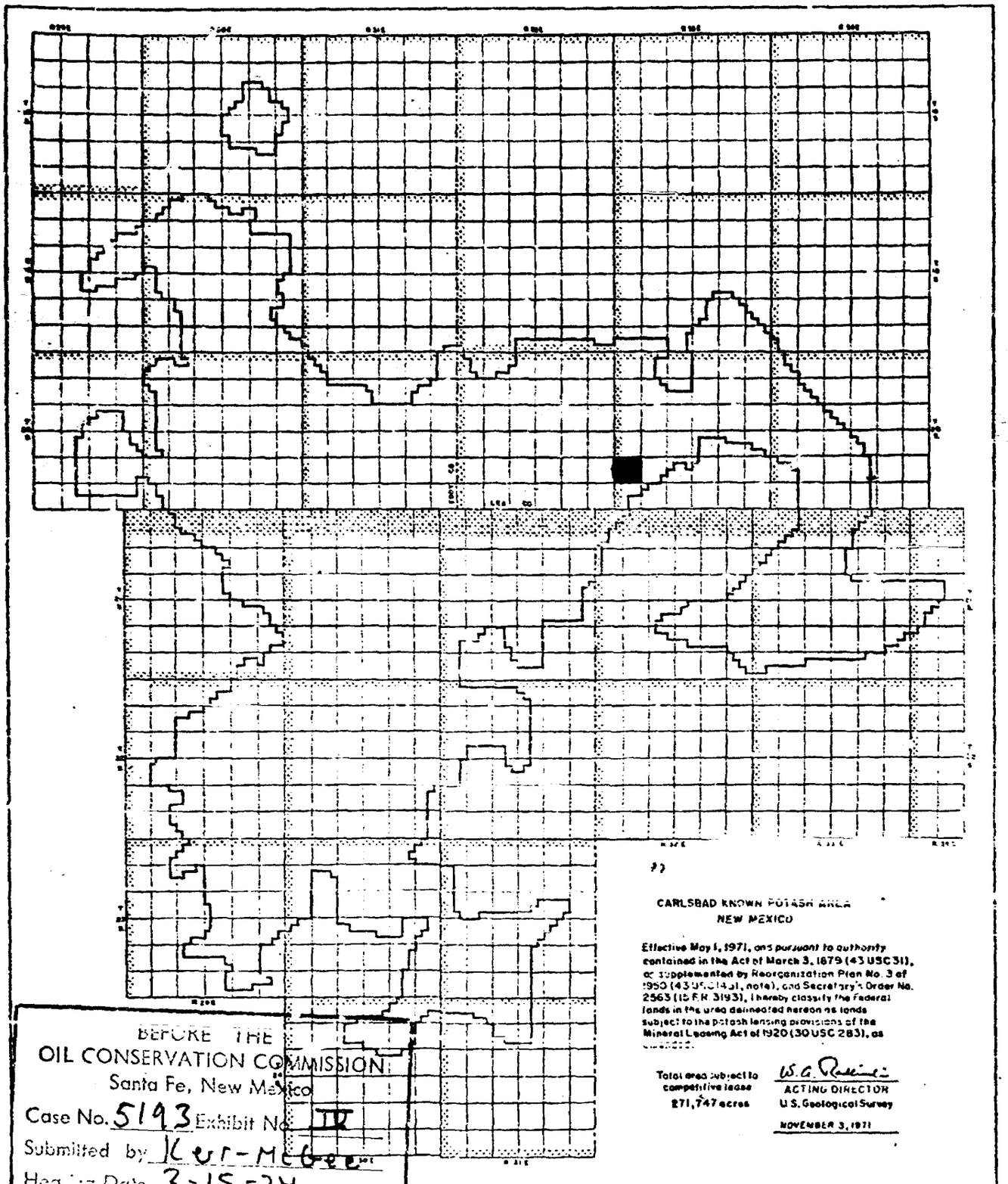
Part 8. Future controversies as to whether to permit the drilling of an oil and gas test in the Secretary's Potash Area which cannot be resolved in the field are to be referred to the Chief, Conservation Division, with a recommendation from the Regional Conservation Manager.

If these recommendations meet with your approval, we suggest that this memorandum be sent to the Assistant Secretary - Energy & Minerals for review and the subsequent authorization of the Secretary of the Interior to proceed as recommended.

Russell G. Wayland

Chief, Conservation Division

Enclosures



CARLSBAD KNOWN POTASH AREA
NEW MEXICO

Effective May 1, 1971, and pursuant to authority contained in the Act of March 3, 1879 (43 USC 31), as supplemented by Reorganization Plan No. 3 of 1950 (43 U.S.C. 141 nl, note), and Secretary's Order No. 2563 (15 F.R. 3191), I hereby classify the Federal lands in the area delineated hereon as lands subject to the potash leasing provisions of the Mineral Leasing Act of 1920 (30 USC 283), as amended.

Total area subject to competitive lease
271,747 acres

W. A. Radlinski
ACTING DIRECTOR
U.S. Geological Survey

NOVEMBER 3, 1971

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. IV
Submitted by Kellahin & Kellahin
Hearing Date 3-15-74

EXHIBIT IV

KERR-McGEE

P. O. BOX 610 • HOBBS, NEW MEXICO 88240

January 22, 1974

Chief Engineer
Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico 87501

Re: Oil Conservation Commission, Order No. R-111 A, Map of Potash Lease Holdings and Five-Year Development Plan

Dear Sir:

Attached are two copies of a map showing the outline of our Federal and State Potash Leases in Lea and Eddy Counties. In addition, you are being furnished with two copies of a map showing lands that will be developed by Kerr-McGee Corporation during the next five years.

Yours very truly,

KERR-McGEE CORPORATION

By: R. H. Lane

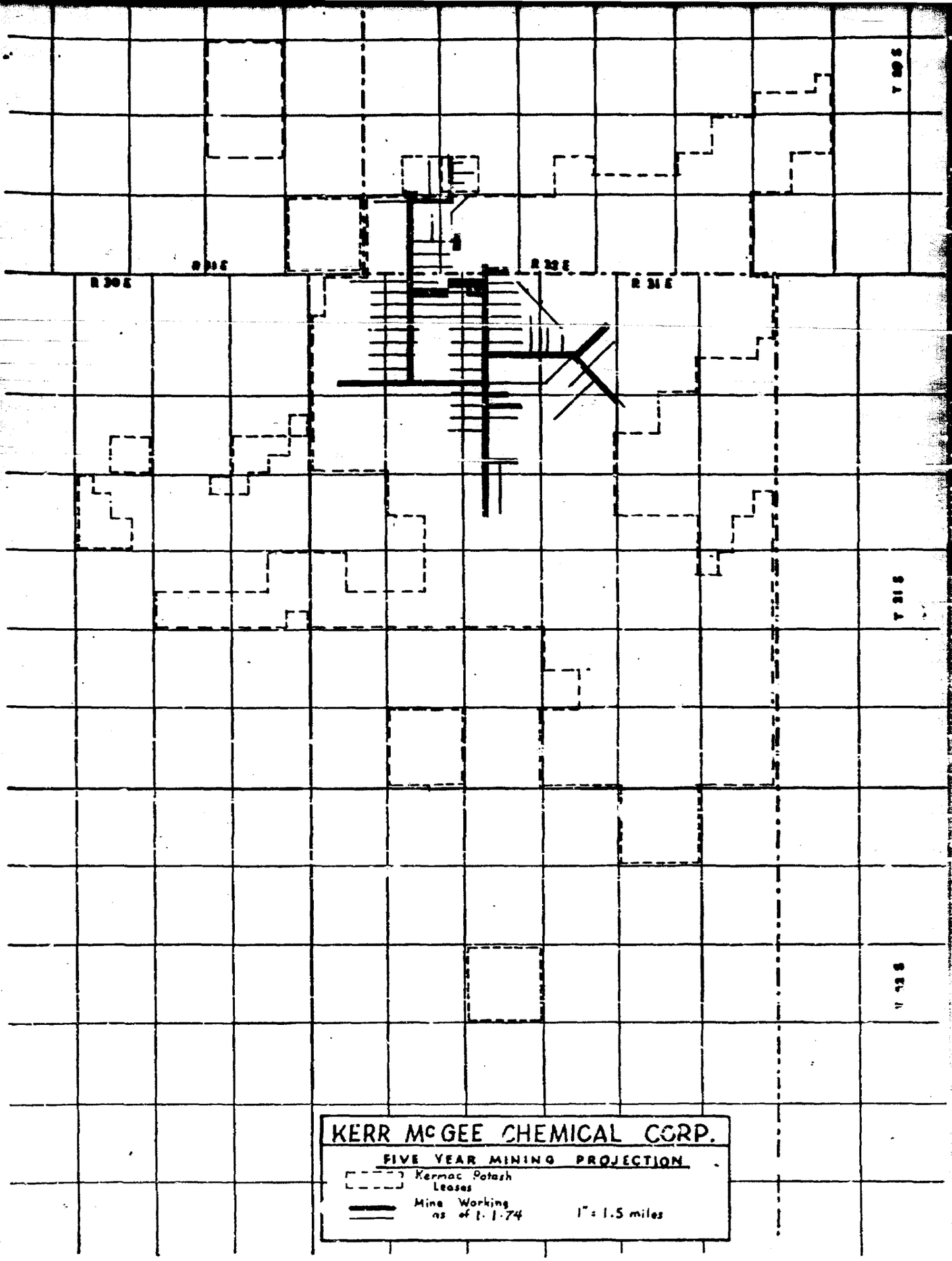
R. H. Lane

RHL:bd

cc: G. R. Cochran - Oklahoma City
L. E. Craig - Oklahoma City
w/Attachment

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. VI
Submitted by Kerr-McGee
Hearing Date 3-15-74

EXHIBIT VI



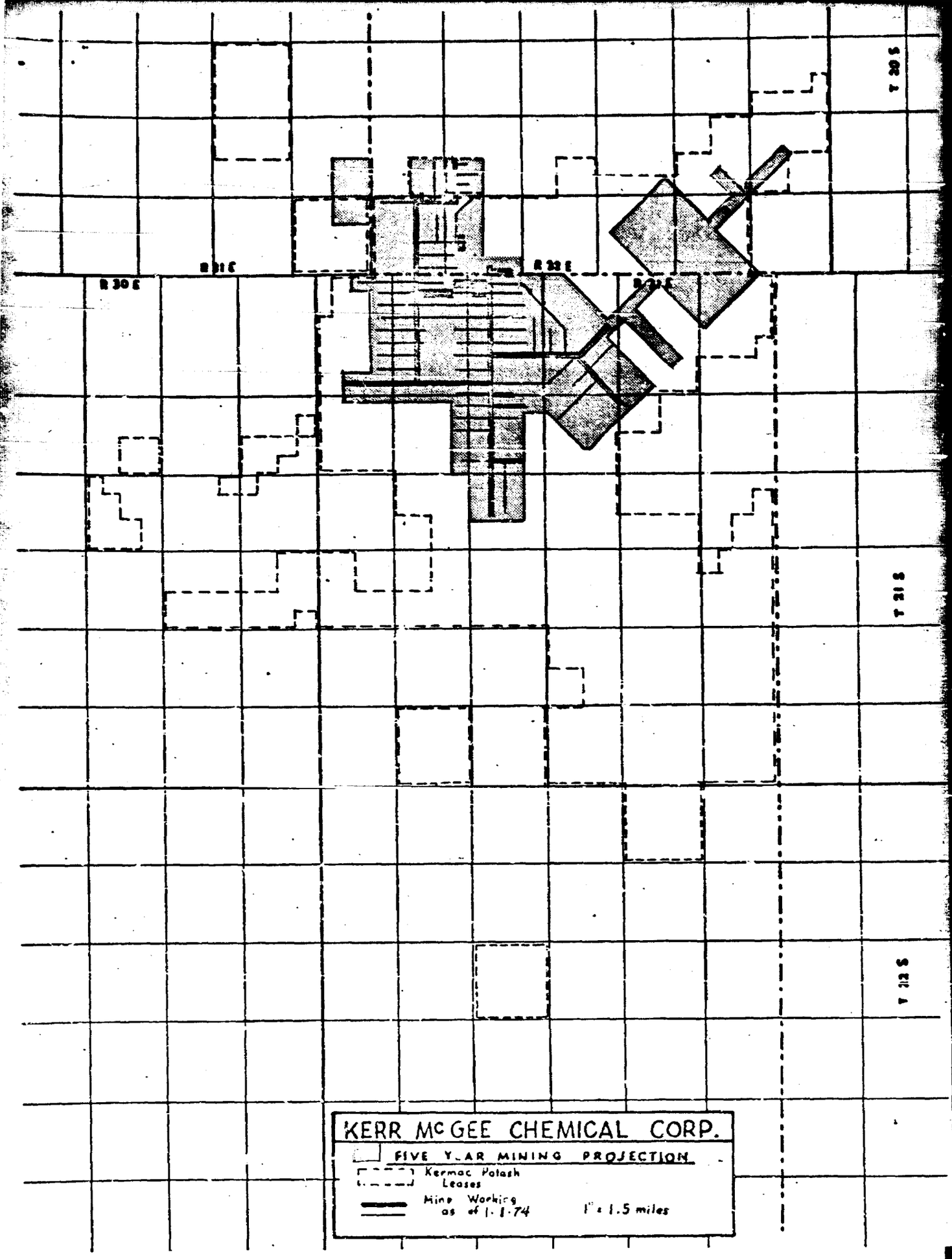
KERR McGEE CHEMICAL CORP.

FIVE YEAR MINING PROJECTION

Kermac Potash Leases

Mine Working as of 1-1-74

1" = 1.5 miles


R 30 E
R 31 E
R 32 E
R 33 E
T 22 S
T 23 S
KERR McGEE CHEMICAL CORP.
FIVE YEAR MINING PROJECTION
Kermac Potash Leases
Mine Workings as of 1-1-74
1" = 1.5 miles

DATA SHEET

U.S.P. 141 Core Test

Well:	USP No. 141, Permit N.M. 0432
Location	2523 ft. from north line 2933 ft. from east line Section 29, T20S, R33E, N.M.P.M., N.M. Lea County
Elevation:	3584 ft. above sea level
Total Depth:	2503 ft.
Type Well:	Rotary Rock bit : 0' to 1532' Cored : 1532' to 2503'
Size Hole:	6" hole surface to 1532 ft. 4" hole 1532' to 2503 ft.
Drilling Contractor:	Joy Manufacturing Co.
Casing Record:	4" casing set to 1532' and all casing recovered
Drilling Record:	Began September 1, 1954 Completed October 8, 1954

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. VIII-A
Submitted by Kerr-McGee
Hearing Date 3-15-74

VIII-A

REPORT ON DRILLING

USP 1A1 CORE TEST

USP 1A1 Core Test is located in the southwest quarter of the northeast quarter of Section 2?, Township 20 south, Range 33 east, Lea County, N.M.P.M., N.M. This test was located on Permit NM 0402 which was required from the National Potash Union. This eastern potash core test is 2.32 miles south of USP 139 core test, 2.21 miles southeast of USP 127 core test, and 1.82 miles west of U.S.G.S. 17 core test. The primary prospecting objective of USP 1A1 core test was to explore the Bed No. 1 ore potential which was found to be present in commercial grade and thickness.

Bed No. 4 was cut from 2429'10" to 2436'9" and carries no sylvite. This 6'11" interval averages 0.36% K_2O

Scattered sylvite, carnallite and kieserite mineralization was found between the upper carnallite stray zone down to Anhydrite "A". Langbeinite was found below Anhydrite "A".

The better showings are enumerated below:

Upper carnallite stray zone 1640'10" - 1650'10", 2'0" This 2'0" zone averages 25.0% kieserite, 21.2% carnallite, 3.92% sylvite and 1.60% anhydrite.

Upper stray sylvite bed 2122'4" - 2127'5", 5'1" This 5'1" bed averages 44.35% K_2O and 5.05% water insolubles. This bed can be broken down to 2122'4" - 2124'0", 1'8" - 7.2% K_2O and 15.41% water insolubles and 2124'0" - 2127'5", 3'5" - 62.46% K_2O and 0.03% water insolubles.

Bed No.1 sylvite 2190'2" - 2195'5", 5'3". This 5'3" bed averages 17.2% K_2O and 1.9% water insolubles. This is the best consistent ore showing in USP 1A1 core test.

Bed No. 1A 2235'11" - 2238'3", 2'4". This 2'4" bed averages 13.21% kieserite, 17.1% carnallite, and 5.23% sylvite.

Bed No. 2 2291'0" - 2292'5", 1'5". This 1'5" bed averages 13.44% K_2O or 21.27% sylvite and 4.08% water insolubles.

Bed No. 2A 2310'3" - 2312'11", 2'8". This 2'8" bed averages 16.00% K_2O or 25.32% sylvite

Bed No. 3 2333'3" - 2335'6", 2'4". This 2'4" bed averages 56.5% langbeinite.

Respectfully submitted

Joe P. Smith

CORE SAMPLE ANALYSIS

USP 141 CORE TEST

From	To	Thick	Fe_2O	P_2O	SO_4	% Water Insolubles
1648'10"	1650'10"	2'0"	6.05	6.27	10.61	
1650'10"	1651'10"	1'0"	4.00	2.42		
1651'10"	1654'2"	2'4"	6.70	4.25	3.45	
1654'2"	1655'6"	1'4"	1.42	1.09	1.05	
2120'0"	2122'4"	1'4"	2.16			
2122'4"	2124'0"	1'8"	7.24			15.41
2124'0"	2127'5"	3'5"	62.46			
2127'5"	2128'3"	0'10"	2.37			0.66
2143'8"	2144'9"	1'1"	3.66			
2179'10"	2180'3"	0'5"	10.53	4.82	20.82	
2187'4"	2190'2"	2'10"	2.64			
2190'2"	2195'5"	5'3"	17.54			1.94
2195'5"	2196'4"	0'11"	4.88			10.24
2206'3"	2209'5"	4'2"	6.57			1.95
2228'9"	2232'9"	4'0"	2.77	1.12		
2232'9"	2234'4"	1'7"	1.71	0.83		
2234'4"	2235'11"	1'7"	5.27	1.94		0.87
2235'11"	2238'3"	2'4"	6.19	4.71	12.65	3.56
2238'3"	2239'10"	1'7"	1.95	1.06		8.90
2239'10"	2240'8"	0'10"	4.06	0.71		10.01
2240'8"	2245'4"	4'8"	3.88	1.33		6.73
2275'10"	2279'6"	3'8"	2.34	0.82		
2280'1"	2281'8"	1'7"	2.24			
2291'0"	2292'5"	1'5"	13.44			4.65

Budget Bureau 42 R358.4.
Approval expires 12-31-53.

(SUBMIT IN TRIPLICATE)

Land Office New Mexico

Permit No. 0482

Unit

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
JUN 22 1953
U. S. Geological Survey

SUNDRY NOTICES AND REPORTS ON WELLS

NOTICE OF INTENTION TO DRILL		SUBSEQUENT REPORT OF WATER SHUT-OFF	
NOTICE OF INTENTION TO CHANGE PLANS		SUBSEQUENT REPORT OF SHOOTING OR ACIDIZING	
NOTICE OF INTENTION TO TEST WATER SHUT-OFF		SUBSEQUENT REPORT OF ALTERING CASING	
NOTICE OF INTENTION TO RE-DRILL OR REPAIR WELL		SUBSEQUENT REPORT OF RE-DRILLING OR REPAIR	
NOTICE OF INTENTION TO SHOOT OR ACIDIZE		SUBSEQUENT REPORT OF ABANDONMENT	X
NOTICE OF INTENTION TO PULL OR ALTER CASING		SUPPLEMENTARY WELL HISTORY	
NOTICE OF INTENTION TO ABANDON WELL			

(INDICATE ABOVE BY CHECK MARK NATURE OF REPORT, NOTICE, OR OTHER DATA)

June 17, 1953

Well No. F-29 is located 1320 ft. from ~~{N}~~ {S} ~~line~~ and 1320 ft. from ~~{E}~~ {W} ~~line~~ of sec. 31

S. W. corner

SW¼ Sec. 31 (¼ Sec. and Sec. No.) 20 South (Twp.) 33 East (Range) N.M.P.M. (Meridian)

Potash (Field) Lea (County or Subdivision) New Mexico (State or Territory)

The elevation of the derrick floor above sea level is 3616 ft.

DETAILS OF WORK

(State names of and expected depths to objective sands; show sizes, weights, and lengths of proposed casings; indicate mudding jobs, cementing points, and all other important proposed work)

Cement 2120' to 1450'
Mud 1450' to 10'
Cement 10' to surface and set 4" pipe 4' above surface
Started drilling 5-8-53
Stopped drilling 6-3-53
T. S. 1400'
T. D. 2244'
Culebra 1450' - 1460'
"A" Bed Did not drill

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. VIII-B
Submitted by Kerr-McGee
Hearing Date 3-15-74

I understand that this plan of work must receive approval in writing by the Geological Survey before operations may be commenced.

Company Farmers Educational & Cooperative Union of America

Address 3501 E. 46th Avenue
Denver, Colorado

By: [signature]

APPROVED: JUN 22 1953
U. S. Geological Survey

By [signature]

Title REGIONAL MINING SUPERVISOR U.S.G.S.

U. S. GOVERNMENT PRINTING OFFICE 16—61377-4

VIII-B

Recapitulation F-[illegible]

Company: Farmers Educational & Cooperative Union of America

Location: 1320' North of South Line
1320' East of West Line
Section 31, T 20 S, R 33 E

Elevation: 3610'

Type of Well: Potash core test. Used a rock bit from the surface to 1515' 0" and cored from 1515' 0" to 2244' 0". Began drilling 5-8-53 and finished drilling 6-3-53.

Casing Record: Set 1394' of 4½" O.D. casing.

Cement Record: Cemented from 2120' to 1450'.

Drilling Contractor: Olen F. Featherstone.

Limestone: 1450' to 1460' (culebra)

Beds Analyzed:

10th ore zone

2127' 10" to 2132' 0"	4' 2"	13.5%	K_2O sylvite
		4.9%	insoluble

From	To	Interval	Description	K_2O	N_2	CO_2	H_2O
[illegible]	[illegible]	[illegible]	[illegible], blebs sylvite	5.71	0.13	0.29	1.13
~~2137' 0"~~	~~2138' 7"~~	~~1' 7"~~	~~Sylvinite~~	~~10.82~~	~~0.30~~	~~1.15~~	~~4.00~~
2138' 7"	2139' 5"	1' 5"	Sylvite, halite	12.90	0.35	0.49	6.26

Hayward No. 28

RECAPITULATION IMCC NO. 155

Lessee	~~International~~ Minerals & Chemical Corporation
Location	1320' South of North Line 1320' East of West Line Section 25, T. 20 S., R. 32 E.
Elevation	~~3560'~~ 3565.10'
Total Depth	2135'
Type of Well	Potash core test. A rotary rig was used from the surface to the bottom.
Drilling Contractor	Joy Manufacturing Company
Size of Hole	The hole is 6¾" from the surface to 1365'. From 1365' to the bottom the hole was cored with a 3½" O.D. core bit.
Water Horizon	No water horizons determined.
Casing Record	Set 1365' of 4" casing.
Drilling Record	Began drilling with a rock bit 3-31-52 and stopped 4-19-52 at a depth of 1365'. Began core drilling 4-21-52 at 1365' and stopped 4-28-52 at a depth of 2135'.
Rustler Limestone	1370' to 1394' (Culebra)
Top of Salt	1400'
Beds Analyzed:	

Carnallite Bed	1506'- 1" to 1503'- 0"	1'-11"	3.68% K_2O as carnallite, 8.50% Kieserite
No. 1 Bed	2039'-11" to 2049'-11"	10'- 0"	12.93% K_2O as sylvite, .95% K_2O as carnallite, 1.77% Kieserite and 2.99% insolubles
Sylvite Bed	2085'- 0" to 2089'- 2"	4'- 2"	10.72% K_2O as sylvite, and 4.04% insolubles

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. VIII-C
Submitted by Ker-McGee
Hearing Date 3-15-74

VIII-C

INACC NO. 155 CORE TEST

From	To	Interval	Description	K_2O	Mg	SO_4	Insol.
Carnallite Bed:							
1506'- 1"	1507'- 0"	0'-11"	Carnallite and halite	5.4	4.0	3.89	37.0
1507'- 0"	1508'- 0"	1'- 0"	Carnallite and halite	2.5	4.13	7.94	34.7
1508'- 0"	1509'- 0"	1'- 0"	Halite, trace of carnallite	.99	1.45	3.37	5.52
No. 1 Bed:							
2039'-11"	2040'- 7"	0'- 8"	Sylvinite	31.9	.15	.53	.73
2040'- 7"	2041'- 7"	1'- 0"	Halite and sylvite, trace of carnallite	13.86	.22	.53	2.67
2041'- 7"	2042'- 1"	0'- 6"	Halite and sylvite, trace of carnallite	12.9	1.05	2.14	4.19
2042'- 1"	2044'-11"	2'-10"	Halite, little carnallite	2.52	1.40	1.93	.41
2044'-11"	2045'-11"	1'- 0"	Halite and sylvite, trace of carnallite	15.65	.50	.58	2.63
2045'-11"	2047'- 4"	1'- 5"	Halite and sylvite, trace of carnallite	25.5	.60	1.77	6.99
2047'- 4"	2048'- 9"	1'- 5"	Halite and sylvite, trace of carnallite	14.0	.62	.66	4.14
2048'- 9"	2049'-11"	1'- 2"	Halite and sylvite, trace of carnallite	15.8	.92	1.11	4.40
2049'-11"	2050'-11"	1'- 0"	Halite, blebs of sylvite and carnallite	5.5	.87	1.85	4.10
Sylvite Bed:							
2083'- 0"	2084'- 0"	1'- 0"	Halite, trace of sylvite	2.8	.25	2.76	.20
2084'- 0"	2085'- 0"	1'- 0"	Halite, little sylvite	7.14	.52	4.20	3.26
2085'- 0"	2086'- 1"	1'- 1"	Halite, little sylvite	8.16	.25	2.10	.20
2086'- 1"	2087'- 0"	0'-11"	Sylvinite	21.2	.35	1.11	4.72
2087'- 0"	2088'- 6"	1'- 6"	Halite, little sylvite	3.03	.52	.74	6.03
2088'- 6"	2089'- 2"	0'- 8"	Sylvinite	18.4	.35	.66	4.90
2089'- 2"	2090'- 6"	1'- 4"	Halite, little sylvite	4.38	.35	1.40	5.10
2090'- 6"	2091'- 6"	1'- 0"	Halite and sylvite	9.79	.62	1.73	10.25
2091'- 6"	2092'- 6"	1'- 0"	Halite, trace of sylvite	2.57	.50	3.46	6.03

Kerr-McGee Chemical Corp.
Hobbs Potash Facility

K_2O Feet Method

K_2O Tons in the 2100' Radius Area Around the Proposed Well

Calculation of Values

Area No.	Planimeter Reading (P.R.)	K_2O Feet	Factor*	K_2O Tons
1	0.185	1.0375	113,882.35	21,858
2	0.575	1.0125		66,301
3	0.750	.9875		84,344
4	0.889	.9625		97,445
5	0.940	.9375		100,359
6	0.900	.9125		93,526
7	0.715	.8875		72,265
8	0.635	.8625		62,372
9	0.635	.8375		60,564
10	0.510	.8125		47,190
11	0.465	.7875		41,702
12	0.165	.7625		14,328
	7.364			762,254

* Factor $\dfrac{(1{,}320\ \text{ft})^2 \times 1\ \text{Ft}}{15.3\ \text{Ft}^3/\text{ton}}$

K_2O Tons $= \dfrac{(\text{P.R.})(1{,}742{,}400\ \text{sq. ft.})(K_2O\ \text{Feet})}{15.3\ \text{Ft}^3/\text{ton}} = K_2O\ \text{Tons}$

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. VIII-D
Submitted by: Kerr-McGee
Hearing Date 3-15-74

VIII-D

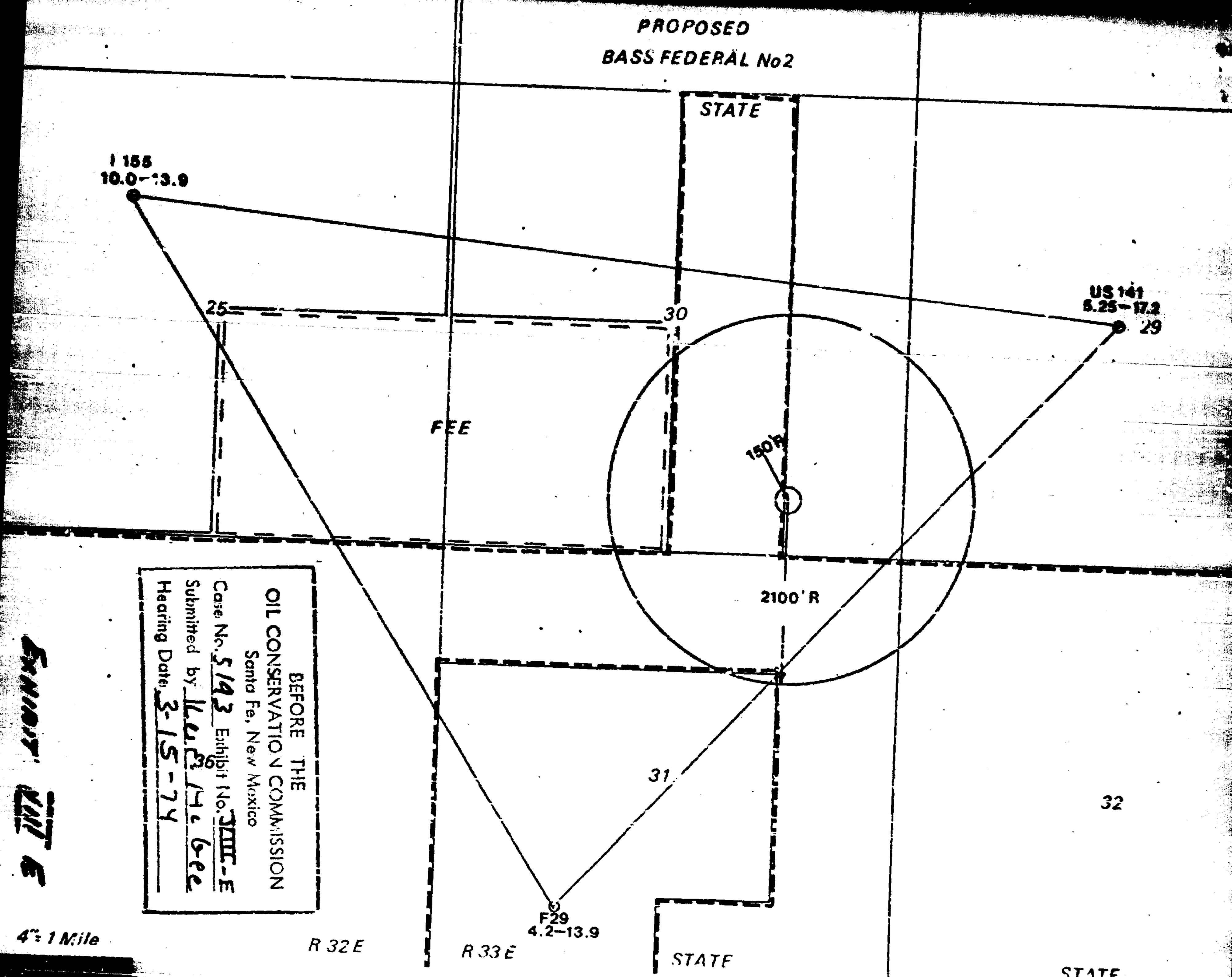
KHI
3-11-74

Calculations of Value
Bass Federal No. 2
660 FS - 1300 FE
Section 30 T20S R33E

Value of ore loss in 2100' radius area around the proposed well east of Kerr-McGee potash leases by using K_2O Feet Method (see attached).

Normal Mine Plan:		
K_2O Tons in Place	=	762,254
K_2O Tons to Mill @ 80% Extraction	=	609,803
Tons of Product @ 82% Mill Recovery x 62% K_2O Grade	=	806,513
Mine Plans With No Second Mining:		
K_2O Tons to Mill @ 35% Extraction and No Mining within 150' of Well	=	266,789
Tons of Product @ 82% Mill Recovery x 62% K_2O Grade	=	352,850
Product Tons Lost to Well:		
Normal Mine Plan	=	806,513
Mine Plan with No Second Mining	=	352,850
Total		453,663
Sales Value @ $33.89/Ton	=	$15,374,639

RHL
3-12-74



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5143 Exhibit No. XIII-E
Submitted by Kerr McGee
Hearing Date 3-15-74

EXHIBIT XIII E

Calculations of Value

Bass Fed No. 2
660' FS, 1300' FE
Sec. 30 T20S R33E

Value of ore lost in the 2100' radius area around the proposed well east of Kerr-McGee's potash leases.

Area of 2100' radius circle	=	13,854,456 sq. ft.
Less area lost to Bass Fed # 1	=	1,151,853 sq. ft.
		12,702,603 sq. ft.

△	Area ÷ 15.3	Height (Ft.)	Tons in place	K_2O Grade	K_2O Tons
4_a	830,236	6.48	5,379,926	14.70	790,849

Normal Mine Plan:

Tons in Place	=	5,379,926
Tons to Mill @ 80% extraction	=	4,303,941
Tons of Product @ 82% Mill Recovery x 62% K_2O Grade	=	836,769

Mine Plans with No Second Mining:

Tons to Mill @ 35% extraction and No Mining Within 150' of Well	=	1,87[illegible]06
Tons of Product @ 82% Mill Recovery x 62% K_2O Grade	=	364,050

Product Tons Lost to Well:

State Lands	=	265,058
Federal Lands	=	157,330
Fee Lands	=	50,331
Total		472,719

Sales Value @ $33.89/Ton = $16,020,447

2-26-74 Rev. (Ownership)
R.H.L.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. IX
Submitted by Kerr-McGee
Hearing Date 3-15-74

muriate OF POTASH

AGRICULTURAL GRADES 62% K_2O

BULLETIN 102P

PRICE SCHEDULE

EFFECTIVE January 1, 1974
(Subject to change without notice)

Subject to our written confirmation and in accordance with the terms and conditions of our Standard Contract and this Price List, we are pleased to offer agricultural grades of Muriate of Potash on an F.O.B. car, Carlsbad, New Mexico basis, in minimum carloads of 40 tons, priced in U.S. dollars per unit of K_2O.

BULK OR BAGGED

F.O.B. CARS HOBBS, NEW MEXICO, ... IN BULK PER UNIT OF K_2O:

	Jan. 1, 1974 June 30, 1974
Standard	52¢
Coarse	55¢
Granular	57¢

BAGGING: All muriate grades are available in 100 lb multiwall bags at a cost of $9.00 per ton for bags and bagging.

MANURE SALTS, 20% Minimum, Run of Mine = 17.65¢ per Unit of K_2O.

TERMS OF SALE

Net cash in United States funds 30 days from date of Bill of Lading. A service charge of 1% per month will be assessed and billed on all overdue accounts.

1. Shipments will be made as follows:

   Muriate of Potash, from Seller's Mine, Hobbs, New Mexico, freight collect. The total delivered cost of the product will be the above F.O.B. Mine Basis, plus the lowest applicable published single carload rail freight to Buyer's destination. We reserve the right to equalize against the delivered price of potash shipped by other producers from other producing points.

2. Trucks will be loaded at our plant only by prearrangement and provided that trucker has written authorization from a contract customer at a truck loading charge of $2.00 per net ton.

3. Billing price will be governed by railroad bill of lading date.

4. Seller reserves the right to decline acceptance of orders received after the 20th of any month for shipment during that month, if physically unable to make shipment. Seller further reserves the right to refuse or accept orders for shipment of any grade of muriate of potash in any given month in excess of the fraction of 1/12th of the contract tonnage.

5. Registration, under applicable state and local laws where necessary, is the responsibility of the buyer.

6. Any present or future sales, production, manufacturer's excise or similar tax, and any increase therein, imposed by any governmental authority affecting the production, sale or delivery of product hereunder shall be added to the prices herein quoted and borne by buyer.

12-31-73

IX

KERR-McGEE CHEMICAL CORP.
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73102

Kellahin –

Intro – South Salt Lake Morrow Gas Pool – Old rules 160 – Special rules enacted for 320 – approved unorthodox location. On Federal land – Teledyne owner of only potash lease under proposed unit. Teledyne did not protest application.

Brown – Landman – Bilco –

Exhibit 1 – [illegible] sales by Companies to [illegible]

Exhibit 2 – map [illegible] SSLMGP

Exhibit 3 – ownership map – S/2 Section 40 dedicated. Bilco has right to drill – communitized

Exhibit 4 – [illegible] agreement, Extended to April 1, 1970

Bilco drilled well in N/2 with no [illegible] – test.

Exhibit 5 – Federal permit to drill well in N/2

Exhibit 6 – [illegible] of [illegible] to well in N/2

Exhibit 7 – [illegible] well [illegible] for gas from well in N/2 – Commitment to take gas from subject well.

Exhibit 8 – State approval to drill

Exhibit 9 – Potash [illegible] map – well not on lease – [illegible] close to Teledyne lease.

Exhibit 10 – [illegible] [illegible] [illegible] [illegible] [illegible]

Roble stipulates:
(1) Tolco well excellent development prospect
(2) No objection to well drilled in N/2
(3) Well is not located at lease

Tolco stipulates -
(1) Well in potash area.

Bill Hanna - Consulting pet. geo - stipulated qualified.

Exhibit 11 - structure map SSL lower Morrow - - good development prospect.
Exhibit 12 - Stratigraphic X-section - good dev. pros. - if well not drilled, gas wasted
Exhibit 13 - production history of well in N/2

GLENN COPE - Consulting Engineer -

Exhibit 14 monthly production history of No. 1 well Cumulative 1.2 billion.
Exhibit 15 - press decline of cumulative prod. table for Texaco well
Exhibit 16 - projected performance of No. 2 well.
17. [illegible] surface pipe to salt section, intermediate to 5620 feet.
Cross - Roble wants guarantee of no damage - question [illegible].
[illegible] of completion + plugging -
[illegible] Exhibit No. 2 - testimony + report of [illegible] in Phillips case [illegible] of

of C operations on potash mining. Asks Cope if he agrees with statements. Agrees that potash is at depth of 2100 feet. States he has no knowledge to disagree with other question. Admission of K-M exhibit 1-A, 1-B + 2 refused - not appropriate in connection with X-exam of Cope.

<u>Mc Peters</u> - Moranco - drilling contractor problems of directional drilling.
~~Rowan Drilling Co.~~ - by - <u>Hallert</u> problems of directional drilling.

<u>George Warnock - mining geologist -</u>
<u>Exhibit 18 - ore reserves map - polygonal</u>
<u>Exhibit 19 - updated maps</u>
" 20 - Map utilizing foot-per-cent method
21 - Kerr McGee's outline of probable ore deposits.
20-A - update of 20: moves trend further west of well
22 - map of current + projected KM mining operations

The following exhibits were offered by Ken McGee

I — denied
I-A — denied
I-B — denied
II — denied
III — denied
IV — admitted
V — admitted
VI — admitted
VII — admitted
VIII — admitted
VIII-A — admitted
VIII-B — admitted
VIII-C — admitted
VIII-D — admitted
VIII-E — admitted
IX — admitted
X — admitted
XI — admitted (substitution report — 4 pages) *
XII — admitted (picture) *
XIII — denied *
XIV — denied (substitution) — Boyd Report

BEST AVAILABLE COPY

GENERAL OFFICES-FORT WORTH

PERRY R. BASS
DIVISION LAND & GEOLOGICAL OFFICE
POST OFFICE BOX 171
MIDLAND, TEXAS 79701

March 11, 1974

New Mexico Oil
Conservation Commission
Santa Fe, New Mexico 87501

Re: Belco #2 Bass-Federal
S½ of Section 30,
T-20-S, R-33-E, Lea
County, New Mexico.

Gentlemen:

Perry R. Bass and Bass Enterprises Production Co. have a working interest in the above proposed test and we concur and support the position of Belco Petroleum Corporation.

We strongly feel if this test well is not allowed to be drilled, that our correlative rights will be violated and valuable gas reserves will not be recovered.

We sincerely request the New Mexico Oil Conservation Commission to approve the permit and location requested by Belco, and allow Belco to orderly develope the property in the spirit set forth under the R-111-A regulation without further delay.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: Bill Seetzer

PERRY R. BASS

BY: Bill Seetzer

BS/sbc

1974 MAR 14 PM 4:17

IPMFEKA SANA
2-034131E073 03/14/74
ICS IPMBNGZ CSP
3032929920 TDBN DENVER CO 33 03-14 0607P EDT
PMS CMAR L BROWN, DLR
HILTON INN
SANTA FE NM
REFERENCE BASS FEDERAL NUMBER TWO 600 FSL AND 1300 FEL SECTION 30 TOWNSHIP 20 SOUTH RANGE 33 EAST LEA COUNTY NEW MEXICO
TENNECO OIL COMPANY SUPPORTS BELCOS POSITION IN DRILLING OF SUBJECT WELL
D D MYERS DENVER DIVISION PRODUCTION MANAGER

1808 EDT

IPMFEKA SANA

PHILLIPS PETROLEUM COMPANY
ODESSA, TEXAS 79760
PHILLIPS BUILDING, FOURTH & WASHINGTON

LEGAL DEPARTMENT

March 13, 1974

New Mexico Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico 87501

Re: Case No. 519[illegible] - Application of Belco Petroleum Company
For Drilling Permit in Potash-Oil Area, Lea County,
New Mexico

Gentlemen:

Phillips Petroleum Company is the owner of an interest in the unit behind the proposed well and requests that the Commission now approve Belco's application for a permit to drill.

Yours truly,

PHILLIPS PETROLEUM COMPANY

BY /s/ J. V. Peacock
Joe V. Peacock
Division Chief Attorney

JVP:nc

TEXACO

PETROLEUM PRODUCTS

PRODUCING DEPARTMENT
CENTRAL UNITED STATES
MIDLAND DIVISION

TEXACO INC.
P. O. BOX 3109
MIDLAND, TEXAS 79701

MAR 15 1974

OIL CONSERVATION COMM
Santa Fe

March 12, 1974

177447 - AUDIE RICHARDS LEASE
LEA COUNTY, NEW MEXICO
Belco Petroleum Corporation
Bass-Federal No. 2
660' FSL and 1300' FEL
Section 30 - 20S-33E

Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Gentlemen:

Texaco Inc., as a non-operator interest owner, files this letter of support in favor of Belco Petroleum Corporation's application to drill the captioned test. An objection to approval of Belco's application has been entered, and the matter will come before the Commission for hearing on March 15, 1974.

The captioned test is to develop known gas reserves. Texaco believes that denying Belco's application would prevent the orderly development and production of oil and gas from the South Salt Lake Field. We urge the Commission to approve Belco's application in order that correlative rights of the mineral owners will be protected.

Yours very truly,

Darrell Smith
Division Manager

By G. F. Clarke
G. F. Clarke
Assistant Division Manager

BEH-JM

cc: Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

POTASH COMPANY OF AMERICA

Photographs of Main South Entries Showing Oil Seep Near Abandoned Oil Well

January 18, 1962

Tension crack in anhydrite filled with salt showing oil seep in Main South.

Anhydrite bed - Main South showing oil seep.

Oil seep in rib of Main South Entry.

Face of Main South. Red is polyhalite and salt. Oil covers most of face.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico

Case No. 5193 Exhibit No. 12

Submitted by KERR-McGEE

Hearing Date 3/16/74

Case 5193

203 W. Aven., N
Lovington, New Mexico
March 11, 1974

MAR 14 1974

Oil Conservation Commission
Santa Fe, New Mexico

Gentlemen:

With reference to drilling of No. 2 Bass Federal well on E½SE¼ Section 30, Township 20 South, Range 33 East, N.M.P.M., Lea County, New Mexico, as a mineral owner under the SW¼ of this section I urge the entire S½ of this section be unitized as requested by Belco Petroleum Corporation.

Very truly yours

Audie Richards

Audie Richards

Case 5793

March 8, 1974

Henry Monteith
Artesia Hotel
Artesia, New Mexico

New Mexico Oil Conservation Commission
Post Office Box 2088
Santa Fe, New Mexico

RE: Belco Petroleum Corporation's
Application to Drill the
#2 Bass Federal Well
S/2 Section 30, T20S, R33E,
Lea County, New Mexico

Gentlemen:

I and my sister, Vera Briggs, own royalty interests in the SW/4 Section 30, T-20-S, R-33-E, Lea County, New Mexico. These royalty interests are presently being drained by offsetting production and, consequently, we urge your approval of Belco Petroleum Corporation's Application to Drill the above test. If this test is not drilled, our correlative rights will be violated.

Very truly yours,

Henry Monteith

Henry Monteith

Vera Briggs

Vera Briggs

HM:OB:dp

7 o K

827

BEST AVAILABLE COPY

1974 MAR 13 AM 10: 52

WU MGR SANA
AYB038(1242)(2-015238E072)PD 03/13/74 1242
ICS IPMBNGZ CSP
9156826631 TDBN MIDLAND TX 98 03-13 1242P EDT
PMS NEW MEXICO OIL CONSERVATION COMMISSIONSTATE LAND OFFICE BLDG,FONE

SANTE FE NM 8750:
ATLANTIC RICHFIELD COMPANY UNABLE TO BE PRESENT AT HEARING MARCH 15TH 9AM PROTESTING BELLCOS APPLICATION TO DRILL NUMBER 2 BASS FEDERAL SOUTH HALF SECTION 30 TOWNSHIP 20 SOUTH RANGE 33 EAST LEA COUNTY NEW MEXICO,AS A 25 PERCENT MINERAL INTEREST OWNER IN SOUTHWEST QUARTER SECTION 30 TOWNSHIP 20 SOUTH RANGE 33 EAST AND A WORKING INTEREST OWNER IN OTHER TRACKS, CORRELATED RIGHTS WILL BE VIOLATED UNLESS NUMBER 2 BASS FEDERAL IS DRILLED ATLANTIC RICHFIELD SUPPORTS BELLCOS POSITION IN THAT SECTION 36 TOWNSHIP 20 SOUTH RANGE 33 EAST SUFFERING DRAINAGE FROM OTHER WELLS IN AREA

RECEIVED
MAR 14 1974
OIL CONSERVATION COMM.
Santa Fe

TELEPHONED
TIME 1100 A
TO ADSL
BY
TO MR MIZE

A J BROWN JOINT INTEREST SUPERINTENDENT
NNNN

Case 5193

Docket No. 7-74

DOCKET: COMMISSION HEARING - FRIDAY - MARCH 15, 1974

OIL CONSERVATION COMMISSION - 9 A.M. - MORGAN HALL, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

CASE 5193: Application of Belco Petroleum Corporation for a drilling permit in the Potash-Oil Area, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority to drill its proposed Bass-Federal Well No. 2 to test the Pennsylvanian formation at an unorthodox location 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, South Salt Lake Field, Lea County, New Mexico, said location being within the boundaries of the Potash-Oil Area as defined by Commission Order No. R-111-A, and having been objected by the owner of potash leases in the area. This unorthodox location was previously approved by the Commission by Order No. R-4699.

WILLIAM A. SLOAN
JACKSON G. AKIN
JOHN D. ROBB
CHARLES B. LARRASEE
JAMES C. RITCHIE
JOHN P. EASTHAM
WILLIAM C. SCHAAB
WILLIAM C. SCRIGGS
RAY H. RODEY
ROBERT D. TAICHERT
ROBERT M. ST. JOHN
JOSEPH J. MULLINS
DUANE C. GILKEY
MARK K. ADAMS
ROBERT G. McCORKLE
PETER G. BRINA
BRUCE D. HALL

JOHN P. SALAZAR
WILLIAM S. DIXON
JOHN P. BURTON
REX D. THROCKMORTON
ROBERTA COOPER RAMO
JONATHAN W. HEWES
JAY R. GENTRY ORTIZ
GENE C. WALTON

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.
COUNSELLORS AND ATTORNEYS AT LAW
FIRST NATIONAL BANK BUILDING-WEST
WEST CENTRAL AVENUE AT THIRD
P. O. BOX 1888
ALBUQUERQUE, NEW MEXICO 87103

OF COUNSEL
DON L. DICKASON

PEARCE C. RODEY
1889-1958

TELEPHONE 243-1301
AREA CODE 505

February 22, 1974

Oil Conservation Commission
Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. A. L. Porter

Re: Belco Petroleum Corporation - Bass-Federal No. 2

Dear Mr. Porter:

This letter will confirm the fact that Kerr-McGee waives arbitration in this matter. We understand that the hearing will probably be set for March 15th.

Sincerely yours,

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.

By: John D. Robb

JDR/sa

cc: Mr. Jason Kellahin

DOCKET MAILED

Date 3-1-74

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 22, 1974

Mr. Jason Kellahin
Kellahin & Fox
Attorneys at Law
Post Office Box 1769
Santa Fe, New Mexico

DOCKET MAILED
Date 3-1-74

Mr. John D. Robb
Attorney at Law
Post Office Box 1888
Albuquerque, New Mexico 87103

Gentlemen:

With further reference to the Belco application to drill a gas well in Section 30, Township 20 South, Range 33 East, Lea County, New Mexico, I appreciate your notification that you are willing to waive an arbitration meeting. We are therefore advertising the matter for hearing at 9 a.m. on March 15, 1974 at Morgan Hall, State Land Office Building, Santa Fe, New Mexico. This matter will be heard by a quorum of the Commission.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir
cc: Commissioners Trujillo and Armijo
Mr. Orvis Frederick, U. S. G. S. - Roswell, N.M.
Mr. R. S. Fulton, U.S.G.S. - Carlsbad, New Mexico

DOCKET MAILED
Date 3-1-74

KERR-McGEE CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73102

February 18, 1974

JAMES J. KELLY
PRESIDENT

Mr. R. S. Fulton
Regional Mining Supervisor
United States Geological Survey
Carlsbad, New Mexico 88220

Dear Mr. Fulton:

As you know, Kerr-McGee has objected to the drilling of the natural gas test by Belco in Section 30, Township 20 South, Range 33 East, Lea County, New Mexico. Although Kerr-McGee does not presently hold a federal potash lease on Section 30, it appears that it would be the logical lessee to mine this resource from its existing facilities.

We are furnishing the attached map to support our belief that commercial potash deposits exist in this Section. Appreciable loss of recoverable potash reserves will occur if a gas test is drilled. Consequently, we have made the attached calculations from such data as is available to us from the areas shown on the accompanying map.

We are writing this letter in an effort to clarify Kerr-McGee's position with respect to this matter.

Sincerely yours,

James J. Kelly
President

JJK:mj
Attach. Map

cc: Andrew V. Bailey, USGS, Reston, Virginia 22070
A. L. Porter, Jr., USGS, Santa Fe, New Mexico 87501
D. M. Van Sickle, USGS, Roswell, New Mexico 88201

Calculations of Value

Bass Fed #2
660' S, 1320' E
Sec. 30 T20S R33E

Value of ore lost in the 2100' radius area around the proposed well east of Kerr-McGee's potash leases.

Area of 2100' radius circle	=	13,854,456 sq. ft.
Less area lost to Bass Fed # 1	=	1,151,853 sq. ft.
		12,702,603 sq. ft.

△	Area ÷ 15.3	Height (Ft.)	Tons	K_2O Grade	K_2O Tons
4a	830,236	6.48	5,379,926	14.70	790,849

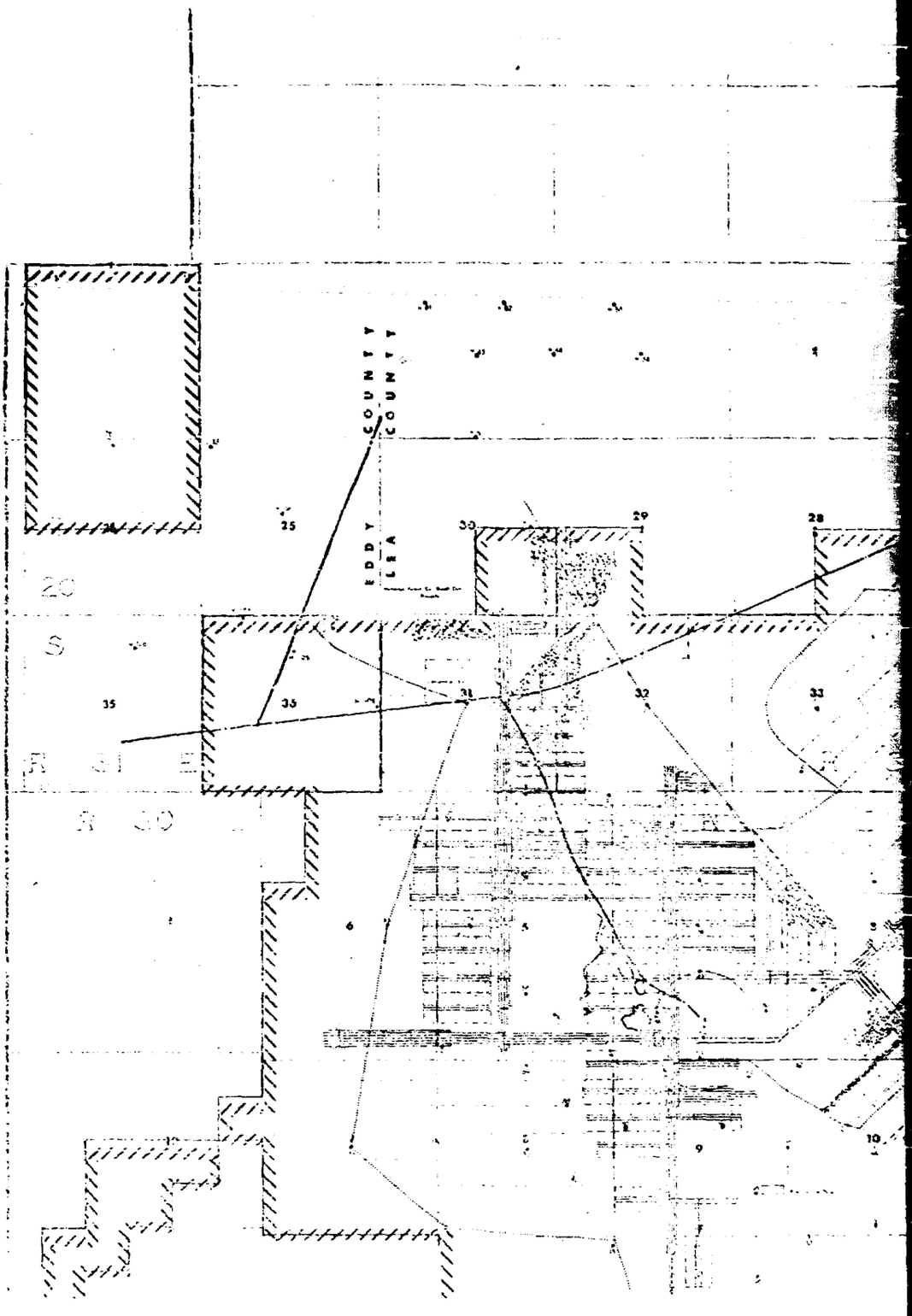
Normal Mine Plan:

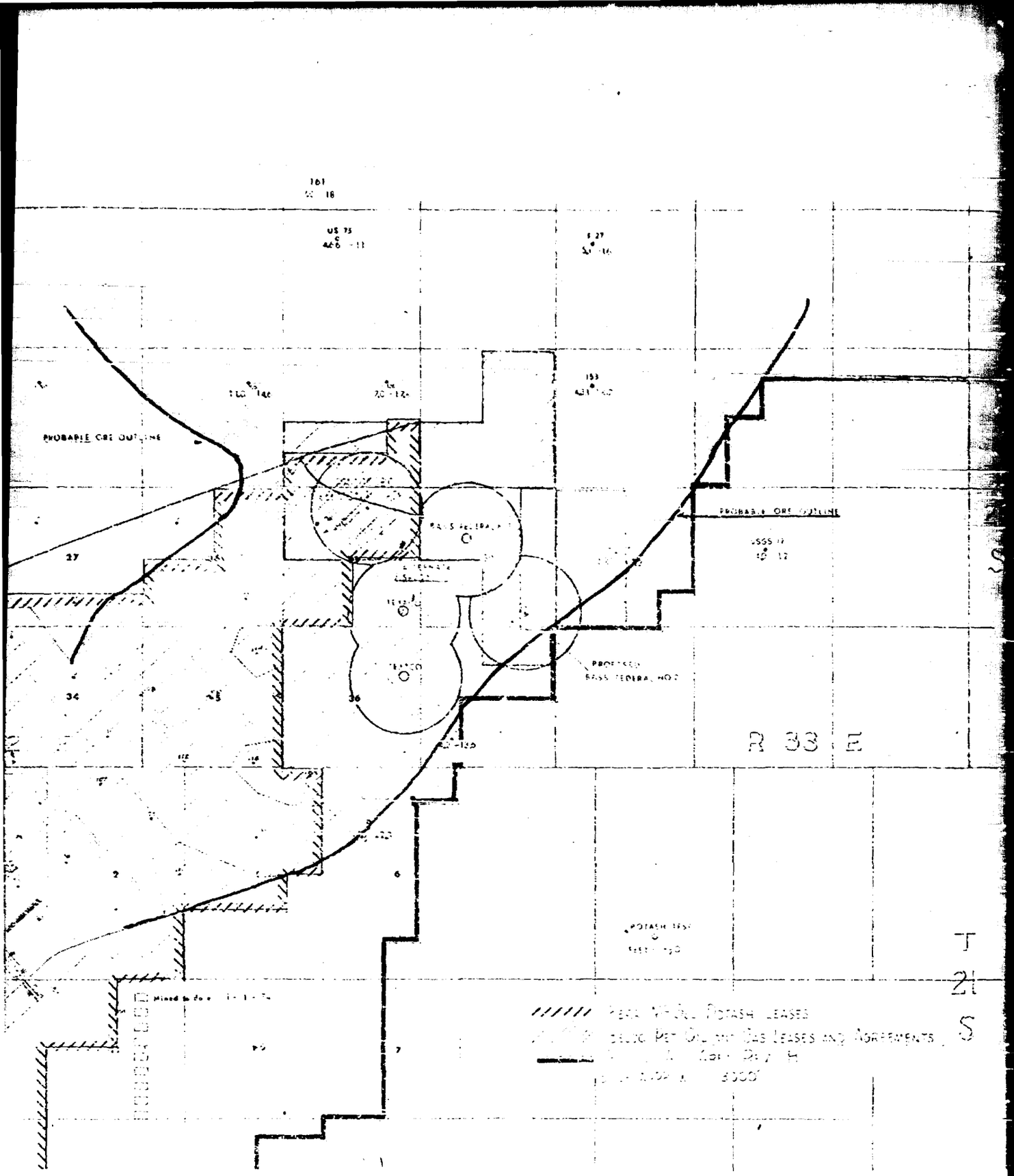
Tons in place	=	5,379,926
Tons to Mill @ 80% extraction	=	4,303,941
Tons of Product @ 82% Mill recovery x 62% K_2O grade	=	836,769

Mine Plans with No Second Mining:

Tons to Mill @ 35% extraction and no mining within 150' of well	=	1,872,496
Tons of Product @ 82% Mill Recovery x 62% K_2O grade	=	364,050
Product Tons Lost to Well	=	472,719
Sales Value @ $24.35/Ton	=	$ 11,510,708

RHL
2-14-74


EDDY COUNTY
LEA COUNTY
25
30
29
28
20
S
35
36
31
32
33
6
5
9
10


PROBABLE ORE OUTLINE
PROBABLE ORE OUTLINE
PROPOSED
R 33 E
T
21
S

KELLAHIN AND FOX
ATTORNEYS AT LAW
500 DON GASPAR AVENUE
POST OFFICE BOX 1769
SANTA FE, NEW MEXICO 87501

JASON W. KELLAHIN
ROBERT E. FOX
W. THOMAS KELLAHIN

TELEPHONE 982-4315
AREA CODE 505

Feb. 19, 1974

Mr. A. L. Porter, Secretary-Director
Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Belco Petroleum Corporation Application for Permit to Drill its Bass-Federal No. 2 Well, Potash Area

Dear Mr. Porter:

Belco Petroleum Corporation is in agreement that there would be no purpose served in holding the secheduled arbitration meeting on the above application in Roswell unless Kerr-McGee Corporation indicates that an agreement is possible. For that reason, and in response to your letter of February 13, 1974, Belco Petroleum Corporation will waive any requirement for the arbitration hearing under the provisions of Commission Order No. R-111-A, and request that a hearing on this application be set before the Commission at the earliest possible date.

We request a hearing before a quorum of the Commission, rather than before a Commission examiner in order to avoid any further delay in disposing of this application.

Your consideration of this will be appreciated.

Sincerely,

Jason W. Kellahin

Jason W. Kellahin

JWK:ss
cc: Mr. Orvis Frederick, U.S.G.S., Roswell
Mr. R. S. Fulton, U.S.G.S., Carlsbad
Mr. Charles Savage, Belco Petroleum Corp., New York
Mr. Lee Hering, Belco Petroleum Corp., Houston
Mr. John D. Robb, Attorney at Law, Albuquerque

3-1-74

United States Department of the Interior

GEOLOGICAL SURVEY
P. O. Box 1157
Hobbs, New Mexico 88240

October 23, 1973

OIL CONSERVATION COMMISSION
SANTA FE

Mr. A. L. Porter, Jr.
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Porter:

Attached is an information copy of an Application for Permit to Drill a well to a depth of 13,600 feet to test the Pennsylvanian in the SE¼SE¼ sec. 30, T. 20 S., R. 33 E., Lea County, New Mexico, filed by Belco Petroleum Corporation, 2000 Wilco Building, Midland, Texas.

The well location is in the Oil-Potash area on land included in Federal oil and gas lease New Mexico 03023-A.

Sincerely yours,

Arthur R. Brown
District Engineer

Attachment

KERR-McGEE CORPORATION
KERR-McGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 73102

October 26, 1973

Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico 87501

Re: Belco Petroleum Corporation
Bass-Federal No. 2
600' FSL and 1300' FEL
Section 30-T20S-R33E
Lea County, New Mexico

Gentlemen:

Kerr-McGee Corporation is the lessee of United States Potassium Lease NM 0554862, which lands including, among other lands, lands in Section 25-T20S-R32E, N.M.P.M., Lea County, New Mexico, are within one mile of the proposed drill site. Kerr-McGee hereby enters its objection to the approval of the application of Belco Petroleum Corporation.

Commercial deposits of potash are located in Section 25-T20S-R32E and potash core tests to the southwest, east and northeast of the proposed drill site indicate a commercial deposit exists throughout this area. Permitting the well to be drilled would constitute waste, in that production of gas would have the effect of reducing the total quantity of commercial deposits of potash that may be reasonably recovered in commercial quantities, would unduly interfere with the orderly development of the potash deposits and would create hazards to mining.

Very truly yours,

KERR-McGEE CORPORATION

Harold J. Kleen

Harold J. Kleen
Vice President
Minerals Exploration

HJK-ew

cc: R. S. Fulton
Regional Mining Supervisor
U.S.G.S.
Federal Building
Carlsbad, New Mexico 88220

Belco Petroleum Corporation

TELEGRAM

October 29, 1973

OIL CONSERVATION COMMISSION

OKLAHOMA CITY

BELCO

PLEASE REFER TO OUR LETTER OF OCTOBER 26, 1973 RE PETROLEUM CORPORATION FED. NO. 2 - 600' FSL AND 1300' FEL, SECTION 30, TOWNSHIP 20 SOUTH, RANGE 33 EAST, LEA COUNTY, NEW MEXICO. THE FIRST SENTENCE SHOULD READ "KERR McGEE CORPORATION IS THE LESSEE OF UNITED STATES POTASSIUM LEASE N M 0554862 INCLUDING AMONG OTHER LANDS, LANDS IN SECTION 25, TOWNSHIP 20 SOUTH, RANGE 32 EAST, NMPM, LEA COUNTY, NEW MEXICO WHICH LANDS ARE WITHIN ONE MILE OF THE PROPOSED DRILL SITE".

HAROLD J. KLEEN
KERR McGEE CORPORATION
OKLAHOMA CITY

Telegram will be mailed in.

og

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

January 30, 1974

Mr. Harold J. Kleen
Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Dear Sir:

With reference to your letter of October 26, 1973 which stated an objection by Kerr-McGee Corporation to the drilling of the Belco Petroleum Corporation Bass-Federal No. 2 Well 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, Lea County, New Mexico, I am hereby giving notice of an arbitration meeting to be held in the U. S. Geological Survey Office in the Federal Building in Roswell, New Mexico, at 10 o'clock a.m. on February 8, 1974. This meeting is in accordance with the provisions of Commission Order No. R-111-A, and by copies of this letter the other interested parties are being notified.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

cc: Belco Petroleum Corporation, 2000 Wilco Bldg., Midland
Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.C.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, New Mexico

OIL CONSERVATION COMMISSION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

March 8, 1974

CASE 5193

COPY

Sheriff
Eddy County Court House
Carlsbad, New Mexico 88220

Dear Sir:

Enclosed are Subpoenas which need to be served as soon as possible.

Any charges will be paid by the Commission.

Very truly yours,

WILLIAM F. CARR
General Counsel

WFC/dr

enclosure

OIL CONSERVATION COMMISSION
P. O. BOX 2088
SANTA FE, NEW MEXICO 87501

March 8, 1974

COPY

Mrs. Hawthorne
Eddy County Sheriff's Office
Eddy County Court House
Carlsbad, New Mexico 88220

Dear Mrs. Hawthorne:

This confirms my request made this date by telephone of you to have the Subpoena issued by the New Mexico Oil Conservation Commission against Kerr-McGee Corporation served on Mr. R. C. Green instead of Mr. John M. Swales.

Your assistance in this matter is appreciated.

Very truly yours,

WILLIAM F. CARR
Special Assistant Attorney General

WFC/dr

SUBPOENA DUCE TECUM

THE STATE OF NEW MEXICO

TO: Mr. John M. Swales, General Manager, Kerr-McGee Corporation, Greeting:

We command you to be and appear on or before March 14, 1974, before the Oil Conservation Commission of the State of New Mexico, in the Land Office Building, in the City of Santa Fe, in Oil Conservation Commission Case No. 5193, application of Belco Petroleum Corporation for a drilling permit in the Potash-Oil Area, Lea County, New Mexico, and that you bring with you and produce at the time and place aforesaid Potash Core Hole Logs with complete analysis on the following cores:

IMC	105 - NE	Sec. 23 -	T20S R32E
IMC	128 - NE	Sec. 24 -	T20S R32E
IMC	153 - NW	Sec. 20 -	T20S R32E
F	27 - NW_2	Sec. 17 -	T20S R33E
K	108 - E_2^2	Sec. 34 -	T20S R32E
K	110 - E_2^2	Sec. 35 -	T20S R32E
K	112 - S_2^2	Sec. 35 -	T20S R32E
K	107 - N^2	Sec. 2 -	T21S R32E
K	109 - NE^4	Sec. 1 -	T21S R32E
K	111 - W^2	Sec. 1 -	T21S R32E
D	165 - NW^4	Sec. 6 -	T21S R33E

And this do you under penalty of the law.

WITNESS A. L. Porter, Jr., Secretary-Director of the Oil Conservation Commission of the State of New Mexico, and the seal of said Commission, this _____ day of _____, A.D. 1974

_____

KERR-McGEE CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73102

February 19, 1974

JAMES J. KELLY
PRESIDENT

Mr. A. L. Porter, Jr.
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Porter:

Enclosed is a copy of a letter that was sent to you yesterday erroneously directed to the United States Geological Survey, as we were misinformed that you were with that agency, rather than the Oil Conservation Commission. We trust this will clarify the matter, in the event you receive the duplicate mailing.

Sincerely yours,

James J. Kelly

James J. Kelly
President

JJK:mj
Enc.

KERR-McGEE CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73102

February 18, 1974

JAMES J. KELLY
PRESIDENT

Mr. R. S. Fulton
Regional Mining Supervisor
United States Geological Survey
Carlsbad, New Mexico 88220

Dear Mr. Fulton:

As you know, Kerr-McGee has objected to the drilling of the natural gas test by Belco in Section 30, Township 20 South, Range 33 East, Lea County, New Mexico. Although Kerr-McGee does not presently hold a federal potash lease on Section 30, it appears that it would be the logical lessee to mine this resource from its existing facilities.

We are furnishing the attached map to support our belief that commercial potash deposits exist in this Section. Appreciable loss of recoverable potash reserves will occur if a gas test is drilled. Consequently, we have made the attached calculations from such data as is available to us from the areas shown on the accompanying map.

We are writing this letter in an effort to clarify Kerr-McGee's position with respect to this matter.

Sincerely yours,

James J. Kelly
President

JJK:mj
Attach. Map

cc: Andrew V. Bailey, USGS, Reston, Virginia 22070)
A. L. Porter, Jr., USGS, Santa Fe, New Mexico 87501) w/att.
D. M. Van Sickle, USGS, Roswell, New Mexico 88201)

Memo

From

2-21-74

A. L. PORTER, JR.
SECRETARY-DIRECTOR

To

Talked with Mr. George Cochran of Kerr Mc Gee Nuclear. He said Mr. Rabb of Alb. would call me today or tomorrow.

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 13, 1974

Mr. Harold J. Kleen, Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Gentlemen:

Enclosed is an official notice of an arbitration meeting to be held on March 1, 1974.

Our Commission would like for Kerr-McGee and Belco to make every effort to reach an agreement and let this office know not later than February 25 as to the success of your efforts. In the event that you are unable to reach an agreement and you feel that the arbitration meeting would not result in an agreement, please notify this office by February 25 of your willingness to waive the arbitration meeting and we will proceed to advertise the matter for hearing before the Commission.

I am sure that all parties realize that there would seem to be no point in holding the arbitration meeting unless there is a good possibility of reaching an agreement.

Very truly yours,

A. L. Porter, Jr.

A. L. PORTER, Jr.
Secretary-Director

ALP/ir
cc: Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.G.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, N.M.
Mr. John Robb, Attorney at Law, Albuquerque, N.M.
Mr. Joe D. Ramey, Oil Conservation Commission, Hobbs, N.M.

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 13, 1974

Mr. Harold J. Kleen, Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Gentlemen:

Enclosed is an official notice of an arbitration meeting to be held on March 1, 1974.

Our Commission would like for Kerr-McGee and Belco to make every effort to reach an agreement and let this office know not later than February 25 as to the success of your efforts. In the event that you are unable to reach an agreement and you feel that the arbitration meeting would not result in an agreement, please notify this office by February 25 of your willingness to waive the arbitration meeting and we will proceed to advertise the matter for hearing before the Commission.

I am sure that all parties realize that there would seem to be no point in holding the arbitration meeting unless there is a good possibility of reaching an agreement.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir
cc: Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.G.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, N.M.
Mr. John Robb, Attorney at Law, Albuquerque, N.M.
Mr. Joe D. Ramey, Oil Conservation Commission, Hobbs, N.M.

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 13, 1974

Mr. Harold J. Kleen
Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Dear Sir:

With reference to your letter of October 26, 1973 which stated an objection by Kerr-McGee Corporation to the drilling of the Belco Petroleum Corporation Bass-Federal No. 2 Well 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, Lea County, New Mexico, I am hereby giving notice of an arbitration meeting to be held in the U. S. Geological Survey Office in the Federal Building in Roswell, New Mexico, at 10 o'clock a.m. on March 1, 1974. This meeting is in accordance with the provisions of Commission Order No. R-111-A, and by copies of this letter the other interested parties are being notified.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir
cc: Belco Petroleum Corporation, 2000 Wilco Bldg., Midland
Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.G.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, New Mexico
Mr. John Robb, Attorney at Law, Albuquerque, New Mexico

Also a copy to Mr.
John Robb

March 12

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

February 13, 1974

Mr. Harold J. Kleen
Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Dear Sir:

With reference to your letter of October 26, 1973 which stated an objection by Kerr-McGee Corporation to the drilling of the Belco Petroleum Corporation Bass-Federal No. 2 Well 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, Lea County, New Mexico, I am hereby giving notice of an arbitration meeting to be held in the U. S. Geological Survey Office in the Federal Building in Roswell, New Mexico, at 10 o'clock a.m. on March 1, 1974. This meeting is in accordance with the provisions of Commission Order No. R-111-A, and by copies of this letter the other interested parties are being notified.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

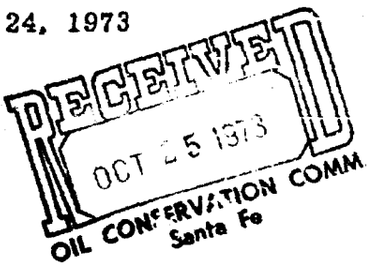
ALP/ir
cc: Belco Petroleum Corporation, 2000 Wilco Bldg., Midland
Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.G.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, New Mexico
Mr. John Robb, Attorney at Law, Albuquerque, New Mexico

MATKINS AND MARTIN
ATTORNEYS AT LAW
601 NORTH CANAL STREET
P. O. DRAWER N
CARLSBAD, NEW MEXICO 88220

JEROME D. MATKINS
W. T. MARTIN, JR

AREA CODE 505
885-2445
885-2312

October 24, 1973



Mr. A. L. Porter, Jr., Secretary
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Belco Petroleum Corporation
Bass Federal No. 2
660' FSL & 1300' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Dear Mr. Porter:

This is to advise that Harroun and Haworth, a partnership composed of D. S. Harroun and Russell Haworth, object to the application for permit to drill filed by Belco Petroleum Corporation on the referenced property.

Yours very truly,

MATKINS AND MARTIN

Jerome D. Matkins
Attorneys for Harroun and Haworth

ln
cc: D. S. Harroun
Belco Petroleum Corporation
Regional Oil and Gas Supervisor, USGS
Mr. R. S. Fulton, USGS
Kerr-McGee Chemical Corporation, Attn: John M. Swales

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 · SANTA FE
87501

January 30, 1974

Mr. Harold J. Kleen
Vice President
Kerr-McGee Corporation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Dear Sir:

With reference to your letter of October 26, 1973 which stated an objection by Kerr-McGee Corporation to the drilling of the Belco Petroleum Corporation Bass-Federal No. 2 Well 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, Lea County, New Mexico, I am hereby giving notice of an arbitration meeting to be held in the U. S. Geological Survey Office in the Federal Building in Roswell, New Mexico, at 10 o'clock a.m. on February 8, 1974. This meeting is in accordance with the provisions of Commission Order No. R-111-A, and by copies of this letter the other interested parties are being notified.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

cc: Belco Petroleum Corporation, 2000 Wilco Bldg., Midland
Mr. Orvis Frederick, U.S.G.S., Roswell, New Mexico
Mr. R. S. Fulton, U.S.G.S., Carlsbad, New Mexico
Mr. Jason Kellahin, Kellahin & Fox, Santa Fe, New Mexico

2-7-74 Robb -
At suggestion of John Robb - meeting was postponed. Will give written notice later
Called Frederick
Called Kellahin

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42 R1425.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK: DRILL ☒ DEEPEN ☐ PLUG BACK ☐

b. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ OTHER — SINGLE ZONE ☒ MULTIPLE ZONE ☐

2. NAME OF OPERATOR: Belco Petroleum Corporation

3. ADDRESS OF OPERATOR: 2000 Wilco Building, Midland, Texas 79701

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 660' FSL & 1300' FEL Section 30, T-20-S, R-33-E Lea County
At proposed prod. zone: Same

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 33 Miles East of Carlsbad, New Mexico

5. LEASE DESIGNATION AND SERIAL NO.: NM-03023A
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: None
7. UNIT AGREEMENT NAME: None
8. FARM OR LEASE NAME: Bass-Federal
9. WELL NO.: 2
10. FIELD AND POOL, OR WILDCAT: South Salt Lake
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec. 30, T-20-S, R-33-E
12. COUNTY OR PARISH: Lea
13. STATE: New Mexico

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any)	660'	16. NO. OF ACRES IN LEASE	320	17. NO. OF ACRES ASSIGNED TO THIS WELL	320
18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.	None	19. PROPOSED DEPTH	13,600'	20. ROTARY OR CABLE TOOLS	Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): 3598.9 GR

22. APPROX. DATE WORK WILL START*: 11-15-73

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
16'	13 3/8"	48#	1,000'	350sx (To Circulate)
12 ¼	10 3/4"	40.50#	3,100'	650sx (To Circulate)
9 ½	7 5/8"	26.40 & 29.70#	10,300'	3000sx
6 ½	5 1/2"	17#	13,600'	750sx

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED [signature] TITLE District Engineer DATE 10-18-73

(This space for Federal or State office use)

PERMIT NO. _____ APPROVAL DATE _____

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions On Reverse Side

NEW MEXICO OIL CONSERVATION COMMISSION

WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102
Supersedes C-128
Effective 1-1-65

All distances must be from the outer boundaries of the Section.

Operator	Lease	Well No.
BELCO PETROLEUM CORP.	BASS FEDERAL	2

Unit Letter	Section	Township	Range	County
P	30	20 South	33 East	Lea

Actual Footage Location of Well: 660 feet from the South line and 1300 feet from the East line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
3598.9			Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

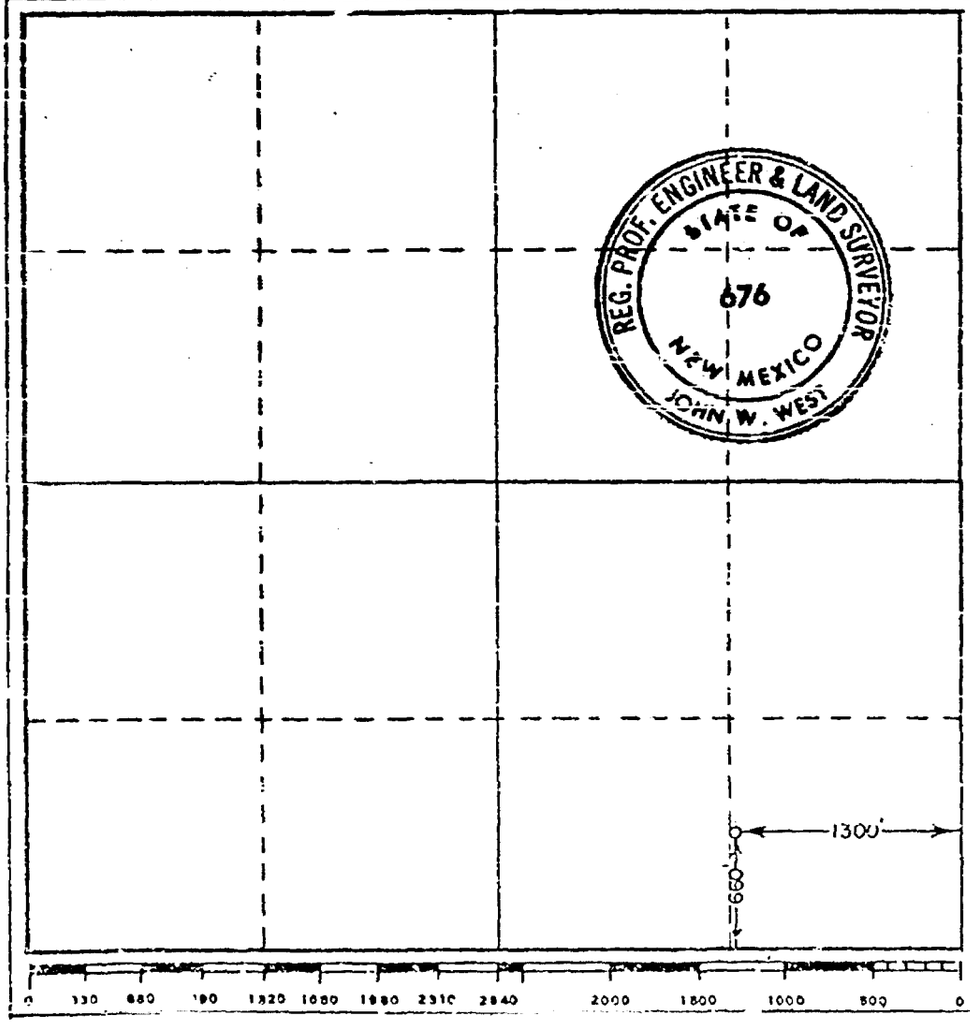
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling. etc?

☐ Yes ☐ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.



CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name: Glenn Cepe

Position: District Engineer

Company: Belco Petroleum Corporation

Date: 10/18/73

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

Date Surveyed: October 10, 1973

Registered Professional Engineer and/or Land Surveyor

John W West

Certificate No. 676

BEST AVAILABLE COPY

1973 OCT 29 AM 11:11

western union telegram

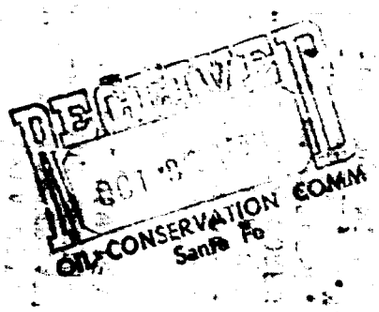
IPMFEKA SANA
1-02812 TA 302 10/29/73
TLX KERRMCGEE OKC B
OKLA CITY OKLA 10-29-73
PMS OIL CONSERVATION COMMISSION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

GENTLEMEN:
PLEASE REFER TO OUR LETTER OF OCTOBER 26, 1973, RE BELCO PETROLEUM CORPORATION BASS-FEDERAL NO. 2 600' FSL AND 1300' FEL SECTION 36-T20S-R33E LEA COUNTY, NEW MEXICO. FIRST SENTENCE SHOULD READ "KERR-MCGEE CORPORATION IS THE LESSEE OF UNITED STATES POTASSIUM LEASE NM 055486, INCLUDING, AMONG OTHER LANDS, LANDS IN SECTION 25-T20S-R32E, N.M.P.M., LEA COUNTY, NEW MEXICO, WHICH LANDS ARE WITHIN ONE MILE OF THE PROPOSED DRILL SITE."

HAROLD J. KLEEN
KERR MCGEE CORP
OKLA CITY OKLA

1306 EST

IPMFEKA SANA


OIL CONSERVATION COMM
Santa Fe

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
P. O. BOX 2088 - SANTA FE
87501

I. R. TRUJILLO
CHAIRMAN
LAND COMMISSIONER
ALEX J. ARMIJO
MEMBER
STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

October 29, 1973

Mr. Jerome D. Matkins
Matkins and Martin
Attorneys at Law
Post Office Drawer N
Carlsbad, New Mexico 88220

Dear Mr. Matkins:

In response to your letter of October 24 objecting to the application for a permit to drill filed by Belco Petroleum Corporation, I am quoting below Section VII of Commission Order No. R-111-A.

"Before commencing drilling operations for oil or gas on any lands within the Potash Area, the well operator shall prepare a map or plat showing the location of the proposed well, said map or plat to accompany each copy of the Notice of Intention to Drill. In addition to the number of copies required by the Commission, the well operator shall send one copy by registered mail to all potash operators holding potash leases within a radius of one mile of the proposed well, as reflected by the plats submitted under paragraph IX (2).

The well operator shall furnish proof of the fact that said potash operators were notified by registered mail of his intent by attaching return receipt to the copies of the Notice of Intention to Drill and plats furnished the Commission.

The Commission, or its authorized representative, may approved such Notice of Intention to Drill if no objection to the location of the proposed well is made by a potash operator within ten days after receipt. If the location of the proposed well is objected to by the potash operator, the matter shall be referred to the Secretary-Director of the Commission for arbitration. If a satisfactory settlement cannot be reached, the Secretary-Director of the Commission shall refer the matter to a hearing before the Commission after due notice and a decision either approving or denying the operator's plans to drill shall be entered by the Commission."

Mr. Jerome D. Matkins
Matkins and Martin
Attorneys at Law
Post Office Drawer N
Carlsbad, New Mexico 88220

In view of the foregoing, it does not appear that your clients have established that they have the standing to object to the well location since they are not potash operators.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

cc: Belco Petroleum Corporation, 2000 Wilco Building, Midland, Texas 79701
Kerr McGee Corporation, Kerr McGee Building, Oklahoma City, Oklahoma 73102
Mr. R. S. Fulton, Regional Mining Supervisor, U. S. G. S., Federal Building, Carlsbad, New Mexico 88220

SHARP DRILLING CO., INC.
FIRST NATIONAL BANK BUILDING
P. O. BOX 1271 TELEPHONE 683-3384
MIDLAND, TEXAS 79701

March 12, 1974

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Attention: Mr. Al Owings

Gentlemen:

We have considered your solicitation for a footage bid to drill your 13,300' Morrow well to be located in Section 30, T-20-S, R-33-E, Lea County, New Mexico, to be drilled as a directional hole with the surface location to be approximately 4,000' East in Section 29. We regret that we can not submit a bid on this well for the following reasons:

(1) We are unable to determine the number of days required to drill a well of this nature.

(2) We can not estimate the number or types of bits required for this project.

(3) We are unable to determine the cost of directional drilling services required for drilling this well.

(4) We are reluctant to furnish our drillstem to drill this directional well because we are presently receiving estimates of two years as a delivery date to replace drill pipe. We recognize that this project will cause excessive wear to our drillstring, and we do not know at this point just what our replacement cost of this pie might be.

If we can furnish further information regarding this well, please advise.

Yours very truly,

SHARP DRILLING CO., INC.

R. E. Throckmorton

R. E. Throckmorton
Vice President

RET/pb

WILLIAM A. SLOAN
JACKSON G. AKIN
JOHN D. ROBB
CHARLES B. LARRABEE
JAMES C. RITCHIE
JOHN P. EASTHAM
WILLIAM C. SCHAAB
WILLIAM C. BRIGGS
RAY H. RODEY
ROBERT D. TAICHERT
ROBERT M. ST. JOHN
JOSEPH J. MULLINS
DUANE C. GILKEY
MARK K. ADAMS
ROBERT G. McCORKLE
PETER G. PRINA
BRUCE D. HALL
JOHN P. SALAZAR
WILLIAM S. DIXON
JOHN P. BURTON
REX D. THROCKMORTON
ROBERTA COOPER RAMO
JONATHAN W. HEWES
JAY R. GENTRY ORTIZ
GENE C. WALTON

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.
COUNSELLORS AND ATTORNEYS AT LAW
FIRST NATIONAL BANK BUILDING-WEST
WEST CENTRAL AVENUE AT THIRD
P. O. BOX 1888
ALBUQUERQUE, NEW MEXICO 87103

OF COUNSEL
DON L. DICKASON

PEARCE C. RODEY
1869-1958

TELEPHONE 243-1301
AREA CODE 505

March 20, 1974

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Ida Rodriguez

Re: Case No. 5193

Dear Ida:

Enclosed are four legible copies of Exhibit XI of Kerr-McGee Corporation in the referenced Case. Please place the Commission's Stamp upon at least two copies of the Exhibit and fill in the blanks indicating that it is Exhibit XI of Kerr-McGee Corporation submitted in connection with the referenced case on March 15, 1974. Please telephone me if you have any questions.

Yours very truly,

RODEY, DICKASON, SLOAN, AKIN & ROBB, P.A.

Mark

By:
Mark K. Adams

MKA/sa
Encl.
cc: Bob Lane

EXHIBIT B

(I L L E G I B L E)

UNDERGROUND MOVEMENT AND SUBSIDENCE OVER UNITED STATES POTASH COMPANY MINE

E. H. Miller
Resident Manager

F. L. Pierson
Senior Geologist

U. S. Potash Company
Carlsbad, New Mexico

[Presented at Annual Meeting of American Institute of Mining, Metallurgical, and Petroleum Engineers, New York, February 16-22, 1958].

UNDERGROUND MOVEMENT AND SUBSIDENCE OVER UNITED STATES POTASH COMPANY MINE

581929

By

Earl H. Miller, Resident Manager
and
Francis L. Pierson, Senior Geologist

The United States Potash Company was the original discoverer and first producer of underground mined potash ore in North America and commenced active production of potash in 1931. In July 1936, the company merged with United States Borax & Chemical Corporation and is now a Division of that corporation.

The mine is located twenty-two miles east of the city of Carlsbad and the refinery is located sixteen miles south of the mine. The mine was placed where the ore was found and the refinery placed where there was sufficient water for a dissolving and re-crystallization plant.

For twenty-three of the last twenty-six years, the potash ore was mined with the room and pillar method, taking approximately sixty percent extraction and leaving forty percent in pillars. These pillars are generally fifty-eight feet by fifty-eight feet square. Three years ago, it was decided that removal of as large an extraction as possible from these pillars should be commenced.

The first visible evidence of subsidence on the surface is by small hairline cracks which rapidly develop into openings measuring up to approximately one inch wide and one hundred feet long. As the face retreats underground, these tension cracks disappear. About the boundaries of the final mined area which have been unworked for any length of time, these cracks appear and become larger. With continual strain and erosional effects, some of the cracks develop into sizeable openings measuring six inches to two feet wide and with an unknown depth. With continued erosion, the walls of the cracks fall into the bottom, thus widening and filling the openings.

In the present stage after two years, some of the openings appear as slump holes measuring some six to eight feet across, ten to thirty feet long, and five to fifteen feet deep. The geologic structure through which these forces are transmitted is rather typical of bedded salt deposits in the area. The buff dolomite section at approximately four hundred feet below the surface is a

water zone of considerable magnitude over quite an extensive area. The fact that both the salt and potash are highly soluble makes it imperative that the section between this buff dolomite and the underground salt and potash beds below must not be ruptured. The potash bed, which varies from five to fifteen feet in height and lies more or less horizontal, is approximately one thousand feet below the surface and is normally overlain by a salt section some five hundred feet thick. The shale and clay strata below the water zone and above the salt section form the impervious layer which protects the salt section from the water above.

The effects of subsidence over the surface area are much larger than the actual final mined area underground. In those places where final mining has been carried to the limits of the ore-body, subsidence effects have been observed some seven hundred feet beyond the limits on the surface. In those places where final mining stopped in a first mined area, subsidence has been noted for distances as great as one thousand two hundred feet beyond the limits of final mining. Principally for this reason, a large zone about the hoisting shafts has been prohibited to final mining activities until all other mining is completed.

In present operations, there are two types of mining in use. The first is known as conventional mining which utilizes undercutters, drills and blasting, after which the ore is moved from the face with loaders and shuttle cars. The other method is with continuous mining machines, using extensible and mainline haulage belts. In both of these operations, final mining is being carried on. The conventional final mining system is used generally in high ore in which it would be uneconomical to use a continuous mining machine.

In cases where a mud seam or zone of weakness occurs in a pillar, it will, of course, crush and fail at this point. Frequently when the mud seam is just above the back or just under the floor, the pillar will punch through into the weak zone. Additional effects caused by the mud seam just above or just below an entry are frequent sags and falls of roof slabs and heaving of the floor.

Even in the event that roof slabs begin to fail over haulage ways, an attempt is made to control their subsidence until the haulage way is abandoned. In controlling roof slabs, cribbing, stulls and roof bolts are often used. These measures usually suffice to keep the haulage ways open but occasionally it is necessary to blast down a slab and remove it.

It is thought that roof slabbing and floor heaving are caused by the vertical pressure and certain resulting forces. The vertical pressure through a punching action causes the tendency for the floor to rise in the entry and the back to sag. The other resulting forces are thought to be the movement of clay in the clay seams from above and below the pillars out into the floor and back in the entries. It is also thought that "end pressure" exerted on the floor and roof slabs from the expanding pillars helps to cause the initial separation of the slabs.

The second type of mining in our operations is in the continuous miner sections. About five years ago we commenced the use of continuous miners, and in this operation a different type pillar was necessary due to the limitations of the machine. The general mining pattern with this method leaves pillars one hundred feet long and thirty-five feet wide after first mining. In final mining, these pillars are reduced to such size that from ninety-five to ninety-eight percent extraction is being obtained. The back stands well immediately after mining but with such a large percentage of extraction, subsidence is relatively rapid.

In technically plotting subsidence, the major amount of movement underground is estimated to be approximately twelve feet, while the major subsidence on the surface is approximately eight and one-half feet. This would appear to indicate that very little breaking in to the place in the strata above the mined-out area and that the overlying beds are more or less subsiding uniformly.

In plotting the movement of one particular station on the surface and underground in the final mined area, it was found that for approximately thirty days subsidence was extremely rapid. The total height of the mined-out area was originally 12.75 feet. For the first thirty days after final mining, there was apparently little movement; that between thirty and sixty days, the underground workings at this point had subsided 3.25 feet, while the point above on the surface had dropped 0.75 feet. At the end of one hundred days, the back had come down a total of six feet, while subsidence on the surface measured 2.20 feet. After one hundred and forty days, the station underground had dropped a total of seven and one-half feet, while the point on the surface had moved down three and one-half feet. Due to the bad conditions of the back underground at this time, observations were discontinued. On the surface, however, the point continued downward, measuring six feet total drop after two hundred days. It was at approximately this point that the sharp rate of subsidence changed abruptly. At the end of one thousand days, the surface station had subsided a total of 7.50 feet, an increase of 1.50 feet in the last eight hundred days.

In graphing the movement of this station, it was found that the line was not continuously downward but indicated that subsidence, both underground and on the surface, came in waves or intervals, and in some cases the ground actually rose from the previous month's reading. From our closest observation in a single instance, it appeared that surface subsidence became measurable approximately thirty-five days after subsidence was noted underground.

In the first study of subsidence movement, a grid was set over the area to be mined with stations on five-hundred foot spacing, both east-west and north-south. These stations were triangulated in each month and a record of their movement was noted. From this date an approximate limiting angle of 51 degrees - 30 degrees has been calculated, the limiting angle, of course, being measured from a line drawn vertically up from the edge of advance and a second line drawn upward from the edge of advance to the outermost point where subsidence was observed on the surface. This limiting angle is important in determining where surface structures will be affected by subsidence. There are many factors which contribute to the degree of the angle. Those principally responsible are:

(1) The overlying strata through which subsidence takes place, this angle being relatively small for strong rocks and relatively large for weaker members, the total limiting angle, of course, being the sum of the various limiting angles up through the different strata.

(2) It has been observed that the limiting angle is greater in areas where final mining operations are bordered by first mining operations. Strictly speaking, this is not a true limiting angle because extraction outside the area affects an increase of the angle. However, from the practical point of view, it is quite necessary to take this influence under consideration. We have observed in some cases a limiting angle as large as 51 to 30 degrees. It may be when the ground completely stabilizes that this angle will become somewhat greater.

The limiting angle, of course, can only be measured well after final mining has been completed and the ground has more or less become stabilized. Up until that point there is a definite lag of subsidence behind final mining operations.

Recently a line of stations on one-hundred feet centers was placed over the center of an area which was to be final mined. In addition to giving much closer control on subsidence date, we can determine the amount of strain (elongation and compression)

between these points. This method of computing will give a more accurate limiting angle and an angle of repose which is the complement of the limiting angle, and the angle of break. The angle of break is of considerable interest as it is the line through which the greatest force of shear is exerted. This angle is measured from the horizontal to a line which is drawn from the edge of advance of the remaining face underground up to a point of maximum tension strain, as plotted from the field data.

It is expected that with continued study, more detailed information on the characteristics of ground movement, as applied to salt-bedded deposits in the Carlsbad district, will become available.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 5193
Order No. R-4759

APPLICATION OF BELCO PETROLEUM
CORPORATION FOR A DRILLING PERMIT
IN THE POTASH-OIL AREA, LEA COUNTY,
NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on March 15, 1974, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission".

NOW, on this _____ day of March, 1974, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Belco Petroleum Corporation, seeks authority to drill its proposed Bass-Federal Well No. 2 to test the Pennsylvanian formation at an unorthodox location 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake-Morrow Gas Pool, Lea County, New Mexico, said location being within the boundaries of the Potash-Oil Area as defined by Commission Order R-111-A, and having been objected to by the owner of potash leases in the Area. This unorthodox location was previously approved by the Commission by Order No. R-4699.

(3) That the entire S/2 of said Section 30 may reasonably be presumed to be productive of gas from the Morrow formation.

(4) That a well drilled at the proposed location would not be in sufficient proximity to commercial deposits of potash to impose a hazard to the mining of such deposits.

~~(5) That the proposed unorthodox location has previously been approved by the Commission by Order No. R-4699.~~

(5) That approval of the application is necessary to prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED:

(1) That Belco Petroleum Corporation is hereby authorized to drill its proposed Bass-Federal Well No. 2 in the Potash Oil Area at an unorthodox location 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake Morrow Gas Pool, Lea County, New Mexico.

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

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

RECEIVED
FEB 4 1974

INVOICE — PRODUCING OPERATORS — INVOICE

STATE OF NEW MEXICO

Below is statement of pipeline oil runs and dry gas marketed (25 MCF representing one barrel) for month of December, 1973 and proration of New Mexico Oil and Gas Engineering Committee expense for January, 1974. In accordance with the adopted By-laws of the Committee, the minimum billing is $15.00 per month. Please report changes in names and addresses of operators and make remittance to the New Mexico Oil & Gas Engineering Committee, P.O. Box 127, Hobbs, New Mexico 88240.

Operators	Bbls of Oil	Bbls. 25 MCF to 1 Bbl.	Bbls. Run All Fields	Proration of Expense
Adobe Oil Company	723	2,793	3,516	$ 15.00
Agua, Inc.	1,825		1,825	15.00
Alamr Petroleum Company		151	151	15.00
Amerada Hess Corporation	251,949	44,313	296,262	79.41
American Trading & Production Co.	943		943	15.00
Amini Oil Corporation	14,198	3,082	17,280	15.00
Amoco Production Company	306,719	319,160	625,879	167.75
Anadarko Production Company	108,562	1,468	110,030	29.50
Anderson Oil & Gas Company, Inc.	8,870	21	8,891	15.00
Antweil, Morris R.	3,730	13,848	17,578	15.00
APCO Oil Corporation		1,000	1,000	15.00
Apexco, Inc.	36,160		36,160	15.00
Apollo Oil Company	400		400	15.00
Armer Oil Company	7,110		7,110	15.00
Ashland Oil & Refining Co.	477		477	15.00
Ashmun & Hilliard Oil Company	1,433		1,433	15.00
Atlantic Richfield Company	1,189,812	90,447	1,280,259	343.14
Aztec Oil & Gas Company	20,978	117,566	138,544	37.13
Barber Oil Inc.	4,185	350	4,535	15.00
Barnhill, Wm. B.	650		650	15.00
Bass, Perry R.	5,573	5,732	11,305	15.00
Baxter, Murphy H.	9,362		9,362	15.00
BCO, Inc.	6,175	195	6,370	15.00
BTA Oil Producers	30,750		30,750	15.00
Beard, J. G.	3,928		3,928	15.00
Belco Petroleum Corp.	14,469	21,036	35,505	15.00
Bell Petroleum Company	11,362		11,162	15.00
Benson-Montin-Greer Drlg. Co.	59,040	590	59,630	15.98
Black, W. H. & Dan-Partnership	545		545	15.00
Blue Danube Oil Company, Inc.		955	955	15.00
Bonanza Oil Corporation	715		715	15.00
Bridwell Oil Company	2,728		2,728	15.00
Bright & Schiff	525		525	15.00
Brookhaven Oil Company		3,519	3,519	15.00

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 1
Submitted by Belco
Hearing Date 3-13-74

Midland, Texas 79701
Telephone (915) 683 6368

Belco Petroleum Corporation

November 6, 1973

LAND SECTION
PHILLIPS PETROLEUM CO

Belco

Perry R. Bass
P. O. Box 171
Midland, Texas 79701
Attention: Bill Seltzer

Atlantic Richfield Company
P. O. Box 1610
Midland, Texas 79701
Attention: Jim Walker

Bass Enterprises Production Co.
P. O. Box No. 171
Midland, Texas 79701
Attention: Bill Seltzer

Phillips Petroleum Company
Phillips Building
Odessa, Texas
Attention: E. M. Gorence

Frank O. Elliott, Tr.
Clarence E. Hinkle, Tr. and
Edna Ione Hall, Tr.
P. O. Box 1355
Roswell, New Mexico

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 4
Submitted by Belco
Hearing Date 3-15-74

Extended & To Copy 1-74 except Atl Rich extended to 7/1/74

Re: Teas Prospect
Belco #2-Bass Federal
Section 30, T20S, R33E
Eddy County, New Mexico

Gentlemen:

Under the terms of Farmout Agreement dated August 8, 1972, as amended by letter dated June 18, 1973, Belco must commence a second test on the captioned prospect on or before January 1, 1974.

By letter dated August 31, 1973, Belco proposed to drill the captioned test with the S/2 Section 30 dedicated thereto. Perry R. Bass subsequently objected to the inclusion of the W/2 SW/4 of Section 30 in this proration unit and suggested that a non-standard unit covering the SE/4, E/2 SW/4 Section 30 and the N/2 NE/4 Section 31 be formed. In deference to this request, we went before the Oil Conservation Commission for hearing on October 3, 1973 requesting such a non-standard unit. Texaco, Inc. objected to the formation of this non-standard unit. Due to a technical error in the advertising, this hearing was re-advertised and rescheduled for October 31, 1973 at which time both Texaco and Belco entered additional testimony into the record. The thrust of Texaco's testimony was that no decision should be made by the commission until such time as the exact amount of acreage to be dedicated to their #1-Audie Richards well located SE/4 Section 25 had been settled. We, of course, requested that the commission approve our request for a

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash-Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
[illegible] day of November, 1973.
PHILLIPS PETROLEUM COMPANY

BY [illegible]

RECEIVED
N[illegible] 1 1973
MIDLAND OFFICE

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
30 day of November, 1973.
PERRY R. BASS
BY

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash-Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
____ day of November, 1973.

BASS ENTERPRISES PRODUCTION CO.

BY _____

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash-Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
____ day of November, 1973.

_____
Edna Ione Hall, Trustee

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash-Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
11th day of November, 1973.

Frank O. Elliott, Trustee

non-standard unit. It is our opinion that the commission will probably not make a ruling in our application until after the hearing on Texaco's application for a non-standard proration unit comprised of the SE/4 of Section 25 has been heard. This item will come before the commission on November 28, 1973.

On October 18, 1973, Belco made application to the regulatory bodies to drill the captioned well at a location 1300' FEL and 660' FSL of Section 30. Inasmuch as this location is within the boundaries of the New Mexico Oil Conservation Commission Potash-Oil Area as defined by Order #R-111, Belco was obligated to notify offset potash operators. As of the date of this writing, two operators have objected to drilling this well. They are Kerr McGee and Harroun and Haworth. The Oil Conservation Commission has dismissed the protest of Harroun and Haworth. We have had a lengthy conversation with Mr. Pete Porter of the Oil Conservation Commission and he refuses to dismiss the Kerr McGee protest and feels that it must be handled in the normal procedure i.e. arbitration and hearing before the commission.

Belco is considering another visit with Kerr McGee in an effort to solicit their withdrawal of this protest; however, we are not optimistic that this can be accomplished. In all likelihood, it will be necessary to bring this matter before the commission by hearing.

The consequence of the above problems are that no definitive proration unit will be approved until some time late in December; and unless the Kerr McGee protest can be removed, the chances are that the issuance of a permit to drill this well will be delayed at least until early 1974. Consequently, we herein request an extension of time to April 1, 1974 in which to commence the second well called for under the terms of the Farmout Agreement dated August 8, 1972. Please so indicate your approval of this extension by signing in the space provided below and returning one copy of this letter at your earliest convenience.

If you should have any additional questions, please do not hesitate to contact me.

Yours very truly,

BELCO PETROLEUM CORPORATION

Omar L. Brown
District Landman

OLB/MW

AGREED TO AND ACCEPTED THIS
day of November, 1973.

Clarence E. Hinkle, Trustee

AtlanticRichfieldCompany
North American Producing Division
Permian Dist
Post Office Box 1610
Midland, Texas 79701
Telephone 915 682 8631

C. H. McClure
District Land Manager

January 10, 1974

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Attention: Mr. Omar L. Brown

Re: Farmout Agreement
Little Eddy Unit
Lea County, New Mexico
AR-GL-49832; A-NM-11

Gentlemen:

Under date August 8, 1972, you entered into a farmout agreement between Perry R. Bass, et al, covering lands in Lea County, New Mexico, reference being made to said Farmout Agreement herein for all purposes.

You have requested an extension of time in which to commence the drilling of the second test well. An extension to July 1, 1971, is hereby granted, provided, however, in the event that the United States Geological Survey and the New Mexico Oil Conservation Commission issue Belco a permit to drill prior to July 1, 1974, Belco would be obligated to commence the drilling of the second test well within 45 days of issuance of the permit.

Except as expressly provided for herein said Farmout Agreement shall remain as originally written and previously amended.

Very truly yours,

M. James Walker

M. James Walker
Area Landman

MJW:jrb

PERRY R. BASS
DIVISION LAND & GEOLOGICAL OFFICE
POST OFFICE BOX 1111
MIDLAND, TEXAS 79701

June 18, 1973

Re: Farmout Agreement dated
August 8, 1972, Lea County,
New Mexico.

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Gentlemen:

You have requested an extension of time for drilling additional wells as set forth on pages 4 and 5 of the above captioned Farmout Agreement, due to objections and protests from potash companies on potash leases within one mile of your proposed second test, which is located in the NW¼NE¼ of Section 25, T-20-S, R-32-E, Lea County, New Mexico.

We hereby extend the time for commencement of the second well as set forth in the above captioned farmout agreement as follows: Said second well under said Farmout Agreement shall commence operations within thirty (30) days after the completion of the Belco #1 Felmont, located in the NW¼NE¼ of Section 25, T-20-S, R-32-E, Lea County, New Mexico. Said well shall be commenced no later than January 1, 1974.

Other than herein altered, all terms and provisions of our agreement of August 8, 1972, shall remain in full force and effect.

This agreement may be executed by executing the original copy of this letter, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof, with the same effect as if all parties had executed the same instrument.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: Bill Seetzer

PERRY R. BASS

BY: Bill Seetzer

ATLANTIC RICHFIELD COMPANY

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

This agreement may be executed by executing the original copy of this letter, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof, with the same effect as if all parties had executed the same instrument.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: Bill Seezer

PERRY R. BASS

BY: Bill Seezer

ATLANTIC RICHFIELD COMPANY

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

Frank O. Elliott, Trustee under the Frank O. Elliott Living Trust

Clarence E. Hinkle, Trustee under the Frank O. Elliott Living Trust

This agreement may be executed by executing the original copy of this letter, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof, with the same effect as if all parties had executed the same instrument.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: Bill Seeger

PERRY R. BASS

BY: Bill Seeger

ATLANTIC RICHFIELD COMPANY

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

This agreement may be executed by executing the original copy of this letter, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof, with the same effect as if all parties had executed the same instrument.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: Bill Seetzer

PERRY R. BASS

BY: Bill Seetzer

ATLANTIC RICHFIELD COMPANY

BY: W. James Walker

PHILLIPS PETROLEUM COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

Edna Ione Hall, Trustee under
the Edna Ione Hall Living Trust

Clarence E. Hinkle, Trustee under
the Edna Ione Hall Living Trust

August 8, 1972

Farmout Agreement
Lea County, New Mexico

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Gentlemen:

We claim ownership of the Oil and Gas Leases listed below in Schedule A and Schedule B in the following percentages:

SCHEDULE A

Perry R. Bass	1/4 of 89%
Bass Enterprises Production Co.	3/4 of 89%
Atlantic Richfield Company	2%
Texaco, Inc.	5%
Phillips Petroleum Company	2%
Tenneco Oil Company, successor in title to Leonard Oil Company	1%
Frank O. Elliott and Clarence E. Hinkle, Trustees under the Frank O. Elliott Living Trust, successor in title to Sunshine Royalty Company	1/2 of 1%
Edna Ione Hall and Clarence E. Hinkle, Trustees under the Edna Ione Hall Living Trust, successor in title to Sunshine Royalty Company	1/2 of 1%

#4806-A - Oil and Gas Lease dated April 8, 1952, from Audie Richards, a single man having never been married; Edgar Richards, a married man dealing with his sole and separate property; June Shield, a married woman dealing with her sole and separate property, Hettie Mae Pruit, a married woman dealing with her sole and separate property, to Howard W. Jennings, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-B - Oil and Gas Lease dated April 8, 1952, from Mary Lorena Higgins, Individually and as Trustee, Eula Higgins, a single woman, Flora May Edwards, a single woman, Mary Higgins Smith and J. H. Smith, her husband, Thelma Higgins Kesler and Ralph Kesler, her husband, Samuel O. Higgins and Marie W. Higgins, his wife, W. F. Higgins and Annie Long Higgins, his wife, Earl Curtis Higgins and Hazel G. Higgins, his wife, J. Vernon Higgins and Charles Davis Higgins, his wife, and S. O. Higgins, a single man, to Howard W. Jennings, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-C - Oil and Gas Lease dated April 16, 1956, from Betty M. Dreessen, dealing in her separate property but joined pro forma by her husband E. T. Dreessen, to Sid W. Richardson and Perry R. Bass insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-D - Oil and Gas Lease dated April 16, 1956, from Cecil H. Kyte, Trustee for David Bond Kyte, to Sid W. Richardson and Perry R. Bass, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-E - Oil and Gas Lease dated December 10, 1955, from Maybelle K. Stewart, a widow, to Sunshine Royalty Company, a corporation, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-F - Oil and Gas Lease dated December 10, 1955, from Maybelle K. Stewart, a widow, to Leonard Oil Company, a corporation, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-G - Oil and Gas Lease dated October 16, 1956, from Leonard Oil Company, a corporation, to Richardson & Bass, a partnership composed of S. W. Richardson and Perry R. Bass, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-H - Oil and Gas Lease dated October 16, 1956, from Sunshine Royalty Company, to Richardson & Bass, a partnership composed of S. W. Richardson and Perry R. Bass, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-I - Oil and Gas Lease dated November 6, 1956, from Pearl Monteith, a widow, to The Texas Company, A Delaware Corporation, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-J - Oil and Gas Lease dated November 6, 1956, from Henry Lawson Monteith, dealing in his sole and separate property and Vera Allene Briggs, dealing in her sole and separate property, to The Texas Company, a Delaware Corporation, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4806-K - Oil and Gas Lease dated August 28, 1950, from M. P. Long and T. W. Prentice, Ancillary Executors of the Estate of L. H. Wentz, Deceased in and for the State of New Mexico, to Cities Service Oil Company, a corporation, insofar as it covers the E½/SW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

Atlantic Richfield Company claims ownership to an undivided one-fourth (1/4) unleased mineral interest in the E/2 SW/4 of Section 30, T-20-S, R-33-E, Lea County, New Mexico, which is deemed to be leased on the form of lease marked Exhibit "B" and attached hereto.

#4067 - Oil and Gas Lease dated May 1, 1952, from the United States of America, to Howard W. Jennings, covering among other lands, Lots 3 and 4, the E½/SW¼ and the SE¼ of Section 19; the E½/E½ of Section 30; all in T-20-S, R-33-E, Lea County, New Mexico.

#4067-X - Oil and Gas Lease dated May 1, 1952, from the United States of America, to Howard W. Jennings, covering among other lands, the NW¼ of Section 30, T-20-S, R-33-E, Lea County, New Mexico.

#4148 - Oil and Gas Lease dated May 10, 1951, from the State of New Mexico, to Malco Refineries, Inc., covering among other lands, the N½/NE¼ of Section 31, T-20-S, R-33-E, Lea County, New Mexico.

SCHEDULE B

Bass Enterprises Production Co.	3/4
Perry R. Bass	1/4

#4148 - Oil and Gas Lease dated May 10, 1951, from the State of New Mexico to Malco Refineries, Inc., covering among other lands, the W½/NE¼ of Section 19, T-20-S, R-33-E, Lea County, New Mexico.

#4067 - Oil and Gas Lease dated May 1, 1952, from the United States of America, to Howard W. Jennings, covering among other lands, the E½/NE¼ of Section 19, T-20-S, R-33-E, Lea County, New Mexico.

All of the above described leases and lands are hereinafter referred to as said leases.

It is mutually agreed that ~~on or before November 1, 1972,~~ you will, at your own expense, ~~commence~~ actual drilling of a test well, at a location of your choice, in either the Northeast quarter of the Southwest quarter (NE¼/SW¼) or the Southeast quarter of the Northwest quarter (SE¼/NW¼) of Section 30, T-20-S, R-33-E, Lea County, New Mexico. You agree to prosecute the drilling of said well in a workmanlike manner, to a depth sufficient to test the Morrow formation at approximately 13,400 feet and you shall have the option but not the obligation to drill said test well to a deeper depth to test the Devonian formation at approximately 14,~~400~~ feet. Said well to be completed within one hundred eighty (180) days from the date of actual spudding of same.

If in the drilling of said test well the hole is lost due to lost circulation, blowout, high pressure, unusual mechanical problems, or a practically impenetrable substance is encountered which would make further drilling impracticable, then you shall have the right to commence, on or before thirty (30) days after the completion or abandonment of the test well, operations for the drilling of another test well, at a location to be selected by you upon some

portion of said leases. If this alternate test well is commenced, it shall be drilled with due diligence to the same depth as provided for the original test well.

If either of said wells are drilled to a depth sufficient to test the Morrow formation or deeper depth and completed as a commercial producer of oil and/or gas, and if you have complied with the other terms and provisions of this Agreement, we will, within thirty (30) days after being furnished proper evidence that said well has been completed as a commercial producer of oil and/or gas, deliver to you an Assignment of Operating Rights, without warranty of title, all of our right, title and interest in and to acreage and leases approved by the U.S.G.S. and the OCC of the State of New Mexico and approval of the undersigned parties for a proration unit to the producing depth for said well, down to a depth of one hundred (100) feet below the producing perforations.

In this Assignment of Operating Rights, we shall retain a one-eighth of eight-eighths (1/8 of 8/8) overriding royalty and out of this overriding royalty we will assume any overriding royalty or oil payment presently existing on said leases. The above overriding royalty reserved by the undersigned, at our option, may be converted into a 37½% working interest in this well and the leases assigned thereto, after you have recovered all of your costs of drilling, completing and operating said well. The overriding royalty and conversion shall be reduced to accord with each party's interest in the proration unit approved by the U.S.G.S., the OCC of the State of New Mexico and the undersigned parties. In determining the cost of drilling, completing and operating of said well, the Accounting Procedure attached to the Operating Agreement shall apply in determining the payout period to the conversion privilege herein retained by the parties.

or royalty in excess of the usual 1/8

By securing commercial production of oil and/or gas from the above test well or substitute well, you shall have earned an option to continuously develop the above described acreage to the producing horizon with the understanding that no more than one hundred eighty (180) days shall elapse between the completion of one well upon our acreage and the commencement of operations for another test well upon some portion of the above described acreage. You shall give Bass et al thirty (30) days written notice prior to the commencement of operation, after you have earned the above option, in which to join you in paying 37½% of the cost of the proposed well reduced proportionately to the acreage each party owns in the proposed prorated unit. Said notice shall designate the location of said well, its depth and the acreage allotted for a prorated unit along with a proposed AFE. In the event the party or parties do not desire to join you in drilling the proposed test, each declining party shall retain a one-eighth of eight-eighths, (1/8 of 8/8) overriding royalty and out of this overriding royalty each declining party shall assume any overriding royalty or oil payment presently existing on said lease reduced proportionately to the acreage contributed to the proposed unit. This option to join or farmout shall be continuous on each subsequent proposed proration unit and well thereafter. Failure to continuously de-

portion of said leases. If this alternate test well is commenced, it shall be drilled with due diligence to the same depth as provided for the original test well.

~~If either of said wells are drilled to a depth sufficient to test~~ the Morrow formation or deeper depth and completed as a commercial producer of oil and/or gas, and if you have complied with the other terms and provisions of this Agreement, ~~we will~~, within thirty (30) days after being furnished proper evidence that said well has been completed as a commercial producer of oil and/or gas, ~~deliver~~ to you an Assignment of Operating Rights, without warranty of title, all of our right, title and interest ~~in and to acreage and~~ leases approved by the U.S.G.S. and the OCC of the State of New Mexico and approval of the undersigned parties ~~for a proration unit~~ to the producing depth for said well, down to a depth of one hundred (100) feet below the producing perforations.

In this Assignment of Operating Rights, ~~we shall retain~~ a one-eighth of eight-eighths (1/8 of 8/8) ~~overriding royalty~~ and out of this overriding royalty ~~we will~~ assume any overriding royalty or oil payment presently existing on said leases. The above overriding royalty reserved by the undersigned, at our option, may be converted into a 37½% working interest in this well and the leases assigned thereto, after you have recovered all of your costs of drilling, completing and operating said well. The overriding royalty and conversion shall be reduced to accord with each party's interest in the proration unit approved by the U.S.G.S., the OCC of the State of New Mexico and the undersigned parties. In determining the cost of drilling, completing and operating of said well, the Accounting Procedure attached to the Operating Agreement shall apply in determining the payout period to the conversion privilege herein retained by the parties.

By securing commercial production of oil and/or gas from the above test well or substitute well, you shall have earned an option to continuously develop the above described acreage to the producing horizon with the understanding that no more than one hundred eighty (180) days shall elapse between the completion of one well upon our acreage and the commencement of operations for another test well upon some portion of the above described acreage. You shall give Bass et al thirty (30) days written notice prior to the commencement of operation, after you have earned the above option, in which to join you in paying 37½% of the cost of the proposed well reduced proportionately to the acreage each party owns in the proposed prorated unit. Said notice shall designate the location of said well, its depth and the acreage allotted for a prorated unit along with a proposed AFE. In the event the party or parties do not desire to join you in drilling the proposed test, each declining party shall retain a one-eighth of eight-eighths, (1/8 of 8/8) overriding royalty and out of this overriding royalty each declining party shall assume any overriding royalty or oil payment presently existing on said lease reduced proportionately to the acreage contributed to the proposed unit. This option to join or farmout shall be continuous on each subsequent proposed proration unit and well thereafter. Failure to continuously de-

velop such acreage shall automatically release any interest which you might have in our above described acreage, with the exception of any acreage previously earned.

Each commercial producer completed in accordance with the terms of the continuous drilling program above set out, shall earn an Assignment of Operating Rights as above provided for the covering of the proration unit designated and approved by the U.S.G.S., the OCC of the State of New Mexico and the undersigned parties, down to a depth of one hundred (100) feet below the producing perforations of each subsequent well drilled thereon.

The undersigned parties hereto ~~shall have the right to~~ market their share, whether it be a working interest or an overriding royalty interest of the liquid hydrocarbons (crude ~~oil~~ and condensate) and gas (casinghead and gas well gas) produced from any of the lands and leases set out above, subject to the following:

> The undersigned parties hereto right to purchase gas and liquid hydrocarbons shall not apply when such hydrocarbons are used by you in your operations.

All sands and formations, in which oil or gas may be encountered, shall be tested to the complete satisfaction of the undersigned. You agree that our representative shall have free and convenient access to the derrick floor at all times for the purpose of witnessing the progress of the drilling of said test well; that Mr. Bill Ford (Residence phone 683-3850, Office phone 682-4329) or Mr. W. J. Parsons (Residence phone 694-2206, Office phone 682-4329) representing Perry R. Bass, of Midland, Texas, and such other person or persons so designated by the undersigned parties, shall be furnished with the following information and notices:

a) notice that the well has been staked and operations are about to begin, together with daily drilling reports on the progress of said test well;

b) any surveys of the hole, however made;

c) samples of the fluid recovered on drillstem and production tests;

d) samples of all cores taken and samples of cuttings from the surface of the soil to the total depth drilled, such cuttings to be furnished at least twice each week in receptacles supplied by us properly labeled, core samples to be furnished or made available to our representative immediately after the same have been taken;

e) notice of your intention to take any drillstem test in sufficient time for us to arrange to have our representative present to witness such test;

f) notice of the completion of said test well in sufficient time for us to arrange to have our representative present to witness the measurement of the depth; and the permission of the undersigned to abandon the well before actual plugging shall take place;

g) one induction electrical survey and gamma ray log and one porosity log;

h) a certified copy of the log upon completion of the well;

i) deliver a complete set of white sacks containing samples of the well to Midland Sample Library;

j) a copy of monthly production reports, together with notification of major workovers, on all wells drilled upon our acreage.

You agree to fully protect us against any and all claims of any and every nature whatsoever by our lessors, their tenants and/or any third parties caused by or arising from your operations on the land covered by this Agreement.

~~Neither this letter, nor any rights hereunder, shall be~~ assigned by you without the written consent of the undersigned.

If the foregoing outlines your understanding of the conditions under which this Agreement is made, please signify your acceptance in the space provided below and return the duplicate original to us. If this Agreement is not executed and returned before fifteen (15) days from this date, it shall, at the option of the undersigned, become null and void.

This agreement may be executed by executing the original copy of this agreement, a counterpart thereof, or other instrument agreeing to be bound by the provisions hereof, with the same effect as if all parties had executed the same instrument, and the provisions hereof shall be binding upon and shall inure to the benefit of each party executing this agreement and his or its heirs, devisees, legal representatives, successors and assigns, as to all interests of such party in the leases hereinabove described.

This agreement and all of the rights, obligations and conditions hereof shall be binding upon each party executing this instrument and their heirs, devisees, successors and assigns. Should any party named herein fail to execute this agreement or should any party execute this agreement who is not named below, it shall nevertheless be binding upon such party or parties executing the agreement.

Operating Agreement attached hereto and made a part hereof for all purposes.

Notwithstanding anything herein to the contrary, should there be a conflict between this Letter Agreement and the Operating

Agreement, this Letter Agreement shall be superior and controlling in all aspects.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: _____

_____
Perry R. Bass

ATLANTIC RICHFIELD COMPANY

BY: _____

TEXACO, INC.

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

TENNECO OIL COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

Agreement, this Letter Agreement shall be superior and controlling in all aspects.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: _____

_____
Perry R. Bass

ATLANTIC RICHFIELD COMPANY

BY: M. James Walker

TEXACO, INC.

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

TENNECO OIL COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

Agreement, this Letter Agreement shall be superior and controlling in all aspects.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: ______________________

____

Perry R. Bass

ATLANTIC RICHFIELD COMPANY

BY: ______________________

TEXACO, INC.

BY: ______________________

PHILLIPS PETROLEUM COMPANY

APPROVED BY

BY: ______________________
FRED FORWARD, Attorney-in-Fact

TENNECO OIL COMPANY

BY: ______________________

____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

Agreement, this Letter Agreement shall be superior and controlling in all aspects.

Yours very truly,

BASS ENTERPRISES PRODUCTION CO.

BY: _____

_____
Perry R. Bass

ATLANTIC RICHFIELD COMPANY

BY: _____

TEXACO, INC.

BY: _____

PHILLIPS PETROLEUM COMPANY

BY: _____

TENNECO OIL COMPANY

BY: _____

_____
Frank O. Elliott, Trustee under
the Frank O. Elliott Living Trust

_____
Clarence E. Hinkle, Trustee under
the Frank O. Elliott Living Trust

Edna Ione Hall, Trustee under the
Edna Ione Hall Living Trust

Clarence E. Hinkle, Trustee under
the Edna Ione Hall Living Trust

ACCEPTED and AGREED TO this the _____ day of _____, 1972.

BELCO PETROLEUM CORPORATION.

Edna Ione Hall, Trustee under the Edna Ione Hall Living Trust

Clarence E. Hinkle, Trustee under the Edna Ione Hall Living Trust

ACCEPTED and AGREED TO this the 14th day of September, 1972.

BELCO PETROLEUM CORPORATION.

BY: John D. Lang
Vice President

Edna Ione Hall, Trustee under the
Edna Ione Hall Living Trust

Clarence E. Hinkle, Trustee under
the Edna Ione Hall Living Trust

ACCEPTED and AGREED TO this the _____ day of _____, 1972.

BELCO PETROLEUM CORPORATION.

STATE OF TEXAS)
COUNTY OF ECTOR)

The foregoing instrument was acknowledged before me this 5th day of April, 1972, by FRED FORWARD as attorney-in-fact on behalf of PHILLIPS PETROLEUM COMPANY, A Delaware Corporation.

My Commission Expires:

June 1, 1973

Notary Public in and for
Ector County,
Texas.

United States Department of the Interior

GEOLOGICAL SURVEY

Drawer 1857
Roswell, New Mexico 88240

October 12, 1972

RECEIVED

OCT 16 1972

MIDLAND OFFICE

Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Bass No. 1
in N/2 of 30

Gentlemen:

Your Application for Permit to Drill well No. 1 Bass Federal in the SE¼NW¼ sec. 30, T. 20 S., R. 33 E., Lea County, New Mexico, lease New Mexico 03023-B, to a depth of 14,500 feet to test the Devonian formation in the Potash Area is hereby approved.

One copy of the application is returned herewith. Please notify the District Engineer, Geological Survey, P. O. Box 1157, Hobbs, New Mexico 88240, in sufficient time for a representative to witness all cementing operations.

Sincerely yours,

N. O. FREDERICK
Area Oil and Gas Supervisor

Enclosure

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 5
Submitted by Belco
Hearing Date 3-13-74

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42 R1425

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

5. LEASE DESIGNATION AND SERIAL NO.: NM-03923-B

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME:

8. FARM OR LEASE NAME: Bass Federal

9. WELL NO.: 1

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Section 30, T-20-S, R-33

12. COUNTY OR PARISH: Lea

13. STATE: New Mexico

1a. TYPE OF WORK: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. TYPE OF WELL: OIL WELL [ ] GAS WELL [X] OTHER — SINGLE ZONE [X] MULTIPLE ZONE [ ]

2. NAME OF OPERATOR: Belco Petroleum Corporation

3. ADDRESS OF OPERATOR: 2000 Wilco Building, Midland, Texas 79701

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 1980' FNL & [illegible] Section 30, T-20-S, R-33-E, Lea County
At proposed prod. zone: Same

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 33 miles east of Carlsbad, New Mexico

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. line, if any)	16. NO. OF ACRES IN LEASE	17. NO. OF ACRES ASSIGNED TO THIS WELL
1980'	320	320
18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.	**19. PROPOSED DEPTH**	**20. ROTARY OR CABLE TOOLS**
None	14,500'	Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): 3580.9' GR

22. APPROX. DATE WORK WILL START*: October 10, 1972

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
~~20"~~	~~16"~~	~~65#~~	1,200'	1200 sx.
~~15"~~	~~13-3/8"~~	~~54.5#~~	2,800'	700 sx.
12-1/4"	9-5/8"	47#	11,400'	300 sx. [illegible]
8-1/2"	5-1/2"	20#	14,300'	400 sx.

Drilling, casing, and cementing programs to be in accordance with OCC Order R-111-A.

Mud Program: Conditioned fresh water 2300 to 11,400 feet. Brine or weighted mud as required 11,400 to 14,300 feet. Light brine 14,300 to 14,500 feet.

BOP Program: As in sketch A above 11,400 feet and as in sketch B below 11,400 feet.

Pit Volume Totalizer to be used below 11,400 feet.

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED [signature] TITLE District Engineer DATE 9-28-72

(This space for Federal or State office use)

PERMIT NO. _____ APPROVAL DATE _____

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

RECEIVED
OCT 16 1972
MIDLAND OFFICE

*See Instructions On Reverse Side

September 28, 1972

Bass No 1
in N/2 of Sec 30

Kerr-McGee Corporation
P. O. Box 610
Hobbs, New Mexico 88240

Re: Belco Petroleum Corporation
Bass Federal No. 1
1980' FNGWL's of Section 30
T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

Belco Petroleum Corporation is planning to drill the subject well at the above location. Attached for your information is the U.S.G.S. Form 9-331-C with our proposed casing and cementing program. You will note that the program is in accordance with the regulations of Order R-111-A.

Belco Petroleum Corporation respectfully requests that if you, as the owner of a potash lease located within one mile of our proposed drillsite, have no objection to this procedure, please execute and return two copies of the attached letter.

Very truly yours,

BELCO PETROLEUM CORPORATION

Glenn Cope
District Engineer

GC/sh
Attachments

Received 24 Hr Oky
Kerr McGee
By L. Ndane
9/29/72

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5793 Exhibit No. 6
Submitted by Belco
Hearing Date 3-15-74

Snd copy to G. Cope.
1ib Tear

KERR-McGEE CORPORATION
KERR-McGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 7310?

COPY

October 6, 1972

RECEIVED

OCT 10 1972

MIDLAND OFFICE

United States Geological Survey
Post Office Box 1157
Hobbs, New Mexico

Dear Sirs:

A copy of Belco Petroleum Corporation's Application For Permit To Drill has been received for the following location:

> 1980' FN&WL's Section 30, T-20-S, R-33-E, Lea County, New Mexico. This test well to be drilled to a proposed depth of 14,500 feet.

As a holder of Potash Leases within one (1) mile of the proposed well, Kerr-McGee Corporation has no objection to the drilling of the above referenced well, provided all drilling is done in accordance with Belco's Permit and with the New Mexico Oil Conservation Commission Order Number R-111-A.

Very truly yours,

Harold J. Kleen

Harold J. Kleen
Vice President
Minerals Exploration

HJK-ew

cc: Belco Petroleum Corporation
2000 Wilco Building
Midland, Texas 79701

Tex Mex 1

El Paso Natural Gas Company

El Paso, Texas 79978

June 1, 1973

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 7
Submitted by Belco
Hearing Date 3-15-74

Belco 1972 Oil and Gas Fund, Ltd.
c/o Belco Petroleum Corporation
Belco Petroleum Building
630 Third Avenue
New York, New York 10017

Re: Emergency Limited-Term Gas Purchase Contract--
Belco Operated Bass Federal No. 1 Well
All Section 30, T-20-S, R-33-E
Lea County, New Mexico

Bass No 1
N/2 of Sec 30

Gentlemen:

This Letter Agreement evidences the understanding reached between Belco 1972 Oil and Gas Fund, Ltd., as "Seller," and El Paso Natural Gas Company, as "Buyer," regarding the sale and purchase of gas-well gas (as so classified by the New Mexico Oil Conservation Commission) on an emergency limited-term basis from subject well, attributable to Seller's interest therein, as follows:

1.

Buyer is in need of emergency and limited-term gas supplies to aid it in assuring the maintenance of adequate natural gas service on its pipeline system and to thereby minimize curtailment of service to its customers.

2.

Seller will use its best efforts to deliver and sell and Buyer will use its best efforts to receive and purchase all gas Seller shall have available for delivery hereunder attributable to Seller's interest in subject well. The initial daily volume of gas available hereunder is estimated to be approximately five thousand

(5,000) MCF. Buyer represents that it shall at all times during the term hereof maintain sufficient pipeline capacity to receive volumes of gas hereunder which are at least ratable with the production of gas from wells belonging to others completed in the same reservoirs in which subject well is completed, whether such other wells be connected to Buyer's field gathering system or to a field gathering system or another purchaser. Determination of whether or not production is ratable shall be in accordance with the applicable rules and regulations established by duly constituted governmental authorities having jurisdiction thereof, or, in the absence of such rules and regulations, on the basis of gas reserves.

3.

The point of delivery of gas delivered hereunder shall be at the inlet of Buyer's gas measurement facilities to be located adjacent to subject well.

4.

Seller will deliver gas hereunder at a pressure sufficient to enter Buyer's gathering system against the working pressure maintained therein from time to time at the point of delivery, provided such working pressure shall not exceed seven hundred (700) psig, and further provided that neither Seller nor Buyer shall be obligated to install compression facilities in order to deliver gas hereunder, but either may do so at its option.

5.

The gas delivered hereunder shall be merchantable natural

gas and shall have a total gross heating value of not less than one thousand (1,000) BTU per cubic foot. Such gas shall not contain more than one-quarter (1/4) grain of hydrogen sulphide nor more than five (5) grains total sulphur (mercaptans) per one hundred (100) cubic feet; two per cent (2%) by volume of carbon dioxide nor more than two-tenths (0.2) of one per cent (1%) by volume of oxygen. Seller shall install, at its sole cost and expense, all separators and/or other devices which may be found necessary to prevent hydrocarbons and water in their liquid state from entering Buyer's gathering system at the point of delivery hereunder. If any gas delivered hereunder fails to meet any one of said quality requirements, then Buyer shall have the right, at its option, to refuse to accept such gas.

6.

Buyer shall pay Seller fifty-five cents (55¢) for each one thousand (1,000) cubic feet of gas delivered hereunder from said well, adjusted upward or downward as the total gross heating value of such gas varies from one thousand (1,000) BTU per cubic foot. On or before the tenth (10th) day of each calendar month, Buyer shall render to Seller a statement showing the total volume of gas measured in Buyer's meter station during the preceding calendar month, and on or before the twenty-fifth (25th) day of the calendar month in which such statement is rendered, shall tender its check for payment for all gas purchased hereunder during such calendar month. The statement and check shall be mailed to Seller:

Pelco 1972 Oil and Gas Fund, Ltd.
Pelco Petroleum Building
630 Third Avenue
New York, New York 10017

Each party hereto shall have the right at all reasonable times to examine the books and records of the other party to the extent necessary to verify the accuracy of any statement or computation made under or pursuant to this Letter Agreement. Any statement shall be final as to all parties unless questioned within one (1) year after payment thereof has been made.

7.

Any expense incurred in connection with the purchase and receipt of gas shall be borne by Buyer, and any expenses incurred in making the delivery and sale shall be borne by Seller, including, without limitation, the payment of any and all taxes levied on such gas prior to the delivery thereof to Buyer.

8.

The sale and purchase of gas hereunder shall begin as soon as practicable after execution hereof as an emergency sale in accordance with Federal Power Commission Order No. 418, issued December 10, 1970, and pursuant to Section 157.29 of the Commission's Regulations Under the Natural Gas Act for a period of sixty (60) days from the date of first delivery. In order that the sale and purchase of gas hereunder may be continued for a further period of time upon conclusion of said sixty (60) day period, Seller agrees that it will timely file and prosecute with diligence an application with the Commission for a limited-term certificate with a pre-granted

abandonment provision for a limited-term of twenty-four (24) months from the date of first delivery of gas under said certificate. Such application shall be made by Seller pursuant to the Commission's Order No. 431 and 431-A issued April 15, 1971 and July 31, 1972, respectively. In the event the Commission fails to issue such certificate or fails to issue such certificate in terms satisfactory to Seller prior to sixty (60) days after the date of first delivery of gas hereunder, then sales shall be terminated forthwith and this agreement may be terminated at any time and by written notice to Buyer. Upon issuance by the Commission of a final nonappealable limited-term certificate in terms (including pre-granted abandonment) satisfactory to Seller, the sale and purchase of gas hereunder shall resume or continue, as the case may be, for the limited-term authorized.

9.

Measurement of gas delivered hereunder and related activities will be performed by Buyer in facilities installed by Buyer in accordance with the American Gas Association Gas Measurement Committee Report No. 3, Revised 1969, as amended from time to time.

10.

Except for the determination of the total gross heating value, the unit of volume for purposes of measurement of gas delivered hereunder shall be one (1) cubic foot of gas at a temperature base of sixty degrees (60°) F. and at a pressure base of fourteen and sixty-five hundredths pounds (14.65#) per square inch absolute. Atmospheric pressure shall be assumed to be thirteen and two-tenths

pounds (13.2#) per square inch absolute. Volumes shall be determined in accordance with American Gas Association Gas Measurement Committee Report No. 3, Revised 1969, as amended from time to time. The unit of volume for the determination of the total gross heating value of the gas delivered hereunder shall be the amount of gas, on a dry basis, which would occupy a volume of one (1) cubic foot at a temperature of sixty degrees (60°) F. and under a pressure equivalent to thirty inches (30") of mercury at thirty-two degrees (32°) F. Gas delivered hereunder shall be sampled by Buyer and tested by appropriate laboratory analyses promptly upon first delivery of gas and at three (3) month intervals thereafter during the term hereof for purposes of determining the total gross heating value thereof.

11.

Unless earlier terminated in accordance with paragraph 8 hereof, this Letter Agreement shall continue in full force and effect for a term ending upon the expiration of the twenty-four (24) month delivery period referred to in said paragraph 8. At the end of said term, all obligations of both Buyer and Seller hereunder shall terminate, except as to the payment for any gas delivered during the term hereof.

12.

Seller warrants title to all gas delivered hereunder and its right to sell same and warrants that such gas shall be free and clear of all liens and adverse claims. Title to all gas delivered hereunder shall pass from Seller to Buyer at the point of delivery

hereunder.

13.

Buyer shall be deemed to be in possession of gas sold hereunder and responsible for any loss, damages or injury caused thereby after such gas is delivered to Buyer at the point of delivery. Seller shall be deemed to be in possession of the gas sold hereunder and responsible for any loss, damages or injury caused thereby prior to delivery of same to Buyer at the point of delivery.

14.

Each party hereto shall be excused from performing under this agreement, other than to make payments for gas delivered hereunder, to the extent it is rendered unable to perform by a force majeure situation, but only for the period of time such force majeure situation continues. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts or other industrial disturbances, acts of the public enemy, wars, blockade, insurrections, riots, epidemics, landslides, lightning, earthquakes, fires, storms, floods, washouts, arrests, breakage or accident to machinery or lines of pipe, freezing of wells or lines of pipe, partial or entire failure of wells or plant operations, breakage of gathering or transmission lines, and other causes, whether of the kind herein enumerated or otherwise, not within the control of the party claiming suspension and which by the exercise of due diligence such party is unable to prevent or overcome.

15.

This agreement shall be subject to all valid applicable state and local laws, rules and regulations. Both Buyer and Seller shall be entitled to treat all laws, orders, rules and regulations issued by any Federal or State regulatory body as valid at such time and may act in accordance therewith until such time as the same may be invalidated by final judgement in a court of competent jurisdiction.

16.

This agreement shall bind and benefit the parties hereto and their respective successors and assigns.

17.

Any notice provided for or permitted in this Letter Agreement shall be deemed sufficiently given and served when and if deposited in the United States mail, postage prepaid and registered, addressed to Seller at the address referred to in paragraph 6 hereof, or to Buyer at P. O. Box 1492, El Paso, Texas 79978, as the case may be, or to such other address as either party shall respectively hereafter designate in writing. Routine communications, including monthly statements and payments, shall be considered as duly delivered when mailed by either registered mail or ordinary first class mail, postage prepaid.

If the foregoing correctly states Seller's understanding concerning the matters covered herein, it is requested that Seller indicate its acceptance hereof and agreement hereto by executing

this letter in the space provided below.

Very truly yours,

EL PASO NATURAL GAS COMPANY

By A. R. Derrick, Vice President

Accepted and Agreed to this
17th day of May, 1973:

BELCO 1972 OIL AND GAS FUND, LTD.

By

Belco Petroleum Corporation,
General Partner

El Paso Natural Gas Company

El Paso, Texas 79978

A. M. DERRICK
VICE PRESIDENT

September 21, 1973

Belco 1972 Oil and Gas Fund, Ltd.
Belco Petroleum Building
630 Third Avenue
New York, New York 10017

Re: Emergency Limited-Term Gas Purchase Contract--Belco Operated Bass Federal No. 1 Well, All Section 30, T 20 S, R 33 E Lea County, New Mexico

Gentlemen:

Reference is made to that certain Letter Agreement between us dated June 1, 1973, captioned as per the above.

In accordance with the provisions thereof, first deliveries of gas from all wells covered thereunder occurred September 12, 1973, and thus establishes the commencement date for the sixty day emergency delivery period referred to in paragraph 8 thereof.

In view of the Federal Power Commission's Order No. 491 issued September 14, 1973, the parties hereto now desire to amend and supplement said Letter Agreement in the following respects:

1.

In accordance with said Order, Belco will file a notice of withdrawal with the Federal Power Commission of its limited-term certificate applicable to said Letter Agreement subject to the refiling thereof as referred to below.

2.

Pursuant to said Order, it is agreed that, upon the conclusion of the said sixty (60) day emergency delivery period, being November 11, 1973, the purchase and sale of gas shall continue for an additional emergency delivery period of one hundred eighty (180) days, which such additional delivery period will conclude May 10, 1974.

3.

It is agreed that Belco shall timely refile its application for a limited-term certificate prior to the conclusion of said additional one hundred eighty (180) day delivery period; however, for a limited term of eighteen (18) months rather than the twenty-four (24) month period now provided.

4.

All other terms and provisions of said Letter Agreement shall remain fully effective insofar as the same are not inconsistent with the foregoing.

If the foregoing correctly states your understanding concerning the matters covered herein, it is requested that you indicate your acceptance hereof and agreement hereto by executing this letter in the space provided below.

Very truly yours,

EL PASO NATURAL GAS COMPANY

By A. M. Derrick
A. M. Derrick, Vice President

Accepted and Agreed to this
24TH day of SEPTEMBER, 1973:

BELCO 1972 OIL AND GAS FUND, LTD.

By
Belco Petroleum Corporation,
General Partner

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

5. LEASE DESIGNATION AND SERIAL NO.: NM-03023A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: None

7. UNIT AGREEMENT NAME: None

8. FARM OR LEASE NAME: Bass-Federal

9. WELL NO.: 2

10. FIELD AND POOL, OR WILDCAT: South Salt Lake

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec. 30, T-20-S, R-33-E

12. COUNTY OR PARISH: Lea

13. STATE: New Mexico

1a. TYPE OF WORK: DRILL ☒ DEEPEN ☐ PLUG BACK ☐

b. TYPE OF WELL: OIL WELL ☐ GAS WELL ☒ OTHER — SINGLE ZONE ☒ MULTIPLE ZONE ☐

2. NAME OF OPERATOR: Belco Petroleum Corporation

3. ADDRESS OF OPERATOR: 2000 Wilco Building, Midland, Texas 79701

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 660' FSL & 1300' FEL Section 30, T-20-S, R-33-E Lea County
At proposed prod. zone: Same

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 33 Miles East of Carlsbad, New Mexico

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drig. unit line, if any): 660'

16. NO. OF ACRES IN LEASE: 320

17. NO. OF ACRES ASSIGNED TO THIS WELL: 320

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.: None

19. PROPOSED DEPTH: 13,600'

20. ROTARY OR CABLE TOOLS: Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): 3598.9 GR

22. APPROX. DATE WORK WILL START*: 11-15-73

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
16'	13 3/8"	48#	1,000'	350sx (To Circulate)
12 ¼	10 3/4"	40.50#	3,100'	650sx (To Circulate)
9 ½	7 5/8"	26.40 & 29.70#	10,300'	~~2000sx~~ to surf. in 2 stages
6 ½	5 1/2"	17#	13,600'	750sx

1st 8?? + 200
2nd ??? light weight & ?? ??? 500 ?? neat

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 8
Submitted by Belco
Hearing Date 3-1?-74

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED [signature] TITLE District Engineer DATE 10-18-73

(This space for Federal or State office use)

PERMIT NO. ______ APPROVAL DATE ______

APPROVED BY ______ TITLE ______ DATE ______

CONDITIONS OF APPROVAL, IF ANY:

*See Instructions On Reverse Side

2000 Wall Building
Midland, Texas 79701
Telephone (915) 683-6366

Belco Petroleum Corporation

Belco

October 18, 1973

United States Geological Survey
Post Office Box 1157
Hobbs, New Mexico 88240

Re: Belco Petroleum Corporation
Bass Federal Well No. 2
660' FSL & 1300' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

1. Existing Roads - Highway 128 is the nearest existing road.

2. Planned Access Road - It is planned to extend the caliche road straight south from the Bass-Federal No. 1 to a point directly east of the proposed location and then build a road directly east to the proposed location.

3. Location of Wells - This is the second Belco Petroleum Corporation well in the field, being a southeast offset to the Belco Petroleum Corporation Bass Federal No. 1.

4. Lateral Roads to Well Locations - The roads to the wells are shown on the attached plat.

5. Location of Tank Batteries and Flowlines - In case of production, any tank battery or necessary producing facility would be placed upon the drilling pad.

6. Location and Types of Water Supply - There is no ground water available in the area and water will have to be purchased from a commercial source and trucked to the location.

7. Methods for Handling Waste Disposal - It is planned to build an 8' X 4' X 4' waste pit next to the reserve pit in which to dispose of all waste.

8. Proposed Disposition of Produced Brine Water - Subject well is a gas prospect and no water production is anticipated; however, any produced brine water would be disposed of by hauling to a commercial water disposal well.

9. Disposition of Casinghead Gas - There is a ready market in the area for casinghead gas and the low pressure casinghead gas will be sold.

10. Location Layout - Attached is a diagram of the location showing the position of the various components of the system.

11. Plans for Restoration of the Surface - In case of a dry hole or upon abandonment of the well, all pits and cellars will be filled and leveled. The location will be leveled as nearly as possible to original top ground contour with all dead men removed, all junk and trash disposed.

Very truly yours,

BELCO PETROLEUM CORPORATION

Original Signed
By GLENN COPE

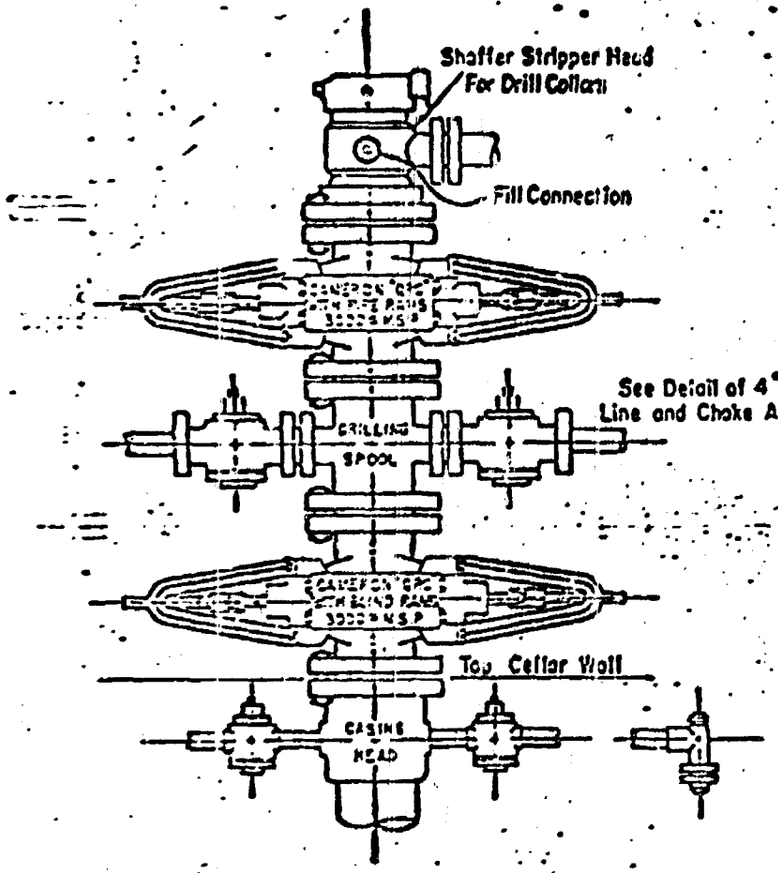
Glenn Cope
District Engineer

GC/sl

Attachments

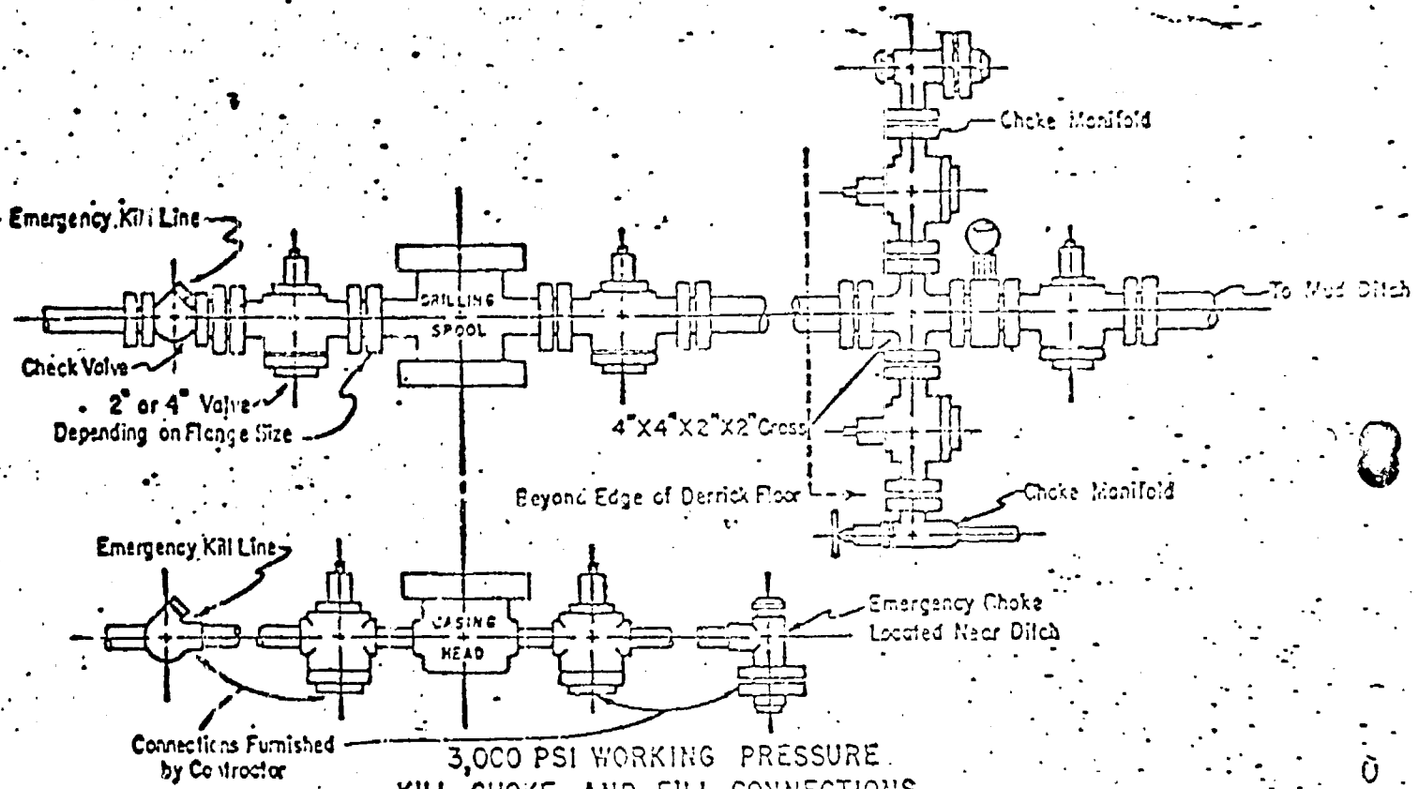
Drawing No. 2
Revised- June 1959

SKETCH "A"



3,000 PSI WORKING PRESSURE BLOWOUT PREVENTER HOOK-UP

Series 900 Flanges, or Better



3,000 PSI WORKING PRESSURE
KILL, CHOKE, AND FILL CONNECTIONS

API Series 900 Flanges or Better

DETAIL OF 4" FLOW LINE CHOKE ASSEMBLY

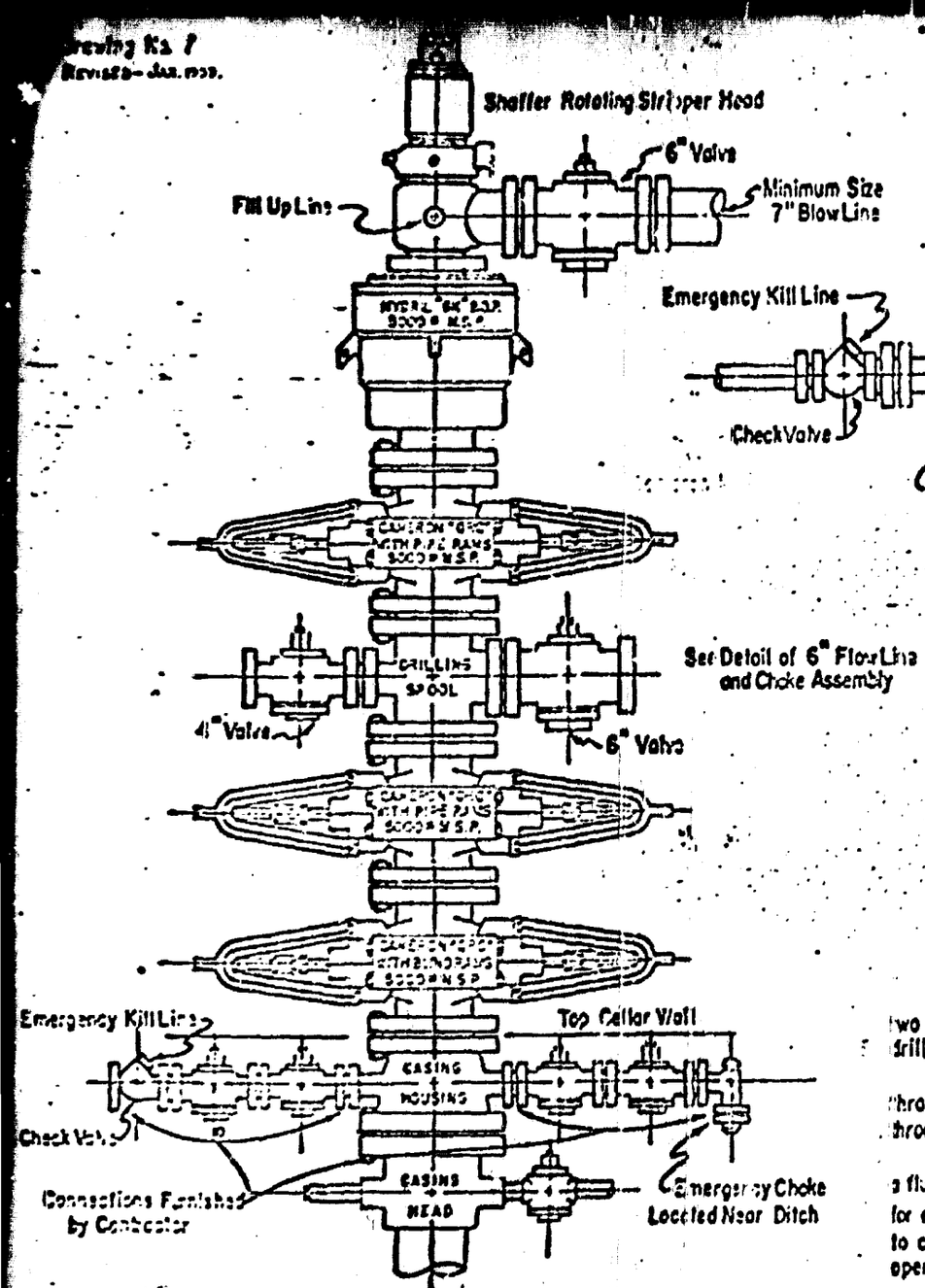
Minimum assembly for 3000 PSI working pressure will consist of two preventers which may be Cameron QRC, Cameron Type F, single or double, Cameron Space-Saver or Shaffer Hydraulic, single or double. If double preventers are provided, the drilling spool shall be placed below the preventers and the blind rams placed in the upper preventer. With this arrangement it will not be necessary to provide a kill and choke line to Gulf's casinghead housing. In lieu of the drilling spool, the flanged outlets of the double Shaffer, the Space-Saver or double F, if they are the correct size, and provided the preventers can be installed to meet Gulf's requirements, may be used for the four-inch flow line and the two-inch kill line.

Size 12-inch preventers may be used for work down through 8-5/8-inch casing. Size 10-inch preventers may be used for work down through 7-5/8-inch casing. Size six-inch preventers are to be used for work through 7-inch and 5-1/2-inch casings.

Minimum operating equipment for the preventers will be: (1) An air operated pump and (2) An accumulator (s) with some means of obtaining a fluid charge. A closed fluid system is recommended. The closing manifold and remote closing manifold will have a separate four-way valve for each pressure operated device. Sufficient fluid capacity in the accumulator (s) shall be available to close all the pressure operated devices at the same time with 25 per cent reserve. Gulf No. 551 hydraulic oil shall be used as the operating fluid.

The four-inch flow line from the preventers shall be supported by a metal stand or reinforced concrete. All valves throughout the assembly shall be selected for operation in both gas and fluids. Sufficient substructure height is to be provided in the event Gulf should request installation of a rotating type blow-out preventer. The preventers will be provided with stem extensions, universal joints, if needed, and operating wheels.

Drawing No. 7
Revised- Jan. 1955



SKETCH "B"

AIR-GAS-MIST DRILLING
5,000 PSI WORKING PRESSURE
BLOWOUT PREVENTER HOOK-UP

AIR-GAS-MIST DRILLING
5,000 PSI WORKING PRESSURE
KILL, CHOKE, AND FILL CONNECTIONS
API Series 1500 Flanges or Better

DETAIL OF 6" FLOW LINE CHOKE ASSEMBLY

Minimum assembly for 5000 PSI working pressure will consist of four preventers and a Shaffer Combination Rotating Stripper Head. The two lower preventers may be Cameron QRC, Cameron Type F, single or double, or Shaffer hydraulic, single or double. The preventer above the drilling spool may be Cameron QRC or Cameron Type F and the upper preventer below the Shaffer Rotating Stripper Head will be Hydril GK.

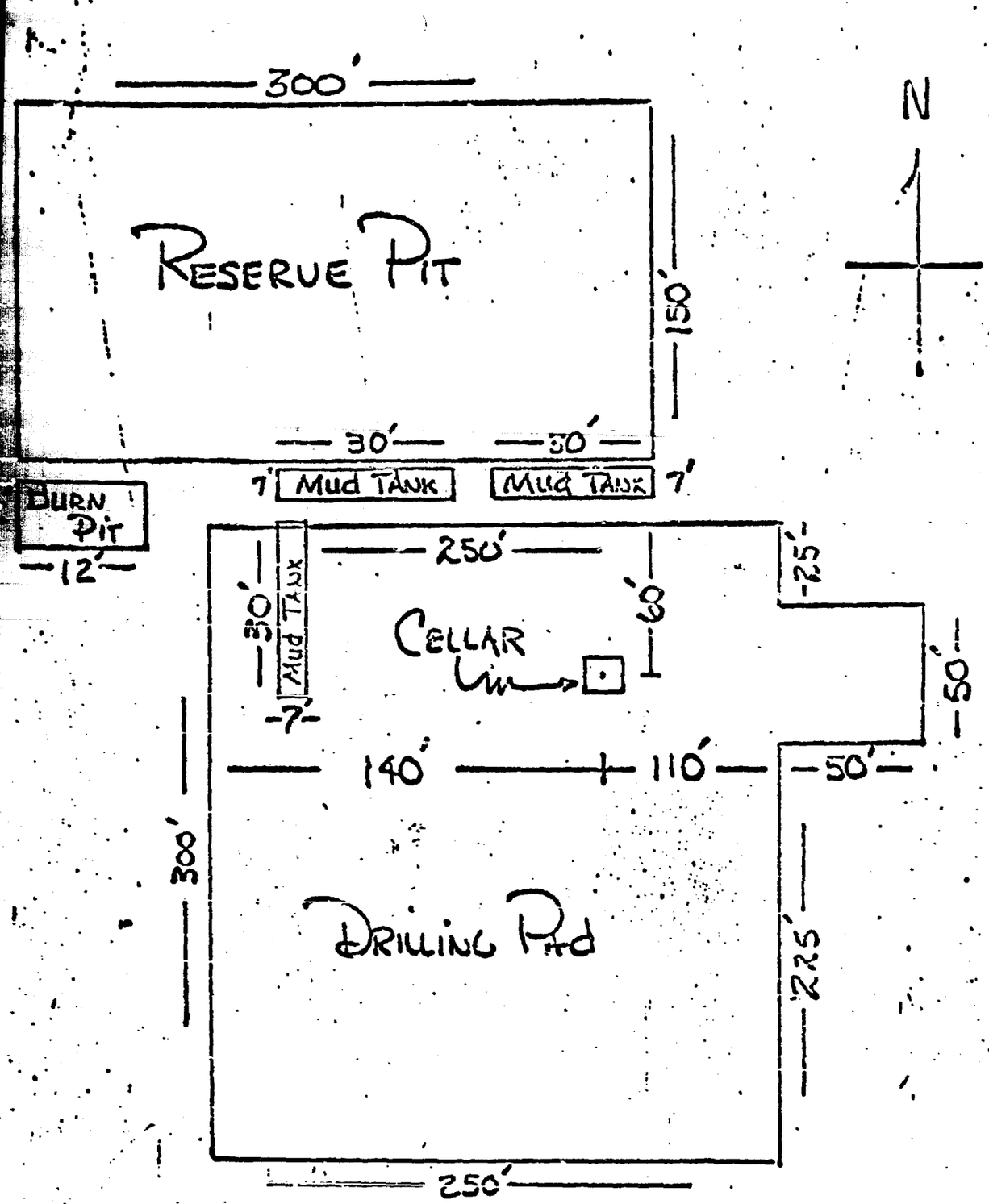
Size 12-inch preventers may be used for work down through 8-5/8-inch casing. Size 10-inch preventers may be used for work down through 7-5/8-inch casing. Size 6-inch preventers, with a 4-inch or larger flow line choke assembly as shown above, are to be used for work through 7-inch and 5-1/2-inch casings.

Minimum operating equipment for the preventers will be: (1) an air operated pump and (2) an accumulator (s) with some means of obtaining a fluid charge. A closed fluid system is recommended. The closing manifold and remote closing manifold will have a separate four-way valve for each pressure operated device and a Hydril regulator will be provided. Sufficient fluid capacity in the accumulator (s) shall be available to close all the pressure operated devices at the same time with 25 per cent reserve. Gulf No. 561 hydraulic oil shall be used as the operating fluid.

The six-inch flow line shall be supported by a metal stand or reinforced concrete. All valves throughout the assembly shall be selected for operation in both gas and fluids.

The ram type preventers and the Cameron HCR valves will be provided with stem extensions, universal joints, if needed, and operating wheels.

* 14-inch 5000 PSI W.P. Flange



BELCO PET. CO. - NEW DRILLING PAD

BEFORE THE

OIL CONSERVATION COMMISSION OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF BELCO PETROLEUM CORPORATION FOR APPROVAL OF A NON-STANDARD GAS PRORATION UNIT AND UNORTHODOX WELL LOCATION, SOUTH SALT LAKE FIELD, LEA COUNTY, NEW MEXICO

A P P L I C A T I O N

COMES NOW BELCO PETROLEUM CORPORATION and applies to the Oil Conservation Commission for approval of a non-standard gas proration unit and approval of an unorthodox well location in the South Salt Lake Field, Lea County, New Mexico, and in support thereof would show the Commission:

1. Applicant proposes to drill a well to the Morrow formation in the South Salt Lake Field, the well to be located 660 feet from the South line, and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, N.M.P.M., to be dedicated to a unit composed of the E/2 SW/4 and SE/4 of Section 30, and the N/2 NE/4 of Section 31, all in Township 20 South, Range 33 East.

2. Applicant proposed the non-standard unit for the reason the W/2 SW/4 of Section 30, is within the Little Eddy Unit and within a participating area for Morrow production; all of Section 31 with the exception of the N/2 NE/4 is also within the Little Eddy Unit, and this 80-acre tract will be isolated and without an opportunity to participate in production unless the proposed non-standard unit is approved.

3. Applicant proposes the unorthodox well location in order to avoid drilling on an existing potash lease which, in addition to other lands, covers the W/2 SE/4 of Section 30, and the N/2 NE/4 of Section 31.

WHEREFORE applicant requests that this application be set for hearing before the Commission's duly appointed examiner, and that after notice and hearing as required by law the Commission enter its order approving the non-standard unit and unorthodox well location as prayed for.

Respectfully submitted:

BELCO PETROLEUM CORPORATION

By _____

KELLAHIN & FOX
P. O. Box 1769
Santa Fe, New Mexico 87501

ATTORNEYS FOR APPLICANT

NEW MEXICO OIL CONSERVATION COMMISSION

WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102
Supersedes C-128
Effective 1-1-65

All distances must be from the outer boundaries of the Section.

Operator	Lease	Well No.
BELCO PETROLEUM CORP.	BASS FEDERAL	2

Unit Letter	Section	Township	Range	County
P	30	20 South	33 East	Lea

Actual Footage Location of Well:
660 feet from the South line and 1300 feet from the East line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
3598.9			Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

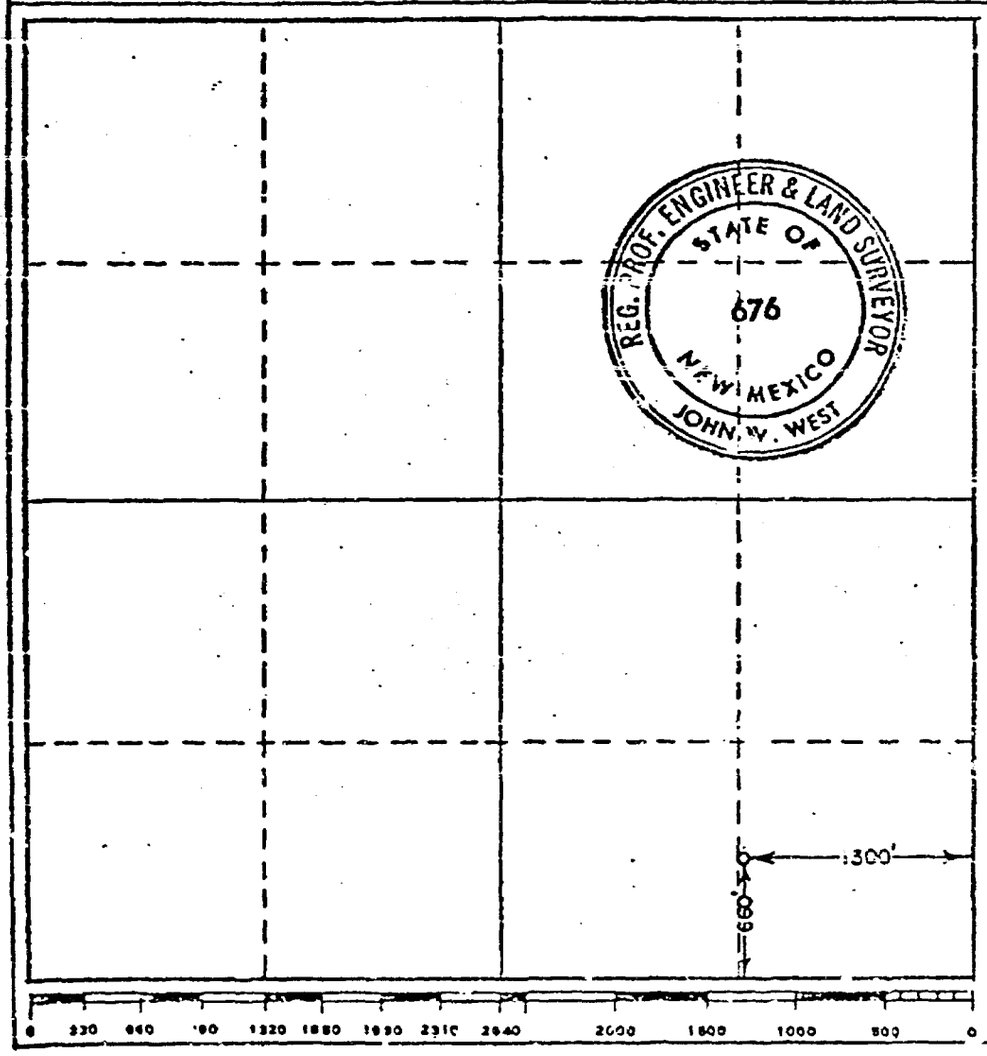
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling. etc?

☐ Yes ☐ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.



CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name: Glenn Cox

Position: District Engineer

Company: Belco Petroleum Corporation

Date: 10/18/73

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

Date Surveyed: October 10, 1973

Registered Professional Engineer and/or Land Surveyor

John W West

Certificate No. 676

2000 Wiley Building
Midland, Texas 79701
Telephone (915) 683-6366

Belco Petroleum Corporation

Belco

October 13, 1973

U. S. Potash and Chemical Co.
101 North Halagueno
Carlsbad, New Mexico 88220

Re: Belco Petroleum Corporation
Bass Federal No. 2
660' FSL & 1?00' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

Belco Petroleum Corporation is planning to drill the subject well at the above location. Attached for your information is the U.S.G.S. Form 9-331-C with our proposed casing and cementing program. You will note that the program is in accordance with the regulations of Order R-111-A.

Belco Petroleum Corporation respectfully requests that if you, as the owner of a potash lease located within one mile of our proposed drillsite, have no objection to this procedure, please execute and return two copies of the attached letter.

Very truly yours,

BELCO PETROLEUM CORPORATION

Glenn Cope
District Engineer

GC/sl

Attachments

2000 Wilco Building
Midland, Texas 79701
Telephone (915) 683-6366

Belco Petroleum Corporation

Belco

October 18, 1973

Mr. E. W. Douglas
1113 Tracy Place
Carlsbad, New Mexico 88220

Re: Belco Petroleum Corporation
Bass Federal No. 2
660' FSL & 1300' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

Belco Petroleum Corporation is planning to drill the subject well at the above location. Attached for your information is the U.S.G.S. Form 9-331-C with our proposed casing and cementing program. You will note that the program is in accordance with the regulations of Order R-111-A.

Belco Petroleum Corporation respectfully requests that if you, as the owner of a potash lease located within one mile of our proposed drillsite, have no objection to this procedure, please execute and return two copies of the attached letter.

Very truly yours,

BELCO PETROLEUM CORPORATION

Glenn Cope
District Engineer

GC/sl

Attachments

2000 Wilco Building
Midland, Texas 79701
Telephone (915) 683-6366

Belco Petroleum Corporation

Belco

October 18, 1973

Messrs. D. S. Harroun &
R. Haworth
601 Riverside Drive
Carlsbad, New Mexico 88220

Re: Belco Petroleum Corporation
Bass Federal No. 2
660' FSL & 1300' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

Belco Petroleum Corporation is planning to drill the subject well at the above location. Attached for your information is the U.S.G.S. Form 9-331-C with our proposed casing and cementing program. You will note that the program is in accordance with the regulations for Order R-111-A.

Belco Petroleum Corporation respectfully requests that if you, as the owner of a potash lease located within one mile of our proposed drillsite, have no objection to this procedure, please execute and return two copies of the attached letter.

Very truly yours,

BELCO PETROLEUM CORPORATION

Glenn Cope
District Engineer

GC/sl

Attachments

2000 Wilco Building
Midland, Texas 79701
Telephone (915) 683-6366

Belco Petroleum Corporation

Belco

October 18, 1973

Kermac Potash Company
Post Office Box 610
Hobbs, New Mexico 88240

Re: Belco Petroleum Corporation
Bass Federal No. 2
660' FSL & 1300' FEL
Section 30, T-20-S, R-33-E
Lea County, New Mexico

Gentlemen:

Belco Petroleum Corporation is planning to drill the subject well at the above location. Attached for your information is the U.S.G.S. Form 9-331-C with our proposed casing and cementing program. You will note that the program is in accordance with the regulations of Order R-111-A.

Belco Petroleum Corporation respectfully requests that if you, as the owner of a potash lease located within one mile of our proposed drillsite, have no objection to this procedure, please execute and return two copies of the attached letter.

Very truly yours,

BELCO PETROLEUM CORPORATION

By

Glenn Cope
District Engineer

GC/sl

Attachments

Value $		Special Delivery $	
Reg. Fee $	95	Return Receipt $	15
Handling Charge $		Restricted Delivery $	
Postage $	16	☐ AIRMAIL	
POSTMASTER (By)			

MAILING OFFICE

FROM "

TO E. W. Douglas
1113 Tracy Place
Carlsbad, N. Mex.

REGISTERED NO. 966

POSTMARK OF

Value $	None	Special Delivery $	
Reg. Fee $	95	Return Receipt $	15
Handling Charge $		Restricted Delivery $	
Postage $	16	☐ AIRMAIL	
POSTMASTER (By)			

MAILING OFFICE

FROM "

TO W. S. Poteet
105 N. Halagueno
Carlsbad N. M.

REGISTERED NO. 965

POSTMARK OF

Value $	None	Special Delivery $	
Reg. Fee $	95	Return Receipt $	15
Handling Charge $		Restricted Delivery $	
Postage $	16	☐ AIRMAIL	
POSTMASTER (By)			

MAILING OFFICE

FROM "

TO Kerr-McGee Potash Co.
Box 610
Hobbs N. M.

REGISTERED NO. 964

POSTMARK OF

Value $	None	Special Delivery $	
Reg. Fee $	95	Return Receipt $	15
Handling Charge $		Restricted Delivery $	
Postage $	16	☐ AIRMAIL	
POSTMASTER (By)			

MAILING OFFICE

FROM [illegible]
[illegible] Wilco Bldg
Midland Texas

TO D. S. Harrison
601 Riverside Dr
Carlsbad N. M.

Form 9-1123
(Rev. Dec. 1961)

(Submit triplicate to appropriate Regional Oil and Gas or Mining Supervisor)

(4)

Bass Federal #2
Well File

DESIGNATION OF OPERATOR

The undersigned is, on the records of the Bureau of Land Management, holder of lease

DISTRICT LAND OFFICE: Santa Fe, New Mexico
SERIAL NO.: NM-03023-A

and hereby designates

NAME: Belco Petroleum Corporation
ADDRESS: Wilco Building, Midland, Texas 79701

as his operator and local agent, with full authority to act in his behalf in complying with the terms of the lease and regulations applicable thereto and on whom the supervisor or his representative may serve written or oral instructions in securing compliance with the Operating Regulations with respect to (describe acreage to which this designation is applicable):

Township 20 South, Range 33 East, N.M.P.M.
Section 30: E½SE¼
Lea County

It is understood that this designation of operator does not relieve the lessee of responsibility for compliance with the terms of the lease and the Operating Regulations. It is also understood that this designation of operator does not constitute an assignment of any interest in the lease.

In case of default on the part of the designated operator, the lessee will make full and prompt compliance with all regulations, lease terms, or orders of the Secretary of the Interior or his representative.

The lessee agrees promptly to notify the supervisor of any change in the designated operator.

Attest:

Marguerite Wright
Secretary

October 19, 1973
(Date)

BASS ENTERPRISES PRODUCTION CO.

By: B. P. Duncan
Vice President

Perry R. Bass
PERRY R. BASS (Agent)

1211 Fort Worth National Bank Bldg.
Fort Worth, Texas 76102

RECEIVED
OCT 23 19[illegible]
MIDLAND OFFICE

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE NO. 5073
Order No. R-4699

APPLICATION OF BELCO PETROLEUM
CORPORATION FOR A NON-STANDARD GAS
PRORATION UNIT AND UNORTHODOX
LOCATION, LEA COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on October 3, 1973, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 15th day of January, 1974, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises.

FINDS:

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

(2) That the applicant, Belco Petroleum Corporation, seeks approval for a 320-acre non-standard gas proration unit comprising the E/2 SW/4 and SE/4 of Section 30 and the N/2 NE/4 of Section 31, all in Township 20 South, Range 33 East, NMPM, South Salt Lake Field, Lea County, New Mexico, to be dedicated to a well to be drilled at an unorthodox location 660 feet from the South line and 1300 feet from the East line of said Section 30.

(3) That the applicant requests approval of the non-standard unit because it believes that the W/2 SW/4 of Section 30 is already committed to a participating area for Morrow production and may not participate in production from a standard unit consisting of the S/2 of Section 30.

(4) That the applicant seeks approval of the proposed unorthodox location for the purpose of avoiding an existing potash lease underlying Section 30.

(5) That the working interest owner of the W/2 SW/4 of Section 31 is willing and able to participate in a standard unit consisting of the S/2 of Section 31.

(6) That creation of the proposed non-standard gas proration unit would result in the formation of other non-standard units.

(7) That the owner of the W/2 SW/4 of Section 30 has objected to the proposed non-standard unit.

(8) That the application for a non-standard gas proration unit should be denied.

(9) That approval of the application for the proposed unorthodox location will allow the operator to avoid an existing potash lease underlying the W/2 SE/4 of said Section 30, enable the applicant to recover his just and equitable share of the gas in the South Salt Lake Field, and prevent waste and protect correlative rights.

(10) That no offset operator has objected to the proposed unorthodox location.

(11) That the application for an unorthodox gas well location should be approved.

IT IS THEREFORE ORDERED:

(1) That the application for a non-standard gas proration unit is hereby denied.

(2) That the applicant is hereby authorized to drill a gas well at an unorthodox location 660 feet from the South line and 1300 feet from the East line of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake Field, Lea County, New Mexico.

(3) That the S/2 of Section 30, Township 20 South, Range 33 East, NMPM, South Salt Lake Field, Lea County, New Mexico, shall be dedicated to said well.

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

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

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

I. R. TRUJILLO, Chairman

ALEX J. ARMIJO, Member

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

S E A L

dr/

Federal Abstract Company

STATE · FEDERAL · INDIAN LANDS

POST OFFICE BOX 2288 - PHONE 982-5537 - SANTA FE, NEW MEXICO 87501

March 14, 1974

Kellahin & Fox, Attorneys
500 Don Gaspar Avenue
Santa Fe, New Mexico 87501

Gentlemen:

This is to certify that the Plat Book Records in the United States Land Office at Santa Fe, New Mexico, affecting the Potash Rights to the E½SE¼ Section 30, T. 20 S., - R. 33 E., N.M.P.M., reflect that this land is Open Public Domain and in a Known Geological Structure. Lots 3, 4, E½SW¼ Section 30, T. 20 S., - R. 33 E., N.M.P.M., is under HE Patent No. 833688 issued November 21, 1921.

That the Records in the Offices of the Commissioner of Public Lands of the State of New Mexico, affecting the Potash Rights to the W½SE¼ Section 30, T. 20 S., - R. 33 E., N.M.P.M., reflect that this land was granted December 14, 1936 to the United States Potash Company under Potash Mining Lease M-651 and is now held by the U. S. Potash & Chemical Company, P. O. Box 101, Carlsbad, New Mexico under Assignment No. 5.

Very truly yours,

FEDERAL ABSTRACT COMPANY

Hoover H. Wright, Secretary

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit No. 10
Submitted by Belco
Hearing Date 3-15-74

LEASE NO. M-651 APPLICATION NO. M-651

POTASH MINING LEASE
(Under Act Approved March 12, 1929)

THIS INDENTURE OF LEASE entered into in duplicate this 14th day of December, 1936, by and between the State of New Mexico acting in this behalf by Frank Vesely, its Commissioner of Public Lands, party of the first part and hereinafter called the lessor, and United States Potash Company, (No Stockholders' Liability) a corporation organized and existing under the laws of the State of New Mexico, party of the second part and hereinafter called the lessee, under, pursuant and subject to the terms and provisions of Chapter 140 of the Session Laws of the New Mexico Legislature of 1929 and Chapter 99 of the Session Laws of the New Mexico Legislature of 1923, and hereinafter referred to as the Acts, all of the provisions of said statutes being hereby made a part hereof.

WITNESSETH:

SECTION 1. THAT WHEREAS the said lessee has filed in the office of the Commissioner of Public Lands its application to surrender leases held by it and numbered M-90, M-196, M-197, M-198, M-208, M-224, M-226, M-227, M-228, M-229½, M-305, M-342 and M-435, and has complied with all the provisions of said leases providing for their surrender; and

WHEREAS, the said lessee has filed in said office an application for a new lease for the exploration, development and production of potassium, sodium, phosphorus and other minerals of similar occurrence and their salts and compounds upon the lands hereinafter described, and has tendered the sum of three thousand one hundred sixty-seven dollars and twenty-five cents ($3,167.25) as the first annual rental thereon, together with the sum of $5.00

application fee as evidenced by official receipt No. 207166 ; and

WHEREAS, the said lessee has heretofore explored the lands hereinafter described, by test wells and by the sinking thereon of a shaft at large expense, and has discovered on said land potassium in commercial quantities, and the said lessee has heretofore begun and is now continuing the production on said land of potassium on a commercial basis, and has produced from the lands hereinafter described, and paid royalty on more than forty thousand tons of crude potassium salts in each of the years 1935 and 1936;

NOW, THEREFORE, in consideration of the said above tender, receipt whereof is hereby confessed and acknowledged, and of the rents and royalties to be paid and the covenants to be observed as herein set forth, the lessor does hereby grant, demise, lease and let to the lessee exclusively for the sole and only purpose of exploration, development and production of potassium, sodium, phosphorus and other minerals of similar occurrence and their salts and compounds in, upon and under the following described land situated in the Counties of Eddy and Lea, State of New Mexico, and more particularly described as follows, to wit:

ALL ASSIGNED 36,512.56 acres

ALL ASSIGNED

Subdivision	Sec.	Twp.	Rge.	Acres
PARCEL "A"				
All	32	21S	29E	612.72
Lot 1, SE¼SW¼	18	"	"	70.36
All	32	20S	30E	640.00
N½	29	"	"	320.00
N½	30	"	"	319.55
SW¼, SW¼NW¼,	11	21S	29E	200.00
N½NW¼, SE¼NW¼, NE¼SW¼	13	"	"	160.00
NW¼, NW¼NE¼, NE¼NE¼, NW¼SE¼	14	"	"	280.00

Assigned To Commercial Alkali Co.

Subdivision	Sec.	Twp.	Rge.	Acres.
PARCEL "B"				
$S\frac{1}{2}S\frac{1}{2}$	32	20S	32E	160.00
$NE\frac{1}{4}SW\frac{1}{4}$, $W\frac{1}{2}SE\frac{1}{4}$	9	22S	30E	120.00
All	4	22S	30E	641.28
$N\frac{1}{2}$, $SW\frac{1}{4}$	28	21S	"	480.00
$E\frac{1}{2}$	21	"	"	320.00
$N\frac{1}{2}$	27	"	"	320.00
All except $SW\frac{1}{4}SW\frac{1}{4}$	2	22S	"	601.52
$N\frac{1}{2}S\frac{1}{2}$, $SW\frac{1}{4}NW\frac{1}{4}$, $SE\frac{1}{4}NW\frac{1}{4}$	32	20S	32E	240.00
PARCEL "C"				
All	5	22S	30E	641.12
All	8	"	"	640.00
$N\frac{1}{2}$, $W\frac{1}{2}SW\frac{1}{4}$, $SE\frac{1}{4}SW\frac{1}{4}$	9	"	"	440.00
All	16	"	"	640.00
All	17	"	"	640.00
PARCEL "D"				
$S\frac{1}{2}NE\frac{1}{4}$, $NE\frac{1}{4}NE\frac{1}{4}$	32	20S	32E	120.00
All	36	"	"	640.00
All	16	"	33E	640.00
$S\frac{1}{2}S\frac{1}{2}$	17	"	"	160.00
$W\frac{1}{2}$, $S\frac{1}{2}SE\frac{1}{4}$	18	"	"	399.88
$W\frac{1}{2}NE\frac{1}{4}$	19	"	"	80.00
All	32	"	"	640.00
$N\frac{1}{2}N\frac{1}{2}$, $SE\frac{1}{4}NE\frac{1}{4}$, $E\frac{1}{2}SE\frac{1}{4}$, $SW\frac{1}{4}SE\frac{1}{4}$	31	"	"	320.26
PARCEL "E"				
All	2	20S	33E	638.04
Lots 3, 4, $SW\frac{1}{4}NE\frac{1}{4}$, $S\frac{1}{2}NW\frac{1}{4}$, $W\frac{1}{2}SW\frac{1}{4}$, $SE\frac{1}{4}SW\frac{1}{4}$, $N\frac{1}{2}SE\frac{1}{4}$	4	"	"	400.92
$W\frac{1}{2}E$	30	"	"	160.00

Subdivision	Sec.	Twp.	Rge.	Acres
	PARCEL "E" (Continued)			
SE¼SE¼	27	20S	33E	40.00
All	36	"	"	640.00
SE¼	12	"	32E	160.00
All	13	"	"	640.00
SW¼	36	19S	33E	160.00
W½SE¼, SE¼SE¼	36	"	"	120.00
	PARCEL "F"			
All	2	21S	29E	941.44
All	16	"	"	640.00
All	36	"	"	637.12
NW¼NW¼	8	"	30E	40.00
NE¼SE¼	20	"	"	40.00
	PARCEL "G"			
NE¼	19	21S	31E	160.00
NW¼	20	"	"	160.00
SW¼NE¼, SW¼	17	"	"	200.00
All	36	"	30E	640.00
All	22	"	"	640.00
N½	23	"	"	320.00
SE¼, S½SW¼	14	"	"	240.00
S½	13	"	"	320.00
S½NW¼	24	"	"	80.00
	PARCEL "H"			
All	32	20S	31E	640.00
All	16	21S	"	640.00
E½SE¼, SW¼SE¼,	28	"	30E	120.00
All	32	"	"	640.00
All	16	20S	31E	640.00

Subdivision	Sec.	Twp.	Rge.	Acres
	PARCEL "I"			
All		21S	30E	943.80
All	16	"	"	640.00
All (NE¼NW¼ assigned to Dorval Corp.)	36	20S	"	640.00
All	36	"	31E	640.00
	PARCEL "J"			
S½SW¼, SW¼SE¼, N½S½	1	21S	33E	280.00
S½	2	"	"	320.00
S½	3	"	"	320.00
S½	4	"	"	320.00
S½	5	"	"	320.00
S½	6	"	"	311.13
Lots 1, 2, 7, 8, 9, 10, 15 and 16	5	"	"	318.08
E½	8	"	"	320.00
E½	17	"	"	320.00
S½SW¼, NW¼SW¼	32	20S	34E	120.00
	PARCEL "K"			
All	16	21S	28E	640.00
All	36	"	"	640.00
	PARCEL "L"			
All	16	23S	29E	640.00
NE¼, E½SE¼, N½NW¼	32	"	"	320.00
	PARCEL "M"			
All	2	22S	29E	640.24
All	18	21S	31E	635.04
S½NW¼, N½SW¼	11	22S	29E	160.00

containing 31,672.50 acres, more or less, together with the right to construct and maintain thereon all works, buildings, plants, waterways or reservoirs necessary to the full enjoyment thereof, including the right to drill, maintain and operate water wells on said lands and to produce and use the water therefrom; provided, that this lease shall extend only to and include any right or interest in the lands or the minerals therein reserved to the State of New Mexico under contract of purchase or deed heretofore or hereafter issued with a reservation of the minerals therein to said State.

TO HAVE AND TO HOLD the said lands and all rights and privileges granted hereunder for a term of ten years and as long thereafter as the said minerals or any of them in paying quantities shall be produced from the leased lands.

SECTION 2. In consideration of the premises, the lessee hereby agrees as follows, to wit:

(a) Unless extension be granted by the Commissioner of Public Lands, to produce from the lands hereinabove described, and to pay the royalty hereinafter specified on at least fifty thousand (50,000) tons of crude potassium salts during each and every year of this lease; provided, that if in any year such production of crude potassium salts falls below the amount herein specified, the lessee shall, within thirty days after the expiration of such year, pay to the Commissioner of Public Lands a sum equal to the number of tons of such shortage below fifty thousand tons, multiplied by the average royalty paid for potassium produced from said lands during the last preceding twelve months in which there was such production, and the making of such payment shall have the same effect as if the full fifty thousand tons were produced during the year for which such payment is made.

(b) If by reason of economic conditions, or of other circumstances beyond the control of the lessee, there is a complete shutdown of its operations of mining and refining potassium on the lands hereinabove described, and all other lands in the vicinity of said lands owned or operated by the lessee, the provisions of the preceding paragraph (a) of this section shall be waived and become inoperative during the period of such shutdown; provided, that the lessee shall not be entitled to the benefits of this paragraph for more than six months at any one time, without the approval of the Commissioner of Public Lands.

(c) To pay to the lessor annually in advance on the successive anniversary dates of this lease the sum of ten cents (10¢) per acre for each and every acre of land as to which the lease may be in force when such payments shall become due, such rental payments to continue so long as this lease shall remain in force. Provided, however, that the annual rental on this lease shall not in any case be less than one hundred dollars ($100.00) to be paid in cash.

(d) To pay to the lessor a royalty of five percent of the value of the minerals produced hereunder, except sodium chloride or common salt, such royalty to be computed upon the value of said minerals delivered at the nearest or most accessible railroad shipping point; and to pay to the lessor a royalty of ten percent of the actual sale price on all sodium chloride or common salt produced hereunder at the place of extraction; all such royalty provided for herein is expressly reserved to the lessor as provided by statute.

(e) Rentals and royalties due the State shall constitute a first lien on any and all improvements on the land leased, prior and superior to any other lien or encumbrance whatsoever whether created with or without notice of the lien for rental or royalties due or to become due.

(f) To furnish monthly sworn statements in detail in such form as may be prescribed by the lessor, of the amount and value of output from the leasehold delivered at the nearest or most accessible railroad shipping point, as a basis for determining the amount of royalties, and to permit at all reasonable times the inspection by the lessor or his duly authorized agent of all books and accounts of the lessee relating thereto, it being a condition of this grant that falsification of any such statements, records, books or accounts by the lessee shall be deemed and taken as sufficient ground for cancellation of this lease.

(g) To furnish the lessor annually a map showing all prospecting and development work on the leased lands and other related information, together with a report showing all buildings, structures and workings placed thereon, and a complete sworn statement of the amount of potassium and other minerals produced and saved by lessee's operations hereunder.

(h) To carry on all mining, reducing, refining and other operations in a good and workmanlike manner in accordance with approved methods and practice, having due regard to the health and safety of employees, the prevention of waste and the preservation and conservation of the property for further productive operations, and to observe all state laws relative to the health and safety of such employees, all mining and related productive operations to be subject to inspection by the lessor or his duly authorized agent and by other duly constituted state authority.

(i) To deliver to the lessor upon the termination of this lease, as a result of forfeiture or otherwise, the lands covered hereby including all fixtures and improvements other than structures, buildings, derricks, machinery, equipment, tools and personal property located and used above ground and other than pumps, engines, air compressors, dynamos, motors, cars and other similar appliances

used underground situated on any of said lands, in good order and condition so as to permit of immediate continued operation to the full extent and capacity of the leased premises. Provided, that upon such termination of the lease the lessee shall have ninety days from such termination to remove such machinery, tools, equipment and personal property from the leased premises if free from a state lien; and all such property shall become the property of the lessor if not so removed within said period of ninety days or within such extension of time as may be granted by the lessor.

(j) To pay when due all taxes lawfully assessed and levied under the laws of the State of New Mexico upon the improvements, output of mines and other rights, property and assets of the lessee.

(k) To comply with all statutory requirements where the surface of the lands embraced herein has been or may be leased, sold or otherwise disposed of under State laws reserving to the State of New Mexico the mineral deposits therein contained.

(l) Not to assign or sublet the premises covered hereby without the written consent and approval of the lessor.

(m) To take and preserve a core of all formations penetrated by any test well containing any of the minerals mentioned in Section 1 hereof, one-quarter of such core to be the property of the lessor, and the lessee further agrees to furnish the lessor promptly copies of any and all analysis made by or for the lessee of cores taken from test wells drilled on the leased premises, and copies of analysis of samples of minerals mined therefrom upon demand of the lessor.

(n) Before commencing operations hereunder to furnish the Commissioner of Public Lands a good and sufficient bond in the penal sum of not to exceed ten thousand dollars ($10,000.00) conditioned upon the faithful performance by the lessee of all and singular, the terms and conditions of this lease, and keep

such bond in force and effect so long as lessee's operations shall continue under the terms hereof.

SECTION 3. The lessor hereby expressly reserves:

(a) The right to permit for joint or several use such easements and rights of way upon, through or in the lands hereby leased as may be necessary or appropriate to the use or disposal of the lands for purposes other than the purpose of this lease, and the right to dispose of the surface of the said lands under the laws of the State of New Mexico now existing or hereafter enacted, insofar as said surface is not necessary or required for use of the lessee in extracting and removing the potash and other mineral deposits therein contained. And the lessor further expressly reserves the right to lease the said lands for minerals other than those described in Section 1 hereof, but the working of said lands under such lease, for such other minerals shall not be permitted where such operations will prevent or materially interfere with the operations of the lessee hereunder.

SECTION 4. The lessee may at any time, by paying to the lessor all amounts then due the lessor as provided herein and the further sum of ten dollars ($10.00) surrender and cancel this lease insofar as the same covers all or any portion of the land herein leased, and be relieved from further obligations or liabilities hereunder as to the lands surrendered. Provided, that all wages or monies due and payable to the workmen employed by the lessee shall have been paid and that a satisfactory showing is made to the lessor that all creditors or others having an interest in or lien or claim against the lessee are fairly and equitably protected, but in no case shall such termination be effective until the lessee shall have made adequate provision for the preservation of any mines, productive works and permanent improvements on the lands covered hereby; and provided further

that this surrender clause and the option herein reserved to the lessee shall cease and become absolutely inoperative immediately and concurrently with the institution of any suit in any court of law or equity by the lessor, lessee or any assignee to enforce this lease or any of its terms, expressed or implied.

SECTION 5. If the lessee shall fail to comply with the provisions of this lease or make default in the performance or observance of any of the terms, covenants and stipulations herein, and such default shall continue for thirty days after service of written notice thereof by the lessor, then the lessor may and he is hereby expressly authorized to declare a forfeiture and cancellation of this lease. A waiver of any particular cause of forfeiture shall not prevent the cancellation and forfeiture of this lease for any other cause of forfeiture or for the same cause occurring at any other time.

SECTION 6. It is expressly understood and agreed that all of the obligations, covenants, agreements, rights and privileges of this lease shall extend to and be binding upon and inure to the benefit of the lawful assigns or successors in interest of the parties hereto.

IN WITNESS WHEREOF: The party of the first part has hereunto signed and caused its name to be signed by its Commissioner of Public Lands, thereunto duly authorized, with the seal of his office affixed, and the lessee has signed this instrument the day and year first above written.

STATE OF NEW MEXICO

By _____
Commissioner of Public Lands.

ATTEST:

_____
Secretary.

UNITED STATES POTASH COMPANY
(No Stockholders Liability).

By _____
Its Vice President

STATE OF New York }
COUNTY OF New York } ss.

On this 19th day of December, 1936, personally appeared Horace M. Albright to me personally known, who being by me duly sworn did say that he is the Vice President of United States Potash Company, (No Stockholders' Liability) and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its board of directors and said Horace M. Albright acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in the certificate above written.

Gertrude B Stichler
Notary Public.

My commission expires:
March 30, 1938

Form M-12 Corporation

RECEIVED
JUL 31 9 04 AM '68
LAND OFFICE
SANTA FE, N. M.

ASSIGNMENT OF MINERAL LEASE 55271

KNOW ALL MEN BY THESE PRESENTS:

That United States Borax and Chemical Corporation

a corporation, Los Angeles, California

hereinafter sometimes called "Assignor," party of the first part, for and in consideration of the sum of One Dollar, and other good and valuable consideration paid by

Continental American Royalty Company, a South Dakota corporation

whose postoffice address is 1201 Praetorian Building, Dallas, Texas 75201

hereinafter sometimes called "Assignee," party of the second part, has sold, transferred, set over and assigned, and by these presents does sell, transfer, set over and assign to the Assignee its successors and assigns, all of the assignor's right, title, interest and claim in and to that certain Mineral Lease No. M-651

made by the State of New Mexico to United States Borax and Chemical Corporation

under date of _____, 19____.

and more particularly described as follows:

Lands described on attached Exhibit "A"
which is for all purposes made a part hereof.

TOTAL ACREAGE 30,512.50

The Assignee assumes and agrees to perform all obligations to the State of New Mexico insofar as said described lands are affected, and to pay such rental and royalties, and to do such other acts as are by said lease required as to the above described subdivisions, to the same extent and in the same manner as if the provisions of said lease were fully set out herein.

It is agreed that the Assignee shall succeed to all the rights, benefits and privileges granted the Lessee by the terms of said lease, as to the lands above described.

IN WITNESS WHEREOF, the said party has hereunder caused these presents to be signed and sealed by its proper officers by authority of its Board of Directors this the day of July 10, 19 68.

ATTEST:

Secretary

By

President

M-12

CALIFORNIA
STATE OF NEW MEXICO)
County of Los Angeles) ss.

On this 10th day of July, 1968, before me personally appeared Ray J. Coleman, Vice President of the United States Borax and Chemical Corporation to me personally known, who being by me duly sworn did say that the and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said Ray J. Coleman acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on this, the day and year first above written.

Josephine Johnson
Notary Public
PRINCIPAL OFFICE IN LOS ANGELES COUNTY

My Commission expires My Commission Expires May 18, 1969

Office of Commissioner of Public Lands
Santa Fe, New Mexico

I hereby certify that the within assignment was filed in my office on the 31st day of July, 1968, and approved by me on August 29, 1968.

Commissioner of Public Lands

INSTRUCTIONS AND INFORMATION

1. All Assignments must be filed in the State Land Office within 100 days from date of issue and accompanied by Cashier's Check, Bank Draft, P. O. or Express Money Order.

2. Recording and approval fees are $10.00 for each Assignment.

3. When assignments are accompanied by personal check, the Commissioner of Public Lands reserves the right to withhold approval of assignment until checks are paid.

4. Assignments will not be approved when assigned to more than two persons.

5. Assignments must show complete postoffice address of assignee.

6. Assignments must be executed before an officer authorized to take acknowledgments of deeds. Corporations must use corporate form of acknowledgment.

7. Assignments must show whether assignors are married or single; if married, both husband and wife must sign the assignment, and certificate of acknowledgment must show marital status of assignors.

8. All official business, letters and communications must be addressed to and sent direct to the Commissioner of Public Lands.

9. Make all payments for annual rental and recording and approval fees, to

COMMISSIONER OF PUBLIC LANDS
SANTA FE, NEW MEXICO

55271

RECEIVED
JUL 31 3 04 PM '68
STATE LAND OFFICE
SANTA FE, N. M.

Eddy T20S, R30E: Section 29 - N½ 320.00
Section 30 - N½ 319.65
Section 32 - All 640.00
Section 36 - All except N½ NW¼ 560.00

1,920.00 Lea T20S, R31E: Section 16 - All 640.00
Section 32 - All 640.00
Section 36 - All 640.00

Eddy T21S, R28E: Section 16 - All 640.00
Section 36 - All 640.00

Eddy T21S, R29E: Section 2 - All 941.44
Section 11 - SW¼, SW¼ NW¼ 200.00
Section 13 - N½ NW¼, SE¼ NW¼, NE¼ SW¼ 160.00
Section 14 - NW¼, N½ NE¼, NW¼ SE¼ 280.00
Section 16 - All 640.00
Section 18 - Lot 1, SE¼ SW¼ 70.36
Section 32 - All 612.72
Section 36 - All (E½ & SW¼ sublease to I.M.C.C.) 637.12

Eddy T21S, R30E: Section 2 - All 949.80
Section 8 - NW¼ NW¼ 40.00
Section 13 - S½ 320.00
Section 14 - S½ SW¼, SE¼, SE¼ NE¼ 280.00
Section 16 - All 640.00
Section 20 - NE¼ SE¼ 40.00
Section 21 - E½ 320.00
Section 22 - All 640.00
Section 23 - N½ 320.00
Section 24 - NW¼ 160.00
Section 27 - N½ 320.00
Section 28 - N½, SW¼, E½ SE¼, SW¼ SE¼ 600.00
Section 32 - All (subleased to I.M.C.C.) 640.00
Section 36 - All 640.00

Eddy T22S, R29E: Section 2 - All (subleased to IMCC) 640.24
Section 11 - S½ NW¼, N½ SW¼ (subleased to IMCC) 160.00

Eddy T22S, R30E: Section 2 - N½, SE¼, N½ SW¼, SE¼ SW¼ 601.32
Section 4 - All (subleased to IMCC) 641.28
Section 5 - All (W½ subleased to IMCC) 641.12
Section 8 - All (subleased to IMCC) 641.00
Section 9 - N½, SW¼, W½ SE¼ (subleased to IMCC) 560.00
Section 16 - All (subleased to IMCC) 640.00
Section [illegible] - All (subleased to IMCC) 640.00

NM-651

55271

RECEIVED
JUL 31 9 04 AM '68
STATE LAND OFFICE
SANTA FE, N.M.

	Eddy	T23S, R29E:	Section 16 - All	640.00
			Section 32 - NE¼, E½ SE¼, N½ NW¼	320.00
280.00	Lea	T19S, R33E:	Section 36 - SW¼, W½ SE¼, SE¼ SE¼	280.00
1,440.00	Lea	T20S, R32E:	Section 36 - All	640.00
			Section 12 - SE¼	160.00
			Section 13 - All	640.00
4,119.10	Lea	T20S, R33E:	Section 2 - All	638.04
			Section 4 - NW¼, W½ SW¼, SE¼ SW¼, N½ SE¼, SW¼ NE¼	400.92
			Section 16 - All	640.00
			Section 17 - S½ S½	160.00
			Section 18 - W½, S½ SE¼	399.88
			Section 19 - W½ NE¼	80.00
			Section 27 - SE¼ SE¼	40.00
			Section 30 - W½ E½	160.00
			Section 31 - N½ N½, SE¼ NE¼, E½ SE¼, SW¼ SE¼	320.26
			Section 32 - All	640.00
			Section 36 All	640.00
120.00	Lea	T20S, R34E:	Section 32 - S½ SW¼, NW¼ SW¼	120.00
	Eddy	T21S, R31E:	Section 17 - SW¼	160.00
			Section 18 - All	635.04
			Section 19 - NE¼	160.00
			Section 20 - NW¼	160.00
2,829.21	Lea	T21S, R33E:	Section 1 - S½ SW¼, SW¼ SE¼, N½ S½	280.00
			Section 2 - S½	320.00
			Section 3 - S½	320.00
			Section 4 - S½	320.00
			Section 5 - S½, Lots 1, 2, 7, 8, 9, 10, 15 and 16	638.08
			Section 6 - S½	311.13
			Section 8 - E½	320.00
			Section 17 - E½	320.00

Total 30,512.50

A-651 Cont.

COLLATERAL ASSIGNMENT

The undersigned CONTINENTAL AMERICAN ROYALTY COMPANY of 1201 Praetorian Building, Dallas, Texas, the holder of State Mining Lease No. M-651, does hereby assign, transfer and set over unto UNITED STATES BORAX AND CHEMICAL CORPORATION, P. O. Box 75128, Sanford Station, Los Angeles, California 90005, the aforesaid lease covering the following described lands of the State of New Mexico - to wit:

Property described on attached Exhibit "A"
which is for all purposes made a part hereof.

This assignment is made as collateral security for the payment of indebtedness owing by the undersigned to the assignee herein amounting to $1,000,000.00 and the payment of further advances that may hereafter be made by the assignee herein to the undersigned, now exceeding, however, the sum of $_____.

This assignment is made subject to all the terms and provisions of H.B.205, enacted by the Eleventh Legislature of the State of New Mexico and approved by the Governor of New Mexico on the 14th day of March, 1933, and acts amendatory thereto.

CONTINENTAL AMERICAN ROYALTY COMPANY,
Assignor

ATTEST: _____
Asst. Secretary

By _____
President

STATE OF New York)
County of New York) ss.

The foregoing instrument was acknowledged before me this 23rd day of July, 1966 by W. William Muller of Continental American Royalty Company, a South Dakota corporation, on behalf of said corporation.

_____
Notary Public

My commission expires:
_____

56066

M-651

T20S, R30E:	Section 29 - N½	320.00
	Section 30 - N½	319.55
	Section 32 - All	640.00
	Section 36 - All except N½ NW¼	560.00
T20S, R31E:	Section 16 - All	640.00
	Section 32 - All	640.00
	Section 36 - All	640.00
T21S, R28E:	Section 16 - All	640.00
	Section 36 - All	640.00
T21S, R29E:	Section 2 - All	941.44
	Section 11 - SW¼, SW¼ NW¼	200.00
	Section 13 - N½ NW¼, SE¼ NW¼, NE¼ SW¼	160.00
	Section 14 - NW¼, N½ NE¼, NW¼ SE¼	280.00
	Section 16 - All	640.00
	Section 18 - Lot 1, SE¼ SW¼	76.36
	Section 32 - All	612.72
	Section 36 - All (E½ & SW¼ sublease to I.M.C.C.)	637.12
T21S, R30E:	Section 2 - All	943.80
	Section 6 - NW¼ NW¼	40.00
	Section 13 - S½	320.00
	Section 14 - S½ SW¼, SE¼, SE¼ NE¼	280.00
	Section 16 - All	640.00
	Section 20 - NE¼ SE¼	40.00
	Section 21 - E½	320.00
	Section 22 - All	640.00
	Section 23 - N½	320.00
	Section 24 - NW¼	160.00
	Section 27 - N½	320.00
	Section 28 - N½, SW¼, E½ SE¼, SW¼ SE¼	600.00
	Section 32 - All (subleased to I.M.C.C.)	640.00
	Section 36 - All	640.00
T22S, R29E:	Section 2 - All (subleased to IMCC)	640.24
	Section 11 - S½ NW¼, N½ SW¼ (subleased to IMCC)	160.00
T22S, R30E:	Section 2 - N½, SE¼, N½ SW¼, SE¼ SW¼	601.52
	Section 4 - All (subleased to IMCC)	641.28
	Section 5 - All (W½ subleased to IMCC)	641.12
	Section 8 - All (subleased to IMCC)	640.00
	Section 9 - N½, SW¼, W½ SE¼ (subleased to IMCC)	560.00
	Section 16 - All (subleased to IMCC)	640.00
	Section 17 - All (subleased to IMCC)	640.00

RECEIVED
AUG 12 10 03 AM '66
STATE LAND OFFICE
SANTA FE, N. M.

Exhibit "A"

M-651
Page 2 of 2 pages

T23S, R29E:	Section 16 - All	640.00
	Section 32 - NE¼, E½ SE¼, N½ NW¼	320.00
T19S, R33E:	Section 36 - SW¼, W½ SE¼, SE¼ SE¼	280.00
T20S, R32E:	Section 36 - All	640.00
	Section 12 - SE¼	160.00
	Section 13 - All	640.00
T20S, R33E:	Section 2 - All	638.04
	Section 4 - NW¼, W½ SW¼, SE¼ SW¼, N½ SE¼, SW¼ NE¼	400.92
	Section 16 - All	640.00
	Section 17 - S½ S½	160.00
	Section 18 - W½, S½ SE¼	399.28
	Section 19 - W½ NE¼	80.00
	Section 27 - SE¼ SE¼	40.00
	Section 30 - W½ E½	160.00
	Section 31 - N½ N½, SE¼ NE¼, E½ SE¼, SW¼ SE¼	320.26
	Section 32 - All	640.00
	Section 36 All	640.00
T20S, R34E:	Section 32 - S½ SW¼, NW¼ SW¼	120.00
T21S, R31E:	Section 17 - SW¼	160.00
	Section 18 - All	635.04
	Section 19 - NE¼	160.00
	Section 20 - NW¼	160.00
T21S, R33E:	Section 1 - S½ SW¼, SW¼ SE¼, N½ S½	280.00
	Section 2 - S½	320.00
	Section 3 - S½	320.00
	Section 4 - S½	320.00
	Section 5 - S½, Lots 1, 2, 7, 8, 9, 10, 15 and 16	638.08
	Section 6 - S½	311.13
	Section 8 - E½	320.00
	Section 17- E½	320.00

RECEIVED
AUG 12 10 03 AM '68
STATE LAND OFFICE
SANTA FE, N. M.

74756

ASSIGNMENT OF STATE OF NEW MEXICO MINERAL LEASE

KNOW ALL MEN BY THESE PRESENTS:

That CONTINENTAL AMERICAN ROYALTY COMPANY, a South Dakota corporation of Dallas, Texas hereinafter sometimes called "Assignor", party of the first part, for and in consideration of the sum of One Dollar, and other good and valuable consideration paid by U.S. POTASH & CHEMICAL COMPANY, a Delaware corporation whose post-office address is P. O. Box 101, Carlsbad, New Mexico hereinafter sometimes called "Assignee", party of the second part, has sold, transferred, set over and assigned, and by these presents does sell, transfer, set over and assign to the Assignee, its successors and assigns, all of the Assignor's right, title, interest and claim in and to that certain Mineral Lease No. M 651 made by the State of New Mexico to United States Borax & Chemical Corporation under date of December 14, 1936, covering the following described lands in the State of New Mexico:

T20S, R30E:	Section 29 - N½ — Subleased
	Section 30 - N½ — Subleased
	Section 32 - All
	Section 36 - All except N½ NW¼
T20S, R31E:	Section 16 - All
	Section 32 - All
	Section 36 - All — Subleased
T21S, R28E:	Section 16 - All
	Section 36 - All
T21S, R29E:	Section 2 - All
	Section 11 - SW¼, SW¼ NW¼
	Section 13 - N½ NW¼, SE¼ NW¼, NE¼ SW¼
	Section 14 - NW¼, N½ NE¼, NW¼ SE¼
	Section 16 - All
	Section 18 - Lot 1, SE¼ SW¼
	Section 32 - All
	Section 36 - All (E½ & SW¼ sublease to I.M.C.C.)
T21S, R30E:	Section 2 - All
	Section 8 - NW¼ NW¼
	Section 13 - S½

	Section 14 - S½ SW¼, SE¼, SE¼ NE¼
	Section 16 - All
	Section 20 - NE¼ SE¼
	Section 21 - E½
	Section 22 - All
	Section 23 - N½
	Section 24 - NW¼
	Section 27 - N½
	Section 28 - N½, SW¼, E½ SE¼, SW¼ SE¼
	Section 32 - All (subleased to I.M.C.C.)
	Section 36 - All
T22S, R29E:	Section 2 - All (subleased to IMCC)
	Section 11 - S½ NW¼, N½ SW¼ (subleased to IMCC)
T22S, R30E:	Section 2 - N½, SE¼, N½ SW¼, SE¼ SW¼
	Section 4 - All (subleased to IMCC)
	Section 5 - All (W½ subleased to IMCC)
	Section 8 - All (subleased to IMCC)
	Section 9 - N½, SW¼, W½ SE¼ (subleased to IMCC)
	Section 16 - All (subleased to IMCC)
	Section 17 - All (subleased to IMCC)
T23S, R29E:	Section 16 - All
	Section 32 - NE¼, E½ SE¼, N½ NW¼
T19S, R33E:	Section 36 - SW¼, W½ SE¼, SE¼ SE¼
T20S, R32E:	Section 36 - All
	Section 12 - SE¼
	Section 13 - All
T20S, R33E:	Section 2 - All
	Section 4 - NW¼, W½ SW¼, SE¼ SW¼, N½ SE¼, SW¼ NE¼
	Section 16 - All
	Section 17 - S½ S½
	Section 18 - W½, S½ SE¼
	Section 19 - W½ NE¼
	Section 27 - SE¼ SE¼
	Section 30 - W½ E½
	Section 31 - N½ N½, SE¼ NE¼, E½ SE¼, SW¼ SE¼
	Section 32 - All
	Section 36 - All
T20S, R34E:	Section 32 - S½ SW¼, NW¼ SW¼
T21S, R31E:	Section 17 - SW¼
	Section 18 - All

	Section 19 - NE¼
	Section 20 - NW¼
T21S, R33E:	Section 1 - S½ SW¼, SW¼ SE¼, N½ S½
	Section 2 - S½
	Section 3 - S½
	Section 4 - S½
	Section 5 - S½, Lots 1, 2, 7, 8, 9, 10, 15 and 16
	Section 6 - S½
	Section 8 - E½
	Section 17 - E½

The Assignee assumes and agrees to perform all obligations to the State of New Mexico insofar as said described lands are affected and to pay such rental and royalties, and to do such other acts as are by said lease required as to the above described subdivisions, to the same extent and in the same manner as if the provisions of said lease were fully set out herein.

It is agreed that the Assignee shall succeed to all the right, benefits and privileges granted the Lessee by the terms of said lease, as to the lands above described.

IN WITNESS WHEREOF, the said party has hereunder caused these presents to be signed and sealed by its proper officers by authority of its Board of Directors this the 9th day of June, 1969.

CONTINENTAL AMERICAN ROYALTY COMPANY

By _____
President

ATTEST:

By: _____
Secretary

STATE OF ILLINOIS)
) ss.
COUNTY OF COOK)

On this 9th day of June, 1969, before me personally appeared N. William Mulier to me personally known who being by me duly sworn did say that he is the President of the Continental American Royalty Company, a South Dakota corporation, and that the seal affixed to the foregoing instrument is the corporate seal of said corporation and that said instrument was signed and sealed in behalf of said corporation by authority of its Board of Directors, and said N. William Muller acknowledged said instrument to be the free act and deed of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on this, the day and year first above written.

Nancy Ross
Notary Public

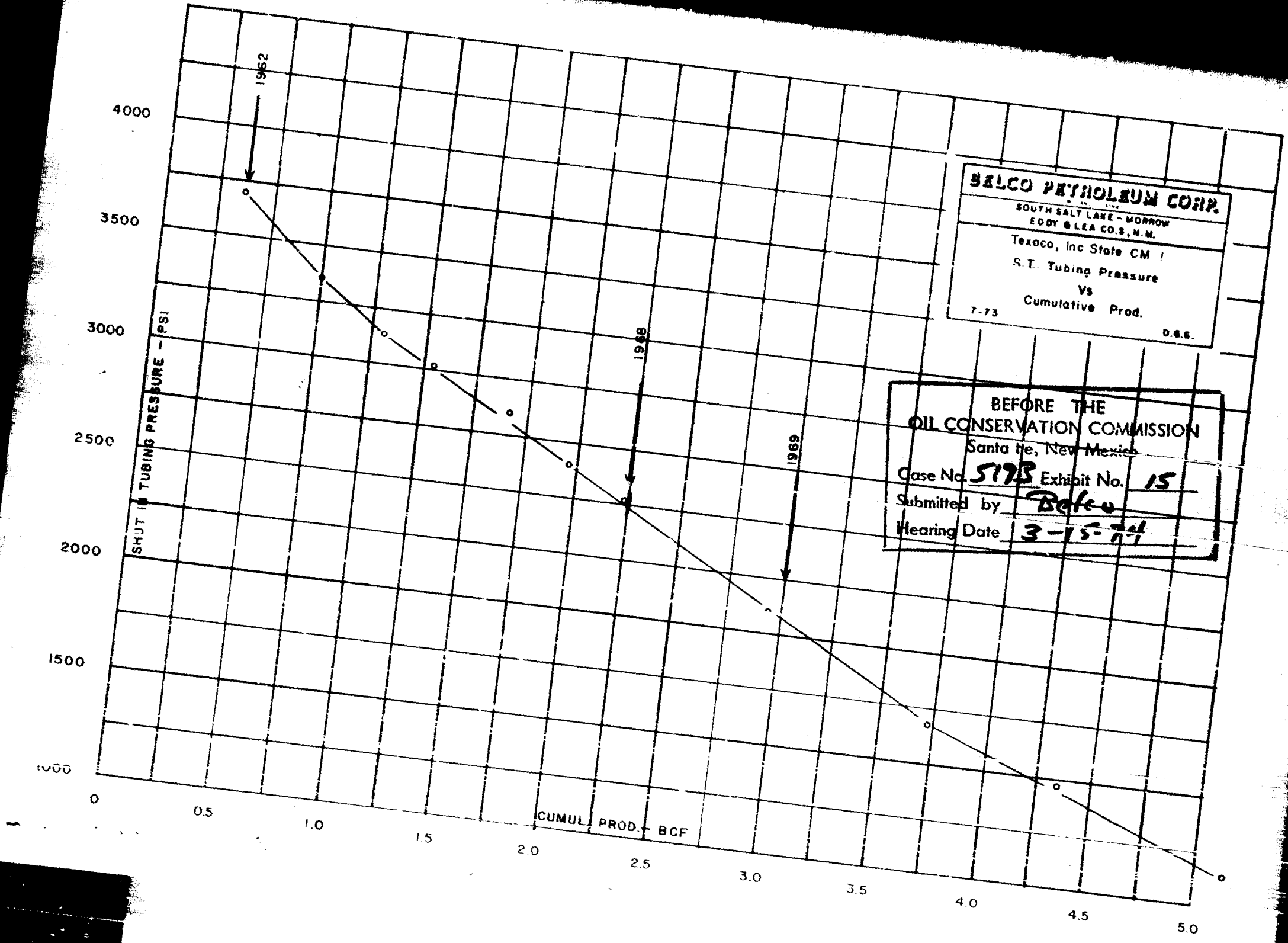
My commission expires:

2/23/71

Office of Commissioner of Public Lands
Santa Fe, New Mexico

I hereby certify that the within assignment was filed in my office on August 14, 1969, and approved by me on September 16, 1969.

COMMISSIONER OF PUBLIC LANDS



BELCO PETROLEUM CORP.
SOUTH SALT LAKE - MORROW
EDDY & LEA CO.S, N.M.
Texaco, Inc State CM 1
S.I. Tubing Pressure
Vs
Cumulative Prod.
7-73
D.G.G.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5795 Exhibit No. 15
Submitted by Belco
Hearing Date 3-15-74

CASE [illegible]: Application of [illegible]
PETROLEUM FOR A DRILLING PERMIT
IN THE POTASH-OIL AREA, LEA COUNTY