KERR-McGEE CORPORATION

KERR McGEE BUILDING • OKLAHOMA CITY, OKLAHOMA 73102

August 7, 1973

JAMES J. KELLY
PRESIDENT

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 5193 Exhibit 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, 26, 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

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

1100 GIHLS TOWER WEST
MIDLAND, TEXAS 79701
915 683-1841

800 MAIN BUILDING
HOUSTON, TEXAS 77002
713-228-8148

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 $41^{\circ}14'$. 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

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March 9, 1974

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

Attention: Mr. John D. Robb

Dear Mr. Robb:

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

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, 13,808-898	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 a 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.

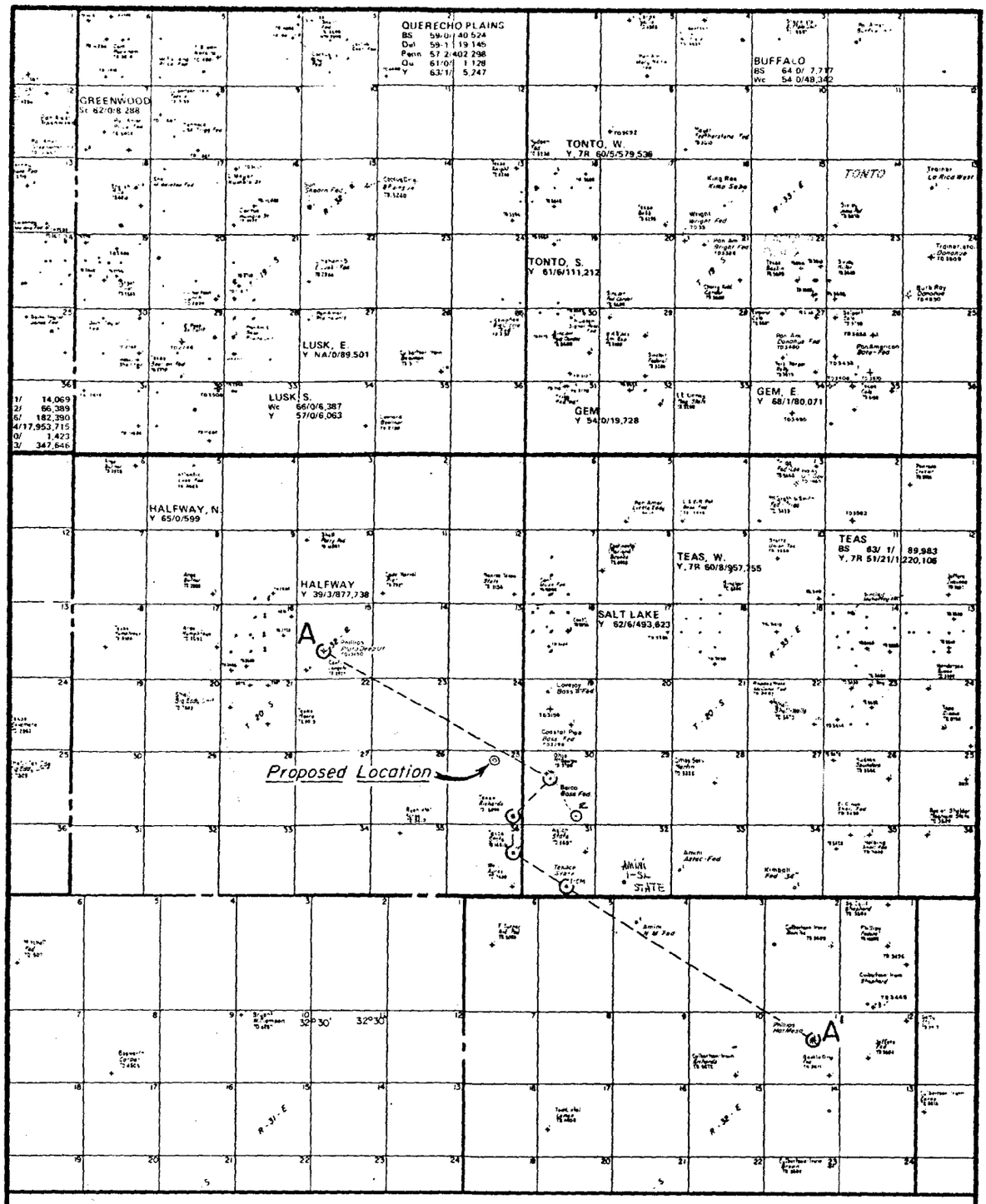
Yours very truly,

SIPES, WILLIAMSON & AYCOCK, INC.

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

/lm

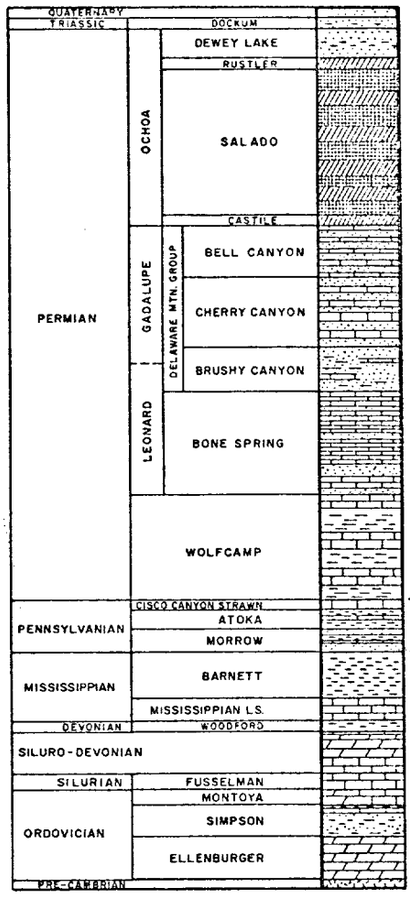
Attachments



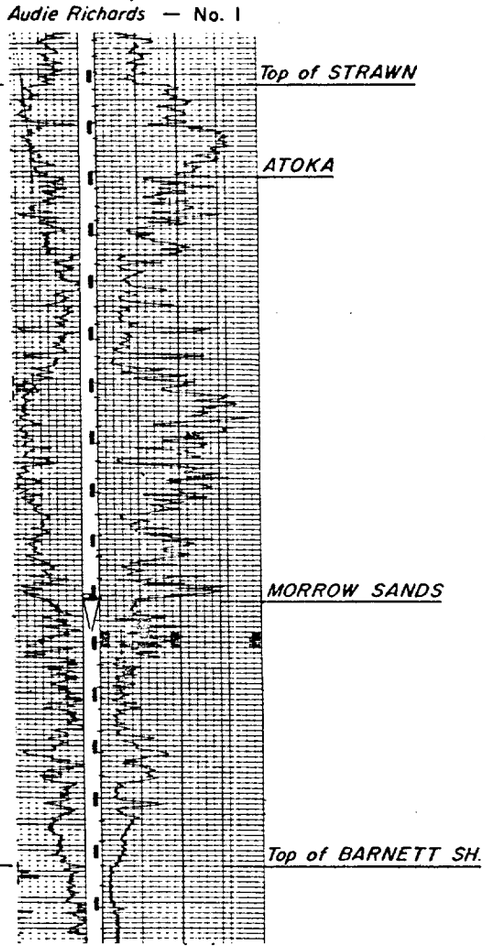
AREA PLAT

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. Consulting Engineers	Midland - Houston, Texas	Ref. No. 3.606	EXHIBIT NO. 1

GENERALIZED SECTION - DELAWARE BASIN



Texaco, Inc.
Audie Richards — No. 1



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. Consulting Engineers Midland - Houston, Texas		Ref. No. 3.606	EXHIBIT NO. 2

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 Kerr-McGee
Hearing Date 3-15-74

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

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

Your Reference: ECS

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.

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 so advise us.

For your convenience we enclose two additional copies.

Ex 13 denied plats (Figs 1 & 2 of Ex F) not admitted
Ex 14 denied (Boyd Co. Report) not admitted

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

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

Respectfully submitted

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

By [signature]
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.