#### WATERFLOOD PROJECT PROPOSED EK PENROSE SAND UNIT EK YATES – SEVEN RIVERS – QUEEN FIELD LEA COUNTY, NEW MEXICO

#### **Recommendation**

It is proposed to form a unit consisting of parts of Sections 24 and 25 of T18S – R33E and parts of Sections 19, 20, 29 and 30 of T18S – R34E for the purpose of water flooding the Penrose Sand. The proposed Penrose Sand interval to be unitized and waterflooded is shown on Exhibit "8". The proposed unit area is shown on Exhibit "1".

#### Location and Geology

The proposed EK Penrose Sand Unit (EKPSU) is located 25 miles West of Hobbs, New Mexico and is situated on the South end of the EK Queen Unit (EKQU) that was a successful main Queen Waterflood developed by Mobil Oil Corporation in the late 1960's. Seely Oil Company has acquired the EKQU and is continuing to develop the Main Queen within and surrounding the EKQU. During the original drilling of the Main Queen, several wells were drilled deep enough to test the Lower Queen (known locally as the Penrose Sand), which is the subject of this study.

The Penrose Sand is a member of the Guadalupian series of Permian Age. The productive sand is a grey, fine to medium grain, friable quartz sandstone. The thickness varies from a few feet to about ten feet, as shown on the Net Pay Isopach Penrose Sand map (Exhibit "9"). The thickness was determined from available log and core data and is shown in Table I. The sand appears to be a wedge or bar deposit isolated by hard dense anhydrite above the pay and a red silty sand with calcerous or anhydritic cementation below the porosity developments. The productive Penrose in this area develops porosity in the very top of the Penrose section as shown on the enclosed cross-section (Exhibit "10").

As can be seen from the structure map (Exhibit "<u>11</u>"), the EK Penrose Sand Field shows minor structural relief with regional dip to the South-Southeast of 100-125 feet per mile. There appears to be a gas/oil contact in the Northwest part at an estimated – 708 subsea. Several wells located above this subsea depth were reported to produce gas, but were not tested for any substantial length of time after the original completion. The wells were all plugged back to the main Queen sand very shortly after testing gas from the Penrose. There is no evidence that indicates the gas cap to have been an effective part of the primary producing mechanism. The primary depletion recovery mechanism is solution gas drive with no evidence of any significant water encroachment in the field; however, the recently completed Seely Oil Company McElvain Federal #10

> BEFORE THE OIL CONSERVATION DIVISION Santa Fe, New Mexico Case Nos. 12964/12983 Exhibit No. 7 Submitted by: <u>Seely Oil Company</u> Hearing Date: January 9, 2003

well produces 50% water suggesting that there could be an oil/water contact to the Southeast.

#### **Primary Production History**

The Ibex Co. McElvain Federal #1 well was the discovery Penrose well and was completed in August, 1955, for an initial potential of 284 BOPD. All initial potentials are shown on the Penrose Sand Initial Potential Map (Exhibit "12"). As of January 1958, an additional 12 wells were drilled and attempted in the Penrose; eight (8) were oil, three (3) tested gas and one (1) dry hole. The one dry hole was the lbex Co. McElvain Federal #4, located in the NE/4 NW/4 of Section 25 - 18S - 33E, which established the western limit on the field. During 1974 Armer Oil Company (now Seely Oil Company) extended the field to the East by drilling two successful oil wells in the SW/4 of Section 20 – 18S 34E. The eastern limit of the field was determined in February, 1975, by the Union Texas State #1 well drilled by Armer Oil Company in the SW/4 SE/4 of Section 20 and was further confirmed recently by the Seely Oil Company McElvain Federal #12, located in the NW/4 NE/4 Section 29 - 18S - 34E that encountered no Penrose sand. The northeastern limit was determined in 1975 by the General Operating Co. Scharbauer Cattle Co. #2, located in the NW/4 SW/4 of Section 20, which was not commercial in the Penrose. In 1981, C. W. Stumhoffer drilled the CS Federal #1 which had an initial potential of 30 BOPD. The CS Federal #1 well is the most northerly well to produce oil from the Penrose. In 1987, BTA Oil Producers drilled two (2) wells on the proposed unit acreage. located in the SE/4 NE/4 of Section 25 - 18S - 33E, and the SW/4 NW/4 of Section 30 - 18S - 34E. The EK-A 8701 JVP well, located in Section 25 ran a DST on the Penrose sand that recovered 3' of drilling mud. In addition, neither well appears to be productive from log evaluations. In 1990, the Morexco McElvain Federal #6. located in the SW/4 NE/4 of Section 25 - 18S - 33E was completed with an initial potential of 1 BOPD.

Two recent Penrose completions, the Citation #1 well (NW/4 SW/4 Section 20 - 18S - 34E) and the McElvain Federal #10 (SE/4 NW/4 Section 29 - 18S - 34E) extended the productive Penrose to the Northeast and Southeast.

In an attempt to better define the reservoir, a First 12 Months Oil Production Map was prepared and is attached as Exhibit "13\_".

There are 16 wells that have produced Penrose Oil within the proposed unit area. Table II lists all wells that have tested the Penrose Sand or are to be included in the development of the proposed EKPSU. Only four (4) of the original wells have produced continuously and have produced more than 50% of the total Penrose oil produced. The total Penrose oil production from the field as of January 1, 2002 is 395,252 barrels. The production of the field is shown on the enclosed production Penrose Sand Cumulative Production (Exhibit "14") and the EK Penrose Sand Production History (Exhibit " $_{15}$ "). At this point the only significant Penrose production is the Citation #1 well and the McElvain Federal #10 well, which produce 6 – 7 BOPD and 15 – 16 BOPD respectively.

The ultimate recovery of each is estimated to be 25,000 BO for the McElvain Federal #10 and 30,000 for the Citation #1.

#### Unitization of the Proposed EKPSU

A formula consisting of 80 percent for cumulative primary oil production as of January 1, 2002 and 20% for acreage is recommended for the unitization formula. In addition each usable well will receive a 10,000 barrel credit. For unitization purposes the estimated ultimate recovery of 30,000 BO is used for the Citation #1 and 25,000 BO for the McElvain Federal #10. The Yates Oil Corporation Howe Federal Lease (E/2 SW/4 Section 30-18S-34E) has 2 Bone Spring oil producers active at this time. When the Howe #1 well was drilled through the Penrose Sand, a drilling break and show were reported. In addition, the electric logs indicate that the Penrose Sand should be oil productive from the Penrose Sand in both wellbores. The Howe #1 is scheduled to be converted to a Penrose Sand water injection well, as shown on the Plan of Development. For unitization purposes, an ultimate recovery of 55,000 BO was assigned to the 80 acre Howe Federal lease. Although we believe that the net sand isopachous map is reasonably accurate, it is believed the best representation of secondary potential is the cumulative primary production,

modified to incorporate the estimated ultimate recovery mentioned above. Based upon the unitization formula as presented, the individual tract factors were determined and are shown on Table III.

#### **Estimation of Secondary Reserves**

Table IV is a summary of basic data and sets out the reservoir characteristics and reservoir volume. Table V sets out sample calculations used to determine original oil in place and secondary reserves. Based upon these calculations, the original oil in place is estimated to be 2,000,000 BO and the estimated secondary recovery is 460,000 BO.

#### LIST OF TABLES

- I DETERMINATION OF AVERAGE POROSITY
- II GEOLOGIC AND COMPLETION DATA
- III TRACT PARTICIPATION FACTOR DETERMINATION
- IV SUMMARY OF BASIC DATA
- V SAMPLE CALCULATIONS
- VI PLAN OF DEVELOPMENT

#### LIST OF EXHIBITS

Type Log Showing Unitized Formation

Unit Map - EK Penrose Sand Unit

Net Pay Isopach Penrose Sand

Structural Cross Section A -A

Structure Map – Top of Penrose

Penrose Sand Initial Potentials

First 12 Months Oil Production

Penrose Sand Cumulative Production (As of 1/1/02)

EK Penrose Sand Production History

Plan of Development

### TABLE I DETERMINATION OF AVERAGE POROSITY

#### Penrose Formation

#### E K QUEEN FIELD

#### Lea County, New Mexico

#### Core Data

Operator	Lease and Well Number	Feet <u>Analyzed</u>	Average Porosity Per Cent	Average Permeability <u>Millidarcys</u>	Residual Oil Saturation, <u>Per Cent</u>
Caper Drilling Company	Sively 9	11	12.4	1.4	10.3
Ibex	McElvain Federal 2	7	14.5	32.7	15.5
	McElvain Federal 5	5	11.9	0.9	13.3
Sivley	Federal 2	7	11.3	9.3	6.4
	Federal 3	4	11.5	1.5	13.6
	Federal 4	3	10.5	0.9	10.4

#### Log Data

<u>Operator</u>	Lease and Well Number	<u>Thickness</u>	Average Porosity <u>Per Cent</u>
Concho Oil & Gas	Citation #1	6	13.0
Seely Oil Co.	McElvain Federal "A" #1	3	12.7
Seely Oil Co.	McElvain Federal #8	3	13.3
Seely Oil Co.	McElvain Federal #10	3	13.3
Seely Oil Co.	Scharbauer #1	3	13.0
Seely Oil Co.	Scharbauer #2	4	13.0

Average Porosity= 150.4/12= 12.53

# Table II Geologic and Completion Data

Operation         Lesses         Weil #         Section         Unit         Distance         Priori         Section         Unit         Section           Section         1         2         5-663         Unit         27         5-663         667         7/3         Fine: 016 gai insection           Section         1         2         5-663         10         10         275         668         7/3         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         8         666         7/3         7         8         666         7/3         7         8         8         7         7 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th>Top of</th><th>ď</th><th>Perforations</th><th></th><th></th><th></th><th>đ</th><th></th></td<>									Top of	ď	Perforations				đ	
Operator         Lases         Weil & Section         Unit Loc Frobage         To         Dutin         State         Print         In         End         In         Section         To         Print         In         Section         To         Print         In         Section         To         Print         In         Section         To         Section         To         Field         F									Penrose Pay	Below	latum		ğ			
Seeky OI Company         EAC Advent Unit         23         35 (15 a)         15         36 (15 a)         17	Completion	Operator	Lease	Weil #	Section		01	Datum	Subsea	Perfs ft		erfs ft		stimulation	<u>Oil / Gas / H2O</u>	Current Status
Seey OII Company         EXame Energy OII Company <thexame Energy OII Company         <thexame Energy OII</thexame </thexame 	Sep-57	Seely Oil Company	EK Queen Unit	23		1980 FSL & 1897	4703	3982	969-	4678	4686		_++	rac- 30k gal lease crude & 37.3k lbs sand	Flowed Gas @ 6mmcfpd	Flowed Gas @ 6mmcfpd Active Queen Sand WIW
Beeky OII Company         EX Omenu Unit         2/4         G1653, Lit Shwy Federal         3         G1633, Lit Shwy Federal         3         G1634, Lit Shwy Federal         3         G1634, Lit Shwy Federal         3         G1634, Lit Shwy Federal         3         G1644, Lit Shwy Federal         G1644, Lit Shwy Federal         G1644, Lit Shwy Federal         G1644, Lit Shwy Federal         G1644, Lit Shwy CL S	Feb-55	Seely Oil Company	EK Queen Unit	21	19-18S-34E	ø	4473		NDE	4390	4445		L	rac- 10k gai lease crude & 15k lbs sand		Producing
Weble OII Corp.         T.J. Silvey Federal         3         19-18-Surd         n         2410         473         752         752         753         753         754         Action Surd         Subset         Action Surd         Acti	Dec-57	Seely Oil Company	EK Queen Unit	24	9-18S-34E	330 FSL	4718	4710	-735	4429	4698	281	12		471710	Active Queen Sand WIW
Hamson Oli         Percoli Federal         1         (p-165-34E         0         306         -760         4733         4730         4730         4730         775         476         776         476         776         476         776         4730         777         476         606         606         606         776         4730         777         473         777         476         606         4711         4781         773         773         476         606         4716         4716         4733         773         4730         4733         773         476         476         476         476         476         476         4774         4783         773         476         476         4774         4783         4701         4763         476         4774         4783         4701         476         4774         4783         4702         773         473         4704 <t< td=""><td>Jan-56</td><td>Mobil Oil Corp.</td><td>T.J. Silvey Federal</td><td>e</td><td></td><td>++</td><td>4735</td><td>3956</td><td>752</td><td>4708</td><td>4718</td><td></td><td>-762</td><td></td><td>115/?/0</td><td>P&amp;A</td></t<>	Jan-56	Mobil Oil Corp.	T.J. Silvey Federal	e		++	4735	3956	752	4708	4718		-762		115/?/0	P&A
Seeiy OI Company         C. S. Federal         1         1         19-188-34E         0         66F SL & 1704         4720         4720         4720         4720         4721         4720         4721         4720         4721         4720         4721         4721         4721         4721         4724         773         771         Addr S 00 gal Fract Wr gal & 4.25 k lose sand           Seeiy OI Company         Scharbauer         2         20-185-34E         3015         1640         4771         4748         778         701         Addr S 00 gal Fract Wr gal & 4.25 k lose sand           Seeiy OI Company         Ext and Unit         17         22         20-185-34E         1040 FSL         4650         4746         778         701         Addr S 00 gal Fract Wr gal & 4.25 k lose sand           Seeiy OI Company         Ext and         2         22-185-33E         5         50 FSL & 160 FNL         450         773         4650         773         703         Addr S 00 gal FSL fract Wr gal & 10k ks sand           Seeiy OI Company         McElvain Federal         1         2         25153         6         600 FNL & 4650         773         703         703         704 FS0 0gal FSL fract Wr gal          705         764         706         706         706 <td< td=""><td>Jan-56</td><td>Hanson Oil</td><td>Penzoil Federal</td><td>-</td><td></td><td>330 FSL &amp;</td><td>4800</td><td>3960</td><td>-760</td><td>4723</td><td>4736</td><td>-+-+</td><td>-776 A</td><td>cid-1k gal, Frac-20k gal KCI &amp; 23k lbs sar</td><td>75/7/0</td><td>Р&amp;А</td></td<>	Jan-56	Hanson Oil	Penzoil Federal	-		330 FSL &	4800	3960	-760	4723	4736	-+-+	-776 A	cid-1k gal, Frac-20k gal KCI & 23k lbs sar	75/7/0	Р&А
Seeiy OII Company         Schuthauer         1         Z0-188-34f         m         307FL & FWL         4640         4771         4784         770         Adde Kigal 45%, Fibe- 16K gait           Seeiy OII Company         KK owen Unit         19         24-188-336f         1         1860FEL         4650         759         474         473         770         Adde Kigal 45%, Fibe- 10K gait 41%           Seeiy OII Company         KK owen Unit         19         24-185-336f         1         1860FEL         4650         773         453         4650 Qait 15% ME           Seeiy OII Company         KK owen Unit         19         24-185-336f         9         960 FLL 4650         3029         756         4657         773         753         753         750         764         773         753         753         763         760 FLL 4650         772         4537         4657         760         773         753         753         753         753         753         753         753         753         753         753         753         753         753         753         753         753         753         753         754         756         756         756         756         756         756         756         7	Jul-81	Seely Oil Company	C. S. Federal	-		660 FSL &	4784	3983	-733	4720	4730	++		ccid- 500 gal, Frac 40k gal & 42.5k lbs sand	30 / 18 / 0	Producing
Seety OI Company         Scharbauer         2         20-185-34E         n         306 FSL         4620         3963         -756         47.46         4764         -753         -781         Accid-500 gall Face-10K galk & 10k lbs sand           Seety OI Company         EK Queen Unit         19         24-185-33E         1 1900 FSL         4657         -7702         4525         45304         -756         4544         -753         756         4626         500 gall Face-10K galk & 10k lbs sand           Seety OI Company         EK Cueen Unit         27         25-185-33E         5 600 FNL & 1800 FEL         4577         452         4550 (-1)         733         4537         4507 (-500 gall Face-0K galk 6 files sand           Seety OI Company         MEE/wain Federal         1         25-185-33E         5 600 FNL & 1600 FEL         4577         363         4577 (-1)         733         4637         776<	Sep-99	Seely Oil Company	Scharbauer	-			4840	4014	-760	4777	4784	-+		vcid- 1k gal 15%, Frac- 18k gal	10 / 6 / 0	Producing
Seety OI Company         EV/T         4525         4650 FEL         4657         -         477         4525         4650 OII         Alot 500 gall Fise. T0k gal & 10k lbs sand           Seety OII Company         EX         21         24-165-33E         990 FSL & 1980 FEL         4657         7.02         4258         4587         4565         7.13         Alot 500 gall Fise. T0k gal & 10k lbs sand           Chiles Drilling Co.         Guif Federal         1         25-165-33E         960 FNL & 1600 FEL         4770         337         4537         4657         733         753         Face T0k gal & 10k lbs sand           Seety OII Company         McElvain Federal         1         25-165-33E         660 FNL & 1600 FEL         4677         3604         773         753         753         733         753         Face T0k gal & 10k lbs sand           Seety OII Company         McElvain Federal         1         25-165-33E         660 FNL & 1600 FEL         4677         367         4677         773         753         753         Face T0k gal & 10k lbs sand           Seety OII Company         McElvain Federal         0         27-163         3600 FNL & 1600 FEL         4716         770         766         776         764         500 gall KCL           Seety OII Company	Feb-00	Seely Oil Company	Scharbauer	2		330 FSL	4820	3983	-759	4746	4764	++		veid-1k gal KCI & 18k lbs sand	15 / 40 / 1	Producing
Seety OII Company         EK Queen Unit         27         24-185-33E         o         B00 FSL & 1980 FEL         4657         -702         4654         A 64-500 gal 15% NE           Chilles Drilling Co.         Guif Federal         1         25-185-33E         a         600 FNL & 1980 FEL         4700         3929         -756         4637         4657         758         773         Acid-500 gal 15% NE           Seety OII Company         McElvain Federal         1         25-185-33E         b         660 FNL & 1980 FEL         457         3904         -733         4537         4657         763         776         764         Acid-500 gal 15% NE           Seety OII Company         McElvain Federal         1         25-185-33E         p         660 FNL & 1980 FEL         4875         3694         -733         4537         4657         753         753         Frac- 10k gal Ke           Seety OII Company         McElvain Federal         0         2776         473         4637         775         765         560 FRL         806 FNL         806 FNL </td <td>Feb-57</td> <td>Seely Oil Company</td> <td>EK Queen Unit</td> <td>19</td> <td>24-18S-33E j</td> <td>00</td> <td>4650</td> <td></td> <td>-677</td> <td>4625</td> <td>4650(OH)</td> <td></td> <td>A ,</td> <td>vcid-500 gal, Frac- 10k gal &amp; 10k lbs. sand</td> <td>Didn't Recover Load</td> <td>Producing</td>	Feb-57	Seely Oil Company	EK Queen Unit	19	24-18S-33E j	00	4650		-677	4625	4650(OH)		A ,	vcid-500 gal, Frac- 10k gal & 10k lbs. sand	Didn't Recover Load	Producing
Chilles Drilling Co.         Gut Federal         1         25-185-335         a         660 FNL & 660 FL         4720         3929         -756         4687         4702         -758         773           Seely OII Company         McEivain Federal         1         25-185-335         b         660 FNL & 1980 FEL         4657         3904         -733         4657(0H)         -733         753         753           Seely OII Company         McEivain Federal         4         25-185-335         c         660 FNL & 1980 FEL         4975         3904         -733         4657(0H)         -733         753         753         753           Seely OII Company         McEivain Federal         10         29-185-33E         6 60 FNL & 1980 FEL         5401         3906         -770         4673         4683         -775         775         775           Seely OII Company         McEivain Federal         10         29-185-34E         1650 FNL & 1980 FEL         5401         3906         -764         4776         4776         776         776           Seely OII Company         McEivain Federal         2         30-185-34E         1650 FNL & 1980 FEL         5401         3764         4725         4742         766         776           <	Jun-66	Seely Oil Company	EK Queen Unit	27	11	990 FSL &	4657		-702	4628	4634		- 4	& Tuk Ibs. sand vcid- 500 gal. 15% NE	Flowed Gas @ 2mmcfpd	Active WIW
Seely OII Company         McElvain Federal         1         25-18S-33E         b         660 FNL & 1960 FWL         4657         3904         -733         4657(0H)         -733         753         753         753         753         755           Seely OII Company         McElvain Federal         4         25-18S-33E         c         660 FNL & 1960 FWL         5998         -779         753         4657(0H)         -733         4653         -775         0           Seely OII Company         McElvain Federal         6         25-18S-33E         g         1650 FNL & 1650 FEL         4975         3898         -770         4673         4683         -775         7           Seely OII Company         McElvain Federal         10         29-18S-34E         6         1650 FNL & 1980 FKL         4975         3898         -770         4732         4742         766         -776           Seely OII Company         McElvain Federal         10         29-18S-34E         5         5         5401         4732         4742         766         776           Seely OII Company         McElvain Federal         2         30-18S-34E         560 FNL & 1618 FWL         4721         3466         -770         4716         4732         776	Jun-57	Chiles Drilling Co.	Guff Federal	-		660 FNL &	4720	3929	-756	4687	4702	++-	-773		47 / ? / 0	P&A
Seely Oil Company         McElvain Federal         4         25-185-33E         c         660 FNL & 1650 FEL         4975         3898         -770         4673         4683         -775         775 <t< td=""><td>Aug-55</td><td>Seely Oil Company</td><td>McElvain Federal</td><td>-</td><td></td><td>660 FNL</td><td>4657</td><td>3904</td><td>-733</td><td>4637</td><td>4657(OH)</td><td></td><td></td><td>rac- 10k gal. &amp; 10k lbs. sand</td><td>284 / ? / 0</td><td>Producing</td></t<>	Aug-55	Seely Oil Company	McElvain Federal	-		660 FNL	4657	3904	-733	4637	4657(OH)			rac- 10k gal. & 10k lbs. sand	284 / ? / 0	Producing
Seely Oil Company         McElvain Federal         6         25-18S-33E         9         1650 FLL         4975         3898         -770         4673         4683         -775         776         775         776         776         776         776         776         776         776         776         776		Seely Oil Company	McElvain Federal	4		660 FNL &	5998		-729				0			P&A
Seeiy Oil Company         McElvain Federal         10         29-18S-34E         6         1650 <sup>°</sup> FNL & 1980 <sup>°</sup> FWI         6050         747         4778         4785         7           Seeiy Oil Company         McElvain Federal         2         30-18S-34E         5         5         5401         3966         -764         4732         4742         -766         776           Seeiy Oil Company         McElvain Federal         5         30-18S-34E         5         560 FNL & 3300 FEL         5401         3966         -764         4732         4742         -766         776           Seeiy Oil Company         McElvain Federal         5         30-18S-34E         560 FNL & 3300 FEL         4751         3949         -752         4706         4730         -767         781           Chiles Drilling Co.         Guif Federal         1         30-18S-34E         560 FNL & 1618 FWL         4728         3936         -752         4690         4708         -754         -776           Owen C. Finch         Guif Federal         1         30-18S-34E         1650 FNL & 307 FWL         4732         3921         -770         4697         4709         -776         776           Owen C. Finch         Guif Federal         3         30-18S-	Jan-91	Seely Oil Company	McElvain Federal	9		1650 FNL &	4975	3898	-770	4673	4683			vcid- 1k gal NeFe, Frac- 20k gal gel	1/0/0	Producing
Seely Oil Company         McElvain Federal         2         30-18S-34E         b         .5 FNL & 1980 FEL         5401         3966         -764         4732         4742         -766         -776         781           Seely Oil Company         McElvain Federal         5         30-18S-34E         c         660 FNL & 3300 FEL         4751         3949         -762         4716         4730         -767         781           Seely Oil Company         McElvain Federal         2         30-18S-34E         c         660 FNL & 1618 FWL         4751         3949         -762         4716         4730         -767         781           Chiles Drilling Co.         Guif Federal         1         30-18S-34E         6         560 FNL & 1618 FWL         4728         3936         -752         4690         4708         -756         776         781           Owen C. Finch         Guif Federal         1         30-18S-34E         6         1650 FNL & 2290 FWL         4732         3921         -770         4697         4709         -776         780           Owen C. Finch         Guif Federal         3         30-18S-34E         f         2310 FNL & 2290 FWL         4732         3921         -770         4697         4709         7	Dec-01	Seely Oil Company	McElvain Federal	10		1650' FNL	6050			4778	4785		, – , *	000 gal MCA, Frac-18,000 gal KCL		Producing
Seely Oil Company         McElvain Federal         5         30-18S-34E         c         660 FNL & 3300 FEL         4751         3949         -762         4716         4730         -767         -781           Chiles Drilling Co.         Guif Federal         2         30-18S-34E         d         560 FNL & 1618 FWL         4751         3949         -762         4716         4730         -767         -781           Chiles Drilling Co.         Guif Federal         1         30-18S-34E         d         560 FNL & 1618 FWL         4728         3936         -752         4690         4708         -776         -772           Owen C. Finch         Guif Federal         1         30-18S-34E         e         1650 FNL & 907 FWL         4732         3921         -770         4697         4709         -776         -788           Seely Oil Company         McElvain Federal         3         30-18S-34E         f         2310 FNL & 2290 FWL         4900         3910         -765         4670         4710         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -760         -776         -76	Nov-55	Seely Oil Company	McElvain Federal	2		.5 FNL &	5401	3966	-764	4732	4742			rac-6k gal refined oil w/ 9k lbs sand	211 / ? / 0	Producing
Chiles Drilling Co.       Guif Federal       2       30-18S-34E       d       560 FNL & 1618 FWL       4728       3936       -752       4690       4708       -754       -772         Owen C. Finch       Guif Federal       1       30-18S-34E       e       1650 FNL & 907 FWL       4732       3921       -770       4697       4709       -776       778         Owen C. Finch       Guif Federal       1       30-18S-34E       e       1650 FNL & 907 FWL       4732       3921       -770       4697       4709       -776       778         Seely Oil Company       McElvain Federal       3       30-18S-34E       f       2310 FNL & 2290 FWL       4900       3910       -765       4670       4710       -760       800         Yate Petroleum       Howe "TG" Federal       1       30-18S-34E       k       1980 FSL & 1830 FWL       10512       -786       9541       -760       800	Jun-57	Seely Oil Company	McElvain Federal	5		660 FNL	4751	3949	-762	4716	4730			veid- 1k gal Frac- 16.8k frac oil	55 / ? / 0	Producing
Owen C. Finch         Guff Federal         1         30-18S-34E         e         1650 FNL & 907 FWL         4732         3921         -770         4697         4709         -776         -788           Nem C. Finch         Guff Federal         1         30-18S-34E         e         1650 FNL & 907 FWL         4732         3921         -770         4697         4709         -776         -788           Seely Oil Company         McElvain Federal         3         30-18S-34E         f         2310 FNL & 2290 FWL         4900         3910         -765         4670         4710         -760         -800           Yate Petroleum         Howe "TG" Federal         1         30-18S-34E         k         1980 FSL & 1830 FWL         10512         -786         9519         9541         m	Aug-57	Chiles Drilling Co.	Guff Federal	2		560 FNL &	4728	3936	-752	4690	4708	++		x for its same void- 500 gal Frac- 19.3k gal lease crude	80 / 2 / 0	Р&А
Seely Oil Company         McElvain Federal         3         30-18S-34E         f         2310 FNL & 2290 FWL         4900         3910         -765         4670         4710         -760         -800           Yate Petroleum         Howe "TG" Federal         1         30-18S-34E         k         1980 FSL & 1830 FWL         10512         -786         9519         9541         -760         -800	Feb-58	Owen C. Finch	Gulf Federal	-			4732	3921	0//-	4697	4709			w/ 14k ibs sand vcid- unknown Frac- 20k gal lease crude	8 1 2 1 0	P&A
Yate Petroleum         Howe "TG" Federal         1         30-18S-34E         k         1980 FSL & 1830 FWL         10512         -786         9549         9541	Apr-56	Seely Oil Company	McElvain Federal	r		2310 FNL &	4900	3910	-765	4670	4710			& 17.5 k lbs sand rac- 10k gal & 15k lbs sand	22/7/0	Producing
	Apr-82	Yate Petroleum	Howe "TG" Federal	-		1980 FSL &	10512		-786	9519	9541		•	vcid- 2k gal 15% Ne Acid.		Producing
Yate Petroleum Howe 16" Federal 2 30-185-34E n 810 FSL & 1830 FWL 9/ 14 -/91 9490 9341	Jan-86	Yate Petroleum	Howe "TG" Federal	5	30-18S-34E n	810 FSL & 1830 FWL	9714		-791	9495	9541		⊥₹	Frac- 1k gal rog. Acid, 30k lbs sand Acid- 3k gal. Frac- 60k gal KCl water,		Producing

## Table III EK Penrose Sand Unit

Autor Ford         Autor Ford         Cum Current         Current         Current         Cur
(a = 0 + 1 + 12) $(a = 0 + 1 + 12)$ $(a = 0 + 12)$
16 666020%         3 737660%         6716         1 70%         0 716         70000         100000         50.443           6         76         7
1         1000         1000
1 $1$
R         Ze,530         6.71%         Ze,530         6.751         1         1.000         26,530           8.164086%         1.632820%         100,015         2.5.30%         6.7751         1         10000         34,722           8.164086%         1.632820%         100,015         2.5.30%         24,722         1         10000         34,722           2.271306%         0.544273%         53,002         13,141%         53,002         13,141%         53,002         13,369           2.271306%         0.544273%         3,369         0.00%         3,369         1         10000         63,002         53,000           13,500831%         2.721366%         0.544273%         3,369         0.00%         3,369         13,369         13,369           13,500831%         2.721366%         0.544273%         3,369         113,41%         3,369         13,369         13,369           13,500831%         2.721366%         0.544273%         1,326         1,336         13,369         13,369         13,369           13,500831%         2.721366%         0.000%         3,5000         25,000         13,5000         35,000         35,000         13,369           14,51736%         1.221366%
1         26,500         6,17%         26,530         6,1751         1         26,530         1,151         1,45,675           1         1         21,42         7,37%         23,472         1         10000         34,722         1         10000         34,722         1         145,675           1         21,42         7,37%         23,472         1         10000         34,722         1         10000         34,722         1         145,675         1         133,995 <t< td=""></t<>
3.164086%         1.632820%         100015         25.30%         61.751         1         10000         71.751         145.675           2.4,722         74         73%         24,722         1         10000         34,72         145.675           2.1,723         74         73%         24,722         1         10000         34,72           2.1,723         73%         53,002         13,41%         53,002         13,41%         53,002         31,42           2.721366%         0.544273%         53,002         13,41%         53,002         13,41%         53,002         63,002         63,002           2.721366%         0.544273%         3389         0.66%         3,369         1         10000         63,002         63,002           13.50631%         2.771366%         0.544273%         1.000%         63,002         13,569         13,569         13,569           13.506631%         2.771366%         0.00%         2,5000         2,5000         35,000         35,000         35,000           10.506466%         2.177092%         1,31%         5,960         7,772         5,196         7,772           10.506667%         1.77092%         5,166         1,10000         8,500<
B         164086%         1,632820%         100,015         25,30%         61,751         1         146,675         146,675           2,122         2,122         1         10000         3,173         1         10000         3,173         145,675           2,722         2,122         0         0         0         0         0         0         0           2,721366%         0,544273%         53,002         13,41%         53,002         13,41%         53,002         13,14%         53,002         63,002         63,002         63,002         63,002         63,002         63,002         63,002         63,002         13,369 <td< td=""></td<>
24/72 $2.4/72$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $10000$ $3472$ $1$ $1$ $10000$ $3472$ $1$
1         29,142         7.37k         29,142         7.37k         29,142         7         10000         39,142         7           2         721386%         0.544273%         53,002         13,141%         53,002         1         10000         63,002         71,366         71,366         71,366         71,366         71,752         1           10.865465%         2.177093%         0.244273%         118,202         463%         55,60         1         10000         65,000         35,000         35,000         35,000         71,752         1           10.865476%         2.177093%         118,202         4.63%         5,166         1         10000         65,566         71,752         1           10.865465%         2.177093%         1.827         4.63%         5,166         1         10000         65,600         71,752         1
1         0         0         0         0         0         0         0           2771366%         0.544273%         53,002         13,145         53,002         13,145         53,002         13,1369         13,369         14,772         14         14,69         14,69         14,69         14,69         14,69         14,69         14,69         14,69         14,69         14,69         14,69         14,75         14         14,69         14,75         14         14,75         14         14,75         14         14,75         14         14,75         14         14,75         <
2.721366%         0.544273%         53,002         13,41%         53,002         13,369         1
2.721366%         0.544273%         3,389         0.066%         3,389         1         10000         13,389         13,389         13,389           115.06831%         2.721366%         0.544273%         0         0.00%         1         3,500         13,389         13,389         13,389           15.8640%         2.17063%         0         0.00%         25,000         25,000         1         10000         35,000         32,30
13.606831%         2.721366%         0         0.00%         5.000         25,000         1         10000         35,000
16         3265640%         5         5         000         35,000 <t< td=""></t<>
16.328197%         3.265640%         1         10000         35,000
10.885465%         2.177093%         18.292         4.63%         5.196         1         10000         66.556         71,752         1           2.721366%         0.544273%         18.292         4.63%         5.196         5.196         71,752         1           2.721366%         0.544273%         18.292         4.63%         5.196         5.196         71,752         1           2.721366%         0.544273%         15,949         4.04%         5,196         5.196         71,752         1           5.442732%         1.089547%         15,949         4.04%         77,386         1         10000         86,569         71,752         1           5.442732%         1.089547%         77,386         1.5,949         25,289         25,289         25,289         25,289         25,289         25,289         25,289         15,949
10.865465%       2.177093%       18,282       4.63%       56,556       1       100000       66,556       71,752       1         2.721366%       0.544273%       18,282       4.63%       5,196       1       100000       66,556       71,752       1         2.721366%       0.544273%       18,282       4.63%       5,196       1       100000       66,556       71,752       1         5.442732%       1.088547%       15,949       4.04%       15,949       1       10000       87,366       1       1         5.442732%       1.088547%       77,366       19,58%       77,366       19,5949       15,949       1
2.721366%       0.544273%       18,292       4.63%       56,556       1       10000       66,556       71,752       1         2.42732%       1.088547%       5,196       1.31%       5,196       5,196       7,1752       1         5.442732%       1.088547%       15,949       4.04%       15,949       15
2.721366%       0.544273%       18,282       4.63%       5,196       7,752       7,752       7         2.721366%       0.544273%       15,949       1.31%       5,196       7,752       7       7         5.442732%       1.088547%       15,949       4.04%       15,949       15,948       16,949       15
5.442732%         5,196         1.31%         5,196         1,5,949         1,
5.442732%       1.088547%       15,949       4.04%       15,949       16,949       16,949       16,949       16,949       16,949       16,949       16,949       16,949       11       10,000       550,690       550,690       550,690       550,690       550,690       550,690       550,690       550,690       550,690       550,690       550,690       550,690
5.113447%       1.022689%       25,289       6.40%       25,289       6.40%       25,289       25,289       25,289       25,289       1         5.442732%       1.086547%       77,386       19,58%       19,58%       19,58%       87,386       1       10000       87,386       1         2.721366%       0.544273%       9,562       2.42%       20,438       30,000       1       10000       87,386       87,386       1         2.721366%       0.544273%       9,562       2.42%       20,438       30,000       1       10000       87,386       87,386       1         94.557268%       18.911454%       335252       100.00%       45,438       440,690       11       110,000       550,690       550,690       560,690       87,0690       8         6.442732%       1.088546%       0       0.00%       55,000       55,000       1       10,000       65,
5.442732%       1.088547%       77,386       19.58%       77,386       1       10000       87,386       87,386       87,386         2.721366%       0.544273%       9,562       2.42%       20,438       30,000       1       10000       40,000       40,000         2.721366%       0.544273%       9,562       2.42%       20,438       30,000       1       10000       40,000       40,000         94.557268%       18.911454%       395252       100.00%       45,438       440,690       11       110,000       550,690       550,690         5.442732%       1.086546%       0       0.00%       55,000       55,000       1       10,000       65,000       65,000
2.721366%       0.544273%       9,562       2.42%       20,438       30,000       1       10000       40,000       40,000       8         94.557268%       18.911454%       395252       100.00%       45,438       440,690       11       110,000       550,690       8         5.442732%       1.088546%       0       0.00%       55,000       55,000       10,000       65,000       65,000       1
94.557268%       18.911454%       395252       100.00%       45,438       440,890       550,690       550,690       550,690         5.442732%       1.088546%       0       0.00%       55,000       55,000       65,000       65,000
1.085546% 0 0.00% 55,000 55,000 65,000 65,000
1,470 100.00000% 20.00000% 395,252 100.00% 100,438 495,690 12 120,000 615,690 615,690 100.00000% 80.00000%

#### TABLE IV SUMMARY OF BASIC DATA PENROSE SAND FORMATION E K PENROSE SAND UNIT E K-YATES-SR-QUEEN FIELD Lea County, New Mexico

Oil Production for Proposed Project Area Cumulative Oil Production in unit area 1/1/02 Estimated Remaining Primary as of 1/1/02 Total Estimated Primary Production	395,252 <u>39,273</u> 434,525
Fluid and Rock CharacteristicsAverage Porosity (From Core Data) – PercentAverage Permeability (From Core Data) – MillidarcysConnate Water Saturation – PercentFormation Volume Factor – Barrels Reservoir Space/ Stock Tank BarOriginal Solution Gas Oil Ration – Cubic Feet per BarrelReservoir Temperature - °FOriginal Reservoir Pressure – psig @ 730'Residual Oil Saturation – Sor – Percent	12.53 8.7 30.0 rrel 1.27 575.0 103.0 1499 psi 18.0
Reservoir Volume for Project AreaTotal Reservoir Volume Including Gas Cap Acre – FeetOil Productive Reservoir Volume In Project Area – Acre – FeetTotal Oil Productive Area – AcresAverage Thickness of Oil Productive Reservoir – FeetArea of Effective Oil Reservoir (Floodable) AcresVolume of Effective Oil Reservoir – Acre – FeetVolume of Effective Reservoir Above Gas Oil Contact – Acre – Feet	4819 3692 919 4' 786 3194 436
Stock Tank Oil in Place Productive Reservoir Volume – Barrels/Acre – Foot Barrels	536 2,000,000
Oil Recovery for Oil Productive Reservoir Primary Oil Production	434,525
Barrels/Acre – Foot (Total Area of Productive Reservoir) Barrels/Acre – Foot (Oil Reservoir Only) Percent N- OOIP (Total Productive Reservoir)	90 117 21.9
<u>Secondary Recovery Barrels</u> Barrels Per Floodable Acre – Foot Percent N – OOIP	460,000 144 23.2
<u>Ultimate Recovery – Primary &amp; Secondary – Barrels</u> Barrels Per Oil Productive Acre – Foot Percent N – OOIP	894,461 261 45.2

#### TABLE V

#### SAMPLE CALCULATIONS EK PENROSE UNIT EK-YATES-SR-QUEEN FIELD

Lea County, New Mexico

1. Estimated N (original oil in place)

N= <u>7758(Ø) (1-SW)</u> Boı

$$= \frac{7758 (.1253)(1-.3)}{1.27}$$

= 536 B/A-F

#### Where:

 $\emptyset$  is weighted average porosity from core and log analysis in unit Area.

SW is average interstitial water saturation based on log calculations from Seely Oil Company's Scharbauer No.2 well.

Bo1 is original formation volume factor based on initial solution GOR of 575/1 BHT of 103° F, gas gravity of .98, and oil gravity of 35.9° API.

2. Calculation of Secondary Reserves

Np Sec = 
$$\underline{E}$$
 {7758(Ø)(1-SW)-Np(Bo1)} Bo2 - 7758(Ø)(Sor)  
Bo2 Bo1

Np Sec =  $\frac{.57}{1.06}$  {7758(.1252)(1-.3)-117(1.27)} $\frac{1.06}{1.27}$  - 7758(.1252)(.18) = .538 {679.9 - 148.6}.8346 - 174.8 = .538 (443.4 - 174.8) = .538 (268.6) = 144 B/A-F

#### Where:

Np Sec = Estimated Secondary Recovery, B/A-F

E = Overall Flooding Efficiency, % Horizontal 80%, Vertical .71% => .57

 $\emptyset$  = Average Porosity, %

Sw = Average water saturation % pore space

Np = Primary Recovery, B/A-F

Bo1 = Original Formation Volume Factor, reservoir bbl/stock tank bbl

Bo<sub>2</sub> = Present Formation Volume Factor, reservoir bbl/stock tank bbl