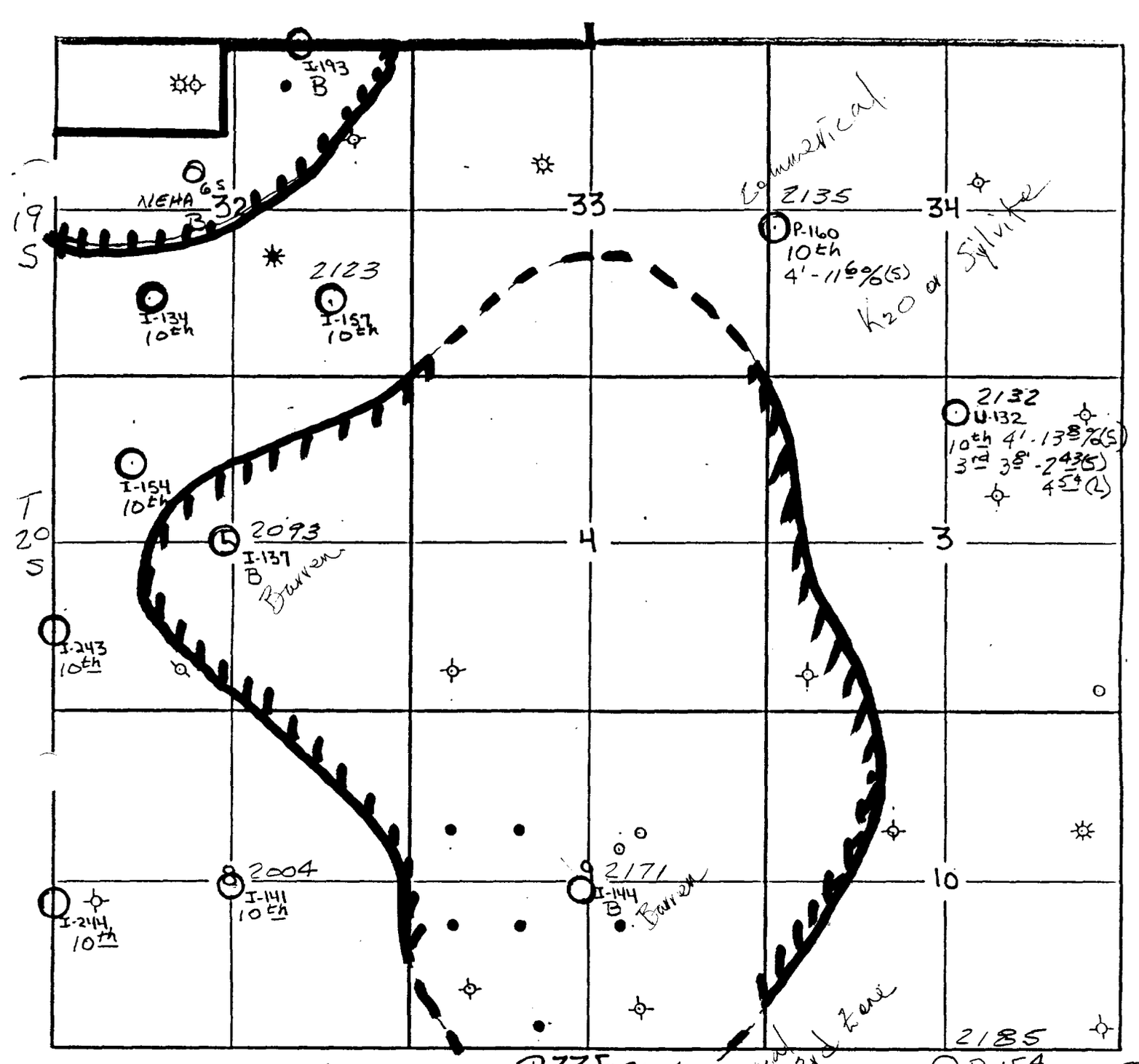


POTASH CORE HOLE LOCATIONS

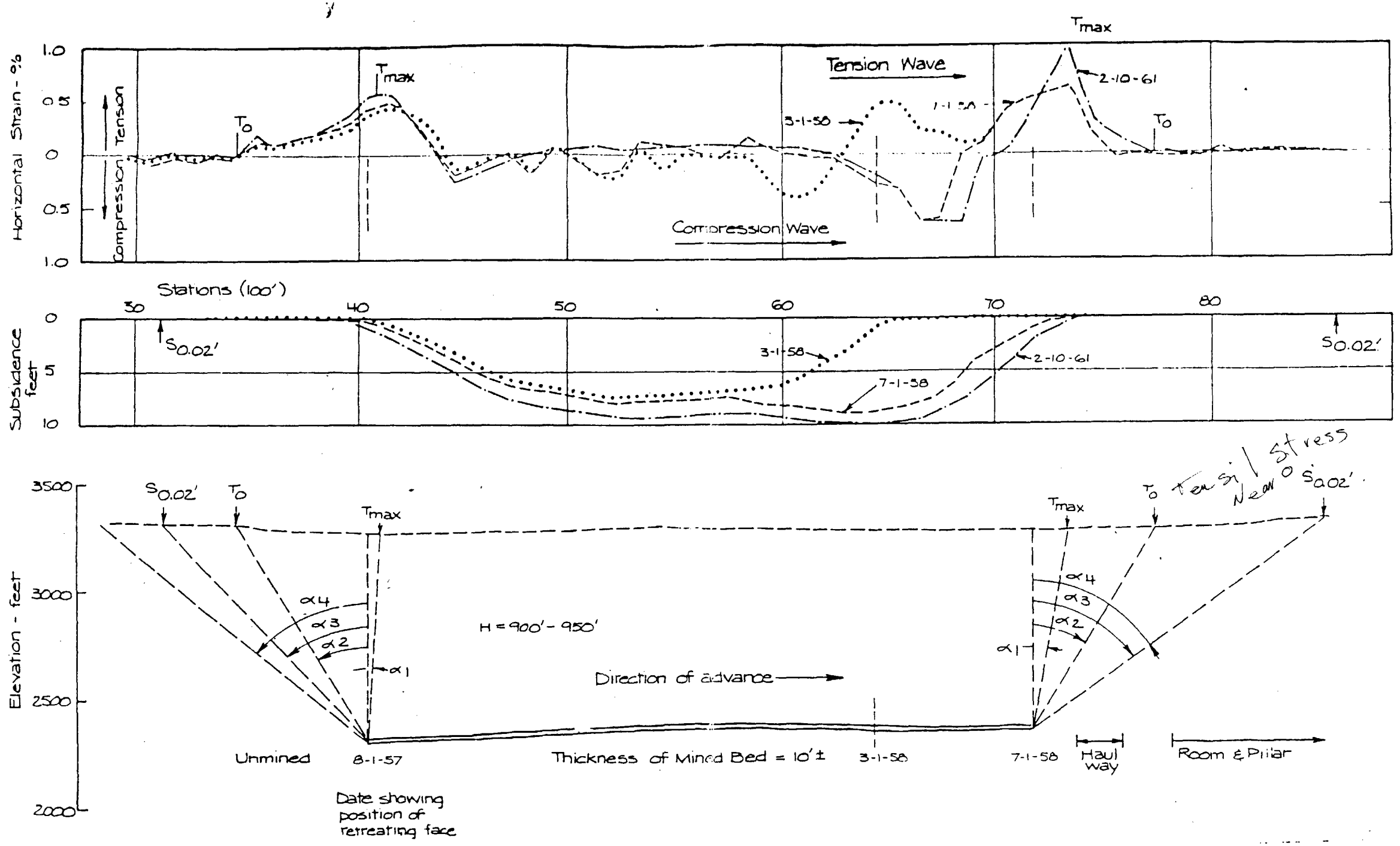
GARY L. HUTCHINSON
P.O. BOX 110
GOLDEN, COLORADO 80402
Minerals Management Consultant

County: LEA
Geol: GLH
Scale:
State: NM
Date: 11/93

Figure 4-2

PROFILE OF SUBSIDENCE AND HORIZONTAL STRAIN

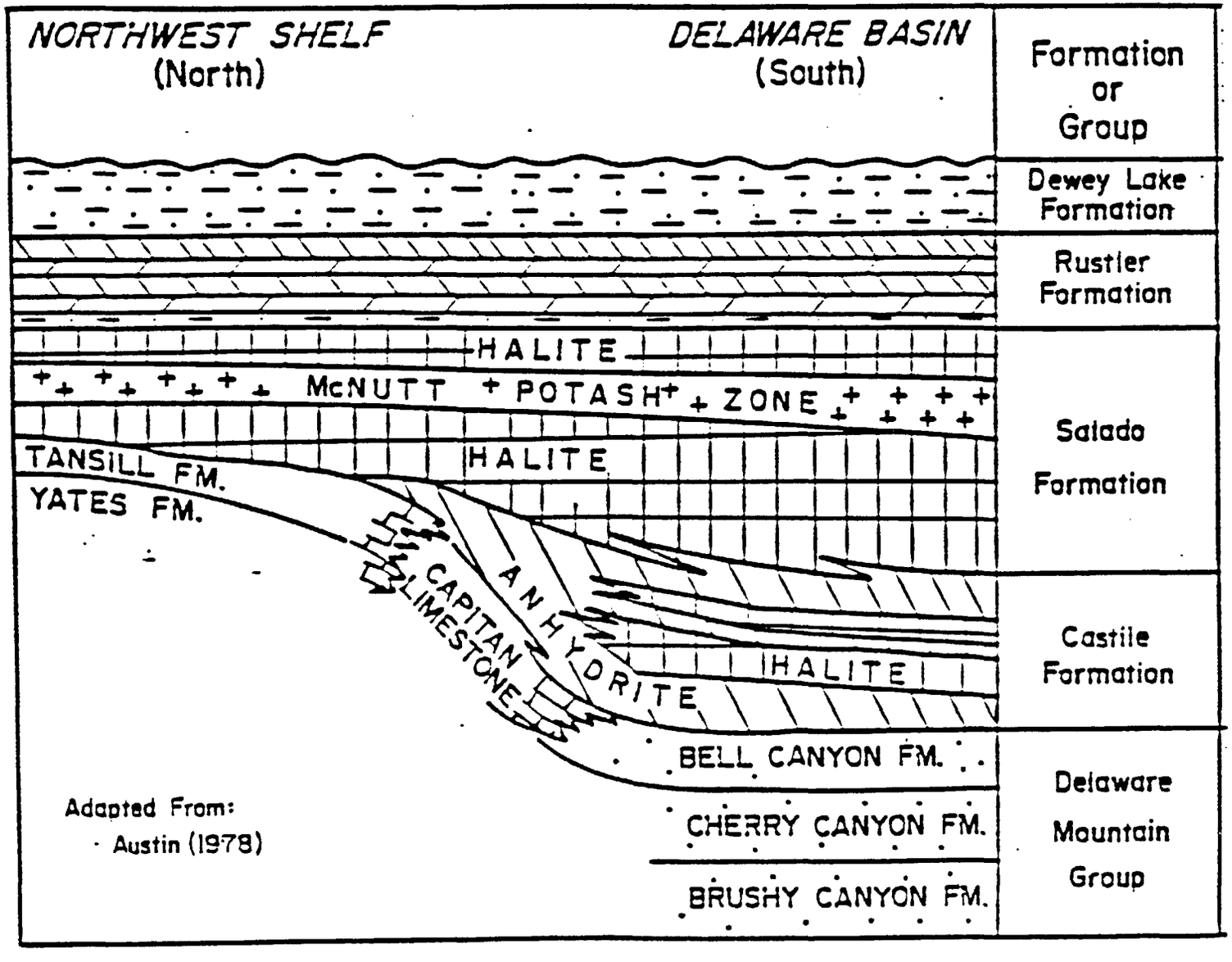
(after Deere, 1961)

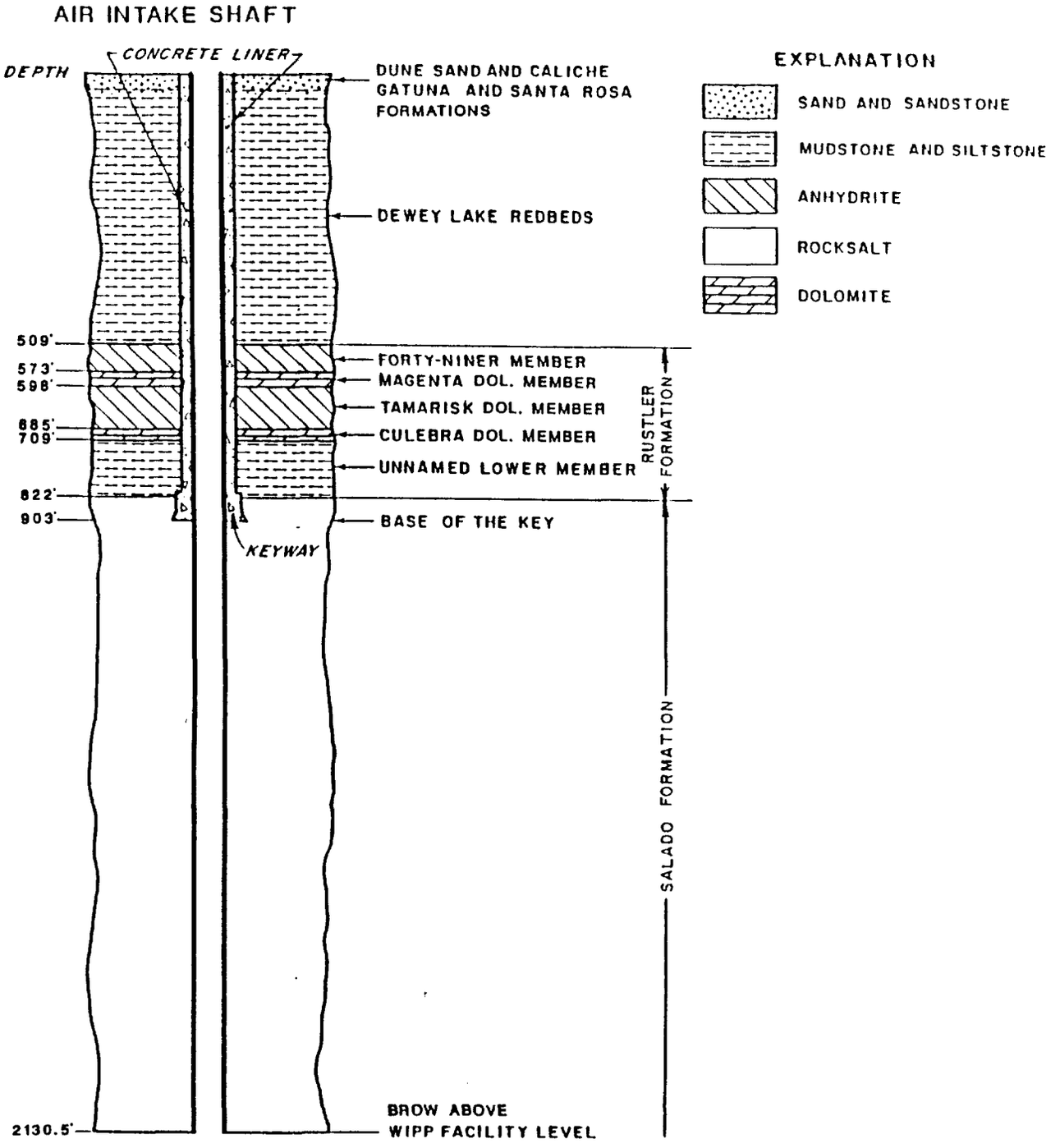


	αi	$\alpha 2$	$\alpha 3$	$\alpha 4$	H x tan$\alpha 3$
Left side - Unmined Area	-3°	31°	42°	>49°	910'
Right side - Room & Pillar Area	10°	32°	55°	56°	1350'
Basis of Angle	T_{max}	T_o	$S_{0.02'}$	Limit	

$\alpha 1$ Angle of Break
$\alpha 2$ Angle to 0 Horizontal Tension
$\alpha 3$ Arbitrary Vertical Subsidence
$\alpha 4$ Angle of Draw

GARY L. HUTCHINSON
1806 Arapahoe Street
Golden, CO 80401 - 1853


NORTHWEST SHELF
(North)
DELAWARE BASIN
(South)
Formation or Group
Dewey Lake Formation
Rustler Formation
HALITE
McNUTT POTASH ZONE
HALITE
Salado Formation
TANSILL FM.
YATES FM.
CAPITAN LIMESTONE
ANHYDRITE
HALITE
Castile Formation
BELL CANYON FM.
CHERRY CANYON FM.
BRUSHY CANYON FM.
Delaware Mountain Group
Adapted From:
Austin (1978)



NOTES:

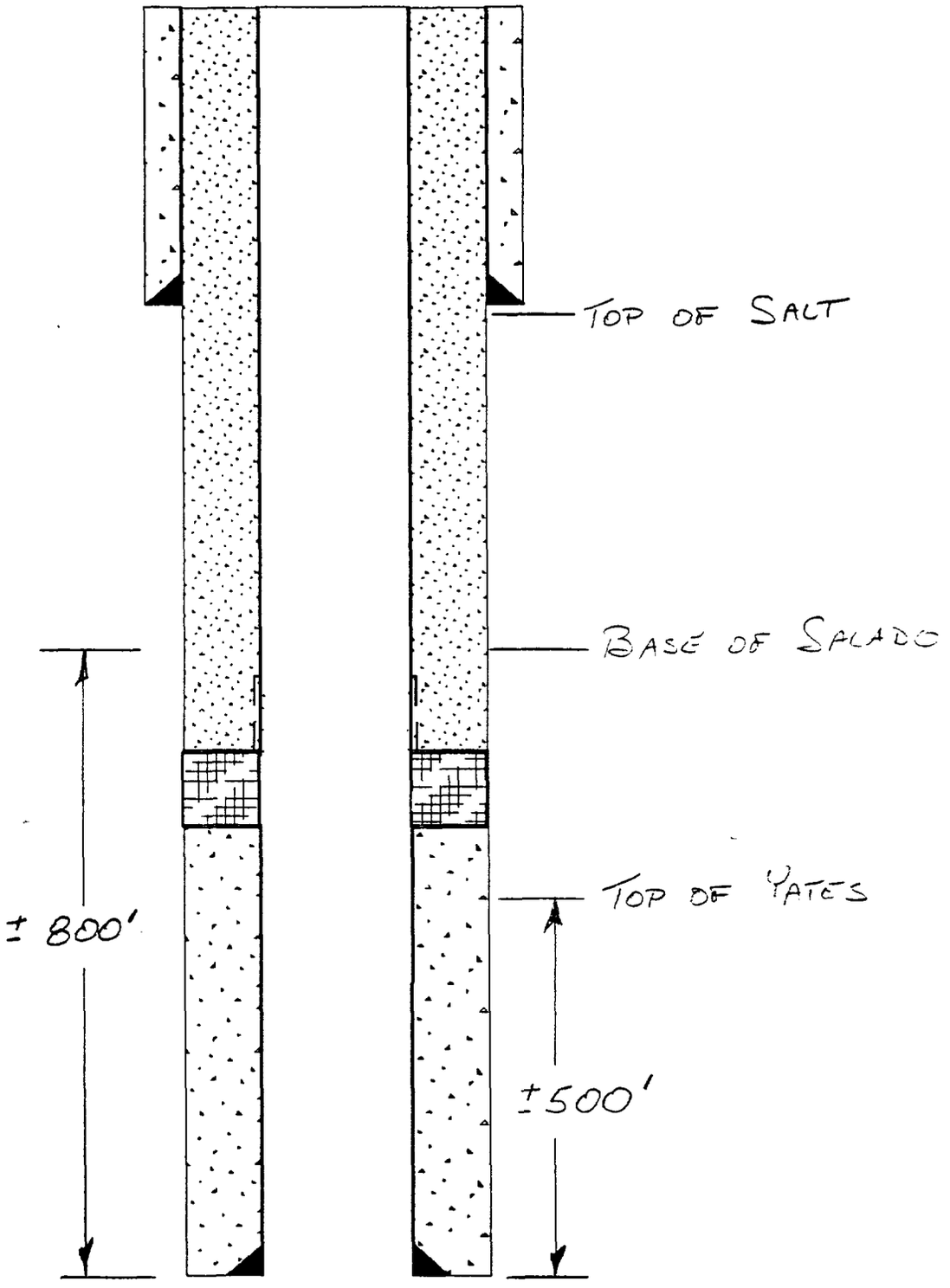
1 ALL ROCKS BELOW SANTA ROSA ARE PERMIAN IN AGE..

2 RUSTLER DEPTHS WERE MEASURED FROM SUBCOLLAR (18.5' BELOW TOP OF CEMENT). KEYWAY AND BROW WERE MEASURED FROM TOP OF CEMENT (ELEV. 3410' ABOVE MSL).

Figure 2. Generalized lithologic column of the Air Intake Shaft (AIS).

Wellbore Schematic

CEMENT, PLUGS, and COMBINATION TOOL AFTER DRILL OUT



WCT

FIGURE 4 - G

WCT

CONDUCTIVITY RANGES

(FEET PER DAY)

BELL CANYON ~ YATES ~ SEVEN RIVERS

SANDSTONES	$30X10^{-3}$ - $200X10^{-3}$
SILTSTONES AND SHALES	$0.2X10^{-3}$
SS, SILTSTONE & SHALE	$0.002X10^{-3}$ - $50X10^{-3}$
OTHER TESTS	$0.001X10^{-3}$ - $6X10^{-3}$
AVERAGE ALL TESTS	$33X10^{-3}$

CASTILE

ALTERNATING ANHYDRITES & HALITE	0 CONDUCTIVITY

SALADO

HALITE ZONES INCLUDING MCNUTT	0 CONDUCTIVITY
ARGILLACEOUS HALITE MARKER BED 139 WITH ANHYDRITE	$0.000004X10^{-3}$-$0.00007X10^{-3}$
	$0.0001X10^{-3}$ - $0.002X10^{-3}$
AVERAGE NON-SALT ZONE TESTS	$0.000543X10^{-3}$

RUSTLER

RANGES FROM IMPERMEABLE AT CONTACT ZONE WITH SALADO TO EXTREMELY PERMEABLE IN CULEBRA DOLOMITE.

DISTANCE COMPARISONS

BY ASSUMING UNIT AREAS, GRADIENTS AND THICKNESSES AND LIQUID VISCOSITY'S OF THE VARIOUS FORMATIONS;

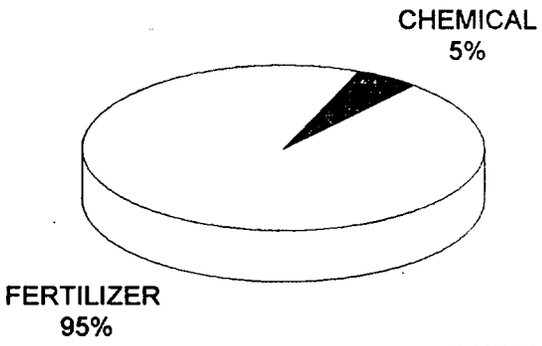
1" OF WATER PENETRATION IN THE AVERAGE NON-HALITE BED IN THE SALADO, IS EQUIVALENT TO:

5,000 FEET IN THE AVERAGE BELL CANYON, YATES OR SEVEN RIVERS FORMATION IN THE SAME AMOUNT OF TIME

AMOUNT OF TIME FOR WATER TO TRAVEL 1" IN AVERAGE SALADO NON-HALITE BED IS 420 YEARS

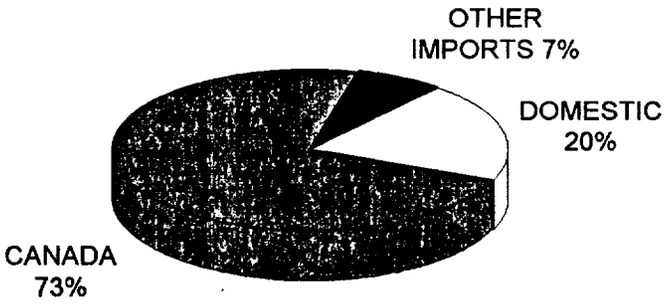
MITCHELL ENERGY
WEST TEAS PROJECT

U.S. POTASH DEMAND USES

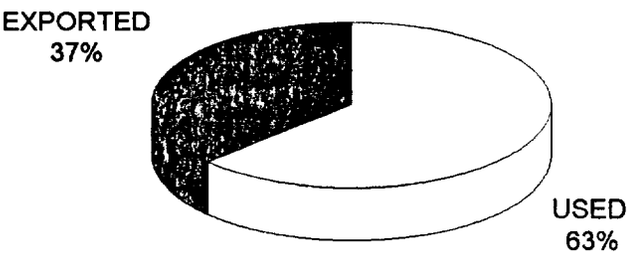


5400000 METRIC TONS K20

US DEMAND SOURCES



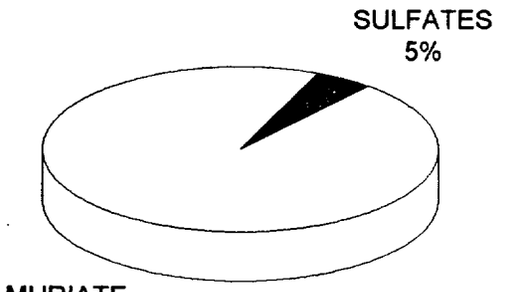
US POTASH PRODUCTION



1760000 METRIC TONS

GARY L. HUTCHINSON
11/93

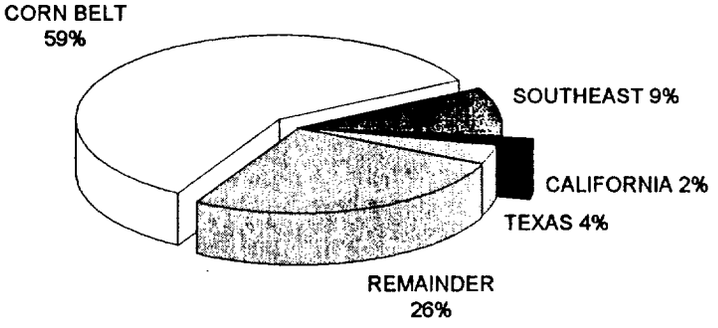
US FERTILIZER DEMAND



Langbeinite - So. Part.

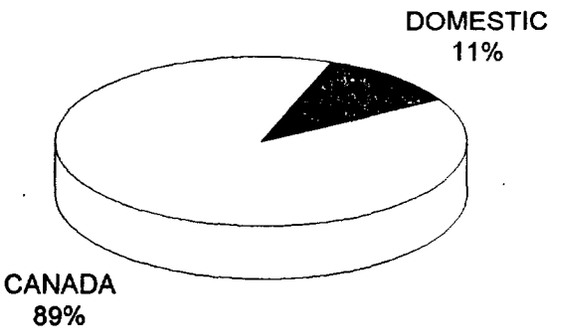
SPECIALTY CROPS

US FERTILIZER DEMAND BY GEOGRAPHICAL AREAS

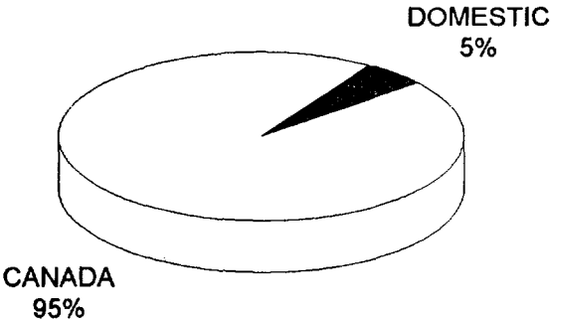


MITCHELL ENERGY
WEST TEAS PROJECT

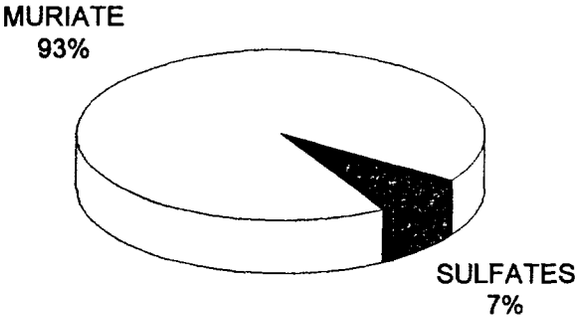
CORN BELT DEMAND SOURCES



CORN BELT W/O MISSOURI SOURCES



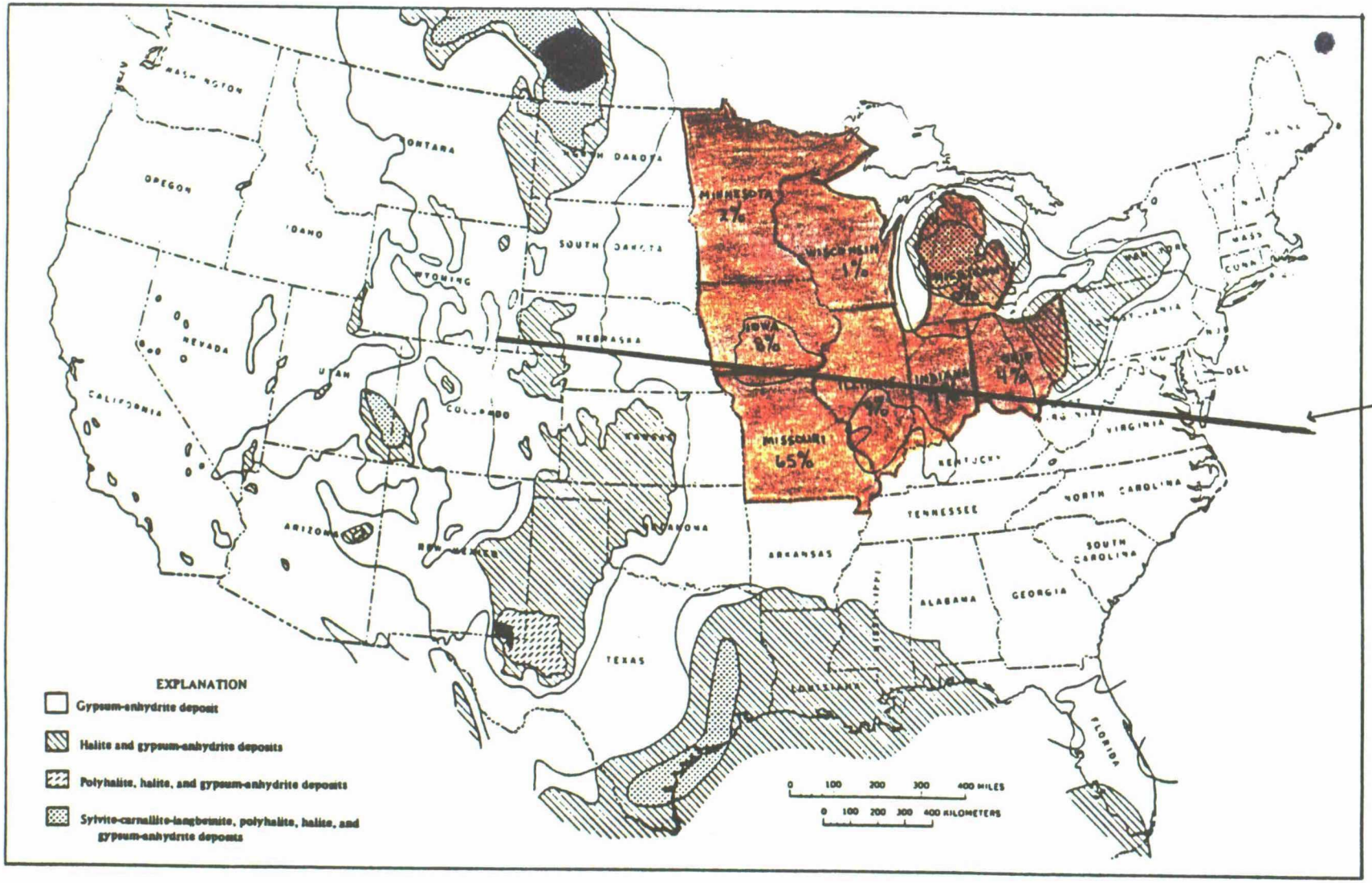
NEW MEXICO PRODUCTION



POTASSIUM MAGNESIUM SULFATE

GARY L. HUTCHINSON
11/93

MITCHELL ENERGY
WEST TEAS PROJECT



Marine evaporite deposits of the United States.

U.S. FERTILIZER (POTASH)
(Cornbelt 60%± of U.S. Demand)
(%) Supplied Domestically

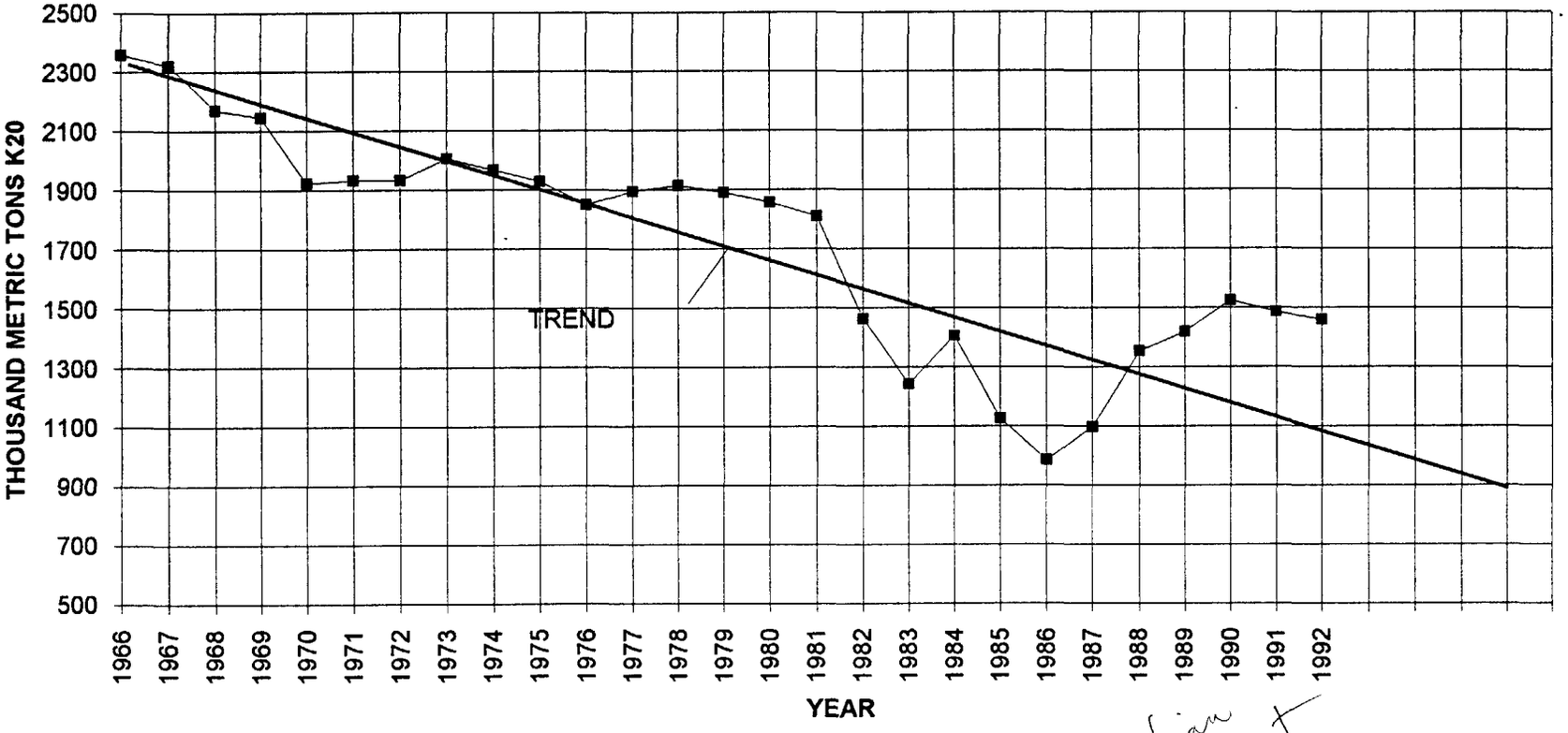
GARY L. HUTCHINSON
11/93

NEW MEXICO - CANADIAN MURIATE PRODUCTION FROM SYLVITE

	CANADA	NEW MEXICO
1991 PRODUCTION-M MET T.	7389	1369
PRICE/MET TON K_2O	$130	$130
CASH COSTS/MET TON MINED AND MILLED	$11±	$15±
GRADES MINED (%K_2O)	>25%	<13.2%
MINING THICKNESS (FEET)	25-28	5-8
PRODUCTION CAPACITY (MILLION METRIC T/YR)	11.5	1.5
% OF WORLD RESERVES (RUSSIAN AREA-38%)	47	<1
COMPARATIVE ADVANTAGE WITH 20% MILL LOSS	2.6:1	

MITCHELL ENERGY
WEST TEAS PROJECT
GARY L. HUTCHINSON
11/93

NEW MEXICO PRODUCTION



Canadian Agreement

GARY L. HUTCHINSON
4/94

MITC L ENERGY
WE EAS PROJECT

No Mines

	A	B	C	D	E	F	G	H
1	YEAR	M MET T	% CHANGES			MINES OP	SYLVITE	% CHANGE
2		K2O NM	FROM'80	FROM'84	FROM'92		MINES	FROM '80
3	1980	2048				7	5	
4	1984	1552	-24%			6	4	-20%
5	1992	1559	-24%	0%		5 TO 6	3 TO4	-20 TO -40
6	1993	1460	-29%	-6%	-6%	4 TO 5	2 TO 3	-40 TO -60
7	1994					4+	2+	-60
8	1995-96						1+	-80 (E)

GARY L. HUTCHINSON
4/94

NEW MEXICO OIL CONSERVATION COMMISSION

STATE LAND OFFICE BUILDING

STATE OF NEW MEXICO

CASE NOS. 10446, 10447, 10448, 10449

Consolidated

IN THE MATTER OF:

The Application of Yates Petroleum Corporation for Authorization to Drill, Eddy County, New Mexico.

VOLUME VI

BEFORE:

CHAIRMAN WILLIAM LEMAY

COMMISSIONER GARY CARLSON

COMMISSIONER BILL WEISS

FLORENE DAVIDSON, Senior Staff Specialist

State Land Office Building

October 23, 1992

REPORTED BY:

CARLA RODRIGUEZ
Certified Court Reporter
for the State of New Mexico

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217 Montezuma Street
Post Office Box 2068
Santa Fe, New Mexico 87504-2068
BY: **JAMES G. BRUCE, ESQ.**

FOR BASS ENTERPRISES PRODUCTION COMPANY:

KELLAHIN & KELLAHIN
Post Office Box 2265
Santa Fe, New Mexico 87504-2265
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Post Office Box 2208
Santa Fe, New Mexico 87504-2208
BY: **WILLIAM F. CARR, ESQ.**

* * * * * * *

I N D E X

E X H I B I T S

when they were just trying to determine where to set that mine shaft, judging by the number of core holes you're talking about, just by that alone, the 92 core holes?

A. The policy, I don't know exactly what that policy was.

Q. Now, when we were talking about, you said the main--I guess when you were deciding and you say this is going to be the consideration that guides you in the development of Section 2, is that when you strike off in a direction, you usually go to the lease limit or the limit of the ore, is that correct, and then you stop there and work back?

A. Generally, unless there's indicated ore. If you run into an unexpected barren area or below-grade ore, if there's indicated ore on the other side, you'll decide possibly to take and drive through it.

Q. That's a decision that's governed by economics, isn't it?

A. You might say that.

Q. Well, let's go up to the northeast corner of your mine here on Exhibit 38, where you stopped your mining in 4/83 just adjacent to

Section 36, the state lease acreage?

A. Uh-huh.

Q. Now, you told us that mine management decided to move to the southernmost part of your ore reserves and leave that area, is that correct?

A. Yes.

Q. Was that an economic decision?

A. In part. It was two-fold there.

Q. You didn't go to the lease lines or the end of the ore body with respect to that mine shaft in April of 1983, did you?

A. No, we didn't.

Q. What was the economic consideration that stopped you there?

A. We were working in what they call the southwest ore body, finishing up over in an area to the east. The decision was to come back and start the development of the south and reserve the east for a later date, without cutting up that block of ore, and leaving the entry standing as long as it might be.

Q. There's plenty of ore up there in the northeast, isn't there?

A. Yes.

Q. Now, when we talk about the royalty on this state acreage, some of your acreage out here also has overriding royalties that go to persons other than the State of New Mexico?

A. That is correct.

Q. Section 36 and 31 have some of those overriding royalties?

A. There is sections. I'm not sure which ones.

Q. You just don't know if Section 36 has--

A. Not right now, no. I don't have the list with me.

Q. Isn't it true that when we look at the lease burden and the economics of mining a particular area, you don't look just at the federal or state royalty but you look at all burdens on that acreage, don't you?

A. To my knowledge, royalty has never entered into mine plans, starting or stopping of an area, in any decisions.

Q. But economics dictated that you completely leave the area of the northeast and move down to the south?

A. Possibly, yes.

Q. How important is it to mine close to

your shaft?

A. You leave a barrier pillar, and within that pillar you have limited extraction.

Q. How important is it when you're planning your mine faces, the mining faces, such as where you've got your current areas of mining? How important is that to get them close to your shaft?

A. It's important, yes.

Q. From an economic standpoint it's important, isn't it?

A. Safety and possible damage through subsidence.

Q. Section 2, the mining in Section 2 would be the farthermost point that you've ever mined from your shaft, wouldn't it?

A. Yes, sir.

Q. And you've said that right now that New Mexico Potash does have approximately 16 or so miles of conveyor capacity, and that would get you to Section 2, wouldn't it?

A. Yes.

Q. But that would mean that you would have to stop mining in other areas and you would have to concentrate your mining in just one area?

A. No.

Q. What other areas, if you drove down into Section 2, would you be mining at?

A. As I said, the main entry or main access, it would be my access, what I would do, would be this main entry system, which is to the left of the centerfold of the map. You would be mining to the west of that, along with the south down here. There would be different blocks coming back along that belt line.

MR. HIGH: With Mr. Carlson out of the room, do you want to break now?

CHAIRMAN LEMAY: I thought I'd let him get through with his point.

MR. HIGH: I would like to have all three Commissioners here. Yates had the benefit of having all three Commissioners and I would request the same. I would like to adjourn when someone has to leave.

MR. CARROLL: I can stop. It won't bother me at all.

CHAIRMAN LEMAY: You might want to pick it up again after the recess.

MR. CARROLL: Sure.

CHAIRMAN LEMAY: I'm sorry for our

schedule.

MR. HIGH: That's fine. All I ask is that my witnesses be heard by all three Commissioners. And I understand budget hearings, so whatever you need is fine with me.

CHAIRMAN LEMAY: We'll come back at 12:30.

[The noon recess was taken.]

CHAIRMAN LEMAY: We shall continue. Before lunch, Mr. Carroll, you were cross-examining Mr. Lane.

EXAMINATION RESUMED

BY MR. CARROLL:

Q. Mr. Lane, I think right at the close of our morning session, I had just asked you a question concerning if you had run your conveyor, the conveyor belt or systems that you now have, run them down to Section 2, I had asked you whether or not that would allow for additional mining off in other areas, and I think you told me it would?

A. It would.

Q. Now, in order to accomplish that mining in other areas, would that require you to purchase any new conveyor belts or systems at

all?

A. I don't think it would.

Q. Turn to your Exhibit 38, would you, again. Let me ask you a question. There are three areas that are termed current area of mining. Let's start with these on the right-hand side here, on the east edge. There's one above each other.

The ones up above Section 22, do you intend to mine out that particular area before going to Section 2?

A. Yes. The section right above 22, yes, it would be mined out.

Q. All of that white area above Section 2. It seems you have a number of belts and tunnels going in different directions. You're saying you would intend to mine all of that area before going to Section 2. And would that also include driving to the lease line over here that runs north and south along the eastern edge of Sections 24 and 25 and the section above that?

A. The area which would be Section 13, north of 24?

Q. Yes.

A. 13 and 12 would follow the mining of

the section above 22, in the west half of Section 14.

Q. Would that include both first and secondary mining?

A. In that portion there, yes.

Q. What about this current area of mining over here to the left side of your map? Do you intend to turn those tunnels back to the west and drive all the way to the lease line there before going to Section 2?

A. Looking at the bottom of that M-651 lease where it says current mining areas?

Q. Yes.

A. West of the word "current," there's some drifts turned off and they are proceeding west, also, west and south.

Q. So before you get to Section 2, you would intend to drive to the lease line and mine that, is that correct?

A. That west side, yes.

Q. Really the term "ore body," many times New Mexico Potash, that ore body, you're talking about blocks of ore, and New Mexico Potash has gone out here and classified blocks and they would go in and mine that block and move into

another block? Isn't that really the way you do it?

A. Blocks?

Q. Blocks.

A. No, we had a northwest ore body and a northeast ore body, a southwest ore body and now the south ore body, not as a block.

Q. Let's look to the north of your Lease No. M-651, the full section of that lease. You say this was a mined area. It starts 6/79 and ends 5/81; is that correct?

A. That's correct.

Q. That would mean that in that area, the secondary mining terminated at the end of the 1981--

A. --period there. Yes.

Q. Then you see there's a block even further away from your mine shaft, to the west, which shows that it would begin mining and actually terminated almost a year later?

A. That is correct.

Q. So you didn't drive all the way to the end and secondarily mine and work back towards your mine shaft, did you?

A. This one case here, this last panel

came out before the entry system was retreated back, for access to that part over there we mined from 80 to 82. We still had an entry system through there.

Q. But you did not mine all the way--just totally mine and retreat from that area until 1982, did you?

A. Not completely, no. We found more ore out in this other area than we planned on.

Q. Well, is it the finding of the more ore that somehow affects your driving to the lease line?

A. That lease line moves. That was a new lease, that south half of the north half of 13, I think it is.

Q. Just one question, and it just occurred to me as I was looking here. When we were talking with Mr. Case, he was pointing out the oil wells, there were three of them. I'm not sure that we actually got them pinpointed. I made a note to myself that we didn't. You're familiar enough with this map and you can point out the oil wells? I just noticed the dry hole symbol in this area we were talking about?

A. Yes, I can.

Q. Would you, so that we do know what we're talking about?

A. It shows one in the southeast quarter of Section 8, 21-31.

Q. That's just above Section 17 or just diagonally offset from this M-651?

A. Right, to the northeast.

Q. That dry hole symbol, I guess the dry hole symbol, that's the well?

A. That's correct.

Q. Where's the next one?

A. Section 14, just a little southwest of the plant site or the shaft area.

Q. It's right snuggled up in that corner of that section, isn't it, the northwest corner?

A. Pretty close.

Q. Is that an entry or development shaft that runs north and south there?

A. That is right.

Q. That well is right against that, is that correct?

CHAIRMAN LEMAY: You have to find that one again for us.

A. You see where the mine shaft symbol is, pointing up to this dark area right in the

center? It's in Section 4, Section 14, the next section to the southeast in the northwest corner.

MR. CARROLL: Do all three of you see that one now?

A. That's Section 14. No, not 14. 12, 11, 10. Section 10.

CHAIRMAN LEMAY: That would be 10, not 14?

THE WITNESS: Section 10. I'm sorry.

Q. And there is a third one up close to the area where it says mined 4/1983?

A. Yes, up in Section 35 of 20-32.

Q. Starting back with the last one we talked about, do you know the distance that your mine shaft is actually from the wellbore in Section 35?

A. At least 200 feet.

Q. The one down here in Section 10, do you know how close that one was?

A. The same. We mined with the 200 pillar around it.

Q. The third one to the east, was that a 200-foot pillar?

A. That's approximately 400 off the main

drifts heading northeast.

Q. Is it in a pillar, then?

A. Yes, it's in a pillar.

Q. This is in a secondary mined area, is that correct?

A. Where is that, out in the east?

Q. No, the one to the west.

A. The one in the west is.

Q. It's in a pillar?

A. Uh-huh.

Q. The size of that pillar, then?

A. That was 200 feet.

Q. When we were talking about the change in the royalty rates, you said it was in 1984 that New Mexico went to the sliding scale?

A. Yes.

Q. In this area, when you stopped mining up there in the northeast, was in April of 1983. You were aware before 1984 that the change was coming, weren't you?

A. I don't think I was. I wasn't.

Q. That change was dictated by the legislature, wasn't it?

A. I don't know.

Q. When you say you don't use royalty in

your calculation, can you say that the management of the mine does not consider royalty?

A. I think I can, yes. I've sat in on budgets.

Q. Did I understand you that in an overall sense, you expect to mine Section 2 completely before returning back to the north part of your mine area, this area where mining was stopped back in the early 80s?

A. I would say Section 2 would be mined before we go west--I mean going to the northeast. There would still be mining in the south but not in Section 2. It would be retreating the entries out in the remaining ore.

Q. Mr. Case indicated that you could tell us approximately how much fresh air would be circulating by the work faces. There is a federal requirement?

A. Yes.

Q. What is the federal requirement?

A. The federal requirement, I think, is 9000 cubic feet in the last open break.

Q. That's cubic feet per minute?

A. Yes.

Q. Across the mine face?

West Teas - Yates/ Seven Rivers Pool

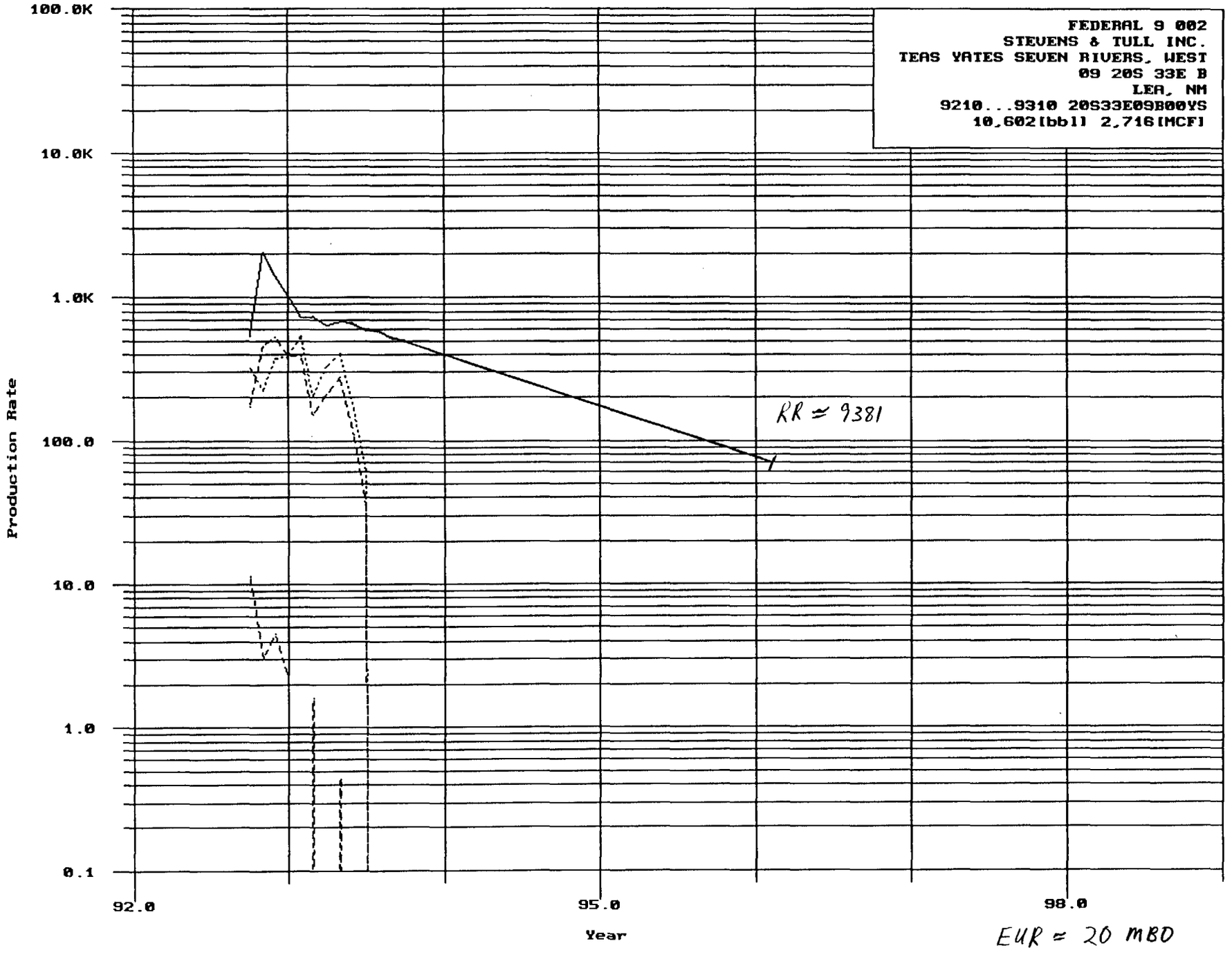
Estimated Reserve per Well

YATES PRODUCERS ONLY

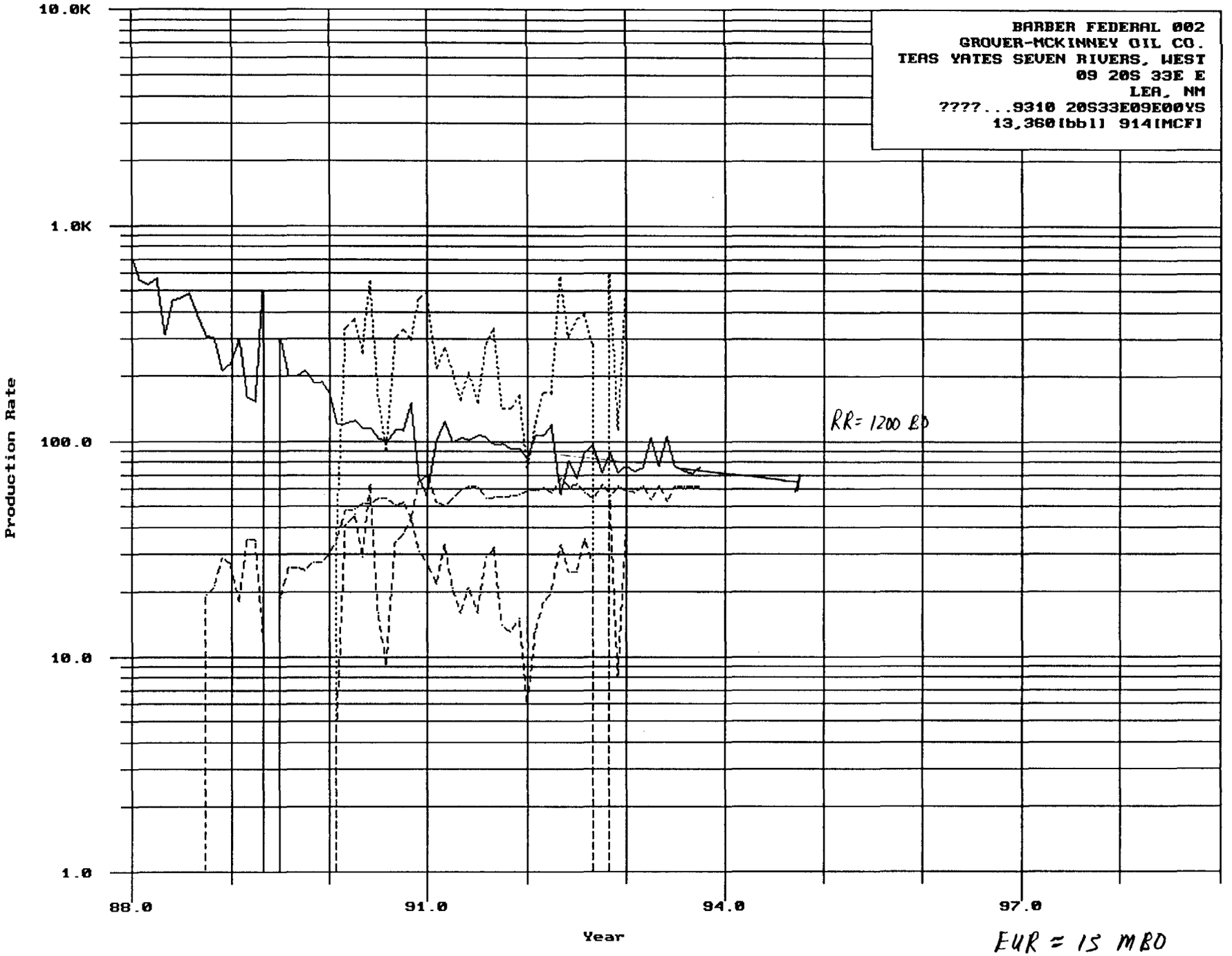
NMID	LEASE NAME	WELL #	STATUS	COMP DATE	CUMULATIVE THROUGH 11/93 OIL (bbl)	GAS (mcf)	GOR SCF/BBL)	LAST 12 MONTHS OIL (bbl)	GAS (mcf)	LAST MONTH OIL (bbl)	GAS (mcf)	ESTIMATED ULTIMATE RECOVERY (From Decline Curves) (MBO)
20S33E09B00YS	FEDERAL 9	002	ACT	9210	11,172	2,716	243	8,618	2,090	570	0	**20**
20S33E09E00YS	BARBER FEDERAL	002	ACT	8711	13,435	914	68	954	45	75	0	**15**
20S33E09F00YS	BARBER FEDERAL	001	ACT	8706	57,799	4,551	79	4,917	230	379	0	**87**
20S33E09G00YS	FEDERAL 9	001	ACT	9112	14,003	6,939	496	5,348	2,071	187	0	**20**
20S33E09J00YS	FEDERAL	003	ACT	8804	12,681	819	65	575	30	53	0	**13**
20S33E16CPKYS	ATLANTIC STATE	001	INA		98,249	0	0	0	0	0	0	**98**
20S33E16DPAYS	LEA STATE	002	INA		11,361	0	0	0	0	0	0	**11**
20S33E16EPKYS	ARCO STATE	001	INA	8202	179,529	0	0	0	0	0	0	**180**
20S33E16JPKYS	SNYDER	001	INA		127,876	1	0	0	0	0	0	**127**
				TOTALS	**526,105**	**15,940**		**20,412**	**4,466**	**1,264**	**0**	**571**

571,000 BO / 9 WELLS = 63 BO AVG/WELL

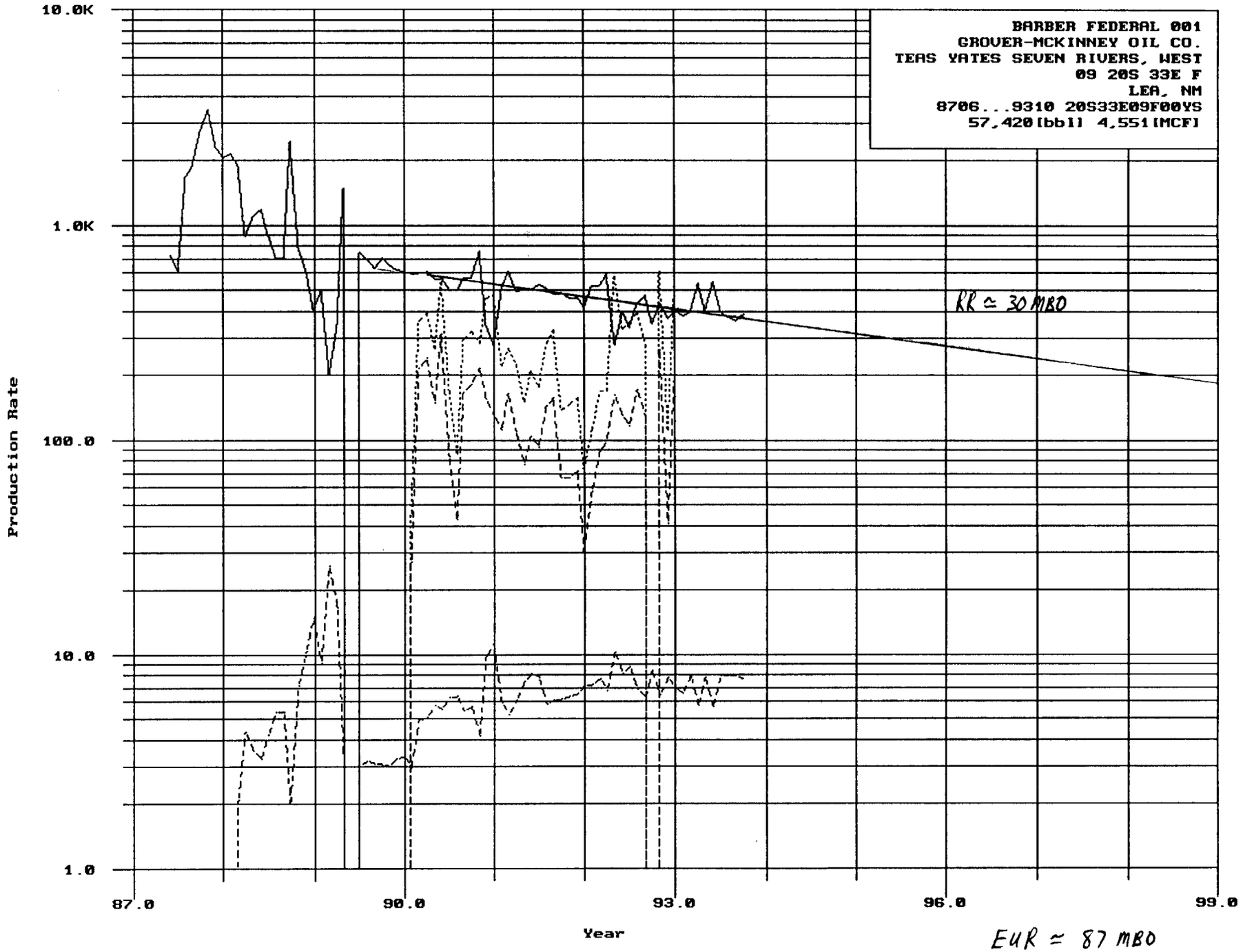
RATE VERSUS TIME



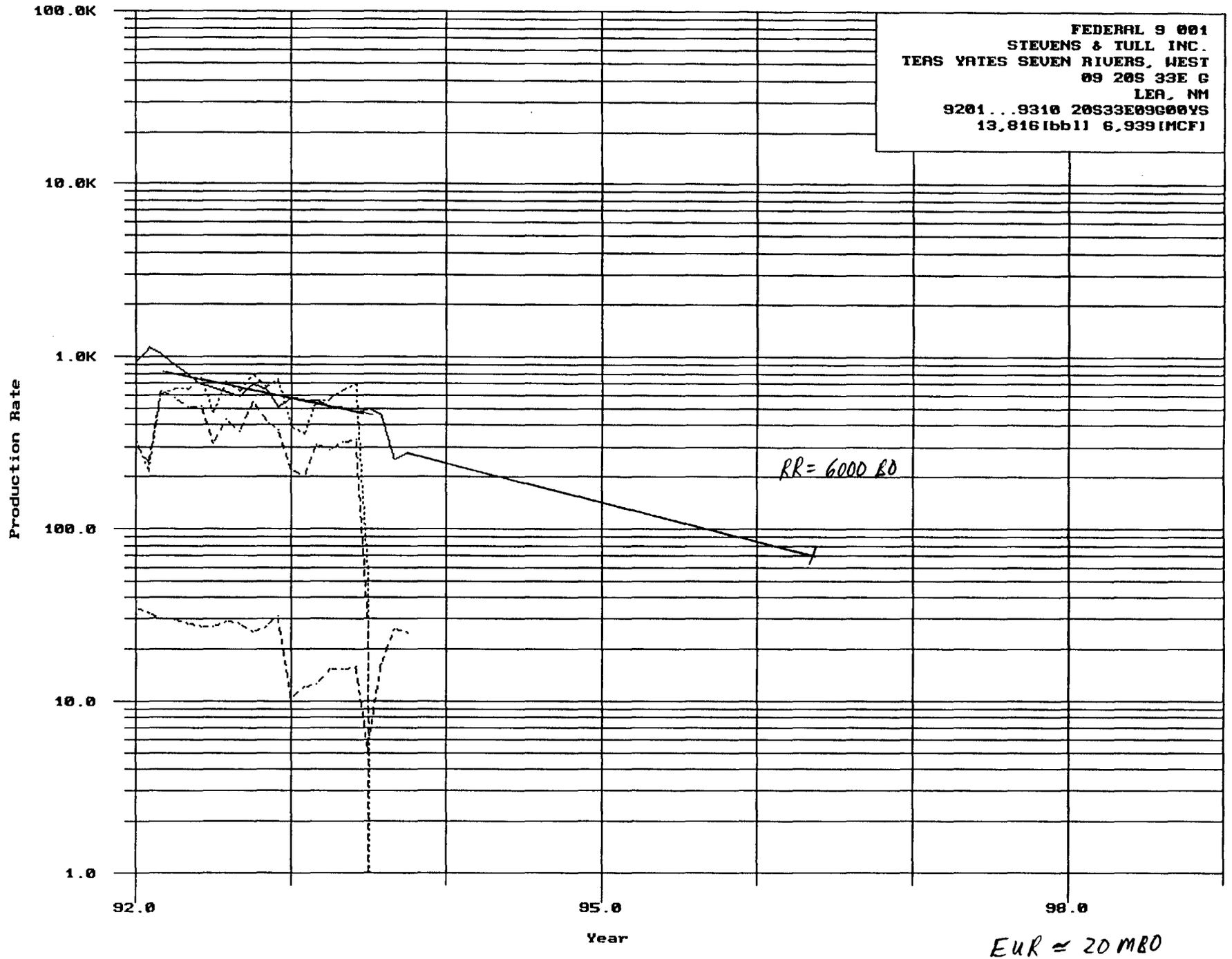
RATE VERSUS TIME



RATE VERSUS TIME



RATE VERSUS TIME

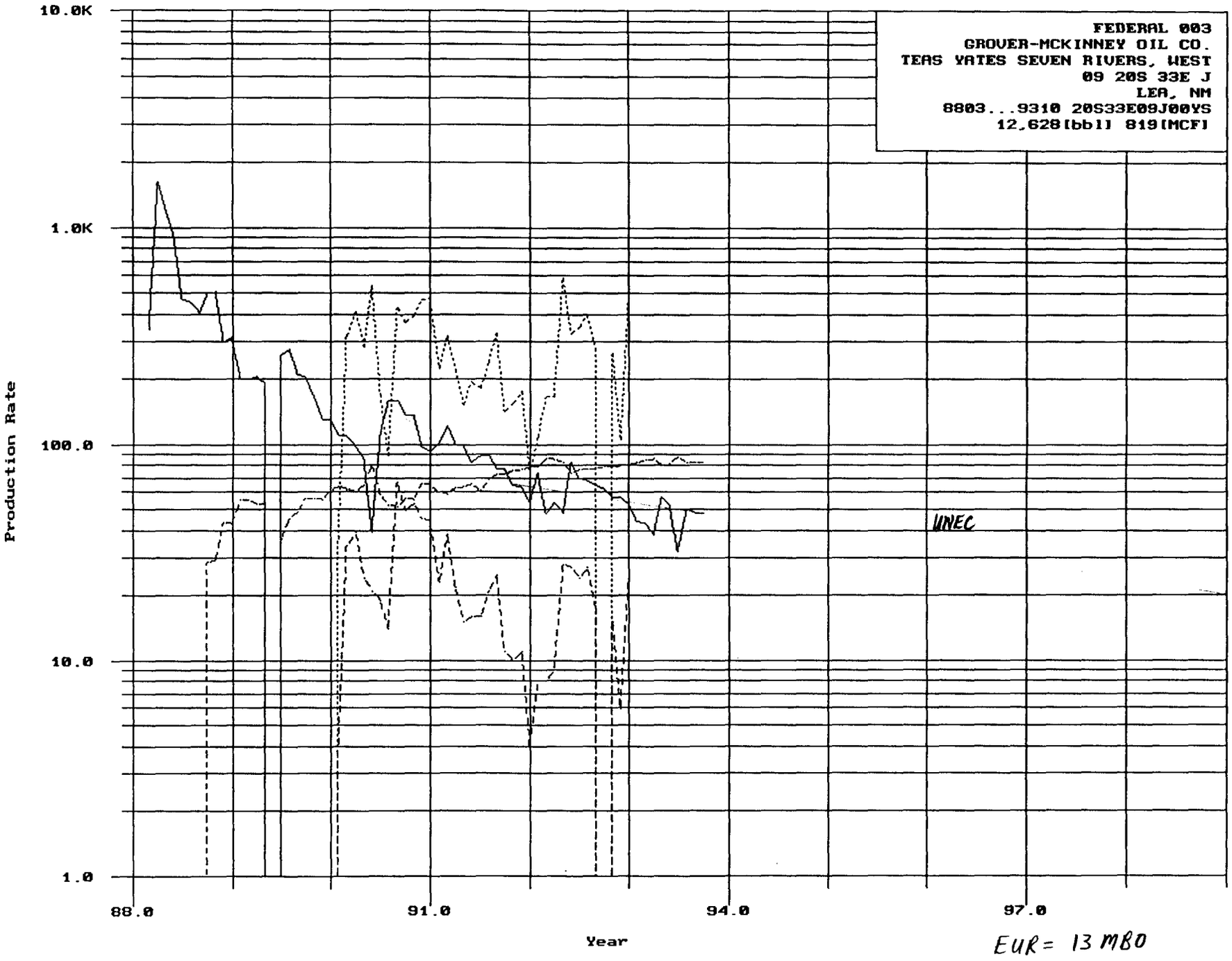


EUR ≈ 20 MBO

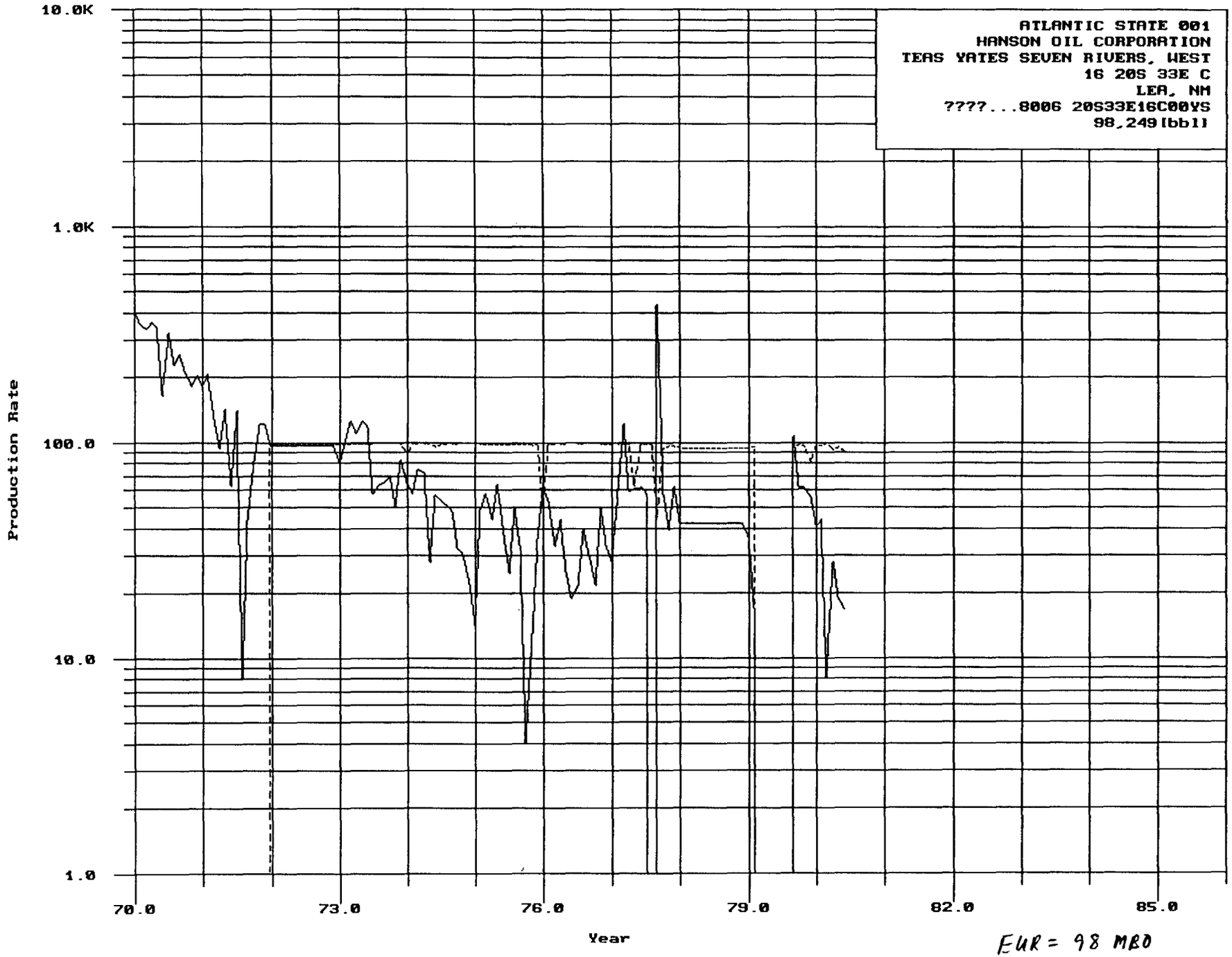
—Oil ---Gas ---WaterCut ·····GOR

Mon Apr 18 15:03:12 1994

RATE VERSUS TIME



RATE VERSUS TIME



EUR = 98 MBO

Mon Apr 18 15:00:37 1994

RATE V.. .3US TIME

LEA STATE 002
SINCLAIR OIL CORPORATION
TEAS YATES SEVEN RIVERS, WEST
16 20S 33E D
LEA, NM
????...???? 20S33E16DPAYS

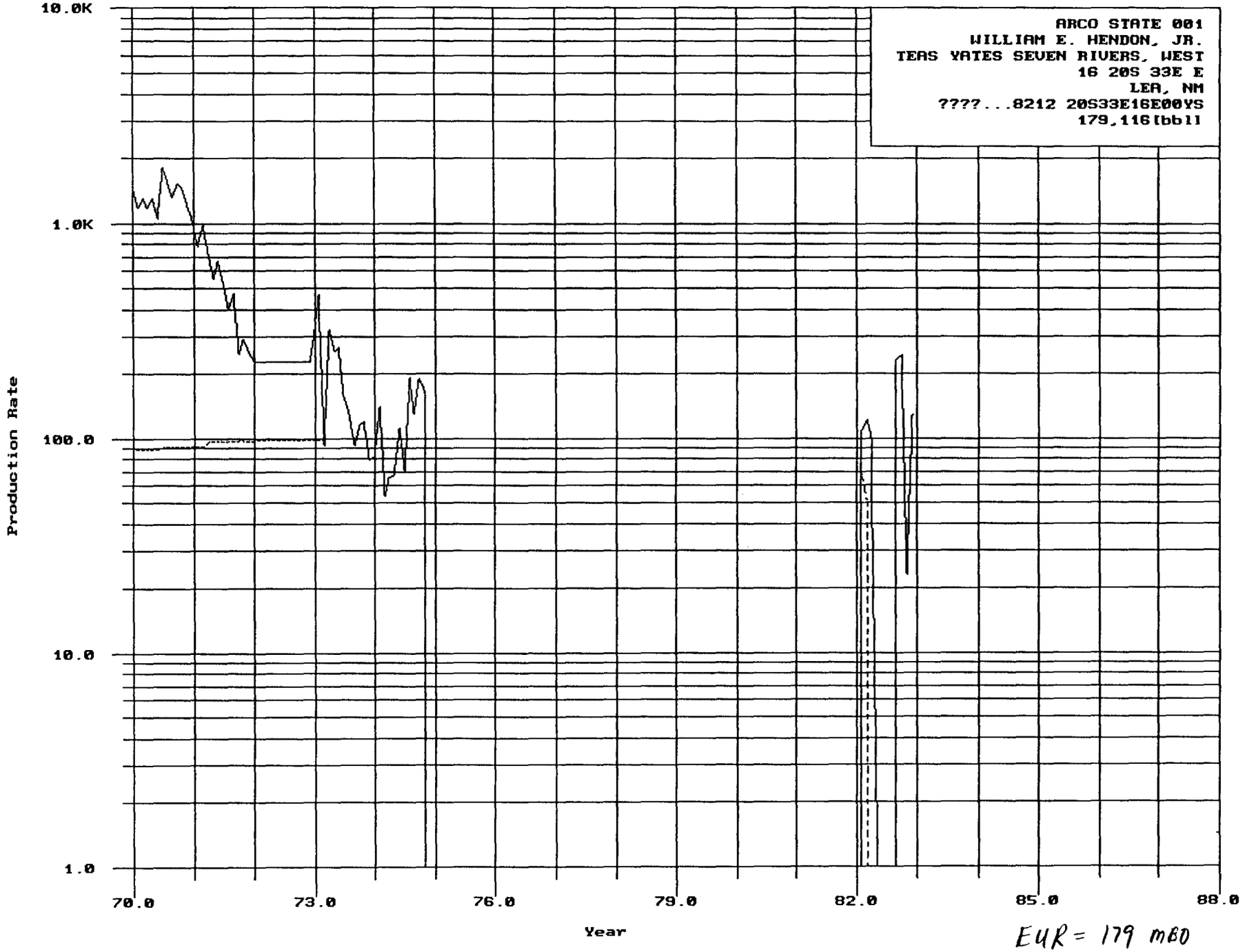
Cum= 11,361 Bo

No Data

EUR = 11 MBO

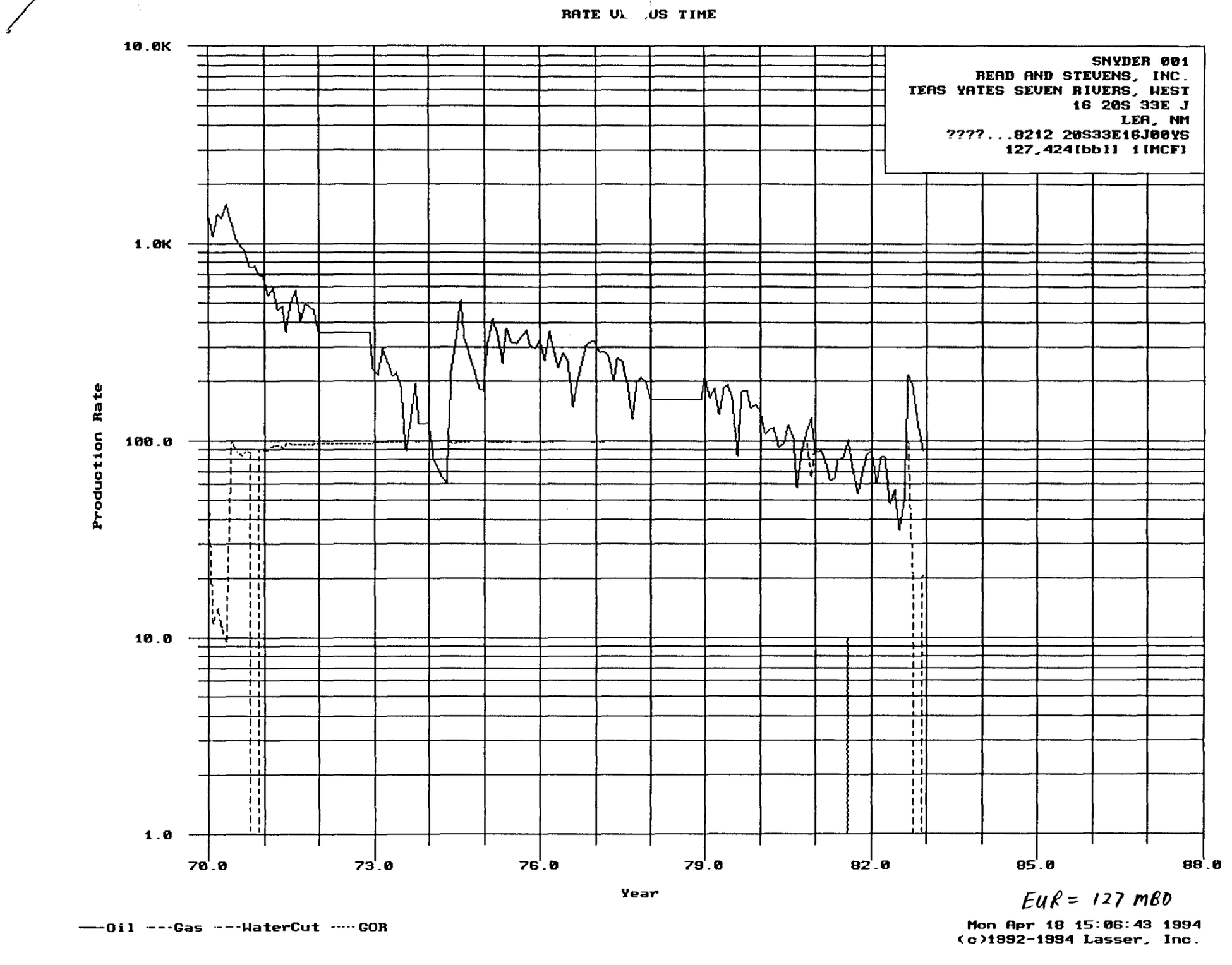
Mon Apr 18 15:06:22 1994

RATE VS. SUS TIME



EUR = 179 MBO

Mon Apr 18 14:59:53 1994


RATE VS. TIME
SNYDER 001
READ AND STEVENS, INC.
TEAS YATES SEVEN RIVERS, WEST
16 20S 33E J
LEA, NM
????...8212 20S33E16J00YS
127,424[bbl] 1[MCF]
10.0K
1.0K
100.0
10.0
1.0
Production Rate
70.0
73.0
76.0
79.0
82.0
85.0
88.0
Year
EUR = 127 MBO
—Oil ---Gas ---WaterCut ·····GOR
Mon Apr 18 15:06:43 1994
(c)1992-1994 Lasser, Inc.

Economic Analysis (Project Basis)

Anasazi / Scharbauer Area
West Teas - Yates/ Seven Rivers Pool
Lea County, New Mexico

	Case I 9 Producers		Case II 8 Producers + 1 dry hole		Case III 7 Producers + 2 dry hole	
	w/Salt Protection String	*w/o Salt Protection String*	*w/Salt Protection String*	*w/o Salt Protection String*	*w/Salt Protection String*	*w/o Salt Protection String*
Expected Reserve:	567,000 BO 28,350 MCFG		504,000 BO 25,200 MCFG		441,000 BO 22,050 MCFG	
Breakeven Reserve:	477,000 BO	396,000 BO	453,000 BO	369,800 BO	428,500 BO	343,000 BO
Drill & Complete Cost:	$3,069,000	$2,614,500	$2,913,000	$2,441,500	$2,757,000	$2,268,500
Present Value Profit (AFIT):	$477,000	$765,000	$290,300	$595,400	$108,300	$428,500
Rate of Return:	32%	51%	25%	45%	18%	37%
Discounted Profitability Index:	.27	.48	.19	.41	.10	.33

Assumptions:

Current Oil Price = $15.00/BO
Current Gas Price = $1.90/MCF
Prices were Escalated at 5% per year for the Life of the wells.
GOR = 50:1

= Discounted Profit / Cap Invest

Return - Cost (Disc.) / Cost

10

Economic Analysis (Individual Well)

Anasazi / Scharbauer Area

West Teas - Yates/ Seven Rivers Pool

Lea County, New Mexico

	Well w/Salt Protection String	Well w/o Salt Protection String
Expected Gross Reserve:	**63,000 BO 3,100 MCFG**	
Breakeven Reserve:	**53,000 BO**	**44,000 BO**
Drill & Complete Cost:	**$341,000**	**$290,500**
Present Value Profit (AFIT):	**$53,000**	**$85,000**
Rate of Return:	**32%**	**51%**
Discounted Profitability Index:	**.27**	**.48**

Assumptions:

Current Oil Price = $15.00/BO
Current Gas Price = $1.90/MCF
Prices were Escalated at 5% per year for the Life of the well.
GOR = 50:1
Projected Life = 8.5 years