STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT

OIL CONSERVATION DIVISION
P. O. Box 2088
Santa Fe, New Mexico 87501

Adopted 3-2-84
Side 1

APPLICATION FOR CLASSIFICATION AS HARDSHIP GAS WELL

Operator Northwest Pipeline Corporation Contact Party Mark McCallister

Address P.O. Box 90, Farmington, NM 87499 Phone No. 505-327-5351

Lease San Juan 29-5 Unit Well No. 91 UT B Sec. 35 TWP 29N RGE 5W

Pool Name Basin Dakota Minimum Rate Requested 28 MCF/D

Transporter Name El Paso Natural Gas Purchaser (if different) _____

Are you seeking emergency "hardship" classification for this well? X yes _____ no

Applicant must provide the following information to support his contention that the subject well qualifies as a hardship gas well.

1) Provide a statement of the problem that leads the applicant to believe that "underground waste" will occur if the subject well is shut-in or is curtailed below its ability to produce. (The definition of underground waste is shown on the reverse side of this form)

2) Document that you as applicant have done all you reasonably and economically can do to eliminate or prevent the problem(s) leading to this application.

   a) Well history. Explain fully all attempts made to rectify the problem. If no attempts have been made, explain reasons for failure to do so.

   b) Mechanical condition of the well(provide wellbore sketch). Explain fully mechanical attempts to rectify the problem, including but not limited to:

      i) the use of "smallbore" tubing; ii) other de-watering devices, such as plunger lift, rod pumping units, etc.

3) Present historical data which demonstrates conditions that can lead to waste. Such data should include:

   a) Permanent loss of productivity after shut-in periods (i.e., formation damage).

   b) Frequency of swabbing required after the well is shut-in or curtailed.

   c) Length of time swabbing is required to return well to production after being shut-in.

   d) Actual cost figures showing inability to continue operations without special relief

4) If failure to obtain a hardship gas well classification would result in premature abandonment, calculate the quantity of gas reserves which would be lost

5) Show the minimum sustainable producing rate of the subject well. This rate can be determined by:

   a) Minimum flow or "log off" test; and/or

   b) Documentation of well production history (producing rates and pressures, as well as gas/water ratio, both before and after shut-in periods due to the well dying, and other appropriate production data).

6) Attach a plat and/or map showing the proration unit dedicated to the well and the ownership of all offsetting acreage.

7) Submit any other appropriate data which will support the need for a hardship classification.

8) If the well is in a prorated pool, please show its current under- or over-produced status.

9) Attach a signed statement certifying that all information submitted with this application is true and correct to the best of your knowledge; that one copy of the application has been submitted to the appropriate Division district office (give the name) and that notice of the application has been given to the transporter/purchaser and all offset operators.

EXAMINER STC
OIL CONSERVATION D
NW Pipeline EXHIBIT NO. 1
CASE NO. 8890

GENERAL INFORMATION APPLICABLE TO HARDSHIP GAS WELL CLASSIFICATION

1) Definition of Underground Waste.

"Underground Waste as those words are generally understood in the oil and gas business, and in any event to embrace the inefficient, excessive, or improper use or dissipation of the reservoir energy, including gas energy and water drive, of any pool, and the locating, spacing, drilling, equipping, operating, or producing, of any well or wells in a manner to reduce or tend to reduce the total quantity of crude petroleum oil or natural gas ultimately recovered from any pool, and the use of inefficient underground storage of natural gas."

2) The only acceptable basis for obtaining a "hardship" classification is prevention of waste with the burden of proof solely on the applicant. The applicant must not only prove waste will occur without the "hardship" classification, but also that he has acted in a responsible and prudent manner to minimize or eliminate the problem prior to requesting this special consideration. If the subject well is classified as a "hardship" well, it will be permitted to produce at a specified minimum sustainable rate without being subject to shut-in by the purchaser due to low demand. The Division can rescind approval at any time without notice and require the operator to show cause why the classification should not be permanently rescinded if abuse of this special classification becomes apparent.

3) The minimum rate will be the minimum sustainable rate at which the well will flow. If data from historical production is insufficient to support this rate (in the opinion of the Director), or if an offset operator or purchaser objects to the requested rate, a minimum flow ("log off") test may be required. The operator may, if he desires, conduct the minimum flow test, and submit this information with his application.

4) If a minimum flow test is to be run, either at the operator's option or at the request of the Division, the offset operators, any protesting party, the purchaser and OCD will be notified of the date of the test and given the opportunity to witness, if they so desire.

5) Any interested party may review the data submitted at either the Santa Fe office or the appropriate OCD District Office.

6) The Director can approve uncontested applications administratively if, in his opinion, sufficient justification is furnished. Notice shall be given of intent to approve by attaching such notice to the regular examiner's hearing docket. Within 20 days following the date of such hearing, the affected parties will be permitted to file an objection. If no objection has been filed, the application may be approved.

7) Should a protest be filed in writing, the applicant will be permitted to either withdraw the application, or request it to be set for hearing.

8) An emergency approval, on a temporary basis for a period not to exceed 90 days, may be granted by the District Supervisor, pending filing of formal application and final action of the OCD Director. This temporary approval may be granted only if the District Supervisor is convinced waste will occur without immediate relief. If granted, the District Supervisor will notify the purchaser.

9) After a well receives a "hardship" classification, it will be retained for a period of one year unless rescinded sooner by the Division. The applicant will be required to certify annually that conditions have not changed substantially in order to continue to retain this classification.

10) Nothing here withstanding, the Division may, on its own motion, require any and all operators to show cause why approval(s) should not be rescinded if abuse is suspected or market conditions substantially change in the State of New Mexico.

11) A well classified as a "hardship well" will continue to accumulate over and under production (prorated pools). Should allowables exceed the hardship allowable assigned, the well will be permitted to produce at the higher rate, if capable of doing so, and would be treated as any other non-hardship well. Any cumulative overproduction accrued either before or after being classified "hardship" must, however, be balanced before the well can be allowed to produce at the higher rate.

I. Underground Waste

After being shut-in for over-production in 1984 the subject well logged resulting in a recoverable reserves decrease of 178.6 MMCF (see attachment #6). This estimate was calculated by subtracting the reserves remaining after the well was returned to production (140.8 MMCF) from the reserves remaining when the well was shut-in for over-production (319.4 MMCF) The well was producing 245 MCF/D when shut-in and was returned to production after swabbing producing 108 MCF/D. As stated previously, the reserves lost, or underground waste, as a result of the well being shut-in and logging are 178.6 MMCF.

As stated previously, when the well is shut-in for low demand or over-production it logs off. The cost to swab the well and return it to production is $5,000 (5 days swabbing at $1,000/day). Assuming the well logs off 3 times per year, the annual swabbing costs will be $15,000. As the rate of production declines, the well will not be economical to swab when it reaches a producing rate of 40 MCF/D. The recoverable reserves remaining when the well is producing 40 MCF/D are 52.1 MMCF of the current estimate of 140.8 MMCF. The well will be prematurely abandoned with these reserves (52.1) as underground waste. In addition, if reserves are lost when the well is logged off, there is the possibility of substantially more underground waste occurring each time the well is shut in for over-production or no demand.

II. Attempted Methods of Production

A) Well history (see attachment #1).

B) Mechanical attempts to sustain production

1) "Small bore" tubing: Changing the existing tubing to smaller I.D. tubing will not prevent the well from logging off. The

reduced I.D. tubing decreases the volume of gas needed to lift fluids from the wellbore. The resulting reduced volume required to lift fluid is effective only if the well is flowing or will flow when opened to the pipeline. The size of the tubing is irrelevant if the well is logged off. Actually, when shut-in, the amount of fluid needed to fill the smaller tubing creating a hydrostatic pressure on the formation is greatly reduced. Thus, fluid entry in the wellbore and tubing during shut-in can result in a logged condition occuring more rapidly.

2) Plunger lift: Two plunger lift systems were installed on offset Dakota wells with production problems similar to the subject well. Each well was swabbed until capable of unloading fluids to atmosphere. The plunger controllers were set to run the plungers when the desired casing pressure was reached during buildup. The controllers were set to shut the wells in at plunger arrival. Both wells were logged after 3 days production with the plunger systems. The wells were swabbed with the plungers in the tubing for 1 week each. Neither well was capable of production after swabbing. The plunger lift systems were removed and determined to be unsuccessful for removing fluids from these Dakota Wells due to the rapid accumulation of wellbore fluids and low volumes of gas.

As is the case of the "small bore" tubing, the plunger lift systems are only applicable if the well is flowing or capable of production. The plunger will not prevent a well from logging off if it shut-in.

3) Stopcock production: The subject well is currently producing with the aid of a stopcock. The use of a stopcock is

beneficial in two ways: 1) bottom hole pressure is maintained at a high level, 2) water production can be reduced to acceptable levels (less than 5 BWPD).

4) Pumping unit: The estimated cost to install a pumping unit is $76,000 not including tanks. The production from the subject well will not justify the initial cost of a pumping unit and the monthly operating costs. If a pumping unit is the only means to produce the well, it would be prematurely abandoned at this time. The underground waste would be 140.8 MMCF.

5) Downhole submersible pump: A submersible pump will not operate in a 2-phase environment (gas/liquid).

6) Setting a cement retainer for water shut-off: Setting a cement retainer downhole in the casing to shut-off water production is not feasible because the Dakota formation is completed in the upper zone only. The hydraulic fracture treatment used to stimulate the well has caused communication throughout the entire zone around the wellbore. The water has saturated the entire perforated interval.

III. Conditions Leading to Waste

A) Permanent loss of productivity: The calculated reserves remaining when the well was shut-in for over-production were 319.4 MMCF (see attachment #6). The well was returned to production after swabbing at 108 MCF/D. The calculated reserves remaining from this producing rate are 140.8 MMCF. The reserves lost from the subject well logging, after being shut-in for over-production, are

178.6 MMCF. The lost reserves are more than 50% of the reserves remaining when the well was shut-in.

B) Frequency of swabbing: After logging in late 1984, the subject well required 11 days of swabbing to regain production. The results of tests conducted on the well indicate the well must be produced for at least one hour each day or the well will log and require swabbing.

Dakota wells in the San Juan 29-5 Unit produced an average of 172 days in 1985. The wells were shut-in for no demand 47% of the year.

It is estimated that without a hardship classification, the subject well will be shut-in and log off a minimum of 3 times per year and will require swabbing to regain production. The well was logged for almost 1 year in 1985 and required swabbing 11 days to regain production. If the well was swabbed a short time after logging due to shut-in it is estimated it will require 5 days of swabbing to regain production.

C) Swabbing costs: As stated previously, the subject well required 11 days of swabbing after shut-in during 1984 at a cost of $13,750. The cost includes rig, technician and vehicle.

D) Estimated swabbing costs: If the well logs 3 times per year and requires 5 days to regain production, the annual swabbing costs will be $15,000. With a technician at $250/day for time and vehicle, the annual swabbing costs will be $18,750.

IV. Premature Abandonment

Using the estimated swabbing costs stated above, the well will not be economical to swab when the production declines to 40 MCF/D. The well will be prematurely abandoned with 52.1 MMCF reserves remaining. The gross loss of revenue will be $104,200 (at $2.00/MCF).

If more reserves are lost from future well logging, premature abandonment could occur with substantially more reserves remaining.

V. Minimum Producing Rate

A) Log-off test: A log-off test was conducted on the subject well in December of 1985 and January of 1986. The test was conducted with a stopcock using the procedure recommended by the NMOCD in Aztec. A pressure recorder was connected to the casing to monitor the pressure drawdown during each flow period. The well was determined to be logging when the casing pressure drops were progressively less during flow intervals of the same time period. The well was then logged by decreasing this flow time period.

The data from the log-off test indicates a minimum producing rate of 28 MCF/D is required to keep the well from logging off (see attachment #5). The well must be produced for a 1 hour period every 24 hours at the choke setting used for the log-off test (10764).

B) Gas/liquid ratio: An initial liquid production test (I.L.P.T.) conducted in November of 1980 resulted in an average water rate of 19 BWPD. The gas/liquid ratio was 39,684 ft^3/bbl. A stopcock was installed to maintain bottom hole pressure and reduce the liquid production to less than 5 BWPD.

When the well was shut-in for over-production the producing rate was 254 MCF/FD. The stopcock was set for 2 hours off and 10 hours on. The water production rate had declined to 12 BWPD without the stopcock. The gas/liquid ratio was 21,167 ft^3/bbl.

The water production was estimated at 14 BWPD, without the stopcock in service, after the well was swabbed in 1985. The stopcock is set for 5 hours off and 1 hour on. The average production rate is 108 MCF/D with the stopcock in service and the gas/liquid ratio is 7,714 ft^3/bbl.

The rapid decrease in the gas/liquid ratio suggests the area around the wellbore is increasing in water saturation while the gas production is decreasing. The well is currently producing less gas and more water compared to the gas and water rates when the well was shut-in.

VI. Offset Ownership

A) The offset acreage from the San Juan 29-5 Unit #91, in the Dakota formation, are leased by Phillips Petroleum (SF-78917), American Petrofina (NM011350-A), El Paso Natural Gas (SF 78412 & SF 011349-13) and El Paso's San Juan 28-5 Unit (see attachment #2).

VII. Other Data Supporting the Hardship Classification

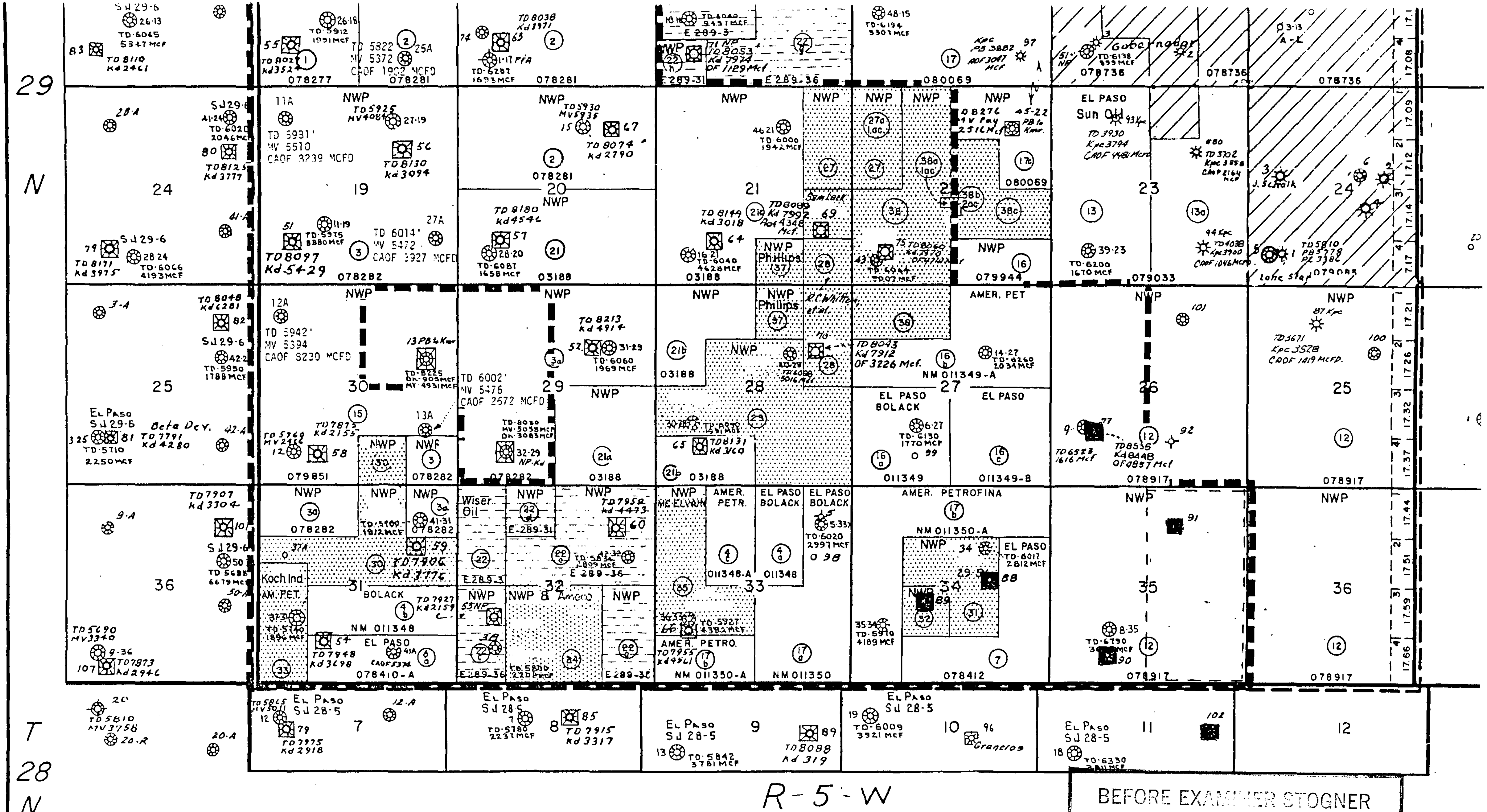
A) Percent decline: The rate of decline from 1980, when the subject well was first delivered, until 1984, when the well was shut-in for over-production, was 28%. Offset wells experienced an average 18% decline during the same time period (first 4 years of production, see attachment #4). The rapid decline in the rate of production suggests an abnormal decrease in the relative permeability to gas around the wellbore and an increase in water

saturation. When the well logs off, the increase in water saturation and decrease in gas permeability is accentuated. There is the possibility of permanent formation damage as indicated from the large loss in reserves due to the well logging in 1984.

B) Offset well swabbing: As stated previously, there are 3 offset Dakota wells with very similar production problems, i.e., they log when shut-in. The offset wells produce approximately the same amount of water but less gas. Each of the offset wells have logged off previously and required extensive swabbing; but, production was always regained at some lower rate than before logging. All three wells are currently logged off. Approximately $15,000 has been spent on each well in 1985 for swabbing. Not one of the three wells is capable of production and all three are being considered for permanent abandonment.

VIII. Production Status

When the San Juan 29-5 Unit #91 was shut-in for over-production the accrued over-production was 54,760 MCF. Due to very little production in 1985, the status of the well is now marginal and the allowable is what the well will produce.



SAN JUAN 29-5 UNIT

RIO ARRIBA COUNTY NEW MEXICO

BEFORE EXAMINER STOGNER

OIL CONSERVATION DIVISION

EXHIBIT NO. 3

CASE NO. 8890

SAN JUAN 29-5 UNIT #91

WELL HISTORY

07-30-80	Well first delivered. Q=2776 MCF/D
11-25-80	Completed 12 day liquid production test - 19 BWPD.
05-01-81	Installed stopcock set for 6 hours off & 2 hours on.
12-29-81	Changed stopcock time to 2 hours off & 4 hours on. QI=1011 MCF/D, QA=252 MCF/D.
04-12-82	Changed stopcock time to 2 hours off & 10 hours on. QI=607 MCF/D, QA=400 MCF/D.
09-19-84	Well shut in for overproduction. QI=313 MCF/D, QA=261 MCF/D.
12-20-84	Well scheduled to produce. Logged. Csg pressure=1620#, tubing pressure=880#.
12-26-84	Equalized tubing and casing. Well still logged.
10-18-85 to 10-29-85	Swab well.
10-30-85	Acidized well.
10-31-85 to 11-02-85	Swab well.
11-11-85	Well on line; stopcock set for 5 hours off & 1 hour on. QI=575 MCF/D, QA=96 MCF/D.
11-12-85	Well logged.
11-20-85	Swab well.
12-03-85	Well on line; stopcock set for 7 hours off & 1 hour on. QI=622 MCF/D, QA=78 MCF/D. Well produced steady and did not log at this setting.
12-16-85	Changed stopcock time to 5 hours off & 1 hour on. QI=601 MCF/D, QA=100 MCF/D. Well produced steady and did not log at this setting. First day of log-off test.
12-18-85	Changed stopcock time to 6½ hours off and 1½ hours on. QI=571 MCF/D, QA=107 MCF/D. Well produced steady throughout this time setting. Third day of log-off test.

12-20-85 Changed stopcock time to 11 hours off & 1 hour on.
QI=612 MCF/D, QA=51 MCF/D.
Well produced steady throughout time setting. Fifth day of log-off test.

12-24-85 Changed stopcock time to 5½ hours off & ½ hour on.
QI=618 MCF/D, QA=57 MCF/D.
Well produced steady throughout time setting. Ninth day of log-off test.

12-26-85 Log-off test concluded. Stopcock time changed back to 11 hours off & 1 hour on.

01-07-86 Log-off test inconclusive. Changed stopcock time to 11¼ hours off and 3/4 hours on.
QI=721 MCF/D, QA=45 MCF/D.
Start log-off test.

01-08-86 Changed stopcock time to 11½ hours off & ½ hour on.
QI=650 MCF/D, QA=27 MCF/D.
Well produced steady throughout time setting. Second day of log-off test.

01-15-86 Changed stopcock time setting to 11-3/4 hours off and ¼ hour on.
QI=739 MCF/D, QA=15 MCF/D.
Ninth day of log-off test.

01-17-86 Found well logging with stopcock set at 11-3/4 hours off and ¼ hour on. Unloaded well through unit and changed time to 11 hours off and 1 hour on. Log-off test concluded.

01-22-86 Log-off test conclusive. Changed stopcock time back to 11-3/4 hours off and ¼ hour on.
QI=748 MCF/D, QA=16 MCF/D.
Start log-off test.

01-25-86 Well logging with stopcock set at 11-3/4 hours off and ¼ hour on. Unloaded well through unit and changed stopcock time to 5 hours off and 1 hour on. Log-off test concluded.

SWABBING COST SUMMARY

Well Name: San Juan 29-5 Unit #91 DK

Rig: Silver Star Swabbing

Invoice Date	Cost	Days
10/26/85	$4,287.64	5
11/11/85	3,580.65	5
11/20/85	514.66	1
Total	$8,381.95	11

NWP Representative: Production technician at $22.11 hr

Average 10 hrs/day = $221.10/day
Total = $2,432.10

NWP Vehicle: 1 ton pickup at $.77/mile

Distance to San Juan 29-5 Unit #91 = 65 miles one way
130 miles/day at $.77/mile = $100.10/day
Total = $1,101.10

NWP Engineering overhead & miscellaneous charges: $165/day

Total = $1,815.00

Totals:		
	Rig	$ 8,381.95
	Man	2,432.10
	Vehicle	1,101.10
	OH	1,815.00
		$13,730.15

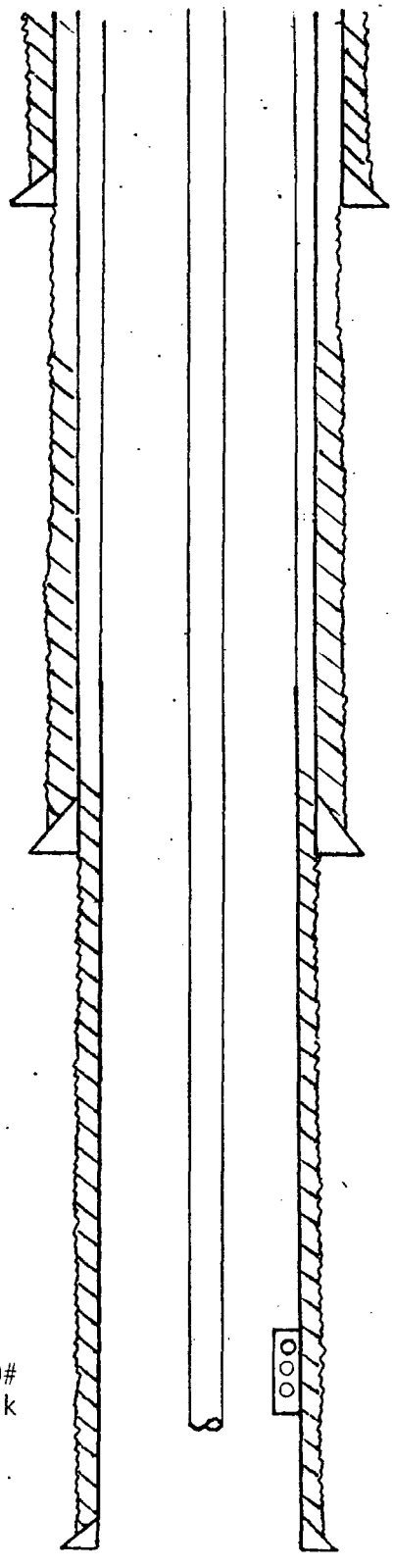
MAM/dd

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
EXHIBIT NO. 5
CASE NO. 8890

46 0782

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
EXHIBIT NO. 106
CASE NO. 8870

WELL BORE DIAGRAM FOR San Juan 29-5 Unit #91 DK



9-5/8" - 36# - Set at 393'
Cmt with 165 sx

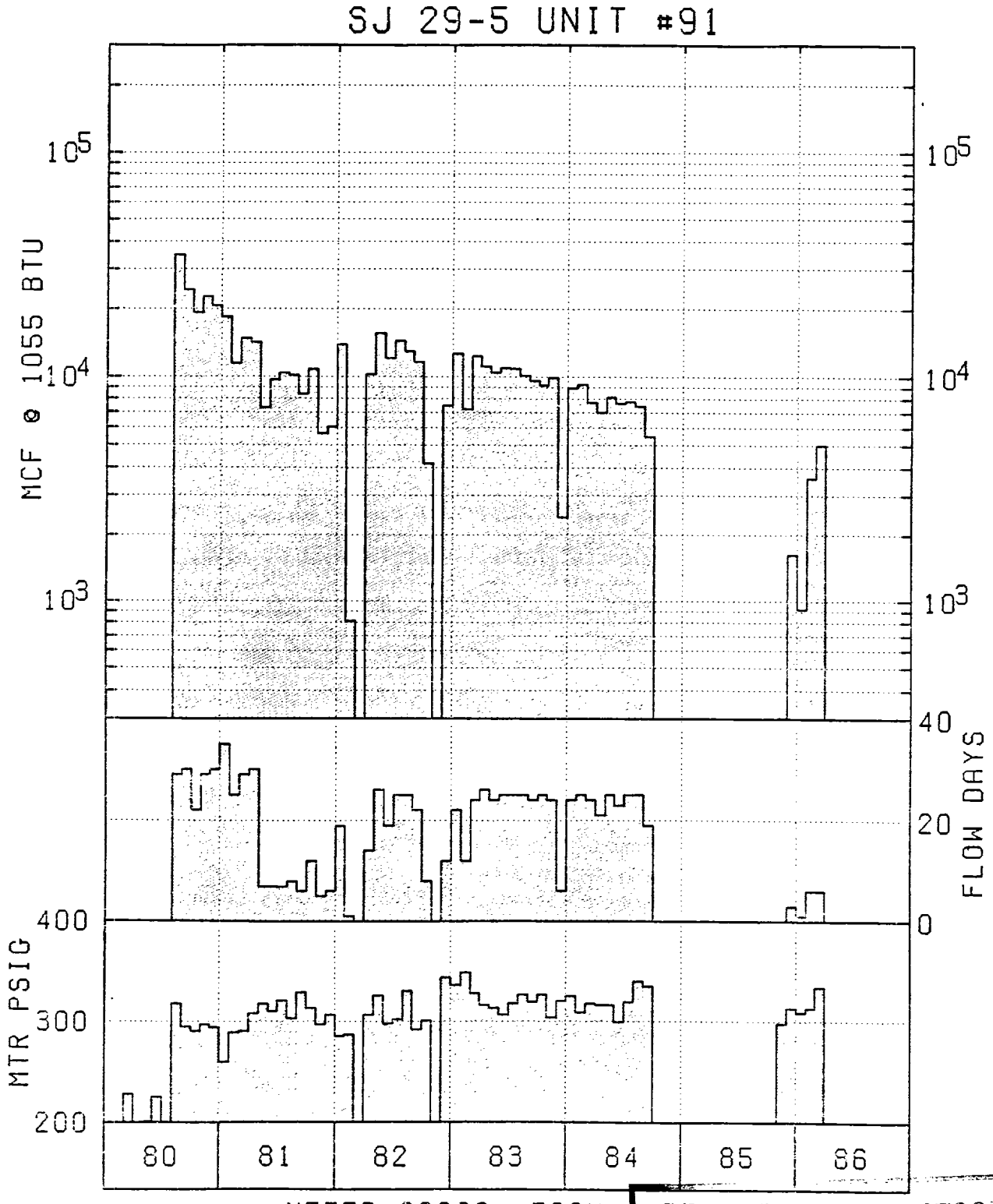
7" - 20# & 23# - Set at 4630'
Cmt with 175 sx

2-3/8" - 4.7# - Set at 8750'
SN at 8719'

8726' Perfs
8736' 22 holes 2 spf

Completed with 50,000# of 40/60 sand in slick water

4-1/2" - 10.5# & 11.6# - Set at 8827'
Cmt with 345 sx



METER:89603 T29N R5W 35B

N MEXICO

BASIN FIELD

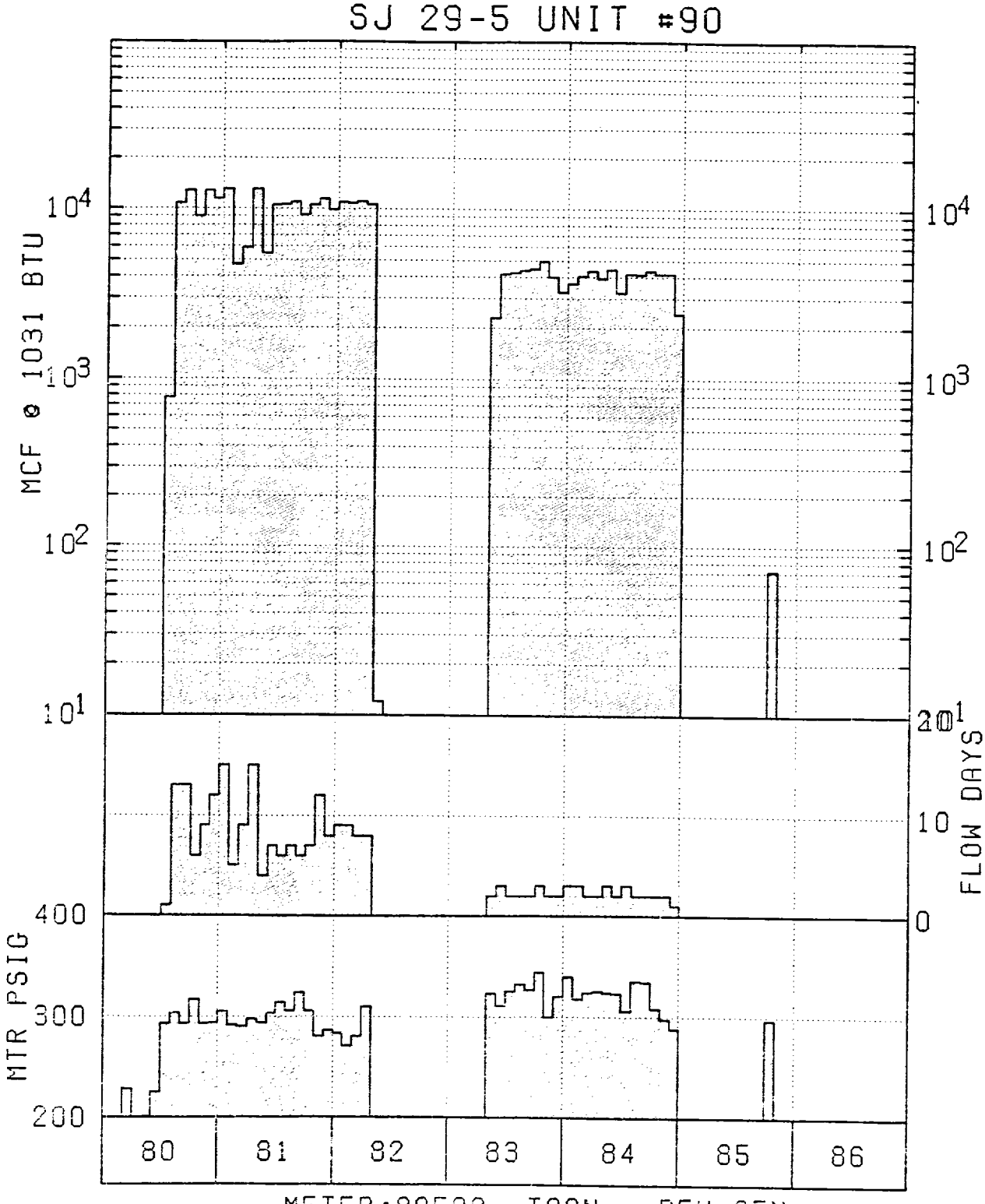
DAKOTA FORMATION

BEFORE EXAMINER

OIL CONSERVATION DIVISION

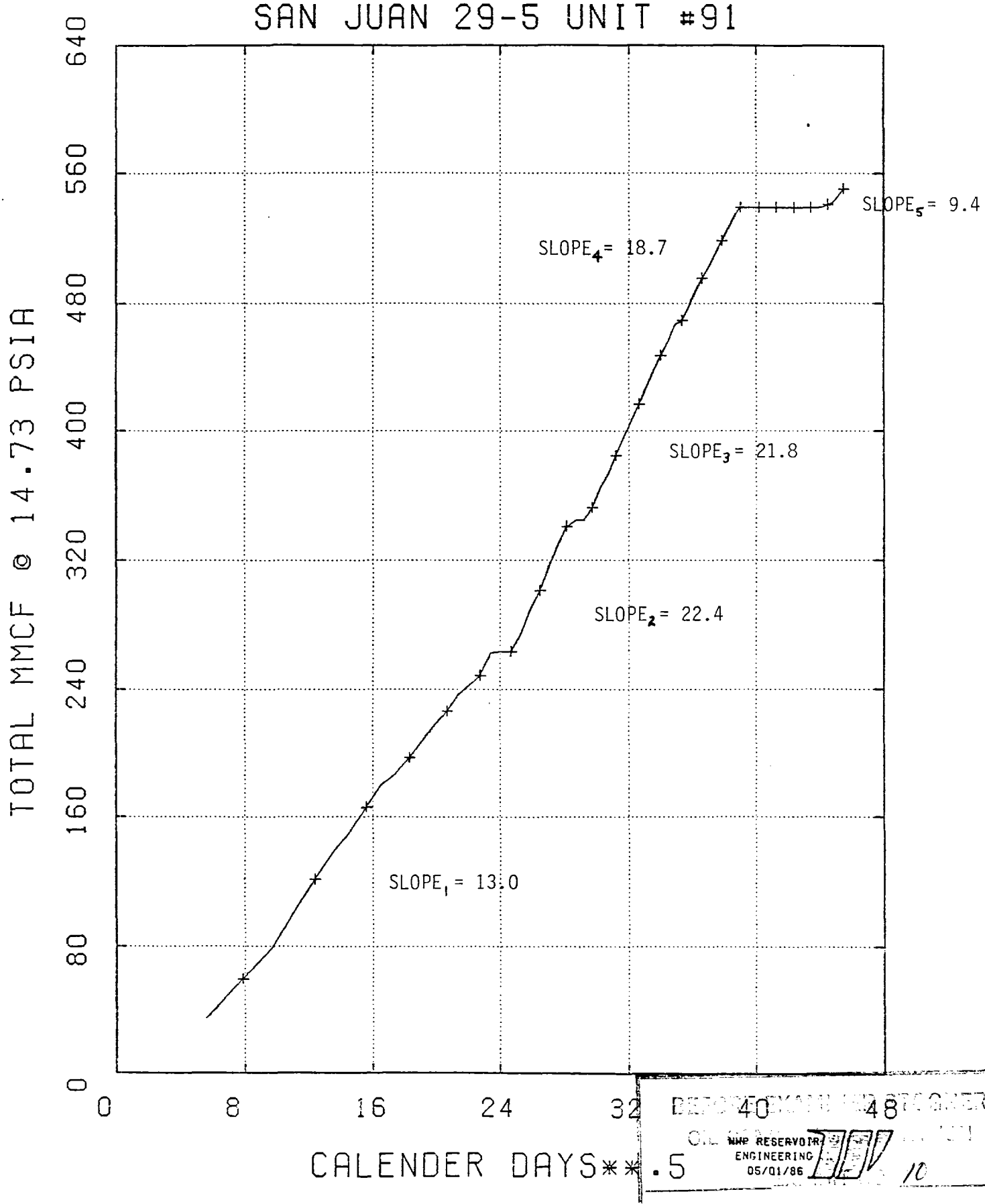
NMP RESERVOIR ENGINEERING 04/30/86

CASE NO. 8890

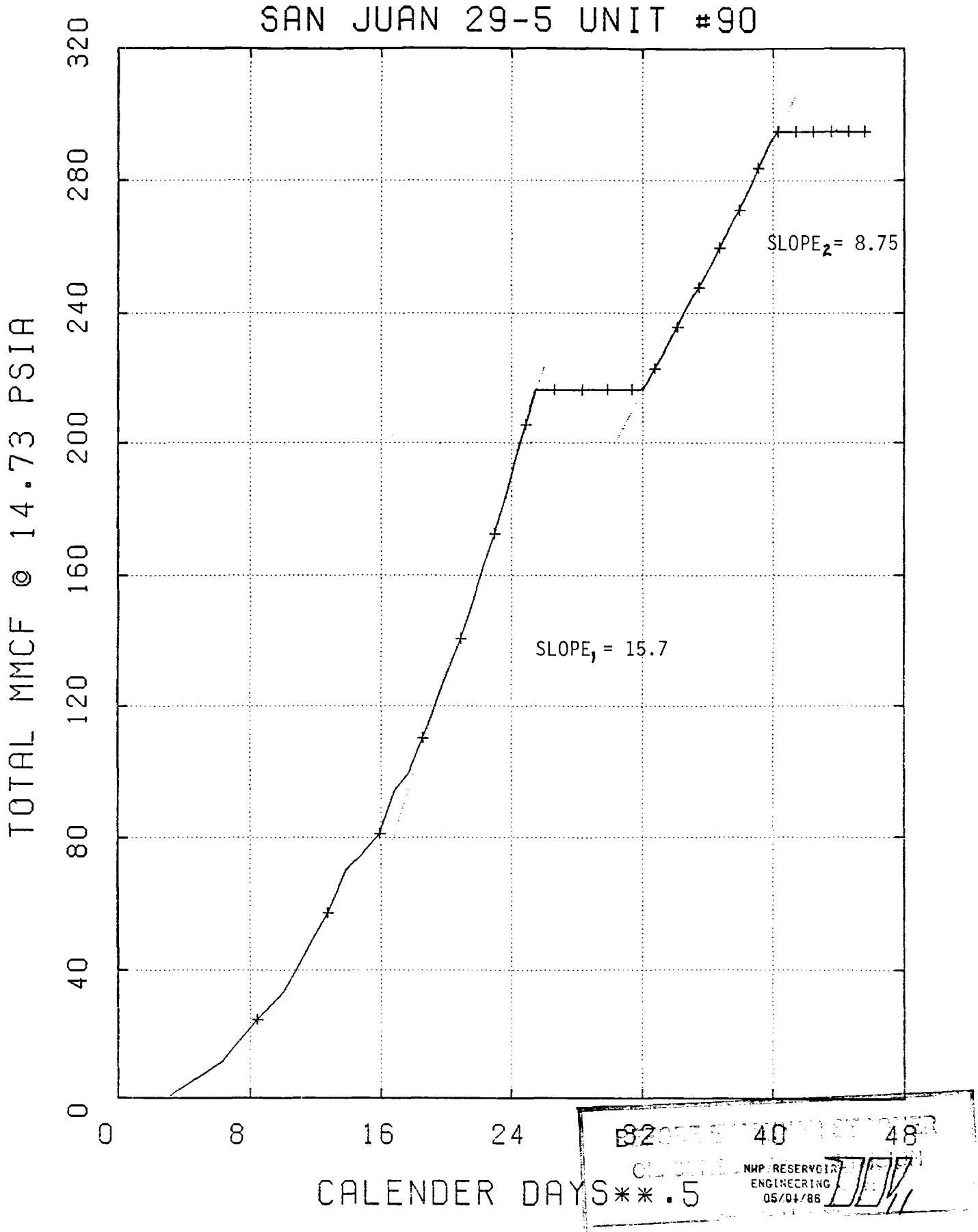


METER:89592 T29N R5W 35N
N MEXICO
BASIN FIELD
DAKOTA FORMATION

BEFORE EXAMINER
OIL CONSERVATION DIVISION
NMP RESERVOIR ENGINEERING 04/30/86
EXHIBIT #9
CASE NO. 8890



BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
NMP RESERVOIR ENGINEERING 05/01/86
EXHIBIT NO. 10
CASE NO. 8890



NMP RESERVOIR ENGINEERING 05/01/86

CASE NO. 8890

SAN JUAN 29-5 UNIT #91 DK

$$Qt = Qi * E^{-DT}$$ (1)

$$-D = 1/T * Ln(Qt/Qi)$$

WHERE: Qt = PRODUCING RATE AT TIME = T (MCF/D)
Qi = INITIAL PRODUCING RATE (MCF/D)
E = EXPONENTIAL FUNCTION
-D = % DECLINE (decimal)
T = TIME PERIOD (years)

1980 Qi = 754 MCF/D
1984 Qt = 245 MCF/D
T = 4
Ln(Qt/Qi) = -1.12

-D = -0.28

ESTIMATED RESERVES LOST FROM THE #91 LOGGING

$$Np = \frac{Qi - Qt}{D} * 365$$ (1)

WHERE: Np = RESERVES REMAINING (MMCF)
Qi = INITIAL PRODUCING RATE (MCF/D)
Qt = PRODUCING RATE AT ABANDONMENT (MCF/D)
D = % DECLINE (decimal)

RESERVES BEFORE LOGGING:

Qi = 245.00 MCF/D
Qt = 0.00 MCF/D
D = 0.28

Np = 319.37 MMCF

RESERVES AFTER LOGGING:

Qi = 146 MCF/D
Qt = 0.00
D = 0.28

Np = 190.32

LOST RESERVES = 129.05

ESTIMATED RESERVES LOST
FROM PREMATURE ABANDONMENT

Qi = 40.00
Qt = 0.00
D= 0.28

Np = 52.14 MMCF

(1) ARPS.J.J.: ESTIMATION OF PRIMARY OIL AND GAS RESERVES, PETROLEUM PRODUCTION HANDBOOK,VOL. II; RESERVIOR ENGINEERING, SPE OF AIME, 1962,P.37-43