ALCAN PIPELINE COMPANY
DOCKET NO. CP76-_____
EXHIBIT H-2
HEARING EXHIBIT NO.___

This Belongs to
Jerry McCutcheon

GAS SUPPLY STUDY

SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
STATE OF ALASKA

Prepared For

A L C A N P I P E L I N E C O M P A N Y

June 1976

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June 29, 1976 76-915.01

Alcan Pipeline Company
315 East 200 South
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Attention: Mr. John McMillian

Gentlemen:

In accordance with your authorization, a reservoir study which utilized a two-dimensional, cross-sectional, three fluid-phase mathematical reservoir model to simulate the Sadlerochit reservoir in the Prudhoe Bay Field in Alaska has been completed. The main purpose of this study was to evaluate the potential gas supply from the Sadlerochit reservoir. Various oil and gas producing rates and operating alternatives were considered to investigate the possible future gas supply and the ultimate oil recovery to be expected.

The highest oil recovery from operating plans including gas sales was 7.72 billion STB or 39.5 percent of the oil initially in place. The oil and gas sales rates for this operation were 1.2 million STB/D and 1.2 billion scf/D, respectively. Economic considerations were not included in this study, but will necessarily need inclusion before the most desirable operating plan can be finalized.

We appreciate the opportunity of conducting this study for you and are hopeful that it will fulfill your requirements at this time.

Very truly yours,

CORE LABORATORIES, INC.

Glenn H. Jones, Jr., Manager
Engineering Services - Domestic

GHJ/bjh

T A B L E O F C O N T E N T S

TABLE OF CONTENTS (Cont'd)

I N T R O D U C T I O N

This report presents the results of a reservoir study which utilized a two-dimensional, cross-sectional, three fluid-phase mathematical reservoir model to simulate the Sadlerochit reservoir in the Prudhoe Bay Field in Alaska. The basic purpose of the study was to evaluate the future gas supply from the Sadlerochit reservoir considering various operating alternatives and the accompanying effect upon the ultimate recovery of oil reserves. An economic evaluation of the results was not included in this work.

This study was made by the Engineering and Consulting Department of Core Laboratories, Inc. of Dallas, Texas upon the authorization of Mr. John McMillian, President of Alcan Pipeline Company of Salt Lake City, Utah.

Data utilized in the preparation of this report were furnished by Alcan Pipeline Company and also gathered from public records. The major sources of input data for the model study were the "In Place Volumetric Determination of Fluids - Sadlerochit Formation Prudhoe Bay Field" June, 1974 report and "Prediction of Reservoir Fluid Recovery - Sadlerochit Formation Prudhoe Bay Field - January 1976" prepared by H. K. van Poollen for the State of Alaska Department of Natural Resources.

S U M M A R Y

A reservoir simulation model was used to generate production and injection data for 21 operating plans for the Sadlerochit reservoir, Prudhoe Bay Field, Alaska. Detailed annual data for these plans are presented in tabular form in Tables II through XXII, and graphically on Figs. 21 through 41, respectively.

Cases 1, 2 and 3 were run to evaluate the effects of the limited aquifer and water injection on oil recovery. Water influx and water injection were included in all subsequent cases which evaluated the effects of various oil production rates and gas sales.

An oil rate of 1.6 million barrels per day was used in each of the first three runs (Cases 1 through 3). For the gas sales cases, the maximum oil rates used were; 1.2, 1.6 and 2.0 million barrels per day. In all cases, an initial oil rate of 600 thousand barrels per day was used for the first 3 months of production. After the 3 months, the rate was increased to 1.2 million barrels per day, then later increased to 1.6 and 2.0 million barrels per day as required for the various cases.

Two types of gas sales schedules were used, constant sales rate and a gradual increase in gas sales volumes. In each case, gas sales commenced 3.5 years after oil production commenced.

In the cases which included water injection (Cases 3 through 21), the volume of water injected complemented the

natural water influx so that the pressure was maintained in the aquifer. The volumes of water injected as presented in Table XXIII varied from 0.518 million barrels per day with no gas sales to 1.592 million barrels per day with maximum gas sales. In all water injection cases, injection was started six years after oil production began.

Condensate recovery from the produced gas was not evaluated in this study. The recovery of condensate would enhance the total fluid recovery for the gas sales cases because of the earlier recovery of the liquids as compared to waiting until blowdown.

An overview of the findings of the study are presented below:

1. The range of oil recoveries from the cases evaluated varied from 8.36 billion barrels (42.8 percent of the original oil in place) to 5.96 billion barrels (30.5 percent).

   The lowest oil recovery resulted with the case of the highest gas sales of 4 billion cubic feet per day with pressure maintenance.

   The highest oil recovery occurred when all of the available gas was reinjected and pressure was maintained in the aquifer. The effect of factors such as liquid recovery for gas-cap processing, and power requirements to inject and recycle high gas volumes in the absences of gas sales were not considered in this study, but should be considered in the selection of the field operating plan.

2. The range of gas recoveries from cases considering gas sales varied from a low of 16.50 trillion cubic feet (39.42 percent) to a high of 29.02 trillion cubic feet (69.3 percent). The low recovery was from the case where gas sales were 1.2 billion cubic feet per day. The high value of gas recovery was for the sales rates of 3.0 and 4.0 billion cubic feet per day, which required a large volume of gas to be produced directly from the gas cap. In all cases, gas recoveries reflect the recovery at the time that oil production was terminated.

C O N C L U S I O N S A N D
R E C O M M E N D A T I O N S

The following conclusions and recommendations were based on the results of the twenty one operating plans presented in this report. The plans were selected to include a range of operating cases that may be considered as reasonable by the State of Alaska and the producers.

Because of a lack of pressures and production data, the performance predictions were based entirely on a theoretical reservoir simulation. While such a simulation technique is recognized as a reliable and accepted method of analysis, prediction values should not be considered to be absolute, but will provide a basis for reliable comparison of results to be expected from the operating plan that is implemented.

Conclusions

1. The estimated in-place hydrocarbon volumes contained in the Sadlerochit reservoir are:

Oil	-	19.529 Billion barrels
Solution Gas	-	15.276 Trillion cubic feet
Gas-Cap Gas	-	26.578 Trillion cubic feet

2. Higher oil recoveries result from pressure maintenance by water injection.

3. The selection of an optimum operating plan will necessarily include economic factors. The operating limits

such as the limiting gas-oil ratios and gas sales rates may have to be adjusted based on the actual performance of the reservoir.

4. Highest volumes of gas sales resulted in lowest volumes of oil recovery. However, the oil recoveries resulting from no gas sales can be approached by a combination of limited gas sales, water injection and adjusting the field operating limits based on performance of the reservoir.

Recommendations

1. Monitor closely the early life pressure and production performance in order to evaluate the magnitude of the natural water influx.

2. If influx proves to be limited, start pressure maintenance of the reservoir by water injection during the early life of the field.

3. Each oil producer should be selectively perforated to take advantage of shale stringers in an attempt to minimize gas and water coning.

4. When evaluating the appropriate level for gas sales during the oil depletion period, consideration should also be directed toward the effect of recovering condensate from the gas-cap gas earlier, and the cost of equipment and fuel to reinject all of the produced gas.

5. After production begins, update the reservoir simulation studies to include performance data and modify operating limits to optimize recovery of the resources.

D I S C U S S I O N

GENERAL

The Prudhoe Bay Field was discovered in 1968 by the Atlantic Richfield Company. The Prudhoe Bay Field, as shown on Fig. 1, is located approximately 265 miles north of the Arctic Circle in the eastern portion of the Arctic Slope of Alaska and is the largest hydrocarbon accumulation thus far discovered on the North American continent. The structure of the large field is a westward plunging faulted anticline, limited on the east by an unconformity, faulting on the north and west, and an aquifer on the south. The geologic age of the producing reservoirs ranges from Mississippian to Jurassic. The Sadlerochit formation is a group of sandstones of early Triassic age and is the major hydrocarbon producing interval. The Sadlerochit is at a depth of approximately 8,000 to 9,000 ft subsea. The maximum oil and gas thicknesses of the zone are approximately 460 and 350 ft, respectively.

The Oil and Gas Conservation Committee of the State of Alaska has designated the Prudhoe Oil Pool to include the Sag River, Shublik, and the Sadlerochit reservoirs. Because the Sag River and Shublik reservoirs are of minor significance as compared to the Sadlerochit reservoir, only the hydrocarbons contained in the Sadlerochit have been included in this study. Likewise, the condensate contained in the associated gas-cap gas of the Sadlerochit reservoir

is minor compared to the oil volume and has not been included in this study.

Most of the geological interpretation, volumetric data, fluid distribution, and reservoir rock and fluid properties used in this reservoir study were obtained from van Poollen's prior work. An independent effort was made by Core Laboratories' engineers and geologists to verify the information; however, only the basic data in van Poollen's reports of June, 1974 and January, 1976 were available. Some minor variations in interpretation of these data resulted and were utilized in this study.

GEOLOGY

A stratigraphic column of the Prudhoe Bay Field is represented in Fig. 2. The basement formation at Prudhoe Bay is the pre-Mississippian Neruokpuk Formation. Overlying the Neruokpuk are two sequences of sedimentary rocks. In ascending order the lower sequence is made up of the Kekiktuk Conglomerate, Kayak Shale, Itkilyariak, and the Lisburne Group carbonates, which contain the Lisburne Pool, the lowest defined oil reservoir in the field. Following are the Sadlerochit, Shublik, and Sag River formations which are considered the most important hydrocarbon-bearing reservoirs in the Prudhoe Bay Field. Next are the Kingak Shale and the Kuparuk River sand which is the youngest unit in the lower sequence and the shallowest defined hydrocarbon-bearing zone in the field.

The upper sequence is made up mostly of nonmarine and marine clastics. In ascending order the formations included are as follows: an unnamed shale, the Seabee, the Prince Creek and Schrader Bluff, the Sagavanirktok, and the Gubik. The rocks in the upper sequence range in geological age from Early Cretaceous through Quaternary.

The upper sequence overlies the truncated lower sequence with the lower sequence forming a westward-plunging faulted anticlinal nose, with local structural closure in the western portion of the field. The hydrocarbons are trapped in the lower sequence by a combination of structural and stratigraphic traps. Fig. 3 presents a schematic geological east-west cross section of the field.

The Prudhoe Oil Pool has been defined by the Oil and Gas Conservation Committee of the State of Alaska, in Conservation Order No. 98-B, to include from top to bottom, the Sag River Sandstone, the Shublik, and the sandstone unit of the Ivishak Member of the Sadlerochit Formation. This reservoir simulation includes only the sandstone unit of the Ivishak Member of the Sadlerochit Formation, hereafter referred to as the Sadlerochit reservoir.

The Sadlerochit reservoir is of early Triassic geologic age and is considered to be of deltaic depositional environment. The reservoir varies in gross thickness from more than 600 ft in the central and southern portions of the field to approximately 300 ft in the extreme northeastern area. The lithology of the zone is mostly sand and conglomerate with

limited amounts of silt and shale. For this study, the Sadlerochit reservoir was divided into three basic zones (Upper, Middle, and Lower) on the basis of stratigraphy and rock properties defined from well logs.

The hydrocarbons in the Sadlerochit reservoir are trapped by faults, truncation of rock, and an oil-water contact. Fig. 4 presents a structure map contoured on top of the Upper Zone and Fig. 5 is a structure map contoured on the base of the Lower Zone. The fault pattern is based primarily on the structure maps previously presented by the operators at a public hearing. The interior faults are considered to be non-sealing to fluid movement.

RESERVOIR ROCK PROPERTIES

The reservoir rock properties used to determine the reservoir volumes and flow capacity were in general taken from van Poollen's work and verified where available data allowed.

Porosity

The porosity values used were determined from sonic log calculations. A correlation with core analysis porosity was established and used in the calculations. The resulting average porosities by zone are as follows:

Zone	Average Porosity, percent
Upper	23.56
Middle	20.17
Lower	21.07

Absolute Permeability

The horizontal permeability used in the simulator was based on core analysis and flow tests, averaged 200 millidarcies. The vertical permeability used was 20 millidarcies. The horizontal permeabilities in a portion of the Upper and Middle Zones were increased by factors ranging from 3 to 5, based on variations in the core and flow tests.

Rock Compressibility

A value of 3.4×10^{-6} psi^{-1} was used in the model for the reservoir rock compressibility and was determined from porosity compaction tests.

Relative Permeability

The relative permeability was determined from averaging data available from laboratory special core analysis tests.

Relative permeability to oil curves were developed for the area in the reservoir near the gas-oil contact and near the oil-water contact, as shown on Figs. 6 and 7, respectively. Relative permeability curves used in the model for gas-to-gas saturation and water-to-water saturation are shown on Figs. 8 and 9, respectively.

Van Poollen reported that the residual oil saturations behind the advancing aquifer or water injection front and advancing gas-cap gas were based on an extensive study of special core analysis studies. The values that are considered to be representative and used in this model study were 23.0

percent behind the water invaded zone and 32.0 percent behind the gas invaded zone. These residual values greatly influence the final oil recovery values obtained under the various operating plans.

Water Saturation

The irreducible water saturation was determined to be 19.0 percent and was based on log calculations. The interstitial water saturation distribution in the reservoir was based on capillary pressure data that were derived from log analysis.

FLUID CONTACTS

Gas-Oil Contact

The gas-oil contact in the Sadlerochit reservoir was determined by analyzing the Sidewall Neutron Porosity log in conjunction with the Borehole Compensated Sonic log. The contact was found to be a horizontal surface at 8,580 ft subsea.

Oil-Water Contact

The resistivity curves of the Dual Induction Laterolog were used to pick the oil-water contact. Although the contact varied somewhat over the field, probably resulting from changes in reservoir rock properties and capillarity, an average oil-water contact level was picked at 9,020 ft subsea for use in the model.

NET PAY DETERMINATION

The Sadlerochit reservoir is made up of sands and conglomerates with some interbedding of shale and silt. The

thickness of shale and silt beds, determined by examining the Spontaneous and Gamma Ray surveys, and were not considered to be net pay.

RESERVOIR TEMPERATURE AND PRESSURE

Reservoir temperature is described in the reservoir simulator for any given depth by the equation:

$$T(°F) = 200°F + 0.024°F/ft \text{ [Depth (ft ss) - 8,620 ft]}$$

A plot of this relationship is shown on Fig. 10.

Reservoir pressure is described in the reservoir simulator for any given depth between the gas-oil and oil-water contacts by the equation:

$$P(psig) = 4,265 \text{ psig} + 0.31 \text{ psi/ft [Depth (ft ss) - 8,400 ft]}$$

A plot of this relationship is shown on Fig. 11.

RESERVOIR FLUID PROPERTIES

The reservoir fluid properties for oil, gas, and water were taken from van Poollen's prior work. No original data were available for analysis. The oil properties were developed for six depth intervals between the gas-oil and oil-water contacts. These properties include the formation volume factor, solution gas-oil ratio and viscosity values as a function of pressure. Plots of these properties that were used in the model are shown on Figs. 12 through 17, respectively. The gas formation volume factor and viscosity plots versus pressure are shown on Fig. 18.

Water properties were based on published correlations using the following parameters:

Salinity	-	19,125 ppm
Pressure Range	-	0 - 5,000 psig
Temperature	-	210°F

A plot of the water formation volume factor versus pressure is shown on Fig. 19.

HYDROCARBONS INITIALLY IN PLACE

Utilizing the basic data discussed above, the resulting hydrocarbons initially in place in the Sadlerochit reservoir are as follows:

State Study

Oil	-	19.529 Billion barrels
Solution Gas	-	15.276 Trillion cubic feet
Gas-Cap Gas	-	26.578 Trillion cubic feet

These volumes were used in the reservoir simulator.

RESERVOIR SIMULATION MODEL

The reservoir simulator used for this model study was a two-dimensional, cross-sectional, three fluid-phase mathematical simulator. The cross section included was oriented to reflect the configuration of the reservoir. A total of eight layers were used. Layers 1 through 4 were configured to the properties of the Upper and Middle Zones. The Bottom Zone was divided into four layers. Using the eight layers made it possible to more accurately describe the oil and water saturations in the model. Each of the layers were represented in 21 concentric cells, which simulated the structural configuration of the Sadlerochit reservoir as illustrated on Fig. 20.

The production capacity was distributed in relation to the volume of oil originally in place. Theoretical well productivity indices were calculated based on the reservoir rock and fluid properties and appeared reasonable.

The model included the capability of tracking the advancing gas cap and/or aquifer and taking into account the resulting changes in fluid saturations in the perforated interval. These saturations were then related to the relative permeability relationships which prescribed the gas-oil ratio and water-cut producing performance. As well workovers were required to reduce gas and water production beyond limiting conditions, the productivity indices in the wells were reduced in proportion to the amount of perforated interval remaining open.

The basic input data for the model were taken from van Poollen's prior work with some minor changes in interpretation made.

GENERAL OPERATING GUIDELINES

The guidelines that were generally applied to the operating programs considered were in the most part those set out by van Poollen's work reported in January, 1976. These guidelines seemed reasonable and may approximate future procedures.

In all operating alternatives considered the following conditions were adhered to:

1. Oil producing rates were:

7-1-77 to 10-1-77	-	0.600 Million B/D
10-1-77 to 12-31-78	-	1.200 Million B/D
1-1-79 till decline	-	ranged from 1.2 to 2.0 Million B/D

2. Oil wells were completed by perforating the center 80 percent of the oil zone between the gas-oil and oil-water contacts.
3. Two recompletions were allowed prior to abandonment because of excessive gas and/or water production. The first recompletion reduced the perforated interval to 40 percent of the original interval and the second recompletion reduced the remaining interval to 75 percent, either from the top or bottom, depending if gas or water limits were being exceeded.
4. The limiting water cut was 75 percent.
5. The limiting gas-oil ratio was 15,000 scf/B.
6. For cases considering no gas sales, 92 percent of the produced gas was reinjected with 8 percent assumed to be used as fuel.
7. For cases considering gas sales, the sales gas volumes equalled the produced gas volumes reduced by 12 percent to account for the removal of CO_2 and 100×10^6 scf/D assumed to be used for field fuel.

8. In cases considering pressure maintenance, it was assumed that the pressure in the aquifer would be maintained from the time injection was begun. With essentially no field performance available it is not known how much water injection will be required. It was assumed that a combination of water influx and injection would maintain the pressure.

9. The maximum bottom-hole pressure drawdown was restricted to 750 psig.

10. A field economic limit of approximately 100,000 B/D was used in all cases.

DEFINITION OF OPERATING ALTERNATIVES CONSIDERED

After tbe basic data were input in the model and the in-place hydrocarbon volumes were verified, a run was made that allowed an overall energy check of Core Lab's model as compared to van Poollen's model. With the model in a past history matching mode, the oil, gas, and water withdrawals from one of van Poollen's cases were simulated as being produced from Core Lab's model. The resulting reservoir pressure performance was very similar to van Poollen's results. This was expected and in essence generally verified van Poollen's results.

The following discussion presents a description of the operating alternatives that were considered during this model study. The results are summarized in Table I.

Case 1

No aquifer, no water injection, no gas sales, maximum oil rate of 1.6 Million B/D.

Case 2

With aquifer, no water injection, no gas sales and a maximum oil rate of 1.6 Million B/D.

Case 3

With aquifer, water injection, no gas sales and a maximum oil rate of 1.6 Million B/D.

Case 4

With aquifer, water injection, gas sales at a maximum sales rate of 2.25 Bcf/D, and a maximum oil rate of 1.2 Million B/D.

Case 5

With aquifer, water injection, maximum gas sales of 2.25 Bcf/D, with a maximum oil rate of 1.6 Million B/D.

Case 6

With aquifer, water injection, maximum gas sales of 2.25 Bcf/D, with a maximum oil rate of 2.0 Million B/D.

Case 7

With aquifer, with water injection, maximum gas sales of 2.40 Bcf/D, and a maximum oil rate of 1.2 Million B/D.

Case 8

With aquifer, with water injection, maximum gas sales of 2.4 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 9

With aquifer, with water injection, maximum gas sales of 2.4 Bcf/D and a maximum oil rate of 2.0 Million B/D.

Case 10

With aquifer, with water injection, maximum gas sales of 1.2 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 11

With aquifer, with water injection, maximum gas sales of 1.6 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 12

With aquifer, with water injection, maximum gas sales of 1.8 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 13

With aquifer, with water injection, maximum gas sales of 2.0 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 14

With aquifer, with water injection, maximum gas sales of 3.0 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 15

With aquifer, with water injection, maximum gas sales of 4.0 Bcf/D and a maximum oil rate of 1.2 Million B/D.

Case 16

With aquifer, with water injection, maximum gas sales of 1.2 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 17

With aquifer, with water injection, maximum gas sales of 1.6 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 18

With aquifer, with water injection, maximum gas sales of 1.8 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 19

With aquifer, with water injection, maximum gas sales of 2.0 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 20

With aquifer, with water injection, maximum gas sales of 3.0 Bcf/D and a maximum oil rate of 1.6 Million B/D.

Case 21

With aquifer, with water injection, maximum gas sales of 4.0 Bcf/D and a maximum oil rate of 1.6 Million B/D.

DISCUSSION OF RESULTS

The three operating alternatives which considered no sale of produced gas, Cases 1, 2, and 3, yielded ultimate oil recoveries that range from 6.53 Billion barrels (33.5 percent) with no aquifer or water injection to 8.36 Billion barrels (42.8 percent) including a limited aquifer and water injection. This trend is to be expected and agrees with prior published studies. This being the case, all other operating plans that were considered included the effect of a limited aquifer and water injection in an attempt to maximize oil recovery. The detailed results of Cases 1, 2, and 3 are shown in Tables II, III, and IV and on Figs. 21, 22, and 23, respectively.

There were a total of 18 cases that considered the operating alternative of gas sales. Two groups of cases, with three cases in each group, considered maximum oil rates of 1.2, 1.6, and 2.0 Million B/D with a maximum sales gas rate of 2.25 Bcf/D for one group and 2.40 Bcf/D for the other group. Of these six cases, the highest ultimate oil

recovery of 7.28 Billion barrels (37.3 percent) resulted from the gas sales rate of 2.25 Bcf/D with an oil rate of 1.6 Million B/D, respectively. The lowest ultimate oil recovery of 7.06 Billion barrels (36.2 percent) resulted from the highest gas sales and oil rates of 2.40 Bcf/D and 2.0 Million B/D, respectively. The detailed results of these six cases are presented in Tables IV through X and on Figs. 24 through 29, respectively.

Another group of cases that considered gas sales amounted to six additional cases. In this group the maximum gas sales rate ranged from 1.2 to 4.0 Bcf/D with the maximum oil rate being 1.2 Million B/D. The highest ultimate oil recovery from this group was 7.72 Billion barrels (39.5 percent) for the operating program of lowest gas sales rate of 1.2 Bcf/D. The lowest ultimate oil recovery from this group of cases was 5.96 Billion barrels (30.5 percent) for the operating plan of the highest gas sales rate of 4.0 Bcf/D. The detailed results of these six cases are presented in Tables XI through XVI and on Figs. 30 through 35, respectively.

An additional group of six cases was run that considered gas sales ranging from 1.2 to 4.0 Bcf/D with a maximum oil rate of 1.6 Million B/D. The highest ultimate oil recovery from this group was 7.68 Billion barrels (39.3 percent) for the operating plan of the lowest gas sales rate of 1.2 Bcf/D. The lowest ultimate oil recovery from this group of cases was 6.23 Billion barrels (31.9 percent) for the case with the highest gas sales rate of 4.0 Bcf/D. The detailed results of these

six cases are presented in Tables XVII through XXII and on Figs. 36 through 41, respectively.

From the above discussed eighteen cases which include the sale of gas produced from the oil column wells and also gas produced from the gas-cap wells, if required to make the prescribed gas sales rate, the maximum ultimate oil recovery was 7.72 Billion barrels (39.5 percent). This operating program included the lowest gas sales rate of 1.2 Bcf/D and the lowest oil rate of 1.2 Million B/D. This operating plan also recovered the minimum gas volume of 16.50 Trillion cubic feet (39.4 percent) of the eighteen cases considered.

The lowest ultimate oil recovery from the eighteen gas sales cases was 5.96 Billion barrels (30.5 percent). This resulted from the case considering the highest gas sales rate of 4.0 Bcf/D and an oil rate of 1.2 Million B/D.

Ultimate gas recoveries varied from a low range of 16 to 17 Trillion cubic feet (40.0 percent) to a high range of 28 to 29 Trillion cubic feet (69.0 percent) As would be expected, the lower gas recoveries accompanied the lowest gas sales rate of 1.2 Bcf/D and the higher recoveries were from the higher gas sales rate of 3.0 and 4.0 Bcf/D. In all cases, gas recoveries reflect the recovery at the time that oil production was terminated. In actual operation, the difference in gas recoveries will be reduced by production during the blowdown phase.

N O M E N C L A T U R E

K_{ro}	Relative permeability to oil fraction
S and S_{or}	Residual oil saturation, percent of pore volume
S_o	Oil saturation, percent of pore volume
K_{rg}	Relative permeability to gas, fraction
S_g	Gas saturation, percent of pore volume
S_{gr}	Critical gas saturation, percent of pore volume
K_{rw}	Relative permeability to water, fraction
S_w	Water saturation, percent of pore volume
S_{wc}	Irreducible water saturation, fraction of pore volume
B_o	Oil formation volume factor, reservoir barrels per stock-tank barrel
μ_o	Oil viscosity, centipoise
cp	Centipoise
R_s	Solution gas-oil ratio, standard cubic feet per stock-tank barrel
B_g	Gas formation volume factor, reservoir cubic feet per standard cubic feet
μ_g	Gas viscosity, centipoise
B_w	Water formation volume factor, reservoir barrels per stock-tank barrel
B/D	Barrels per day
scf/D	Standard cubic feet per day
Bcf/D	Billion cubic feet per day
Tcf	Trillion cubic feet

L I S T O F T A B L E S

TABLE I

SUMMARY OF SIMULATION RESULTS

Sadlerochit Reservoir
Prudhoe Bay Field

Case	Maximum Gas Sales MMMscf/D	Maximum Oil Rate MMSTB/D	Producing Life Years	Ultimate Oil Recovery MMMSTB	Cumulative Gas Produced MMMMscf	Cumulative Gas Injected MMMMscf	Cumulative Gas Recovery MMMMscf	Ultimate Oil Recovery % OIIP	Cumulative Gas Recovery % GIIP
1	0.00	1.6	35	6.53	11.24	10.34	0.90	33.46	2.15
2	0.00	1.6	39	7.61	12.23	11.25	0.98	38.95	2.34
3	0.00	1.6	39	8.36	11.83	10.88	0.95	42.81	2.26
4	2.25	1.2	33	7.25	30.00	1.95	28.05	37.12	67.02
5	2.25	1.6	31	7.28	29.24	3.04	26.20	37.28	62.60
6	2.25	2.0	30	7.12	28.75	3.48	25.27	36.44	60.38
7	2.40	1.2	33	7.26	31.72	1.92	29.80	37.19	71.21
8	2.40	1.6	30	7.19	29.75	2.96	26.79	36.80	64.02
9	2.40	2.0	30	7.06	30.15	3.33	26.82	36.15	64.09
10	1.20	1.2	34	7.72	18.71	2.21	16.50	39.52	39.42
11	1.60	1.2	34	7.57	23.42	1.89	21.53	38.76	51.45
12	1.80	1.2	33	7.38	25.44	2.14	23.30	37.78	55.68
13	2.00	1.2	33	7.27	27.55	1.82	25.73	37.24	61.47
*14	3.00	1.2	26	6.63	30.54	1.57	28.98	33.93	69.23
*15	4.00	1.2	20	5.96	29.70	1.57	28.13	30.51	67.22
16	1.20	1.6	34	7.68	21.01	4.33	16.68	39.31	39.86
17	1.60	1.6	32	7.37	23.53	3.28	20.25	37.74	48.39
18	1.80	1.6	32	7.27	25.62	3.03	22.59	37.22	53.99
19	2.00	1.6	31	7.31	26.85	2.77	24.07	37.44	57.52
*20	3.00	1.6	26	6.71	31.10	2.08	29.02	34.35	69.34
*21	4.00	1.6	20	6.23	30.16	1.99	28.17	31.90	67.31

NOTE: 1. All cases except 1 and 2 included influx and water injection. Case 1 had no influx or water injection and Case 2 had influx only.
2. No gas sales, 92% of gas returned to cap.

3. With gas sales, actual gas withdrawal is:
1.46 BCF/D with sales of 1.2 BCF/D
1.80 BCF/D with sales of 1.5 BCF/D
1.92 BCF/D with sales of 1.6 BCF/D
2.15 BCF/D with sales of 1.8 BCF/D
2.37 BCF/D with sales of 2.0 BCF/D
2.66 BCF/D with sales of 2.25 BCF/D
2.83 BCF/D with sales of 2.4 BCF/D
3.51 BCF/D with sales of 3.0 BCF/D
4.65 BCF/D with sales of 4.0 BCF/D

Excess for CO_2 and Fuel

* Shut-in because pressure in gas cap became too low.

DETAILED RESULTS OF CASE 1

NO AQUIFER — NO WATER INJECTION

GAS INJECTION — NO GAS SALES

	AVERAGE RATES FOR YEAR										CUMULATIVES TO YEAR END								
YEAR	OIL PROD	GAS					TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	GAS					WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE	
		OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD					OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD			OIL %	TOTAL GAS %
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA		
1	1.050	.974	.000	.974	.896	.078	928	0.	.0	.384	.356	.000	.356	.327	.029	0.	4199	1.97	.07
2	1.500	1.912	.000	1.912	1.759	.153	1275	5.	.3	.931	1.054	.000	1.054	.970	.084	2.	4051	4.77	.20
3	1.600	2.437	.000	2.437	2.242	.195	1523	24.	1.5	1.516	1.944	.000	1.944	1.789	.155	11.	3915	7.76	.37
4	1.600	2.513	.000	2.513	2.312	.201	1571	66.	4.0	2.100	2.862	.000	2.862	2.633	.229	35.	3794	10.75	.55
5	1.600	3.510	.000	3.510	3.230	.280	2194	134.	7.7	2.685	4.144	.000	4.144	3.813	.331	84.	3641	13.75	.79
6	1.501	3.545	.000	3.545	3.261	.284	2362	202.	11.9	3.233	5.439	.000	5.439	5.004	.435	157.	3538	16.55	1.04
7	1.168	2.370	.000	2.370	2.181	.189	2029	150.	11.4	3.660	6.305	.000	6.305	5.801	.504	212.	3478	18.74	1.20
8	.910	2.927	.000	2.927	2.693	.234	3216	159.	14.9	3.992	7.374	.000	7.374	6.784	.590	270.	3415	20.44	1.41
9	.723	1.420	.000	1.420	1.306	.114	1964	198.	21.5	4.256	7.892	.000	7.892	7.261	.631	342.	3392	21.79	1.51
10	.669	1.321	.000	1.321	1.215	.106	1975	170.	20.3	4.500	8.375	.000	8.375	7.705	.670	404.	3351	23.04	1.60
11	.570	1.694	.000	1.694	1.559	.135	2972	172.	23.2	4.708	8.994	.000	8.994	8.274	.720	467.	3310	24.11	1.72
12	.462	.515	.000	.515	.474	.041	1115	128.	21.7	4.877	9.182	.000	9.182	8.447	.735	514.	3302	24.97	1.76
13	.362	.710	.000	.710	.654	.056	1961	33.	8.4	5.010	9.441	.000	9.441	8.686	.755	526.	3285	25.65	1.80
14	.319	.315	.000	.315	.289	.026	987	54.	14.5	5.126	9.556	.000	9.556	8.792	.764	545.	3274	26.25	1.83
15	.307	.384	.000	.384	.354	.030	1251	66.	17.7	5.238	9.697	.000	9.697	8.921	.776	570.	3258	26.82	1.85
16	.284	.464	.000	.464	.427	.037	1634	77.	21.3	5.342	9.866	.000	9.866	9.077	.789	598.	3241	27.35	1.89
17	.251	.338	.000	.338	.311	.027	1347	73.	22.5	5.434	9.990	.000	9.990	9.191	.799	624.	3229	27.83	1.91
18	.234	.230	.000	.230	.212	.018	983	59.	20.1	5.519	10.074	.000	10.074	9.268	.806	646.	3218	28.26	1.93
19	.226	.268	.000	.268	.246	.022	1186	65.	22.3	5.602	10.172	.000	10.172	9.358	.814	670.	3205	28.69	1.94
20	.215	.288	.000	.288	.265	.023	1340	72.	25.1	5.680	10.277	.000	10.277	9.455	.822	696.	3194	29.08	1.96
21	.207	.192	.000	.192	.176	.016	928	70.	25.3	5.756	10.347	.000	10.347	9.519	.828	722.	3183	29.47	1.98
22	.206	.191	.000	.191	.176	.015	927	53.	20.5	5.831	10.417	.000	10.417	9.584	.833	741.	3173	29.86	1.99
23	.200	.199	.000	.199	.183	.016	995	56.	21.9	5.904	10.490	.000	10.490	9.650	.840	761.	3162	30.23	2.01
24	.195	.193	.000	.193	.177	.016	990	58.	22.9	5.975	10.560	.000	10.560	9.715	.845	782.	3153	30.60	2.02
25	.194	.192	.000	.192	.176	.016	990	61.	23.9	6.046	10.630	.000	10.630	9.780	.850	805.	3143	30.96	2.03
26	.191	.259	.000	.259	.238	.021	1356	66.	25.7	6.116	10.724	.000	10.724	9.867	.857	829.	3131	31.32	2.05
27	.182	.192	.000	.192	.177	.015	1055	69.	27.5	6.183	10.795	.000	10.795	9.931	.864	854.	3122	31.66	2.06
28	.151	.235	.000	.235	.216	.019	1556	35.	18.8	6.238	10.881	.000	10.881	10.010	.871	867.	3116	31.94	2.08
29	.134	.237	.000	.237	.218	.019	1769	30.	18.3	6.287	10.967	.000	10.967	10.090	.877	878.	3109	32.19	2.10
30	.119	.138	.000	.138	.127	.011	1160	34.	22.2	6.330	11.018	.000	11.018	10.136	.882	890.	3105	32.41	2.11
31	.118	.114	.000	.114	.105	.009	966	36.	23.4	6.373	11.059	.000	11.059	10.175	.884	904.	3099	32.63	2.11
32	.114	.112	.000	.112	.103	.009	982	29.	20.3	6.415	11.100	.000	11.100	10.212	.888	914.	3094	32.85	2.12
33	.111	.109	.000	.109	.100	.009	982	24.	17.8	6.455	11.140	.000	11.140	10.249	.891	923.	3089	33.05	2.13
34	.111	.111	.000	.111	.102	.009	1000	26.	19.0	6.496	11.180	.000	11.180	10.286	.894	933.	3084	33.26	2.14
35	.104	.155	.000	.155	.143	.012	1490	22.	17.5	6.534	11.237	.000	11.237	10.338	.899	941.	3079	33.46	2.15

TABLE II

DETAILED RESULTS OF CASE 2

AQUIFER — NO WATER INJECTION

GAS INJECTION — NO GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.590	1.918	.000	1.918	1.765	.153	1279	11.	.7	.931	1.056	.000	1.056	.971	.085	4.	4095	4.77	.20
3	1.600	2.022	.000	2.022	1.861	.161	1264	56.	3.4	1.516	1.795	.000	1.795	1.651	.144	24.	4002	7.76	.34
4	1.600	3.248	.000	3.248	2.988	.260	2030	139.	8.0	2.100	2.981	.000	2.981	2.742	.239	75.	3861	10.75	.57
5	1.600	1.515	.000	1.515	1.394	.121	947	206.	11.4	2.685	3.534	.000	3.534	3.251	.283	151.	3804	13.75	.68
6	1.600	3.925	.000	3.925	3.611	.314	2453	212.	11.7	3.269	4.968	.000	4.968	4.570	.398	228.	3658	16.74	.95
7	1.436	2.759	.000	2.759	2.538	.221	1921	330.	18.7	3.793	5.976	.000	5.976	5.497	.479	349.	3613	19.42	1.14
8	1.164	2.172	.000	2.172	1.998	.174	1866	205.	15.0	4.219	6.769	.000	6.769	6.227	.542	423.	3572	21.60	1.30
9	.900	1.106	.000	1.106	1.018	.088	1229	144.	13.8	4.547	7.173	.000	7.173	6.599	.574	476.	3530	23.28	1.37
10	.789	1.659	.000	1.659	1.526	.133	2103	120.	13.2	4.836	7.779	.000	7.779	7.156	.623	520.	3483	24.76	1.49
11	.693	1.369	.000	1.369	1.260	.109	1975	131.	15.9	5.089	8.279	.000	8.279	7.616	.663	567.	3449	26.06	1.58
12	.637	1.401	.000	1.401	1.289	.112	2199	128.	16.7	5.321	8.790	.000	8.790	8.087	.703	614.	3414	27.25	1.68
13	.579	1.656	.000	1.656	1.523	.133	2860	146.	20.1	5.533	9.395	.000	9.395	8.644	.751	667.	3380	28.33	1.79
14	.458	.594	.000	.594	.546	.048	1297	165.	26.5	5.700	9.612	.000	9.612	8.843	.769	728.	3367	29.19	1.84
15	.417	1.000	.000	1.000	.920	.080	2398	182.	30.4	5.853	9.977	.000	9.977	9.179	.798	794.	3337	29.97	1.91
16	.371	.880	.000	.880	.809	.071	2372	166.	30.9	5.988	10.299	.000	10.299	9.475	.824	855.	3323	30.66	1.97
17	.344	.426	.000	.426	.392	.034	1238	146.	29.8	6.114	10.454	.000	10.454	9.618	.836	908.	3306	31.31	2.00
18	.333	.336	.000	.336	.309	.027	1009	139.	29.4	6.236	10.577	.000	10.577	9.731	.846	959.	3287	31.93	2.02
19	.306	.468	.000	.468	.431	.037	1529	140.	31.4	6.347	10.748	.000	10.748	9.888	.860	1010.	3269	32.50	2.05
20	.290	.586	.000	.586	.539	.047	2021	142.	32.9	6.453	10.962	.000	10.962	10.085	.877	1062.	3248	33.04	2.10
21	.269	.396	.000	.396	.364	.032	1472	147.	35.3	6.552	11.106	.000	11.106	10.218	.888	1115.	3238	33.55	2.12
22	.263	.232	.000	.232	.214	.018	882	136.	34.1	6.648	11.191	.000	11.191	10.296	.895	1165.	3224	34.04	2.14
23	.259	.252	.000	.252	.231	.021	973	125.	32.6	6.742	11.283	.000	11.283	10.380	.903	1211.	3209	34.52	2.16
24	.252	.229	.000	.229	.211	.018	909	120.	32.3	6.834	11.367	.000	11.367	10.458	.909	1255.	3197	34.99	2.17
25	.257	.266	.000	.266	.245	.021	1035	71.	21.6	6.928	11.464	.000	11.464	10.547	.917	1281.	3184	35.48	2.19
26	.231	.315	.000	.315	.290	.025	1364	64.	21.7	7.013	11.579	.000	11.579	10.653	.926	1304.	3175	35.91	2.21
27	.155	.189	.000	.189	.174	.015	1219	29.	15.8	7.069	11.648	.000	11.648	10.716	.932	1315.	3170	36.20	2.23
28	.145	.223	.000	.223	.206	.017	1538	30.	17.1	7.122	11.730	.000	11.730	10.791	.939	1326.	3163	36.47	2.24
29	.133	.168	.000	.168	.155	.013	1263	34.	20.4	7.171	11.791	.000	11.791	10.848	.943	1338.	3158	36.72	2.25
30	.132	.122	.000	.122	.112	.010	924	38.	22.4	7.219	11.836	.000	11.836	10.889	.947	1352.	3153	36.97	2.26
31	.131	.117	.000	.117	.108	.009	893	41.	23.8	7.267	11.879	.000	11.879	10.928	.951	1367.	3147	37.21	2.27
32	.130	.117	.000	.117	.108	.009	900	44.	25.3	7.314	11.921	.000	11.921	10.968	.953	1383.	3141	37.45	2.28
33	.129	.123	.000	.123	.113	.010	953	47.	26.7	7.361	11.966	.000	11.966	11.009	.957	1400.	3135	37.69	2.29
34	.121	.154	.000	.154	.142	.012	1273	45.	27.1	7.406	12.023	.000	12.023	11.061	.962	1416.	3129	37.92	2.30
35	.118	.107	.000	.107	.098	.009	907	47.	28.5	7.449	12.062	.000	12.062	11.097	.965	1434.	3124	38.14	2.31
36	.117	.124	.000	.124	.114	.010	1060	50.	29.9	7.491	12.107	.000	12.107	11.138	.969	1452.	3118	38.36	2.32
37	.109	.109	.000	.109	.100	.009	1000	52.	32.3	7.531	12.147	.000	12.147	11.175	.972	1471.	3113	38.56	2.32
38	.107	.103	.000	.103	.095	.008	963	51.	32.3	7.570	12.184	.000	12.184	11.210	.974	1490.	3107	38.76	2.33
39	.098	.120	.000	.120	.111	.009	1224	36.	26.9	7.606	12.228	.000	12.228	11.250	.978	1503.	3103	38.95	2.34
40	.094	.087	.000	.087	.080	.007	926	37.	28.2	7.640	12.260	.000	12.260	11.279	.981	1516.	3100	39.12	2.34

TABLE III

DETAILED RESULTS OF CASE 3

AQUIFER WITH WATER INJECTION

GAS INJECTION NO GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	1.012	.000	1.012	.931	.081	964	0.	.0	.384	.369	.000	.369	.340	.029	0.	4215	1.97	.07
2	1.500	1.861	.000	1.861	1.712	.149	1241	15.	1.0	.931	1.049	.000	1.049	.965	.084	5.	4094	4.77	.20
3	1.600	2.065	.000	2.065	1.900	.165	1291	69.	4.1	1.516	1.803	.000	1.803	1.659	.144	30.	3995	7.76	.34
4	1.600	3.614	.000	3.614	3.324	.290	2259	163.	9.2	2.100	3.123	.000	3.123	2.873	.250	90.	3862	10.75	.60
5	1.600	1.719	.000	1.719	1.581	.138	1074	157.	8.9	2.685	3.751	.000	3.751	3.451	.300	147.	3794	13.75	.72
6	1.598	4.027	.000	4.027	3.705	.322	2520	270.	14.5	3.268	5.222	.000	5.222	4.804	.418	246.	3674	16.73	1.00
7	1.407	3.143	.000	3.143	2.891	.252	2234	406.	22.4	3.782	6.370	.000	6.370	5.860	.510	394.	3575	19.37	1.22
8	1.249	2.501	.000	2.501	2.301	.200	2002	316.	20.2	4.238	7.283	.000	7.283	6.700	.583	509.	3532	21.70	1.39
9	1.070	1.706	.000	1.706	1.569	.137	1594	221.	17.1	4.629	7.906	.000	7.906	7.274	.632	590.	3539	23.70	1.51
10	.936	1.231	.000	1.231	1.132	.099	1315	301.	24.3	4.971	8.356	.000	8.356	7.687	.669	700.	3531	25.45	1.60
11	.852	.778	.000	.778	.715	.063	913	280.	24.7	5.282	8.640	.000	8.640	7.949	.691	802.	3516	27.05	1.65
12	.766	1.454	.000	1.454	1.337	.117	1898	177.	18.8	5.562	9.171	.000	9.171	8.437	.734	867.	3501	28.48	1.75
13	.660	1.227	.000	1.227	1.129	.098	1859	193.	22.6	5.803	9.619	.000	9.619	8.849	.770	938.	3505	29.71	1.84
14	.567	.548	.000	.548	.504	.044	966	266.	31.9	6.010	9.819	.000	9.819	9.034	.785	1035.	3516	30.77	1.88
15	.469	.427	.000	.427	.393	.034	910	284.	37.7	6.181	9.975	.000	9.975	9.177	.798	1139.	3516	31.65	1.91
16	.428	.471	.000	.471	.434	.037	1100	290.	40.4	6.338	10.148	.000	10.148	9.336	.812	1245.	3514	32.45	1.94
17	.371	.436	.000	.436	.401	.035	1175	270.	42.1	6.473	10.307	.000	10.307	9.482	.825	1343.	3514	33.15	1.97
18	.350	.307	.000	.307	.282	.025	877	265.	43.1	6.601	10.419	.000	10.419	9.585	.834	1440.	3516	33.80	1.99
19	.368	.406	.000	.406	.373	.033	1103	121.	24.7	6.735	10.567	.000	10.567	9.722	.845	1484.	3523	34.49	2.02
20	.346	.252	.000	.252	.232	.020	728	154.	30.8	6.862	10.659	.000	10.659	9.806	.853	1540.	3528	35.14	2.04
21	.326	.228	.000	.228	.210	.018	699	181.	35.7	6.981	10.742	.000	10.742	9.883	.859	1606.	3531	35.75	2.05
22	.321	.225	.000	.225	.207	.018	701	167.	34.2	7.098	10.825	.000	10.825	9.959	.866	1667.	3534	36.35	2.07
23	.306	.230	.000	.230	.212	.018	752	174.	36.2	7.210	10.908	.000	10.908	10.036	.872	1731.	3535	36.92	2.08
24	.287	.202	.000	.202	.186	.016	704	174.	37.7	7.314	10.982	.000	10.982	10.104	.878	1795.	3538	37.45	2.10
25	.273	.274	.000	.274	.252	.022	1004	126.	31.6	7.414	11.082	.000	11.082	10.196	.886	1840.	3543	37.96	2.12
26	.254	.190	.000	.190	.175	.015	748	122.	32.4	7.507	11.152	.000	11.152	10.260	.892	1885.	3547	38.44	2.13
27	.238	.270	.000	.270	.248	.022	1134	140.	37.0	7.594	11.250	.000	11.250	10.350	.900	1936.	3549	38.89	2.15
28	.220	.151	.000	.151	.139	.012	686	159.	42.0	7.674	11.305	.000	11.305	10.401	.904	1994.	3552	39.30	2.16
29	.212	.146	.000	.146	.134	.012	689	169.	44.4	7.752	11.359	.000	11.359	10.450	.909	2056.	3554	39.69	2.17
30	.216	.150	.000	.150	.138	.012	694	139.	39.2	7.831	11.414	.000	11.414	10.501	.913	2107.	3557	40.10	2.18
31	.211	.148	.000	.148	.136	.012	701	152.	41.9	7.908	11.468	.000	11.468	10.550	.918	2162.	3558	40.49	2.19
32	.204	.171	.000	.171	.157	.014	838	132.	39.3	7.982	11.530	.000	11.530	10.608	.922	2210.	3561	40.87	2.20
33	.197	.137	.000	.137	.126	.011	695	119.	37.7	8.054	11.580	.000	11.580	10.654	.926	2254.	3564	41.24	2.21
34	.190	.132	.000	.132	.122	.010	695	134.	41.4	8.123	11.628	.000	11.628	10.698	.930	2303.	3567	41.59	2.22
35	.182	.127	.000	.127	.117	.010	698	125.	40.7	8.190	11.675	.000	11.675	10.741	.934	2349.	3570	41.94	2.23
36	.138	.094	.000	.094	.087	.007	681	105.	43.2	8.240	11.709	.000	11.709	10.772	.937	2387.	3575	42.19	2.24
37	.122	.120	.000	.120	.111	.009	984	82.	40.2	8.285	11.753	.000	11.753	10.813	.940	2417.	3579	42.42	2.25
38	.107	.129	.000	.129	.119	.010	1206	92.	46.2	8.324	11.800	.000	11.800	10.856	.944	2450.	3584	42.62	2.26
39	.098	.082	.000	.082	.075	.007	837	100.	50.5	8.360	11.830	.000	11.830	10.884	.946	2487.	3588	42.81	2.26
40	.094	.088	.000	.088	.081	.007	936	80.	46.0	8.394	11.862	.000	11.862	10.913	.949	2516.	3592	42.98	2.27

TABLE IV

DETAILED RESULTS OF CASE 4

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	M$/DAY	%	10^9 STB	TRILLION SCF					10^8 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.514	.053	1.567	.095	1.472	1306	74.	5.8	1.698	1.981	.010	1.991	1.586	.405	36.	3960	8.69	.97
4.5	1.200	1.816	.002	1.818	.327	1.491	1515	101.	7.8	1.918	2.313	.010	2.323	1.645	.678	55.	3883	9.82	1.62
5	1.200	3.073	.000	3.073	1.167	1.906	2561	134.	10.0	2.137	2.874	.010	2.884	1.858	1.026	79.	3786	10.94	2.45
5.5	1.200	2.224	.144	2.368	.518	1.850	1973	127.	9.6	2.356	3.280	.036	3.316	1.953	1.363	102.	3737	12.06	3.26
6	1.200	.992	1.665	2.657	.000	2.657	2214	110.	8.4	2.575	3.461	.340	3.801	1.953	1.848	122.	3674	13.19	4.42
7	1.200	1.172	1.485	2.657	.000	2.657	2214	193.	13.9	3.013	3.889	.883	4.772	1.953	2.819	193.	3536	15.43	6.74
8	1.200	1.617	1.039	2.656	.000	2.656	2213	369.	23.5	3.452	4.480	1.262	5.742	1.953	3.789	327.	3414	17.68	9.05
9	1.200	1.559	1.098	2.657	.000	2.657	2214	356.	22.9	3.890	5.050	1.663	6.713	1.953	4.760	457.	3320	19.92	11.37
10	1.195	1.108	1.548	2.656	.000	2.656	2223	344.	22.4	4.326	5.454	2.229	7.683	1.953	5.730	583.	3239	22.15	13.69
11	1.048	1.099	1.558	2.657	.000	2.657	2535	516.	33.0	4.709	5.856	2.798	8.654	1.953	6.701	771.	3164	24.11	16.01
12	.943	.839	1.818	2.657	.000	2.657	2818	315.	25.0	5.053	6.162	3.462	9.624	1.953	7.671	886.	3112	25.87	18.33
13	.819	.896	1.761	2.657	.000	2.657	3244	340.	29.3	5.352	6.490	4.105	10.595	1.953	8.642	1011.	3059	27.41	20.65
14	.724	.646	2.011	2.657	.000	2.657	3670	315.	30.3	5.617	6.726	4.839	11.565	1.953	9.612	1126.	3015	28.76	22.97
15	.589	.596	2.060	2.656	.000	2.656	4509	390.	39.8	5.832	6.943	5.592	12.535	1.953	10.582	1268.	2973	29.86	25.28
16	.474	.447	2.209	2.656	.000	2.656	5603	391.	45.2	6.005	7.107	6.399	13.506	1.953	11.553	1411.	2935	30.75	27.60
17	.383	.373	2.284	2.657	.000	2.657	6937	327.	46.1	6.145	7.243	7.233	14.476	1.953	12.523	1530.	2906	31.47	29.92
18	.366	.314	2.343	2.657	.000	2.657	7260	217.	37.2	6.278	7.358	8.089	15.447	1.953	13.494	1610.	2882	32.15	32.24
19	.343	.289	2.368	2.657	.000	2.657	7746	181.	34.5	6.404	7.463	8.954	16.417	1.953	14.464	1676.	2859	32.79	34.56
20	.297	.268	2.388	2.656	.000	2.656	8943	206.	41.0	6.512	7.561	9.826	17.387	1.953	15.434	1751.	2828	33.35	36.88
21	.261	.307	2.350	2.657	.000	2.657	10180	177.	40.4	6.607	7.674	10.684	18.358	1.953	16.405	1815.	2792	33.83	39.20
22	.228	.205	2.452	2.657	.000	2.657	11654	164.	41.8	6.691	7.748	11.580	19.328	1.953	17.375	1875.	2756	34.26	41.52
23	.196	.196	2.461	2.657	.000	2.657	13556	142.	42.0	6.762	7.820	12.479	20.299	1.953	18.346	1927.	2730	34.63	43.84
24	.177	.194	2.463	2.657	.000	2.657	15011	136.	43.5	6.827	7.891	13.378	21.269	1.953	19.316	1977.	2720	34.96	46.15
25	.160	.144	2.512	2.656	.000	2.656	16600	149.	48.2	6.885	7.944	14.296	22.240	1.953	20.287	2032.	2696	35.26	48.47
26	.158	.142	2.515	2.657	.000	2.657	16816	86.	35.2	6.943	7.995	15.214	23.209	1.953	21.256	2063.	2666	35.55	50.79
27	.144	.138	2.519	2.657	.000	2.657	18451	89.	38.2	6.996	8.046	16.134	24.180	1.953	22.227	2095.	2639	35.82	53.11
28	.130	.119	2.538	2.657	.000	2.657	20438	89.	40.6	7.043	8.089	17.061	25.150	1.953	23.197	2128.	2622	36.06	55.43
29	.125	.111	2.546	2.657	.000	2.657	21256	74.	37.2	7.089	8.130	17.991	26.121	1.953	24.168	2155.	2583	36.30	57.75
30	.123	.108	2.549	2.657	.000	2.657	21602	55.	30.9	7.134	8.169	18.922	27.091	1.953	25.138	2175.	2544	36.53	60.06
31	.116	.111	2.546	2.657	.000	2.657	22905	57.	32.9	7.176	8.209	19.852	28.061	1.953	26.108	2196.	2503	36.75	62.38
32	.107	.177	2.479	2.656	.000	2.656	24822	67.	38.5	7.215	8.274	20.758	29.032	1.953	27.079	2220.	2454	36.95	64.70
33	.096	.085	2.572	2.657	.000	2.657	27677	75.	43.9	7.250	8.305	21.697	30.002	1.953	28.049	2247.	2398	37.12	67.02
34	.091	.080	2.577	2.657	.000	2.657	29198	52.	36.4	7.284	8.334	22.639	30.973	1.953	29.020	2266.	2360	37.30	69.34
35	.086	.077	2.580	2.657	.000	2.657	30895	43.	33.3	7.315	8.363	23.581	31.944	1.953	29.991	2282.	2312	37.46	71.66
36																			
37																			
38																			

TABLE V

DETAILED RESULTS OF CASE 5

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	M$/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.964	.000	3.964	2.300	1.664	2477	158.	9.0	2.064	2.887	.000	2.887	2.410	.477	70.	3843	10.57	1.14
4.5	1.600	2.029	.138	2.167	.647	1.520	1354	209.	11.6	2.356	3.257	.025	3.282	2.528	.754	109.	3797	12.06	1.80
5	1.600	1.473	.332	1.805	.000	1.805	1128	131.	7.6	2.648	3.526	.086	3.612	2.528	1.084	132.	3725	13.56	2.59
5.5	1.600	2.701	.000	2.701	.824	1.877	1688	184.	10.3	2.940	4.019	.086	4.105	2.678	1.427	166.	3632	15.05	3.41
6	1.599	3.002	.073	3.075	.385	2.690	1923	296.	15.6	3.232	4.568	.099	4.667	2.749	1.918	220.	3550	16.55	4.58
7	1.398	3.509	.008	3.517	.791	2.726	2516	415.	22.9	3.743	5.849	.102	5.951	3.038	2.913	372.	3423	19.17	6.96
8	1.283	2.031	.626	2.657	.000	2.657	2071	224.	14.9	4.212	6.591	.330	6.921	3.038	3.883	453.	3342	21.57	9.28
9	1.059	1.213	1.444	2.657	.000	2.657	2509	414.	28.1	4.599	7.034	.858	7.892	3.038	4.854	605.	3254	23.55	11.60
10	.926	1.246	1.411	2.657	.000	2.657	2869	390.	29.6	4.937	7.489	1.373	8.862	3.038	5.824	747.	3181	25.28	13.92
11	.828	.842	1.815	2.657	.000	2.657	3209	289.	25.9	5.239	7.797	2.036	9.833	3.038	6.795	853.	3123	26.83	16.24
12	.734	.752	1.905	2.657	.000	2.657	3620	308.	29.6	5.507	8.071	2.732	10.803	3.038	7.765	966.	3065	28.20	18.55
13	.642	.577	2.080	2.657	.000	2.657	4139	341.	34.7	5.742	8.282	3.491	11.773	3.038	8.735	1090.	3014	29.40	20.87
14	.552	.583	2.074	2.657	.000	2.657	4813	315.	36.3	5.943	8.495	4.249	12.744	3.038	9.706	1205.	2969	30.43	23.19
15	.459	.434	2.223	2.657	.000	2.657	5789	347.	43.1	6.111	8.653	5.061	13.714	3.038	10.676	1332.	2927	31.29	25.51
16	.398	.403	2.254	2.657	.000	2.657	6676	323.	44.8	6.256	8.800	5.884	14.684	3.038	11.646	1450.	2888	32.03	27.83
17	.356	.348	2.308	2.656	.000	2.656	7461	185.	34.2	6.386	8.928	6.727	15.655	3.038	12.617	1518.	2857	32.70	30.15
18	.325	.401	2.255	2.656	.000	2.656	8172	180.	35.6	6.505	9.074	7.551	16.625	3.038	13.587	1583.	2825	33.31	32.46
19	.280	.285	2.372	2.657	.000	2.657	9489	198.	41.4	6.607	9.178	8.418	17.596	3.038	14.558	1656.	2801	33.83	34.78
20	.252	.277	2.380	2.657	.000	2.657	10544	170.	40.3	6.699	9.279	9.287	18.566	3.038	15.528	1718.	2772	34.30	37.10
21	.221	.218	2.439	2.657	.000	2.657	12023	156.	41.4	6.780	9.359	10.178	19.537	3.038	16.499	1775.	2737	34.72	39.42
22	.194	.171	2.486	2.657	.000	2.657	13696	136.	41.2	6.851	9.422	11.086	20.508	3.038	17.470	1825.	2697	35.08	41.74
23	.171	.155	2.502	2.657	.000	2.657	15538	150.	46.7	6.913	9.478	11.999	21.477	3.038	18.439	1879.	2659	35.40	44.06
24	.158	.143	2.514	2.657	.000	2.657	16816	127.	44.6	6.971	9.530	12.918	22.448	3.038	19.410	1926.	2642	35.70	46.38
25	.152	.131	2.526	2.657	.000	2.657	17480	85.	35.9	7.027	9.578	13.840	23.418	3.038	20.380	1957.	2628	35.98	48.70
26	.139	.155	2.502	2.657	.000	2.657	19115	87.	38.5	7.077	9.635	14.754	24.389	3.038	21.351	1989.	2599	36.24	51.02
27	.124	.155	2.501	2.656	.000	2.656	21419	95.	43.4	7.123	9.692	15.668	25.360	3.038	22.322	2023.	2555	36.47	53.34
28	.121	.105	2.552	2.657	.000	2.657	21959	56.	31.6	7.167	9.730	16.600	26.330	3.038	23.292	2044.	2524	36.70	55.65
29	.113	.099	2.558	2.657	.000	2.657	23513	55.	32.7	7.208	9.766	17.534	27.300	3.038	24.262	2064.	2505	36.91	57.97
30	.106	.088	2.569	2.657	.000	2.657	25066	65.	38.0	7.247	9.798	18.472	28.270	3.038	25.232	2088.	2469	37.11	60.29
31	.098	.085	2.572	2.657	.000	2.657	27112	70.	41.7	7.283	9.829	19.412	29.241	3.038	26.203	2113.	2425	37.29	62.61
32	.091	.081	2.576	2.657	.000	2.657	29198	74.	44.8	7.316	9.859	20.353	30.212	3.038	27.174	2140.	2383	37.46	64.93
33	.089	.078	2.579	2.657	.000	2.657	29854	41.	31.5	7.348	9.887	21.295	31.182	3.038	28.144	2155.	2328	37.63	67.25
34	.083	.082	2.575	2.657	.000	2.657	32012	43.	34.1	7.379	9.917	22.235	32.152	3.038	29.114	2171.	2275	37.78	69.56
35	.077	.075	2.582	2.657	.000	2.657	34506	43.	35.8	7.407	9.944	23.178	33.122	3.038	30.084	2187.	2215	37.93	71.88
36																			
37																			
38																			

TABLE VI

DETAILED RESULTS OF CASE 6

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD (MMSTB/DAY)	GAS (MMMSCF/DAY): OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD	TOTAL GOR (SCF/STB)	WATER PROD (MB/DAY)	WATER CUT (%)	CUM OIL (10^9 STB)	CUMULATIVES TO YEAR END — GAS (TRILLION SCF): OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD	WATER PROD (10^6 B)	AVE OIL PRESS (PSIA)	RECOVERY OF ORIGINAL IN-PLACE: OIL (%)	TOTAL GAS (%)
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.964	.000	3.964	2.300	1.664	2477	158.	9.0	2.064	2.887	.000	2.887	2.410	.477	70.	3843	10.57	1.14
4.5	2.000	2.084	.000	2.084	.570	1.514	1042	241.	10.8	2.429	3.267	.000	3.267	2.514	.753	114.	3780	12.44	1.80
5	1.996	2.329	.007	2.336	.489	1.847	1170	179.	8.2	2.793	3.692	.001	3.693	2.603	1.090	147.	3683	14.30	2.60
5.5	1.776	3.717	.000	3.717	1.760	1.957	2093	261.	12.8	3.118	4.371	.001	4.372	2.925	1.447	195.	3591	15.97	3.46
6	1.544	4.795	.000	4.795	1.967	2.828	3106	371.	19.4	3.400	5.247	.001	5.248	3.284	1.964	262.	3499	17.41	4.69
7	1.342	3.193	.000	3.193	.493	2.700	2379	335.	20.0	3.890	6.413	.001	6.414	3.464	2.950	385.	3407	19.92	7.05
8	1.207	2.117	.590	2.707	.046	2.661	2243	270.	18.3	4.331	7.187	.217	7.404	3.481	3.923	484.	3326	22.18	9.37
9	1.005	1.014	1.643	2.657	.000	2.657	2644	405.	28.7	4.698	7.557	.817	8.374	3.481	4.893	632.	3244	24.06	11.69
10	.887	.967	1.690	2.657	.000	2.657	2995	326.	26.9	5.022	7.910	1.434	9.344	3.481	5.863	751.	3171	25.72	14.01
11	.766	.731	1.926	2.657	.000	2.657	3469	324.	29.7	5.302	8.177	2.138	10.315	3.481	6.834	869.	3106	27.15	16.33
12	.686	.705	1.952	2.657	.000	2.657	3873	324.	32.1	5.552	8.434	2.851	11.285	3.481	7.804	987.	3048	28.43	18.65
13	.586	.552	2.105	2.657	.000	2.657	4534	375.	39.0	5.767	8.636	3.619	12.255	3.481	8.774	1125.	2995	29.53	20.96
14	.493	.537	2.120	2.657	.000	2.657	5389	291.	37.1	5.947	8.832	4.394	13.226	3.481	9.745	1231.	2953	30.45	23.28
15	.412	.423	2.234	2.657	.000	2.657	6449	345.	45.6	6.097	8.987	5.209	14.196	3.481	10.715	1357.	2910	31.22	25.60
16	.354	.352	2.305	2.657	.000	2.657	7506	300.	45.9	6.226	9.115	6.051	15.166	3.481	11.685	1466.	2872	31.88	27.92
17	.319	.390	2.267	2.657	.000	2.657	8329	195.	37.9	6.343	9.258	6.879	16.137	3.481	12.656	1538.	2839	32.48	30.24
18	.274	.312	2.344	2.656	.000	2.656	9693	179.	39.5	6.443	9.372	7.735	17.107	3.481	13.626	1603.	2806	32.99	32.56
19	.241	.273	2.384	2.657	.000	2.657	11025	180.	42.8	6.531	9.472	8.606	18.078	3.481	14.597	1669.	2782	33.44	34.88
20	.214	.244	2.412	2.656	.000	2.656	12411	160.	42.8	6.609	9.561	9.487	19.048	3.481	15.567	1727.	2754	33.84	37.20
21	.191	.180	2.477	2.657	.000	2.657	13911	120.	38.6	6.679	9.626	10.392	20.018	3.481	16.537	1771.	2719	34.20	39.51
22	.169	.161	2.496	2.657	.000	2.657	15722	116.	40.7	6.741	9.685	11.304	20.989	3.481	17.508	1814.	2678	34.52	41.83
23	.148	.146	2.511	2.657	.000	2.657	17953	125.	45.8	6.795	9.739	12.221	21.960	3.481	18.479	1859.	2640	34.79	44.15
24	.144	.129	2.528	2.657	.000	2.657	18451	92.	39.0	6.848	9.786	13.144	22.930	3.481	19.449	1893.	2620	35.07	46.47
25	.146	.137	2.520	2.657	.000	2.657	18199	77.	34.5	6.901	9.836	14.064	23.900	3.481	20.419	1921.	2603	35.34	48.79
26	.133	.179	2.478	2.657	.000	2.657	19977	90.	40.4	6.949	9.901	14.969	24.870	3.481	21.389	1954.	2572	35.58	51.11
27	.123	.109	2.548	2.657	.000	2.657	21602	85.	40.9	6.994	9.941	15.900	25.841	3.481	22.360	1985.	2530	35.81	53.43
28	.119	.104	2.553	2.657	.000	2.657	22328	58.	32.8	7.038	9.979	16.832	26.811	3.481	23.330	2006.	2495	36.04	55.74
29	.111	.096	2.561	2.657	.000	2.657	23937	56.	33.5	7.079	10.014	17.768	27.782	3.481	24.301	2027.	2469	36.25	58.06
30	.104	.089	2.568	2.657	.000	2.657	25548	66.	38.8	7.117	10.046	18.706	28.752	3.481	25.271	2051.	2440	36.44	60.38
31	.096	.084	2.573	2.657	.000	2.657	27677	72.	42.9	7.152	10.077	19.646	29.723	3.481	26.242	2077.	2394	36.62	62.70
32	.090	.080	2.577	2.657	.000	2.657	29522	68.	43.0	7.185	10.106	20.587	30.693	3.481	27.212	2102.	2352	36.79	65.02
33	.087	.080	2.577	2.657	.000	2.657	30540	41.	32.0	7.217	10.135	21.528	31.663	3.481	28.182	2117.	2298	36.96	67.34
34	.082	.087	2.569	2.656	.000	2.656	32390	44.	34.9	7.246	10.167	22.467	32.634	3.481	29.153	2133.	2244	37.10	69.66
35	.075	.062	2.595	2.657	.000	2.657	35427	43.	36.4	7.274	10.190	23.415	33.605	3.481	30.124	2149.	2183	37.25	71.98
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TABLE VII

DETAILED RESULTS OF CASE 7

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.514	.053	1.567	.095	1.472	1306	74.	5.8	1.698	1.981	.010	1.991	1.586	.405	36.	3960	8.69	.97
4.5	1.200	1.816	.002	1.818	.327	1.491	1515	101.	7.8	1.918	2.313	.010	2.323	1.645	.678	55.	3883	9.82	1.62
5	1.200	3.071	.000	3.071	1.061	2.010	2559	134.	10.0	2.137	2.874	.010	2.884	1.839	1.045	79.	3785	10.94	2.50
5.5	1.200	2.418	.000	2.418	.460	1.958	2015	127.	9.6	2.356	3.315	.010	3.325	1.923	1.402	102.	3730	12.06	3.35
6	1.200	.987	1.840	2.827	.000	2.827	2356	112.	8.5	2.575	3.495	.346	3.841	1.923	1.918	123.	3666	13.19	4.58
7	1.200	1.161	1.666	2.827	.000	2.827	2356	196.	14.0	3.013	3.919	.955	4.874	1.923	2.951	194.	3522	15.43	7.05
8	1.200	1.725	1.103	2.828	.000	2.828	2357	377.	23.9	3.452	4.549	1.358	5.907	1.923	3.984	332.	3394	17.68	9.52
9	1.200	1.373	1.454	2.827	.000	2.827	2356	344.	22.3	3.890	5.051	1.889	6.940	1.923	5.017	457.	3300	19.92	11.99
10	1.190	1.083	1.744	2.827	.000	2.827	2376	356.	23.0	4.325	5.446	2.526	7.972	1.923	6.049	587.	3212	22.15	14.45
11	1.044	1.042	1.786	2.828	.000	2.828	2709	514.	33.0	4.706	5.827	3.178	9.005	1.923	7.082	775.	3134	24.10	16.92
12	.944	.974	1.853	2.827	.000	2.827	2995	323.	25.5	5.050	6.183	3.855	10.038	1.923	8.115	893.	3076	25.86	19.39
13	.831	.948	1.879	2.827	.000	2.827	3402	321.	27.9	5.354	6.529	4.541	11.070	1.923	9.147	1010.	3022	27.42	21.86
14	.725	.658	2.169	2.827	.000	2.827	3899	315.	30.3	5.619	6.769	5.333	12.102	1.923	10.179	1125.	2974	28.77	24.32
15	.590	.601	2.226	2.827	.000	2.827	4792	398.	40.3	5.834	6.989	6.147	13.136	1.923	11.213	1270.	2929	29.87	26.79
16	.483	.442	2.385	2.827	.000	2.827	5853	381.	44.1	6.011	7.150	7.018	14.168	1.923	12.245	1410.	2889	30.78	29.26
17	.398	.395	2.433	2.828	.000	2.828	7106	312.	43.9	6.156	7.295	7.906	15.201	1.923	13.278	1524.	2857	31.52	31.73
18	.380	.318	2.509	2.827	.000	2.827	7439	212.	35.8	6.295	7.411	8.823	16.234	1.923	14.311	1601.	2833	32.23	34.19
19	.357	.318	2.509	2.827	.000	2.827	7919	186.	34.3	6.426	7.527	9.739	17.266	1.923	15.343	1669.	2802	32.90	36.66
20	.306	.270	2.557	2.827	.000	2.827	9239	219.	41.7	6.537	7.626	10.673	18.299	1.923	16.376	1749.	2763	33.47	39.13
21	.271	.332	2.495	2.827	.000	2.827	10432	179.	39.8	6.636	7.747	11.584	19.331	1.923	17.408	1815.	2724	33.98	41.59
22	.224	.202	2.625	2.827	.000	2.827	12621	171.	43.3	6.718	7.821	12.543	20.364	1.923	18.441	1877.	2686	34.40	44.06
23	.191	.189	2.638	2.827	.000	2.827	14801	137.	41.8	6.787	7.890	13.507	21.397	1.923	19.474	1927.	2671	34.75	46.53
24	.173	.183	2.644	2.827	.000	2.827	16341	137.	44.2	6.851	7.957	14.472	22.429	1.923	20.506	1977.	2653	35.08	49.00
25	.156	.162	2.665	2.827	.000	2.827	18122	148.	48.7	6.907	8.016	15.446	23.462	1.923	21.539	2031.	2620	35.37	51.46
26	.151	.140	2.687	2.827	.000	2.827	18722	86.	36.3	6.963	8.068	16.427	24.495	1.923	22.572	2062.	2580	35.65	53.93
27	.139	.133	2.694	2.827	.000	2.827	20338	84.	37.7	7.013	8.116	17.411	25.527	1.923	23.604	2093.	2559	35.91	56.40
28	.125	.118	2.710	2.828	.000	2.828	22624	87.	41.0	7.059	8.159	18.401	26.560	1.923	24.637	2125.	2535	36.15	58.87
29	.122	.109	2.718	2.827	.000	2.827	23172	69.	36.1	7.104	8.199	19.394	27.593	1.923	25.670	2150.	2491	36.38	61.34
30	.120	.108	2.719	2.827	.000	2.827	23558	53.	30.6	7.147	8.239	20.387	28.626	1.923	26.703	2169.	2449	36.60	63.80
31	.113	.103	2.725	2.828	.000	2.828	25027	59.	34.3	7.189	8.276	21.382	29.658	1.923	27.735	2191.	2393	36.81	66.27
32	.105	.097	2.730	2.827	.000	2.827	26924	68.	39.3	7.227	8.312	22.379	30.691	1.923	28.768	2215.	2335	37.01	68.74
33	.098	.088	2.740	2.828	.000	2.828	28857	68.	41.0	7.263	8.344	23.380	31.724	1.923	29.801	2240.	2278	37.19	71.21
34																			
35																			
36																			
37																			
38																			

TABLE VIII

DETAILED RESULTS OF CASE 8

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.964	.000	3.964	2.300	1.664	2477	158.	9.0	2.064	2.887	.000	2.887	2.410	.477	70.	3843	10.57	1.14
4.5	1.600	2.029	.138	2.167	.647	1.520	1354	209.	11.6	2.356	3.257	.025	3.282	2.528	.754	109.	3797	12.06	1.80
5	1.600	1.472	.446	1.918	.000	1.918	1199	131.	7.6	2.648	3.526	.107	3.633	2.528	1.105	132.	3722	13.56	2.64
5.5	1.608	2.686	.012	2.698	.717	1.981	1686	184.	10.3	2.940	4.017	.109	4.126	2.659	1.467	166.	3629	15.05	3.51
6	1.599	2.978	.133	3.111	.261	2.850	1946	297.	15.7	3.232	4.560	.133	4.693	2.706	1.987	220.	3543	16.55	4.75
7	1.403	3.522	.057	3.579	.692	2.887	2551	399.	22.1	3.745	5.847	.154	6.001	2.959	3.042	366.	3411	19.18	7.27
8	1.277	1.882	.945	2.827	.000	2.827	2214	231.	15.3	4.211	6.534	.499	7.033	2.959	4.074	451.	3325	21.56	9.73
9	1.051	1.154	1.673	2.827	.000	2.827	2690	416.	28.4	4.595	6.956	1.110	8.066	2.959	5.107	603.	3233	23.53	12.20
10	.916	1.126	1.701	2.827	.000	2.827	3086	403.	30.6	4.930	7.367	1.731	9.098	2.959	6.139	750.	3156	25.24	14.67
11	.823	.831	1.996	2.827	.000	2.827	3435	281.	25.5	5.230	7.671	2.460	10.131	2.959	7.172	853.	3093	26.78	17.14
12	.722	.741	2.086	2.827	.000	2.827	3916	310.	30.0	5.494	7.942	3.222	11.164	2.959	8.205	966.	3032	28.13	19.60
13	.632	.574	2.253	2.827	.000	2.827	4473	339.	34.9	5.725	8.151	4.045	12.196	2.959	9.237	1090.	2978	29.32	22.07
14	.537	.577	2.250	2.827	.000	2.827	5264	308.	36.4	5.921	8.362	4.867	13.229	2.959	10.270	1202.	2932	30.32	24.54
15	.443	.429	2.399	2.828	.000	2.828	6384	363.	45.0	6.083	8.518	5.743	14.261	2.959	11.302	1335.	2885	31.15	27.00
16	.390	.405	2.422	2.827	.000	2.827	7249	296.	43.1	6.225	8.667	6.628	15.295	2.959	12.336	1443.	2847	31.88	29.48
17	.344	.327	2.500	2.827	.000	2.827	8218	183.	34.7	6.351	8.786	7.541	16.327	2.959	13.368	1510.	2811	32.52	31.94
18	.316	.395	2.432	2.827	.000	2.827	8946	182.	36.5	6.466	8.930	8.430	17.360	2.959	14.401	1576.	2781	33.11	34.41
19	.273	.277	2.550	2.827	.000	2.827	10355	199.	42.2	6.566	9.031	9.361	18.392	2.959	15.433	1649.	2752	33.62	36.88
20	.242	.257	2.570	2.827	.000	2.827	11682	169.	41.1	6.654	9.125	10.300	19.425	2.959	16.466	1711.	2716	34.07	39.34
21	.214	.216	2.611	2.827	.000	2.827	13210	150.	41.2	6.733	9.204	11.254	20.458	2.959	17.499	1766.	2674	34.48	41.81
22	.187	.168	2.659	2.827	.000	2.827	15118	139.	42.6	6.801	9.266	12.225	21.491	2.959	18.532	1816.	2634	34.83	44.28
23	.164	.153	2.675	2.828	.000	2.828	17244	149.	47.6	6.861	9.321	13.202	22.523	2.959	19.564	1871.	2602	35.13	46.75
24	.157	.146	2.681	2.827	.000	2.827	18006	121.	43.5	6.919	9.375	14.181	23.556	2.959	20.597	1915.	2587	35.43	49.21
25	.146	.129	2.699	2.828	.000	2.828	19370	80.	35.4	6.972	9.422	15.167	24.589	2.959	21.630	1944.	2562	35.70	51.68
26	.134	.121	2.707	2.828	.000	2.828	21104	87.	39.4	7.021	9.466	16.155	25.621	2.959	22.662	1976.	2519	35.95	54.15
27	.123	.124	2.703	2.827	.000	2.827	22984	95.	43.6	7.066	9.511	17.142	26.653	2.959	23.694	2011.	2477	36.18	56.61
28	.119	.163	2.664	2.827	.000	2.827	23756	48.	28.7	7.109	9.571	18.116	27.687	2.959	24.728	2028.	2456	36.40	59.08
29	.109	.093	2.734	2.827	.000	2.827	25936	58.	34.7	7.149	9.605	19.114	28.719	2.959	25.760	2050.	2420	36.61	61.55
30	.102	.088	2.740	2.828	.000	2.828	27725	64.	38.6	7.186	9.637	20.115	29.752	2.959	26.793	2073.	2371	36.80	64.02
31	.095	.083	2.745	2.828	.000	2.828	29768	67.	41.4	7.221	9.667	21.117	30.784	2.959	27.825	2097.	2324	36.98	66.48
32	.088	.079	2.748	2.827	.000	2.827	32125	73.	45.3	7.253	9.696	22.121	31.817	2.959	28.858	2124.	2263	37.14	68.95
33	.086	.075	2.752	2.827	.000	2.827	32872	37.	30.1	7.285	9.723	23.126	32.849	2.959	29.890	2137.	2201	37.30	71.42
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TABLE IX

DETAILED RESULTS OF CASE 9

AQUIFER
GAS INJECTION

WITH WATER INJECTION
GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.964	.000	3.964	2.300	1.664	2477	158.	9.0	2.064	2.887	.000	2.887	2.410	.477	70.	3843	10.57	1.14
4.5	2.000	2.084	.000	2.084	.570	1.514	1042	241.	10.8	2.429	3.267	.000	3.267	2.514	.753	114.	3780	12.44	1.80
5	1.995	2.326	.039	2.365	.411	1.954	1185	179.	8.2	2.793	3.692	.007	3.699	2.589	1.110	147.	3681	14.30	2.65
5.5	1.775	3.704	.000	3.704	1.643	2.061	2087	261.	12.8	3.118	4.368	.007	4.375	2.889	1.486	195.	3588	15.97	3.55
6	1.543	4.758	.000	4.758	1.776	2.982	3084	371.	19.4	3.399	5.237	.007	5.244	3.213	2.031	263.	3493	17.40	4.85
7	1.341	3.167	.000	3.167	.312	2.855	2362	336.	20.0	3.889	6.394	.007	6.401	3.327	3.074	385.	3396	19.91	7.34
8	1.203	1.967	.861	2.828	.000	2.828	2351	275.	18.6	4.329	7.112	.321	7.433	3.327	4.106	486.	3309	22.17	9.81
9	1.001	1.037	1.790	2.827	.000	2.827	2824	403.	28.7	4.694	7.491	.975	8.466	3.327	5.139	633.	3222	24.04	12.28
10	.874	.985	1.842	2.827	.000	2.827	3235	341.	28.1	5.013	7.851	1.648	9.499	3.327	6.172	757.	3146	25.67	14.75
11	.764	.725	2.102	2.827	.000	2.827	3700	304.	28.5	5.293	8.115	2.416	10.531	3.327	7.204	869.	3078	27.10	17.21
12	.673	.694	2.133	2.827	.000	2.827	4201	322.	32.4	5.538	8.369	3.195	11.564	3.327	8.237	986.	3017	28.36	19.68
13	.576	.542	2.285	2.827	.000	2.827	4908	364.	38.7	5.749	8.567	4.030	12.597	3.327	9.270	1119.	2962	29.44	22.15
14	.477	.516	2.311	2.827	.000	2.827	5927	291.	37.9	5.923	8.756	4.874	13.630	3.327	10.303	1225.	2917	30.33	24.62
15	.395	.409	2.418	2.827	.000	2.827	7157	361.	47.8	6.067	8.905	5.757	14.662	3.327	11.335	1357.	2870	31.07	27.08
16	.346	.356	2.472	2.828	.000	2.828	8173	279.	44.6	6.194	9.035	6.660	15.695	3.327	12.368	1459.	2830	31.72	29.55
17	.306	.357	2.470	2.827	.000	2.827	9239	185.	37.7	6.305	9.165	7.562	16.727	3.327	13.400	1526.	2794	32.29	32.02
18	.265	.319	2.508	2.827	.000	2.827	10668	182.	40.7	6.402	9.282	8.479	17.761	3.327	14.434	1593.	2762	32.78	34.49
19	.235	.266	2.561	2.827	.000	2.827	12030	178.	43.1	6.488	9.379	9.414	18.793	3.327	15.466	1658.	2734	33.22	36.95
20	.207	.246	2.581	2.827	.000	2.827	13657	151.	42.2	6.564	9.469	10.357	19.826	3.327	16.499	1713.	2699	33.61	39.42
21	.184	.177	2.650	2.827	.000	2.827	15364	120.	39.5	6.631	9.534	11.325	20.859	3.327	17.532	1757.	2657	33.95	41.89
22	.163	.151	2.677	2.828	.000	2.828	17350	121.	42.6	6.690	9.589	12.302	21.891	3.327	18.564	1802.	2615	34.26	44.36
23	.145	.139	2.689	2.828	.000	2.828	19503	120.	45.3	6.743	9.639	13.284	22.923	3.327	19.596	1845.	2582	34.53	46.82
24	.143	.132	2.696	2.828	.000	2.828	19776	89.	38.4	6.795	9.687	14.269	23.956	3.327	20.629	1878.	2565	34.79	49.29
25	.143	.125	2.703	2.828	.000	2.828	19776	80.	35.9	6.848	9.733	15.256	24.989	3.327	21.662	1907.	2536	35.07	51.76
26	.132	.122	2.705	2.827	.000	2.827	21417	89.	40.3	6.896	9.778	16.244	26.022	3.327	22.695	1939.	2493	35.31	54.23
27	.122	.189	2.639	2.828	.000	2.828	23180	86.	41.3	6.940	9.846	17.208	27.054	3.327	23.727	1971.	2450	35.54	56.69
28	.115	.101	2.726	2.827	.000	2.827	24583	49.	29.9	6.982	9.883	18.204	28.087	3.327	24.760	1989.	2422	35.75	59.16
29	.108	.092	2.735	2.827	.000	2.827	26176	59.	35.3	7.022	9.917	19.203	29.120	3.327	25.793	2010.	2391	35.96	61.63
30	.101	.088	2.739	2.827	.000	2.827	27990	65.	39.2	7.059	9.949	20.203	30.152	3.327	26.825	2034.	2341	36.15	64.09
31	.093	.084	2.744	2.828	.000	2.828	30409	68.	42.2	7.093	9.980	21.205	31.185	3.327	27.858	2059.	2293	36.32	66.56
32	.088	.080	2.747	2.827	.000	2.827	32125	66.	42.9	7.125	10.009	22.209	32.218	3.327	28.891	2083.	2234	36.48	69.03
33	.085	.073	2.754	2.827	.000	2.827	33259	39.	31.5	7.156	10.036	23.215	33.251	3.327	29.924	2097.	2170	36.64	71.50
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TABLE X

DETAILED RESULTS OF CASE 10

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4170	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.514	.053	1.567	.095	1.472	1306	74.	5.8	1.698	1.981	.010	1.991	1.586	.405	36.	3960	8.69	.97
5	1.200	2.448	.001	2.449	.906	1.543	2041	118.	9.0	2.137	2.875	.010	2.885	1.917	.968	79.	3791	10.94	2.31
6	1.200	1.609	.284	1.893	.395	1.498	1577	117.	8.9	2.575	3.463	.114	3.577	2.061	1.516	122.	3714	13.19	3.62
7	1.200	1.301	.208	1.509	.042	1.467	1257	182.	13.2	3.013	3.938	.190	4.128	2.076	2.052	188.	3518	15.43	4.90
8	1.200	1.853	.006	1.859	.363	1.496	1549	340.	22.1	3.452	4.615	.192	4.807	2.209	2.598	317.	3528	17.68	6.21
9	1.200	1.220	.246	1.466	.002	1.464	1222	310.	20.5	3.890	5.060	.282	5.342	2.209	3.133	426.	3480	19.92	7.49
10	1.200	1.129	.335	1.464	.000	1.464	1220	335.	21.8	4.328	5.472	.404	5.876	2.209	3.667	548.	3419	22.16	8.76
11	1.101	1.010	.454	1.464	.000	1.464	1330	441.	28.6	4.730	5.841	.570	6.411	2.209	4.202	710.	3370	24.22	10.04
12	.964	.901	.563	1.464	.000	1.464	1519	414.	30.0	5.082	6.170	.775	6.945	2.209	4.736	861.	3334	26.02	11.32
13	.872	.874	.590	1.464	.000	1.464	1679	350.	28.6	5.401	6.490	.991	7.481	2.209	5.272	989.	3305	27.66	12.60
14	.761	.684	.779	1.463	.000	1.463	1922	348.	31.4	5.679	6.740	1.275	8.015	2.209	5.806	1116.	3279	29.08	13.87
15	.652	.588	.875	1.463	.000	1.463	2244	449.	40.8	5.917	6.954	1.595	8.549	2.209	6.340	1280.	3254	30.30	15.15
16	.568	.557	.906	1.463	.000	1.463	2576	346.	37.9	6.125	7.158	1.926	9.084	2.209	6.875	1406.	3239	31.36	16.43
17	.505	.428	1.035	1.463	.000	1.463	2897	362.	41.8	6.309	7.314	2.304	9.618	2.209	7.409	1538.	3229	32.21	17.70
18	.437	.572	.891	1.463	.000	1.463	3348	321.	42.3	6.469	7.523	2.630	10.153	2.209	7.944	1656.	3208	33.13	18.98
19	.389	.479	.985	1.464	.000	1.464	3763	191.	32.9	6.611	7.698	2.990	10.688	2.209	8.479	1725.	3204	33.85	20.26
20	.362	.305	1.159	1.464	.000	1.464	4044	177.	32.8	6.743	7.810	3.413	11.223	2.209	9.014	1790.	3194	34.53	21.54
21	.327	.305	1.159	1.464	.000	1.464	4477	182.	35.8	6.862	7.921	3.836	11.757	2.209	9.548	1857.	3185	35.14	22.81
22	.307	.282	1.181	1.463	.000	1.463	4765	148.	32.5	6.975	8.024	4.267	12.291	2.209	10.082	1911.	3178	35.72	24.09
23	.273	.213	1.251	1.464	.000	1.464	5367	138.	33.5	7.074	8.102	4.724	12.826	2.209	10.617	1961.	3175	36.22	25.37
24	.242	.305	1.159	1.464	.000	1.464	6050	138.	36.3	7.162	8.213	5.148	13.361	2.209	11.152	2012.	3169	36.67	26.65
25	.202	.155	1.309	1.464	.000	1.464	7248	146.	42.0	7.236	8.270	5.626	13.896	2.209	11.687	2065.	3160	37.05	27.92
26	.191	.147	1.317	1.464	.000	1.464	7665	137.	41.8	7.306	8.323	6.107	14.430	2.209	12.221	2115.	3147	37.41	29.20
27	.185	.141	1.322	1.463	.000	1.463	7908	126.	40.5	7.374	8.375	6.590	14.965	2.209	12.756	2161.	3132	37.76	30.48
28	.168	.127	1.336	1.463	.000	1.463	8708	129.	43.4	7.435	8.421	7.078	15.499	2.209	13.290	2209.	3119	38.07	31.75
29	.149	.111	1.352	1.463	.000	1.463	9819	100.	40.2	7.489	8.462	7.572	16.034	2.209	13.825	2245.	3109	38.35	33.03
30	.149	.113	1.351	1.464	.000	1.464	9826	63.	29.7	7.544	8.507	8.065	16.568	2.209	14.359	2268.	3104	38.63	34.31
31	.141	.158	1.306	1.464	.000	1.464	10383	72.	33.8	7.595	8.561	8.542	17.103	2.209	14.894	2294.	3103	38.89	35.59
32	.124	.123	1.341	1.464	.000	1.464	11806	85.	40.7	7.641	8.605	9.032	17.637	2.209	15.428	2325.	3095	39.13	36.86
33	.110	.082	1.382	1.464	.000	1.464	13309	81.	42.4	7.681	8.635	9.537	18.172	2.209	15.963	2354.	3086	39.33	38.14
34	.100	.078	1.386	1.464	.000	1.464	14640	84.	45.7	7.717	8.664	10.043	18.707	2.209	16.498	2385.	3071	39.52	39.42
35	.096	.081	1.383	1.464	.000	1.464	15250	63.	39.6	7.752	8.693	10.548	19.241	2.209	17.032	2408.	3055	39.69	40.70
36	.091	.078	1.386	1.464	.000	1.464	16088	56.	38.1	7.786	8.722	11.054	19.776	2.209	17.567	2429.	3041	39.87	41.97
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TABLE XI

DETAILED RESULTS OF CASE 11

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.508	.410	1.918	.000	1.918	1598	74.	5.8	1.698	1.980	.075	2.055	1.568	.487	36.	3950	8.69	1.16
5	1.200	2.338	.107	2.445	.484	1.961	2037	119.	9.0	2.137	2.834	.114	2.948	1.745	1.203	79.	3767	10.94	2.87
6	1.200	2.067	.236	2.303	.354	1.949	1919	122.	9.2	2.575	3.589	.200	3.789	1.874	1.915	124.	3567	13.19	4.58
7	1.200	1.186	.732	1.918	.000	1.918	1598	202.	14.4	3.013	4.022	.467	4.489	1.874	2.615	198.	3561	15.43	6.25
8	1.200	1.528	.425	1.953	.033	1.920	1627	375.	23.8	3.452	4.580	.623	5.203	1.886	3.317	335.	3466	17.68	7.93
9	1.200	1.663	.262	1.925	.007	1.918	1604	335.	21.8	3.890	5.188	.719	5.907	1.889	4.018	457.	3392	19.92	9.60
10	1.199	1.428	.490	1.918	.000	1.918	1600	325.	21.3	4.328	5.709	.898	6.607	1.889	4.718	576.	3328	22.16	11.27
11	1.073	1.185	.733	1.918	.000	1.918	1788	522.	32.7	4.720	6.142	1.165	7.307	1.889	5.418	767.	3270	24.17	12.95
12	.993	1.094	.824	1.918	.000	1.918	1932	324.	24.6	5.082	6.542	1.466	8.008	1.889	6.119	885.	3233	26.02	14.62
13	.883	.912	1.006	1.918	.000	1.918	2172	312.	26.1	5.405	6.875	1.834	8.709	1.889	6.820	999.	3195	27.68	16.30
14	.769	.679	1.239	1.918	.000	1.918	2494	363.	32.1	5.685	7.123	2.286	9.409	1.889	7.520	1132.	3150	29.11	17.97
15	.667	.628	1.290	1.918	.000	1.918	2876	382.	36.4	5.929	7.352	2.758	10.110	1.889	8.221	1271.	3132	30.36	19.64
16	.541	.543	1.375	1.918	.000	1.918	3545	392.	42.0	6.127	7.551	3.260	10.811	1.889	8.922	1414.	3107	31.37	21.32
17	.432	.382	1.536	1.918	.000	1.918	4440	411.	48.8	6.285	7.690	3.821	11.511	1.889	9.622	1565.	3085	32.18	22.99
18	.404	.373	1.545	1.918	.000	1.918	4748	246.	37.8	6.432	7.827	4.385	12.212	1.889	10.323	1654.	3068	32.94	24.67
19	.393	.363	1.555	1.918	.000	1.918	4880	183.	31.8	6.576	7.959	4.953	12.912	1.889	11.023	1721.	3051	33.67	26.34
20	.347	.377	1.541	1.918	.000	1.918	5527	202.	36.8	6.702	8.097	5.516	13.613	1.889	11.724	1795.	3035	34.32	28.01
21	.300	.277	1.641	1.918	.000	1.918	6393	198.	39.9	6.812	8.198	6.116	14.314	1.889	12.425	1867.	3027	34.88	29.69
22	.269	.266	1.652	1.918	.000	1.918	7130	194.	41.9	6.910	8.295	6.719	15.014	1.889	13.125	1938.	3010	35.38	31.36
23	.229	.212	1.706	1.918	.000	1.918	8376	183.	44.4	6.994	8.373	7.342	15.715	1.889	13.826	2005.	2993	35.81	33.04
24	.206	.160	1.758	1.918	.000	1.918	9311	140.	40.5	7.069	8.431	7.984	16.415	1.889	14.526	2056.	2971	36.20	34.71
25	.181	.147	1.771	1.918	.000	1.918	10597	156.	46.7	7.135	8.485	8.631	17.116	1.889	15.227	2113.	2950	36.54	36.38
26	.175	.191	1.727	1.918	.000	1.918	10960	129.	42.4	7.199	8.555	9.262	17.817	1.889	15.928	2160.	2934	36.86	38.06
27	.155	.152	1.767	1.919	.000	1.919	12381	81.	34.3	7.256	8.610	9.907	18.517	1.889	16.628	2189.	2935	37.16	39.73
28	.144	.110	1.808	1.918	.000	1.918	13319	96.	38.5	7.308	8.650	10.568	19.218	1.889	17.329	2222.	2927	37.42	41.41
29	.136	.105	1.813	1.918	.000	1.918	14103	93.	40.6	7.358	8.689	11.230	19.919	1.889	18.030	2256.	2911	37.68	43.08
30	.135	.106	1.812	1.918	.000	1.918	14297	64.	32.2	7.407	8.728	11.892	20.620	1.889	18.731	2279.	2887	37.93	44.76
31	.124	.101	1.818	1.919	.000	1.919	15476	70.	36.1	7.452	8.764	12.556	21.320	1.889	19.431	2305.	2863	38.16	46.43
32	.115	.092	1.826	1.918	.000	1.918	16678	66.	36.5	7.495	8.798	13.223	22.021	1.889	20.132	2329.	2855	38.38	48.10
33	.107	.090	1.828	1.918	.000	1.918	17925	76.	41.5	7.534	8.831	13.891	22.722	1.889	20.833	2357.	2845	38.58	49.78
34	.098	.132	1.786	1.918	.000	1.918	19571	81.	45.3	7.570	8.879	14.543	23.422	1.889	21.533	2387.	2822	38.76	51.45
35	.087	.074	1.845	1.919	.000	1.919	22057	48.	35.6	7.602	8.906	15.217	24.123	1.889	22.234	2404.	2796	38.93	53.13
36	.082	.063	1.855	1.918	.000	1.918	23390	47.	36.4	7.632	8.929	15.894	24.823	1.889	22.934	2421.	2773	39.08	54.80
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TABLE XII

DETAILED RESULTS OF CASE 12

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	M$/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.505	.641	2.146	.000	2.146	1788	74.	5.8	1.698	1.979	.117	2.096	1.568	.528	36.	3944	8.69	1.26
5	1.200	2.280	.215	2.495	.321	2.174	2079	119.	9.0	2.137	2.812	.195	3.007	1.686	1.321	80.	3754	10.94	3.16
6	1.200	2.387	.072	2.459	.288	2.171	2049	123.	9.3	2.575	3.684	.222	3.906	1.791	2.115	125.	3634	13.19	5.05
7	1.200	2.430	.000	2.430	.262	2.168	2025	218.	15.4	3.013	4.571	.222	4.793	1.887	2.906	204.	3517	15.43	6.94
8	1.200	2.693	.000	2.693	.504	2.189	2244	425.	26.2	3.452	5.555	.222	5.777	2.070	3.707	359.	3420	17.68	8.86
9	1.200	2.262	.080	2.342	.181	2.161	1952	297.	19.8	3.890	6.381	.251	6.632	2.136	4.496	468.	3358	19.92	10.74
10	1.199	1.563	.582	2.145	.000	2.145	1789	393.	24.7	4.328	6.952	.464	7.416	2.136	5.280	612.	3290	22.16	12.62
11	1.097	1.147	.998	2.145	.000	2.145	1955	441.	28.7	4.729	7.371	.828	8.199	2.136	6.063	773.	3234	24.22	14.49
12	.952	.913	1.232	2.145	.000	2.145	2253	369.	27.9	5.076	7.705	1.278	8.983	2.136	6.847	907.	3189	25.99	16.36
13	.829	.900	1.245	2.145	.000	2.145	2587	325.	28.2	5.379	8.033	1.733	9.766	2.136	7.630	1026.	3148	27.54	18.23
14	.690	.632	1.513	2.145	.000	2.145	3109	454.	39.7	5.631	8.264	2.286	10.550	2.136	8.414	1192.	3106	28.83	20.10
15	.622	.612	1.534	2.146	.000	2.146	3450	383.	38.1	5.858	8.488	2.846	11.334	2.136	9.198	1332.	3075	30.00	21.98
16	.497	.513	1.633	2.146	.000	2.146	4318	378.	43.2	6.040	8.675	3.443	12.118	2.136	9.982	1470.	3047	30.93	23.85
17	.411	.368	1.778	2.146	.000	2.146	5221	342.	45.4	6.190	8.809	4.092	12.901	2.136	10.765	1595.	3022	31.70	25.72
18	.379	.359	1.787	2.146	.000	2.146	5662	269.	41.5	6.328	8.949	4.744	13.684	2.136	11.548	1693.	2999	32.40	27.59
19	.371	.314	1.831	2.145	.000	2.145	5782	186.	33.4	6.464	9.055	5.413	14.468	2.136	12.332	1761.	2983	33.10	29.47
20	.327	.373	1.773	2.146	.000	2.146	6563	195.	37.4	6.583	9.191	6.061	15.252	2.136	13.116	1832.	2968	33.71	31.34
21	.286	.246	1.899	2.145	.000	2.145	7500	192.	40.2	6.688	9.281	6.755	16.036	2.136	13.900	1902.	2947	34.25	33.21
22	.251	.241	1.904	2.145	.000	2.145	8546	182.	42.0	6.779	9.369	7.450	16.819	2.136	14.683	1969.	2922	34.71	35.08
23	.222	.213	1.933	2.146	.000	2.146	9667	145.	39.5	6.860	9.447	8.156	17.603	2.136	15.467	2021.	2898	35.13	36.96
24	.193	.155	1.991	2.146	.000	2.146	11119	145.	42.9	6.931	9.503	8.883	18.386	2.136	16.250	2074.	2873	35.49	38.83
25	.172	.148	1.997	2.145	.000	2.145	12471	155.	47.4	6.994	9.558	9.613	19.171	2.136	17.035	2131.	2859	35.81	40.70
26	.174	.139	2.006	2.145	.000	2.145	12328	107.	37.2	7.057	9.608	10.345	19.953	2.136	17.817	2169.	2854	36.14	42.57
27	.160	.146	2.000	2.146	.000	2.146	13412	101.	38.7	7.116	9.662	11.076	20.738	2.136	18.602	2206.	2840	36.44	44.45
28	.138	.182	1.964	2.146	.000	2.146	15551	94.	40.5	7.166	9.728	11.793	21.521	2.136	19.385	2240.	2816	36.69	46.32
29	.129	.106	2.039	2.145	.000	2.145	16628	88.	40.6	7.213	9.767	12.538	22.305	2.136	20.169	2272.	2786	36.93	48.19
30	.124	.101	2.044	2.145	.000	2.145	17298	57.	31.5	7.259	9.804	13.285	23.089	2.136	20.953	2293.	2780	37.17	50.06
31	.117	.097	2.048	2.145	.000	2.145	18333	61.	34.3	7.301	9.839	14.033	23.872	2.136	21.736	2315.	2765	37.39	51.94
32	.109	.089	2.057	2.146	.000	2.146	19688	71.	39.4	7.341	9.872	14.784	24.656	2.136	22.520	2341.	2743	37.59	53.81
33	.101	.084	2.062	2.146	.000	2.146	21248	77.	43.3	7.378	9.902	15.537	25.439	2.136	23.303	2369.	2701	37.78	55.68
34	.095	.082	2.064	2.146	.000	2.146	22589	65.	40.6	7.413	9.932	16.291	26.223	2.136	24.087	2393.	2675	37.96	57.55
35	.091	.099	2.047	2.146	.000	2.146	23582	44.	32.6	7.446	9.968	17.038	27.006	2.136	24.870	2409.	2641	38.13	59.42
36	.083	.075	2.070	2.145	.000	2.145	25843	51.	38.1	7.476	9.996	17.794	27.790	2.136	25.654	2428.	2605	38.28	61.30
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TABLE XIII

DETAILED RESULTS OF CASE 13

AQUIFER — WITH WATER INJECTION

GAS INJECTION — GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS					TOTAL COR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS					WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE	
		OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD					OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD			OIL	TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.502	.871	2.373	.000	2.373	1977	74.	5.8	1.698	1.979	.159	2.138	1.568	.570	76.	3939	8.69	1.36
5	1.200	2.221	.358	2.579	.190	2.389	2149	120.	9.1	2.137	2.790	.290	3.080	1.638	1.442	80.	3742	10.94	3.45
6	1.200	2.316	.284	2.600	.209	2.391	2167	117.	8.9	2.575	3.636	.394	4.030	1.714	2.316	123.	3611	13.19	5.53
7	1.200	2.285	.121	2.406	.030	2.376	2005	225.	15.8	3.013	4.471	.438	4.909	1.725	3.184	205.	3492	15.43	7.61
8	1.200	2.622	.024	2.646	.252	2.394	2205	442.	26.9	3.452	5.429	.446	5.875	1.817	4.058	366.	3387	17.68	9.70
9	1.200	2.022	.362	2.384	.011	2.373	1987	296.	19.8	3.890	6.167	.579	6.746	1.821	4.925	474.	3319	19.92	11.77
10	1.198	1.274	1.099	2.373	.000	2.373	1981	398.	24.9	4.327	6.632	.980	7.612	1.821	5.791	620.	3247	22.16	13.84
11	1.069	1.014	1.358	2.372	.000	2.372	2219	444.	29.3	4.718	7.003	1.476	8.479	1.821	6.658	782.	3187	24.16	15.91
12	.921	.837	1.536	2.373	.000	2.373	2577	377.	29.0	5.054	7.309	2.037	9.346	1.821	7.525	919.	3137	25.88	17.98
13	.793	.874	1.499	2.373	.000	2.373	2992	355.	30.9	5.344	7.628	2.584	10.212	1.821	8.391	1049.	3090	27.36	20.05
14	.683	.623	1.750	2.373	.000	2.373	3474	414.	37.7	5.594	7.855	3.224	11.079	1.821	9.258	1200.	3049	28.64	22.12
15	.589	.576	1.796	2.372	.000	2.372	4027	382.	39.3	5.809	8.066	3.880	11.946	1.821	10.125	1340.	3014	29.75	24.19
16	.468	.455	1.918	2.373	.000	2.373	5071	353.	43.0	5.979	8.232	4.580	12.812	1.821	10.991	1469.	2984	30.62	26.26
17	.396	.362	2.011	2.373	.000	2.373	5992	328.	45.3	6.124	8.364	5.314	13.678	1.821	11.857	1589.	2956	31.36	28.33
18	.364	.322	2.051	2.373	.000	2.373	6519	252.	40.9	6.257	8.482	6.064	14.546	1.821	12.725	1681.	2933	32.04	30.40
19	.354	.287	2.086	2.373	.000	2.373	6703	182.	34.0	6.387	8.587	6.825	15.412	1.821	13.591	1748.	2915	32.71	32.47
20	.310	.322	2.050	2.372	.000	2.372	7652	196.	38.7	6.500	8.705	7.574	16.279	1.821	14.458	1819.	2890	33.28	34.55
21	.269	.272	2.101	2.373	.000	2.373	8822	193.	41.8	6.598	8.804	8.342	17.146	1.821	15.325	1889.	2862	33.79	36.62
22	.240	.216	2.157	2.373	.000	2.373	9887	153.	38.9	6.686	8.883	9.130	18.013	1.821	16.192	1945.	2833	34.24	38.69
23	.219	.205	2.168	2.373	.000	2.373	11390	144.	40.7	6.762	8.957	9.921	18.878	1.821	17.057	1998.	2803	34.63	40.76
24	.185	.180	2.193	2.373	.000	2.373	12827	142.	43.4	6.830	9.023	10.722	19.745	1.821	17.924	2050.	2791	34.97	42.83
25	.169	.144	2.229	2.373	.000	2.373	14041	142.	45.7	6.892	9.076	11.536	20.612	1.821	18.791	2101.	2779	35.29	44.90
26	.174	.152	2.221	2.373	.000	2.373	13638	106.	37.9	6.955	9.131	12.347	21.478	1.821	19.657	2140.	2757	35.61	46.97
27	.153	.130	2.242	2.372	.000	2.372	15503	94.	38.1	7.011	9.179	13.166	22.345	1.821	20.524	2174.	2731	35.90	49.04
28	.138	.118	2.254	2.372	.000	2.372	17188	99.	41.8	7.061	9.222	13.990	23.212	1.821	21.391	2211.	2710	36.16	51.11
29	.131	.145	2.228	2.373	.000	2.373	18115	73.	35.8	7.109	9.275	14.804	24.079	1.821	22.258	2237.	2597	36.40	53.18
30	.124	.149	2.224	2.373	.000	2.373	19137	57.	31.5	7.154	9.329	15.616	24.945	1.821	23.124	2258.	2566	36.63	55.25
31	.115	.096	2.277	2.373	.000	2.373	20635	62.	35.0	7.196	9.364	16.448	25.812	1.821	23.991	2281.	2627	36.85	57.32
32	.108	.091	2.281	2.372	.000	2.372	21963	65.	37.6	7.235	9.398	17.281	26.679	1.821	24.858	2305.	2595	37.05	59.40
33	.100	.087	2.285	2.372	.000	2.372	23720	73.	42.2	7.272	9.430	18.116	27.546	1.821	25.725	2331.	2557	37.24	61.47
34	.095	.085	2.287	2.372	.000	2.372	24968	63.	39.9	7.307	9.461	18.951	28.412	1.821	26.591	2354.	2513	37.42	63.54
35	.091	.080	2.293	2.373	.000	2.373	26077	47.	32.1	7.340	9.490	19.788	29.278	1.821	27.457	2370.	2474	37.59	65.60
36	.085	.080	2.293	2.373	.000	2.373	27918	47.	35.6	7.371	9.519	20.626	30.145	1.821	28.324	2387.	2446	37.74	67.68
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TABLE XIV

DETAILED RESULTS OF CASE 14

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4130	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.508	2.001	3.509	.000	3.509	2924	74.	5.8	1.698	1.980	.365	2.345	1.568	.777	36.	3911	8.69	1.86
5	1.200	1.949	1.560	3.509	.000	3.509	2924	123.	9.3	2.137	2.692	.935	3.627	1.568	2.059	81.	3671	10.94	4.92
6	1.200	2.423	1.087	3.510	.000	3.510	2925	125.	9.4	2.575	3.577	1.332	4.909	1.568	3.341	127.	3494	13.19	7.98
7	1.200	1.798	1.711	3.509	.000	3.509	2924	267.	18.2	3.013	4.233	1.957	6.190	1.568	4.622	224.	3347	15.43	11.04
8	1.200	1.737	1.772	3.509	.000	3.509	2924	475.	28.4	3.452	4.868	2.604	7.472	1.568	5.904	398.	3220	17.68	14.11
9	1.200	1.286	2.223	3.509	.000	3.509	2924	305.	20.3	3.890	5.737	3.416	8.753	1.568	7.185	509.	3122	19.92	17.17
10	1.163	1.085	2.424	3.509	.000	3.509	3017	413.	26.2	4.315	6.734	4.302	10.036	1.568	8.468	660.	3024	22.10	20.23
11	.969	.978	2.531	3.509	.000	3.509	3621	477.	33.0	4.669	8.091	5.226	11.317	1.568	9.749	834.	2945	23.91	23.29
12	.853	.835	2.674	3.509	.000	3.509	4114	311.	26.7	4.980	6.396	6.203	12.599	1.568	11.031	948.	2880	25.50	26.36
13	.742	.711	2.798	3.509	.000	3.509	4729	339.	31.4	5.251	6.656	7.225	13.881	1.568	12.313	1072.	2815	26.89	29.42
14	.622	.740	2.769	3.509	.000	3.509	5641	383.	38.1	5.478	6.926	8.236	15.162	1.568	13.594	1212.	2755	28.05	32.48
15	.485	.454	3.055	3.509	.000	3.509	7235	360.	42.6	5.655	7.092	9.352	16.444	1.568	14.876	1343.	2706	28.96	35.54
16	.385	.443	3.066	3.509	.000	3.509	9114	348.	47.5	5.796	7.254	10.472	17.726	1.568	16.158	1470.	2668	29.68	38.61
17	.364	.332	3.177	3.509	.000	3.509	9640	243.	40.0	5.929	7.375	11.633	19.008	1.568	17.440	1559.	2625	30.36	41.67
18	.326	.370	3.139	3.509	.000	3.509	10764	198.	37.8	6.048	7.510	12.779	20.289	1.568	18.721	1631.	2574	30.97	44.73
19	.290	.273	3.237	3.510	.000	3.510	12103	176.	37.8	6.154	7.609	13.961	21.570	1.568	20.002	1695.	2518	31.51	47.79
20	.249	.237	3.272	3.509	.000	3.509	14092	179.	41.8	6.245	7.696	15.157	22.853	1.568	21.285	1761.	2479	31.98	50.86
21	.230	.216	3.293	3.509	.000	3.509	15257	128.	35.8	6.329	7.775	16.359	24.134	1.568	22.566	1807.	2454	32.41	53.92
22	.203	.193	3.316	3.509	.000	3.509	17286	144.	41.5	6.403	7.845	17.570	25.415	1.568	23.847	1860.	2406	32.79	56.98
23	.181	.191	3.318	3.509	.000	3.509	19387	130.	41.8	6.469	7.915	18.782	26.697	1.568	25.129	1907.	2365	33.13	60.04
24	.155	.201	3.308	3.509	.000	3.509	22639	143.	48.0	6.526	7.989	19.991	27.980	1.568	26.412	1960.	2332	33.42	63.11
25	.142	.173	3.336	3.509	.000	3.509	24711	131.	48.0	6.578	8.052	21.209	29.261	1.568	27.693	2007.	2266	33.68	66.17
26	.133	.132	3.377	3.509	.000	3.509	26383	82.	38.1	6.627	8.100	22.443	30.543	1.568	28.975	2037.	2210	33.93	69.23
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TABLE XV

DETAILED RESULTS OF CASE 15

AQUIFER WITH WATER INJECTION
GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL COR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.200	1.426	.000	1.426	1.312	.114	1188	7.	.6	.822	.876	.000	.876	.806	.070	2.	4136	4.21	.17
3	1.200	1.642	.000	1.642	1.511	.131	1368	28.	2.3	1.260	1.476	.000	1.476	1.358	.118	13.	4055	6.45	.28
3.5	1.200	1.252	.000	1.252	1.151	.101	1043	53.	4.2	1.479	1.705	.000	1.705	1.568	.137	23.	4025	7.57	.33
4	1.200	1.497	3.148	4.645	.000	4.645	3871	75.	5.9	1.699	1.978	.575	2.553	1.568	.985	36.	3884	8.69	2.35
5	1.200	1.669	2.977	4.646	.000	4.646	3872	125.	9.4	2.137	2.587	1.662	4.249	1.568	2.681	82.	3599	10.94	6.41
6	1.200	2.198	2.447	4.645	.000	4.645	3871	126.	9.5	2.575	3.390	2.556	5.946	1.568	4.378	128.	3380	13.19	10.46
7	1.200	2.143	2.503	4.646	.000	4.646	3872	310.	20.5	3.013	4.173	3.470	7.643	1.568	6.075	241.	3200	15.43	14.52
8	1.200	1.855	2.791	4.646	.000	4.646	3872	462.	27.8	3.452	4.850	4.489	9.339	1.568	7.771	410.	3054	17.68	18.57
9	1.200	1.763	2.883	4.646	.000	4.646	3872	315.	20.8	3.890	5.494	5.542	11.036	1.568	9.468	525.	2970	19.92	22.62
10	1.081	1.326	3.319	4.645	.000	4.645	4297	502.	31.7	4.285	5.979	6.755	12.734	1.568	11.166	708.	2814	21.94	26.68
11	.885	.953	3.692	4.645	.000	4.645	5249	429.	32.6	4.608	6.327	8.103	14.430	1.568	12.862	865.	2723	23.60	30.73
12	.767	.783	3.862	4.645	.000	4.645	6056	321.	29.5	4.888	6.617	9.514	16.127	1.568	14.559	982.	2636	25.03	34.79
13	.669	.674	3.971	4.645	.000	4.645	6943	320.	32.4	5.132	6.859	10.965	17.824	1.568	16.256	1099.	2550	26.28	38.84
14	.536	.577	4.068	4.645	.000	4.645	8666	386.	41.9	5.328	7.070	12.450	19.520	1.568	17.952	1240.	2484	27.28	42.89
15	.391	.443	4.202	4.645	.000	4.645	11880	341.	46.6	5.471	7.232	13.985	21.217	1.568	19.649	1364.	2422	28.01	46.95
16	.332	.483	4.162	4.645	.000	4.645	13991	313.	48.5	5.592	7.408	15.506	22.914	1.568	21.346	1479.	2343	28.63	51.00
17	.295	.309	4.337	4.646	.000	4.646	15749	211.	41.7	5.700	7.521	17.090	24.611	1.568	23.043	1556.	2264	29.19	55.06
18	.262	.278	4.367	4.645	.000	4.645	17729	170.	39.4	5.796	7.623	18.685	26.308	1.568	24.740	1618.	2200	29.68	59.11
19	.236	.255	4.391	4.646	.000	4.646	19686	167.	41.4	5.882	7.716	20.288	28.004	1.568	26.436	1679.	2146	30.12	63.17
20	.210	.225	4.420	4.645	.000	4.645	22119	138.	39.7	5.959	7.798	21.903	29.701	1.568	28.133	1729.	2076	30.51	67.22
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TABLE XVI

DETAILED RESULTS OF CASE 16

AQUIFER GAS INJECTION — WITH WATER INJECTION GAS SALES

AVERAGE RATES FOR YEAR — CUMULATIVES TO YEAR END

YEAR	OIL PROD	GAS					TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	GAS					WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE	
		OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD					OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD			OIL	TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.73
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.964	.000	3.964	2.300	1.664	2477	158.	9.0	2.064	2.887	.000	2.887	2.410	.477	70.	3843	10.57	1.14
5	1.600	1.752	.084	1.836	.342	1.494	1147	170.	9.6	2.648	3.526	.031	3.557	2.535	1.022	132.	3732	13.56	2.44
6	1.600	2.947	.000	2.947	1.365	1.582	1842	238.	12.9	3.232	4.603	.031	4.634	3.033	1.601	219.	3575	16.55	3.83
7	1.410	3.712	.000	3.712	2.068	1.644	2633	417.	22.8	3.747	5.959	.031	5.990	3.789	2.201	372.	3485	19.19	5.26
8	1.300	2.819	.000	2.819	1.247	1.572	2168	221.	14.5	4.222	6.988	.031	7.019	4.244	2.775	453.	3436	21.62	6.63
9	1.089	1.401	.302	1.703	.220	1.483	1564	398.	26.8	4.620	7.500	.141	7.641	4.325	3.316	598.	3399	23.66	7.92
10	.978	1.343	.121	1.464	.000	1.464	1497	360.	26.9	4.977	7.990	.185	8.175	4.325	3.850	729.	3353	25.49	9.20
11	.865	.893	.571	1.464	.000	1.464	1692	290.	25.1	5.293	8.317	.394	8.711	4.325	4.386	835.	3316	27.10	10.48
12	.758	.835	.628	1.463	.000	1.463	1930	369.	32.7	5.570	8.622	.623	9.245	4.325	4.920	970.	3280	28.52	11.76
13	.679	.629	.835	1.464	.000	1.464	2156	367.	35.1	5.818	8.851	.928	9.779	4.325	5.454	1104.	3249	29.79	13.03
14	.578	.726	.738	1.464	.000	1.464	2533	389.	40.2	6.029	9.117	1.197	10.314	4.325	5.989	1246.	3222	30.87	14.31
15	.508	.457	1.006	1.463	.000	1.463	2880	294.	36.7	6.215	9.284	1.565	10.849	4.325	6.524	1354.	3205	31.82	15.59
16	.434	.417	1.047	1.464	.000	1.464	3373	339.	43.9	6.373	9.436	1.947	11.383	4.325	7.058	1477.	3186	32.63	16.86
17	.402	.432	1.032	1.464	.000	1.464	3642	262.	39.5	6.520	9.594	2.324	11.918	4.325	7.593	1573.	3171	33.39	18.14
18	.361	.338	1.125	1.463	.000	1.463	4053	248.	40.7	6.652	9.717	2.735	12.452	4.325	8.127	1664.	3157	34.06	19.42
19	.304	.300	1.164	1.464	.000	1.464	4816	170.	35.9	6.763	9.827	3.160	12.987	4.325	8.662	1726.	3148	34.63	20.70
20	.283	.234	1.229	1.463	.000	1.463	5170	166.	37.0	6.867	9.912	3.609	13.521	4.325	9.196	1786.	3135	35.16	21.97
21	.261	.258	1.206	1.464	.000	1.464	5609	150.	36.5	6.962	10.006	4.050	14.056	4.325	9.731	1841.	3123	35.65	23.25
22	.225	.264	1.200	1.464	.000	1.464	6507	143.	38.9	7.044	10.103	4.488	14.591	4.325	10.266	1893.	3113	36.07	24.53
23	.197	.158	1.305	1.463	.000	1.463	7426	129.	39.6	7.116	10.161	4.965	15.126	4.325	10.801	1940.	3107	36.44	25.81
24	.177	.138	1.325	1.463	.000	1.463	8266	120.	40.4	7.181	10.211	5.449	15.660	4.325	11.335	1984.	3100	36.77	27.08
25	.177	.138	1.326	1.464	.000	1.464	8271	96.	35.2	7.245	10.261	5.933	16.194	4.325	11.869	2019.	3091	37.10	28.36
26	.166	.130	1.334	1.464	.000	1.464	8819	101.	37.8	7.306	10.309	6.420	16.729	4.325	12.404	2056.	3077	37.41	29.64
27	.155	.121	1.343	1.464	.000	1.464	9445	116.	42.8	7.363	10.353	6.911	17.264	4.325	12.939	2099.	3061	37.70	30.92
28	.149	.123	1.341	1.464	.000	1.464	9826	96.	39.2	7.417	10.398	7.400	17.798	4.325	13.473	2133.	3045	37.98	32.19
29	.143	.167	1.297	1.464	.000	1.464	10238	61.	29.9	7.469	10.459	7.874	18.333	4.325	14.008	2156.	3031	38.25	33.47
30	.132	.132	1.331	1.463	.000	1.463	11083	68.	34.0	7.517	10.507	8.360	18.867	4.325	14.542	2181.	3017	38.49	34.75
31	.120	.101	1.362	1.463	.000	1.463	12192	81.	40.3	7.561	10.544	8.858	19.402	4.325	15.077	2210.	3012	38.72	36.02
32	.112	.091	1.372	1.463	.000	1.463	13062	89.	44.3	7.602	10.577	9.359	19.936	4.325	15.611	2243.	3008	38.93	37.30
33	.104	.087	1.377	1.464	.000	1.464	14077	85.	45.0	7.640	10.609	9.862	20.471	4.325	16.146	2274.	2999	39.12	38.58
34	.097	.080	1.384	1.464	.000	1.464	15093	49.	33.6	7.676	10.638	10.368	21.006	4.325	16.681	2292.	2987	39.31	39.86
35	.091	.077	1.387	1.464	.000	1.464	16088	55.	37.7	7.709	10.666	10.874	21.540	4.325	17.215	2312.	2972	39.47	41.13
36	.085	.072	1.391	1.463	.000	1.463	17212	64.	43.0	7.740	10.693	11.382	22.075	4.325	17.750	2335.	2952	39.63	42.41
37	.081	.070	1.394	1.464	.000	1.464	18074	66.	44.9	7.769	10.718	11.891	22.609	4.325	18.284	2359.	2936	39.78	43.69
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TABLE XVII

DETAILED RESULTS OF CASE 17

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.952	.000	3.952	1.871	2.081	2470	159.	9.0	2.064	2.884	.000	2.884	2.331	.553	70.	3838	10.57	1.32
5	1.600	1.729	.461	2.190	.249	1.941	1369	165.	9.3	2.648	3.516	.168	3.684	2.422	1.262	131.	3707	13.56	3.02
6	1.599	2.688	.017	2.705	.724	1.981	1692	253.	13.7	3.232	4.498	.174	4.672	2.687	1.985	223.	3544	16.55	4.74
7	1.410	3.397	.000	3.397	1.360	2.037	2409	389.	21.6	3.747	5.738	.174	5.912	3.184	2.728	365.	3444	19.19	6.52
8	1.293	2.066	.144	2.210	.268	1.942	1709	231.	15.2	4.219	6.497	.227	6.720	3.282	3.438	449.	3389	21.60	8.21
9	1.076	1.126	.792	1.918	.000	1.918	1783	418.	28.0	4.612	6.904	.516	7.420	3.282	4.138	602.	3326	23.62	9.89
10	.940	.968	.950	1.918	.000	1.918	2040	348.	27.0	4.956	7.258	.863	8.121	3.282	4.839	729.	3276	25.38	11.56
11	.810	.792	1.126	1.918	.000	1.918	2368	344.	29.8	5.252	7.547	1.275	8.822	3.282	5.540	854.	3228	26.89	13.24
12	.743	.734	1.184	1.918	.000	1.918	2581	317.	29.9	5.523	7.815	1.707	9.522	3.282	6.240	970.	3185	28.28	14.91
13	.640	.554	1.364	1.918	.000	1.918	2997	369.	36.6	5.757	8.018	2.205	10.223	3.282	6.941	1105.	3149	29.48	16.58
14	.549	.574	1.344	1.918	.000	1.918	3494	326.	37.3	5.957	8.228	2.696	10.924	3.282	7.642	1224.	3121	30.50	18.26
15	.474	.433	1.485	1.918	.000	1.918	4046	332.	41.2	6.130	8.386	3.238	11.624	3.282	8.342	1345.	3092	31.39	19.93
16	.399	.594	1.324	1.918	.000	1.918	4807	322.	44.7	6.276	8.603	3.722	12.325	3.282	9.043	1463.	3066	32.14	21.61
17	.355	.438	1.480	1.918	.000	1.918	5403	266.	42.8	6.406	8.767	4.267	13.026	3.282	9.744	1560.	3046	32.80	23.28
18	.307	.284	1.635	1.919	.000	1.919	6251	164.	34.8	6.518	8.866	4.860	13.726	3.282	10.444	1620.	3028	33.38	24.95
19	.276	.283	1.635	1.918	.000	1.918	6949	177.	39.1	6.619	8.970	5.457	14.427	3.282	11.145	1684.	3008	33.89	26.63
20	.254	.249	1.669	1.918	.000	1.918	7551	136.	34.9	6.711	9.061	6.065	15.127	3.282	11.845	1734.	2997	34.36	28.30
21	.228	.194	1.725	1.919	.000	1.919	8417	139.	37.9	6.795	9.132	6.696	15.828	3.282	12.546	1785.	2981	34.79	29.98
22	.205	.184	1.734	1.918	.000	1.918	9356	121.	37.1	6.869	9.199	7.330	16.529	3.282	13.247	1829.	2966	35.17	31.65
23	.174	.217	1.701	1.918	.000	1.918	11023	119.	40.6	6.933	9.278	7.951	17.229	3.282	13.947	1872.	2944	35.50	33.32
24	.153	.165	1.753	1.918	.000	1.918	12536	135.	46.9	6.989	9.338	8.591	17.929	3.282	14.647	1921.	2920	35.79	35.00
25	.156	.126	1.792	1.918	.000	1.918	12295	88.	36.1	7.046	9.384	9.245	18.630	3.282	15.348	1954.	2899	36.08	36.67
26	.148	.116	1.802	1.918	.000	1.918	12959	79.	34.8	7.100	9.427	9.904	19.331	3.282	16.049	1982.	2877	36.36	38.35
27	.139	.109	1.809	1.918	.000	1.918	13799	91.	39.6	7.150	9.466	10.565	20.031	3.282	16.749	2016.	2866	36.61	40.02
28	.138	.109	1.809	1.918	.000	1.918	13899	70.	33.7	7.201	9.506	11.226	20.732	3.282	17.450	2041.	2859	36.87	41.69
29	.133	.104	1.814	1.918	.000	1.918	14421	70.	34.5	7.250	9.544	11.889	21.433	3.282	18.151	2067.	2842	37.12	43.37
30	.125	.099	1.819	1.918	.000	1.918	15344	73.	36.9	7.295	9.581	12.553	22.134	3.282	18.852	2093.	2819	37.35	45.04
31	.112	.141	1.777	1.918	.000	1.918	17125	74.	39.8	7.336	9.632	13.202	22.834	3.282	19.552	2120.	2791	37.56	46.72
32	.097	.087	1.832	1.919	.000	1.919	19784	78.	44.6	7.371	9.664	13.871	23.535	3.282	20.253	2149.	2768	37.74	48.39
33	.091	.070	1.848	1.918	.000	1.918	21077	60.	39.7	7.405	9.689	14.546	24.235	3.282	20.953	2170.	2754	37.92	50.06
34	.087	.065	1.854	1.919	.000	1.919	22057	50.	36.5	7.436	9.713	15.223	24.936	3.282	21.654	2189.	2750	38.08	51.74
35	.081	.060	1.858	1.918	.000	1.918	23679	54.	40.0	7.466	9.735	15.902	25.637	3.282	22.355	2209.	2721	38.23	53.41
36	.076	.059	1.859	1.918	.000	1.918	25237	53.	41.1	7.494	9.756	16.581	26.337	3.282	23.056	2228.	2697	38.37	55.09
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TABLE XVIII

DETAILED RESULTS OF CASE 18

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL COR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.948	.000	3.948	1.659	2.289	2467	159.	9.0	2.064	2.884	.000	2.884	2.293	.591	70.	3834	10.57	1.41
5	1.600	1.741	.637	2.378	.214	2.164	1486	163.	9.2	2.648	3.520	.233	3.753	2.371	1.382	130.	3588	13.56	3.30
6	1.598	2.715	.051	2.766	.571	2.195	1731	254.	13.7	3.232	4.511	.251	4.762	2.579	2.183	223.	3519	16.55	5.22
7	1.399	3.433	.000	3.433	1.184	2.249	2454	389.	21.8	3.743	5.765	.251	6.016	3.012	3.004	365.	3413	19.17	7.18
8	1.280	1.885	.304	2.189	.040	2.149	1710	234.	15.5	4.210	6.454	.762	6.816	3.026	3.790	451.	3354	21.56	9.06
9	1.065	1.162	.983	2.145	.000	2.145	2014	418.	28.2	4.599	6.878	.721	7.599	3.026	4.573	603.	3281	23.55	10.93
10	.915	.937	1.209	2.146	.000	2.146	2345	370.	28.8	4.933	7.220	1.163	8.383	3.026	5.357	738.	3227	25.26	12.80
11	.797	.806	1.339	2.145	.000	2.145	2691	328.	29.2	5.224	7.515	1.652	9.167	3.026	6.141	858.	3177	26.75	14.67
12	.726	.706	1.439	2.145	.000	2.145	2955	313.	30.1	5.490	7.773	2.178	9.951	3.026	6.925	973.	3131	28.11	16.55
13	.619	.570	1.575	2.145	.000	2.145	3465	378.	37.9	5.715	7.981	2.753	10.734	3.026	7.708	1110.	3089	29.26	18.42
14	.533	.558	1.587	2.145	.000	2.145	4024	308.	36.6	5.910	8.185	3.333	11.518	3.026	8.492	1223.	3057	30.26	20.29
15	.451	.414	1.732	2.146	.000	2.146	4758	327.	42.0	6.075	8.376	3.965	12.301	3.026	9.275	1342.	3026	31.11	22.16
16	.383	.392	1.753	2.145	.000	2.145	5601	328.	46.1	6.215	8.479	4.606	13.085	3.026	10.059	1462.	2997	31.82	24.03
17	.349	.436	1.710	2.146	.000	2.146	6149	236.	40.3	6.343	8.638	5.230	13.868	3.026	10.842	1548.	2971	32.48	25.91
18	.300	.376	1.770	2.146	.000	2.146	7153	164.	35.3	6.452	8.775	5.877	14.652	3.026	11.626	1608.	2949	33.04	27.78
19	.264	.278	1.867	2.145	.000	2.145	8125	196.	42.6	6.549	8.877	6.559	15.436	3.026	12.410	1680.	2926	33.53	29.65
20	.243	.267	1.879	2.146	.000	2.146	8831	156.	39.1	6.638	8.974	7.245	16.219	3.026	13.193	1737.	2910	33.99	31.52
21	.209	.192	1.953	2.145	.000	2.145	10263	155.	42.6	6.714	9.044	7.959	17.003	3.026	13.977	1793.	2893	34.38	33.40
22	.192	.168	1.978	2.146	.000	2.146	11177	113.	37.0	6.784	9.106	8.681	17.787	3.026	14.761	1835.	2869	34.74	35.27
23	.168	.157	1.989	2.146	.000	2.146	12774	123.	42.3	6.845	9.163	9.407	18.570	3.026	15.544	1880.	2838	35.05	37.14
24	.150	.175	1.971	2.146	.000	2.146	14707	135.	47.4	6.900	9.227	10.127	19.354	3.026	16.328	1929.	2811	35.33	39.01
25	.151	.164	1.982	2.146	.000	2.146	14212	70.	31.7	6.955	9.286	10.851	20.137	3.026	17.111	1955.	2788	35.61	40.88
26	.143	.118	2.028	2.146	.000	2.146	15007	81.	36.2	7.007	9.329	11.592	20.921	3.026	17.895	1984.	2779	35.88	42.76
27	.133	.108	2.037	2.145	.000	2.145	16128	96.	41.9	7.056	9.369	12.336	21.705	3.026	18.679	2019.	2764	36.13	44.63
28	.134	.107	2.039	2.146	.000	2.146	16015	65.	32.7	7.104	9.408	13.081	22.489	3.026	19.463	2043.	2743	36.38	46.50
29	.126	.103	2.043	2.146	.000	2.146	17032	66.	34.4	7.150	9.445	13.827	23.272	3.026	20.246	2067.	2714	36.61	48.38
30	.115	.095	2.051	2.146	.000	2.146	18661	67.	36.8	7.192	9.480	14.576	24.056	3.026	21.030	2091.	2684	36.83	50.25
31	.108	.090	2.056	2.146	.000	2.146	19870	67.	38.3	7.232	9.513	15.326	24.839	3.026	21.813	2116.	2670	37.07	52.12
32	.100	.090	2.055	2.145	.000	2.145	21450	79.	44.1	7.268	9.546	16.077	25.623	3.026	22.597	2145.	2653	37.22	53.99
33	.092	.122	2.024	2.146	.000	2.146	23326	54.	37.0	7.302	9.590	16.816	26.406	3.026	23.380	2165.	2622	37.39	55.86
34	.083	.065	2.081	2.146	.000	2.146	25855	45.	35.2	7.332	9.614	17.575	27.190	3.026	24.164	2181.	2592	37.54	57.74
35	.078	.060	2.085	2.145	.000	2.145	27500	48.	38.1	7.361	9.636	18.338	27.974	3.026	24.948	2199.	2564	37.69	59.61
36	.073	.058	2.088	2.146	.000	2.146	29397	54.	42.5	7.387	9.657	19.101	28.758	3.026	25.732	2219.	2525	37.83	61.48
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TABLE XIX

DETAILED RESULTS OF CASE 19

AQUIFER WITH WATER INJECTION

GAS INJECTION GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS					TOTAL GOR	WATER PROD	WATER CUT	CUMULATIVES TO YEAR END: CUM OIL	GAS					WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE	
		OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD					OIL ZONE PROD	GAS CAP PROD	TOTAL PROD	INJ.	NET PROD			OIL	TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.943	.000	3.943	1.445	2.498	2464	159.	9.0	2.064	2.883	.000	2.883	2.254	.629	70.	3830	10.57	1.50
5	1.600	1.740	.826	2.566	.178	2.388	1604	164.	9.3	2.648	3.518	.302	3.820	2.318	1.502	130.	3673	13.56	3.59
6	1.596	2.625	.112	2.737	.335	2.402	1715	259.	14.0	3.231	4.477	.343	4.820	2.441	2.379	225.	3500	16.54	5.68
7	1.399	3.348	.016	3.364	.911	2.453	2405	376.	21.2	3.742	5.700	.348	6.048	2.774	3.274	363.	3389	19.16	7.82
8	1.271	1.694	.678	2.372	.000	2.372	1866	246.	16.2	4.206	6.319	.596	6.915	2.774	4.141	452.	3321	21.54	9.89
9	1.049	1.058	1.314	2.372	.000	2.372	2261	417.	28.4	4.590	6.705	1.076	7.781	2.774	5.007	604.	3244	23.50	11.96
10	.922	1.096	1.277	2.373	.000	2.373	2574	380.	29.2	4.926	7.105	1.543	8.648	2.774	5.874	743.	3181	25.22	14.04
11	.827	.851	1.522	2.373	.000	2.373	2869	293.	26.2	5.228	7.416	2.099	9.515	2.774	6.741	850.	3129	26.77	16.11
12	.734	.711	1.662	2.373	.000	2.373	3233	312.	29.8	5.496	7.676	2.706	10.382	2.774	7.608	964.	3079	28.14	18.18
13	.641	.611	1.762	2.373	.000	2.373	3702	351.	35.4	5.730	7.899	3.349	11.248	2.774	8.474	1092.	3035	29.34	20.25
14	.555	.572	1.801	2.373	.000	2.373	4276	310.	35.8	5.933	8.107	4.007	12.114	2.774	9.340	1206.	2997	30.38	22.32
15	.466	.431	1.942	2.373	.000	2.373	5092	342.	42.3	6.103	8.265	4.717	12.982	2.774	10.208	1331.	2961	31.25	24.39
16	.407	.400	1.973	2.373	.000	2.373	5830	326.	44.5	6.253	8.411	5.437	13.848	2.774	11.074	1450.	2928	32.01	26.46
17	.362	.335	2.038	2.373	.000	2.373	6555	186.	33.9	6.384	8.533	6.182	14.715	2.774	11.941	1518.	2902	32.69	28.53
18	.334	.409	1.964	2.373	.000	2.373	7105	175.	34.4	6.506	8.682	6.899	15.581	2.774	12.807	1581.	2873	33.31	30.60
19	.289	.288	2.085	2.373	.000	2.373	8211	198.	40.7	6.612	8.787	7.660	16.447	2.774	13.673	1654.	2852	33.86	32.67
20	.261	.277	2.095	2.372	.000	2.372	9088	168.	39.2	6.707	8.889	8.426	17.315	2.774	14.541	1715.	2833	34.34	34.74
21	.228	.227	2.146	2.373	.000	2.373	10408	170.	42.7	6.790	8.971	9.210	18.181	2.774	15.407	1777.	2805	34.77	36.81
22	.201	.176	2.197	2.373	.000	2.373	11806	132.	39.6	6.864	9.036	10.012	19.048	2.774	16.274	1825.	2772	35.15	38.88
23	.179	.160	2.213	2.373	.000	2.373	13257	151.	45.8	6.929	9.094	10.820	19.914	2.774	17.140	1880.	2740	35.48	40.95
24	.162	.135	2.238	2.373	.000	2.373	14648	141.	46.5	6.988	9.144	11.638	20.782	2.774	18.008	1932.	2711	35.78	43.03
25	.160	.138	2.235	2.373	.000	2.373	14831	92.	36.5	7.047	9.194	12.454	21.648	2.774	18.874	1965.	2702	36.08	45.10
26	.141	.193	2.180	2.373	.000	2.373	16830	85.	37.6	7.098	9.264	13.250	22.514	2.774	19.740	1996.	2687	36.35	47.17
27	.127	.105	2.267	2.372	.000	2.372	18677	98.	43.6	7.144	9.303	14.078	23.381	2.774	20.607	2032.	2661	36.58	49.24
28	.129	.108	2.265	2.373	.000	2.373	18395	61.	32.1	7.191	9.342	14.905	24.247	2.774	21.473	2055.	2626	36.82	51.31
29	.118	.099	2.274	2.373	.000	2.373	20110	61.	34.1	7.235	9.378	15.736	25.114	2.774	22.340	2077.	2597	37.05	53.38
30	.110	.094	2.279	2.373	.000	2.373	21573	61.	35.7	7.275	9.413	16.568	25.981	2.774	23.207	2099.	2582	37.25	55.45
31	.102	.086	2.287	2.373	.000	2.373	23265	73.	41.7	7.312	9.444	17.403	26.847	2.774	24.073	2126.	2556	37.44	57.52
32	.094	.079	2.293	2.372	.000	2.372	25234	79.	45.7	7.347	9.473	18.241	27.714	2.774	24.940	2155.	2517	37.62	59.59
33	.092	.083	2.289	2.372	.000	2.372	25783	42.	31.3	7.380	9.504	19.077	28.581	2.774	25.807	2170.	2485	37.79	61.66
34	.085	.087	2.286	2.373	.000	2.373	27918	45.	34.6	7.411	9.535	19.912	29.447	2.774	26.673	2187.	2443	37.95	63.73
35	.079	.071	2.302	2.373	.000	2.373	30038	52.	39.7	7.440	9.561	20.753	30.314	2.774	27.540	2205.	2397	38.10	65.80
36	.074	.093	2.280	2.373	.000	2.373	32068	49.	39.8	7.467	9.595	21.586	31.181	2.774	28.407	2223.	2351	38.24	67.87
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TABLE XX

DETAILED RESULTS OF CASE 20

AQUIFER — WITH WATER INJECTION

GAS INJECTION — GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB/DAY	MMMSCF/DAY					SCF/STB	MB/DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.912	.118	4.030	.479	3.551	2519	159.	9.0	2.064	2.877	.022	2.899	2.077	.822	74.	3814	10.57	1.96
5	1.600	1.729	1.783	3.512	.003	3.509	2195	160.	9.1	2.648	3.508	.673	4.181	2.078	2.103	129.	3599	13.56	5.02
6	1.588	2.528	.989	3.517	.007	3.510	2215	286.	15.3	3.228	4.432	1.034	5.466	2.081	3.385	233.	3393	16.53	8.09
7	1.375	2.315	1.194	3.509	.000	3.509	2552	364.	20.9	3.730	5.278	1.470	6.748	2.081	4.667	366.	3262	19.10	11.15
8	1.247	1.452	2.057	3.509	.000	3.509	2814	309.	19.9	4.186	5.898	2.221	8.029	2.081	5.948	479.	3153	21.43	14.21
9	1.012	1.099	2.410	3.509	.000	3.509	3467	420.	29.3	4.556	6.209	3.102	9.311	2.081	7.230	637.	3055	23.33	17.28
10	.864	.838	2.672	3.510	.000	3.510	4062	389.	31.0	4.871	6.515	4.077	10.592	2.081	8.511	775.	2974	24.94	20.34
11	.757	.897	2.612	3.509	.000	3.509	4635	303.	28.6	5.148	6.843	5.031	11.874	2.081	9.793	885.	2899	26.36	23.40
12	.640	.637	2.872	3.509	.000	3.509	5483	338.	34.6	5.382	7.076	6.081	13.157	2.081	11.076	1009.	2831	27.56	26.46
13	.562	.612	2.897	3.509	.000	3.509	6244	303.	35.0	5.587	7.299	7.139	14.438	2.081	12.757	1120.	2771	28.61	29.53
14	.453	.436	3.073	3.509	.000	3.509	7746	328.	42.0	5.752	7.458	8.261	15.719	2.081	13.638	1239.	2716	29.45	32.59
15	.380	.417	3.092	3.509	.000	3.509	9234	343.	47.4	5.891	7.611	9.391	17.002	2.081	14.921	1365.	2658	30.17	35.65
16	.323	.303	3.207	3.510	.000	3.510	10867	206.	38.9	6.009	7.721	10.562	18.283	2.081	16.202	1440.	2622	30.77	38.71
17	.307	.300	3.209	3.509	.000	3.509	11430	167.	35.2	6.121	7.831	11.734	19.565	2.081	17.484	1501.	2581	31.34	41.78
18	.269	.253	3.256	3.509	.000	3.509	13045	190.	41.4	6.219	7.923	12.923	20.846	2.081	18.765	1571.	2529	31.84	44.84
19	.244	.238	3.271	3.509	.000	3.509	14381	151.	38.2	6.308	8.010	14.118	22.128	2.081	20.047	1626.	2473	32.30	47.90
20	.217	.277	3.232	3.509	.000	3.509	16171	142.	39.6	6.388	8.111	15.299	23.409	2.081	21.328	1678.	2417	32.71	50.96
21	.185	.222	3.287	3.509	.000	3.509	18968	126.	40.5	6.455	8.192	16.499	24.691	2.081	22.610	1724.	2390	33.05	54.02
22	.166	.175	3.334	3.509	.000	3.509	21139	125.	43.0	6.516	8.256	17.717	25.973	2.081	23.892	1769.	2354	33.37	57.09
23	.147	.172	3.337	3.509	.000	3.509	23871	146.	49.8	6.569	8.319	18.936	27.255	2.081	25.174	1822.	2294	33.64	60.15
24	.142	.173	3.336	3.509	.000	3.509	24711	112.	44.1	6.621	8.382	20.154	28.536	2.081	26.455	1867.	2254	33.90	63.21
25	.124	.133	3.376	3.509	.000	3.509	28298	77.	38.3	6.667	8.431	21.387	29.818	2.081	27.737	1892.	2211	34.14	66.27
26	.114	.118	3.391	3.509	.000	3.509	30781	87.	43.3	6.709	8.474	22.626	31.100	2.081	29.019	1923.	2143	34.35	69.34
27																			
28																			
29																			
30																			
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32																			
33																			
34																			
35																			
36																			
37																			
38																			
39																			
40																			

TABLE XXI

DETAILED RESULTS OF CASE 21

AQUIFER — WITH WATER INJECTION

GAS INJECTION — GAS SALES

YEAR	AVERAGE RATES FOR YEAR: OIL PROD	GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	TOTAL GOR	WATER PROD	WATER CUT	CUM OIL	CUMULATIVES TO YEAR END: GAS: OIL ZONE PROD	GAS: GAS CAP PROD	GAS: TOTAL PROD	GAS: INJ.	GAS: NET PROD	WATER PROD	AVE OIL PRESS	RECOVERY OF ORIGINAL IN-PLACE: OIL	RECOVERY OF ORIGINAL IN-PLACE: TOTAL GAS
	MMSTB DAY	MMMSCF/DAY					SCF STB	MB DAY	%	10^9 STB	TRILLION SCF					10^6 B	PSIA	%	%
1	1.050	.972	.000	.972	.895	.077	926	0.	.0	.384	.355	.000	.355	.327	.028	0.	4216	1.97	.07
2	1.400	1.719	.000	1.719	1.581	.138	1228	9.	.6	.895	.983	.000	.983	.904	.079	3.	4108	4.58	.19
3	1.600	2.092	.000	2.092	1.925	.167	1307	52.	3.1	1.479	1.747	.000	1.747	1.607	.140	22.	4009	7.57	.33
3.5	1.600	2.276	.000	2.276	2.094	.182	1422	105.	6.2	1.771	2.163	.000	2.163	1.990	.173	41.	3945	9.07	.41
4	1.600	3.860	.798	4.658	.011	4.647	2911	159.	9.0	2.064	2.868	.146	3.014	1.992	1.022	71.	3795	10.57	2.44
5	1.600	1.854	2.791	4.645	.000	4.645	2903	167.	9.5	2.648	3.545	1.165	4.710	1.992	2.718	132.	3526	17.56	6.49
6	1.582	2.355	2.290	4.645	.000	4.645	2936	313.	16.5	3.226	4.405	2.002	6.407	1.992	4.415	245.	3286	15.52	10.55
7	1.336	1.735	2.910	4.645	.000	4.645	3477	362.	21.3	3.714	5.039	3.065	8.104	1.992	6.112	378.	3134	19.02	14.60
8	1.184	1.208	3.437	4.645	.000	4.645	3923	413.	20.9	4.146	5.480	4.320	9.800	1.992	7.808	492.	2997	21.23	18.66
9	.942	1.169	3.477	4.646	.000	4.646	4932	503.	34.8	4.490	5.907	5.590	11.497	1.992	9.505	676.	2869	22.99	22.71
10	.835	.872	3.774	4.646	.000	4.646	5564	322.	27.8	4.795	6.225	6.968	13.193	1.992	11.201	794.	2770	24.55	26.76
11	.720	.747	3.898	4.645	.000	4.645	6451	285.	28.4	5.058	6.498	8.392	14.890	1.992	12.898	898.	2676	25.90	30.82
12	.640	.819	3.827	4.646	.000	4.646	7259	261.	29.0	5.292	6.797	9.790	16.587	1.992	14.595	993.	2588	27.10	34.87
13	.539	.556	4.090	4.646	.000	4.646	8620	303.	36.0	5.489	7.080	11.284	18.284	1.992	16.292	1104.	2505	28.11	38.93
14	.446	.510	4.135	4.645	.000	4.645	10415	315.	41.4	5.652	7.187	12.794	19.981	1.992	17.989	1219.	2427	28.94	42.98
15	.354	.390	4.256	4.646	.000	4.646	13124	279.	44.1	5.781	7.329	14.349	21.678	1.992	19.686	1321.	2370	29.60	47.04
16	.315	.399	4.247	4.646	.000	4.646	14749	224.	41.6	5.896	7.475	15.900	23.375	1.992	21.383	1403.	2297	30.19	51.09
17	.284	.285	4.360	4.645	.000	4.645	16356	165.	36.7	6.000	7.579	17.492	25.071	1.992	23.079	1463.	2213	30.72	55.14
18	.235	.260	4.385	4.645	.000	4.645	19766	186.	44.2	6.086	7.674	19.094	26.768	1.992	24.776	1531.	2134	31.16	59.20
19	.208	.228	4.417	4.645	.000	4.645	22332	121.	36.8	6.162	7.757	20.707	28.464	1.992	26.472	1575.	2087	31.55	63.25
20	.188	.201	4.444	4.645	.000	4.645	24707	126.	40.1	6.230	7.831	22.331	30.162	1.992	28.170	1621.	2012	31.90	67.31
21																			
22																			
23																			
24																			
25																			
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40																			

TABLE XXII

TABLE XXIII

SUMMARY OF WATER INJECTION RATES AND VOLUMES

Sadlerochit Reservoir
Prudhoe Bay Field

Case	Average Injection Rate Million BPD	Cumulative Injected Volume Billion BBL
3	0.518	7.376
4	1.382	17.652
5	1.297	15.146
6	1.267	14.332
7	1.362	16.899
8	1.325	14.989
9	1.295	14.656
10	1.077	13.756
11	1.190	15.202
12	1.239	15.378
13	1.282	15.909
14	1.489	14.675
15	1.592	12.201
16	1.041	13.298
17	1.163	14.012
18	1.189	14.318
19	1.252	14.618
20	1.439	14.178
21	1.551	11.891

L I S T O F F I G U R E S

LIST OF FIGURES (Cont'd)

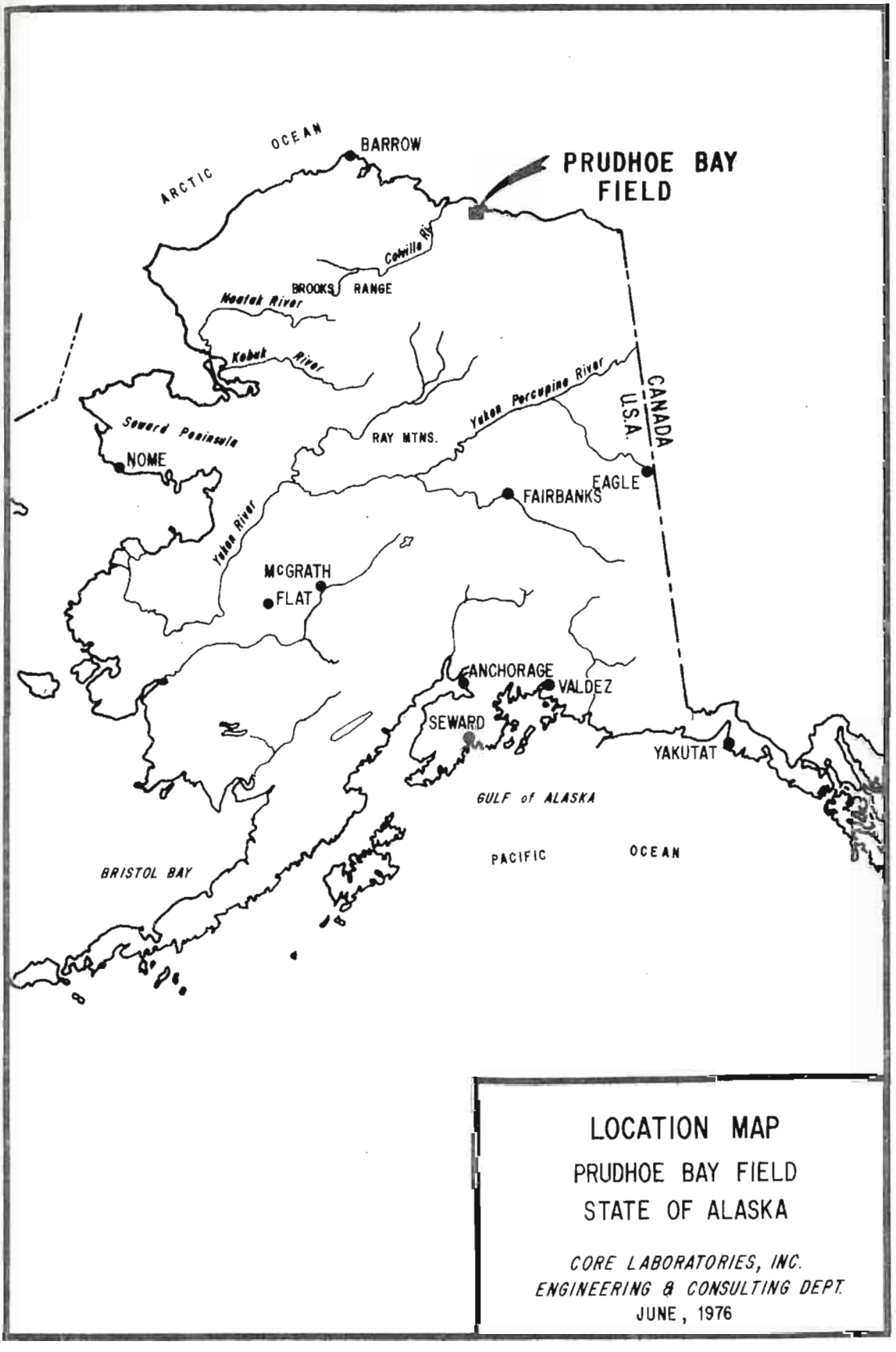
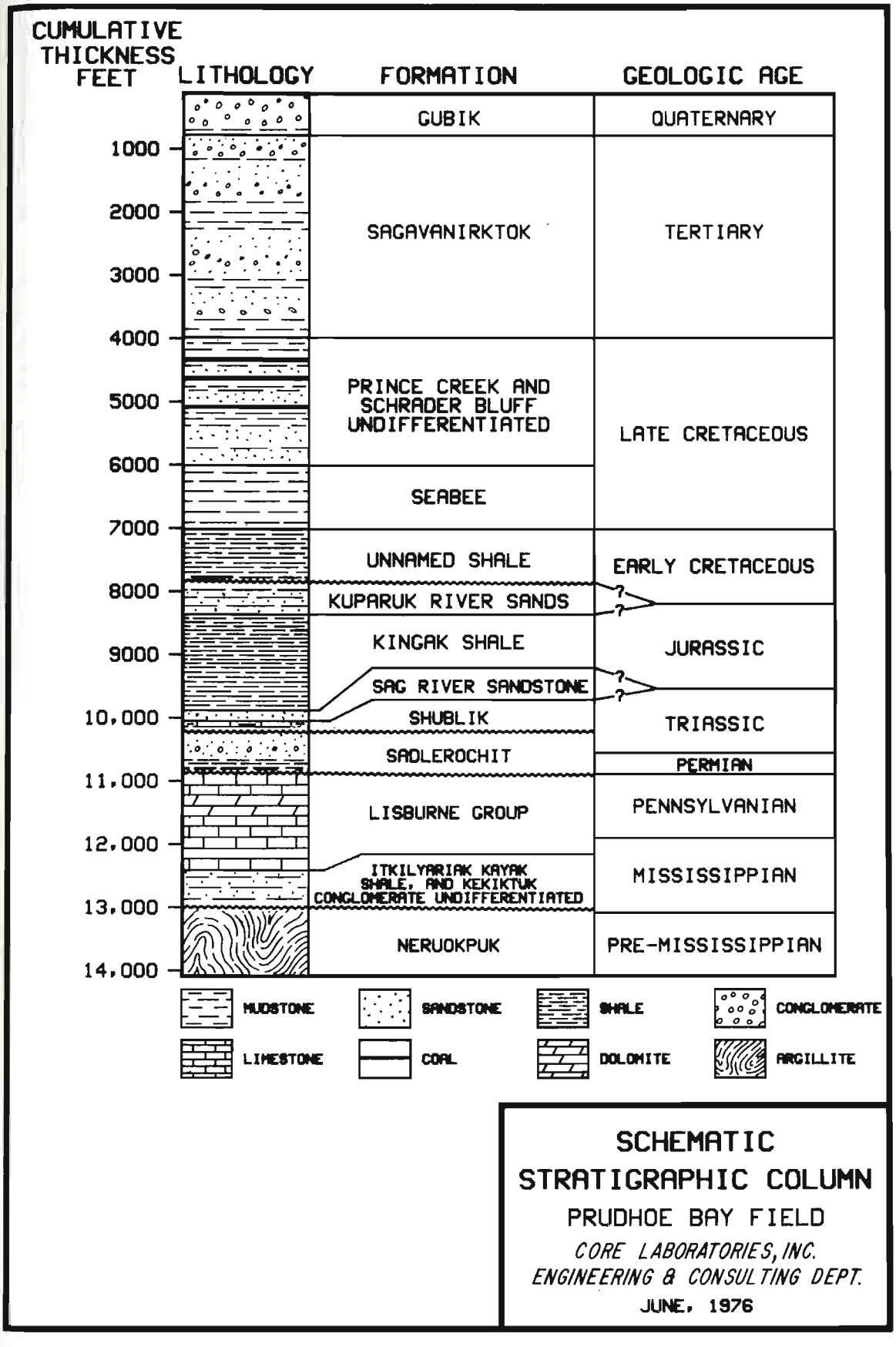
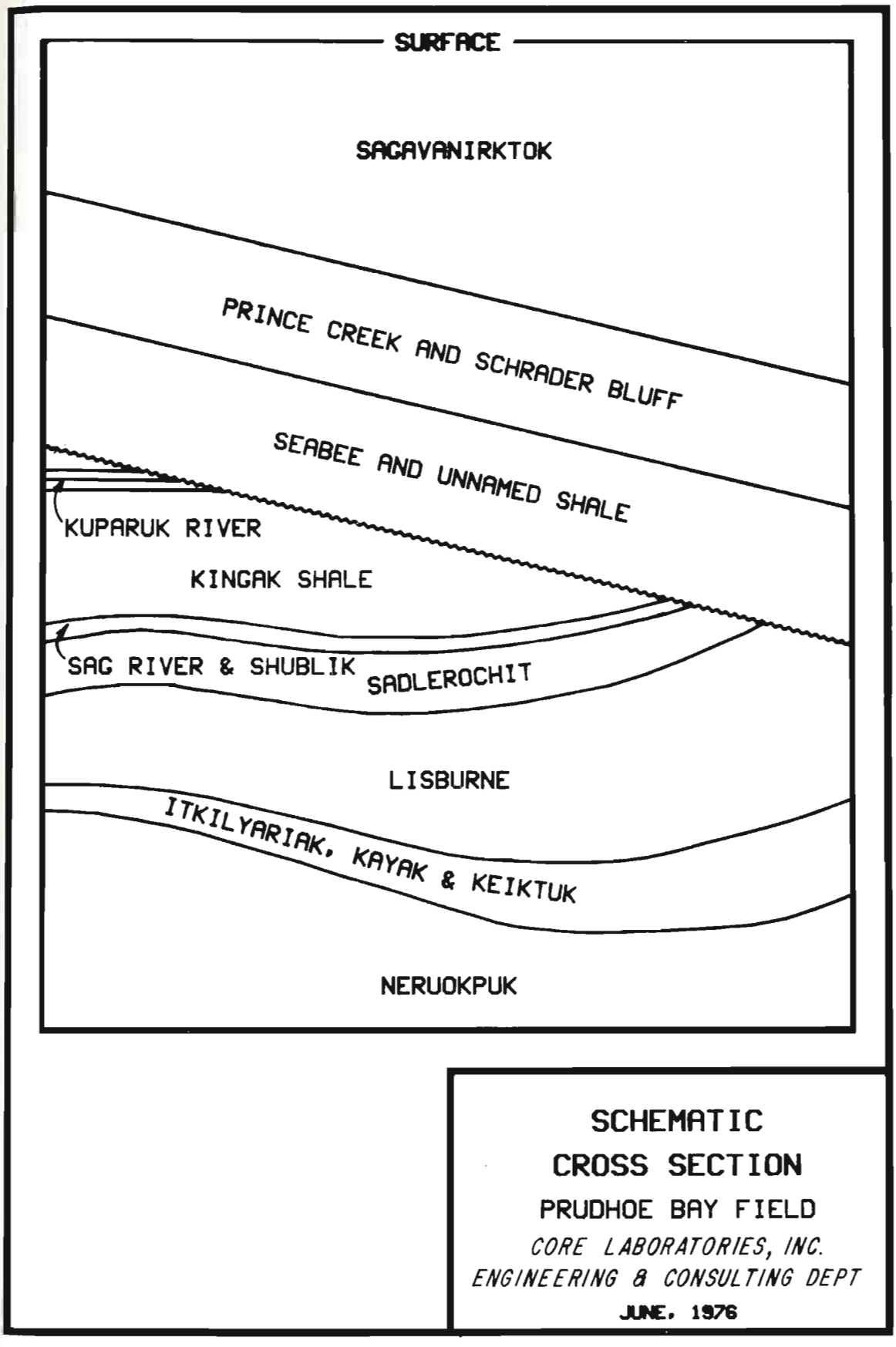

ARCTIC OCEAN
BARROW
PRUDHOE BAY FIELD
Colville R.
BROOKS RANGE
Noatak River
Kobuk River
Seward Peninsula
NOME
RAY MTNS.
Yukon Porcupine River
CANADA
U.S.A.
EAGLE
FAIRBANKS
Yukon River
McGRATH
FLAT
ANCHORAGE
VALDEZ
SEWARD
YAKUTAT
GULF of ALASKA
PACIFIC OCEAN
BRISTOL BAY
LOCATION MAP
PRUDHOE BAY FIELD
STATE OF ALASKA
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976

FIGURE 1



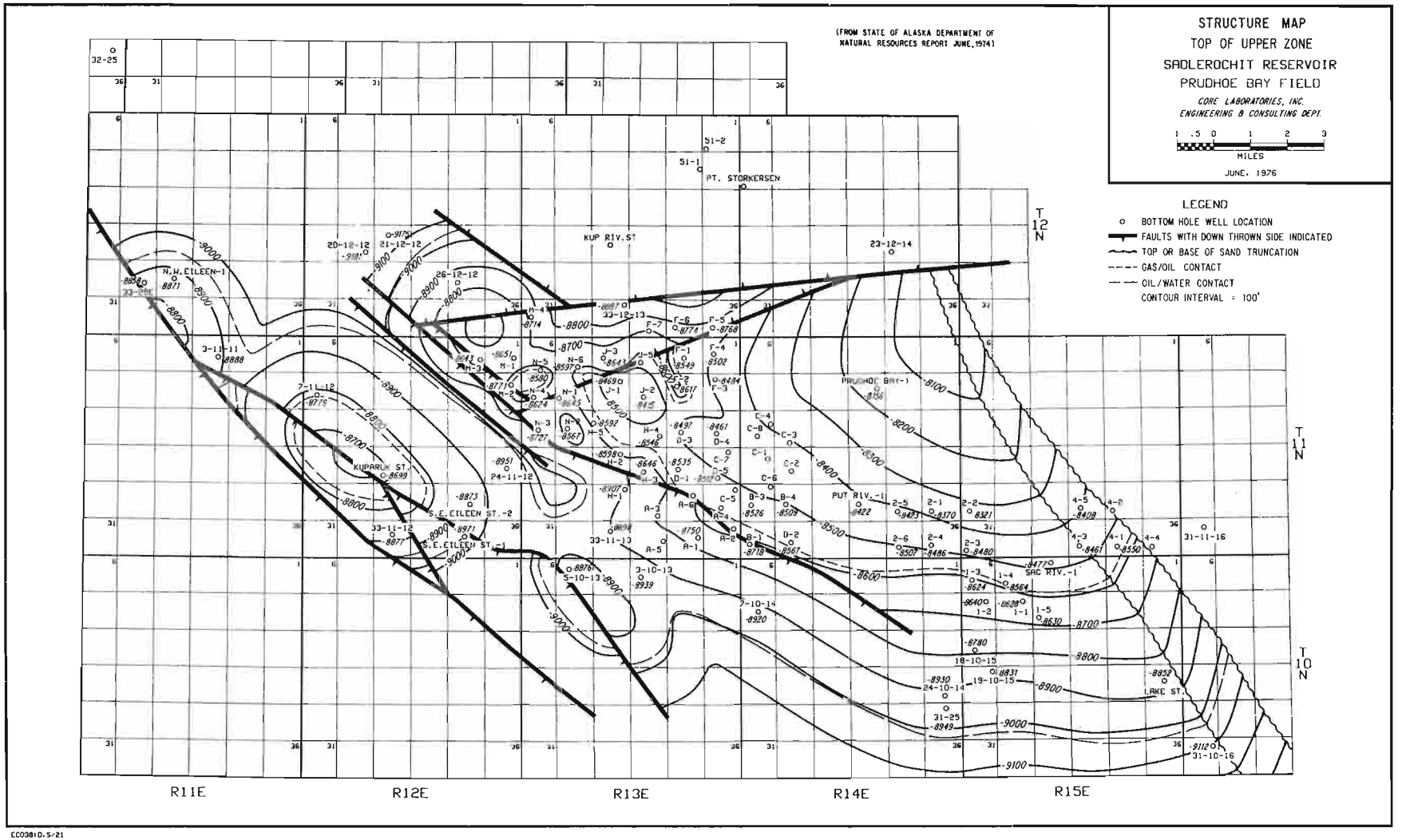
SCHEMATIC
STRATIGRAPHIC COLUMN
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976

FIGURE 2



SCHEMATIC
CROSS SECTION
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT
JUNE, 1976

FIGURE 3



EC0381D.S/21

FIGURE 4

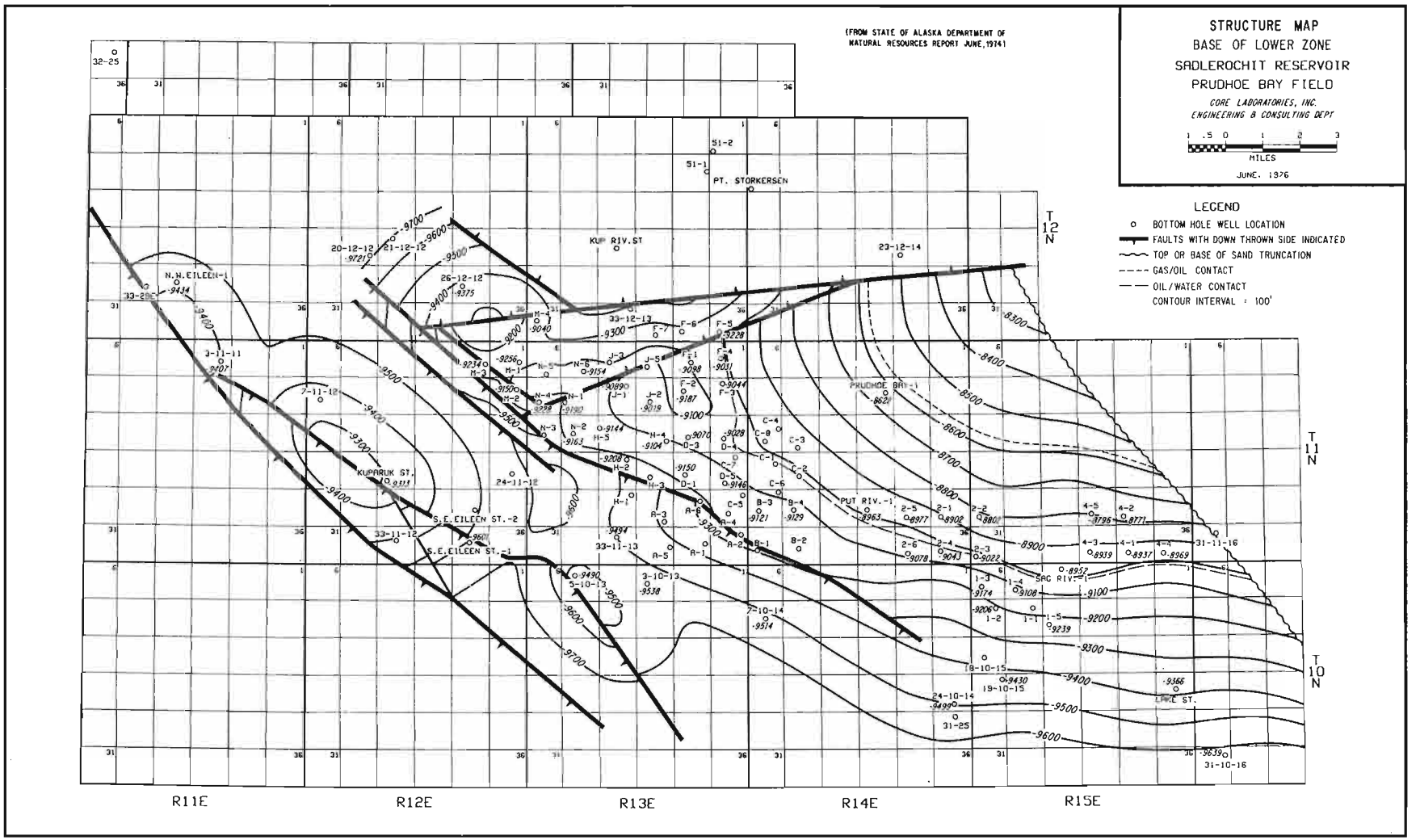

STRUCTURE MAP
BASE OF LOWER ZONE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
MILES
JUNE, 1976
(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JUNE, 1974)
LEGEND
BOTTOM HOLE WELL LOCATION
FAULTS WITH DOWN THROWN SIDE INDICATED
TOP OR BASE OF SAND TRUNCATION
GAS/OIL CONTACT
OIL/WATER CONTACT
CONTOUR INTERVAL = 100'
PT. STORKERSEN
KUPARUK RIV. ST.
PRUDHOE BAY-1
PUT RIV.-1
SAG RIV.
N.W. EILEEN-1
S.E. EILEEN ST.-2
S.E. EILEEN ST.-1
KUPARUK ST.
T 12 N
T 11 N
T 10 N
R11E
R12E
R13E
R14E
R15E

FIGURE 5

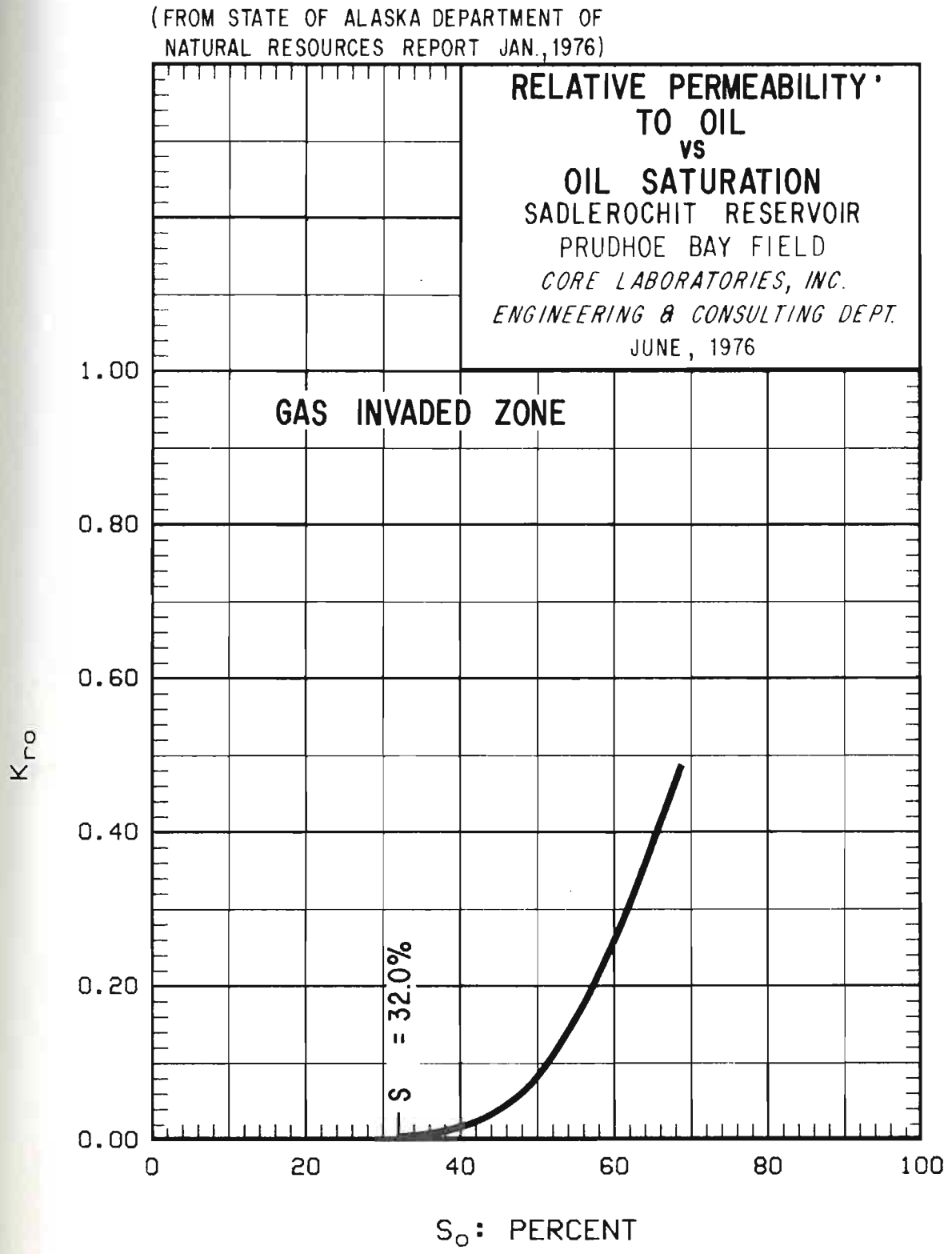

(FROM STATE OF ALASKA DEPARTMENT OF
NATURAL RESOURCES REPORT JAN., 1976)
RELATIVE PERMEABILITY
TO OIL
VS
OIL SATURATION
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
GAS INVADED ZONE
S = 32.0%
1.00
0.80
0.60
0.40
0.20
0.00
Kro
0
20
40
60
80
100
So: PERCENT

FIGURE 6

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

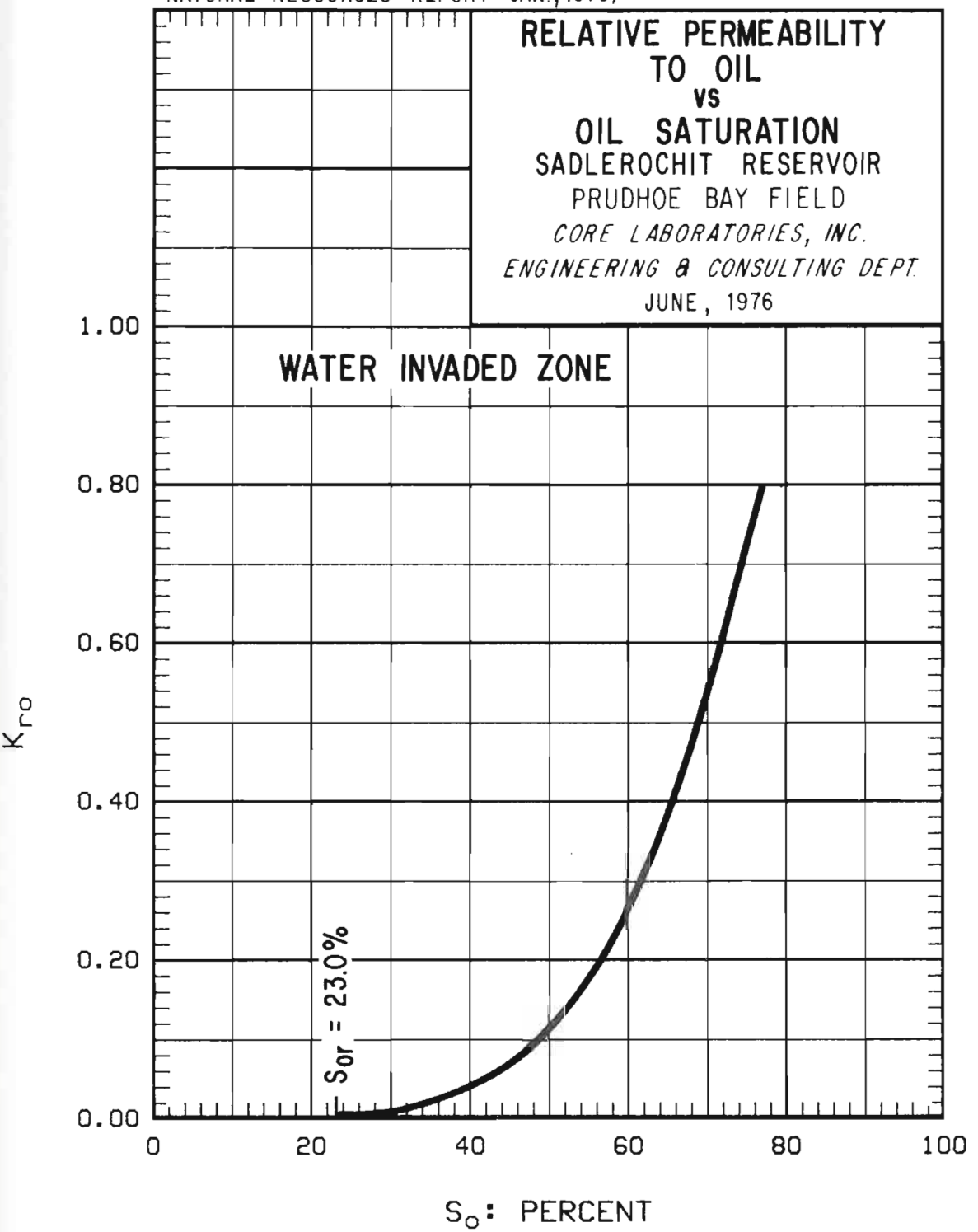


FIGURE 7

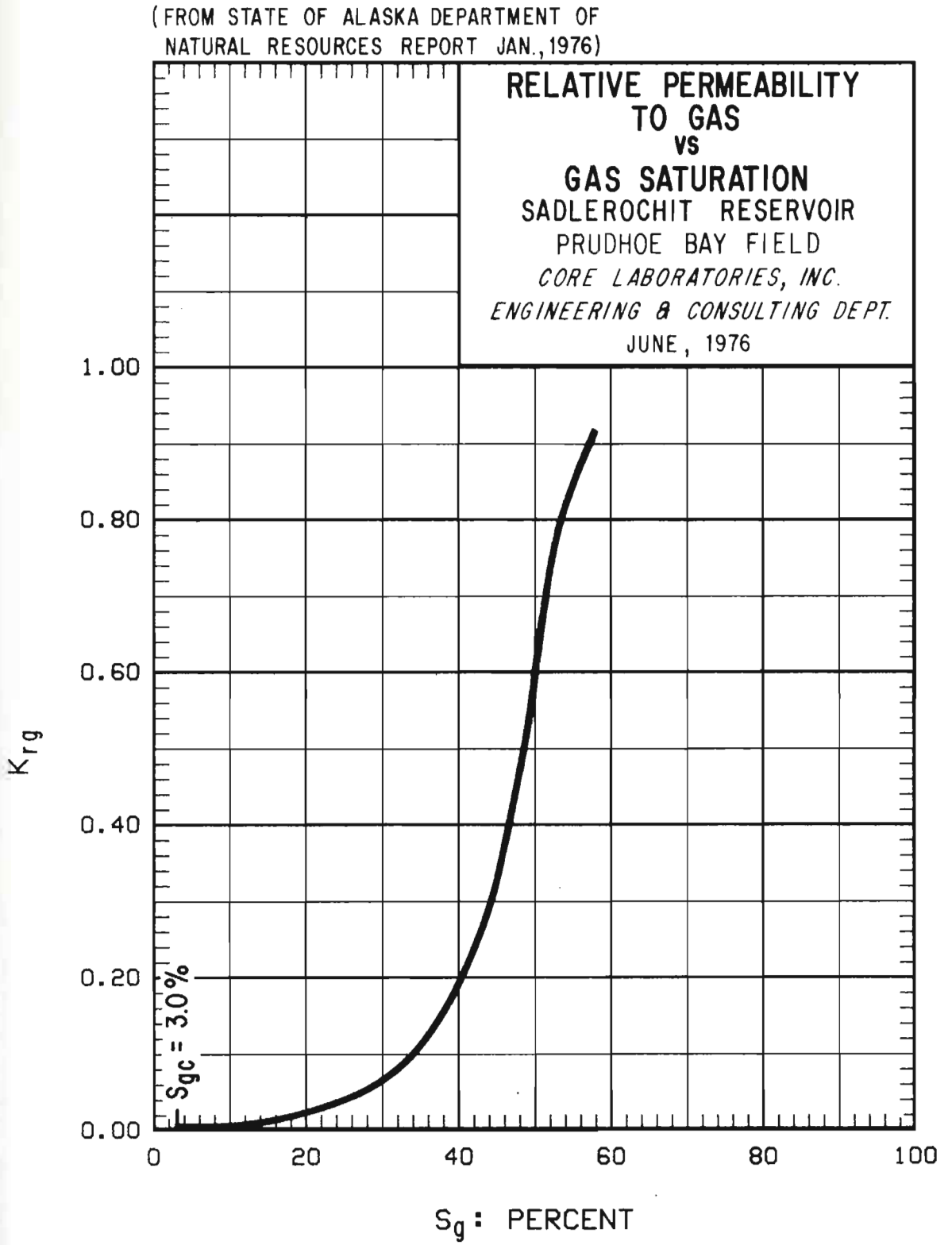

(FROM STATE OF ALASKA DEPARTMENT OF
NATURAL RESOURCES REPORT JAN., 1976)
RELATIVE PERMEABILITY
TO GAS
VS
GAS SATURATION
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
1.00
0.80
0.60
0.40
0.20
0.00
Krg
Sgc = 3.0%
0
20
40
60
80
100
Sg : PERCENT

FIGURE 8

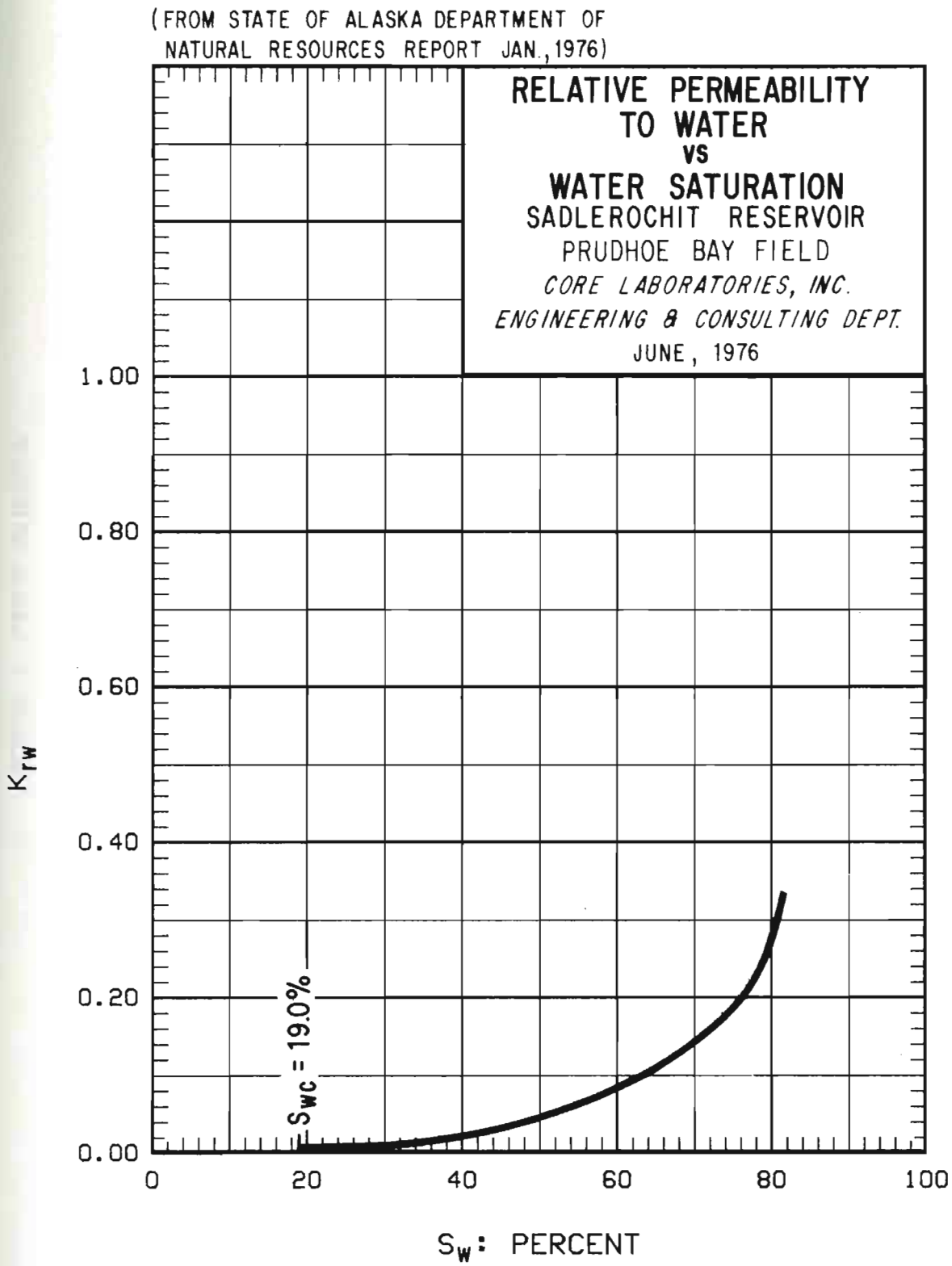

(FROM STATE OF ALASKA DEPARTMENT OF
NATURAL RESOURCES REPORT JAN., 1976)
RELATIVE PERMEABILITY
TO WATER
VS
WATER SATURATION
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
1.00
0.80
0.60
0.40
0.20
0.00
K_{rw}
S_{wc} = 19.0%
0
20
40
60
80
100
S_w: PERCENT

FIGURE 9

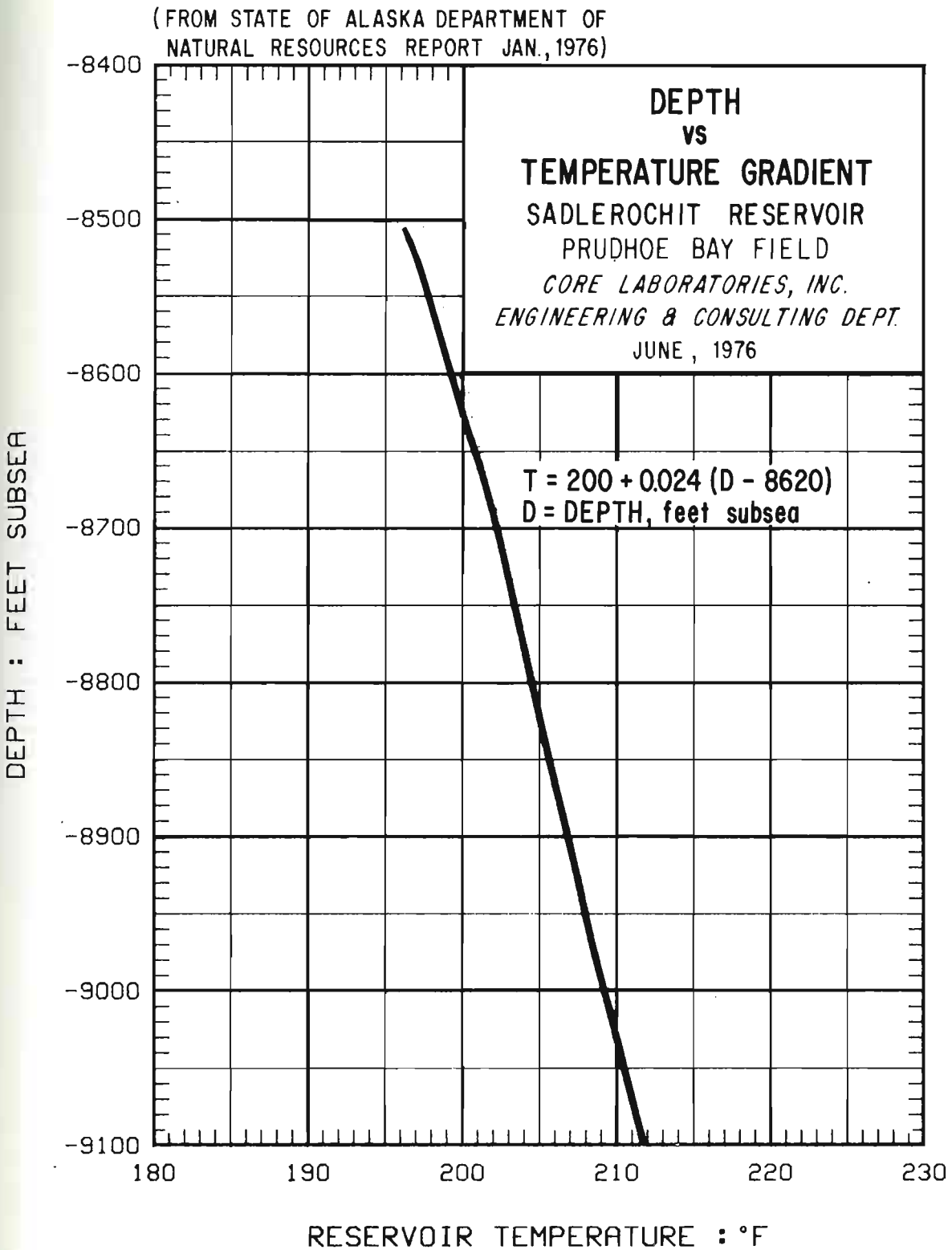

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)
DEPTH
VS
TEMPERATURE GRADIENT
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
T = 200 + 0.024 (D - 8620)
D = DEPTH, feet subsea
-8400
-8500
-8600
-8700
-8800
-8900
-9000
-9100
180
190
200
210
220
230
DEPTH : FEET SUBSEA
RESERVOIR TEMPERATURE : °F

FIGURE 10

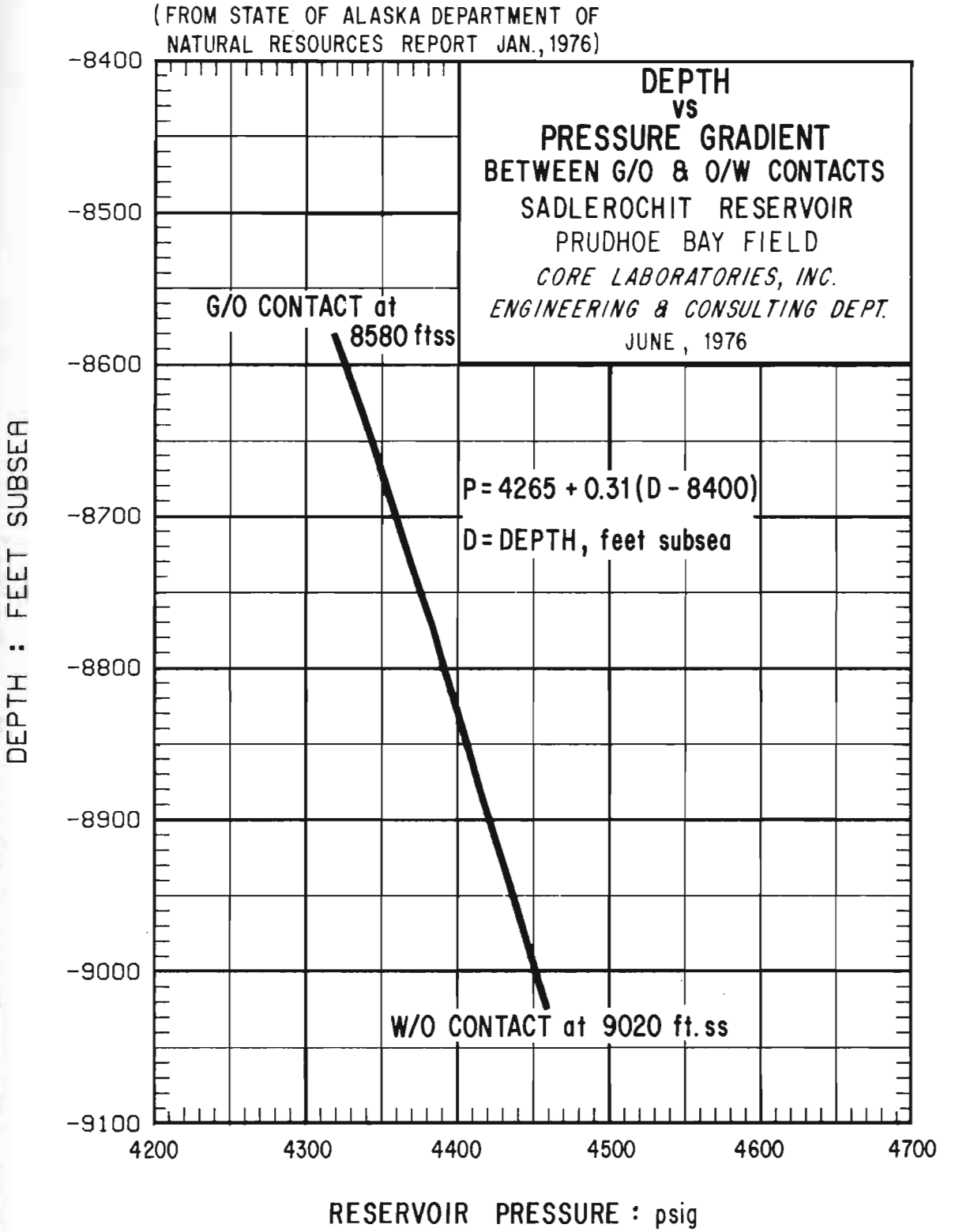

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)
DEPTH
vs
PRESSURE GRADIENT
BETWEEN G/O & O/W CONTACTS
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
G/O CONTACT at 8580 ftss
P = 4265 + 0.31 (D - 8400)
D = DEPTH, feet subsea
W/O CONTACT at 9020 ft. ss
-8400
-8500
-8600
-8700
-8800
-8900
-9000
-9100
4200
4300
4400
4500
4600
4700
DEPTH : FEET SUBSEA
RESERVOIR PRESSURE : psig

FIGURE 11

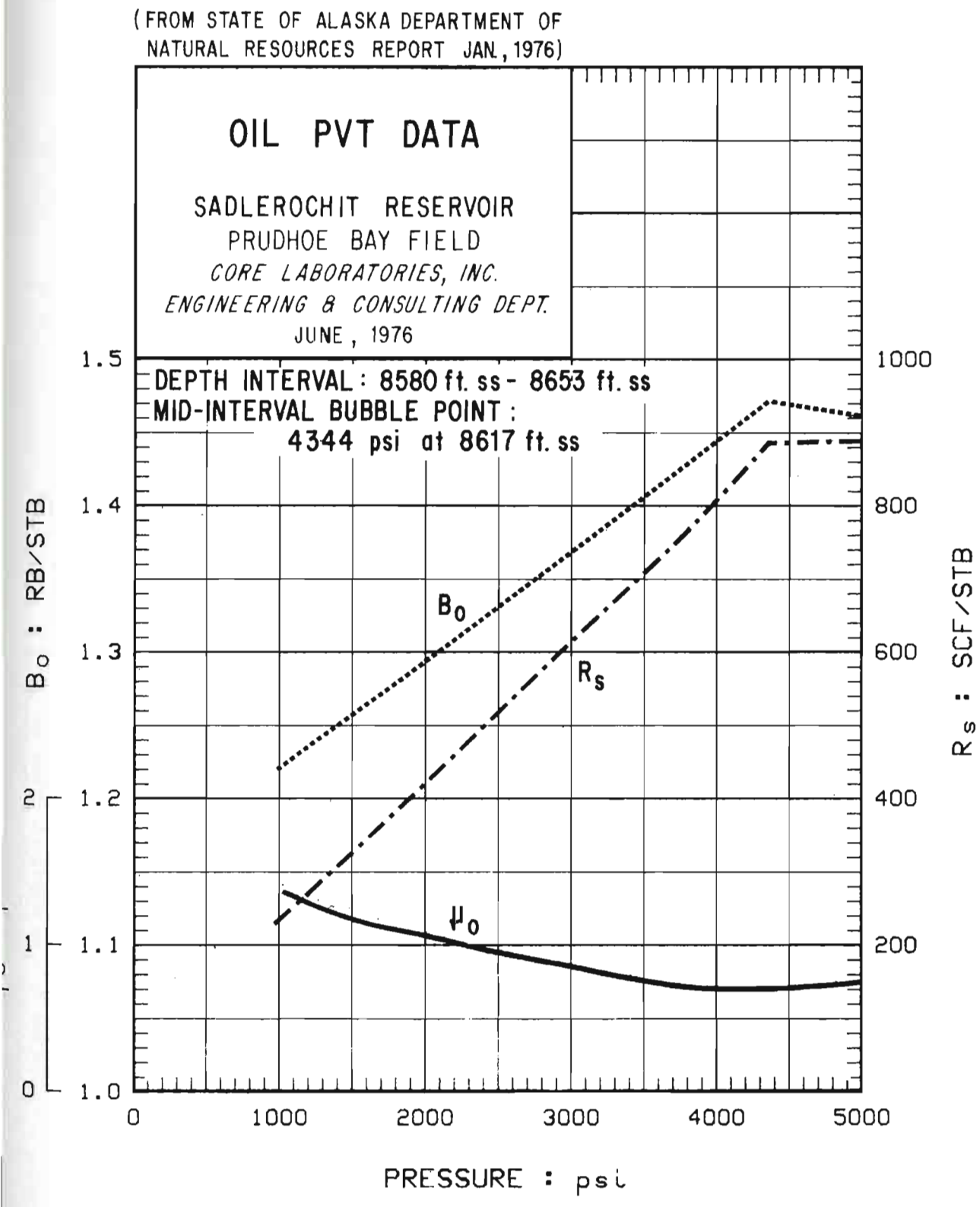

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)
OIL PVT DATA
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
DEPTH INTERVAL: 8580 ft. ss - 8653 ft. ss
MID-INTERVAL BUBBLE POINT:
4344 psi at 8617 ft. ss
Bo
Rs
μo
Bo : RB/STB
Rs : SCF/STB
PRESSURE : psi
1.5
1.4
1.3
1.2
1.1
1.0
1000
800
600
400
200
0
1000
2000
3000
4000
5000
2
1
0

FIGURE 12

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

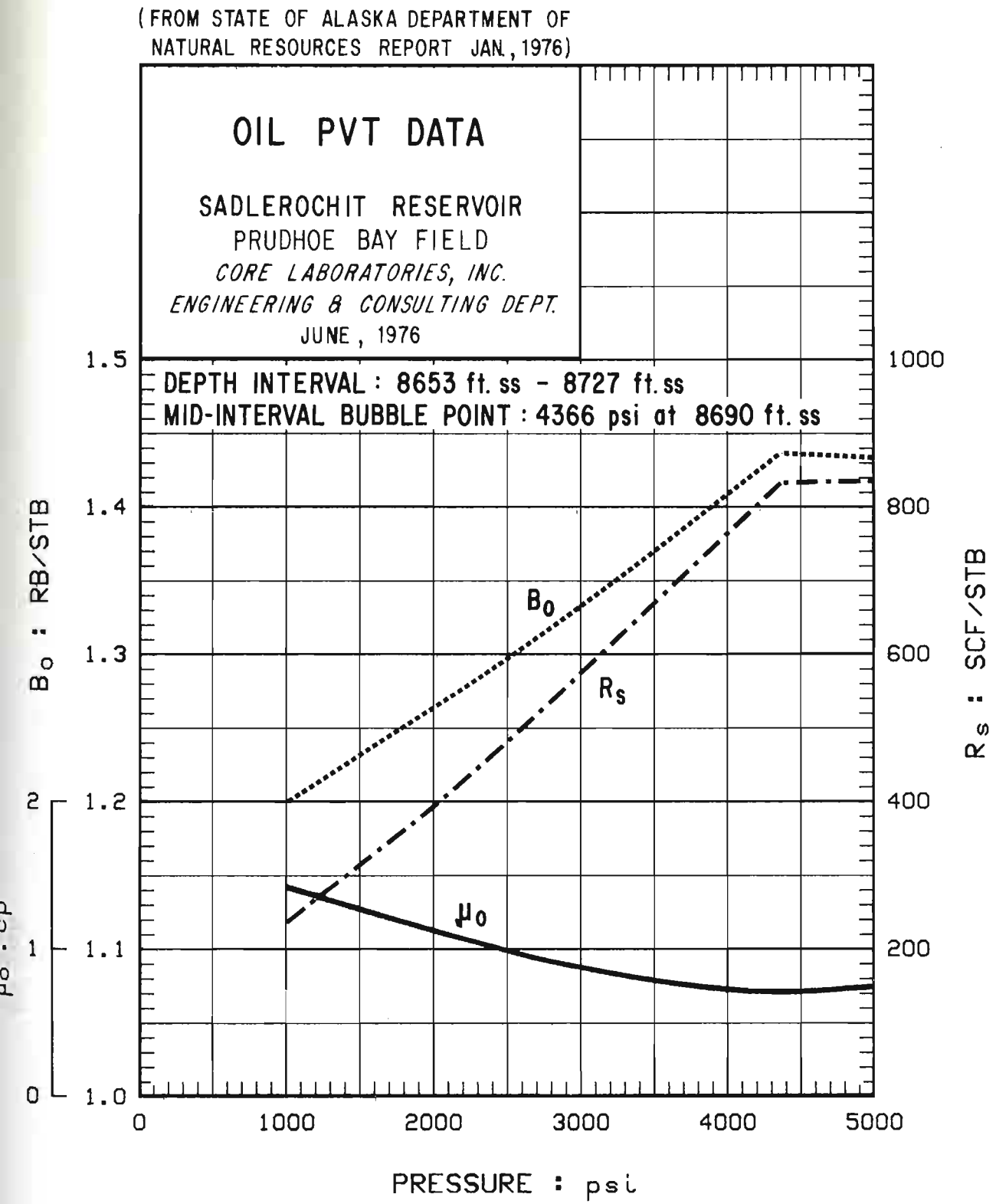


FIGURE 13

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

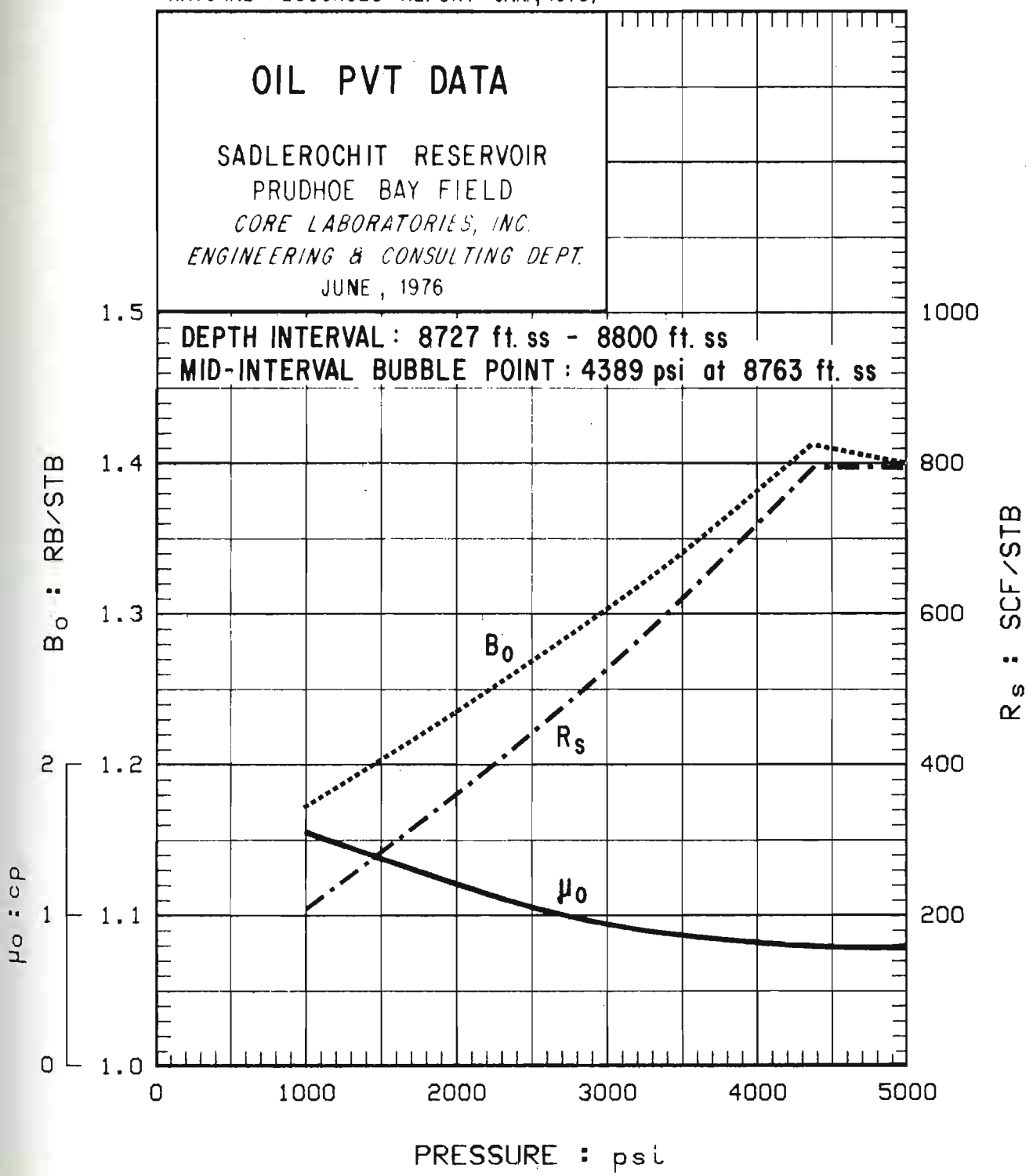


FIGURE 14

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

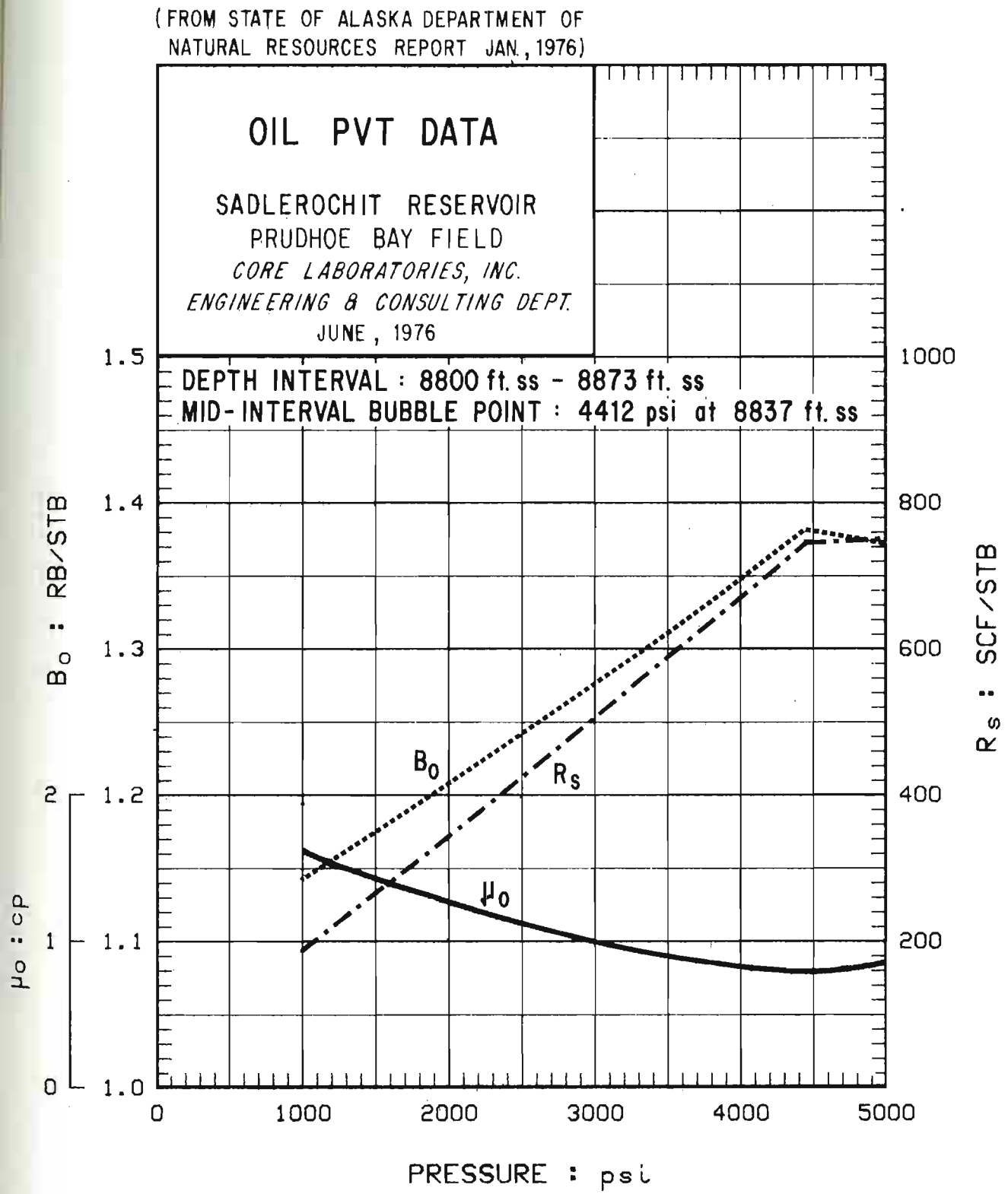


FIGURE 15

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

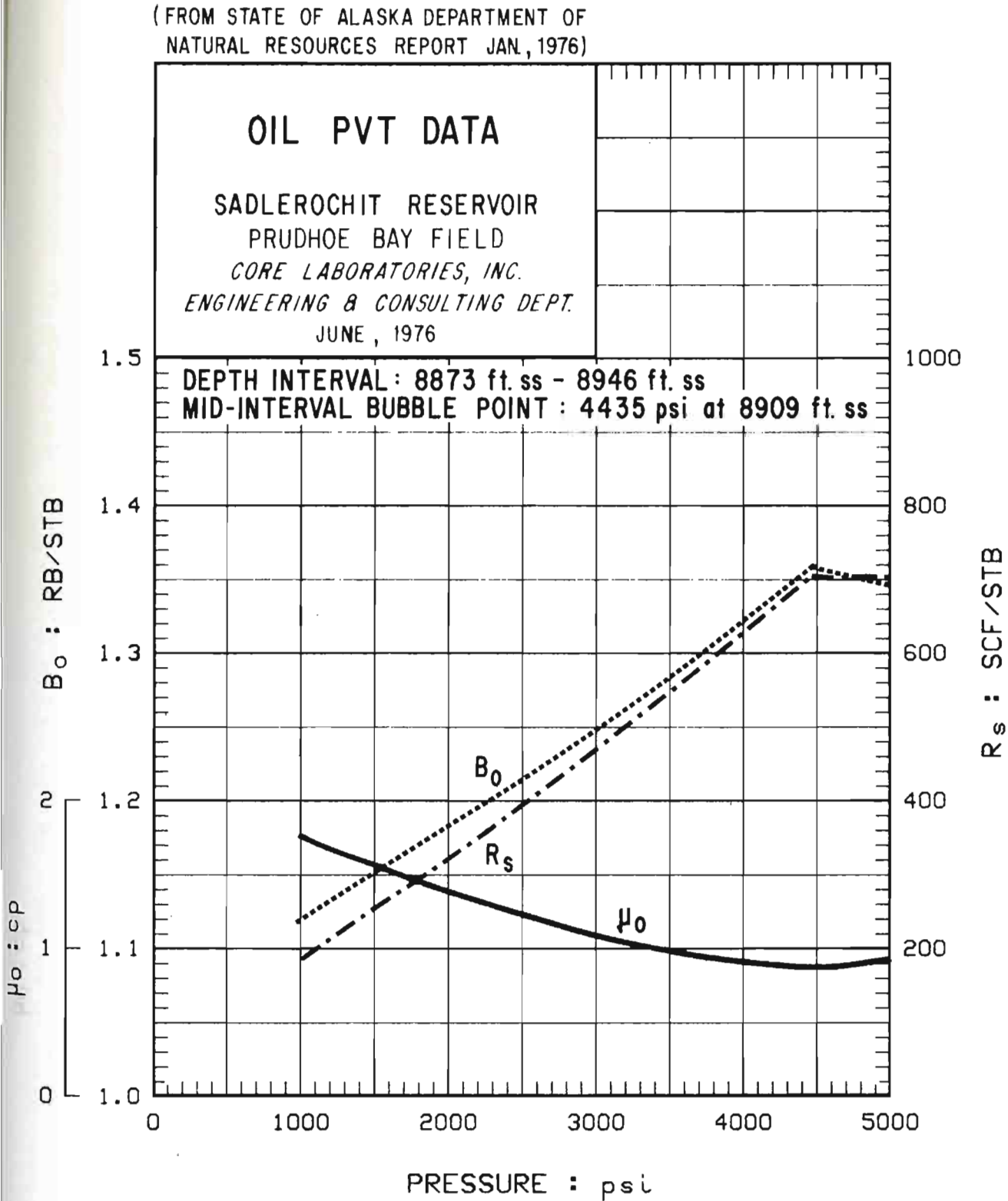


FIGURE 16

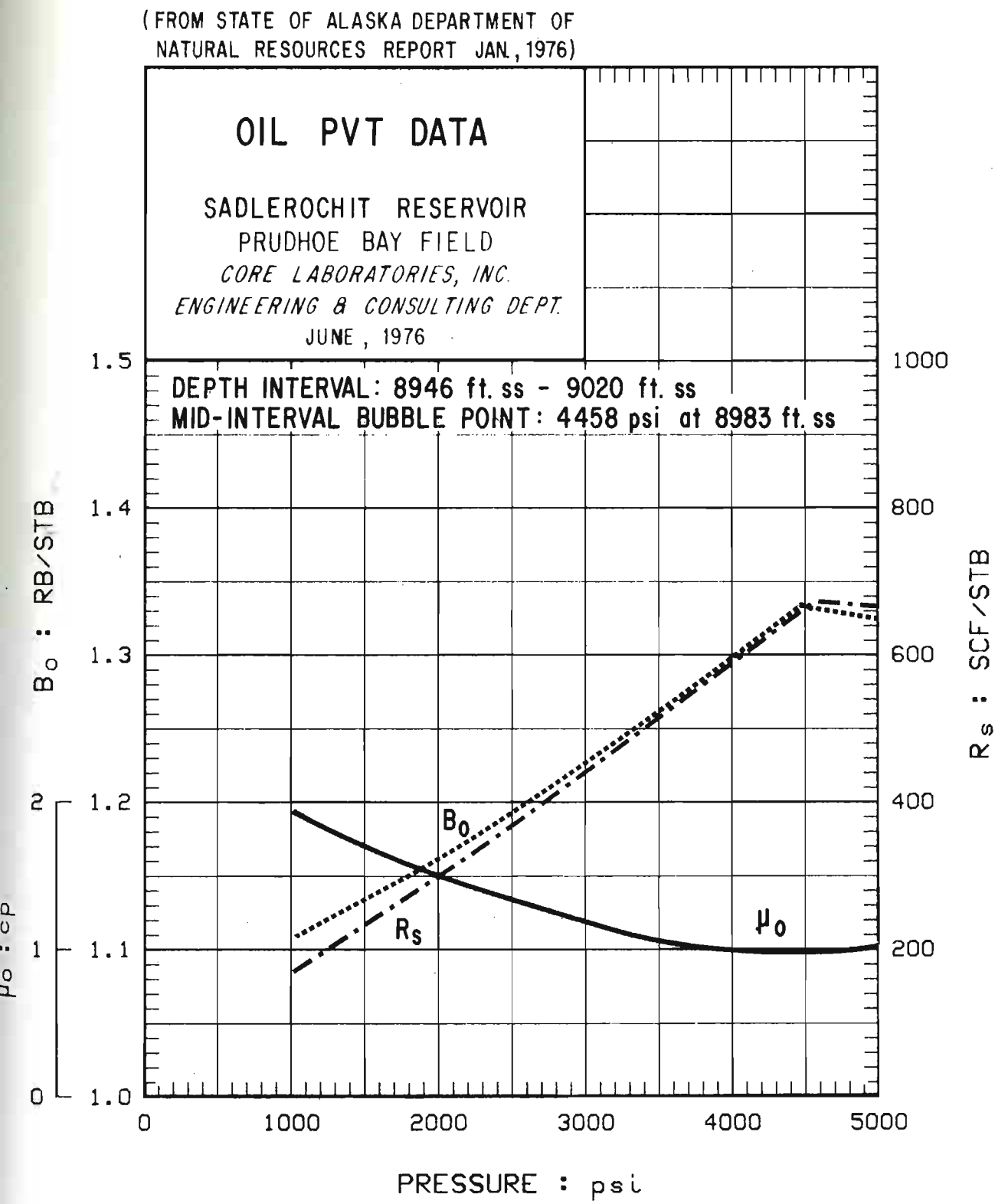

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)
OIL PVT DATA
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
DEPTH INTERVAL: 8946 ft. ss - 9020 ft. ss
MID-INTERVAL BUBBLE POINT: 4458 psi at 8983 ft. ss
Bo : RB/STB
Rs : SCF/STB
μo : cp
Bo
Rs
μo
1.5
1.4
1.3
1.2
1.1
1.0
1000
800
600
400
200
2
1
0
0
1000
2000
3000
4000
5000
PRESSURE : psi

FIGURE 17

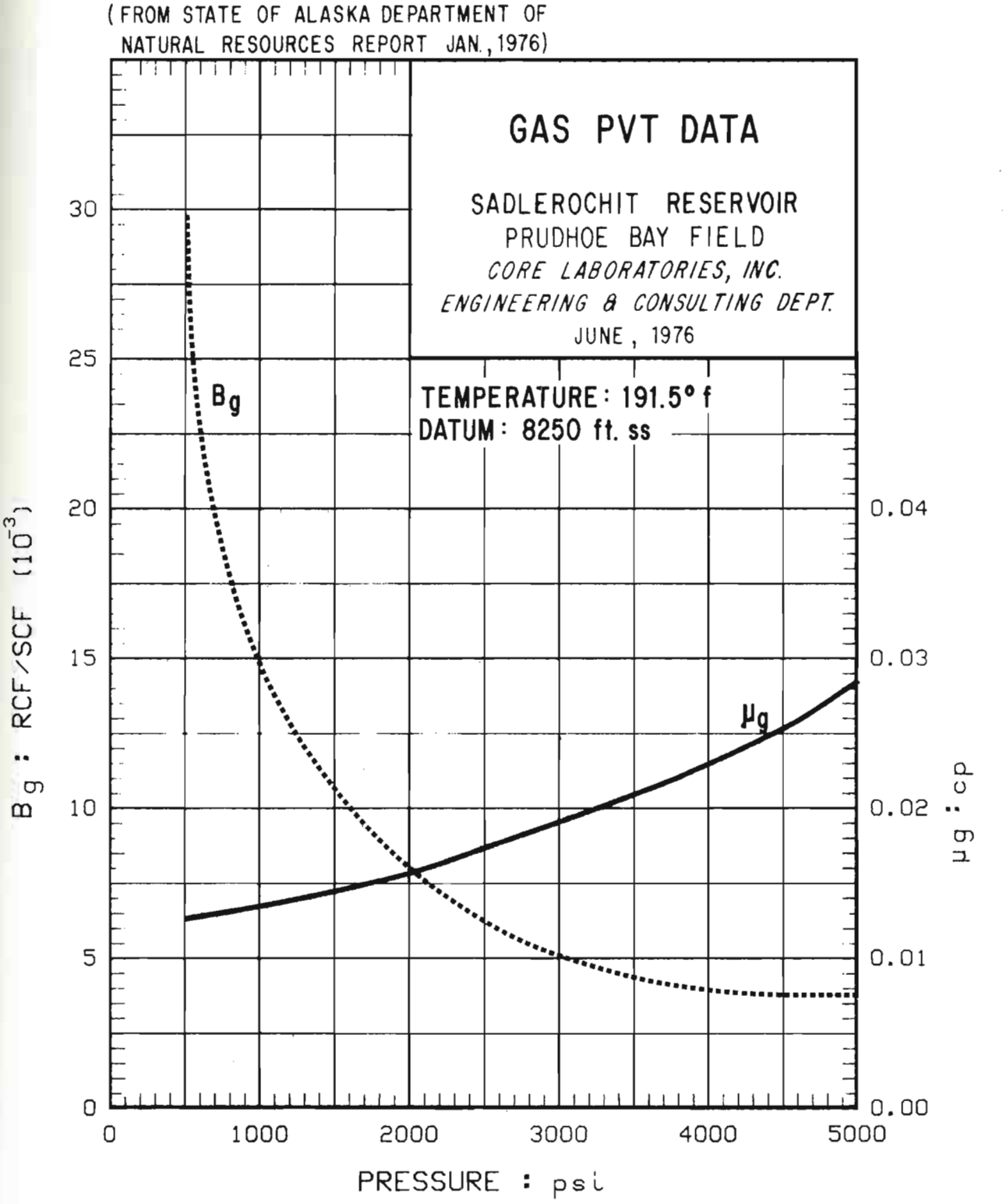

(FROM STATE OF ALASKA DEPARTMENT OF
NATURAL RESOURCES REPORT JAN., 1976)
GAS PVT DATA
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TEMPERATURE: 191.5° f
DATUM: 8250 ft. ss
Bg
μg
Bg : RCF/SCF (10⁻³)
μg : cp
PRESSURE : psi
0
5
10
15
20
25
30
0.00
0.01
0.02
0.03
0.04
0
1000
2000
3000
4000
5000

FIGURE 18

(FROM STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES REPORT JAN., 1976)

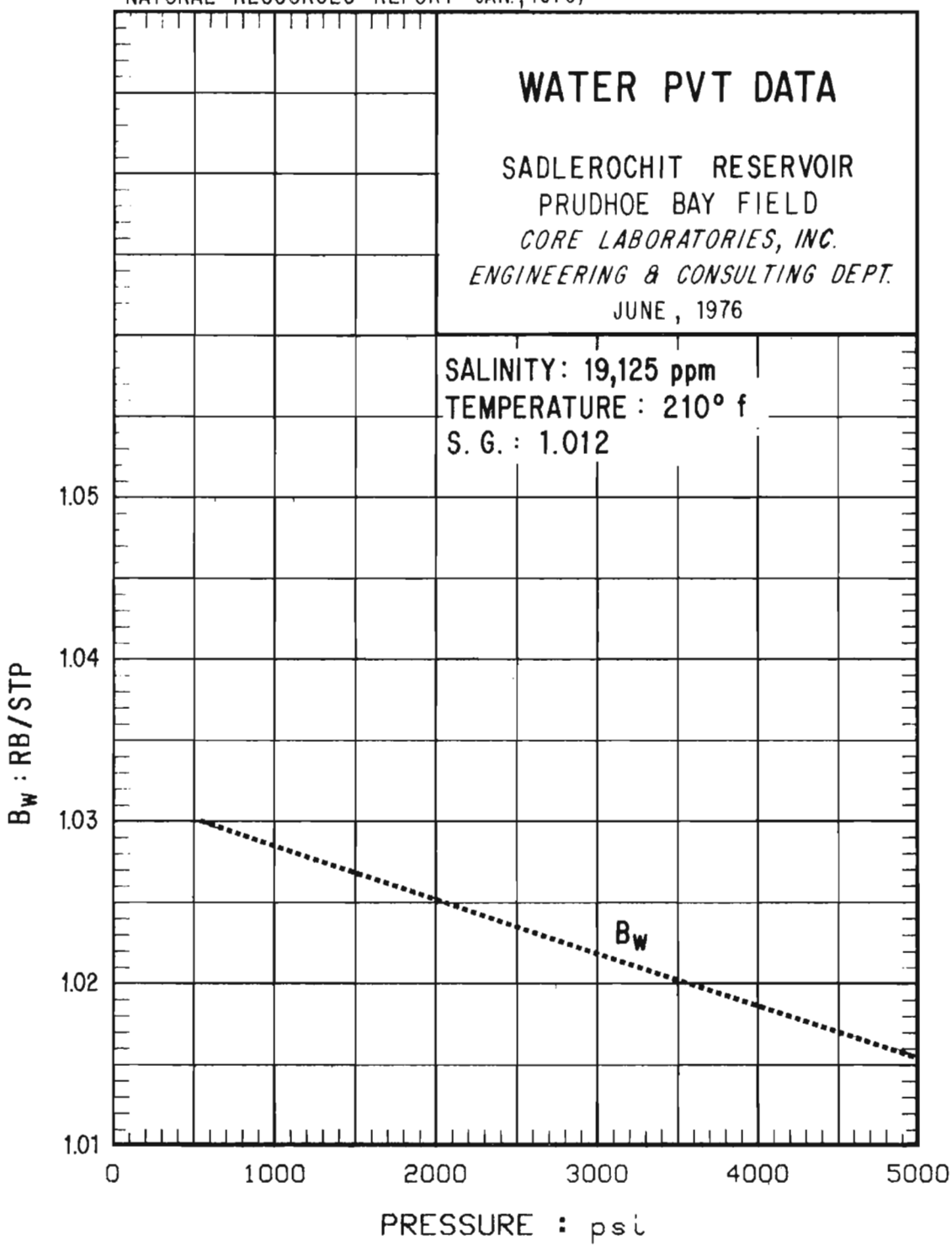
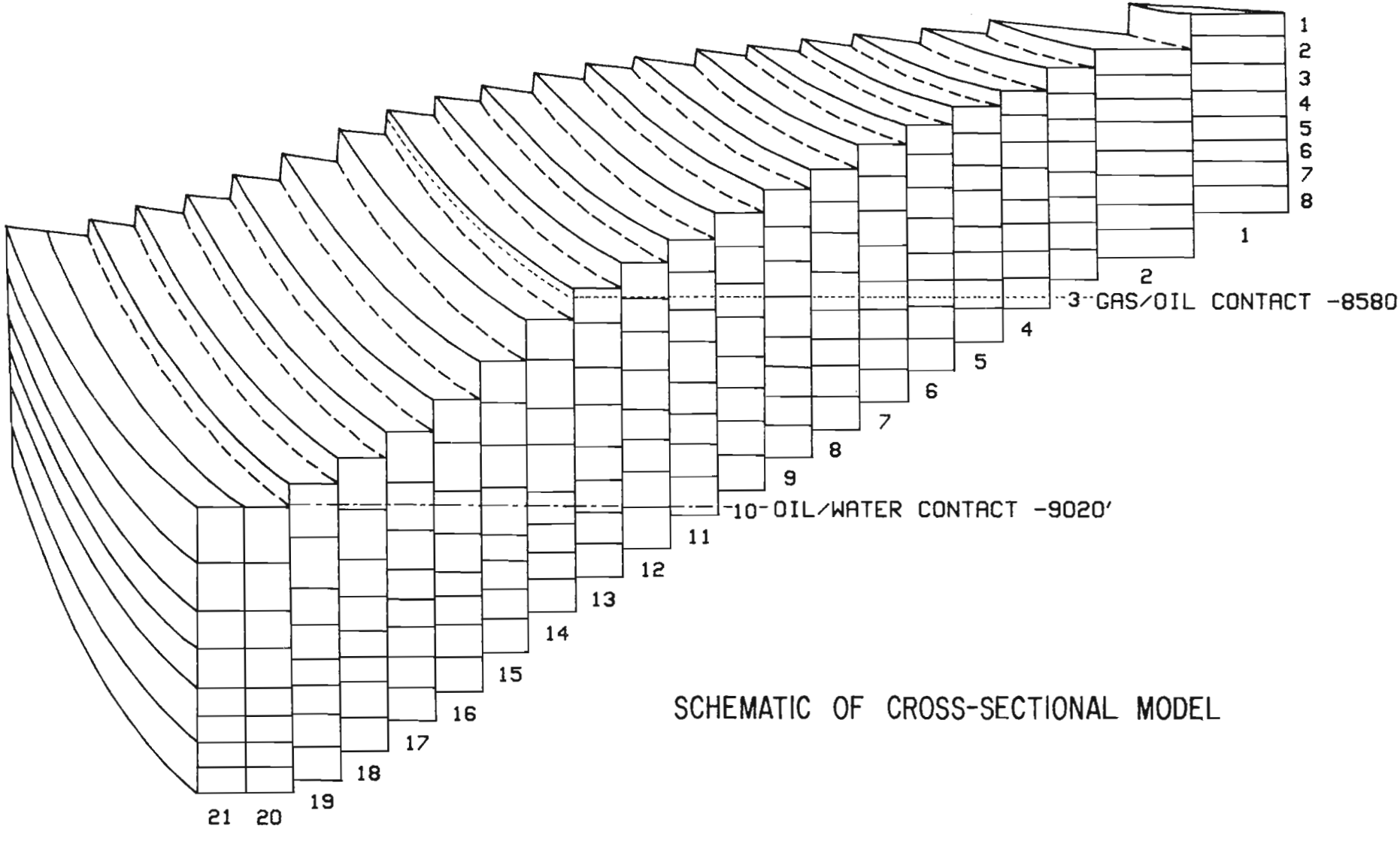


FIGURE 19



SCHEMATIC OF CROSS-SECTIONAL MODEL

FIGURE 20

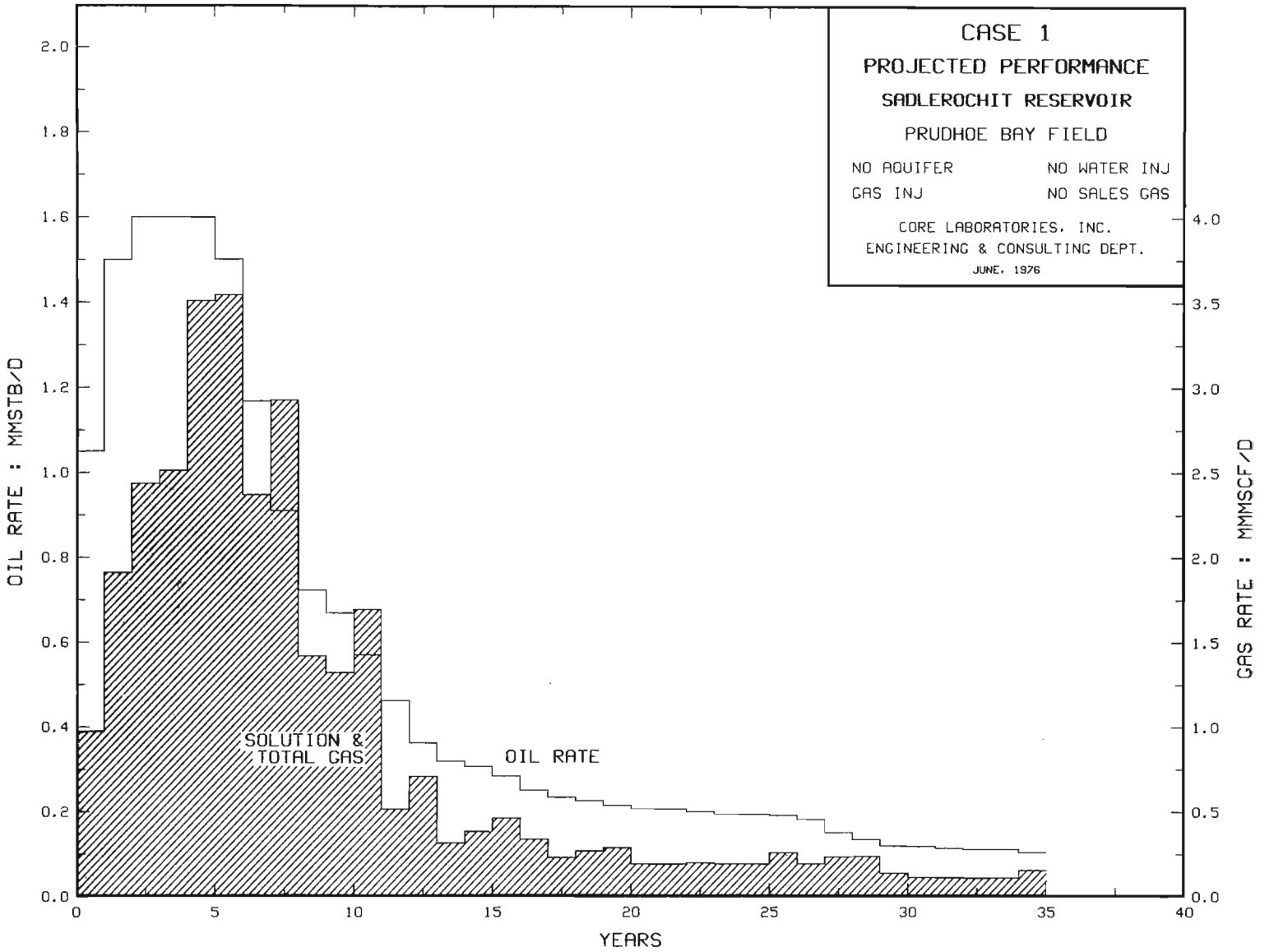

CASE 1
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
NO AQUIFER
NO WATER INJ
GAS INJ
NO SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
SOLUTION & TOTAL GAS
OIL RATE
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 21

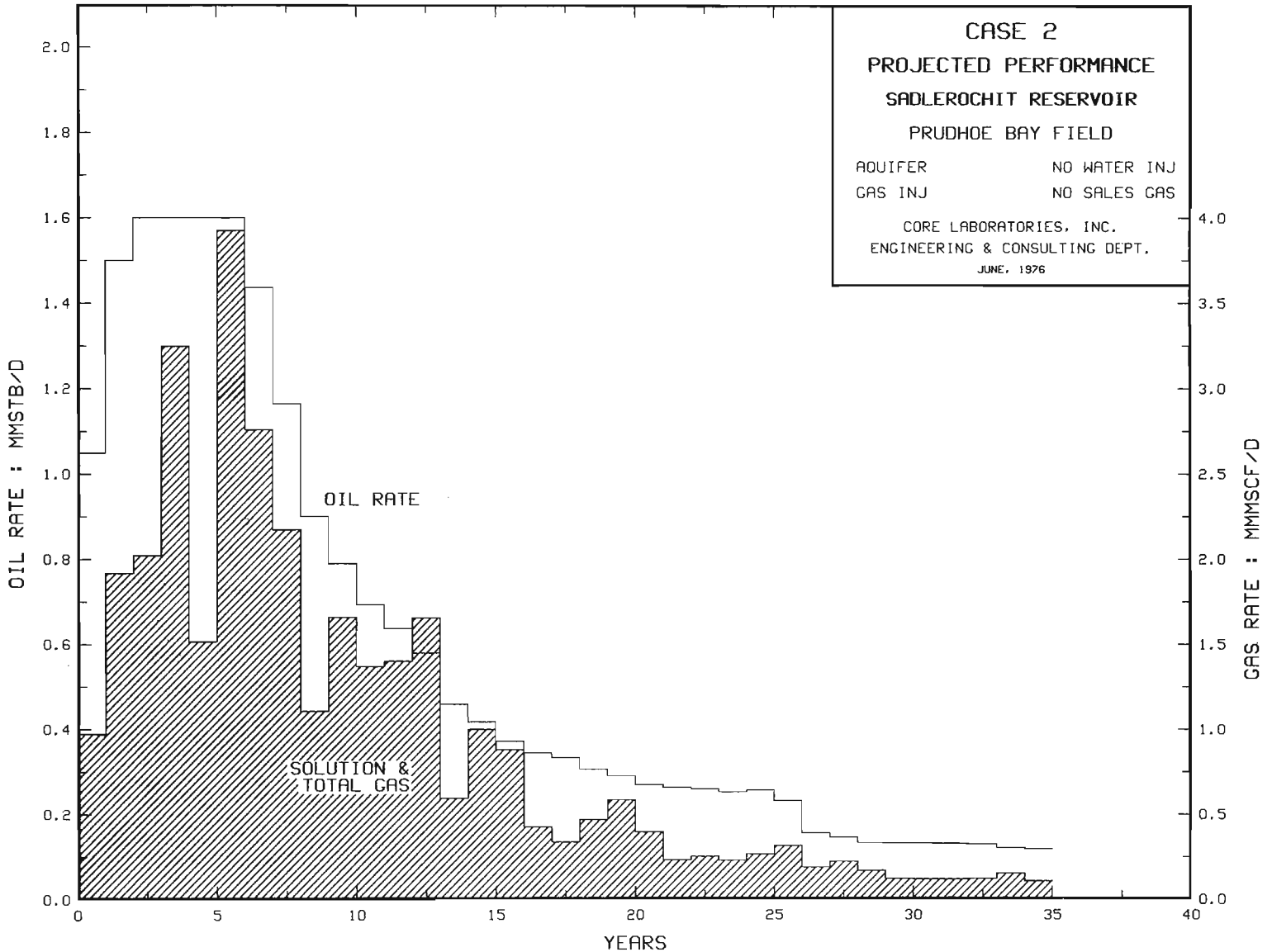

CASE 2
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
NO WATER INJ
GAS INJ
NO SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE
SOLUTION & TOTAL GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 22

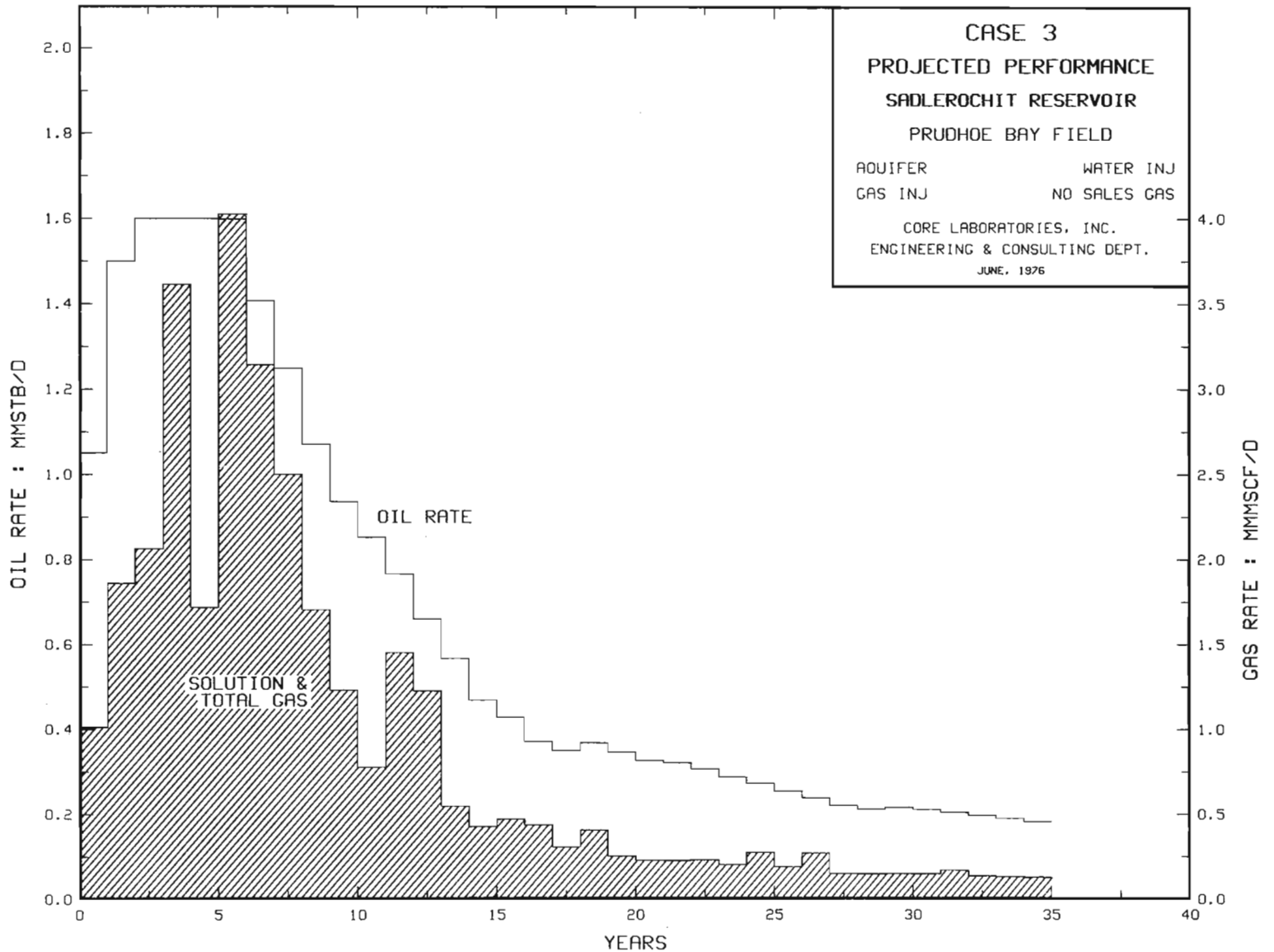

CASE 3
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
NO SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
OIL RATE
SOLUTION & TOTAL GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 23

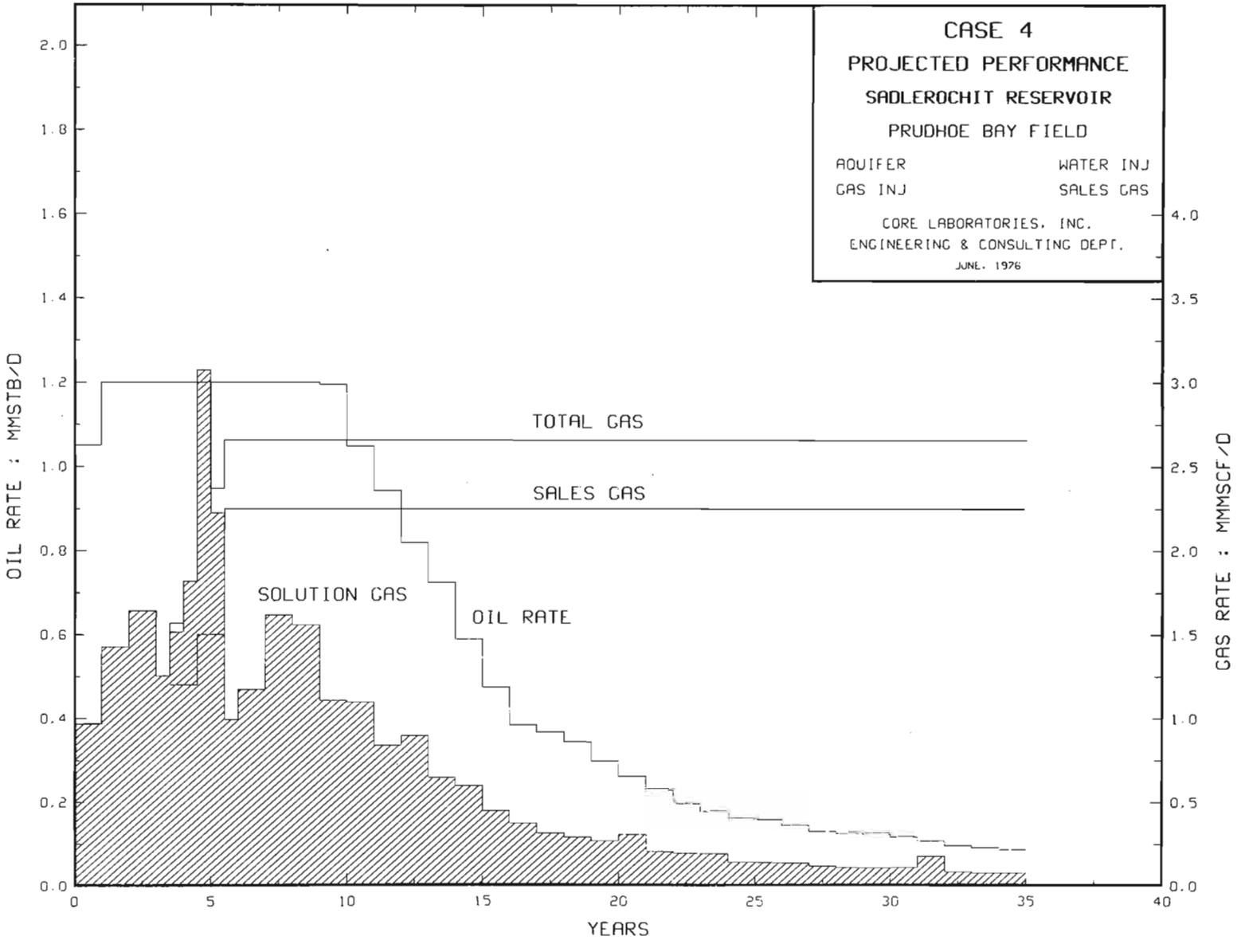

CASE 4
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
SOLUTION GAS
OIL RATE
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 24

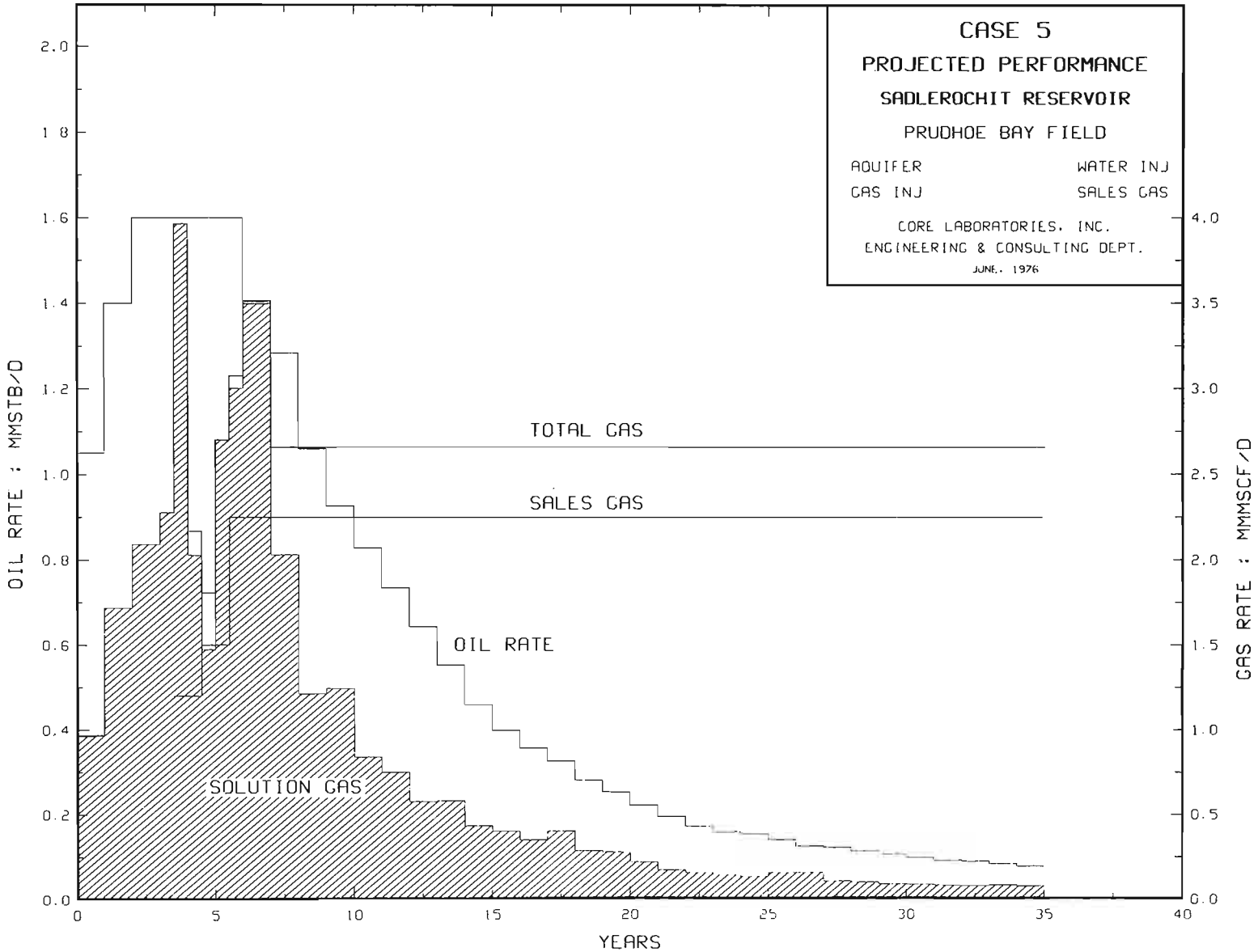

CASE 5
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE ; MMSTB/D
GAS RATE ; MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 25

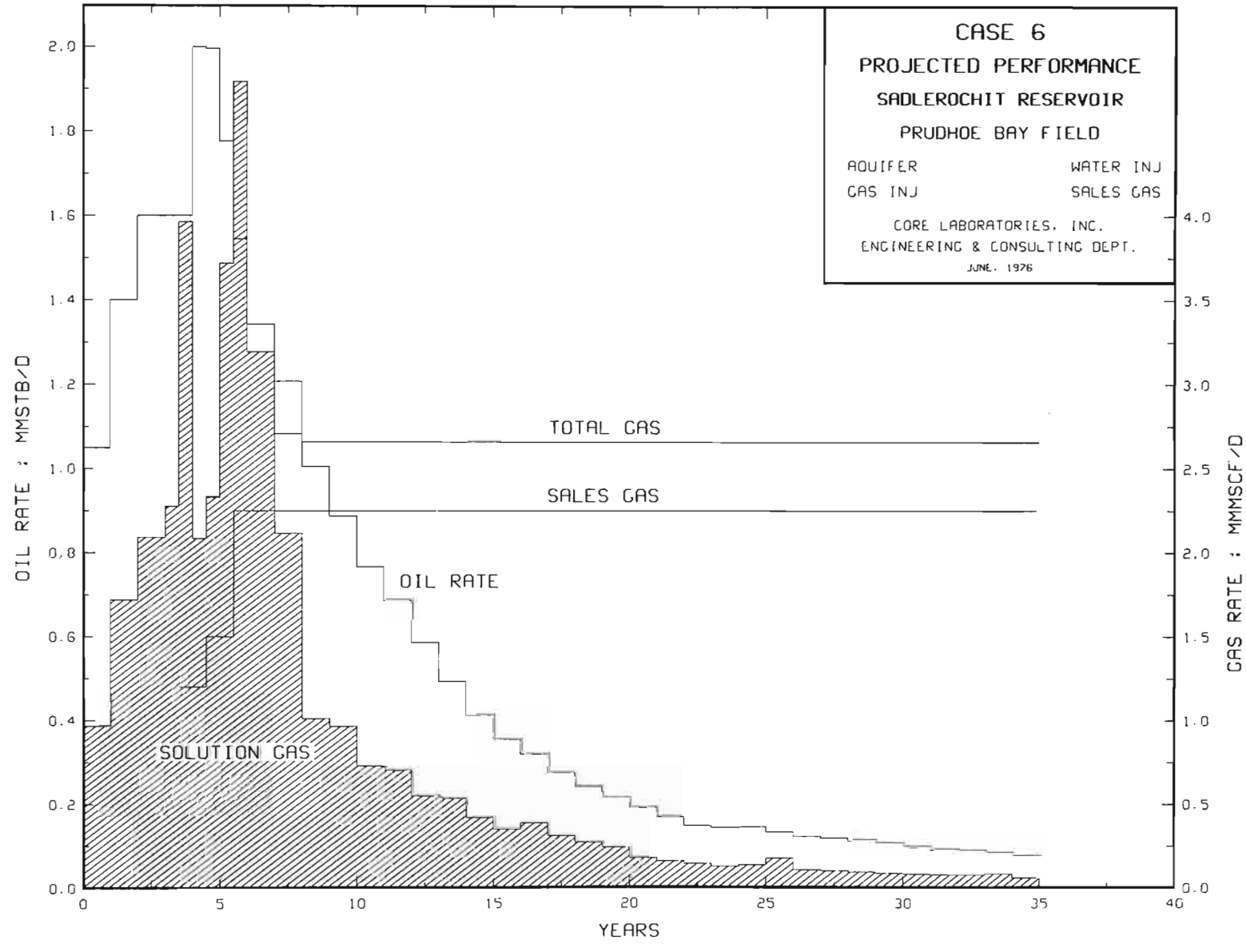

CASE 6
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 26

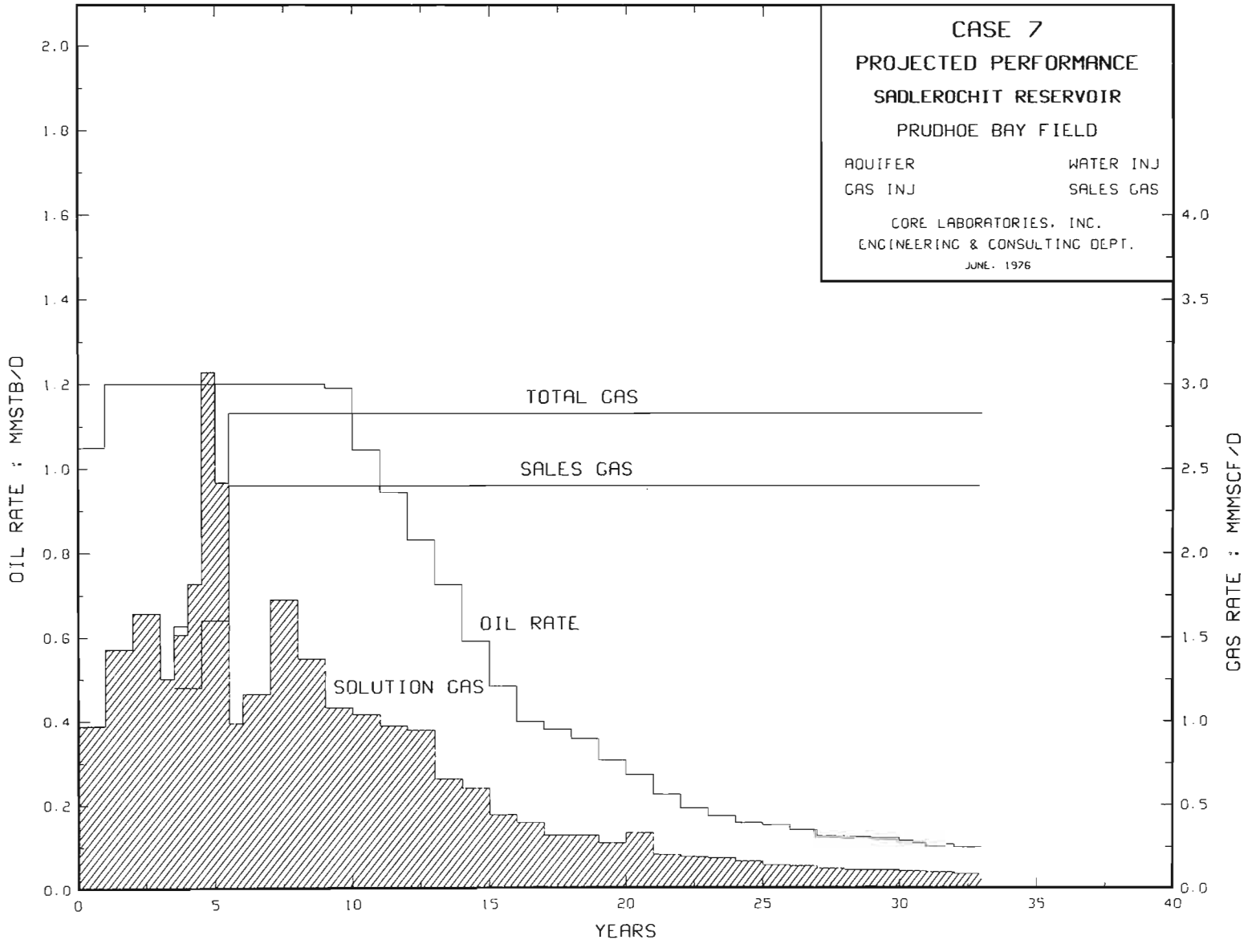

CASE 7
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 27

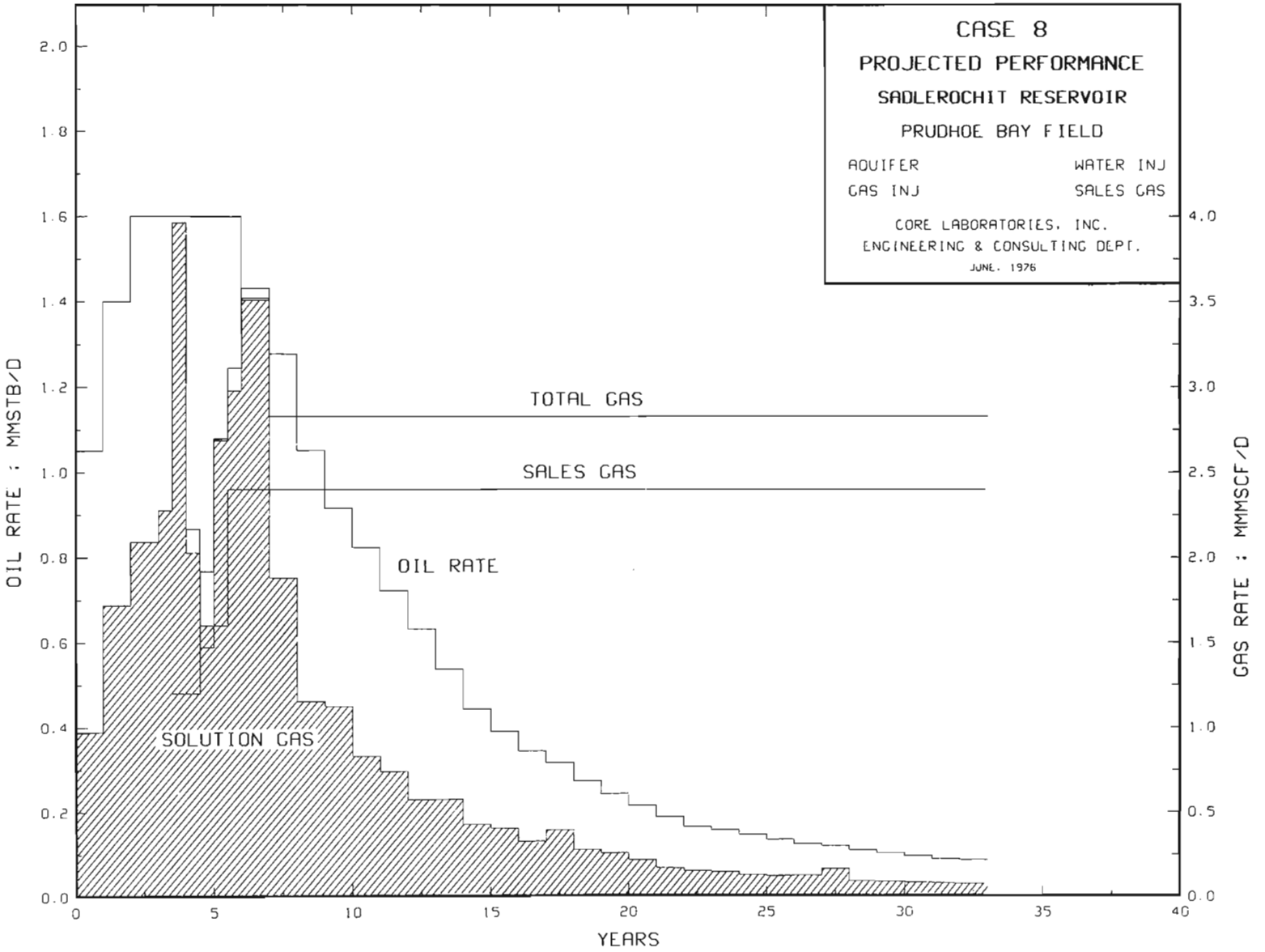

CASE 8
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 28

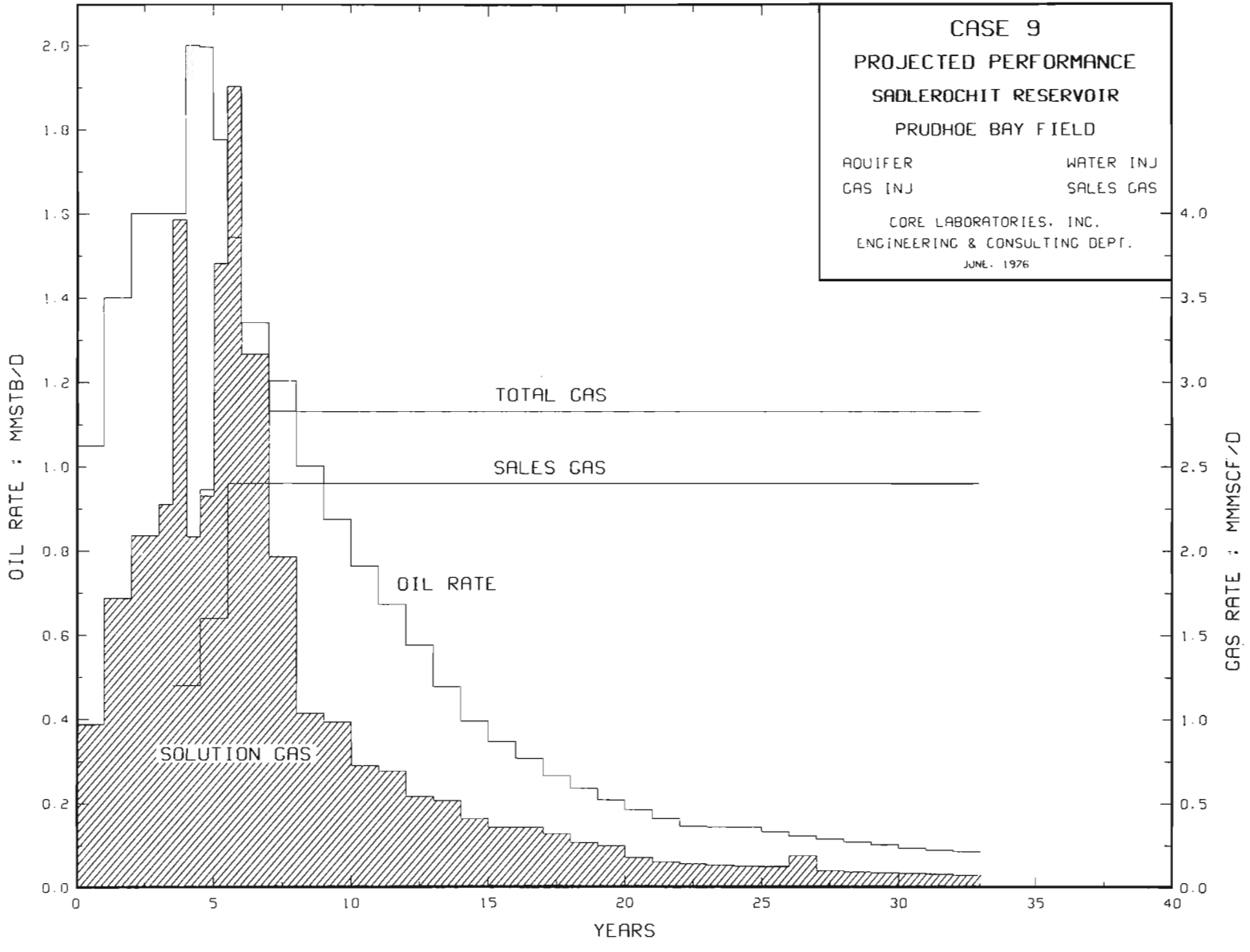

CASE 9
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 29

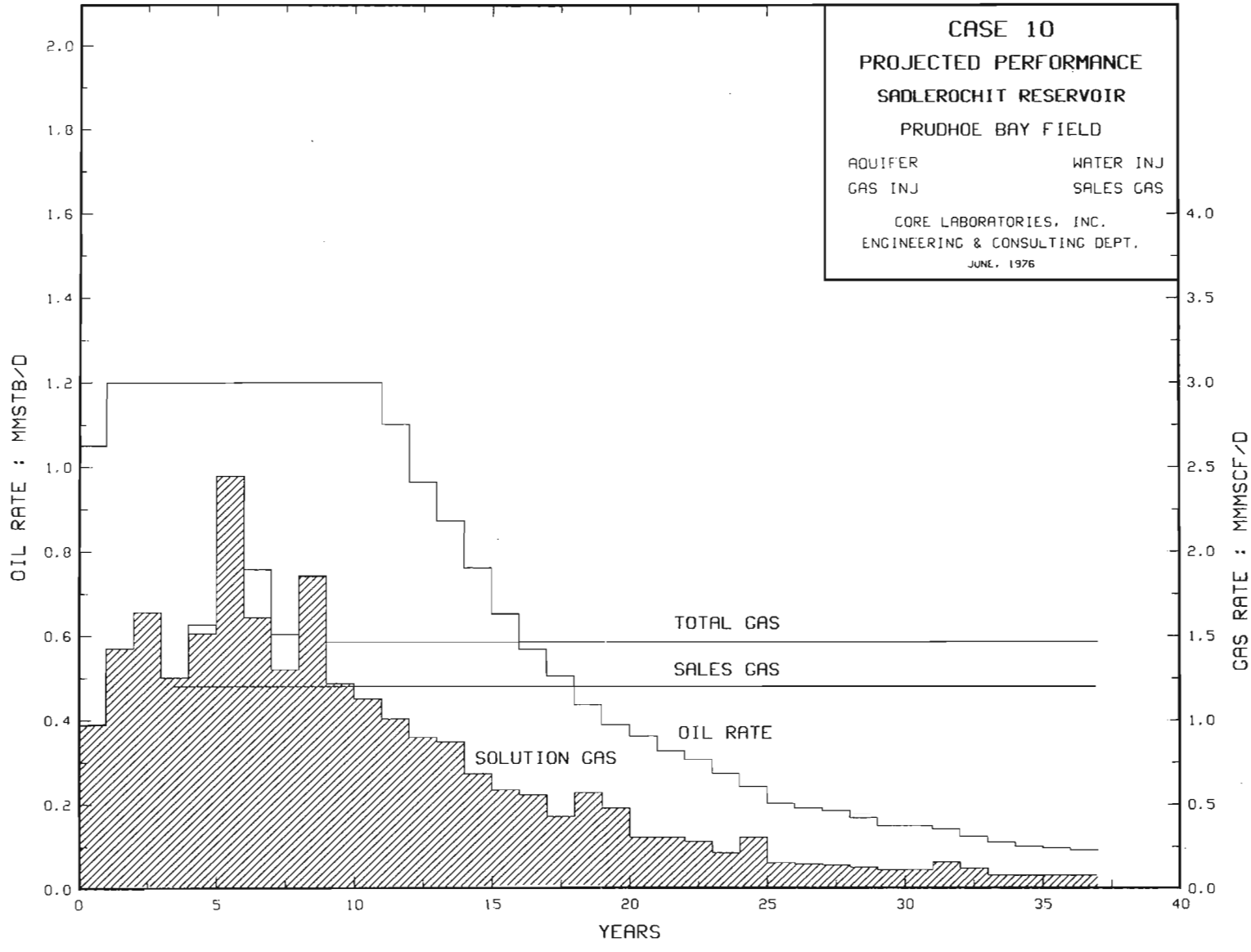

CASE 10
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 30

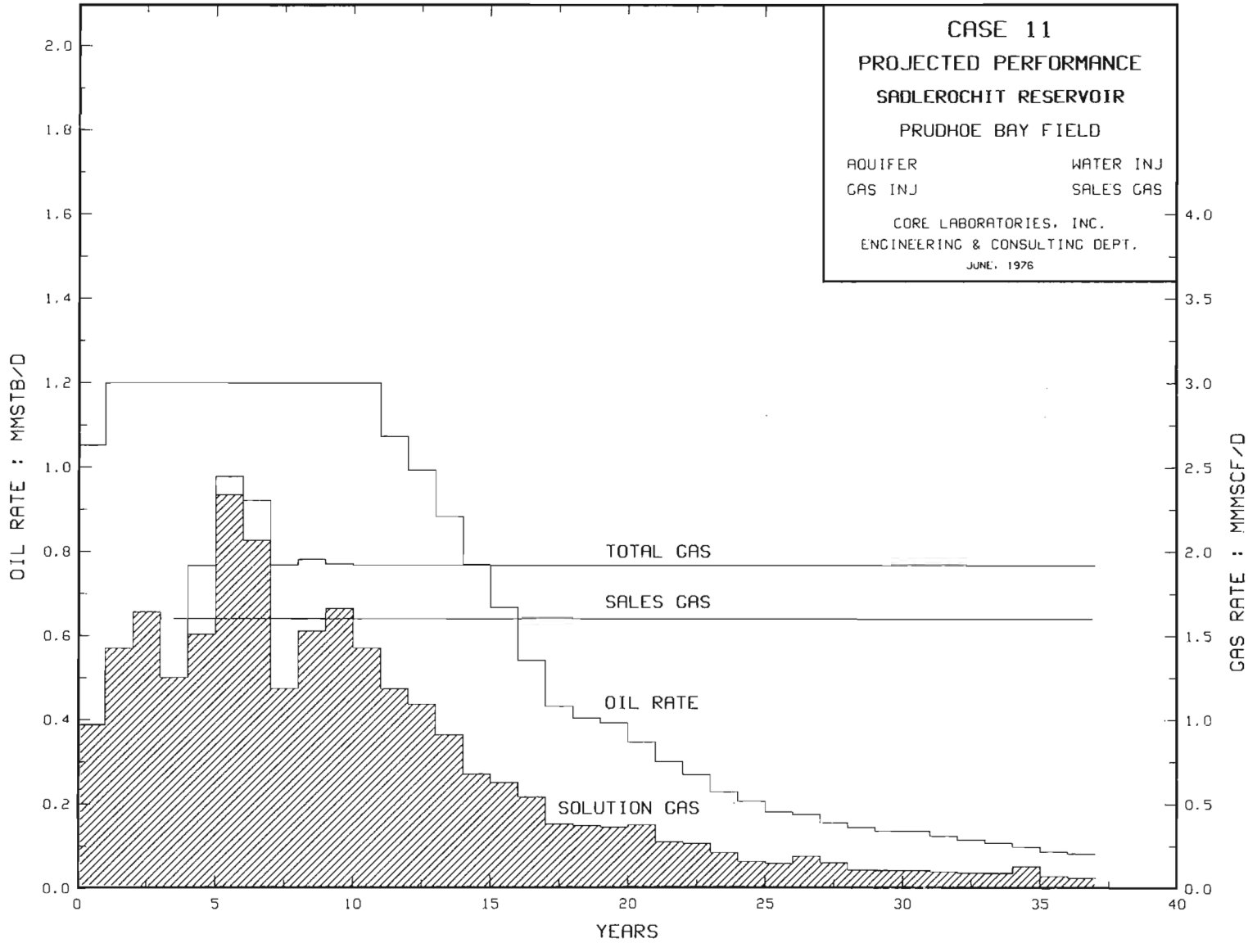

CASE 11
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 31

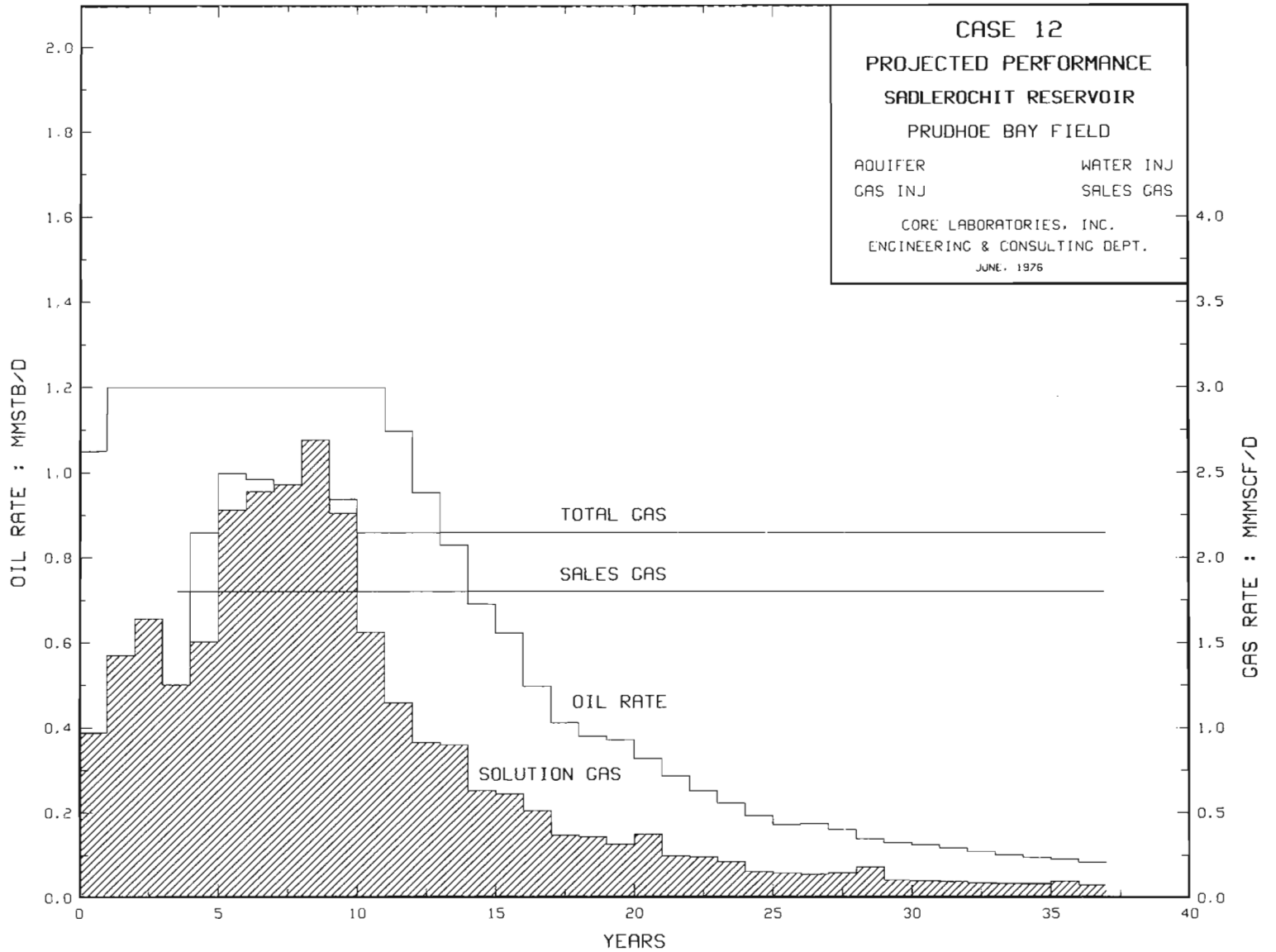

CASE 12
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 32

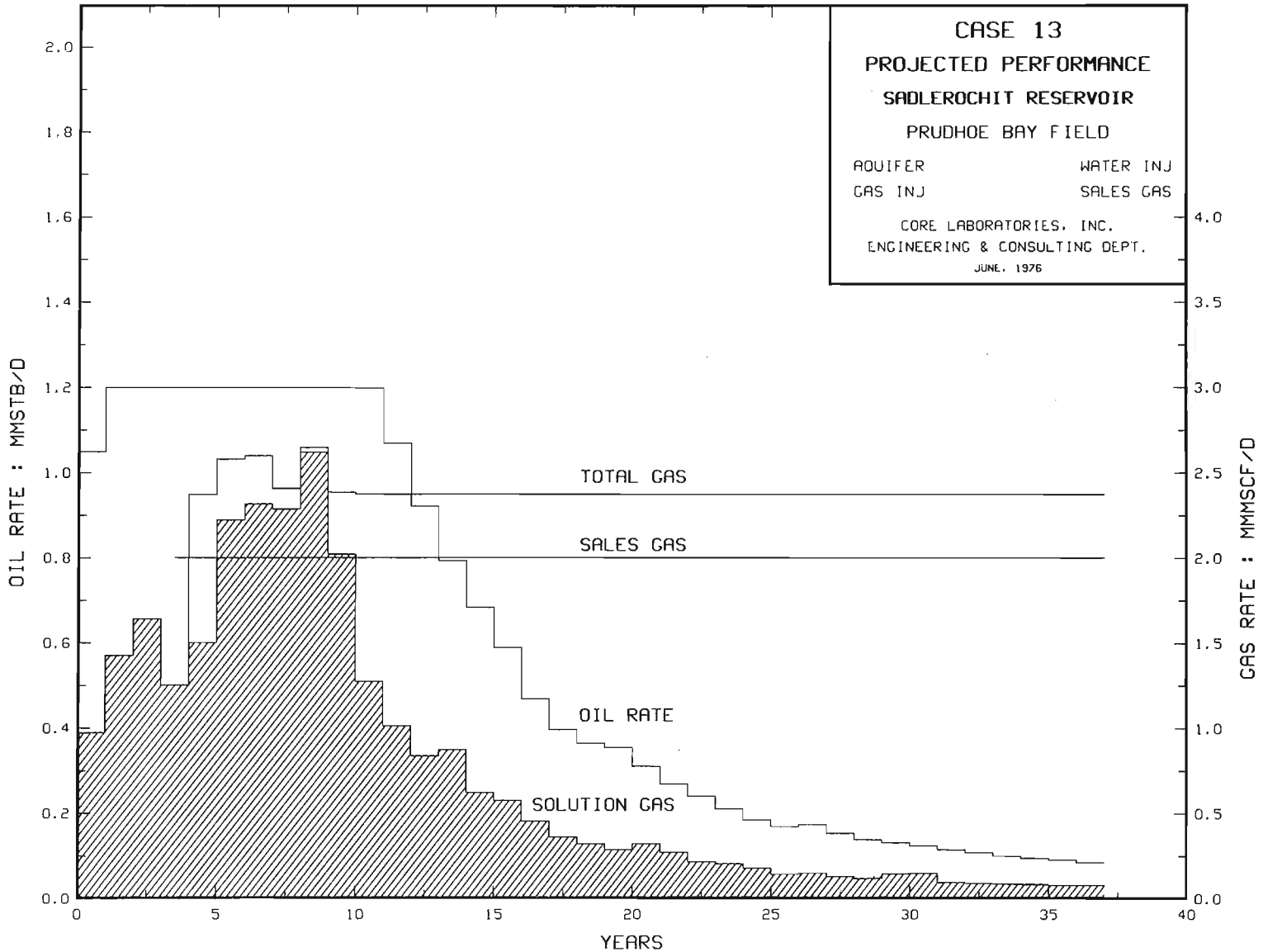

CASE 13
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 33

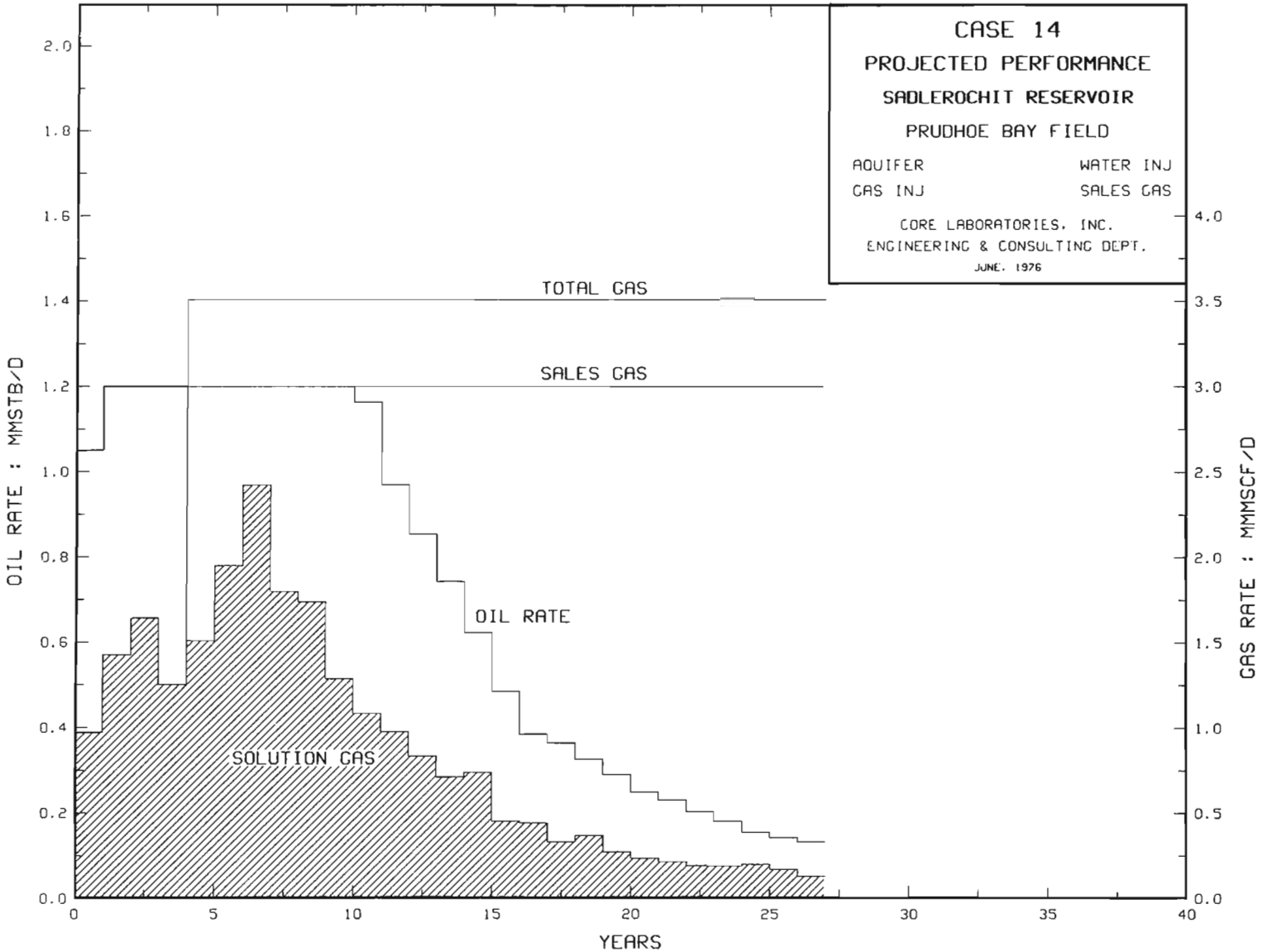

CASE 14
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 34

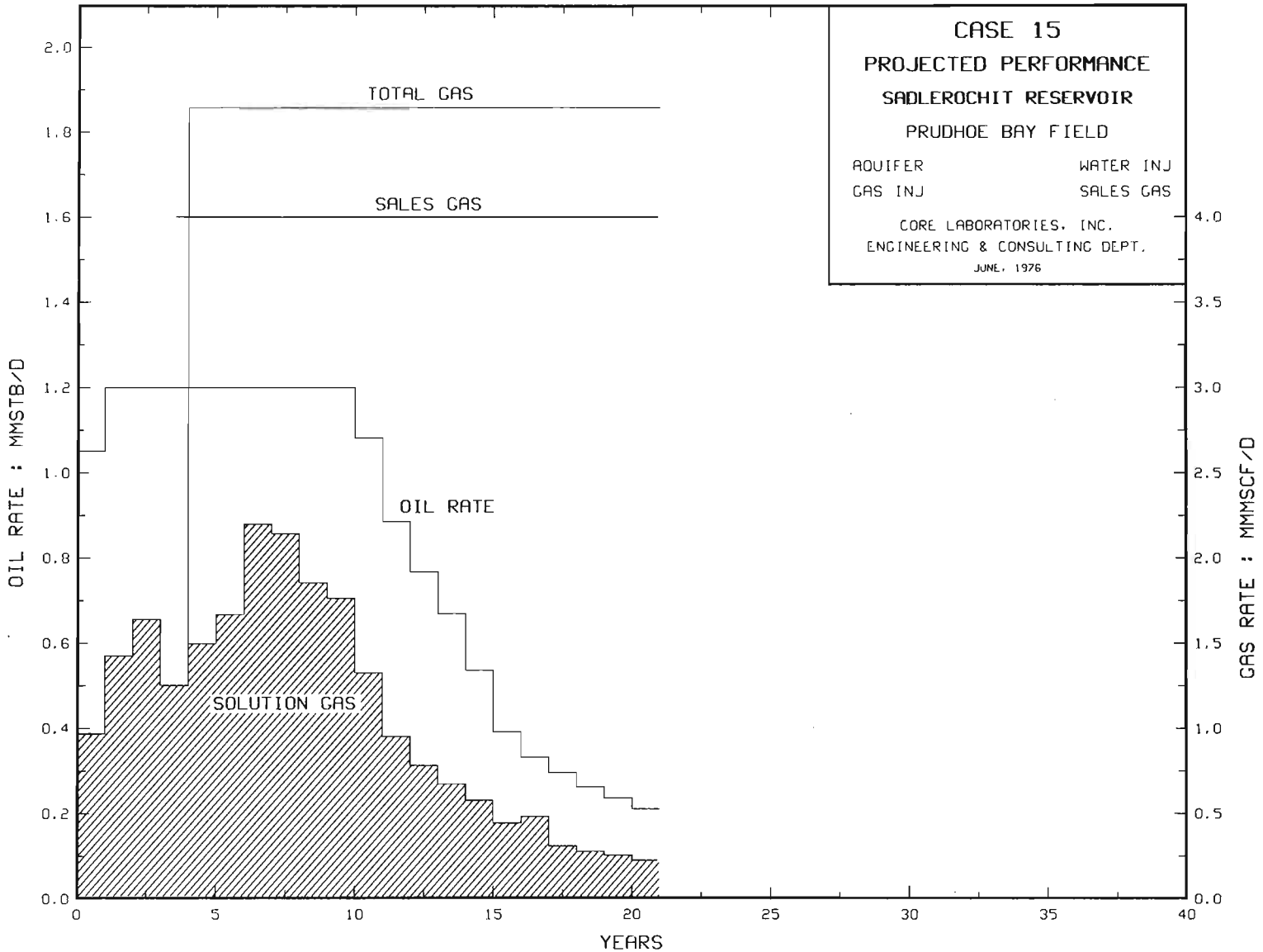

CASE 15
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
GAS INJ
WATER INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.5
1.5
2.5
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 35

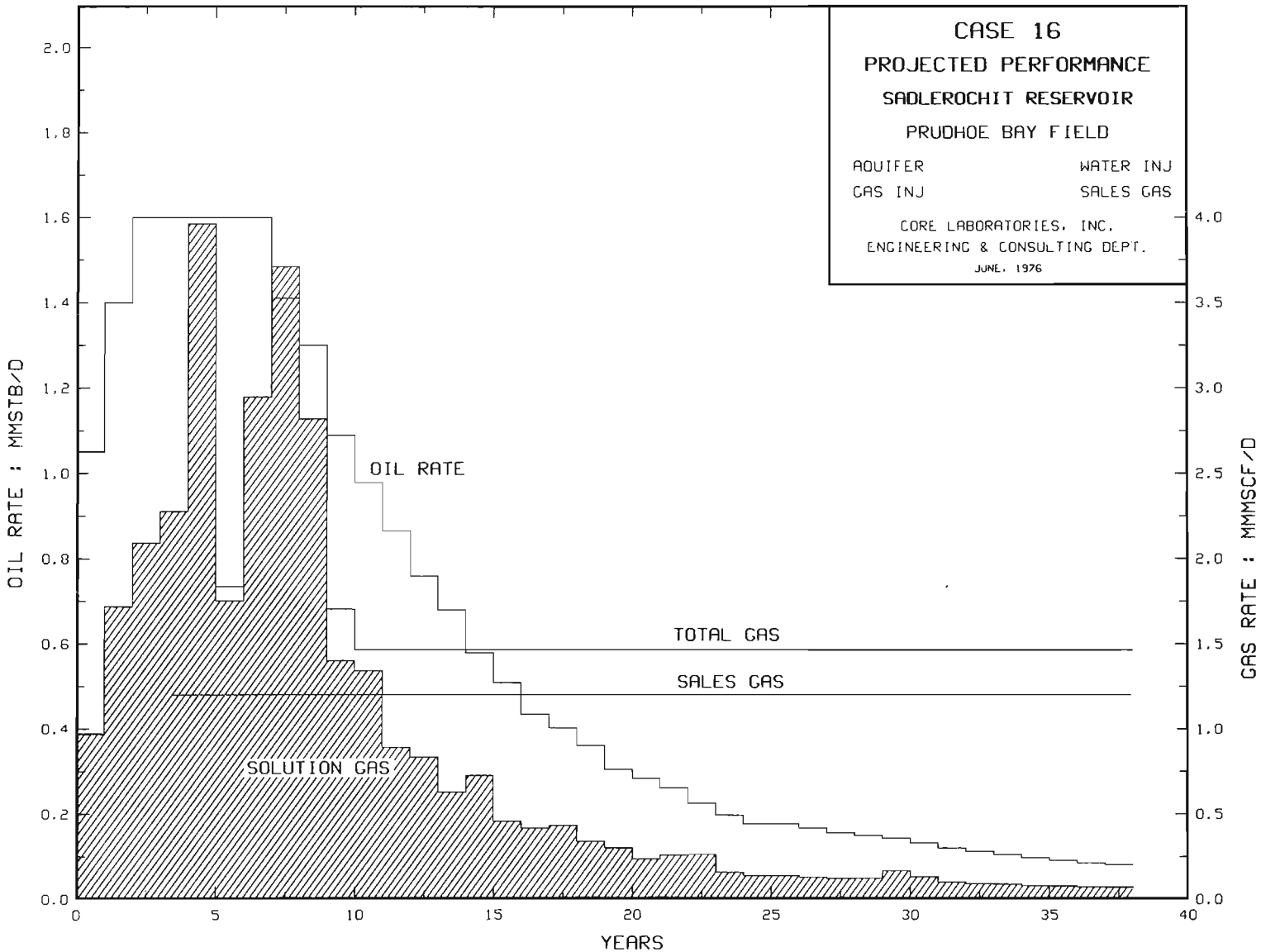

CASE 16
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
OIL RATE
TOTAL GAS
SALES GAS
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 36

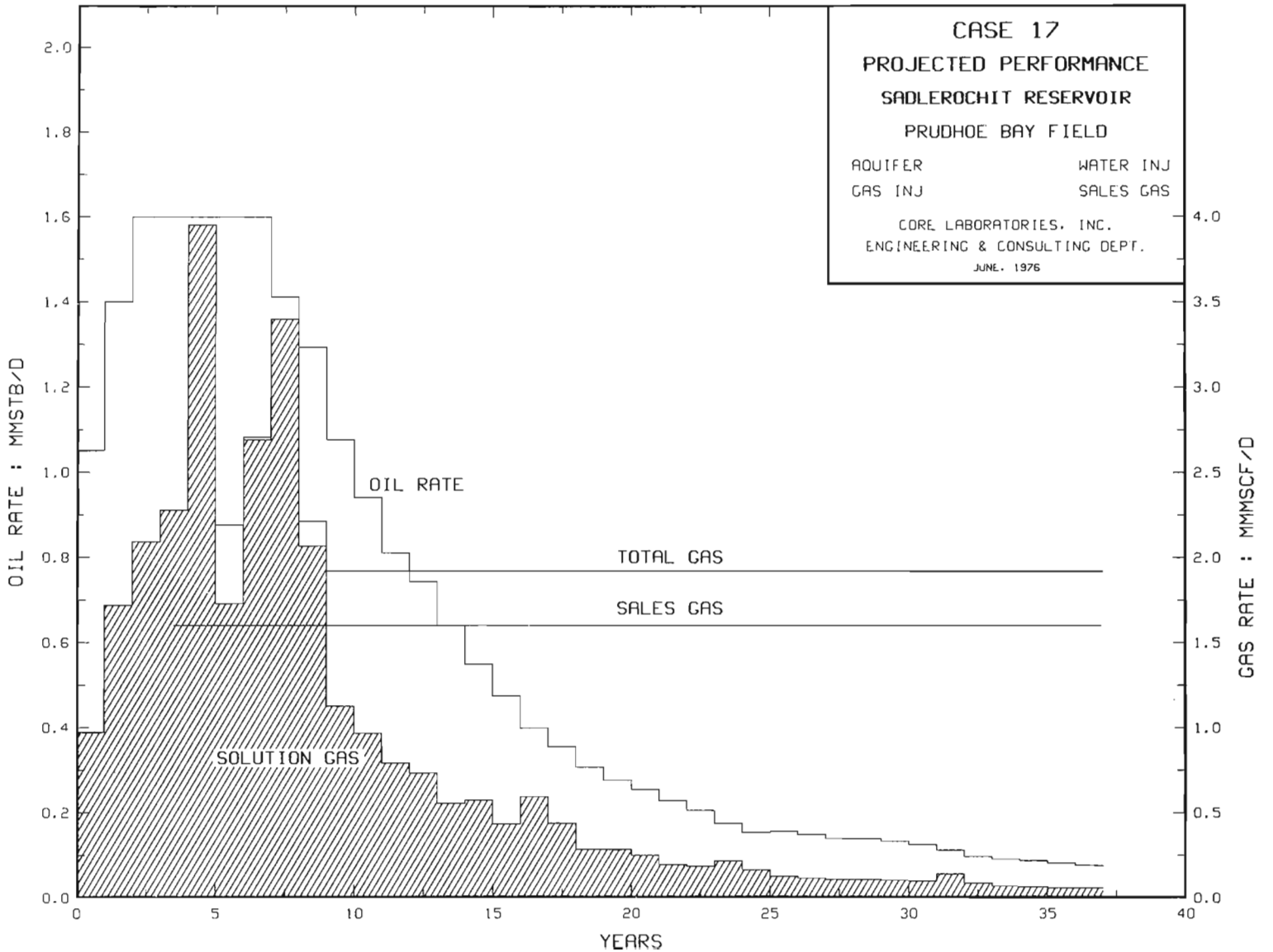

CASE 17
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
OIL RATE
TOTAL GAS
SALES GAS
SOLUTION GAS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 37

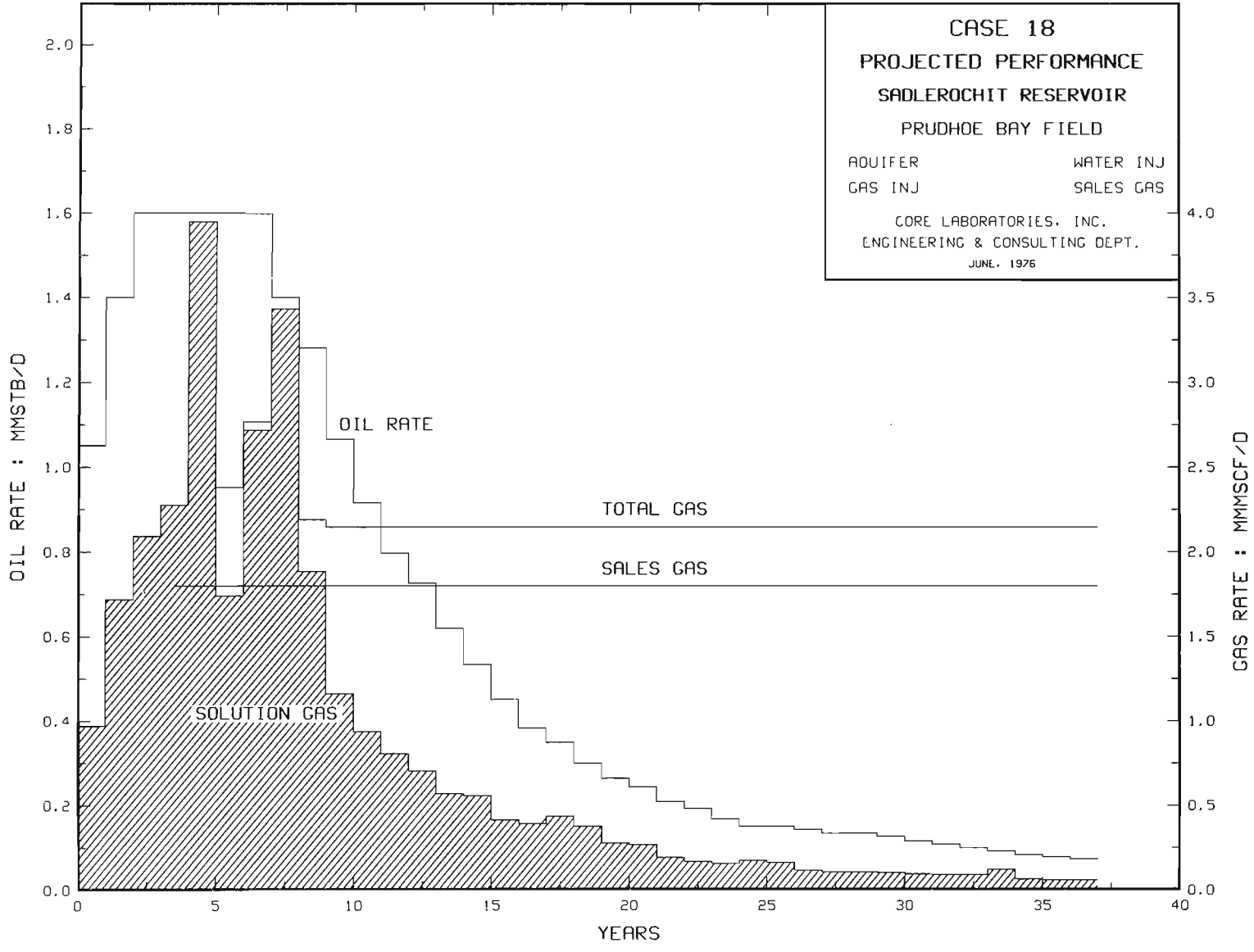

CASE 18
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE
TOTAL GAS
SALES GAS
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 38

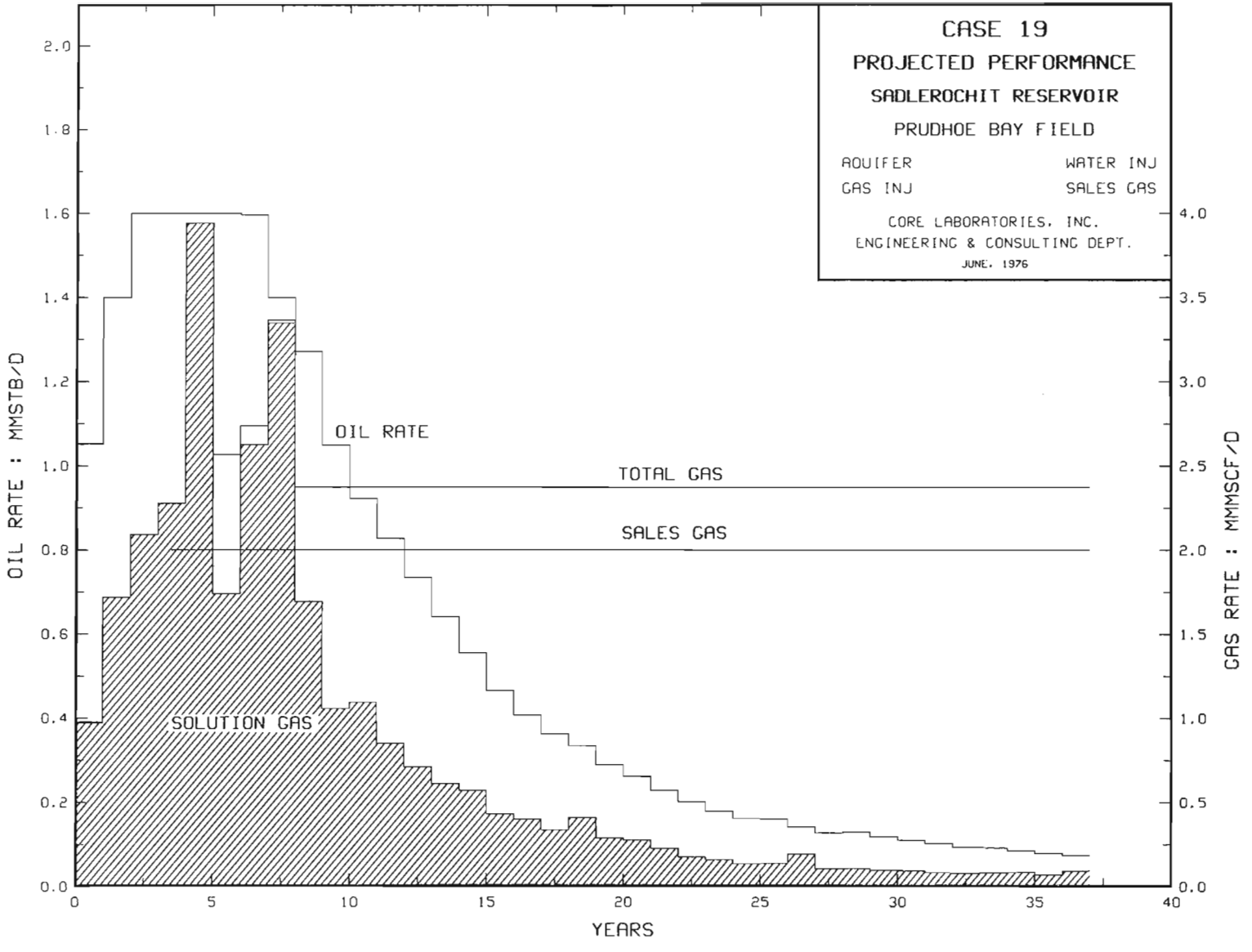

CASE 19
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
OIL RATE
TOTAL GAS
SALES GAS
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 39

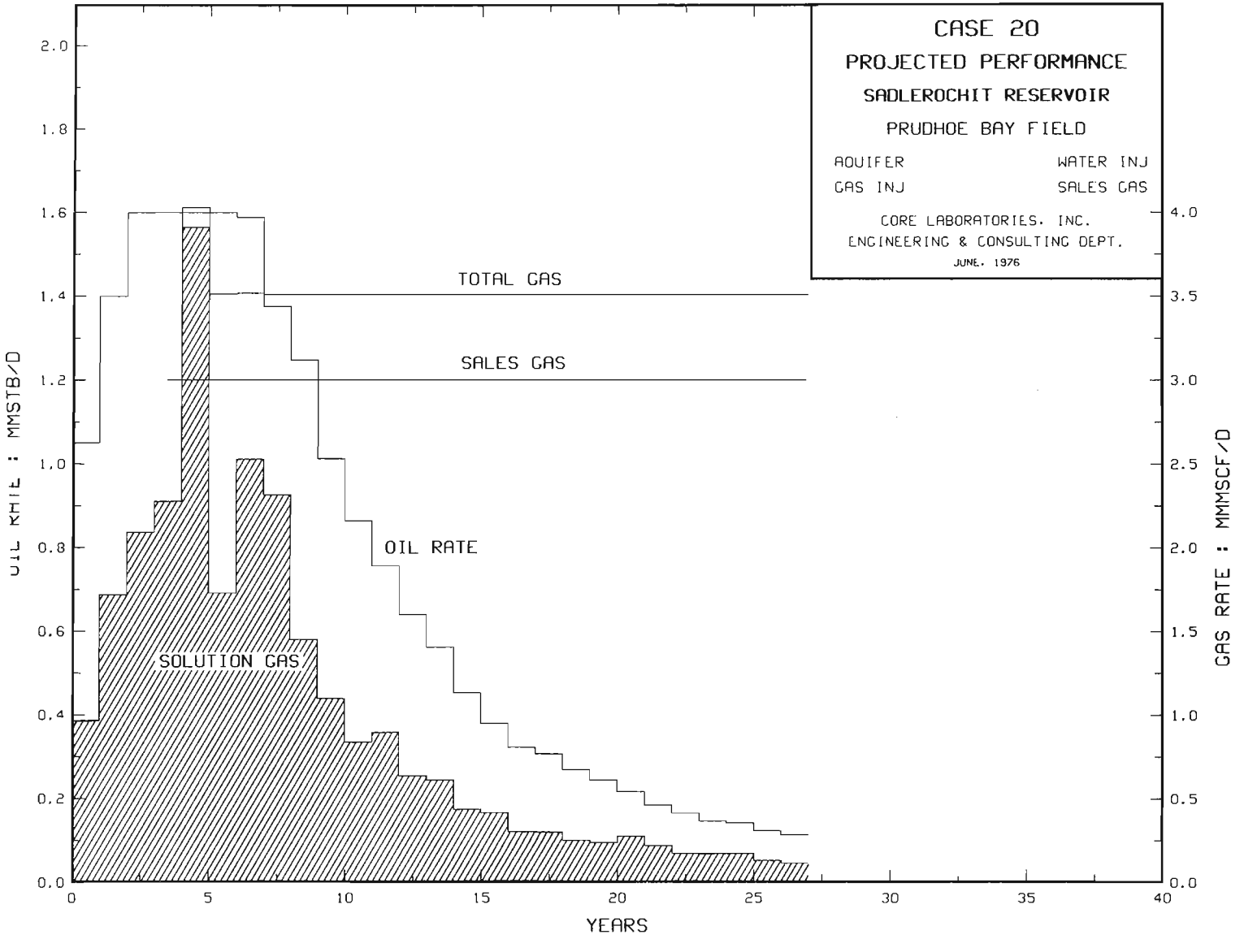

CASE 20
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
WATER INJ
GAS INJ
SALES GAS
CORE LABORATORIES. INC.
ENGINEERING & CONSULTING DEPT.
JUNE. 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 40

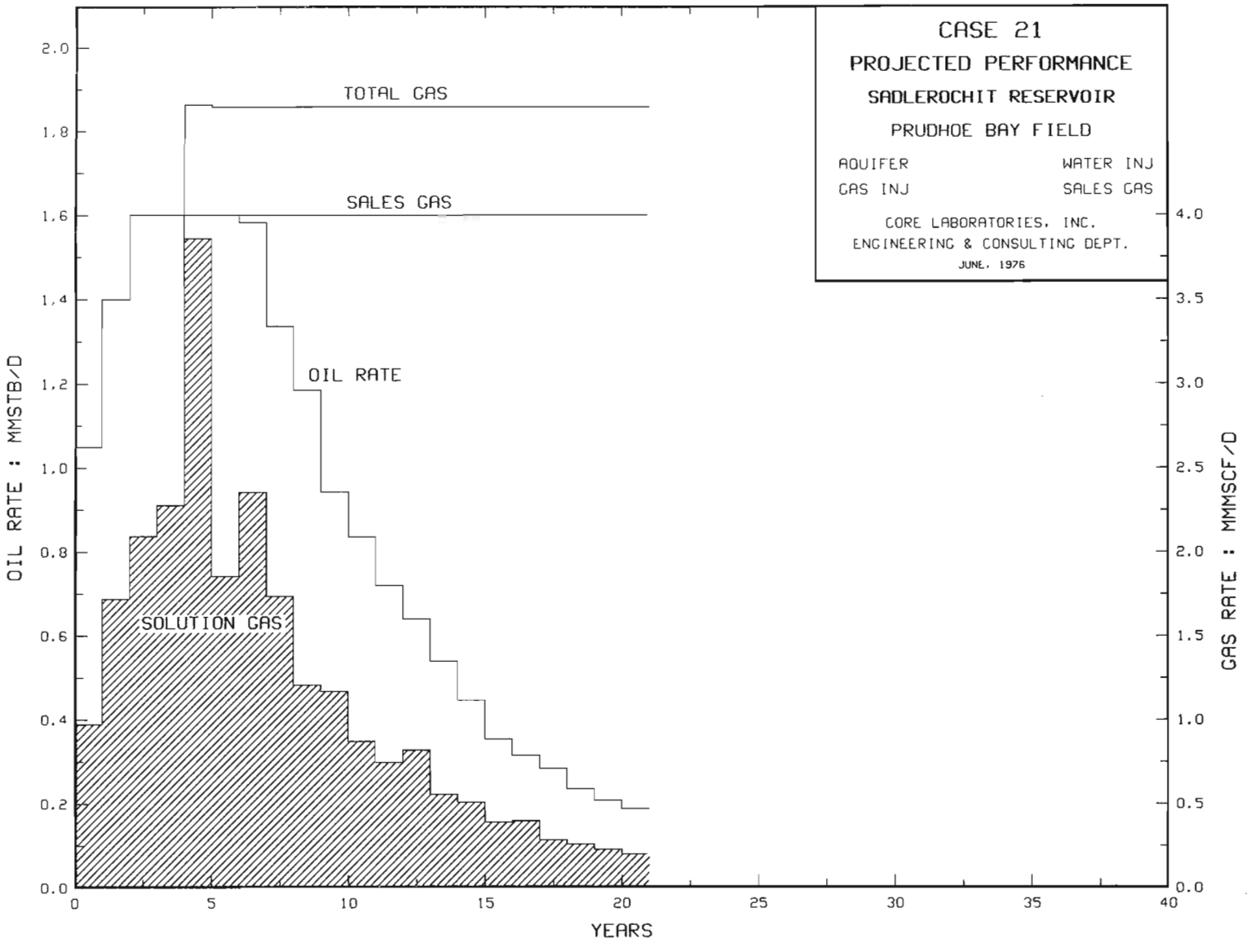

CASE 21
PROJECTED PERFORMANCE
SADLEROCHIT RESERVOIR
PRUDHOE BAY FIELD
AQUIFER
GAS INJ
WATER INJ
SALES GAS
CORE LABORATORIES, INC.
ENGINEERING & CONSULTING DEPT.
JUNE, 1976
TOTAL GAS
SALES GAS
OIL RATE
SOLUTION GAS
OIL RATE : MMSTB/D
GAS RATE : MMMSCF/D
YEARS
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
5
10
15
20
25
30
35
40

FIGURE 41

Capital Energy Letter

Congressional Energy Report

SPECIAL SUPPLEMENT WITH CEL NO. 145, OCT. 25, 1976

ENERGY SCORECARD FOR 94TH CONGRESS
Tabulation of Votes in the Senate & House
On Key Energy Issues in 1975-76

By Ms. Dale Tate, CEL Congressional Editor

Senators and House members in the 94th Congress cast their votes on several critical energy issues--price controls on oil and natural gas, petroleum industry divestiture, strip mining controls and changes in offshore leasing legislation.

CEL believes that it would be both interesting and instructive to look back at how each member of Congress voted on these key issues. This compilation can be used as a guide through the past--and perhaps to the future.

SENATE ISSUES:

1. Jackson OCS federal exploration amendment (adopted 46 to 41)
2. Pearson-Bentsen substitute for natural gas decontrol to S-2310 (adopted 50 to 41)
3. Abourezk amendment to S-2310 for vertical divestiture (rejected 45 to 54)
4. 40-month extension of crude oil price controls S-621 (passed 47-36)
5. Kennedy horizontal divestiture amendment to S-2310 (rejected 39 to 53)
6. Final passage of S-7, surface mining controls (passed 84 to 13)

KEY: Blank indicates that seat was vacant at time of vote. Y, voted yeas; N, voted no; O, did not vote; #, announced for; --, announced against; &, paired for; X, paired against.

SENATE:

	1	2	3	4	5	6
ALABAMA						
Allen (D)	N	Y	N	N	N	Y
Sparkman (D)	Y	O	N	Y	O	Y
ALASKA						
Gravel (D)	N	Y	N	O	N	Y
Stevens (R)	N	Y	N	--	N	Y
ARIZONA						
Fannin (R)	N	Y	N	N	N	N
Goldwater (R)	O	Y	N	N	N	O
ARKANSAS						
Bumpers (D)	Y	N	Y	Y	N	Y
McClellan (D)	N	Y	N	Y	N	Y
CALIFORNIA						
Cranston (D)	Y	N	Y	Y	Y	Y
Tunney (D)	Y	Y	Y	Y	Y	Y
COLORADO						
Hart (D)	Y	N	Y	Y	Y	Y
Haskell (D)	Y	N	Y	Y	Y	Y
CONNECTICUT						
Ribicoff (D)	Y	N	Y	Y	Y	Y
Weicker (R)	N	Y	N	N	N	Y
DELAWARE						
Biden (D)	Y	N	Y	Y	Y	Y
Roth (R)	N	Y	N	Y	N	Y
FLORIDA						
Chiles (D)	Y	Y	Y	Y	N	Y
Stone (D)	Y	Y	N	Y	N	Y
GEORGIA						
Nunn (D)	N	Y	N	N	N	Y
Talmadge (D)	N	N	N	Y	N	Y
HAWAII						
Inouye (D)	Y	N	Y	O	Y	Y
Fong (R)	N	Y	N	N	N	Y
IDAHO						
Church (D)	Y	N	Y	O	Y	Y
McClure (R)	N	Y	N	N	N	Y
ILLINOIS						
Stevenson (D)	Y	N	Y	Y	Y	Y
Percy (R)	Y	Y	N	N	N	Y
INDIANA						
Bayh (D)	Y	O	Y	O	#	Y
Hartke (D)	O	&	Y	O	Y	Y
IOWA						
Clark (D)	Y	N	Y	Y	Y	Y
Culver (D)	Y	X	Y	Y	Y	Y
KANSAS						
Dole (R)	N	Y	N	N	N	Y
Pearson (R)	N	Y	N	N	N	Y
KENTUCKY						
Ford (D)	Y	Y	Y	Y	N	Y
Huddleston (D)	N	Y	N	Y	Y	Y
LOUISIANA						
Johnston (D)	N	Y	N	N	N	Y
Long (D)	N	Y	N	N	N	Y
MAINE						
Hathaway (D)	Y	N	Y	Y	Y	Y
Muskie (D)	O	N	Y	Y	Y	Y
MARYLAND						
Beall (R)	N	Y	N	N	N	Y
Mathias (R)	Y	Y	O	O	X	Y
MASSACHUSETTS						
Kennedy (D)	Y	N	Y	O	Y	Y
Brooke (R)	Y	O	Y	Y	Y	Y
MICHIGAN						
Hart (D)	Y	O	Y	Y	&	Y
Griffin (R)	N	Y	N	N	N	Y
MINNESOTA						
Humphrey (D)	Y	N	Y	Y	Y	Y
Mondale (D)	Y	N	Y	Y	Y	Y

	1	2	3	4	5	6
MISSISSIPPI						
Eastland (D)	O	Y	N	N	N	N
Stennis (D)	O	O	N	O	O	N
MISSOURI						
Eagleton (D)	Y	N	N	Y	N	Y
Symington (D)	O	N	N	Y	N	Y
MONTANA						
Mansfield (D)	Y	N	Y	Y	Y	Y
Metcalf (D)	Y	X	Y	Y	Y	Y
NEBRASKA						
Curtis (R)	O	Y	N	N	N	N
Hruska (R)	N	Y	N	O	N	N
NEVADA						
Cannon (D)	Y	N	Y	Y	N	Y
Laxalt (R)	N	Y	N	N	N	N
NEW HAMPSHIRE						
McIntyre (D)	Y	N	Y	Y	Y	Y
Durkin (D)		N	Y		Y	
NEW JERSEY						
Williams (D)	Y	N	Y	Y	Y	Y
Case (R)	Y	N	Y	Y	Y	Y
NEW MEXICO						
Montoya (D)	Y	Y	N	N	N	Y
Domenici (R)	N	Y	N	N	N	Y
NEW YORK						
Buckley (R-Con.)	N	Y	N	O	N	Y
Javits (D)	O	N	N	Y	N	Y
NORTH CAROLINA						
Morgan (D)	Y	N	N	Y	&	Y
Helms (R)	N	Y	N	N	N	N
NORTH DAKOTA						
Burdick (D)	Y	N	N	Y	Y	Y
Young (R)	N	Y	N	N	N	N
OHIO						
Glenn (D)	#	N	N	Y	N	Y
Taft (R)	N	Y	N	--	N	#
OKLAHOMA						
Bartlett (R)	N	Y	N	N	N	N
Bellmon (R)	N	Y	N	N	N	Y
OREGON						
Hatfield (R)	N	Y	Y	N	N	Y
Packwood (R)	N	Y	Y	N	Y	Y
PENNSYLVANIA						
Schweiker (R)	Y	N	Y	Y	Y	Y
Scott (R)	N	Y	N	N	N	Y
RHODE ISLAND						
Pastore (D)	Y	N	Y	Y	Y	Y
Pell (D)	Y	N	Y	Y	Y	Y
SOUTH CAROLINA						
Hollings (D)	Y	N	Y	O	Y	Y
Thurmond (R)	N	Y	N	N	N	Y
SOUTH DAKOTA						
Abourezk (D)	Y	N	Y	N	Y	Y
McGovern (D)	Y	N	Y	Y	Y	Y

	1	2	3	4	5	6
TENNESSEE						
Baker (R)	O	Y	N	N	O	Y
Brock (R)	N	Y	N	N	N	Y
TEXAS						
Bentsen (D)	N	Y	N	N	N	Y
Tower (R)	N	Y	N	N	N	N
UTAH						
Moss (D)	Y	N	Y	O	Y	Y
Garn (R)	N	Y	N	N	N	N
VERMONT						
Leahy (D)	Y	N	Y	#	Y	Y
Stafford (R)	N	N	Y	Y	Y	Y
VIRGINIA						
Byrd (Ind.)	N	Y	N	O	N	N
Scott (R)	O	Y	N	N	N	N
WASHINGTON						
Jackson (D)	Y	N	Y	Y	Y	Y
Magnuson (D)	#	N	Y	Y	N	Y
WEST VIRGINIA						
Byrd (D)	N	Y	N	Y	N	Y
Randolph (D)	N	Y	N	Y	N	Y
WISCONSIN						
Nelson (D)	Y	N	Y	Y	Y	Y
Proxmire (D)	Y	N	Y	Y	Y	Y
WYOMING						
McGee (D)	N	&	N	N	X	Y
Hansen (R)	N	Y	N	N	N	Y

HOUSE ISSUES:

1. Repeal of the percentage depletion allowance (adopted 248 to 163)
2. 40-month extension of petroleum price and allocation controls (adopted 255 to 148)
3. Smith substitute to retain price controls on natural gas (adopted 205 to 201)
4. Override of the President's veto on surface coal mining (failed 278 to 143)

HOUSE:

	1	2	3	4
ALABAMA				
Edwards (R)	N	O	N	Y
Dickinson (R)	N	N	N	N
Nichols (D)	Y	Y	N	N
Bevill (D)	Y	Y	Y	N
Jones (D)	N	Y	N	&
Buchanan (R)	N	N	N	N
Flowers (D)	N	Y	N	N
ALASKA				
Young (R)	N	N	N	N
ARIZONA				
Rhodes (R)	N	N	N	N
Udall (D)	Y	#	&	Y
Steiger (R)	N	N	O	N
Conlan (R)	N	N	N	N
ARKANSAS				
Alexander (D)	Y	&	O	N
Mills (D)	O	Y	X	N
Hammerschmidt (R)	N	Y	N	N
Thornton (D)	N	N	N	N

	1	2	3	4
CALIFORNIA				
Johnson (D)	N	Y	N	N
Clausen (R)	N	N	N	Y
Moss (D)	Y	Y	Y	Y
Leggett (D)	Y	Y	Y	Y
Burton, J. (D)	Y	Y	Y	Y
Burton, P. (D)	Y	&	Y	Y
Miller (D)	Y	Y	Y	Y
Dellums (D)	Y	Y	Y	Y
Stark (D)	Y	Y	Y	Y
Edwards (D)	Y	Y	Y	Y
Ryan (D)	Y	Y	Y	Y
McCloskey (R)	O	N	O	Y
Mineta (D)	Y	Y	Y	Y
McFall (D)	Y	Y	Y	Y
Sisk (D)	Y	&	Y	Y
Talcott (R)	N	N	N	Y
Krebs (D)	Y	Y	Y	Y
Ketchum (R)	O	N	N	N
Lagomarsino (R)	N	N	N	Y
Goldwater (R)	O	N	N	N
Corman (D)	Y	Y	Y	Y
Moorhead (R)	N	N	N	Y
Rees (D)	Y	Y	N	Y
Waxman (D)	Y	Y	Y	Y
Roybal (D)	Y	Y	Y	Y
Rousselot (R)	O	N	N	N
Bell (R)	Y	N	N	Y
Burke (D)	Y	Y	Y	Y
Hawkins (D)	Y	Y	&	Y
Danielson (D)	Y	Y	Y	Y
Wilson (D)	Y	Y	Y	Y
Anderson (D)	Y	Y	Y	Y
Clawson (R)	N	N	N	N
Hannaford (D)	Y	Y	Y	Y
Lloyd (D)	Y	Y	Y	Y
Brown (D)	N	O	N	Y
Pettis (R)	O	N	N	Y
Patterson (D)	O	Y	Y	Y
Wiggins (R)	N	N	N	Y
Hinshaw (R)	Y	N	O	N
Wilson (R)	N	O	N	N
Van Deerlin (D)	Y	Y	Y	Y
Burgener (R)	Y	N	N	N
COLORADO				
Schroeder (D)	Y	Y	N	Y
Wirth (D)	Y	Y	Y	Y
Evans (D)	Y	Y	Y	Y
Johnson (R)	N	N	N	Y
Armstrong (R)	N	N	N	Y
CONNECTICUT				
Cotter (D)	Y	Y	Y	Y
Dodd (D)	Y	Y	Y	Y
Giaimo (D)	Y	Y	N	Y
McKinney (R)	Y	Y	N	#
Sarasin (R)	Y	N	N	Y
Moffett (D)	Y	Y	Y	Y
DELAWARE				
duPont (R)	Y	N	N	Y
FLORIDA				
Sikes (D)	Y	X	N	N
Fuqua (D)	Y	Y	N	Y
Bennett (D)	Y	Y	N	Y
Chappell (D)	O	N	X	N
Kelly (R)	Y	N	N	N
Young (R)	Y	N	N	Y
Gibbons (D)	Y	O	N	Y

	1	2	3	4
FLORIDA (continued)				
Haley (D)	N	N	N	Y
Frey (R)	N	N	N	Y
Bafalis (R)	Y	N	N	Y
Rogers (D)	Y	Y	Y	Y
Burke (R)	N	X	N	Y
Lehman (D)	Y	O	N	Y
Pepper (D)	Y	Y	N	Y
Fascell (D)	Y	Y	Y	Y
GEORGIA				
Ginn (D)	N	Y	N	N
Mathis (D)	N	Y	N	N
Brinkley (D)	N	Y	Y	Y
Levitas (D)	Y	Y	Y	Y
Young (D)	Y	Y	Y	Y
Flynt (D)	X	Y	N	X
McDonald (D)	N	N	N	N
Stuckey (D)	N	Y	N	Y
Landrum (D)	N	N	N	N
Stephens (D)	N	N	N	N
HAWAII				
Matsunaga (D)	Y	Y	Y	Y
Mink (D)	Y	Y	Y	Y
IDAHO				
Symms (R)	N	N	N	N
Hansen (R)	N	N	N	N
ILLINOIS				
Metcalfe (D)	Y	Y	&	Y
Murphy (D)	Y	Y	&	Y
Russo (D)	Y	Y	Y	Y
Derwinski (R)	N	N	N	N
Fary (D)	O	O	Y	
Hyde (R)	N	N	N	N
Collins (D)	Y	Y	Y	Y
Rostenkowski (D)	O	Y	&	&
Yates (D)	Y	Y	Y	Y
Mikva (D)	Y	Y	Y	Y
Annunzio (D)	Y	&	Y	Y
Crane (R)	N	N	N	N
McClory (R)	N	N	N	Y
Erlenborn (R)	N	N	N	N
Hall (D)	Y	Y	Y	Y
Anderson (R)	N	N	X	Y
O'Brien (R)	N	N	N	N
Michel (R)	N	N	N	N
Railsback (R)	N	N	N	Y
Findley (R)	Y	N	N	Y
Madigan (R)	Y	N	N	N
Shipley (D)	N	N	Y	Y
Price (D)	Y	Y	Y	Y
Simon (D)	Y	Y	Y	Y
INDIANA				
Madden (D)	Y	Y	Y	Y
Fithian (D)	Y	Y	Y	Y
Brademas (D)	Y	Y	Y	Y
Roush (D)	Y	Y	Y	Y
Hillis (R)	N	Y	N	N
Evans (D)	Y	Y	Y	Y
Myers (R)	N	N	N	N
Hayes (D)	Y	Y	Y	Y
Hamilton (D)	Y	Y	N	Y
Sharp (D)	Y	Y	Y	Y
Jacobs (D)	Y	Y	Y	Y
IOWA				
Mezvinsky (D)	Y	Y	Y	Y

	1	2	3	4
IOWA (continued)				
Blouin (D)	Y	Y	Y	Y
Grassley (R)	Y	Y	N	N
Smith (D)	Y	Y	Y	Y
Harkin (D)	Y	Y	Y	Y
Bedell (D)	Y	Y	Y	Y
KANSAS				
Sebelius (R)	N	N	N	N
Keys (D)	Y	Y	Y	Y
Winn (R)	N	N	N	N
Shriver (R)	N	N	N	N
Skubitz (R)	N	N	N	N
KENTUCKY				
Hubbard (D)	Y	Y	N	N
Natcher (D)	Y	Y	N	Y
Mazzoli (D)	N	Y	Y	Y
Snyder (R)	Y	Y	Y	N
Carter (R)	Y	Y	N	N
Breckinridge (D)	N	Y	Y	Y
Perkins (D)	Y	Y	Y	Y
LOUISIANA				
Hebert (D)	N	X	N	N
Boggs (D)	N	N	N	Y
Treen (R)	N	N	N	N
Waggonner (D)	N	N	N	N
Passman (D)	N	N	N	Y
Moore (R)	N	N	N	N
Breaux (D)	N	X	N	N
Long (D)	N	Y	N	Y
MAINE				
Emery (D)	Y	Y	N	Y
Cohen (R)	N	Y	Y	Y
MARYLAND				
Bauman (R)	N	N	N	N
Long (D)	O	N	N	Y
Sarbanes (D)	Y	Y	Y	Y
Holt (R)	N	N	N	N
Spellman (D)	Y	&	Y	Y
Byron (D)	N	N	N	N
Mitchell (D)	Y	Y	Y	Y
Gude (R)	Y	Y	Y	Y
MASSACHUSETTS				
Conte (R)	Y	Y	N	Y
Boland (D)	Y	Y	Y	Y
Early (D)	Y	Y	Y	Y
Drinan (D)	Y	Y	Y	Y
Tsongas (D)	Y	Y	Y	Y
Harrington (D)	Y	Y	Y	Y
Macdonald (D)	Y	O	Y	Y
O'Neill (D)	Y	Y	Y	Y
Moakely (D)	Y	Y	Y	Y
Heckler (R)	Y	Y	Y	Y
Burke (D)	Y	Y	Y	Y
Studds (D)	Y	Y	Y	Y
MICHIGAN				
Conyers (D)	Y	Y	Y	&
Esch (R)	N	N	O	Y
Brown (R)	O	N	O	N
Hutchinson (R)	N	X	N	N
Vander Veen (D)	Y	Y	Y	Y
Carr (D)	Y	Y	Y	Y
Riegle (D)	Y	Y	Y	Y
Traxler (D)	Y	Y	Y	Y

	1	2	3	4
MICHIGAN (continued)				
Vander Jagt (R)	N	N	N	N
Cederberg (R)	N	N	N	N
Ruppe (R)	N	Y	N	Y
O'Hara (D)	Y	Y	Y	Y
Diggs (D)	Y	Y	&	Y
Nedzi (D)	Y	Y	Y	Y
Ford (D)	Y	Y	Y	Y
Dingell (D)	N	Y	Y	Y
Brodhead (D)	Y	Y	Y	Y
Blanchard (D)	Y	Y	Y	Y
Broomfield (R)	Y	X	N	N
MINNESOTA				
Quie (R)	N	N	N	Y
Hagedorn (R)	N	N	N	N
Frenzel (R)	N	N	N	Y
Karth (D)	Y	Y	Y	Y
Fraser (D)	O	O	Y	Y
Nolan (D)	Y	Y	Y	Y
Bergland (D)	Y	Y	Y	Y
Oberstar (D)	Y	Y	Y	Y
MISSISSIPPI				
Whitten (D)	N	Y	N	Y
Bowen (D)	N	N	N	Y
Montgomery (D)	N	N	N	N
Cochran (R)	N	N	N	N
Lott (R)	N	N	N	N
MISSOURI				
Clay (D)	Y	Y	Y	Y
Symington (D)	Y	Y	Y	Y
Sullivan (D)	Y	Y	Y	Y
Randall (D)	Y	Y	N	N
Bolling (D)	Y	Y	Y	Y
Litton (D)	O	Y	Y	Y
Taylor (R)	N	N	N	N
Ichord (D)	Y	N	N	N
Hungate (D)	Y	Y	Y	Y
Burlison (D)	Y	Y	Y	Y
MONTANA				
Baucus (D)	Y	Y	Y	Y
Melcher (D)	N	Y	Y	Y
NEBRASKA				
Thone (R)	Y	Y	N	N
McCollister (R)	N	N	N	N
Smith (R)	N	N	N	N
NEVADA				
Santini (D)	Y	Y	N	Y
NEW HAMPSHIRE				
D'Amours (D)	Y	Y	Y	Y
Cleveland (R)	Y	N	N	N
NEW JERSEY				
Florio (D)	Y	Y	Y	Y
Hughes (D)	Y	Y	Y	Y
Howard (D)	Y	Y	Y	Y
Thompson (D)	Y	&	Y	Y
Fenwick (R)	O	O	Y	Y
Forsythe (R)	N	N	N	Y
Maguire (D)	Y	Y	Y	Y
Roe (D)	Y	Y	Y	Y
Helstoski (D)	Y	Y	Y	Y
Rodino (D)	Y	&	Y	&
Minish (D)	Y	Y	Y	Y

	1	2	3	4
NEW JERSEY (continued)				
Rinaldo (R)	Y	Y	Y	Y
Meyner (D)	Y	Y	Y	Y
Daniels (D)	Y	Y	Y	Y
Patten (D)	Y	Y	Y	Y
NEW MEXICO				
Lujan (R)	N	N	N	O
Runnels (D)	N	N	N	N
NEW YORK				
Pike (D)	Y	Y	Y	Y
Downey (D)	Y	Y	Y	Y
Ambro (D)	Y	Y	Y	Y
Lent (R)	Y	N	N	N
Wydler (R)	Y	N	N	N
Wolff (D)	Y	Y	Y	Y
Adabbo (D)	Y	Y	Y	Y
Rosenthal (D)	Y	Y	Y	Y
Delaney (D)	Y	Y	Y	Y
Biaggi (D)	Y	Y	Y	N
Scheuer (D)	Y	Y	Y	Y
Chisholm (D)	Y	Y	Y	Y
Solarz (D)	Y	Y	Y	Y
Richmond (D)	Y	Y	Y	Y
Zeferetti (D)	Y	Y	Y	Y
Holtzman (D)	Y	Y	Y	Y
Murphy (D)	N	Y	N	Y
Koch (D)	Y	Y	Y	Y
Rangel (D)	Y	Y	Y	Y
Abzug (D)	&	Y	Y	Y
Badillo (D)	Y	Y	Y	Y
Bingham (D)	Y	Y	Y	Y
Peyser (R)	Y	Y	Y	Y
Ottinger (D)	Y	Y	Y	Y
Fish (R)	N	N	N	Y
Gilman (R)	Y	Y	Y	Y
McHugh (D)	Y	Y	Y	Y
Stratton (D)	N	Y	Y	N
Pattison (D)	Y	Y	Y	Y
McEwen (R)	N	N	X	N
Mitchell (R)	Y	N	Y	N
Hanley (D)	N	Y	Y	Y
Walsh (R)	Y	N	Y	N
Horton (R)	Y	N	N	Y
Conable (R)	N	N	N	N
LaFalce (D)	Y	Y	Y	Y
Nowak (D)	Y	Y	Y	Y
Kemp (R)	N	N	N	N
Hastings (R)	N	N	O	Y
NORTH CAROLINA				
Jones (D)	Y	Y	N	N
Fountain (D)	X	Y	N	N
Henderson (D)	N	Y	N	Y
Andrews (D)	Y	Y	N	N
Neal (D)	Y	Y	Y	Y
Preyer (D)	Y	Y	N	Y
Rose (D)	Y	O	Y	N
Hefner (D)	Y	Y	N	N
Martin (R)	N	N	N	N
Broyhill (R)	N	N	N	N
Taylor (D)	N	Y	N	Y
NORTH DAKOTA				
Andrews (R)	Y	Y	N	Y
OHIO				
Gradison (R)	N	N	N	N
Clancy (R)	N	N	X	N

	1	2	3	4
OHIO (continued)				
Whalen (R)	Y	Y	Y	Y
Guyer (R)	Y	N	N	N
Latta (R)	Y	N	N	N
Harsha (R)	N	Y	O	N
Brown (R)	N	N	N	N
Kindness (R)	N	N	N	N
Ashley (R)	Y	Y	Y	Y
Miller (R)	N	N	N	Y
Stanton (R)	Y	Y	N	Y
Devine (R)	N	N	N	N
Mosher (R)	Y	Y	N	Y
Seiberling (D)	Y	Y	Y	Y
Wylie (R)	N	N	O	Y
Regula (R)	Y	Y	N	Y
Ashbrook (R)	N	N	O	N
Hays (D)	Y	O	Y	Y
Carney (D)	Y	Y	Y	Y
Stanton (D)	Y	Y	Y	Y
Stokes (D)	Y	Y	Y	Y
Vanik (D)	Y	Y	Y	Y
Mottl (D)	Y	Y	Y	Y
OKLAHOMA				
Jones (D)	N	N	N	N
Risenhoover (D)	N	X	N	N
Albert (D)	O	O	O	Y
Steed (D)	N	N	N	X
Jarman (D)	N	N	N	N
English (D)	N	N	N	N
OREGON				
AuCoin (D)	Y	Y	Y	Y
Ullman (D)	N	Y	Y	Y
Duncan (D)	Y	Y	Y	Y
Weaver (D)	Y	Y	Y	Y
PENNSYLVANIA				
Barrett (D)	O	Y	Y	Y
Nix (D)	Y	Y	Y	Y
Green (D)	Y	Y	Y	Y
Eilberg (D)	Y	Y	Y	Y
Schulze (R)	Y	N	N	Y
Yatron (D)	Y	Y	Y	Y
Edgar (D)	Y	Y	Y	Y
Beister (R)	Y	Y	Y	Y
Shuster (R)	N	N	N	N
McDade (R)	Y	Y	N	Y
Flood (D)	Y	Y	Y	Y
Murtha (D)	O	Y	Y	Y
Coughlin (R)	N	Y	N	Y
Moorhead (D)	Y	Y	Y	Y
Rooney (D)	Y	Y	N	Y
Eshleman (R)	N	N	O	N
Schneebeli (R)	N	N	O	N
Heinz (R)	Y	Y	N	Y
Goodling (R)	Y	N	N	Y
Gaydos (D)	Y	Y	Y	Y
Dent (D)	Y	Y	Y	Y
Morgan (D)	Y	Y	Y	Y
Johnson (R)	N	N	N	N
Vigorito (D)	Y	Y	Y	Y
Myers (R)	N	N	N	Y
RHODE ISLAND				
St. Germain (D)	Y	Y	Y	Y
Beard (D)	Y	Y	Y	Y
SOUTH CAROLINA				
Davis (D)	N	Y	N	N

	1	2	3	4
SOUTH CAROLINA (continued)				
Spence (R)	N	N	N	N
Derrick (D)	Y	O	N	N
Mann (D)	N	N	N	N
Holland (D)	O	N	X	N
Jenrette (D)	Y	Y	Y	N
SOUTH DAKOTA				
Pressler (R)	Y	Y	Y	Y
Abnor (R)	Y	Y	N	N
TENNESSEE				
Quillen (R)	N	N	N	N
Duncan (R)	N	Y	N	N
Lloyd (D)	Y	Y	Y	Y
Evins (D)	Y	Y	Y	N
Fulton (D)	N		Y	Y
Beard (R)	N	N	N	N
Jones (D)	Y	Y	N	--
Ford (D)	Y	Y	Y	Y
TEXAS				
Patman (D)	N	Y	N	N
Wilson (D)	N	Y	N	O
Collins (R)	N	Y	N	N
Roberts (D)	N	N	N	N
Steelman (R)	N	N	N	Y
Teague (D)	O	N	N	N
Archer (R)	N	N	N	N
Eckhardt (D)	Y	Y	Y	Y
Brooks (D)	N	O	X	Y
Pickle (D)	N	N	N	Y
Poage (D)	N	N	N	N
Wright (D)	N	N	N	Y
Hightower (D)	N	N	N	N
Young (D)	N	N	N	N
de la Garza (D)	N	N	N	N
White (D)	N	N	N	N
Burleson (D)	N	N	N	N
Jordan (D)	N	Y	N	Y
Mahon (D)	N	N	N	N
Gonzalez (D)	N	N	N	O
Krueger (D)	N	N	N	Y
Casey (D)	N	N		N
Kazen (D)	N	N	N	N
Milford (D)	N	N	N	N
UTAH				
McKay (D)	N	Y	N	Y
Howe (D)	N	Y	O	Y
VERMONT				
Jeffords (R)	Y	Y	&	Y
VIRGINIA				
Downing (D)	Y	N	N	N
Whitehurst (R)	N	N	N	N
Satterfield (D)	N	N	N	N
Daniel (R)	N	N	N	N
Daniel (D)	N	N	N	N
Butler (R)	N	N	N	N
Robinson (R)	N	N	N	N
Harris (D)	Y	Y	Y	Y
Wampler (R)	N	N	N	N
Fisher (D)	Y	Y	Y	Y
WASHINGTON				
Pritchard (R)	N	N	N	Y

	1	2	3	4
WASHINGTON (continued)				
Meeds (D)	Y	Y	Y	Y
Bonker (D)	Y	Y	Y	Y
McCormack (D)	Y	Y	N	Y
Foley (D)	N	O	Y	Y
Hicks (D)	Y	Y	Y	Y
Adams (D)	Y	Y	Y	Y
WEST VIRGINIA				
Mollohan (D)	N	Y	N	O
Staggers (D)	&	Y	Y	Y
Slack (D)	N	Y	N	N
Hechler (D)	Y	Y	Y	N
WISCONSIN				
Aspin (D)	Y	O	Y	Y
Kastenmeier (D)	Y	Y	Y	Y
Baldus (D)	Y	Y	Y	Y
Zablocki (D)	Y	Y	Y	Y
Reuss (D)	Y	Y	Y	Y
Steiger (R)	N	N	N	N
Obey (D)	Y	Y	Y	Y
Cornell (D)	Y	Y	Y	Y
Kasten (R)	N	N	N	Y
WYOMING				
Roncalio (D)	N	Y	N	Y

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