Submit 3 Copies
to Appropriate
District Office

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-103
Revised 1-1-89

DISTRICT I
P.O. Box 1980, Hobbs, NM 88240

DISTRICT II
P.O. Drawer DD, Artesia, NM 88210

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

OIL CONSERVATION DIVISION

2040 Pacheco St.
Santa Fe, NM 87505

WELL API NO. 30-025-34403

5 Indicate Type of Lease: STATE ☐ FEE ☒

6 State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS

(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7 Lease Name or Unit Agreement Name: C. T. Bates

1 Type of Well: OIL WELL ☐ GAS WELL ☒ OTHER

2 Name of Operator: Doyle Hartman

8 Well No.: 3

3 Address of Operator: P. .O. Box 10426, Midland, TX 79702

9 Pool name or Wildcat: Rhodes (Y-7R) Gas

4 Well Location
Unit Letter K : 1980 Feet From The South Line and 1980 Feet From The West Line
Section 10 Township 26S Range 37E NMPM Lea County

10 Elevation (*Show whether DF, RKB, RT, GR, etc.*) 2987' GL (3004' RKB)

11 Check Appropriate Box to Indicate Nature of Notice, Report, or Other Data

NOTICE OF INTENTION TO:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐
PULL OR ALTER CASING	☐		
OTHER:			☐

SUBSEQUENT REPORT OF:			
REMEDIAL WORK	☐	ALTERING CASING	☐
COMMENCE DRILLING OPNS.	☐	PLUG AND ANBANDONMENT	☐
CASING TEST AND CEMENT JOB	☒		
OTHER: high-pressure Salado waterflow @ 2278'			☒

12 Describe Proposed or Completed Operations (*Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work*) SEE RULE 1103.

On attached page 2, see detailed report of high-pressure Salado waterflow, cement job and casing test. This waterflow represents the fourth waterflow that can be documented as clearly occurring, at Salado MB 144, in the Rhodes Pool area and was caused by out-of-zone water injection at pressures in excess of the natural overburden gradient of 1.00 psi/ft.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE [signature] TITLE Owner/Operator DATE 06-24-98

TYPE OR PRINT NAME Doyle Hartman TELEPHONE NO. 915-684-4011

(This space for State Use)

APPROVED BY TITLE DATE JUL 10 1998

CONDITIONS OF APPROVAL, IF ANY:

Details of Completed Operations

Drilled 12-1/4" hole to a total depth of 2600' RKB. At a total depth of 2278' RKB (at 3:35 p.m., 6-17-98), encountered high-pressure saturated brine water trapped under Salado MB 144. Resulting water flow tested as follows:

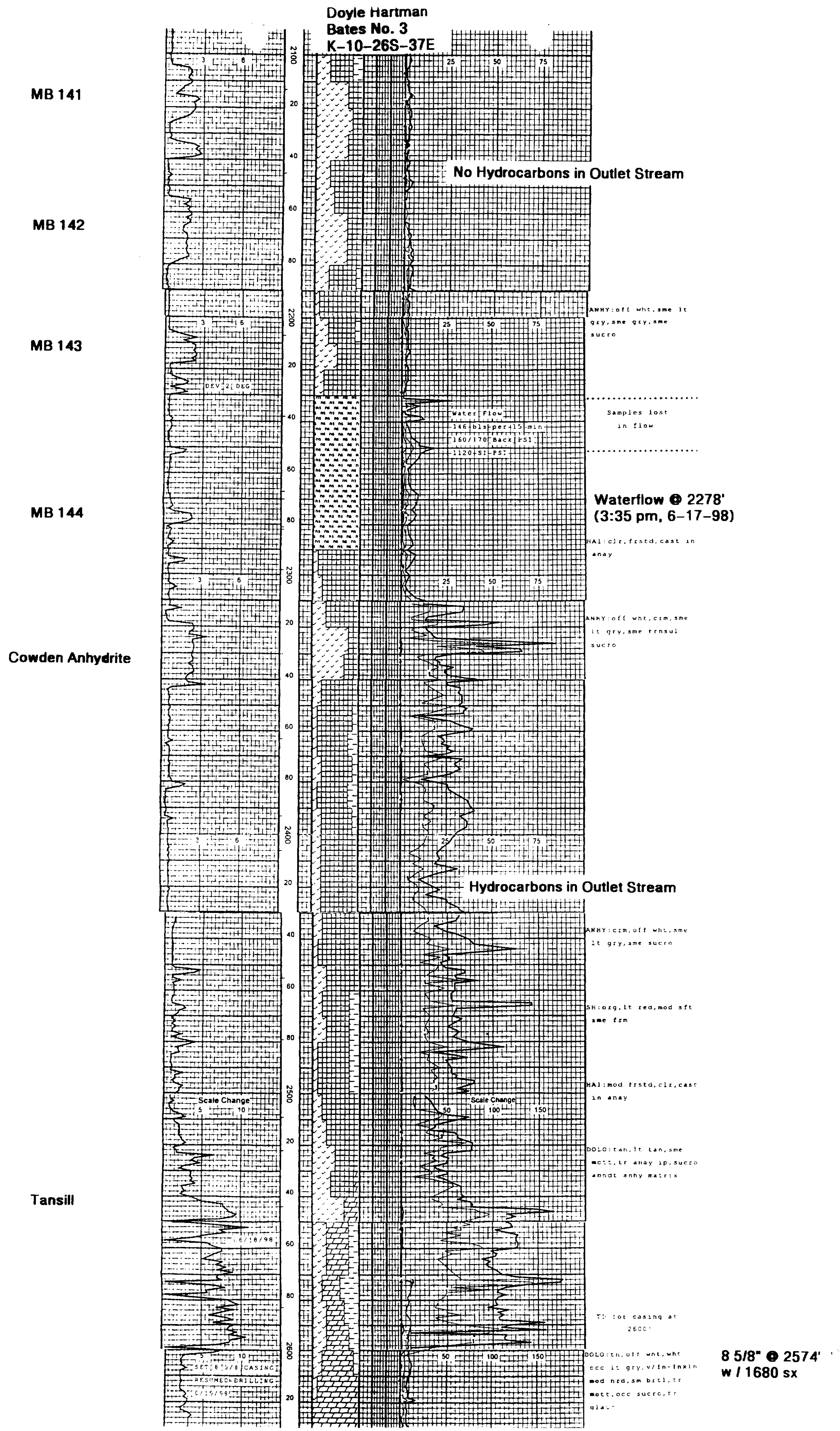
Rate:	14,016 BPD (9.73 BPM)
FWHP:	160 psi
SIWHP:	1110 psi (1 min)
SIBHP:	2306 psi @ 2278'
SIBHP Grad:	1.012 psi/ft @ 2278'

(Lithostatic Grad: 1.000 psi/ft)

Resulting waterflow water also had strong hydrocarbon odor as well as mud log gas chromatograph hydrocarbon show between 2310' and 2600'.

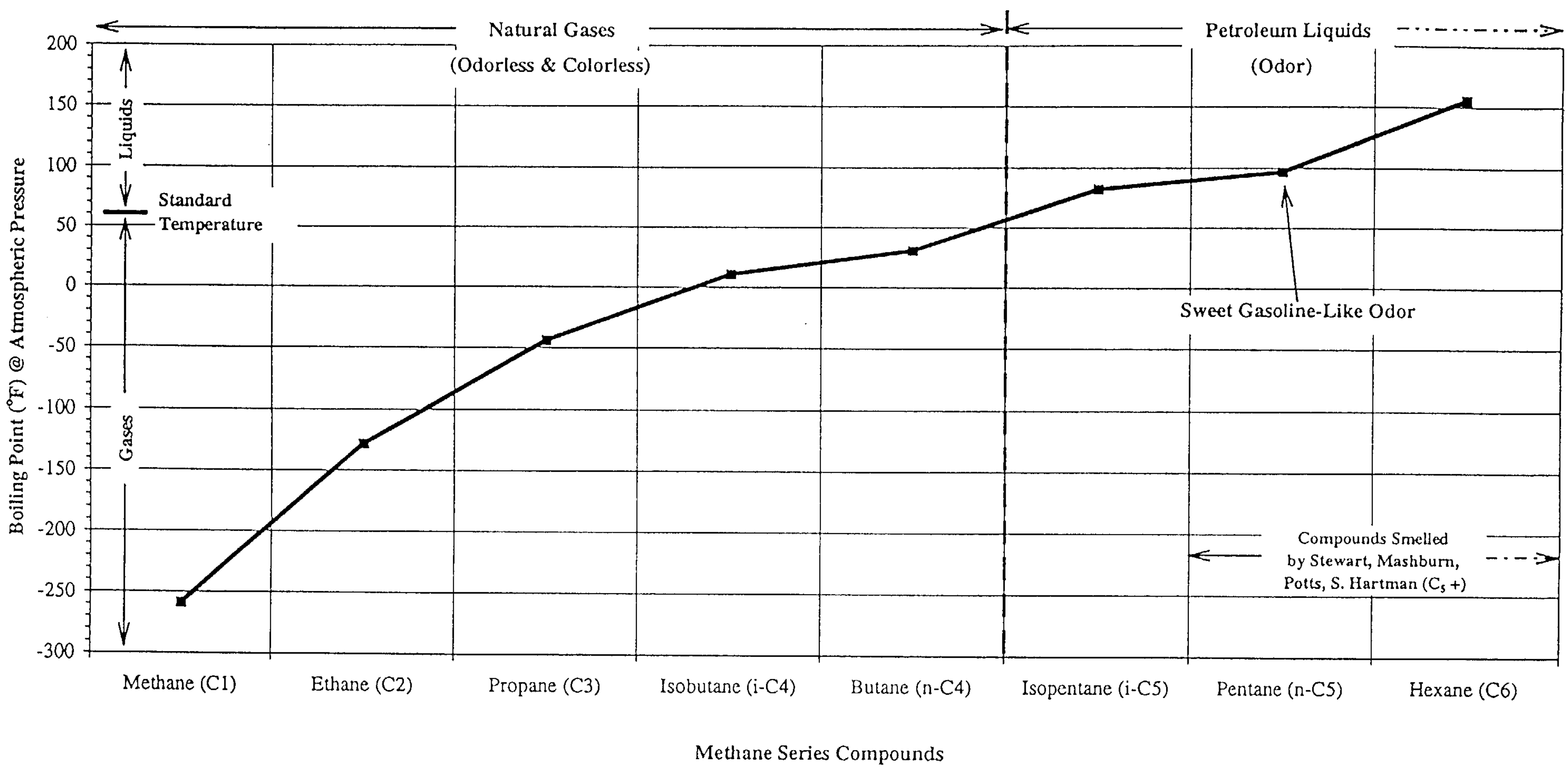
Ran 2580.82' of 8-5/8" O.D., 24 lb/ft and 32 lb/ft, J-55, ST&C casing and landed at 2574' RKB. While holding an annular back pressure of 100 psi to 200 psi, cemented casing at a pump rate of 10 BPM with a total of 1680 sx of API Class-C cement containing 3% $CaCl_2$ and 0.5 lb/sx flocele. Had cement returns to surface with 975 ft^3 of cement remaining to be displaced. After returns became good quality cement, reduced pump rate to 5 BPM, increased annular back pressure to 600 psi, and squeezed away approximately 550 sx of cement. FSIP = 900 psi (2653 psi @ 2278'). Plug down at 6:30 p.m., 6-18-98. WOC 8 hours (1000 psi compressive strength at 80°F). Pressure tested 8-5/8" O.D. casing to 1000 psi. Pressure held okay.

High pressure waterflow underlying Salado MB144 now isolated behind 8-5/8" O.D., 32 lb/ft, J-55 casing, at depth originally encountered.

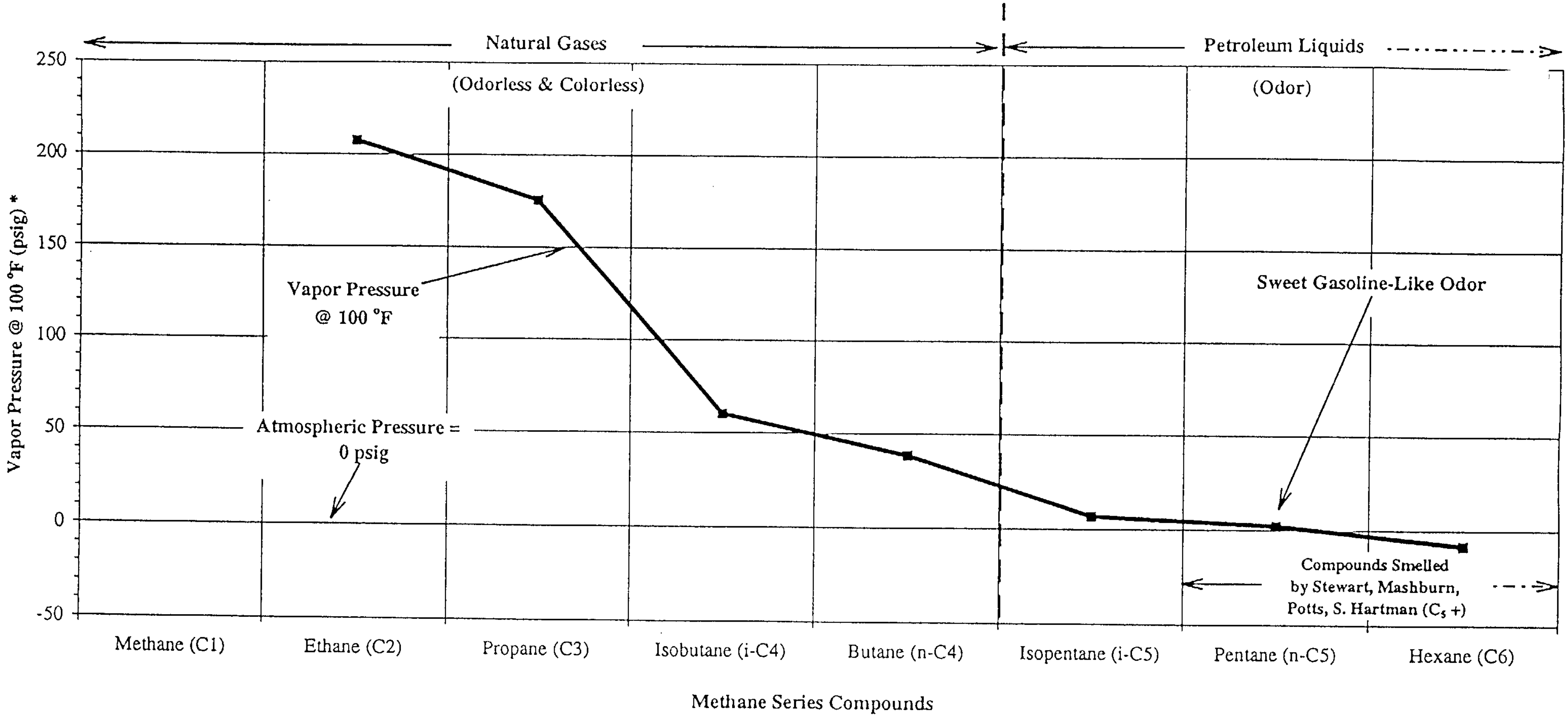


Doyle Hartman
Bates No. 3
K-10-26S-37E
MB 141
MB 142
MB 143
MB 144
Cowden Anhydrite
Tansill
No Hydrocarbons in Outlet Stream
ANHY:off wht,sme lt gry,sme gry,sme sucro
Samples lost in flow
Water Flow
146 bls per 15 min
160/170 Back PSI
1120 SI PSI
Waterflow @ 2278' (3:35 pm, 6-17-98)
HAl:clr,frstd,cast in anay
ANHY:off wht,crm,sme lt gry,sme trnsul sucro
Hydrocarbons in Outlet Stream
ANHY:crm,off wht,sme lt gry,sme sucro
SH:org,lt red,mod sft sme frm
HAl:mod frstd,clr,cast in anay
Scale Change
DOLO:tan,lt tan,sme mott,tr anay ip,sucro abndt anhy matrix
TD for casing at 2600'
DOLO:tn,off wht,wht occ lt gry,v/fn-fnxln mod hrd,sm brtl,tr mott,occ sucro,tr glau
8 5/8" @ 2574' w / 1680 sx

Methane Series Boiling Points vs. Number of Carbon Atoms



Vapor Pressure of Paraffin (Methane Series) Hydrocarbons Measured at 100 °F



* psig = psia - 13.2 psi

Physical Properties of Organic (Methane Series) Compounds
Handbook of Chemistry and Physics
43rd Edition

Chemical Name	Formula	Molecular Weight	Physical Form	Color	Odor	Density (g/ml)	Melting Point (°C)	Melting Point (°F)	Boiling Point @ 14.7 psia (°C)	Boiling Point @ 14.7 psia (°F)	Solubility in Water @ 20 °C (68 °F) (g/100 ml)	Solubility in Water @ 20 °C (68 °F) (mg/L)
Methane	CH_4	16.04	Gas	None	...	0.4150	-184	-299.2	-161.5	-258.7	9.0 cm^3	
Ethane	C_2H_6	30.07	Gas	None	...	0.5610	-172	-277.6	-88.3	-126.94	4.7 cm^3	
Propane	C_3H_8	44.09	Liq. Gas	None	Sweet	0.5853	-189.9	-309.82	-42.17	-43.906	6.5 cm^3	
			Gas	None	...							
i-Butane	C_4H_{10}	58.12	Gas	None	...	0.6030	-145	-229	-10.2	13.64	13 cm^3	
n-Butane	C_4H_{10}	58.12	Gas	None	...	0.6000	-135	-211	-0.6	30.92	15 cm^3	
i-Pentane	C_5H_{12}	72.15	Liquid	None	Sweet	0.6210	-160.5	-256.9	28	82.4	0	0
n-Pentane	C_5H_{12}	72.15	Liquid	None	Sweet	0.6260	-131.5	-204.7	36.2	97.16	0.0360	360
Hexane	C_6H_{14}	86.17	Liquid	None	...	0.6600	-94.3	-137.74	69	156.2	0.0138	138
Heptane	C_7H_{16}	100.20	Liquid	None	...	0.6840	-90.5	-130.9	98.43	209.174	0.0052	52
Octane	C_8H_{18}	114.22	Liquid	None	...	0.7060	-56.5	-69.7	125.8	258.44	0.0015	15
Nonane	C_9H_{20}	128.25	Liquid	None	...	0.7180	-53.7	-64.66	150.8	303.44	0	0
Decane	$C_{10}H_{22}$	142.28	Liquid	None	...	0.7300	-31	-23.8	174	345.2	0	0

Suspended Oil Content of Water at Rhodes "B" Battery and Injection Plant

Date	Oil Content (mg/L)
04/14/80	30
06/16/80	66
08/14/80	15
10/13/80	39
12/15/80	71
02/17/81	30
04/22/81	7
06/25/81	16
10/28/81	21
12/29/81	189
04/26/82	35
06/30/82	32
08/30/82	14
10/26/82	25
12/30/82	27
03/01/83	3
04/26/83	35
06/30/83	57
09/02/83	48
11/03/83	62
01/06/84	155
03/09/84	318

SOUTHEAST NEW MEXICO
MEASURED LITHOSTATIC, HYDROSTATIC, AND PORE PRESSURE
VS.
DEPTH

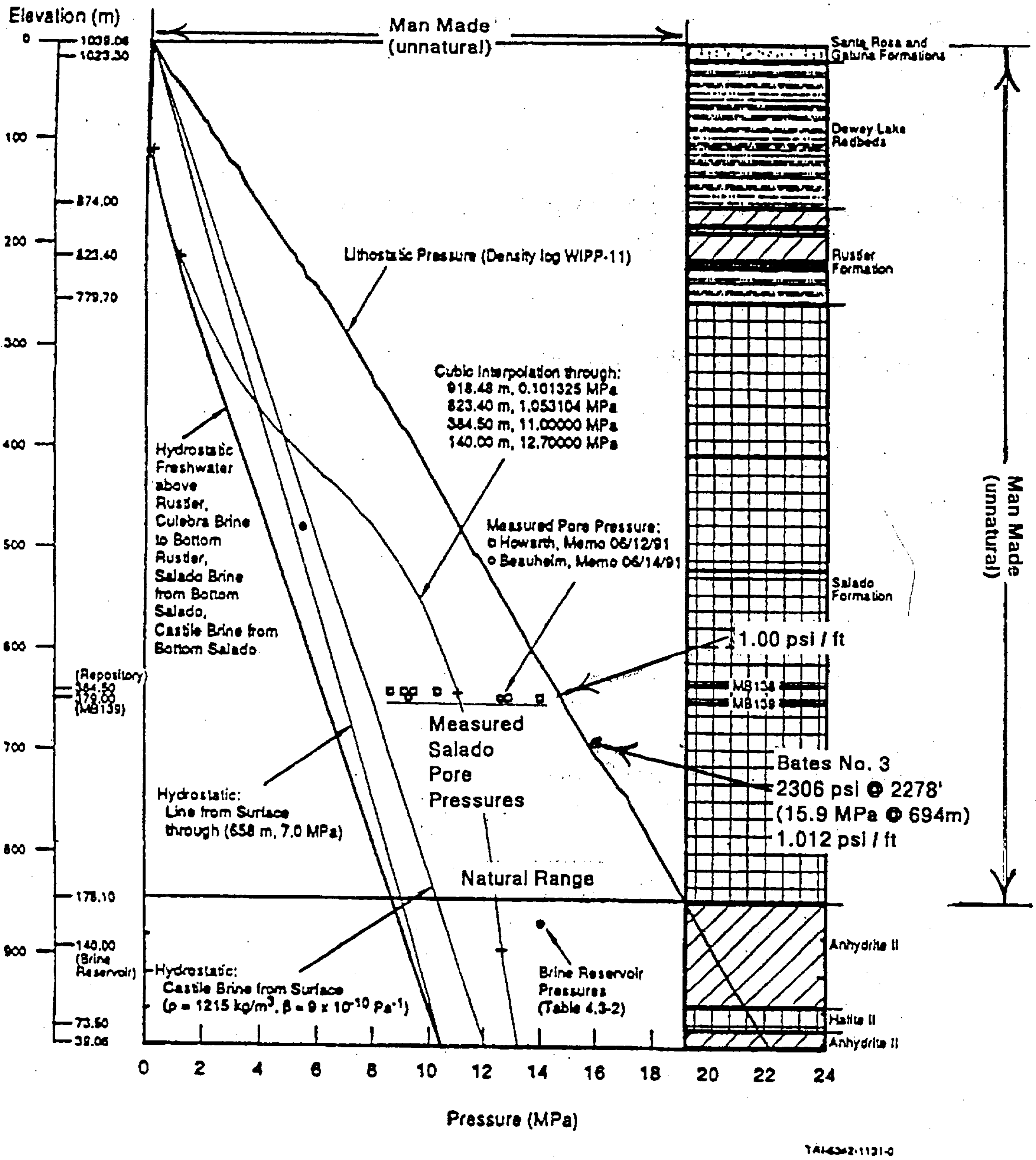


Figure 2.2-5. Lithostatic and Hydrostatic Pressure with Depth.

SECOND EDITION

GEOLOGY OF PETROLEUM

A. I. LEVORSEN

Sections on Hydrodynamics and Capillary Pressure revised and edited by
FREDERICK A. F. BERRY
University of California, Berkeley

W. H. Freeman and Company
SAN FRANCISCO AND LONDON

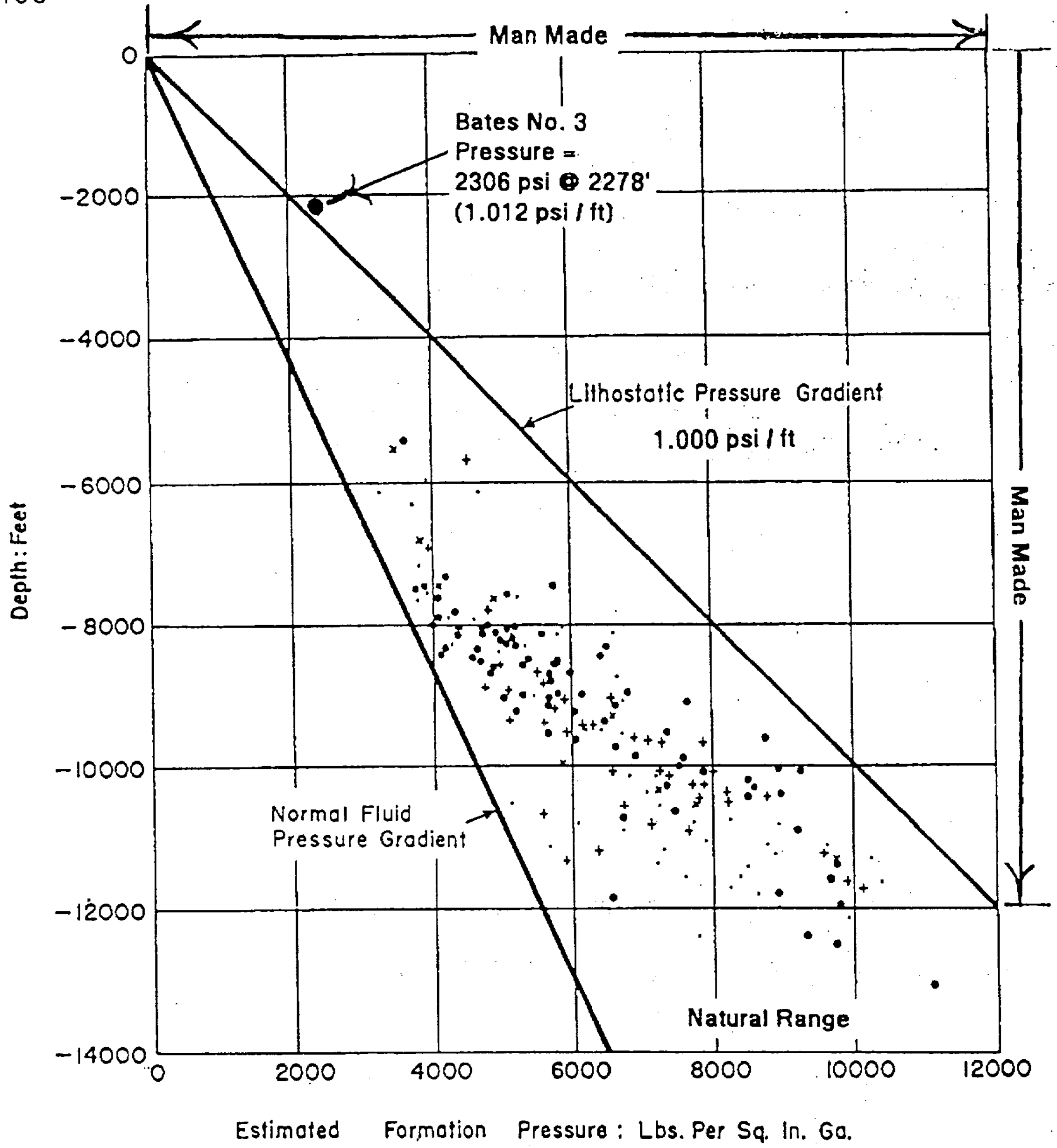


FIGURE 9-10 *The estimated reservoir pressure versus depth for over 100 wells in a group of Gulf Coast oil fields. Large circles, Frio formation; small dots, Cockfield, Miocene; crosses, Anahuac formation.* [*Redrawn from Cannon and Sullins, O. & G. Jour., May 25, 1946, p. 120, and Oil Weekly, May 27, 1946, p. 34.*]

The reservoirs associated with salt domes along the Gulf Coast of Texas and Louisiana, especially, are frequently characterized by excess fluid pressures, which are probably caused by the faulting and diastrophism accompanying the intrusion of the salt domes into the soft and incompetent Tertiary sediments of the region. Some examples are shown in Figure 9-10. Wedges or blocks of tightly compressed sediments with fluid pressures on the order of 50–80 psi per 100 feet of depth are common, and it requires great care in drilling to prevent the wells from "blowing out" and getting out of control. Isolated sand lenses, also in the soft Tertiary sediments, are often characterized by high fluid pressures and low fluid volumes, perhaps because they were sealed in by the load of the overlying sediments.

A notable example of excess fluid pressures is found in the isolated thrust-fault blocks of the Ventura oil field of California.[15] (See Fig. 9-12.) The best explanation seems to be that these fluid pressures are caused by diastrophic compression and then sealed in by the thrust faults bounding the zones or pools that occur in the field. The rocks are soft Tertiary formations. Another possible cause of excess fluid pressures in sealed reservoirs is the increase in volume of hydrocarbons of high molecular weight when they are converted to the lighter hydrocarbons. Another example of excess fluid pressures occurs in the Bayou St. Denis area of Jefferson Parish, Louisiana, on the northern edge of Barataria Bay. There the bottom-hole fluid pressure was 12,635 psi at a depth of 13,000 feet.[16] Gas wells in the Yates sand (Permian) of the East Wasson field in Yoakum County, western Texas, encountered fluid pressures up to 2,800 psi at a depth of 3,120 feet. The gas was non-inflammable and was 97 percent nitrogen.[17] Reservoir pressures in

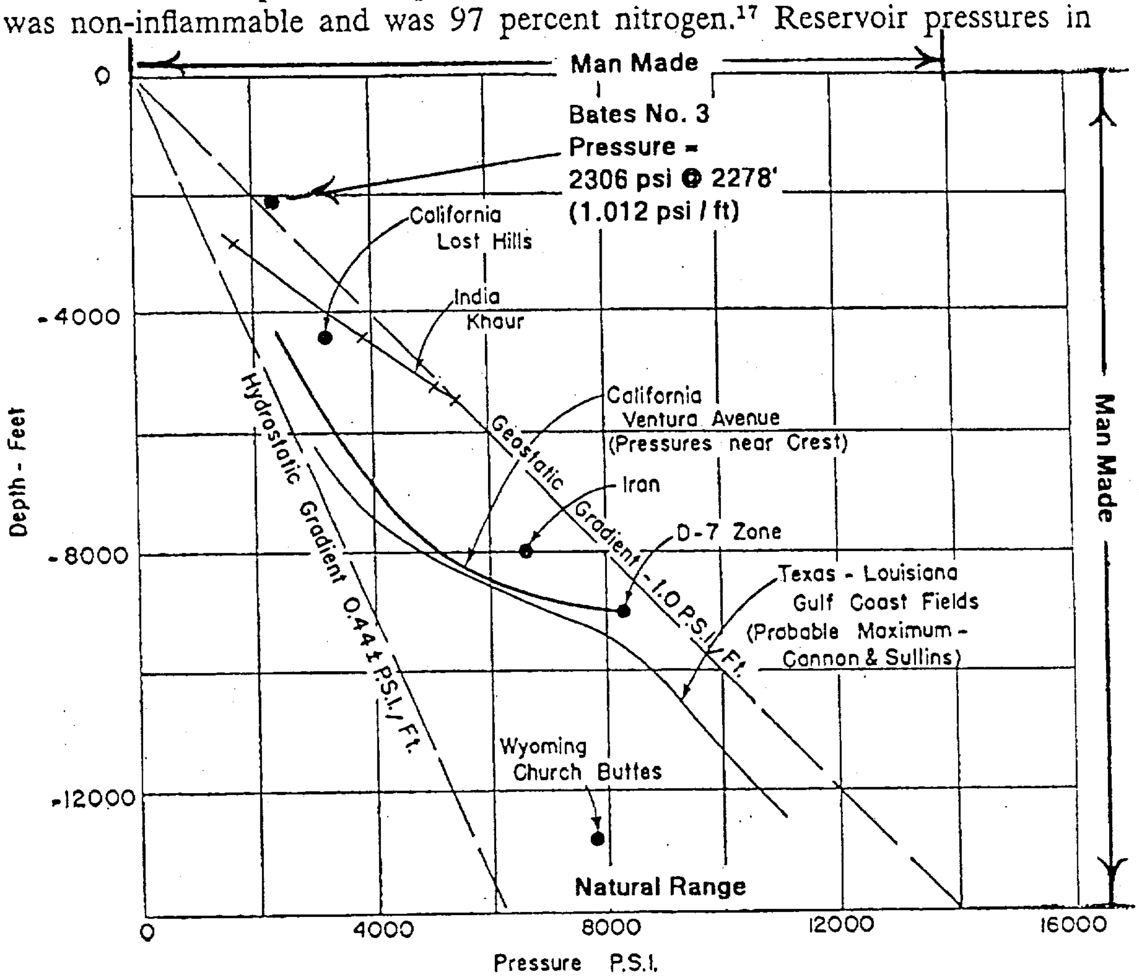


FIGURE 9-11 *The relation between fluid pressure and depth in some excess-pressure pools. [Redrawn from Watts, Trans. Amer. Inst. Min. Met. Engrs., Vol. 174 (1948), p. 194, Fig. 2.]*

Where high artificial fluid pressures are applied to rocks underground, as in water repressuring, hydraulic fracturing, acidizing, and cementing, it has been observed that, as the pressures approach the geostatic pressure for the given depth, the formations often "break down"; there is a sudden increase in the amount of fluid that enters the formation, apparently as a result of a sudden increase in space. Such a condition may result from the formation of new fractures, from the opening up of incipient fractures, or from parting along bedding planes. It has also been explained as being due to lifting of the overburden. Breakdown pressures of from 0.5 to 1.7 times the geostatic pressure normal for the given depth have been reported.[20]

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8. Gilman A. Hill, William A. Colburn, and Jack W. Knight, "Reducing Oil-Finding Costs by Use of Hydrodynamic Evaluation," in *Economics of Petroleum, Exploration, Development, and Property Evaluation,* Southwestern Legal Foundation, Dallas, Texas, Prentice-Hall, Inc., Englewood Cliffs (1961).

Frederick A. F. Berry, "Hydrodynamics and Geochemistry of the Jurassic and Cretaceous Systems in the San Juan Basin, Northwestern New Mexico and Southwestern Colorado," Ph.D. thesis, Stanford University (1959), 192 pp.

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10. Francis P. Shepard, *Submarine Geology,* Harper & Brothers, New York (1948), 348 pages, pp. 47–53.

11. Jonas Hanway, *An Historical Account of the British Trade over the Caspian Sea . . . ,* London (1753), Vol. 1.

12. R. E. Gibson, "The Nature of Solutions and Their Behavior under High Pressure," Scientific Monthly, Vol. 46 (February 1938), pp. 103–119.

13. M. King Hubbert and William B. Rubey, "Role of Fluid Pressure in Mechanics of Overthrust Faulting," Bull. Geol. Soc. Amer., Vol. 70, pp. 149–158.

14. G. E. Cannon and R. C. Craze, "Excessive Pressures and Pressure Variations with Depth of Petroleum Reservoirs in the Gulf Coast Region of Texas and Louisiana," Trans. Amer. Inst. Min. Met. Engrs., Vol. 127 (1938), pp. 31–38.

George Dickinson, "Geological Aspects of Abnormal Reservoir Pressures in Gulf Coast Louisiana," Bull. Amer. Assoc. Petrol. Geol., Vol. 37 (February 1953), pp. 410–432. Bibliog. 36 items.

15. E. V. Watts, "Some Aspects of High Pressure in the D7 Zone of the Ventura Avenue Field," Trans. Amer. Inst. Min. Met. Engrs., Vol. 174 (1948), pp. 191–200. Discussion to p. 205. 16 references cited. Also Tech. Paper 2204, Petrol. Technol. (May 1947).

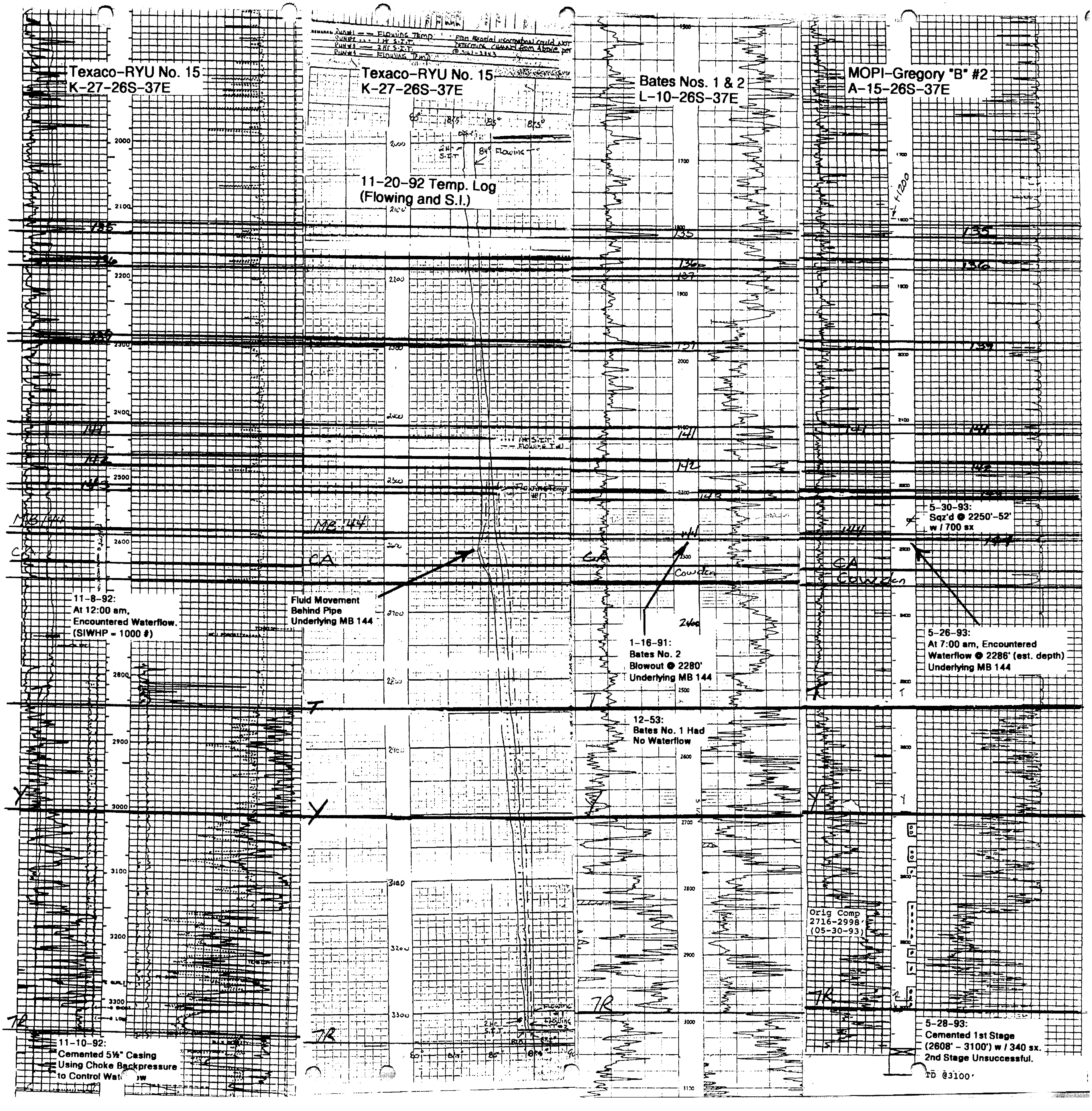
16. Leigh S. McCaslin, Jr., O. & G. Jour., September 8, 1949, p. 56.

17. Alden S. Donnelly, "High-pressure Yates Sand Gas Problem, East Wasson Field, Yoakum County, West Texas," Bull. Amer. Assoc. Petrol. Geol., Vol. 25 (1941), pp. 1880–1897.

18. C. E. Keep and H. L. Ward, "Drilling Against High Rock Pressures with Particular Reference to Operations Conducted in the Khaur Field, Punjab," Jour. Inst. Petrol. Technol., Vol. 20 (1934), pp. 990–1013. Discussion to p. 1026.

19. H. H. Suter, "The General and Economic Geology of Trinidad, B.W.I.," Colonial Geol. and Min. Res., Vol. 3 (1952), p. 22.

20. John C. Calhoun, "Pressure Parting of Formations," O. & G. Jour., January 12, 1950, p. 85. Bibliog. 5 items.



Texaco-RYU No. 15
K-27-26S-37E
Texaco-RYU No. 15
K-27-26S-37E
11-20-92 Temp. Log
(Flowing and S.I.)
Bates Nos. 1 & 2
L-10-26S-37E
MOPI-Gregory "B" #2
A-15-26S-37E
135
136
137
141
142
143
MB 144
CA
Cowden
T
Y
7R
11-8-92:
At 12:00 am,
Encountered Waterflow.
(SIWHP = 1000 #)
Fluid Movement
Behind Pipe
Underlying MB 144
1-16-91:
Bates No. 2
Blowout @ 2280'
Underlying MB 144
12-53:
Bates No. 1 Had
No Waterflow
5-30-93:
Sqz'd @ 2250'-52'
w / 700 sx
5-26-93:
At 7:00 am, Encountered
Waterflow @ 2286' (est. depth)
Underlying MB 144
Orig Comp
2716-2998'
(05-30-93)
5-28-93:
Cemented 1st Stage
(2608' - 3100') w / 340 sx.
2nd Stage Unsuccessful.
TD @3100'
11-10-92:
Cemented 5½" Casing
Using Choke Backpressure
to Control Wat[...]ow