

APR 5 1985

MEMORANDUM

SUBJECT: Classification of McElmo Dome Disposal Wells
Well Classification Advisory #8

FROM: Paul M. Baltay, Director
State Programs Division (WH-550)

TO: Max H. Dodson, Director
Water Management Division - Region VIII

Shell Western E & P, Incorporated (SWEPI) operates two injection wells to dispose of wastes at its McElmo Dome field in Colorado. You have classified these two wells as Class I non-hazardous disposal wells. SWEPI has protested your classification, and Mr. M.L. Blanton of SWEPI has written to the Office of Drinking Water (February 7, 1985) requesting a classification to Class II.

We have reviewed the information submitted by Mr. Blanton and additional information provided by your staff. Based on that information, we believe your classification of these wells as Class I is appropriate.

The primary purpose of the McElmo Dome operation is the production of carbon dioxide. The term "natural gas" as used in the Safe Drinking Water Act, the Underground Injection Control (UIC) regulations, and generally in the industry refers to one of the hydrocarbon series (see 40 CFR 144.1 (g)(2)(iv) and 144.6 (b)(3)). Therefore, carbon dioxide is not a "natural gas" for purposes of the UIC program. While it appears that small amounts of methane and crude oil are produced, their production is incidental to the primary purpose of the operation. Historically, SWEPI has not declared either the oil or methane for royalty purposes and has treated them as unwanted waste products.

CONCURRENCES

MBOL	SPD						
SURNAME	Baltay						
TE	4/4/85						

The two injection wells are used to dispose of wastes from the operation. These wastes include not only the brines produced with the carbon dioxide but also the waste water from the stripping process which contains elevated levels of sodium nitrate. Even if this were a natural gas production operation (which we believe it is not), it is questionable whether the disposal wells would qualify for the exclusion in 40 CFR 144.6 (b)(1). That exclusion was designed for non-contact "blow-down waters from cooling towers and boilers used in the initial digging process...(46 FR 48245). Finally, injection through these wells appears to be solely for the purpose of disposal and has no function in the enhanced recovery of oil or natural gas.

In summary, we agree with your classification of these two wells as Class I. I hope this memo will assist you in resolving SWEPI's questions and will clear the way to the expeditions permitting of the wells.

cc: Water Supply Branch Chiefs
Regions I - X

WH550:PBaltay:ca:4/4/85:382-5522:1009ET

CONCURRENCES

7MBOL							
SURNAME							
DATE							

APR 5 1985

Mr. M.L. Blanton
 Division Production Manager
 Mid Continent Division
 Shell Western E&P, Inc.
 P.O. Box 991
 Houston, Texas 77001

Dear Mr. Blanton:

This is in response to your letter of February 7, 1985. You requested the Office of Drinking Water to review the classification of the two disposal wells operated by your company at the McElmo Dome field as Class I wells.

My office has reviewed the information you provided me and the information gathered by our Regional Office in Denver. Based on that information, we believe that the Regional Office's classification of these wells as Class I is correct.

I have attached a courtesy copy of my memorandum to Mr. Dodson on this subject. As you know, our Regional Offices are responsible for the actual administration of the Underground Injection Control program in the various States. I am sure Region VIII will be in official contact with your company in the near future.

I appreciate your concern for the least complicated form of regulating these wells. I am assured that our Regional Office and the Colorado Oil and Gas Commission have developed an effective working relationship.

The dual Federal/State jurisdiction in this case should not be the cause of undue burdens on you or delays in your obtaining permits for and operating these two wells.

Sincerely,

Paul M. Baltay, Director
 State Programs Division

WH550:PBaltay:ca:4/4/85:1009E87825522

YMBOL	SPD							
SURNAME	Baltay							
DATE	4/4/85							

Tom



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
1860 LINCOLN STREET
DENVER, COLORADO 80295-0699

APR 05 1985
REF: 8WM-DW

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. M.L. Blanton
Division Production Manager
Mid-Continent Division
Shell Western E & P, Inc.
Post Office Box 991
Houston, Texas 77001

RE: Call for Permit Application
McElmo Dome Field, Colorado
Yellow Jacket ND-1
Hovenweep WD-1

Dear Mr. Blanton:

Based upon the information submitted to us, and information available to us through public records, EPA has determined that the subject injection wells are Class I Industrial Disposal wells for the purposes of EPA's UIC program in Colorado.

This classification requires permitting of these facilities by EPA. However, it does not preclude the State of Colorado from regulating these facilities according to State law.

In keeping with our commitment to you, as made in correspondence dated February 25, 1985, your applications are due to our office within 30 days of Shell Western's receipt of this letter.

As a courtesy, our Headquarter's office is forwarding to you, under separate cover, a copy of their determination. Should you have questions, please direct them to Angus Campbell at (303) 293-1420.

Sincerely,

Patrick A. Crotty, P.E.
Chief, Ground Water Section

cc: Warren Hill, SWEPA
Paul Baltay, EPA ODW
William Smith, COGCC

4/685-8-8-2
1537-4/11



February 7, 1985

Mr. Paul Baltay, Director
State Programs Division Environmental Protection Agency
401 M St. SW
Washington, DC 20460

Dear Mr. Baltay:

SUBJECT: WELL CLASSIFICATION - MC ELMO DOME DISPOSAL WELLS

My staff informs me a difference of opinion has arisen regarding the appropriate Underground Injection Control (UIC) classification of produced water disposal wells serving the McElmo Dome field, Colorado. I understand EPA Region VIII is seeking your counsel in determining the classification of the subject wells. The purpose of this letter is to convey my strong belief the McElmo Dome produced water disposal wells adhere to the spirit, intent and letter of the UIC definition for Class II wells. Accordingly, I request careful review of these wells and your finding they are Class II wells.

Shell Western E&P Inc (SWEPI), operates the McElmo Dome field under oil and gas leases from the Bureau of Land Management (BLM) and numerous private land owners. The McElmo Dome field produces carbon dioxide (CO₂) methane, crude oil, and produced water by conventional oil and gas primary processes including flowing and pumping. The CO₂ and methane are used for enhanced recovery injection in the Wasson field of West Texas. Both the CO₂ and methane are sold under the terms and provisions of the oil and gas leases and royalties are paid to the owners under these same leases.

The crude oil is separated from the natural gases and wasted with the concurrence of the BLM and the state since the current crude oil production is too small to be financially viable. However, we are attempting to find a market for the oil and propose selling the oil when the market is developed. Again, royalties will be paid on the crude oil when sold under terms and provisions of the oil and gas leases.

The produced water is injected into two disposal wells located in and serving the McElmo Dome field. These wells are Yellow Jacket WD-1 and Hovenweep WD-1.

SWEPI operates the McElmo Dome field in accordance with an oil and gas unitization order from the Colorado Oil and Gas Commission. In all respects the State of Colorado and SWEPI recognize the McElmo Dome field as an oil and gas operation. This is further demonstrated by the Colorado Oil and Gas Commission granting Class II UIC permits for Yellow Jacket WD-1 and Havenweep WD-1.

A review of the UIC regulations supports the position the McElmo Dome disposal wells are correctly classified as Class II. First, EPA discusses Class II wells at 45 Fed. Reg. 42474, column 3 (June 24, 1980) and describes "Class II wells [as]... those injection wells associated with oil and gas industry... under the UIC regulations". Further, the McElmo Dome producing wells, served by the instant disposal wells, produce about 1.5 million cubic feet per day of methane and about 1 barrel per day of crude oil. Thus, the produced water injected into the subject disposal wells are "fluids... [w]hich are brought to the surface in connection with conventional oil or gas production "[45 Fed. Reg. 42502, June 24, 1980]. Therefore the instant wells comply fully with the regulatory definition.

Designating Yellow Jacket WD-1 and Hovenweep WD-1 Class II offers several practical advantages. First, these disposal wells are regulated by the same Agency overseeing the Unitization e.g., Colorado Oil and Gas Commission. Thus, all McElmo Dome operations are under one regulator. Second, the instant wells are converted producers authorized by the Colorado Oil and Gas Commission. Therefore, the drilling and completion records for these wells are held by the Commission and the Commission staff is familiar with the wells. This knowledge of the wells will help avoid delays in operation of the wells which are critical to the success of the Wasson CO₂ flood.

Your early consideration of our request would be appreciated. Additionally, please feel free to call Mr. Tom Karnes [713-870-3761] of my staff or Dr. G. H. Holliday [713-241-1455] of Shell Oil Co.

Very truly yours,


M. L. Blanton
Division Production Manager
Mid-Continent Division

cc: EPA Region VIII
Colorado Oil & Gas
Conservation Commission

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: FEB 12 1985

SUBJECT: McElmo Dome CO₂ Disposal Well Classification

FROM: Tom Belk, Chief
Ground Water Protection Program

TO: Patrick A. Crotty, Chief *PAC*
Ground Water Section

As per my January 23, 1985 memo to your office, please find as Item I, Shell's response to our request for more information. Also attached, please find Item II which is the production report submitted to the Colorado Oil and Gas Conservation Commission (OGCC) by Shell Oil. Additionally, please find Item III which is the background information consisting of correspondence between Shell Oil and our office, and our office and your office. Make note of memos dated May 31, 1984, November 3, 1984, December 6, 1984, and December 21, 1984.

On January 28, 1985 Shell Oil submitted information concerning their claim that the McElmo Dome CO₂ Field produces methane and oil in conjunction with the CO₂, "thereby confirming that their disposal well is in the Class II category". On January 30 and 31st Angus Campbell, of my staff, went to the OGCC to confirm the production of methane. It was confirmed that methane is produced; however, only as a contaminant to the CO₂ production. The hydrocarbon gas is either vented, flared or removed at the gas processing plant in Cortez, Colorado. This data was verbally confirmed at the State Land Board of Colorado who monitors all royalties paid to the State for mineral production.

In Item II please note the column labeled GS/CD, this is the type of gas the Mill Levy for the OGCC is calculated from. As you can see, the operator reports the gas as CO₂. Also take note that no gas was sold until April 1984. This is because the pipeline had to be filled (capacity of pipeline is 5.6 bcf/day).

It is the opinion of my staff that given the present data, this field is clearly a CO₂ producer and hydrocarbons are only waste products and therefore, should stay in the Class I classification. Tom, please make your determination and send us a written response so we can notify Shell of the final determination and continue processing the permit application. Once we receive your final determination, we will be calling in an application from another operator of a CO₂ field.

Thank you for your quick response in this matter.

cc. John Atcheson - HQ

ITEM I

Shell's Response to Region VIII's
request for additional information.

13 Pages

Shell Western E&P Inc.

A Subsidiary of Shell Oil Company



P.O. Box 991
Houston, TX 77001

January 23, 1985

United States Environmental Protection Agency
ATTN Mr. Patrick A. Crotty, Chief
Ground Water Section
Region VIII
1860 Lincoln Street
Denver, CO 80295

JAN 26 1985

Gentlemen:

SUBJECT: WATER DISPOSAL WELLS - McELMO DOME

This responds to your letter dated December 21, 1984, requesting additional information about Shell Western E&P Inc. (SWEPI) McElmo Dome disposal wells. We compiled the information and offer it for your consideration.

SWEPI operates producing wells in the McElmo Dome field under oil and gas leases with the Bureau of Land Management and private owners. These oil and gas leases are assigned to Shell Oil Company. SWEPI, a wholly owned subsidiary of Shell Oil Company, now operates the field. Additionally, a Unit Agreement including all of the leases, was ratified by the State of Colorado on August 24, 1982, to consolidate oil and gas operations of the McElmo Dome (Leadville) Unit. SWEPI currently produces about 1.5 million standard cubic feet per day of methane (hydrocarbon gas) from these wells within the Unit, Attachment A. This natural gas is sold and royalties paid to BLM and private owners under the above leases. Further, these wells produce a small quantity of crude oil, which is not sold since this production is not commercial, Attachment A.

Additionally, these wells produce about 245 barrels per day of formation water with the natural gas and crude oil. This water is separated from the gas and injected into two disposal wells [HWD-1 and YWD-1].

These disposal wells clearly comply with the definition of a Class II injection well [40 CFR § 146.5(b)] since the wells inject "fluids . . . [w]hich are brought to the surface in connection with conventional oil and gas production."

Based on the above analysis which demonstrates the two McElmo Dome disposal wells satisfy 40 CFR § 146.5(b), we request these wells be

DNBB852101

Handwritten signature

reclassified as Class II disposal wells. Additionally, we request a stay of the permit application deadline of February 28, 1985, until the reclassification question is resolved.

Attached, as requested, are the well completion reports for HWD-1 and YWD-1 injection wells, Attachment B, and injection well schematic drawings for HWD-1 and YWD-1, Attachment C.

We trust this information will enable you to make an early decision on reclassification of the disposal wells; however, should you have questions concerning the information submitted or require additional information, please contact Mr. W. G. Hill at (713)870-3815 or Ms. Lillian Abrego at (713)870-3987.

Very truly yours,



M. L. Blanton
Division Production Manager
Mid-Continent Division

WGH:JB

Attachments

cc: William R. Smith, Director
Colorado Oil & Gas Conservation Commission
1313 Sherman Street, Room 721
Denver, CO 80203

DNBB852101

Attachment A

Hydrocarbon Production

<u>Component</u>	<u>Rate</u>	<u>Volume</u>	<u>Disposition</u>
Crude Oil	Barrels/Week	5.4*(calculated)	**
Methane Gas	MMSCF/Day	1.5 (calculated)	sold

* Approximately 2.7 barrels from each central facility

** The production of crude oil from the McElmo Dome Field wells began approximately three months ago. At present, we have no means of precisely measuring the oil since it is separated from the gas along with water and glycol. This oil is presently being accumulated in a steel tank which also contains water and glycol. The oil has no commercial value as crude oil; therefore, it will either be sold to an oil reclaiming service or be disposed of in a state approved disposal facility.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

(When filled in, this information is for Bureau use only)

WELL IDENTIFICATION AND SERIAL NO.

C-10103

IF INDIAN, ALIQUOT OR TRACT NAME

COMPLETION OR RECOMPLETION REPORT AND LOG

WELL: NEW WELL RE-DRILL DRY OTHER SHD

COMPLETION: MECHANICAL PLUG PERM REPAIR OTHER Converted to SHD

NAME OF OPERATOR: Shell Western E&P, Inc. (See remarks on reverse)

ADDRESS OF OPERATOR: P. O. Box 991, Houston, TX 77001

LOCATION OF WELL (Report location clearly and in accordance with any State or Federal regulations): 300' FSL & 515' FEL, Sec. 9

At top prod. interval reported below: Same

At total depth: Same

RECEIVED
JUL 11 1984

COLO. OIL & GAS CONS. COMM.

Sec. 9, T37N, R18W, NMPM

12. COUNTY OR PARISH: Montezuma
13. STATE: Colorado

14. PERMIT NO: NA
DATE ISSUED: 8/3/78
15. ELEVATION (BY BAR, ST, GS, ETC.): 6877' GR
16. DATE S.D. REACHED: 1/14/79
17. DATE COMPL. (Ready to prod.): 12/6/83
18. DATE S.D. FILED: 11/21/78

19. ELEV. CASINGHEAD: --
20. INTERVALS DRILLED BY: X
21. ROTARY TOOLS: --
22. CABLE TOOLS: --
23. PLUG BACK T.D. MD & TVD: 8535
24. TOTAL DEPTH, MD & TVD: 8583

25. PRODUCING INTERVAL(S) OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD): 8480-8534 (L. Leadville)
26. WAS DIRECTIONAL SURVEY MADE: No
27. WAS WELL CORKED: No

TYPE ELECTRIC AND OTHER LOGS RUN: CBL/temp log/depth correlation log

CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB/FT	DEPTH RTD (MD)	WIRE SIZE	CEMENTING RECORD	AMOUNT PULLED
7/8"	48	50	17 1/2"	75sx C + 2 1/2 CoC12	--
8"	36.32.3	2873	12 1/4"	600sx Lite + 200 sx B	--
	23.29	8020	8 3/4"	600sx Lite + 350 sx B	--

LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	BACKS CEMENT	SCREEN (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
4 1/2"	7827	8581	150		3 1/2"	8172	8093

28. PERFORATION RECORD (Interval, size and number): 8480-8534 (4 JSPF/O degree phase, 13.5 grans/shot)

29. ACID SHOT, FRACTURE CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
8480-8534	acidized w/113 bbls 15% HCl acid
8326-8448	squeezed w/150 sx Class H cmt

PRODUCTION

33. DATE FIRST PRODUCTION: --
PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump): CONVERTED TO SALT WATER DISPOSAL WELL
WELL STATUS (Producing or shut-in): --

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD. FOR TEST PERIOD	OIL--BBL.	GAS--MCF.	WATER--BBL.	GAS-OIL RATIO

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): --

35. LIST OF ATTACHMENTS

Logs

I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.

BY: [Signature] TITLE: Supvr, Reg/Permits DATE: 7/9/84

(See Instructions and Spaces for Additional Data on Reverse Side)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations or to omit any matter within its jurisdiction.

GEOLOGIC MARKET

3A. Core intervals; and all and shut-in pressures, and

37. SUMMARY OF POROUS ZONES: (Show all important zones of porosity and coal, shale, gas, tests, including depth interval tested, cushion used, time tool open, etc.)

TOP	BOTTOM	DESCRIPTION, COMMENTS, ETC.	NAME	MEAS. DEPTH	TIME
8289	8448	Leadville Formerly Yellow Jacket #2 development of CO2 market tested. The well has been shut-in pending completion of the Invermear Central Facilities.	Jurassic Triassic Permian Pennsylvanian Desert Creek Salt (Top) Hermosa (Top) Mississippian	186 1398 2712 4482 6006 6130 7995 8230	

3B.

MEAS. DEPTH

NAME

DESCRIPTION, COMMENTS, ETC.

BOTTOM

TOP

LEADVILLE

TIME

RECEIVED

Form Approved Budget Control No. 8-1984

Form 9-331 Dec. 1973

UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

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 Form 9-331-C for such proposals.)

1. oil well [] gas well [] other CO2

2. NAME OF OPERATOR SHELL WESTERN E&P INC.

3. ADDRESS OF OPERATOR P. O. BOX 991, HOUSTON, TEXAS

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.) AT SURFACE: 300' FSL & 515' FEL, SEC 9 AT TOP PROD. INTERVAL: Same AT TOTAL DEPTH: Same

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

REQUEST FOR APPROVAL TO: TEST WATER SHUT-OFF, FRACTURE TREAT, SHOOT OR ACIDIZE, REPAIR WELL, PULL OR ALTER CASING, MULTIPLE COMPLETE, CHANGE ZONES, ABANDON (other) Run Permanent Injection Equipment.

SUBSEQUENT REPORT OF: []

5. LEASE C-10103 6. IF INDIAN, ALLOTTEE OR TRIBE NAME 7. UNIT AGREEMENT NAME MC ELMO DOME UNIT 8. FARM OR LEASE NAME MC ELMO DOME (9-38-18) 9. WELL NO. HWD-1 10. FIELD OR WILDCAT NAME MC ELMO DOME 11. SEC., T., R., M. OR BLK. AND SURVEY OR AREA SEC. 9, T38N, R18W, NMPM 12. COUNTY OR PARISH MONTEZUMA 13. STATE COLORADO 14. API NO. NA 15. ELEVATIONS (SHOW DF, XDB, AND WD) 6877' GR

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

84-07-02

RELEASED REP AND POH WITH 2 7/8" TEG. AND BAKER MODEL "G" REP. PU (SNE) RAN CBL FROM PETD 8535' (LOGGERS) TO 2300'.

84-07-05

RIH WITH PERMANENT INJECTION EQUIPMENT AS FOLLOWS:

KE CORRECTION 0' 22' TUBING HANGER 22' 23' 1-3 1/2" X2' SUB EUE BRD "IPC" 8.3#/FT J-55 23' 25' CROSSOVER (3 1/2" BRD BOX X 2-7/8" BRD PIN) "IPC" J-55 25' 26' 1-2 7/8" X2' SUB EUE BRD "IPC" 8.5#/FT J-55 26' 28'

Subsurface Safety Valve: Manu. and Type

18. I hereby certify that the foregoing is true and correct

SIGNED A. J. Fore with Supervisor Regulatory July 13, 1984

APPROVED BY DIRECTOR O & G Cons. Comm.

Continued

1-2 7.6"X10' SUE EUE BRD "IPC" 6.5' FT J-55	26'	33'
2ST JTS (7749') 2 7/8" EUE BRD "IPC" 6.5' FT J-55	39'	7797'
CROSSOVER (2 7/8" BRD BOX X 2 7/8" A-95 PIN) 13 CR	7727'	7755'
BAKER MODEL "FL" ON/OFF TOOL W/2.25" "F" PROFILE 13 CR	7760'	7790'
CROSSOVER (2 7/8" A-95 BOX X 2 3/8" BRD PIN) 13 CR	7750'	7791'
10JTS (301') 2 3/8" EUE BRD "IPC" 4.78' FT J-55	7791'	8092'
CROSSOVER (2 3/8" BRD BOX X 2 3/8" A-95 PIN) 13 CR	8092'	8093'
BAKER MODEL A-3 LOC-SET PACKER W/A-95 BXP 13 CR	8093'	8097'
1-2 3/8"X10' SUB L-60 4.78' FT W/A-95 BXP 13 CR	8097'	8107'
BAKER MODEL "F" NIPPLE ID=1.81" W/A-95 BXP 13 CR	8107'	8109'
1 JT (31') 2 3/8" L-60 4.78' FT (SLOTTED) W/A-95 BXP 13 CR	8109'	8139'
1 JT (31') 2 3/8" L-60 4.78' FT (PLAIN) W/A-95 BXP 13 CR	8139'	8170'
BAKER MODEL "R" NIPPLE ID=1.81" W/A-95 BXP 13 CR	8170'	8171'
BAKER W/LG W/A-95 BOX 13 CR	8171'	8172'

SET PKR AT 8093'. PACKED OFF WITH 20,000#. RELEASED ON/OFF TOOL AND
CIRCULATED 350 BBL FW TREATED WITH TRETOLITE KM-44 AND K-477 PRESSURE
TEST PKR TO 1000 PSI FOR 15 MIN. TEST OKAY. LATCHED BACK ONTO ON/OFF
TOOL AND LANDED WITH 7000# COMPRESSION. PRESSURE TEST TAG TO 1500 PSI
FOR 15 MIN - TEST OKAY. NO-BOF AND NO-TRF.

Attachment B

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES

File one copy for Patented, Federal and Indian lands
File in duplicate for State lands

LEASE DEDICATION AND SERIAL NO

C-2654-A

IF INDIAN, ALLOTTEE OR TRIBE NAME

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

1. TYPE OF WELL: OIL WELL GAS WELL DAY Other: Salt Water
 2. TYPE OF COMPLETION: NEW WELL WORK OVER DEEP EN PLUG BACK DIFF PERM Other: Disposal (CO2)
Convert to SWD

1. UNIT AGREEMENT NAME: McElmo Dome Unit
 2. NAME OF OPERATOR: Shell Western E&P, Inc.
 3. ADDRESS OF OPERATOR: P. O. Box 991, Houston, TX 77001

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements):
 At surface: 2095' FNL & 1995' FWL, Sec. 26
 At top prod. interval reported below: Same
 At total depth: Same

4. WELL NO.: YWD-1
 5. FIELD AND POOL OR WILDCAT: McElmo Dome
 6. SEC. T. R. M. OR BLOCK AND ACRES OR AREA: Sec. 26, T38N, R18W, NMPM

7. DATE SPLDDED: 9/29/77
 8. DATE T.D. REACHED: 11/26/77
 9. DATE COMPL. (Ready to prod): 5-19-84 (Plg & Adv)
 10. ELEVATIONS (Dr. BSS. BY. GS. ETC.): 6808' KB
 11. TOTAL DEPTH, MD & TVD: 8478
 12. PLUG. BACK T.D., MD & TVD: 8450
 13. IF MULTIPLE COMPL. HOW MANY: --
 14. INTERVALS DRILLED BY: 0-8478'
 15. PRODUCING INTERVAL(S) OF THIS COMPLETION—TOP, BOTTOM, PAISE (MD AND TVD): 8292'-8406' (L. Leadville)
 16. WAS DIRECTIONAL SURVEY MADE: no

12. COUNTY: Montezuma
 13. STATE: Colorado
 14. WAS WELL FORED YES NO (See source code)
 15. DRILL STEM TEST YES NO (See source code)

CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB/FT	DEPTH SET (MD)	WELL SIZE	CEMENTING RECORD	AMOUNT PULLED
13 3/8"	54.50	40	17 1/2"	75sx8+3%CaCl2	--
9 5/8"	36	2702	12 1/4"	900sx8+1/2#Flocele+2%CaCl2	--
7"	26	7919	8 3/4"	175sxl.t. Wt +15#salt+2%CaCl2+	--
				200sx8+7#salt+2%CaCl2	

20. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	BACKS CEMENT	SCREEN (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
4 1/2"	7759	8476	180sx8		3 1/2"	8175	8110.5'

21. PREPARATION RECORD (Interval, size and number)

INTERVAL	SIZE	NUMBER
8292-8352'	(2)JSPF	
8360-8380'	(4)JSPF	
8386-8406'	(4)JSPF	

22. ACID SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL FORD
8292-8406'	acidized w/5000 gals 15% HCL acid
8182-8274'	squeezed w/100 sx "C" cmt

23. PRODUCTION

DATE FIRST PRODUCTION: _____
 PRODUCTION METHOD (Flowing, gas lift, pumping—name and type of pump): _____
 WELL STATUS (Producing or shut-in): _____

SALT WATER DISPOSAL WELL

DATE OF TEST	BOLES TESTED	CHASS SIZE	PROD'N FOR TEST PERIOD	OIL--BBL	GAS--MCF	WATER--BBL	GAS OIL RATIO

24. DISPOSITION OF GAS (Bov, used for fuel, vented, etc.): _____
 TEST WITNESSED BY: _____
 LIST OF ATTACHMENTS: None
 I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.
 SIGNED: [Signature] for A.J. Fore TITLE: Supervisor Reg/Permits DATE: May 20, 1984
 See Specs for Additional Data on Reverse Side

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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 Form 9-331-C for such proposals.)

1. oil well gas well other CO₂

2. NAME OF OPERATOR
Shell Oil Company

3. ADDRESS OF OPERATOR
P. O. Box 991, Houston, Texas 77001

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below)
AT SURFACE: 2095' NL & 1995' FWL, Sec 26
AT TOP PROD. INTERVAL: Same
AT TOTAL DEPTH: Same

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

5. LEASE
C-2654-A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
--

7. UNIT AGREEMENT NAME
Mc Elmo Dome Unit

8. FARM OR LEASE NAME
Yellow Jacket Unit

9. WELL NO.
1

10. FIELD OR WILDCAT NAME
Mc Elmo Dome

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 26 T32N R18W NMDM

12. COUNTY OR PARISH
Montezuma

13. STATE
Colorado

14. API NO.
05-083-6195

15. ELEVATIONS (SHOW DF, KDB. AND WD)
6397' Gr.

REQUEST FOR APPROVAL TO: SUBSEQUENT REPORT OF:

- TEST WATER SHUT-OFF
- FRACTURE TREAT
- SHOOT OR ACIDIZE
- REPAIR WELL
- PULL OR ALTER CASING
- MULTIPLE COMPLETE
- CHANGE ZONES
- ABANDON*

-
-
-
-
-
-
-
-

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

(either) Recomplete in Lower Leadville and Run Injectivity Test

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)

9/23/83 Squeeze cement perforations from 8182' to 8274' w/ 100 sx. class H cement. Max pressure 300 psi.

9/24 to 10/25/83 Fished packer and drilled retainer and cement to 8450'

10/27/83 Perforated Lower Leadville from 8360 to 8300 and 8386' to 8406'. Ran injectivity test. Formation would only take 2 bpm @ 100psi.

10/29/83 Perforated Lower Leadville from 8292' to 8352'.

10/31/83 Acid treated perms from 8292' to 8406' (200 holes) w/ 5000 gal 15% HCL w/294 ball sealers.

11/1/83 On injectivity test ppd 7 bpm @ 1000 psi and ppd 4 bpm w no pressure.

11/2/83 Set Baker Model G lock-set RBP @ 8019'. Tested to 1000 psi, held OK. Well TA'ed until placed in service as a disposal well.

18. I hereby certify that the foregoing is true and correct

SIGNED A.J. Fore TITLE Supervisor req/per DATE November 18, 1983

(This space for Federal or State Office use)

APPROVED BY _____

TITLE _____ DATE _____

ACCEPTED FOR RECORD

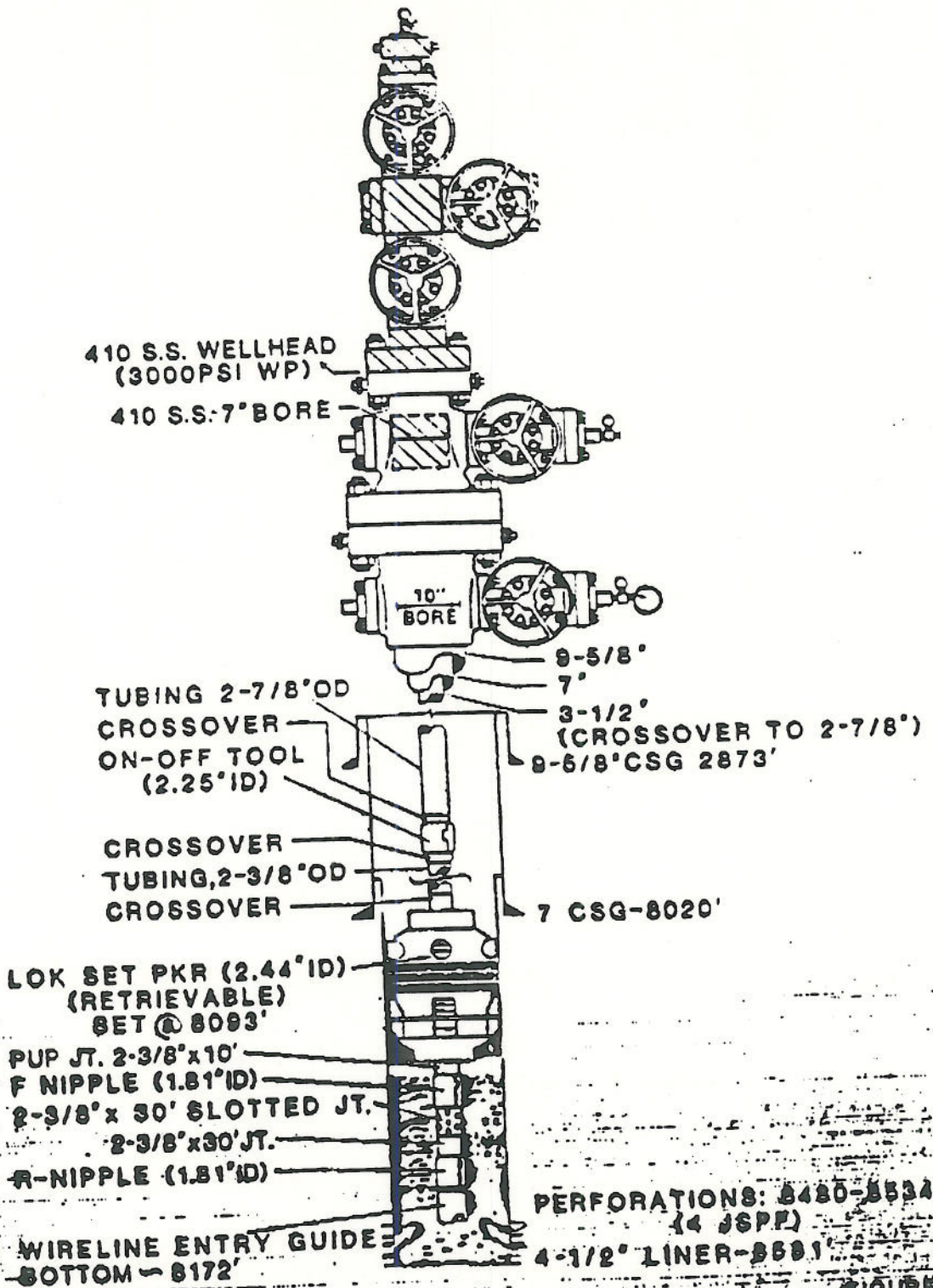
OPERATOR'S COPY

RECEIVED
Bureau of Land Management
NOV 20 1983

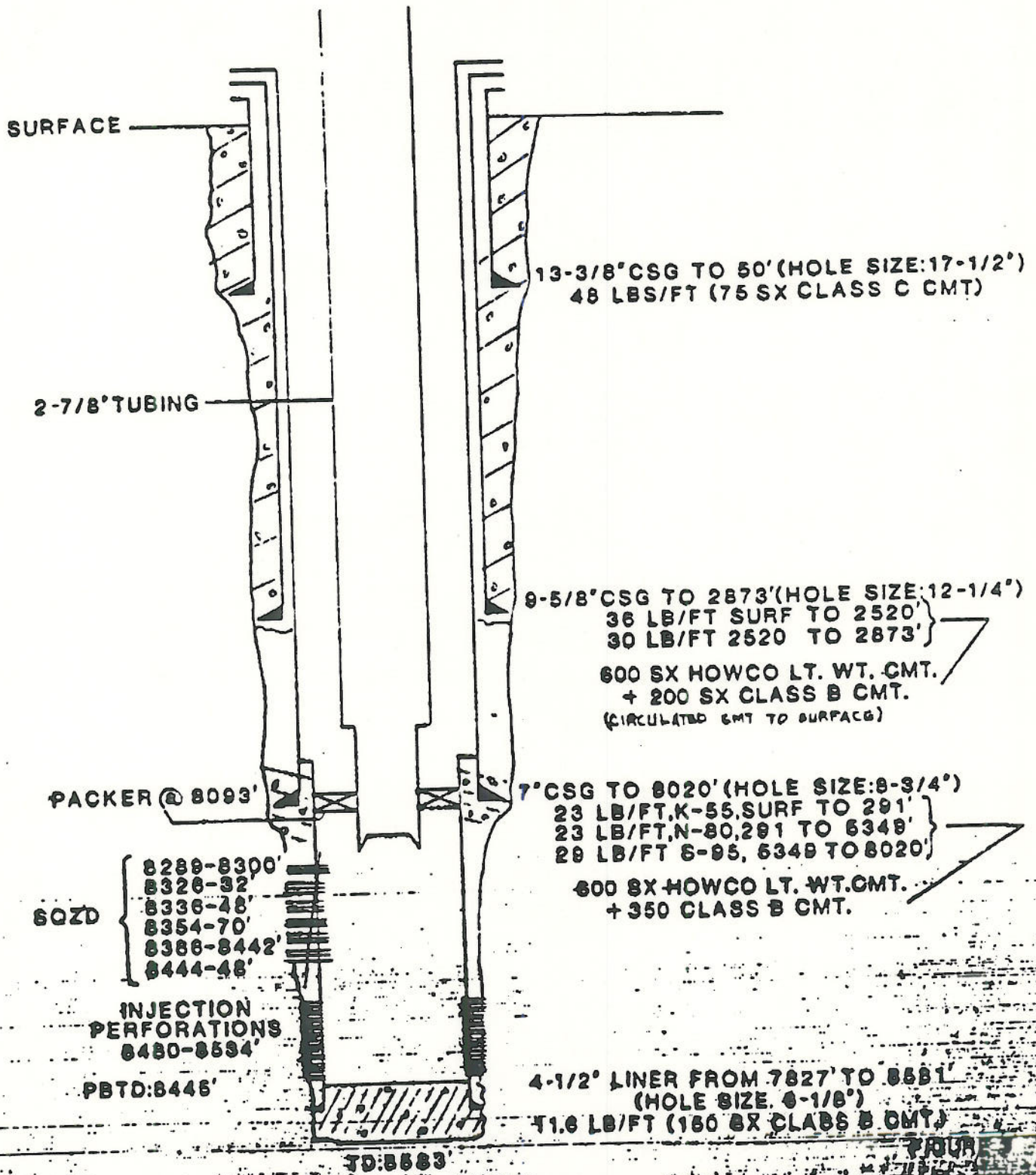
NOV 1 1983
District

See instructions on Reverse Side

COMPLETION DETAILS OF HWD-1



CONSTRUCTION DETAILS OF HWD-1



COMPLETION DETAILS OF YWD-1

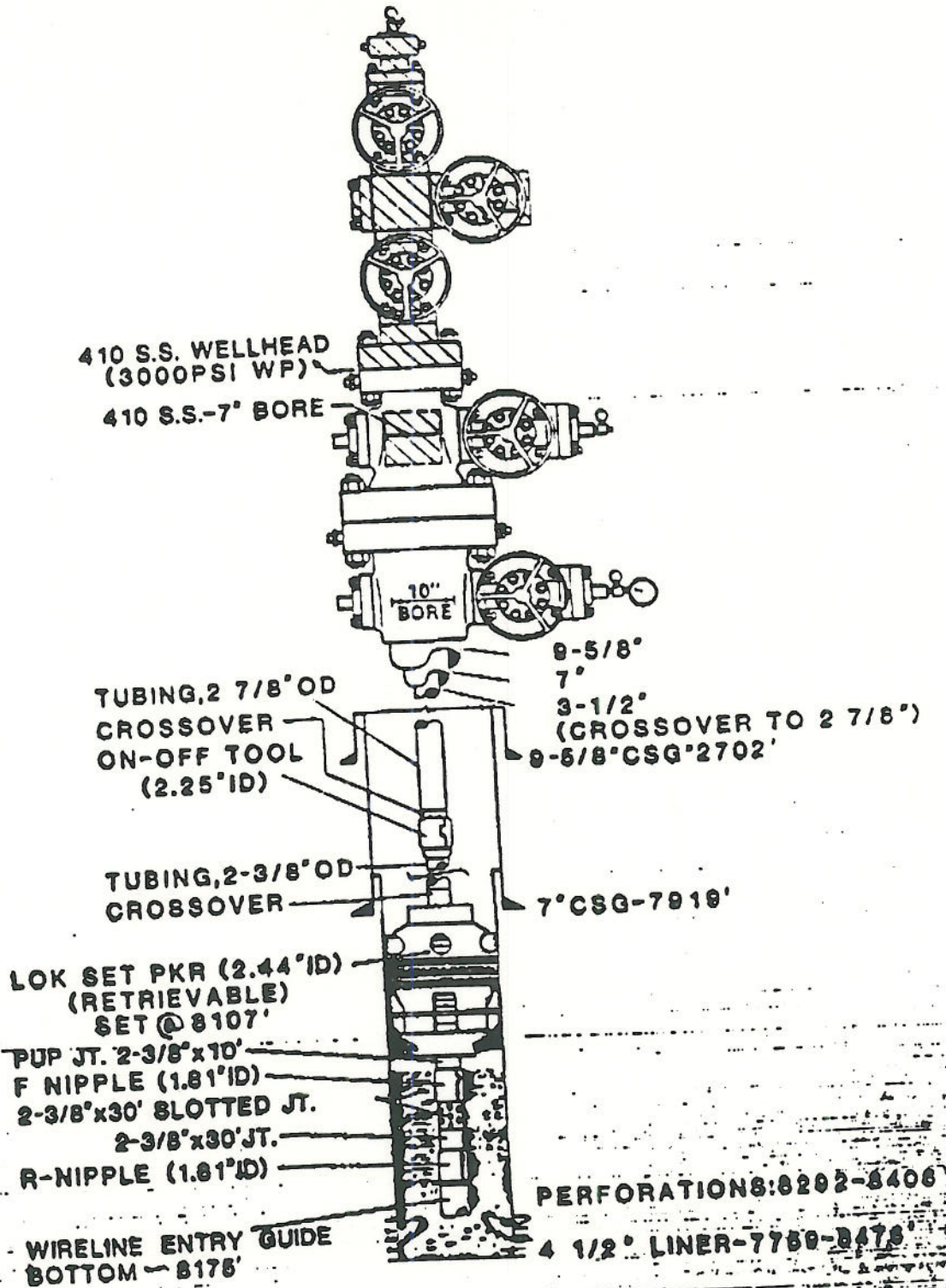


FIGURE 1

CONSTRUCTION DETAILS OF YWD-1

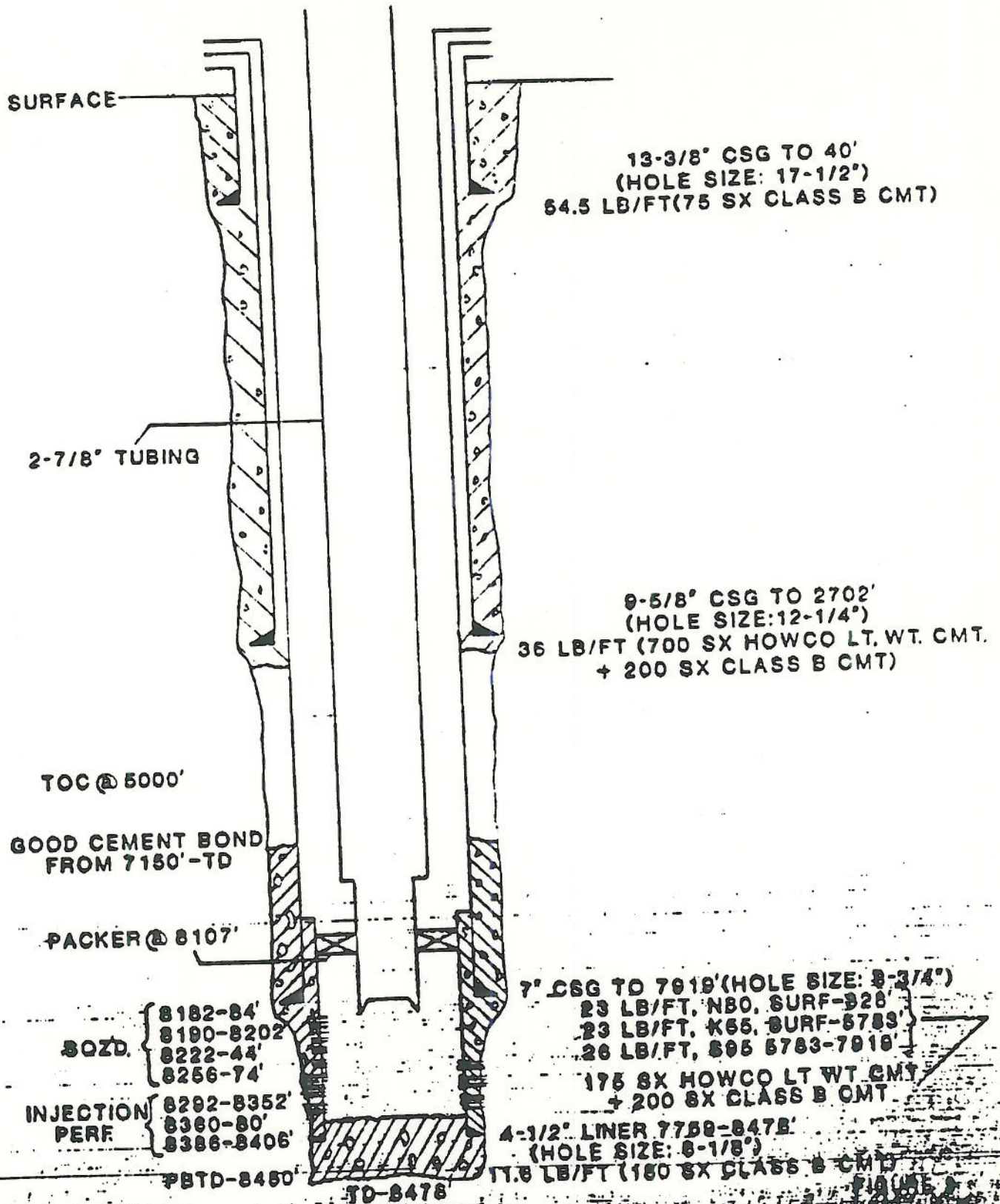
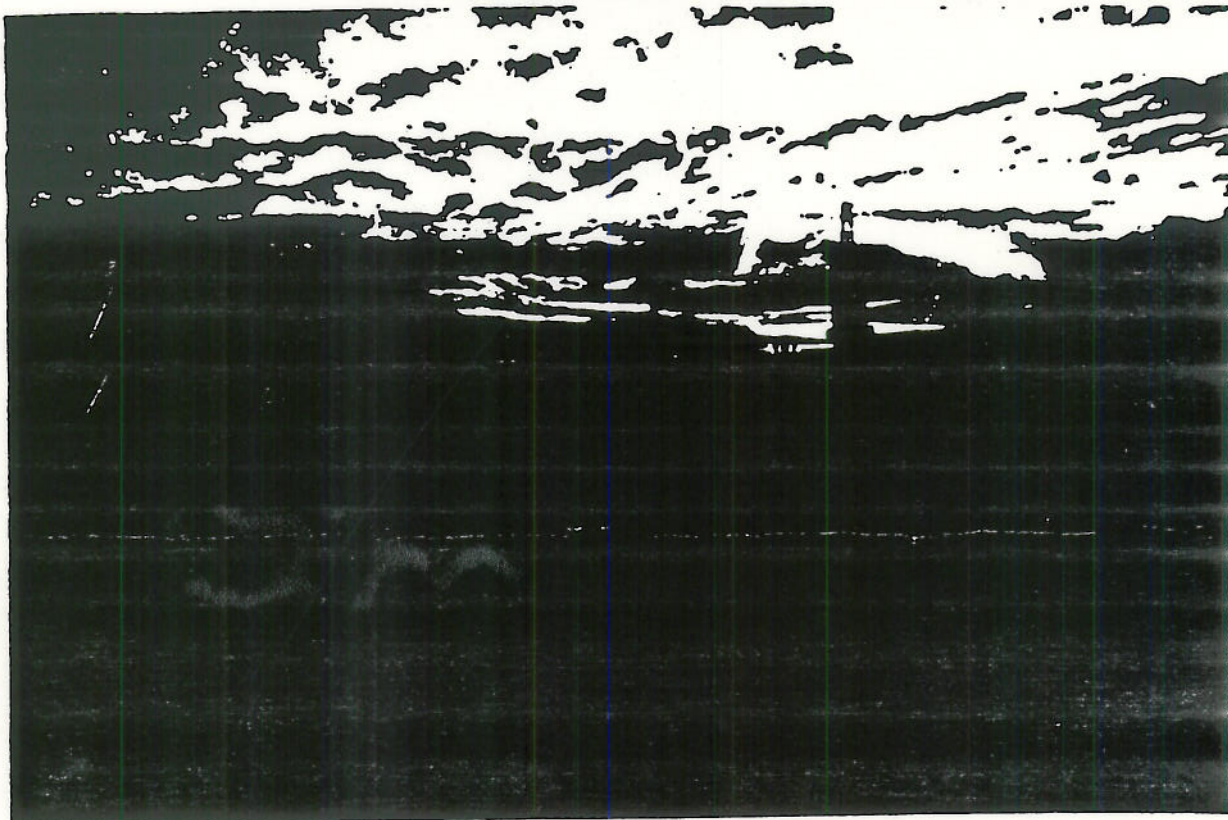


FIGURE 2



Development drilling in the Greater Prudhoe Bay area probably will stay at current record levels through the rest of the century as North Slope producers begin exploiting third-generation oil reserves in North America's richest hydrocarbon province.

Alaskan North Slope operators push projects to recover third-generation oil

About this issue . . .

OGJ team headed by Bob Williams, West Coast Editor, covers exploration/development activity throughout the U.S. and Canadian far northern frontiers in this report. Despite disappointments at Mukluk off Alaska and in the Canadian Beaufort and Arctic Islands, the Far North still is regarded as probably the brightest hope for giant new oil and gas fields in this hemisphere.

Alaskan North Slope operators, led by ARCO Alaska Inc., have embarked on an ambitious effort to exploit a third generation of reserves underlying North America's richest hydrocarbon province.

That assumes that primary development of megagiant Prudhoe Bay oil field represents the North Slope's first generation of oil exploitation, and that Kuparuk development programs and Prudhoe secondary recovery and reservoir maintenance programs represent the second generation.

ARCO and partners now are poised to begin exploitation of thin-return, even marginally economic, reserves through tertiary recovery and

than 60 million bbl of original oil in place.

How carefully the economics of those development programs must be fine-tuned is typified by the selective modular program planned for the next North Slope field due on stream, Milne Point (see story, p. 63).

The success of these programs would offset the expected sharp decline of oil production from Prudhoe and Kuparuk fields during the late 1980s. But beyond that, recent statements by Atlantic Richfield's Chairman Robert O. Anderson and Pres. William F. Kieschnick suggest that the programs planned might enable the Trans-Alaska Pipeline System (TAPS) to keep humming at capacity to the end of the century. It certainly could keep ARCO domestically self-sufficient in crude supplies through 2000, they contend.

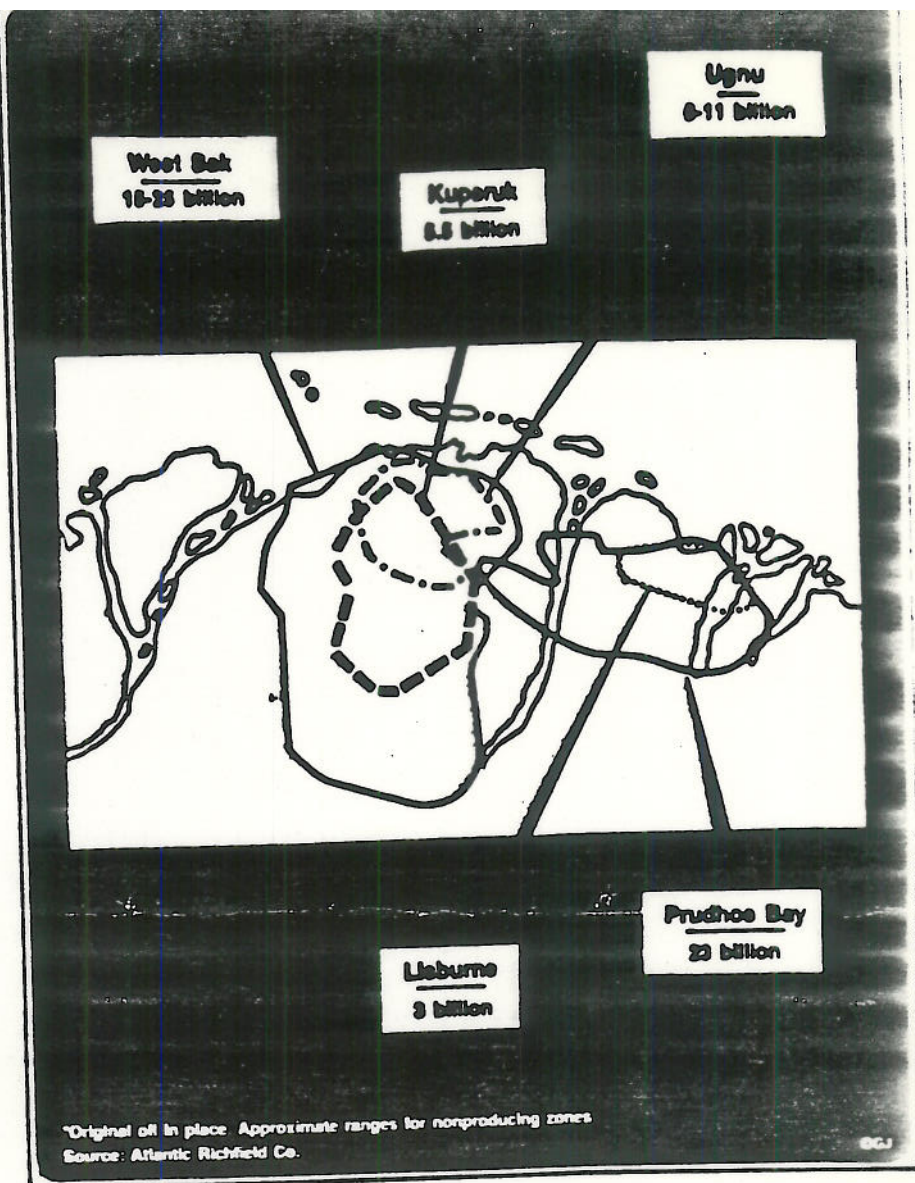
Some of the reserves exploitation efforts might call for routine scaling up or down of modular increments in line with crude price trends or require development of new technology. But it seems apparent that as each new program advances, it furthers the economic infrastructure of oil development on the North Slope and thus aids the economics of other, future projects in the petroleum industry's most costly environment.

All of which, incidentally, calls for facilities modules amounting to a record North Slope sealift in 1986. And look for more records set thereafter as the current record pace of development drilling continues almost unabated on the slope for the rest of the century.

West Sak elephant. Leading the list of these ambitious programs is the proposed development of the megagiant West Sak reservoir, a thin Cretaceous sand overlying Kuparuk River pay and encompassing a 200-250 sq mile area.

ARCO pegs West Sak original oil in place at 15-25 billion bbl. A \$75 million pilot program employing hot water injection in the heavy oil zone will get under way by midsummer. It will be the world's first thermal EOR project in an Arctic region. If pilot results are encouraging, it could lead to a commercial program with an ultimate recovery target of 20% beginning during the late 1980s.

In the interim, a demonstration project is likely, with a modular scale-up later on a scale smaller than the modular development increments at Kuparuk. The scale of a commercial West Sak program and its projected peak production rate haven't been



determined yet, but the rate likely would peak perhaps at 100,000-200,000 b/d of oil.

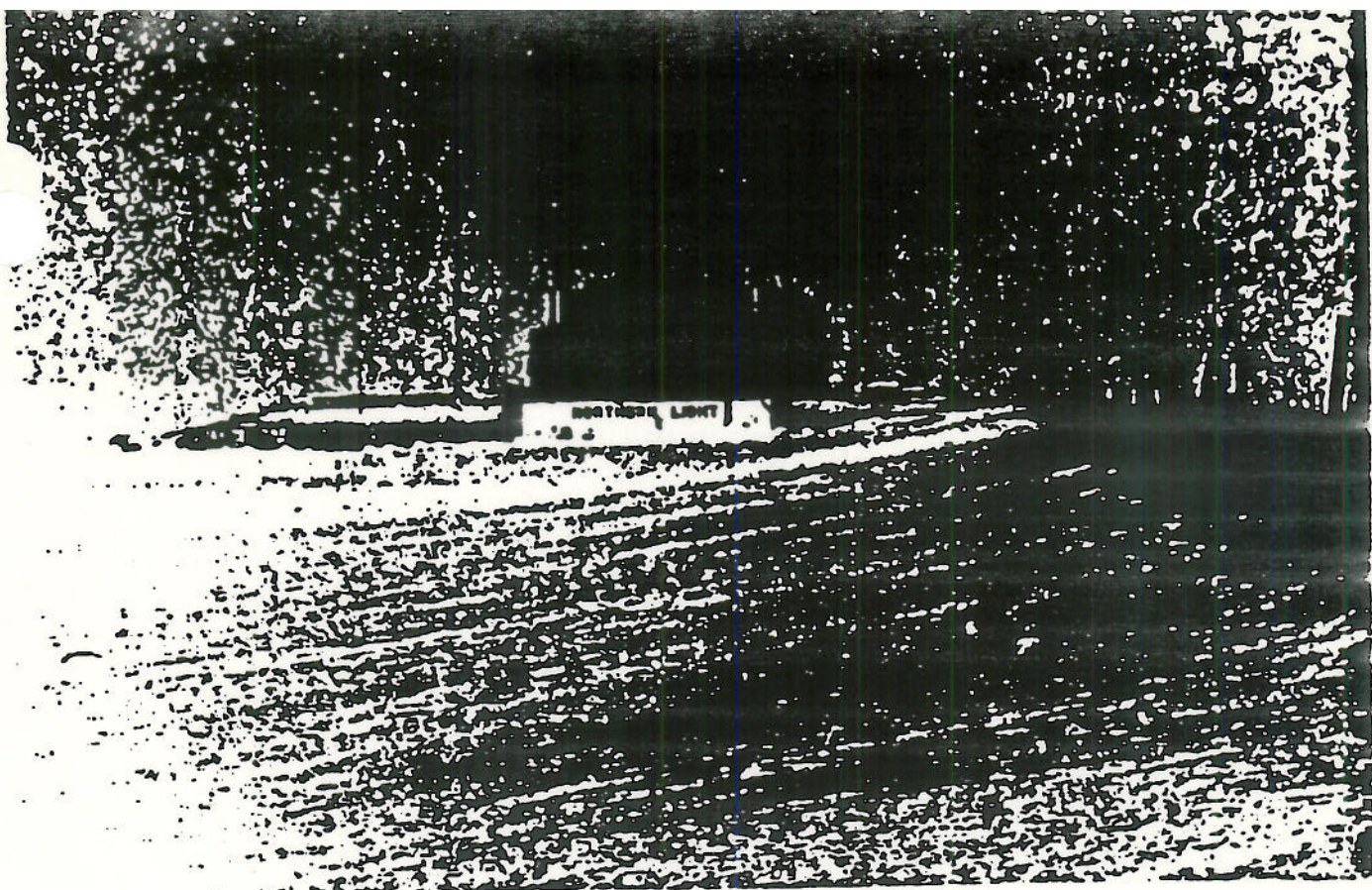
The pilot calls for a hot waterflood on 5 acre spacing with 13 wells, a bounded inverted nine spot with eight producers, an injector in the middle and four injectors on the outside, to provide a closed pilot system for better evaluation. A later demonstration scale-up would involve 20 acre spacing. Injection of 200-300° F. water will begin at the rate of about 1,000 b/d, doubling later to yield pilot oil output of perhaps 2,500 b/d. ARCO expects to see some kind of reservoir response the first year and is already conducting detailed engineering on an expanded pilot or demonstration scale program to begin possibly during 1985.

But a larger commitment, to even a fifth of the West Sak pay area, would

require a significant reduction in expected well costs to even lower than Kuparuk because of low productivity expected in the West Sak wells. That's so even with planned consolidation of facilities with concurrent Kuparuk development.

Lisburne. Closer in timing—but no less difficult to economically extract—will be oil from the Lisburne, a fractured carbonate limestone reservoir which underlies the Sadlerochit and which has confounded Prudhoe operators for many years.

Later this year ARCO and partners plan to launch a 180 well Lisburne development program that will add about 140 million bbl of reserves, with more on tap from a later waterflood. Production could begin in 1987 and build quickly to 100,000 b/d, with primary recovery in the Prudhoe field area estimated at about 15% of



Seawater treatment plant to handle about 2.2 million b/d of Beaufort Sea water for giant Prudhoe Bay waterflood is scheduled to start up this summer. It's part of massive \$10.4 billion Prudhoe pressure maintenance program.

3 billion bbl of in place oil. Initial development would cover about 60 sq miles with the wells initially on 160 acre spacing and the structural high at the Prudhoe gas cap. ARCO needs more data before deciding whether to go to 80 or 320 acre spacing later.

Many of the Lisburne wells thus could be produced to commingle with Sadlerochit oil and be recompleted later as gas wells. But the Lisburne has its own gas cap, and there remain some questions about how Lisburne gas will interact with the reservoir's natural fracture system.

Lisburne development will call for its own gas compression and stand-alone crude gathering facilities.

Miscible gas. Meanwhile ARCO and partners have obtained approval for a \$750 million, fivefold expansion of the world's first tertiary EOR project, an enriched-gas miscible flood of Prudhoe Bay field. Start-up is slated for early to mid-1987.

ARCO has been operating the 650 acre, \$111 million Prudhoe Flow Station Three Injection Project in the eastern portion of Prudhoe field since December 1982, except for downtime following a fire. Plans call for the miscible gas flood to boost recovery another 5-5.5% beyond wa-

terflood. The project would be expanded to about 12,900 acres, or about 10% of Prudhoe field area.

As with this pilot, the expanded Prudhoe Bay Miscible Gas (PBMG) project entails alternate injection of water and enriched (with NGL) gas to boost recovery by an additional 115 million bbl of oil. Currently injection volumes at the pilot run about 35-40 MMcfd of miscible enriched gas and about 90,000 b/d of water via 11 enriched gas injectors and seven up-structure water injectors.

That would increase to injection of about 180 MMcfd of gas at first, peaking at about 266 MMcfd in 1996, and averaging about 200 MMcfd during the 10 year program life. It will use inverted nine spots on 80 acre spacing for at least 10 years from 1987, or until the miscible gas slug pore volume reaches 10%.

About 1,000 b/d of liquids injectant is produced by the field fuel gas unit comprising flash drum and scrubber liquids and other offgas and residue gases from Flow Station Three. A bigger, 2.7 billion cfd capacity NGL plant for the expanded operation is expected on the 1986 sealift to yield ethane, propane, and CO₂ to enrich the gas, about 40,000 b/d of NGL to be blended into the TAPS crude

stream, and residue gas for reinjection.

A similar miscible program may be technically feasible at Kuparuk as well, says ARCO, but the economics are questionable there because it would have to buy the liquids from the Prudhoe unit.

Other development prospects. Farther down the line is another huge heavy oil resource on the North Slope that's currently beyond industry's technical capability, the Ugnu reservoir.

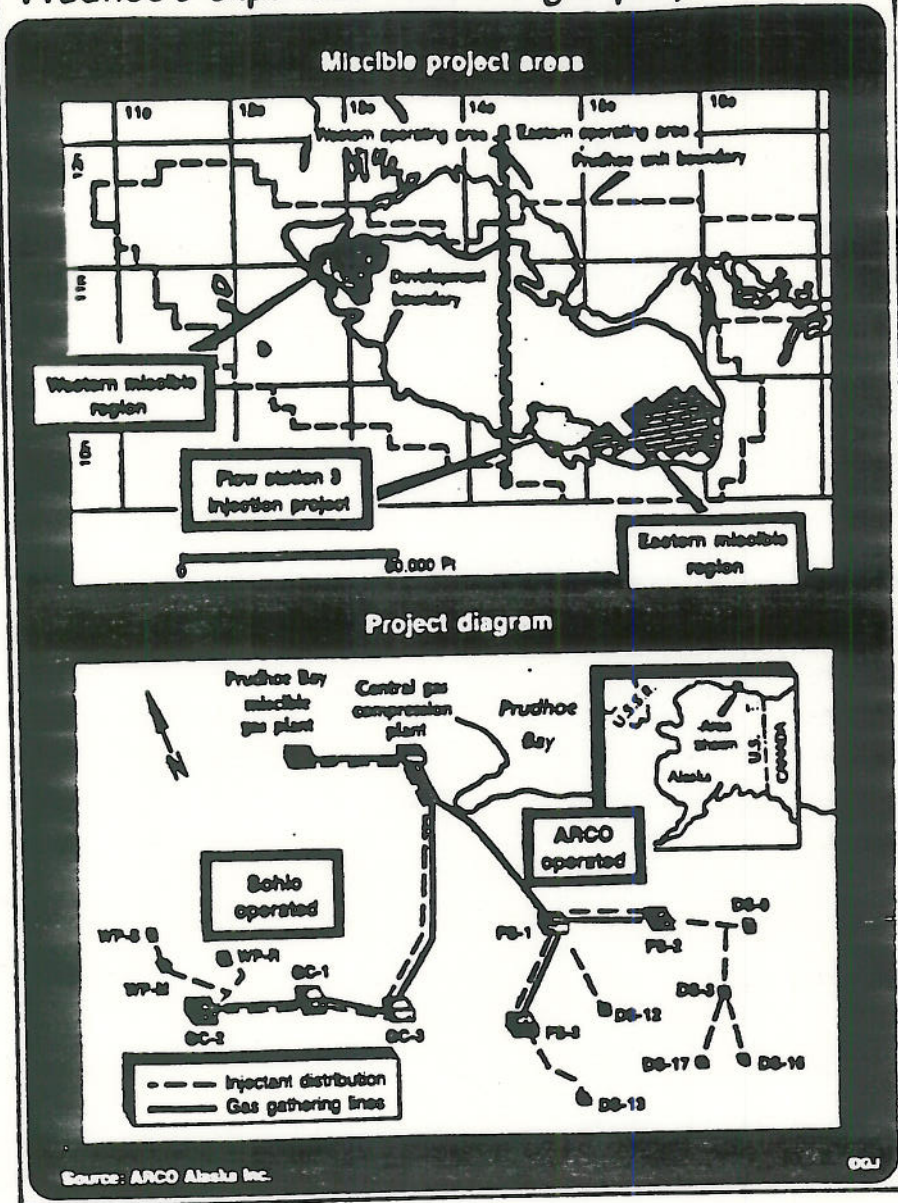
Ugnu's in-place load of 6-11 billion bbl of shallow, 10-11° gravity oil won't yield readily to anything but a technological leap.

Another prospect for future development might be the Prudhoe West End reservoir, although no plans are on tap yet. And Gwydyr Bay Sadlerochit reserves north of Prudhoe probably will need another concurrent development nearby to reach commerciality.

A decision is likely to come this autumn by Sohio and partners whether to launch a project to begin the first production of oil from the Beaufort Sea with development of the 300 million bbl Endicott reservoir.

The lack of gas market not only stymies a solution for disposal of the

Prudhoe's expanded miscible gas project



giant Prudhoe gas reserves, it also inhibits production of 350 million bbl of condensate in the giant Point Thomson gas/condensate reservoir. Recent interest by Japanese financial institutions in feasibility of an all-Alaska gas pipeline and LNG export project strengthened that \$25 billion project's hand against the long-delayed \$40 billion Alaska Natural Gas Transportation System, although current prospects aren't promising for either.

Current work. Meanwhile, first and second generation work continues apace at Prudhoe and Kuparuk. Plans call for 70-80 development wells at Kuparuk and 50-60 at Prudhoe this year. The giant Beaufort seawater treating plant is due to start up shortly, launching Prudhoe's 2.2 million b/d fieldwide waterflood. Kuparuk's full field waterflood is expected to start up in 1986.

Start-up of Kuparuk's second central producing facility is due later this year, with a design capacity of 120,000 b/d of oil. The third phase will be installed in 1987.

Prudhoe is progressing on its \$2 billion gas lift program, undergoing initial installation, with tripling of capacity planned by next year. Second phase equipment for Prudhoe's low-pressure separation program came up on last year's sealift and should go on stream before next year. And the last two phases of Prudhoe's well pad manifolding effort will start up this year and next.

It all adds up to a massive effort by North Slope producers, especially ARCO, to move beyond the "Prudhoeman" quest for the next elephant and apply an activist engineering approach to wring new giants out of the resource base at hand.

Alaska wildcat

The remote waters of the Bering Sea will dominate Arctic Alaska wildcatting during 1984-85 as the oil and gas industry gets its first opportunity to test leases on Alaska's tantalizing western Outer Continental Shelf.

Look for drilling to begin on at least 10 exploratory wells and perhaps as many as 15 or more costing \$20-30 million each in the St. George and Norton Sound basins during the first season beginning in second half 1984. Depending upon results from the first season, follow-up tests in these two areas in tandem with launching of the first campaign in the forbidding Navarin basin next year could mean sufficient work for a fleet of 6-7 rigs off Alaska's western coast through 1986.

Even if all three western OCS basins should eventually prove nonproductive, the broad spectrum of geological plays evinced in bidding in the first areawide sales there means a 3 year drilling campaign at least to furnish that proof, say industry executives. Operators will encounter geology unrelated to that with which they're familiar, for example, on the North Slope.

Although the Bering basins command the spotlight at the moment, industry isn't about to walk away from the Beaufort Sea, despite the bad news at Mukluk. Plans call for a significant test in the western Beaufort involving the first use of a mobile gravity structure in U.S. waters and the delineation of a significant oil strike in the eastern Beaufort.

That gravity structure could see action in the Beaufort during 1985-86 as industry gears up to drill acreage acquired in Diapir Sale 87, scheduled next month. This sale will feature the most remote tracts yet offered in U.S. waters.

Heading the list of onshore Arctic Alaska wildcat programs are the long-awaited first tests by industry next winter in the National Petroleum Reserve-Alaska (NPR-A) and the Arctic National Wildlife Range (ANWR).

Meanwhile, Alaskan operators must continue to deal with a tough political