Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

30-045-24187

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TIGHT HOLE

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

5. LEASE DESIGNATION AND SERIAL NO.: NOO-C-14-20-5337

6. IF INDIAN, ALLOTTEE OR TRIBE NAME:

7. UNIT AGREEMENT NAME:

1a. TYPE OF WORK: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] OTHER — SINGLE ZONE [X] MULTIPLE ZONE [ ]

8. FARM OR LEASE NAME: Harlan-TallJim

9. WELL NO.: #2

2. NAME OF OPERATOR: Harlan Drilling Company

3. ADDRESS OF OPERATOR: P.O. Box 2183, Farmington, New Mexico 87401

10. FIELD AND POOL, OR WILDCAT: Verde-Gallup

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 990'N- 990'W- Sec.1 - T30N-R16W
At proposed prod. zone: 1650'- 1800' Verde Gallup

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec.1, T30N, R 16W
990'from N, 990 Ft.W

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 12 miles N.W., Kirtland, New Mexico

12. COUNTY OR PARISH: San Juan — 13. STATE: New Mexico

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any)	16. NO. OF ACRES IN LEASE	17. NO. OF ACRES ASSIGNED TO THIS WELL
990'		40
18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.	**19. PROPOSED DEPTH**	**20. ROTARY OR CABLE TOOLS**
1880'	1850'	Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): 5536 GL

22. APPROX. DATE WORK WILL START*: December 21, 1979

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
20"	16"	65	30'	8 Yds Redimix to circulate
14-3/4"	11-3/4"	42	600'	330 sacks
9-7/8"	7-5/8"	26.40	+1551'	335 sacks

Drill 4, 200' directional drain holes. TD of drain holes to not excede 330' of Drill Tract.

APPROVAL VALID FOR 90 DAYS UNLESS DRILLING COMMENCED
EXPIRES 4/24/80

RECEIVED
JAN 25 1980
OIL CON. COM.
DIST. 3

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED [signature] TITLE President DATE Dec 19, 1979

(This space for Federal or State office use)

PERMIT NO. _____ APPROVAL DATE _____

APPROVED BY _____ TITLE _____ DATE _____

CONDITIONS OF APPROVAL, IF ANY:

ok Snk

*See Instructions On Reverse Side

APPROVED
JAN 24 1980
[signature]
ACTING DISTRICT ENGINEER

All distances must be from the outer boundaries of the Section

Operator	Lease	Well No.
HARLAN EXPLORATION & DRILLING CO.	Harlan - Talljim	#2

Unit Letter	Section	Township	Range	County
D	1	39 NORTH	16 WEST	SAN JUAN

Actual Footage Location of Well:
990 feet from the NORTH line and 990 feet from the WEST line

Ground Level Elev.	Producing Formation	Pool	Dedicated Acreage:
5536	Gallup	Verde	40 Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.

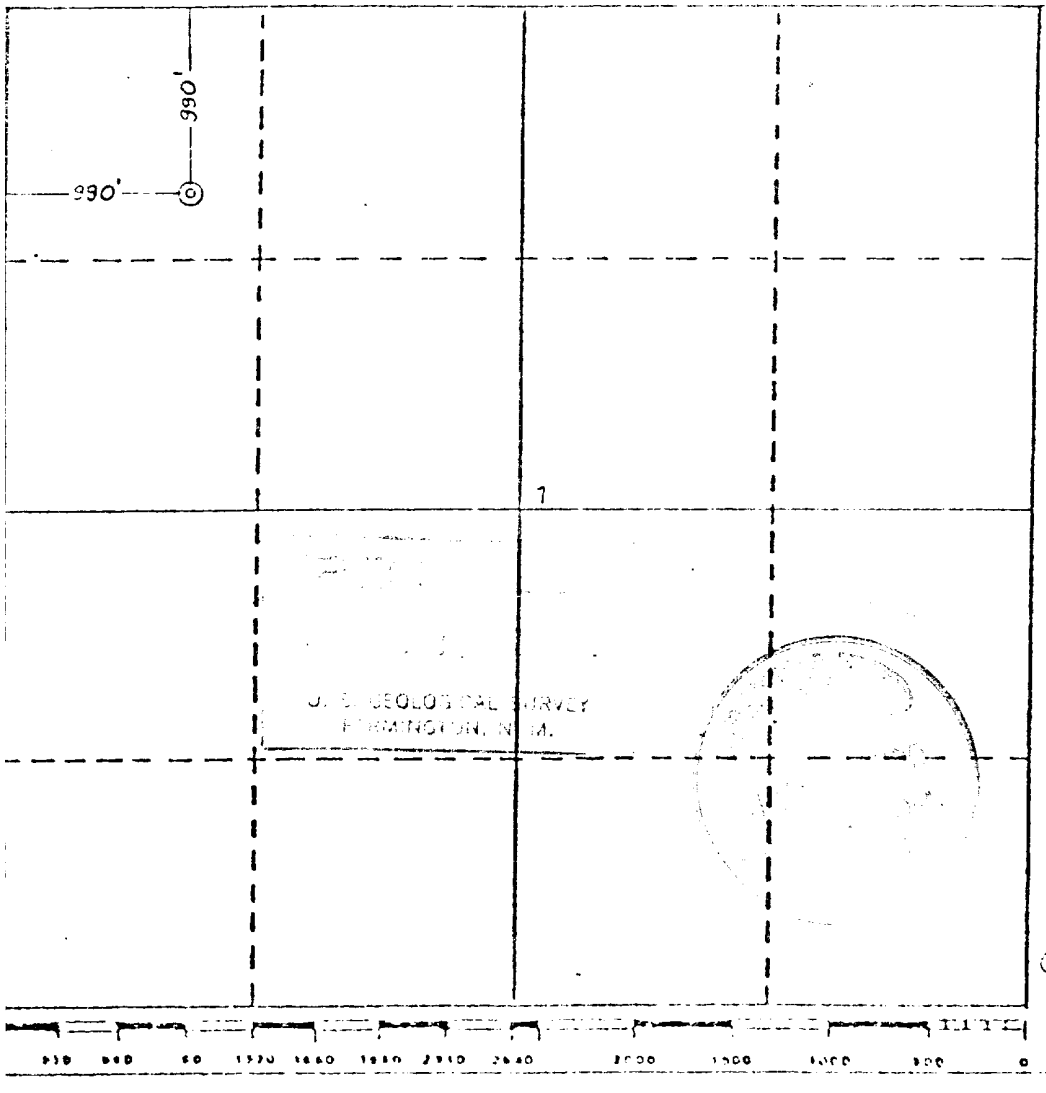
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).

3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

☐ Yes ☒ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Division.



CERTIFICATION

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

Name
President
Position
Harlan Drilling Company
Company
Date
Dec 19, 1979

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR STATE OF NEW MEXICO NO. 1463

Date Surveyed
November 21, 1979
Registered Professional Engineer and/or Land Surveyor
James P. Leese
Certificate No.
1463

United States Department of the Interior
NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. Box 728
Santa Fe, New Mexico 87501

IN REPLY REFER TO:
H24 (SWR) PC

DEC 10 1979

Mr. Kenneth Harlan
Harlan Drilling Company
P.O. Box 2183
Farmington, New Mexico 87401

RE: An Archeological Clearance Survey of the Proposed Tall Jim #2 Well Location and Access Road in San Juan County, New Mexico

NMSU 79-283

Dear Mr. Harlan:

On November 20, 1979, Dabney Ford from the Cultural Resource Management Program, New Mexico State University, conducted an archeological clearance survey of a proposed well location and access road on Navajo Allotment Lands. The well location was surveyed by walking parallel transects spaced 75' apart over an area 500 x 500 feet square. The access road and an alternate route were also surveyed. The proposed well is located in the SE¼ of the NW¼ of the NE¼ of Section 1, T30N, R16W in San Juan County, New Mexico. The well site will be located 990' from the north line and 990' from the west. The access road is 300' long and 20' wide, approaching from the south. The alternate route has the same dimensions but approaches from the north.

In the course of the survey, an isolated occurrence of historic trash was found along the first 50' of the alternate road (see enclosed report). The trash has resulted from traffic along a major road to the north, and does not warrant avoidance measures. Archeological clearance was recommended and is granted given the lack of cultural resources of any importance.

However, if any buried resources should become evident as a result of earth modifying activities, all construction must cease. Archeologists

from this office and from NMSU should be notified so that a decision can be made as to whether further resource management is necessary.

If you have any questions regarding this project, please do not hesitate to contact Jane Whitmore, Archeologist with this office. She can be reached at (505) 988-6561.

Sincerely yours,

George G. West
Supervisory Archeologist, Branch
of Indian Cultural Resources

Enclosures

cc:
BIA, Navajo Area Office, Window Rock, AZ (2)
Dr. David Doyel, Cultural Resource
Management Program, Window Rock, AZ
Dr. Bill Naylor, NMSU, Farmington, NM
S.H.P.O., New Mexico
U.S.G.S., Farmington, NM

Operations Plan - Harlan TallJim #2

I. Location: Section 1-Twn 30 North, Range 16 West, San Juan County, N.M.

Field: Verde Gallup Elevation: 5492' Est.

II. Geology:

A. Formation tops:

		8A Drillers log zone	8B Drilling Phase
Point lookout sh	400'	0-200' sand & shale	0-600' Phase I
Mancos shale	550'	200-540' sand & some shale	600-1550 Phase II
Gallup Formation	1550'	540-910' gr. hard shale	1500-1800 Phase III
		910-1110' sand & some shale	1550 - Deviated
		1110-1710 gr. hard sand & shale	
		1710-1850' sand & shale	Phase IV

B. Logging Program: CNL-FDC-w/cal, GRNL.

C. Coring: Core Lab

III. Drilling:

A. Mud Program:

0-30' Spud Mud
30'-600' fresh water gel Wt. 9.2#, 38 Vis
600'-1550'- Air or Air foam, 2400 CFM
1550'- 1800'- invermul wt. 8.8-9.2#, 36-40 Vis.

IV. Materials:

A. Casing Program:

Hole size	Depth	Casing Size	Wt. & Grade
20"	30'	16"	65-H40
14-3/4"	600'	11-3/4"	42-H40
9-7/8"	+1551'	7-5/8"	26.40-H40

B. Float Equipment:

16" conductor w/ guide shoe - circulate cement, 11-3/4 casing w/cement guide shoe- circulate cement to surface.

C. Tubing:

1700'- 2-3/8, 4.7#, J-55 Tubing w/seeding nipple, 20' mud anchor.

D. Wellhead Equipment:

7-5/8"x2-3/8" Larkin Tubing head.

Continued Page 2 (Two)

V. Cementing:

A. Conductor: Drill 20" hole with rathole digger then set 16" OF. 65#, H-40 St&C casing at 30' Gr.L.

B. Cement Conductor: With 8 yds Redimix w/2% Ca. Cl.

C. Nipple up diverter.

D. Drill 14-3/4" hole: Pick up 14-3/4" HTC OSC-3 bit and 6" drill collars. Drill to 600' or into Mancos shale.

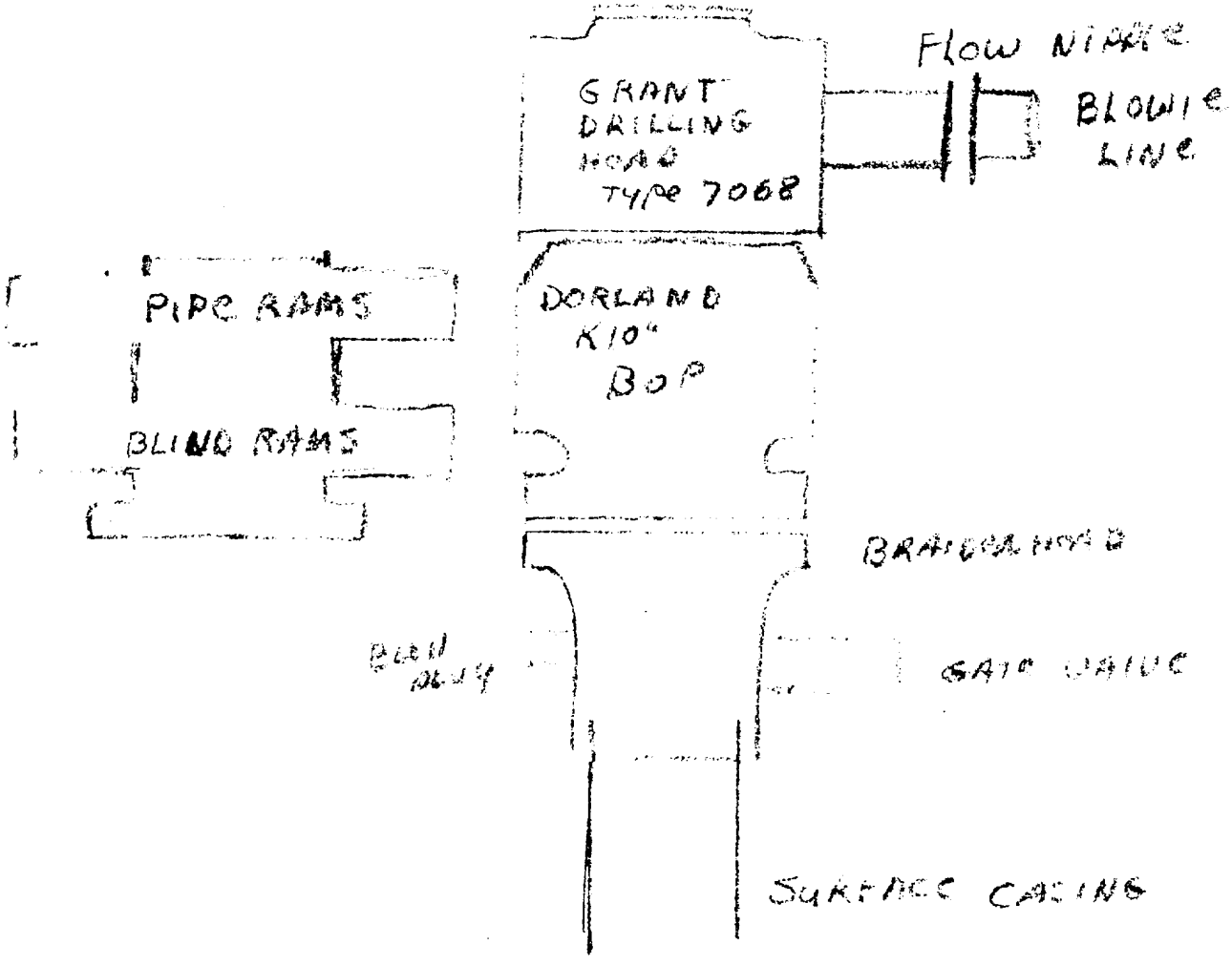
E. Surface casing: Set 600' of 11-3/4" OD 42#, H-40 ST&C casing w/Howco float shoe on bottom.

F. Cement 11-3/4" surface casing: 230 sx Howco lite w/10% gilsonite and 2% CaCl 13.1# 1 Gal, yield 1.7 cu. ft/sx, tail w/100 sx class "H" w/2% CaCl 15.6# gal. yield 1.18 cu/ft/sx.

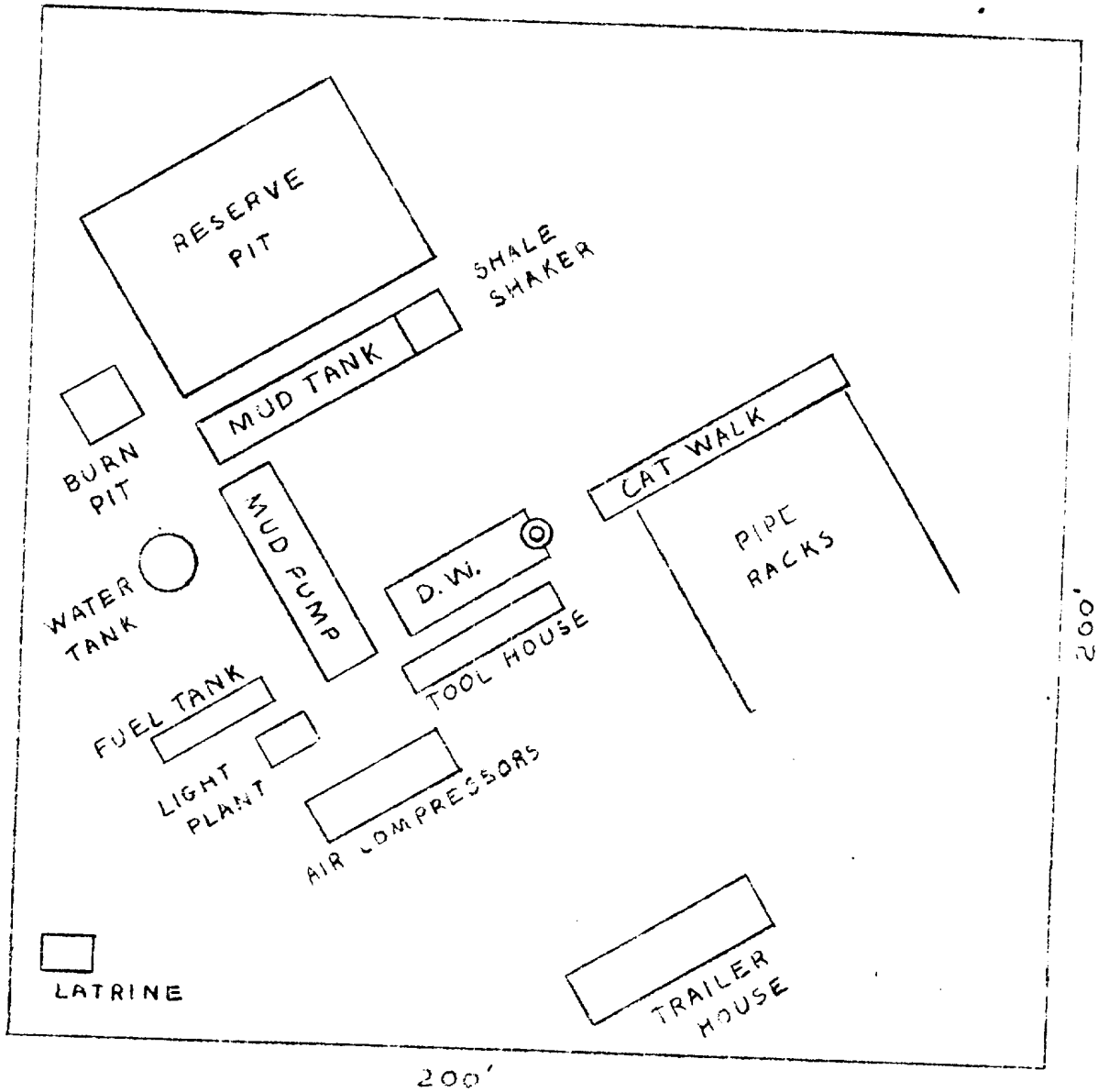
G. Nipple up 12 bag type preventer and rotating air head. Drill 9-7/8" hole.

H. Cement Production Casing: 7-5/8" casing set at +1550' w/235 sx 10% Diacel "D" cement w/1/4# flocile/sx (yield 1.92) wt 13.2#) tail w/100 sx class "H" with 2% CaCl (yield 1.18) (15.6 # 1 Gal) WOC 72 hours. All cement calculations could change w/caliper log calculations.

I. A prespud or pre drill out meeting is to be held prior to starting the drilling period.



Typical BOP installed for Gallup Well, Grant Drilling head type 7086, will be installed throughout drilling and completion operations. Dorland K 10" 900 series rated at 3000 PSI working pressure will be installed when air drilling operations begin. Series 900 double gated BOP rated at 3000 PSI working pressure will be installed when completion operations begin and the blowie line is converted into a flow line.



LOCATION PLAT

Harlan Drilling Company

P.O. BOX 1367 FARMINGTON, NEW MEXICO 87401

Multi-Point Surface Use Plan

TallJim # 2

1. Existing Road - Please refer to Map #1 which shows existing roads. No new roads required. All existing roads will be properly maintained during the duration of this project.

2. Planned access Roads:
None

3. Location of existing wells:
Please refer to Map #1

4. Location of and type water supply:
San Juan River

5. Source of Construction Materials:
No additional materials will be required to build either the access road or the proposed location.

6. Methods of Handling Waste Materials:
All garbage and trash materials will be put into a burn pit shown on the attached location Plat #1. When clean up operations are begun on the proposed project, the burn pit with its refuse will be buried to a depth of at least three feet (3'). A latrine, the location of which is also shown on Plat #1, will be provided for human waste. If large amounts of liquids are left in the reserve pit after completion of the project, the pit will be fenced until the liquids have had adequate time to dry. The location clean-up will not take place until such time as the reserve pit can be properly covered over to prevent run-off from carrying any of these materials into the watershed. No earthen pit will be located on natural drainges: all earthen pits will be so constructed as to prevent leakage from occurring.

7. Ancillary Facilities:
No camps or airstrips will be associated with this project.

8. Wellsite layout:
Please refer to the attached Plat #1.

(Continued Page Two)

9. Plans for restoration of the surface:

After completion of the proposed project, the location will be cleaned and leveled. The location will be left in such a condition that will enable reseeding operations to be carried out. Seed mixture as designated by the responsible government agency will be used. the reseeding operation will be performed during the time period set forth by the regulatory body. The location production equipment will be painted as designated by the responsible government agency.

10. Other Information:

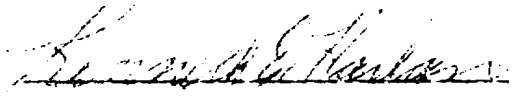
The Terrain is broken ridge slope with southeasterly drainage, alluvial surface deposits, and sandstone outcrops.

11. Operator's Representative:

Kenneth E. Harlan, P.O. Box 2183, Farmington, New Mexico.

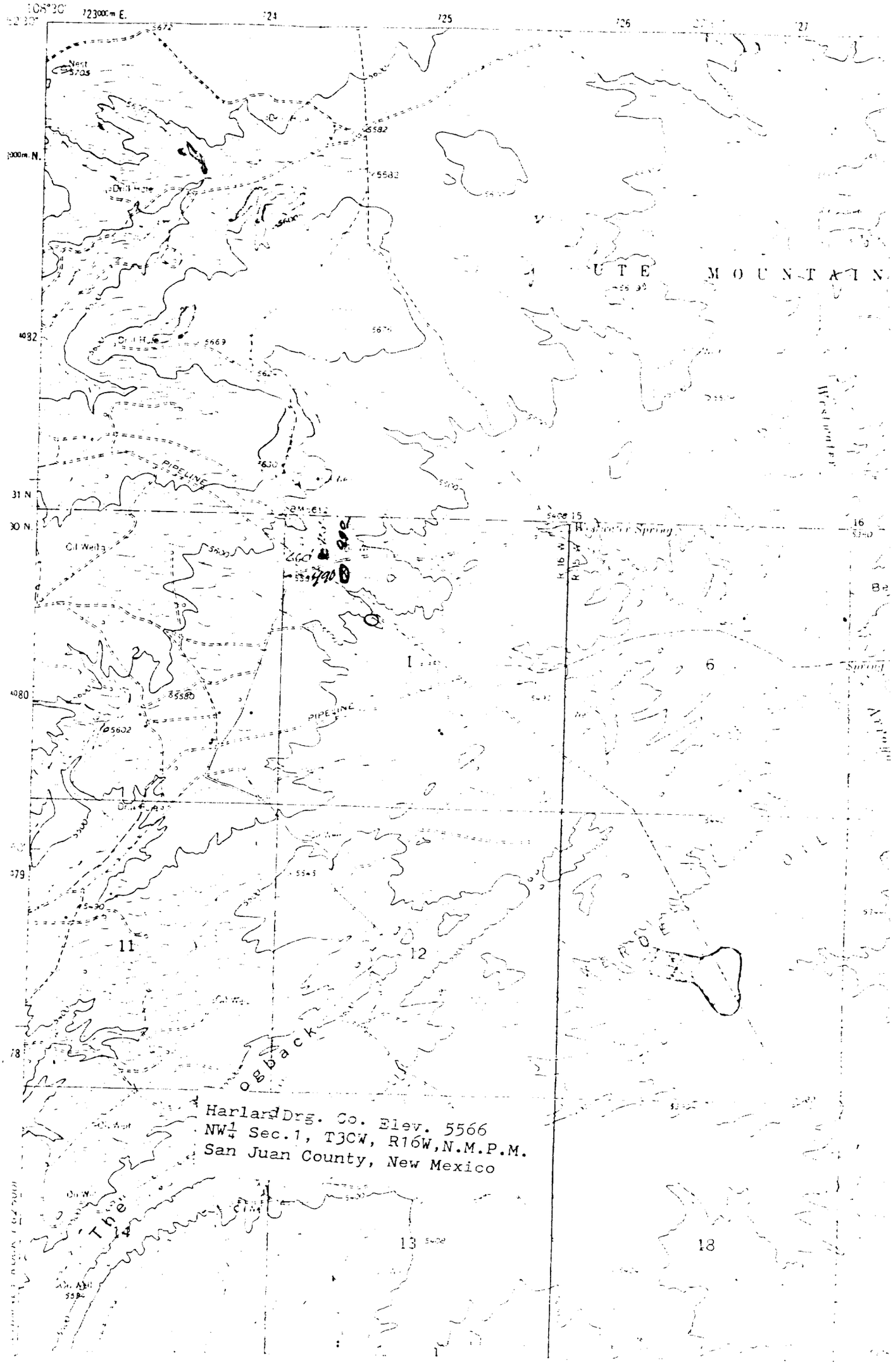
12. Certification:

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drillsite and access route; that I am familiar with the conditions which presently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by Harlan Drilling Company and its contractors and sub-contractors in conformity with this plan and the terms and conditions under which it is approved.



Kenneth E. Harlan
Harlan Drilling Company

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



Harland Drg. Co. Elev. 5566
NW¼ Sec. 1, T30W, R16W, N.M.P.M.
San Juan County, New Mexico

Harlan Drilling Company

P.O. BOX 1367 FARMINGTON, NEW MEXICO 87401

January 21, 1980

United States Department of the Interior
Geological Survey
Mr. James F. Sims
District Oil and Gas Supervisor
P. O. Box 959
Farmington, New Mexico 87401

Re: Well No. 2, Harlan-Tall Jim

Dear Mr. Sims:

In reply to your letter dated January 14, 1980, the following is submitted:

As soon as we received your letter, I called you and explained that the proper location of the well is 990 feet from the North line and 990 feet from the West line of Section 1, T30N, R16W. The BIA letter was incorrect as to the location. I have spoken with Mr. Chee twice since receipt of your letter. He has assured me that a letter has been written to you confirming the correct location as 990 feet from each the North and West lines of Section 1.

I believe that the attached descriptions of Phases I, II, III, and IV should answer your remaining questions.

If you have any further questions, please call me at 327-5156.

Thank you very much.

Kindest regards,

Leslie E. Nunn

Enc.

JOB PLAN

Phase I - Page 1 Harlan Tall Jim #2

12/12/79

1. Drill conductor hole to 30' w/rathole digger. Set 16" OD 65# H-40 ST&C Csg at 30' from ground level and cement same w/6 yards Redi-mix cement.

2. Move in Harlan Drilling Company rig. RU Same. If rathole digger not available as per step #1 then PU and spud hole with either 24" or 20" re-tip bit, whichever might be available, and drill conductor hole to 35'. Run 16" OD conductor casing (use Texas Pattern Guide Shoe) as above, cement same w/HOWCO. Cement w/Class "B" w/2% CaCl for full returns to surface. WOC 12 hrs.

3. NU diverter and bag preventor.

4. PU bit #2, an HTC 14 3/4" OSC-3 tooth bit. Drill out cement.

5. Condition spud mud (fresh water gel and native mud) and drill to 606'. Circulate hole clean.

6. RU and run surface casing. Run 11 3/4" OD 42# J-55 ST&C casing to TD.

7. Cement 11 3/4" surface casing w/230 sx HOWCO lite w/10# gilsonite + 2% CaCl (yield 1.7 cu ft/sx) (wt. 13.1#/gal), tail w/100 sx Class "B" w/2% CaCl (yield 1.18 cu ft/sx) (wt. 15.6#/gal). WOC 12 hrs.

JOB PLAN

12/11/79

Phase II - Air-Airfoam drill 600' to 1560'

1. A. Install lowermost casing head on 11 3/4" casing.
   B. Nipple up bag type preventor and rotating head.
   C. Hook up choke and fill line.

2. Pick up 9 7/8" HTC OSC-1G bit, 6" drill collars and 4" DP. GIH, tag cement, pick up, close and test bag type preventor. Check airhead rubber. Drill cement and shoe. Drill 5' new hole. Circulate hole clean.

3. Hook up air compressors and blow line. Pull bit to 200'. Stage in and unload mud from hole with air.

4. Dry hole and drill ahead.

5. Dust to 7 5/8" casing point at approx. 1560'. Check for gas on each connection.

6. POOH to log. Log in dry hole. Rig up Schlumberger, run Compensated Neutron Formation Density w/Caliper Log.

7. GIH, load hole w/mud.

8. Rig up and run 7 5/8" OD 26.40# K-55 LT&C 8R casing. Run Howco Float shoe, one joint 7 5/8" casing, Howco insert float valve and 7 5/8" casing. Float casing in hole.

9. Rig up Howco. Cement 7 5/8" csg, set at 1560' w/235 sx 10% Diacel "D" w/1/4# flocele/sx (yield 1.92) (wt 13.2#/gal) tail w/100 sx Class "B" w/2% CaCl (yield 1.18) (wt 15.6#/gal). WOC 72 hrs. Cement calculations could change with Caliper log calculations.

JOB PLAN

Phase III - Case 1 Harlan Tarr-Sim #2

12/11/79

1. Nipple up to 7 5/8" casing. Install bag type preventer and rotating head.

2. Pick up 6 3/4" OD HTC OSC-1G bit and drill pipe. GIH, tag cement. Close bag preventer and check same. Re-check rotating head rubber.

3. Drill float collar and 20' cement. Test casing w/rig pump. Drill out cement and 5' new hole. Circ hole clean.

4. Displace water and mud from casing with invermul. Circ and condition invermul and hole. Invermul Wt 8.6, Vis 32, Oil 70%.

5. Drill 15' of new hole, circ and condition hole. POOH.

6. Core Pay Zone:
   A. Pick up 6 3/4" OD X 2 5/8" ID Christensen Diamond Bit, type MC201 (8 s/k), 60' X 4 3/4" OD Christensen Core barrel (for 60' X 2 5/8" core) and drill pipe. GIH. Cut 60' core. POOH.
   B. Have Core Lab pick up, pack and analyze all of core.

7. Repeat step 6.

8. Repeat step 6.

9. Repeat step 6.

10. Rig up Schlumberger, Run CNL FDC w/Caliper, Induction Gamma Ray, Dipmeter, Fracture tool (Circumferential Micro Sonic) and TDT in open hole.

JOB PLAN

Phase III - Page 1 Harlan Tall-Jim #2

12/11/79

1. Nipple up to 7 5/8" casing. Install bag type preventer and rotating head.

2. Pick up 6 3/4" OD HTC OSC-1G bit and drill pipe. GIH, tag cement. Close bag preventer and check same. Re-check rotating head rubber.

3. Drill float collar and 20' cement. Test casing w/rig pump. Drill out cement and 5' new hole. Circ hole clean.

4. Displace water and mud from casing with invermul. Circ and condition invermul and hole. Invermul Wt 8.6, Vis 32, Oil 70%.

5. Drill 15' of new hole, circ and condition hole. POOH.

6. Core Pay Zone:
   A. Pick up 6 3/4" OD X 2 5/8" ID Christensen Diamond Bit, type MC201 (8 s/k), 60' X 4 3/4" OD Christensen Core barrel (for 60' X 2 5/8" core) and drill pipe. GIH. Cut 60' core. POOH.
   B. Have Core Lab pick up, pack and analyze all of core.

7. Repeat step 6.

8. Repeat step 6.

9. Repeat step 6.

10. Rig up Schlumberger. Run CNL FDC w/Caliper, Induction Gamma Ray, Dipmeter, Fracture tool (Circumferential Micro Sonic) and DT in open hole.

11. Stage in hole w/2 3/8" tbg w/OE tbg w/collar, w/bar, on bottom. Displace invermul into tank for storage.

12. Swab test open hole 1550' to TD. It may take two days to swab test this zone, catch two samples of oil production to have analyzed by Halliburton and Rift. Oil sample analysis to indicate type oil and probable parafin type.
    A. Make comparison and evaluation of this swab test with the current pumping test on Tall Jim #1 well.

DON R. HOLBERT
CONSULTING PETROLEUM ENGINEER
6637 WEST HINSDALE AVENUE
LITTLETON, COLORADO 80123
(303) 979-4966

December 13, 1979

Mr. Kenneth Harlan
Harlan Drilling and Exploration
621 Rosa
Farmington, New Mexico 87401

Dear Mr. Harlan:

Enclosed is a brochure on my drainhole drilling tools. Most people need additional help in making cost estimates and I am happy to do this. As you know, drilling drainholes is not yet commo[illegible] in the industry. I have only drilled four drainhole wells, all successful to a substantial degree.

My tools do require careful attention to detail, especially the drilling fluid. We have to add an extreme pressure lubricant to prevent the extremely concentrated loads on parts of the tools from adversely affecting the steering. I have also found it necessary to especially design my whipstock to overcome undesireable effects from the deviation from vertical common even at shallow depths. Other than these factors, the tools are very simple with operating principles that most oil men can easily understand. They are also rugged, as the enclosed pictures attest.

We did a number of new things at the Empire Abo Unit Well No. K-142 and some of them gave us problems. Nevertheless, we did drill the drainhole in a reasonable time and the well is performing very well. This is an anti-gas coning application with the well cased low and the drainhole drilled at the bottom. We expect to do another well early next year if the other owners approve.

ARCO simulated the drainhole with a mathematical model to be sure the drilling effort would be worthwhile. Not everyone can afford this approach, but when the wells cost $500,000, it helps to have some evidence it is worth the effort.

My personal conviction is these tools have great potential, especially for probing for natural fracture systems in the tight gas sands. Should you have problems with your new method, but still maintain an interest in horizontal drilling, please contact me.

Yours truly,

Don R. Holbert
Don Holbert-Drainholes, Inc.

DRH/jmw

Enclosures

DRAINHOLE DRILLING

A Productivity Enhancement and Increased Recovery Technique for the Oil, Gas and Mining Industries

DON R. HOLBERT
CONSULTING PETROLEUM ENGINEER
DRAINHOLE TOOLS PROPRIETOR
6637 WEST HINSDALE AVENUE
LITTLETON, COLORADO 80123
(303) 979-4966

DRAINHOLE TOOLS SERVICE

DRAINHOLES

Drainholes are essentially horizontal holes drilled from vertical well bores. They can extend from a hundred feet or less to thousands of feet in horizontal distance. The bore hole is turned from vertical to horizontal by drilling a sharply curved arc. Drainholes have been drilled with radii of 11 1/2 feet. The present tools were designed and have been used to drill a drainhole with a radius of 38.2 feet. The angle build is 1 1/2 degrees per foot and the actual drilled distance along the arc to turn to horizontal is 60 feet.

USES OF DRAINHOLES

Drainholes should be useful in developing highly efficient secondary or enhanced recovery flooding patterns, in intersecting natural fracture systems (especially where directionally oriented by rock tectonics), in establishing communication in impermeable rocks, increasing productivity and in combatting coning. Drainholes may have considerably more potential in increasing gas production from tight gas bearing rocks than the giant fracture treatments now being tested.

Horizontal holes have been used in coal for demethanization. Coal is well known to be highly fractured with an oriented direction for the highest permeability fractures. Actual drilling appears to be the only way to intersect the high permeability fractures. Drainholes offer an excellent way to do this.

DRILLING OPERATIONS

The present tools drill a 4 3/4" diameter drainhole from a 5 1/2" whipstock. The clearance between the whipstock face and the rock to be drilled should be minimal. A 6" section of gauge open hole is best. This open hole should preferably be less than 2 degrees in deviation.

Enlarged and irregular holes and wells with deviations up to 15 degrees can be handled with a special whipstock design. Tools to drill larger or smaller drainholes out of larger or smaller vertical well bores can be custom designed and fabricated.

Drainholes longer than 200 feet can be drilled by using 2 3/8" EUE N-80 drill tubing ahead of the 200 feet of flexible drill collars. The N-80 tubing can be run, but not rotated, through the curved section without exceeding the yield point. The flexible drill collars can be kept in the curved bore while the tubing is in the straight lateral during the drilling operations. The course can be controlled by building or dropping angle as necessary.

CASING THE DRAINHOLE

The drainhole can be cased using either 4 1/2" O.D. flush joint casing cut with the same machine used to manufacture the flexible drill collars or uncut 2 3/8" EUE N-80 or smaller tubing. The hole can be cased to the surface by leaving the whipstock emplaced.

DRAINHOLE COSTS

The cost of drilling drainholes is highly dependent upon the rig, mud system, depth, trip time, penetration rate, etc. Further information is available upon request.