

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
MINERALS MANAGEMENT SERVICE

## 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 MMS-331-C for such proposals.)

1. oil well ☐ gas well ☐ other ☒ WILDCAT

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

3. ADDRESS OF OPERATOR (Where form is completed)  
601 West 5th Avenue, Suite 810, Anchorage, AK 99501

4. LOCATION OF WELL (Report location in accordance with instructions\* and Item 16.)  
AT SURFACE: 70 18' 52.67" N & 144 45' 32.90" W UTM Zone 6  
AT TOP PROD. INTERVAL:  
AT TOTAL DEPTH:

15. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA  
REQUEST FOR APPROVAL TO: SUBSEQUENT REPORT OF:

ACIDIZE	<input type="checkbox"/>	<input type="checkbox"/>
REPAIR WELL	<input type="checkbox"/>	<input type="checkbox"/>
PULL OR ALTER CASING	<input type="checkbox"/>	<input type="checkbox"/>
MULTIPLE COMPLETE	<input type="checkbox"/>	<input type="checkbox"/>
CHANGE ZONES	<input type="checkbox"/>	<input type="checkbox"/>
PERFORATE	<input type="checkbox"/>	<input type="checkbox"/>
PERMANENT ABANDONMENT	<input type="checkbox"/>	<input type="checkbox"/>
TEMPORARY ABANDONMENT	<input type="checkbox"/>	<input type="checkbox"/>
ARTIFICIAL LIFT	<input type="checkbox"/>	<input type="checkbox"/>

(Other) Submission of final prognosis

16. 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.)\*

Please see the attached prognosis

RECEIVED  
OCS DISTRICT OFFICE

AUG 5 1986

MINERALS MANAGEMENT SERVICE  
ANCHORAGE, ALASKA

Subsurface Safety Valve: Manu. and Type \_\_\_\_\_ Set @ \_\_\_\_\_ Ft.

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

SIGNED [Signature] TITLE Sr. Staff Environmental Engineer DATE 8-1-86

(This space for Federal or State office use)

APPROVED [Signature] TITLE DISTRICT SUPERVISOR DATE AUG 5 1986  
CONDITIONS OF APPROVAL, IF ANY:

APPROVAL SUBJECT TO ATTACHED REQUIREMENTS

PRIVATE AND CONFIDENTIAL

5. LEASE NO.	OCS Y-871
6. AREA & BLOCK	NR6-4 Block 678
7. WELL NO.	OCS Y -871 #1
8. UNIT AGREEMENT	N/A
9. FIELD	WILDCAT
10. EXPLORATION <input checked="" type="checkbox"/> DEVELOPMENT <input type="checkbox"/>	
11. ADJACENT STATE	ALASKA
12. API NO.	55-171-00002
13. ELEVATIONS	RKB 39' DF
14. WATER DEPTH	116'

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

871 #1

6-B.2

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
MINERALS MANAGEMENT SERVICE  
ALASKA OCS REGION

CONDITIONS OF APPROVAL TO DRILL FOR OIL OR GAS

OCS-Y 0871 Well No. 1

Send submittals to the Supervisor, District Office, at this address:

U.S. Dept. of Interior  
Minerals Management Service  
District Office  
P.O. Box 101159  
Anchorage, AK 99510

1. Submit the well's surface location as soon as the final surveyed location and the K.B. elevation have been determined, on Form 9-331, "Sundry Notices and Reports on Wells", in triplicate plus two public information copies, to the Supervisor, District Office. Specify the well location (latitude/longitude, distance from lease lines, Mercadian, Loran C), the location of each anchor, and the amount of chain and wire rope deployed. Notify the U.S. Coast Guard Office of Jurisdiction of the location for listing in the local notice to mariners.
2. Submit a daily drilling report until the final status of the well is established (one copy, no prescribed form) outlining the following: drilling depth, bottom hole location (if a directional well), mud weight, principal items of work done during the previous day (running casing, testing, coring, sidewall sampling, logging, etc.), zones of abnormal pressure, lost circulation, depth of kicks, other hole difficulties encountered.
3. Submit as soon as available one copy of all field prints of well logs and directional surveys. Submit mudlog and MWD log data on a daily basis as stated in the Shell Western E&P, Inc.'s letter of September 26, 1985, (Security Procedures for OCS-Y 0871).
4. Submit as soon as available but no later than 30 days after completion of the well, three copies (two blue-line and one sepia) of all final well logs including composite mud logs and MWD logs if run; two copies of the composite directional surveys, and one copy of the digitized magnetic well log tapes if run or prepared.
5. Submit within 30 days of completion of the well, two copies (plus two public information copies) of a Completion Report (Form 9-330) and a Well Summary Report. Note all occurrences of oil, gas, sulfur, and other minerals of potential geological interest on the Completion Report, including all important zones of porosity and contents thereof; cored intervals; and complete details of all drill stem or formation tests. Identify rock units in time-stratigraphic terms showing, the depths to the tops of the

Upper Pliocene, Middle Pliocene, Lower Pliocene, Upper Miocene, Middle Miocene, etc., on the Completion Report or on a marked electric log.

6. Submit a written notification (Sundry Notice, Form 9-331, in triplicate, plus two public information copies), of intent to change any approved plan of operations for approval. Emergency approval may be obtained verbally, but must be followed by the written notice.

A subsequent report for the casing string run is to be furnished on Form 9-331 for each string of casing run. When a leak-off test is performed at the casing shoe, furnish the results along with the casing report.

Applications for Approval to Abandon a Well shall be submitted in accordance with Subsections 1.1 and 1.2 of OCS Order No. 3.

7. Submit two copies of all well reports, geochemical analyses and core analyses as soon as available.
8. Submit as soon as available two copies of a paleontological identification report of all foraminifera, nannoplankton and/or palynomorphs by depth, if prepared, and two copies of velocity surveys, if run.
9. The Supervisor, District Office, will require sufficient time to examine well records before completion, suspension, or abandonment activities are commenced, or before approval of the proposed disposition of a well is granted.
10. Prior to coring or testing, notice will be given to the Minerals Management Service so that such operations may be witnessed if deemed necessary by the District Supervisor.

Submit a written notification (Sundry Notice, Form 9-331, in triplicate, plus two public information copies) of the intent to test. This notice should include:

- a. The current and anticipated condition of the well.
  - b. The sequence of proposed operations, the perforated test interval depths, the surface and subsurface equipment schematics, planned pressure testing of tubular and other equipment, plugging or isolating of perforated intervals, disposal produced gas or fluids, and any other pertinent information.
11. Submit two copies of field well test data within 48 hours of such tests. Two copies of the interpreted results of these tests should be submitted as soon as available.

12. Ship samples of all cores, representative cuts, unwashed bulk and washed (dry) ditch samples to the Minerals Management Service, Regional Supervisor, Offshore Resource Evaluation, 949 E. 36th Ave., Third Floor, Suite 316, Anchorage, AK 99508.
13. All operations shall be subject to inspection by Federal inspectors designated by the District Supervisor.
14. Maintain an emergency standby vessel/vehicle at all times during operations. No operations shall be conducted unless there is a standby vessel/vehicle within the immediate vicinity of the drilling unit but no farther away than 5 miles or 20 minutes steaming distance, whichever is less.
15. Should a well be successfully completed for production or recompleted for production in a new interval, this office must be notified when the well is placed in a producing status. Notification may be provided orally but must be confirmed in writing and received in this office no later than the fifth business day following the date on which the well is placed on production. Provide the following information with the notification:
  - a. Operator name.
  - b. Well name, number, and location.
  - c. Date well was placed on production.
  - d. The lease, communitized tract, or unit participating area to which the well's production is attributable.

# FINAL ALASKA DIVISION DRILLING PROGNOSIS

6/24/86

RIG: CANMAR EXPLORER II

WELL: OCS-Y-871 #1

AFE NO: 266121

LOCATION: Lat. 70°18'52.67"N

Long. 144°45'32.90"W

UTM Zone 6

X = 584,233M Y = 7,802,338M

FIELD: CORONA

EST. ELEVATION: KB - 38.4

Water Depth - 115.6

EVALUATION

GEOLOGY

DRILLING

CORES	ELEC. SURVEYS	MUD LOGGER	SIGNIFICANT FORMATIONS	WELL DEPTH KB BML	CASING AND CEMENT	HOLE SIZE	HOLE DEV. AND DIR. CONTROL	MUD PROGRAM
No Cores Planned Baroid & Anadril Resistivity - Gamma Ray MWD will be run from 30" shoe to TD	No logs above 20"	#1 Logging contingent on shows, (same as run #2) Velocity check shot while WOC.	Mean Sea Level 38.4					
			Mud Line 154					
			Base of glory hole 187.533.5					
			30" Struct. Pipe (Already in Place) 383229			30" set in 1985 D-12-1/4" UR-26"		Sea water, viscous pills as required. To 1000' BLM High VIS refrig. Spud mud.
			20" Cond. Pipe 11541000					
			Lavender 1290			17-1/2"		
			Dark Blue 2440					
			13-3/8" Surf. CSG 26502496					
			T. of Primary Obj. 2990					
			Vermillion 4540			12-1/4"		
Run #3 Same as run #2 plus Velocity Check Shot	#2 DIT-E/MSFL/SDT/AMS/GR; LDT/DNL/NGT-D/ML/AMS; CST/GR: Clean out trip; RFT/GR: SHDT/AMS	Mud Logger and Drilling Data Unit	B. of Primary Obj. 5540					
			9-5/8" Inter. CSG 60005846					
			T. of Green 6740			8-1/2"		
			Green event 8940			7" Drilling/Prod. Liner available if need at/or before TD		
			TD 10000	9846			500' radius target at 10000' maximum survey spacing 490' (MMS)	Generic Mud #2 w/10000 ppm Chloride ion Weight and viscosity as required (sea water will be used if fresh water resupply becomes impractical). Similar to mud run on Hammerhead.

PROPRIETARY

NOTE: Well testing is contingent on other evaluation.- Well to be P&amp;Aed at TD.

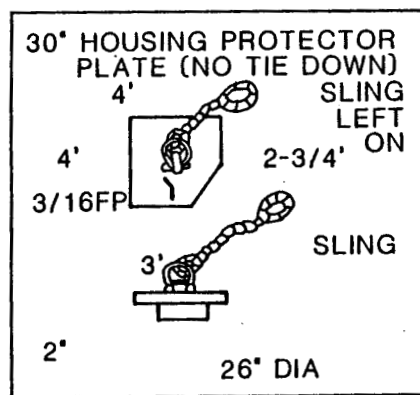
SHALLOW HAZARDS

A shallow hazards survey performed by Dames and Moore indicated our surface location is free from shallow gas hazards. The survey also indicates that our well should not cross any major faults in the shallow portion of the well (small faults may be present but could not be picked up by the survey).

Despite the fact that no gas is indicated for our location, the presence of shallow gas in the general area makes caution while drilling the shallow hole sections mandatory.

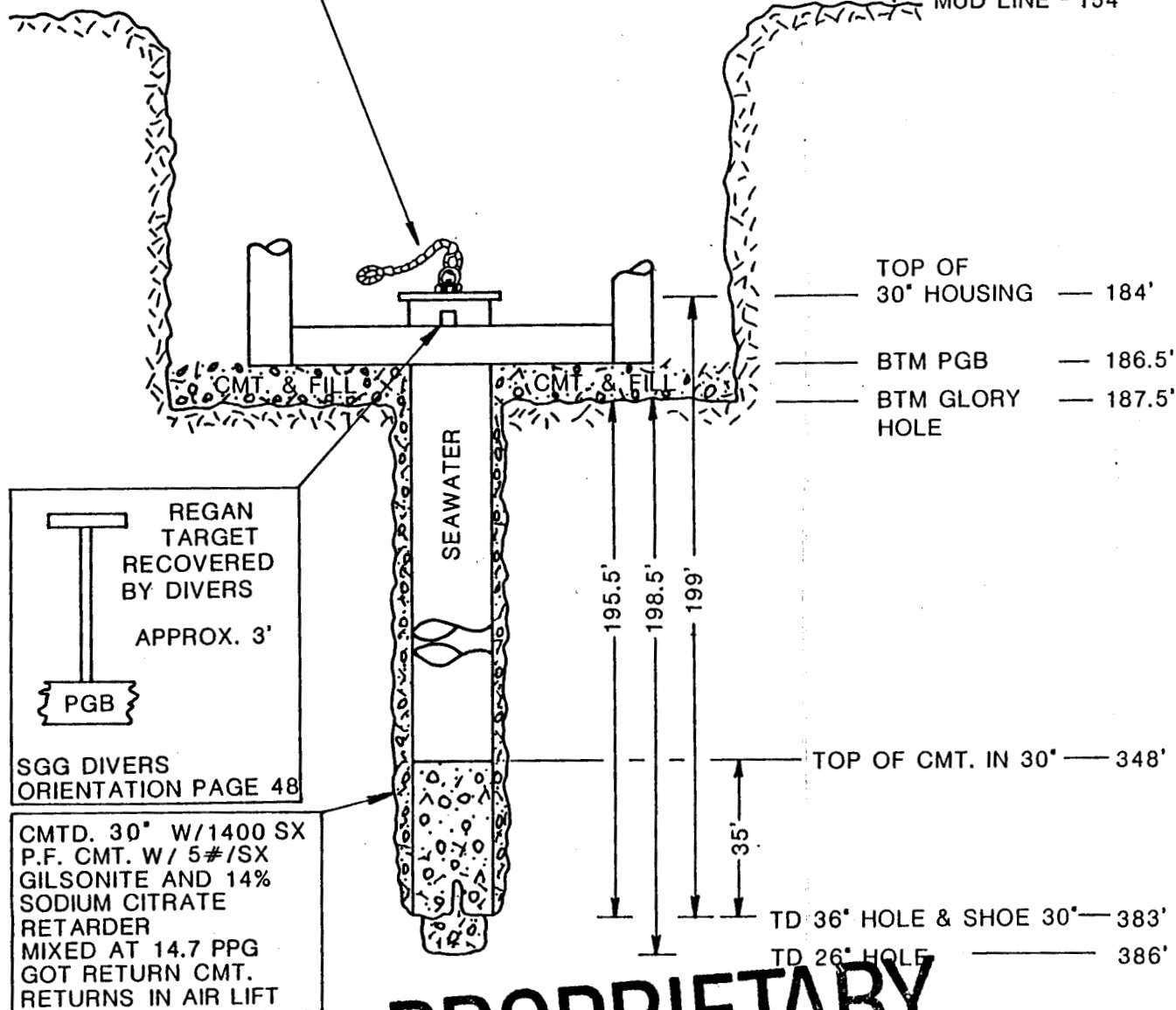
**PROPRIETARY**

OFFICIAL WELL MEASUREMENTS  
 OCS-Y-871 BLK 678 WELL NO. 1  
 LOC. N7802338 E584233 UTM ZONE 6  
 T & A STATUS



RKB ————— 0 FT.

MSL ————— 38.4'

WATER DEPTH  
115.6'FIRM  
MUD LINE - 154'

**PROPRIETARY**

POTENTIAL FOR PERMAFROST AND GAS HYDRATES

AT PROSPECT CORONA

In March of 1985 a transient electromagnetic (TEM) survey was performed at Prospect Corona. The results of the survey indicate that ice bonded permafrost exists from 200' RKB to 370' RKB. Based on this survey, we believe that most, if not all ice bonded permafrost is behind the 30" casing.

Our intention is to treat the 20" casing's hole as if there is permafrost, gas hydrates and free gas. It will be drilled with sea water mud with gel sweeps. The mud system which will be used will be refrigerated to 50-60°F to help prevent thawing of permafrost. A pin connector and diverter will be run so that any flows can be diverted at the surface. It is our intention to drill the 20" hole section as rapidly as possible (maximum 100 ft/hr) and to minimize the time spent in this hole section to minimize possible thaw. On the 20", permafrost cement will be used with a class G tail slurry.

**PROPRIETARY**



DISCUSSION OF POTENTIAL FOR ABNORMAL PRESSURES

Seismic lines across this prospect indicate the potential for gas columns extending as much as 750' below the depth at which they will be penetrated. The risk associated with penetrating these sands is that the reservoir pressure at the depth at which they are penetrated is equal to the reservoir pressure at the base of the gas column (less the gradient exerted by a column of gas).

The first apparent seismic anomaly is at 2,990' RKB, with a potential for 750' of gas. To control a 750' gas column at this depth (presuming a .465 pressure gradient and a gas gradient of .058 psi/ft) a 10.8 ppg mud weight would be required. All other potential gas columns in the well could be controlled with a 10.5 ppg mud weight.

Mud weights with which these sands will be penetrated will depend largely upon the frac gradient indicated by our FIT test. Mud weights used will be calculated presuming a 750' gas column at 2,990' with a gas influx into the well bore of 10 barrels and a 50 psi margin above shut-in.

**PROPRIETARY**

Revised 5-16-86  
OPERATIONS WORKSHEET

## CORONA #1

## Current Status:

Explorer II, Supplier IV, Supplier VII, and Robert Lemeur are anchored behind McClure Island. The 20" and 13 3/8" casing strings are onboard as is enough mud and cement to reach TD. The 7" and 9 5/8" casing strings will be transported to location as soon as deck space becomes available. Also onboard is the glory hole bit and enough 30" casing, 20" casing, and wellhead equipment for a second/relief well.

In 1985, Corona's glory hole was deepened and 30" casing set (hole angle at shoe of 30" surveyed at 1/2°). It is probable that the glory hole has been filled with sediment (10-20' ft.) over the winter. Due to the movement of all transponders in 1984 (and their subsequent uselessness) no transponders were put out at Prospect Corona in 1985. The well will be located using Geodetic shore base stations and a Mesotech Sidescan Sonar.

Any supply runs out of Deadhorse will be made using one of six ice strengthened barges operated by Crowley and Kodiak Marine out of Prudhoe Bay. One of the Canadian supply vessels will be used for re-supply out of Tuk. ERA will supply most helicopter services to the rig. Most contractors are the same as in 1985.

1. Move drillship onto location bearing N82E. Deploy and set anchors. Record Mesotech sonar images.
2. Mix 500 bbls of kill mud at 11.5 ppg. Mix viscous slugs as per mud program.
3. Run Mini-Rover camera while preparing to jump divers. Jump divers, inspect glory hole, and run glory hole profile sonar. Have divers stab guidelines while running glory hole profile sonar.
4. Run 2 airlift systems and wellhead jetting tool. Clean out fill in glory hole. (Jump divers as necessary to inspect progress of glory hole cleaning.) Ensure airlifts are outboard of beams.
5. Once glory hole is cleaned to the point where the housing protector plate can be retrieved, pull wellhead jetting tool, protector plate, and RIH with 26" bit. Drill out shoe of 30" and 25' of new hole. POOH.
6. After divers have verified that the glory hole is clean enough to proceed and have checked the angle of the PGB, re-run the glory hole profiler as the pin connector is moved to the moon pool (if it becomes apparent that additional rig time will be required for the glory hole profile run, leave out).

PROPRIETARY

7. Run pin connector and riser and test diverter system.
8. Drill 12 1/4" pilot hole with center jet bit and MWDs to 1,200' RKB (casing will be run to 1154' RKB; additional 46' is rat hole). Maintain angle at 2° or less, survey with MWD every 90'. If angle at shoe of 30" is 1° or greater, consider back reaming. Temperature to be maintained at 60° or less if possible.
9. Circulate bottoms up. POOH and pick up underreaming assembly. Underream hole to 26" (refer to "Contingency Plan for Handling Shallow Gas Flows" for additional information). Survey with MWD every 90'.
10. At 1,200', circulate bottoms up. Spot viscous cooled mud (45°F±) on bottom. Short trip to the 30" shoe. RIH and check for fill. Circulate bottoms up and check for gas. While circulating bottoms up, fill hole with cooled (45°F±) 10.6 ppg viscous mud.
11. Displace riser with seawater and check well for flow. POOH while strapping pipe. Be cautious pulling underreamer into 30" casing shoe and into pin connector. Run borehole geometry log (caliper log).
12. Pull riser and pin connector and rig down diverter system.
13. Run 20" casing as per prognosis to 1154' RKB. Jump divers to check 20" as it enters 30" wellhead and have them position airlift, recover guide shackles, and check PGB angle (Position 2 airlift systems and tie off on guide base so that the airlift pipes can not damage well head).
14. Cement 20" as per prognosis. (Have 10 stand cement stinger made up while drilling and underreaming prior to running casing.) Clean glory hole with airlift system while cementing. After POOH with cement stinger and prior to pulling airlift systems, cover wellhead with protective cover.
15. Stump test BOP to 3,500 psi on annulars and 5,000 psi on rams.
16. While running BOP stack, WOC 8 hours (refer to prior test data on shoe cement at 38 degrees F. If compressive strength is less than 500 psi after 8 hours wait until either 500 psi is reached, from test data, or 18 hours has elapsed). Raise kill mud weight to 12.0±ppg while WOC.

**PROPRIETARY**

17. Run and land BOP and riser as per procedure to be provided (make sure well head and VX ring in connector are clean before landing - using divers - and that the choke and kill line are pumped through just prior to landing in order to clean wellhead seat. Also, just prior to landing stack, close blind rams and fill riser with water. Open rams just prior to lowering stack. This should aid in flushing VX seat clean).
18. Pressure test casing to 210 psi against blind rams. Function test Regan preventer and diverter system. Test BOPs as per Canmar's detailed test procedure.
19. RIH with 17-1/2" bit, MWDs, and stabilized drilling assembly. Drill shoe with seawater. Displace 20" with 10.5 ppg mud and drill 20' of new hole. Test shoe to leak off. Drill ahead to 2,700' RKB using freshwater mud (10,000 ppm NaCl or less).
20. Survey at least every 492' (MMS requirement). Exploration has allowed a 500' radius target at 10,000'. If the MWD survey tool fails, approach MMS for waiver on 492' requirement with understanding that we will resurvey with new tool on next bit trip.
21. Circulate and condition mud for running 13 3/8" casing.  
  
NOTE: If time permits and mud log/MWD information warrants, wireline logs may be run as stated on graphical prognosis.
22. Run and cement 13-3/8" casing as per prognosis (drift to 12 1/4"). WOC for a minimum of 12 hours prior to drilling out of 13-3/8" shoe. (While WOC run velocity check shot if time permits). If surface preparations and velocity check shot are completed within 12 hours, approach MMS with cement compressive strength data for possible early drill out. Raise kill mud to 12.5±ppg.
23. Test BOP stack. Refer to BOP information for test values. Hold low test for 3 minutes and high test for 3 minutes. Pressure test casing and seal assembly with shear rams to 1,650 psi for 30 minutes. NOTE TO MMS: We were granted the request that the 3,500 psi test pressure be waived for the shear rams and that a 1,650 psi test be accepted for both casing and shear rams.
24. Drill out 13-3/8" casing with 12-1/4" bit, MWDs, and stabilized drilling assembly (displace hole with mud if seawater used to drill shoe joint). Make 20' of new hole and run a formation leak off test. Use FIT data and attached chart to determine mud weight required to drill into sand at 2,990'. Caution should be exercised when drilling below the 13-3/8" casing. Have at least one hole volume of 12.5 ppg mud available to circulate in case of a well kick.

**PROPRIETARY**

25. Potential exists for high pressure gas below the 13-3/8" casing shoe. The actual pressure encountered depends on the height of the gas column. The maximum anticipated height is 750', which would cause a SICP of 191 psi and a SIDPP of 126 psi with 10.0 ppg mud and 10 Bbl gas influx at 2,990'. This is equal to an 11.75 ppg mud weight at the shoe of the 13-3/8" casing with a 50 psi kill margin.
26. Drill ahead with a fresh water polymer mud to 6000' RKB. Survey every 492' (MMS requirement) using the MWD. Continue drilling below 6000' until a 400' shale section is found, geopressures are indicated, and/or petrophysical considerations require wireline evaluation. If MWD survey tool fails, contact MMS for variance on 492' survey requirement and survey missed hole section while tripping in with next bit.

NOTE: 9 5/8" casing may be set prior to 6000' if d-exponents, trip gas, hole conditions, etc. indicate either hole deterioration or the onset of pressures. While seismic information leads us to believe that this well will be normal pressured to TD, this is a Frontier area and caution should be used.

27. Log with necessary clean out trips.
28. TIH and circulate and condition mud to run 9-5/8" casing.
29. Run and cement 9-5/8" casing as per prognosis. WOC for 12 hours minimum prior to drilling shoe. Again, if it is possible to drill out prior to 12 hours, approach MMS with compressive strength data of cement for possible waiver. Test BOP's as per Canmar BOP test schedule. Pressure test casing to 1760 psi for 30 minutes. Note to MMS: We were granted the request that the 1760 psi test against casing be allowed as a test of the shear rams (ie. shear rams will only be tested to 1760 psi).
30. Drill out 9-5/8" shoe with an 8 1/2" bit, MWD's, and stabilized drilling assembly. Drill 20' of new formation and test shoe to 16 ppg or leak-off (whichever is less).
31. Drill 8-1/2" hole to 10,000' or TD.
32. Circulate and condition mud for logs.
33. Log with necessary clean out trips.

**PROPRIETARY**

34. Based on logs, either run and cement 7" liner to protect any zones of interest, plug back into 9-5/8", or P&A well.
35. At this point a decision will be made as to whether a well test is justified (if time permits).
36. Prepare to P&A. (Note: We have permission from MMS to leave wellhead in glory hole since it will be greater than 16' below the ocean floor).

M. Wood

Approved: M. Wood  
Senior Drilling Superintendent

RLC/VEU/BDK

**PROPRIETARY**

## DRILLING FLUIDS PROGRAM

### CORONA #1

Kill mud properties (EPA Generic Mud #7):

Mud wt. 11.5 ppg (mix with fresh water)  
 Vis. 50 sec/qt  
 W.L. 10-12 cc  
 Raise kill mud weight after each casing string according to FIT tests.

Interval - 358-1,200'  
 Mud wt. - 10.2-10.4 ppg  
 Mud Type - EPA Generic Mud #6. Inverted with 60-90 sec. funnel vis. Run a closed refrigerated gel system and run all solids control equipment to minimize solids. Fill hole with cooled gelled mud prior to running casing. Keep 500 bbls of kill mud in reserve pit. Run 12/20s on all shakers. Have 200+ vis sweeps ready. Properties for sweeps and kill mud same as above.

Potential Problems in this Hole Section:

#### Shallow Gas:

Shallow Seismic data indicates this hole section is free of shallow gas pockets. There are some anomalies present but they have very little height or extent. Small (12 1/4") hole size, 10.2+ ppg mud, and controlled penetration rates should all aid in preventing any problems with shallow gas. Also, jet nozzle sizes have been sized such that if a gas influx did occur and kill mud had to be pumped, the rig mud pumps would reach their stroke per minute limit before reaching the liners pressure rating.

#### Gas Hydrates :

There is the potential for gas hydrates in this interval. Extensive modelling indicates that the main potential for problems is for unloading of the annulus as the hydrate goes into a gas phase. A hydrate at 500' on this well would release ten times the volume of gas as the same volume of cuttings from a gas sand. To minimize risk from hydrate expansion, a 12 1/4" pilot hole will be drilled to minimize cuttings in the annulus. P-rates will be maintained below instantaneous rates of 100 fph. Circulating rates will be 1000 gpm + in order to string hydrates and cuttings out over longer sections of hole. Mud weights will be 10.2+ in order to maintain enough hydrostatic head to prevent a free gas zone influx even if a hydrate is penetrated and there is some gas expansion in the annulus.

# PROPRIETARY

While drilling the 12 1/4" pilot hole, gas cuts at surface, gas composition, and MWD resistivity - gamma information will be monitored so that any gas or hydrate zones can be identified and special precautions can be taken when the hole is opened/under-reamed to 26".

#### Bit Balling:

Union experienced bit balling problems in this hole section. Center jet bits and optimum pressure drops across the bit nozzles will be used (i.e., nozzles will be small enough to give good cleaning but large enough that they won't interfere with potential kill operations).

#### Gravel and Boulders:

Drilling the 30" hole section at Corona and part of the 20" hole section on Hammerhead, boulders and gravel were encountered. Viscous sweeps will be available if needed. If the problem is persistent, the mud systems viscosity will be raised.

#### Permafrost:

Most of the subsea permafrost should be behind 30". However, there is the possibility some will still have to be drilled. It is believed that this permafrost will be in the form of ice lenses and/or partial freezing of pore space waters. This form of permafrost would not be expected to lose its soil strength as would a permafrost with all of its pore space frozen. As a precaution, mud temperatures should be run at 50-60°F maximum. However, no rig time should be spent meeting this "goal".

#### Well Bore Freeze-Back:

Since this hole section will not be logged, and salinity will not have a severe effect on the RLL MWD readings, the mud for drilling this hole section should have a salinity of 30,000 ppm NaCl or less. (NOTE: This salinity will have to be cut back to 10,000 ppm before drilling out of 20" casing).

This salinity should offer almost indefinite freezeback protection for both the well bore and 20" casing annulus.

#### Loss of Returns:

The pin connector is not equipped with subsea dump valves, so if loss of returns is experienced, fill annulus with sea water and begin cutting back on mud weight at slow pump speeds. Lost circulation material should be spotted after cutting weight back if circulation has not been regained. If returns are still not regained, consider pulling riser and drilling ahead.

**PROPRIETARY**



Interval - 1,200-2,700'

Mud Type - EPA Generic Mud #2 - Lightly dispersed polymer mud.

Mud Properties and Chemicals:

Mud wt.	10.5-11.0
Vis	60-90 - Gel/Ben Ex/X-C Polymer
PV	12-15 Resinex
YP	25-30
Gels	4/10 - 6/20
WL	10-15 cc - CMC
pH	8.0 - 9.0 - caustic (minimal amounts)
NaCl	10,000 ppm maximum

Run 1 - 12/20 and 2 - 20/30 screens, and all solids control equipment while drilling to keep solids to a minimum. Raise kill mud to mud weight indicated by leak off at 20" shoe (12.0 ppg+).

Potential Problems in this Hole Section:

Shallow Gas:

Again, seismic indicates this well location is free of any events which would flag potential for shallow gas problems. However, the mud weight will be maintained at 10.5+ ppg and the BOP stack will be in place in case the well has to be shut-in. For further discussion of how a shallow gas kick would be handled in this hole section, refer to "Contingency Plan for Handling Shallow Gas Flows".

Gas Hydrates:

There is the potential for Gas Hydrates in most of this hole section. Again, the main concern is with the decomposition of the Gas Hydrate cuttings as they travel and expand in the well's annulus. Presuming the worst case scenario of having a free gas zone at the shoe of the 20", an instantaneous penetration rate of 250fph with a 10.5 ppg mud in the hole is the maximum penetration rate we should allow. However, if a higher mud weight is run and MWD information indicates that there are no sands near the shoe, the hydrate models will be re-evaluated based on the actual mud weight and the depth to the first resistive sand below the 20" shoe. This should allow even higher penetration rates.

Bit Balling:

Union had bit balling problems in this hole section. Using a center jet bit and better hydraulics should aid this problem.

**PROPRIETARY**

Mud Temperature:

Mud temperatures should not be a problem in this hole. The mud coolers should not be run on this hole section unless surface gas and MWD logs indicate the presense of hydrates. In the case hydrates are indicated, the hole should be displaced with a chilled ( 45°F) mud before coming out of the hole for a bit change or to run 13 3/8" casing. Cooling the mud while drilling should not be necessary.

**PROPRIETARY**

Interval - 2,700' - Total Depth  
 Mud Type - Lightly dispersed fresh water polymer mud (EPA Generic Mud #2) (Maximum of 10,000 ppm NaCl)

Mud Properties and Chemicals -

Mud wt.	9.5-10.8 ppg	Barite
vis	40-45 sec/qt	Gel/XC-Polymer
PV	20	Control with
YP	20	XC-Polymer & Resinex
Gels	2/5-4/10	
WL	8 or less	Driscopac, Resinex
HTHP at 150°F	16 cc	
pH	8.0-9.0	

Mud weight as required by hole conditions. The well is expected to be normally pressured. However, as already noted in the Worksheet, the potential for high pressure gas exists below 2,990'. An expected pressure gradient, frac gradient, and temperature profile is attached. Mud weight used to penetrate sand at 2,990' will be determined after the Formation Integrity Test based on attached chart of MW vs Formation Integrity Test equivalent mud weights.

NOTE: Upon penetration of many sands, severe gas cut mud and gas bubbles can be expected.

Other Potential Problems In This Hole Section:

Tight Hole:

At around 6700', Union experienced tight hole problems on their well. This problem was only experienced one time and Soltex and gel were added, and the problem was alleviated. Due to evaluation problems created by possibly conflicting Soltex fluorescence, attempts to clean out tight hole intervals (short trips, string reamers, reaming, etc.) should be made prior to Soltex addition.

Sheen From Drill Cuttings:

We have had problems in the past with oil generated from drill cuttings creating a sheen. If this occurs, mud and cuttings will have to be collected for onshore disposal.

Geopressures:

Again, while geopressures are not expected, this is a "Frontier" area and any indication of geopressure onset will be watched for closely.

**PROPRIETARY**

Mud Quantities - The following minimum quantities of mud material will be maintained on the rig:

Barite	(2000 sxs) 100 tons
Bentonite	60,000#
Lost circulation material	200 sxs

In addition maintain 500 sxs Class "G" neat cement on the rig.

The following mud chemicals could be used in varying concentrations:

Chemicals and additives approved for Generic muds 2, 6 and 7.

- Barite
- Bentonite
- Attapulgate
- Drispac (Polyanionic cellulose)
- CMC (Carboxymethyle cellulose)
- Spersene (Chrome lignosulphonate)
- Technisperse (lignosulfonate)
- Caustic
- Sodium Bicarbonate/Soda Ash
- Lime
- Carbonox (Lignite)
- Sea Water
- Fresh Water
- Nut Plug
- Mica
- Kwik Seal
- Aluminum Stearate

Chemicals which have been granted EPA approval for discharge:

- Resinex
- DD (Drilling detergent) or MD (Mud Detergent)
- Benex
- XC Polymer
- SAPP (sodium acid pyrophosphate)
- Sulf-X ES (zinc oxide; H<sub>2</sub>S scavenger)
- Soltex (sulfonated asphalt)(Do not use unless absolutely necessary)
- NaCl
- Gelite (saponite, a clay mineral similar to bentonite)
- Durogel (sepiolite clay used instead of attapulgate)
- Poly R X (polymer treated humate)
- HEC Polymer
- Sodium Nitrate
- Calcuim Carbide
- Gelex

**PROPRIETARY**

NOTE: If an additive is not on either list do not use prior to receiving approval from EPA. Remove any products from rig which do not have EPA approval.

NOTE: Due to concerns about paleo and florescencing tendencies of Poly RX (expressed by partners) Poly RX should not be run (replace with Resinex).

Haliburton M0-55, M0-56, Hiflo IV, and mineral oil and Kenol ES Spotting Fluid (non-sheening mineral oil) has been approved as spotting fluids.

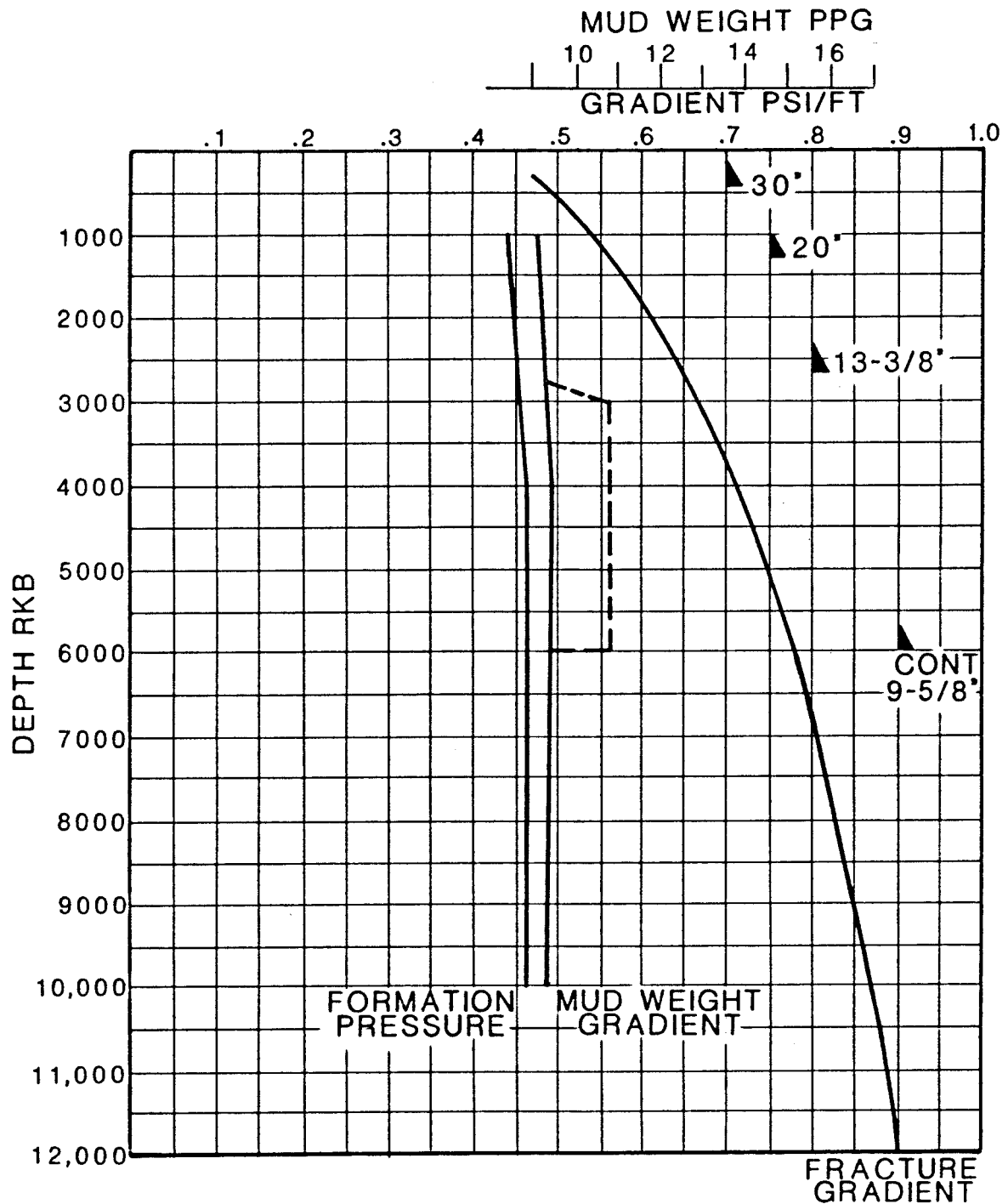
Either of these pills must be isolated after spotting and sent to shore for disposal. We are required to obtain a quart sample of the mud before the pill is added and two gallons after the pill is added for bioassay work. Check with Susan Brown at 263-9613 before spotting pill for exact EPA requirements.

**PROPRIETARY**

# CORONA #1

## MUD WEIGHT FRAC GRADIENT CURVES Versus DEPTH CURVES

— LINE REPRESENTS MINIMUM  
MUD WEIGHT WHICH WOULD  
BE REQUIRED IF A 750' GAS  
COLUMN IS ENCOUNTERED  
AT 2,990' RKB



# PROPRIETARY

TABLE 1 - Approved Drilling Mud Types

Components	Maximum Allowable Concentration*	Components	Maximum Allowable Concentration
<b>1. Seawater/Freshwater/Potassium/Polymer Mud:</b>		<b>5. Spud Mud:</b>	
KCl	50	Lime	1
Starch	12	Attapulgit or Bentonite	50
Cellulose Polymer	5	Caustic	2
Xanthum Gum Polymer	2	Barite	50
Drilled Solids	100	Soda Ash/Sodium Bicarbonate	2
Caustic	3	Seawater	**
Barite	450		
Seawater or Freshwater	**		
<b>2. Seawater/Lignosulfonate Mud:</b>		<b>6. Seawater/Freshwater Gel Mud:</b>	
Attapulgit or Bentonite	50	Lime	2
Lignosulfonate, Chrome, or Ferrochrome	15	Attapulgit or Bentonite	50
Lignite, Untreated or Chrome-treated	10	Caustic	3
Caustic	5	Barite	50
Barite	450	Drilled Solids	100
Drilled Solids	100	Soda Ash/Sodium Bicarbonate	2
Soda Ash/Sodium Bicarbonate	2	Cellulose Polymer	2
Cellulose Polymer	5	Seawater or Freshwater	**
Seawater	**		
<b>3. Lime Mud:</b>		<b>7. Lightly Treated Lignosulfonate Freshwater/Seawater Mud:</b>	
Lime	20	Lime	2
Bentonite	50	Bentonite	50
Lignosulfonate, Chrome, or Ferrochrome	15	Lignosulfonate, Chrome, or Ferrochrome	6
Lignite, Untreated or Chrome-treated	10	Lignite, Untreated or Chrome-treated	4
Caustic	5	Caustic	3
Barite	180	Barite	180
Drilled Solids	100	Drilled Solids	100
Soda Ash/Sodium Bicarbonate	2	Soda Ash/Sodium Bicarbonate	2
Seawater or Freshwater	**	Cellulose Polymer	2
		Seawater to Freshwater ratio 1:1 approx.	**
<b>4. Nondispersed Mud:</b>		<b>8. Lignosulfonate Freshwater Mud:</b>	
Bentonite	15	Lime	2
Acrylic Polymer	2	Bentonite	50
Barite	180	Lignosulfonate, Chrome, or Ferrochrome	15
Drilled Solids	70	Lignite, Untreated or Chrome-treated	10
Seawater or Freshwater	**	Caustic	5
		Barite	450
		Drilled Solids	100
		Soda Ash/Sodium Bicarbonate	2
		Cellulose Polymer	2
		Freshwater	**

\* = pounds per barrel

\*\* = As Needed

TABLE 2 Approved Mud Components/Specialty Additives

Additive Function	Generic Description*	MAC** (pounds per barrel)
<u>Lost Circulation</u>		
Mica	Flakes of silicate mineral mica	45
Nut Shells	Crushed granular nut hulls	As needed
	Vegetable plus polymer fibers, flakes, and granules	50
<u>Friction Reducers</u>		
Inert Spheres	Plastic spheres	8
Organic Material	Liquid triglycerides in a vegetable oil	6
	Oleates in mixed alcohols	6
	Phosphoric acid esters and triethanolamine	0.4
<u>Defoamer</u>	Aluminum Stearate	0.2
<u>Dispersant</u>	Sodium polyphosphate	0.5

\* Any proprietary formulation that contains a substance which is an intentional component of the formulation, other than those specifically described, must be approved by the Regional Administrator.

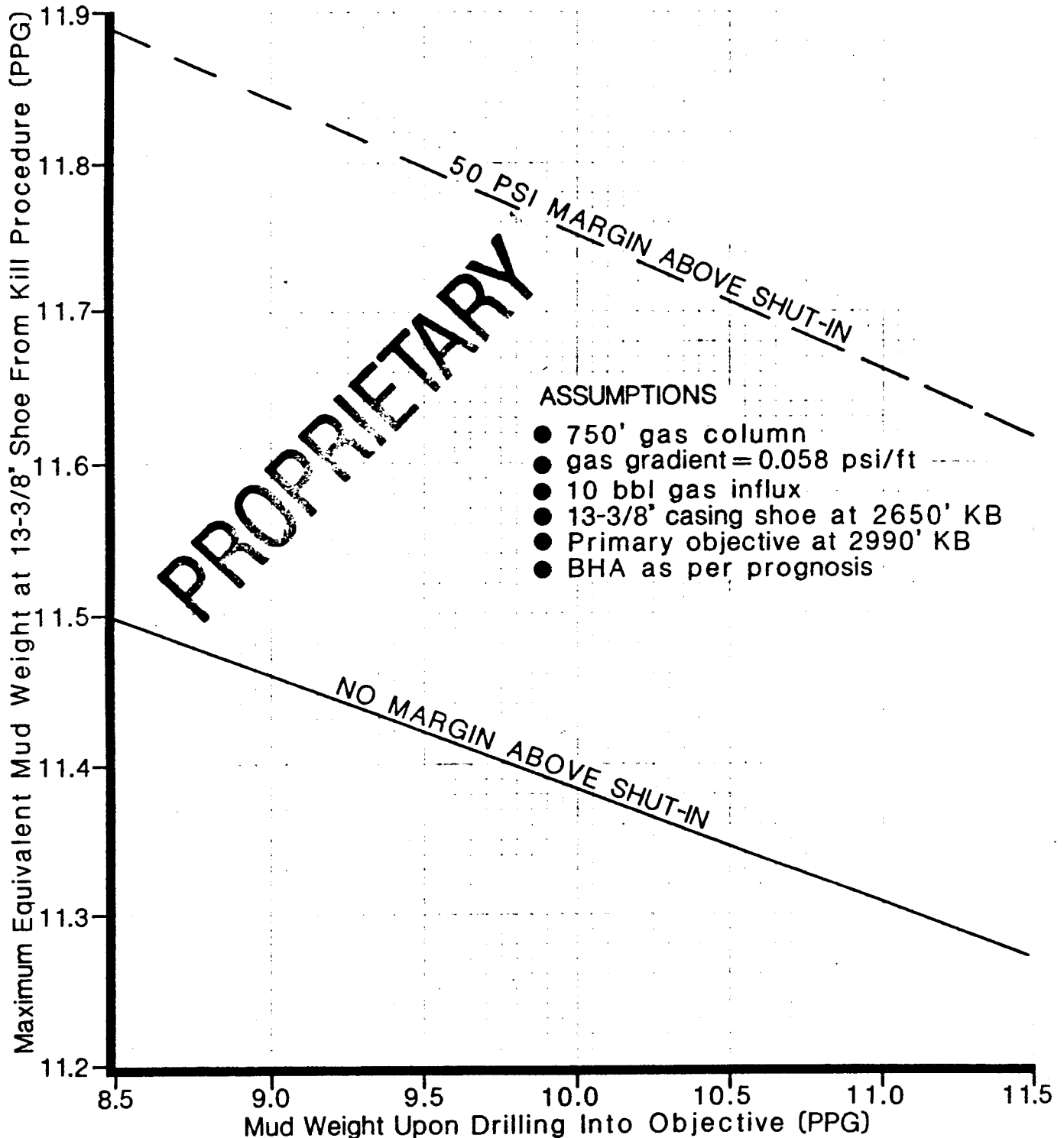
\*\* Maximum Allowable Concentration



# CORONA #1

Equivalent Mud Weight at 13-3/8" Casing Shoe From Kill Procedure  
Versus

Mud Weight Upon Drilling Into Primary Objective



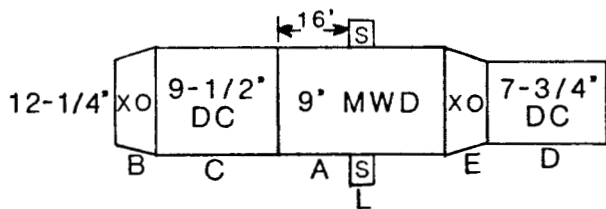
NOTE: Drill into primary objective with a mud weight high enough such that the equivalent mud weight at the 13-3/8" casing shoe from a kill procedure is less than the formation fracture gradient.



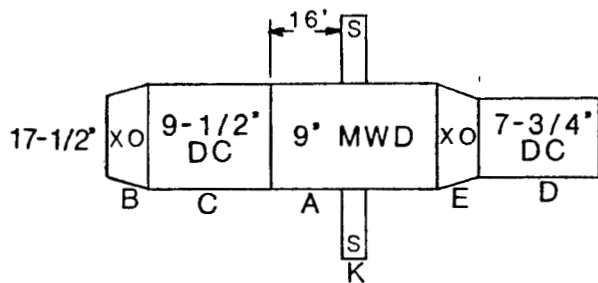
# CORONA BHA PROGRAM

1. Have the following stands stood back in the derrick prior to drilling out of the 30" casing (make up these stands when no operating time will be lost):

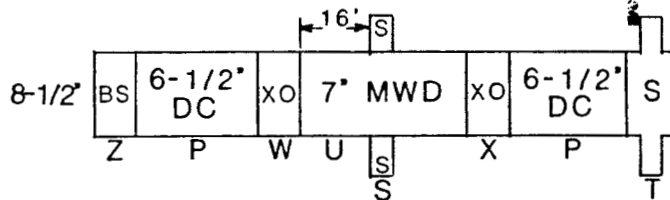
10 stands of grade "E" drill pipe for step 13 of the operations worksheet while drilling the 12 1/4" pilot hole and 26" hole (i.e., do not break down stands after drilling the pilot hole). This is for the 20" casing cementing stinger.



Assembly 'A'

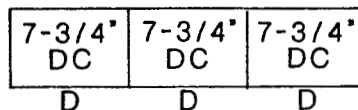
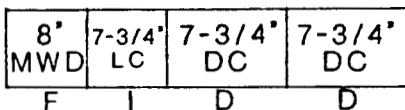


Assembly 'B'

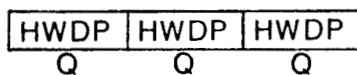
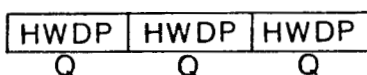
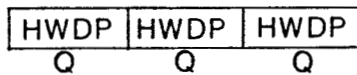
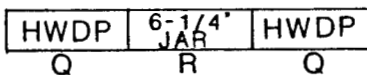
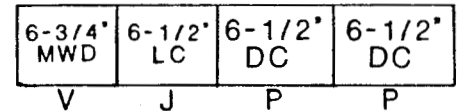
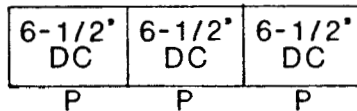
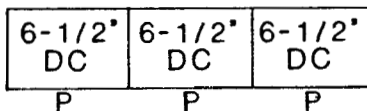


Assembly 'C'

# PROPRIETARY



If additional room is available in the derrick, stand back as much of the following as possible:



## BIT HYDRAULICS PROGRAM

The recommended bit hydraulics program is based on the following considerations in order of precedence:

1. Hydrate considerations
2. Maximum flow rate 20% less than turbulent flow across largest drill collar
3. Flow rate within MWD turbine limitations
4. Maximize bit HHP/in<sup>2</sup>
5. Six inch liners in both mud pumps (rated to 4,665 psi; discharge of 4.41 gallons per stroke)

MD Interval (feet)	Hole Size (In.)	Max. BHA OD (In.)	Prog'd Mud Wt. (ppg)	Prog'd PV & YP		Crit. Flow (gpm)	LAM FLOW w/20% SF PV & YP*		Stdpipe Press. (psi)	Flow Rate (gpm)	Pump Rate (spm)	Min. A.V. (ft/min)	Max. A.V. (ft/min)	Jets (32nd)	Bit HHP/in <sup>2</sup>
383-1200	12½	9½	10.2	22	34	1094	30	45	2850	1050	238	206	430	12,16,16,18	9.7
383-1200	26	9½	10.2	22	34	6107	3	4	4200	1050	238	40	44	13,13,14	1.7
1200-2700	17½	9½	10.5	14	28	2468	5	9	4200	900	204	90	102	10,14,14,14	5.9
2700-6000	12½	9½	10.0	20	20	852	21	21	4200	700	159	137	287	9,11,12,12	11.5
6000-10000	8½	7	10.0	20	20	425	20	20	4200	340	77	176	358	10,11,B	12.6

\*NOTE: These values are the minimum PV & YP required to keep the mud in laminar flow across the specified drill collars with a 20% safety factor. The prognosed PV & YP values recommended for each interval are listed in the "Prog'd PV & YP" column.

CORONA #1  
RECOMMENDED BHA INVENTORY

LEGEND	QUANTITY		DESCRIPTION OF COMPONENT	CONNECTIONS	
	IN USE	BACK UP		BOTTOM	TOP
A	1	2	9" Anadrill MWD	7 5/8" Reg BOX	7 5/8" Reg BOX
B	1	2	9 1/2" X-Over(room for tongs,float)	6 5/8" Reg BOX	7 5/8" Reg PIN
C	1	5	9 1/2" X 3" Drill Collars	7 5/8" Reg BOX	7 5/8" Reg PIN
D	12	6	7 3/4" X 2 13/16" Drill Collars	6 5/8" Reg PIN	6 5/8" Reg BOX
E	1	2	9" X 7 3/4" Cross-Over	7 5/8" Reg PIN	6 5/8" Reg BOX
F	1	1	8" Baroid MWD	6 5/8" Reg BOX	6 5/8" Reg BOX
G	1	2	7 3/4" X 6 1/2" Cross-Over	6 5/8" Reg PIN	4 1/2" IF BOX
H	1	2	7 3/4" Dailey Drilling Jars	6 5/8" Reg PIN	6 5/8" Reg BOX
I	1	1	7 3/4" lead drill collar (10')	6 5/8" Reg PIN	6 5/8" Reg BOX
J	1	1	6 1/2" lead drill collar (10')	4 1/2" IF PIN	4 1/2" IF BOX
K	1	0	17 1/2" Stabilizer for 9" MWD		
L	1	1	12 1/4" Stabilizer for 9" MWD		
M	1	1	17 1/2" X 7 3/4" Stabilizer	6 5/8" Reg PIN	6 5/8" Reg PIN
N	1	2	12 1/4" X 7 3/4" Stabilizer	6 5/8" Reg PIN	6 5/8" Reg PIN
P	22	5	6 1/2" X 2 13/16" Drill Collars	4 1/2" IF PIN	4 1/2" IF BOX
Q	12	4	5" X 3" Hevi-Wate Drill Pipe	4 1/2" IF PIN	4 1/2" IF BOX
R	1	2	6 1/4" Dailey Drilling Jars	4 1/2" IF PIN	4 1/2" IF BOX
S	1	1	8 1/2" Stabilizer for 7" MWD		
T	1	2	8 1/2" X 6 1/2" Stabilizer (IB)	4 1/2" IF PIN	4 1/2" IF PIN
U	1	1	7" Anadrill MWD	5 1/2" FH BOX	5 1/2" FH BOX
V	1	1	6 3/4" Baroid MWD	4 1/2" IF BOX	4 1/2" IF BOX
W	1	1	7" Cross-over	4 1/2" IF PIN	5 1/2" FH PIN
X	1	1	7" Cross-over	5 1/2" FH PIN	4 1/2" IF BOX
Y	1	1	Lock-0-Matic Expanding Hole Opener	6 5/8" Reg BOX	6 5/8" Reg PIN
Z	1	2	6 1/2" Bit Sub (bored for float)	4 1/2" Reg BOX	4 1/2" IF BOX
a	1	1	6 1/2" Dart Sub	4 1/2" IF PIN	4 1/2" IF BOX
	1	1	4 3/4" Bit Sub	3 1/2" Reg BOX	3 1/2" IF BOX
	1	1	4 3/4" Cross-Over	3 1/2" IF PIN	4 1/2" IF BOX
	18	3	4 3/4" X 2 1/4" Drill Collars	3 1/2" IF PIN	3 1/2" IF BOX
	0	1	7 3/4" Cross-Over	6 5/8" Reg PIN	6 5/8" Reg PIN
	0	1	17 1/2" X 7 3/4" Stabilizer	6 5/8" Reg PIN	6 5/8" Reg BOX
	0	1	12 1/4" X 7 3/4" Stabilizer	6 5/8" Reg PIN	6 5/8" Reg BOX
	0	4	8 1/2" X 6 1/2" Stabilizer (IB)	4 1/2" IF PIN	4 1/2" IF BOX
	0	1	7 3/4" Bit Sub	6 5/8" Reg BOX	6 5/8" Reg BOX
	0	1	9 1/2" Bit Sub	7 5/8" Reg BOX	6 5/8" Reg BOX
	0	2	Rapidrill Fixed Hole Opener	7 5/8" Reg BOX	7 5/8" Reg PIN

# FINAL ALASKA DIVISION DRILLING PROGNOSIS

6/24/86

RIG: CANMAR EXPLORER II

WELL: OCS-Y-871 #1

AFE NO: 266121

LOCATION: Lat. 70°18'52.67"N  
Long. 144°45'32.90"W  
UTM Zone 6  
X = 584,233M Y = 7,802,338M

FIELD: CORONA

EST. ELEVATION: KB - 38.4  
Water Depth - 115.6

EVALUATION

GEOLOGY

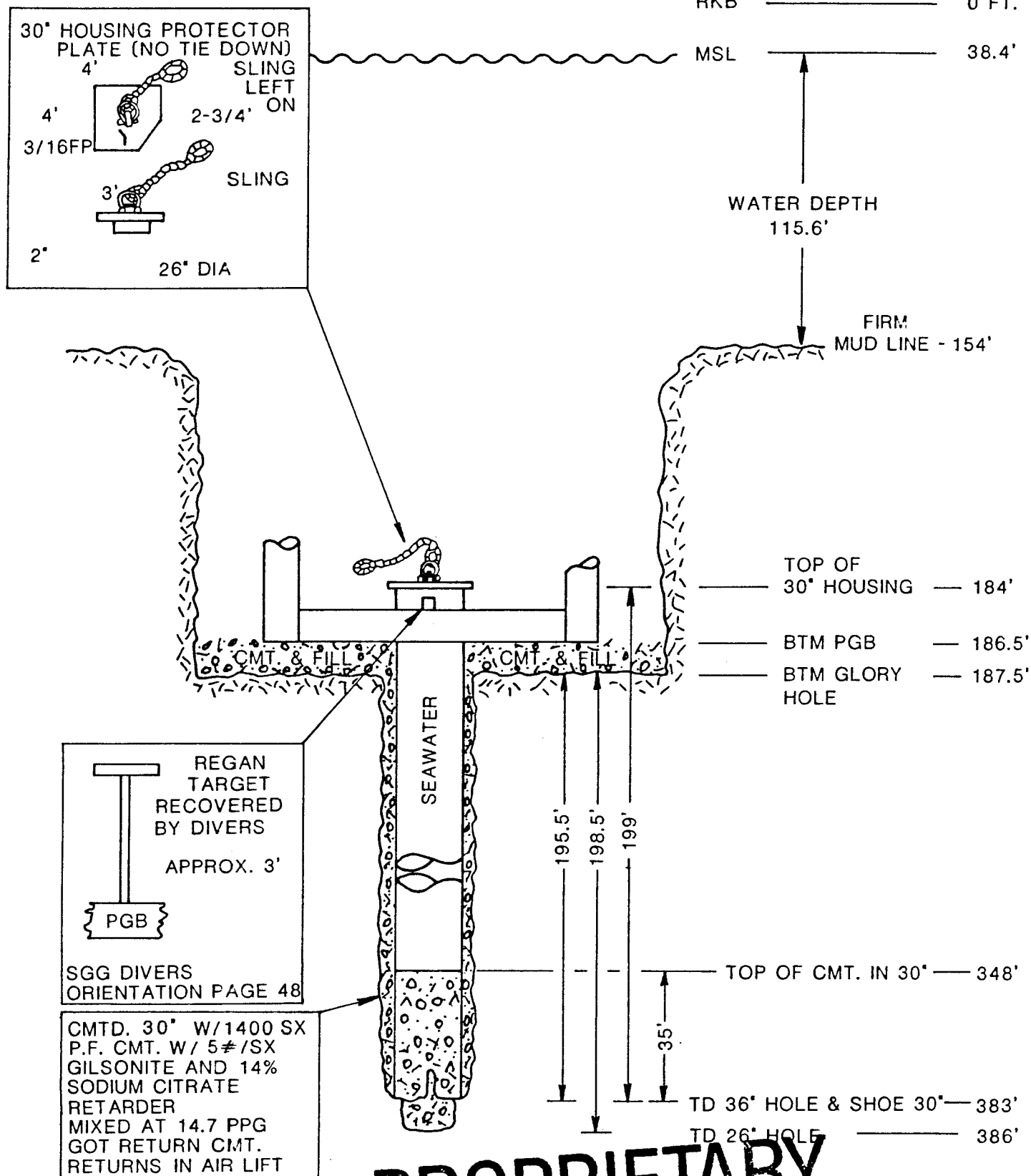
DRILLING

CORES	ELEC. SURVEYS	MUD LOGGER	SIGNIFICANT FORMATIONS	WELL DEPTH KB BML	CASING AND CEMENT	HOLE SIZE	HOLE DEV. AND DIR. CONTROL	MUD PROGRAM
No Cores Planned Baroid & Anadril Resistivity - Gamma Ray MWD will be run from 30' shoe to TD	No logs above 20'	#1 Logging contingent on shows, (same as run #2). Velocity check shot while WOC.	Mean Sea Level	38.4				
			Mud Line	154				
			Base of glory hole	187.5	33.5			
			30" Struct. Pipe (Already in Place)	383	229			
			20" Cond. Pipe	1154	1000			
			Lavender	1290				
			Dark Blue	2440				
			13-3/8" Surf. CSG	2650	2496			
			T. of Primary Obj.	2990				
			Vermilion	4540				
Run #3 Same as run #2 plus Velocity Check Shot	#2 DIT-E/MSFL/SDT/AMS/GR; LDT/DNL/NGT-D/ML/AMS; CST/GR; Clean out trip; RFT/GR; SHDT/AMS	Mud Logger and Drilling Data Unit	B. of Primary Obj.	5540				
			9-5/8" Inter. CSG	6000	5846			
			T. of Green	6740				
			Green event	8940				
			TD	10000	9846			
No Cores Planned Baroid & Anadril Resistivity - Gamma Ray MWD will be run from 30' shoe to TD	No logs above 20'	#1 Logging contingent on shows, (same as run #2). Velocity check shot while WOC.						
Run #3 Same as run #2 plus Velocity Check Shot	#2 DIT-E/MSFL/SDT/AMS/GR; LDT/DNL/NGT-D/ML/AMS; CST/GR; Clean out trip; RFT/GR; SHDT/AMS	Mud Logger and Drilling Data Unit						
No Cores Planned Baroid & Anadril Resistivity - Gamma Ray MWD will be run from 30' shoe to TD	No logs above 20'	#1 Logging contingent on shows, (same as run #2). Velocity check shot while WOC.						
Run #3 Same as run #2 plus Velocity Check Shot	#2 DIT-E/MSFL/SDT/AMS/GR; LDT/DNL/NGT-D/ML/AMS; CST/GR; Clean out trip; RFT/GR; SHDT/AMS	Mud Logger and Drilling Data Unit						

PROPRIETARY

NOTE: Well testing is contingent on other evaluation.- Well to be P&Aed at TD.

OFFICIAL WELL MEASUREMENTS  
 OCS-Y-871 BLK 678 WELL NO. 1  
 LOC. N7802338 E584233 UTM ZONE 6  
 T & A STATUS



**PROPRIETARY**

## CORONA #1

## RECOMMENDED BIT INVENTORY

QUANTITY		BIT SIZE	DESCRIPTION OF BIT	RECOMMENDED	TYPE OF
IN USE	BACK UP	INCHES		NOZZLES	CONNECTION
1	1	26	1-1-1 w/Center Jet	12,16,16,18	7 5/8" Reg
1	1	12 1/4	1-1-1 w/Center Jet	12,16,16,18	6 5/8" Reg
1	1	17 1/2	1-1-1	13,13,14	7 5/8" Reg
1	1	26	Lock-O-Matic Expanding Hole Opener	13,13,14	6 5/8" Reg
1	2	17 1/2	1-1-1 w/Center Jet; Extended Nozzles	10,14,14,14	6 5/8" Reg
2	4	12 1/4	1-1-6 or 1-1-4 w/C.J.; Ex. Nozzles	9,11,12,12	6 5/8" Reg
12	3	8 1/2	1-1-6 or 1-1-4	10,11,B	4 1/2" Reg
0	2	8 1/2	1-2-6 or 1-2-4	10,11,B	4 1/2" Reg
0	1	8 1/2	4-3-7 (Recommend NC-1)	10,11,B	4 1/2" Reg
0	2	8 1/2	1-3-6 or 1-3-4	10,11,B	4 1/2" Reg
0	2	26	Rapidrill Fixed Hole Opener	12,12,13	7 5/8" Reg
0	1	5 7/8	Milltooth to clean out 7" liner		3 1/2" Reg

\_\_\_ = Center Nozzle

NOTE: Be sure to have bit breakers on board for both standard and extended nozzle bits.

NOTE: Will need 18 - 4 3/4" steel drill collars for possible testing inside 7" liner.

# PROPRIETARY



CORONA #1

BIT & BHA PROGRAM

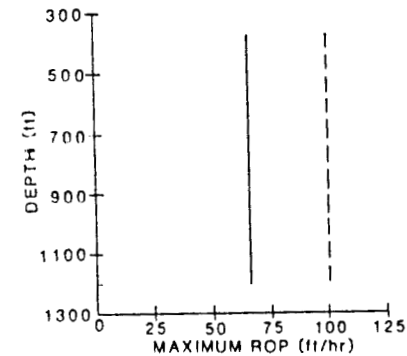
2. Be sure the capability exists to pick up 9 1/2" (7 5/8" Reg Pin), 7 3/4" (6 5/8" Reg Pin), and 6 1/2" (4 1/2" IF Pin) drill collars by the pin end in order to make up the collars "upside down" in the drill string (i.e., will eliminate cross-overs to the MWD's).
3. Do not run a pump out sub above the MWD's
4. Place a retrievable drill pipe screen above the Anadril MWD where it can be cleaned while breaking out a stand.
5. Do not run single shot check shot surveys to verify the MWD. Run single shot surveys only if the MWD fails and the MMS 492' survey requirement can not be waived.
6. Pick up 72 stands of grade "E" drill pipe followed by grade "G" to TD.

**PROPRIETARY**

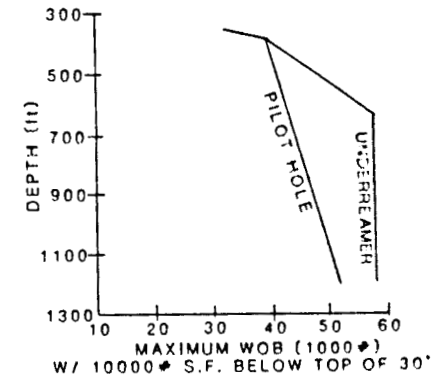
CORONA #1  
26" HOLE FROM 383' to 1200'

## RECOMMENDATIONS

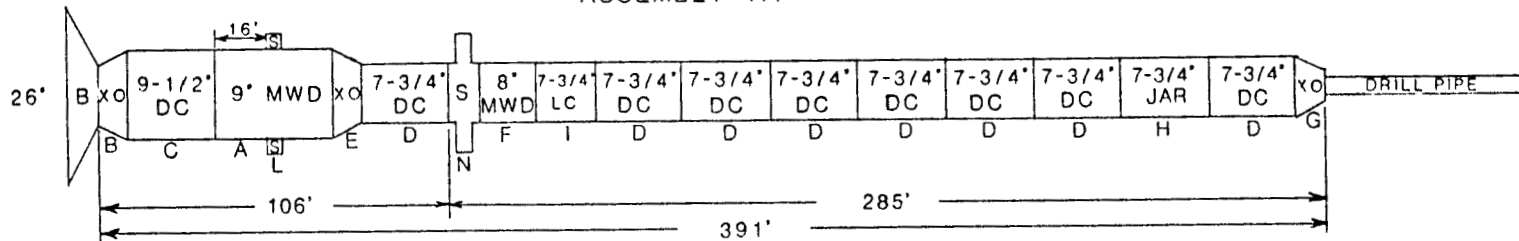
- \* Drill out of 30" casing with a 26" bit and drill 20'. POOH. Drill 12 1/4" hole to 1200'. POOH. Underream to 26".
- \* Use a type 1-1-1 bit
- \* Control penetration rate to 100 ft/hr
- \* Maintain mud temperature below 50 to 60 degrees F
- \* Have MWD turbines set for 700 to 1200 gpm
- \* Run 9 1/2" drill collar upside down to avoid cross-over
- \* Use a double pin stabilizer to avoid a cross-over
- \* Use a 17 1/2" bit welded to the underreaming assembly
- \* On underreaming assembly, leave top stabilizer 12 1/4"
- \* Run a float in the bit sub
- \* Do not break down drill pipe stands from pilot hole assembly (for cement stinger)



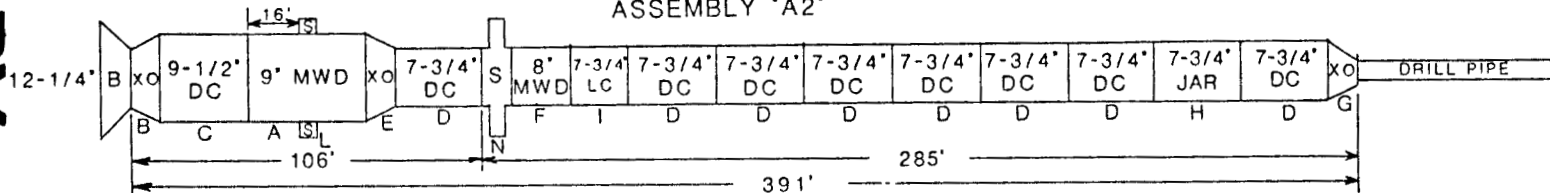
—:HAMMERHEAD (Actual)  
- - - :CORONA (Proposed)



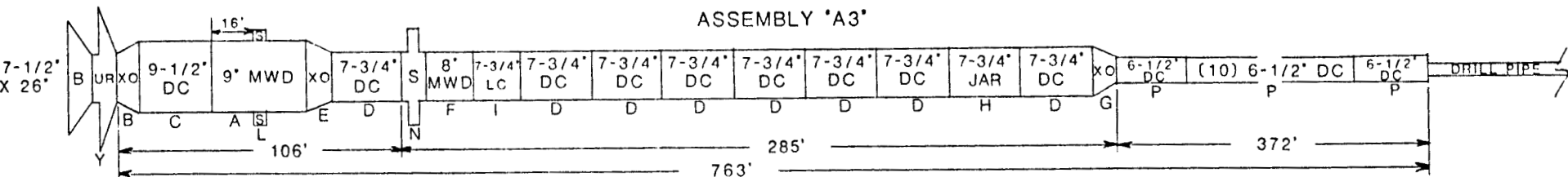
ASSEMBLY 'A1'



ASSEMBLY 'A2'



ASSEMBLY 'A3'

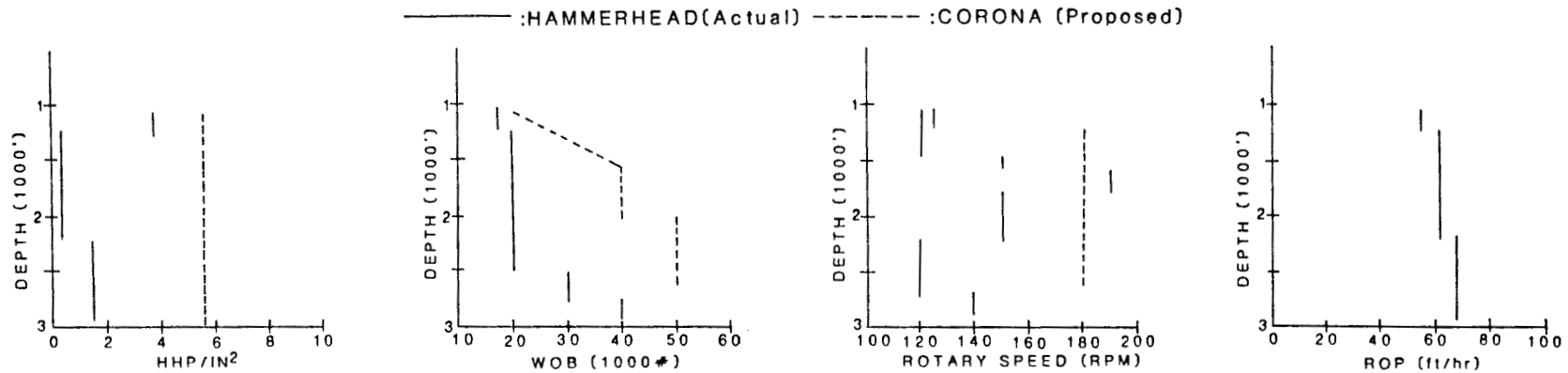


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CORONA #1  
17 1/2" HOLE FROM 1154' to 2700'

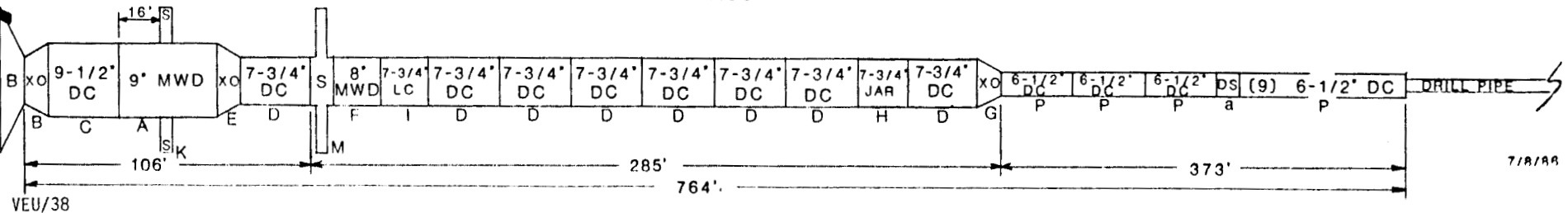
RECOMMENDATIONS

- \* Drill out of 20" casing with this assembly and maintain to casing point
- \* Use type 1-1-1 bits with center jets
- \* Run bottom drill collar upside down to avoid cross-overs
- \* All connections to be 7 5/8" Reg, 6 5/8" Reg, or 4 1/2" IF. Bit to be 6 5/8" Reg.
- \* Limit penetration rate to 250 ft/hr
- \* Have MWD turbines set for 700 to 1200 gpm
- \* Use a double pin stabilizer to avoid a cross-over
- \* Run a float in the bit sub



$$\frac{(MW)(GPM)^3}{4,476,376,775 (TFA)^2}$$

ASSEMBLY 'B'

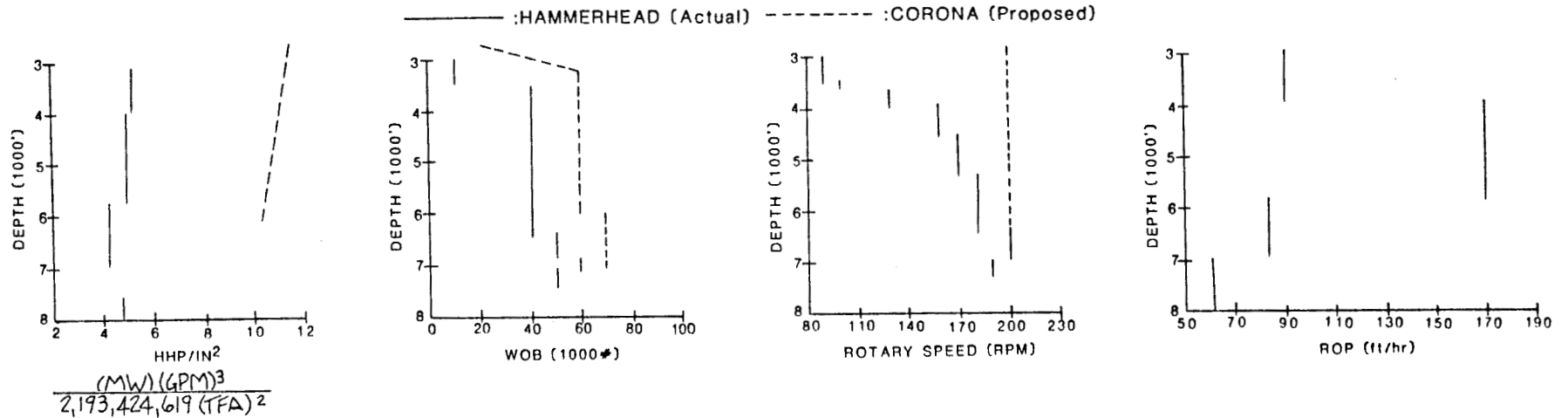


PROPRIETARY

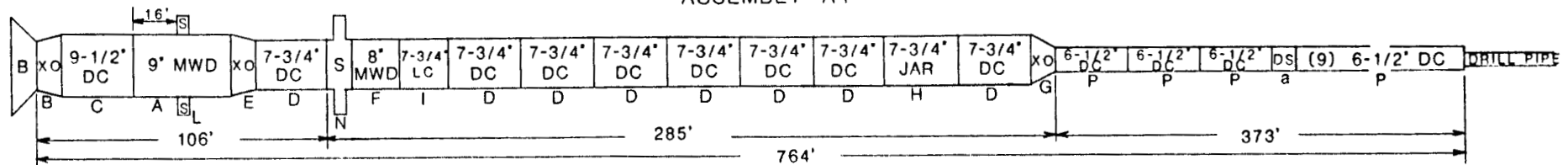
CORONA #1  
12 1/4" HOLE FROM 2650 TO 6000'

### RECOMMENDATIONS

- \* Drill out of 13 3/8" casing with this assembly and maintain to casing point
- \* Use type 1-1-4 or 1-1-6 bits with center jets and extended nozzles
- \* Run bottom drill collar upside down to avoid cross-overs
- \* All connections to be 7 5/8" Reg, 6 5/8" Reg, or 4 1/2" IF. Bit to be 6 5/8" Reg.
- \* Have 8" MWD turbine set for 700 to 1200 gpm
- \* Use a double pin stabilizer to avoid a cross-over
- \* Do not run a float in the bit sub



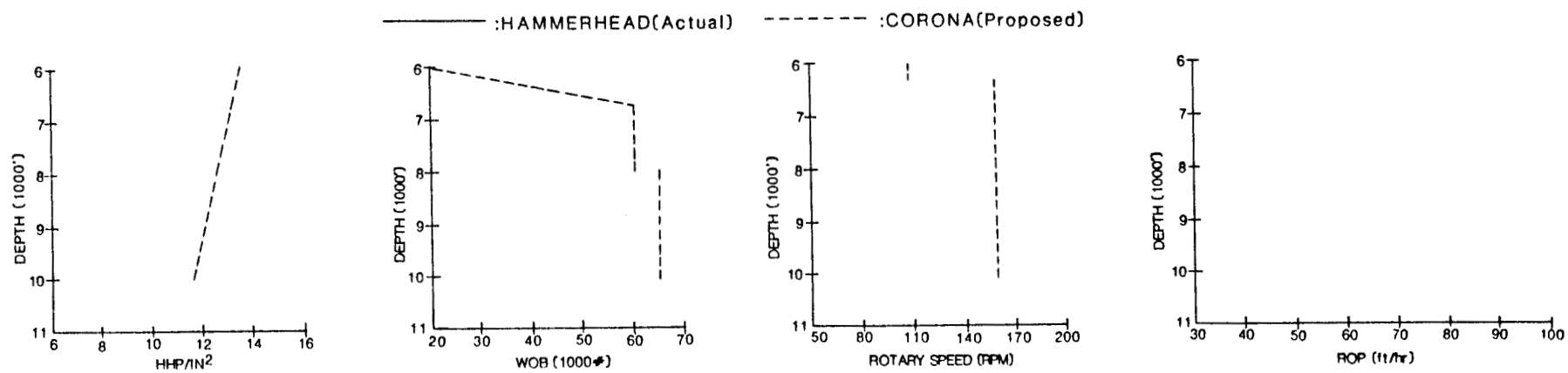
### ASSEMBLY 'A4'



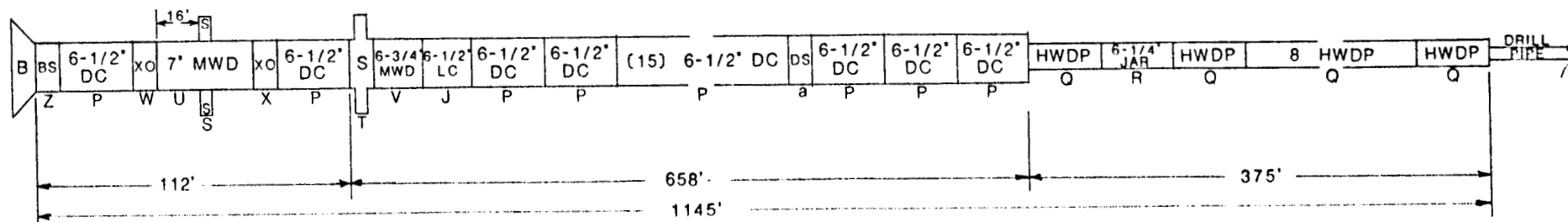
**CORONA #1**  
**8 1/2" HOLE FROM 6000' TO TD**

**RECOMMENDATIONS**

- \* Drill out of 9-5/8" casing with this BHA and maintain to TD
- \* Use type 1-1-4 or 1-1-6 bits
- \* Have MWD turbines set for 290 to 485 gpm
- \* Run a float in the bit sub



$$\frac{(MW)(GPM)^3}{1,056,059,500 (TFA)^2}$$



**ASSEMBLY 'C'**

**PROPRIETARY**

Corona #1  
OCS-Y-871 #1  
BOP & Wellhead Equipment  
BOP Test Procedure

<u>Interval</u>	<u>Description</u>	<u>Max. Antic. Kick Press.</u>	<u>Blind Shear Ram</u>	<u>Pipe Ram</u>	<u>Annular</u>
Below 30" to 20" csg pt	Returns will be taken at base of glory hole for the first 25' drilled out of the 30". Afterwards, returns will be brought to the drillship via the riser. A function test of the Regan/Diverter system will be performed. As long as surface diverter system will be used, a daily function test should be performed.				
Below 20" to 13-3/8" csg pt	10 M-18-3/4" RT R AA Diverter-500 psi Regan KFDS	410	1000 psi	1000 psi	1000 psi
Below 13-3/8"	10 M-18-3/4" RT R AA	1643 psi	1650 psi*	3500 psi	3500 psi
Below 9-5/8" (if run)	10 M-18-3/4" RT R AA	1643 psi	1650 psi*	5000 psi	3500 psi

\*Request that we be allowed by MMS to test casing string and blind rams simultaneously at the csg test pressures indicated above has been approved by the MMS. Blind rams will only be tested prior to drilling shoe of any casing string set.

Notes:

- When stump testing BOP's, bleed off hydraulic pressure (Kooimey pressure) from rams while they are in the closed position to insure that mechanical lock functions properly (i.e. insure that rams will stay closed if pressure is lost).
- Stump test BOP A-3500, R-7500
- Weekly BOP test required in addition to test at casing point
- Maximum anticipated kick pressure based on 1/3 estimated bottomhole pressure at deepest exposed depth.
- See attached "Contingency Plan for Handling Shallow Gas Flows" for additional details on well control procedures.
- In the event of a kick below 20", the initial shut-in will be on the subsea annular preventer using the soft shut-in technique. If while choking back while shutting in, the pressure reaches the maximum pressure allowable to preclude breaking down the 20" shoe, the well will either be circulated with the maximum allowable choke pressure while kill mud is pumped; or the surface annular will be closed and the subsea annular(s) will be opened and the well will be diverted to the down wind side of the rig.
- All high pressure tests on BOP & choke manifold will be preceded by a 250 psi low pressure test.
- Rams will be run (from bottom to top) 5", 3 1/2", 5", and blinds.
- RT = triple rams; R = ram; AA = double annulars
- Hold Low tests for 3 minutes; 3 minutes on High test

PROPRIETARY

### DIVERTER SYSTEM

After drilling 25' out of the shoe of the 30" structural casing, the (Hughes) Regan KFDS diverter will be nipped up. The diverter will be used for all drilling operations prior to running the 20 inch casing at 1,154 ft RKB and as a back up to the BOP stack in the 17 1/2" hole if the fracture gradient at the 20" shoe will not permit a conventional kill procedure.

Diverter lines onboard the CANMAR Explorer II are 12 inches in diameter and branch from a "T" to port and starboard discharge points. The principal diverter line is equipped with a 12 inch air actuated valve which will open automatically when the diverter is closed. The port and starboard discharge lines are equipped with a knife valve which is linked through a control mechanism. This control mechanism makes it impossible to close both discharge lines simultaneously. One of the diverter discharge lines will be open at all times.

### WELLHEAD

The subsea wellhead to be used in this program is a Vetco SG-5XP in a singer stack, 4 hanger configuration (16", 13 3/8", 9 5/8", and 7"). A load ring on the 13 3/8" casing hanger transfers casing and test pressures directly to the wellhead housing and not to the 16" casing hanger. The wellhead has a maximum service pressure of 10,000 psi.

### SUBSEA BOPs

Detailed specifications for 18 3/4" (10,000 psi) Shaffer rams and 18 3/4" (5,000 psi) double spherical annular BOPs are listed in CANMAR Explorer II Description attachment.

**PROPRIETARY**

PROJECTED MEASUREMENTS OF BOP STACK IN GLORY HOLE  
BLOCK NR64 678 WELL #1  
CORONA

RKB  
0 Ft.

MSL  
38.4'

DIVERS BTM  
154'  
FIRM BTM 158.4'

TOP OF G. POST  
161.1'

TOP OF MANDREL  
164.1'

BLIND/SHEAR  
170.1'

TOP 5' RAM  
174.3'

MID 3-1/2' RAM  
175.9'

BTM 5' RAM  
177.4'

18-3/4' WH  
181.1'

TOP OF 30' CSG  
184'

BTM PGB 186.5'

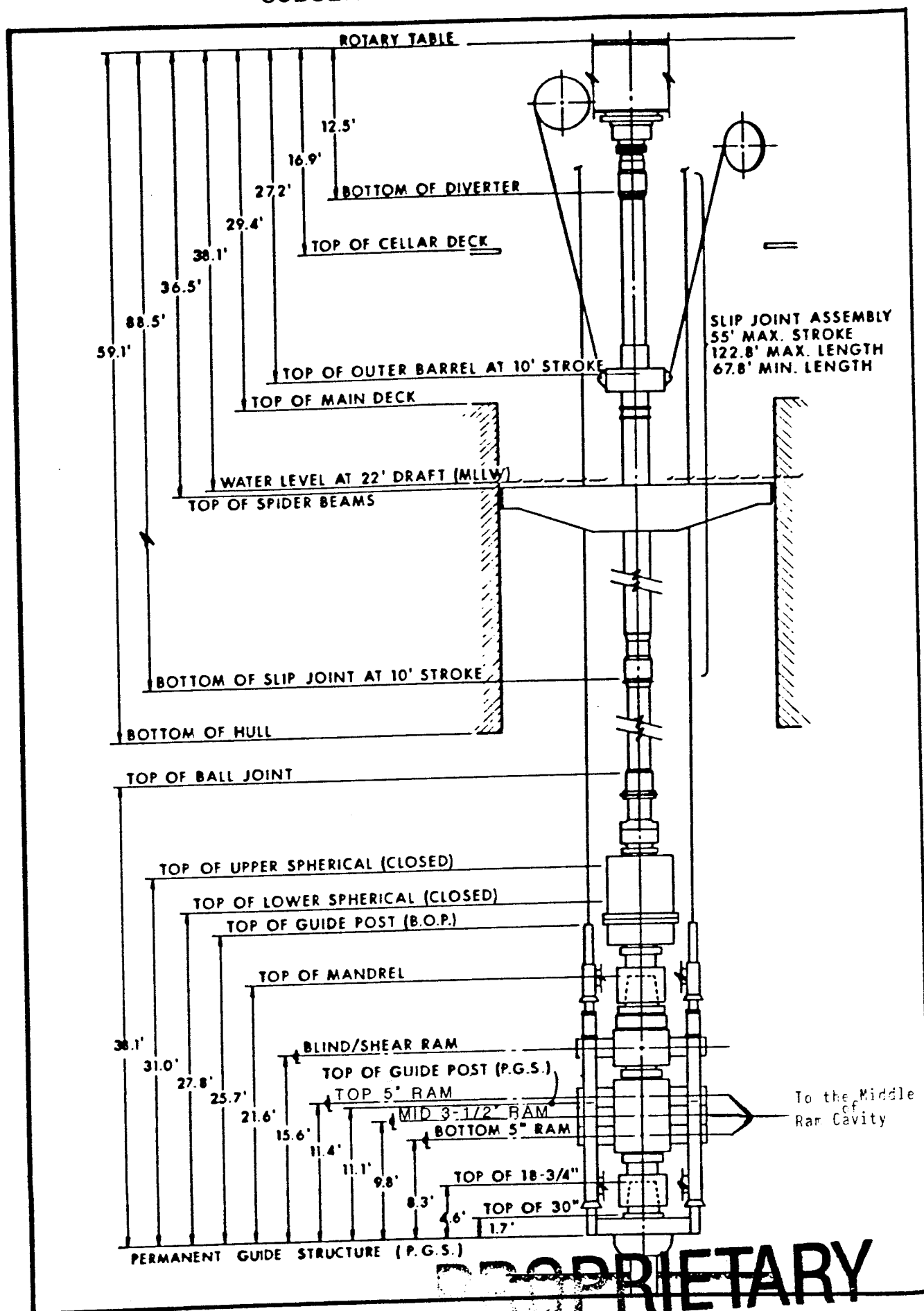
BTM GLORY HOLE  
187.5'

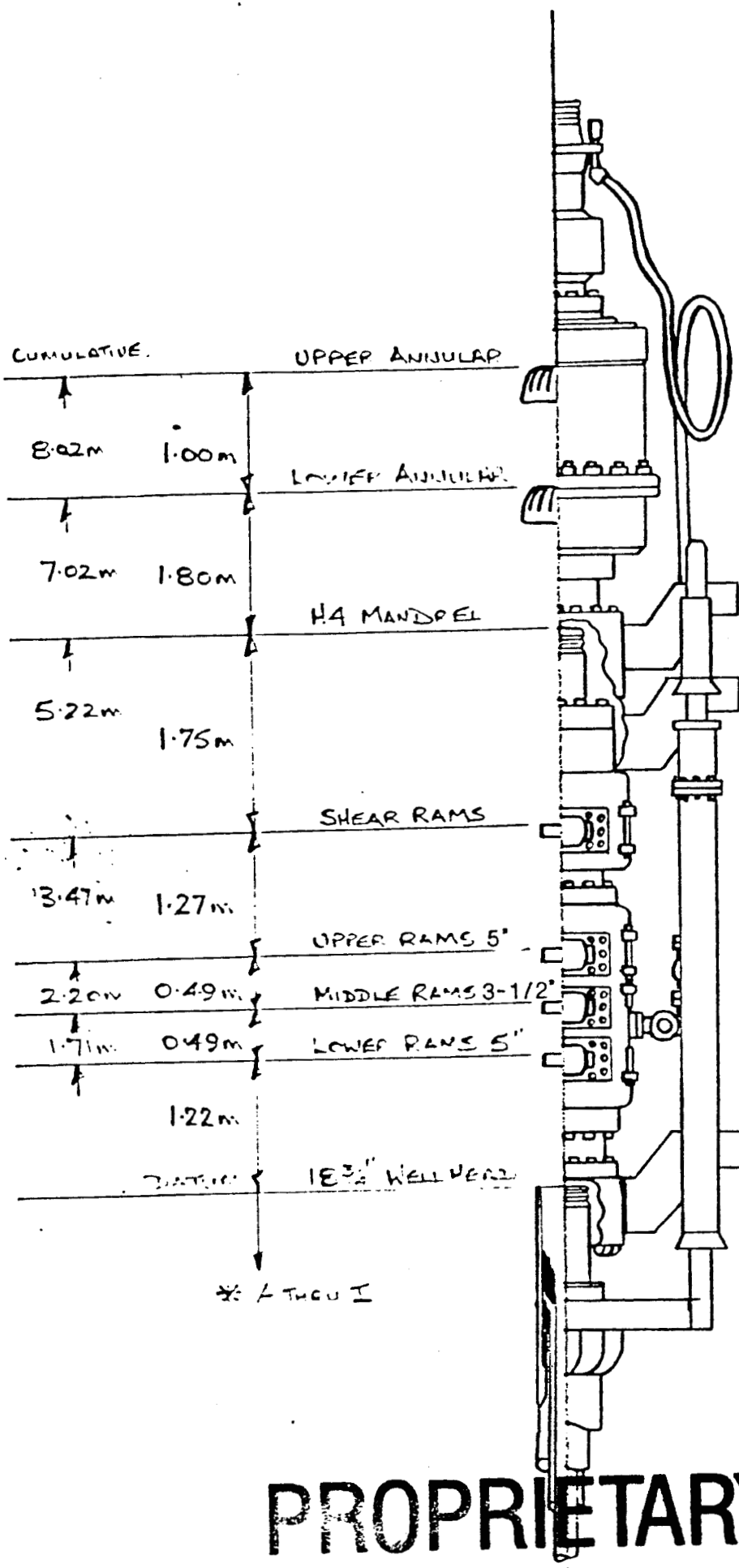
PROPRIETARY



# CORONA #1 SUBSEA BOPE ASSEMBLY

Page 35





## VETCO.

- A - Top 7" Pack-off = 0.34  
 B - Top 7" Wear Bush = 0.04  
 C - Top 9 5/8" Pack-off = 0.82  
 D - Top 9 5/8" Wear Bush = 0.22  
 E - Top 13 3/8" Pack-off = 1.20  
 F - Top 13 3/8" Wear Bush = 0.22  
 G - Top 16" Pack-off = 2.39  
 H - Top 16" Wear Bush = 0.22  
 I - Top 30" Well Head = 0.0

## HUGHES.

With 16" Well Head

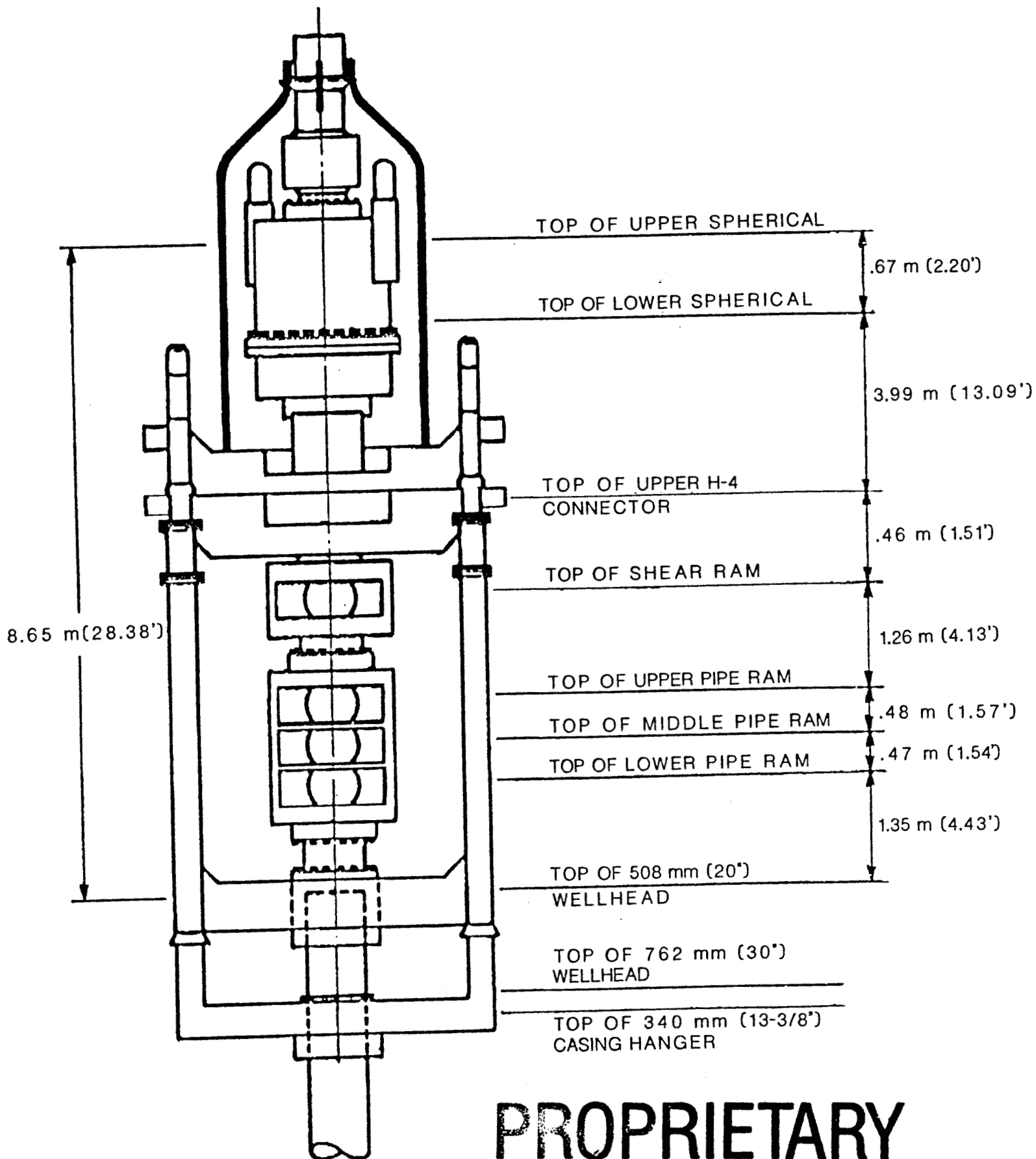
- A - Top of 7" Pack-off = 0.32m - 0.97  
 B - Top of 7" Wear Bush = N/A - 0.36  
 C - Top of 9 5/8" Pack-off = 0.92m - 1.58  
 D - Top of 9 5/8" Wear Bush = 0.29m - 0.36  
 E - Top of 13 3/8" Pack-off = 1.53m - 2.19  
 F - Top of 13 3/8" Wear Bush = 0.29m - 0.31  
 G - Top of 16" Pack-off = 2.14m - N/A  
 H - Top of 16" Wear Bush = 0.30m - N/A  
 I - Top of 30" Well Head = ±1.35m - ±1.3

Approved by: [Signature] Date: 11/1/78  
 Hughes: [Signature] #cc-075341  
 #cc-075021

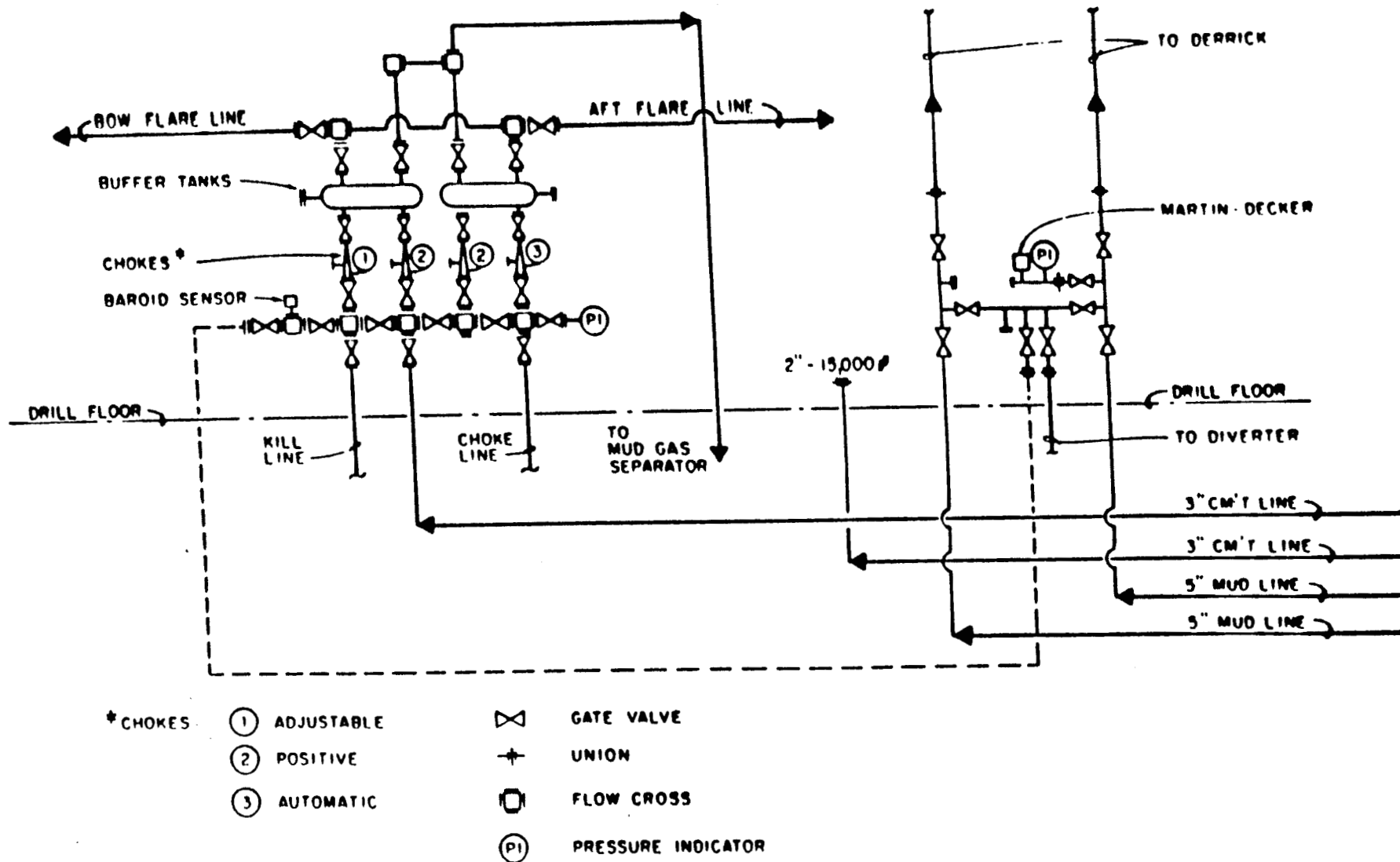
F. MARCHANT [Signature]

PROPRIETARY

NL SHAFFER  
18-3/4" 10,000 LB STACK



**PROPRIETARY**

CHOKE & KILL MANIFOLDSTANDPIPE MANIFOLD

SCHEMATIC OF CHOKE AND KILL MANIFOLD

# PROPRIETARY

## CORONA #1 EAST BEAUFORT SEA CASING DESIGN CRITERIA

<u>Size</u>	<u>Depth RKB/BML</u>	<u>Mud Wt. @ Setting Depth</u>	<u>Est. F.G. @ Csg. Shoe</u>	<u>Depth to Next Csg. String</u>	<u>Mud Wt. @ Csg. String</u>	<u>Max. SICP (1/3 BHP)</u>
20"	1154/1000	9.2	.48	2700	9.3	410
13-3/8"	2650/2496	9.3	.72 (design)	10,000	9.5	1643
9-5/8"	6000/5846	12.2 (design)	.78	10,000	9.5	3900 (max.SITP)
7"	10,000/9846	9.5	.87			3900 (max.SITP)

## CASING DESIGN

<u>Size</u>	<u>(RKB/BML) Interval</u>	<u>Description</u>	<u>D e s i g n   C o n d i t i o n s</u>			<u>Casing Rating/Design Factors</u>		
			<u>T# Wt. in Mud</u>	<u>B psi 1/3 BHP</u>	<u>C psi 1/3 Drw.D</u>	<u>T#</u>	<u>B psi</u>	<u>C psi</u>
20"	1158/1000	133#/ft.X-56 Vetco LS-2 conn	116,000	410	446	1.4MM/12.0	1500/3.3	1500/3.3
13-3/8"	2650/2492	72#/ft.N-80 BT&C	174,000	1643	1250	1,545M/6.77	5380/3.05	2670/2.38
9-5/8"	6000/5842	53.5#/ft.L-80 LT&C	263,000	3900(SITP)	3800 Full evac.	1.047MM/3.98	7930/1.96	6620/1.66
7"	10,000/9842 or (TOL/BOL) 5600/10,000	35#/ft.L-80 LTC-ABC (0-5000) 35#/ft.L-80 LTC-ABC	223,000	3900(SITP)	4930 Full evac.	.60MM/2.7	9240B*/2.3	10180/2.1

\*B = Coupling leak pressure

Corona #1  
Formation Fracture Gradient Test (For All Casing Points)

1. After casing is cemented, drill out no more than 20 ft. of new hole. PU into shoe.
2. Rig up Halliburton pumps.
3. Make sure the hole is full, close annulars and rig up to pump down drill pipe. Install a positive displacement flow meter (Flowco or equivalent) accurate to .1 bbl in the line. Also install a continuous recording pressure gauge in line.
4. Pressure up by pumping down drillpipe or kill line. Pump fluid in 1 bbl increments until pressure is within 1 ppg of expected leak-off and then decrease to .5 bbl increments. Use the lowest pump rate possible. Shut down pump for one minute + after displacing each increment. Record pressure and volume and displace more fluid. Leak off occurs when the pressure rise is no longer proportional to the volume increase. A suggested format for recording pressure and volume is attached. Also, be prepared to plot pressure versus volume during test.
5. When the formation starts to accept liquid, shut pump down and note the instantaneous shut in pressure.
6. Release pressure and record the volume of mud returned to tanks.
7. Send the recorded data and pressure chart to the Anchorage Office.
8. Record final test results on morning report and daily tour sheets.

**PROPRIETARY**

## CEMENT REQUIREMENTS OF CORONA #1

30" IN PLACE20" Casing in 26" Hole @ 1154' RKB, 1000' BML

Pump enough cement to fill annulus from 1,000' BML to base of glory hole. Volume calculated with 100% excess and 40' of cement left inside 20". If BGT (caliper) log is run, calculate volume based on 35% excess. Once cement returns are received in the glory hole airlift system, (if received prior to pumping all of the permafrost cement), the Class "G" tail cement will be pumped and displaced to 20'± above the shoe of the 20" casing. A 10 stand drill pipe stinger will be used to cement.

Pump 2,128 sx of Canadian Permafrost Cement mixed at 14.7 ppg with a 1.11 ft<sup>3</sup>/sk yield using 4.27 gallons of sea water per sack. Follow by 523 sx G + .75% CFR-2 + 2% CaCl<sub>2</sub> mixed at 15.8 ppg with a 1.15 ft<sup>3</sup>/sk yield using 5.0 gallons of sea water per sack.

Precede cement with 50 bbl sea water spacer.

## \* CONDITIONS &amp; TEST REQUIREMENTS

- \* Run tests with 40°, 50°, 70°, 90° and 110° F mix water on tail slurry
- \* Run tests on heavier Class "G" slurries (by using less mix water) as possible cement for shoe.
- \* Cement at shoe strong enough to drill out in 8 hours or ASAP (500 PSI compressive strength)
- \* BHST = 38°F BHCT = 42°F
- \* Time from start displacing to cement at shoe = 4 minutes (mix 6 bbl/min; disp 9 bbl/min)
- \* Total time for job = 1:55 hours (mix 5 bbl/min; disp 8 bbl/min) + 5 min.
- \* No float collar to be run
- \* Estimated cement volume = 2,964 CF (100% excess)
- \* Provide 6, 8, 12, and 24 hour compressive strengths on tail slurry
- \* Total thickening time between 3 and 4 hours (repeat test)

# PROPRIETARY

13 3/8" Casing in 17 1/2" Hole

Enough cement will be pumped to fill the annulus from 2,496' BML to 250' inside the 20" casing with 50% excess and 80' of cement left in 13-3/8" casing. An SSR pipe wiper system will be used to cement (no stinger is run with this system).

Pump 711 sx of G + 2.25% PHG + .75% CFR-2 +  $\text{CaCl}_2$  @ 13.2 ppg, 1.78  $\text{ft}^3/\text{sk}$ , 9.6 gal/sk. Mix with fresh water.

Followed by 496 sx of G + .75% CFR-2 + 1%  $\text{CaCl}_2$  (equals 500' of tail in annulus). Mixed @ 15.8 ppg with 1.15  $\text{ft}^3/\text{sk}$  yield mixed with 5.0 gallons of fresh water per sack.

Precede cement with 50 bbl sea water spacer. (If MWD logs indicate any potential gas zones, a weighted spacer may be required.) Volumes will be changed to reflect actual hole wash out based on caliper logs if logs are run. Run equalizing sub above plugs to prevent premature plug release.

## \* CONDITIONS AND TEST REQUIREMENTS

- \* Cement at shoe strong enough to drill out in 8 hours or ASAP
- \* BHST = 63°F    BHCT = 60°F
- \* Total time for job = 1:49 Hours (mix 5 bbl/min Disp 8 bbl/min) + 5 min
- \* One float collar to be run
- \* Estimated cement volume = 1836 CF (50% Excess)
- \* Provide 6, 8, 12, and 24 hour compressive strengths on tail slurry
- \* Total thickening time between 3 and 4 hours (repeat test)
- \* Run tests using rig water samples.

9 5/8" Protective String in 12 1/4" Hole

Enough cement will be pumped to fill the annulus from 6,000' to 250' inside 13 3/8" casing with 35% excess and 80' of cement left inside 9 5/8". A SSR plug system will be used to displace cement.

Pump an estimated 1,329 sx of G + .75% CFR-2 mixed at 15.8 ppg with 1.15  $\text{ft}^3/\text{sk}$  yield using 5.0 gallons of fresh water per sack.

Precede cement with 100 bbl of weighted spacer. Actual amount of 15.8 ppg cement which can be pumped will be determined after leak off test on



13 3/8" shoe. If leak off test indicates that returns would most likely be lost by pumping only 15.8 ppg cement, a lead slurry of G + 2.25% PHG + .75% CFR-2 mixed at 13.2 ppg with a 1.78 ft<sup>3</sup>/sk yield using 9.6 gallons of fresh water per sack will be pumped. By design, we hope to be able to get 15.8 ppg cement across any zones which might be production tested. Actual volumes pumped will be changed based on hole caliper logs.

\* CONDITIONS AND TEST REQUIREMENTS

- \* Cement at shoe strong enough to drill out in 8 hours
- \* BHST = 112°F
- \* Cement brought up to temperature in 62 minutes (mix 6 bbl/min disp 9 bbl/min)
- \* Total time for job = 1:52 hours (mix 6 bbl/min disp 8 bbl/min)
- \* One float collar to be run
- \* Estimated cement volume = 1528 CF (35% excess)
- \* Water loss less than 75cc at 150°F
- \* Production quality cement (run equalizing sub above plugs)
- \* Ultimate compressive strength to be above 2000 PSI at 2990' KB
- \* BHST @ 2990' KB = 65°F
- \* 100 BBL weighted spacer (run mud compatibility test on spacer)
- \* Provide 6, 8, 12 and 24 hour compressive strengths on class "G"
- \* Total thickening time between 3 and 4 hours (repeat test)
- \* Gas zones possible through entire section. Run test on cements resistant to gas channeling.
- \* Need 20-30 minute gel transition time
- \* No free water
- \* Run thickening time and transition time tests on the final slurry mixed 1 ppg heavy and 1 ppg light.

**PROPRIETARY**

7" Liner Run in 8 1/2" Hole to 10,000 RKB

Presumes 9 5/8" is run to 6,000' and 400' of overlap of 7" in 9 5/8" is run.

Enough cement will be pumped to fill the annulus (plus 25% over caliper volume) and the 400' overlap, as well as 400' of cement on top of the liner.

Pump an estimated 1,080 sx of Class "G" + .75% CFR-2 + .3% Halad 22A + 3% KCl mixed at 15.8 ppg with a 1.15 ft<sup>3</sup>/sk yield and 5.0 gallons of fresh water per sack.

If logs indicate pay within 400' of the 9 5/8" shoe, the 7" X 9 5/8" overlap may be shortened to as little as 100'.

Run 100 bbls of weighted spacer.

\* CONDITIONS AND TEST REQUIREMENTS

- \* BHST = 175° F
- \* Cement brought up to temperature in 40 minutes (mix 6 bbl/min disp 9 bbl/min)
- \* Total time for job = 1:12 hours (mix 5 bbl/min disp 8 bbl.min) + 10 min
- \* Conventional 2 plug cement job
- \* Two float collars to be run
- \* Estimated cement volume = 1242 CF (100% Excess to gage hole)
- \* Water loss less than 75cc at 200°F
- \* Ultimate compressive strength above 2000 PSI at 6000' KB
- \* BHST @ 6000' KB = 112° F
- \* Provide 12 and 24 hour compressive strengths at 6000' and 10000' KB
- \* Total thickening time between 2.5 and 3.5 hours (repeat test)
- \* Run mud compatability test with spacer
- \* Production quality cement
- \* Need 20-30 minute gel transition time
- \* No free water
- \* Run thickening time and transition time tests on the final slurry mixed 1 ppg heavy and 1 ppg light

7" Liner Run in 8 1/2" Hole to 12,000' RKB

Presumes 9 5/8" is run to 6000' and 400' of overlap in 9 5/8" in run. Enough cement will be pumped to fill the annulus (plus 25% over caliper volume) and the 400' overlap, as well as 400' of cement on top of liner.

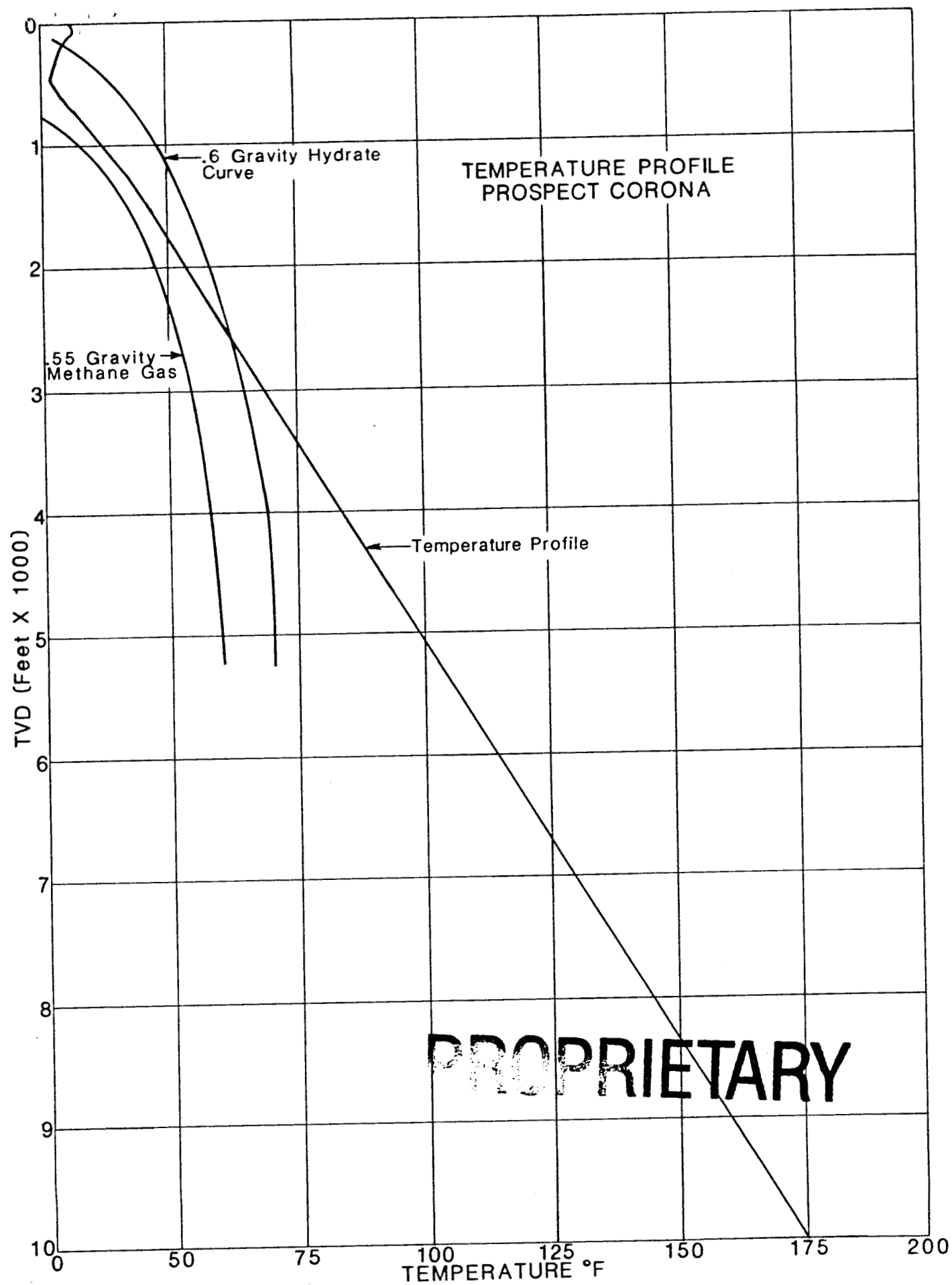
Pump an estimated 1500 sx of Class "G" + .75% CFR-2 + .3% Halad 22A + \_\_\_% KCL mixed at 15.8 ppg with a 1.15 ft<sup>3</sup> /sk yield and 5.0 gallons of fresh water per sack.

Run 100 Bbls of weighted spacer.

\* CONDITIONS AND TEST REQUIREMENTS

- \* Cement into 9 5/8" casing shoe
- \* BHST = 205°F
- \* Cement brought up to temperature in 52 minutes (Mix 6 bbl/min disp 9 bbl/min)
- \* Total time for job = 1:33 hours (mix 5 bbl/min disp 8 bbl/min) + 5 min
- \* Conventional 2 plug cement job
- \* Two float collars to be run
- \* Estimated cement volume = 1725 CF (100% excess to gage hole)
- \* Water loss less than 75cc at 200° F
- \* Ultimate compressive strength above 2000 PSI at 6000' KB
- \* BHST @ 6000' KB = 112°F
- \* Provide 12 and 24 hour compressive strengths at 6000' and 12,000' KB
- \* Total thickening time between 2.5 and 3.5 hours (repeat tests)
- \* Production quality cement
- \* Need 20-30 minute gel transition times
- \* No free water
- \* Run thickening time and transition time tests on the final slurry mixed 1 ppg heavy and 1 ppg light.

NOTE: A 500' column of cement must be run above the top of any hydrocarbon zone. If cement columns into previous shoe are not high enough to meet the 500' requirement, amount of cement pumped will be increased except on liners.



EVALUATION PROGNOSIS  
CORONA PROSPECT  
SHELL OCS-Y-871 #1

GENERAL: A three man (Anadrill) mud logging unit will be operational from spud to TD. Total gas, C1-C5 chromatography and H2S detection will be operational. Calibrations will be made each 24 hours for each gas detection system. Two MWD tools will be operational, Anadrill's MWD and Baroids RLL, from the 20" conductor pipe to TD. Two open hole logging runs (Schlumberger) are planned. In addition to conventional logs, the Phasor Induction (DIT-E), Array Sonic (SDT), Stratigraphic Dipmeter (SHDT), Repeat Formation Tester (RFT) and Sidewall Cores (CST) will be run.

MUD LOGGING (Anadrill's Advisor System)

Gas Detection: The gas detection system will consist of the following with individual backups.

- A. Total gas analysis. Flame Ionization Detector (FID)
- B. C1-C5 gas chromatography. FID/w HP peak integrator.
- C. H2S detection: General Monitors-Metal Oxide Type  
Delphian Mud Duck - Ion Selective Electrode.

Gas Calibration: All instruments are to be calibrated once each tower (every 12) hours with a suitable gas sample.

- A. Chromatograph: A standard containing methane, ethane, propane, isobutane, normal butane, and pentane. The normal standard should contain a concentration of .25% of each gas in nitrogen or air.
- B. Total Hydrocarbon Analyzer: A mixture of 2.0% and 20% methane in air or nitrogen. The C1-C4 component mixture can be used for the high range and calculation made on the basis of methane equivalents.

Cuttings Samples: An appropriate number of samples will be collected from spud to TD. These will include:

- A. Unwashed samples at 30-foot intervals (10-foot intervals in slow drilling).
- B. Washed and dried cuttings at 30-foot intervals (10-foot in slow drilling).

The unwashed cutting samples will be collected in bulk containers at the well site and shipped to Anadrill's facility in Anchorage where the samples will be split, dried, bagged and sent to partners. A set of samples will be available for examination by geologic personnel at the well site.

GEOCHEMICAL SAMPLES: Two type samples will be collected.

A. Canned geochem samples at 90-foot intervals.

B. Gas samples will be collected from gas flowline to D.O.T. pressure vessels during significant oil/gas shows.

Additional services provided by Anadrill's computerized "Advisor System" interfaced with Anadrill's MWD tool:

1. Formation Log: Including drill rate, lithology description, total gas and chromatographic gas analysis with FID chromatograph, hydrocarbon show evaluation.
2. Surface Measurements: depth, WOB, mud temperature in/out, conductivity in/out, pit volumes, pump strokes, rotary speed and torque, mud weight in/out, pump pressure, flow rates, casing pressure, hookload, shale density.
3. Engineering programs and cross-plotting routines.

Mudlogging unit will be staffed as follows:

2 advisor system (computer) operators (one each tower)  
2 sample loggers (geologist) (one each tower)  
2 (minimum) sample catchers

#### OPEN HOLE WIRELINE LOGS (Schlumberger)

Two open hole logging runs are planned. A petrophysical engineer will be present to supervise all log runs.

Given acceptable hole conditions and time, logs will be run in the following order:

TENTATIVELY NO LOGGING RUNS PLANNED IN 17-1/2" HOLE.

**PROPRIETARY**

RUN #1 @ 6000'KB (12 1/4" HOLE) (Approx. time 36 hrs.)

1. DIT-E/MSFL/SDT/GR/AMS (waveforms included)
2. LDT/DNL/NGT-D/ML/AMS
3. CST/GR (Approx. 2 runs of sidewall samples)
4. RFT/GR (pressure sets and fluid samples)
5. SHDT/AMS

RUN #2 @ 10000'KB (8-1/2" HOLE) (Approx. time 36 hrs.)

As above, if shows are encountered plus CHECK SHOT SURVEY.

\*Various calipers are present on several tools (Density, Microlog, and Dipmeter)

\*Sidewall samples will be described and shipped to P.T.S. Laboratories in Anchorage.

Open hole Schlumberger logging personnel:

- 2 Schlumberger Engineers.
- 2 Schlumberger Operators.

#### MEASUREMENT WHILE DRILLING (MWD)

MWD tools will be used to replace and supplement conventional open hole wireline logging data and provide real time petrophysical and geological info.

Anadrill's (MWD) will provide for the following real time evaluation data acquisition:

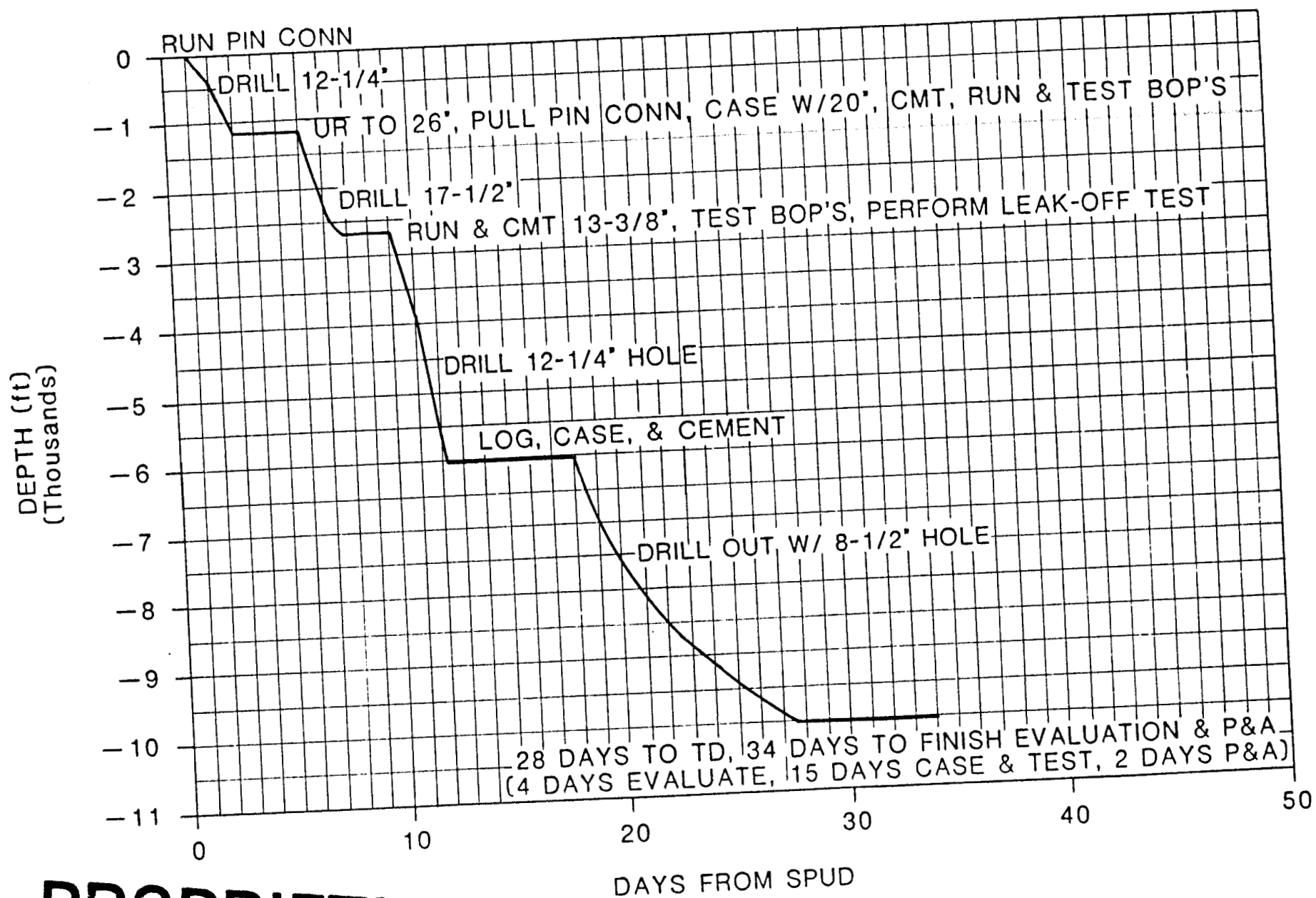
- A. 16" short normal resistivity
- B. Scintillation detection gamma ray.
- C. Personnel includes two equipment operators.

Baroid will supplement the MWD data acquisition with a downhole recorder:

- A. Electromagnetic Wave Propagation (EWR) resistivity.
- B. Geiger Mueller detector gamma ray.
- C. Personnel includes one equipment operator.

# PROPRIETARY

# CORONA DAYS vs DEPTH



**PROPRIETARY**



**Shell Western E&P Inc.**

801 West Fifth Avenue • Suite 810  
Anchorage, Alaska 99501

May 16, 1985

U. S. Department of the Interior  
Minerals Management Service  
Alaska OCS Region  
ATTN: Brian Schoof  
P. O. Box 101159  
Anchorage, Alaska 99510

Gentlemen:

Please find the enclosed three copies of an Application for Permit to Drill (APD) for Shell Western E & P Inc. (SWEPI) et al OCS Y-871 #1. The well is located in the Beaufort Sea, 24 miles WNW of Barter Island. This well will be drilled with the CANMAR drillship, the Explorer II. The spud date is expected to be around September 20, 1985. This date is, however, dependent upon the fall whale migration.

We request departure from MMS-OCS 1 standard, subsection 5.2.5 Personal Protective Equipment. Based on the temperature, pressure gradients, and rock types expected on this well, it is extremely unlikely that H<sub>2</sub>S will be encountered in quantities dangerous to personnel or equipment.<sup>2</sup> These assumptions are based on the information on the wells in the area and SWEPI's analysis of H<sub>2</sub>S generating mechanisms in other clastic sedimentary sequences. In any event, H<sub>2</sub>S detection and monitoring equipment, and a large variety of protective breathing apparatus are available on the rig, as specified in the enclosed "H<sub>2</sub>S Contingency Plan".

The relief well drilling agreement between CANMAR and SWEPI is enclosed. As you will note, there will be three CANMAR drillships that could be called upon to drill a relief well. This provides a solid contingency for our Eastern Beaufort Sea operation.

Additional information on the drilling plan is attached and as usual, we request that the attached information (with the exception of the public information) be held confidential. We would appreciate your usual expeditious handling of this attachment.

Very truly yours,

for: G. O. Anderson  
SEC Manager  
Pacific Frontier Division

DEPARTMENT OF THE INTERIOR  
MINERALS MANAGEMENT SERVICE

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

TYPE OF WORK

DRILL ☒

DEEPEN ☐

PLUG BACK ☐

TYPE OF WELL

OIL WELL ☐

GAS WELL ☐

OTHER Wildcat

SINGLE ZONE ☐

MULTIPLE ZONE ☐

NAME OF OPERATOR

Shell Western E & P, Inc.

ADDRESS OF OPERATOR (When form is completed)

601 West Fifth Avenue, Suite 810, Anchorage, AK 99501

1. LOCATION OF WELL (Report location in accordance with instructions)  
At surface Lat. 70° 18' 52.56" N Long. 144° 45' 31.64" W

As proposed prod. zone

UTM Zone 6 x=584,246.081 M y=7,802,334.601 M

12. DISTANCE IN MILES AND DIRECTION FROM NEAREST ONSHORE POINT OF DEPARTURE  
24 Miles WNW of Barter Island

13. NO. OF ACRES IN LEASE  
5693.29

14. DISTANCE FROM PROPOSED LOCATION TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.

N/A

15. PROPOSED DEPTH

MD 12,000 TVD same

16. RIG NAME & TYPE

Explorer II (Drillship)

17. ELEVATIONS (Show whether DF or RKB)

39' RKB

18. WATER DEPTH

119'

19. APPROX. DATE WORK WILL START

September 20, 1985

20. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE AND GRADE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT (CU. FT.)
36"	30" Structure Pipe	310 #/foot	358'	1250 C.F. to glory hole
26"	20" K-55 VETCO LS	133 #/foot	1158'	2960 C.F. to glory hole
17 1/2"	13 3/8" L-80 BT&C	72 #/foot	2650'	1390 C.F. 250' into 20"
* 12 1/2"	9 5/8" L-80 LT&C	53.5 #/foot	6000'	1530 C.F. 250' into 13 3/8"
9 7/8"	7" L-80 LT&C-ABC &/or L-80 FL4S	26#/foot	10,000'	3160 C.F. 400' into 13 3/8"
		26#/foot	10,000'	

\* contingency casing.

\*\* test casing.

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM. GIVE BLOWOUT PREVENTER PROGRAM AND MUD PROGRAM OR ATTACH DRILLING PROGNOSIS CONTAINING INFORMATION REQUIRED BY OCS ORDERS.

21. SIGNED

TITLE Sr. Staff Environmental Engineer DATE 5-16-85

(This space for Federal or State office use)

PERMIT NO.

APPROVAL DATE

APPROVED BY

TITLE

DATE

CONDITIONS OF APPROVAL, IF ANY:



MM:DO

United States Department of the Interior  
MINERALS MANAGEMENT SERVICE  
ALASKA OCS REGION

Building Address P.O. Box 30110  
Anchorage, AK 99510

May 23, 1985

Shell Western E&P Inc.  
Attn: G. J. Anderson  
601 West Fifth Avenue, Suite 8103.  
Anchorage, AK 99501

Gentlemen:

This office has completed a review of your Application for Permit to Drill (APD) for OCS-Y 0871, Well No. 1, in Sale 87 area of the Beaufort Sea. Additional information or actions needed to further process this application is listed below.

1. Proposed Depth of 12,000'.

Your casing, BOP, mud and other well programs and charts are based on a proposed 10,000' well. Prior to drilling below this depth, you will be required to submit to the Minerals Management Service (MMS) all relevant data and information covering the extended interval of the well.

2. Well Control Training For Rotary Helper and Derrickman Levels).

The training and subsequent onsite weekly drills have to be conducted under an MMS approved plan. The classroom portion of this training could be conducted onsite in U.S. waters, or at an approved Rotary Helper and Derrickman School in the U.S.

Please contact Mr. B. J. Schoger or Marty Courtois of our Branch of Monitoring and Penalties Section at our Headquarters Office in Reston, Virginia, if you have any questions regarding "Well Control Training Programs" approval or requirements. Their phone number is: (703) 860-7506

3. Critical Operations and Curtailment Plan.

Please indicate what will be the amount of tension you will apply to the anchors and relocate these values to the critical operations and Curtailment Plan.

CC: GJA  
DLV  
BOK  
RLC  
SEC File


4. Hydrogen Sulfide Contingency Plan.

a. The H<sub>2</sub>S standard GSS-OCS-1, now MMSS-OCS-1, states in part: "All personnel on a drill facility in H<sub>2</sub>S and SO<sub>2</sub> environment shall have immediate access to a pressure-demand type respirator stored in accordance with 5.2.5(b)." Please indicate the storage location of the breathing respirators.

b. Your cover letter requested a departure from MMSS-OCS-1 Subsection 5.2.5, Personal Protective Equipment. We have reviewed the Hydrogen Sulfide Contingency Plan and are unsure what departure you are seeking. Please clarify your departure request.

The geohazard report and other seismic data will be addressed as needed under separate cover.

Sincerely,

  
Brian F. Schoof  
Supervisor, District Office  
Field Operations

cc: Dave Yesland, Shell Western E&P, 601 W. 5th Ave.,  
Ste. 810, Anchorage, AK 99501

Note to MMS:

While 10,000' is the expected TD for this well, we wish to permit the well for 12,000' TD. Extension of well beyond 10,000' will be based on information obtained at or below 6,000'.

It should also be noted that evaluation and hole sizes indicated in the prognosis may be changed to effect time savings in order to reach objectives prior to ice up, whale migration, etc. (eg. 17-1/2" hole might be drilled in one run below 20" casing and the logging program shortened in order to get 13-3/8" casing in the ground prior to ice up or whale migration).

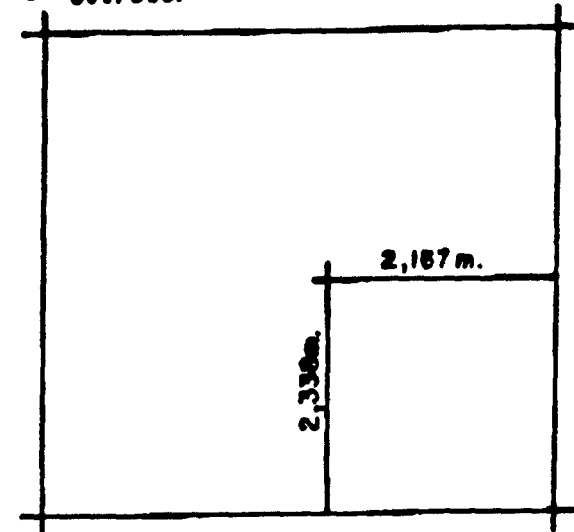
We would like to point out that SWEPI has adopted Union Oil of California's Critical Operations and Curtailment Plan; Hydrogen Sulfide Contingency Plan; Waste and Pollution Control Guidelines; and Welding, Burning, and Hot Tapping Safe Practices and Procedures Plan. We feel it is important that Union's and SWEPI's plans be as similar as possible in order to avoid confusion which might occur if operatorship of the Explorer II was changed over from Union to SWEPI in the 1985 drilling season.

RLC/b1

# BLOCK 878

N=7,804,808.  
E= 801,808.

N=7,804,808.  
E= 808,408.



N=7,808,008.  
E= 801,808.

N=7,808,008.  
E= 808,408.



1"=2000 METERS

## NOTES

1. LOCATION OF WELL SITE WAS ACCOMPLISHED BY USE OF A DEL NORTE TRIANGULAR WAP SYSTEM WITH THREE RANGES FROM STATIONS: BRANGLON, RACON, CAMDEN RMI, AND SKER UDE.
2. POSITION WAS CONFIRMED WITH 17 S-S PAGES ON A MAGNETIC RE-1000 SATELLITE RECEIVER.
3. ALL DIMENSIONS AND COORDINATES ARE IN METERS UNLESS NOTED OTHERWISE.

OPERATOR..... SHELL WESTERN  
RIG..... EXPLORER II  
AREA..... CAMDEN BAY  
BLOCK..... 878  
WELL..... CORONA  
DATE..... OCTOBER 4, 1985  
HEADING..... 082 DEGREES TRUE

U.T.M. COORDINATES. ZONE 09

N= 7,802,338.  
E= 804,233.

GEODETTIC POSITION, MAD-27

LAT. N 70 18 52.87  
LONG. N 144 48 32.88

## WELL LOCATION DESCRIPTION

2167 METERS WEST OF THE EAST LINE  
AND 2338 METERS NORTH OF THE SOUTH LINE.  
BLOCK 878, OCS PRODUCTION DIAGRAM  
MA 8-4, ALASKA.



## CERTIFICATE OF SURVEYOR

I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA AND THAT THIS PLAN REPRESENTS A LOCATION SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL DETAILS ARE CORRECT.

DATE 10/12/85 SURVEYOR Stanley E. King

LOCATION SURVEY FOR

CORONA

LOCATED IN THE CAMDEN BAY AREA  
SURVEYED FOR

DOMESTIC PETROLEUM

SURVEYED BY

ITEC-1

INTERNATIONAL TECHNOLOGY LIMITED  
DENVER, COLORADO ANCHORAGE, ALASKA HOUSTON, TEXAS

# DOME PETROLEUM LIMITED

BOX 200  
CALGARY, ALBERTA, CANADA  
T2P 2H8

(403) 231-3000

1986 04 22

Shell Western E & P Incorporated  
601 West Fifth Avenue  
Suite 810  
Anchorage, Alaska

Attention: Mr. P. Woodson

Dear Sir:

## RE: 1986 RELIEF WELL CAPABILITY FOR U.S. BEAUFORT SEA OPERATIONS

Further to our recent discussions between representatives of Dome Petroleum Limited ("DOME") and Shell Western E & P Inc., ("SHELL"), DOME is prepared to provide SHELL, one of the drillships (Explorer I, Explorer III or Explorer IV, herein called "drillship") for the purposes of providing relief well capability to support SHELL's 1986 U.S. Beaufort Sea operations with the Explorer II drillship, upon the following terms and conditions:

1. DOME shall, for the purposes of supplying relief well capability to support SHELL's 1986 U.S. Beaufort Sea operations utilizing the Explorer II drillship, supply to SHELL as requested, a drillship during the 1986 Beaufort Sea drilling season.
2. DOME shall supply the drillship upon terms and conditions and at rates to be agreed upon between DOME and SHELL based upon the philosophy that DOME and its contractor shall be kept whole with respect to the contract in place covering the use of the drillship supplied hereunder.
3. SHELL shall supply to DOME, as requested, the Explorer II drillship, on a reciprocal basis, for the purposes of supplying relief well capability to support DOME's 1986 Canadian Beaufort Sea operations, during the 1986 Beaufort Sea drilling season.
4. SHELL shall supply the drillship upon terms and conditions and at rates to be agreed between SHELL and DOME based upon the philosophy that SHELL and its contractor shall be kept whole with respect to the contract in place covering the use of the drillship supplied hereunder.

5. DOME and SHELL shall supply each to the other, in the case of DOME a drillship and in the case of SHELL the Explorer II drillship, for the purposes of drilling a relief well, upon request, unless such drillship or the Explorer II drillship be at such time already engaged in relief well drilling operations.
6. In the extreme event SHELL is required to drill a relief well, DOME will make available to SHELL, all sub-sea wellhead equipment B.O.P. stack, well casing and consumables required for the relief well, from DOME's emergency supplies in Tuk or McKinley Bay.

If the above accurately sets forth your understanding of the agreement reached between DOME and SHELL, please so indicate by dating and signing the enclosed copy of this letter and returning same to us.

Regards,



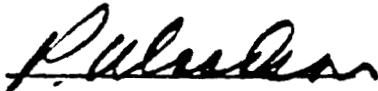
Percho

Vice President - Canmar

Accepted and Agreed to:

SHELL WESTERN E & P INC.

By:



Title: Division Operations Manager

Date: May 1, 1986

ADJ:11g



## CONTINGENCY PLAN FOR HANDLING SHALLOW GAS FLOWS

### I. 36" Support Pile Hole (In Place)

### II. 26" Conductor Casing Hole

- A. A pin connector/riser system will be installed after drilling 25' out of the 30" casing. A diverter and annular preventer will be hooked up at surface and function tested.
- B. A 12-1/4" hole will be drilled below the 30" shoe with returns brought to the surface. Returns at surface will be monitored using standard drilling procedures for detecting kicks.
- C. If a flow is detected, the wind direction will be determined, the downwind diverter line will be opened and the upwind line closed, and then the annular preventer will be closed.
- D. After closing the annular preventer, the pump's suction will be switched to the pit of kill mud and the hole will be filled as fast as possible.

### III. 17-1/2" for Surface Casing

- A. After running the 20" casing, the BOP stack and riser will be run.
- B. A 17-1/2" hole will be drilled out of the 20" to a depth of 2,700', and 13-3/8" casing run. Returns will be brought to surface and will be monitored for signs of a kick.
- C. If a small influx is detected early, the driller may opt to shut well in and perform a conventional kill. The Soft Shut-In technique will be used. If it is apparent that the shut-in pressure will exceed the 20" shoe's integrity, the well will either be opened to the diverters or maximum allowable back pressure will be held while 11 ppg kill mud is pumped around.
- D. If the flow is to be diverted, the wind direction will be determined, the downwind diverter line will be opened and the upwind line closed. The Regan Annular preventer at surface will then be closed.
- E. A 500 bbl pit of 11 ppg of kill mud will be kept at all times until the 13-3/8" casing is run.