BHP Petroleum (Americas) Inc

MEMORANDUM

FROM: Paul Bertoglio
N.D. Thomas

Date: January 14, 1986

TO: Reg Orr

Subject: Utah International
LaPlata Mine Deep Water Well
Final Drilling Prognosis

N.D. Thomas, T.C. Durham, and I met with representatives of Utah International, Arapahoe Drilling, and Mr. John Shomaker, a water well consultant hired by Utah, on 1-7-86 at the San Juan Mine. This final drilling prognosis is based partially on Mr. Shomaker's experience with the drilling of the Morrison. By modifying and using Mr. Shomaker's recommendations, the overall drilling and completing cost will be reduced by approximately $76,000 ($484,000 to $408,000 - Case I); however, the dry hole cost will increase from $309,000 to $381,000 (Case I). Barring any unforeseen problems, this well should be spud by 1-17-86.

Mr. Shomaker's Recommendations:

Mr. Shomaker's experience with Morrison water wells indicates the long term productivity of the Morrison will be hindered by foreign fluids. With the mine's life expected to be 32 years, Mr. Shomaker recommended the best procedure to ensure the maximum long term productivity of this well would be to set the 7" casing at the top of the Morrison thick sand and drill the sand with a cable tool rig. A slotted liner would then be hung across the sand. Drawdown testing of the well would be accomplished by either jetting via a tubing string or a coiled tubing unit.

Final Well Prognosis

Both of the attached costs estimates and the well prognosis are similar to those attached to the 10-4-85 memo except they have been adjusted for Mr. Shomaker's recommendations and all depths adjusted due to the hole being moved down dip as shown on the structural map (attached).

Additionally, rather than use a cable tool rig, we recommended the sand be drilled with the rotary rig using air and then converting to mist or foam as required once water starts entering the hole. Dan Hayhurst with Utah discussed this procedure with Mr. Shomaker on 1-10-86 and he had no objections. The use of the rotary rig is recommended for the following reasons:

1. Safety: Should any unexpected gas be encountered, the rotary rig will have Blowout Prevention Equipment (BOPE) on the well for diversion and control.

2. Time: The rotary should be able to complete the drilling in 2 to 3 days versus at least 20 to 30 days for the cable tool rig.

3. Economics: The rotary rig will cost approximately $15,000 (3 days) to T.D. the well versus approximately $50,000 (25 days) for the cable tool rig.

4. Formation Damage: The use of mist or foam will have even less hydrostatic pressure applied on the formation than the cable tool rig.

5. Less Risk of Downhole Problems: Because this hole will undoubtably be crooked, the chance of the cable breaking on the cable tool rig becomes much greater. A fishing job to recover the drilling line could be very expensive and time consuming.

6. Testing: The drawdown test on the Morrison could be performed using the drill string and the air compression equipment used to drill the sand. This will be more economical and less time consuming.

Conclusions

The procedure recommended by Mr. Shomaker will reduce the total drilling and completing costs from $484,140 to $407,840 for Case I and from $590,915 to $517,000 for Case II. The one drawback to this procedure will be the minimum dry hole cost (Case I) will increase from $308,700 to $380,900 due to the fact the 7" casing will be required to be set and cemented to the surface prior to drilling the Morrison Sand. After reviewing additional offsetting well records, we feel the Case I prognosis can be accomplished.

Please advise if you have any questions.

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LA PLATA MINE DEEP WATER WELL
SW SE SECTION 23 T32N-R13W
SAN JUAN COUNTY, NEW MEXICO

DRILLING PROGNOSIS

1) Surface Formation: Kirtland

2) Estimated Formation Tops:

Pictured Cliffs	-	1850'
Mesa Verde	-	3550'
Mancos	-	4450'
Gallup	-	5550'
Dakota	-	6500'
Morrison	-	6750'
Morrison Sand	-	7250'
Total Depth	-	7600'

3) Casing:

Case I
Surface - 300' of 13 3/8" 54.50# K-55 in a 17 1/2" hole.

Production - 7250' of 7" 20#, 23# and 26# K-55 in a 8 3/4" hole.

Slotted Liner - 4-1/2" 10.5# K-55 7200' to 7600' in a 6-1/8" hole.

Case II
Surface - 300' of 13 3/8" 54.5# K-55 in a 17 1/2" hole.

Intermediate - 4600' of 9 5/8" 36# K-55 in a 12 1/4" hole.

Liner - 7" 23# and 26# from 4500' to 7250' in a 8 1/2" hole.

4) Cement:

Case I
Surface - 350 sx Class "B" w/2% $CaCl_2$ & 1/4#/sx Flocele

Production - 3 stages: 1st - 7250'-5400' 275 sx 50-50 Pozmix w/2% gel, 0.5% FR-10, and 1/4#/sx Flocele; 2nd - 4600'-3200' 200 sx 65-35 Pozmix w/3% gel, 10% salt, 10% Cal Seal, and 12 1/2#/sx Gilsonite followed by 100 sx Class "B"; 3rd - 1950'-surface 325 sx 65-35 Pozmix w/6% gel, 10% salt and 6 1/4#/sx Gilsonite followed by 100 sx Class "B".

Case II
Surface - 350 sx Class "B" w/2% $CaCl_2$, 0.5% FR-10, 1/4#/sx Flocele.

Intermediate - 2 stages. 1st - 4600'-3200' 325 sx 65-35 Pozmix w/3% gel, 10% salt, 10% Cal Seal and 12 1/2#/sx Gilsonite followed by 100 sx Class "B". 2nd - 1950'- surface 525 sx 65-35 Pozmix w/6% gel, 10% salt and 6 1/4#/sx Gilsonite followed by 100 sx Class "B".

Liner: - 7250' to 4500' 300 sx "Lite" followed by 200 sx 50-50 Pozmix w/2% gel, 0.5% FR-10, 1/4#/sx Flocele.

5) Formation Tests:
Drawdown - Morrison Sand.

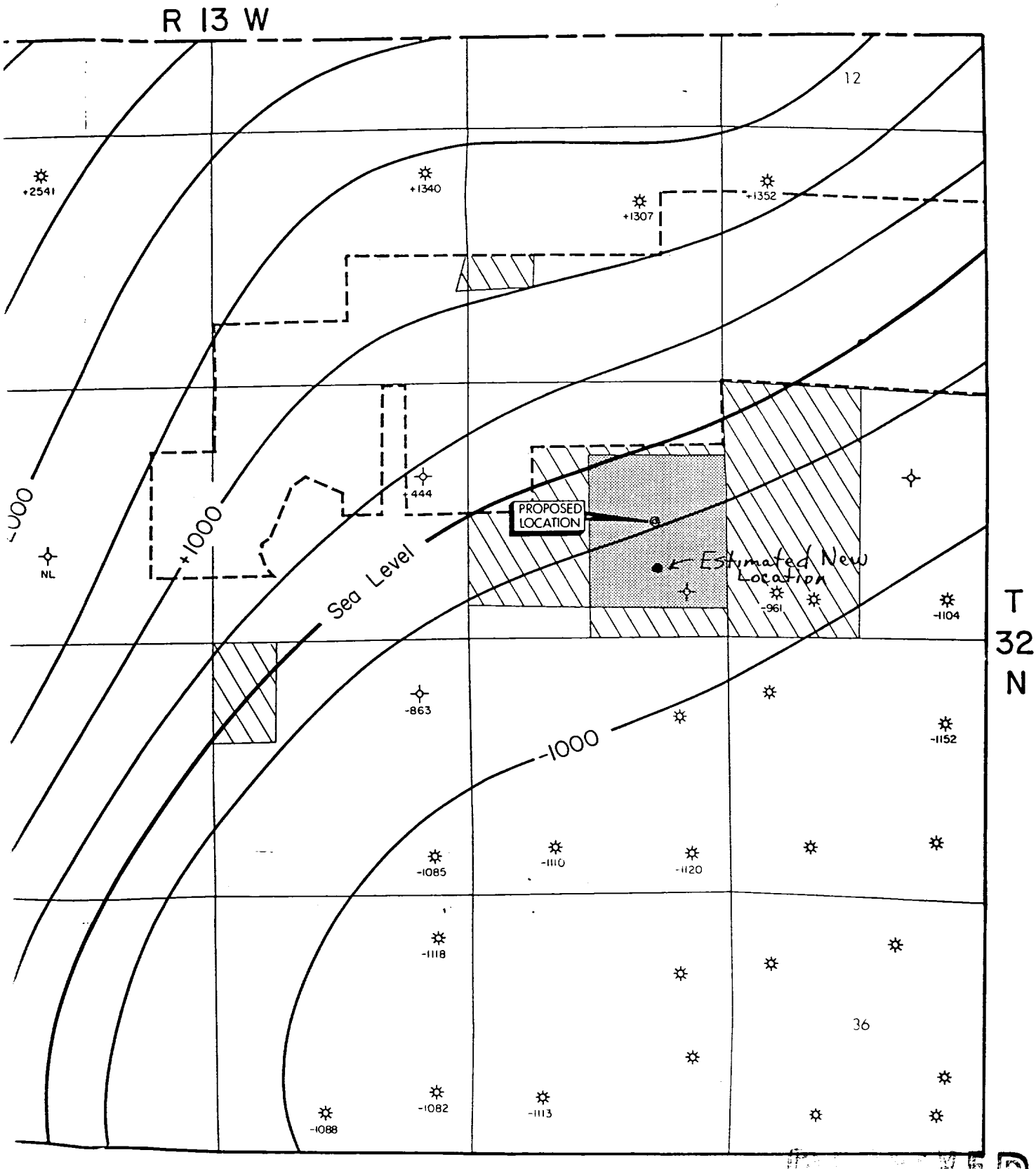
6) Logging Program:
Spontaneous Potential - Induction Electric Log from 7250' to surface or intermediate casing shoe. Spontaneous Potential - Induction Electric Log and Density Log from T.D. to 7" casing shoe.

7) Mud Program:
Fresh water to 2500'. Start mudding up from 2500' to 3000'. Begin adding LCM such that mud contains 10% LCM by 3350'. Drill to 7250' with mud with mud weight 9-9.5#/gal. Drill out from underneath 7" with air, and as water is encountered, convert to mist or foam as required.

8) Abnormal Hazzards or Pressures:
None anticipated.

9) Drilling Problems:
Severe deviation throughout. Possible loss circulation in the Mesa Verde Formation.

10) Completion and Stimulation:
Slotted Liner.



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