EC-25

MEMORANDUM

TO: H. J. Olson

DATE: October 19, 1984

FROM: J. E. Deymonaz

cc: W. M. Dolan
A. P. Wicklund
J. J. King
H. D. Pilkington

SUBJECT: Alum Water Well 67-29
Esmeralda County, Nevada

Attached is the drilling history and well schematic (Fig. 1) for the Alum water well near the proposed TFD site.

As can be seen on the schematic, the static water level is at 610 feet, 30 feet below the casing. While running casing, drag increased with depth and the casing had to be driven below about 550 feet. Due to concerns that thin walled casing might collapse if forced further, no effort was made to drive the casing deeper.

The open hole emits a considerable amount of hot vapors indicating boiling in the well at or above the water level. If the temperature profile is similar to test hole 56-29, located about 50 feet away, temperatures of 100°C exist at the water level. This is about 4°C above boiling at this elevation and would result in minor flashing in the wellbore.

With air lift the well produced a measured flow of 60 gpm. Since most wells will yield more fluids by pumping than with air lift, the well should be capable of pumping 60 - 100 gpm which will be adequate for any drilling operations. Since fluids will need to be extracted from the open hole interval, an air lift method should not be used unless the hole is cased to TD with 4 1/2 inch casing. The lower 175 feet of 4 1/2 inch casing should be slotted if this method is used. To optimize the potential yield of the well, however, either a submersible or jet pump should be used.

After nearly one hour of air lift, the water still had a considerable amount of drilling foam so no water sample was collected. The water is from the same system encountered in nearby 56-29 and the geochemistry from that hole is attached (Table 1) as is the generalized lithology and temperature profile (Fig. 2).

In drilling both 56-29 and 67-29, the pre-Tertiary silicic siltstones below about 350 feet have been very hard and abrasive. Even using downhole hammers, penetration was only 10-20 feet per hour. Bit life was less than 20 hours, in which time they cut less than 200 feet of hole losing inserts and considerable guage in the process. This should be considered in planning the future TFD well. Rather than drilling 1,000 feet of 17 1/2 inch hole as called for in the drilling plan, this should be reduced to approximately 500 feet. If the pre-Tertiary contact is deeper, due to faulting, a general plan to drill about 100 feet into the siltstone unit should be followed.

John E. Deymonaz

JED/jn
attachments

DRILL HISTORY
Alum water well
67-29 (a, b, & c)

9-24 Stevens-Harris crew MOB from Hinkley, Utah to Tonopah, Nevada. Dean Pilkington on site for SRC.

9-25 Rig moved to Alum 67-29a site, set up and drilled a 6 1/4" hole from 0 - 375 feet.

9-26 Lost two cones in hole off rock bit, fished out most of steel with junk basket.

9-27 Abandon 67-29a and moved rig 100' west, set up on 67-29b. Drilled 6" hole with hammer 0 - 235'. Injured helper with pipe wrench, take to Tonopah hospital.

9-28 Drill 6" hole 235' - 375'.

9-29 Drill 6" hole 375' - 550'.

9-30 Stick 6" hammer while reentering hole, twist off, leave two collars, (40') and hammer tool.

10-1 Abandon, 67-29b, move rig 50' east to 67-29c. Set up, drill 12" hole 0 - 19', set and cement 19' of 10" casing.

10-2 No drilling, crew bringing in additional drill pipe and collars.

10-3 Drilling with 8 1/2" hammer 19' - 385'. John Deymonaz relieves Dean Pilkington as SRC representative.

10-4 Drilling with 8 1/2" hammer 385' - 525'.

10-5 Reduce to 8" hammer and drill 525' - 620'.

10-6 Drill with 8" hammer 620' - 705'.

10-7 Reduce to 5 7/8" button rock bit and drill 705' - 775'. Water entries at 712' - 714', 720' - 723', 728' - 733', 734' - 736' and 737' - 739'. Hole making 60 gpm while drillig with air. POH, begin running 6 5/8" OD weld joint casing.

10-8 Complete running casing to 583.5", had to drive last 30" of casing with hammer. RIH to TD, clean hole, air lift water for 30 minutes, POH lay down tools. Cement upper 25" of 6 5/8" casing.

10-9 Weld plate on wellhead, clean up site, release rig at 10:30 a.m.

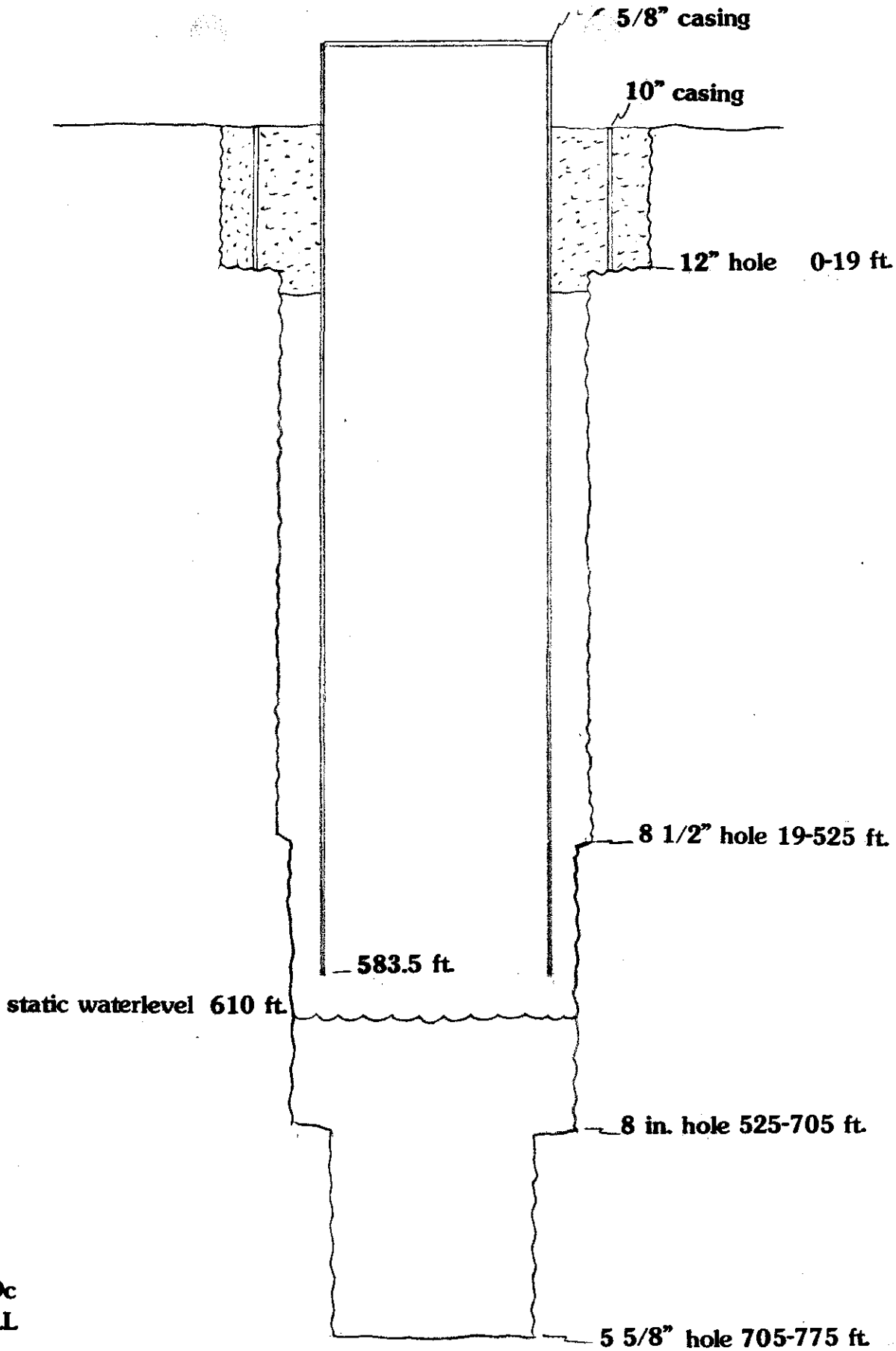
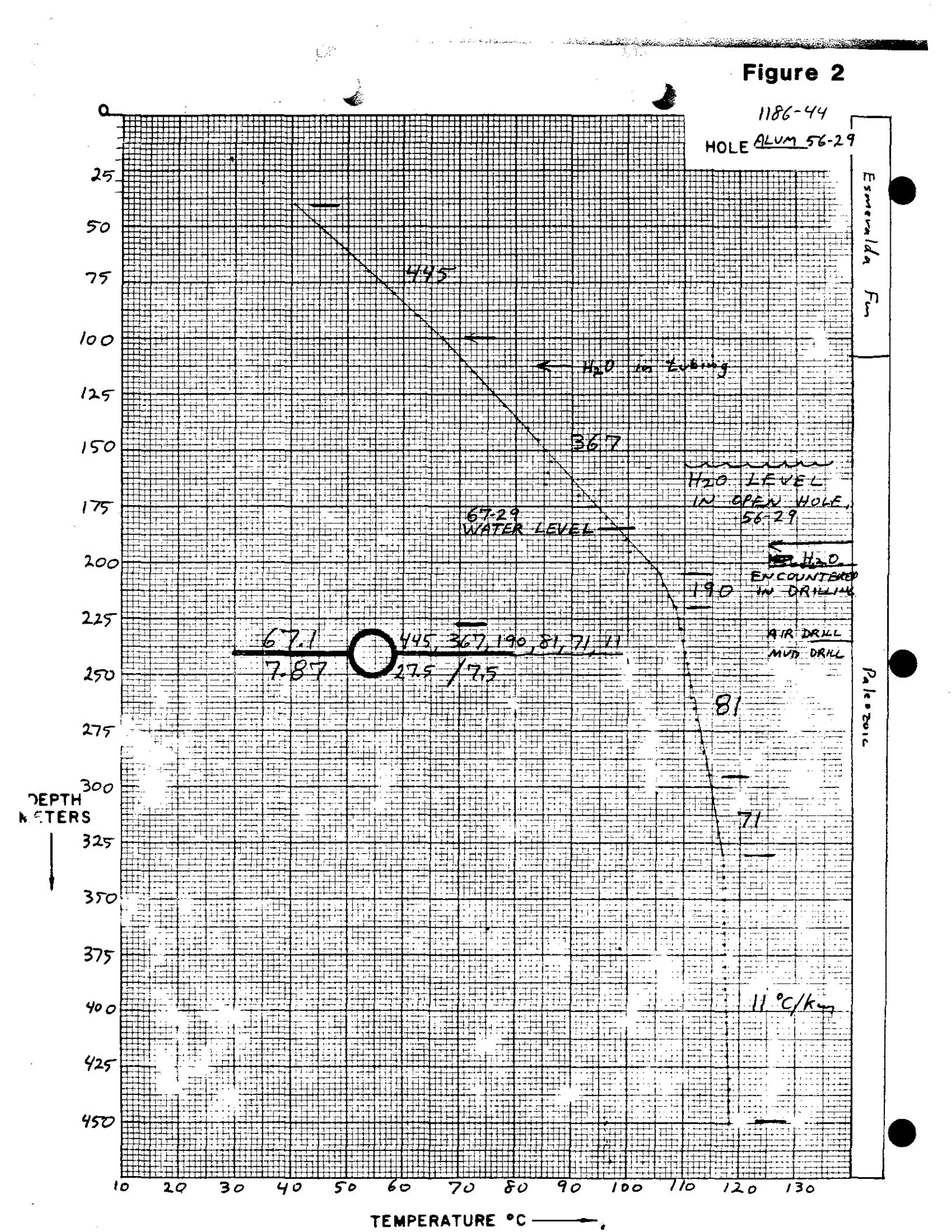


Figure 1

ALUM 67-29c
WATER WELL

Contractor: Stevens-Harris
Rig: Ingersol Rand
Source: J. Deymonaz

Figure 2


1186-44
HOLE ALUM 56-29
Esmeralda Fm
Paleozoic
445
← H2O in tubing
367
H2O LEVEL IN OPEN HOLE, 56-29
67-29 WATER LEVEL
H2O ENCOUNTERED IN DRILLING
190
AIR DRILL
MUD DRILL
67.1
7.87
445, 367, 190, 81, 71, 11
27.5 / 7.5
81
71
11 °C/km
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
DEPTH METERS
10
20
30
40
50
60
70
80
90
100
110
120
130
TEMPERATURE °C

LITHOLOGIC LOG

Project: Alum

Hole: 56-29

Elevation: 5020' Date Drilled: Completed: 12/21/81

Location: NW 1/4 SE 1/4 Sec 29 T1N R38 1/2E Method: air/foam and mud

Geologist: John Deymonaz Gamma:

Depth (m)	Description
0- 41	Esmeralda Fm - Siltstones and Sandstones - Firm to hard, predominantly light green and gray siltstones with minor fine sandstones. Intermittent zones of silicification. Minor iron staining along fractures and minor pyrite along small tight fractures.
41-111	Esmeralda Fm Siltstone - Med. to dark gray siltstones and soft shales. Some swelling in clays at 41m. Minor calcite along rare fractures. Rare pyrite.
111-454	Siltstone - Paleozoic ? section, hard, abrasive dark gray siltstones and shales. Bedding and laminations visible in larger chips. Intermittent fine grained argillaceous sandstones. Pyrite 5-20%, highest amount in upper portions of section. Large (up to 3 cm) pyrite crystals in white mylonite (?) from fault zone from 200m to unknown depth. Significant amounts of 80°C water encountered at 200-205m. Formation appears pervasively fractured.

TABLE 1

Analysis of water sample collected from Alum hole 56-29. Sample W-14298.

Temperature	80°C
Discharge	60gpm
Depth	665-775 feet
Taste	Strong NaCl
Odor	Moderate H_2S
SiO_2	190ppm
Na	2700
K	320
Ca	87
Mg	20
Li	10.0
Cl	4600
F	5.3
HCO_3	12.3
B	33
Mn	150
Mo	15ppb
pH	8.5
Conductivity	13,000mmho/cm
Tqtz no steam loss	176.5°C
Tqtz max steam loss	165.3°C
T chalcedony	154.8°C
TNa-K-Ca	231.7°C
TNa-K-Ca-Mg	149.9°C