U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING

SUBJECT: UPDATE ON FLUID IN USW UZ-14

PRESENTER: RICHARD R. LUCKEY

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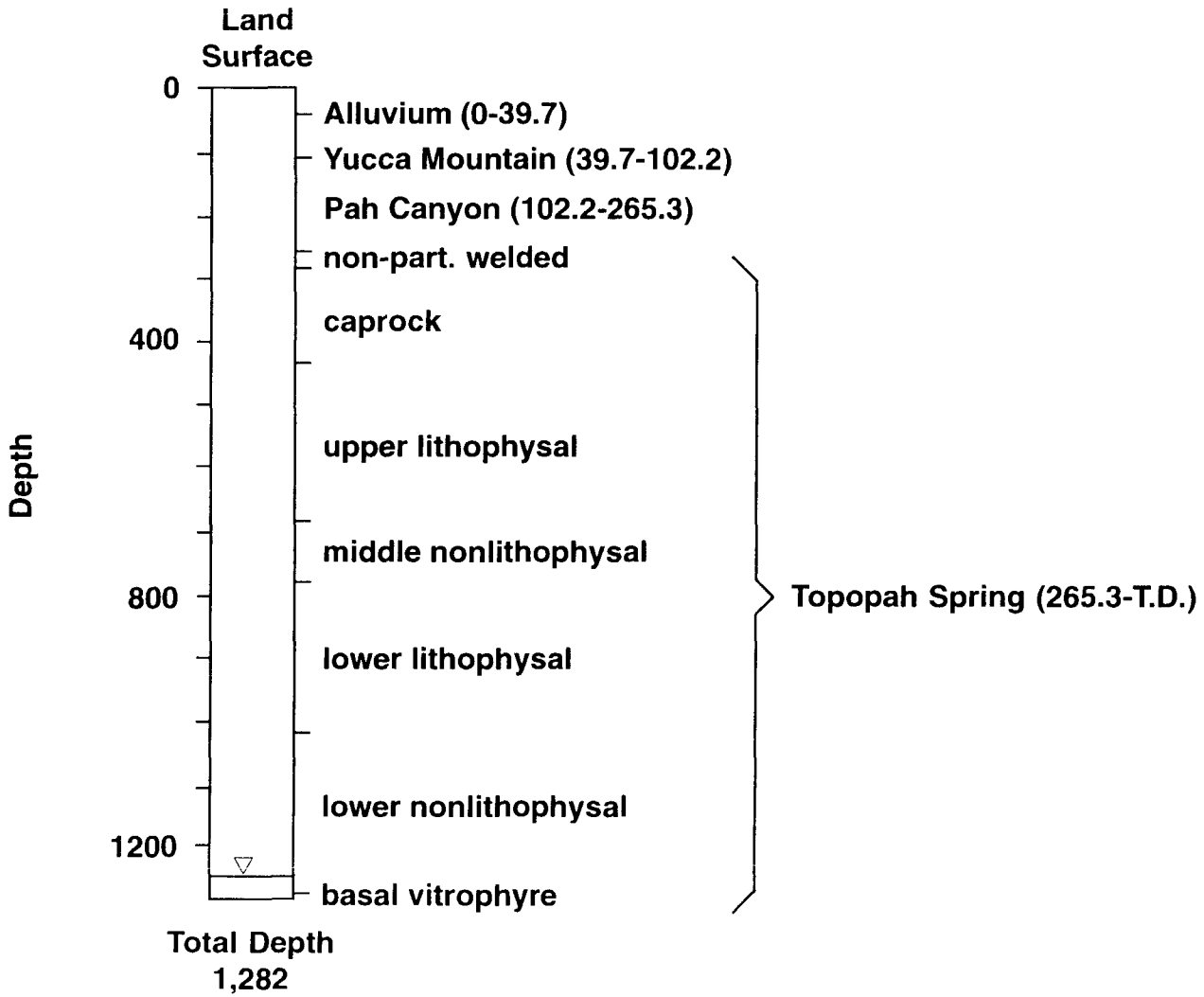
LAS VEGAS, NEVADA
OCTOBER 19-20, 1993

USW UZ-14

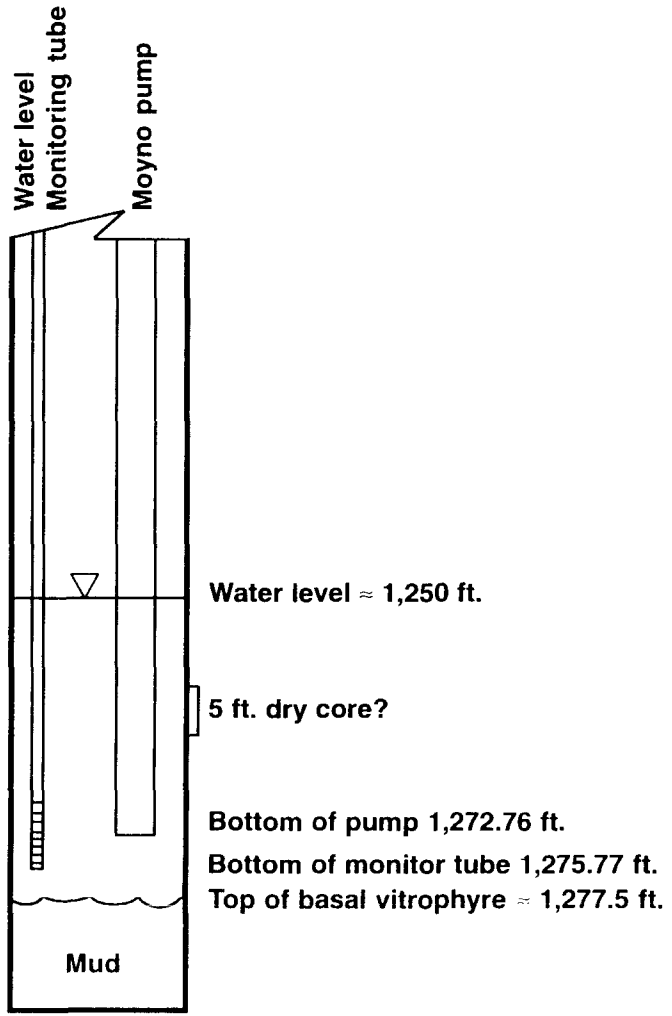
- Fluid encountered 7/30/93 at 1,256.6 to 1,258.5 ft.
- Fluid in lower nonlithophysal unit of Topopah Spring
- Static fluid level about 1,250 ft.
- Fluid bailed for chemical analysis
- Hydraulic tests conducted August 17-27, 1993
- Total depth during hydraulic tests was 1,282 ft.

USW UZ-14
August 1993



SCTUZ142.125.NWTRB/10-19-93

USW UZ-14
August 1993



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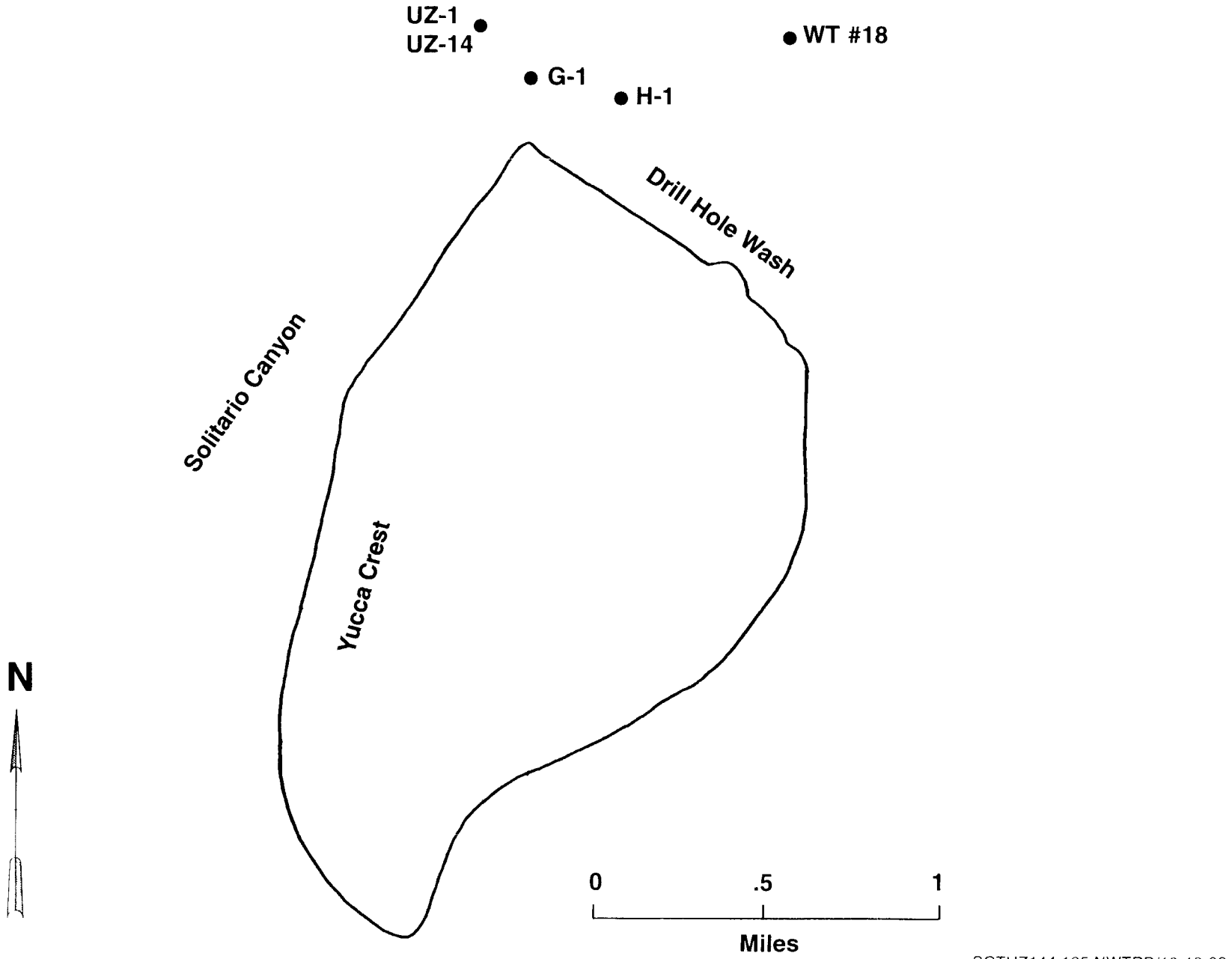

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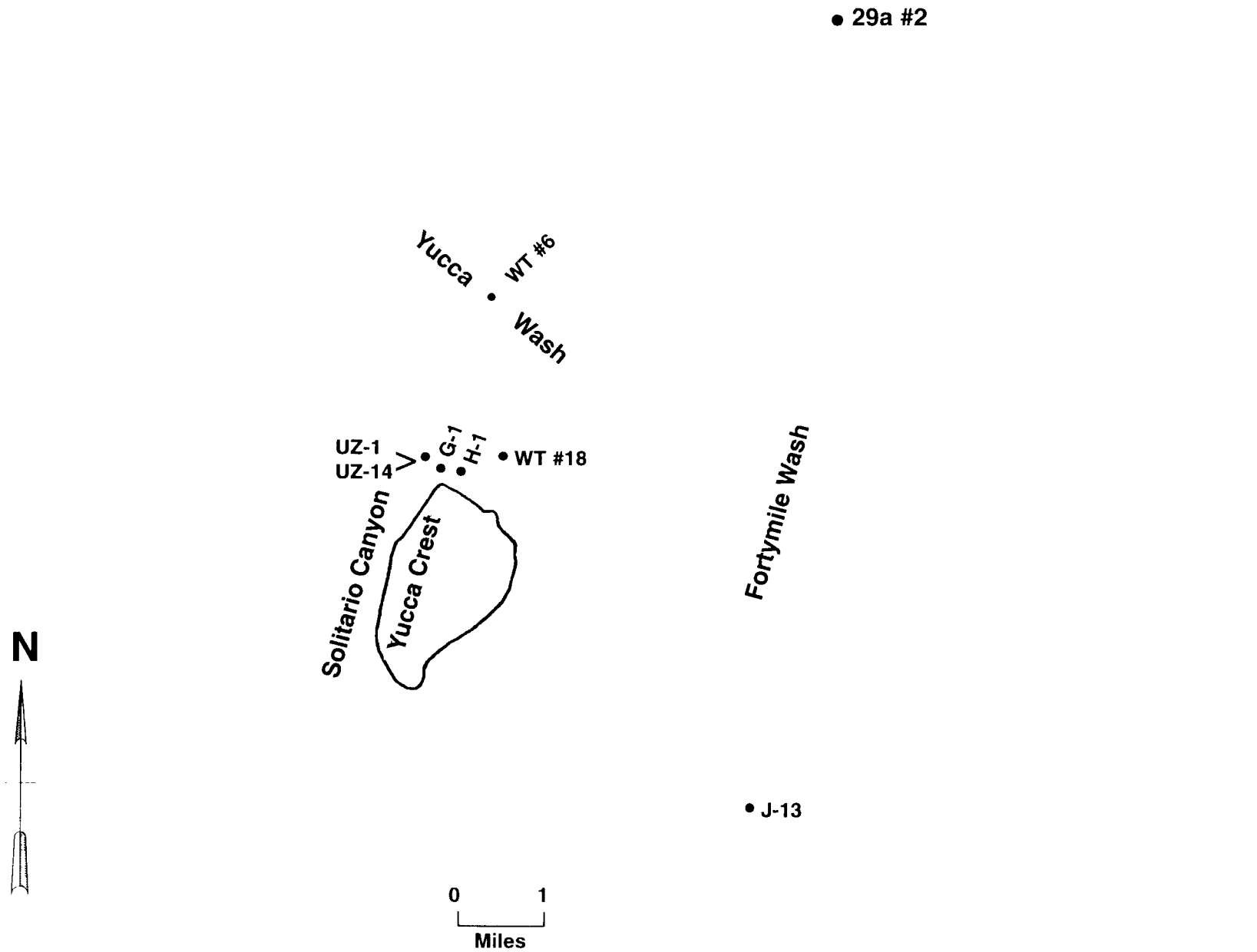


SCTUZ145.125.NWTRB/10-19-93

USW G-1

- Approximately 1,000 ft. SE of UZ-14
- Drilled March-August 1980 with polymer drilling fluid
  - Polymer 1-5% ethoxylated octylphenol, 20-40% hydrotreated light distillate (MSDS)
  - Combined with J-13 water
- Total depth of 6,000 ft.
- Circulation rarely maintained
- 2.4 Million gallons of drilling fluid lost

USW H-1

- Less than 1,500 ft. ESE of G-1
- Drilled September-November 1980 with air-foam
- TV log showed some dripping water in Topopah Spring and Calico Hills
- Depth to water is about 1,878 ft. (730.6 m. above sea level)
- Total depth is 6,000 ft.

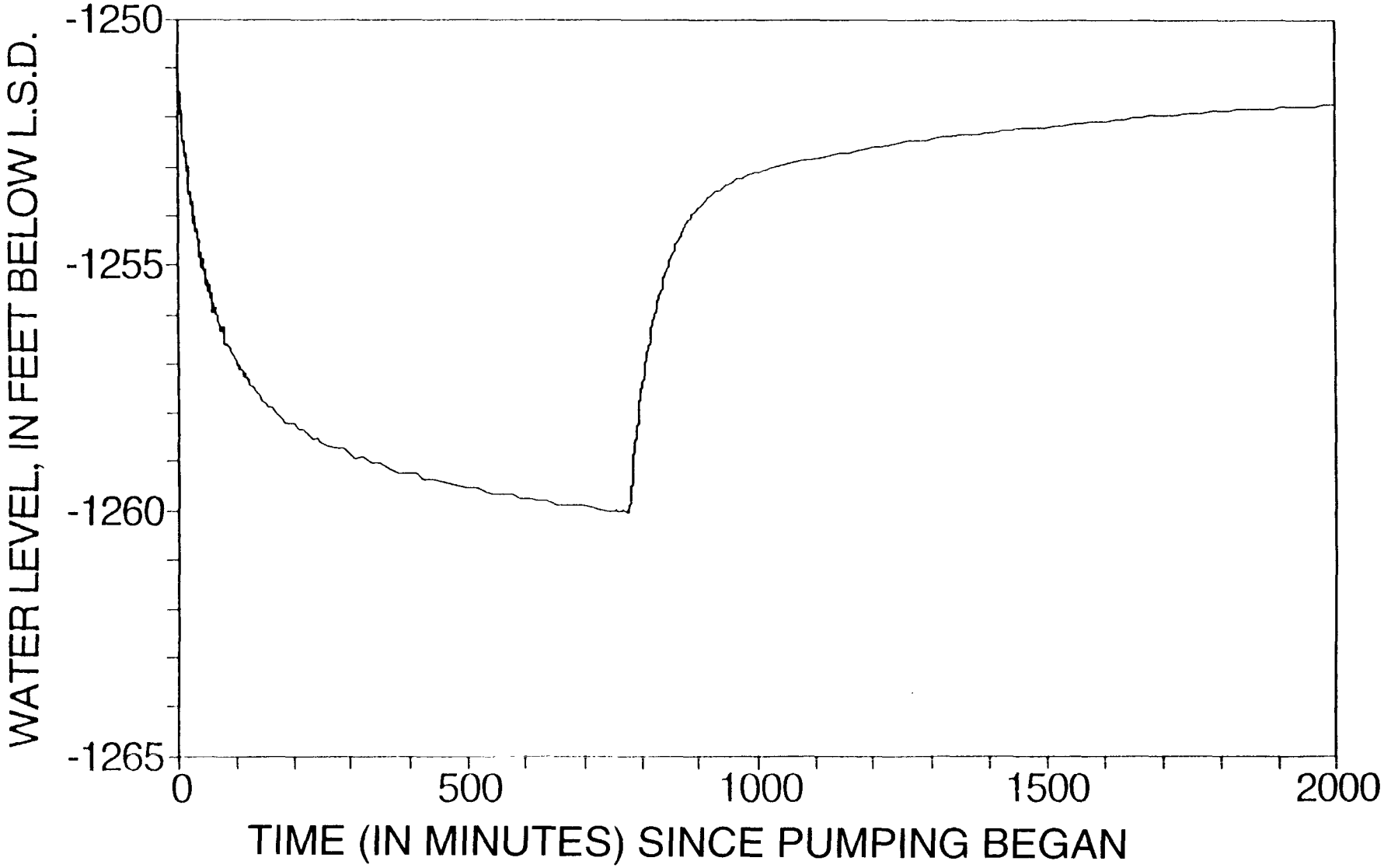
USW UZ-1

- Drilled April-July 1983 with air
- Fluid encountered at about 1,256 ft.
- Final fluid level at about 1,251 ft. (967 m. above sea level)
- Fluid sample collected and analyzed
  - Contained G-1 polymer
- Total depth is 1,270 ft. Terminated because of water and drilling problems

UZ-14 Hydraulic Tests

- #1 8/17/93 13.2 hours 0.91 gal./min.
  - Water level monitoring tube plugged with mud
- #2 8/19/93 13.0 hours 0.90 gal./min.
  - Good test
- #3 8/23/93 9.3 hours 1.87 gal./min.
  - Ended prematurely - excessive drawdown
- #4 8/24/93 66.8 hours 0.93 gal./min.
  - Good test

Test #2
UZ-14



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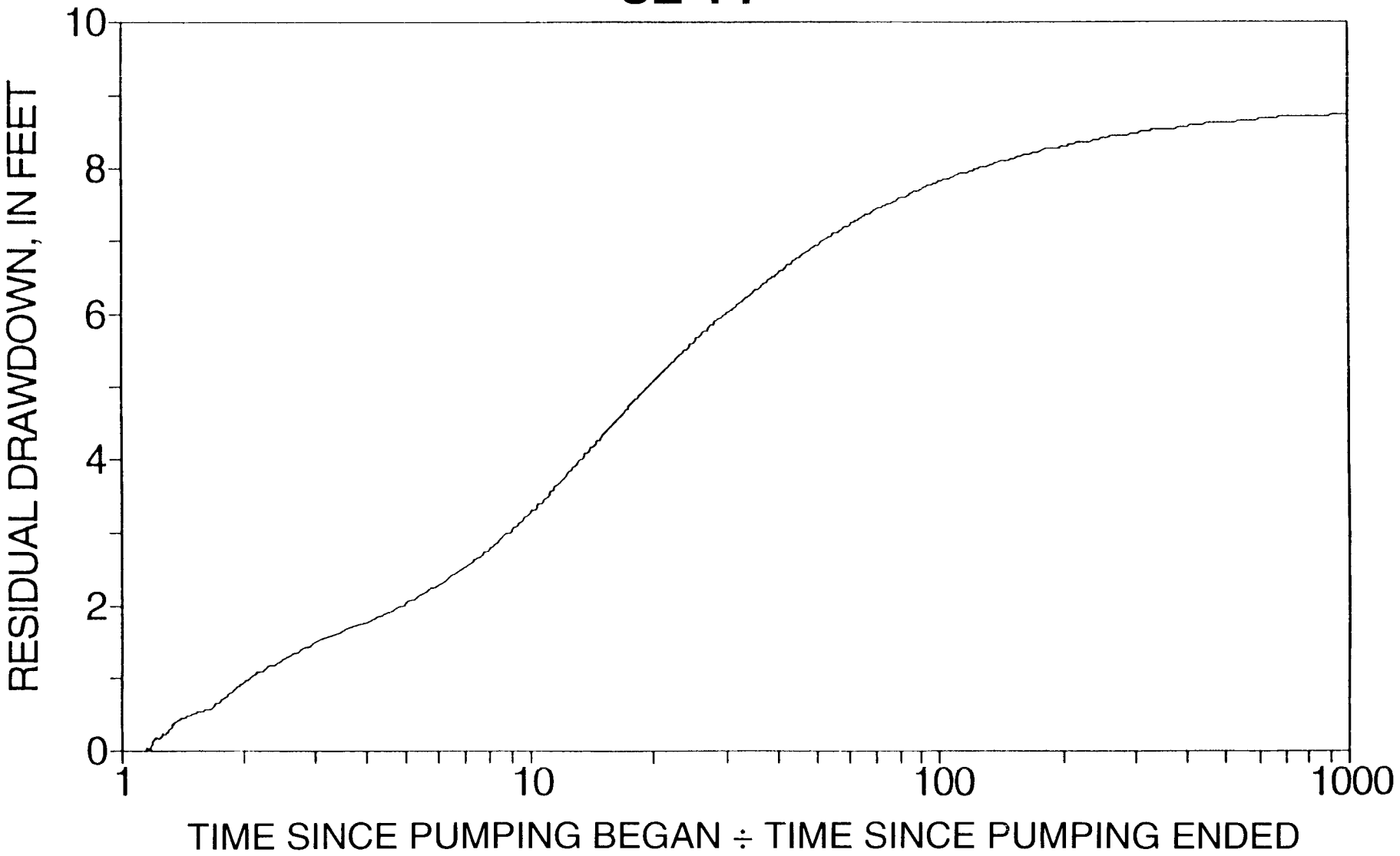
Test #2

UZ-14



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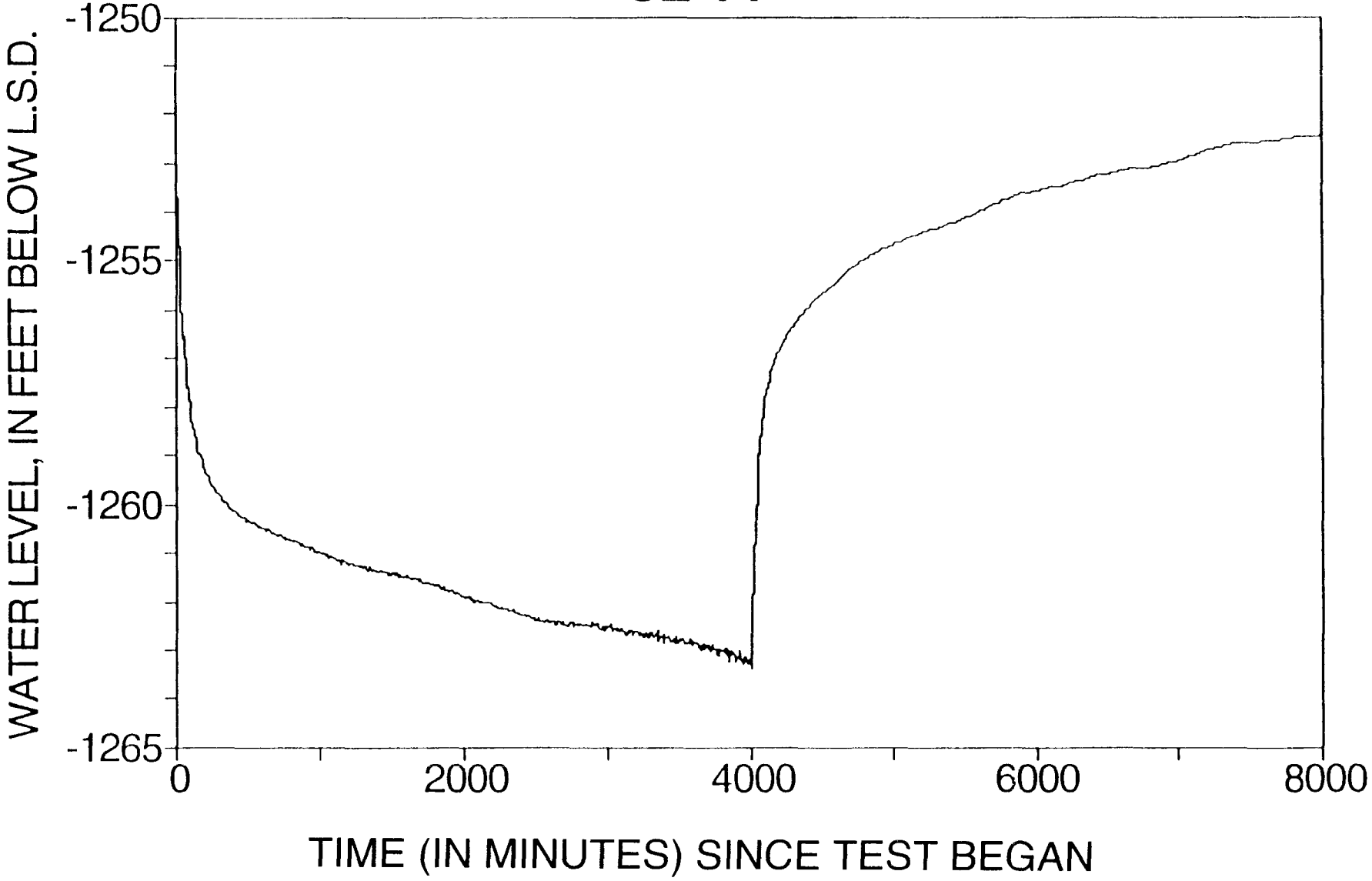
Test #4

UZ-14



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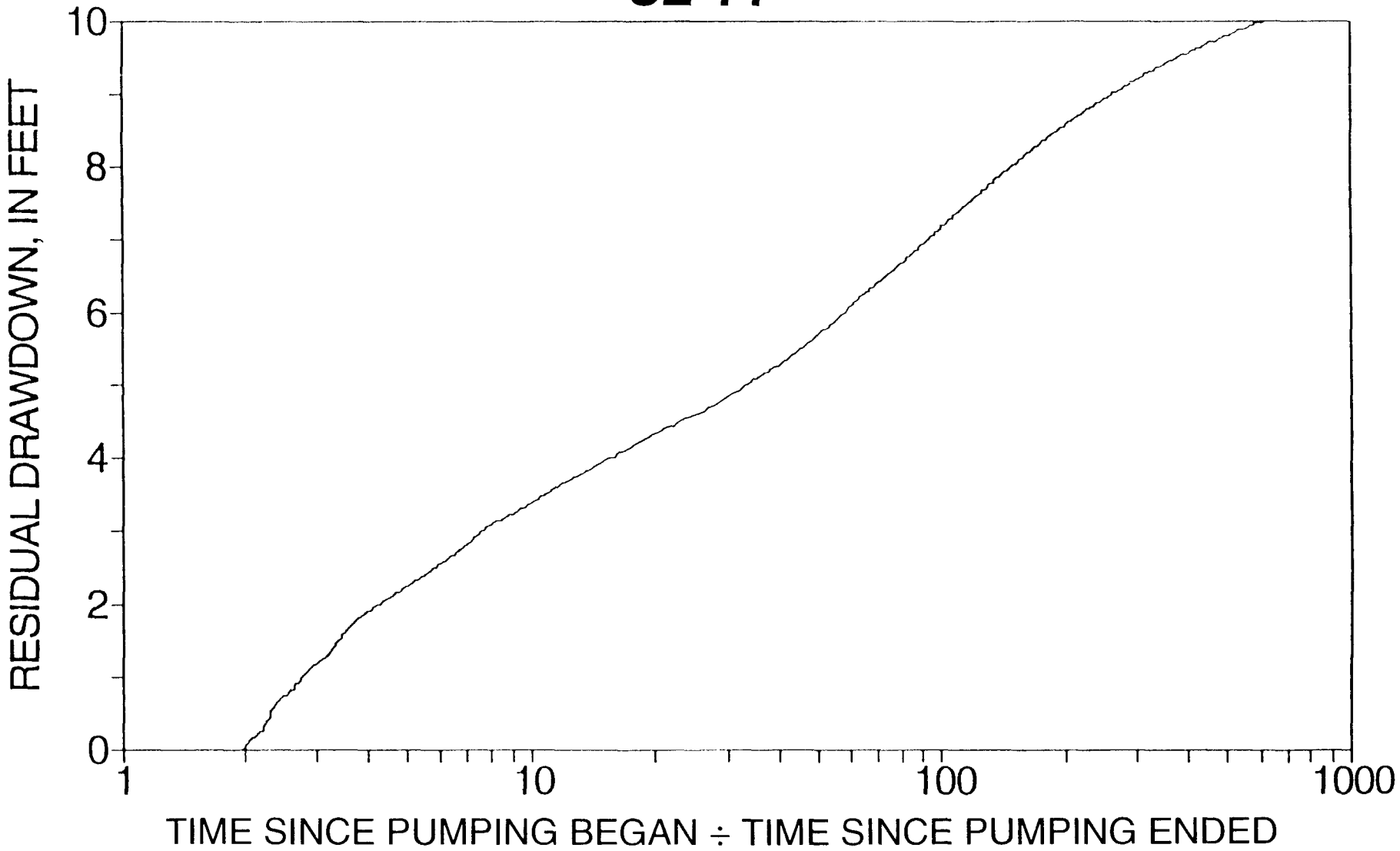
Test #4

UZ-14



SCTUZ1413.125.NWTRB/10-19-93

UZ-14 Hydraulic Tests

- **Starting Water Level:** 1,250.05 ft. 8/17/93
- **Total Pumpage:** 6,190 gal. in 4 tests
- **Total Time pumped:** 102.2 hours in 4 tests
- **Final Water Levels:** 1,252.41 ft. 8/30/93
  1250.98 ft. 9/7/93
  1250.71 ft. 9/10/93

  - Projected full recovery by 9/17/93

Transmissivity Estimates

- **Bailer Test (recovery):** **7 $ft.^2$/day**
  - **In core track**
- **Test #2 (drawdown):** **6 $ft.^2$/day**
- **Test #2 (recovery):** **6-10 $ft.^2$/day**
- **Test #4 (recovery):** **8-10 $ft.^2$/day**

Hydraulic Tests Summary

- Test results consistent with each other
- No boundary effects seen
- No residual drawdown

Chemical and Biological Evidence

- G-1 polymer detected (low concentration in UZ-14)
- Total organic carbon concentration very high
- CO_2 increasing in lower zone of UZ-1
- Estimate 40,000 organisms per milliliter
  - 10-20 organisms per milliliter in J-13
- All point to degrading drilling fluid

Isotopic Evidence

- Tritium at background levels (water >100 years old)
- Carbon-14 uncorrected age in UZ-1 of 3,600 yrs.
  - J-13 about 9,900 yrs. (deep water table)
  - UE-29a #2 about 3,800 yrs. (shallow water table)
- No C-14 results yet for UZ-14
- Fluid comparable in age to upper Fortymile Wash; younger than lower Fortymile Wash

Conclusions

- Fluid in UZ-14 same fluid as in UZ-1
- Fluid contains polymer used to drill G-1
- Possible interpretations (Whitfield on UZ-1)
  - Fluid is only degraded G-1 drilling fluid
  - Fluid is contaminated perched water
  - Fluid is contaminated water table
- No interpretation can be eliminated based on current understanding

Prognosis

- **Deepening UZ-14 to resolve if fluid is at water table**
  - **UZ-14 at x,xxx ft. on 10/xx/93**
  - **Core is wet/dry (??) below x,xxx ft.**
- **Further chemical analyses will be done with hope that it will help further resolve issue. Carbon-14 may be best hope for resolving issue.**
- **Perhaps will be unable to determine if natural perched water is involved**
- **By end of planned drilling program, should know if perched water is rare or common**