

EXPERIMENT 5: GROUNDWATER HYDROLOGY

Background: Groundwater hydrology primarily consists of 2 types of activities: water sampling/monitoring and subsurface hydrogeologic characterization. Water sampling/monitoring involves mapping water levels in wells and collecting samples for water quality analysis. Subsurface hydrogeologic characterization can involve two different types of activities- collecting sediment and analyzing it for its properties or conducting pumping tests and slug tests to determine the values of hydraulic conductivity and storativity.

Objective: Practice field techniques associated with well monitoring and sediment sample collection.

Procedure:

A. Well Monitoring

1. Use a water level sounder to determine the water depth in a monitoring well located around the agricultural fields west of Highway 113.
2. Measure the height of your water depth datum above the concrete pad for a well.

Equipment Needs: sounder, tape measure

B. Hand Augering

1. Use a hand auger to dig a 2 m hole in the ground.
2. Describe the properties of the sediment as you go along and record them as a function of depth

Equipment Needs: auger, big screwdriver, color chart

C. ESP coring

1. Use the ESP corer to collect a 9' continuous core- THE ESP CORER IS BROKEN IN 2006.

Equipment Needs: ESP corer, plastic liners

D. Vibracoring

1. Use the vibracorer to collect a 1' core- the ground may be too hard to penetrate at the field site.

Equipment Needs: Honda motor, "rabbit-ears", vibrating hose, high-lift jack, 2 vice grips, allen wrench, and aluminum conduit

E. Gas-powered Auger

1. Use a gas-powered auger to dig a 2 m hole in the ground.
2. Describe the properties of the sediment as you go along and record them as a function of depth

Equipment Needs: auger, color chart

E. Core processing

1. Cut open a core segment and describe its stratigraphy.

Results: (what should be in your report)

A. Descriptions of all sediment samples/profiles.

Discussion:

Explain your thoughts on the history of sediment deposition revealed in the samples collected from the Putah Creek floodplain.

Answer the following question:

Question #1: One day before a pumping test at the Campbell Tract on campus, the follow water depths were observed in the campus wells. Using this data, the information in your earlier handout, and the blank map of the Campbell Tract wells, draw a contour map of the WATER SURFACE ELEVATION at that point in the pumping test.

| <u>Well</u> | <u>Depth</u> | <u>Well Measurement Correction (ft)</u> |
|-------------|--------------|---|
| A1 | 35.051 | 0.62 |
| E2A | 39.14 | 1.15 |
| C2A | 39.92 | 0.60 |
| E5 | 38.77 | 0.64 |
| E8 | 45.8 | 3.416 |
| C2B | 38.04 | 0.08 |
| E3D | 32.29 | 0.08 |
| E3B | 32.865 | 0.48 |
| E4A | 34.25 | 0.26 |

Grade Sheet for Experiment 5: GROUNDWATER HYDROLOGY

| <u>TASK</u> | <u>SCORE</u> | <u>POSSIBLE</u> |
|-----------------------------|--------------|-----------------|
| A. WATER LEVEL MEASUREMENTS | | |
| Potentiometric map | | 10 |
| C. SEDIMENT ANALYSES | | |
| Hand augering profile | | 20 |
| Final Report | | 10 |
| SUBTOTAL | | 40 |
| Extra Credit | | |

TOTAL

WELL INFORMATION

Well E-4A: Pumped well

Drilled in 1956 by cable-tool method
Total Depth = approx. 340 feet
Perforated Interval = unknown - estimated on attached table
Casing Diameter = 14 inches
Elevation = 58.09 ft
Geology: See attached well log

Well E-5: Observation Well:

Drilled in 1956 by cable-tool method
Total Depth = approx. 344 feet
Perforated interval: unknown - estimated on attached table
Casing Diameter: 14 inches
Geology: see attached well log
Elevation = 61.66 ft
Distance from well E-4A: 1368 feet

Well E-3B: Observation Well:

Drilled in approx 1952 (pump installed in 1952)
Total Depth: approx. 250 feet
Perforated intervals: 116-136 feet; 205-244 feet
Casing Diameter: ? 14 inches ?
Geology: unknown
Elevation = 57.46 ft
Distance from well E-4A: 2563 feet

Well E-3D: Observation Well:

Drilled in 1972
Total Depth: approx. 455 feet
Perforated intervals: 185-225; 250-270; 355-371; 418-443 feet
Casing Diameter: 14 inches
Geology: unknown
Elevation = 54.28 ft
Distance from well E-4a: 2563 feet

Well C-2A: Observation Well

Drilled in 1932
Total Depth: approx. 250 feet
Perforated intervals: 202-248 (lined and rehab in 1979) 12" screen
Casing Diameter: 14 inches (new liner)
Geology: unknown
Elevation = 63.71 ft
Distance from well E-4a: 2179 feet

Well C-2B: Observation Well

Drilled in 1932
Total Depth: approximately 264 feet
Perforated intervals: 221-264 feet (lined and rehab in 1979: 12" screen
Casing Diameter: 12.75"OD liner inside 14" ID original casing
Geology: unknown
Elevation = 61.57 ft
Distance from well E-4a: 2021 feet

Well E-2A: Observation Well

Drilled in 1948
Total Depth: approximately 250 feet
Perforated intervals: 76-96 feet; 172-250 feet
Casing Diameter: 14" ?
Geology: unknown
Elevation = 62.09 ft
Distance from well E-4a: approx 3170 feet

Well E-8: Observation Well

Drilled in 1972
Total Depth: 517 feet
Perforated intervals: 185-190, 235-290, 365-390, 495-505
Casing Diameter ?
Geology: unknown
Elevation = 59.91 ft
Distance from well E-4a: approx. 1530 feet

Well A-1: Observation Well

Drilled in ?
Total Depth: 300
Perforated intervals: 110-122, 179-185, 209-293
Casing Diameter: ?
Geology: unknown
Elevation = 56.69 ft
Distance from well E-4a: approx. 3257 feet

Well HYD-1: Observation Well

Drilled in 1996
Total Depth: 50 feet
Perforated interval: 25-50 feet
Casing Diameter: 2"
Geology: See log
Elevation = ?
Distance from well E-4a: 50 feet.