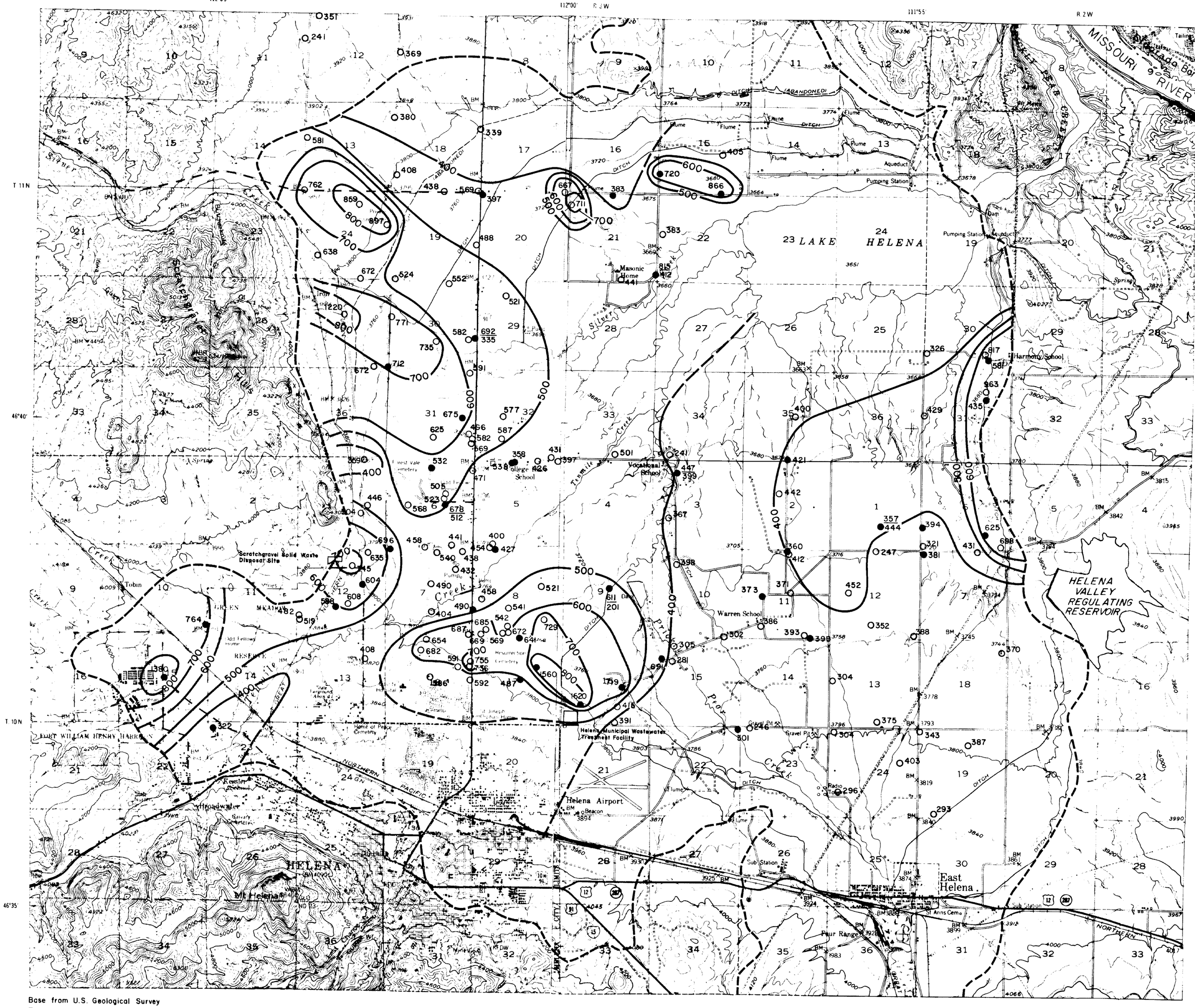
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with
LEWIS AND CLARK COUNTY and the
MONTANA BUREAU OF MINES AND GEOLOGY

WATER-RESOURCES INVESTIGATIONS
OPEN-FILE REPORT 80-1102
PLATE 4



EXPLANATION

- APPROXIMATE LIMIT OF SATURATED ALLUVIAL DEPOSITS
- 500 — LINE OF EQUAL SPECIFIC CONDUCTANCE (1979)--Dashed where approximately located. Interval 100 micromhos per centimeter at 25 degrees Celsius

SPECIFIC CONDUCTANCE, IN MICROMHOS PER CENTIMETER AT 25° CELSIUS, FOR WELL WATER SAMPLED IN 1979

- 521 ○ Domestic well
- 357/444 ● Augered test well

Where two values are given, upper value is for shallower well and lower value is for deeper well

Base from U.S. Geological Survey
East Helena and Helena 1:62,500, 1950
Regulating reservoir as of 1965

1 0 1 2 MILES
1 5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP SHOWING SPECIFIC CONDUCTANCE OF WATER FROM SHALLOW AQUIFERS, 1979, HELENA VALLEY, MONTANA

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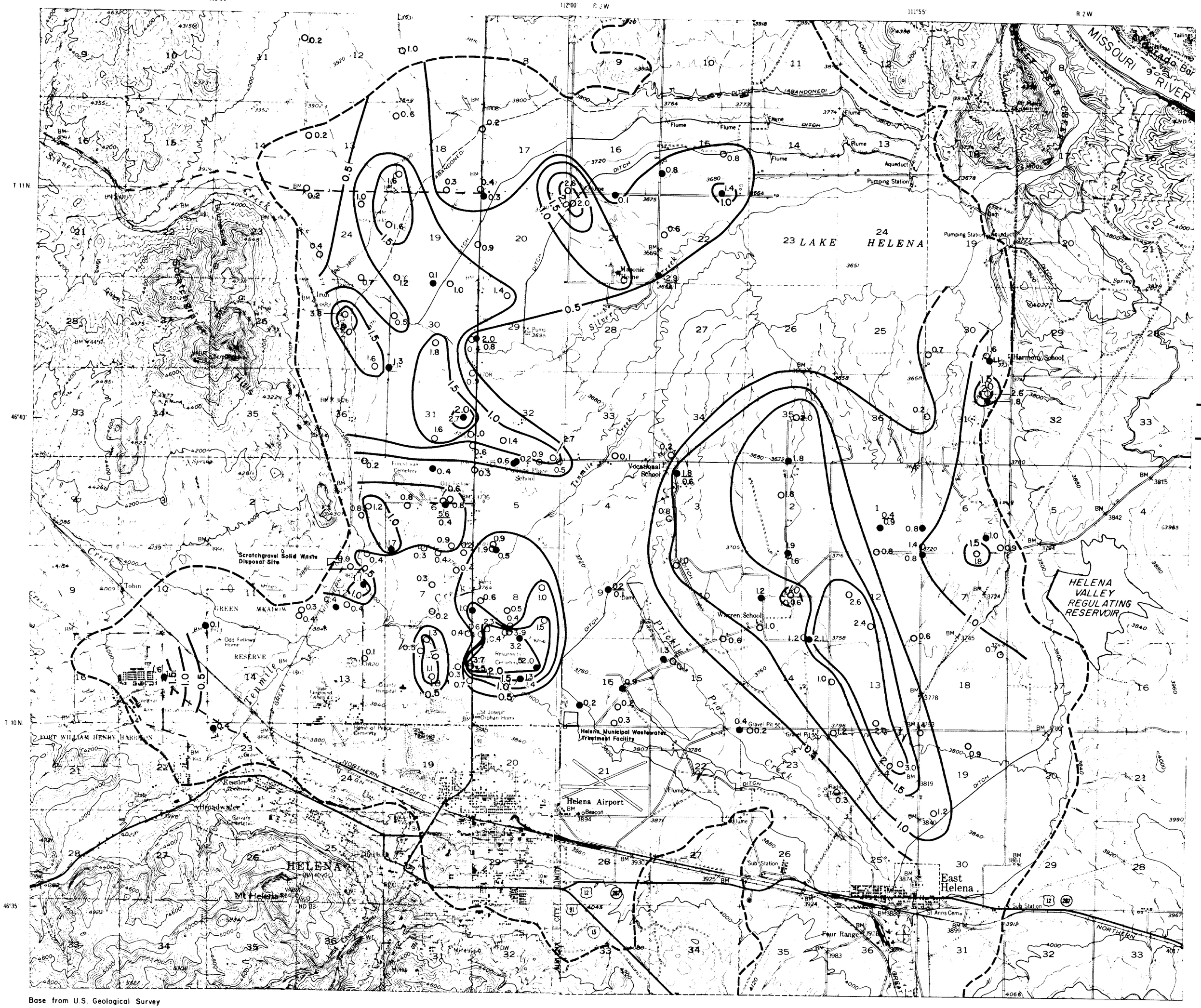
PLATE 5



EXPLANATION

APPROXIMATE LIMIT OF SATURATED ALLUVIAL DEPOSITS

1.0 — LINE OF EQUAL NITRATE CONCENTRATION (1979)--Dashed where approximately located. Interval 0.5 milligram per liter nitrate as nitrogen for concentrations equal to or less less than 2.0 milligrams per liter

NITRATE CONCENTRATION, IN MILLIGRAMS PER LITER, FOR WELL WATER SAMPLED IN 1979

1.8 ○ Domestic well

0.4 / 0.9 ● Augered test well

Where two values are given, upper value is for shallower well and lower value is for deeper well

MAP SHOWING CONCENTRATION OF NITRATE IN WATER FROM SHALLOW AQUIFERS, 1979, HELENA VALLEY, MONTANA

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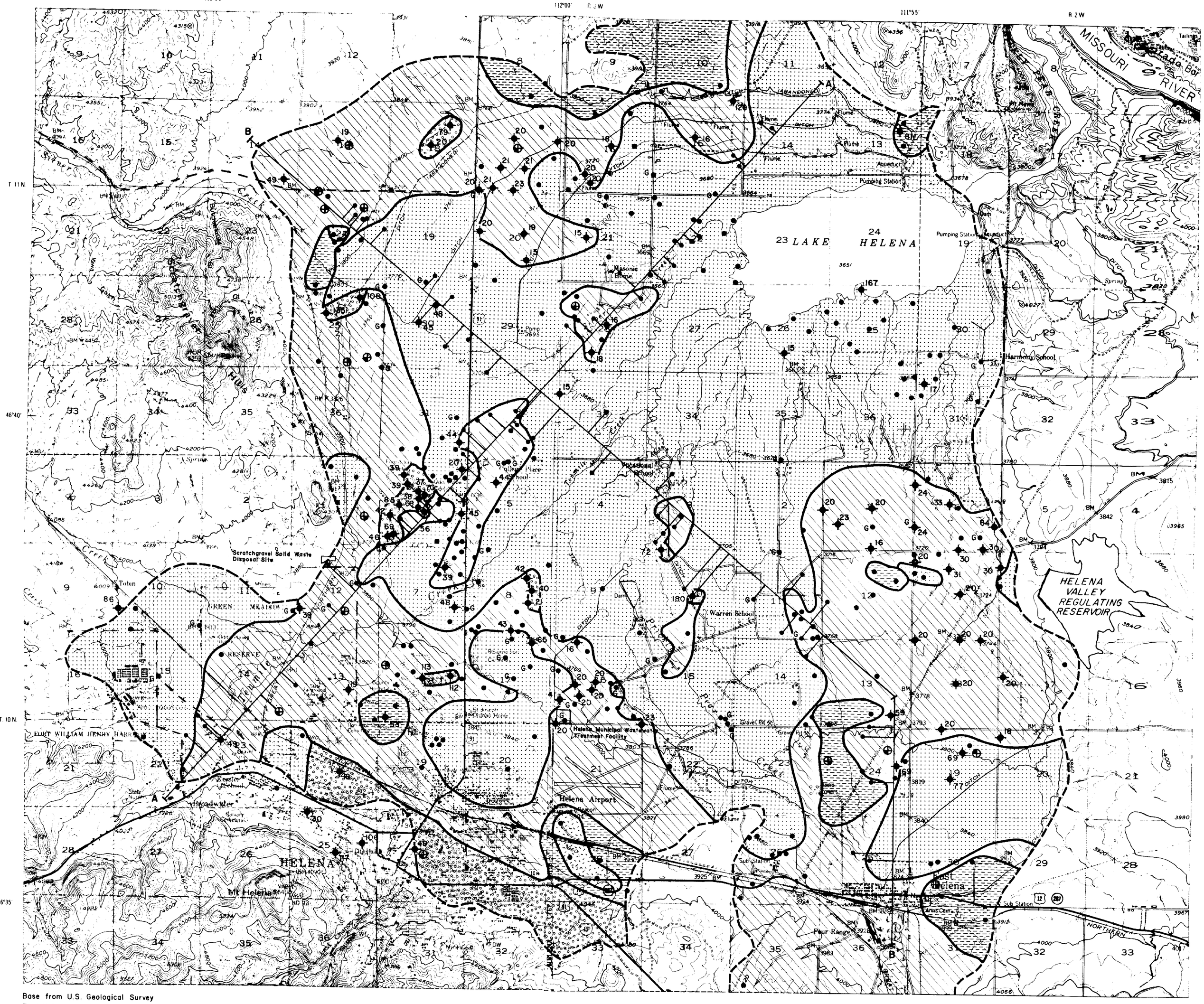
PLATE 2



EXPLANATION

DEPTH TO TOP OF LAYER OF FINE-GRAINED MATERIAL ("CLAY"), IN FEET BELOW LAND SURFACE

- 0-20
- 21-40
- 41-60
- 61-80
- Clay absent to depth penetrated

APPROXIMATE LIMIT OF SATURATED ALLUVIAL DEPOSITS

A——A' LINE OF SECTION SHOWN ON FIGURE 3

WELL OR TEST HOLE

- ● Lithologic log available
- G● Gamma-ray log available
- 24✦ Did not penetrate fine-grained material. Number is total depth, in feet below land surface

Penetrated fine-grained material at anomalous depth, in feet below land surface

- ⊕ 0-20
- ⊕ 21-40
- ⊕ 41-60
- ⊕ 61-80

MAP SHOWING DEPTH TO UPPERMOST LAYER OF FINE-GRAINED MATERIAL ("CLAY"), HELENA VALLEY, MONTANA

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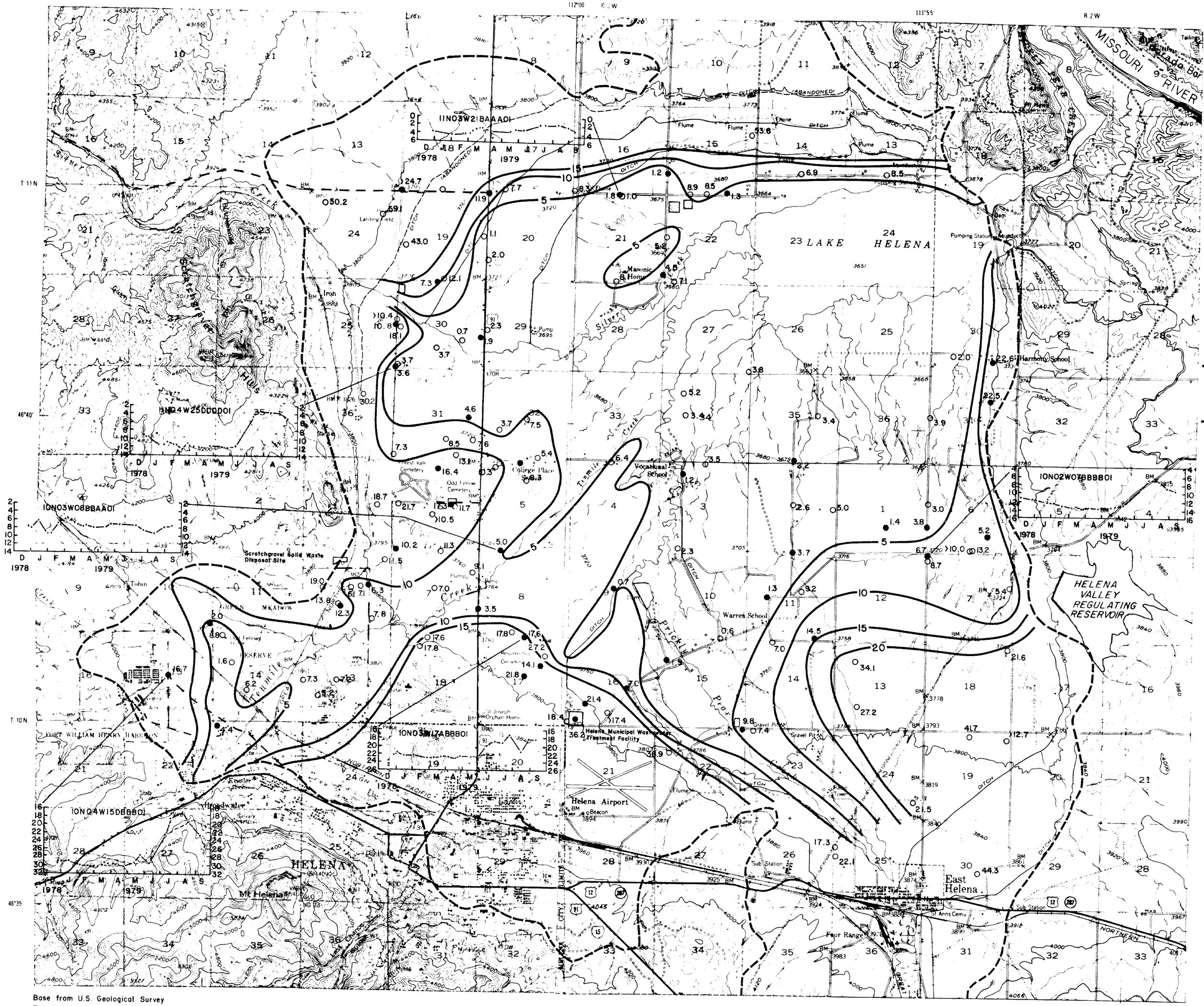
PLATE 1



Base from U.S. Geological Survey
East Helena and Helena 1:62,500, 1950
Regulating reservoir as of 1965

1 0 1 2 MILES
1 5 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

EXPLANATION

5 — LINE OF EQUAL MINIMUM DEPTH TO WATER (1976-79)--Interval 5 feet. Datum is land surface

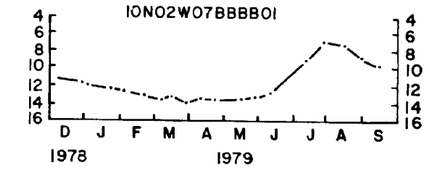
APPROXIMATE LIMIT OF SATURATED ALLUVIAL DEPOSITS

MINIMUM DEPTH TO WATER, IN FEET BELOW LAND SURFACE

○ 5.4 Well measured during September or November 1976

● 1.9 Augered test well measured periodically during 1978 and 1979

□ AQUIFER-TEST SITE



Hydrograph showing depth to water, in feet below land surface

MAP SHOWING MINIMUM DEPTH TO WATER IN SHALLOW AQUIFERS AND WATER-LEVEL FLUCTUATIONS FOR SELECTED WELLS, HELENA VALLEY, MONTANA

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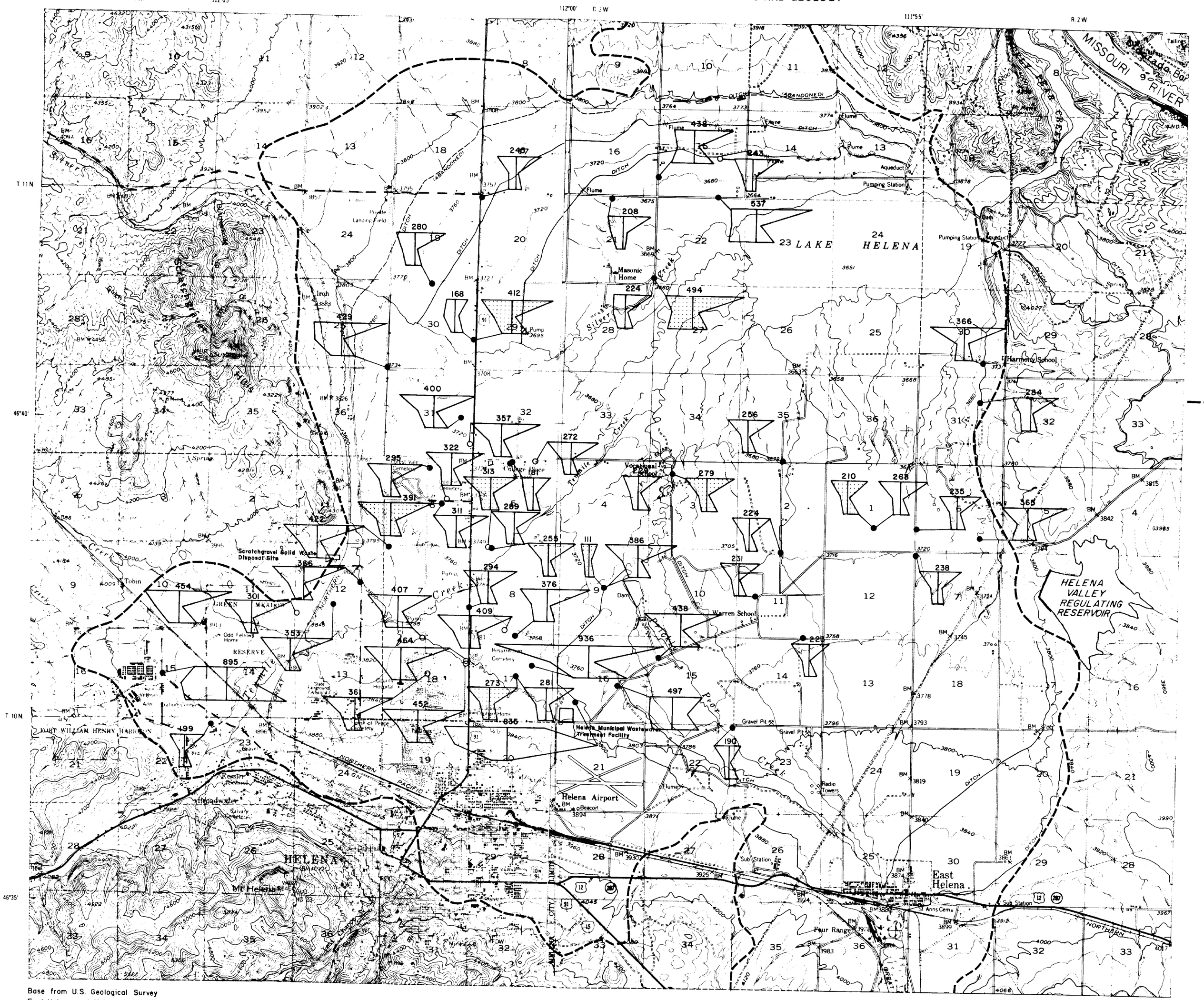
PLATE 3



EXPLANATION

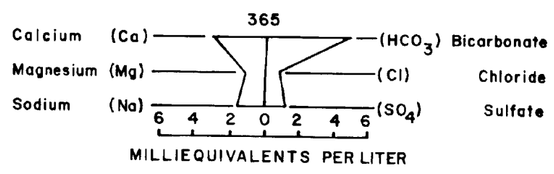
APPROXIMATE LIMIT OF SATURATED ALLUVIAL DEPOSITS

WELL SAMPLED IN 1979

○ Domestic well

● Augered test well

WATER-QUALITY DIAGRAM



Number above diagram is dissolved-solids concentration, in milligrams per liter. Stippled diagram represents the shallower of two wells at same location

MAP SHOWING DISTRIBUTION OF MAJOR IONS IN WATER FROM SHALLOW AQUIFERS, 1979, HELENA VALLEY, MONTANA