UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Helium Sniffer Field Test:

Newcastle, Utah, 10-26 March 1976

By

Edward H. Denton

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

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The Helium Sniffer (Friedman and Denton, 1976; Roberts and others, 1975) was used to measure the flux of helium permeating the soil at a site in southwest Utah where a new irrigation well had unexpectedly encountered hot water (110° C). About 200 soil-gas samples, taken 2 ft (0.61 m) below the surface, were collected in the vicinity of the well, covering an area of some 2 mi^2 ($\sim$ 5 km^2), as shown in figures 1-3. Since only about half these data were taken over a uniform grid, the resulting pattern of helium concentrations is somewhat incomplete. Nevertheless, the more densely spaced data appear to delineate a dome beneath which hot water has accumulated, and into the side of which the well was drilled.

Throughout the survey, the weather remained dry and cool, averaging 55° F (13° C), with the wind from the southwest at zero to 13 mph (0-5.8 m/s), and the barometric pressure ranging from 24.91 to 25.25 inches of mercury (43.55-55.06 millibars). The soil in the region was fairly dry. It varied in texture from sandy to clayey near the well, to pea-size gravel in the foothills (southeast). The abundance of helium in the ambient atmosphere was found to be within 1 percent of 5,240 ppb. The sensitivity of the spectrometer itself remained within 10 percent of 18 parts per billion (helium in air) per leak detector unit.

References Cited

Friedman, I., and Denton, E. H., 1976, A portable helium sniffer: U.S. Geol. Survey Jour. Research, v. 4, no. 1, p. 35-36.

Roberts, A. A., Friedman, I., Donovan, T. J., and Denton, E. H., 1975, Helium survey, a possible technique for locating geothermal reservoirs: Geophys. Res. Letters, v. 2, no. 6, p. 209-210.

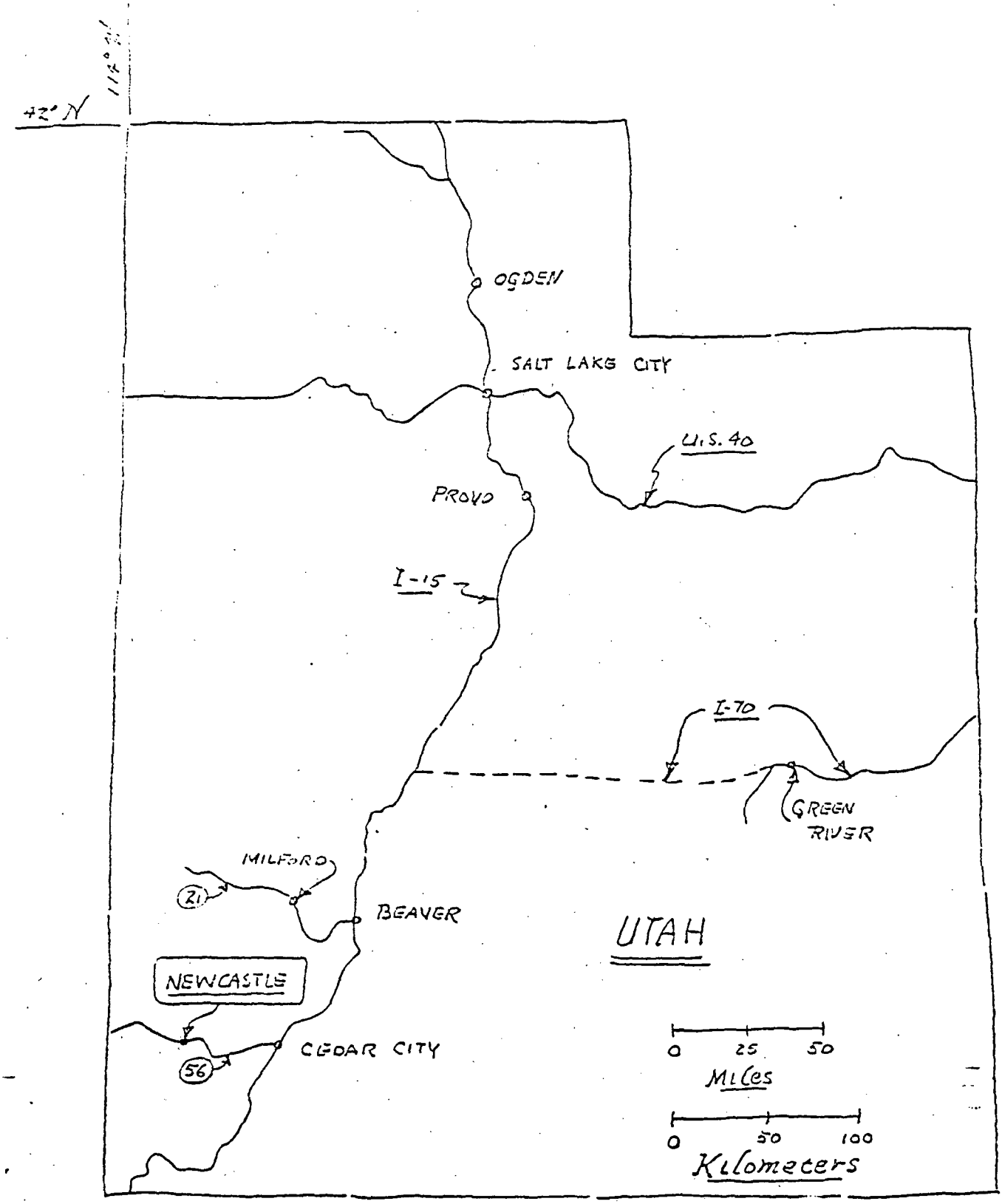

FIGURE 1. Location of area surveyed for helium.

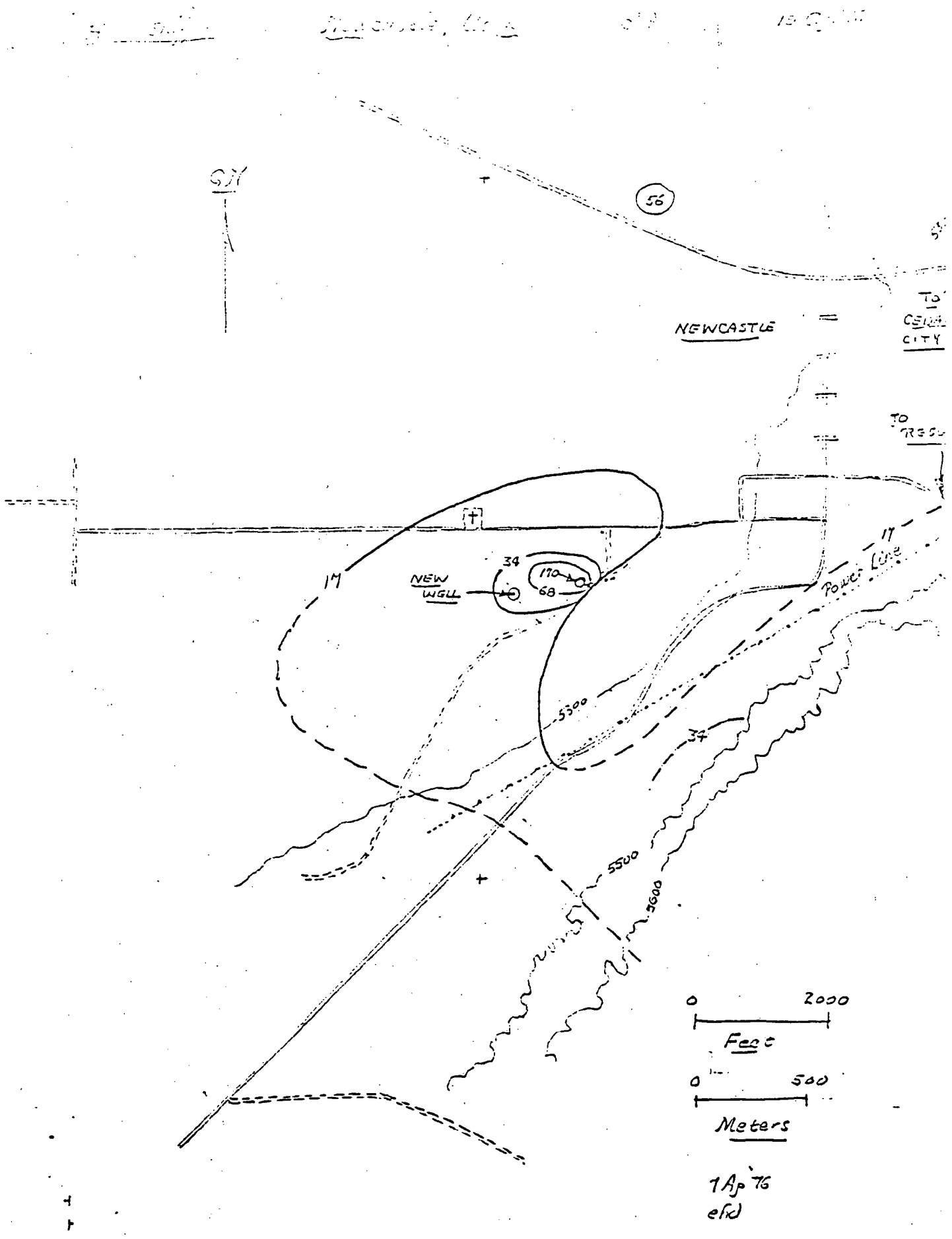

FIGURE 2. Helium concentration contours (solid lines, dashed where inferred); concentrations in parts per billion helium in air, greater than 5240

(eld)
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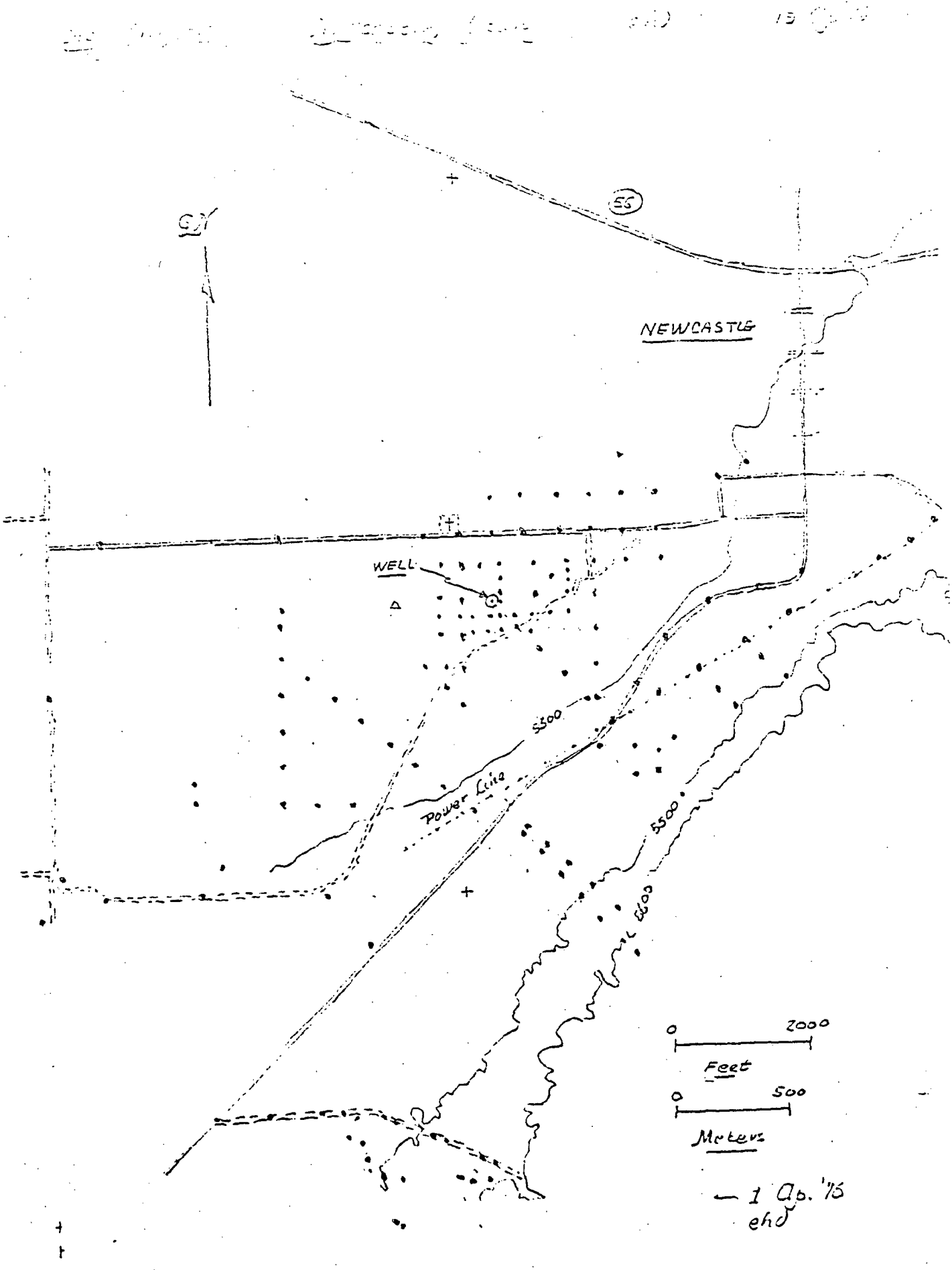

FIGURE 5. Distribution of sampling points (docs) using 2-foot probes 1/4-inch diameter.