IMPROVED TARGET DISCRIMINATION USING FAST SAMPLING HIGH GRADIENT TOLERANT MAGNETOMETER

On the following three pages are maps of a survey site on a military installation in the southern United States. The survey was conducted as part of a military base cleanup campaign in an effort to comply with recent government directives regarding environmental responsibility.

The site had been bulldozed and the remains of a circular concrete tank were visible at the surface. The concrete had "coathanger" size reinforcing bar embedded in it. The large steel tank next to the concrete tank indicated in the plan view Figure A was *not* discovered until the G-822L magnetic data was processed.

A magnetometer survey was conducted over the area on 5 foot spacings with a proton magnetometer with the sensor held at 6 feet. The resulting contour map is shown in Figure B. Note that the small tank is obscured by the larger steel tank anomaly. In fact, if the interpreter was not careful in his analysis, he could have concluded that the anomaly was due entirely to the concrete/rebar structure and that there was no other structure in the survey area.

Now compare Figure C which shows a contour map generated with data from the Geometrics G-822L Cesium Magnetometer with the sensor at 2 feet above the surface. The data was acquired on the same 5 foot centers. Note that the tremendous gradient tolerance of the cesium magnetometer allows it to track the earth's field in close proximity to steel objects such as vehicles, buildings, pipelines and steel tanks. The system is also immune to AC fields produced by power lines.

The smaller concrete tank anomaly can be clearly seen in the magnetic contour map made of the G-822L data. The higher sensor attitude of the proton magnetometer survey effectively "low passes" or smoothes the data, obscuring the concrete tank anomaly. Note that the proton magnetometer cannot be used at 2 feet altitude over large steel objects, as the proton magnetometer signal-to-noise ratio is degraded by high gradient fields.

In our second example, Figure D on page 5 of this report, we show G-822L data collected at the Stanford University 2 acre Test Site where we have buried several drums in different configurations. A proton gradiometer survey of the entire 6000 sq. meter site took 10 hours. The same survey area took less than one hour with the G-822L system.

Further research is being done using the continuous high sample rate of the cesium magnetometer (10 samples per second) over this and other sites. High sampling rates and better gradient tolerance improve the resolving power of magnetometer surveys for buried drums, tanks and ordnance. In addition, survey costs drop dramatically as large areas can be covered at a fast walking pace.

FIGURE A

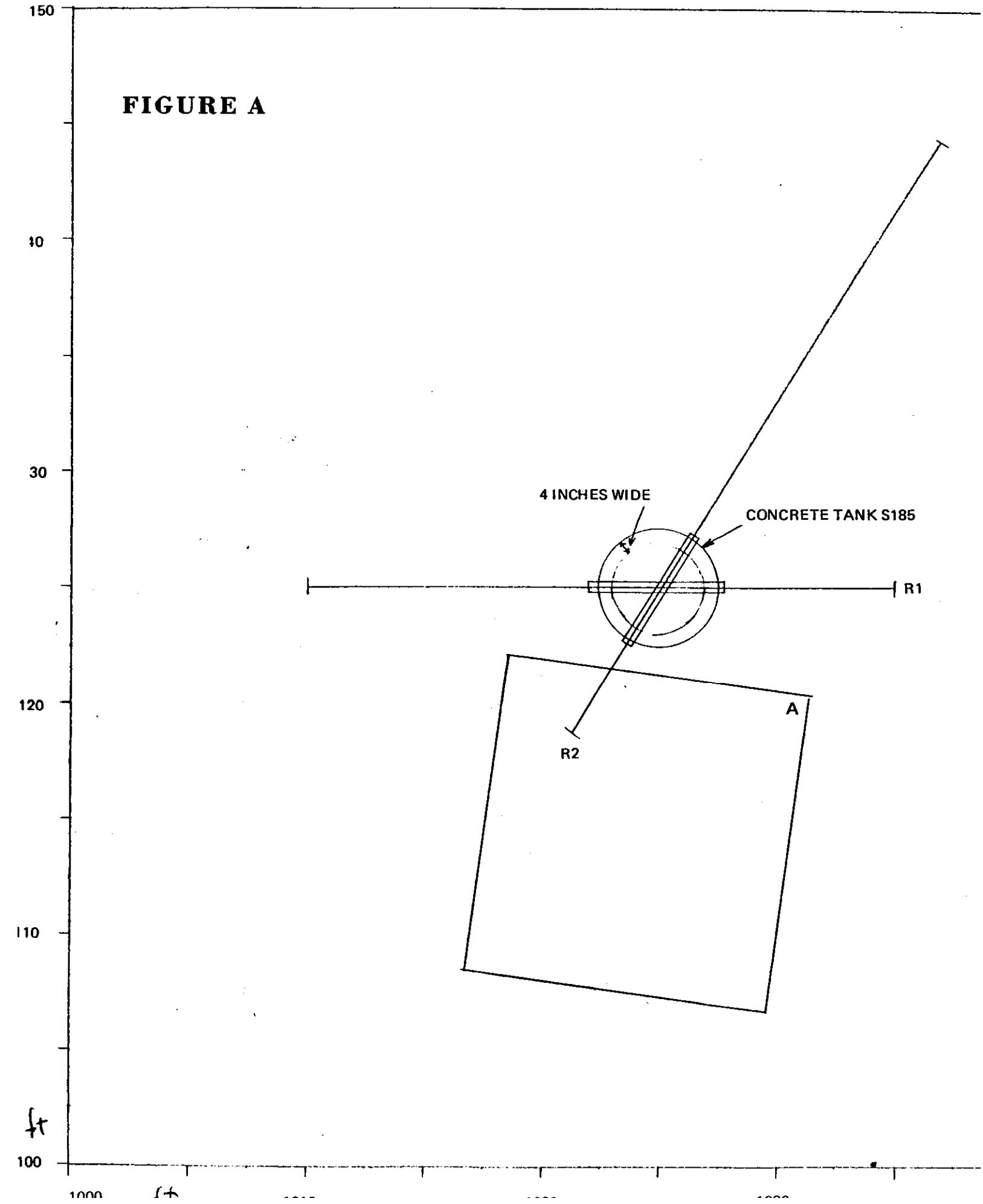
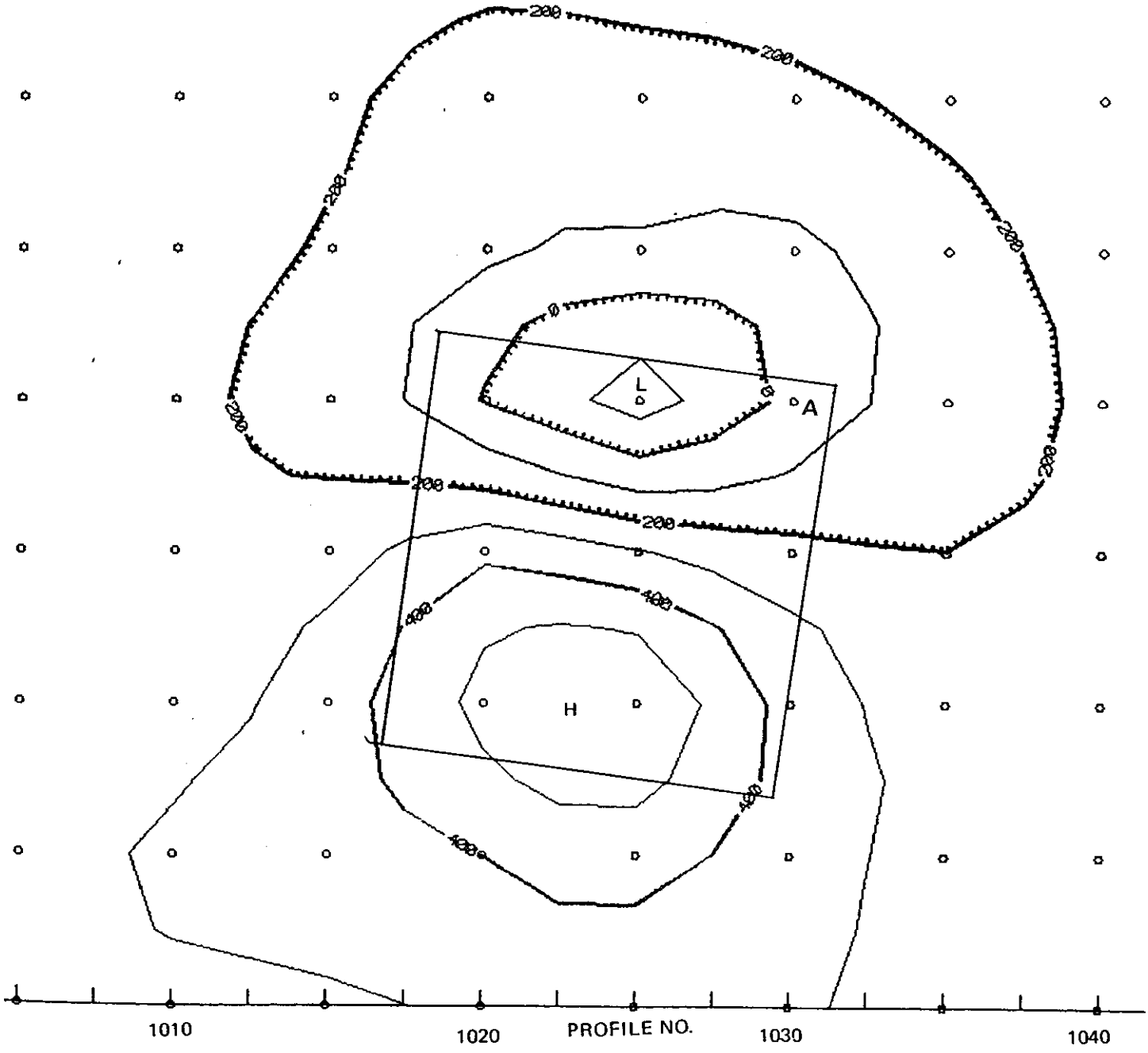

150
40
30
120
110
100
ft
1000
4 INCHES WIDE
CONCRETE TANK S185
R1
R2
A

FIGURE B


200
200
200
200
200
200
200
0
0
L
A
400
400
400
400
H
1010
1020
PROFILE NO.
1030
1040

MAGNETIC TOTAL FIELD (822) - S185 (CONCRETE TANK

FIGURE C

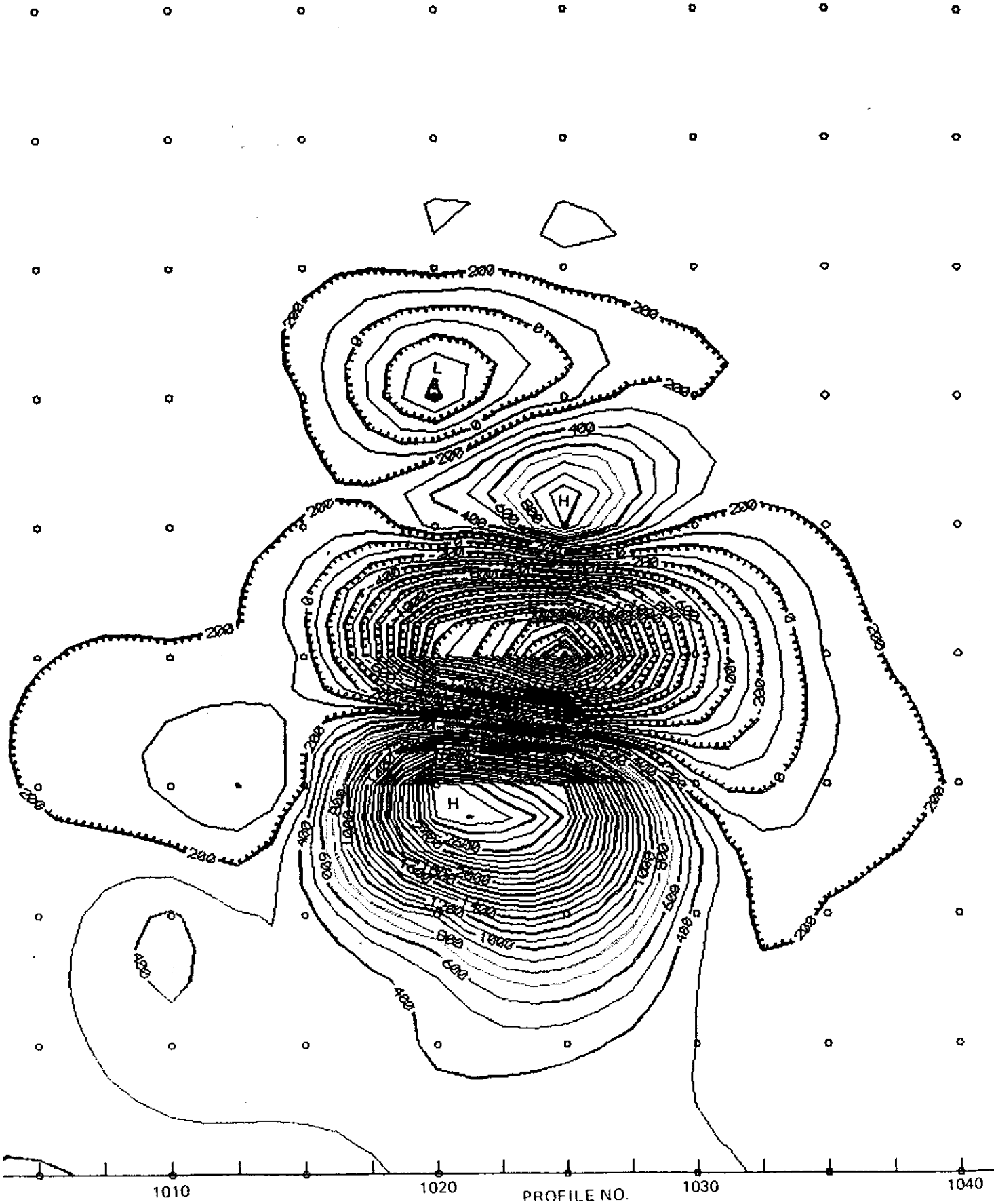


FIGURE D