

## **GEOPHYSICAL SUBSURFACE INVESTIGATION**

for  
**INGERSOL RAND EQUIPMENT SALES**  
at  
**1944 Marina Boulevard**  
**San Leandro, California**

### **Subject**

Geophysical subsurface investigation for underground storage tanks (USTs).

### **Site Location and Description**

On September 23 through 25, 1998, Subtronic conducted a subsurface geophysical survey at 1944 Marina Boulevard in San Leandro, California. The area being investigated consists of the northwest portion of the storage yard. The site surveyed is soil covered and its dimensions are approximately 130 feet by 220 feet.

### **Geophysical Equipment**

The specialized equipment used at the site includes an RD 400, TW-6 M-Scope, a magnetic locator (the Schonstedt GA-72CV) and the 858G Magmapper (magnetometer).

#### *Magnetic Locator*

The Schonstedt Instrument Company GA-72CV is a hand-held magnetic locator designed to detect magnetic objects made of iron and steel buried up to a depth of eight feet below the surface.

Primary applications of the magnetic locator are locating UST's, buried drums and underground pipes.

#### *Radiodetection RD 400 Cable and Pipe Tracer*

The RD 400 cable locator is a hand-held instrument used to detect buried utilities. The primary application of the RD 400 is to pinpoint the path of electric lines and other power conductors such as CATV and telephone cables. Pipes made of steel or copper and pipes with tracer wire are also easily traced.

#### *TW-6 M-Scope*

The Fisher TW-6 M-Scope is a split box inductive locator and metal detector mounted on a four foot rod. The split box locator can detect metal lines "inductively".

The M-Scope is also used to detect buried metallic objects such as manhole covers, underground storage tanks, etc...

### 858G Magmapper

The 858G Magmapper is a magnetometer which records magnetic readings as fast as 10 per second. The 858G uses the cesium vapor laser technology to accomplish this. Another advantage besides the high number of readings is that magnetometer still provides reliable readings in an area with a lot of metal.

## Survey Methodology

First, a visual inspection was conducted at this site. Underground utilities, vaults, boxes, exposed piping and UST-related features such as vent pipes, product lines, fill ports, topographic mounds and depressions were noted. Any UST fill ports found were physically probed to determine size, orientation and depth.

Exposed piping or risers found on the site were energized, traced out and the surface location was spray painted on the ground. The site was then scanned with both the M-Scope and the magnetic locator for piping and possible buried UST's along traverses spaced approximately five feet apart. Magnetometer data using the 858G Magmapper was also collected along the same grid. Data is stored on the 858G and then downloaded to a laptop computer for processing. The data is then contoured and analysed for anomalies. Special note is taken to anomalies which cannot be associated to a visible cultural feature.

## Results of the Subsurface Investigation

The visual inspection for USTs did not reveal any indications of UST type features on the ground.

The results of the magnetic locator and the M-SCOPE survey detected two anomalies with approximate dimensions of 10 feet by 4 feet. These anomalies labelled A and B, may not contain enough steel to be observed in the magnetometer map however they warrant further exploration (see site sketch). A pipe trending north south ending approximately 10 feet from the northwest corner of the property was also detected (see site sketch). High readings in a square shaped area labelled C were detected at the northwest corner of the main service building just in front of the air compressor wash area. The cause of some of the high readings could be attributed to some steel piping, railroad tracks, or a reinforced concrete pad. The large amounts of buried steel in the area may mask the anomaly of a UST. A small line trending N-S labelled 3 on the west edge of anomaly C is seen on the magnetometer contour map and is detected by the Schonstedt.

The results from the magnetometer (858G) show anomalies either caused by objects known to be buried (i.e. railroad tracks) or objects visible at the surface (i.e. above ground tanks). Two rectangular shaped anomalies adjacent to the railroad tracks are labelled 1 and 2 are marked on the magnetometer contour map. The cause of these anomalies may be debris or mechanical devices related to the tracks or a buried UST in the vicinity. A third area south the large metallic anomaly labelled

C is also marked. This anomaly may be due to piping, however it too should be verified with excavation.

Recommendations:

The anomalous areas should be verified with excavation. The cause of the anomalies in area C need to be verified, it could be from a reinforced concrete pad.

**Limitations**

The subsurface geology, object size and composition, burial depth, and surface interference are all major factors as to whether the object will be detected by surface geophysical methods. These are all factors beyond Subtronic's control. The results of geophysical surveys may not represent unique solutions. Apparently similar anomalies may be created by different subsurface phenomena.

The limits of discernment of this survey are estimated to be objects less than two cubic feet, or fifteen gallons, objects buried greater than ten feet and areas within ten feet of metal fences, buildings and vehicles.

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### Vertical Gradient Magnetic Data -- Contour Map

Site -- Northwest Portion of Property Located at 1944 Marina Boulevard, San Leandro

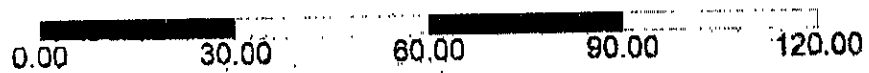
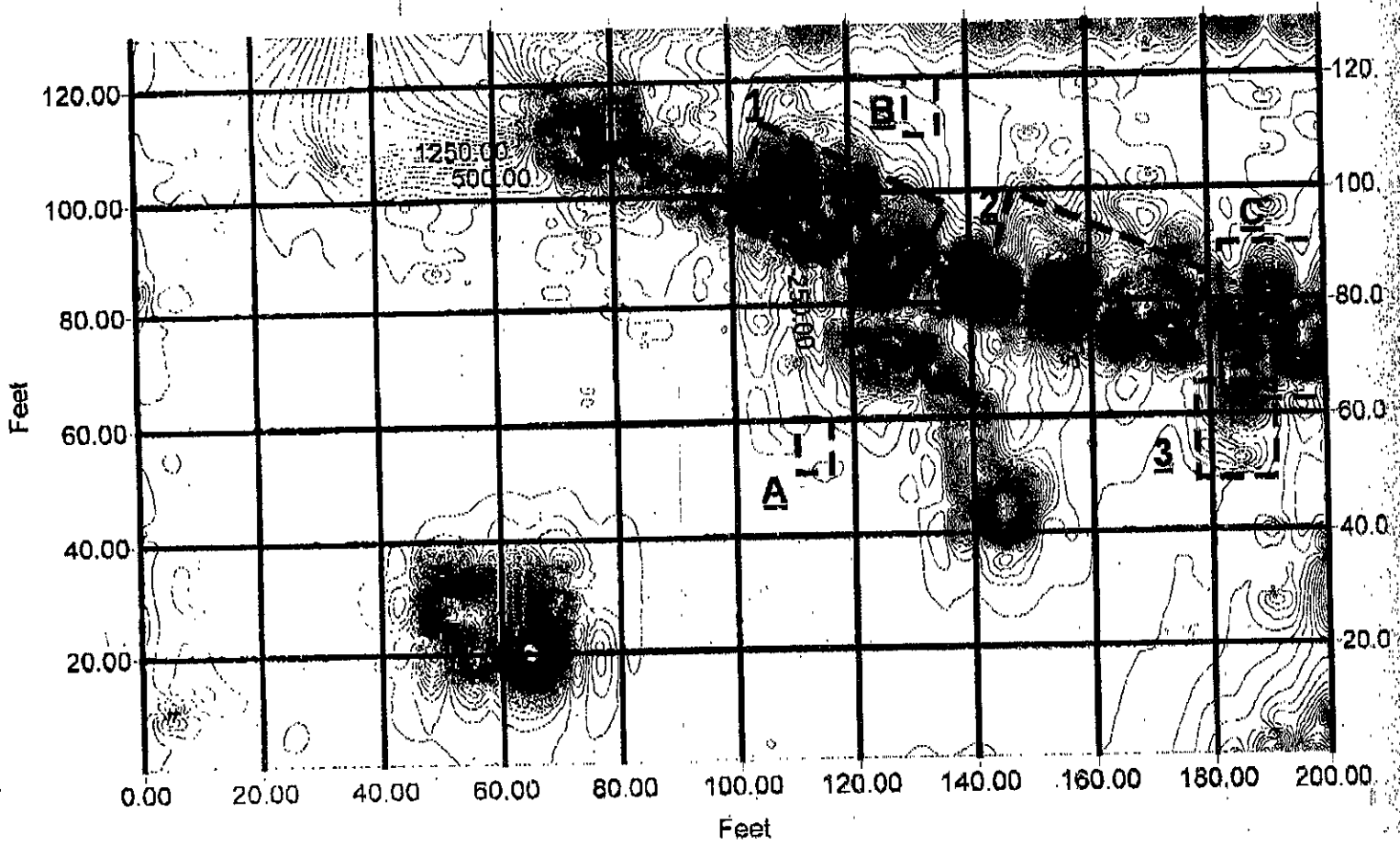


Table of Anomalies

- Anomalies Detected with M-SCOPE and Schonstedt
- A These anomalies do not show up on the magnetometer maps.
  - B They may be too small to be detected.
  - C
  - 3
- Anomalies Interpreted from Magnetometer
- 1 These anomalies are adjacent to the tracks and
  - 2 warrant further investigation
  - 3