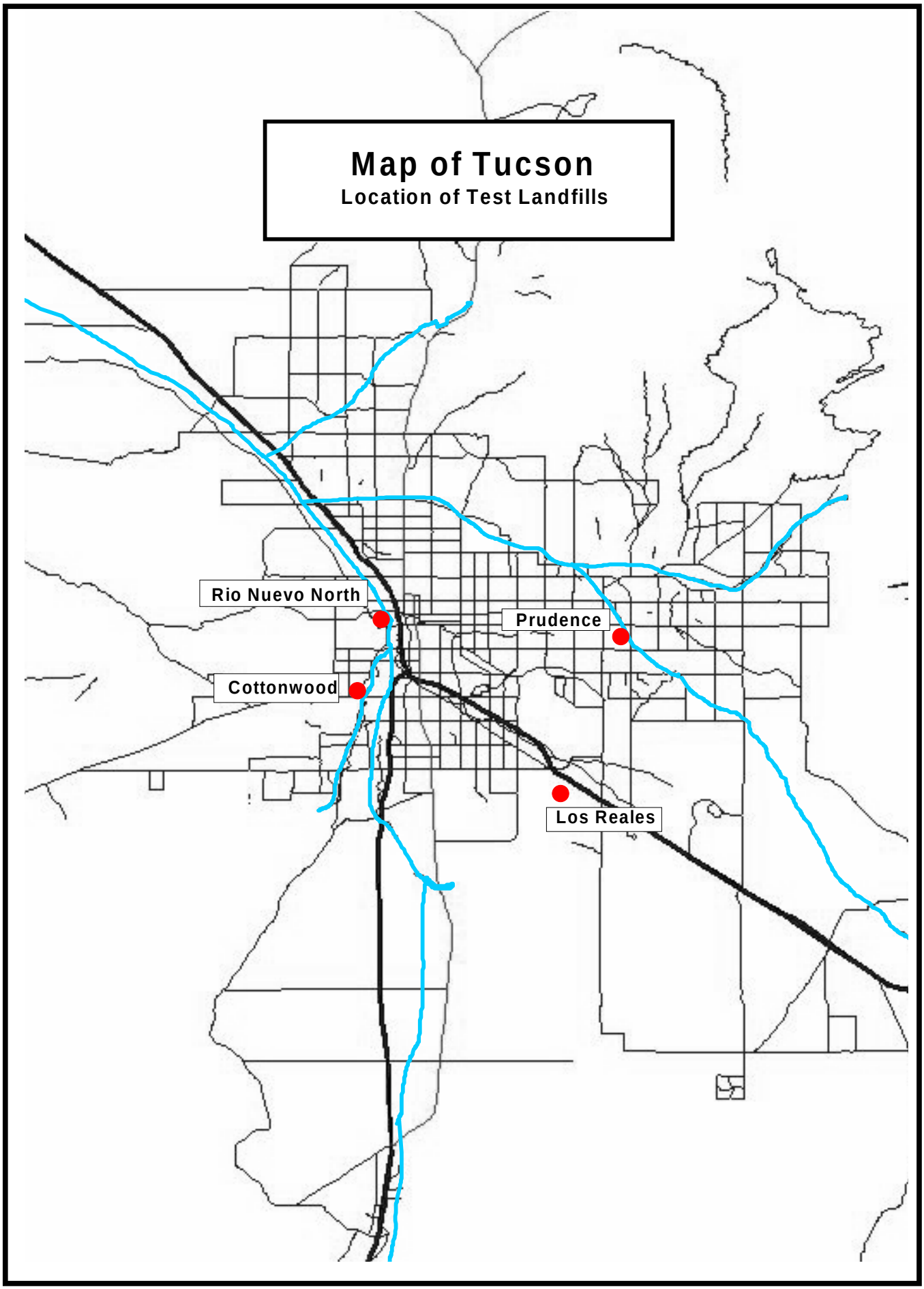
Case Histories

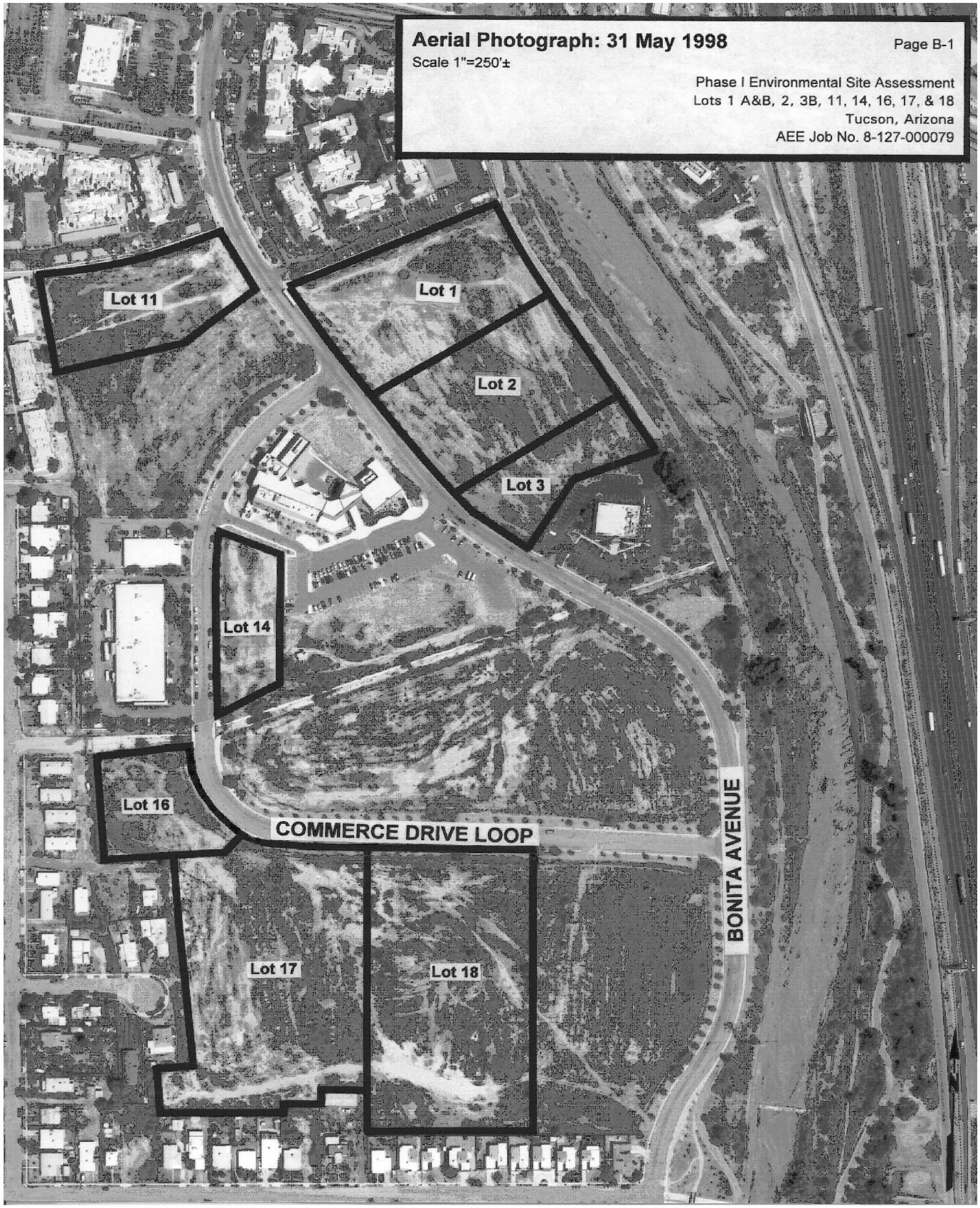

Map of Tucson
Location of Test Landfills
Rio Nuevo North
Prudence
Cottonwood
Los Reales

Down in the Dumps Workshop Notes

Landfills in the Tucson area have historically been located in old gravel and clay operation pits near the main rivers although the active Los Reales landfill is an exception. Survey data collected with the ZETA system include Rio Nuevo North, Cottonwood and Los Reales landfills. Data at Prudence were collected in 1989 using a standard seven spread setup.

Zonge Engineering

Rio Nuevo North



Cooper Aerial Survey Co. 1998

Down in the Dumps Workshop Notes

Haphazard cleaning of the Rio Nuevo North landfill in the early 1980's left pockets of garbage in the subsurface below 17 feet (the reach of the backhoe).

IP and resistivity data were initially collected along a test line using the ZETA system. Three borings were advanced to determine whether IP results and the location of buried solid waste were correlated.

Data acquisition in the dipole-dipole configuration consisted of a station spacing of 7.5 feet and a dipole size of 15 feet with twelve points collected along each diagonal (n=0.5, n=1.0, …n=6). The electric-field signal was sensed at the receiver site using tin-coated copper braid electrodes. A time domain, 0.5 Hz signal was used, stacking and averaging eight cycles to minimize random noise. Measuring all data points at least twice established repeatability of the data.

Modeling the survey data consisted of a two dimensional smooth-model technique including topography. The resistivity and IP phase responses, as a function of n-spacing, are converted to a two-dimensional model of the electrical structure, as a function of depth. The results of modeling create a realistic geo-electric cross section that allows for the interpretation of the edges of buried landfills, thickness of soil cover, and thickness of waste material.

Zonge Engineering

Test Line on Lots 17 and 18

Area photograph from 1953

Cooper Aerial Survey Co. 1953

Area photograph from 1973

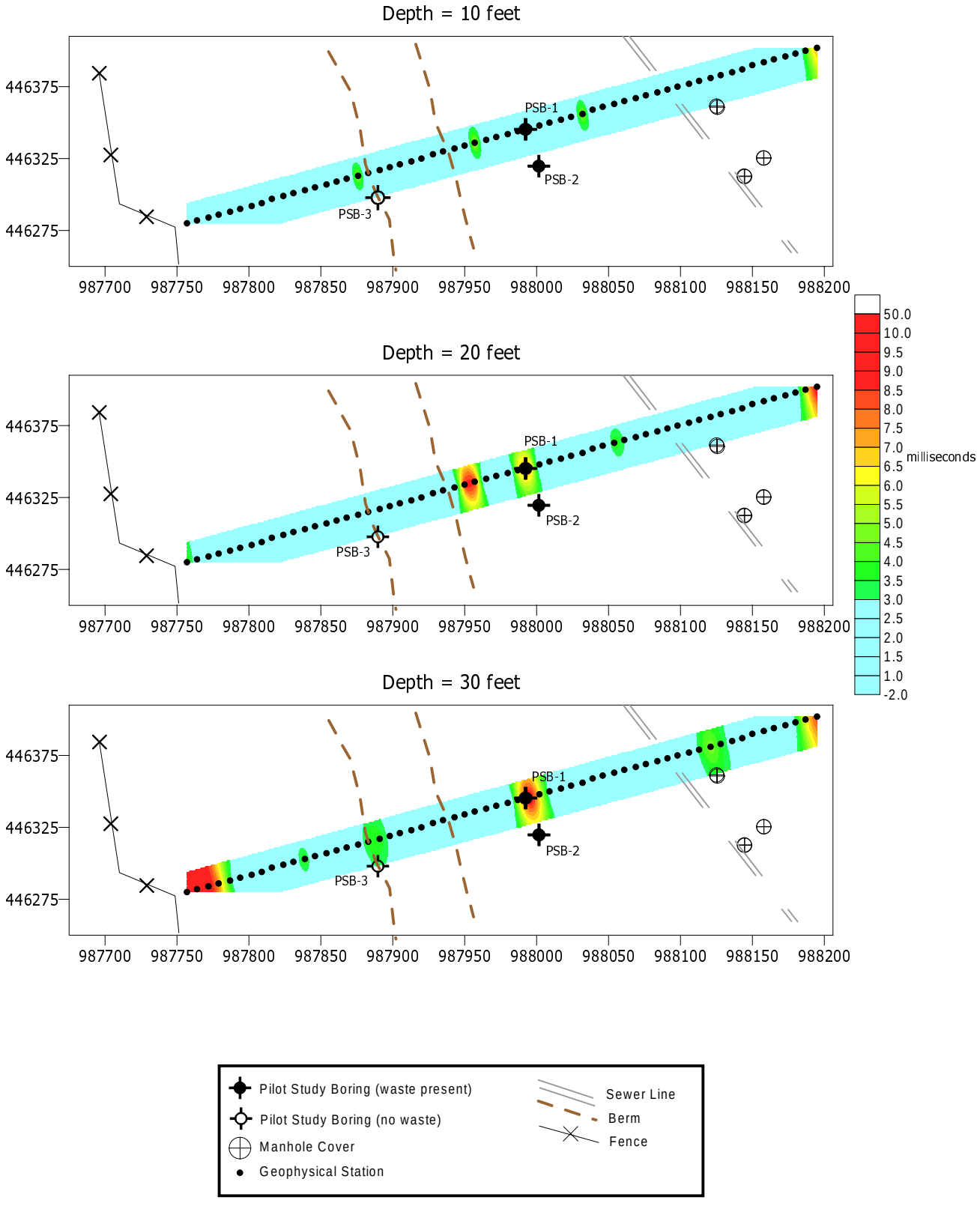
Cooper Aerial Survey Co. 1973

Down in the Dumps Workshop Notes

The location of the test line on the Rio Nuevo North project area was picked to cross a deep pit shown on the old aerial photographs. If garbage was still buried on the property, then the deep pit was thought to be the best location to try and detect the waste.

Zonge Engineering

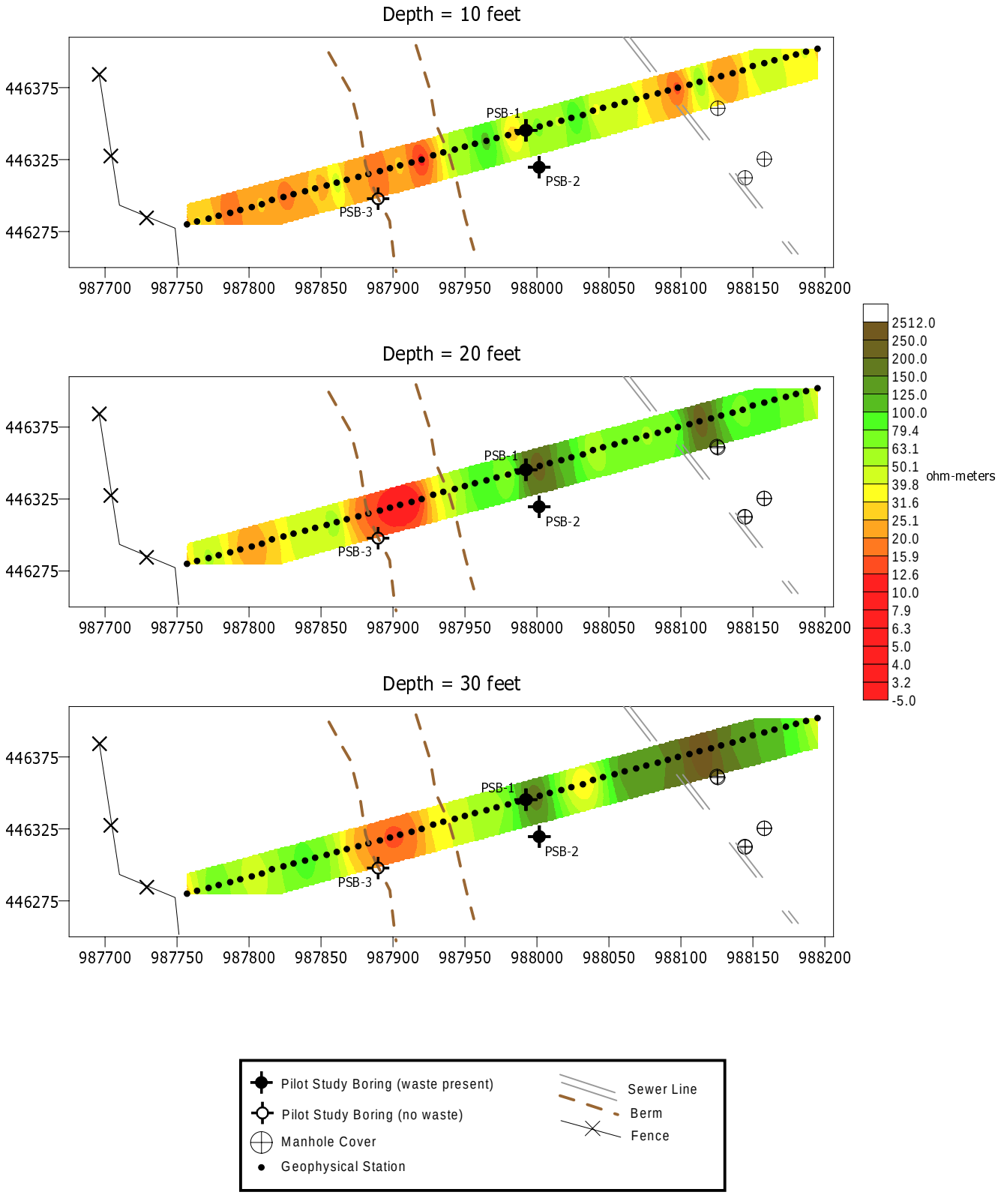
Test Line
IP Depth Sections



Down in the Dumps Workshop Notes

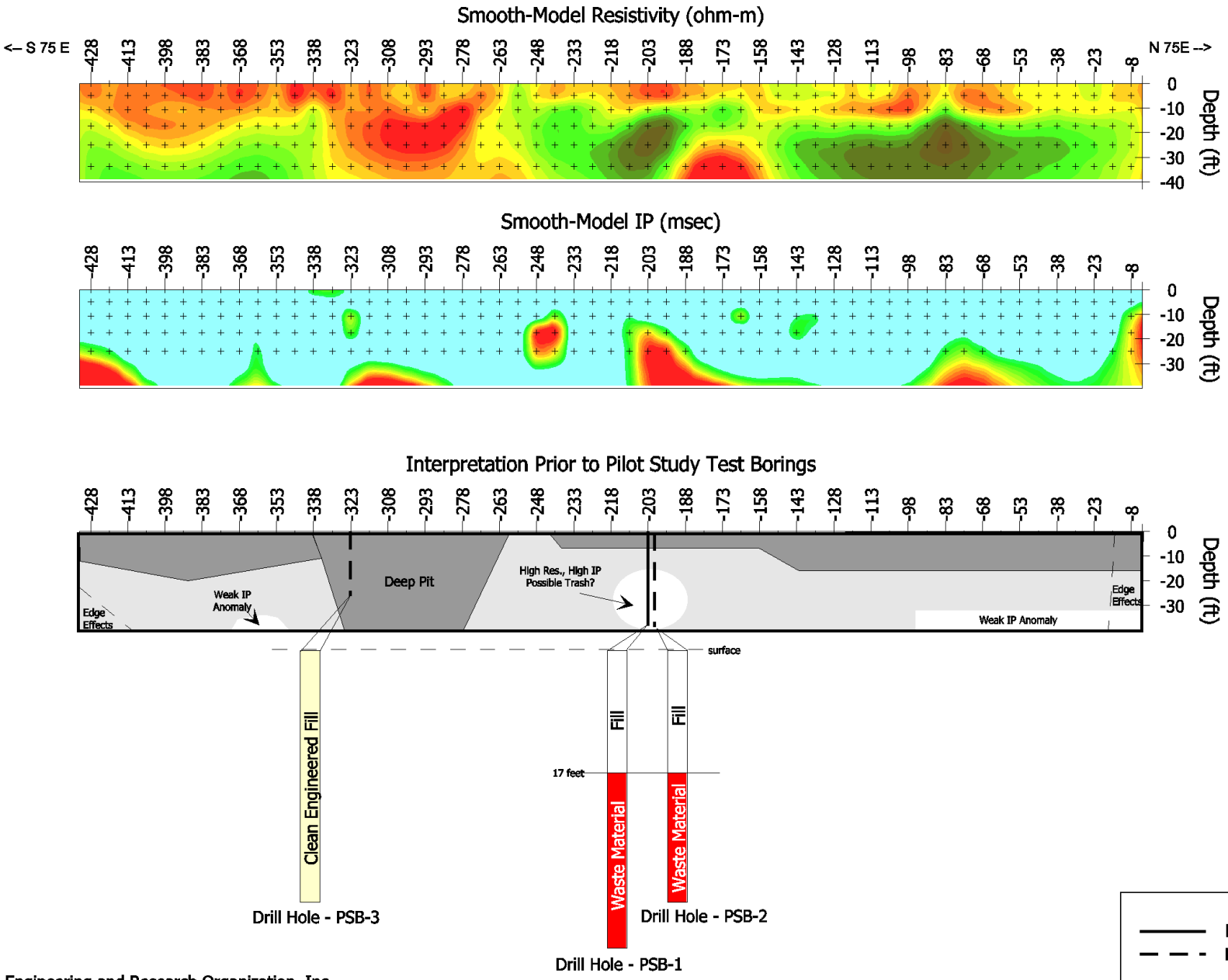
Smooth-model inversion depth sections along the test line for 10, 20, and 30 feet depth show the location of the three test borings. The first boring (PSB-1) was positioned over an IP high in the middle of the line, the third (PSB-3) over an area with no IP anomaly but a resistivity low, and the second (PSB-2) was placed off line to help determine the extent of the waste.

Test Line
Resistivity Depth Section



The third boring (PSB-3) was positioned over a resistivity low, but not correlated with IP high. The other two anomalies were located in moderate resitivities.

Test Line



by Zonge Engineering and Research Organization, Inc.

Down in the Dumps Workshop Notes

Cross sections and drilling hole results show the strong correlation between IP highs (over 3 milliseconds) and buried solid waste. Clean engineered fill was encountered in the boring located over the resistivity low.

Zonge Engineering