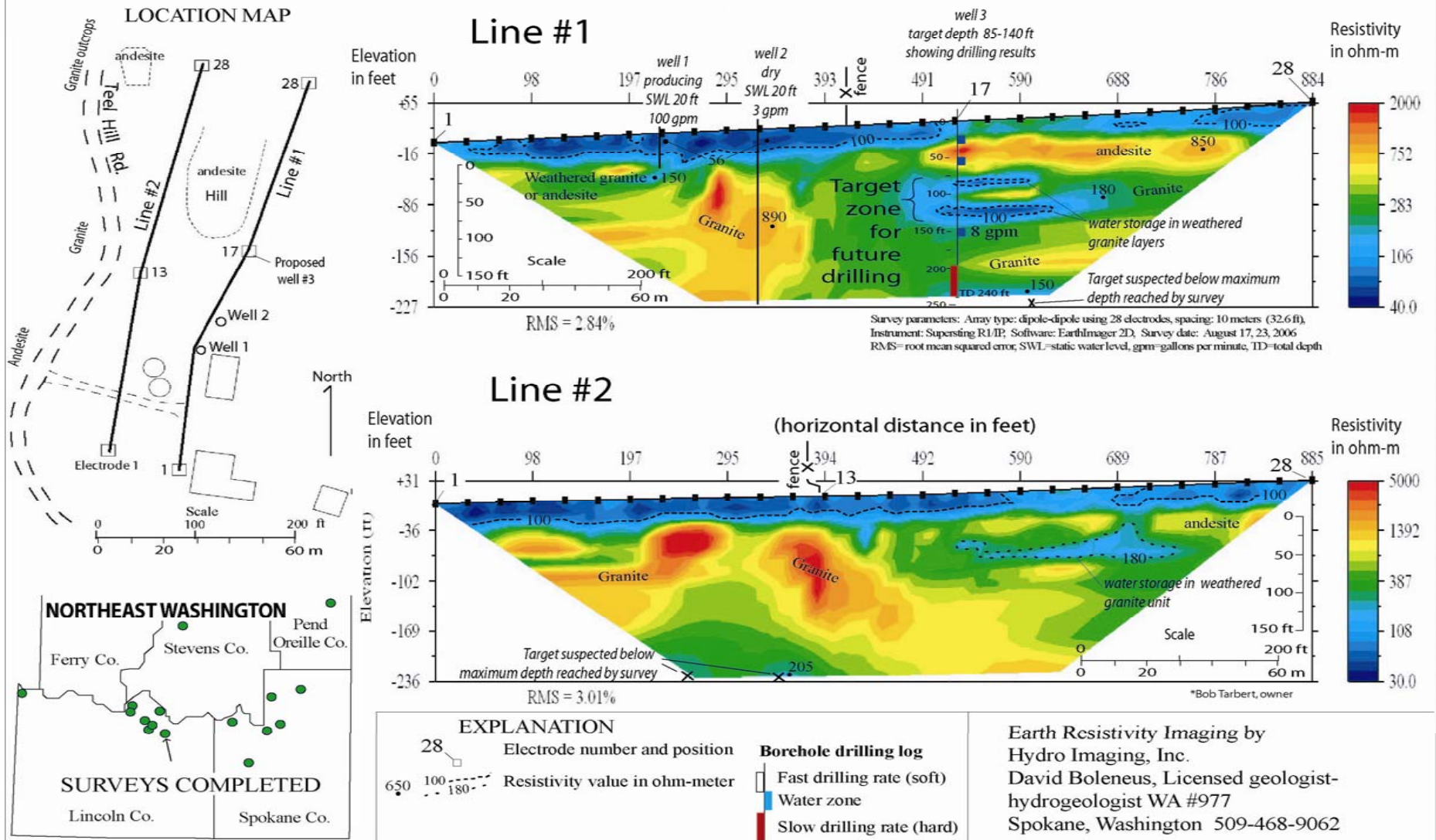


# Water Storage in Weathered Granite, Northern Lincoln County, Wash.\*

(horizontal distance in feet)



## Case Study 1

### Water Storage in Weathered Granite, Lincoln County, Washington

#### Pre-drilling Hydrogeological Assessment



## Case Study 1

### Water Storage in Weathered Granite, Lincoln County, Washington Example of a water well discovery

**CONCLUSION**—The two resistivity *HydroImages* recorded during a Pre-Drilling Hydrogeological Assessment in August 2006 resulted in recommending of a site for drilling (*Target Zone*, on HydroImage profile Line #1). The well subsequently became a producing water well with an initial rate of 11 gallons per minute (gpm).

**REVIEW OF RESULTS**—After review of hydrogeological data, including geology, aerial photographic maps, site conditions, and water well data from two existing wells, the first of two earth resistivity imaging lines were recorded. The earth resistivity imaging line was positioned along older wells #1 and #2 to purposely take advantage of the information known about those wells and to test the area nearby the customer’s house, barn, and shops but upstream from areas that livestock concentrated. The area was largely surrounded by granite outcrops, but the outcropping andesite hill suggested that sedimentary units may lie at depth. Line #1 also lies along a valley bottom. Along this line, water wells #1 and #2 were drilled several years ago. The first, a shallow well reaching 45 ft yields usable quantities of surface water but produces only intermittently during the dry periods, and the second well, more than 500 ft deep, is dry as it found no usable water (see Line #1). Review of the *HydroImage* electrical resistivity imaging data along line #1 revealed a possible target, so a confirmation Line #2 was recorded. Lines #1 and #2 are 900 feet in length and 225 feet apart (*Location Map*). The result showed that the target zone on Line #1 was the most favorable site. This target zone consists of two horizontal zones having low values of resistivity suggesting the extent of water-bearing rock (blue color). The low resistivity layers in the target zone are a few feet thick, at depths ranging from 105 to 145 ft, and have an imaged length of 130-150 ft. The lowest values of resistivity were 84 ohm-m (ohm meters) for the upper zone and 69 ohm-m for the lower zone. A dashed line shows the position of 100 ohm-m contour line. As a benchmark resistivity value, the lower the resistivity and larger the area on the HydroImage profile, then the greater is the suspected quantity of water.

Customer drilled well #3 one month later in September 2006 to test the target zone at location recommended (electrode 17 on HydroImage Line #1). The target zones exhibited a more rapid drill penetration rate indicating a partly disaggregated, weathered, granite-like rock. Minor water zones were encountered at a depth of 70 to 120 ft depth and increased at 150 ft depth. All zones combined to 152 ft gave a pump-test of 8 to 11 gallons per minute by Tarbert Drilling Co. (blue box on well 3). Drilling showed that water-bearing rock consists of weathered granite of several feet in thickness. A zone of hard drilling at 195 to 240 ft corresponds with higher resistivity values in unweathered very hard granite (red box). Testing at time of pump installation gave a yield rate 11 gpm.