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**Tech Note: The Importance of Response Testing**  
**From: Dan Pipp, Chemist, Direct Image Specialist**  
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**FAQ: How often do I need to perform response testing and why?**

Geoprobe Systems® trains operators in the proper techniques for direct image tool operation as outlined in the Geoprobe® SOPs for MIP, EC and HPT and in the ASTM standard (ASTM D 7352-07) for MIP logging. This includes how to perform the required QA testing. Any time an instrument is used to collect data, QA tests must be performed to ensure that the instrument is capable of generating good data. With Geoprobe® Direct Image® logging tools, response testing is the QA test that will prove that the instrumentation is capable of generating



Fig. 1: MIP Chemical response test

quality data and that the logs have been performed in accordance with the standards set. Response tests must be performed before and after each log to prove that the instrumentation operated properly throughout the course of the log. Bypassing the response tests eliminates the available record used to determine the status of the instrumentation at the time the logs were made. Logs performed without response tests will have very limited support from Geoprobe®.

Response testing in MIP logging includes performing chemical responses tests (Figure 1) using a chemical standard of an expected site compound (or similar compound). This test will validate that the contaminant detection system is working from the membrane to the detectors for that type of compound, i.e. Benzene, Toluene or Gasoline for a petroleum site, PCE for a dry cleaner site (not all inclusive). It is crucial that the operators and their customers have confidence that the MIP detector system brought to the site will be able to detect the contaminants present.



Fig. 2: EC dipole test on a MIP probe

MIP operators also need to perform an EC dipole test (Figure 2) which will ensure the electrical conductivity will be accurate and consistent in the logs by applying a known load value to the system resulting in a specific EC response.

The FI6000 data acquisition system will direct an operator through performing the pre and post log chemical response tests and the EC dipole tests with each log. The FC5000 data acquisition system needs to have these tests performed in the MIP/T(ime) software before and after running the MIP logs. The EC dipole tests need to be performed in the same screen as the chemical response tests and will be saved in the EC time graph.

The response test for the EC tool uses an EC test load and test jig system (Figure 3). This will apply a known load value resulting in specific EC response ensuring that the electrical conductivity will be accurate and consistent in the logs. The FI6000 data acquisition system will direct an operator through performing the pre and post log EC test load tests with each log. The FC5000 data acquisition system will perform an instrument test that will check the instruments EC calibration. This test is now used as a troubleshooting step if the test load values are out of range. In the FC5000 software an operator needs to advance to the logging screen and run the 3 level tests on the EC test load and write down the values from the screen into their field notebook.

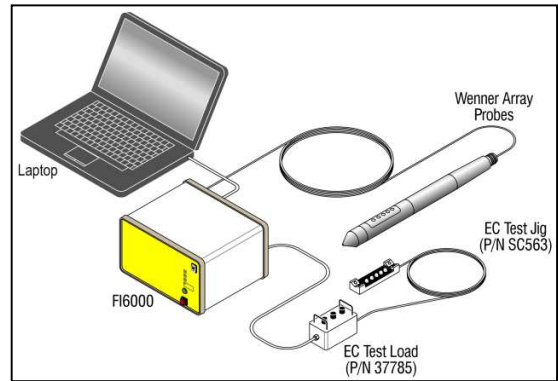


Fig.3: EC Test load for EC and HPT Wenner array probes

With the HPT probe, the EC response test is the same as what is written above for the EC probe. There is also a response test for the down-hole pressure sensor (Figure 4). This test verifies that the HPT (down-hole) pressure sensor can accurately measure a column of water, determine atmospheric pressure and determine the condition of the HPT injection screen by measuring the pressure with and without water flow. With HPT the operator must perform this HPT sensor response test as well as a down-hole dissipation test to be able to calculate the static water level and to estimate hydraulic conductivity (K). The FI6000 data acquisition system will direct an operator through performing pre and post log response tests with each log. On the FC5000 systems the operator is directed through making the HPT measurements when they choose to run the instrument tests. For the EC test load data (Figure 3) an operator needs to advance to the logging screen and run the 3 level tests on the EC test load and write down the values from the screen into their field notebook.

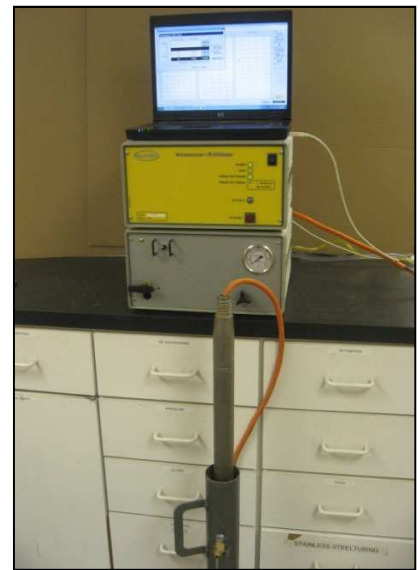


Fig.4: HPT pressure sensor response test

All analytical techniques used to obtain data require testing to validate the instruments used to collect the data. Response testing is what Geoprobe® requires for validation of the Direct Image® instruments. It is in everyone's best interest that these tests are performed but it is up to the operators and their clients, the consultants and regulators, to ensure that these tests are performed before and after each log onsite. Geoprobe Systems® will only stand behind the data generated if we are able to verify proper system operation through the saved response test data located in the .TIM and .INF/.NFO files generated by the software.