

## Overview of Flow Testing Service:

The Airwell Group have designed, manufactured and operate a range of flow testing equipment that delivers a highly accurate flow testing service with data capture. This data is captured in Excel format and can often be emailed to the client from the pumping site during or at the conclusion of the test.

### **Airwell Flow Testing Capabilities.**

Our current flow testing capabilities are up to 60 litres per second however new equipment currently being manufactured will increase our testing capabilities up to 120 litres per second.

Airwell have experienced and mine site ready operators to conduct the flow testing program.

### **Automation**

Once the Airwell flow testing equipment has been set up at the bore, the constant flow test process becomes fully automatic. The flow testing system is controlled by an on board PLC unit which can be monitored and controlled remotely by radio signal or internet (if available). Adjustments to flow rates and other parameters can be changed remotely during the flow test.

The PLC will constantly monitor the discharge flow rate adjusting "tweaking" the pump speed to maintain a constant flow throughout the period of flow testing. Flow rate accuracies of better than 0.2% are achieved.

When the pump is installed into the bore, a down hole pressure transducer is also installed; this transducer will monitor the water level in the bore and relay this information to the PLC with accuracies of 0.065%. The system is also able to monitor water levels in multiple other observation bores located nearby.

The testing equipment will automatically take readings at predetermined intervals of the standing water level in the bore(s), and the discharge flow from the pump for the entire duration of the pumping test and recharge periods. Manual dipping can also be completed if data verification is required.

### **Improved Site OH&S**

With our remote monitoring and control capabilities, it is no longer necessary for staff to remain at the bore site 24 hours per day. Our staff are now able to monitor the ongoing flow testing results overnight from the safety of their site accommodation with it only necessary to return to the bore site for emergencies.

### **Typical Testing Procedure**

Testing requirements differ from site to site depending on the purpose of the flow test. Airwell will always undertake the test in accordance with the client needs and requests.

Most flow tests will generally consist of:

1. Logging of data for the bore being tested and for other observation bores nearby.
2. The test will usually commence with a step drawdown test to determine the flow rate for the pumping test. The test will often involve four to five steps.
3. Following completion of the step test monitoring of the water level recovery is logged until the initial standing water level is restored (or another predetermined recovery level is achieved).
4. The constant flow rate test will commence for the period specified by the client at nominated flow rate.
5. Conclude pumping with recovery rate being logged until the initial standing water level is restored (or another predetermined recovery level is achieved).



6. Logging is concluded. All data is compiled electronically and presented to the client in Excel format.

### **Airwell Equipment to Automate and log the flow test**

#### **Control Skid**

Airwell have designed and built control Skids to house all of the electronic equipment to control and monitor the flow testing process, mounted inside an enclosed skid makes this delicate equipment as robust as possible.

This equipment includes:

#### **PLC Controller**

A PLC system accurately controls the water pumping flow rate via a VSD, based on the information from the Magflow meter.

#### **Data Logger**

A Data logging unit records all the test data from the pumping bore and any surrounding monitoring bores.

#### **Mag Flow Meter**

The 3" and 6" Mag flow meters mounted inside provide the control with a constant and very accurate reading of the discharge of the pump. (Plus or minus .5%)

#### **VVF Drive**

The Airwell unit shown in this picture has a 15Kw VSD drive fitted inside to allow the controller to vary the speed of the electric submersible to maintain the desired flow.

#### **Pressure Transducer**

A small diameter pressure transducer is run down the bore with the pump to measure standing water levels in pumping bore. Additional observation bores can also be monitored. The data from all wells is logged in real time.



**All electrical equipment is connected with approved plugs so there is no need for hard wiring on site.**

### Airwell Pump Test Control Dashboard

The screenshot below is an example of the Airwell Pump Test Control Dashboard that allows the operator to fully control and monitor the testing equipment from any location. If within 15km of the bore communication is achieved using the skid unit's inbuilt radio link or from any location using the skids 3G modem when the test is conducted within mobile reception.

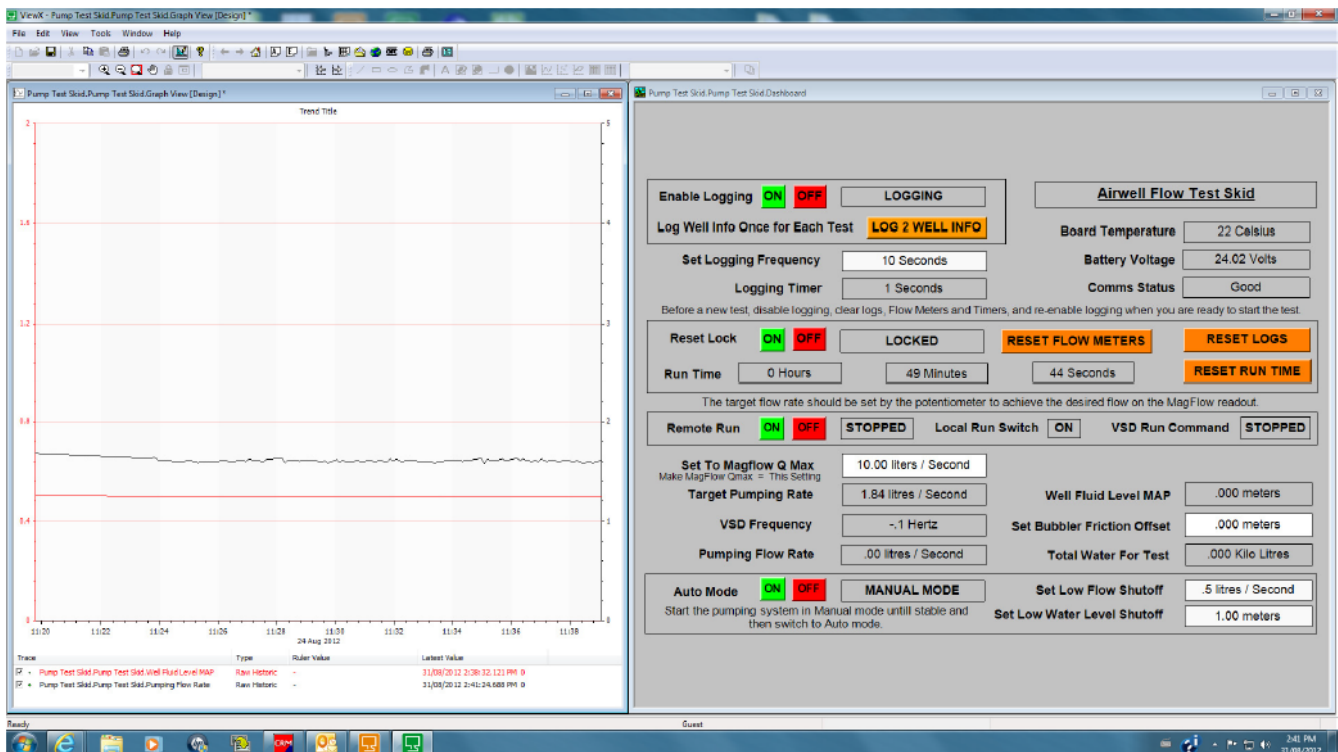
#### Safety of Operation

In addition to the convenience this remote control feature gives, it also significantly reduces the onsite risk, as the onsite operators can monitor the test from the caravan or mine camp without the need to travel to the bore during the night.

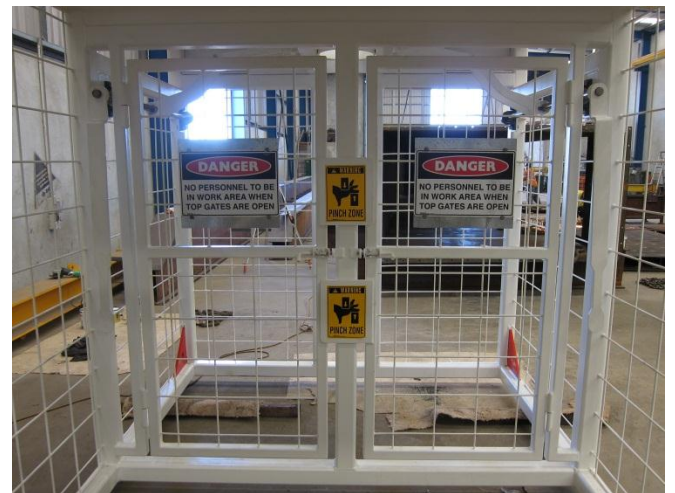
It also allows for the Airwell head office to give monitoring support, allowing the site technicians to either conduct other activities on site or to stand down.

#### Real Time Data to Client

When the test is conducted within mobile reception, and for protracted contracts, it is also possible for the client to view the test from any location by downloading the Airwell software onto their own computer.



**Site Setup Example**



Overhead load protection safety cage. Designed and built by PIHA.

For more information on Airwell Group's flow testing services please contact us on the details below.

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