

## Appendix I

# FORT MONMOUTH WELL DEPTH MEASUREMENT PROCEEDURE

Brinkerhoff Project No. 09BR116

**Fort Monmouth  
Groundwater Protection Program  
Standard Practice Procedure**

**Well Depth Measurement Procedure**

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# Monitor Well Depth Measurement Procedure

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## 1.0 PURPOSE

This procedure is a standardized method for determining the measured depth of a groundwater monitoring well. The measured depth of a well, when compared to the constructed depth of the well, provides an indication of sediment accumulation or obstructions within the well.

## 2.0 APPLICABILITY

Measuring well depth is applicable to all monitor wells located at the Fort Monmouth.

## 3.0 DEFINITIONS

**Constructed Depth** - the distance from the top of the innermost well casing to the bottom of the screened or open interval as reported in: The Fort Monmouth Well Search Data Base.

**Installation Restoration Program (IRP)** - Program Description: The Army's Defense Environmental Restoration Program (DERP) was formally established by Congress in 1986 and provides for the cleanup of Department of Defense (DoD) sites under the jurisdiction of the Secretary of Defense. The Army has two restoration programs under DERP at active/operating Army installations, the Installation Restoration Program (IRP) is a comprehensive program to identify, investigate and clean up hazardous substances, pollutants, and contaminants at active/operating Army installations. Eligible sites include those contaminated by past defense activities that require clean up under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by Superfund Amendments and Reauthorization Act (SARA) and certain corrective actions required by the Resource Conservation Recovery Act (RCRA).

**IRP Manager** - person responsible for day-to-day management of the Fort Monmouth Installation Restoration Program or authorized designee.

**Measured Depth** - the distance from the top of the innermost well casing to the bottom of the well as measured in the field.

**Sediment Accumulation** - accumulation of sand, silt, precipitates, or other debris in the bottom of the well.

**Well Cap** - a removable cap used to cover a well casing.

**Well Casing** - steel, stainless steel, or PVC pipe which provides unobstructed access to the monitored interval.

**Well Identification** - an Aluminum plate embossed with the well identification number and other pertinent information that is attached to the outermost casing of all wells.

## 4.0 REFERENCES

### 4.1 Use References

- 4.1.1 "Fort Monmouth Well Search Data Base, August 2008 (or most revision).
- 4.1.2 "Monitor-Well Inspection and Maintenance Plan, Fort Monmouth, New Jersey (Revised)", August 2008

### 4.2 Source References

- 4.2.1 NJDEP's *Field Sampling Procedures Manual*, August 2005 edition  
<http://www.state.nj.us/dep/srp/guidance/fspm/>
- 4.2.2 RCRA E GROUND-WATER MONITORING: DRAFT TECHNICAL GUIDANCE OFFICE OF SOLID WASTE U.S. ENVIRONMENTAL PROTECTION AGENCY  
[http://www.epa.gov/correctiveaction/resource/guidance/sitechar/gwmonitr/rcra\\_gw.pdf](http://www.epa.gov/correctiveaction/resource/guidance/sitechar/gwmonitr/rcra_gw.pdf) looks like a good document may be a more recent one? See end of this document for the procedure for getting (dow).
- 4.2.3 Agency, "A Compendium of Superfund Field Operations Methods", EPA/540/P-87/001, 1987.  
<http://www.hanford.gov/dqo/project/level5/Sfcompnd.pdf> old document
- 4.2.4 U.S. ENVIRONMENTAL PROTECTION AGENCY, "RCRA GROUNDWATER MONITORING TECHNICAL ENFORCEMENT GUIDANCE DOCUMENT", OSWER-9950.1, SEPTEMBER 1986. RCRA GROUND-WATER MONITORING: DRAFT TECHNICAL GUIDANCE, OFFICE OF SOLID WASTE U.S. ENVIRONMENTAL PROTECTION AGENCY, NOVEMBER, 1992  
[http://www.epa.gov/reg3wcmd/ca/pdf/Rcra\\_gwm92.pdf](http://www.epa.gov/reg3wcmd/ca/pdf/Rcra_gwm92.pdf)

## 5.0 PRECAUTIONS AND LIMITATIONS

### 5.1 Constructed Well Depth

The reported constructed depth of the well may require confirmation or may be inaccurate as recorded in original well construction records.

## **5.2 Measurement Accuracy**

Increased depth and large water columns decrease the accuracy of the well depth measurement.

## **5.3 Safety**

Established safety standards and requirements of the technicians' employer, DOD, and OSHA will apply to the process of obtaining the measured depth of a monitor well. All field personnel will be provided with appropriate safety clothing, equipment, and training.

## **5.5 Well Access**

A well may be deemed inaccessible because of site conditions or operations. Always check with the appropriate property manager and/or the Provost Office prior to accessing the area.

## **6.0 PREREQUISITES**

All monitor wells will have the measured depth determined during a scheduled well inspection.

## **7.0 TEST EQUIPMENT, TOOLS AND SUPPLIES**

**7.1 Documentation:** Well Construction Data Summary, Updated Well Database, (or most recent version), Daily Activity Logbook, and Monitor-Well Inspection Checklist.

**7.2 Personnel Protection Equipment:**  
Required: rubber gloves  
Optional: safety shoes, tyvek coveralls, hard hat, and protective eye-wear.

- 7.3 Field Equipment: Keys to unlock wells, indelible marker, pen, clipboard, and weighted fiberglass or steel measuring tape(s) and/or cable (the weight will be stainless steel or other approved inert material and have a blunt end facing down).
- 7.4 Decontamination Equipment: Plastic ground covers, de-ionized water, mild detergent, and wash and rinse water collection vessels.

## **8.0 ACTION STEPS**

- 8.1 Preparation: Review Well Construction Data Summary and Updated Well Search Data Base to obtain the constructed depth of the well and determine the well location.
- 8.2 Record well number and date.
- 8.3 Put on rubber gloves.
- 8.4 Remove well lock and well cap.
- 8.5 Locate the reference mark at the top of the innermost well casing. If a reference mark is not present, make one with indelible marker, and notify Fort Monmouth IRP Manager or authorized designee.
- 8.6 Select the appropriate length measuring tape and/or cable.
- 8.7 Slowly lower the weight into the well until the bottom of the well is encountered as indicated by slack in the tape measure or a solid impact.
- 8.8 When slack or impact occurs, slowly lift the tape until the tape becomes taut. Raise and lower the tape until the point of tension release becomes clearly defined.
- 8.9 Hold the tape to the reference mark on the casing.
- 8.10 Record the measurement to the nearest 0.1 ft as the measured well depth in the Daily Activity Logbook and/or Well Inspection Checklist.

8.11 Repeat steps 8.6 - 8.9 several times to ensure an accurate measurement. Readings should remain constant (i.e., within 0.1 ft).

8.12 Remove the measuring tape from the well and decontaminate in accordance with the Site Specific Field Sampling Protocol.

**8.12** Close well cap and replace lock.

## **9.0 ACCEPTANCE CRITERIA**

An acceptable measured depth of a well is achieved when the range of three or more consecutive measurements are within 0.1 ft.

## **10.0 POST-PERFORMANCE ACTIVITIES**

Report to the Y-12 GWPP Manager or authorized designee those wells with significant (i.e., greater than 1 ft.) differences between the constructed well depth and the measured well depth.

## **11.0 RECORDS**

**11.1** Daily Activity Log

**11.2** Well Inspection Checklist

From **RCRA GROUND-WATER MONITORING:  
DRAFT TECHNICAL GUIDANCE**  
**OFFICE OF SOLID WASTE**  
**U.S. ENVIRONMENTAL PROTECTION AGENCY**  
**401 M STREET, S.W.**  
**WASHINGTON, D.C. 20460**  
**NOVEMBER 1992**

[http://www.epa.gov/correctiveaction/resource/guidance/sitechar/gwmonitr/rcra\\_gw.pdf](http://www.epa.gov/correctiveaction/resource/guidance/sitechar/gwmonitr/rcra_gw.pdf)

#### 7.2.2 Measurement of Static Water Level Elevation

The QAPjP should include procedures for measuring the static water level elevation in each well prior to each sampling event, as required in §264.97(f). The QAPjP also should include procedures for measuring the depth of each well prior to each sampling event. Measuring water level elevations on a regular basis is important for determining whether horizontal and vertical components of the hydraulic gradient have changed since initial site characterization. A change in ground-water flow direction may necessitate modifying the design of the ground-water monitoring system. Water level elevations typically have been measured using a number of devices and methods, including the following:

- Steel tape coated with carpenter's chalk (wetted-tape method);
- Float-type devices;
- Pressure transducers;
- Acoustic well probes;
- Electric sensors; and
- Air lines.

These devices and methods are described in more detail in Aller et al. (1989), USEPA (1987a), and Dalton et al. (1991). Dalton et al. (1991) provide the water level measurement accuracy of each of these devices. The QAPjP should specify the device to be used for water level measurements, as well as the procedure for measuring water levels. Regardless of the method or device chosen to measure the water level elevation in a monitoring well or piezometer, the following criteria should be met when determining water level elevations: Prior to measurement, water levels in piezometers and wells should be allowed to recover for a minimum of 24 hours after well construction, well development, or well purging. In low yield aquifers, recovery may take longer than 24 hours. If necessary, several water level measurements should be made over a period of several days to ensure that recovery has occurred. · Water levels should be measured with a precision of  $\pm 0.01$  foot. Water levels should be measured from the surveyed datum on the top of the inner well casing. In general, the wetted-tape method is the only method for water level measurement that is consistently accurate to 0.01 foot (Dalton et al., 1991). Water level measurements from boreholes, piezometers, or monitoring wells used to define the water table or a single potentiometric surface should be made within 24 hours. In certain situations, water level measurements should be made within an even shorter time interval. These situations typically include:

- tidally influenced aquifers;
- aquifers affected by river stage, bank storage, impoundments, and/or unlined ditches;
- aquifers stressed by intermittent pumping of production irrigation or supply wells; and
- aquifers being actively recharged because of recent precipitation.

Water level measurement equipment should be constructed of materials that are chemically inert and not prone to sorption or desorption. Water level measurement equipment should be decontaminated prior to use at each well to ensure sample integrity and to prevent cross-contamination of ground water. Measuring tapes and marked cables that are used to measure water levels should be periodically checked for stretch.

Well depth should be measured each time ground water is sampled. Well depth may be measured using a weighted tape measure or marked cable constructed of materials that are chemically inert and not prone to sorption or desorption. The weight should be heavy enough to keep the tape measure straight and blunt enough so that it will not penetrate soft materials on the bottom of the well. The deeper the well, the heavier the weight has to be to "feel" the bottom of the well. Standing water level measuring devices are generally not appropriate for making well depth measurements. Equipment used to measure well depth should be decontaminated prior to use at each well. The measuring tape or marked cable used to measure well depth should be periodically checked for stretch.