Water Well Monitoring Technician

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Water Well & Pump Installation Standards Program

Water Well Monitoring

- Objective
  - To provide an access point for withdrawing a representative ground water sample
- Fact
  - Fifty percent of the United States population relies on ground water for their drinking water.

Definitions

- **Permeability**: The property or capacity of a porous rock, sediment, or soil for transmitting a fluid; it is a measure of the relative ease of a fluid flow under unequal pressure.

- **Porosity**: The percentage of the bulk volume of a rock or soil that is occupied by interstices, whether isolated or connected.

- **Aggressive Water**: Low pH (<7.0) water tends to be corrosive and high pH (>7.5) water is protective of pipe material.
- **Annular Space**: The space between the well casing and the well bore or the space between two or more strings of well casing.
- **Aliquot**: A portion of a sample of equal size.
- **MSDS**: Material Safety Data Sheets provide information about the product.
- **Personal Exposure Limit**: PEL is the specific chemical level in air that may cause bodily harm.

Well Seal

- What are the four License types that can break the seal on the well?
  - Licensed Pump Installation Contractor
  - Licensed Pump Installation Supervisor
  - Water Well Monitoring Technician
  - Natural Resources Ground Water Technician
    - Persons holding a combination of any of the above licenses may also break the well seal

Development

- A monitoring well should be developed until visibly clear water is discharged.
- A monitoring well should be developed to allow the collection of turbidity-free representative ground water sample is obtained.

Representative Samples

- Difficult to obtain
  - What is representative?
    - Some believe that a representative sample is obtained by withdrawing x-number casing volumes of water from the well to be purged.
    - Others believe that samples should be obtained after temperature, specific conductance and pH has stabilized.
  - Tap Sample may or may not be a representative sample. Follow the policy and procedures of the regulating agency.
  - Duplicate Samples are used for QA/QC purposes.

Purging

- Purging is the process of removing stagnant water from a well prior to sampling.
- Purging is necessary because a ground water sample must be representative of the formation water.

- Stagnant water trapped above the screen in the well casing remains there until the next sampling event.
  - Stagnant Water has a different:
    - water temperature
    - pH
    - oxidation-reduction potential, and
    - Total Dissolved Solids content than formation water.
  - Stagnant water can affect lab analysis
  - Stagnant water can volatilite or effervesce contaminate analyte

Purge Volumes

- Two Philosophies
  - Borehole volume
    - Range from 1 to 20 borehole volumes
      - Purge volumes generally are between 3 and 6 borehole volumes
  - Stabilization of Indicator Parameters
    - Well should be purged until field measured parameters have stabilized
      - Temperature, pH and specific conductance
- Purge volumes should be in accordance with the sampling plan.

Low Volume Wells

- Low volume = Slow Recovery Wells
  - These wells require special consideration
  - Purging of well may not be required
  - Do not lower water past top of screen, this may cause aeration
  - May take several hours to recharge

Purging Equipment

- Criteria for choosing purge equipment is similar to that of sampling
  - Based upon volume depth-top or bottom of screen contaminant
- Common forms of purge equipment
  - Bailer
  - Suction Lift; used at depths <25 feet
  - Submersible Pumps

Decontamination

- Most important aspect of sampling
  - Also most overlooked component of sampling
- Required in any ground water investigation
- Purpose of decontamination is four fold:
  - To prevent cross-contamination
  - Ensure collection of representative samples
  - Ensure proper operation of equipment
  - Reduce exposure hazard

- Only materials that can be decontaminated should be used for sampling. Most organic materials cannot be decontaminated.
  - Acceptable materials would be:
    - PVC
    - Teflon
    - Stainless Steel

- Decontamination Cleaning Solutions
  - Vary depending upon contaminant
  - Examples are:
    - Distilled Water
    - Methanol
    - Alconox
    - Hydrochloric Acid
    - Clean Potable Water
  - Any combination of these solutions could be used

- Other Methods of Decontamination
  - Pressure Wash
  - Steam Cleaned
  - Combination of Pressure & Steam Cleaning

- Common Sense Decontamination
  - Microbiological Contamination is coliform bacteria
  - Coliform bacteria can be introduced into a water system by just about any activity
  - Sample bottles and containers must be handled with care to prevent contamination
    - DON'T USE CHLORINE ON BOTTLES OR CONTAINERS
    - DON'T WASH BOTTLES OR CONTAINERS

Water Level Data

- Important for various reasons
  - Shows changes in ground water regions
  - Influences by human activity
  - Measurement taken from a known elevation or point
- Piezometers
  - Specifically designed to measure ground water
  - Construction must meet domestic well standards except in areas of ground water contamination, then their construction must meet Monitoring and Recovery Well construction
  - Must be fitted with a watertight cap to prevent ground water contamination

PPE

- Personal Protective Equipment
- 4 - levels
- OSHA standards
- CFR-1910.120
- Hazardous Materials
- Employees Protection

Level A

- Greatest level of Skin, Respiratory, and eye protection. Includes;
- Positive pressure, full face self-contained breathing apparatus (SCBA)
- Encapsulating chemical protective suit(moon suit)
- Coveralls
- Gloves-outer and inner chemical resistant

Level B

- Full face piece SCBA
- Hooded chemical resistant clothing
- Coverall
- Hard Hat
- Gloves-outer and inner, chemical resistant
- Boots- chemical resistant, steel toe and shank

Level C

- Concentrations, type of airborne substances
- Full face or half mask air purifying respirators-NIOSH approved
- Hooded chemical resistant clothing
- Coveralls –gloves
- Eye protection-glasses or face shield

Level D

- Minimal Protection-nuisance contamination
- Coveralls
- Gloves
- Boots-chemical resistant-steel toe and shank
- Safety glasses- chemical slash googles
- Hard hat

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