Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Title 5

DEP FIELD TESTING PROTOCOL FOR REMEDIAL AND GENERAL USE INNOVATIVE/ALTERNATIVE TREATMENT SYSTEMS

The Department requires all single-family home (SFH) innovative/alternative (I/A) treatment systems be field tested whenever the systems are inspected to determine system performance. It is imperative that field tests are **properly conducted and documented** so that the results represent the true performance of these systems. Poor field-testing and sloppy documentation raise questions about the operation of these systems; it may require that the operator collect laboratory samples to accurately document the efficiency of the treatment unit.

The individual collecting the field samples shall have, at a minimum, technical training on sampling techniques and personal safety and shall be thoroughly familiar with the treatment unit that is to be field tested.

The following paragraphs describe in general terms the equipment and sampling protocols that should be utilized when conducting field tests or collecting wastewater samples for laboratory analysis from these I/A systems.

Sampling Equipment

Field personnel collecting samples for either field-testing or laboratory analysis should have access to the following items :

1. A logbook to record field measurements such as dissolved oxygen (DO), turbidity, pH, temperature, etc. and sample time, weather conditions, flow conditions, effluent description including solids carry over, clarity and color or odor and other operating conditions.
2. All information on the location to be tested including DEP required tests.
3. Chain of custody sheets for recording the samples collected when laboratory testing is required.
4. Glove and eye protection equipment plus antibacterial cleaner and distilled water.
5. Turbidity, DO and pH meters, calibrated and tested on site, and a thermometer.
6. Sludge measurement device and a pole with a sampling container on the end to collect samples from difficult to reach locations.
7. For laboratory testing, approved, clean and quality assured sample bottles, labled with a unique identification number, parameter requiring analysis, date and time of collection, source/location of sample and name of sampler provided by a certified laboratory for at least the following types of samples depending on the specific sampling requirements. Do not rinse sample bottles that contain a preservative.:
    i. Sample bottle for BOD_5 and TSS (min. 1,000 ml)
    ii. Sample bottle for oil and grease (min. 1,000 ml)
    iii. Sample container for microbiology (min. 100 ml)
    iv. Sample bottle to collect samples for field testing of pH, etc.
8. Cooler stocked with ice to preserve samples. (ice shall not be left in bags)
9. Other equipment including:
    i. Hose, equipped with a backflow preventer, to induce flow in the system to collect a flowing sample. Water supply to be provided for instances that running water is not available.

ii. Assorted devices to clean any pipes of solid material before collecting a sample.
iii. Ammeter for recording loading of electric motors.
iv. Equipment for preparatory cleaning of sampling point
v. Composite sampling devices when such samples are required.
vi. Equipment and reagents necessary for cleaning and calibrating sampling equipment.

Sampling Techniques

Sample collection and preservation shall be performed in conformance with Part 1060 of the latest edition of "**Standard Methods for the Examination of Water and Wastewater**" and the following guidelines.

Sampling techniques may need to be modified as necessary to reflect field conditions and the type of sample to be collected. In most cases the Department requires discrete grab samples. In certain instances composites samples are specified in the technology or site-specific approval. It is the responsibility of the individual collecting the samples to ensure that the correct sampling techniques are implemented.

Every effort should be made to collect all samples, whether grab or composite, from a free flowing influent or effluent pipe. Hose or portable water sources can sometimes be used for inducing a flowing condition but is not the preferred methodology.

Temperature, pH, DO and Turbidity samples should be collected on site and logged in. Any result that appears unusual should be rerun at the site to assure that the first reading was correct.

When samples for laboratory testing are required they shall be collected and immediately placed in the cooler and covered with ice.

Chain of Custody sheets shall be filled out legibly with correct sample ID numbers, other pertinent information and comments.

Samples shall be delivered to the certified laboratory within the minimum required time span for the critical parameter and preferably, on the same day they are taken.

Field Visual Examination

It is important that the inspector conduct a visual examination of the wastewater. In most cases this visual examination will immediately provide the inspector with an understanding of the status of treatment. The inspector's field inspection should include an evaluation of the color of the wastewater in the treatment unit, odors from the unit and finally the solid content of the effluent. The following are the items that need inspections:

Wastewater Color: gray __ brown___ clear___ turbid ____ other_____
Wastewater Odor: musty____ earthy ____ moldy ___offensive____
Effluent Solids: no___ some___ turbid_____

Field Testing Equipment and Calibration

In general electronic instruments for pH, DO and Turbidity are used to measure the properties of water or wastewater. As such, they are indirect methods of measurement, and must be calibrated. To calibrate probes/instruments, it is extremely important that the technology manufacturers SOP are carefully followed and documented. The operator, by complying with instructions will ensure that the equipment is operating as designed by the supplier and there is quality control of field data. Accurate field data is necessary in order to meet sampling protocol requirements

Non-compliance with calibration and testing instruction will result in a lack of calibration and inaccurate measurements which will mask both treatment and effluent water quality problems and by violating sampling protocols will invalidate all data collected.

Temperature

Measured using pH and dissolved oxygen meter, or thermometer

pH

“acidity” of the water, measured using a pH meter.

This meter is used to measure the acidity of the water by comparing readings from a reference electrode and a sample electrode. To determine pH the output of these electrodes must be temperature-compensated, most pH meters also measure temperature.

Turbidity

The clarity of the water, measured using a portable turbidimeter.

The turbidimeter measures the light transmittance of a sample in NTU's (Nephelometric Turbidity Units, a standard measure). It needs no field calibration. Handle the sample vials only by their ends (preferably the lid) so as not to affect the transmittance; wipe any fingerprints, spots, etc. from the outside of the vial; and be sure to close the vial-compartment lid when taking a measurement.

DO

Dissolved Oxygen content. Measured using a hand-held dissolved oxygen meter.

The DO meter will measure dissolved oxygen, electrical conductivity, and salinity. DO is measured by the rate of consumption of oxygen at the tip of the probe, so it requires continual movement of water past the tip (an up-and-down motion seems to work best, keep the probe tip submerged). Stable readings are not possible while the temperature of the sample is changing. When performing analysis at multiple sampling locations, the DO meter calibration should be checked at the beginning, middle, and end of each analysis day.