CHAPTER 6
SELECTING AND DESCRIBING SAMPLING POINTS

ESSENTIAL ELEMENTS OF A SAMPLING PLAN

- Goals of the Sampling Plan
- Description of the Facility Generating Sludge
- Data Quality Objectives
- **Selecting and Describing Sampling Points**
- Sample Collection Procedures
- Sample Handling Procedures
- Evaluation of Completeness
- Record-Keeping and Reporting Procedures

Any sampling plan must specifically and accurately identify and describe all sample collection points. This description should explain how the selected sampling points were chosen to produce a representative sample that meets the goals of the sampling program.

The first step in selecting sampling points or locations for inclusion in a sampling plan is to review the goals of your sampling program. Clearly defined objectives simplify the process of identifying appropriate sampling locations. If demonstrating compliance with state and federal regulation is your primary concern, then appropriate sampling locations are to some extent defined by the regulations. If your sampling is for process control, then logical sampling points may be readily apparent. For example, if you want to document the efficiency of your dewatering equipment, then the best sampling point would be the first accessible point after the dewatered solids leave the dewatering device.

In Chapter 5, sample type, size, and sampling frequency were discussed as important factors for obtaining a representative sample, the primary underlying objective of any sampling plan. Choosing the appropriate sampling location is equally important. When choosing sampling locations, the following factors should be considered:

- *Representativeness*
- *Type of process—batch or continuous*
- *Accessibility*
- *Safety*

Representativeness

In almost all phases of developing a sampling plan, the issue of sample representativeness arises. Your choice of sampling points can certainly affect the representativeness of a sample. For example, if a POTW sludge is dewatered with a belt filter press and then conveyed to a pug mill for lime stabilization, where is the most representative location to collect a sample? Is it the sludge holding tank or thickener? Is it the sludge conveyor? Is it before or after lime stabilization?

The best choice is the location that produces a representative sample that best meets the stated goals of the sampling plan. If the POTW land applies its biosolids, then sampling sludge after the pathogen and vector attraction reduction processes produces the most representative sample of the material that will actually be land applied. If an operator wishes to observe changes in sludge quality or track the fate of a specific pollutant during sludge processing, then samples from sludge holding tanks and completely processed sludge should be collected. Compliance sampling generally requires that the sludge be collected at the end of the sludge treatment process in the form in which it will be recycled or disposed.

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Type of Process—Batch or Continuous

Choosing appropriate sampling locations also depends on whether your wastewater or sludge is treated in a batch or a continuous process. For example, in a wastewater lagoon, sludge is treated and stored in what amounts to a batch process. Sampling sludge from a lagoon entails collecting a number of grab samples from different areas throughout the lagoon. Biosolids in a stockpile or roll-off container, which can be thought of as a "batch," should be sampled in a similar manner. In all of these situations, a composite sample is produced by collecting a predetermined number of grab samples at random points throughout the batch. For larger areas, such as a lagoon, it is best to establish an imaginary grid system and collect grab samples randomly from within the grid.

Another example of a batch sludge process is dewatering using a plate and frame press. Sludge is pumped into the press until it is full and then the water is removed by compression. After the compression cycle is complete, the press is opened and sludge is scraped from each plate and allowed to fall into a container below. Grab samples are collected at multiple locations from either the press or the container and combined to make a composite sample. The key is that for batch situations, grab samples are collected from multiple locations within the batch.

For continuous processes, multiple grab samples are collected from a single location within the process over time. For example, sludge dewatered in a belt filter press is a continuous process. To sample from a belt filter press, a predetermined number of grab samples are typically collected from the first accessible location after the sludge has passed completely through the press. Generally, this collection location is a point of conveyance between the press and a container or truck in which the sludge will be stored until it is transported to its final destination. If such a procedure is used for the collection of samples for microbial analysis, the samples should be collected over a brief time (less than one hour) and the sample container should be cooled to between 0 and 10 degrees Celsius (° C).

Accessibility

A sampling point must be reasonably accessible to be an effective location. Sampling cannot be performed from a location that cannot be reached. It should be recognized that the best sampling point may not be accessible and that sampling will need to be performed at the next best point of accessibility. Accessibility and safety are related in that a sampling point may be physically accessible, but sampling from that location may present a risk of injury.

When sludge is dewatered with a belt filter press, samples should be collected as the material exits the press. Note the accessibility issues and potential safety hazards present.

Safety

Safety risks must be assessed for each potential sampling location. If there is a risk of injury inherent to a particular sampling location, then consider a safer alternative. The entire sampling process should always emphasize safety. Once you choose a sampling location, identify the potential risks associated with that location, take the appropriate safety precautions, and provide protective equipment.

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Typical Sampling Points

POTWs can have a wide variety of configurations in their sludge processing operations, including a number of acceptable methods for sludge stabilization, pathogen reduction, and vector attraction reduction. This process variability means that appropriate sampling points can differ from facility to facility. However, certain sludge treatment processes suggest common sampling locations. Table 6-1 lists typical sampling points associated with common sludge treatment methods.

Table 6-1. TYPICAL SLUDGE SAMPLING POINTS

Sludge Type	Sampling Point
Anaerobically Digested	Taps on the discharge side of positive displacement pumps
Aerobically Digested	1. Taps on discharge lines from pumps 2. If batch digestion, sample directly from digester. **Two cautions:** • If aerated during sampling, air entrains in the sample and VOCs may purge with escaping air. • When aeration is shut off, solids separate rapidly in a well digested sludge.
Thickened Sludges	Taps on the discharge side of positive displacement pumps
Heat Treated	Taps on the discharge side of positive displacement pumps **after** decanting **Two cautions:** • Tendency for solids separation • High temperature of sample can cause problems with certain sampling containers due to cooling and contraction of entrained gases.
Lagoons	Use a "sludge judge" to collect samples from a randomized grid-like pattern, then composite the collected samples.
Dewatered 1. Belt Filter Press, Centrifuge, Vacuum Filter Press 2. Plate and Frame Press 3. Drying Beds	 1. Discharge chutes or conveyors 2. Random locations from the press or random locations from the storage container 3. Random locations from grid system established over the beds
Stockpiles or Storage Containers	Random points (varying the depths and locations) within the stockpile or container
Compost	Random points (varying the depths and locations) within stockpiles of finished compost ready for sale/distribution

CHAPTER 6 REFERENCES

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