APPENDIX B

EXAMPLE OF A COMPLETED SAMPLING PLAN WORKSHEET

This example of a completed sampling plan worksheet has been included to illustrate the information necessary to document a sampling program for demonstrating compliance with the federal 503 land application requirements. In this example, Attachment A has been developed from information contained in Appendix D and Attachment B has been developed from information in Appendix H.

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SAMPLING PLAN WORKSHEET

(Please provide attachments as needed)

1. General Facility Information:

Facility Name: Example Wastewater Treatment Facility

Phone: (123) 456-7891

Street Address: 10 Example Road

City: Example **State:** EX **Zip**: 12345

2. Contact Person: John Example

Name: John Example **Title:** Chief Operator

Phone: (123) 456-7891

Street Address: 10 Example Road

City: Example **State:** EX **Zip**: 12345

3. Sampling Plan Objective(s): (For explanation, see Chapter 3)

Provide a statement that describes the goals of the sampling program.

To demonstrate compliance with Federal Part 503 requirements for the land application of sewage sludge.

4. Facility Information: (See Chapter 4)

A. *Provide a brief general description of your facility.*
(Example: conventional activated sludge treatment with anaerobic digestion)

Extended aeration facility

B. *Design Flow (MGD):* 1.0 *Average daily flow (MGD):* 0.75

Previous Year's Annual Sludge Production (dry metric tons): 175

C. *Briefly describe the screening, grit removal, and flow equalization process employed at your facility.*

Pretreatment includes a bar rack and comminutor

D. *Describe the industrial pretreatment program, including a list of permitted facilities, the nature of their discharge, and the local limits to which they are subject.*

Permitted Pretreatment Facilities, Flow, Monitoring, and Local Limits

Permittee's Name	Type of Discharge	Avg. Daily Discharge (gal.)	Monitoring Frequency	Local Limits		
				Analyte	Max (mg/L)	Avg. Daily (mg/L)
Example Plating, Inc.	Electroplating	3,000	Quarterly	Total CN	1.9	1.0
				Cu	4.5	2.7
				Ni	4.1	2.6
				Cr	7.0	4.0
				Zn	4.2	2.6
				Pb	0.6	0.4
				Cd	1.2	0.7
				Total Metals	10.5	6.8
				TTO	4.57	--
Example Foods, Inc.	Food processing	10,000	Quarterly	BOD_5	500	200
				TSS	50	30
				pH (SIU)	9.0	7.5

E. *Describe any treatment processes (such as advanced treatment for nutrient removal) that may affect sludge quality.*

No advanced treatment or special processes that influence sludge quality or quantity

F. *Describe the source and generation of solids. Does the sludge contain primary solids? What is the schedule and rationale for wasting of secondary sludge? How are solids stored? What is the dewatering method and what chemicals are used in the dewatering process?*

The only source of solids is from the final clarifiers. There is no primary sludge. Sludge is wasted to a sludge holding tank on a daily basis. About 10,000 gallons are wasted from the system once per day to maintain a MLSS of 2000 mg/L. in the aeration basins. The sludge holding tank is used to store and thicken sludge prior to dewatering. Sludge is dewatered on a 1.5-meter belt filter press using polymer and lime. Dewatering is done during an 8-hour shift, five days per week.

G. *How is the sludge treated to achieve pathogen reduction and vector attraction reduction?*
To achieve pathogen reduction, this facility uses EPA Class B alternative 2, Processes to Significantly Reduce Pathogens (PSRP), specifically 40 CFR Part 503.32(b)(3) Appendix B, A.5. Lime stabilization. Vector attraction reduction (VAR) is accomplished by VAR alternative 6, specifically 40 CFR Part 503.33(b)(6), lime stabilization.

H. *How will the material be used or disposed of?*

Land application to corn and hay fields

5. Data Quality Objectives: (See Chapter 5 and Appendix D)

A. *List the analytes for which testing is required.*

For land application under Part 503, testing would include the analytes in Attachment A

B. *What analytical methods are required?*

See Attachment A

C. *Specify the required quality assurance and quality control for each analytical method used.*

For the metals shown in Attachment A, SW-846 Method 7000A specifies the QA/QC requirements. These requirements should be met along with any QA/QC requirements imposed by the specific analytical method used.

D. *What type of samples will be collected (grab or composite)? If a composite sample is collected, how many grab samples will be collected and what will be the interval between grabs? What will be the sample size?*

For each sampling event involving metals and nitrogen, 8 grab samples (approximately 200 mL) collected 1 hour apart will be mixed to form a composite sample. Based on federal requirements, this facility must test for metals at least once per year. To ensure compliance and public acceptance, metals samples will be collected quarterly. Also, one duplicate sample will be collected each quarter.

For pH analysis, two grab samples will be collected. One sample will be collected at the beginning of a dewatering shift and the other at the end. Both samples will be analyzed in the following manner. A portion of the sample will be analyzed immediately after collection to establish an initial pH. After two hours, a second portion of the sample will be tested for pH to document that pathogen reduction has been achieved. A final portion will be analyzed 22 hours later to demonstrate VAR.

6. Sampling Points: (See Chapter 6)

Provide a detailed description of all sampling points along with the rationale for their selection.

Samples will be collected as sludge falls from the belt filter press into roll-off container below. Please see pictures below.

Picture 1. Belt Filter Press/Sampling Point

Picture 2. Closer View of Sampling Point

Picture 3. Close-up of Sampling Point

7. Sample Collection Procedures: (See Chapter 7 and Appendix H)

Please provide a detailed standard operating procedure (SOP) describing the process used for collecting samples. The step-by-step description should include all details pertaining to sample collection, including a description of the cleaning and preparation procedures for sampling equipment and sample containers.

See Attachment B

8. Sampling Handling Procedures: (See Chapter 8 and Appendix D, H, and J)

Describe the post-collection sample handling procedures employed to maintain sample integrity. This description should explain how the samples will be preserved and transported, what the appropriate hold-time is for each analysis, and whether a chain-of-custody is required.

See Attachment B

9. Evaluation for Completeness: (See Chapter 9)

Describe the process to be used for evaluating the completeness of the sampling effort. Criteria for evaluation might include: Were the goals of the sampling program met? Were data quality objectives achieved? Do the data quality objectives or SOPs need to be revised?

In January of each year in preparation for reporting under Part 503, the previous year's sampling efforts will be evaluated. The following criteria will be evaluated:

1) Was all required sampling performed?

2) Were data quality objectives met?
   a) analytical protocols
   b) detection limits
   c) reporting units
   d) Analytical QA/QC
   e) Field QA/QC

3) Were required sample handling and preservation procedures followed?
4) Were the SOPs used and followed?
5) Were SOPs adequate or are revisions necessary?
6) Were record-keeping and reporting procedures adequate?

10. Record-Keeping and Reporting: (See Chapter 10)

Provide a description of record-keeping procedures. The description should explain what information will be retained and for how long, how the information will be stored, and what records are required to be reported.

The facility has developed a database that includes the following data:

Sample Tracking for Metals and Nitrogen Samples					
Date of sample	Time of Collection for Each Grab	Time of Collection of Composite	Date Received by Lab	Date Analyzed	Date Reported by Lab
	1. 2. 3. 4. 5. 6. 7. 8.				

Sample Tracking for pH Samples (In-house testing)							
		Initial pH		pH after 2 hrs.		pH after 22 hrs.	
Date of sample	Time of Collection	Time of Analysis	pH	Time of Analysis	pH	Time of Analysis	pH

The following analytical records will be kept.

	Concentration											
Sample Date	As	Cd	Cu	Pb	Hg	Mo	Ni	Se	Zn	TKN	NH_3	NO_3

The above records along with the individual sample custody sheets will be kept for five years.

ATTACHMENT A – FEDERAL SLUDGE ANALYTICAL REQUIREMENTS

Analyte	Required Analytical Methods	Required Detection Limits	Required QA/QC	Sample Handling	
				Container	Preservation
Arsenic	AA Furnace SW-846 Method 7060 AA Gaseous Hydride SW-846 Method 7061 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 20 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
Cadmium	AA Furnace SW-846 Method 7131 AA Direct Aspiration SW-846 Method 7130 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 20 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
Copper	AA Furnace SW-846 Method 7211 AA Direct Aspiration SW-846 Method 7210 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 200 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time

ATTACHMENT A – FEDERAL SLUDGE ANALYTICAL REQUIREMENTS

Analyte	Required Analytical Methods	Required Detection Limits	Required QA/QC	Sample Handling	
				Container	Preservation
Lead	AA Furnace SW-846 Method 7421 AA Direct Aspiration SW-846 Method 7420 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 100 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
Mercury	Cold Vapor (manual) SW-846 Method 7470 SW-846 Method 7471	At a minimum 5 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 28 days hold time
Molybdenum	AA Furnace SW-846 Method 7481 AA Direct Aspiration SW-846 Method 7480 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 35 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
Nickel	AA Direct Aspiration SW-846 Method 7520 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 50 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time

ATTACHMENT A – FEDERAL SLUDGE ANALYTICAL REQUIREMENTS

Analyte	Required Analytical Methods	Required Detection Limits	Required QA/QC	Sample Handling	
				Container	Preservation
Selenium	AA Furnace SW-846 Method 7740 AA Gaseous Hydride SW-846 Method 7741 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 10 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
Zinc	AA Direct Aspiration SW-846 Method 7950 Inductively Coupled Plasma SW-846 Method 6010	At a minimum 100 mg/kg, otherwise per lab capability	Per requirements of SW-846 Method 7000A and the specific method used	Plastic or glass	4º C 6 mon. hold time
pH	EPA-9045 SM-4500-H^+	Not applicable	Per method used	Plastic or glass	4º C 24-hours
Total Kjeldahl Nitrogen (TKN)	SM-4500-N_{org} EPA-351.3	Not applicable	Per method used	Plastic or glass	4º C 28-day hold time
Ammonia Nitrogen (NH_3-N)	SM-4500-NH3 SW-846 Method 9200	Not applicable	Per method used	Plastic or glass	4º C 28-day hold time
Nitrate Nitrogen (NO_3-N)	SM-4500-	Not applicable	Per method used	Plastic or glass	4º C 28-day hold time

ATTACHMENT B – SLUDGE SAMPLING PROCEDURE

1. A week to several days prior to the proposed sampling, confirm or schedule sludge processing (dewatering and treatment) to ensure that sludge in the appropriate form (liquid versus dewatered, untreated cake versus treated biosolids) is available for sampling at the proposed date, time, and sampling point.

2. A week to several days prior to the proposed sampling date, schedule/confirm that contract lab performing the analyses is ready and willing to accept samples on the proposed sampling date.

3. At least one day before collecting samples, assemble the equipment necessary to accomplish the proposed sampling. Ensure that all equipment is clean and in good working order (see attached checklist and cleaning procedure).

4. On the day of sampling, obtain ice for sample storage and transportation and place in sample coolers.

5. After arrival in the dewatering room, evaluate dewatering operations. Any observable deviations from normal operation should be noted prior to collecting samples.

6. Put on nitrile gloves and any other required/desired personal safety equipment.

For Metals and Nitrogen:

7. To collect a composite sample for metals, TKN, NH_3, and NO_3 analyses, take the first of 8 grab samples from the belt filter press as biosolids fall into the roll-off container. All grab samples should be collected using a 500 mL Teflon beaker and a stainless steel trowel, and should be approximately 200 mL in volume. After collecting each grab sample, place the sample in the stainless steel bucket and record the time of collection. Wait one hour and collect the next grab sample. Repeat the process until all eight grab samples are collected. Between collecting of grab samples, the previously collected material should be kept cool (at or around 4 degrees Celsius). Ensure that any required or planned field duplicates or blanks are also collected.

8. Once the last grab sample has been collected, thoroughly mix all material accumulated in the stainless steel bucket using a stainless steel trowel. The goal of the mixing process is to produce a homogeneous sample. After the material is completely mixed, record the current time as the composite sample collection time.

9. After mixing, label all sample containers with the following information:

   a) Sample Identification (ID) Number

   b) Date and time of collection

   c) Sample location

   d) Person collecting sample

   e) Preservative

   f) Required test(s)

10. After labeling, fill each individual sample container with portions of the homogenized sample within the stainless steel bucket.

11. After each sample container is filled, seal it with a signed custody seal and place on ice in a cooler for transportation to the laboratory.

12. Prior to delivering the samples to the lab, complete a chain-of-custody form to document proper sample handling.

13. After sample delivery, clean all equipment according to established procedures and store in a clean, dry area (see below).

For pH sampling:

14. To collect pH samples, collect one grab sample of about 400 mL in a glass beaker at the beginning of a dewatering shift and another grab sample at the end of the shift. A field duplicate should be collected for every twenty samples.

15. Record the time of collection for each sample and label each beaker with the date and collection time.

16. Analyze each sample three times to demonstrate pathogen reduction and vector attraction reduction (VAR). Samples should be stored at 4 degrees Celsius between analyses.

EQUIPMENT CHECKLIST

1) Protective Gear
   a. Nitrile gloves
   b. Tyvek sleeves

2) Sample handling and collection
   a. Stainless steel bucket
   b. 500 mL Teflon beaker
   c. Stainless steel trowel
   d. 500 mL glass beaker (2)

3) Transporting and preservation
   a. Sample containers
      1) For metals and nitrogen: use containers provided by the contract lab.
      2) For pH: use beakers prepared in-house according to established cleaning procedures.
   b. Sample cooler – Obtain sample cooler from contract lab. Ice can be purchased locally.

4) Sample ID and Documentation
   a. Markers and pens
   b. Sample container labels
   c. Custody seals
   d. Chain of custody/sample submittal form
   e. Field notebook/sample log/data sheet

5) Cleaning equipment
   a. Disposable towels
   b. Soap
   c. Scrub brush
   d. Rinse water
   e. Deionized water
   d. 10% hydrochloric acid solution
   e. Rinse water
   f. Deionized water
   g. Aluminum foil or plastic wrap

EQUIPMENT PREPARATION AND CLEANING PROCEDURE

The following cleaning procedure is used to clean all plastic, glass, or stainless steel equipment used to collect sludge samples:

1) Rinse equipment with warm tap water to remove the majority of solids.

2) Using a brush and a low-phosphate lab detergent, scrub the equipment to remove all residues.

3) After scrubbing, rinse the equipment three times with tap water.

4) Next, rinse the equipment with a 10% hydrochloric acid solution - allow at least 30 seconds of contact time.

5) Perform a final rinse, which should be a triple rinse with deionized water.

6) After cleaning, allow the equipment to air-dry. To store, cover beakers and buckets with clean aluminum foil or plastic wrap. Sampling implements should also be wrapped in foil or plastic wrap to keep them clean while in storage.

Note: This cleaning procedure is applicable only when sampling for metals, nitrogen, and pH. To sample for other analytes, especially organic contaminants, these procedures should be modified.

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