



3.4.3 Water Pollution Inspections – Inspection of Lagoon Wastewater Treatment systems

## 3.4.3 INSPECTION OF LAGOON WASTEWATER TREATMENT SYSTEMS

### **Purpose**

The purpose of this document is to supply inspectors and investigators with a uniform process to perform an inspection of a lagoon-type wastewater treatment system.

Lagoons may differ in size and appearance from each other and may consist of multiple or single cells. While different, they operate in similar ways, and the inspections of each type differ only slightly.

### **Lagoon Types**

- Non-aerated/Facultative Lagoons - These systems rely on passive treatment. They use biological (photosynthesis) and physical (wind action) processes to supply oxygen for use in treatment.
- Aerated - These facilities use a mechanical device to mix atmospheric oxygen into the water. This often includes blowers or mechanical mixers.

### **Pre-Inspection Activities**

During the pre-inspection portion of the inspection, the inspector should collect and organize the information and equipment needed to conduct the site inspection. The pre-inspection procedures are generally conducted in three phases.

- File Review - The inspector shall obtain files for review of past inspection reports, issued operating and construction permits, reports required by the permit, and any history of violations or other regulatory issues.

Inspectors should familiarize themselves with the permit requirements and effluent parameters, limitations, and sampling frequencies.

The Discharge Monitoring Reports are to be reviewed to determine if there is any history of non-compliance with effluent limitations or failure to submit reports to the department.

- Paperwork - The inspector should make a copy of the permit, Standard Conditions Part I, Part II (if applicable) and Part III, and a copy of the latest revision of the application for renewing the operating permit for the facility [[Form B \(MO-780-1512\)](#) or [Form B2 \(MO-780-1805\)](#)] to take on the inspection. Take an extra copy to leave at the facility in the event the operator does not have a copy of the permit at site.

The inspector shall obtain a copy of an inspection checklist and process checklist, if available, for the type of plant being inspected. These will assist the inspector during the site inspection. The inspector should determine what categories on the process checklist are applicable to the facility. The inspector



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should mark "NA" (Not Applicable) into any sections on the checklist that are not applicable to the facility to help prevent any confusion.

- Sampling and Monitoring Equipment - The inspector shall review the permit to determine what pollutant parameters are listed in Table A. This will assist the inspector in collecting the proper monitoring and sampling equipment. The inspector shall then collect the proper equipment. Typical equipment should include thermometer, pH meter, conductivity meter, dissolved oxygen meter (or combination of), a Hach NI-8 Ammonia Mid Range Test Kit, and a Total Residual Chlorine Meter.

A calibration of field meters should be conducted. This will help to ensure that the equipment is in working condition. In addition, the inspector shall ensure that the field meters have been through a recent Quality Assurance/Quality Control (QA/QC) analysis. See [Chapter Four, Environmental Sampling](#), for information on how to prepare and calibrate equipment.

The inspector is to prepare a sampling kit. At a minimum, the kit should include:

- distilled water bottle for rinsing of equipment
- protective gloves suitable for the sampling event
- sample transport cooler(s)
- ice
- sample containers and labels
- correct preservatives (see [MDNR-FSS-001](#))
- a sterilized Nalgene™ bottle or sterile Whirl Pak™ bag (with sodium thiosulfate if the effluent is chlorinated).
- In addition, a hard hat, hearing protection and safety glasses should be brought along during the inspection. The inspector should wear steel-toed boots. Additional safety equipment may be needed depending on the location and site characteristics of the facility.

The inspector is to ensure that a copy of the Environmental Services Program Field Services Standard Operating Procedures [MDNR-FSS-001](#) and ESP Field Services Field Sheets and Chain-of-Custody MDNR-ESP-002 is taken on the inspection.

Numbered and blank sample tags are to be obtained and brought during the inspection (See MDNR-FSS-003).

The inspector is to obtain a camera, GPS unit, and spare batteries for all equipment, to bring on the inspection. GPS readings are needed for new outfalls and any existing outfalls that have not had a GPS reading collected. The inspector must follow current department/program GPS collection and reporting procedures.

#### **On-site Inspection Activities**

Site entry and initial briefing should be conducted at the facility in accordance with [Chapter 3.1, General Inspection Procedures](#). If available, the inspector should speak with the plant operator or the worker with the most experience operating the facility. The inspector



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should explain the purpose, scope, and department authority for the inspection.

Several checklists are referenced and can be found in the checklists and forms section at the end of this section.

When accessing the site, the inspector should note the presence of an all-weather access road to the facility. Because sludge is to be removed from this type of treatment facility routinely, an access road that will allow access to the plant by sludge removal equipment must be provided. In addition, the inspector should determine if the facility is protected from unauthorized access by an adequate security fence and appropriate warning signs.

#### **Performance Inspection of Non-Aerated/Facultative Lagoon**

The inspection tour of the plant should begin at the influent for the lagoon. You should use the [Non-Aerated Lagoons Checklist](#). At a minimum, an inspection should include the following:

- Some lagoons have pumping stations or screens to remove debris prior to influent entering the primary cell. Check to see that this equipment is functional and working correctly.
- Colors and odors - the lagoon cell(s) should have negligible odor and be a sparkling green color. Other colors or odors may indicate the system is not functioning correctly.
- The surface of the lagoon should be clear of scum and material, or exist in small amounts.
- Some duckweed coverage may be observed on lagoons. Speak with the operator to gain an understanding of any given lagoon system. Use best professional judgment in deciding if coverage is excessive and causing undesirable effects.
- The berm around the cell(s) should be wide enough to allow vehicle traffic for mowing and maintenance.
- The grass or ground cover around the perimeters of the cell(s) should be mowed and maintained.
- Riprap should be clean with little or no vegetation growing in or around it.
- Examine the inner and out perimeters of the cell for signs of erosion damage that may need repair.
- Look for evidence of animal damage (turtles, muskrats, etc.) to the cell berms.
- Transfer or influent and effluent lines should be clear and functional.



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- Gates or control structures should be clean, maintained and functional.
- If a lagoon is discharging, examine the effluent. It should be a clear or light green color with little or no visible solids. Also, there should be little or no odor. Be certain to collect a sample of the effluent if there is a discharge.
- Lagoon systems can be used as a primary treatment prior to discharge on or into a wetland, overland flow or irrigation system. Refer to the section on Land Application Systems to continue with an inspection, as applicable.

#### **Performance Inspection of Aerated Lagoons**

Use the [Aerated Lagoons Checklist](#). Lagoons with aeration systems usually consist of multiple cells with the primary cell being aerated by some mechanical means. Some systems will be electrically powered surface floating mixers or aerators. Others will consist of anchored diffuser systems with air being supplied by a remote compressor or blower.

The same basic inspection protocol applies to aerated systems as non-aerated or facultative lagoons. However, for aerated systems there are some additional inspection steps:

- Check to determine that the aeration system is working properly. If diffusers are being used, check to see that all areas are receiving proper air flow.
- Review records involving run times and maintenance for mechanical systems.
- Are spare parts and materials on hand for repair and routine maintenance?
- Are the aerators or mixers moved on a regular basis to prevent sludge accumulation?
- Are there areas of scum or collected material?

Documentation is an important part of the inspection process, so record observations made during the inspection in the field notebook. Field notes are subject to Sunshine Law requests, therefore ensure that the notes taken are relevant to the inspection.

The inspector should take pictures of items of concern as the inspection is conducted. This will help the inspector to correlate notes taken in the field with what the inspector viewed, while writing the inspection report. In addition, photos are very important for any enforcement case.



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#### **Inspection Sampling**

Effluent - Each inspection shall include collecting samples of the effluent being discharged into the receiving stream. The determination of the chemical and the physical condition of effluent and its effect upon the receiving stream are among the most important components of the inspection. Compliance with effluent limitations does not always show the inspector whether the facility is in compliance with the permit. The inspector shall also use field equipment and direct observations to conduct water quality monitoring. Water quality monitoring with field equipment is to include but not limited to:

- PH (MDNR-FSS-100)
- Dissolved Oxygen (MDNR-FSS-103)
- Conductivity (MDNR-FSS-102)
- Temperature (MDNR-FSS-101)
- Ammonia as Nitrogen ([MDNR-ESP-001](#))

All sampling is to be conducted in accordance with Environmental Services Program Field Services Standard Operating Procedures. The inspector should review MDNR-FSS-005 for additional considerations for obtaining samples. Samples can include but are not limited to:

- Biochemical Oxygen Demand ([MDNR-ESP-001](#))
- Total Suspended Solids / Non-filterable Residue (NFR) ([MDNR-ESP-001](#))
- Fecal Coliform ([MDNR-ESP-001](#) and MDNR-FSS-108)
- Total Residual Chlorine - if chlorine may be present in the discharge or receiving stream (MDNR-WQMS-016)
- Ammonia as Nitrogen ([MDNR-ESP-001](#))
- Total Phosphorus as P ([MDNR-ESP-001](#))
- Oil & Grease ([MDNR-ESP-001](#))
- Chloride ([MDNR-ESP-001](#))
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Instream Monitoring - The inspector is to observe the stream above and below the outfall location. The inspector should attempt to determine if there are any unusual odors of the water in the stream. Are there visible color differences between upstream of the outfall and downstream, and are there any visible bottom deposits?

Downstream sites should be observed or sampled first. The inspector should work his way upstream while monitoring and sampling to prevent stirring of sediment in bottom of creek that could affect downstream results.

Operational Monitoring - The operational control monitoring requirements, listed in [10 CSR 20-9.010](#), are not required at all facilities. However, the monitoring can be conducted to assist the inspector in determining the health of the wastewater treatment plant. A dissolved oxygen meter reading in the aeration chamber will assist in determining if good mixing and aeration are occurring. In addition, the



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use of a pH meter in the aeration chamber will assist the inspector in determining the overall health of the plant.

The inspector should review all onsite documentation that is required by the permit. The inspector shall ask to see if the facility has a copy of the Missouri State Operating Permit and Standard Conditions I, II (if necessary), and III. If they do not have available copies, the inspector is to provide a copy to the facility. The inspector should review the requirements and conditions of the permit with facility staff. In addition, the inspector should determine if there have been any changes at the facility that are not listed on the permit, such as address, owner, continuing authority, and facility description. Provide a copy of the latest revision of the application for renewing the operating permit to the facility [[Form B \(MO-780-1512\)](#)] or [[Form B2 \(MO-780-1805\)](#)].

In accordance with Standard Conditions Part I, the facility is required to retain records of all monitoring information. This is to include all calibration and maintenance records, all original strip chart recording for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. Records are to be maintained for a period of at least three (3) years from the date of the sample, measurement, report or application. In addition, the permittee shall maintain records on file at the facility for at least five years for the items listed in Standard Conditions Part III and any additional items listed in the Special Conditions section of the permit.

Laboratory Inspection - If the facility has an onsite laboratory, the inspector should inspect the laboratory to determine if it is functional and in operational condition. The inspector should discuss with facility staff responsible for collecting samples the methods used for sample collection. In addition, the inspector should determine if the facility is performing any quality assurance/quality control procedures on the laboratory equipment to ensure that reliable and accurate data is being collected and reported to the department. The inspector should use the [Laboratory Inspection Checklist](#).

If the facility has an outside laboratory performing analyses for the required sampling, the inspector should obtain and record the name and location of the contract laboratory. This information should be included in the inspection report.

#### **Post Inspection Procedures**

Meet with the facility representatives and/or operator after the physical inspection and conduct an exit interview.

If unsatisfactory features were discovered during the inspection or file review, review the violations with the plant operator or worker familiar with the plant.



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If unsatisfactory features are discovered, the inspector should explain what actions would be necessary for the facility to correct the violations.

The inspector should provide the facility contact any recommendations to prevent any future deficiencies.

#### **Completing the Written Inspection Report**

The inspector should complete the inspection report and transmit it to the facility and/or permittee in accordance with the guidance provided in [Chapter 3.1, General Inspection Procedures](#).

#### **Lagoon Exemptions**

The Clean Water Commission Regulations allow for permitting exemptions for less than 3000 gallon per day (gpd) non-discharging lagoons. The Water Pollution Control Branch has also developed a policy [3,000 Gallons Per Day or Less No-Discharge Permit Exemption for Domestic Wastewater Facilities \(Lagoons\)](#) that outlines specific information to determine if a facility meets the requirements of the exemption. The [Lagoon Investigation Decision Tree](#) provides guidance for determining actions to take during unpermitted lagoon investigations. Systems found to be in non-exempt status should be inspected using the procedures described above.

#### **CHECKLISTS**

- [Aerated Lagoons Checklist](#)
- [Laboratory Inspection Checklist](#)
- [Non-Aerated Lagoons Checklist](#)
- [Overland Flows Checklist](#)
- [Wetland Flows Checklist](#)



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