

# **Compliance Guide for the Concentrated Aquatic Animal Production Point Source Category**

## **Appendix E2: Example BMP Plan**

Full document available at  
<http://www.epa.gov/waterscience/guide/aquaculture>

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## Example BMP Plan

3M & LJ Fish Farm  
Prepared: September 30, 2004  
NPDES Number: ID 1234567  
Facility Manager: Bob Smith, 555-987-6543

*[Note: this is an example BMP Plan and is not based on an actual facility.]*

### A. Description of Facility

3M & LJ's Fish Farm produces approximately 250,000 pounds of rainbow trout annually. The facility was originally constructed in 1976. It expanded in 1997 to include an off-line settling pond system. The facility currently has 12 100-foot long raceways, a small hatchery building, an office/shop, and an OLS pond for waste treatment (see Figure 1). The fish farm is located near Boise, Idaho. The facility has a non-consumptive water right for 14 cfs of water from Upper Springs. The facility has two discharge points, both of which go into Upper Creek.

### B. Water Source

3M & LJ Fish Farm uses water from Upper Spring, which is a pure spring source with TSS levels generally measured at less than 2.0 mg/L (see historic DMRs). Aquatic vegetation grows around the spring head and the ditch leading to the raceways. An inflow trash rack screen at the facility is used to catch vegetation from the springs and ditch prior to entering the facility. The trash rack screen is cleaned at least daily to prevent vegetation from affecting the water flow to the facility. The spring and head ditch is manually cleaned twice a year to prevent build up of aquatic vegetation. The ditch has an adjustable head gate that controls the water flow to the facility from the spring area. The spring provides a constant supply of water to the facility and the water temperature remains nearly constant at 65 °F ( $\pm 20$  °C).

### C. Treatment System(s) Used

3M & LJ Fish Farm uses quiescent zones to capture solids in the production raceways. Solids are periodically removed and sent to an offline settling (OLS) pond for dewatering. Supernatant from the OLS pond discharges to Upper Creek.

At the downstream end of each raceway is a 20-foot long quiescent zone. The quiescent zone distance meets the minimum design criteria set forth in the *Idaho Waste Management Guidelines for Aquaculture Operations* for quiescent zone length. Each quiescent zone has a wastewater drain line connection that allows each to be vacuumed individually. The vacuum hose is attached to a slotted pipe that is 2 ft. long that serves a vacuum head. Floats are attached to the vacuum hose to prevent the hose from stirring up solids during cleaning events. Gravity transports the wastewater from the quiescent zone to the OLS pond for treatment and storage of settled solids. The delivery rate of wastewater to the OLS pond from the raceway or quiescent zone cleaning is 200 gpm.

The hatchery building is where trout eggs are hatched and the fish are raised up to a size where they can be moved outdoors to the production raceways to finish growing to market size. The troughs and small raceways in the hatchery building all have screened quiescent zones at their downstream ends.

The troughs, small raceways, and their corresponding quiescent zones are cleaned daily. The troughs and raceways all have a separate drain line that allows the cleaning wastewater to be diverted to the OLS pond. Water flow has been measured for the trough and small raceway quiescent zone drains and is 30 gpm and 75 gpm, respectively. Quiescent zone cleaning flows are recorded and used in the calculations for the discharge from the OLS pond. Water used in the hatchery building is diverted from the influent ditch below the weir and is discharged to the head ditch above the first raceways (see Figure 1).

The OLS pond has a design flow of 300 gpm. The dimensions of the OLS pond are 30 ft by 30 ft (surface area of 900 sq ft). The pond slopes to a maximum depth of 3.5 ft. Wastewater comes into the OLS pond from the gravity flow system pipe that spills onto the access ramp. This helps to distribute the flow across the width of the settling pond. Water leaves the pond through an 8 in. standpipe. The standpipe is attached to a 90° elbow that can swivel inside the pond. There is a collar around the standpipe that causes the water that is discharged to be pulled from 20 in. below the pond surface. The collar prevents floating materials from washing out of the pond. The water leaving the pond goes back to a box with a calibrated v-notched weir. The weir is used to verify flow rates through the OLS pond during cleaning events.

#### **D. Other Information**

3M & LJ Fish Farm uses an influent weir to measure flow for the facility. The weir is a calibrated suppressed rectangular weir and is located downstream from the trash rack screen to prevent debris from interfering with weir measurements. The weir is calibrated annually. The weir face and box area is swept clean prior to any measurements being taken. The staff gauge is placed along the weir box wall six times the head distance upstream of the weir crest. The weir has a 3/16 in. blade crest that falls off to a 45° angle to allow water to spring free of the blade. If the blade is nicked, bent, or rounded it is replaced. Weir calibration and testing curve validation are conducted annually. Immediately below the catch pool for the weir is the influent fish screen used to prevent fish from swimming out of the rearing areas and into the springs.

The raceways are grouped in four sections of three units and the groups are operated in series (see Figure 1). There is approximately 2.5 ft of drop between the first and second use raceways to allow for passive oxygen recharge of the raceway water. There is 3.5 ft of drop between the second and third raceway use. There is a 4.0 ft drop between the third and fourth raceway use. Between raceway sections the water falls onto a splashboard before entering the next lower section. The purpose of this splashboard is to break up the water stream leaving the upper raceway and expose as much surface area of the water to open air as possible to maximize the replenishment of dissolved oxygen levels in the raceway waters. After the fourth and final use, water falls 3.5 ft to a concrete pad before flowing into the tail ditch and off of the facility into Upper Creek, which accomplishes the same goal as the splashboards between raceway sets (i.e., it maximizes DO levels for wastewater entering Upper Creek).

## E. Solids Control

1. Efficient feed management (to limit feed input to the minimum amount reasonably necessary to achieve production goals and sustain targeted rates of aquatic animal growth).

3M & LJ Fish Farm recognizes that fish feed management is critical in operating an environmentally friendly and profitable fish farm. Approximately 250,000 lb of trout are produced per year on about 300,000 lb of feed, at a conversion rate of 1.2. Feed used is produced from Best Feed for Fish and generally is composed of 42% protein, 16% fat, < 8% ash and less than 1.3% phosphorus. Feed contents change based on availability of constituents to the feed manufacturer. 3M & LJ Fish Farm keeps records of each shipment of feed received from the manufacturer, including the quantity and proximate analysis.

3M & LJ Fish Farm uses commercially available sinking extruded diets to feed our fish. Using extruded diets leads to the best feed conversion ratios, which minimizes the amount of waste generated by the facility. Specific quantities of feed are fed through demand feeders on each outdoor raceway depending on the quantity, size, and condition of the fish in that raceway. There are two demand feeders on each raceway. Demand feeders allow the fish to decide how much food they need and when they want to feed. This maximizes feeding opportunity and lowers feed conversions by providing a steady, stress free, feeding environment with little waste. Demand feeders are filled, at most, daily or as necessary. Prior to each filling, the feeders are also inspected for proper operation. Fish in the hatchery building are fed by hand several times per day.

Employees observe the feeding behavior of the fish throughout each shift. Fish that are not feeding well have their feed restricted until they are again feeding normally to prevent feed from being wasted and discharged.

When feeding the fish, our facility records the amount fed and estimates the number and weight of the trout being fed. From this information, we have been able to calculate FCRs to better manage feeding at our facility. Records of this information are kept in our office and are available upon request by contacting the facility manager. An example of the form we use is attached.

2. Procedures for routine cleaning of rearing units and offline settling basins.

Quiescent zones are vacuumed every two weeks and prior to fish grading or harvesting events. The screens in front of the quiescent zones are cleaned daily to remove moss (algae) and dead fish. Screens are cleaned to facilitate settling of biosolids from the raceway and to prevent blowouts, which occur when the screen is clogged and breaks from the water pressure. Fish that get into the quiescent zones are removed promptly when discovered. The troughs, small raceways, and their corresponding quiescent zones in the hatchery are cleaned daily.

Raceways above the quiescent zones are vacuumed before scheduled fish inventorying, grading or harvesting events.

The raceways are screened to prevent avian predators from eating the fish. The netting reduces indirect mortality from predators by reducing the incidence of disease at the facility. Healthy fish consume feed better, which prevents uneaten feed from going to waste, and are more active in the raceway, which allows accumulated biosolids to move more readily down the raceway to the quiescent zones, facilitating cleaning and faster removal of biosolids.

The OLS pond is harvested twice annually, in the spring and fall. When the OLS pond is harvested, the water in the pond is slowly decanted by removing the collar from around the standpipe and slowly rotating the standpipe on the 90° elbow to gradually lower the water level in the pond. Once the pond is decanted, a tractor is driven into the pond and the slurry is stirred to a uniform consistency to allow for pumping. The sludge is pumped from the OLS pond into a “honey wagon,” which takes it to a field for land application. Solids content of the slurry varies between 6 % and 12 %.

Sludge and slurry that have been collected in the OLS pond are recycled by land application to nearby cropped fields. Farmers that accept the slurry agree to disc it under within 24 hours of application and prior to any irrigation water being applied to the field. All land application is done in such a manner as to prevent the materials from entering surface or groundwaters. The dates, locations, and amounts of slurry that are taken offsite for land application are kept in a record.

Examples of the forms we use to track cleaning and land application of waste are attached. Records of this information are kept in our office and are available upon request by contacting the facility manager.

3. Procedures for inventorying, grading, and harvesting aquatic animals (that minimize discharge of accumulated solids).

Raceways above the quiescent zones are vacuumed before any scheduled inventorying, grading, or harvesting events to prevent unnecessary disturbance and subsequent discharge of biosolids from the raceways.

4. Remove and dispose of aquatic animal mortalities properly on a regular basis to prevent discharge to waters of the United States (except where authorized by your permitting authority in order to benefit the aquatic environment).

Raceways at our facility are screened to prevent avian predators from eating the fish. This benefits the waste management on the farm by reducing direct mortality to injured fish. The netting reduces indirect mortality by reducing the incidence of disease at the facility. When fish mortality does occur, carcasses are promptly removed (at a minimum – daily). Fish carcasses are typically composted on site. Mortalities from the hatchery are also disposed of with the raceway mortalities. In the event of a significant problem that leads to a large number of mortalities, a local rendering company is called to haul the mortalities away.

Mortalities generally range from 1% to 7% of fish on hand, now that the raceways are screened, and depending on the disease and timing of the disease outbreak.

Our facility tracks carcass removal to improve facility management. When we encounter fish mortalities, we record the number of fish that died, their approximate weight, the group/age, and how we disposed of them. Records of this information are kept in our office and are available upon request by contacting the facility manager. An example of the form we use is attached.

## **F. Material Storage**

1. Proper storage of drugs, pesticides, and feed to prevent spills that may result in the discharge to waters of the United States.

To ensure proper storage of drugs, pesticides, and feed at 3M & LJ Fish Farm, employees have been instructed on the importance of proper handling of these substances through the facility-training program.

Bagged feeds are stored in the shop area and are used on a “first in, first out” basis to prevent lengthy storage of feed. Use of fresh diets improves dietary efficiency. No feed is used if it has exceeded the storage period recommended by the manufacturer. This rarely occurs, but when outdated feed is found, it has to be taken to the local landfill for disposal. The largest diets are purchased in bulk and stored in feed bins. Feed can be poured from the bins and fines screened off before the feed is put in the demand feeders. All fines are collected and sent back to the manufacturer for repelleting. Since converting to extruded pellets, the volume of fines is typically less than 50 lb per month. All the demand feeders are set up with a windshield to prevent the undesired release of feed on windy days.

All drugs, disinfectants, chemicals, and pesticides are stored in a cabinet in the office building in their original containers. The chemical cabinet is in a dry well-ventilated place, away from water, and with no floor drains. Employees have been instructed to keep container lids secure at all times. All liquid materials at our facility are stored in a containment system to prevent possible spills from running off. Every month, we inspect and maintain the storage areas and equipment to prevent spills.

2. Procedures for properly containing, cleaning, and disposing of any spilled materials.

3M & LJ Fish Farm has developed a spill response and prevention plan to ensure that our facility properly contains, cleans, and disposes of spilled materials. The plan provides details on measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills. The plan is reviewed during our required annual employee-training program.

Our spill response and prevention plan is a procedural handbook that identifies individuals responsible for implementing the plan; defines safety measures to be taken with each kind of waste; emphasizes that spills must be cleaned up promptly; specifies how to notify appropriate authorities, such as the fire department for assistance; states procedures for containing, diverting,

isolating, and cleaning up the spill; and describes spill response equipment to be used, including safety and cleanup equipment.

Our plan encourages the use of shop rags (for small spills) and absorbent snakes (for large spills), rather than water. For non-hazardous materials, we would send the rags out for cleaning and throw away the absorbent snakes. For hazardous materials, we would dispose of the cleanup materials according to our state's guidelines. A copy of the plan is kept in our office and is available upon request by contacting the facility manager.

We also keep track of information about any spills at our facility to try to prevent any future spills. This information is kept with other records for the facility in the office. An example of the form we use to track spills is attached.

## **G. Maintenance**

1. Routinely inspect production systems and wastewater treatment systems to identify and promptly repair damage.

We inspect the raceways and quiescent zones every day. More specifically, we check that all of the drain structure parts are functioning properly; that valves and other critical drain components are working properly; and that there are no broken parts. If any parts are broken, we repair them immediately. We check the raceways to make sure they are structurally sound; repair cracks as necessary; and check that all plumbing components are installed and working properly. Finally, we check the quiescent zones for proper function; inspect drains for clogging; and make sure that all settling basins are working properly.

We also check equipment used at the facility every day. We routinely inspect oxygen equipment, filters, and heaters that maintain optimal growing conditions in the hatchery. We also test the demand automatic feeders periodically (weekly) to ensure they are delivering the proper amounts of feed; check demand feeders for proper operation and adjust as necessary; and inspect all feed storage areas to make sure the feed is free from rodents and insects and that no excess moisture or water leaks are present to prevent mold.

We keep track of the inspections of production and wastewater treatment systems at our facility in a log. Records of this information are kept in our office and are available upon request by contacting the facility manager. An example of the log is attached.

2. Regularly conduct maintenance of production systems and wastewater treatment systems to ensure their proper function.

We perform maintenance of parts and equipment when our routine inspections determine that a repair is necessary. We also perform maintenance on equipment that requires periodic maintenance or adjustment, based on the manufacturer's recommendations. For example, demand feeders need to be constantly adjusted to the conditions of the facility to maximize feeding efficiency. Employees immediately correct any feeders discovered to be out of adjustment (feeding too freely or jammed up). We record maintenance in the same log where we

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record inspections of production and wastewater treatment systems. An example of this form is attached.

## H. Record-keeping

1. Maintain records for aquatic animal rearing units documenting feed amounts and estimates of the numbers and weights of aquatic animals in order to calculate representative feed conversion ratios.

We keep records in the office of the amount of feed we feed our fish daily. We also record estimates of the number and weight of trout at our facility at the same time we feed the fish. From this information, we have been able to calculate FCRs to better manage feeding at our facility. All records are maintained and updated as information is collected. For example, feeding records are updated daily. All records are available upon request by contacting the facility manager. Examples of the forms we use are attached.

2. Keep records documenting frequency of cleaning, inspections, maintenance, and repairs.

We keep records in the office of the frequency of cleaning, inspections, maintenance, and repairs at our facility. All records are maintained and updated as information is collected. All records are available upon request by contacting the facility manager. Examples of the forms we use are attached.

## I. Training

1. Train all relevant personnel in spill prevention and how to respond in the event of a spill to ensure proper clean-up and disposal of spilled materials.

All new employees are required to attend training on spill prevention and response. Current employees must attend refresher training once every year. Our facility has developed a spill prevention and response plan, which is covered at employee training. The plan was described in more detail in Section F above. The plan is kept in our office, is accessible to all employees, and is available upon request by contacting the facility manager. We also keep Material Safety data sheets for all chemicals used at the facility within a binder in the chemical cabinet. Employees have been trained on how to use these sheets.

2. Train personnel on proper operation and cleaning of production and wastewater treatment systems, including feeding procedures and proper use of equipment.

All new employees are required to attend training on proper operation and cleaning of production systems and wastewater treatment systems at our facility. Management reviews employee performance in operating the facility and provides additional training for those not operating the facility according to the Standard Operating Procedures.



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**J. Diagram or Map**

A diagram/map of the facility (to illustrate the layout of the operation) is included at the end of the BMP plan as Figure 1.

**K. Review and Endorsement of the BMP Plan**

We, the facility manager and the individuals responsible for implementing the BMP plan, have reviewed and endorsed this BMP plan.

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(Facility Name)

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(NPDES #)

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(Facility Manager – Printed Name)

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(Facility Manager – Signature)

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(Other Individual – Printed Name & Title)

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(Other Individual – Signature)

**L. Certifying the BMP Plan with the Permitting Authority**

A copy of the BMP plan is kept in our office. It is available to any employee at our facility, EPA, and any state environmental agency upon request by contacting the facility manager.

A signed letter has been sent to our permitting authority stating that our facility has developed a BMP plan.

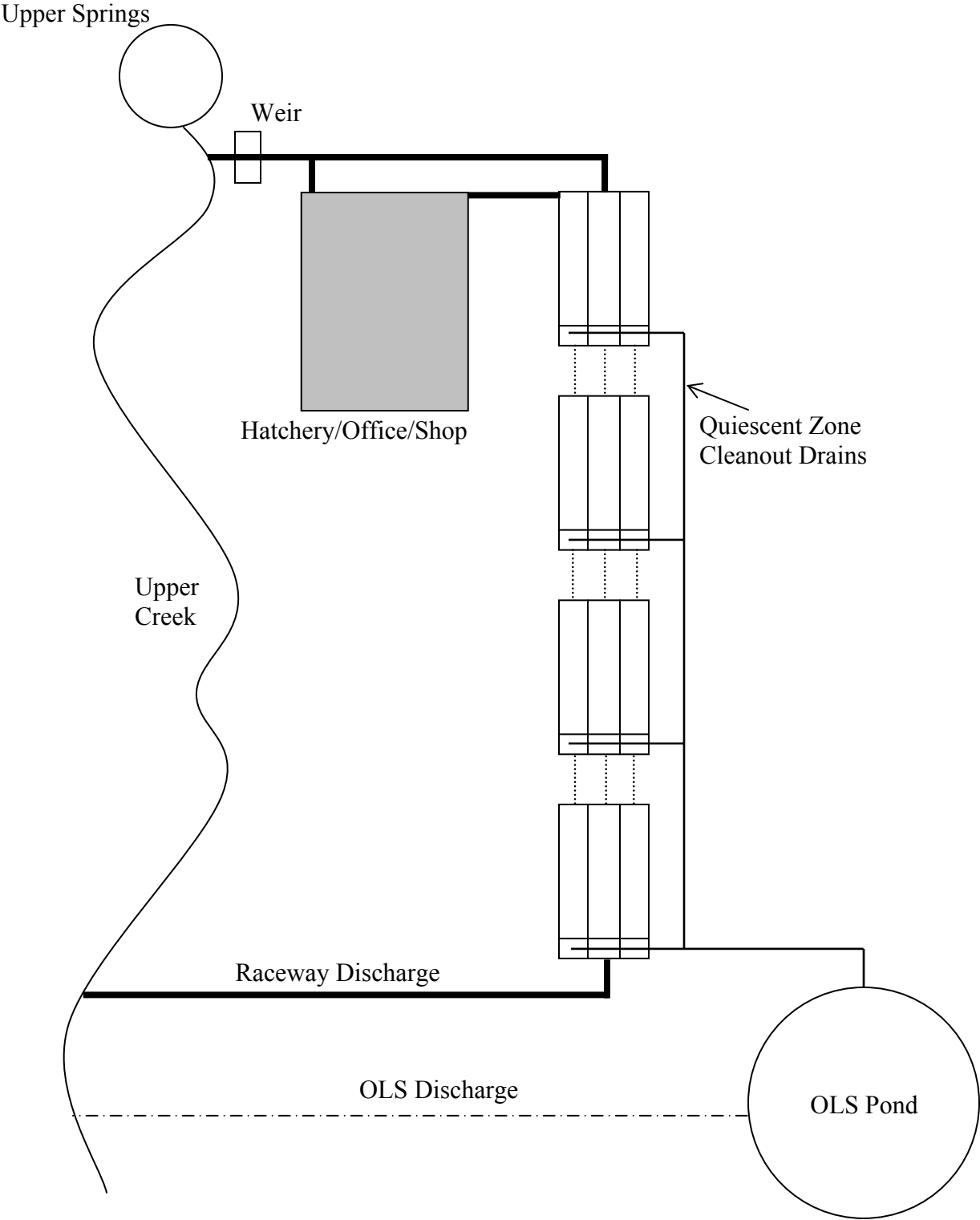


Figure 1: Facility Diagram of 3M & LJ Fish Farm

## Feed Conversion Ratios Log

Facility Name: 3M & LJ Fish Farm

NPDES Permit Number: ID 1234567

**Instructions:** Fill in this form with feeding information so as to keep track of feeding and to calculate/track feed conversion ratios. FCRs are calculated with the following equation:

$$\frac{\text{Dry weight of feed applied}}{\text{Wet weight of fish gained}}$$

Date (start date end date)	Description of Group	Total Feed Amounts (Estimate)	Weights of Animals (start weight end weight)	Weight Gained	Calculated FCR
3/1/04	Rainbow trout stockers	20,775 lbs	100 lbs	17,428 lbs	1.19
10/1/04			17,528 lbs		

## Cleaning Log

**Facility Name:** 3M & LJ Fish Farm

**NPDES Permit Number:** ID 1234567

**Instructions:** Record all cleaning performed on production and/or wastewater system components.

Date Cleaned	Cleaner Initials	Description of Component Cleaned	Notes About Cleaning
10/1/04	ML	QZ raceways 1-10	Cleaned QZs and dam boards; checked and cleaned screens, removing moss and dead fish.

**OLS WASTE LAND APPLICATION LOG****Facility Name:** 3M & LJ Fish Farm**NPDES Permit Number:** ID 1234567

**Instructions:** Record information about land application of OLS waste in the form below. This is an example of a state requirement that is not required by the ELGs.

Date	Initials	Location	Nutrient Analysis	Volume Applied	Notes
10/1/04	ML	Crop Field 1	2.5%% nitrogen 3.0% phosphorus 0.1% potassium 5.0% calcium 1.0% magnesium	10,000 gallons	No problems encountered.

## CARCASS REMOVAL LOG

**Facility Name:** 3M & LJ Fish Farm

**NPDES Permit Number:** ID 1234567

**Instructions:** Record all mortalities observed on a daily basis.

Date	Initials	System/Group of Animals	# of Mortalities	Approx. Weight	Disposal Method	Notes
10/1/04	ML	Rainbow trout - R1-12	20	11 lbs	Composted	All from R4; appear to be from an infection – closely monitoring remaining fish

## EXAMPLE SPILLS AND LEAKS LOG

**Facility Name:** 3M & LJ Fish Farm

**NPDES Permit Number:** ID 1234567

**Instructions:** Fill in this form with information about any spills or leaks.

Date (mm/dd/ yy)	Spill or Leak	Location (as indicated on a site map)	Type of Material & Quantity	Source (if known)	Reason	Amount of Material Recovered	List of Preventative Measures Taken	Initials
10/4/04	Spill	Hatchery floor	Formalin	Storage drum	Top was not secured and the drum was knocked over	20 gallons	Spoke to all employees about the importance of securing lids to storage containers	ML

**Instructions:** Use this page to enter any important notes about the spills from the previous sheets.

Date of spill or leak (mm/dd/yy)	Notes
10/4/04	All employees have been instructed on the importance of securing container lids. Employees were also instructed to double-check that container lids are secured before proceeding with applications.



## STRUCTURAL MAINTENANCE INSPECTION AND MAINTENANCE LOG

Facility Name: 3M & LJ Fish Farm

NPDES Permit Number: ID 1234567

Production or Wastewater Treatment System: Raceway 1

**Instructions:** Fill in all routine inspections and regular maintenance of production systems and wastewater treatment systems in the table below. Use a separate form for each production system and/or wastewater treatment system.

Date Inspected	Inspector Initials	Notes (Note any problems found and maintenance performed)	Date Maintenance Performed
10/1/04	ML	The screens at the end of raceways 5 and 7 were loose; secured the screen.	10/2/04