

## SOP 1: DRY WEATHER OUTFALL INSPECTION

### *Introduction*

Outfalls from an engineered storm drain system can be in the form of pipes or ditches. Under current and pending regulations, it is important to inspect and document water quality from these outfalls under both dry weather and wet weather conditions. SOP 2, “Wet Weather Outfall Inspection”, covers the objectives of that type of inspection. This SOP discusses the dry weather inspection objectives, and how they differ from wet weather inspection objectives.

During a dry weather period, it is anticipated that minimal flow from stormwater outfalls will be observed. Therefore, dry weather inspections aim to characterize any/all flow observed during a dry weather period and identify potential source(s) of an illicit discharge through qualitative testing; further described in SOP 13, “Water Quality Screening in the Field”.

### *Objectives of Dry Weather Inspections*

A dry weather period is a time interval during which less than 0.1 inch of rain is observed across a minimum of 72 hours. Unlike wet weather sampling, dry weather inspections are not intended to capture a “first flush” of stormwater discharge, rather they are intended to identify any/all discharges from a stormwater outfall during a period without recorded rainfall. The objective of inspections during a dry weather period is to characterize observed discharges and facilitate detection of illicit discharges.

### *Visual Condition Assessment*

The attached Dry Weather Outfall Inspection Survey is a tool to assist in documenting observations related to the both quantitative and qualitative characteristics of any/all flows conveyed by the structure during a dry period.

For any visual observation of pollution in a stormwater outfall discharge, an investigation into the pollution source should occur, but the following are often true:

1. Foam: indicator of upstream vehicle washing activities, or an illicit discharge.
2. Oil sheen: result of a leak or spill.
3. Cloudiness: indicator of suspended solids such as dust, ash, powdered chemicals and ground up materials.
4. Color or odor: Indicator of raw materials, chemicals, or sewage.
5. Excessive sediment: indicator or disturbed earth of other unpaved areas lacking adequate erosion control measures.
6. Sanitary waste and optical enhancers (fluorescent dyes added to laundry detergent and some toilet paper): indicators of illicit discharge.
7. Orange staining: indicator of high mineral concentrations.

Many of these observations are indicators of an illicit discharge. Examples of illicit discharges include: cross-connections of sewer services to engineered storm drain systems; leaking septic systems; intentional discharge of pollutants to catch basins; combined sewer overflows; connected floor drains; and sump pumps connected to the system (under some circumstances). Additional guidelines for illicit discharge investigations are included in SOP 10, “Locating Illicit Discharges”.

The Wet Weather Outfall Inspection Survey includes fields where these and other specific observations can be noted. The inspector shall indicate the presence of a specific water quality indicator or parameter by marking “Yes”. If “Yes” is marked, provide additional details in the comments section. If the indicator in question is not present mark “No”.

Within the comments section, provide additional information with regard to recorded precipitation totals, or more detailed descriptions of observations made during the inspection and corrective actions taken.

### *Conditional and Qualitative Considerations*

Although many of the parameters listed above are considered to be indicators of illicit discharge, the presence of a parameter is not absolute evidence of an illicit discharge.

Some of these indicators may occur naturally. Orange staining may be the result of naturally occurring iron, and therefore unrelated to pollution. Foam can be formed when the physical characteristics of water are altered by the presence of organic materials. Foam is typically found in waters with high organic content such as bog lakes, streams that originate from bog lakes, productive lakes, wetlands, or woody areas. To determine the difference between natural foam and foam cause by pollution, consider the following:

1. Wind direction or turbulence: natural foam occurrences on the beach coincide with onshore winds. Often, foam can be found along a shoreline and/or on open waters during windy days. Natural occurrences in rivers can be found downstream of a turbulent site.
2. Proximity to a potential pollution source: some entities including the textile industry, paper production facilities, oil industries, and fire fighting activities work with materials that cause foaming in water. If these materials are released to a water body in large quantities, they can cause foaming. Also, the presence of silt in water, such as from a construction site can cause foam.
3. Feeling: natural foam is typically persistent, light, not slimy to the touch.
4. Presence of decomposing plants or organic material in the water.

Some of the indicators can have multiple causes or sources. For example, both bacteria and petroleum can create a sheen on the water surface. The source of the sheen can be differentiated by disturbing it, such as with a pole. A sheen caused by oil will remain intact and move in a swirl pattern; a sheen caused by bacteria will separate and appear “blocky”. Bacterial or naturally occurring sheens are usually silver or relatively dull in color and will break up into a number of small patches of sheen. The cause may be

presence of iron, decomposition of organic material or presence of certain bacteria. Bacterial sheen is not a pollutant but should be noted.

Optical enhancers at high concentrations are sometimes visible to the naked eye as a bluish-purple haze in the water. However, due to physiological variation of the human eye, not all inspectors may be able to identify the presence of these materials, and quantitative testing is the preferred method to confirm the presence of these compounds. Optical enhancers are typically detected through the use of clean, white cotton pads placed within the discharge for several days, dried, and viewed under a fluorometer. If the cotton pad fluoresces, optical enhancers are assumed to be present. The magnitude of the fluorescence, as measured in fluorescent units, can be used to correlate the concentration of optical enhancers in water to other samples collected locally.

### *Measuring Water Quality*

Based on the results of the Visual Condition Assessment, it may be necessary to collect additional data about water quality. Water quality samples can be in the form of screening using field test kits and instrumentation, or by discrete analytical samples processed by a laboratory.

Information on selecting and using field test kits and instrumentation is included in SOP 13, “Water Quality Screening in the Field.” The Inspection Survey also provides values for what can be considered an appropriate benchmark for a variety of parameters that can be evaluated in the field.

If the results of screening using field test kits indicate that the outfall’s water quality exceeds the benchmarks provided, collection of discrete analytical samples should be considered.

### *Analytical Sample Collection*

Sample collection methods may vary based on specific outfall limitations, but shall follow test procedures outlined in 40 CFR 136. A discrete manual or grab sample can classify water at a distinct point in time. These samples are easily collected and used primarily when the water quality of the discharge is expected to be homogeneous, or unchanging, in nature. A flow-weighted composite sample will classify water quality over a measured period of time. These samples are used when the water quality of the discharge is expected to be heterogeneous, or fluctuating, in nature. Grab samples are more common for dry weather outfall inspections due to the time-sensitive nature of the process.

Protocols for collecting a grab sample shall include the following:

1. Do not eat, drink or smoke during sample collection and processing.
2. Do not collect or process samples near a running vehicle.
3. Do not park vehicles in the immediate sample collection area, including both running and non-running vehicles.
4. Always wear clean, powder-free nitrile gloves when handling sample containers and lids.
5. Never touch the inside surface of a sample container or lid, even with gloved hands.

6. Never allow the inner surface of a sample container or lid to be contacted by any material other than the sample water.
7. Collect samples while facing upstream and so as not to disturb water or sediments in the outfall pipe or ditch.
8. Do not overfill sample containers, and do not dump out any liquid in them. Liquids are often added to sample containers intentionally by the analytical laboratory as a preservative or for pH adjustment.
9. Slowly lower the bottle into the water to avoid bottom disturbance and stirring up sediment.
10. Do not allow any object or material to fall into or contact the collected water sample.
11. Do not allow rainwater to drip from rain gear or other surfaces into sample containers.
12. Replace and tighten sample container lids immediately after sample collection.
13. Accurately label the sample with the time and location.
14. Document on the Wet Weather Outfall Inspection Survey that analytical samples were collected, specify parameters, and note the sample time on the Inspection Survey. This creates a reference point for samples.

### *Analytical Sample Quality Control and Assurance*

Upon completion of successful sample collection, the samples must be sent or delivered to a MassDEP-approved laboratory for analytical testing. Quality control and assurance are important to ensuring accurate analytical test results.

Sample preservation is required to prevent contaminate degradation between sampling and analysis, and should be completed in accordance with 40 CFR 136.3.

Maximum acceptable holding times are also specified for each analytical method in 40 CFR 136.3. Holding time is defined as the period of time between sample collection and extraction for analysis of the sample at the laboratory. Holding time is important because prompt laboratory analysis allows the laboratory to review the data and if analytical problems are found, re-analyze the affected samples within the holding times.

Chain of custody forms are designed to provide sample submittal information and document transfers of sample custody. The forms are typically provided by the laboratory and must be completed by the field sampling personnel for each sample submitted to the lab for analysis. The document must be signed by both the person releasing the sample and the person receiving the sample every time the sample changes hands. The sampling personnel shall keep one copy of the form and send the remaining copies to the laboratory with the samples. Custody seals, which are dated, signed and affixed to the sample container, may be used if the samples are shipped in a cooler via courier or commercial overnight shipping.

### *Attachments*

1. Dry Weather Outfall Inspection Survey

*Related Standard Operating Procedures*

1. SOP 2, Wet Weather Outfall Inspection
2. SOP 10, Locating Illicit Discharges
3. SOP 13, Water Quality Screening in the Field

**Outfall ID:** \_\_\_\_\_ **Town:** \_\_\_\_\_  
**Inspector:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Street Name** \_\_\_\_\_  
**Last rainfall event** \_\_\_\_\_



### DRY WEATHER OUTFALL INSPECTION SURVEY

<b>Type of Outfall (check one):</b>		<b>Pipe Outfall</b> <input type="checkbox"/>	<b>Open Swale Outfall</b> <input type="checkbox"/>
<b>Outfall Label:</b>		<b>Stencil</b> <input type="checkbox"/>	<b>Ground Inset</b> <input type="checkbox"/> <b>Sign</b> <input type="checkbox"/> <b>None</b> <input type="checkbox"/> <b>Other</b> _____
<b>Pipe Material:</b>	Concrete	<input type="checkbox"/>	<b>Pipe Condition:</b>
	Corrugated metal	<input type="checkbox"/>	
	Clay Tile	<input type="checkbox"/>	
	Plastic	<input type="checkbox"/>	
	Other: _____	<input type="checkbox"/>	
<b>Swale Material:</b>	Paved (asphalt)	<input type="checkbox"/>	<b>Swale Condition:</b>
	Concrete	<input type="checkbox"/>	
	Earthen	<input type="checkbox"/>	
	Stone	<input type="checkbox"/>	
	Other: _____	<input type="checkbox"/>	
<b>Shape of Pipe/Swale (check one)</b>			
 <input type="checkbox"/>		 <input type="checkbox"/>	
<b>Rounded Pipe/Swale</b>		<b>Rectangular Pipe/Swale</b>	<b>Triangular Swale</b>
<b>Pipe Measurements:</b>		<b>Swale Measurements:</b>	<b>Is there a headwall?</b>
Inner Dia. (in): d= _____		Swale Width (in): T= _____	Yes <input type="checkbox"/> No <input type="checkbox"/>
Outer Dia. (in): D= _____		Flow Width (in): t= _____	<b>Condition:</b>
Pipe Width (in): T= _____		Swale Height (in): H= _____	
Pipe Height (in): H= _____		Flow Height (in): h= _____*	
Flow Width (in): h= _____*		Bottom Width (in): b= _____	
<b>Location Sketch</b>			
<b>Description of Flow:</b> Heavy <input type="checkbox"/> Moderate <input type="checkbox"/> Trickling <input type="checkbox"/> Dry <input type="checkbox"/>			
<b>If the outlet is submerged check yes and indicate approximate height of water above the outlet invert. h above invert (in):</b> _____			<b>Circle All Materials Present:</b>
<b>Odor:</b> Yes <input type="checkbox"/> No <input type="checkbox"/> <b>Optical enhancers suspected?</b> Yes <input type="checkbox"/> No <input type="checkbox"/> <b>Has channelization occurred?</b> Yes <input type="checkbox"/> No <input type="checkbox"/> <b>Has scouring occurred below the outlet?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>			Rip rap Excessive sediment Foam Sanitary Waste Orange Staining
<b>Required Maintenance:</b> Tree Work Ditch Work Structural Corrosion N/A			Sheen: Bacterial Sheen: Petroleum Floatables Algae Excessive Vegetation
<b>Comments:</b>			