



Water Resources Division

Visual Assessments of Industrial Storm Water

Introduction

Conducting visual assessments of storm water discharges from areas of industrial activity is a new permit requirement for facilities in Michigan with industrial storm water permit coverage. This has been a permit requirement in the Environmental Protection Agency's (EPA's) Multi-Sector General Permit for storm water discharges from industrial activities. Visual assessments have also been a requirement for industrial storm water permits in other states for many years.

Why do we need to monitor storm water runoff? The National Urban Runoff Program and other studies have shown that storm water runoff has a major impact on the water quality of our surface waters. Because of these impacts, the EPA was directed to develop regulations to manage storm water runoff from areas of industrial activity and large urbanized areas. The State of Michigan began to issue permits that authorized storm water discharges from areas of industrial activity in 1994. In 2010, the Department of Environmental Quality (DEQ), Water Resources Division (WRD) developed a report on wet weather pollution in Michigan. The report recognized that through the management of structural controls and employee practices at industrial facilities, the quality of storm water runoff could be improved. However, without monitoring of the storm water runoff we do not know the quality of storm water runoff discharged from these facilities. Storm water monitoring can be difficult because storm events are so variable. Chemical analysis of the storm water can be expensive. Since many of the pollutants that contaminate storm water runoff visually alter the appearance of the storm water runoff, the department has proposed a compromise.

The observation of storm water discharged from a facility is called the visual assessment. The purpose of the visual assessment is to assess the effectiveness of the control measures implemented to minimize contaminants in the storm water discharged from the facility. The control measures implemented are required to be identified in the facility's Storm Water Pollution Prevention Plan (SWPPP).

There are three main components to the visual assessment that we will discuss in this compliance assistance document:

1. **Development of the written procedures.** The written procedures describe how, when, and where the storm water discharged from the facility will be collected and assessed.
2. **Storm water sample collection** and observation of the discharge.
3. **Visual assessment of the sample** by an Industrial Storm Water Certified Operator (certified operator). The results of the assessment must be documented. Storm water permits require the visual assessment of industrial storm water discharges be conducted as part of the comprehensive inspection. Comprehensive inspections are required to be conducted quarterly or on an alternative schedule that has been approved by the WRD of the DEQ.

Written Procedures

The first component is the development of written procedures that the company will follow to ensure that representative samples of storm water runoff are collected from each discharge point.

Within six months of issuance or reissuance of the Certificate of Coverage (COC) or the individual National Pollutant Discharge Elimination System (NPDES) permit, the permittee is required to develop written procedures for conducting the visual assessments at their facility. The written procedures shall be included in the SWPPP.

The visual assessment must be conducted by a certified operator. The written procedures shall include the certified operator(s) who will be conducting the assessments in the written procedures. In addition, due to timing and/or facility size, there may be reasons why it is necessary for personnel – other than a certified operator – to collect the storm water sample. These individuals shall be included in the written procedures as well.

As part of the visual assessment, a representative sample of the storm water discharge will be collected from each discharge point by appropriately trained staff. The written procedures must include information on how a representative storm water sample will be collected from each discharge point. The written procedures should identify if automated samplers will be used to collect a sample. The identification of the discharge points where the visual assessment(s) will be conducted must be included in the written procedures. Discharge points are the locations where storm water is discharged from the facility. The location of these discharge points is required to be included on the site map developed as part of the SWPPP.

There are two types of discharge points:

1. **Outfalls**-These are discharge points where storm water is discharged directly to surface waters of the state. Surface waters of the state include streams, lakes, ponds, county drains, and wetlands. Outfalls can be pipes, ditches, or even sheet flow from the facility. Some facilities will have an outfall where they can manually control the discharge.
2. **Points of Discharge**-These are discharge points where storm water is discharged to a municipal or private separate storm sewer system. The visual assessment should be conducted as close to the point of discharge as possible before the storm water enters the municipal or private separate storm sewer system.

Points of discharge include on-site catch basins and trench drains, in-street catch basins, and conveyances to roadside ditches.

As part of the site map included in the SWPPP, discharge points and drainage patterns are required to be clearly identified. Some facilities may have outfall(s) that discharge directly to a stream and points of discharge to the municipal separate storm sewer system. The drainage patterns should be indicated by arrows.

Some facilities may have internal points of discharge into a county road commission's separate storm sewer system. These facilities would identify the discharge point as the point where their system discharges into the road's storm sewer. Because they cannot access the actual discharge point, they would select the closest accessible manhole to the discharge point as their visual assessment sampling location.

Substantially Identical Discharge Points: Many facilities will have multiple discharge points. For facilities with two or more discharge points that are believed to discharge substantially identical storm water discharges or effluents, these facilities may conduct the visual assessment of the discharge at just one of the discharge points during a storm water discharge event.

How do you determine if the discharge points will have substantially identical effluents? First, look at the significant materials and industrial activities that are occurring in the drainage area for each discharge point. Significant materials and areas of industrial activity are required to be shown on the site map. Discharge points determined to be substantially identical must be identified on the site map included in the SWPPP.

In addition to the site map, use the significant material evaluation that was developed and included in the SWPPP. If the significant materials and industrial activities are the same in the drainage area for each discharge point, then it can be assumed that the effluent discharging after a storm event will be substantially identical.

Be sure to look at all of the industrial processes when making the determination if the discharge points have substantially identical discharges. If the significant materials and the activities occurring in the drainage areas for a discharge point are different, the discharges in the drainage area for each discharge point cannot be expected to be of similar quality and composition. Each discharge point would need to be visually assessed during the storm event discharge.

Visual assessments are to be performed on a rotating basis of each substantially identical discharge point. To ensure each discharge point is assessed on a rotating basis, include a schedule in the written procedures.

If changes occur at the facility that could affect the discharge from either discharge point, then each discharge point would need to be assessed.

Discharges from areas used solely for customer or employee parking and runoff from areas where there has been no industrial activity are not regulated discharge points in industrial storm water permits. In addition, points of discharge to combined sewers, sanitary sewers, or ground water are not regulated by the industrial storm water program.

A visual assessment does not need to be conducted for storm water discharges from unregulated areas.

The written procedures are part of the SWPPP and must meet the minimum requirements of the permit that authorizes the industrial storm water discharge. If the written procedures are not acceptable, the WRD, DEQ staff will request changes to the written procedures.

Sample Collection

Before collecting the sample, ensure that you have safe and easy access to each discharge point. In some cases, the storm water discharge may be underwater, under a structural control or in enclosed pipes.

Scheduling: Plan ahead so you will be ready to conduct the visual assessment when the next discharge occurs from a storm event.

Visual assessments are required to be conducted quarterly as part of the comprehensive inspection.

The general permit allows for the DEQ to approve an alternate schedule for the comprehensive inspections. If the Department has approved an alternative schedule, the visual assessment may be conducted in accordance with the approved schedule.

If an alternative schedule has not been approved, a visual assessment must be conducted within each of the following quarters: January-March, April-June, July-September, and October-December.

The schedule for conducting the visual assessment shall be included in the written procedures.

The visual assessment must be conducted within one month of the control measure observations evaluated and documented by the certified operator during the comprehensive inspection. The inspection of control measures are typically recommended to be conducted during dry weather conditions. Storm events often occur during hours when no one may be at the facility. Therefore the visual assessment should be planned for the first qualifying storm event that occurs after the control measure observations.

Timing: The visual assessment and sample collection must be at least 72 hours from the previous storm event that caused a discharge. This is referred to as a qualifying storm event.

The sample collection and storm water discharge observations portions of the visual assessment must occur within the first 30 minutes of the beginning of the storm water discharge. If it is not possible to collect the storm water sample and conduct the storm water discharge observation within the first 30 minutes of a discharge, you may do the sample collection and observation within the first 60 minutes of discharge. Be sure to provide a written explanation of why additional time was needed.

If the storm water runoff from the facility flows to a detention basin with a controlled discharge structure, the sample must be collected when the valve is opened to allow the discharge. If the water in the detention basin is observed to have unnatural characteristics, this should be noted in the report form and the water should be treated before it is discharged.

Collection: Written procedures were developed on how a representative storm water sample would be collected from each discharge point. If the sample is collected from a storage area with a controlled discharge, the samples shall be collected from the surface of the discharge.

If the discharge is to be collected from a flowing storm water discharge, collect a sample of the water that will be representative of materials that may be floating as well as those suspended in the water.

There may be situations where the sample will be collected in a different container and then transferred to individual containers. The container that will be used to conduct the visual assessment will need to be a clean, clear container.

If the samples will be sent in for chemical analysis, use a container that is appropriate for the parameters that will be analyzed.

In the event that adverse weather conditions prevent the collection of the storm water sample and the observation of the storm water discharge during the quarter or within one month of the control measure observations, a substitute visual assessment can be conducted during the next qualifying storm event.

Adverse weather conditions are those that create inaccessibility to the sampling location or create conditions that would be dangerous to personnel collecting the sample. Examples include local flooding, high winds, electrical storms, or icy conditions. Adverse weather conditions may also create conditions where there would be no discharge, such as extended dry periods or extended cold periods where there is no snowmelt.

The rationale for not conducting the visual assessment during a quarter shall be documented and kept with the SWPPP inspection records.

Structural controls may be in place to remove contaminants from the storm water runoff. The storm water sample should be collected after the storm water has passed through the structural control to provide an accurate assessment of the storm water discharging from the facility.

For example, if the sample collector noted increased turbidity in the storm water runoff before the water passed through a catch basin insert that had been installed to filter sediment from storm water, then it would not give an accurate representation of the storm water discharging from the facility. Therefore the storm water sample should be pulled from the discharge after it has passed through the catch basin insert. In these situations the sample collection will be more difficult and specialized equipment may be needed. This is the type of information that should be included in the written procedures.

The collection of a sample from a snowmelt event must be during a period of measureable discharge. For snowmelt, a measurable discharge is enough snowmelt to collect a sample within a few minutes.

When developing your written procedures, examine your discharge points to determine if specialized equipment is needed to concentrate the storm water so that a sample may be collected. Determine how you will collect a representable sample of the storm water discharge. Since the storm water sample collection and the storm water discharge observation need to be conducted within 30 minutes of the beginning of the discharge, you will need to have your sample containers and equipment ready before the storm event occurs.

Specialized equipment may be needed to collect the storm water so it can be put into the sample container. In some cases, sampling equipment is needed to ensure that the sample collector can safely collect the sample. To reduce slip and fall hazards, a structure may need to be constructed to give access to the sampling location. Precautions need to be taken in areas of traffic or industrial activity at the facility.

Technology may make it possible for a certified operator to conduct the visual assessment without being on site at the time of the discharge. For example, the discharge may be visually recorded and the sample may be collected by an automated sampler which the certified operator could assess within 48 hours.

If the sample will not be visually assessed within a few minutes of collection, the sample needs to be properly stored to prevent degradation of the sample before it can be assessed. Include the storage procedures in the written procedures.

If the certified operator is not available at the time of the discharge, the facility may use staff that have received appropriate training for collection of the storm water sample. The supervising certified operator may want staff to use a visual recording device to indicate conditions at the facility during the discharge. If a visual recording is taken, it must be included with the other documentation of the visual assessment.

Appropriate training must be conducted annually as part of the employee training for staff that will assist the certified operator in conducting the visual assessment. Viewing the Visual Assessment Webinar or tutorials located on the Industrial Program page of the Storm Water Website would be considered appropriate training for the staff working in conjunction with or under the supervision of a certified operator. A description of the training must be included in the written procedures. Documentation that the staff have received appropriate training should be kept with the visual assessment documentation records.

The storm water sample collected during the visual assessment must be observed and documented by a certified operator within 48 hours of sample collection.

Any alternative to a certified operator conducting the visual assessment in person and collecting the storm water sample in person must be included in the written procedures for conducting the visual assessment.

Visual Assessment

The visual assessment involves noting observations of the storm water discharging at each discharge point and the assessment of the sample collected from each discharge point.

Record your observations of the discharge. When observing the discharge you should note any of the following characteristics: color, turbidity, presence of oil films or sheens, if there are floating or suspended solids, foams, or deposits as a result of the discharge. Also note if there are any odors associated with the discharge.

Often the observation of the discharge may be conducted under poor visibility conditions so a representative sample of the discharge must be taken at each discharge point for examination by a certified operator. View the Visual Assessment Webinar to see examples of unnatural characteristics of discharges and information that will need to be included in your documentation.

Contaminants in the discharge may cause it to be discolored. It is important that you have a general idea of the normal color of the receiving waters to which the facility is discharging the storm water. Note the color of the storm water discharging and the color of the receiving waters.

Note if the discharge is cloudy. The cloudiness of the water is called turbidity and it is a measure of the clarity of the water. If you are observing at an outfall also note the turbidity of the receiving waters and if the discharge is causing the receiving waters to become more turbid. If the discharge is more turbid than the receiving waters you will see a plume extending downstream.

The turbidity of the discharge is due to the materials that are suspended in the discharge. They may be liquids or solids. The solid materials that are larger in size with a greater density will settle out of the water more quickly and are called settleable solids. They may produce a sediment delta below the discharge point. These can be observed in areas where the velocity of the water is reduced such as the area downstream of the outfall. If the receiving waters also have a high velocity a sediment delta may not be present even though the discharge has a high turbidity.

After the storm water sample is collected the settleable solids will settle to the bottom of the sampling container in a short period of time.

Suspended solids are usually smaller in size than settleable solids or have an electrical charge that allows them to stay in suspension. In addition other contaminants in the discharge may cause some materials to stay suspended longer. Those materials that do not settle out of the sample within a few minutes are called suspended solids.

Turbidity may also be due to liquids that are suspended in the water. One example is the water soluble oil used in cutting fluids which can give the water a milky appearance.

Look at the surface of the water for oil sheens or films. The color of the sheen is dependent of the type of oils or petroleum products and the thickness of the oil or petroleum film. Also note if there is any odor present. Some petroleum products have distinct odors and this may help you identify the source of contamination.

Some contaminants will float on the surface of the water. Plastics resins, ground rubber, woody materials and other materials that are less dense than water will float. Often, you will see these materials deposited at the outfall or accumulating around your discharge point.

Look at the discharge for the presence of foams. Foams are formed when there are contaminants in the water which act as surfactants. The most common example is the presence of detergents. Occasionally foams may form due to naturally occurring surfactants in the receiving waters.

When conducting the visual assessment, also note any odors associated with the discharge. This can also help you determine the source of the contaminants in the discharge.

Use caution when smelling the sample taking during the visual assessment. Some contaminants can be harmful when inhaled.

Often there may be a combination of the unnatural characteristics in the discharge. For example, the water discharging from a pipe could be turbid with a brownish color and presence of foam. It may also have an odor. Or a discharge could have a dark color with an oil sheen but not have turbidity.

There may be variations from the narrative standard for receiving waters that are due to naturally occurring phenomenon. For example, you may observe a sheen at an outfall. Some sheens are not caused by petroleum products but indicate the presence of a bacterial film. To determine if the sheen is bacterial, you can disturb the sheen with a stick or stone. If it breaks up into fragments, it is bacterial. If the sheen immediately reforms, it is due to petroleum products. Another common example is pollen which may cause the discharge to be yellow or light green. These are the type of observations that need to be recorded during the visual assessment.

Documentation: The documentation of the visual assessment must include the discharge point that was observed and storm event information. Storm event information includes the date and time of the event, duration of the event in hours, amount of precipitation in inches, duration of time since the previous storm event, and the date and time the discharge began. Much of this information may be available on weather information websites such as:

1. the Weather Underground: www.wunderground.com and www.wunderground.com/history; and
2. the National Weather Service: www.weather.gov

A properly placed rain gauge will give the most accurate measure of the amount of precipitation occurring during a storm event at your facility.

The certified operator is responsible for conducting the visual assessment. The visual assessment includes observations of the discharge, noting odors at the time of the discharge, collection of a sample from each discharge point, visual and olfactory observations of the sample and the documentation of sample characteristics.

The department has developed a visual assessment report form for you to use to record the results of the visual assessment. The form can be found on the Industrial Storm Water Web Page.

If the sample collection is conducted by staff other than the certified operator, the name of the person collecting the sample must be included on the report form.

A certified operator needs to conduct the visual assessment of the storm water sample in a well-lit area. If the certified operator was not available at the time of the collection, the assessment of the properly stored sample will need to be conducted within 48 hours of collection by an appropriately trained certified operator.

To conduct the visual assessment, the certified operator will need to gently shake or mix the sample before conducting the assessment.

When the storm water samples are collected from each discharge point, be sure to label the samples. Samples should be labelled with the discharge point number, the date and time of collection, and date and time of the beginning of the discharge event.

On the report form, be sure to include the name of the certified operator who supervised the collection of the storm water discharge and who analyzed the storm water discharge sample. The certified operator must review and sign the report form after visually assessing the sample collected during the discharge event.

Be sure to include the nature of the storm event in the report. The nature of the storm event refers to whether the discharge was from rain or snowmelt.

If there are unusual characteristics of the discharge, determine the probable sources of the contamination. For example, a petroleum sheen was observed at the outfall that was due to fuel spillage at the fueling area.

If the discharge has any of the unusual characteristics we have described, take corrective actions as soon as possible. If these unusual characteristics are present in the receiving waters as a result of the discharge, there may be a violation of the narrative standard.

Any unusual characteristics of the discharge (that could cause a violation of the Water Quality Standards) in the receiving water shall be reported within 24 hours to the department, followed by a written report within five days detailing the findings of the investigation and the steps taken to correct the condition. A discharge that does not meet the narrative standard may be a violation of the Water Quality Standards in the receiving waters and could be a violation of the permit.

Use good professional judgment. If you think the unusual characteristics could pose a threat to the public or the environment, make the call.

The purpose of the visual assessment is to determine the effectiveness of the control measures in place at the facility. There may be unusual characteristics that do not constitute a violation of the permit. If unusual characteristics persist during the discharge, it warrants further investigation to determine the possible source of contamination. Failure to investigate and determine the source of the contamination may be a permit violation.

For example, a few drops of gasoline can produce a sheen on a discharge but this sheen is unlikely to persist or cause harm to the receiving waters. However a larger spill of gasoline would be more persistent in causing a sheen on the discharge and would warrant cleanup at the source of the contamination. It could also pose health risks to public and have an impact on the receiving waters. Therefore, when unusual characteristics are observed they should be documented and further investigation should be conducted to determine if the observed characteristics warrant immediate action or would be something that could be addressed by improved housekeeping practices.

After the sample is visually assessed by the certified operator, a photo of the sample against a white background must be taken. The photo or other visual recordings must be saved for documentation. If the sample was not able to be collected during the first 30 minutes of discharge, a written explanation needs to be included in the documentation.

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Visual Assessment Requirements

Develop Written Procedures

- Must be included as part of the SWPPP within six months of COC issuance.
- Identify certified operator(s) responsible for conducting assessment.
- Identify other staff as appropriate who will be assisting with sample collection and identify training provided.
- Appropriately train certified operators and other staff for collection and assessment of samples.
- Document training of personnel.
- Identify the discharge points (outfalls and points of discharge) that will be assessed.
- Identify a schedule for the visual assessment, i.e. within 30 days of the quarterly comprehensive inspection or based on alternative schedule approved by WRD.
- If applicable, identify substantially identical discharge points and provide a rotating schedule for assessment of these discharge points.
- Identify how a representative sample will be safely obtained from each discharge point including any necessary equipment and supplies.

Sample Collection

- Plan ahead and prepare a sample collection kit.
- Monitor storm event information for a qualifying event (72 hours from the previous storm event that caused a discharge).
- Attempt to collect sample within first 30 minutes, but no later than 60 minutes, of a qualifying storm event (or in the case of snow melt a measurable discharge).
- If staff other than a certified operator collects the sample, ensure they are appropriately trained.
- If adverse weather conditions exist, schedule collection for another day.
- During sample collection, record observation of discharge and receiving waters if observed.
- Label sample containers with: discharge point name/number, date / time of collection, and date / time of the beginning of the discharge event.

Visual Assessment

- Certified operator performs assessment as soon as possible but no later than 48 hours of sample collection.
- Gently shakes or mix sample before conducting assessment.
- Examine in a well-lit area.
- Photograph sample against a white background.
- Document all required event information and observations on a report form and maintain at facility for a minimum of three years.

Follow-Up

- If unnatural characteristics of the discharge are identified (cloudiness, color, sheen, etc.) determines probable sources of the contamination and take appropriate corrective actions.

Evaluate effectiveness of existing control measures.

- Improve implementation of existing measures and/or
- Implement/install additional non-structural and structural control measures.

Report discharges that could cause a violation of water quality standards in the receiving waters in accordance with permit requirements.

Update SWPPP as necessary.

Re-evaluate effectiveness of corrective actions taken during the next visual assessment.

Summary

Plan ahead and prepare a sampling kit for collecting the storm water samples so you will be ready when a qualifying storm event occurs. Provide appropriate training for the certified operators or other staff that will be collecting the sample which will be used to conduct the visual assessment.

Document what is observed at the discharge point at the time of the discharge. A certified operator must visually assess the storm water sample and record the characteristics of the sample with a photograph and a written report.

If there were water quality concerns or unnatural characteristics in the discharge, make corrective actions in a timely manner. If the discharge is causing a violation of the Water Quality Standards, notify the District Office.

If you have questions on developing your written procedures for conducting the visual assessment, please call the industrial storm water staff. A contact list is available on the industrial program page of the storm water website.

Remember the goal is clean discharges of storm water. In most situations, if the storm water discharge does not have any unusual characteristics, we know the controls in place at the facility are effective and the receiving waters are not being impacted. The visual assessment of the storm water discharges will help you determine when your controls need to be altered or improved.

Times and Frequencies to Remember

Task	Frequency or Time
Develop Written Procedures	Within 6 months of Certificate of Coverage or Individual Permit issuance
Conduct Visual Assessment	Within 1 month of control measure observation portion of the comprehensive inspection
Conduct Comprehensive Inspection	Once per quarter or on alternatively approved schedule
Qualifying Storm Event	72 hours from previous storm event that caused a discharge
Collect Storm Water Sample	Within 30 minutes of beginning of discharge, but no later than 60 minutes
Conduct Visual Assessment of Sample	ASAP but no later than 48 hours after sample collection
Maintain Written Documentation of Visual Assessment	Minimum of 3 years

For information or assistance on this publication, please contact the Water Resources Division at 800-662-9278. This publication is available in alternative formats upon request.

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