Indiana Association for Floodplain and Stormwater Management

INAFSM

May 2012

NPDES GUIDANCE for MS4s

Dry Weather Screening

for Illicit Discharge Detection and Elimination

Prepared by the INAFSM Stormwater IDDE Group

INAFSM IDDE Group

The INAFSM IDDE Group is a forum for discussion about the illicit discharge detection and elimination component (minimum control measure 3) of NPDES Phase II regulations for municipal separate storm sewer systems (MS4s). Any INAFSM member is welcome to join the group.

This document was created in consultation with the Indiana Department of Environmental Management Storm Water Program staff.

List of Contributors

May 2012

Members of the IDDE Group who contributed to this document are:

Greg Lake, Howard County, Chair

Dave Bradway, Muncie Sanitary District

Heather Buck, Christopher Burke Engineering

Lori Gates, Christopher Burke Engineering

Elise Pfaff, Elkhart County

Tim Stottlemyer, City of Noblesville

Bob Waples, City of Lebanon

Tracie Belongia, Hancock County

Sarah Brichford, Howard County

Richard DeWitt, City of Franklin

Christie Kallio, Hamilton County

Matt Rummel, Christopher Burke Engineering

Jeremy VanErman, City of Anderson

Purpose

This document provides a framework of recommended practices for screening dry weather discharges as required by the NPDES Phase II Minimum Control Measure #3 - Illicit Discharge Detection and Elimination (IDDE). Specifically, this document addresses sections (d) and (e) of Indiana's current IDDE regulations. These sections raise several questions about minimum actions, water testing, and outfall screening. These activities are very broad in scope which in turn leads to other questions such as "Where do we begin?" and "What parameters do we test?" Hopefully this document will provide useful options for meeting or exceeding the requirements of Sections (d) and (e).

A wide range of capabilities and budgets exist among the MS4s currently designated by the Indiana Department of Environmental Management (IDEM). Recognizing this situation, the INAFSM IDDE Group presents a range of options for dry weather screening that complement the three-tiered approach for good, better and best practices described by IDEM in a guidance worksheet for the IDDE audit (see Resources listing at the end of this section).

The IDEM guidelines for IDDE field screening are as follows:

Screening Level – Good (Minimum Requirement)

- The IDDE plan at a minimum should locate problems via dry weather screening through visual/physical inspections.
- Screening/monitoring levels completed by the MS4 for pipe outfalls that have a diameter of 12 inches or greater and open ditches with a 24 inch or larger bottom.
- The MS4 would be implementing the screening using the gradual approach.

Screening Level – Better

- The IDDE screening would describe a more aggressive approach, analyzing for pollutants of concern and include a larger number of parameters.
- The MS4 will have a timetable for screening that includes a larger number of outfalls.

Screening Level – Best

- The MS4 IDDE plan strategy would describe the aggressive approach to screening and monitoring outfalls.
- The MS4 would document detailed water quality analysis for water bodies in the MS4 area.
- The plan would include a strategy to remove water bodies from the IDEM 303(d) water quality list.
- The MS4 IDDE plan would identify an aggressive timetable for monitoring outfalls.

(IDEM Guidance Worksheet, 5-17-2012)

In this framework the difference between good, better, and best practices is primarily the use of advanced methods to evaluate stormwater outfalls and analyze dry weather discharges. Good practices are an effective approach for beginning an IDDE program with limited staff and budget. Best practices are currently being used by several IDDE programs that were established during the first permit cycle for NPDES Phase II and have been in place for several years.

Finally, the INAFSM Stormwater IDDE Group offers this document as general guidance to Indiana's stormwater professionals. There will be variation among MS4 programs as each program must address local characteristics and issues that shape the IDDE work plan. It is the responsibility of the local MS4 staff to implement an IDDE plan that effectively addresses the situation in their community.

Resources

The following references are excellent sources of information for dry weather screening as well as other aspects of an IDDE program.

Brown, E., Caraco, D., and Pitt, R. 2004. Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments. Center for Watershed Protection and University of Alabama. EPA X-82907801-0. U.S. EPA Officer of Wastewater Management, Washington, D.C.

This publication is available as a free download from the U.S. EPA IDDE web page or the Center for Watershed Protection.

Cuyahoga County Board of Health Watershed Protection. July 2006. Illicit Discharge Detection and Elimination Manual: A Guidance Manual for Municipalities in the State of Ohio. Electronic access (May 2012): http://www.ccbh.net/stormwater.

IDDE Audit MS4 Worksheet: Preparing for the IDDE Permit Evaluation. May 17, 2012. Handout at the 2012 MS4 Meeting from the Indiana Department of Environmental Management, Office of Water Quality, Wetlands and Storm Water Section, Rule 13 Permit Program.

Indiana Department of Environmental Management. May 2003. Indiana's Municipal Separate Storm Sewer System (MS4) Rule 13 Guidance: A Guide to Accompany the MS4 General Permit Requirements Under 327 IAC 15-13. Office of Water Quality, Urban Wet Weather Section, Storm Water Group.
Electronic access (May 2012): http://www.in.gov/idem/files/rule13guidance.pdf.
See page 53 for IDDE program guidance.

U.S. Environmental Protection Agency IDDE web page lists several links to IDDE materials and webcasts: http://cfpub.epa.gov/npdes/stormwater/idde.cfm

327 IAC 15-13-14 (d) - IDDE Plan

The Rule

"An MS4 operator shall develop a plan to detect, address, and eliminate illicit discharges, including illegal dumping, into the MS4 conveyance. This plan need not address the following categories of non-storm water discharges or flows unless the MS4 operator identifies them as significant contributors of pollutants to its MS4 conveyance:"

(1) Water line flushing
(2) Landscape irrigation
(3) Diverted stream flows
(4) Rising ground waters
(5) Uncontaminated ground water infiltration
(6) Uncontaminated pumped ground water
(7) Discharges from potable water sources
(8) Foundation drains
(9) Air conditioning condensation
(10) Irrigation water
(11) Springs
(12) Water from crawl space pumps
(13) Footing drains
(14) Lawn watering
(15) Individual residential car washing
(16) Flows from riparian habitats and wetlands
(17) De-chlorinated swimming pool discharges
(18) Street wash water
(19) Discharges from firefighting activities

First Steps

As the rule states the first step is to develop an IDDE plan that includes methods for detecting, addressing and eliminating illicit discharges. Two critical tasks should be completed before the IDDE plan is finalized and field work for outfall screening begins. These are: 1) mapping of stormwater conveyances and known outfalls, and 2) desktop assessment of illicit discharge potential. Mapping is required under Section 14 (b) and should include all known outfalls of any size that discharge to the MS4 designated receiving waters listed in Part B of the SWQMP. The desktop assessment is strongly recommended to gain insight into relationships between land use and potential illicit discharges within the MS4, particularly for large MS4s with many miles of receiving waters. See Chapter 5 of the manual "Illicit Discharge Detection and Elimination" by Brown et al (listed above under Resources on page 2).

Transition to Outfall Screening and Beyond

Mapping and desktop assessment provide a foundation for defining outfall screening procedures, including scheduling and prioritizing where field work will take place. The field work is essentially an inventory of stormwater conveyances and all of the outfalls that discharge to MS4 designated receiving waters. The outfall inventory yields information for identifying suspected illicit discharges and planning follow-up visits to confirm problems before moving on to source tracking and elimination. A local ordinance for stormwater management should be in place before beginning tracking and elimination.

In developing the IDDE plan, be clear about what each of the required components (detecting, addressing, and eliminating) means and how these will be accomplished. The following list includes basic procedures for detection and elimination of illicit discharges.

Detect

- inventory all outfalls by walking the receiving waters
- conduct dry weather screening to identify outfalls that are suspect for illicit discharge
- evaluate the flow - is this illicit discharge?
- track outfall information

Address

- office and field work to identify source of discharge
- for obvious sources - site visits to confirm source
- for unidentified sources - field work to track upstream of suspect outfalls

Eliminate

- office and field work to identify responsible party (landowner or facility operator)
- enforcement of local ordinance to stop illicit discharge
- notification per local ordinance - certified mail / personal visit / phone call
- follow-up verification of discharge elimination

Build a custom IDDE plan around these basic procedures. Coordinate with other entities for optimum effectiveness. The IDDE plan will include several activities that can be effective for engaging local politicians and others to develop better understanding of why stormwater management is important for the community. Dry weather screening for illicit discharges is one of these activities.

327 IAC 15-13-14 Section (e) - Dry Weather Screening

The Rule

"The plan developed under subsection (d) must, at a minimum, locate problem areas via dry weather screening or other means, determine the sources, remove or otherwise correct illicit connections, and document the actions taken. The dry weather screening or other means must utilize a field testing kit, or similar method, to analyze for pollutants of concern and other parameters, such as pH, conductivity, or nitrogen-ammonia, used to identify possible pollutant sources. All storm water outfalls in the regulated MS4 area under the MS4 operator's control must be screened for illicit discharges."

Tasks for Dry Weather Screening

1. Define dry weather.
2. Define a screening method.
3. Determine criteria for evaluating illicit discharge.
4. Select method for tracking outfall information.
5. Define measurable goals for dry weather screening.

Each of the tasks is discussed below within a framework of "good", "better" and "best" practices.

1. Define Dry Weather

The definition of "dry weather" is important for stormwater managers because we are trying to distinguish illicit discharges from normal rainfall runoff in the conveyance system. Most rainfall events (wet weather) carry pollutants to stormwater conveyances, but it is difficult to track and eliminate specific pollutant sources during wet weather without intensive monitoring and investigation. The best opportunity to find an illicit discharge is during dry weather when rainfall runoff is not flowing in the conveyance system; in dry weather, any flow in the conveyance system is a potentially illicit discharge, something other than rainfall runoff. Rule 13 does not provide a definition of "dry weather"; however, a generally accepted definition is the one provided below as the "Good" practice. Apply your dry weather parameters consistently throughout the outfall screening program.

Good

Dry weather begins after a period of 72 hours with less than 0.10 inches of rain. Alternatively, dry weather may be based on a waiting period, such as 48 to 72 hours, after rainfall events that produce runoff (see page 124 in Brown et al.). Include a definition of dry weather in the local stormwater management ordinance.

Better

Use rainfall information from any local weather tracking location located within the drainage area for the receiving water to be screened. It is possible for one part of your MS4 to have wet weather while another is having dry weather. Determining where it is dry requires local precipitation reports. A national precipitation reporting network called CoCoRaHS is helpful for local rainfall history (http://www.cocorahs.org/). Some Indiana counties have several reporting stations in this network; however, other counties have few or no stations and will have to look elsewhere for local rainfall information such as airports, schools and municipal facilities.

Best

In addition to the "better" practice, consider other variables such as soil type, water table and drainage lag times. If the location to be screened has heavy clay soils consider extending the 72 hour period because of the amount of time it takes for field drainage systems to empty. This may only be appropriate for MS4s with a true rural-urban zone where field drain tiles are common. Similarly, persistently wet areas such as flood storage zones may need longer lag times before screening after a runoff producing rain event.

2. Define a Screening Method

Rule 13 does not specify how dry weather screening should be done, only that it be done with the objective of locating problem areas. There are lots of choices for screening methods. To begin, choose practices that suit your staff and budget. As your IDDE program develops you will have the opportunity to refine and improve outfall screening methods. The next section also describes important concepts that will help define an appropriate screening method for your MS4.

Good

Use simple visual screening procedures and existing data to locate outfalls suspected for illicit discharges including citizen complaints and previous investigations by other local government staff or citizen groups. Visual screening is acceptable as the first step in illicit discharge detection and elimination. A standard form or checklist for screening is used by most IDDE programs. Appendix A has examples of screening forms.

At a minimum, visual screening includes the following:

1. Check for flow at the outfall.
2. A set of questions that help evaluate the outfall and discharge if present.

   Examples:

   - Is there a discharge? (low, medium, high volume)
   - Is the discharge permitted under another program (such as Rule 6)?
   - What color is the flow?
   - Is there an odor?
   - Is there staining or physical evidence of pollutants? (suds, deposits, floatable material)
   - Does this outfall need a follow-up visit to test discharge?

Better

Add a water testing component to the screening. Carry equipment during dry weather screening to test water quality at flowing outfalls. Choosing which water quality parameters to test depends on local conditions and is at the discretion of the MS4. Your desktop assessment results showed general associations that will help determine the parameters for water testing (e.g., bacteria testing for outfalls from an older subdivision with some complaints about sewage smell).

Basic water testing in the field can be useful and inexpensive. Here are three water quality parameters that are simple to use in the field while conducting outfall screening or a follow-up visit to an outfall previously screened.

Temperature

- compare the temperature of the discharge water to the receiving water temperature near the outfall: is the discharge water significantly warmer?

- very warm or hot water may indicate discharge from an industrial process or washwater
- use a thermometer designed for use in the field

pH

- pH is a measure of how acidic (lower pH) or alkaline (higher pH) a solution is
- pH affects the toxicity and availability of other elements and compounds in the water
- high pH (or high alkalinity) may indicate detergents and soap-based products in wastewater discharge / low pH may indicate an acidic discharge
- use a test strip (e.g., about $10-15 for 50 test strips)
  - normal range 6.0 – 9.0
  - out of range = suspect (washwater, industrial or commercial influence)

Ammonia

- ammonia is a nitrogen compound that has two forms: ionized and unionized
- unionized ammonia (NH_3) can be toxic to aquatic animals depending on temperature and pH
- ammonia in outfall discharge typically indicates sewage or wastewater
- test strip (e.g., about $20-25 for 50 test strips)
  - reading > 1.0 mg/L = suspect (sewage/wastewater influence)

Bacteria

Water testing for bacteria is a common procedure for determining illicit discharges. This testing cannot be done in the field; however, water samples can be collected and returned to a laboratory for analysis. You can take the samples to a commercial laboratory or to the municipal water or wastewater utility. Consider the cost of the samples and what the test result will tell you. A simple test for presence or absence of fecal bacteria is not particularly useful because background levels of fecal bacteria are common in surface water due to wildlife (geese, ducks, deer, small mammals). A more appropriate test result for determining illicit discharge is an actual count of *E. coliform* bacteria colonies (e.g., 1,000 CFU/100 mL). *E. coliform* bacteria are the indicator organism commonly used to detect the presence of raw sewage in a water sample. The test result is reported as "colony forming units" (CFU) per 100 milliliters of sample water. Actual counts of bacteria will help you distinguish a background level from a potential illicit discharge.

Other Testing

Additional parameters might include dissolved oxygen, phosphorus, nitrate-nitrogen, detergents, turbidity and conductivity. Choose parameters that are meaningful for the purpose of illicit discharge detection based on the desktop assessment and other references for IDDE program implementation cited on page 2.

An investment in testing equipment is required to move beyond using test strips to more precise sample analysis. Several manufacturers make field test kits and portable hand-held water testing equipment. The cost of these products ranges from less than $100 for single

parameter tests to over $1,000 for multi-parameter tests. Consult with your local water or wastewater utility, or natural resources agency for assistance in choosing water testing methods for IDDE screening field work. These departments may already have equipment you can use or a laboratory that can accommodate your samples collected in the field.

Best

Expand the better practices with additional visual screening and more frequent visits to outfalls with dry weather discharge. Use water testing to confirm the discharge quality (e.g., does it always have a pH out of normal range?) and prepare for the next step of tracking the source. Use a certified laboratory for sample analysis. This may be the laboratory at your municipal water or wastewater utility. Having a certified test result may be necessary to enforce the local illicit discharge ordinance. Even without this requirement, certified test results are often more meaningful to people you talk with during source tracking.

3. Determine Criteria for Evaluating Illicit Discharge

The U.S. Environmental Protection Agency defines an illicit discharge as any discharge to the municipal separate storm sewer system that is not composed entirely of stormwater. Note the list of exceptions in Indiana's Rule 13 (see table page 2). The task of finding these illicit discharges is difficult and time-consuming primarily because there are so many possible pollutants and sources: discharges into the stormwater conveyance system can contain everything from sediment to complex chemical compounds that are not well understood. Obviously, most MS4 programs have limited staff time and budget for IDDE as well as five other MCMs to conduct, too.

These considerations underscore the importance of an efficient approach to outfall screening. By conducting a desktop assessment you determined which land uses contribute stormwater runoff to the outfalls in your MS4. Next, you can select indicator pollutants associated with these land uses. Finally, you will need reference points for each pollutant indicator so that outfall screening information can be evaluated for illicit discharge. Refer to Chapter 12 of the IDDE manual by Brown et al. (cited on page 2) for a description of how to use indicator monitoring to identify illicit discharges. Some general ideas for guiding your MS4's approach are discussed here.

Choosing Screening Indicators

Inform yourself about the water use impairments of the designated receiving waters in your MS4. Is there a history of citizen complaints about specific problems and locations? Are there identified pollutants causing impairments? If yes, develop your IDDE screening program with these pollutants in mind. Once again the desktop assessment is a key first step toward answering these questions and providing the rationale for decision-making as the IDDE program moves forward.

Refer online to the IDEM 303(d) list of impaired waters for your MS4 area. IDEM web link: http://www.in.gov/idem/nps/2348.htm
Are any of these impairments caused by pollutants that your IDDE program has the capability to measure during dry weather screening? If the answer is yes, then you may be able to set a *measurable goal* of restoring water uses by eliminating illicit discharges to the impaired waterbody.

Has there been a Total Maximum Daily Load (TMDL) study that includes any part of your MS4 designated receiving waters? The TMDL study will list pollutants of concern. Refer online to the IDEM TMDL list: http://www.in.gov/idem/nps/2652.htm
Should your IDDE plan include the capability to measure TMDL pollutants of concern at outfalls? Or is this the responsibility of another department? Similar to the 303(d) list of impaired waterbodies, your MS4 may be able to set a *measurable goal* of reducing pollutant loads documented in the TMDL study through the elimination of illicit discharges.

Have there been past incidents or studies that point to specific pollutants of concern? This information has likely already been covered in Part B of the Stormwater Quality Management Plan (SWQMP) and in your desktop assessment. If your SWQMP lists any specific pollutants, include testing methods for them if these are within your capability and budget. Consult with other departments, such as the wastewater treatment facility, to coordinate water quality testing and sharing of results.

Establish Reference Points for Illicit Discharge
Water is known as the universal solvent and may carry a wide range of dissolved substances in various concentrations. After you have chosen the indicators for screening outfalls, select reference points for each indicator. Reference points simply allow you to make a decision about the quality of the discharge: illicit or not illicit. A reference point is usually the concentration of an indicator pollutant (e.g., nitrate-N + nitrite-N > 10 mg/L); but you might also use reference points for simple visual screening, too (e.g., whitish/grey color to outfall discharge indicates illicit discharge).

Look at Indiana's minimum surface water quality standards (327 IAC 2-1-6) or the IDEM water quality targets for watershed groups (http://www.in.gov/idem/6242.htm) to help determine reference points for your IDDE program. The rule containing minimum surface water quality standards contains some information that may not all be helpful for the purpose of IDDE but there are several indicators where concentration ranges are specified for aquatic life.

For the IDEM 303(d) list or a TMDL study as mentioned above, the acceptable concentration is known. For other indicator parameters you will have to select a reference point from the literature or use water quality standards. Chapter 12 of Brown et al. includes discussion of concentrations of indicator parameters that indicate illicit discharges. For example, this manual has two tables (Table 45 on page 134 and Table 46 on page 135) that list parameter concentrations associated with industrial discharges. This chapter is an excellent resource for developing a method to distinguish illicit discharges from non-illicit discharges. Also see the

IDEM guidance document for Rule 13 (http://www.in.gov/idem/files/rule13guidance.pdf): pages 51-53 list several indicator parameters with interpretation for reference.

Create a Flow Chart to Guide Decision-Making

A flow chart that puts your reference points into the context of a decision making framework will help you sort discharges into source categories (e.g., waste water, wash water, tap water, natural source water). This helps you decide which discharges are potentially illicit and will require follow-up investigation and testing. Flow charts can be a simple two-path decision tree (yes or no) or more complicated if you use additional indicators and questions. See Chapter 12 of Brown et al. for a description of how to use a flow chart to identify illicit discharges. Appendix B contains the flow chart described by Brown et al.

Write a Quality Assurance Program Plan

Every IDDE program should have a Quality Assurance Program Plan (QAPP). The QAPP is a reference document for all procedures being used for the IDDE program. Simply write down the approach you are using for IDDE and the methods you are using to support the approach. Include step by step descriptions of outfall screening and water testing methods. This document serves as a reference for all staff and reduces errors in data collection by helping to ensure correct and consistent use of methods. The QAPP does not need to be lengthy but it should be comprehensive for your IDDE procedures and methods. Examples of QAPPs are available from various offices of IDEM. Alternatively, use an internet search for "QAPP for IDDE" to find example documents that you can customize for your MS4 program.

4. Select a Method for Tracking Outfall Information

It is very important to track outfall information and keep records of field work. Each outfall should be assigned a unique identifier (number or combination of numbers and text) that can be used for permanent reference. This identifier plus the other screening information should be recorded using a tracking method that will be used consistently over time. Keep in mind that access to the information is the reason for getting the information – you will want to know the history of discharges for any particular outfall. Has there been an illicit discharge? What was the problem? What was the follow-up? Documentation is important for others who may share the IDDE work and for external reviews of the IDDE program.

Good

The simplest approach is to use paper forms for field screening and keep this paperwork on file in the office. Separate the forms by designated receiving waters listed in Part B of the SWQMP, subwatershed or similar grouping that will help you easily find the information for any particular outfall.

Better

A better practice is to move your hard copy information into an electronic spreadsheet. With the spreadsheet format you will have more options for searching and analyzing records. Again, keep the records grouped by receiving water or area.

Best

The best practice is to have outfall records in an electronic format (database or spreadsheet) that can be used in a Geographic Information System (GIS). One option is to use a handheld GIS unit in the field for entering all the screening information. Coordinate with other departments for GIS work. Perhaps you do not do the GIS work yourself, but someone else can use your IDDE information to make maps useful for tracking your progress, keeping tabs on problem areas and helping the public and elected officials understand the IDDE program.

5. Define Measurable Goals for Dry Weather Screening

MS4s regulated by Rule 13 must define measurable goals for all of the MCMs. Measurable goals for MCM 3 (IDDE) should lead to reductions in the amounts of pollutants entering the stormwater conveyance system. With respect to dry weather screening, the basic tasks are quantifiable and serve as measurable goals for this part of the overall IDDE program. These tasks include the following:

- Screening outfalls
  - Set a timetable for this work – screen all outfalls every year, or screen only a certain percentage of outfalls in each year of the permit.
- Interpreting screening results
  - Identify outfalls with suspected illicit discharge
  - Follow-up investigations to confirm illicit discharge
- Removing illicit discharges
  - Annual goal of removing a certain number of suspected discharges

There are several other measurable goals associated with the IDDE program that are beyond the scope of dry weather screening. These include education and participation activities based on screening results and hazardous waste collections or recycling events that effectively reduce the amount of these materials available for discharge into the MS4 conveyances.

Seek Training for IDDE Methods

If you are new to water quality and watershed management you will benefit from additional training opportunities available from a variety of sources and formats. Attendance at state and national meetings is important for getting up to date information affecting your IDDE program.

Join the Indiana Association of Floodplain and Stormwater Management (INAFSM). INAFSM is the professional organization that supports people who are working in stormwater management in Indiana. INAFSM holds an annual conference in the early fall where stormwater professionals gather to hear presentations and discuss issues about MS4 program implementation including IDDE guidance. The INAFSM conference is an excellent place to ask questions of others and learn about different approaches to IDDE programs. INAFSM also offers training opportunities to stormwater professionals and conducted two workshops for IDDE in 2011.

Learn more about measuring water quality and evaluating problems by participating in a training or workshop. There are several options available including using a consulting firm to set up an IDDE program for your MS4 or a public workshop to learn more about water quality. The US Environmental Protection Agency Stormwater Program web site has links for recorded webcasts about IDDE topics. Look also to local university or college faculty who may be able to help with water sample analysis or provide student interns for outfall screening. A popular public program sponsored by the Indiana Department of Natural Resources is called Hoosier Riverwatch. Riverwatch offers free workshops where participants learn about water quality, aquatic ecology, watershed management and simple water quality tests. Riverwatch provides good background information but does not typically address outfall screening and illicit discharges.

Conclusion

The IDDE requirements of NPDES Phase II are challenging for all MS4 programs. At this time in the second permit cycle for NPDES Phase II regulations, all MS4 programs should be implementing an IDDE program. Hopefully this document provides guidance for MCM 3 that is helpful for any MS4.

Appendix A

Outfall Inventory / Dry Weather Screening Forms

This page was intentionally left blank

Example 1

Outfall Screening Checklist

Outfall #:_____ **Receiving Water:**_____

Date:_____ **Time:** ____ **Air Temperature:**____ **Sunny**___ **Cloudy**___

Inspector: _____

Last Rainfall >= 0.10": _____

Land Use in Drainage Area:_____

Physical Observations

Flow rate: ☐Trickle ☐1/4 Flow ☐1/2 Flow ☐3/4 Flow ☐Full Flow

Discharge Color: ☐none ☐yellow ☐brown ☐green ☐red ☐gray ☐other

Turbidity: ☐none ☐cloudy

Floatables: ☐none ☐petroleum sheen ☐sewage ☐other_____

Deposits/stains: ☐none ☐sediment ☐oily ☐other_____

Vegetation conditions: ☐normal ☐excessive growth ☐inhibited growth

Damage to outfall structures: ☐none ☐cracking ☐spalling ☐peeling paint ☐metal corrosion

Other damage:

_____

Analyses

Parameter	Tested	Results	Equipment Used
Temperature (°C)			
pH			
Conductivity (uS/cm)			

Comments:

_____
_____
_____
_____
_____
_____
_____

Example 2: Brown et al. IDDE manual

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☐ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ Open drainage	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ In-Stream	(applicable when collecting samples)				
Flow Present?	☐ Yes ☐ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		RESULT	UNIT	EQUIPMENT
☐ Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐ Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

This page was intentionally left blank

Appendix B

Two Alternative Flow Charts for IDDE Screening (Brown et al.)

This page was intentionally left blank

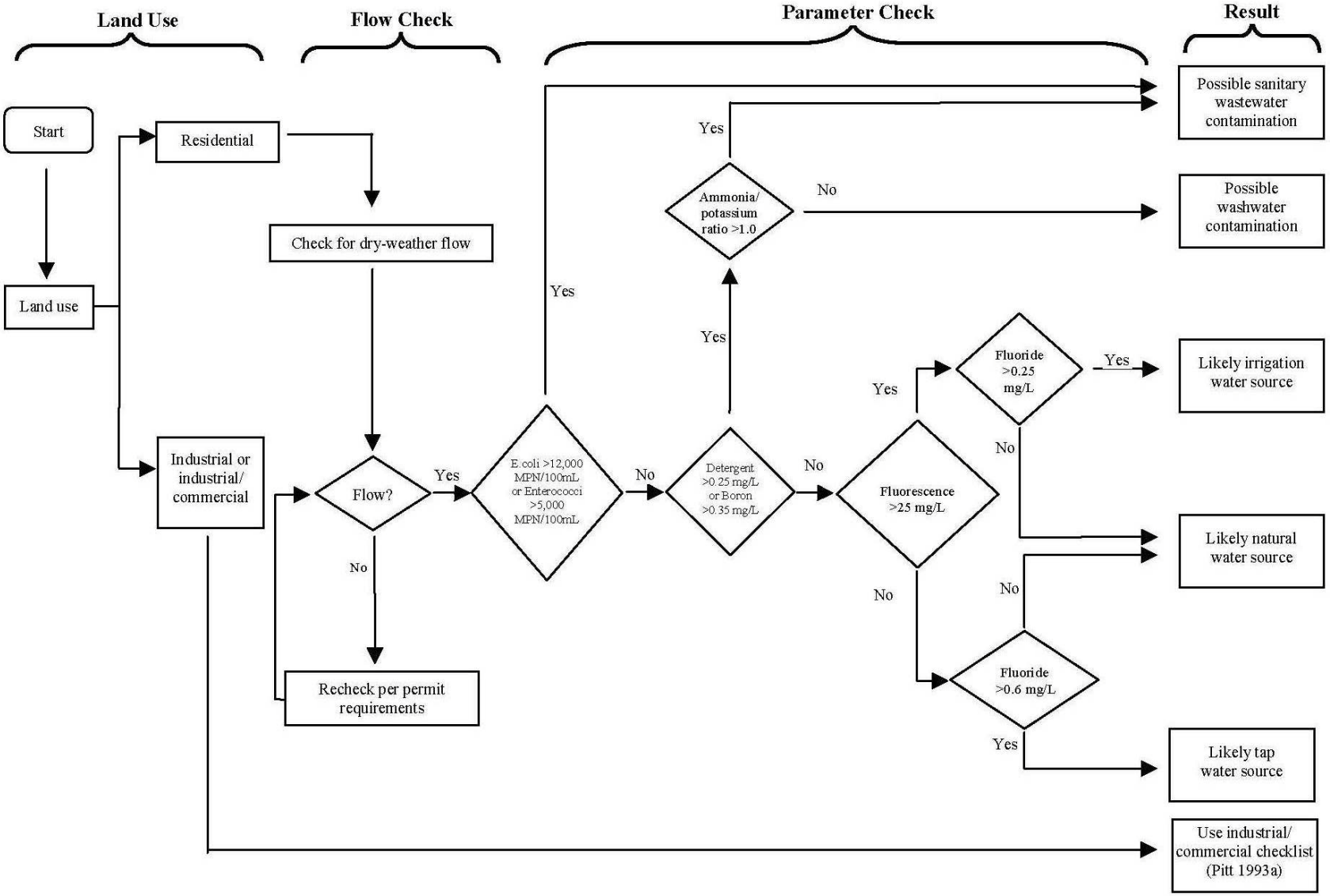
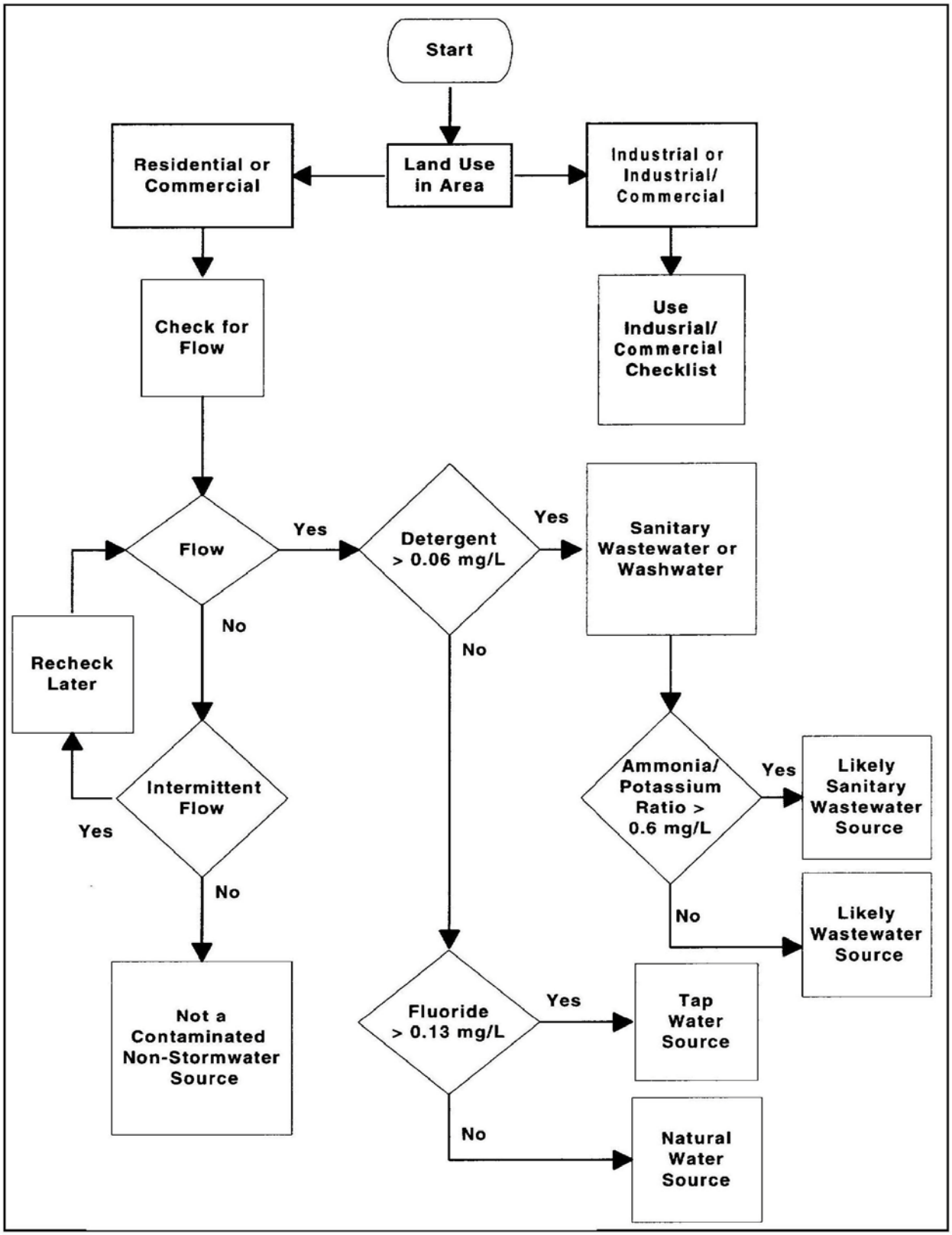


Figure H.1 Complete Flow Chart (Including Additional Confirmatory Parameters) from Tuscaloosa, Alabama

Source: Pitt (2004)

Figure H.2 Original Flow Chart Derived from Data in Birmingham
(Pitt and Lalor, 1993)



This page was intentionally left blank

Dry Weather Screening

for Illicit Discharge Detection and Elimination

May 2012