

EPA Region 1 MS4 Stormwater General Permits and LID Training Clinic



Track B: Technical
**New Illicit Discharge Detection
& Elimination (IDDE) and
Monitoring Requirements**

Holyoke, MA

June 22, 2011

Topics to cover

- What is IDDE?
- What's new in the draft permit?
- System mapping
- Written IDDE program
- Outfall catchment assessments
- Systematic procedures for locating and removing sources
- Outfall inventory
- Stormdrain investigations
- Outfall monitoring
- Resources



What is an illicit discharge?

- Any discharge to MS4 storm sewer that is not stormwater
 - leaking sanitary sewers or water mains
 - illegal sewage connections
 - illegal floor drain connections
 - seasonal draining of swimming pools
 - break-out from failing septic systems
 - spills and dumping
- Flows can be continuous, intermittent, or transitory
- Direct or indirect entry into system



Draft Section 1.4: Allowable Non-stormwater Discharges

- May include:
 - Flows from fire fighting
 - Water line flushing
 - Uncontaminated pumped groundwater
 - Flow from footing drains
 - Runoff from lawn irrigation
- Allowable unless identified by permittees, EPA, or state as a significant pollutant
- Draft Section 2.4.4.4: Permittees to determine and document if these discharges are not significant

Common Sources of Illicit Discharges

- Illegal dumping practices (95%)
- Broken sanitary sewer line (81%)
- Cross-connections (71%)
- Connection of floor drains to storm sewer (62%)
- Sanitary sewer overflows (52%)
- Inflow / infiltration (48%)
- Straight pipe sewer discharge (38%)
- Failing septic systems (33%)
- Improper RV/boat waste disposal (33%)
- Pump station failure (14%)

*% of programs reporting confirming sources from
CWP 2003 survey of IDDE programs*



Your IDDE program should already include:

- Regulatory authority to prohibit discharges and implement enforcement actions
- MS4 map showing all outfall locations and receiving waters
- IDDE plan with procedures to locate discharges, sources, and document removal
- Education of town employees and public



What's New in the Draft Permit

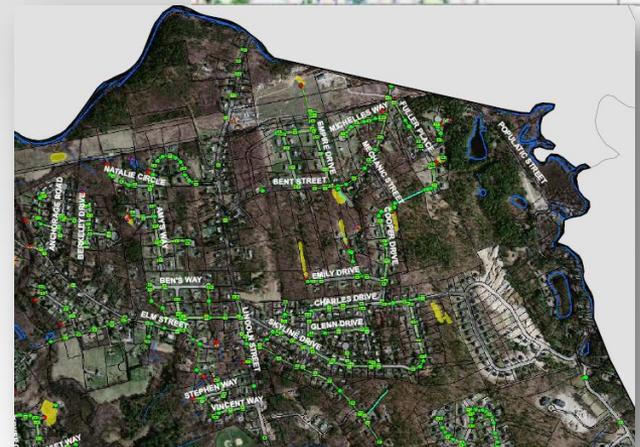
- 1) SSO inventory
- 2) Updates and additional detail to storm sewer map
- 3) Detailed written IDDE program
- 4) Outfall inventory
- 5) Catchment prioritization & assessment
- 6) Detection and elimination procedures and milestones
- 7) Annual training
- 8) Additional reporting requirements
- 9) Outfall monitoring

Draft Section 2.4.4.5: Sanitary Sewer Overflows (SSOs)

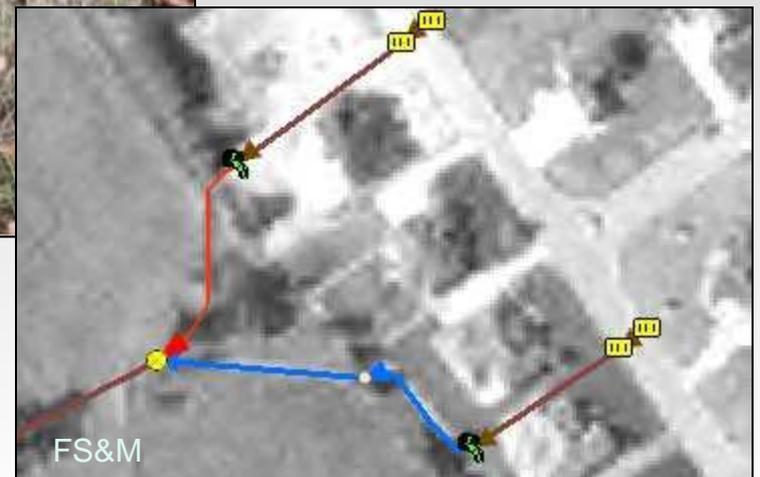
- Known SSO's discharging to MS4
 - Locations of SSOs;
 - Dates & times of known discharges;
 - Estimated discharge volume;
 - Description with known or suspected sources;
 - Mitigation & corrective measures planned, implemented, or implementation schedule established
- Complete inventory within **60 days** of effective permit
- Report new SSOs to EPA/state & fix immediately
- Report progress and update inventory annually

Draft Section 2.4.4.6: MS4 System Maps

- Completed within 2 years of effective permit date
- Must include:
 - All outfalls, receiving waters, and resource waters
 - Storm drainage infrastructure (catch basins, manholes, pipes, and interconnections to other MS4s)
 - Key sanitary sewer info including combined sewers, if any
 - Outfall catchments
- Hard copy or GIS



The importance of Connectivity



Catchment Delineation: Franklin, MA



A catchment is the drainage area to an individual outfall

Draft Section 2.4.4.7: Outfall Inventory

Inventory of all MS4 outfalls

- Location and condition;
- Each outfall labeled with a unique identifier;
- 25% of all outfalls inventoried in each year during permit years 2-5; beginning with priority catchments; and
- Sampling of outfalls with dry weather flow
 - *Combine with Dry Weather Monitoring requirements in Section 3.2 of the Draft Permit*

What's an outfall? Do not include culverts



Most Common Approach to Outfall Inventory

- Visual inspection of the outfall
- **Qualitative** assessment of any flow present, including examination of water color, odor, turbidity, floatables, & sedimentation
- Follow-up grab sample for **quantitative** analysis, either using more sophisticated field equipment or a laboratory



Key Outfall Indicators

- Outfall Damage
- Deposits/Stains
- Abnormal Vegetation
- Poor Pool Quality
- Pipe Benthic Growth
- Floatables
- Turbidity
- Odor
- Color
- Flow rate
- Oil sheen



Microsoft Access - [Outfall Reconnaissance Investigation]

Outfall Reconnaissance Inventory/Sample Collection Field Sheet

Section 1: Background Data

Subsite/Reach	Outfall ID:
Today's Date	Date
Form Completed By:	
Rainfall (in) Last 24 Hours	Last 48 hours
Long	GPS Unit
	Photo #
	GPS LIME #
if all that apply:	<input type="checkbox"/> Open Eyes
	<input type="checkbox"/> Institutional
	<input type="checkbox"/> Other Dam
	Known Inlet(s)

MATERIAL	SHAPE	DIMENSIONS (in.)	MARKER/LABEL
Phase Describe	If Other, Please Describe	if Other, Please Describe	Diameter/Thickness
			In Water
			With Sediment
Phase Describe	If Other, Please Describe	Depth	
		Top Width	
		Bottom Width	

When collecting samples

2 | 1 | 1 of 2



Sampling at Flowing Outfalls

Outfall Inventory Screening Requirements

- Complete 25% of outfalls/year starting in YR 2
- If flowing, sample:
 - temperature
 - conductivity
 - chlorine
 - surfactants
 - ammonia
 - E. coli (freshwater) or enterococcus (salt water)
- Note odor, color, sheen, turbidity, floatables



Additional Requirements to comply with Dry Weather Screening criteria(Draft Section 3.2)

- Conduct when <0.1 inches of rain in 24 hr period
- Screen for pollutants causing impairments
- If signs of flow only, revisit within a week

Fingerprints of Major Sources

Sewage/Septage

- E. Coli
- Detergents (various)
- High Ammonia/
Potassium Ratio

Wash Water

- Detergents (various)

Tap Water

- Fluoride
- Sometimes Hardness

Shallow Groundwater

- Hardness, pH

Draft Section 2.4.4.8: Written IDDE Program

Completed 1 year from permit date

Must include:

- a) Legal authority (*should be done already*)
- b) Protocol to clearly identify responsibilities for ID elimination, confirm fix, and track progress
- c) Assessment of illicit discharge potential of all catchment (identify Priority and Problem catchments)
- d) Systematic procedures for locating and removing illicit connections, and monitoring
- e) Illicit discharge prevention procedures
- f) Indicators of IDDE Program progress
- g) Annual employee training

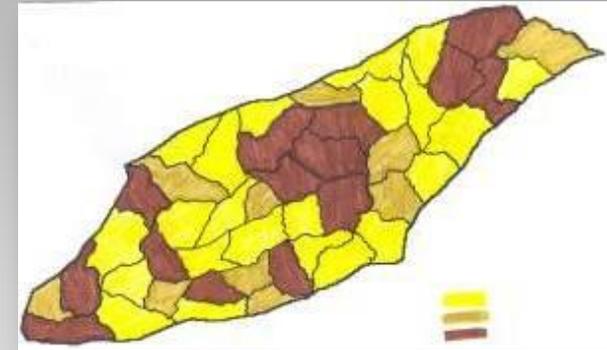
Draft Section 2.4.4.8(c): Catchment Assessments

Factors to prioritize catchments by illicit potential Include:

- Past discharge complaints/reports
- Poor dry weather water quality
- Density of generating sites
- Outfall density
- Age of surrounding development
- Past sewer conversions (from septic)
- Former combined sewers
- Density of older industrial operations
- Density of aging or failing sewers or septic systems
- Presence of culverted streams
- Water resource priorities

Draft Section 2.4.4.8(c): Catchment Assessments

- Prioritize for field investigations
- Early ID of Problem Catchments
 - Where there are known or suspected illicit
 - Continue and/or initiate isolation and removal procedures
- High, medium, low risk catchments
 - Conduct outfall inventories and catchment investigations of drainage network starting in high risk catchments



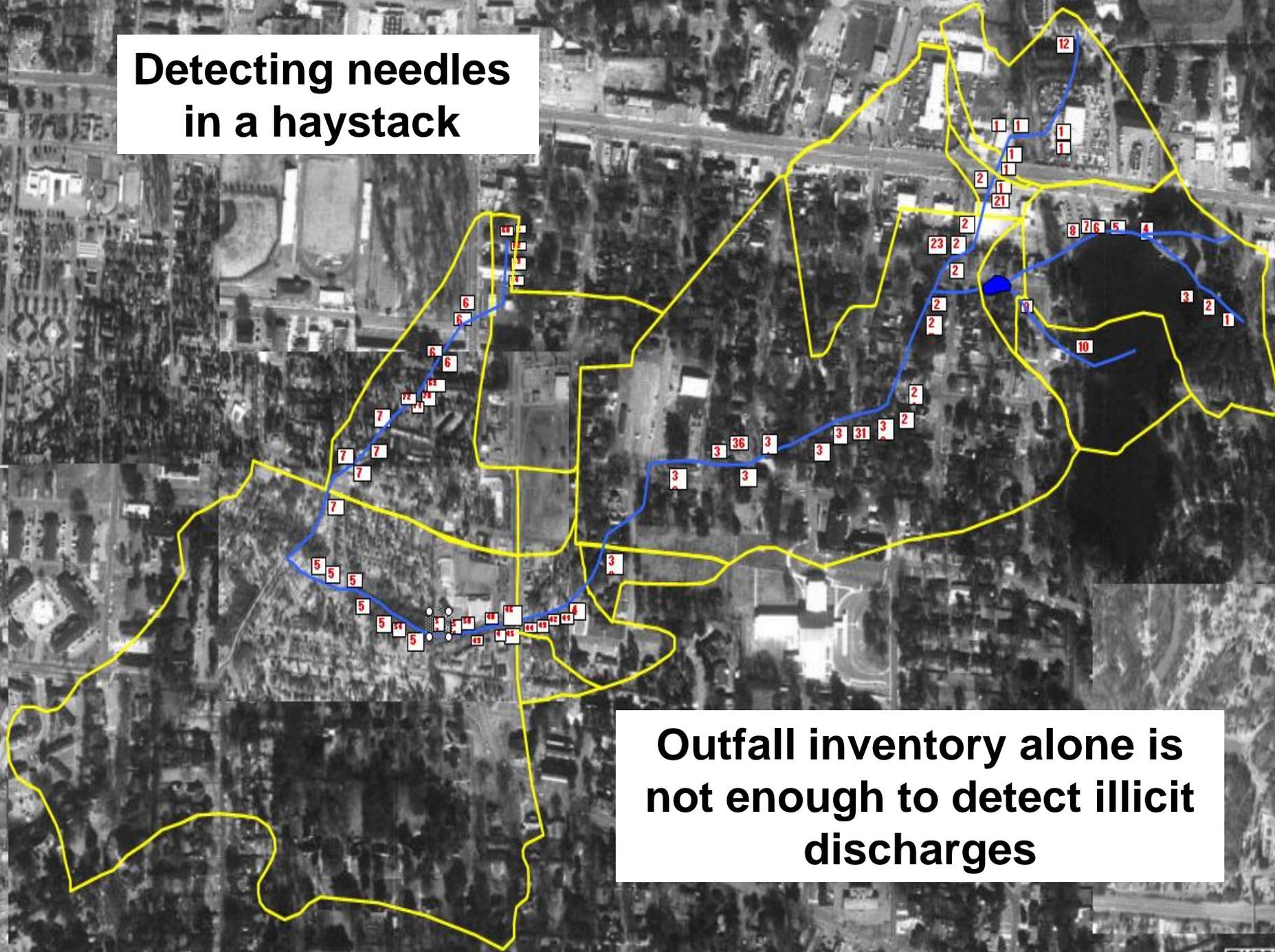
Center For Watershed Protection

Draft Section 2.4.4.8(d): Locating Illicits

- MS4-2003 left it up to permittees
- Draft Permit requires:
 - Systematic stormdrain network investigation
 - Opening and inspection of manholes in all MS4 catchments
 - Sampling of flows
 - Measures to isolate source
- Documentation



Detecting needles in a haystack



**Outfall inventory alone is
not enough to detect illicit
discharges**

Storm Drain Network Investigations

Draft Section 2.4.8.8(d) explicitly stipulates minimum procedures:

- Systematic inspection of junction manholes in continuous upstream or downstream manner
- Key junction manholes must be opened and visual/olfactory inspections performed
- If flow is observed, sample must be taken for ammonia and surfactants, at minimum
- Inspect more manholes, as necessary
- Isolate to a single pipe between two manholes



Manholes

- **Junction manhole** = a manhole or structure with two or more inlets accepting flow from two or more MS4 alignments
- **Key junction manholes** = junction manholes that can represent one or more junction manholes without compromising adequate implementation of IDDE program

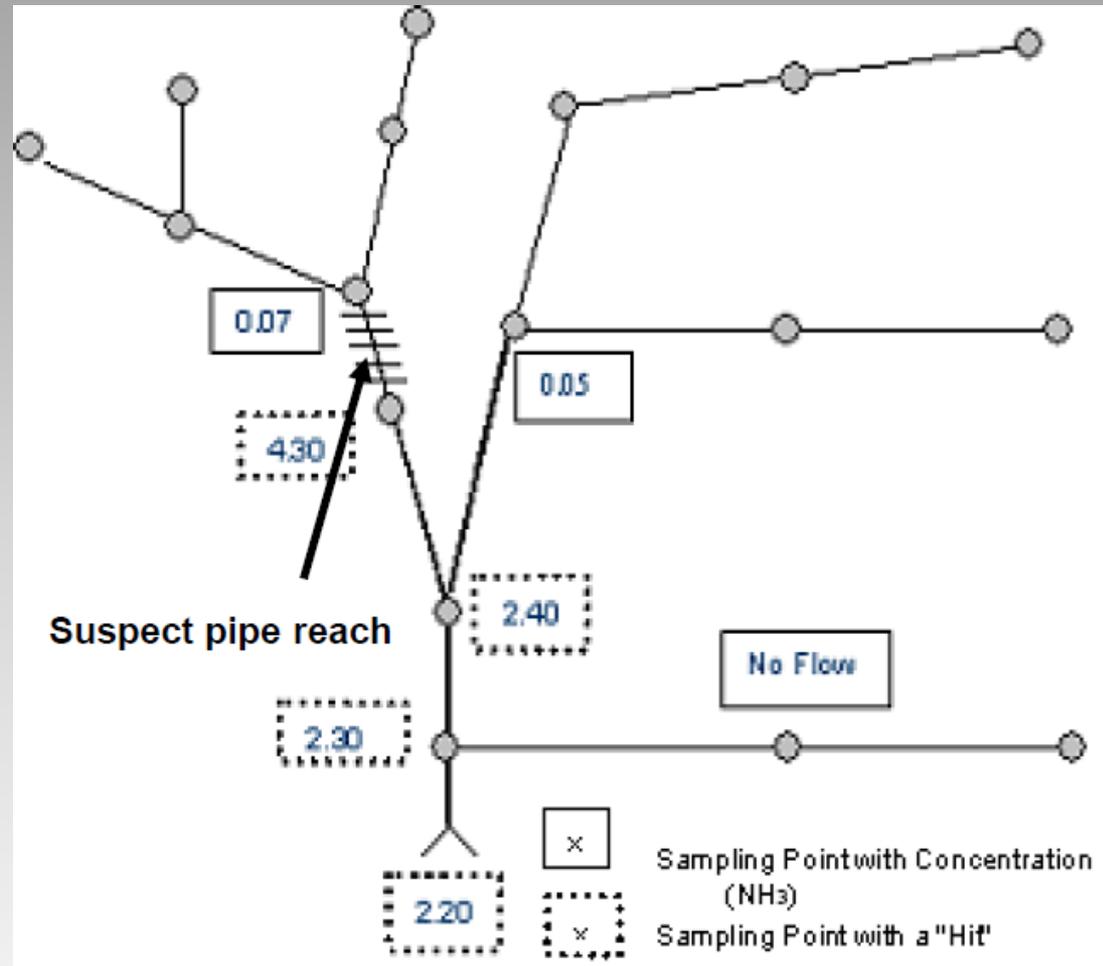
Isolating discharges in the stormdrain network:

- Must sample flows with field kits for ammonia and surfactants at a minimum

Recommended screening thresholds:

≥ 0.25 mg/L surfactants

≥ 0.5 mg/L NH₃



Special Indicators for Intermittent Discharges

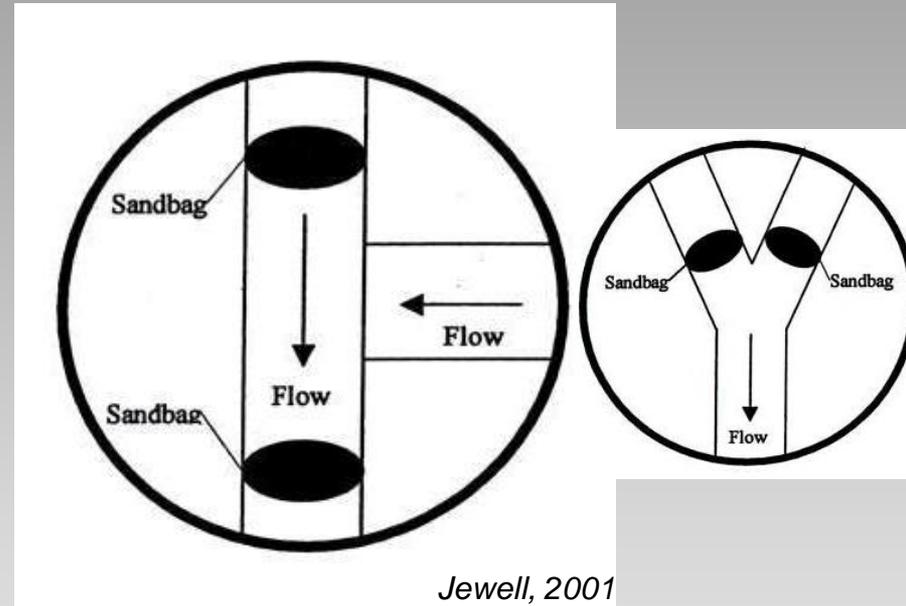
- Field kits
- Pool sampling
- Outfall damming (caulk dams)
- Optical brightener monitoring
- Toxicity testing
- Odd hour sampling
- Automatic samplers



Isolating transitory flows in the stormdrain network:

In suspect manholes

- Preferred: Placement of sandbags within key junction manholes to temporarily dam flows (48 hours)
- Anchor OBM absorbent pads in storm drains to capture dry weather flows and determine presence of flow and/or detergents



Smoke Testing



Source: www.darrscleaning.com

Dye Testing



Source: NEIWPPC, 2003

Imaging



Source: www.darrscleaning.com



Obstruction



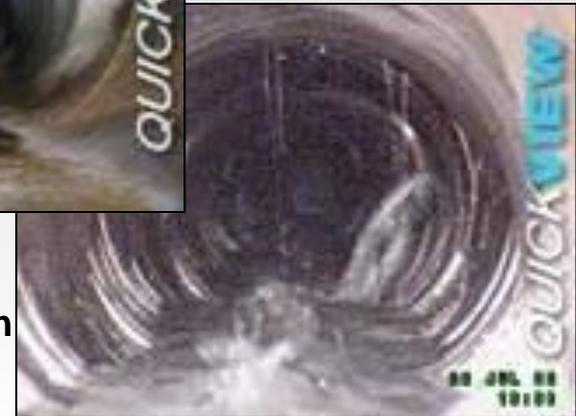
Cross-Connection



Illicit Discharge



Groundwater Infiltration



Additional Upland Analysis

- Use MS4 mapping to pinpoint likely generating sources
- Infrared Photography with gray or color scales representing differences in temperature and emissivity of objects used to locate sewage discharge



“Lucky IDDE” (Tom Lawrence, City of Memphis, TN)



“Lucky IDDE” (Tom Lawrence, City of Memphis, TN)



Discharge Removal

- When source is identified and confirmed document:
 - location
 - Description of discharge
 - Method and date of discovery
 - Date of removal, repair, or enforcement action
 - Estimated flow removed
- Eliminate discharge within 30 days of detection (*Draft Section 2.4.4.2*)
 - *No longer than 6 months*
- Report annually

Methods to Fix and Confirm?

Fixing:

- Varies depending on type and location
- Develop a pre-approved list of certified/licensed contractors
- Use in-house contractors/staff to repair as part of routine maintenance activities

Confirming:

- At source
- Downstream (sampling or sand bagging to ensure only local discharge present)
- Dye testing if internal plumbing or lateral connection

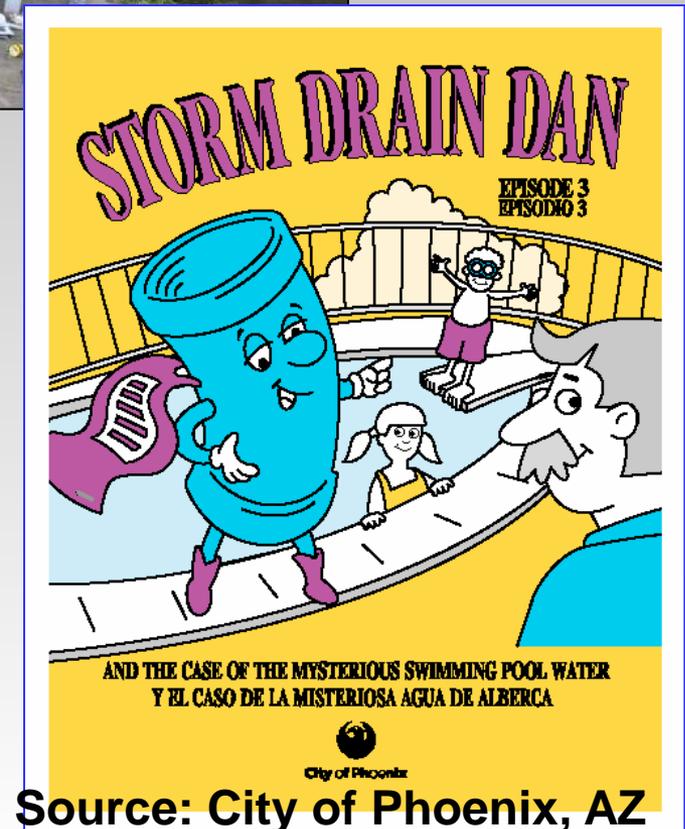
Catchment Assessment Milestones

Draft Section 2.4.4.8(g) MS4 IDDE investigations:

- Problem catchments and “high” & “medium” risk priority catchments
 - 50% completed by Yr 3
 - 100% completed by Yr 5
- “Low” priority risk catchments
 - as soon as possible, but no later than Yr 7

Education and Prevention

- Draft Section 2.4.4.8(e) develop procedures to prevent discharges:
 - spill prevention;
 - public awareness and education;
 - reporting hotlines
- Draft Section 2.4.4.8 (h) conduct annual employee training on how to recognize illicit discharges and SSOs



Source: City of Phoenix, AZ

Summary of IDDE Reporting Req.

- Update on SSO inventory/elimination. Upon discovery, additional SSOs to be reported, in writing, to EPA/MassDEP
- Update on status of mapping, outfall inventory, and inventory of problem catchments;
- Update on status of Protocol & Responsibilities and Systematic Procedure for Locating & Removing Illicit Connections;
- Update on MS4 catchment investigations and details of elimination of IDs in problem catchments; and
- Evaluation of overall effectiveness of the IDDE Program

Indicators for Tracking Program Success

Draft Section 2.4.4.8(f)

At minimum, include measures that demonstrate:

- Efforts to locate discharges (e.g., # junction manholes inspected)
- An elimination of pollutant sources (e.g., volume of sewage removed)
- The # of illicit connections found/removed
- % and area in MS4 evaluated using systematic procedures

Proposed IDDE Milestones	Years from Effective Date of Permit						
	60 Days	1	2	3	4	5	7
Completion of known SSO inventory	X						
Filing of annual report—due August 1		x	x	x	x	x	x
<ul style="list-style-type: none"> •Completed ID risk assessment /prioritization for all MS4 catchments •Completed inventory of Problem Catchments •Submittal of written Systematic Procedures for Locating & Removing Illicit Connections 		X					
<ul style="list-style-type: none"> •25% of the outfall inventory completed •Completion of MS4 Mapping 			X				
<ul style="list-style-type: none"> •50% of the outfall inventory completed •50% of Problem Catchments and catchments with High or Medium ID risk investigated 				X			
75% of the outfall inventory completed					X		
<ul style="list-style-type: none"> •100% of the outfall inventory completed •100% of Problem Catchments and catchments with High or Medium ID risk investigated 						X	
Investigation protocol completed in all catchments							x

Draft Section 3.0: Outfall Monitoring Program

- Implement starting no later than 1 year from permit date
- Begin with highest priority catchments
- Conduct at least 1 dry weather screening/analytical monitoring 1 wet weather analytical monitoring at each outfall within 5 years of effective permit date
- Also must conduct screening/analytical monitoring at interconnections between MS4s

Draft Section 3.2: Dry Weather Monitoring

- Conduct when <0.1 inches of rain in 24 hr period
- Complete 25% of outfalls/yr starting in YR 2
- If flowing, sample:
 - temperature, conductivity,
 - pH
 - chlorine
 - surfactants
 - ammonia
 - E. coli (freshwater) or enterococcus (salt water)
 - Monitor for pollutants causing impairments and undertake efforts to fix if source is found



- *If suspicious but no flow, revisit within a week*

Draft Section 3.3: Wet Weather Monitoring

- Performed after/during any rain event that produces a discharge
- 25% of outfalls/year starting in year 2. Complete within 5 years
- Sample same outfalls and parameters as dry weather sampling
- Monitor for pollutants causing impairments and undertake efforts to fix if source is found

Resources

- NH Estuaries Project 2006 IDDE Guidelines and SOP
http://des.nh.gov/organization/divisions/water/stormwater/documents/nh_idde_sop.pdf
- FB. Environmental 2010 Greenville, NH IDDE Investigation
www.des.state.nh.us/organization/divisions/.../appx-r-greenville-report.pdf
- NEIWPCC 2003 IDDE Manual
www.neiwpcc.org/iddemanual.asp
- CWP 2004 IDDE Manual
www.cwp.org/categoryblog/99-idde-and-septics.html
- EPA NPDES IDDE Training Webinar
cfpub2.epa.gov/npdes/outreach.cfm?program_id=0&otype=1

