Illicit Discharge Detection & Elimination (IDDE) Response & Enforcement

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Today's Agenda

Time	Topic	Length
1:00-2:30	Powerpoint Slides	1.5 hours
2:30-3:00	Team Exercise	30 minutes
3:00-3:45	Field Exercise/Equipment Demos	45 minutes
3:45-4:00	Wrap-up and Questions	15 minutes

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Learning Objectives

- Reinforce how to prevent illicit discharges
- Learn how to identify and investigate illicit discharges
- Understand how to terminate and clean up illicit discharges
- Learn from the experiences of other jurisdictions

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Preventing Illicit Discharges

- Use Your Eyes and Ears
  - Citizen complaints and IDDE hotline
  - Develop an interconnected team – road crews, utility workers, parks staff, and others see the City everyday
  - Plan reviewers – review projects and can anticipate potential for illicit discharges
  - Building inspectors, health department inspectors – identify cross connections?

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Desktop Screening

- Review your GIS mapping
  - Drainage area boundaries
  - Land use/parcel maps
  - Density of industrial NPDES permits
  - Age of development
  - Septic system density
  - Hydrology/flow data
- Priorities for investigation
  - Past discharge complaints
  - Areas with poor water quality
  - High density of septic systems
  - Older industrial operations
  - Areas with aging infrastructure

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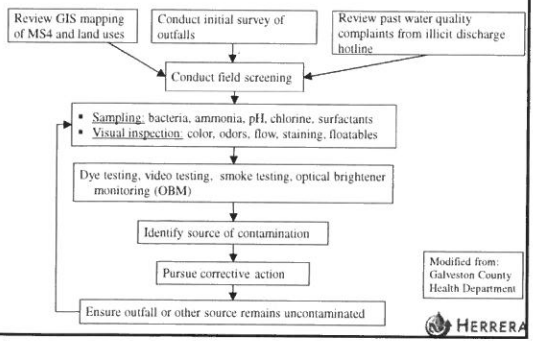
Identifying Illicit Discharges



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Section 4 - Indicators

- Indicator Pullout Sections (continued)
  9. Chlorine & Fluoride
  10. Detergents/Surfactants
  11. Fecal Coliform Bacteria
  12. Hardness
  13. Nitrate
  14. Potassium
  15. Specific Conductivity
- Other Indicators

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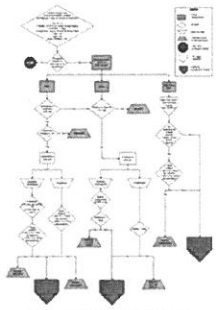
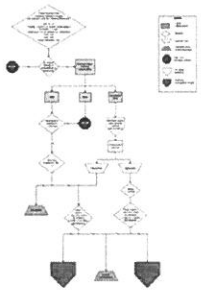
Section 4 - Indicators





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Section 4 - Indicators

Primary Field Screening Indicators	Follow-up Indicators
Ammonia	Chlorine & Fluoride
Color	Detergents/surfactants
Odor	Fecal coliform bacteria
pH	Hardness
Temperature	Nitrate
Turbidity	Potassium
Visual indicators *	Specific conductivity

* Visual indicators include floatables, debris, vegetation, deposits and staining, structural damage, fungus and algae, surface scum or sheen, fish kills

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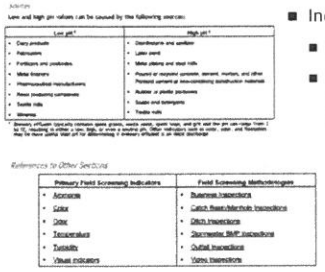
Section 4 - Indicators



- Indicator Pullout Sections
  - Sources
  - References to Other Sections (hyperlinks in electronic version of the manual)

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Physical Indicators - Color

Color	Possible Sources
Tan to brown	Runoff from rainfall, construction, or soil erosion
Blue green/ brown green	Sewage, plankton bloom, fertilizer runoff, vehicle wash water, tracing dye
Milky white	Paint, lime, grease
Milky or dirty gray	Gray water or wastewater (musty odor present?)
Black	Septic wastewater, sulfuric acid, turnover of oxygen depleted water (hydrogen sulfide odor?)
Dark red, purple, blue, black	Fabric dye, paper ink from industrial operations
Orange-red	Iron deposits, iron bacteria, tracing dye
Bright yellow green	Anti-freeze, algae bloom, tracing dye

Source: Galveston County Health Department: A Guidance Manual for Identifying and Eliminating Illicit Connections to MS4s

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Physical Indicators - Odor

Odor	Possible Sources
Musty	Partially treated sewage, livestock waste, algae
Rotten egg/hydrogen sulfide	Raw sewage, sulfuric acid, anaerobic water
Sewage/fecal	Raw sewage
Chlorine	Broken drinking water line, swimming pool water, wastewater treatment plant or industrial discharge
Sharp, acrid, or pungent	Chemicals or pesticides
Rotten/spoiled	Restaurant food waste
Gasoline	Fuel spill, spent petroleum industrial discharge

Source: Galveston County Health Department: A Guidance Manual for Identifying and Eliminating Illicit Connections to MS4s

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Additional Indicators

- pH (86%*)
- Chlorine (76%)
- Specific conductivity (62%)
- Ammonia (52%)
- Surfactants (48%)
- Fecal coliform (33%)
- Fluoride (33%)
- Copper (29%)
- Fluorescence (24%)
- Phenols (14%)
- Potassium (14%)
- Detergents (10%)
- Dissolved oxygen (10%)
- Hardness (10%)
- Iron (10%)

* Percentages represent the number of respondents in a national survey that reported using the indicator during IDDE field screening

Source: CWP IDDE Guidance Manual

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Common Chemical Indicators

- Ammonia (NH_3)
  - Produced by decay of organic nitrogen compounds
  - Use to identify sanitary wastewater & septic tank effluent
  - Can also indicate ammonia based cleaners & fertilizer runoff
  - If you detect it, the source is from a fairly recent discharge
- Fluoride or Chlorine
  - Added to potable water supplies
  - May indicate tap water, sewage, irrigation water, swimming pool water
  - Some communities do not fluoridate their water (test for chlorine instead)

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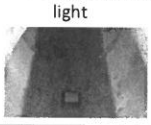
Common Chemical Indicators

- Surfactants
  - Found in household detergents
  - Anionic surfactants are "methylene blue active substances (MBAS)"
  - Colorimetric method: surfactant reacts with methylene blue (results expressed in ppm [mg/L])
- Optical brighteners
  - Also found in household detergents
  - Use to identify sanitary wastewater
  - OBM traps installed in MS4
  - Fluorescence under black light



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Phase II Permit Field Screening Requirements

Category	Phase II Permit (2013-2018)
Field Screening Requirements	Implementation of a field screening methodology appropriate to the characteristics of the MS4 and water quality concerns.
Field Screening Methodologies	Screening for illicit connections may be conducted using *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection 2004), or another methodology of comparable or improved effectiveness.
Business Inspections	Not specified in permit, but Permittees can use business inspections for meeting the Field Screening Performance Measures
Field Screening Performance Measures	New Permittees shall complete field screening for at least 12% of the MS4 no later than December 31, 2017, and on average 12% each year thereafter.
Source Tracing	Procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures.

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Section 3 - Field Screening Methodologies

- Selecting a Field Screening Methodology
  - Figure 1 – Field Screening and Source Tracing Methodology Flow Chart
- General Guidelines
  - Data Management Recommendations
  - Safety Considerations
  - Costs
- Field Screening Methodology Pullout Sections
  1. Business Inspections
  2. Catch Basin/Manhole Inspections
  3. Ditch Inspections
  4. Outfall Inspections
  5. Stormwater BMP Inspections
  6. Video Inspections
- Other Field Screening Methodologies

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Section 3 - Field Screening Methodologies

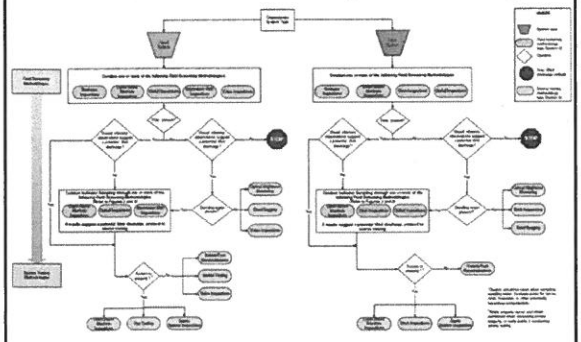

Figure 1. Field Screening and Source Tracing Methodology Flow Chart.

Section 3 - Field Screening Methodologies

- Field Screening Methodology Pullout Sections
  - Description
  - Applications
    - Pipe and/or ditch systems
    - Small and/or large drainage areas
    - Land use types
  - Equipment (checkboxes for field crews)

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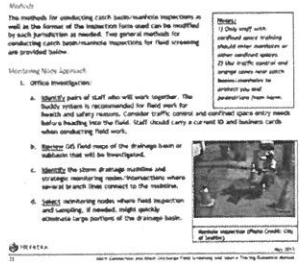
Section 3 - Field Screening Methodologies



- Field Screening Methodology Pullout Sections
  - Methods (SOP format)

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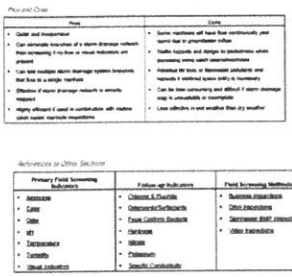
Section 3 - Field Screening Methodologies



- Field Screening Methodology Pullout Sections
  - Pros and Cons
  - References to Other Sections (hyperlinks in electronic version of the manual)

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1. ORI - Field Form (Section 2)

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE	DIMENSIONS (IN.)	SUBMERGED
☐ Closed Pipe	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ 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			

Source: Center for Watershed Protection IDDE Guidance Manual

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1. ORI - Field Form (Section 3)

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

Source: Center for Watershed Protection IDDE Guidance Manual

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1. ORI - Field Form (Section 4 & 5)

Section 4: Physical Indicators for Flowing Outfalls Only

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

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (0-3)		
Color	☐	☐ Sewage ☐ Rancid/Sour ☐ Petroleum/gas ☐ Suds ☐ 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	☐	Text 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; indicators 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

Any 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	
Water quality	☐	☐ Odors ☐ Colors ☐ Clarity ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other	
Pest Nuisance	☐	☐ Bees ☐ Wasps ☐ Ants ☐ Other	

Source: Center for Watershed Protection IDDE Guidance Manual

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1. ORI – Field Equipment

- Vehicle
- GPS unit
- Laptop with GIS layers loaded
- Backpack
- First aid kit
- PPE (nitrile gloves, sunscreen, reflective vests, hip waders, etc.)
- Catch basin puller
- Sledge hammer
- Camera
- Dry erase board and marker
- Field forms, waterproof pens, clipboard
- Tape measure
- Flashlight
- Field meters (temp., conductivity, etc.)
- Wide mouth sample bottle (field tests)
- Laboratory sample bottles and coolers
- Extendable pole for sample collection
- Watch with second hand for measuring flow (or stopwatch)
- pH strips
- Ammonia strips or test kit
- OBM traps
- Dye
- Spray paint
- Rope
- Extra batteries
- Machette

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Field Screening & Source Tracing

1. Outfall reconnaissance inventory (ORI)
2. Catch basin/manhole inspections
3. Drainage area investigations
4. On-site investigations
5. Septic system investigations

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2. Catch Basin/Manhole Inspections

- Narrows source to a single segment of a storm drain
- Three approaches for exploring the MS4 network:
  1. Move up the trunk
  2. Split the storm drain network
  3. Move down the network

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2. Catch Basin/Manhole Inspections - Tools

- Three tools for exploring the network
  1. Inspect manholes
  2. Optical brightener monitoring (OBM) traps
  3. Intensive sampling

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2. Catch Basin/Manhole Inspections - Tools

1. Inspect manholes

- What to look for:
  - Presence of flow?
  - Colors and odors?
  - Floatables, suds?
  - Deposits or stains?
  - Flow during dry weather?
- Pros & Cons?
  - Easy and cheap to do
  - Can narrow down the rough location of a problem
  - May require traffic control and no parking notices

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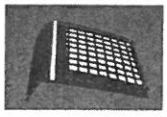
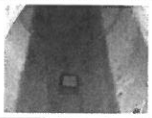
2. Catch Basin/Manhole Inspections - Tools

2. Optical Brightener Monitoring

- Optical brighteners: a mix of organic compounds used to whiten fabrics, plastics, paints, etc.
- Very common in laundry detergents and waste water
- Install optical brightener monitoring (OBM) traps
- Retrieve OBM trap after a few days
- Look for fluorescence of whiteners under a black light

Source: Center for Watershed Protection

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3. Drainage Area Investigations

2. Detailed drainage area investigation
   - Use maps, GIS data, and land use information to pinpoint likely generating sources.

Source: Center for Watershed Protection

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Field Screening & Source Tracing

1. Outfall reconnaissance inventory (ORI)
2. Catch basin/manhole inspections
3. Drainage area investigations
4. On-site investigations
5. Septic system investigations

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Section 5 – Source Tracing Methodologies

- Selecting a Source Tracing Methodology
  - Figure 1 – Field Screening and Source Tracing Methodology Flow Chart
- General Guidelines
  - Data Management Recommendations
  - Safety Considerations
  - Costs
- Source Tracing Methodology Pullout Sections
  1. Business Inspections
  2. Catch Basin/Manhole Inspections
  3. Ditch Inspections
  4. Dye Testing
  5. Optical Brightener Monitoring
  6. Sand Bagging

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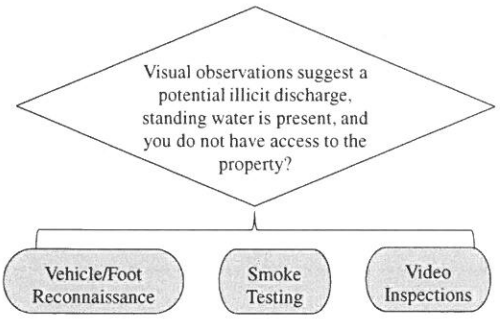
Section 5 – Source Tracing Methodologies



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4. On-Site Investigations

- Used to pinpoint the exact source or connection producing a discharge within a storm drain network
- Three Basic Approaches:
  1. Dye testing
  2. Video inspection
  3. Smoke testing

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4. On-Site Investigations

Dye Testing - Applications

- In the Storm Sewer
  - Use to complete mapping of your MS4
  - Find inter-connections to storm sewer
  - Find leaks from a sanitary sewer to MS4
- At a Facility
  - Determine if illicit connections exist
  - Test sinks, toilets, floor drains

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4. On-Site Investigations
Video Inspection - Applications

- Video inspection
  - To see illicit taps
  - To see the condition of the storm sewer line
  - To create a permanent record

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4. On-Site Investigations
Video Inspection - What to Look For

- Heavily stained pipe
- Grease build-up on pipe walls
- Table scraps
- Toilet paper or paper products
- Soap suds
- Chemicals (if in an industrial area)
- Paint
- Other waste products

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4. On-Site Investigations
Video Inspection - Pros and Cons

- Pros
  - May have equipment in-house
  - Easy to see active taps
  - Create a record of observation
  - Only way to observe pipe between 2 manholes
  - Minimally intrusive
- Cons
  - Expensive to do and time consuming
  - Difficult to see inactive taps
  - Does not work on obstructed sewers
  - May require confined space entry
  - Does not work in small diameter or water-filled pipes

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5. Septic System Investigations

- Three Methods

1. Homeowner surveys
   - Do drains in the house work well?
   - Do the toilets back up frequently?
   - How many people live there?
   - Any wet, smelly spots in the yard?
   - When was the system last maintained?

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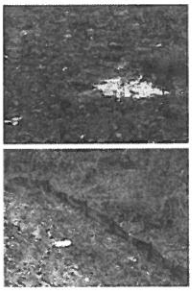
5. Septic System Investigations

2. Observe the yard surface condition
   - Wet, spongy ground surface
   - Damage to drain field from vehicles, heavy objects
   - Visible cave-ins
   - Obvious system bypasses, pipes to ditches, etc.



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5. Septic System Investigations

3. Detailed inspection
   - Certified professional
   - Check the integrity of septic system, depth of solids, etc.
   - Estimate distance to surface water and ground water
   - Dye testing sometimes also used

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Data Management

Clark County, WA

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Outline

- Preventing illicit discharges
- Illicit discharge indicators
- Field screening & source tracing methdologies
- Data management
- Terminating illicit discharges
- Team exercise
- Field exercise
- Questions

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Terminating Illicit Discharges

1. Determine who the responsible party is:
   - Municipality? Initiate spill response or issue work order.
   - Private property? Issue a notice of violation.
2. Eliminate the discharge and confirm it is no longer an issue
3. Complete documentation

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Terminating Illicit Discharges

- How is Correction Confirmed?
  - At the source
  - Downstream (sampling or sand bagging)
  - Dye testing or video inspection (internal plumbing or lateral connection)

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Cleaning up Illicit Discharges

- Grease spilled behind a restaurant?
- Oil or paint dumped in a catch basin?
- Fuel tank on a dump truck is leaking?
- Hydraulic fluid leak at a construction site?
- Dry cleaning solvent discovered in a stream?
- Antifreeze spilled near a catch basin?
- Hose at curb discharging swimming pool water?

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Outline

- Preventing illicit discharges
- Illicit discharge indicators
- Field screening & source tracing methodologies
- Data management
- Terminating illicit discharges
- Team exercise
- Field exercise
- Questions

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Outline

- Preventing illicit discharges
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Review of Learning Objectives

- Reinforce how to prevent illicit discharges
- Learn how to identify and investigate illicit discharges
- Understand how to terminate and clean up illicit discharges
- Learn from the experiences of other jurisdictions

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Questions?

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