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# Illicit Discharge Detection & Elimination

DuPage County IDDE Workshop  
May 27, 2009

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## Who Are We?

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*Engineers and scientists who care about water quality. Specialize and experienced in all aspects of stormwater management, including WPDES permit compliance tasks.*

Experience

*Over 10 years of IDDE program development and implementation.*

*Work with 12 (large and small) communities in Wisconsin and Northern Illinois with their on-going IDDE programs.*

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## Presentation Overview

PART 1  
*Illicit Discharge Detection & Elimination (IDDE) Program Overview*

PART 2  
*Illicit Discharge Detection (Field Screening Procedures) And Elimination (Follow-up Procedures)*

PART 3  
*Case Study*

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## What is an illicit discharge?

**Any discharge to a Municipal Separate Storm Sewer System (MS4) that is not composed entirely of stormwater.**

Except for certain non-stormwater discharges listed in Part 1.B.2 of the ILR40 permit such as:

- Water line and fire hydrant flushing
- Landscape irrigation water
- etc.

(21 listed in ILR40 permit)



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## Why should we care about illicit discharges?

- Sources of illicit discharges can be numerous and ever-present
  - Sewage
  - Industrial & commercial
  - Spills & dumping liquids
  - Outdoor washing (including car washing)
  - Etc.
- We all want clean water for many used
  - Drinking water
  - Fishing or recreation
  - Tourism
  - Water front homes
- "An ounce of prevention is worth a pound of cure"



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## Why do we have illicit discharges?

- Ignorance. Many people don't realize that what enters catch basins and inlets ends up in our oceans, lakes, streams, and rivers



Violation Sources **Occasional Spills - Discharges** AECOM

Violation Sources **Direct Connections** AECOM

Violation Sources **Pipe Defects** AECOM

Educate Public about Illicit Discharges AECOM

- How to educate the public
  - Methods
    - Newsletters, community website
    - TV, radio
    - Classrooms, community events
  - Message
    - Explain what illicit discharges are
    - Explain why they are a concern
    - Explain what they can do to help

**Drain Goes to Stream**

Promote Public Reporting of Illicit Discharges AECOM

- Create a hotline (notification or questions)
- Storm water inlet and/or catch basin stenciling
- Community watch groups
- Community river clean-ups

What is an "outfall" AECOM


**DEFINITION:**  
40 CFR 122.26 (b) (9)

OUTFALL means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to Waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

*NOTE: The definition above is also the definition provided in the General NPDES Permit No. ILR40 for a "REGULATORY OUTFALL"*


## What is an "outfall" AECOM

- Outfalls of any size (not limited to "major outfalls")
- Ditches / swales (at point where discharge to a Waters of the US)
- Private outfalls (not limited to MS4s)



## The Big Picture AECOM

- Storm sewers and stormwater ditches are for stormwater
- Search for non-stormwater flows during periods of dry-weather (<0.1" precip in last 72 hrs)
- Field Work
  - Outfall Screening (Detection)
  - Investigative Tracing (Elimination)



## Perform Outfall Screening (Detection) AECOM

Prepare:



- Field screening forms

Collect:

- Structural Condition
- Photographs
- Water quality samples

If Flow Present:

- Testing (lab or kits)
- Evaluation of results

## Office Tasks AECOM

Field Equipment:

- Use equipment checklist
- Understand what is needed based on Safety Plan



## Office Tasks AECOM

Precipitation Data:





- NOAA website data
- DuPage local gage network
- Local news channels for their weather information/data

Outfall mapping and Outfall ID's:

- Create and print field maps (outfalls & basins)
- ID outfalls either by sequential numbering, by basin names or other naming (GPS location)
- Develop field forms for data gathering
- Evaluate access issues

Vehicle:

- Ability to haul all field equipment and field crew



## Outfall Field Screening Procedure AECOM

Screening Steps:

- Visual and other observation data collection
- Chemical analysis, if flow present
- Log data on field screening forms, including photographs

Miscellaneous:

- Submerged and partially submerged outfalls
- Hard to reach outfalls
- Unknown outfalls

## Outfall Physical Characteristics

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Type:

- Pipe vs Swale

Material:

- Pipe material
- Type of swale vegetation

Shape:


- Use technical guidance examples

Size/Dimension:

- Measure inside to inside

If Flow is Present:

- Depth of flow in pipe or swale
- Velocity of flow



## Physical & Visual Indicators

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Visual Observations:

- Structural condition
- Turbidity
- Water color
- Floatables
- Staining
- Vegetation
- Pool water quality

Other Observations:

- Odor

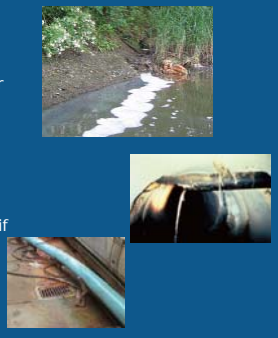


## Chemical Indicators

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Chemical Parameters:

- Detergents – can indicate sewage and/or washwater is present
- Ammonia – can indicate sewage is present
- Fluoride – can indicate if tap water is present
- Potassium – can indicate if industrial or commercial liquid wastes are present




## Other Indicators

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Other Parameters:

- pH – can indicate washwater, industrial or commercial wastes are present
- Conductivity – can indicate sewage, washwater, industrial or commercial is present
- Temperature – can indicate non storm water sources




## End Outfall Screening

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Final Steps:

- Clean instruments
- Dispose of excess sample materials/by-products
- Repack equipment
- Move to next outfall



## Investigative Tracking of Illicit Discharges (Eliminate)

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IDDE SCREENING PARAMETERS AND THRESHOLDS

```

    graph TD
      START([START]) --> S1{Surfactants > 0.25mg/L}
      S1 -- No --> S2{Ammonia/Potassium Ratio > 1:1}
      S1 -- Yes --> S2
      S2 -- No --> S3{Fluoride > 0.25mg/L}
      S2 -- Yes --> C1[Possible sanitary wastewater contribution]
      S3 -- No --> C2[Possible industrial contribution]
      S3 -- Yes --> C3[Liberty natural water source]
      C1 --> C4[Liberty natural water source]
      C2 --> C4
      C3 --> C5[Liberty tap water program in the source]
      C4 --> C5
  
```

SOURCE: Center for Watershed Protection and Robert Pitt 2004

## Locate and Eliminate Sources of Illicit Discharges

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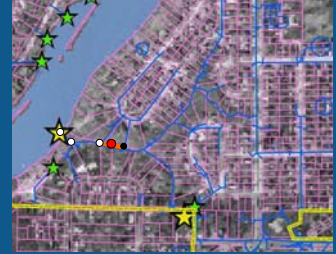
- Trace illicit discharge to its source / isolate ("hit" detected)
- Is a "hit" a Violation? (existing permit holders)
- Take Corrective Action



## Locate and Eliminate Sources of Illicit Discharges

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- What to do if an illicit discharge is suspected?
  - Sample outfall
  - Follow flow upstream
  - Isolate
  - Evaluate Area
    - Windshield Survey
    - Televise
    - Smoke test
    - Dye test



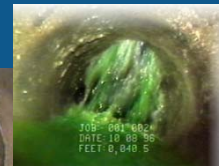
## Windshield Survey and/or System Walk

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## Televising

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## Smoke Testing

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## Dye Water Testing

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## Contact Property Owner

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- Provide notice to property owner
- Disconnect as soon as practicable (24 hours? 48 hours? Days? Weeks?)
- Track, document, and monitor corrective action (s)



## Illicit Discharge Investigations In Racine, WI

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## City of Racine Statistics

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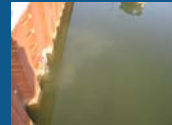
- Population ~ 80,000
- "Fully Urbanized"
- 197,515 linear feet of storm sewer (37.4 miles)
- 113 "outfalls"
- 55 "major outfalls"
  - Root River – 26
  - "North Lake Michigan" – 8
  - "South Lake Michigan" – 13
  - Pike River - 8



## City of Racine 2005 Summer Screening

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- Initial Screening Conducted Summer of 2005
- 55 Outfalls Identified for Screening
- Results:
  - 3 Outfalls Not Screened
  - 21 Outfalls Dry
  - 31 Outfalls Wet or Active
    - 1 Outfall (RR57) determined to be "Minor" but tested anyway
    - 21 Outfalls registered "hits" (6 with 2 parameters)
      - 12 Detergents
      - 10 Chlorine
      - 5 Copper
      - 0 Phenols



## City of Racine 2005 Fall/Winter Screening

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- Confirmation Screening Conducted November of 2005
- Results:
  - 8 Outfalls were Dry
  - 13 Outfalls were Wet or Active
    - 8 Outfalls registered "hits" (1 with 2 parameters)
      - 4 Detergents
      - 4 Chlorine
      - 1 Copper
      - 0 Phenols
    - Good Correlation to Prior Results
  - Sampling and report

## City of Racine RR57 Disconnection (2005)

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- Summer screening identified suspect illicit connection
- NOT one of the Major Outfalls in initial program
- Wet – constant but variable milky flow (with floatables)
- Tested positive for detergents and copper
- Reported to City following observation
- Utilized City televising contract
- Identified connection
- Notified owner
- CORRECTION: Owner had to dig up and properly connect lateral to sanitary sewer



## City of Racine RR61 Disconnection (2006)

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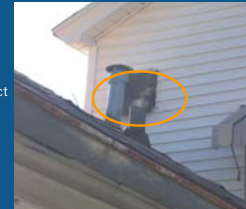
- Initial Findings for Outfall RR61
  - 2005 and 2006 screening and follow-up identified deficiencies
  - Racine Health Department E. Coli testing incorporated into program
  - Identified sanitary system 'direct' cross connection during planning
  - CORRECTION: City repaired/enclosed sanitary sewer
  - E. Coli levels persisted



## City of Racine RR61 Disconnection (2006)

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- Continued Investigation of RR61
  - Continued investigation led to isolation of impacted sewer segment
  - Smoke testing showed lateral connections
  - Dyed water test verified location and number of connections
  - Televised storm sewer indicated indirect connection (leaking laterals)
  - CORRECTION: City relocated storm sewer
  - E. Coli dropped in subsequent tests



## City of Racine RR17

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- RR 17 Rehabilitation
  - Elevated E. Coli and indicator parameters
  - Smoke testing inconclusive
  - CCTV indicated some defects
  - Leaking laterals prime suspect
- CORRECTION: City is contracting for spot repairs and lateral lining or replacement
- RR 18 - similar problems
- CORRECTION: Same as RR 17 except also lining sanitary sewer main where higher than storm
- Will conduct follow-up screening



## Conclusions

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- IDDE programs have been successful
- Many sources are not clear
- Illicit discharges are often seasonal and intermittent
- Continual testing is required
- IDDE programs should be modified as needed

## Questions / Discussion

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