

Con Edison Dielectric Fluid Spill Prevention, Detection & Response Best Practices



**Environment,
Health and Safety**

Joint RRT 1 & 2 Meeting

Vernon Schaefer, Brian DeShong
April 12, 2017

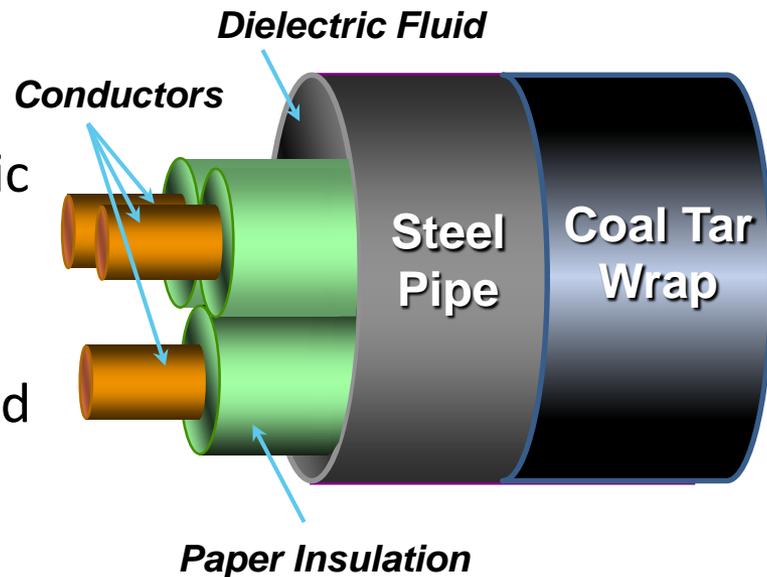
Agenda

- Transmission System Overview
- Leak Detection
- Leak Causes
- Leak Search Process
- Pipe Enhancement as a Preventative Measure
- Spill Response and Cleanup



Transmission Feeder Systems

- High Pressure Fluid Filled Feeders
 - 660 circuit miles
 - 8.7 million gallons dielectric fluid
- Dielectric Fluid
 - Dielectric fluid impregnated paper insulation is one of the best insulating mediums
 - Utilize cooling to increase rating



Leak Detection

- Detection Programs
 - Online leak detection systems on 22 feeders
 - Refurbishment of pressurization plants with early warning leak detection
 - Daily tank level monitoring & trending



Dielectric Fluid Leak Committee

To establish and provide guidelines for a standing committee for detecting and locating leaks on dielectric fluid filled cable systems. The Dielectric Fluid Leak Committee will ensure that leaks are rapidly detected, located, and repaired to minimize the impact on the environment.



Leak Causes

- Contractor damage
- Water impingement
- Coating separation (disbonded coating)
- Corrosion due to stray current



345kV Feeders M51 & M52 NYCTA Drain Bond Installation



M51 & M52 2015 Leaks

- Factory pipe coating is coal tar wrap (CTW)
- Each feeder contains approximately 390,000 gallons
- Protected with impressed current rectifiers
- 2015 leaks: 11,645 gallons to environment (42%)
- Harlem River Drive section: 8,586 gallons (74%)

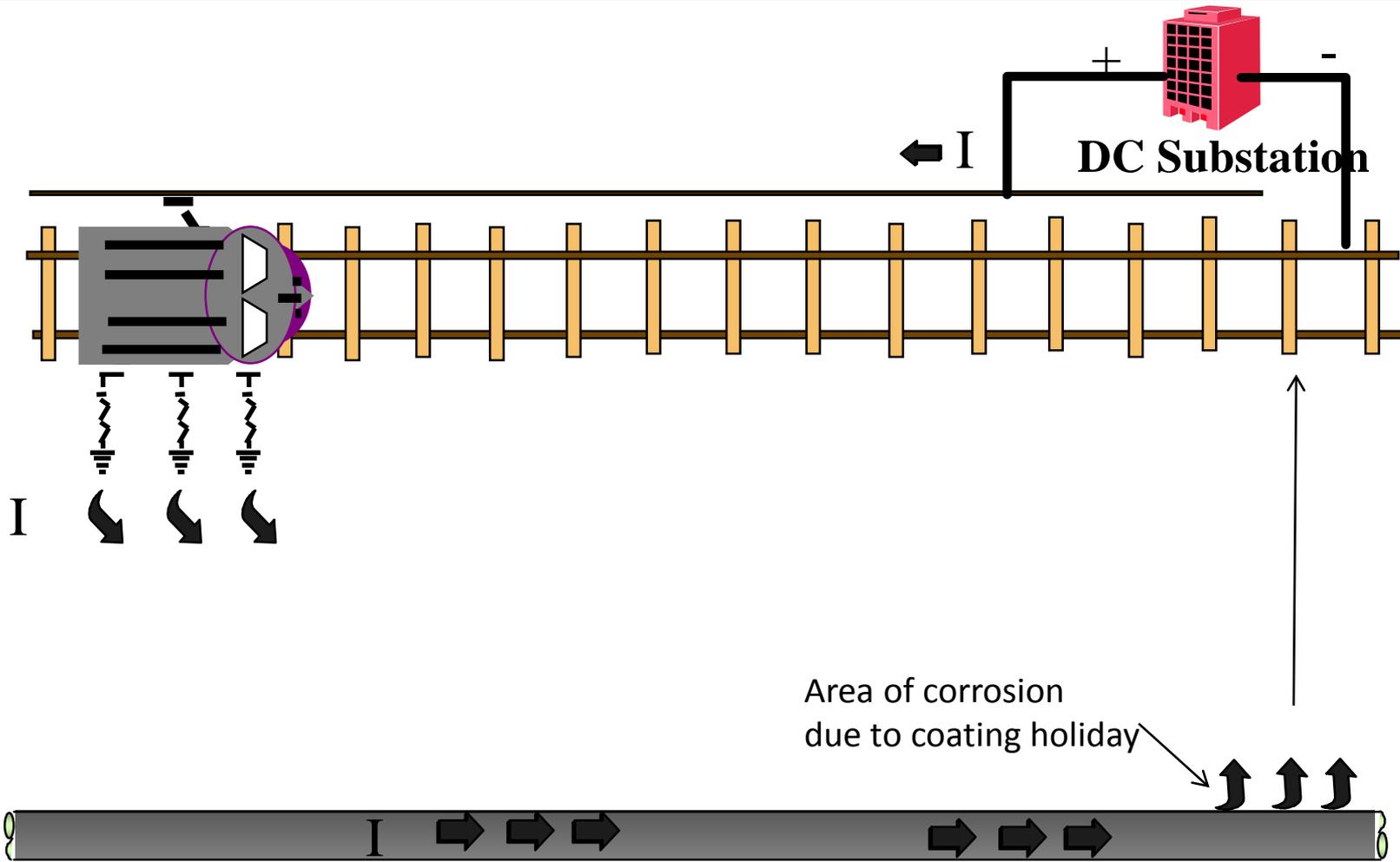


Cathodic Protection

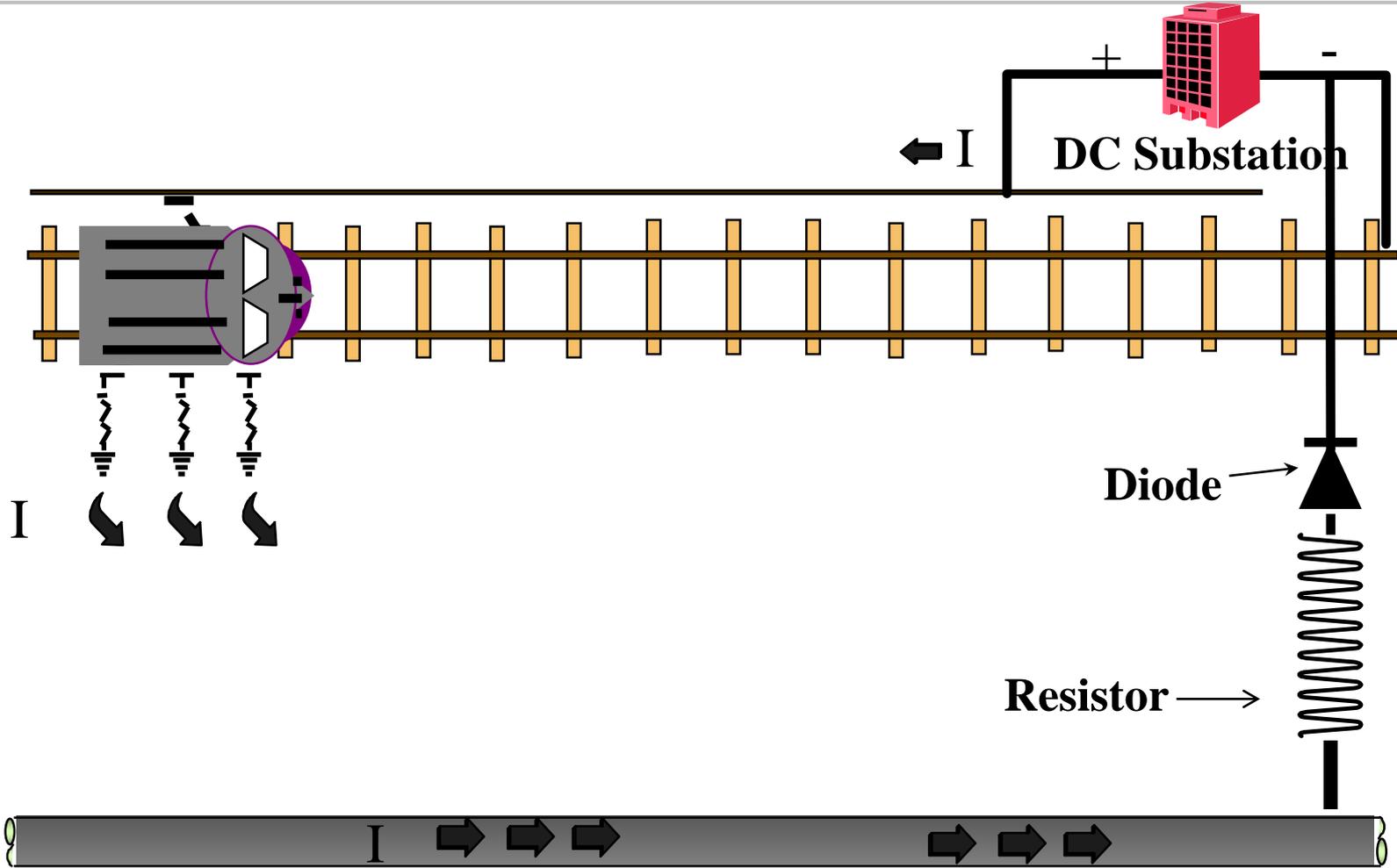
- Electric Transmission pipe type feeders use impressed current rectifiers
- Optimal pipe to soil potential is -0.85 volts or less (more negative)
- Feeders M51 & M52 installed in 1974
 - Initial stray currents as a result of NYCTA along Broadway
 - Electrical interference from DC traction system affects cathodic protection
 - Drain bonds installed at NYCTA Substations:
 - LOCATIONS REDACTED – CRITICAL INFRASTRUCTURE INFORMATION
- Stray current effects mitigated in this area in 1980's



Stray Current Problem



Drain Bond Installation

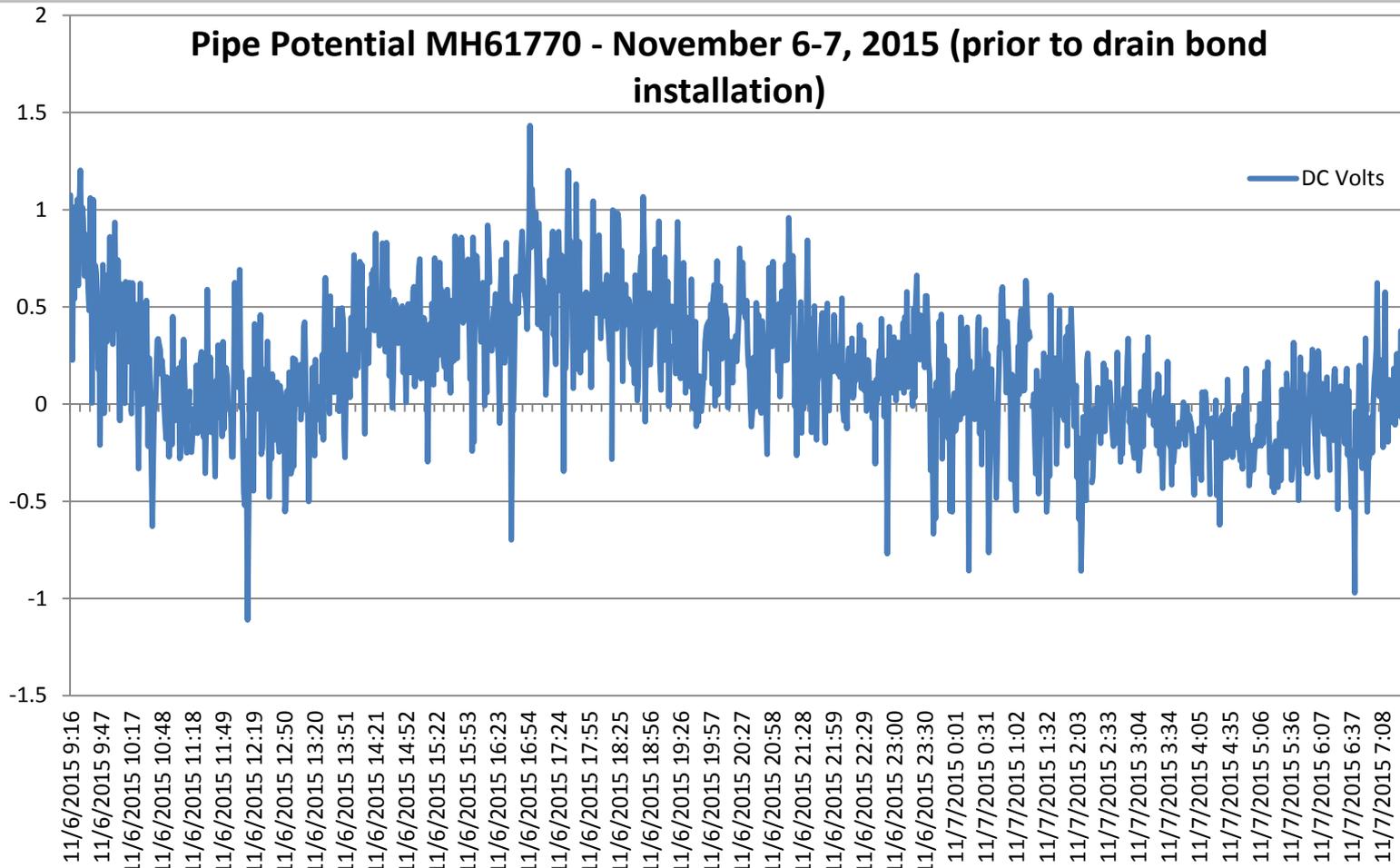


2015 Stray Currents

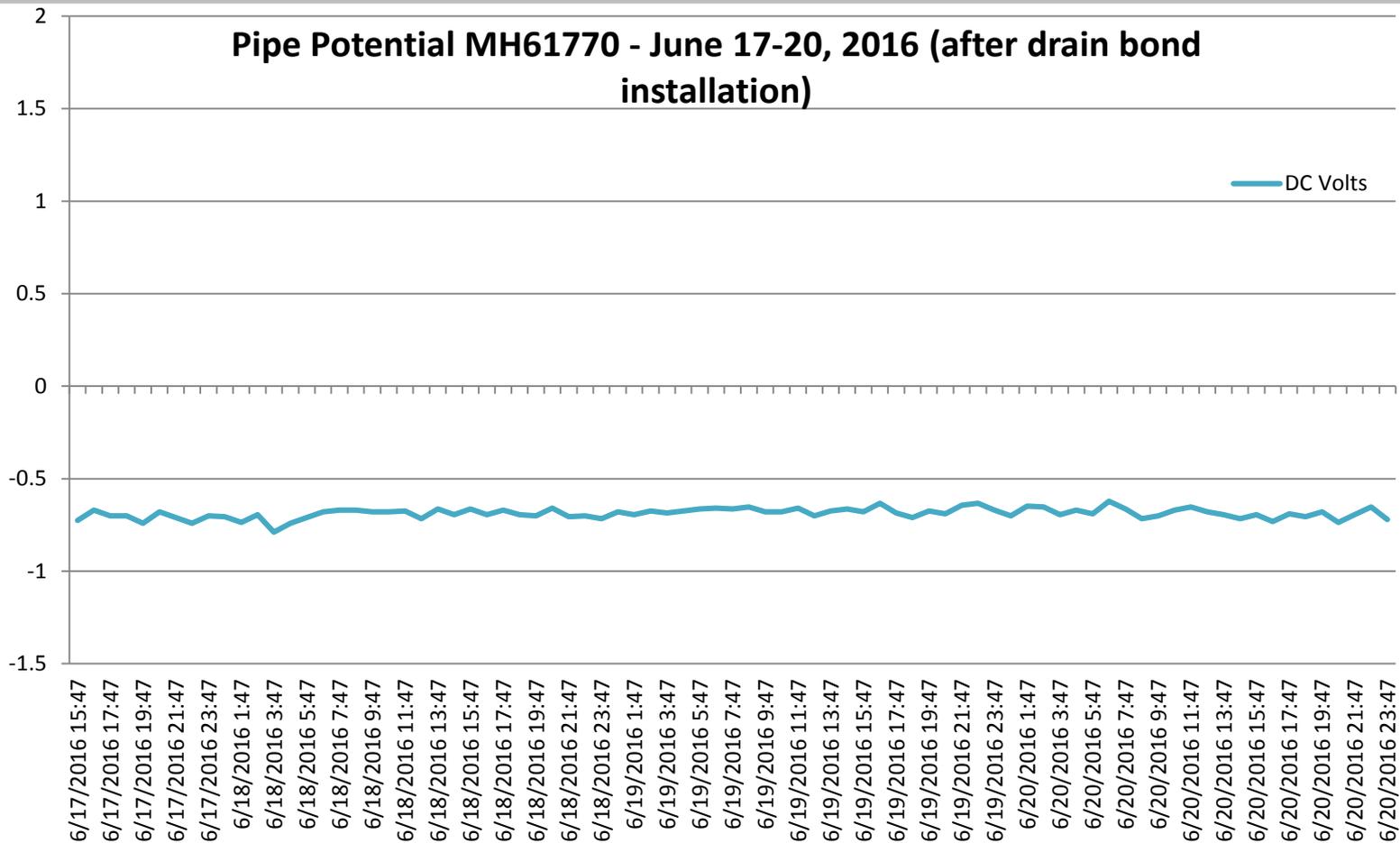
- Since January 2015, 19 leaks have occurred on the Harlem River Drive north of W155th Street
- Not a known historic leak area – only three leaks prior to January, 2015 spread over several pipe sections
- Cathodic protection testing
 - Initial tests by Con Edison
 - Further testing in collaboration with NYCTA
- Testing revealed a stray current concern with Feeders M51 & M52 in the same area of increased number of leaks
- Drain bond installed to NYCTA's **REDACTED** Substation
 - completed on June 14, 2016



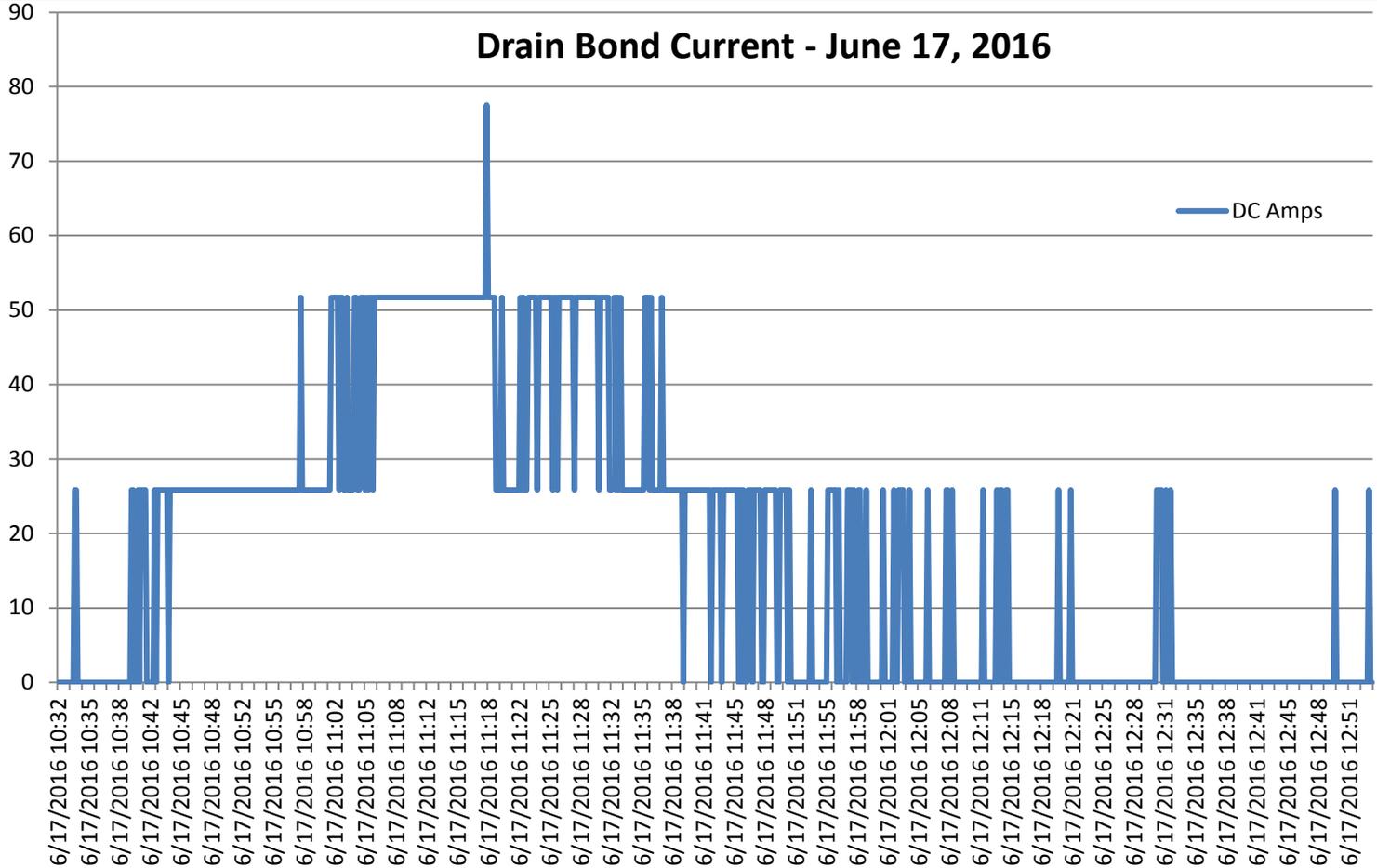
Pipe Potential Testing



Pipe Potential Testing



Drain Bond Currents



PFT Leak Search

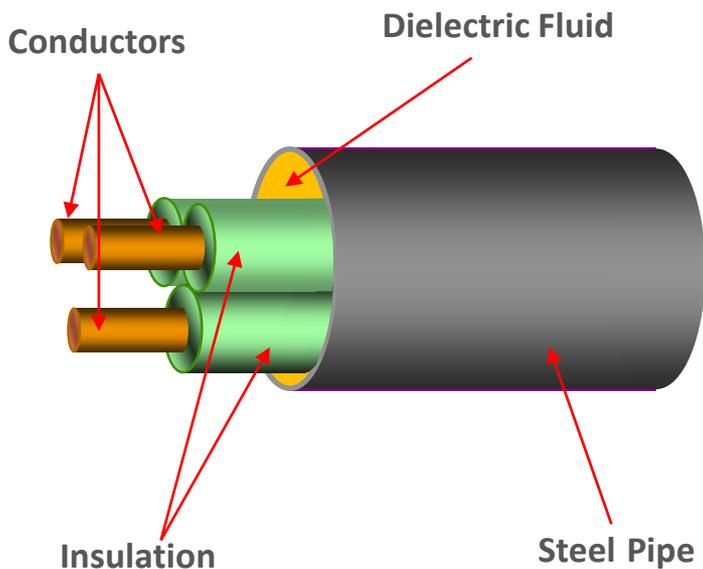


PFT Leak Search

HIGH-PRESSURE FLUID FILLED FEEDERS

PIPE-TYPE FEEDERS

High-Pressure Fluid-Filled



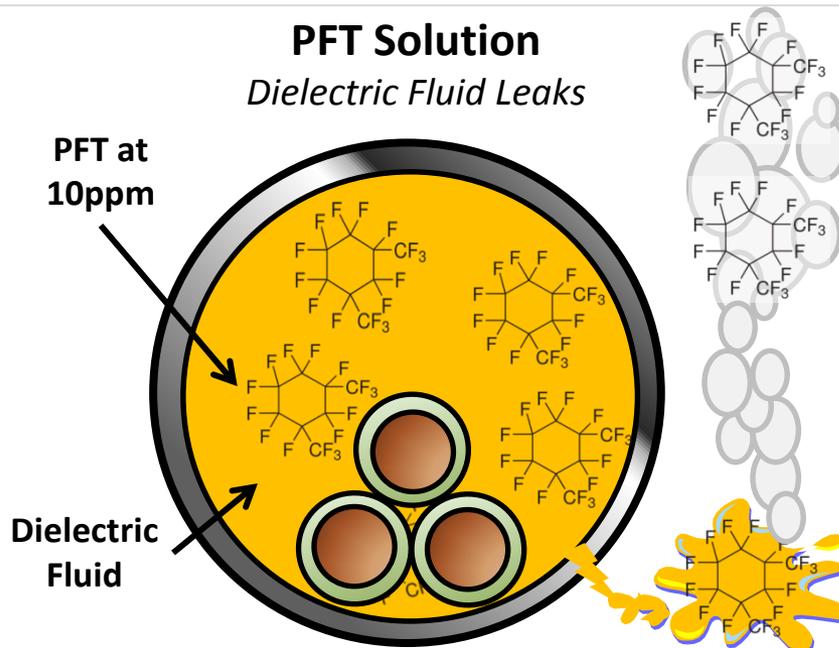
ISSUE AT HAND

Dielectric Fluid Leaks

- Locating leaks can be difficult
- Adding a highly evaporative chemical tracer - Perfluorocarbon Tracer (PFT) to the dielectric fluid can help us locate the leak

PFT Solution

Dielectric Fluid Leaks



PFT Leak Search

FEEDER LEAK SEARCH PROGRAM

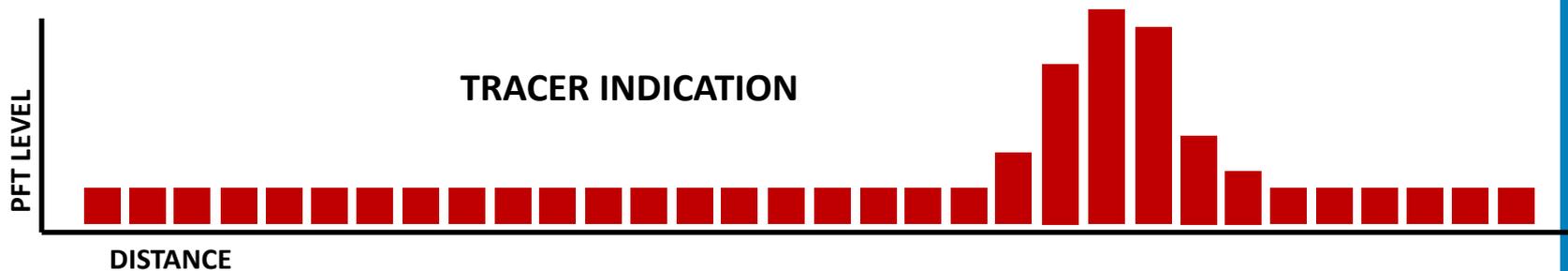
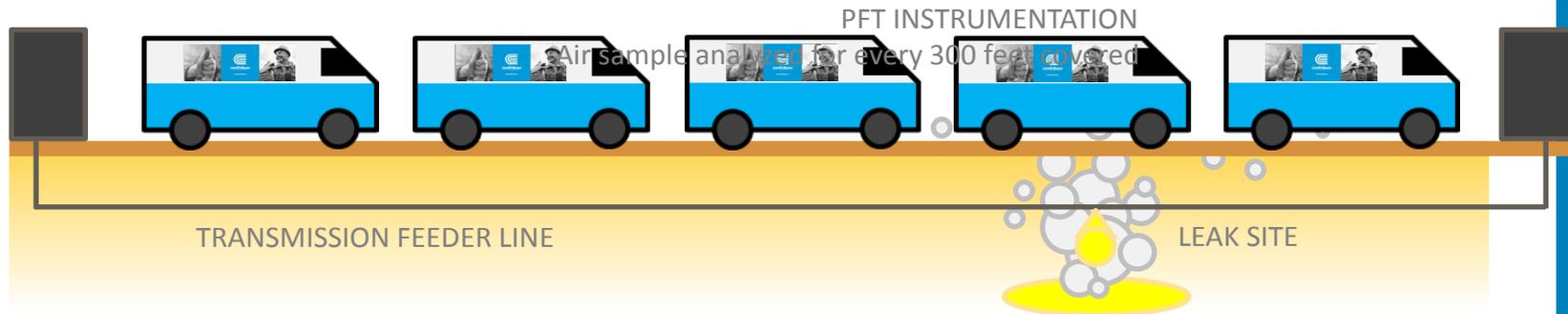
PATROL PROCEDURE

Identify General Leak Area



TERMINAL SUBSTATION 1

TERMINAL SUBSTATION 2



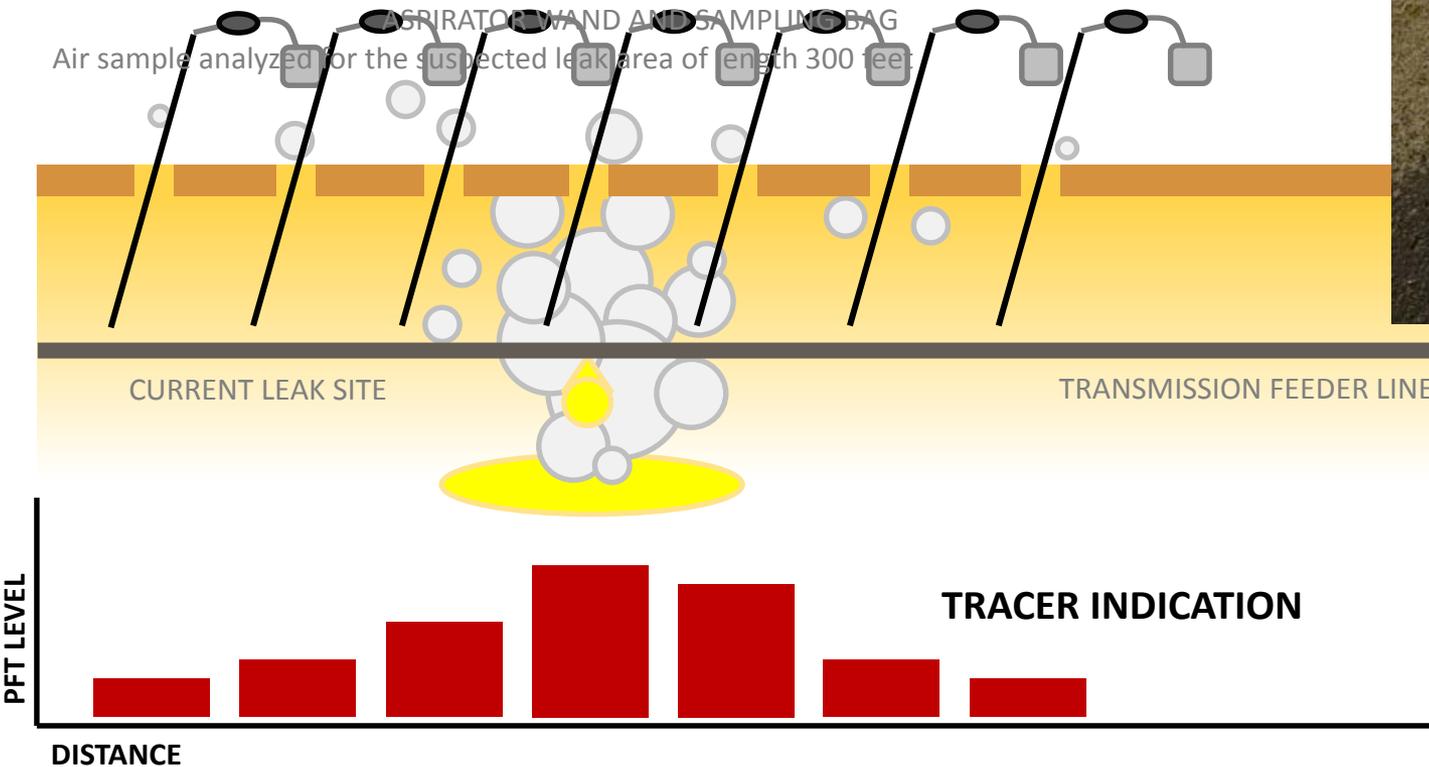
Barhole Analysis

FEEDER LEAK SEARCH PROGRAM



BARHOLE PROCEDURE

Pinpoint Specific Leak Area

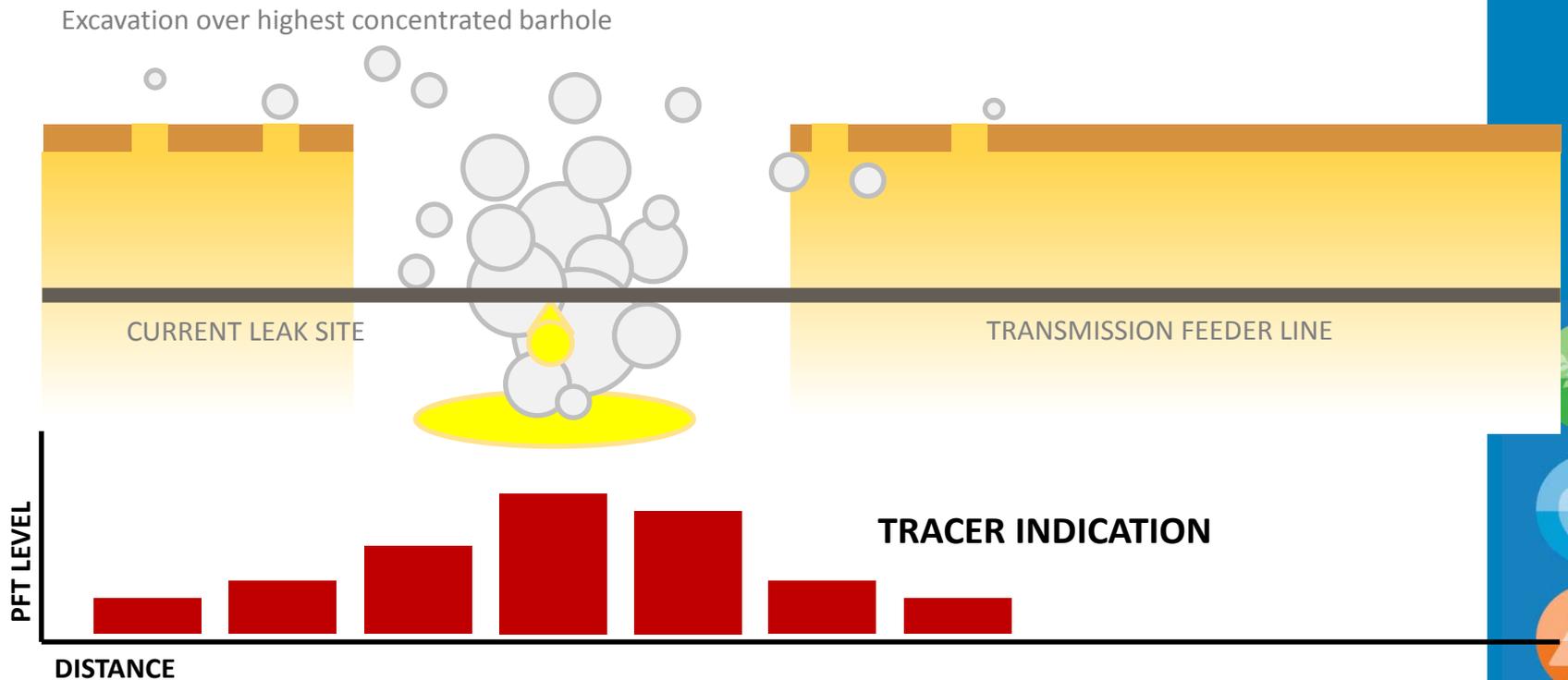


Excavation

FEEDER LEAK SEARCH PROGRAM

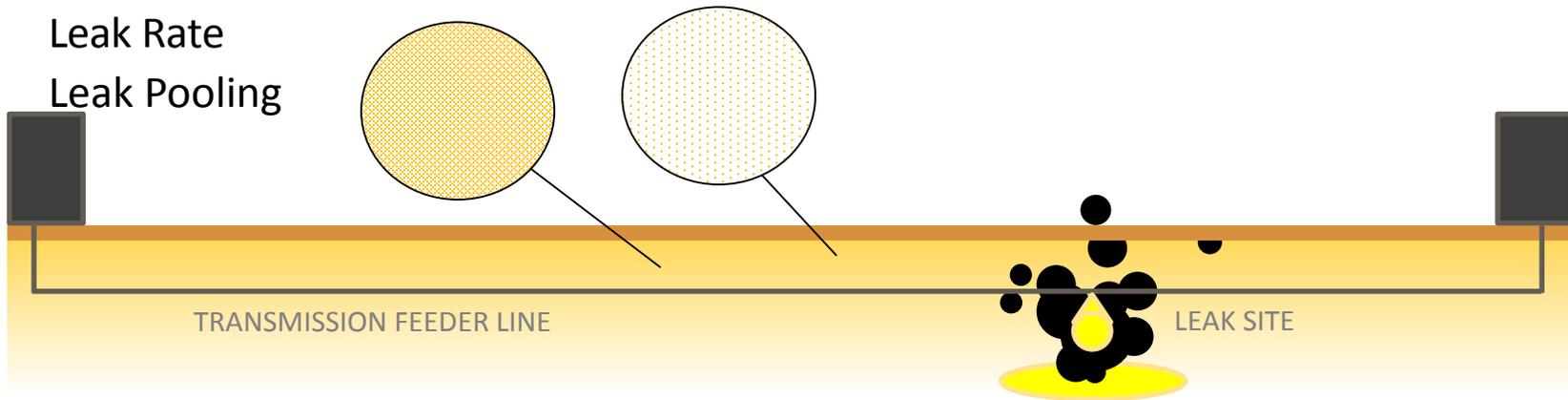
BARHOLE PROCEDURE

Pinpoint Specific Leak Area



PFT Detection Challenges

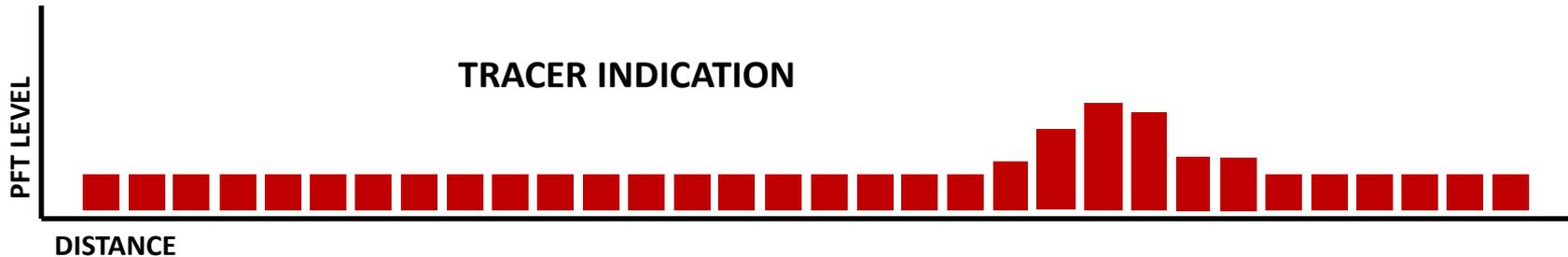
- Geological Factors
- Soil Density
- Frozen Ground
- Leak Rate
- Leak Pooling



TRANSMISSION FEEDER LINE

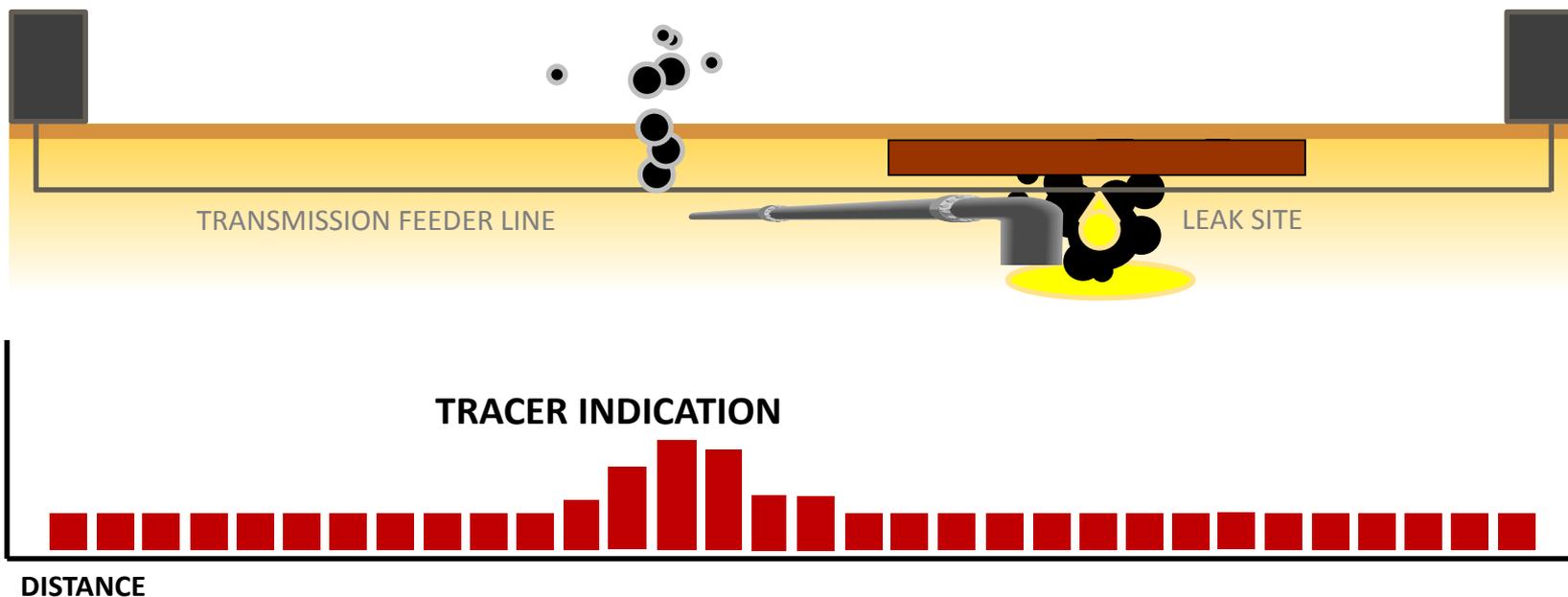
LEAK SITE

TRACER INDICATION



PFT Detection Challenges

- Duct work / piping
- Subway
- Plating
- Residual from old leak



PFT Detection Challenges



Pipe Enhancement Program



Pipe Enhancement Program

- Feeders M51, M52 are the worst performers in terms of leaks
- Areas to be addressed are selected based on study of historic leak locations, pipe-to-soil potentials, and keyhole inspections
- Selected areas are excavated, stripped of coating (ACM), inspected, permanently repaired (welded sleeves), new coating applied, and street fully restored

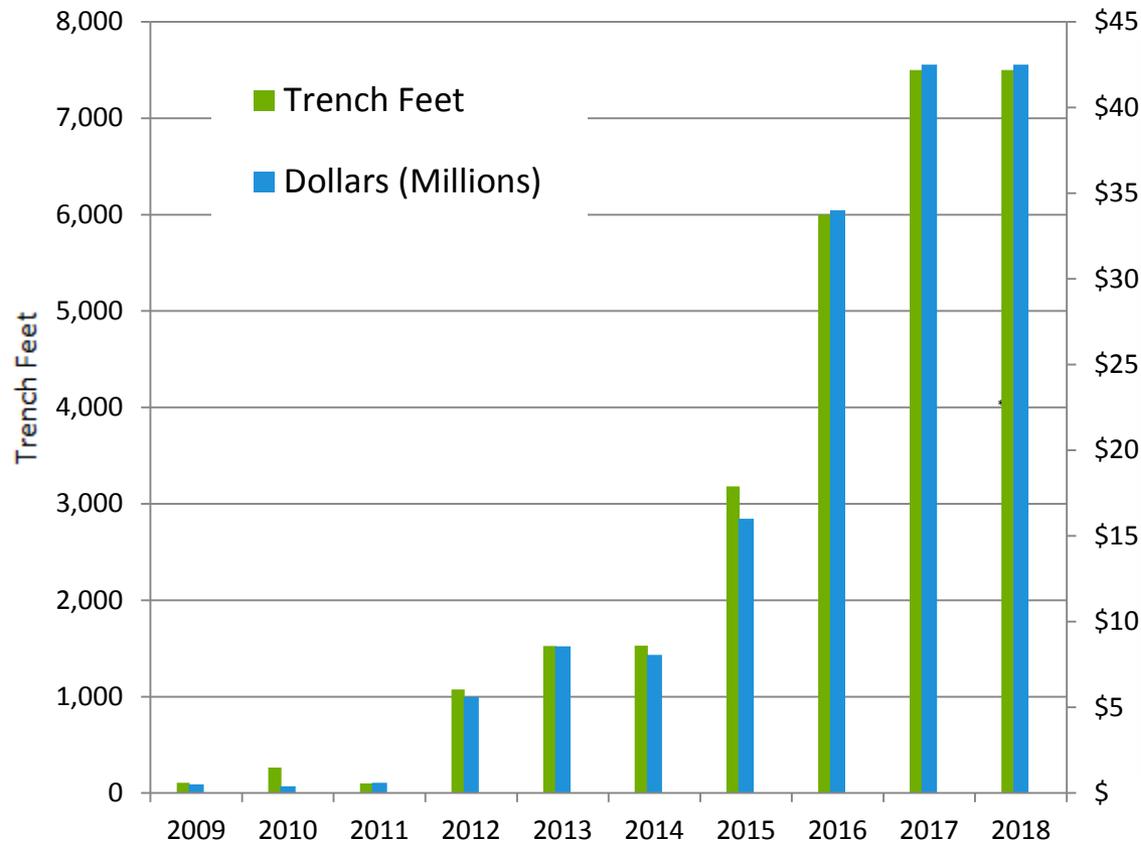


Initiatives to Reduce Leaks

- Increase pipe refurbishment to account for new section of leak-prone pipe along Harlem River Drive
 - Adding 1,500 additional trench feet of pipe refurbishment each year over next two years (2017, 2018)
 - Incremental annual cost = \$8.5 million per year
 - Address stray current along Harlem River Drive to prevent re-occurrence
 - Total pipe refurbished in 2017 and 2018 up to 7,500 trench feet
- Replace labor-intensive coal tar removal / taping method with Teflon/carbon fiber wrap epoxy method
 - Little asbestos abatement required



Accelerated Refurbishment of Leak-Prone Pipe (2016 - 2018)



Pipe Enhancement Process

- Close Interval Survey / Keyhole Inspections
- Community Impact / Outreach
- Impact from other Utilities



Disbonded/Damaged Coating



Coating Removal and Inspection



Typical Corrosion Damage



Interference Issues



Pipe Repairs and New Coating



Pipe Repairs and New Coating

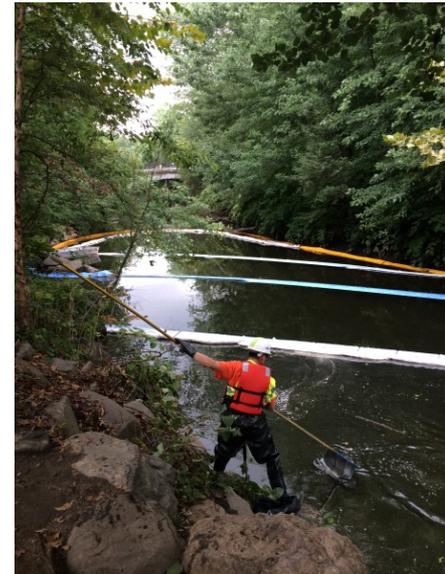


Spill Response & Cleanup



Spill Management Team

- Corporate team created to respond to and manage significant spills to waterways
 - Quarterly meetings/training sessions
 - Members from EH&S and Operations
 - Coordination with US Coast Guard and NYSDEC
- Responses
 - Hutchinson River – 3rd party damage to feeder
 - Bronx River – Y50 Feeder in Yonkers – 4 miles to Bronx Zoo
 - B3402/C3403 Marina Spill – ongoing in Jersey City



Oil Spill Contingency Plans and Offsite Oil Spill Response Plans

- Identifies and prioritizes critical water use/sensitive areas for expedient spill containment, cleanup and recovery
 - Oil Spill Contingency Plans – 300+ Substations and Steam Stations
 - Offsite Oil Spill Response Plans – 15 feeders in Westchester County
- Plans contain off-site drainage pathways and pre-identified spill response deployment areas/actions
 - Response maps are field-verified on a periodic basis



Oil Spill Contingency
Plan Response Map
redacted due to
confidentiality and
sensitivity of utility
infrastructure
location
information

Table 2-1

**SPILL RESPONSE DEPLOYMENT ACTIONS
Bronx River Drainage Basin**

Scenario	Action	Location	Figure(s)
Oil is contained and/or has not yet reached the storm sewer system	Place drain covers and protect storm drain inlets; deploy containment to outfall	Identify catch basins and outfalls in the vicinity of the source of the oil.	1-1
	Deploy containment to outfall	Identify all outfalls connected to storm pipes discharging from nearby catch basins.	1-1
Oil has entered the storm sewer system but has not yet reached a waterbody	Deploy containment to outfall	Identify all outfalls connected to storm pipes discharging from nearby catch basins.	1-1
	Place drain covers and protect storm drain inlets; deploy containment to outfall	Identify catch basins and outfalls in the vicinity of the source of the oil.	1-1
	Deploy containment to protect downstream sensitive areas	Identify spill response deployment area immediately downstream of outfall.	2-1
Oil has reached a waterbody	Deploy containment at furthest downstream location of oil impacts	Hunts Point (DEP Boom)	2-3
	Deploy containment at downstream location	Westchester Avenue Bridge	2-3
	Deploy containment at downstream location	Railroad trestle north of Westchester Avenue Bridge	2-3
	Deploy containment to protect sensitive areas	Jungle World Road Bridge (i.e., Boston Post Road)	2-3
	Deploy containment to protect sensitive areas	Upstream of Bronx Zoo (East Fordham Road/Pelham Parkway)	2-2/2-3
	Deploy containment at downstream location	Moshulu Parkway and Allerton Avenue exit off Bronx River Parkway underpass	2-2



Offsite Oil Spill
Response Plan
Response Maps
redacted due to
confidentiality and
sensitivity of utility
infrastructure
location
information



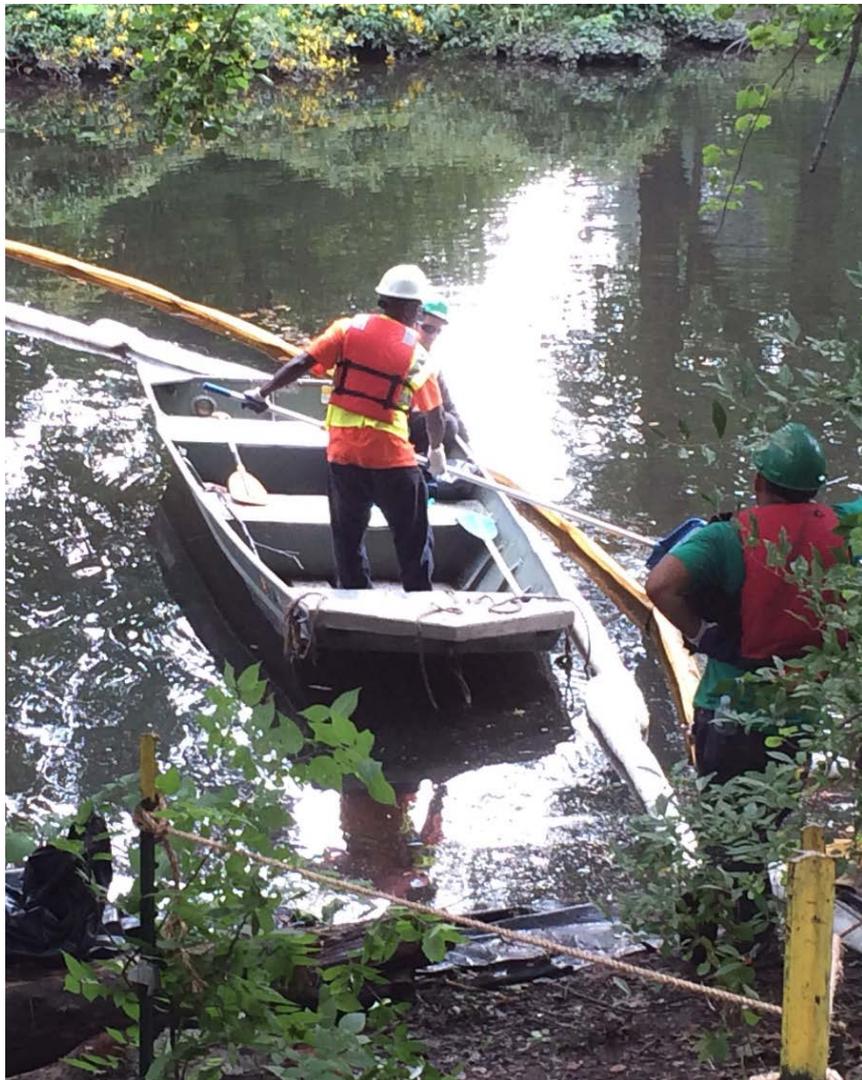
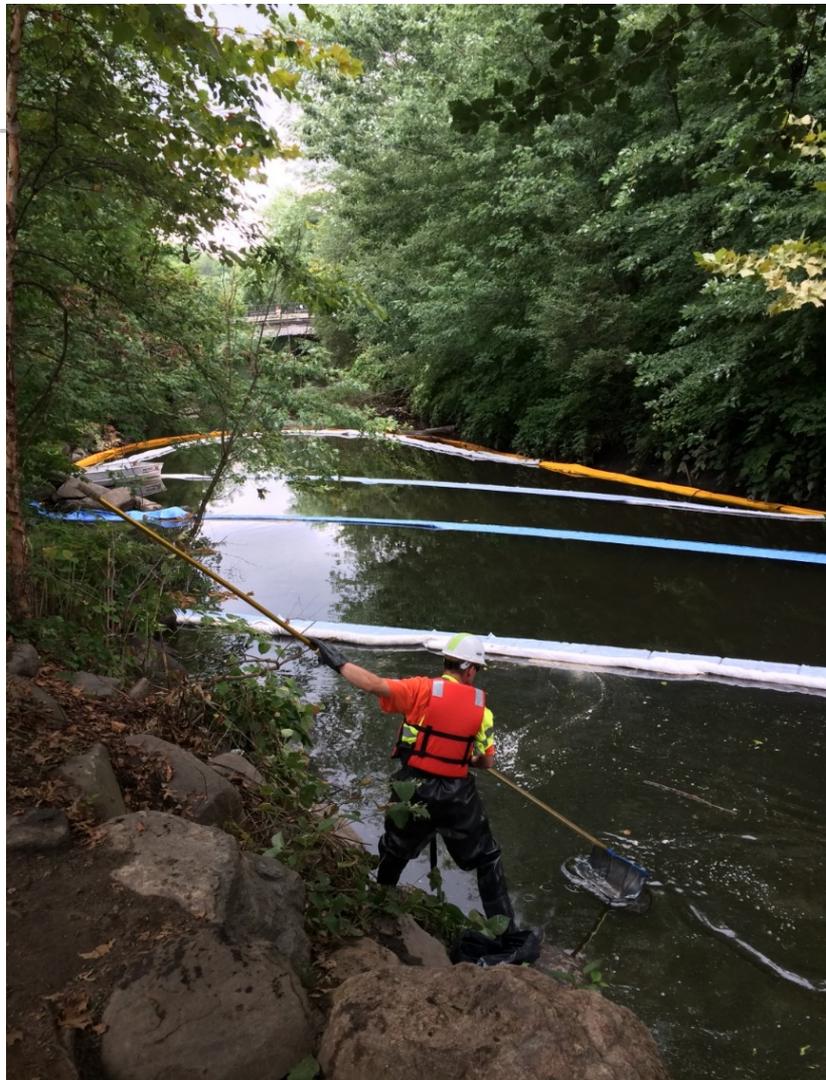






Contain, Divert and Collect





Crucial Skimmers – Clean Harbors Co-op



Skimmer in Newport Marina
in Jersey City, NJ

Skimmer on Bronx River in
Yonkers, NY







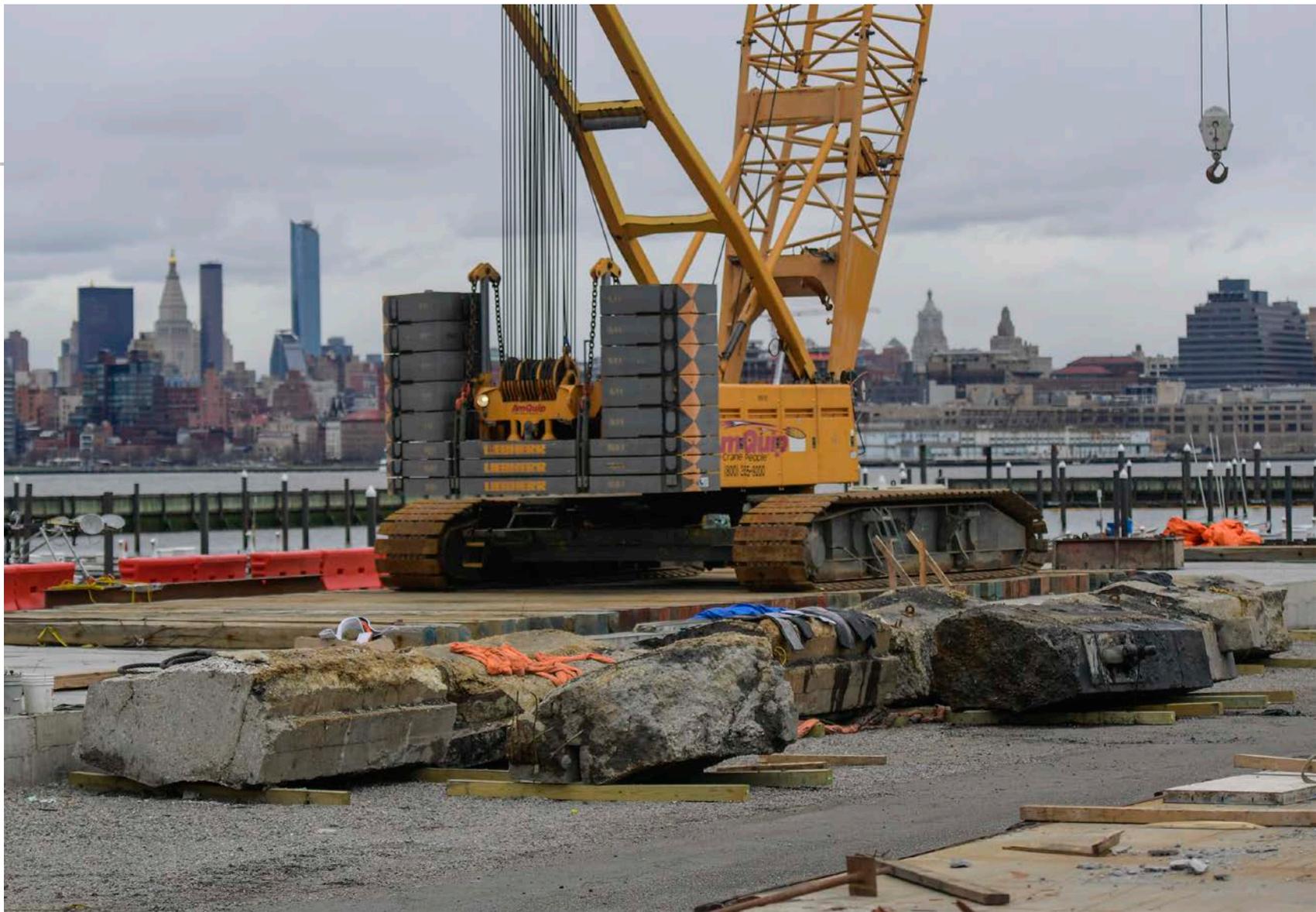


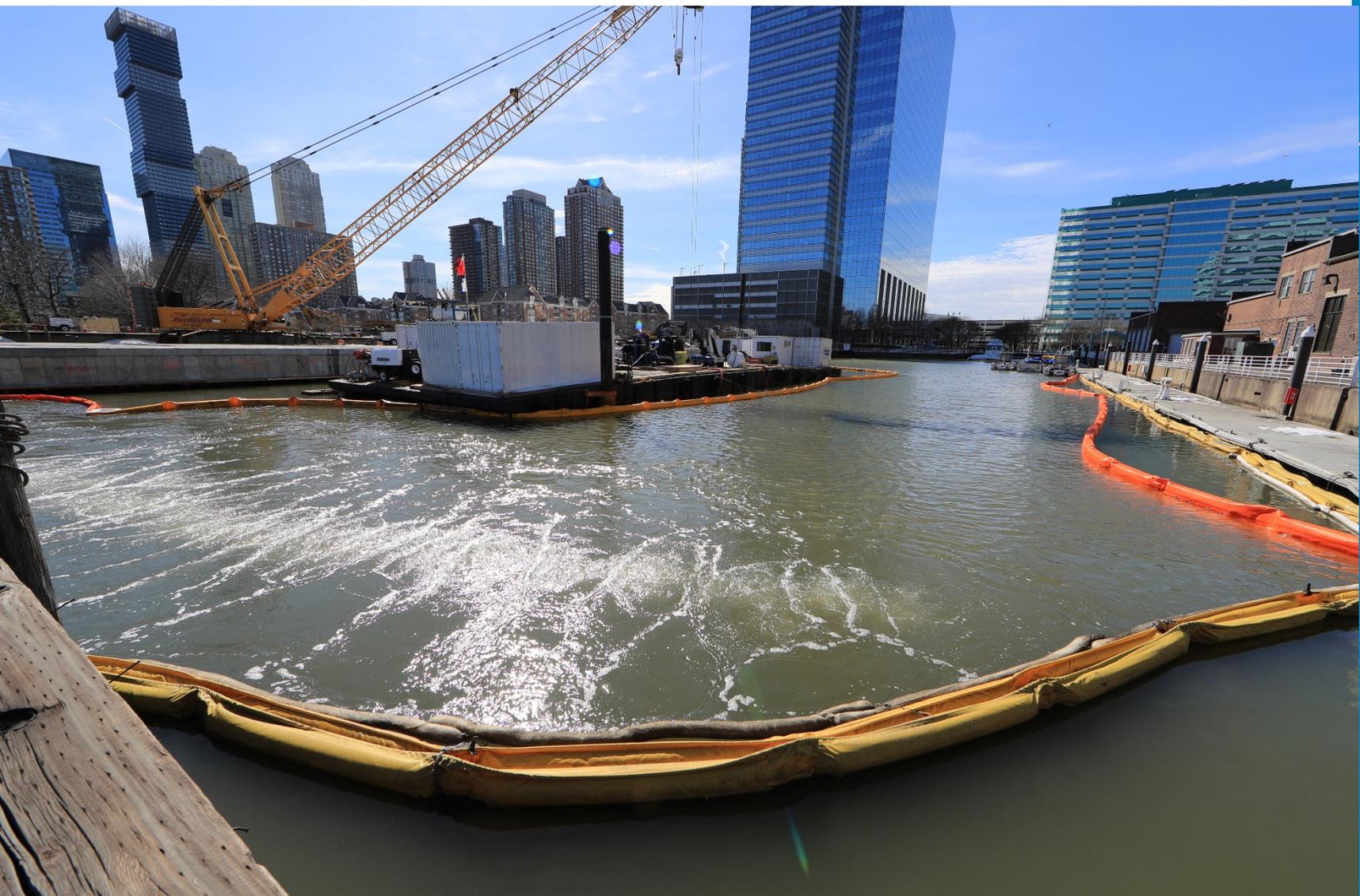






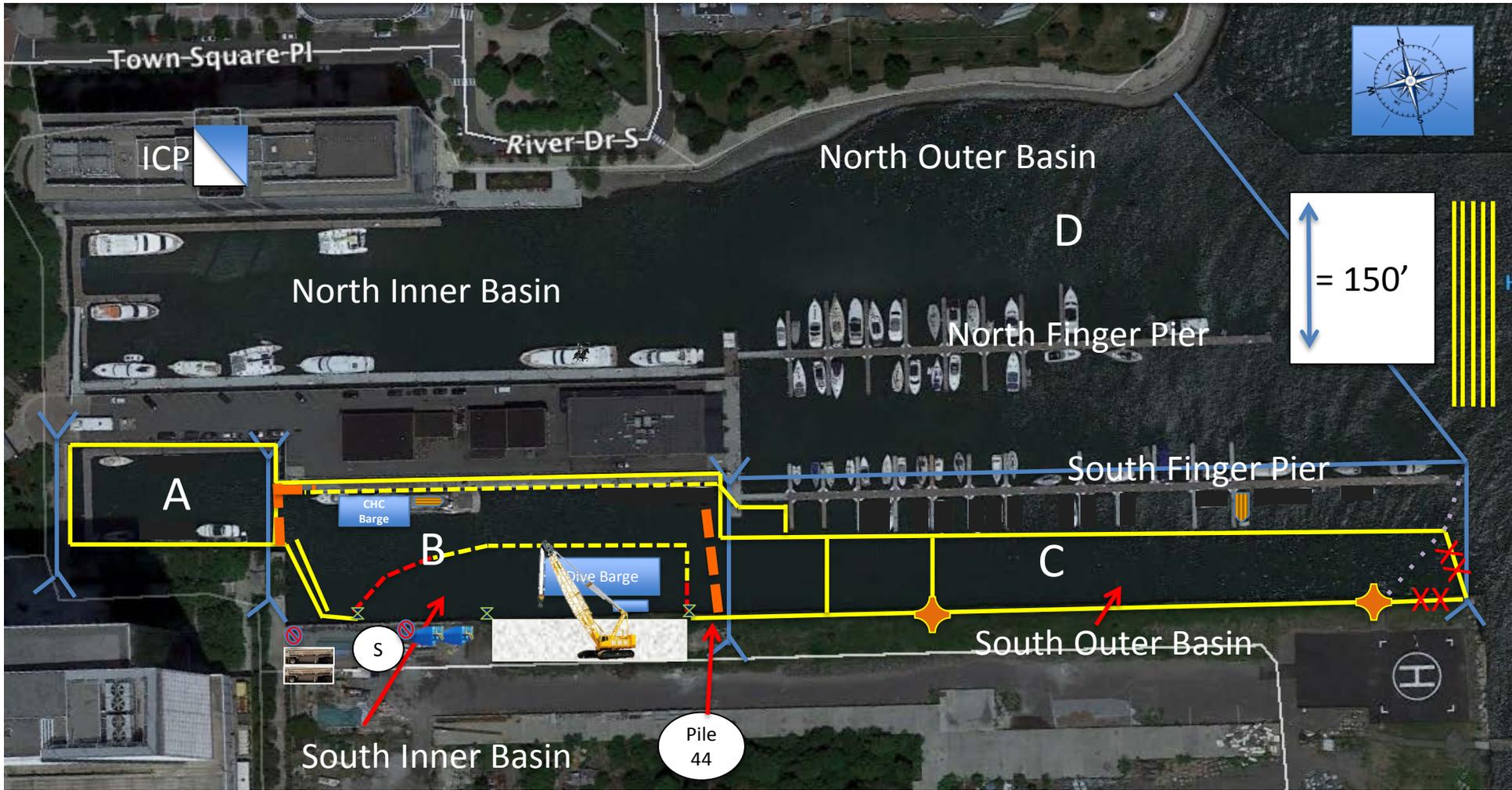






Operation Overview Map

Note: Scale only for Fixed Structures



-  CHC boat
-  Sink Hole
-  PVC Tide Slides
-  Silt Curtain
-  Nitrogen Trailers
-  Boom
-  Fixed I-Beam Tide Slide
-  Bubbler/Silt System
-  Frac Tank
-  Proposed Boom
-  Division Boundaries
-  Staging Area
-  Boom to be discontinued
-  Incident Command Post

Communication with Stakeholders

- Open communication with stakeholders is key
- Develop relationships on “blue sky” days for successful incident response outcomes
 - Familiarization tours
 - “Con Ed 101” training
 - NY/NJ Area Committee
 - Quarterly Task Force meetings



Questions?

