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# PMP Implementation at Deepwater Energy Center

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CLEAN MODERN EFFICIENT FLEXIBLE POWER GENERATION

## Presentation Overview

- Deepwater Energy Center Overview
- PMP Requirements
- Actions Taken
  - Stage 2 Monitoring
  - Controls (BMPs)
  - Source Trackdown efforts
  - Source Removal efforts
- Load Reduction Results

**“Disclaimer”:**

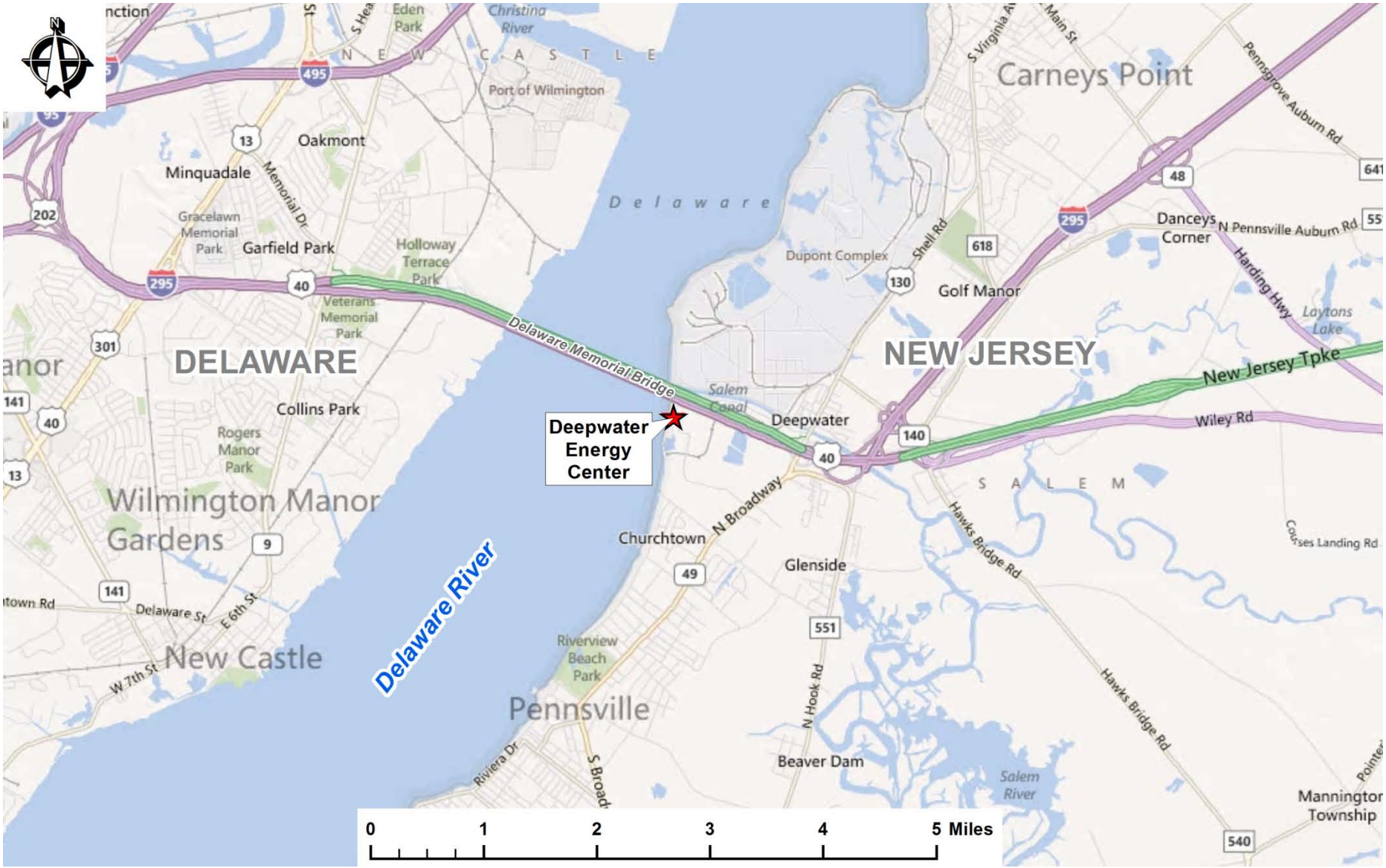
**The Deepwater Energy Center is a very small facility (relative to some other dischargers), and our PCB discharges of concern were limited to 2 small DSN outfall areas, comprised of relatively few catch basins. Therefore, our PMP process has been relatively straight forward and “low tech”. (In other words, you may not find our short story to be very interesting, but it will likely be over before you find time to doze off!)**

# Calpine: A generation ahead – today

- Largest independent power producer in the U.S.
- Fleet of 93 power plants
- More than 28,000 MW generation capacity in 20 states and Canada
- Majority of fleet powered by clean-burning natural gas and renewable geothermal energy

# Plant Overview

# Deepwater Energy Center – Site Location Map



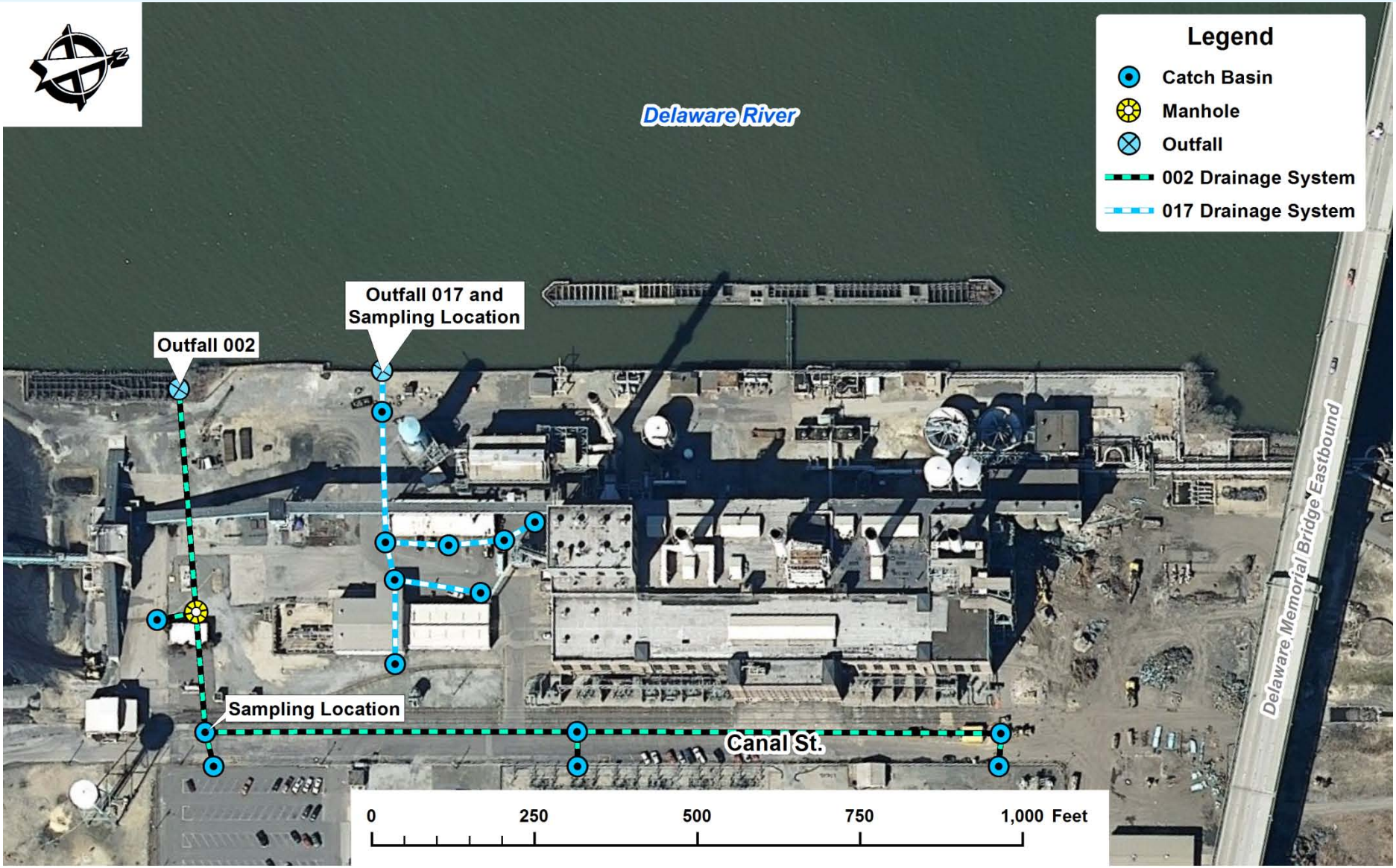
# Deepwater Energy Center - Aerial View

# Deepwater Energy Center – Plant Overview

- Location
  - DE River Mile 68
  - Directly South of DE Memorial Bridge
- Past
  - Commissioned circa 1929
  - Coal, oil, natural gas
- 2010 to Present
  - Oil, natural gas

# PMP Requirements

# PMP included monitoring, controls (BMPs), source trackdown, and source removal within DSN 002 and DSN 017 drainages;



# PMP Actions Taken….

# PMP Actions Taken – Stage 2 Monitoring

- Stage 2 monitoring collected from DSNs 017 and 002 (wet weather) during low tide to avoid tidal influence

- Also collected wet weather river sample during each event for comparison

- Penta-CB Loads calculated and included in PMP updates

# BMPs/Controls Implemented

- Initially, hay bales were deployed around storm drains and in strategic drainage areas

# BMPs/Controls Implemented

- Upgraded to using geotext filter baskets (used in addition to hay bales) for all storm drains & catch basins within DSNs 017 and 002
- maintained regularly
- Cost: $100-$120 per unit

# PMP Actions Taken – Controls (BMPs) Basin Guard

**And for extra measure…..**

**Replaced messy hay bales with Basin Guards**

## Basin Guards

- Prevent silt, sediment and hydrocarbons from entering storm drains
- Provide visual indicators to storm drain locations
- Help comply with NPDES, 40 CFR 122.26 (1999) when used as Best Management Practice in Storm Water Pollution Prevention Plans.
- Cost: $100-120 per unit

# BMPs/Controls Implemented

- Installed filter socks in strategic areas to filter particulates from storm water drainage
- Cost ~$2/foot (2006)

# BMPs/Controls Implemented

- Contracted a street sweeping service to periodically clean paved areas within DSNs 017 and 002
- Cost: ~$400 per “sweep”

# PMP Actions Taken – Source Trackdown Studies

- Basic plan was to “start simple”, and expand trackdown efforts as needed.
- Since most of the catch basins contained sediment both within the catch basin, and on the paved surface immediately adjacent to the catch basin, the sampling efforts started there.

# PMP Actions Taken – Source Trackdown Studies

- Collected surface sediment both within and adjacent to DSN 017 and 002 storm drains and at other strategic locations; analyzed using modified 8082 method (included ~50 congeners)

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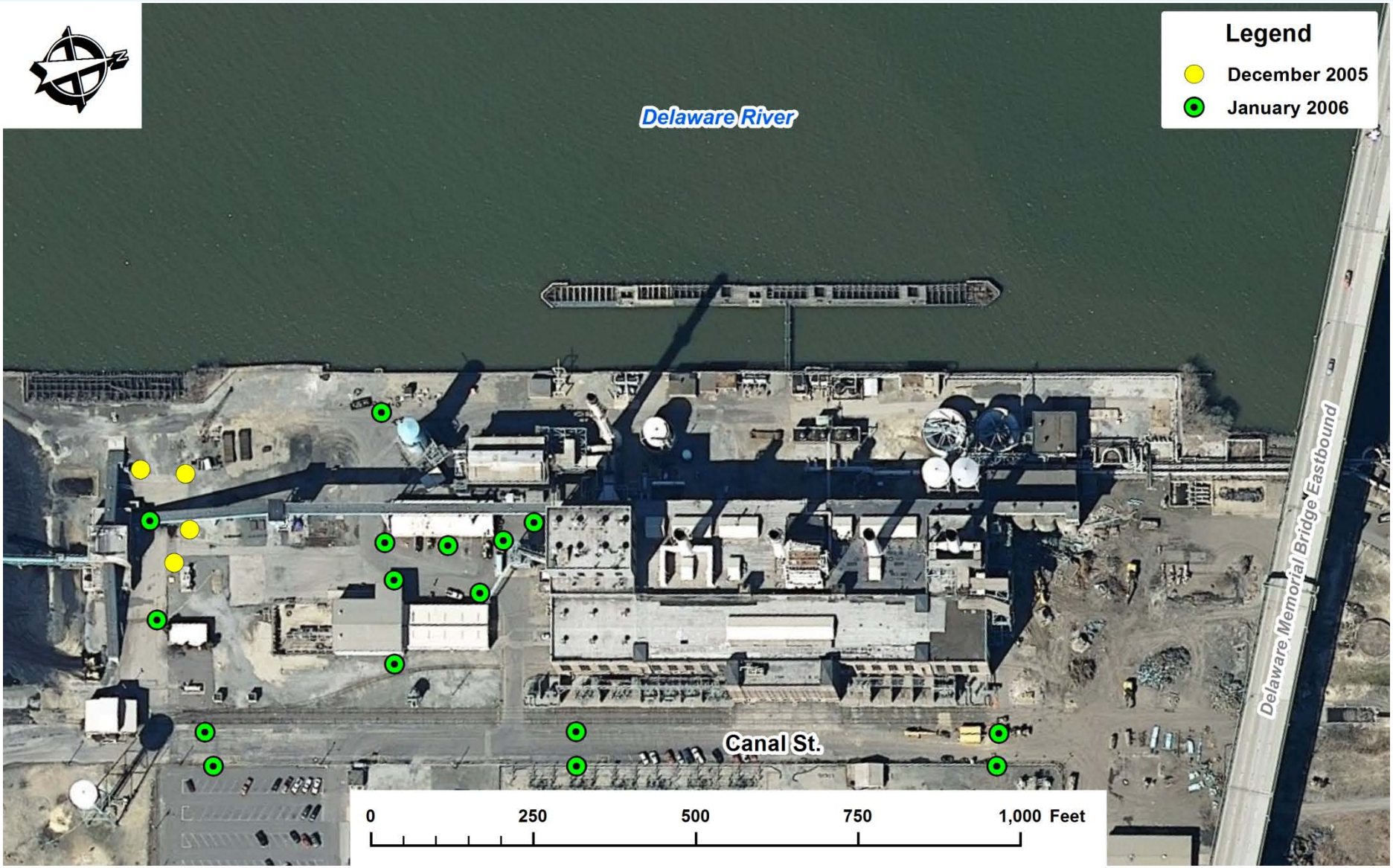
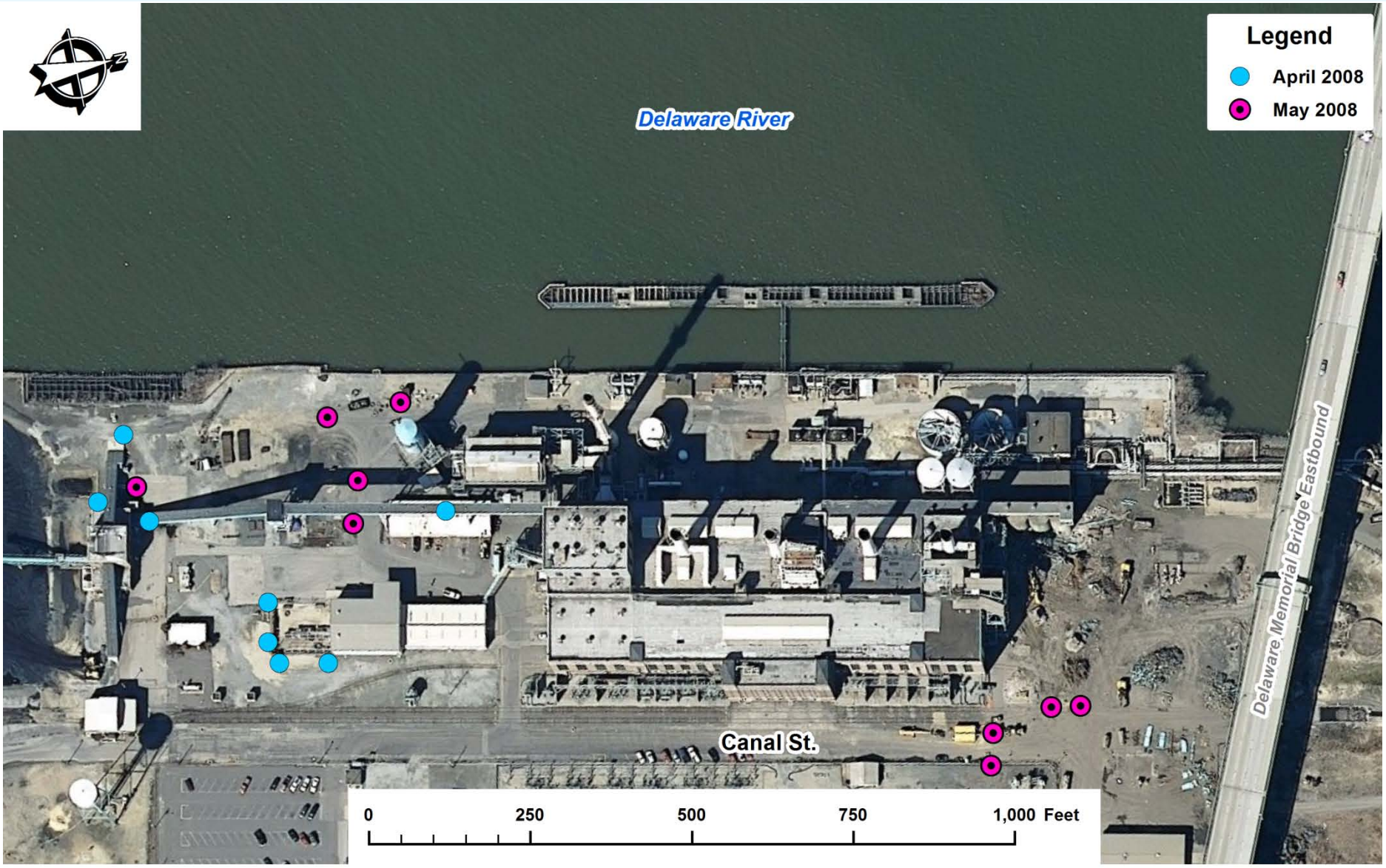
# Initial (2005/2006) PCB Trackdown Sampling Locations



# Additional (2007/2008) PCB Trackdown Sampling Locations



# PMP Actions Taken – Source Trackdown Studies

- Outside of transformer areas, PCB concentrations were in the ug/kg (ppb) level for the majority of sediment samples
- Maximum PCB concentration was ~8 mg/kg (ppm)

# PMP Actions Taken – Source Trackdown Studies

- Parallel sampling efforts were conducted around all transformer areas within 017 and 002
- Maximum PCB concentration was 0.99 mg/kg

# PMP Actions Taken – Potential Source Removal Effort

- Proactively contracted to have DSN 002 and DSN017 piping and catch basins sealed off from the river and cleaned out. This effort addressed the potential for legacy contamination within the stormwater piping and sediments within catch basins.

# PMP Actions Taken – Potential Source Removal Effort

- Clean out of DSN 017 and 002 lines and catch basins
  - Sewer outfalls were first plugged to keep wash water from being discharged into the river.
  - Sediment was then flushed from two (12-inch to 24 inch) storm sewer lines and approximately 16 associated catch basins.
  - ~2,200 ft of pipe was cleaned out.

# PMP Actions Taken – Potential Source Removal Effort

- Clean out of DSN 017 and 002 lines and catch basins
  - Samples collected and analyzed to characterize the sediment for proper disposal.
  - Effort took ~4 days
  - Cost <$30k (2006)
  - ~8.1 tons of material removed and disposed

# PMP Actions Taken – Source Removal Effort

- Spot Removal of PCB impacted soils 2007-2009
  - Adjacent to transformers
  - over 600 g of total PCBs removed

# PMP Actions Taken – Source Removal Effort

# PMP Actions Taken – Source Removal Effort

# PMP Actions Taken – Potential Source Removal Efforts

Several transformers and associated bushings adjacent to the power plant were removed for disposal.

# PMP Actions Taken – Potential Source Removal Efforts

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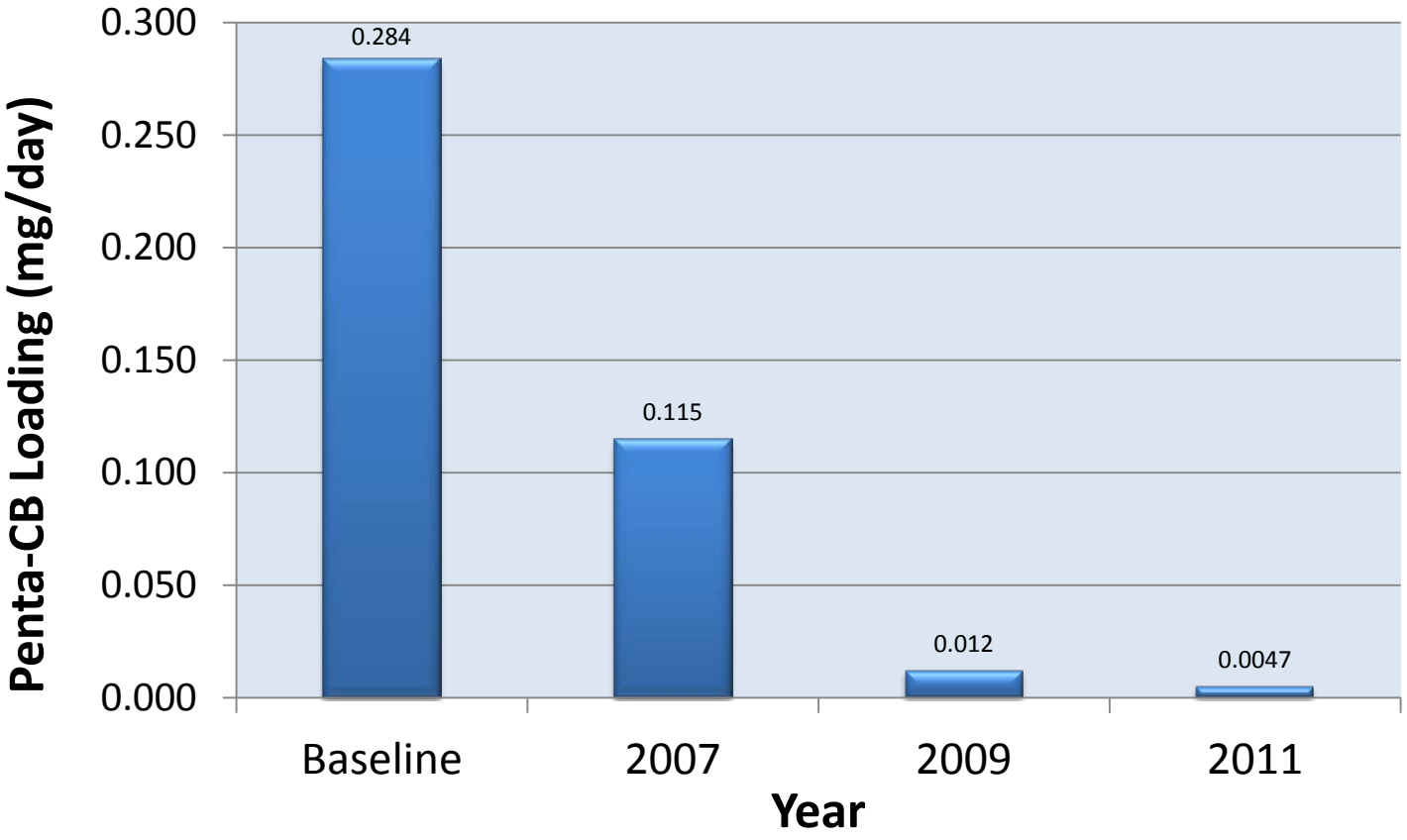
# PMP Implementation Results

# PMP Implementation – Source Removal Summary

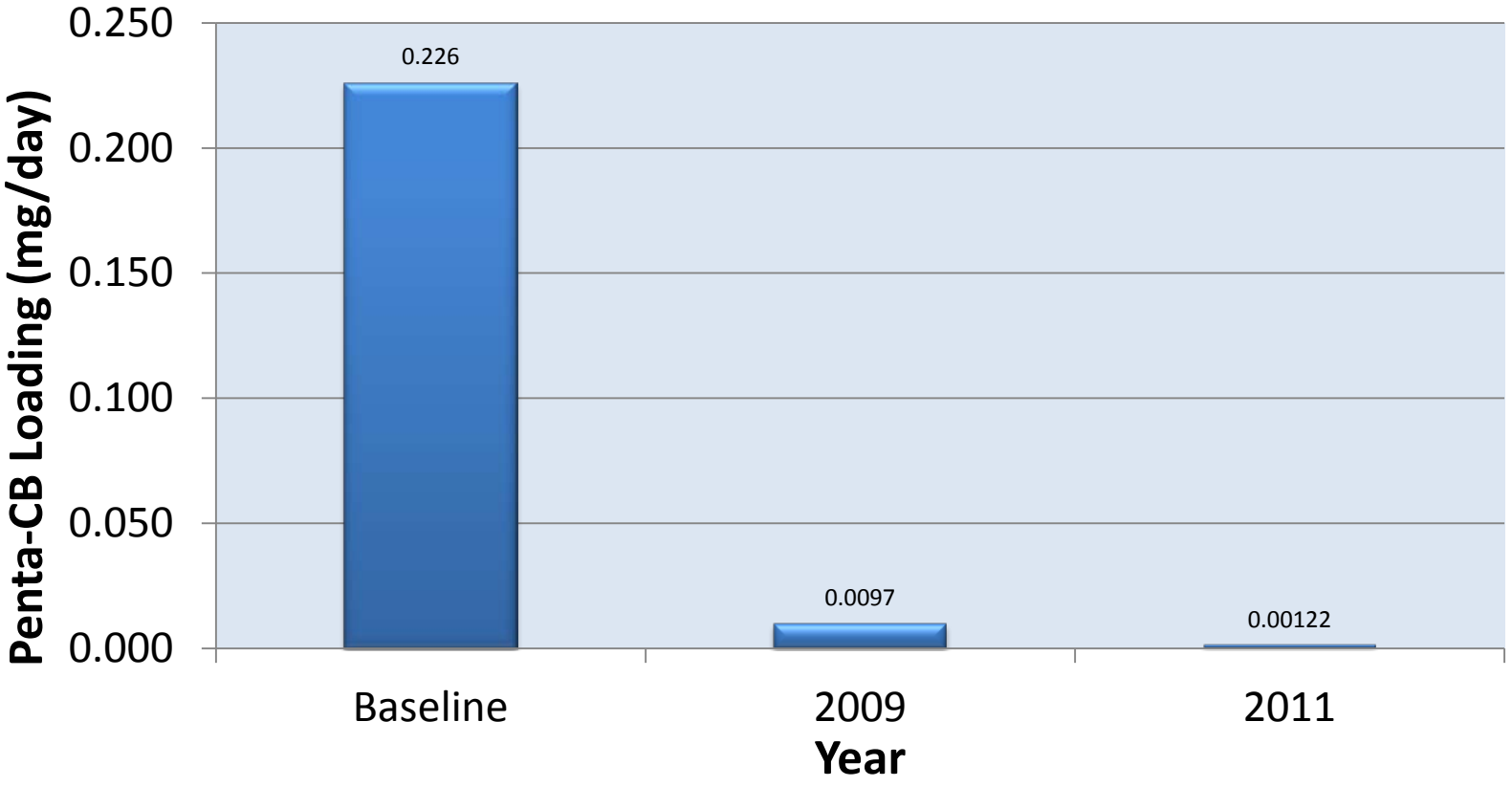
- Throughout the PMP implementation period to date, an estimated total mass of 29,354 grams of PCBs were removed from DSN 002 and 017 drainage areas through:
  - Complete removal of transformers and associated electrical equipment;
  - Retro-fitting/removal of dielectric fluids from transformers and other electrical equipment; and
  - Removal of PCB contaminated sediments.
- All PCB contaminated waste was properly disposed.

## Penta-CB Loading at Deepwater Energy Center Outfall 017




**Cumulative Reduction of Penta-CBs: 98.3%**

## Penta-CB Loading at Deepwater Energy Center Outfall 002




**Cumulative Reduction of Penta-CBs: 99.5%**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