

Yonkers JWWTP - Odor Study Update

Presentation of Results

May 8, 2008

1. Project Background:

- 1992 Odor Study
- Existing Odor Abatement Measures

2. Results of Data Analysis:

- Property Line H₂S Data
- Remote Automatic Samplers
- Odor Complaint History
- Field Sampling Program

3. Dispersion Modeling:

- Dispersion Model
- Meteorological and Terrain Data
- AERMOD Results

4. Odor Abatement

Recommendations

- Screen and Grit Building
- Existing Odor Control Systems
- Ludlow Pump Station
- Miscellaneous Systems

**5. Impact Assessment of
Recommended Odor Abatement
Measures**

The logo for Westchester.gov.com, featuring the word "Westchester" in a large, green, serif font, with "gov.com" in a smaller, green, sans-serif font below it.The logo for Dvirka and Bartilucci Consulting Engineers. It features a stylized "db" in a bold, black, sans-serif font. To the right of the "db" is the text "Dvirka and Bartilucci" in a bold, black, sans-serif font, followed by "CONSULTING ENGINEERS" in a smaller, black, sans-serif font. Below this is the text "A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C." in a very small, black, sans-serif font.



AGENDA:

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Impact Assessment

1992 Odor Study

- **Comprehensive Odor Study of Yonkers JWWTP**
- **Purpose of study:**
 - Determine relationship of Plant flow to odors
 - Assess extent / severity of off-site odor impact
 - Develop odor mitigation recommendations
- **Hydrogen Sulfide (H₂S) was determined to be the primary odor causing compound generated at the Plant**
 - Most common odor compound in wastewater collection and treatment systems
 - Colorless
 - Rotten egg odor
 - Heavier than air
 - 5 ppb recognition threshold

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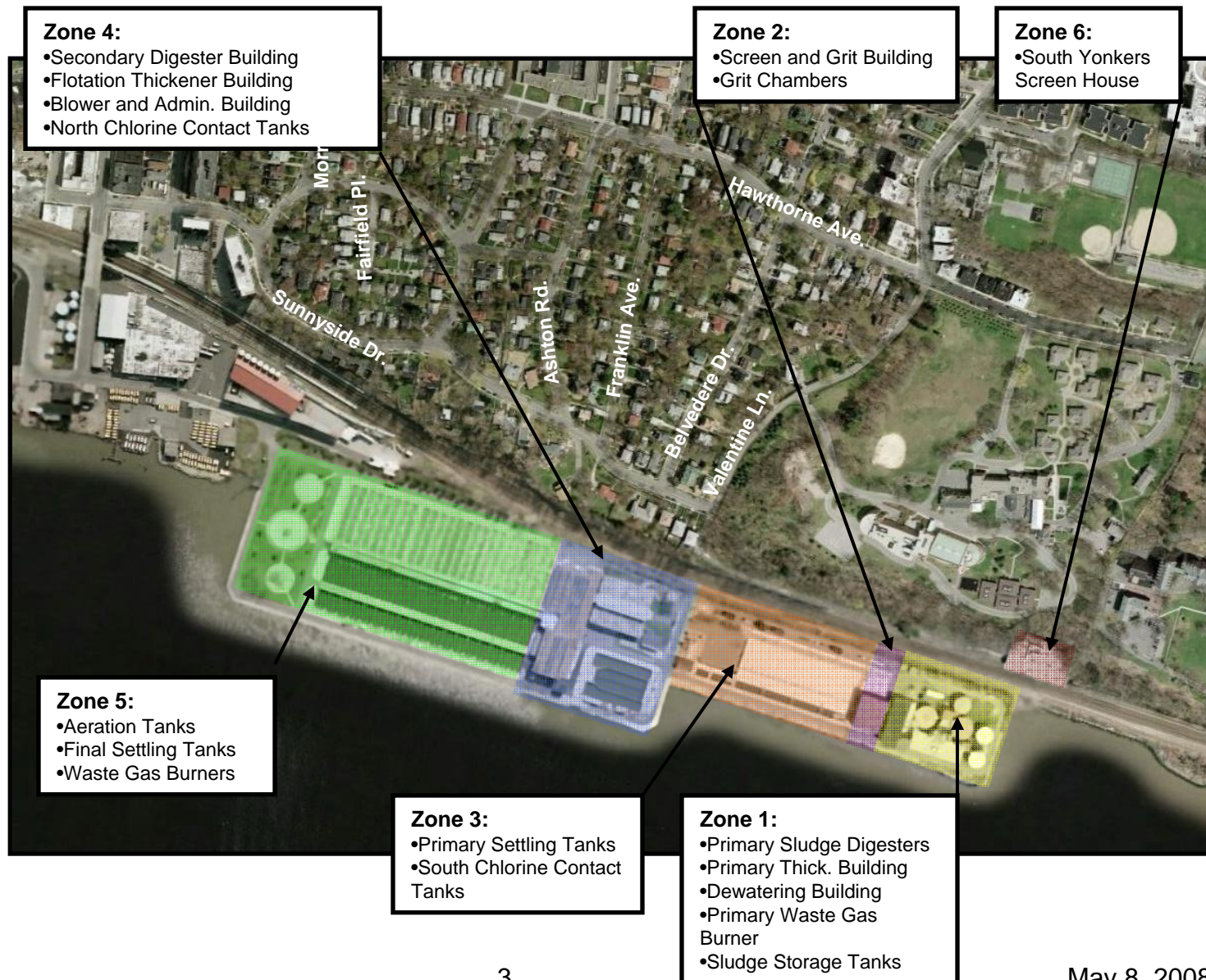
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Site Plan and Zone Designation



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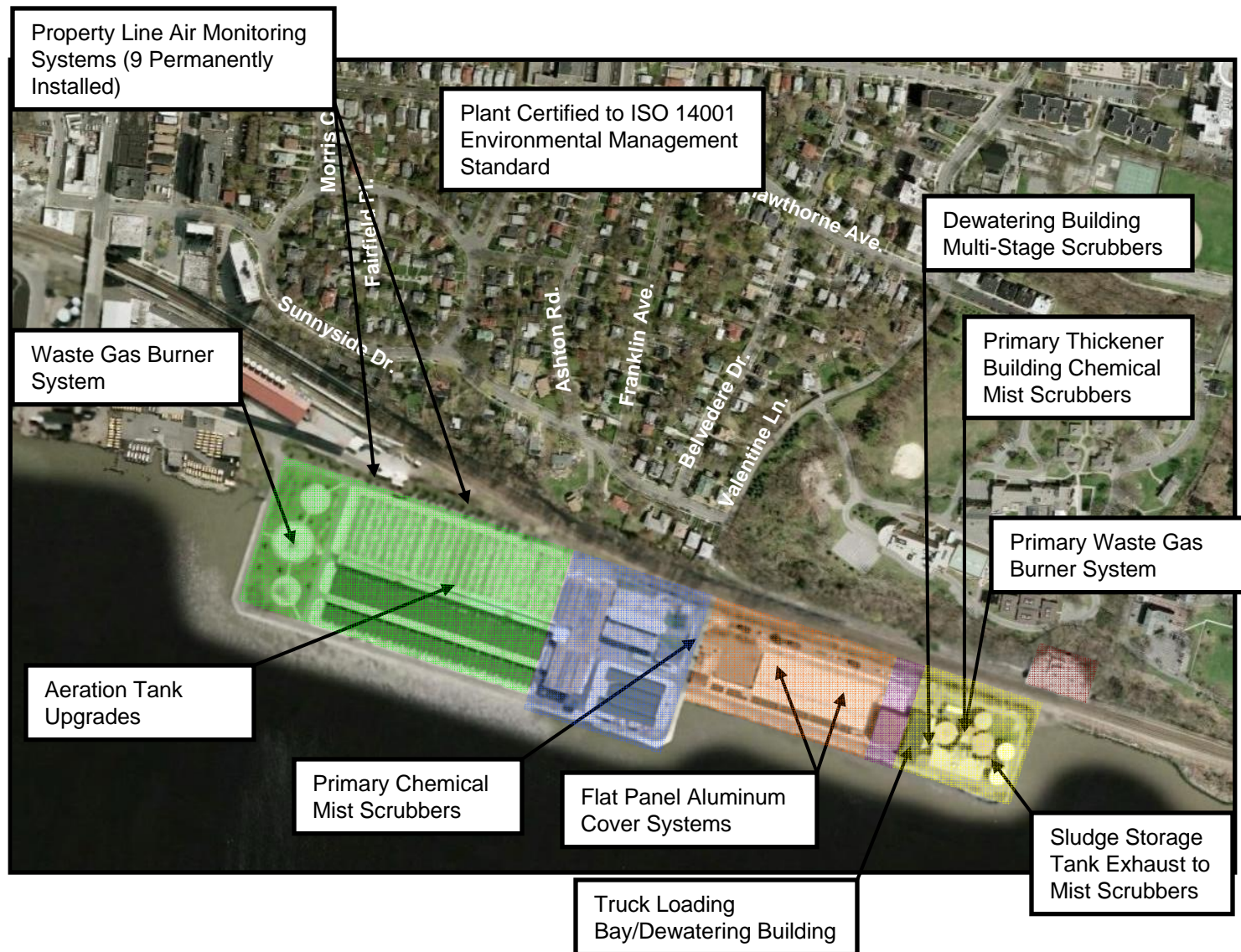
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Impact Assessment

Major Odor Abatement Projects Completed



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Property Line H₂S Data

- **Property Line H₂S Samplers:**

- Nine automatic, continuous, H₂S samplers
- Spaced along the east property line of the Plant
- Can be relocated as required to address specific odor sources / complaints
- Monitor H₂S concentrations down to 3 ppb
- Data compiled and evaluated on a regular basis by plant personnel
- Data from 2005 – 2007 evaluated during Odor Study Update

- **Results:**

- H₂S concentrations exceeding 5 ppb routinely detected (roughly 10% of the samples collected)
- H₂S concentrations ranged from 0 to 136.5 ppb
- Slight decrease in maximum concentrations and percentage above 5 ppb from 2005 to 2007



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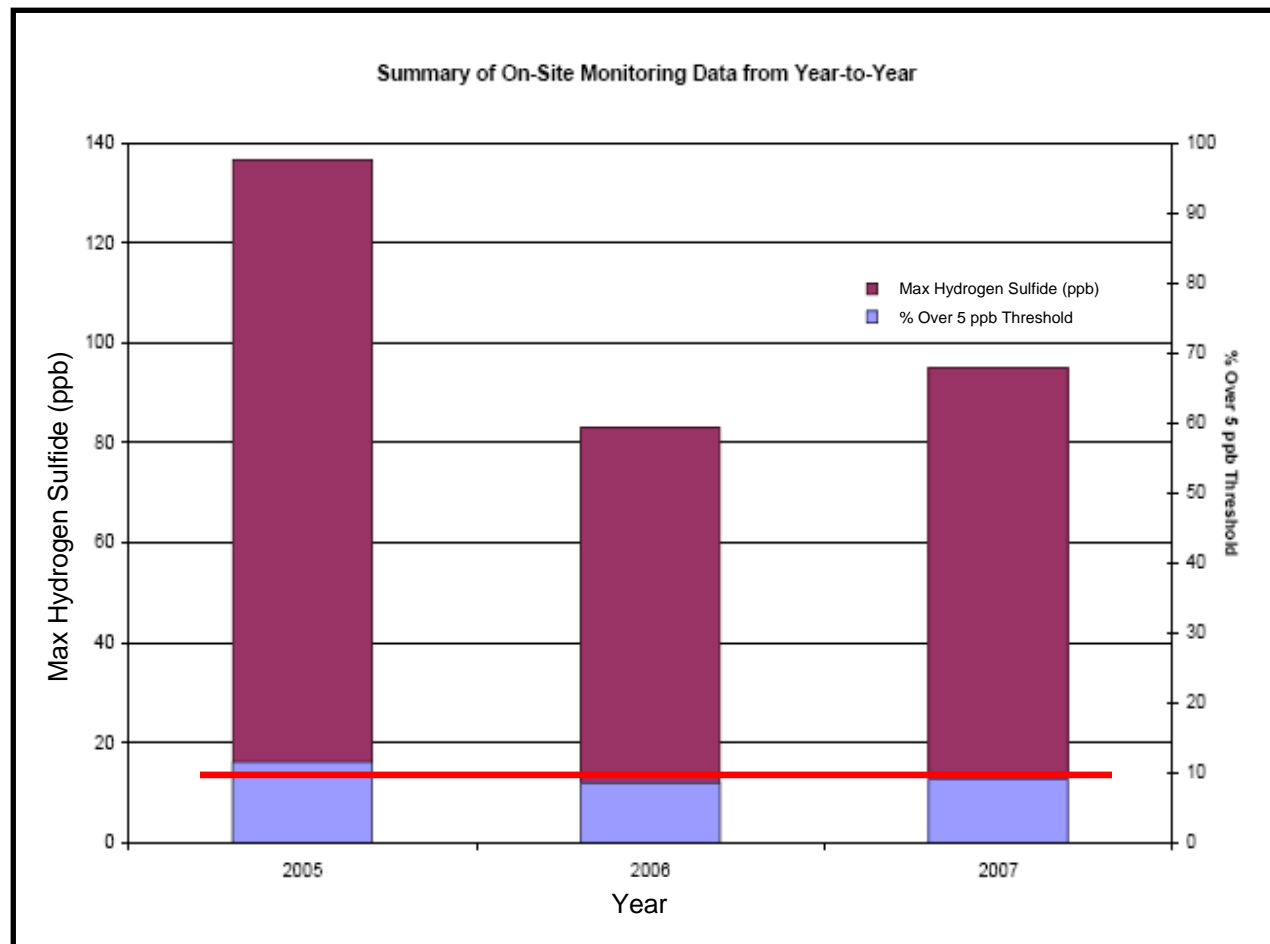
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Property Line H₂S Data (cont.)



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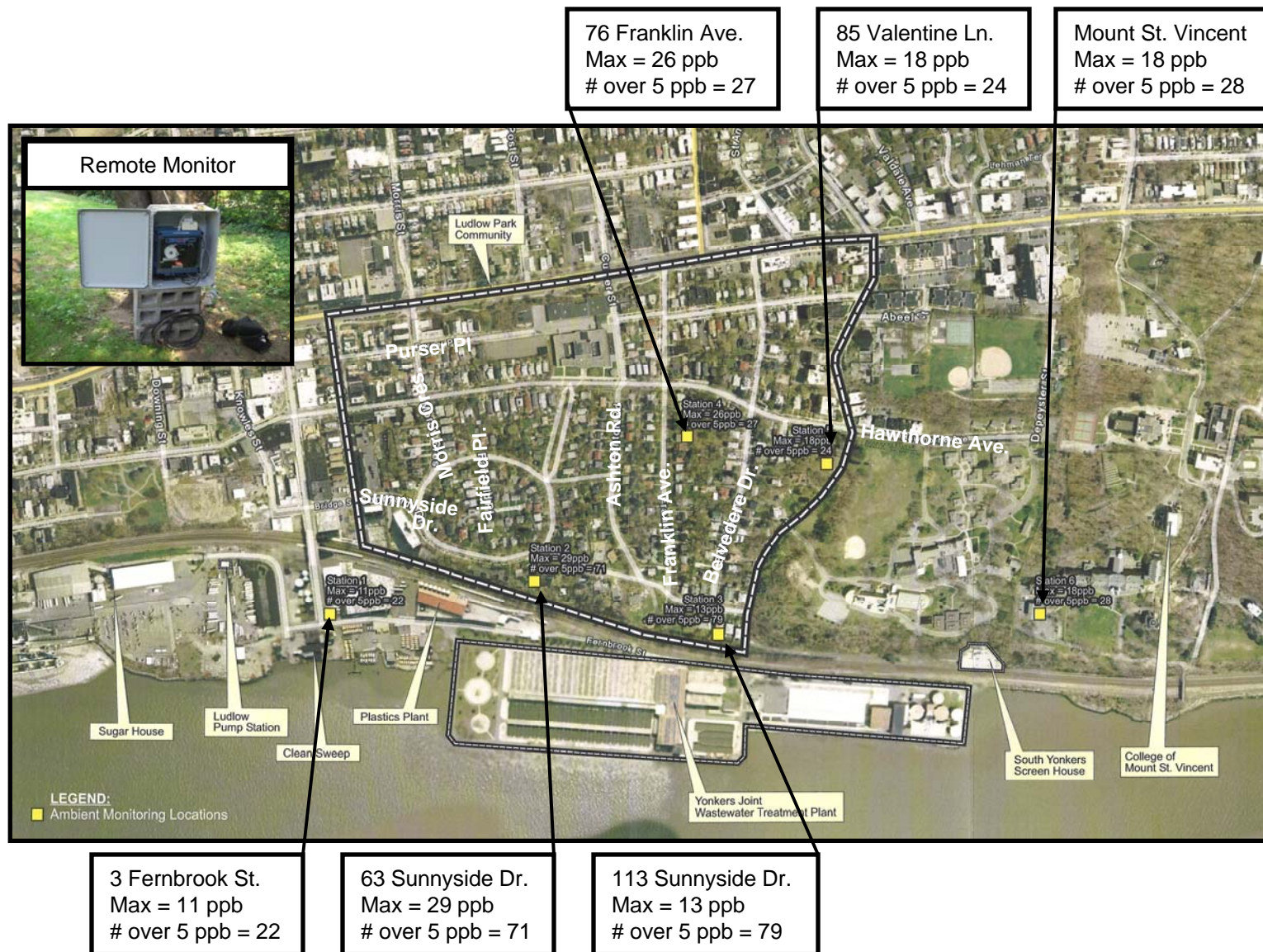
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Remote Automatic Samplers in Neighborhood



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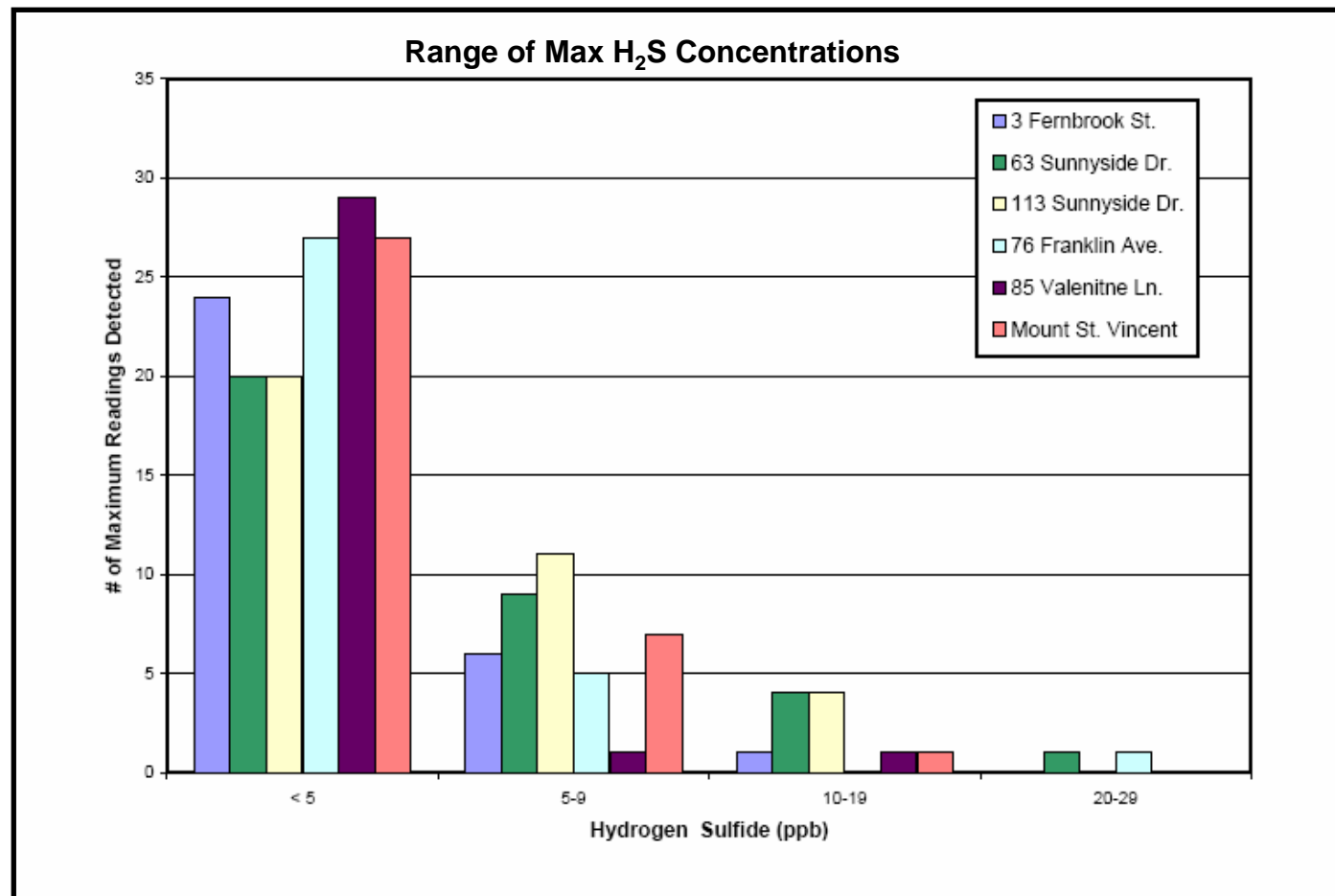
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Remote Automatic Samplers in Neighborhood (cont.)



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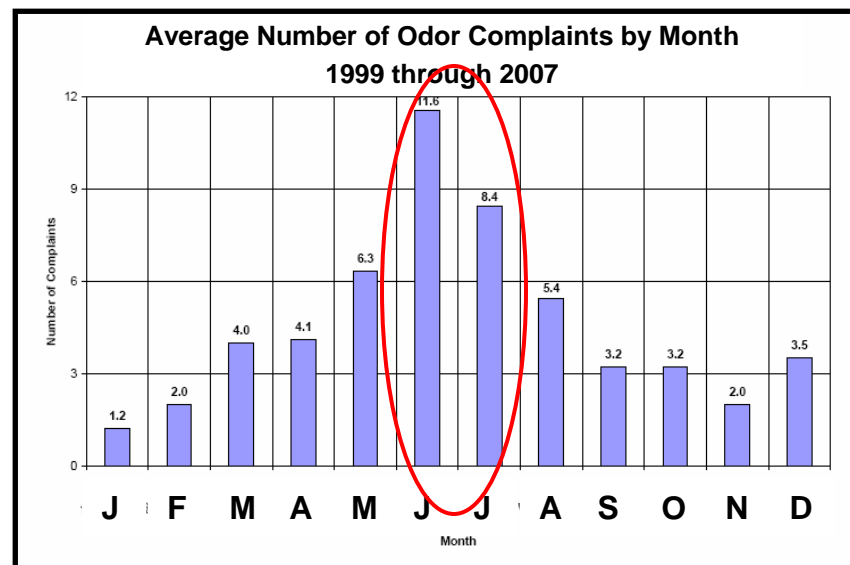
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Odor Complaints

- **Odor Study Update Analysis:**
 - Review of detailed odor complaint data from 2004 through 2007
 - Analysis of odor events (3 or more complaints in one day) which occurred during the study period (May 14 through September 5, 2007)
 - Review of odor complaint statistics from 1999 through 2007
- **Results:**
 - Most complaints occurred during summer months, during the afternoon and the evening



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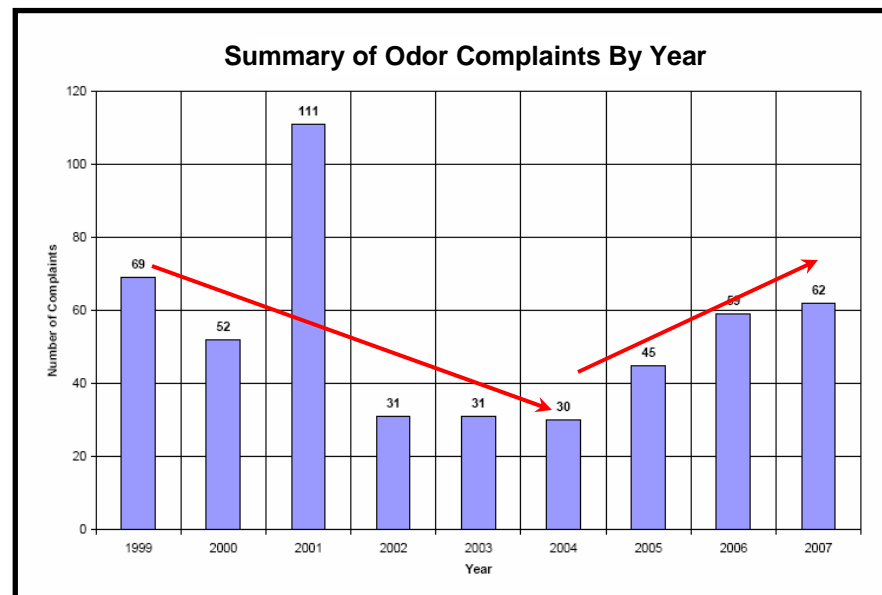
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Odor Complaints (cont'd)

- **Results (cont'd):**

- Steady decrease in complaints from 1999 to 2005, when complaints began to increase again through 2007
- Five odor events occurred from May 14 through September 5, 2007
 - Three of five events – H₂S @ property line > 5 ppb, H₂S detected in neighborhood by remote automatic samplers
 - Two of five events may be attributed to sludge hauling process
 - Two of the five events may be attributed to H₂S sources at the Plant



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Field Sampling: On-Site Monitoring

- **Determination of Emission Rates:**
 - To be discussed with the Air Dispersion Model results.
- **Scrubber Evaluations:**
 - Scrubber systems generally well maintained
 - Plant personnel perform regular inspections and sampling
 - Identified several potential areas for improvements:
 - Monitoring and controlling air flow rates
 - Monitoring of scrubber performance
 - Sodium hypochlorite feed rate control



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Field Sampling: On-Site Monitoring

• Findings:

- On-site sampling generally revealed that areas with the highest hydrogen sulfide levels are already equipped with odor containment and/or control measures, or are already slated for upgrade with odor control.
- No severe uncontrolled hydrogen sulfide sources were identified, although several potential on-going odor sources were identified.
- Existing odor containment cover system is generally air-tight
- Aeration Tanks, Final Settling Tanks, North Chlorine Contact Tanks and South Chlorine Contact Tanks not found to be major hydrogen sulfide sources.



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Field Sampling: On-Site Monitoring

- **Findings (continued):**
 - Primary and Secondary Digester Pressure Relief Vents intermittently discharge concentrated slugs of odors
 - Secondary Sludge Digester Overflow Box odor control systems not operating properly due to moisture buildup
 - Digester Relief Valves and Overflow Boxes are potential VOC sources as a result of the generation of methane



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Off-Site Monitoring

- **Contributions from Off-Site Industrial Facilities:**
 - “Garbage” odors were noted emanating from dumpsters located at Clean Sweep
 - Paint-related odors, “Dry-Cleaner” odors and solvent odors were noted within select sewer system locations
 - VOCs were detected at locations where solvent type odors were noted
- **Off-Site Monitoring Results:**
 - Several City of Yonkers owned and operated manholes found to emit H₂S concentrations in excess of 5 ppb
 - Pressurization of some sections of the sewer system can cause sewer gases to be released to the atmosphere via openings in manhole covers



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Off-Site Monitoring – Average H₂S Concentrations



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Off-Site Monitoring – # of Manhole Exhausting Events





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Dispersion Model

- **AERMOD, Version 6, was utilized for all air dispersion modeling. NYSDEC and USEPA modeling protocols followed.**
- **Developed emission rates (g/sec) from each identified source as a function of measured H₂S concentration and exhaust rate of source.**
- **Exhaust stacks (point sources), building ventilation (point sources) and open tanks and channels (area sources) considered in model.**
- **Model calculates maximum hourly H₂S concentration at a grid of receptors placed at specific locations defined by the user**
- **Per USEPA and NYSDEC guidance, receptor points were placed at the points of intersection of a 70-meter by 70-meter Cartesian grid extending more than 1-kilometer to the north, east and south of the Plant**
- **Separate model runs were completed to assess impacts to elevated receptors (e.g., apartment buildings)**

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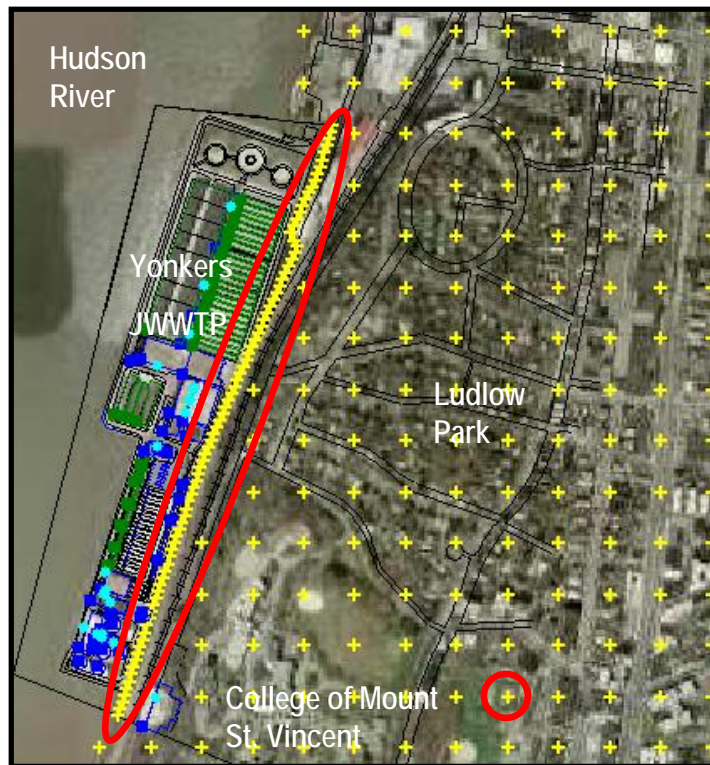
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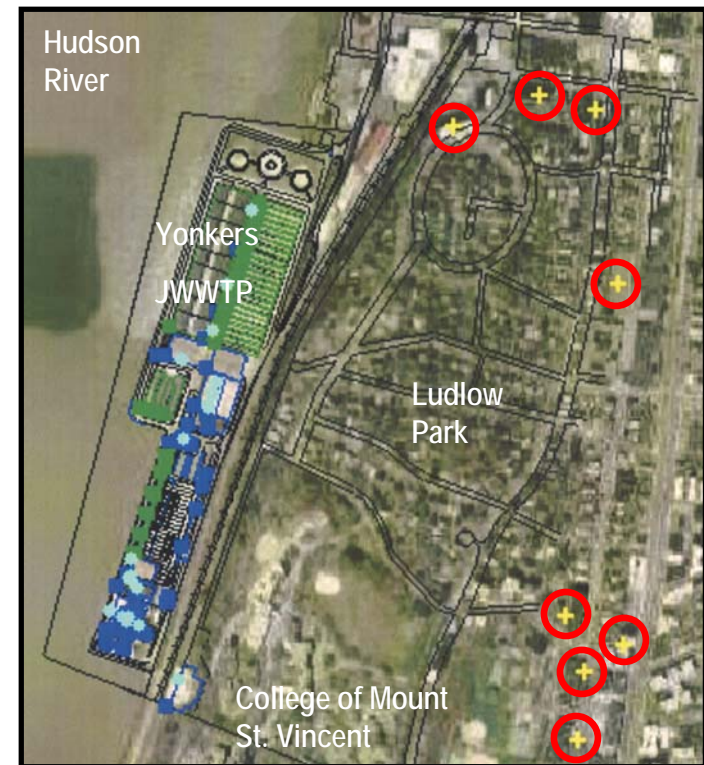
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Dispersion Model - Receptor Grids



Ground Level Receptors



Elevated Receptors

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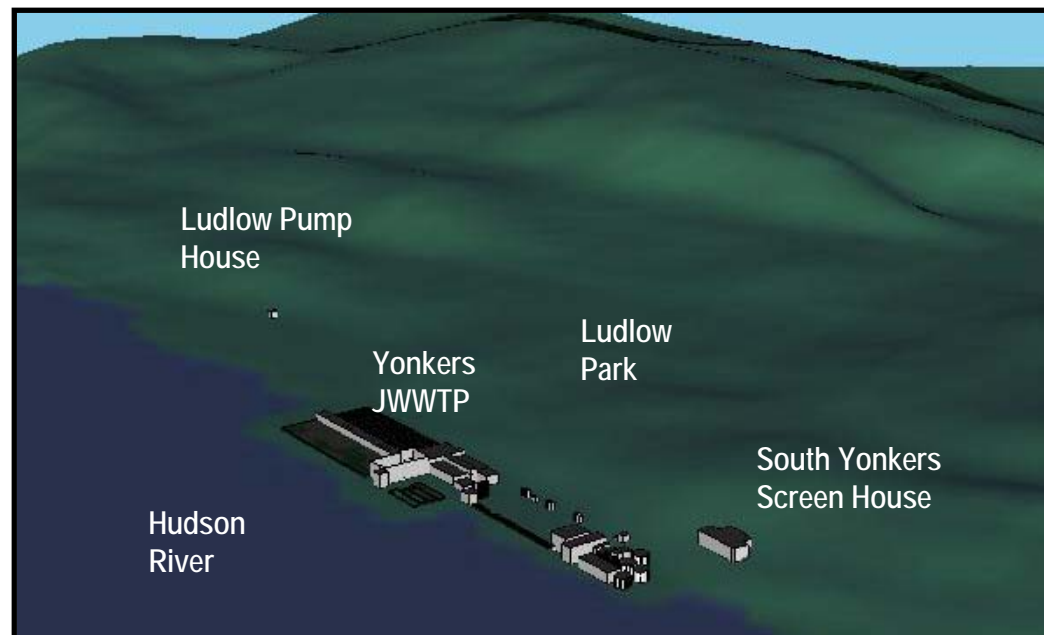
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Meteorological and Terrain Data

- **Meteorological Data:**
 - Per USEPA and NYSDEC guidance, 5-years of meteorological data from the nearest airport with comparable land-use characteristics was incorporated into the model.
- **Terrain Data:**
 - Per USEPA and NYSDEC guidance, 7.5-minute Digital Elevation Model data was incorporated into the model to account for terrain effects of the Plant site and the surrounding areas



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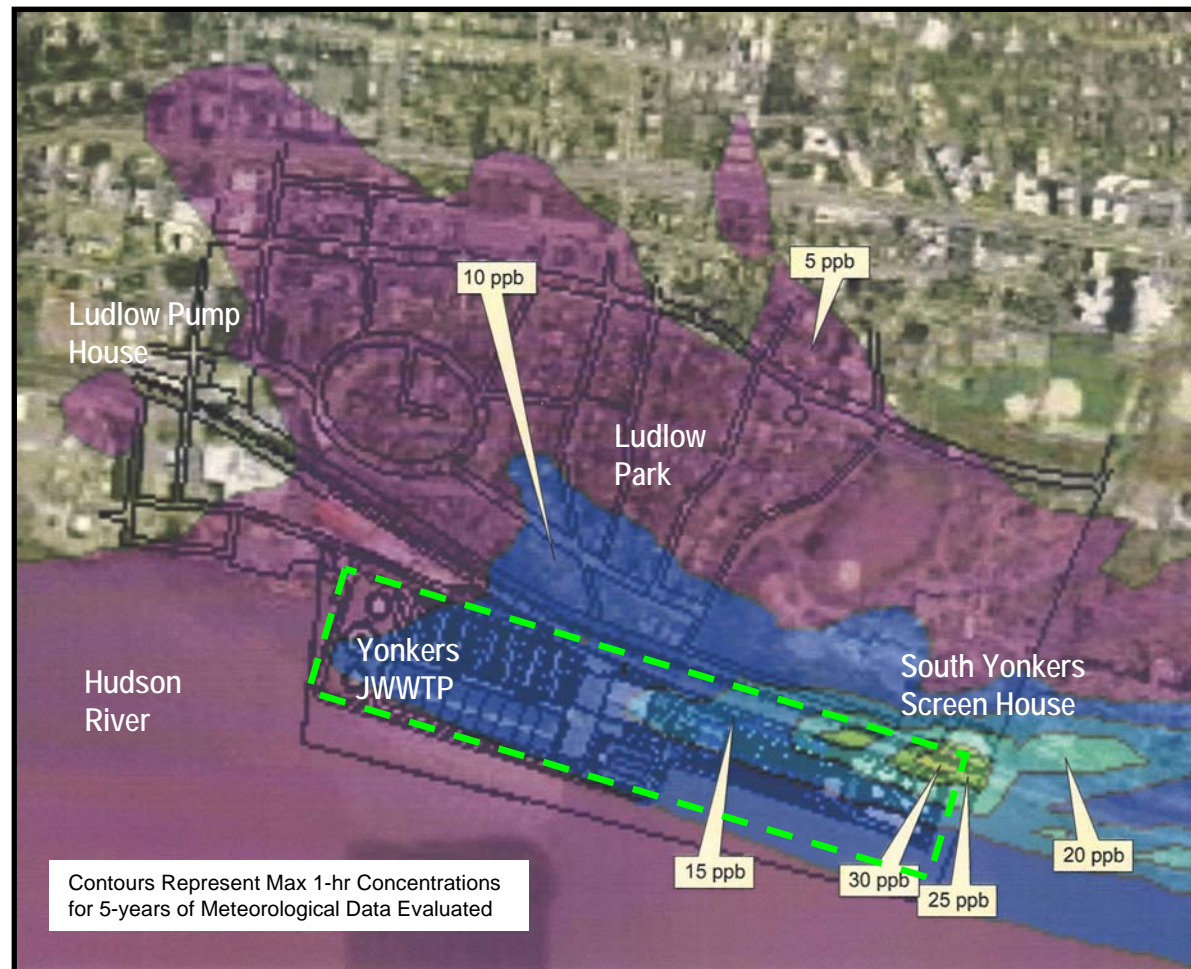
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AERMOD Results – All Sources



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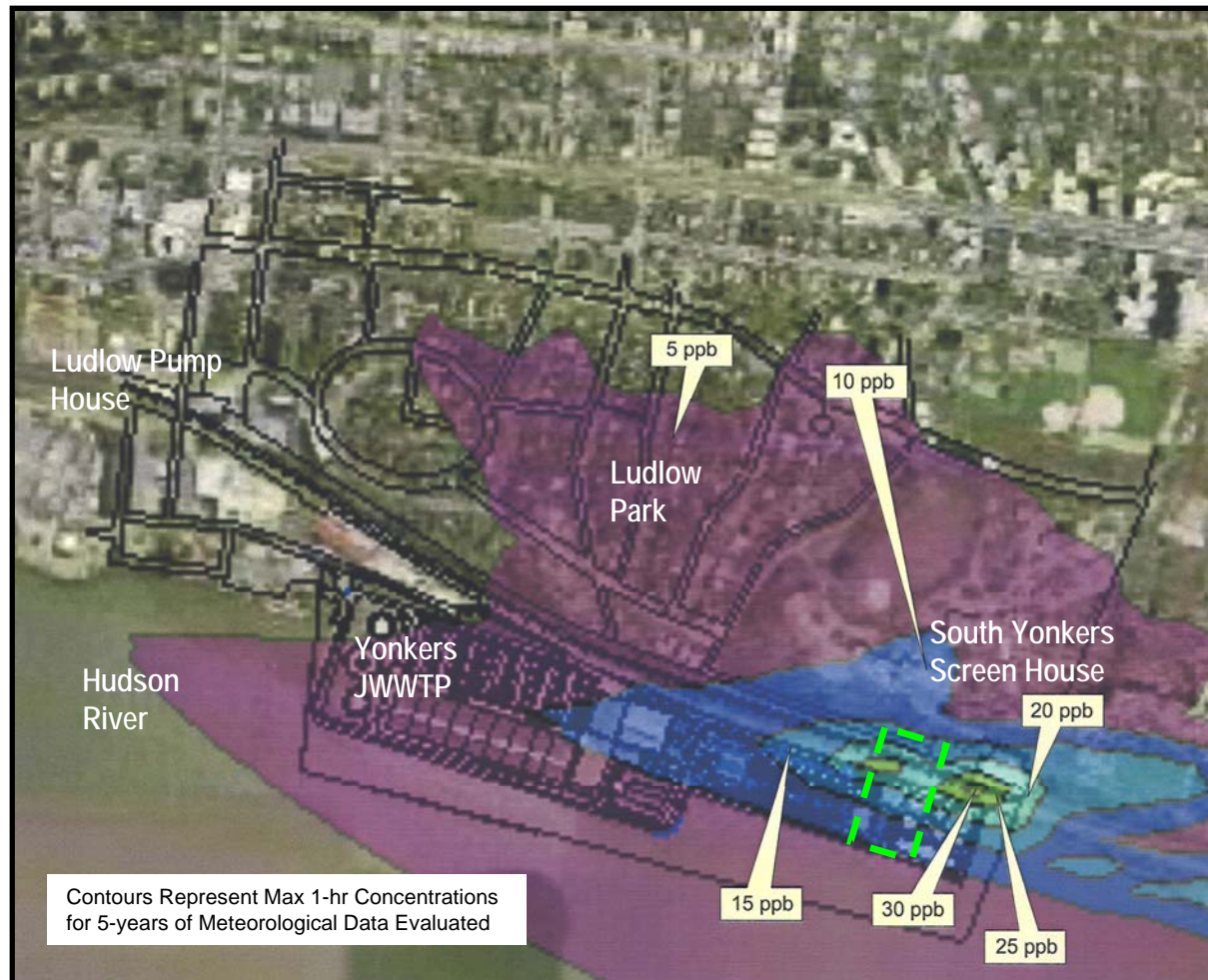
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AERMOD Results – Zone 2 Screen and Grit Building



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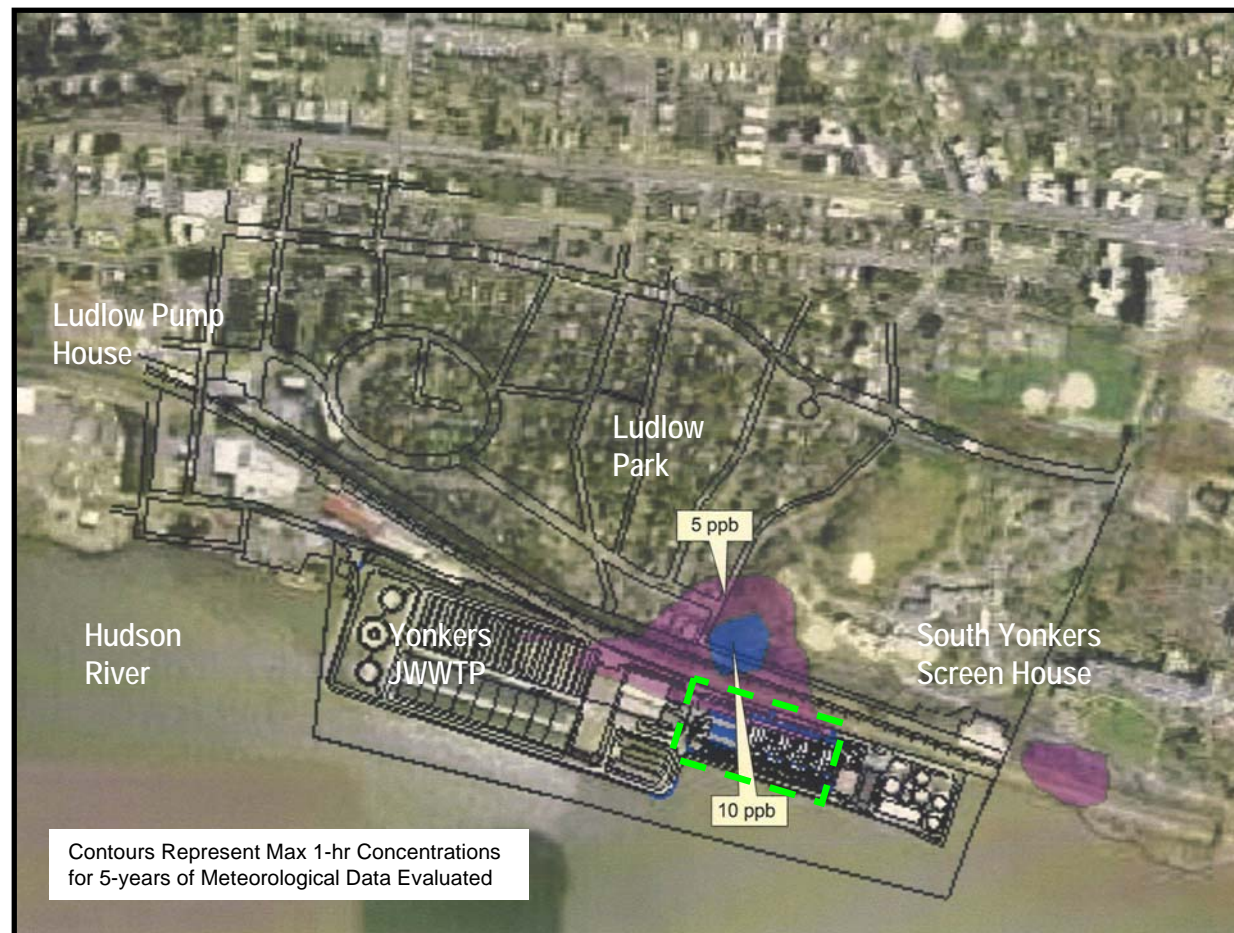
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AERMOD Results – Zone 3 Odor Control Stack



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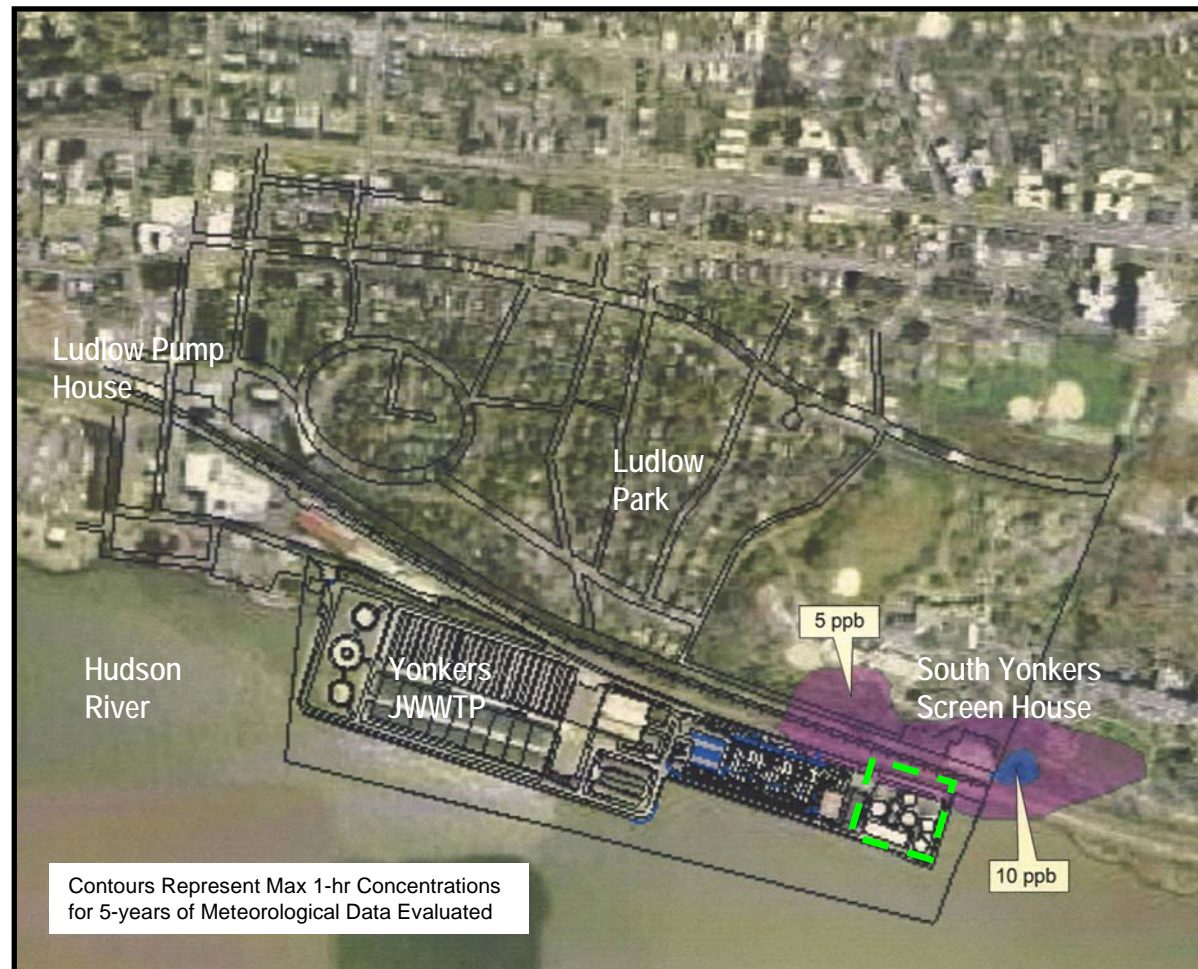
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AERMOD Results – Zone 1 Odor Control Stack



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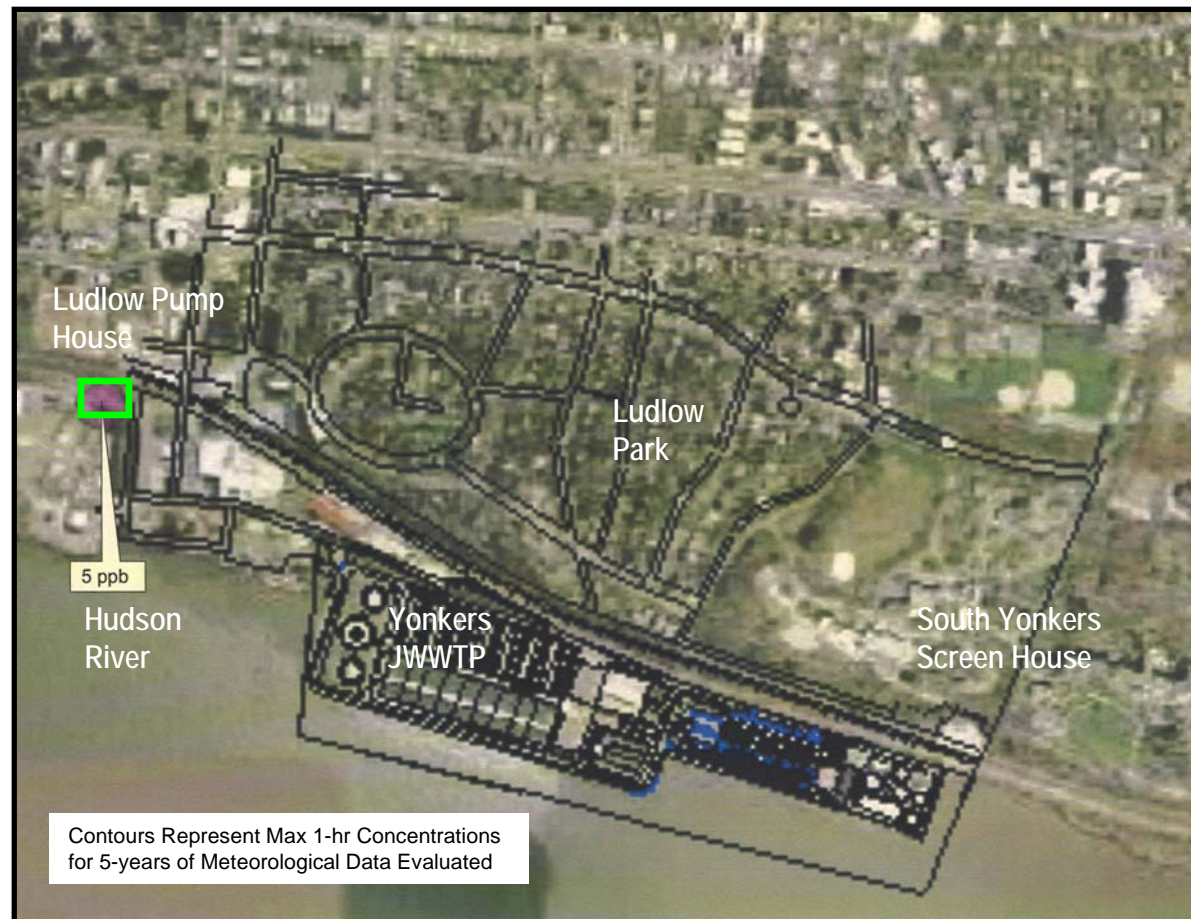
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AERMOD Results – Ludlow Pump Station



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Impact Assessment

AERMOD Results – All Sources w/Elevated Receptors



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Recommendations: Screen and Grit Building

- **Recommend installation of a new odor control system with enhanced ventilation of Screen and Grit Building**
- **Three (3) Low Profile Multi-Stage Odor Control Scrubbers**
- **Located on the roof of the existing Screenings and Grit Container Breezeway**
- **Proposed system uses sodium hydroxide and sodium hypochlorite to remove hydrogen sulfide from the exhaust air prior to discharge to the atmosphere**



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Recommendations: Existing Odor Control Systems

- Air flow metering improvements to more accurately control air flow rate through each scrubber system
- Continuous inlet and outlet H₂S monitoring for scrubber performance
- Automated control of sodium hypochlorite feed through direct H₂S measurements
- Mesh pad demister improvements to increase washing efficiency



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✓Ludlow P.S.

- Misc. Systems
- Impact Assessment

Recommendations: Ludlow Pump Station

- Remove existing wet well exhaust fan and ductwork
- Install new activated carbon odor control adsorption system
- Recommended system includes:
 - Polyethylene activated carbon bed containment vessel
 - FRP ductwork
 - FRP blower



AGENDA:

Project Background

- 1992 Odor Study
- Existing Abatement Measures

Results of Data Analysis

- Property Line H₂S Data
- Remote Samplers
- Odor Complaints
- Field Sampling

Dispersion Modeling

- Dispersion Model
- Met/Terrain Data
- AERMOD Results

Odor Abatement Recs.

- Screen and Grit
- Existing Odor Control
- Ludlow P.S.

✓Misc. Systems

Impact Assessment

Recommendations: Miscellaneous Systems

- **Digester pressure relief vents**
 - Upgrade with activated carbon treatment
 - Work is ongoing at the Primary Digesters
- **Secondary Digester Overflow Boxes**
 - Upgrade with moisture separator to increase operational efficiency
- **Settled Sewage Control Structure**
 - Upgrade with activated carbon treatment



Typical Activated Carbon
Odor Control Unit

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✓ Misc. Systems

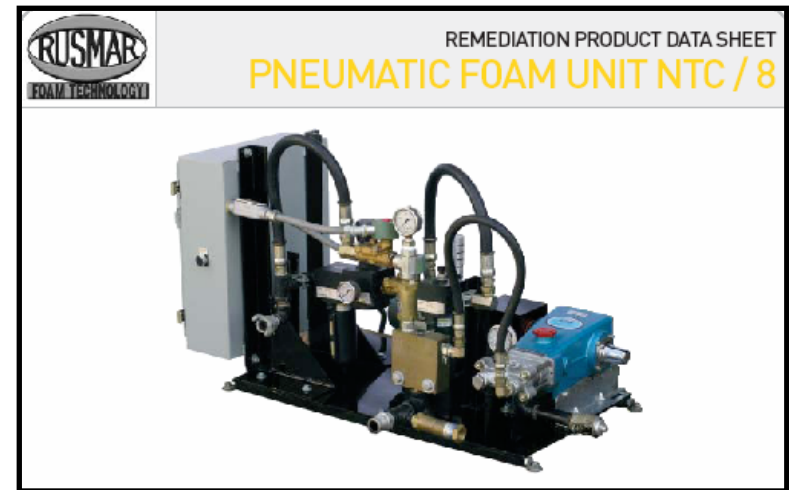
Impact Assessment

Recommendations: Miscellaneous Systems

- **Sludge Transportation Improvements**
 - Upgrade with odor control foam applicator system
 - Foam trial is proposed for 2008
- **Collection System**
 - Install activated carbon manhole inserts



Activated Carbon Manhole Insert



Odor Control Foam Applicator Unit

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Dispersion Modeling

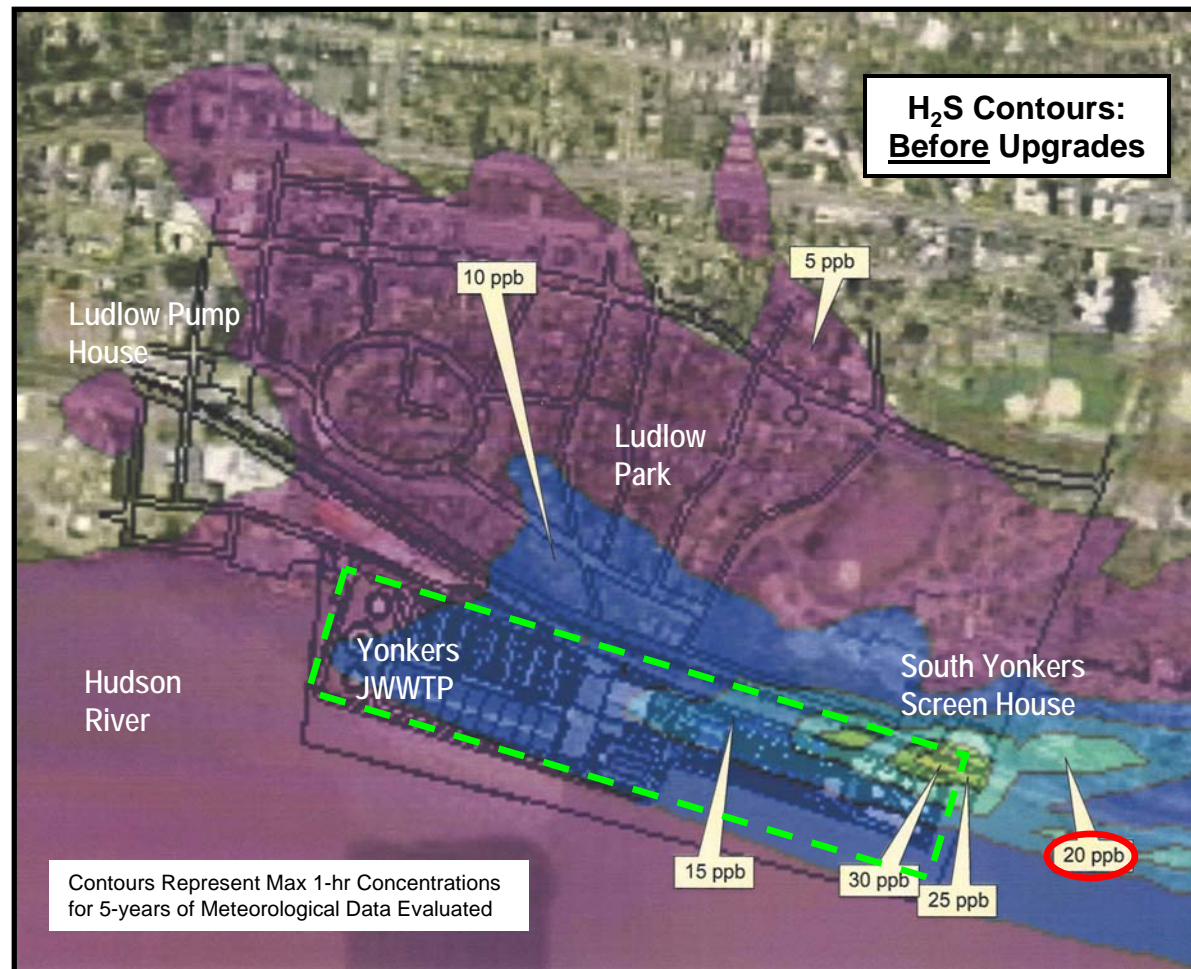
- Dispersion Model
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Impact Assessment

AERMOD Results – All Sources



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AGENDA:

Project Background

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Results of Data Analysis

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Dispersion Modeling

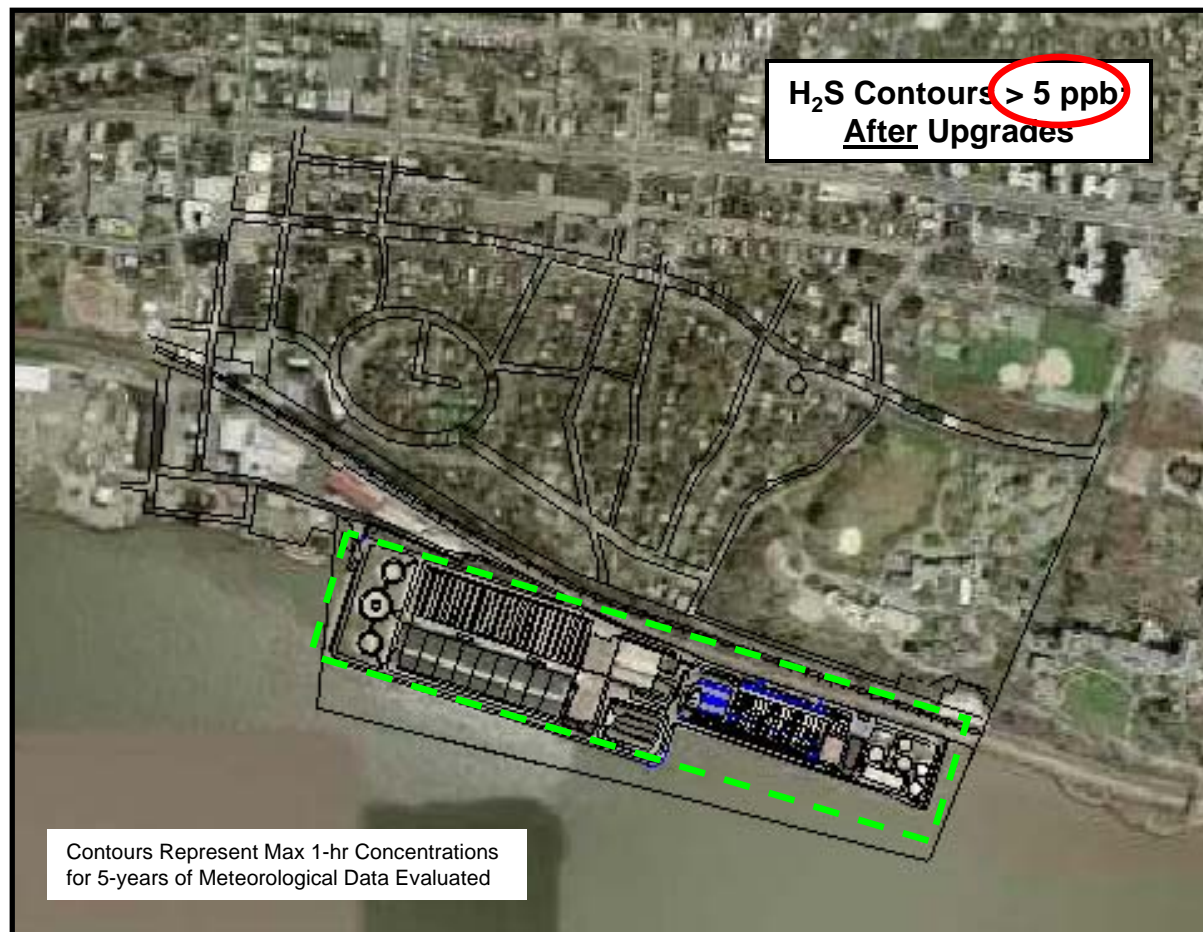
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Odor Abatement Recs.

- Screen and Grit
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Impact Assessment

Impact Assessment of Recommended Measures



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AGENDA:

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Impact Assessment

Impact Assessment of Recommended Measures

