Yonkers Odor Control Study

Yonkers Joint Water Resource Recovery Facility

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CDM Smith

Odor Control Study - Presentation Outline

- Introduction
- Purpose of Odor Control Study
- Background on Odor
- Sampling Overview
- Preliminary Findings

Introductions

CDM Smith Presenters

- Christopher Korzenko, P.E. – Client Service Leader
- William Nylic, P.E. – Project Manager
- Bruce Singleton, P.E. – Odor Control Specialist

Firm Introduction

Company Background – CDM Smith

- Established in 1947
- More than 5,000 employees worldwide
- Services include consulting, engineering, construction, and operations
- Solutions in water, environment, transportation, energy, and facilities
- Experienced in the design and evaluation of odor control systems
  - Odor Source Surveys/Emissions Modeling/Dispersion Modeling
  - Technology Assessments
  - Process Cover Design/Odor Control Design
  - Construction Services

Purpose of Odor Control Study

Goal

- Identify sources of odors and develop recommendations to reduce offsite impacts

Areas of Focus

- Odors associated with taking tanks out of service
- Performance of existing odor control equipment
- Aeration tank odor control
- Flare operation

Odorants Background

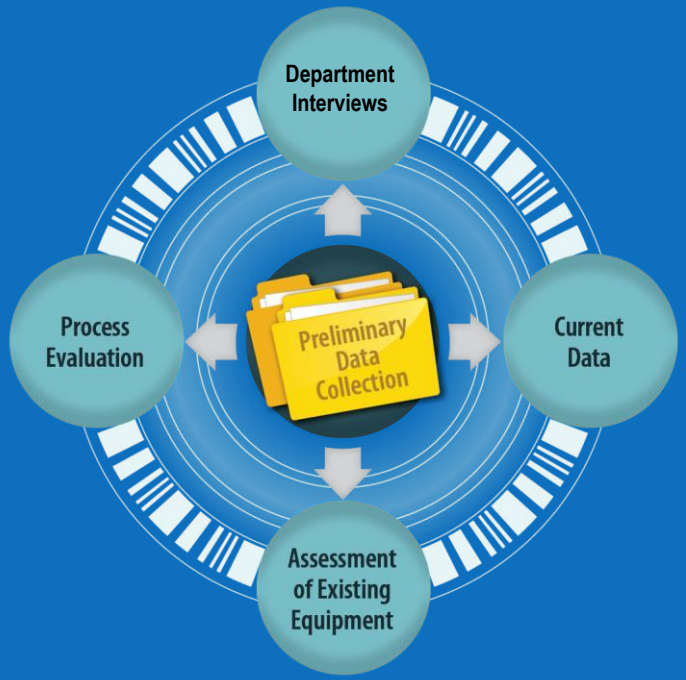
- Odor is the sensing of the odorant
- Identifying the specific odorant leads to the solution
  - Odorous chemical compounds: Odorants
- Resident Odor Observations
  - Chemicals
  - Dryer Sheets
  - Burning
  - Sewage
  - Rotten Food
  - Baby Diapers

Common Odorants in Wastewater

Odorant	Examples	Dominate
Hydrogen Sulfide		• Sewer Systems • Wastewater Treatment Systems
Organic Sulfur Compounds	• Dimethyl Sulfide • Methyl Mercaptan • Carbon Disulfide	• Sludge holding, thickening, dewatering and stabilization processes
Nitrogen Compounds	• Ammonia • Amines • Skatole • Indole	• Sludge digestion (anaerobic)
Volatile Fatty Acids	• Acetic Acid • Butyric Acid • Valeric Acid	• Gravity thickeners
Aldehydes and Ketones	• Acetaldehyde • Methyl Ethyl Ketone • Acetone	• Sludge holding, thickening, dewatering and stabilization processes

Data Collection

- Preliminary Data Collection
  - Collaborative Review of Existing Data with Plant Staff
    - Interviews
      - Plant preferences
    - Plant operations data
      - Odor control process data
      - Odor complaint logs
    - Current data
- Supplemental Data Collection
  - Existing Equipment Assessment
    - Collection and conveyance
    - Treatment Processes
  - Liquid Phase Data
  - Vapor Phase Data



Sampling Plan Overview

- Comprehensive review of existing emission sources
  - Chemical scrubbers
    - Performance
  - Open Tanks and channels
- Investigation of fugitive emissions sources
  - Potential leaks in covers
  - Incomplete/unbalanced ventilation
- Interior ventilation
  - Unbalanced ventilation
  - Odorous rooms exposed to the outside

Sampling Program – Field Equipment Used

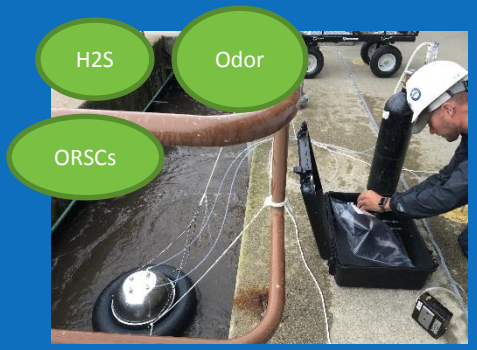
Used a variety of sampling methods to capture maximum amount of odorants

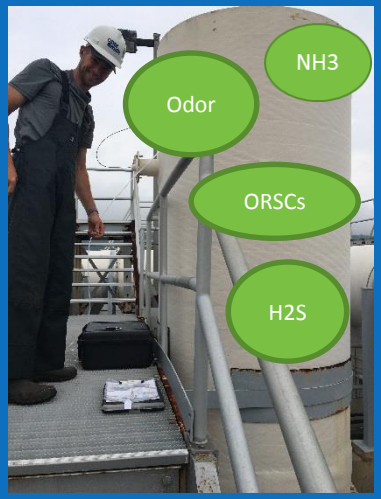
- Colormetric Tubes for specific analytes, NH_3
- H_2S Sensors and Data Loggers
- Equipment for liquid measurements

Sampling Program – Field Equipment Used

Data Collection Design

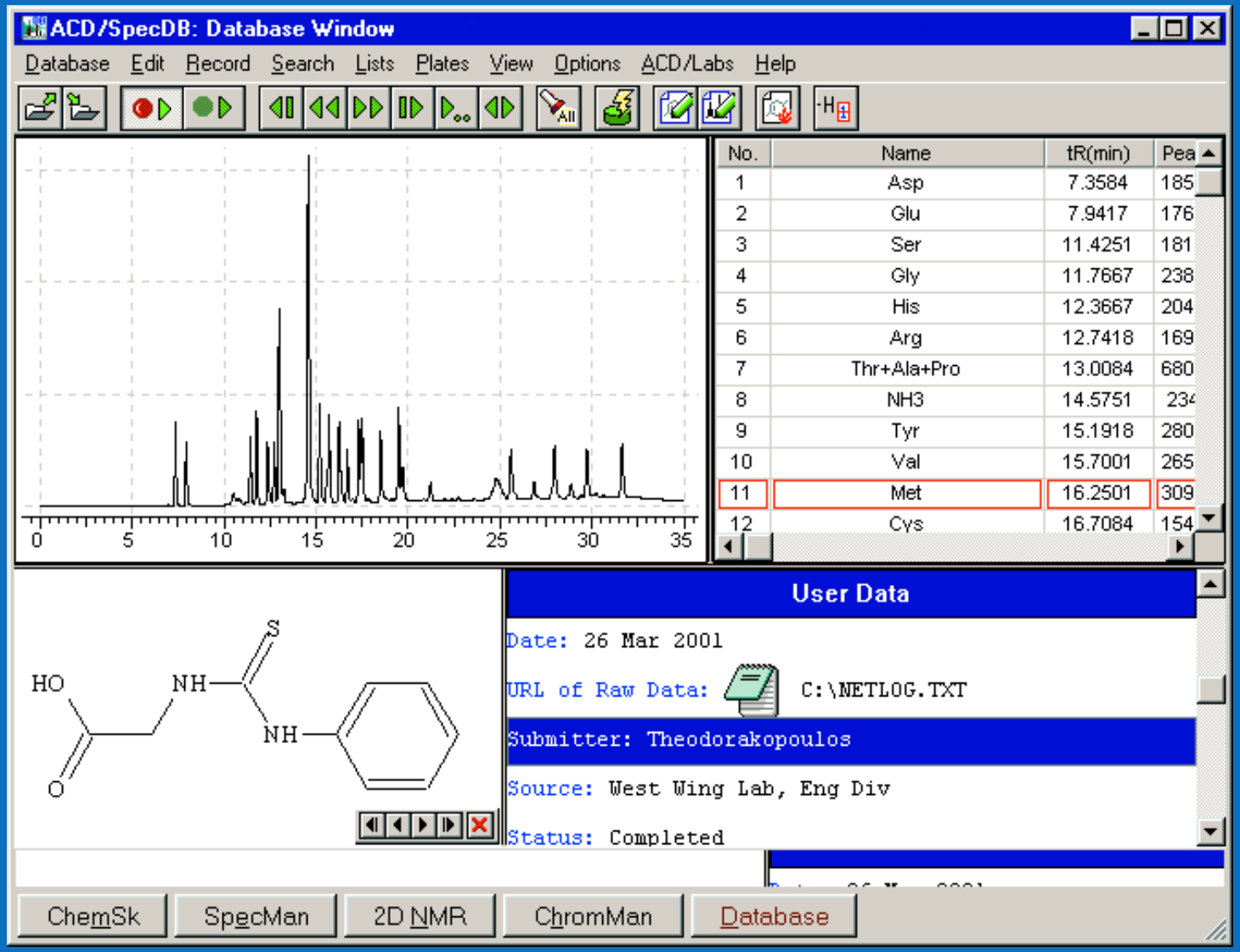
- Analytical analysis for odorants to determine appropriate treatment options and equipment sizing.
  - Hydrogen sulfide (H_2S)
  - Organic Reduced Sulfur Compounds (ORSCs)
    - Mercaptans, organic sulfides
  - Ammonia (NH3)





- Liquid analysis provides an estimate of odor potential from liquid sources
  - Dissolved Oxygen (DO)
  - Oxidation Reduction Potential (ORP)
  - Dissolved Sulfide (dS^-)
  - pH
  - Temperature

Example Results – Gas Chromatography

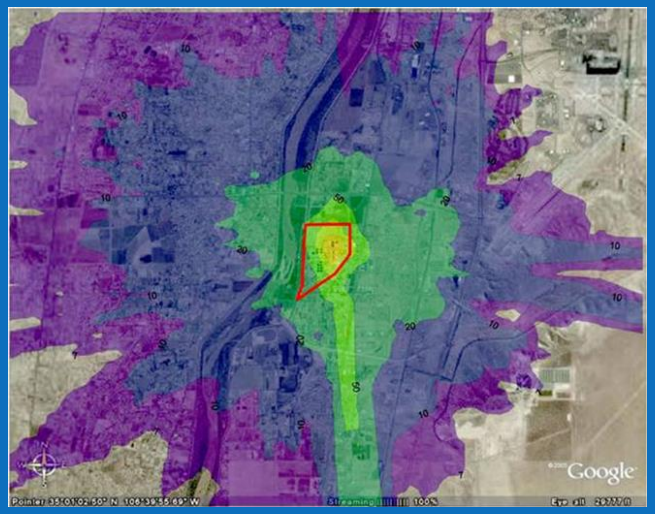


Measuring Odor

- Use “forced-choice” olfactometer
- Odor concentration
  - Expressed as dilutions-to-threshold, (D/T)
  - Detected by 50% of panelists
- Done in accordance with industry-accepted standard
  - EN 13725:2006

Application of Data: Modeling

- How much treatment to design for?
  - Dispersion Analysis
    - Plant wide source sampling
      - H2S
      - VOCs
      - Odors
    - Local Meteorological data
    - Local Topography
    - Local Complaints
  - Provides an assessment of the current (baseline) effects as well as the effects from treatment at various sources



Odor Contour Plots depicting Maximum Extent of Odors that may be detected at the level of 10 odor units (OUs) for 50 hours in a year

The outermost red line depicts the limit of "all" odors. The other colors represent impacts of individual odour sources

Note: The Scale of all figures is the same

Existing Situation 2012
after **Biogas Sphere** was replaced in 2011

The odors after **THP Building Fans** are controlled...

...and **Dryer Building** odors are controlled

...and **Sludge Truck** odors are controlled

...and **CHP** odors are controlled

...and **Screening** odors are controlled

...and **Grit** odors are controlled

Application of Data: Process Assessment

- Liquid samples
  - Indicate septicity of the sewage and potential to create odors
- Vapor samples
  - Indicate the performance of odor control equipment

Data Collection – Collection and Conveyance

- Ventilation, Confinement and Conveyance
  - Fugitive emissions from unbalanced duct systems
  - Safety and Health Codes
  - Corrosion from insufficient ventilation

Duct components

HVAC coordination
safety and code considerations

Airflow Balancing

Next Steps

- Receive analytical results
- Analyze data
- Update air dispersion model
- Provide recommendations for Odor Control System improvements to reduce odors

- Please provide feedback on this presentation to your residents association and include:
  - Topics for next presentation in March 2018
  - Interest in having an odor monitoring station on your property

Questions?