Generating Meaningful Environmental Information During the Chaos of an Emergency Response

NEMC
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Agenda

- Similarities and Differences Between Three Large Scale Releases
- Project Background/ Event Facts
- Environmental Standards' Involvement
- Project Accomplishments
- Activities, Challenges, and Notes of Interest
- Conclusions

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PPL Martins Creek Fossil Plant

- 1.7 GW oil and natural gas-burning power plant complex
- 750 acre site bordered by Delaware River
- Commercial operation of coal plants began in1954

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PPL Fly Ash Release

- August 23, 2005
- 1 million gallons fly ash released
- Rain events resulted in 100-year flooding levels

August 2005

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TVA Kingston Fossil Plant

- 1.7 GW coal-burning power plant complex
- Harriman, TN
- Bordered by three rivers
  – Emory
  – Clinch
  – Tennessee
- Containment ponds

June 2007

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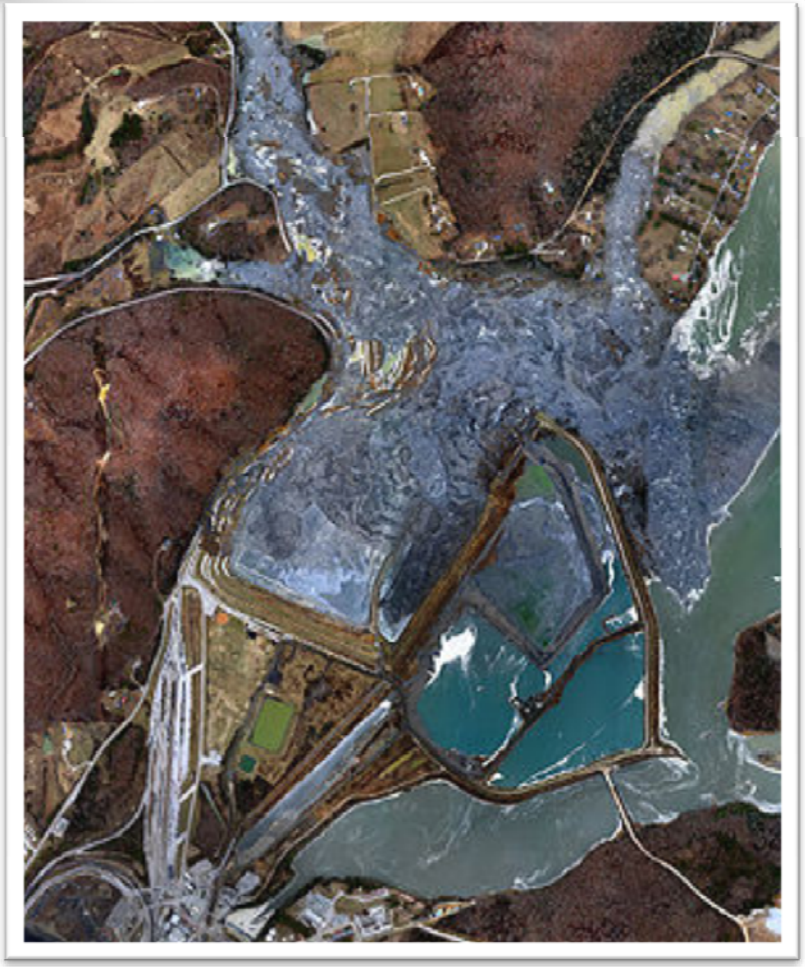
TVA Fly Ash Release

- December 22, 2008, shortly before 1 AM
- Ash dike of 84-acre containment pond ruptured
- 5.4 million cubic yards of fly ash into the Emory River
- 1.1 billion gallons
- Impacted over 300 acres



December 23, 2008

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BP Deepwater Horizon

- Ultra-deepwater offshore oil drilling rig
- Owned by Transocean and leased by BP from 2001 to 2013
- In February 2010, began drilling in the Macondo Prospect ~41 miles southeast of the Louisiana coast at a depth of ~5,000 feet

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Macondo Prospect Release

- April 20, 2010, the Deepwater Horizon Platform exploded, killing11 and injuring17
- An estimated 4.9 M barrels (780,000 cy) of crude oil was released into the waters of the Gulf
- July 15, 2010, the leak was stopped by capping the wellhead
- Tar Mat observed across approximately 4,000 square miles

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Similarities

- Sample collection and environmental management in action within hours
- Sample collection begins with minimal documentation
- Regulatory agencies arrive
- Incident Command System (ICS) set up within days

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Challenges?

- Many challenges in the initial response but chief is

- Chaos

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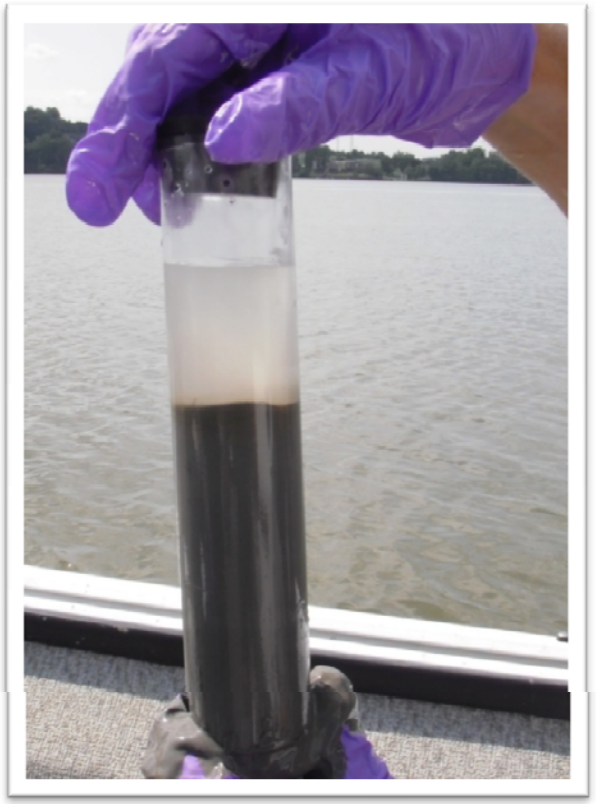
Decision-Making

- Rapid decision-making but still, chaos ensues
- “Who is in charge?” in spite of ICS and team efforts
  - Command hierarchy is not obvious at the bottom
- Environmental specialists rotate in on biweekly basis but have substantial responsibilities elsewhere
- The need to gather information is clear, but what are the research questions?
- What are the uses of the data going to be?

Field Sample Collection

- Few trained field sample collectors
  - Previous downsizing by TVA and elimination of Field Manual
  - Long stretch of river to cover on Delaware
  - Gulf of Mexico operations were led out of multiple command centers at first
  - No Standard Operating Procedures (SOPs) applicable to specific project collection activities
    - Samplers still did a fair job on field custody records and some field logbooks
  - No consistent sample nomenclature
  - No data management plan



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Data Management

- PPL did not have a management system in place
- TVA IT staff rotated members on site to manage Scribe Access™ and implement data reasonableness rules
- Several different data management systems were brought in across ICS locations
- It became obvious that assistance was needed (NOW!) and there were long-term needs
  - Planning
  - Staffing
  - Niche consulting expertise

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Environmental Standards' Involvement

- Martins Creek: Contracted September 2005 – One month after event
- Kingston: Contracted January 21, 2009 - One month after event
- Gulf of Mexico: Contracted May 4, 2010 – Fourteen days after event
- For all projects, Environmental Standards emergency response personnel:
  - Provided observations and concerns
  - Provided global and specific recommendations
  - Initiated immediate QA and data management actions

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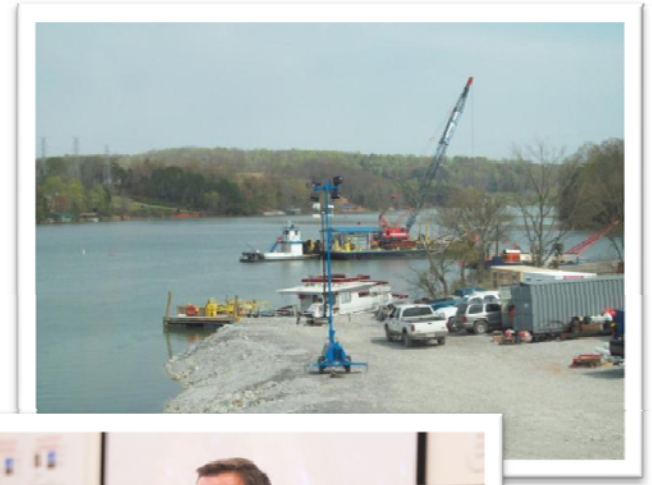
Immediate Observations

- Amazing effort from company and multi-agency staff
  - Sustainable?
- Plans - Lack of overall QA plan (high priority)
- DM tools & process - Very manual, need change management
- Personnel need to attend to pre-event roles, with project structure in place



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Immediate Concerns

- Concern about integrity and quality of data
  - Initially lab data
- Need bulletproof, legally defensible data
  - Sampling issues
  - Laboratory issues
  - Data issues
- Crisis management
  - A finite process

Global Recommendations

- Move away from Crisis to Project Management
  - Overall program/process
    - Sampling Point of Contact
    - Chemistry Point of Contact
    - Data Point of Contact
  - Step back and reassess
    - Roles and responsibilities
    - Business process/supporting functionality
    - Vendors/assist procurement

Specific Recommendations

- Initial steps
  - Develop overall QA Plan document
  - Transition from existing business process – day 1 forward
    - Insert quality system, oversight for lab services
    - Real time data assessment of current data
  - Assume sampling oversight and training
  - Implement data management process
- Assessment and loading of past data
  - Depends on lab production of data packages
  - Proofing output from database
  - Rigorous data validation

Immediate Actions: Data Management

- Implement a full cycle Data Management Process
- Implement an Enterprise Level Data Management System automating to maximum extent
  - Sample planning
  - Correctness / completeness checking
  - Automated data review - verification
  - Data validation support
  - Web Reporting (Self Service)
- Develop Data Management Plan

Immediate Actions: Quality Management

- Quality Assurance Plan - even though approval was months in coming
- Review/Add Laboratories
  - Time, quality, cost – pick two
  - Capable of electronic data deliverables

Immediate Actions: Laboratories

- Laboratory site visits
- EDD specifications in contract
- Data deliverables (Level I, Level IV)
- Helping engineers understand that the typical laboratory cannot provide 24-hour turn-around-time for extended periods
- Develop analytical specifications where agency methods do not suffice

Immediate Actions: Field Oversight

- Review Field Sampling Plans
- Sample crew training – an iterative process made more complex by rapid addition and removal of field crew
- Calibration was a challenge with multiple companies performing field sampling from several different command centers

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Policy on Plans: Utility before Approval

- Developments were so rapid
- Forced to implement plans and procedures in draft form and then wait for:
  - Later approval, or
  - Re-write of documents months later to determine final official copy
- Information to Support Analytical Requests could have been better

Accomplishments

- Develop and support a business process that minimizes time from sample collection to release from “Never” to 6 business days (5 days at lab, 1 day at Environmental Standards), while ensuring that data were releasable. These checks include:
  - Rapid reasonability check
  - Completeness
  - Correctness
  - Automated analytical chemistry data verification
- Develop and support graphing approach for public information website
- Develop and support graphing approach for agency information website

Activities & Challenges - Technical Tasks

- Prepare Technical Requirements and RFP for the Procurement of Laboratories
- Assess comparability of inter-laboratory data
- Establish a document management system
- Establish a Long Term Sample Retain Program
- Establish a Rugged Laboratory PE Program
- Support and Oversee Plaintiff/Third Party Sampling requests

Interesting things along the way…

- Dry-weight versus wet-weight versus as received reporting
- Laboratories don't always follow the published method or their own SOP…let me count the ways
- Lead contamination – weights used for surface water sampling points were sources of contamination
- Defensible (truly) reporting down to a project method detection limit
- Well homogenized, wet fly ash can go into a rail car like pudding and after being rattled, lots of pooled water is on top and packed concrete-like solid resides underneath

Interesting things along the way…

- A number of different types of custody seals can be easily removed and reattached without it looking like sample were tampered with
- Using disposable in line 0.45 micron filters, although expensive, saves time, money and minimize the potential of contamination from excessive sample handling
- Blue ice does not cool samples. An ice bath is needed to cool samples. Blue ice will only maintain temperature
- Proper fly ash homogenization requires herculean efforts the likes of using cement mixers and needs to be repeated immediately prior to sub-sampling

Interesting things along the way…

- Oil changes chemical profile dramatically the moment it is released to air or water. Many components rapidly degrade and diffuse in the environment.
- Catching snapping turtles is tricky business
- There is a minimum sample volume needed for % moisture determinations.

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Meaningful Information from Data

Three Golden Rules of Gathering Meaningful Information

1. Within most commercial laboratory settings, there is no difference between one sample and the next in terms of the levels of importance and care applied
2. Gathering truly important information requires attention to planning and almost a Murphy's Law attitude – expect and plan for "stuff happening" that will have negative effects on the information
3. If the information is truly important, there is a high likelihood that someone, somewhere at some point may challenge the underlying data, especially if there are financial implications

Conclusions

- Every Emergency Response starts off on the wrong foot…and behind in data reporting
- Emergency Response requires a different type of project planning and implementation – optimize for speed while appropriately adding control
- Labs and consultants that are nearest and dearest to the organization are not necessarily the best fit for the emergency
- Bean Counting is critical but relies on proper planning and control – data controls are key
- There will always be a (hopefully) small nugget of data that can't be readily sliced and diced for metrics – accept it and get over it

Conclusions (Cont.)

- Plans, Processes, and Partners
- Have “on the shelf”
  - Quality Assurance Plan
  - Data Management Plan
  - Record Retention Plans
  - Framework for SOPs
- Making it up on the fly during the emergency response is too hard

Conclusions (Cont.)

- If that doesn't work….more things to contemplate that should help
  - Difficult to staff an emergency response with internal personnel who already have jobs
  - Have Relationships/Partners “on the shelf” as well
    - Quality and Data Management
    - Field Sampling
    - Analytical Laboratories
    - Data Interpreters/Risk Assessors

Conclusions (Cont.)

- One cannot do enough to reduce chaos!
- Until formal plans are in place, consider using an Analytical Request Form (ARF) in the early going!
- ARFs are easy to implement
- ARFs collect information on:
  - Reason for sample / data collection
  - What test / analytical sensitivities are desired
  - Who receives results or interprets the data

Conclusions (Cont.)

Question: Why harp on Quality Assurance and Data Management?

Answer: In the end, all you have are data…

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