Quality Assurance Program for the TVA Kingston Ash Recovery Project

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Agenda

- Client Background/ Tennessee Valley Authority (TVA)
- Project Background/ Event Facts
- Environmental Standards' Involvement
- Activities, Challenges, and Notes of Interest
- Project Accomplishments
- Conclusions

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TVA Kingston Fossil Plant

- Tennessee Valley Authority (TVA) Kingston Fossil Plant
  - 1.7-GW coal-burning power plant
  - Bordered by two rivers – Emory and Clinch
  - Uses on average 14,000 tons coal/day

June 2007

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Project Background/Event Facts

- December 22, 2008, shortly before 1 AM
- Ash dyke 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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Challenges?

- Many challenges in the initial response:
  - Organization
  - Resources
  - Planning
  - Health and Safety
  - Data Quality

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Incident Command

- TVA 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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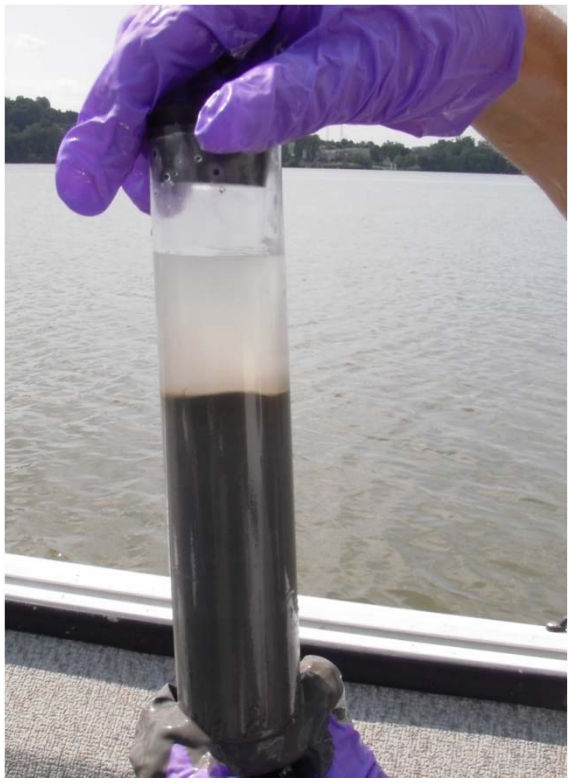
Decision-Making

- Rapid decision-making but still, disorganization
- “Who is in charge” in spite of ICS and team efforts

- TVA environmental specialists rotate in on weekly basis but have substantial responsibilities elsewhere

Field Sample Collection

- Understaffed TVA field sample collectors
  - Previous downsizing by TVA and elimination of Field Manual
  - No Standard Operating Procedures (SOPs) applicable to specific project collection activities
  - No consistent nomenclature



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Data Management

- TVA IT staff rotated members on-site to manage Scribe Access™ and implement data reasonableness rules
- It becomes obvious that assistance is needed and there were needs for longer term
  - Planning
  - Staffing
  - Niche consulting expertise

Environmental Standards' Involvement

- Contracted January 21, 2009 - One month after event
- Provided
  - Observations and concerns
  - Global and specific recommendations
  - Initiated immediate actions to assist

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Immediate Observations

- Amazing effort from TVA personnel
  - Sustainable?
- Plans - Lack of overall QA plan and SOPs
- DM tools and process
  - Very manual
- TVA personnel
  - need to return to pre-December 22 roles and have project structure put into 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
  - December 22, 2008 to March 2009

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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
    - Insert quality system, oversight for lab services, lab procurement
  - Transition from existing business process – day 1 forward
    - Real time data assessment of current data
  - Assume sampling oversight and training – develop SOPs
  - 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

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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

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Immediate Actions: Laboratories

- Laboratory site visits
- EDD specifications in contract
- Data deliverables (Level I, Level IV)
- Helping client understand that the typical laboratory cannot provide 24-hour turn-around-time for extended periods

Immediate Actions: Field Oversight

- Review Field Sampling Plans
- Sample crew training – consistency.
- Implement SOPs.
- Sub-contactor brought in excellent work ethic and quality process – no “recalibration”

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Activities & Challenges

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

Activities

- TVA collected data for many reasons – Community Outreach, Worker Safety, Spill Investigation, Characterization, and Delineation, Regulatory Compliance, Waste Characterization, and many special studies
  - 310 Ash samples
  - 1686 Biota samples (Amphibians, Birds, Fish, Mammals, Vegetation, *etc.*)
  - 113 Ground Water samples
  - 4055 Particulate Matter samples
  - 354 Sediment samples
  - 87 Soil samples
  - 4053 Surface Water samples
- Over 600K analytical records, >1.2M related parameters, and >2M monitoring readings for Air and river water

Accomplishments

- Develop and support a business process that minimizes time from sample collection to release while ensuring that data were releasable.
- Establish a Quality Assurance Protocol and QAPP.
- Established a laboratory program.
- Prepared over 55 SOPs.
- Performed training and field oversights.

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
- Lead contamination – weights used for surface water sampling points were sources of contamination
- Defensible (truly) reporting down to a project method detection limit
- Legacy contamination of sediments prior to spill

Interesting things along the way…

- Evaluation of custody seals.
- 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.
- Proper fly ash homogenization requires tremendous effort.

Interesting things along the way…

- Catching snapping turtles is tricky business

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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.
- Understand that some data collected is not going to meet your needs.

Conclusions (Cont.)

- Plans, Processes, and Partners
  - Things to contemplate that should help
    - 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 confusion!
  - Until formal plans are in place, consider using an Analytical Request Form (ARF) in the early going!
    - Easy to implement
      - Collects information on
        - Reason for sample / data collection
        - What test / analytical sensitivities are desired
        - Who receives results or interprets the data

Conclusions (Cont.)

- Why am I harping on Quality Assurance and Data Management?
  - In the end all you have is data…

Contact

“Setting the Standards for Innovative Environmental Solutions”

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