

Creating “Bullet-Proof” Environmental Information – A Case Study in Driving an Emergency Response to a Highly Managed Process

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Agenda

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



TVA's Kingston Fossil Plant

TVA Kingston Fossil Plant

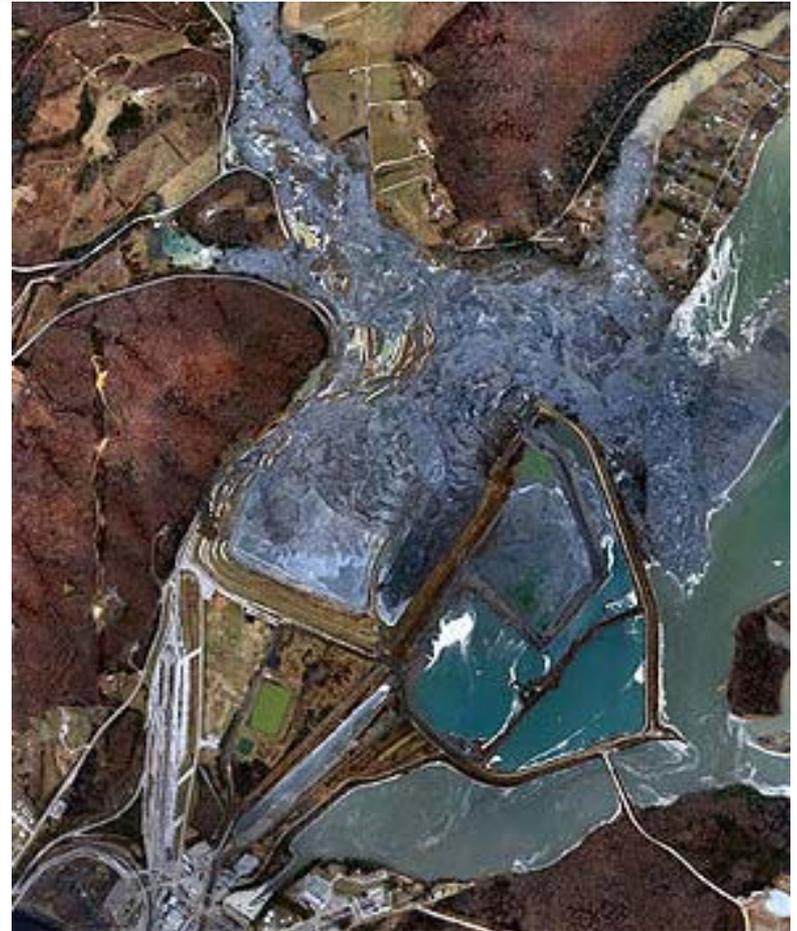
- Tennessee Valley Authority Kingston Fossil Plant
 - 1.7-GW coal-burning power plant
 - Bordered by three rivers – Emory, Clinch, and Tennessee
- Harriman, TN
- Containment ponds



June 2007

Project Background/Event Facts

- 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

Challenges?

- Many challenges in the initial response but there was

Chaos!



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



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

Field Sample Collection

- Few trained TVA field sample collectors
 - 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 naming nomenclature



Data Management

- TVA IT staff rotated members on site to manage Scribe Access™ and implement data reasonableness rules
- It became obvious that assistance was needed (NOW!) and there were going to be long-term needs
 - Planning
 - Staffing
 - Niche consulting expertise

Environmental Standards' Involvement

- Contracted January 21, 2009 - One month after event
 - Provided observations and concerns
 - Provided global and specific recommendations
 - Initiated immediate actions to assist in the response

Immediate Observations

- Amazing effort from TVA personnel
 - Sustainable?
- Plans - Lack of overall QA plan (high priority)
- DM tools and process
 - Very manual
- TVA personnel
 - need to return to pre-December 22 roles and have project structure put into place



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 ?



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 laboratory 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

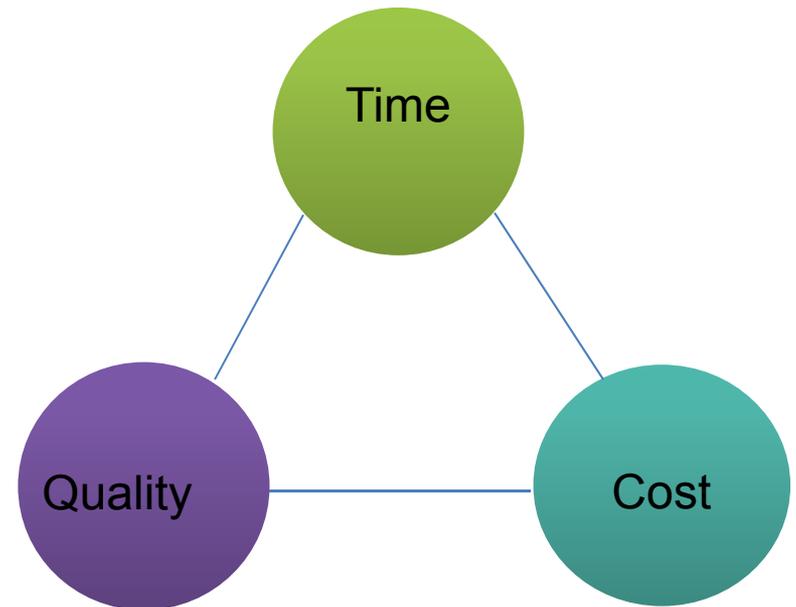


Immediate Actions: Data Management

- 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
 - Capable of electronic data deliverables



Immediate Actions: Laboratories

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

Immediate Actions: Field Oversight

- Review Field Sampling Plan
- Sample crew training – an iterative process made more complex by rapid addition and removal of field crew
- It was easy to implement good field practices and adhere to draft SOPs as they were being developed based on previous practices and training
- New lead engineer brought in had excellent work ethic and quality process – no “recalibration”



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
 - Re-write of documents months later to determine final official copy
 - Information to support analytical requests could have been better

Accomplishments

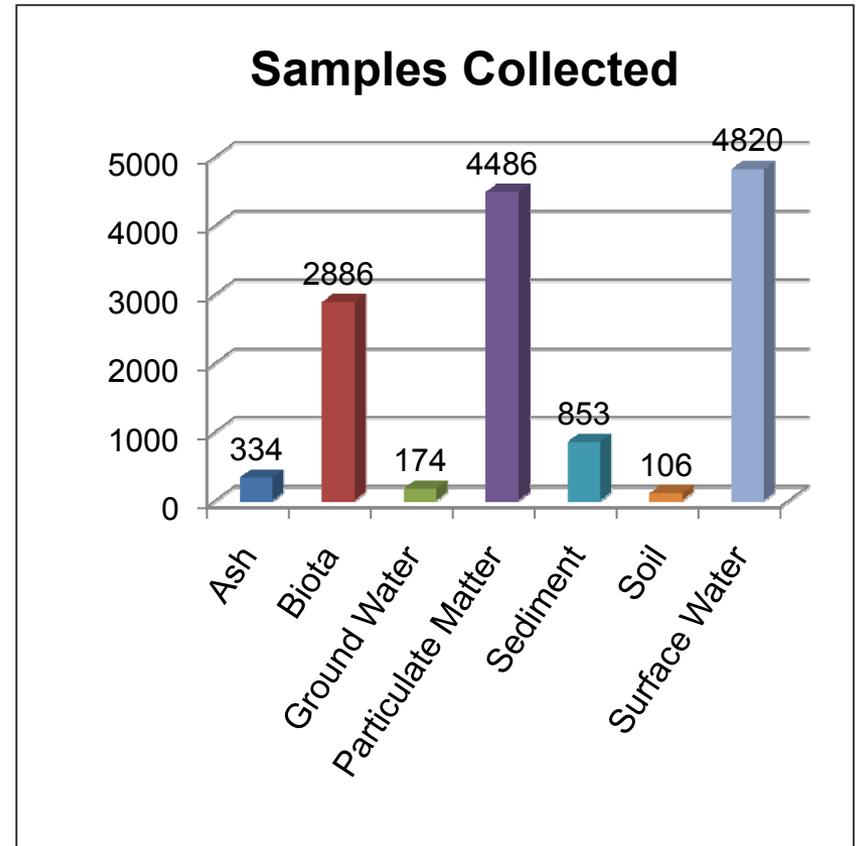
- Developed and supported a business process that minimizes time from sample collection to release from “never” to 6 business days (5 days at lab, 1 day with the QA Team), while ensuring that data were releasable. These checks included
 - Rapid reasonability check
 - Completeness
 - Correctness
 - Automated analytical chemistry data verification
- Developed and supported graphing approach for public information website
- Developed and supported 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 trailer 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
- Over 600K analytical records, > 1.2M related parameters, and > 2M monitoring readings for air and river water



Interesting things along the way...

- Laboratories do not always follow the published method or their own SOPs...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 samples were tampered with
- Using disposable in-line 0.45-micron filters, although expensive, saves time and money and minimizes 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... (Cont.)

Catching snapping turtles is tricky business



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 – optimized for speed while appropriately adding control
- Laboratories and consultants that are nearest and dearest to the organization are not necessarily the best fit for the emergency

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 does not 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 Process 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.)

Question: Why harp on Quality Assurance and Data Management?

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

Aerial Image of Kingston Ash Slide 02/16/2011



0 500 1,000 1,500 2,000
Feet

Tennessee Valley Authority
Geographic Information & Engineering

Before & After – East Embayment



Before & After – Church Slough



Before & After – Swan Pond Road



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