



Generating Meaningful Environmental Data in the Midst of an Emergency Response

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Presented by:

Dennis Callaghan, Director of Information Technologies/Principal Environmental Standards, Inc.

Co-authors:

William J. Rogers Ph.D, Neil E. Carriker Ph.D – Tennessee Valley Authority
Rock Vitale, Ruth Forman – Environmental Standards, Inc.

Acknowledgments to Kim Abbott - Environmental Standards, Inc. and
Robert Crawford - Tennessee Valley Authority



Agenda

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



TVA Kingston Fossil Plant

- Tennessee Valley Authority (TVA)
Kingston Fossil Plant
 - 1.7-GW coal-burning power plant
 - Bordered by three rivers – Emory, Clinch, 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 chief is

■ 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
 - Previous downsizing by TVA and elimination of Field Manual
 - 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 nomenclature





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 (NOW!) 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

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 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

A banner image showing a sunset over a body of water with a dark blue sky and a white diagonal line separating it from the rest of the slide.

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



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
- It was easy to implement good field practices and adhere to draft SOPs as they were being developed based on previous practice and training.
- Sub-contactor brought in 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
 - 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 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
 - 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

A sunset over a body of water with a dark blue sky and a white diagonal line separating the image from the text below.

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 residues 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...

- 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 – 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
 - 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 chaos!
 - 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 harp on Quality Assurance and Data Management?
 - In the end all you have is data...

Contact



“Setting the Standards for Innovative Environmental Solutions”

Dennis P. Callaghan
Environmental Standards, Inc.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482
610.935.5577
solutions@envstd.com
www.envstd.com