

**South River Science Team**  
**Advisory Panel Review Meeting**  
**October 25-26, 2016**

**Tuesday**

**Review of 2016 Monitoring Data: *Josh Collins, AECOM***

Fall Data Collection

- Both Short and Long-term monitoring parameters collected

Long-term Monitoring

- 2016 baseline data has been collected. Data will include all of 2016 plus 2014 and 2015 since construction has begun yet. Integration of multiple lines of evidence has begun. Focus has changed from event-based analysis to a more holistic view. Statistical analysis has started.
  - Aquatic Eco Exposure: Strong relationship between media with familiar spatial trend moving downstream.
  - Terrestrial Eco Exposure: Strong relationship between media with similar spatial trend in terrestrial data. Soil and earthworm data more closely related than wolf spiders along the South River.
  - Human Exposure: THg concentrations follow similar spatial patterns moving downstream with more variability observed at stations on South River. Mallard data is more variable than other receptors. There is a strong correlation between bass and turtle data within sites.
- Summary: Multiple lines of evidence in agreement. Comprehensive baseline data analysis is on-going. Utilize adaptive management post-remedy to assess monitoring program.

Short-term Monitoring

- Stations sampled: STM-01, STM-05, STM-07
- Fall data collections complete with data pending
- Preliminary Results: Periphyton concentrations less in 2016, but still have increasing trend downstream.
- Another set of pore-water data to be collected before construction begins.

Reporting Schedule

- Short-term Monitoring
  - Final Revised 2015 Annual report resubmitted to VDEQ
  - 2016 Annual Report – January 2017 (pending receipt of analytical data)
- Long-term Monitoring
  - Baseline summary report to be prepared this fall/winter
  - Anticipated submittal data – Q1 – 2017

**Reminder: Archived benthic voucher collections available for academic use. Contact Josh Collins for more information**

**Database Demonstration: *Christine Wallace, AECOM***

- Locus EIM (Environmental Information Management) is a cloud based data management solution that allows users to plan samples, manage sampling, lab and subsurface data, visualize results and generate regulatory reports.
- Customization: AECOM has maintained the biological data in Excel. Customization request was based on fields in Excel files not included in EIM. Locus created new fields and tables for storing data efficiently. Data is being migrated in manageable batches.
- Database Migration: Valid Value Lists (VVLs) were established in EIM (7 lists for taxon information, 6 for other biological attributes). VVLs enforce data integrity and limit data entry options. Excel data was moved into uploaded templates and loaded into the newly customized biota tables. Column headers were color coded to help determine which new tables would be populated with which columns of information. Biota data is now in EIM and can be pulled for evaluation.
- Christy gave demonstration of database which created lively discussion.

**Relative Risk Model Demonstration: *Sagar Thakli, AECOM***

- A review of the relative risk model was given with the smallmouth bass endpoint used as an example.
- Applications for the RRM include evaluating factors other than mercury and inputting into monitoring framework. Also, it can be used to evaluate management options as an input to the Enhanced Adaptive Management Model (EAM) and can also be used to incorporate changes in the RRM.
- Demonstration of model was given and lots of discussion followed. AECOM is working to modify model. Currently, model is set as Landis et. al. designed it. Example of needed change would be Reach 1 which includes Waynesboro, both up and downstream of mercury impacted area. It was pretty much a consensus that needed to be changed.

**XRF Potential Application and Discussion: *Robert Brent, JMU***

- Review of XRF previous findings was given. These include:
  - Accuracy at detection levels was good at concentrations < 7.4 ppm and even better at concentrations between 7.4 and 1000 ppm.
  - Precision was comparable to Method 7471A and constrained by sample heterogeneity.
- Moisture can interfere with XRF reading, basically diluting signal. Robert and team conducted several test to determine effect. While Hg results decreased with increasing moisture, variability was less than field triplicate variability. Results are slightly biased high in dry samples and biased low in wet samples. This can be corrected if moisture content is known and will improve the overall slope of the fit across a large sample set, but the correction does not improve the fit of data on an individual sample basis. Two reasons for this: First, variability associated with moisture is smaller than variability with sample heterogeneity. Second, benefits of moisture correction are mostly reserved for results at the upper end of the concentration range.
- Solutions for addressing moisture include:
  - Calibrate with a moist soil that is similar in %moisture to the samples that you intend to measure.
  - A moisture correction equation can be applied if moisture can be measured in the field.

- If calibration samples are representative of sample soil moisture, correction provides very minimal added value because of variability associated with soil sample heterogeneity, decreased benefits at the lower end of the concentration range and questionable environmental relevance of dry-weight concentrations to start with.
- Discussion followed presentation on use of XRF. Many experts impressed with Robert's work on XRF and see it as being a great in field screening tool. There was also talk of using it during soil excavation for determining edges of excavation.

#### **Enhanced Adaptive Management Model Training: *Christy Foran, USACE***

- Christy gave presentation on Adaptive Management model, giving an overview of the process, then showing how it archives anticipated effects, captures different perspectives, catalogs improved understanding and can be used in considering future actions. An example was made using results from data collected from survey of SRST members.
- Adaptive Management = structured, iterative process of robust decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. It's used to overcome the problems of "paralysis by analysis" (no action) and "trial and error" (no learning).
- Conclusion:
  - Supports development of (increasingly certain) anticipated effects in time, under phased implementation.
  - Provide a framework on which to learn from current actions.
  - Focuses monitoring and research needs on the reduction of uncertainty.
  - Encourages preferred action under uncertainty.

#### **Wednesday**

##### **ROPs Review: *Robert Brent, JMU***

- 2016 Activities and "Take-Home Messages"
  - Characterization and Use of Biochars for Treatment of SR Soil and Sediment (Carol Ptacek, Waterloo)
    - Initial batch test of various biochars showed Cowboy Charcoal was about the best for Hg removal and didn't leach much else.
    - Evaluating Cowboy Charcoal for Hg removal under various conditions: as reactive layer, biochar effective at removing Hg under both saturated and variably saturated conditions; a relatively thin layer can be effective for a relatively long time; Hg seems to be held rather tightly on the biochar; but co-blending is not very effective.
    - Comparison of new large batch Cowboy Charcoal with previous batch: different batches fairly consistent; Hg removal best when biochar is crushed.
    - Characterization of new biochars: some other biochars are promising (digestate biochar)
- Floodplain Soil Amendment Pilot (Josh Collins, AECOM)
  - Soil amendment work now in Phase III (applying to floodplain)

- Timeline:
  - Application Technique Feasibility Test: Complete
  - Work Plan Development: Fall 2016
  - Amendment Application: Late Winter 2017
  - Post-Amendment Monitoring: 2017/2018
  - Data Evaluation and Reporting: 2018
- Biochar Effects on Macroinvertebrate Community (Will Clements, Colorado State University)
  - Biochar seems to have a modest but statistically significant effect on benthic macroinvertebrate community measures (perhaps an avoidance response), but washing biochar seems to remove this effect.
- Reactive Capping Simulations (Danny Reible, Texas Tech University)
  - DGT probes indicate that leaching from contaminated banks can be significant
  - Capping can be effective at reducing that leaching.
  - MeHg in pore water much higher in July than October.
- Use of XRF for Field Measurement of Hg (Robert Brent, JMU)
  - Accuracy at detection levels was very good and throughout the range of 7.4 to 1000 ppm.
  - Precision was comparable to method 7471A and constrained by sample heterogeneity.
- Stable Isotope Analysis (Joel Blum, U Michigan)
  - It looks like isotopic analysis can be used in the South River to investigate Hg sources, movement, and transformations.
  - Different isotopic signatures are observed for natural background, plant site inputs and legacy Hg.
  - Different isotopic signatures are observed for dissolved and particulate Hg.
- Real-time Hg Monitoring (Todd Martin, Integral)
  - Good agreement between modeled and measured results.
  - Diurnal fluctuations observed under baseflow due to bioturbation.
  - Annual Hg flux dominated by large storm events, but baseflow load can also be important.
- Dynamic Mercury Cycling Model (Reed Harris)
  - Model is a work in progress, but calibration is nearly complete.
  - THg simulations approximate actual conditions and MeHg simulations are a little low.
  - Results are generally consistent with conceptual model (bank erosion greatest source).
  - Simulated results with plant and bank (0-5 miles) inputs shut off show significant improvements in water, not as much in sediment. Might show natural recovery?
- Enhanced Adaptive Management Model (Christy Foran, USACE)
  - Survey developed and implemented to collect different perspectives.
  - Training to demonstrate the use of the tool.
  - Use and methods behind the tool.

**Plant Remediation Activity: *Mike Liberati, DuPont***

- Mike Jacobi, EPA, is retiring at the end of the year. The original RCRA permit for the plant site written in 1998.
- On-site remedial plans including soil removal in areas where elemental Hg has been found, capping areas with high Hg concentrations in soil and continued cleaning out, re-lining and abandoning sewer lines. There will also be long term groundwater monitoring and institutional controls.
- Waiting for agency approval of CMS-Statement of Basis. Corrective Measures Implementation (CMI) construction anticipated in the Fall of 2017.

#### **Remedial Construction Update: *Mike Liberati, DuPont***

- All permits and approvals for Constitution Park construction approved. Summit Environmental Services awarded construction contract. Mobilization planned for November 1, 2016.

#### **Announcements/Future Meetings**

- Next meeting will be web-meeting. February 1<sup>st</sup>, 2017
- Certificate of Appreciation was given to Don Kain for all of his years of service and dedication to the SRST. Don is retiring at the end of the year. Dave Hirschman accepted role of new SRST Facilitator. DEQ will continue to host meetings at the Valley Regional Office.
- Riverfest: April 29, 2017
- 2<sup>nd</sup> Annual Waynesboro Fly Fishing Expo: April 22-23, 2017
- Trout fishing regulation changes:
- Basic Park will become youth only trout fishing area.
- The delayed harvest section in town will now be catch and release only.

#### **Advisory Panel Input and General Discussion**

- Will Clemens, Ralph Turner and Dave Hirschman led discussion on SRST work, direction, etc.
- Questions were asked of the team about has any new information changed their way of thinking, suggestions on modifying plan and should we be analyzing the data differently?
- Will discussed before and after monitoring and continued asking questions such as what endpoints should we retain moving forward, wanting to see more details on how decisions will be made and stated this will require significant transparency and involvement of the SRST.
- Ralph gave a list of his own general thoughts which included:
  - He was excited about the XRF work and though further development should be supported mainly for use in delineation of remediation sites.
  - Interested in database specifically what's in the data base. He warned that you need to be cautious of the unknown.
  - Discussed how Reed's model might be showing subtle hint of recovery. Is this hidden in the data?
  - Wanted to see expanded reference survey for EAM.
- Vince Maiden asked SRST about thoughts of further XRF use. Most members felt like it was a tool that should be used in the future with guidelines on use.