Kingston Fly Ash Environmental Research Symposium

August 2-3, 2011

Roane State Community College, Harriman, TN

Program Contents

TVA Kingston Fly Ash Recovery Project

Key Outcomes: 2010 Kingston Symposium

The 2010 Kingston Fly Ash Release Environmental Symposium focused on describing the breadth of the research effort underway to evaluate potential environmental effects of the fly ash spill and providing feedback to TVA on the adequacy of that effort. The Breakout Sessions Report from that symposium captured many excellent observations, questions, and recommendations.

The focus of this year's symposium is different. You will be hearing updates on research plans and presentations of initial results. The breakout sessions will focus on the likely components of a long-term monitoring plan, and there will be a similar report on the results of those discussions.

The following summary of key outcomes of last year's symposium are provided as a reference.

2010 Breakout session charge:
The challenges to participants in the 2010 breakout sessions, which were organized by disciplines, were to:

> (1) Evaluate current research studies in each workshop topic area: Are they relevant, sufficient, and pertinent in helping TVA assess and evaluate the environment implications of the fly ash spill?
>
> (2) Identify the major research gaps in the current monitoring and assessment studies that apply to this particular functional workshop area.

Summary of Key Recommendations

1. A major recommendation was that ecological studies be coordinated and better integrated with biogeochemical investigations in order to understand issues related to chemical speciation, bioavailability, and food web transfer. Ecological studies need to rely on and incorporate knowledge of geochemical processes related to the speciation and chemistry of metals while geochemical research should incorporate information on the mobility and toxicity of metals for adequately understanding bioavailability to biological systems.
2. Characterization studies should focus on how metals associated with fly ash may be altered during aging, transport through the river systems, and in depositional environments.
3. Research using new investigatory techniques is needed to better evaluate the long-term potential for mobilization and bioavailability of contaminants in ash left in the rivers and the effects of its gradual mixing with native sediments on mobilization and bioavailability.
4. In Ecotoxicology studies, the endpoints to be measured should focus on those responses that have consequences at the ecosystem level such as reproductive integrity of sentinel wildlife species.
5. 2010 is a critical year for ecological studies that focus on contaminant transport through food web because sufficient time has passed for any contaminants associated with fly ash to be incorporated throughout the food web.
6. Measurement of the correct response endpoints for assessing the chronic effects of metal exposure on organisms, the correct experimental designs (including sample replication and appropriate treatment effects) for assessing potential effects of fly ash exposure on target biota and for use in ecological risk assessment.

Symposium Schedule Overview

Tuesday, August 2, 2011

9:00	**Call to Order**	Dennis Yankee/Neil Carriker
9:05	**Welcome**	Louis Lee
9:25	**Ash Recovery Project Status & Plans**	Steve McCracken/Craig Zeller
10:30	**Break**	
10:50	**Research Overview**	Neil Carriker
11:15	**Ecological Risk Approach**	Dan Jones
11:45	**Lunch/Poster Session**	
1:15	**Concurrent Technical Sessions**	
	1. Geochemistry/Fate & Transport	Moderator: Steve Brower
	2. Bioaccumulation	Moderator: Teri Mathews
3:30	**Break/Poster Session**	
3:45	**Poster Session (Open for public interaction)**	
5:00	**Adjourn**	

Wednesday, August 3, 2011

8:30	**Technical Session—Ecological Effects**	Moderator: Dan Jones
10:30	**Break**	
10:45	**Facilitated Brainstorming Sessions—Long-term Monitoring Program**	
	Facilitators:	Mark Peterson, Ryan Otter, Robb Turner
	Recorders:	Amber Stojak, Bryan Smith, Sidney Whitehead
12:30	**Lunch**	
2:00	**Summary Report-out on Long-term Monitoring**	Marshall Adams
3:00	**Wrap-up/Adjourn**	Dennis Yankee/Neil Carriker

***Site Tour:** The Kingston Fly Ash Recovery site is off-limits to the public. If you would like to do a self-guided automobile tour, a map is available at the registration desk showing locations of a site overlook and viewing points for drive-by viewing. The overlook is accessible from 3:00-6:00 PM Tuesday, 8/2/11, to persons displaying symposium name tags.

If you choose to do a self-guided tour, do not block traffic on Swan Pond Road or Swan Pond Circle by stopping except at designated viewing points, and do not attempt to access restricted areas by automobile or on foot.

Technical Session Presentations

Geochemistry/Fate & Transport

(Concurrent with Bioaccumulation Session)

Tuesday, August 2, 2011, 1315 till 1530

Moderator: Steve Brower

Location: To Be Announced and Posted (dependent upon numbers attending)

#	Title	Presenter
1	2D Sediment Transport Simulation to Support the Monitored Natural Recovery Process for Watts Bar Reservoir	Steve Scott, USACE-ERDC
2	Groundwater Flow and Transport Modeling for Prediction of Potential Impact of Constituents of Concern from the Proposed Ash Landfill at TVA's Kingston Fossil Plant, Tennessee	Changsheng Lu, Jacobs
3	The Effect of Dissolved Organic Matter on the Release of Trace Elements from Coal Ash in Natural Surface Waters	Alison M. Craven, U of Colorado
4	Quantifying the Release of Bioactive Trace Elements from Coal Combustion Products to Natural Waters: Project Overview and Preliminary Results	Candace Wall, ODU
5	Predicting Mobilization and Bioaccumulation of Trace Elements from Coal Fly Ash Using Speciation Analysis	Navdeep Kaur, NCSU
6	Selenium Biogeochemistry in Rivers Receiving Direct Coal Ash Inputs	Greg Cutter, ODU
7	Arsenic and Selenium Dissolution and Kinetics Investigations	Mark Chappell, USACE-ERDC
8	The Geochemical and Isotopic Characterization of the Environmental Impacts of the TVA Coal Ash Spill: A 30 Month Investigation	Laura S. Ruhl, Duke

Technical Session Presentations

Bioaccumulation

(Concurrent with Geochemistry/Fate & Transport Session)

Tuesday, August 2, 2011, 1315 till 1530

Moderator: Teri Mathews

Location: To Be Announced and Posted (dependent upon numbers attending)

#	Title	Presenter
1	Selenium at the Base of Aquatic Food Webs – Insights From Laboratory-Based Bioaccumulation Studies with Periphyton and the Mayfly *Centroptilum Triangulifer*	Justin M. Conley, NCSU
2	Periphyton & Aquatic Vegetation Sampling for the Kingston Ash Recovery Project	Amber Stojak, ARCADIS
3	Trends in Bioaccumulation of Fly Ash Contaminants by Aquatic Invertebrates Downstream of the Tennessee Valley Authority Kingston Fossil Plant	John Smith, ORNL
4	Fish Bioaccumulation Studies Associated with the Kingston Fly Ash Release	S. Marshall Adams, ORNL
5	Effects of the Kingston Ash Spill on Amphibians and Reptiles	Elizabeth Burton, RSI
6	Bioaccumulation in Aquatic- and Riparian-Feeding Birds at the Kingston Ash Spill	Jessie Morris, RSI
7	Bioaccumulation, Maternal Transfer, and Effects of the TVA Kingston Ash Spill on Tree Swallows (*Tachycineta bicolor*)	Suzy Young, ARCADIS
8	Health Assessment of Raccoons *(Procyon lotor*) Following Exposure to Fly Ash	Marcy Souza, UT

Technical Session Presentations

Ecological Effects

Wednesday, August 3, 2011, 0830 till 1030

Moderator: Dan Jones

Location: Gym Floor

#	Title	Presenter
1	TVA Aquatic and Sediment Toxicity Studies	Rick M. Sherrard, TVA
2	The Complexity of Reservoir Benthic Habitats: Deciphering the Effects of the Kingston Fly Ash Release on the Benthic Macroinvertebrate Community	Tyler F. Baker, TVA
3	Assessment of the Fish Assemblage Before and After the Kingston Fly Ash Release	Donny R. Lowery, TVA
4	Assessment of the Health of Sentinel Fish Populations in the Vicinity of the Kingston Fly Ash Release	S. Marshall Adams, ORNL
5	Assessing the Risks to Fish Reproduction from the TVA-Kingston Fossil Plant Fly Ash Release	Mark S. Greeley, Jr., ORNL
6	Bioaccumulation and Energetic Effects of Kingston Fly Ash on Freshwater Mussels: A Combination Field and Laboratory Approach	Ryan R. Otter, MTSU
7	Evaluation of Sublethal Effects of the Kingston, TN Ash Spill on Tree Swallows and Turtles	William A. Hopkins, Virginia Tech

Participating Organizations

Organization	Acronym
Appalachian State University	ASU
ARCADIS	ARCADIS
Duke University	Duke
Environmental Standards Inc.	ESI
Geosyntec	Geosyntec
Iowa State University	Iowa State
Jacobs Engineering	Jacobs
Middle Tennessee State University	MTSU
North Carolina State University	NCSU
Old Dominion University	ODU
Oak Ridge National Laboratory	ORNL
Restoration Services, Inc.	RSI
Roane State Community College	RSCC
Stroud Water Research Center	Stroud
Tennessee Department of Health	TDH
Tennessee Valley Authority	TVA
Tennessee Wildlife Resources Agency	TWRA
U.S. Army Corps of Engineers-Engineering Research and Development Center	USACE-ERDC
U.S. Environmental Protection Agency	EPA
U.S. Geological Survey	USGS
University of California-Davis	UC Davis
University of Colorado	U of Colorado
University of Illinois	U of Illinois
University of Tennessee	UT
University of Tennessee-Knoxville	UTK
Virginia Tech	Virginia Tech

Poster Session Presentations
Listed by Lead Author Organization

Abstract Title	Key Words	Authors	Organization
Baseline Ecological Risk Assessment for the Kingston Fly Ash Recovery Project		1. Daniel S. Jones 2. Suzy Young 3. Amber Stojak 4. Neil Carriker 5. Mark Stack	ARCADIS ARCADIS ARCADIS TVA Jacobs
So What Does It Mean? What Ecological Effects Has the Kingston Ash Spill Caused?		1. Amber Stojak 2. Suzy Young 3. Tyler F. Baker 4. Daniel S. Jones 5. Neil Carriker 6. Marshall Adams 7. John Smith 8. Mark Greeley	ARCADIS ARCADIS TVA ARCADIS TVA ORNL ORNL ORNL
Fly Ash as a Potential Food Supplement? Bioaccumulation in Critters Near the Kingston Ash Spill		1. Suzy Young 2. Amber Stojak 3. Daniel S. Jones 4. Tyler F. Baker 5. Neil Carriker 6. Marshall Adams 7. John Smith	ARCADIS ARCADIS ARCADIS TVA TVA ORNL ORNL
Assessment of Mercury and Methylmercury in the Emory and Clinch River System After the December, 2008 Coal Ash Spill at the Kingston Fossil Plant		1. Amrika Deonarine 2. Helen Hsu-Kim 3. Laura S. Ruhl 4. Avner Vengosh 5. Gideon Bartov 6. Thomas M. Johnson	Duke
The Geochemical and Isotopic Characterization of the Environmental Impacts of the TVA Coal Ash Spill: A 30 month investigation		1. Laura S. Ruhl 2. Avner Vengosh 3. Gary S. Dwyer 4. Heileen Hsu-Kim 5. Amrika Deonarine	Duke
Implementation of a Field and Laboratory QA Oversight Program During the TVA Kingston Ash Recovery Project to Ensure High Quality and Defensible Data		1. Rock J. Vitale 2. Ruth L. Forman 3. Jennifer N. Gable 4. Erin E. Rodgers 5. Stephen D. Brower 6. Dennis P. Callaghan 7. Kim Abbott 8. Bryan D. Smith 9. Jacob Gruzalski 10. William J. Rogers	ESI ESI ESI ESI ESI ESI ESI ESI ESI TVA
Increasing Use of Fly Ash in Concrete through Nanomaterial Modification, Multiscale Characterization, and Improved Processing		1. Kejin Wang 2. S. P. Shah 3. Shiho Kawashima 4. Nishant Greg	Iowa State

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Abstract Title	Key Words	Authors	Organization
Using Raman Spectroscopy for Analyzing Fly Ashes		1. Kejin Wang	Iowa State
Evaluation of Human Health Risk from Potential Exposures to Fly Ash at the TVA Kingston Fly Ash Recovery Project		1. Mark Stack 2. Suzy Young 3. Daniel S. Jones 4. Neil Carriker	Jacobs Arcadis Arcadis TVA
Evaluation of Impacts on Surface Water Quality Associated with a Release of Fly Ash at TVA's Kingston Fossil Plant		1. Mark Stack 2. Paul Clay 3. William Rogers 4. Neil Carriker	Jacobs RSI TVA TVA
Quantifying the Release of Bioactive Trace Elements from Coal Combustion Products to Natural Waters: Project Overview and Preliminary Results	Coal Combustion Products, Bioactive Trace Elements, Environmental Impacts, Rivers and Lakes	1. Candace Wall 2. Bettina Sohst 3. Peter Sedwick	ODU
Integrated Ecological Research: TVA Kingston Ash Recovery Project		1. Neil Carriker 2. Dennis Yankee 3. Rick Sherrard 4. Daniel Jones 5. Suzy Young 6. Paul Clay	TVA TVA TVA ARCADIS ARCADIS RSI
Ambient Air Quality Monitoring		1. RL Pope 2. Bryan D. Smith	TVA
Characterization of Coal Fly Ash Associated with a Release of Fly Ash at TVA's Kingston Fossil Plant		1. William J. Rogers 2. Neil Carriker 3. Paul Clay 4. Mark Stack	TVA TVA RSI Jacobs
Observations of Metals and Metalloids in Sediment Porewater Associated with the Tennessee Valley Authority, Kingston, TN Ash Recovery		1. William J. Rogers 2. Jennifer N. Gable 3. Neil E. Carriker 4. Rock J. Vitale 5. Erin E. Rodgers 6. Bryan Smith 7. Jacob Gruzalski	TVA ESI TVA ESI ESI ESI ESI
The Effect of Dissolved Organic Matter on the Release of Trace Elements from Coal Ash in Natural Surface Waters	Dissolved organic matter, mercury, aromaticity, calcium, leaching	1. Alison Craven 2. Joseph Ryan 1. George Aiken	U of Colorado U of Colorado USGS
Tracing Multiple Sources of Mercury in River Sediments Near the TVA Kingston Site Using Hg Stable Isotope Ratios	Mercury stable isotope "signatures," coal combustion products	1. Gideon Bartov 2. Thomas M. Johnson	U of Illinois

Technical Session Platform Presentations
Listed by Lead Author Organization, Including Key Words

Abstract Title	Key Words	Authors	Organization
Periphyton & Aquatic Vegetation Sampling for the Kingston Ash Recovery Project	Periphyton, aquatic vegetation, bioaccumulation, coal combustion products, fly ash	1. Amber Stojak 2. Suzy Young	ARCADIS
Stratigraphy and Magnetic Susceptibility of Ash Deposits Two Years After the Release	Sub-bottom profiler, stratigraphy, magnetic susceptibility, ash deposits	1. Keith Seramur 2. Ellen A. Cowan 3. Carol M. Babyak 4. J. David Lane	ASU ASU ASU TVA
The Geochemical and Isotopic Characterization of the Environmental Impacts of the TVA Coal Ash Spill: A 30 Month Investigation		1. Laura S. Ruhl 2. Avner Vengosh 3. Gary S. Dwyer 4. Heileen Hsu-Kim 5. Amrika Deonarine	Duke
Groundwater Flow and Transport Modeling for Prediction of Potential Impact of Constituents of Concern from the Proposed Ash Landfill at TVA's Kingston Fossil Plant, Tennessee	Groundwater modeling, contaminants transport	1. Hank Julian 2. Changsheng Lu 3. Mark Boggs	Geosyntec Jacobs TVA
Bioaccumulation and Energetic Effects of Kingston Fly Ash on Freshwater Mussels: A Combination Field and Laboratory Approach	Mussels, in situ, bioaccumulation, glycogen, mussel health, Kingston fly ash	1. Ryan R. Otter 2. Will Monroe 3. David McKinney 4. Bobby Brown 5. Susan Lainer 6. Bob Read	MTSU MTSU TWRA TWRA TWRA TDH
Selenium at the Base of Aquatic Food Webs – Insights from Laboratory-Based Bioaccumulation Studies with Periphyton and the Mayfly *Centroptilum Triangulifer*	Selenium, periphyton, mayfly, bioconcentration, bioaccumulation, toxicity, trophic transfer, food rationing, selenite, selenate	1. JM Conley 2. DB Buchwalter 3. DH Funk	NCSU NCSU Stroud
Predicting Mobilization and Bioaccumulation of Trace Elements from Coal Fly Ash Using Speciation Analysis	Synchrotron x-ray absorption spectroscopy, XANES, EXAFS, hyperprobe analysis, kinetics, periphyton biofilms trophic transfer	1. Navdeep Kaur 2. Dean Hesterberg 3. Owen Duckworth 4. David Buchwalter	NCSU
Selenium Biogeochemistry in Rivers Receiving Direct Coal Ash Inputs	Selenium, speciation, dissolved, particulate, sediments, porewaters, river, biogeochemical processes	1. Gregory A. Cutter 2. Laura Richards	ODU

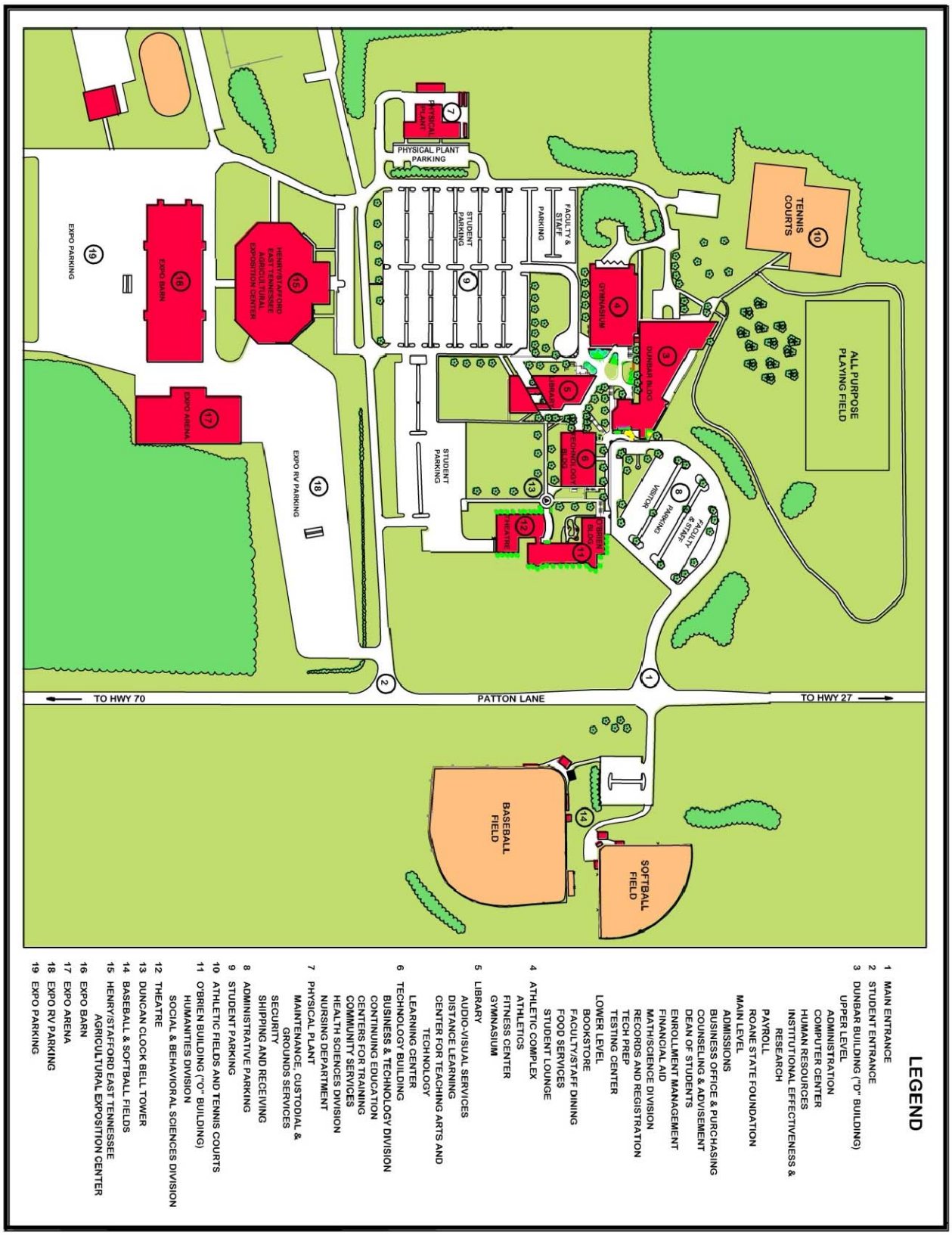
Technical Session Platform Presentations
Listed by Lead Author Organization, Including Key Words

Abstract Title	Key Words	Authors	Organization
Quantifying the Release of Bioactive Trace Elements from Coal Combustion Products to Natural Waters: Project Overview and Preliminary Results	Coal Combustion Products, Bioactive Trace Elements, Environmental Impacts, Rivers and Lakes	1. Candace Wall 2. Bettina Sohst 3. Peter Sedwick	ODU
Fish Bioaccumulation Studies Associated with the Kingston Fly Ash Release	Metal bioaccumulation, spatial and temporal patterns, causal relationships, sentinel fish species	1. Marshall Adams 2. Mary McCracken 3. Terry Matthews 4. Allison Fortner 5. Tyler F. Baker	ORNL ORNL ORNL ORNL TVA
Assessment of the Health of Sentinel Fish Populations in the Vicinity of the Kingston Fly Ash Release	Fish health, causal relationships, integrated health responses, biochemical and physiological	1. Marshall Adams 2. Mark Greeley 3. Allison Fortner 4. Swee Teh	ORNL ORNL ORNL UC Davis
Assessing the Risks to Fish Reproduction from the TVA-Kingston Fossil Plant Fly Ash Release	Fly ash, Coal ash, Fish reproduction, Fish fecundity, Fish early-life stages, Developmental abnormalities, Teratogenicity, Embryo-larval toxicity test, In vitro spawning	1. Mark S. Greeley, Jr. 2. S. Marshall Adams 3. Logan R. Elmore 4. Mary K. McCracken 5. Tyler F. Baker 6. Rick M. Sherrard	ORNL ORNL ORNL ORNL TVA TVA
Trends in Bioaccumulation of Fly Ash Contaminants by Aquatic Invertebrates Downstream of the Tennessee Valley Authority Kingston Fossil Plant	Bioaccumulation, Invertebrates, Spatial Trends, Temporal Trends	1. J. G. Smith 2. Tyler F. Baker	ORNL TVA
The Complexity of Reservoir Benthic Habitats: Deciphering the Effects of the Kingston Fly Ash Release on the Benthic Macroinvertebrate Community	Benthic macroinvertebrates, community structure, habitat, spatial and temporal trends	1. Tyler F. Baker 2. John Smith	TVA ORNL
Assessment of the Fish Assemblage Before and After the Kingston Fly Ash Release	Fish populations, community structure, spatial and temporal trends	1. Donny Lowery 2. Tyler F. Baker 3. John Justice 4. Kurt Lakin 5. Jason Yarbrough	TVA
TVA Aquatic and Sediment Toxicity Studies	Laboratory Toxicity Testing	1. Rick M. Sherrard	TVA
Arsenic and Selenium Dissolution and Kinetics Investigations at ERDC		1. Mark Chappell	USACE-ERDC

Technical Session Platform Presentations
Listed by Lead Author Organization, Including Key Words

Abstract Title	Key Words	Authors	Organization
2D Sediment Transport Simulation to Support the Monitored Natural Recovery Process for Watts Bar Reservoir	Two-dimensional sediment transport modeling, ash fate & transport, monitored natural recovery	1. Stephen Scott 2. Craig Zeller	USACE-ERDC EPA
The Effect of Dissolved Organic Matter on the Release of Trace Elements from Coal Ash in Natural Surface Waters	Dissolved organic matter, mercury, aromaticity, calcium, leaching	3. Alison Craven 4. Joseph Ryan 5. George Aiken	U of Colorado U of Colorado USGS
Health Assessment of Raccoons *(Procyon lotor*) following exposure to Fly Ash	Raccoon, *Procyon lotor*, fly ash, toxicity, pathology	1. Marcy J. Souza 2. Edward C. Ramsay 3. Robert L. Donnell	UTK

RSCC Campus Map 2011



RSCC Ash Symposium Contacts

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RSCC Maintenance		865-882-4565
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	Dan Jones	865-765-5447 (cell)
TVA Logistical Contacts	Robbie McKinney	865-777-3540
	Sidney Whitehead	865-710-6164 (cell)
	Rob Crawford	865-771-1569 (cell)
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