# TVA Kingston Ash Spill

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**Kingston Ash Recovery Project**
**Tennessee Valley Authority**

**Oak Ridge Regional Emergency Management Forum**
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# History of Kingston Fossil Plant

- TVA part of Kingston community since early 1950s
  - Construction of plant began in 1951
  - First unit began operation in 1955
- At time of completion, world's largest coal-burning plant
- About 300 people work there
- Nine generating units with a capacity of 1600MW
- Burns 14,000 tons of low-sulfur coal daily
  - 1,000 tons of ash produced daily
- Produces enough electricity to serve 700,000 homes

# What Happened

- December 22, 2008, between midnight & 1 a.m.
  - 5.4 million cubic yards of coal ash released
  - Ash covered about 500 acres in embayment and river
  - No injuries
  - 3 homes uninhabitable, 23 others damaged
  - Roads, rail line and utilities damaged

# Aerial View of Site – Pre-Event

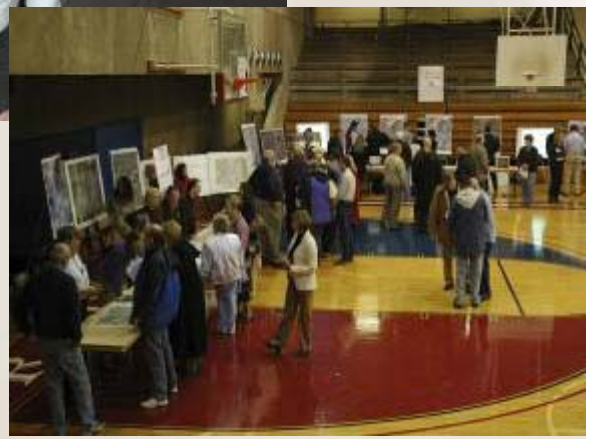
# Aerial View of Site – Post Event

# Initial Emergency Response

- Worked closely with:
  - Roane County Emergency Management Agency
  - Tennessee Department of Environment & Conservation (TDEC)
  - Tennessee Emergency Management Agency (TEMA)
  - U.S. Environmental Protection Agency (EPA)
  - U.S. Army Corps of Engineers
  - U.S. Department of Homeland Security
- Inspected site to verify no further releases
- Established unified incident command center with EPA, state and local agencies

# Initial Response

- Ensure neighbors are safe; arrange temporary housing
- On-water monitoring for potential impacts on water supplies & extent of ash in river
- Begin air quality monitoring
- Respond to property damage; establish claims process
- Set up web site, Outreach Center & public phone line for info
- Conduct community meetings

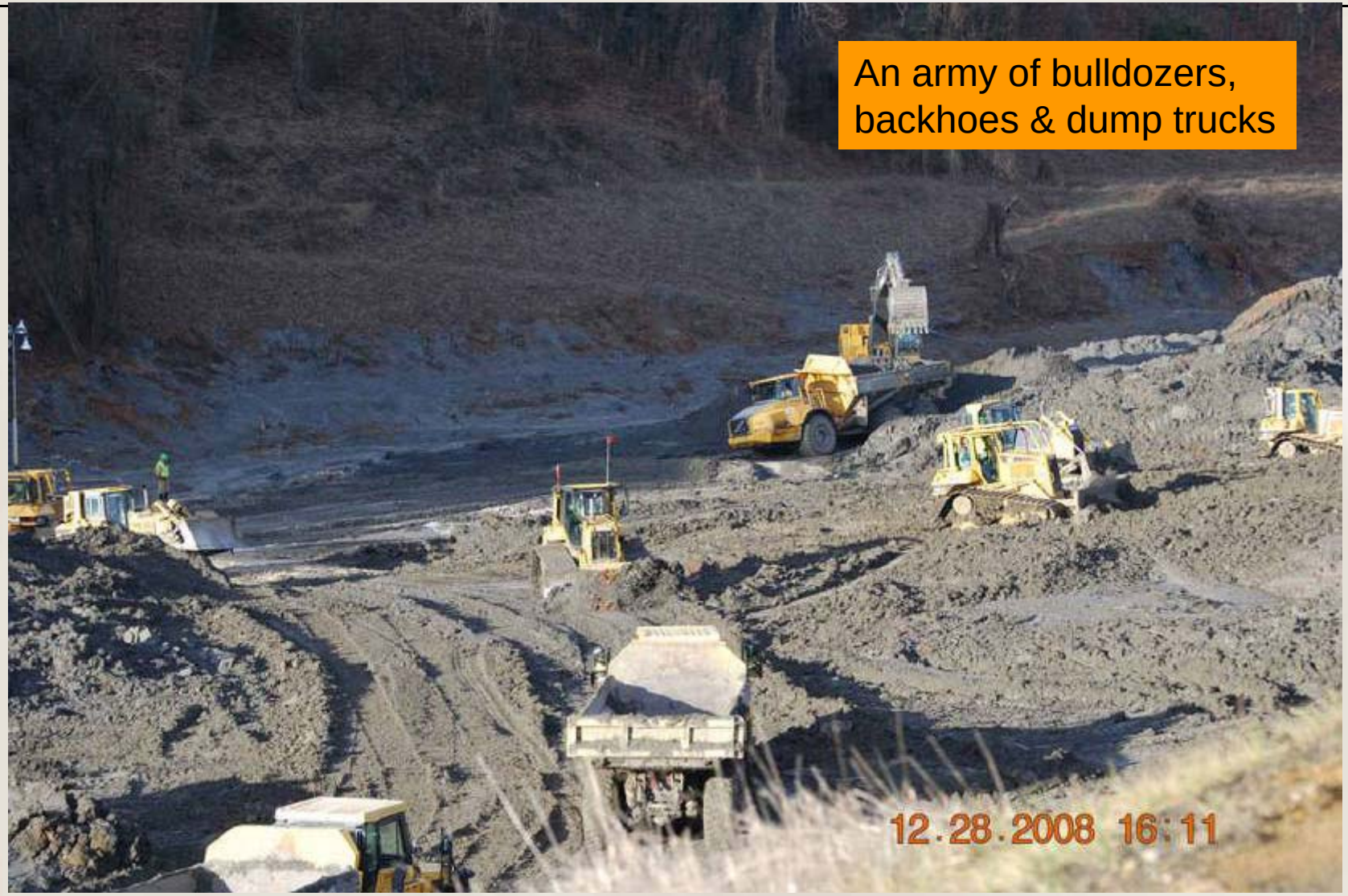


# Kingston Recovery Objectives

## Kingston Recovery Project Objectives

- Ensure the Safety of Citizens and Response Personnel
- Keep the Public and Stakeholders Informed of Response Activities
- Maximize the Protection of Environmentally Sensitive Areas
- Return Community to Normal Conditions

# Initial Cleanup



# Initial Cleanup

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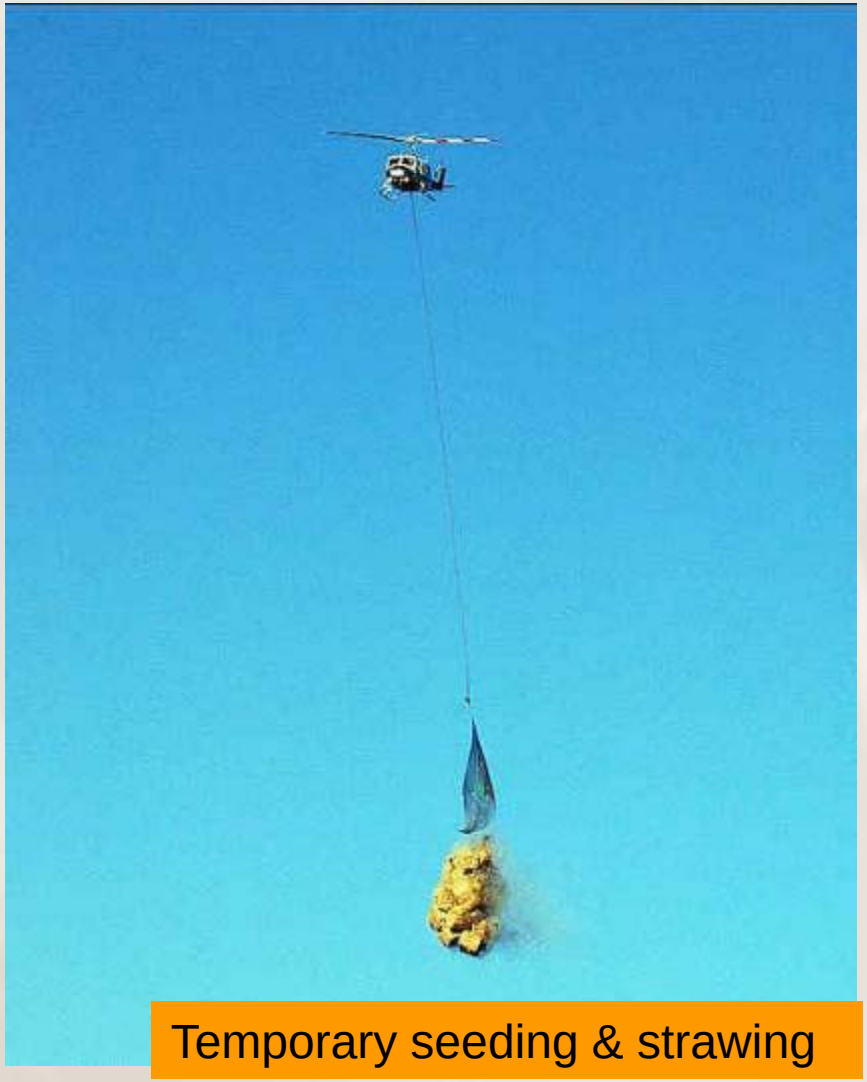


# Initial Cleanup

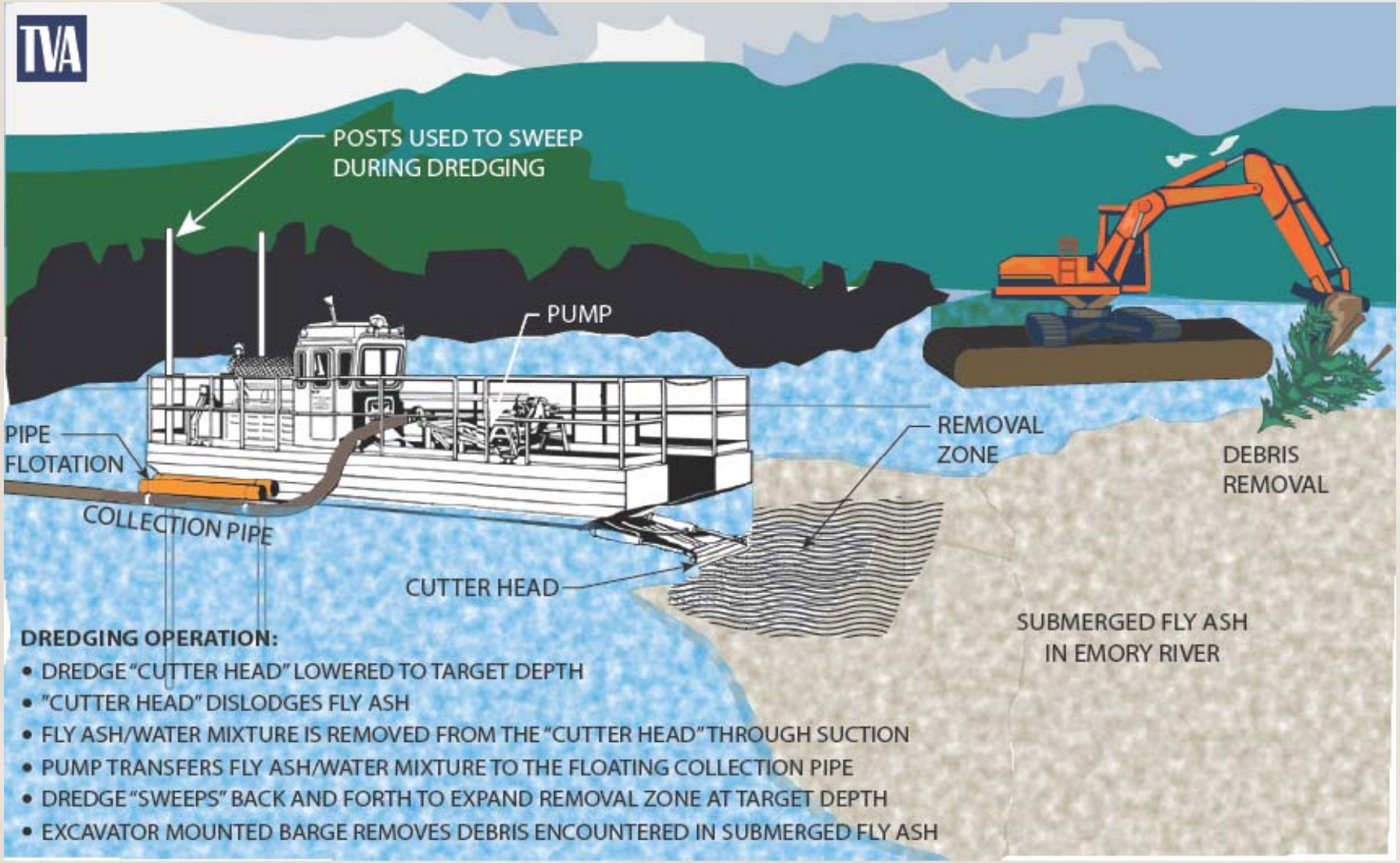
# Dust Suppression

# Ash Recovery & Processing

# Temporary Ash Storage

# Temporary Ash Storage

# Dredging


POSTS USED TO SWEEP DURING DREDGING
PUMP
PIPE FLOTATION
COLLECTION PIPE
CUTTER HEAD
REMOVAL ZONE
DEBRIS REMOVAL
SUBMERGED FLY ASH IN EMORY RIVER
DREDGING OPERATION:
• DREDGE "CUTTER HEAD" LOWERED TO TARGET DEPTH
• "CUTTER HEAD" DISLODGES FLY ASH
• FLY ASH/WATER MIXTURE IS REMOVED FROM THE "CUTTER HEAD" THROUGH SUCTION
• PUMP TRANSFERS FLY ASH/WATER MIXTURE TO THE FLOATING COLLECTION PIPE
• DREDGE "SWEEPS" BACK AND FORTH TO EXPAND REMOVAL ZONE AT TARGET DEPTH
• EXCAVATOR MOUNTED BARGE REMOVES DEBRIS ENCOUNTERED IN SUBMERGED FLY ASH

# Dredging

# Dredging

Dredged Material Pumped Into Ash Recovery Ditch

# Ash Recovery

# Ash Disposal

**Immediate Disposal Options (RFP):**

- Transportation: Truck or Rail
- Potential Locations: Class I landfills in AL, GA & local landfills

**Long Term Options:**

- Dry Fly Ash Collection
- Marketing—beneficial reuse
- Greenfields
- Existing Class I or II Landfills
- Brownfields – e.g. Structural Fill

# Kingston Recovery Costs

**Expenditures to date: ~**$170M

**Burn Rate:** Approximately $400--800K per day

**Estimated Cost for Recovery**: ~$1.2B

**Fleet conversion to dry stacking:** ~$2B

# Initial Environmental Activities

- Began ongoing sampling of air, water & soil
  - First water samples collected ~ 2 pm on 12/22/08
  - Air, ash & soil sampling began December 28
  - Biological sampling began in mid-January
- Stabilized site to prevent further movement of ash
  - Deployed booms to confine floating debris and cenospheres
  - Began building dikes to confine ash in the water
  - Began dust control measures with spray-on dust inhibitors and applying straw & seeding

# Environmental Sampling Overview

- Extensive sampling by TVA, TDEC, TWRA, & EPA
  - Air >100,000 real-time, ~2000 fixed station
  - Drinking water daily/weekly; Kingston & Rockwood
  - Surface Water: >2,500 samples
  - Ground Water: >100 private wells
  - Ash/Soil/Sediment: ~150 samples
  - Radiological: ~ 50 samples
  - Fish tissue: ~ 200 samples **(TVA, TWRA, TDEC, ORNL)**
  - Benthic Invertebrates (e.g., mayfly larvae and adults)
  - Fish Population, Reproductive Health & Spawning Surveys
  - Amphibians, birds, bird eggs, mammals
  - Whole sediment and sediment elutriate toxicity testing
  - Dredge monitoring (plumes, effluent, floating monitors, toxicity)

# Air Monitoring

- Real-time Mobile Sampling
  - >100,000 data points to date
  - Only exceedences of NAAQS were where wood smoke was present
- Fixed Stations
  - Six stations encircling the site
  - FRM PM2.5, FRM PM10 at all sites
  - One station: Hi-vol PM10 and TSP in addition
  - Particulate values well below NAAQS
  - Very few detects on metals

# Radiological Monitoring

- Hand-held monitoring and sampling
  - 7 locations; December 29-30, 2008
- Hand-held monitoring and Area dosimeter deployment
  - Mid-March; retrieved once per quarter
- Individual worker air monitoring for Ra-226 & Ra-228
  - All results 3 to 5 orders of magnitude below 10 CFR 20. Appendix B PELs

# Water Monitoring

- Rivers
  - Routine @ 11 stations
  - Post-rainfall
- Drinking Water
  - TDEC—weekly @ Kingston & Rockwood
  - City of Kingston—daily
- Dredge Plumes
- Ash Pond and Ash Recovery Ditches

# Biological Monitoring

- Fish
  - **Community structure, bioaccumulation, spawning, health**
- Benthic Invertebrates
  - **Community structure, bioaccumulation**
- Small Mammals
  - **Bioaccumulation**
- Great Blue Heron & Osprey
  - **Metals in eggs**
- Tree Swallows
  - **Metals in eggs & hatchlings**
- Spring Breeding Frogs, Salamanders, Snapping Turtles
  - **Bioaccumulation**

# Ash & Sediments

- Physical/Chemical/Radiological Analysis
- Extractable, Bioavailable Metals
- Sediment Elutriate Toxicity
  - **Ceriodaphnia dubia, Pimephales promelas, freshwater juvenile mussels**
- Whole Sediments Toxicity
  - **Hyalella azteca, freshwater juvenile mussels**
- Whole Sediments--Toxicity & Bioaccumulation
  - **Corbicula fluminea, Lumbriculus variegatus**

# CERCLA

- TVA and EPA have agreed to conduct remediation of the KIF Ash Release under the regulatory structure of CERCLA, the Comprehensive Environmental Response, Compensation & Liability Act

- CERCLA provides TVA, regulators, and the public with a clear path forward to clean up the site. Advantages include:
  - Structured approach for making environmental remediation decisions
  - Structured approach for community involvement
  - Provides a clear set of worker health and safety requirements
  - Meets Federal and State requirements; allows TVA to meet non-statute requirements that may be more stringent

- On May 11th TVA and EPA signed an agreement that describes roles and responsibilities of each party.

# Current Status

# Current Dredging Plans

- 3 million cubic yards of ash will be dredged from the Emory River by Spring 2010.
- One million yards dredged as of mid-September.
- Another 2.4 million cubic yards of ash remaining in the failed retention cell and piled up in a cove behind a temporary dike is considered less critical; removal projected to continue through late 2011.