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TVA Fact Sheet

What Are Cenospheres?

The Kingston Fossil Plant ash spill released a type of fly ash called cenospheres into the Emory, Clinch and Tennessee rivers. Cenospheres are very small, hard-shelled, hollow, glass spheres that are created in coal-fired boilers when molten silica solidifies around bubbles of flue gas. The gas bubbles cause the cenospheres to be so lightweight that they float and may appear as a brown froth on the water that collects in bays and around obstructions. Fly ash produced by coal combustion may contain between 0.01 percent and 1 percent cenospheres.

What Should I Do if I Come Into Contact With Cenospheres?

As a precaution to help protect public health and safety, consistent with the advice offered by the Tennessee Department of Health, TVA encourages people to avoid contact with ash from the Kingston ash spill, including cenospheres.

- The Tennessee Department of Health encourages everyone to avoid contact with coal fly ash and advises anyone who does contact the ash to practice good hygiene, especially washing their hands before eating or smoking. Metallic elements are bound to the ash, but occasional exposures for brief periods of time should not pose a threat. People who come in contact with ash or cenospheres should wash the same way they would clean up after mud exposure.

- TVA recommends the following precautions:

    - Do not swim in or near areas where you can see cenospheres on the water.
    - Bathe thoroughly with soap after swimming in the river near the ash spill.

- If you see cenospheres, please call TVA's Outreach Center in Kingston at 865-632-1700 and TVA will dispatch a crew to clean them up.

- For more information on ash and public health, please see the Tennessee Department of Health Fact Sheet on the Health Department's Web site at http://health.state.tn.us/Downloads/coalashfactsheet.pdf.

Additional information on cenospheres:

- Cenospheres are typically collected by skimming them from the surface of the water. TVA uses skimmer booms to concentrate the floating cenospheres and then uses vacuum trucks, hand tools, and other equipment to remove the

cenospheres from the water. The cenospheres are then transported by truck back to the Kingston Fossil Plant for disposal with the ash.

- Because they are lightweight, rigid and waterproof, cenospheres are used in the manufacture of a variety of products. Cenospheres are used as fillers in low-density concrete; in plastics and composite materials used for manufacturing bowling balls, kayaks, surfboards, and automotive components; and in fire bricks, floor tiles, and insulating materials.

- Immediately after the spill, TVA stated that cenospheres are inert, based on the fact that cenospheres are basically glass spheres (molten silica that has re-crystallized around a gas bubble) and based on information from representatives of the industry who test, buy, and sell cenospheres.

- More recently, TVA collected cenospheres downstream of Kingston and had them analyzed for substances such as arsenic and selenium. The samples were also examined by an independent certified laboratory using an electron microscope.

- The chemical analysis of these cenosphere samples showed arsenic concentrations in approximately the same range as TVA has observed in other ash samples – ranging from approximately 20 to 60 parts per million. This result is expected since cenospheres are a component of fly ash. These concentrations are within the range of arsenic concentrations normally found in Tennessee soils, as reported by a 1996 Tennessee Division of Superfund Background Inorganic Survey for soils in Tennessee and a 1986 U.S. Geological Survey study of Tennessee soils.

- This electron-microscope analysis found some discrete iron spheres among the cenospheres and found cenospheres that had iron incorporated into the vitreous material. Iron, arsenic, and other elements present in coal can become contaminants captured in the glass formed as molten silica solidifies around gas bubbles to form cenospheres when the flue gas exits the combustion chamber.

- Other researchers previously reported that about 10 percent of the cenospheres they collected near the Kingston site included an unexpected iron oxide coating that can contain heavy metals, including arsenic. They reported an arsenic concentration in that coating of approximately 1 percent (10,000 parts per million).

- The independent, certified laboratory that conducted electron-microscope analysis of the cenospheres for TVA did not find any iron coatings on those samples nor arsenic levels of that magnitude.

- Based on these analyses, TVA continues to believe that constituents (such as arsenic and selenium) bound in the glass-like composition of the cenospheres cannot readily be released to the environment. However, since these elements exist within the cenospheres, we recommend that anyone who comes in contact with them exercise the same precautions as they would with fly ash. In short, wash the material off your skin.

- TVA continues to welcome input from independent researchers and will continue to thoroughly review and compare findings in order to continue to safeguard the public and workers.

- Safety personnel at the Kingston site perform monitoring weekly or more frequently to evaluate occupational exposure that could occur during the site recovery work. Their monitoring has confirmed there is no need to change the health and safety practices for onsite workers who collect cenospheres.

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