Final Project Report on Arsenic Biogeochemistry in the Clinch River and Watts Bar Reservoir

Volume 2: Quality Assurance/Quality Control Summary Report for Arsenic Biogeochemistry in the Clinch River and Watts Bar Reservoir

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Executive Summary

Arsenic contamination was studied in the Clinch River/Watts Bar Reservoir (CR/WBR) system downstream from the U. S. Department of Energy's Oak Ridge Reservation (ORR). Arsenic is of particular interest and concern because (1) it occurs commonly in coal-bearing rock and waste products
such as fly ash associated with the burning of coal, (2) it is classified as a Class A carcinogen by the U.
S. Environmental Protection Agency, and (3) disposal of fly ash, both on and off the ORR, may have
contaminated surface water and sediments in the Clinch River and Watts Bar Reservoir. The present
study differs from previous reports on arsenic concentrations in the CR/WBR system in the use of much
more sensitive and precise processing and analytical techniques to measure arsenic species (arsenate,
arsenite, and organic arsenic) at levels well below the ecological and human health risk screening
criteria. The absolute detection limits using these techniques are approximately 20 to 40 pmol/L, or
0.0015 to 0.003 µg/L.

Four main sites were sampled quarterly over a 3-year period (1990 through 1992). Sites investigated
included Lower Watts Bar Reservoir near the Watts Bar Dam (Tennessee River kilometer 849.6), the
Kingston area (Clinch River kilometer 1.6), Poplar Creek (Poplar Creek kilometer 1.6), and the McCoy
Branch Embayment (McCoy Branch kilometer 0.3). Additional sites were investigated in the vicinity of
these main stations to determine the distribution of contamination and to identify possible alternative or
additional sources of arsenic.

Detection limits that were a factor of 20 below the minimum risk screening criteria were achieved for
100% of arsenic speciation data. However, 118 samples for inductively coupled plasma metals analysis
were not preserved to analytical specifications, and the analytical holding times for 180 ion
chromatography samples were not met. More rigorous preservative testing protocols and more tightly
defined analytical statements of work will prevent these problems in the future.

Introduction, background, materials and methods, results, discussion, and conclusions are presented in
Volume 1. The Quality Assurance/Quality Control Summary Report; the listing of water quality and
surface water arsenic speciation data by source and site; and the listing of pore water arsenic speciation
and particle-to-water distribution coefficients for As, Fe, and Mn by source, site, and season are
presented in Volume 2.

The Clinch River Environmental Restoration Program is currently completing the second phase of the
Clinch River Remedial Investigation, with the intent of performing a baseline risk assessment on
collected data. The data collected for this report will contribute to the baseline risk assessment for the
Clinch River. Many of the goals of the Clinch River Remedial Investigation were refined using the
results of this study.