

**OAK RIDGE HEALTH STUDIES**  
**OAK RIDGE DOSE RECONSTRUCTION**

**- TASK 2 REPORT -**

**MERCURY RELEASES FROM LITHIUM ENRICHMENT**  
**AT THE OAK RIDGE Y-12 PLANT-**  
**A RECONSTRUCTION OF HISTORICAL RELEASES**  
**AND OFF-SITE DOSES AND HEALTH RISKS**

July 1999

Submitted to the Tennessee Department of Health by



### 3.0 HISTORICAL MERCURY OPERATIONS ON THE ORR

The following section describes historical operations at the ORR involving mercury use, and past investigations into the quantities of mercury used, recovered, and lost to the environment. The information summarized here was gathered from review of historical literature and interviews with current and former ORR staff. In particular, this section describes:

- **Lithium isotope separation operations at Y-12 in the 1950s and 1960s**— these were the ORR operations that used the largest quantities of mercury, and included six pilot plants and three production facilities that used over 20 million pounds of mercury, as well as several auxiliary operations that supported the lithium isotope separation process.
- **The Mercury Task Force investigation of mercury use at Y-12**— the Mercury Task Force was convened in 1983 to investigate quantities of mercury used, recovered, and lost to the environment from Y-12. The Mercury Task Force Report (UCCND 1983a) summarizes the results of their investigation.
- **Procedures historically used to monitor mercury in building air and in liquid effluents from the Y-12 Plant**— beginning in the early 1950s, monitoring programs were conducted to measure mercury in air and liquid effluents from lithium separations processes.

The results of the Task 2 effort to quantify mercury releases from lithium isotope separations and auxiliary operations at Y-12 (the mercury “source terms” used to reconstruct historical off-site doses) are described in Section 4.0. In addition to the lithium isotope separation operations, mercury was used in minor quantities in several other operations at the Y-12, X-10, and K-25 complexes. For each of these minor operations, the project team either found no evidence of mercury release or found releases were insignificant (i.e., they were less than 1 percent of the releases from the Y-12 operations described in this section). No source terms were estimated for these minor uses of mercury. Descriptions of these operations are presented in Appendix A to this report, along with information describing their significance relative to releases from lithium isotope separation operations.

#### 3.1 Lithium Isotope Separation

Beginning in the late 1940s, United States defense program needs made the development of methods to separate lithium isotopes a national priority. As a result, Y-12 became a center of lithium isotope separation process development and operation.

*The 1977 Mercury Inventory Report*

In 1977, USDOE ORO asked Union Carbide to reconstruct the historical inventory of mercury at Y-12. In response, two employees spent two weeks gathering information from documents and employee interviews. The resulting 10-page report, *Mercury Inventory at Y-12 Plant 1950 through 1977* (Case 1977), indicated that about 550,000 pounds of mercury had been spilled or lost to the environment, and about 1.9 million pounds of mercury remained unaccounted for. The report was classified because the quantity of mercury used in lithium enrichment was classified at the time (LaGrone 1983).

*Public Awareness of Mercury Releases*

On December 5, 1981, two brothers, one an employee at ORNL and the other a United States Geological Survey (USGS) employee, collected vegetation at Y-12 near EFPC. They were seeking data to justify a joint ORNL-USGS research project. The ORNL employee had become aware of elevated mercury levels in EFPC from a 1978 environmental study by ORNL. The vegetation samples were confiscated by ORNL on April 12, 1982 and the ORNL employee reprimanded for insubordination. He terminated employment at ORNL in June 1982, believing that his career had been compromised because he had collected unauthorized samples near EFPC (Marshall 1983).

In discussions between the Tennessee Department of Health and Environment (TDHE) and ORO in 1982, the existence of classified reports describing mercury losses from Y-12 was mentioned. These classified reports were then cited by an employee of the State of Tennessee in a newspaper interview. Upon learning of the existence of classified reports on mercury losses from Y-12, as well as the story of the ORNL employee who had conducted unauthorized sampling at Y-12, the *Appalachian Observer* (a local newspaper) filed a Freedom of Information Act (FOIA) request on November 24, 1982 for all reports on mercury spills and emissions at the ORR. In December 1982, the Tennessee State Health Commissioner posted EFPC as unfit for fishing (Marshall 1983) and on May 17, 1983, in response to the FOIA request, a report describing a March 1966 mercury spill at one of the Colex Production facilities (Building 9201-5) and a declassified version of the 1977 mercury inventory report were released to the public (LaGrone 1983).

The release of the declassified version of the 1977 mercury inventory report (Case 1977) generated much public and media interest. When news appeared that more than 2.4 million pounds of mercury had been "lost" or were unaccounted for at Y-12, the plant was deluged with questions.

*The 1983 Mercury Task Force Investigation*

Several weeks prior to the May 17, 1983 release of the 1977 mercury inventory report, ORO informed the Y-12 plant manager that the declassified version of the 1977 report would be released. Acting on rumors of a Congressional subcommittee hearing to be held that summer, the plant manager asked Y-12 employees to send any mercury documents in their possession to Plant Records. This began the collection of documents that became the Mercury Task Force Files (Wilcox 1995).