
**ASBESTOS ASSESSMENT SURVEY
ABOARD THE SS ARCO SAG RIVER**

**PLAINTIFF'S
EXHIBIT**

ARCO 57

Arco Marine, Inc. retained Clayton Environmental Consultants to conduct an asbestos monitoring program and to perform employee awareness training during the northbound sailing of the SS Arco Sag River.

Program Description

From June 15-20, 1991, Mr. Steven R. O'Donnell, an industrial hygienist with Clayton, assessed the condition of the asbestos-containing materials on the ship, collected air and bulk samples, and performed the asbestos awareness training sessions for the Sag River crew. Clayton analyzed all air samples using phase contrast microscopy (PCM) in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7400A. The bulk samples were analyzed for asbestos content using the polarized light microscopy (PLM) technique and following the EPA "Interim Method for the Determination of Asbestos in Bulk Samples", EPA-600/M4-82-020, December 1982.

Air samples were collected randomly throughout the house, engine, and pump rooms. Select samples were also collected in specific locations such as radio room, second and third assistant engineers' stateroom, and the chief mate's stateroom. In addition, bulk samples of the following materials were collected to determine their asbestos content.

- Cloth pipe lagging (over fibrous glass insulation)
- Cement and asbestos ceiling panels (overheads)
- Dust and debris generated during ceiling panel removal (overheads)

The Asbestos Awareness Training sessions on board included health effects of asbestos exposure, regulations, control options, work practices, personal protection measures and proper disposal of asbestos-containing materials.

Results

Results of 33 air samples determined by PCM analysis indicated airborne fiber concentrations ranging from 0.0035 to 0.02 fibers per cubic centimeter (f/cc). All but four samples showed airborne fiber concentrations of less than 0.01 f/cc. The four samples that were at or above 0.01 (the highest one being 0.02) were analyzed by transmission electron microscopy (TEM) using NIOSH Method 7402. The TEM method, unlike PCM, can distinguish between asbestos and non-asbestos fibers. The results of TEM analyses for the four samples submitted indicated airborne fiber concentrations ranging from less than 0.00018 to 0.0021 f/cc. The TEM results indicated that the majority of the fibers seen through PCM are of non-asbestos type.

✓ All air samples collected on SS *Sag River* showed concentrations below the applicable permissible exposure limits (PELs) established by the U.S. Coast Guard (0.1 f/cc) and the U.S. Occupational Safety and Health Administration (OSHA) PEL of 0.2 f/cc. These samples were also below the Environmental Protection Agency (EPA) recommended concentration of 0.01 f/cc for general occupancy.

Bulk samples of cloth pipe lagging, cement and asbestos ceiling panels, and ceiling panel dust were found to contain 30 to 70 percent chrysotile asbestos.

The asbestos survey program is continuing to determine the airborne concentration of asbestos on other ships and to train the vessel crews about asbestos management.