

Summary

Free fall drop testing of unloaded SP981 reservoirs was conducted by Savannah River Technology Center (SRTC) in the Materials Test Facility, Building 232-H on February 2, 1999. The testing consisted of dropping eight aged and two unaged reservoirs on their stems at impact angles of 88° and 70° from heights of approximately 4 and 6 foot above a hardened steel surface. Representative photographs are provided in this report. A detailed description of the drop testing is found in "Preliminary Report: Drop Testing Of Aged Stems On The Sp981 Reservoir", WSRC-RP-99-00220 [1]. Post drop analysis consisting of metallography and hardness testing is presented in this report.

The results showed both the aged and unaged units bent essentially as expected. Similar bend results were exhibited with the aged and unaged units, suggesting minimal, if any, degradation due to the tritium exposure and the aging process. All bent stems displayed significant metal deformation with the most severe deformation found in the 70°- 6 foot drop reservoirs. No cracking was observed. The majority of the bent stems revealed laps on the underside of the bend due to the folding of the metal. The results also show agreement with the stem bends between the drop testing conducted by Sandia National Laboratory and the SRTC testing.

Background

Free fall drop testing of aged SP981 reservoirs was requested by Sandia National Laboratory California (SNL/CA) to assess the damage to their stems under dropping scenarios. The drop testing conducted at the Materials Test Facility, Building 232-H supplemented the drop testing previously conducted at SNL/CA with unaged units. Requests for clarification of stem robustness and advice on handling of units with bent stems from dropping have been received from the Navy through the W76 Acorn Product Realization Team (PRT). Accordingly, the need to acquire data on the handling of units with bent stems motivates this study.

Introduction

Free fall drop testing of eight unloaded aged and two unaged SP981 reservoirs was conducted on February 2, 1999 in the Materials Test Facility, Building 232-H. The aged reservoirs were "end of life" return units from the war reserve (WR) and the unaged reservoirs were reject units that had never been loaded. SP981 reservoirs were selected for their stem configuration and represented the maximum potential for damage of stems under dropping scenarios. This report provides the results of the metallography and hardness testing conducted to assess the damage to the stems after impact with a hardened steel plate. Details of the test apparatus are documented in reference 1.

Eight SP981 reservoirs were unloaded using special unloading instructions that stipulated the specific laser drill hole location. The reservoirs were subsequently drop tested two weeks after the unloading was concluded. Each reservoir was suspended above the center of the impact plate at a predetermined drop height and impact angle. The drops were performed from heights of approximately 4 foot 3 inches (4' 3") or 6 foot 6 inches (6' 6") as measured from impact surface to the end of the reservoir stem and two stem angles (88° & 70°). Detailed specifications on the drop testing configuration are provided in reference 1. Computer modeling and drop testing of unaged reservoirs conducted by SNL/CA indicated the two stem angles to be the most severe [2].