and authentic description of how fusion explosives work should be of great interest to scientifically curious teenagers, undergraduate physics classes, and Col. Muammar al-Qadhafi.

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June 1, 1983

About the Reviewer: Conrad V. Chester is a senior research staff member of the Oak Ridge National Laboratory (ORNL) where he has spent the last 18 years in work related to the survival and recovery from nuclear war. He is currently coordinator of emergency planning research for the ORNL Energy Division. Dr. Chester received a BChE from Cornell University and a PhD in chemical engineering from the University of Tennessee.

Status of USA Nuclear Reactor Pressure Vessel Surveillance for Radiation Effects (ASTM STP 784). Edited by L. E. Steele, American Society for Testing and Materials, Philadelphia, Pennsylvania (1983). $29.50.

The continued safe operation of nuclear reactor power plants depends in part on the ability of the reactor pressure vessel to withstand the degrading effects of radiation damage to the extent that a potential for vessel failure will not exist during the intended life of the plant. When reactor pressure vessels were being designed and fabricated for the plants in operation today, it was recognized that the effects of radiation damage and the rate at which the damage would accumulate were not fully understood. Thus, a surveillance program was instituted that was intended to include (a) irradiation of small representative samples of vessel material in each reactor vessel, (b) measurement of the specimen temperature and neutron fluence, (c) periodic evaluation of the effects of radiation damage to the specimens, and (d) an extrapolation of these data to the reactor vessels in terms of the vessel's future performance capability. This surveillance program is the subject of the book being reviewed, American Society for Testing and Materials (ASTM) STP 784.

To some extent, STP 784 represents an update of an earlier ASTM publication, STP 481 (1970), that dealt with the same subject matter. In the first chapter of the more recent publication, the editor reviews the bases for the surveillance program, sets forth the purpose of STP 784, and mentions the significant technical advancements that are dictating changes in the surveillance program regarding types of specimens, monitoring, and interpretation of data.

A stated major purpose of STP 784, in addition to reviewing surveillance results accumulated since the earlier publication, is to compare surveillance approaches of the four major U.S. producers of nuclear steam generating systems. This is accomplished by including a separate chapter for and authored by each of the nuclear vendors (it includes pressurized and boiling water reactors and gas-cooled reactors). These chapters describe in considerable detail the vessel materials, types, and number of surveillance specimens required, monitoring requirements and techniques, capsule design and loading, specimen identification schemes, and modifications to their surveillance program to meet changing needs. An analysis and discussion of results obtained thus far are also included as well as recommendations for future surveillance programs. Each of the designated chapters does not deal equally with each of these topics, but there is sufficient information with which the reader can make a reasonable comparison of surveillance programs. If, on the other hand, the reader is more interested in a general description of a typical surveillance program for light water reactors (LWRs), he can avoid considerable tedious reading by selecting only one of the LWR vendor's chapters.

The book includes a chapter that represents to some extent the nuclear utilities' point of view regarding reactor vessel surveillance and structural integrity programs. This chapter is somewhat repetitious of earlier chapters in that it reviews the basis for and other aspects of the surveillance program. Quite naturally, emphasis is placed on the need to reduce conservatism in regulatory requirements so as to improve the economics of power generation, while maintaining adequate safety. An optimistic and hopefully realistic point of view is taken that continuing vessel integrity investigative programs will demonstrate the ability of all plants to operate through their projected design lives. Steps that need to be taken to improve the state of the art are discussed, and the roles played by the Electric Power Research Institute, utility users' groups, the U.S. Nuclear Regulatory Commission, and others in a cooperative effort to cope with the very broad scope of the vessel integrity problem are mentioned.

The final chapter in STP 784 is authored by the editor and constitutes a review and analysis of the surveillance program and data for each of the U.S. operating LWRs. Also included is a summary of pertinent vessel surveillance data available for each of the reactors.

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June 3, 1983

About the Reviewer: Dick Cheverton has been at the Oak Ridge National Laboratory for nearly three decades where he has contributed to many phases of the nuclear program. A principal contribution has been to reactor design and development, particularly to the successful High Flux Isotope Reactor. His experience in radiation damage dates from the mid-70s. Mr. Cheverton did his graduate studies in engineering at Georgia Institute of Technology.