

NUREG-1426
Vol. 1

Compilation of Reports from Research Supported by the Materials Engineering Branch, Division of Engineering

1965 – 1990

U.S. Nuclear Regulatory Commission

Office of Nuclear Regulatory Research



AVAILABILITY NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 2120 L Street, NW, Lower Level, Washington, DC 20555
2. The Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013-7082
3. The National Technical Information Service, Springfield, VA 22161

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC Office of Inspection and Enforcement bulletins, circulars, information notices, inspection and investigation notices; Licensee Event Reports; vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the GPO Sales Program: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, and NRC booklets and brochures. Also available are Regulatory Guides, NRC regulations in the Code of Federal Regulations, and Nuclear Regulatory Commission Issuances.

Documents available from the National Technical Information Service include NUREG series reports and technical reports prepared by other federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission.

Documents available from public and special technical libraries include all open literature items, such as books, journal and periodical articles, and transactions. Federal Register notices, federal and state legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free, to the extent of supply, upon written request to the Office of Information Resources Management, Distribution Section, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, 7920 Norfolk Avenue, Bethesda, Maryland, and are available there for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

NUREG-1426
Vol. 1
RF, R5

Compilation of Reports from Research Supported by the Materials Engineering Branch, Division of Engineering

1965 – 1990

Manuscript Completed: April 1991
Date Published: May 1991

Compiled by A. L. Hiser

**Materials Engineering Branch
Division of Engineering
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555**



ABSTRACT

Since 1965, the Materials Engineering Branch, Division of Engineering, of the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research, and its predecessors dating back to the Atomic Energy Commission (AEC), has sponsored research programs concerning the integrity of the primary system pressure boundary of light water reactors. The components of concern in these research programs have included the reactor pressure vessel (RPV), steam generators, and the piping. These research programs have covered a broad range of topics, including fracture mechanics analysis and experimental work for RPV and piping applications, inspection

method development and qualification, and evaluation of irradiation effects to RPV steels.

This report provides as complete a listing as practical of formal technical reports submitted to the NRC by the investigators working on these research programs. This listing includes topical, final and progress reports, and is segmented by topic area. In many cases a report will cover several topics (such as in the case of progress reports of multi-faceted programs), but is listed under only one topic. Therefore, in searching for reports on a specific topic, other related topic areas should be checked also.



Contents

	<i>Page</i>
Abstract	iii
Acknowledgments	vii
Introduction	1
Annealing	2
Correlations	2
Crack Arrest	2
Dosimetry	4
Environmentally-Assisted Cracking and Fatigue	7
Fracture Mechanics: Analysis	13
Fracture Mechanics: Experimental—Component Testing	17
Fracture Mechanics: Experimental—Standard Specimen Testing	22
Leak Detection	24
NDE—Continuous Monitoring (Acoustic Emission)	24
NDE—In-Service Inspection	26
Piping: Analysis	31
Piping: Experimental	33
Pressure Vessel Steels	37
Radiation Embrittlement	38
Residual Stresses	42
Steam Generators	42
Thermal Embrittlement (Cast Stainless Steel)	46

ACKNOWLEDGMENTS

The assistance of the project managers at the laboratories currently working on research programs for the Materials Engineering Branch is appreciated. These individuals include:

S. R. Doctor	Pacific Northwest Laboratories
C. V. Dodd	Oak Ridge National Laboratory
E. M. Hackett	David Taylor Research Center
J. R. Hawthorne	Materials Engineering Associates
F. B. K. Kam	Oak Ridge National Laboratory
R. K. Nanstad	Oak Ridge National Laboratory
W. E. Pennel	Oak Ridge National Laboratory
W. J. Shack	Argonne National Laboratory
G. M. Wilkowski	Battelle



INTRODUCTION

Since 1965, the Materials Engineering Branch, Division of Engineering, of the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research, and its predecessors dating back to the Atomic Energy Commission (AEC), has sponsored research programs concerning the integrity of the primary system pressure boundary of light water reactors. The components of concern in these research programs have included the reactor pressure vessel (RPV), steam generators, and the piping. These research programs have covered a broad range of topics, including fracture mechanics analysis and experimental work for RPV and piping applications, inspection method development and qualification, and evaluation of irradiation effects to RPV steels.

The branch sponsoring these research programs has had various names and affiliations over the years, including the following:

- 1965-1973 Reactor Vessels Branch, Division of Reactor Development and Technology, U.S. Atomic Energy Commission
- 1973-1975 Metallurgy and Materials Research Branch, Division of Reactor Safety Research, U.S. Atomic Energy Commission

1975-1981 Metallurgy and Materials Research Branch, Division of Reactor Safety Research, U.S. Nuclear Regulatory Commission

1981-1986 Materials Engineering Branch, Division of Engineering Technology, U.S. Nuclear Regulatory Commission

1986-1990 Materials Engineering Branch, Division of Engineering, U.S. Nuclear Regulatory Commission.

This report provides as complete a listing as practical of formal technical reports submitted to the NRC by the investigators working on these research programs. This listing includes topical, final and progress reports, and is segmented by topic area. In many cases a report will cover several topics (such as in the case of progress reports of multi-faceted programs), but is listed under only one topic. Therefore, in searching for reports on a specific topic, other related topic areas should be checked also.

This document will be updated periodically as necessary.

Annealing

Cullen, W. H. and Hiser, A. L., "Behavior of Subcritical and Slow-Stable Crack Growth Following a Postirradiation Thermal Anneal Cycle," USNRC Report NUREG/CR-3833, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Hawthorne, J. R., "Survey of Postirradiation Heat Treatment as a Means to Mitigate Radiation Embrittlement of Reactor Vessel Steels," USNRC Report NUREG/CR-0486, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1979.

Hawthorne, J. R., "Exploratory Assessment of Postirradiation Heat Treatment Variables in Notch Ductility Recovery of A 533-B Steel," USNRC Report NUREG/CR-3229, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Hawthorne, J. R., "Steel Impurity Element Effects on Postirradiation Properties Recovery By Annealing—Final Report," USNRC Report NUREG/CR-5388, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

Hawthorne, J. R., "Irradiation-Anneal-Reirradiation (IAR) Studies of Prototypic Reactor Vessel Weldments," USNRC Report NUREG/CR-5469, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1989.

Hawthorne, J. R. and Hiser, A. L., "Phase 2 Investigations of Irradiation-Anneal-Reirradiation (IAR) Properties Trends of RPV Welds: Final Report," USNRC Report NUREG/CR-5492, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1990.

Server, W. L., "Evaluation of System Requirements and Standards Requirements for Thermal Annealing of Reactor Pressure Vessels, Progress Report March–September 1982," USNRC Report NUREG/CR-2780, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1983.

Server, W. L., "Postirradiation Annealing Recovery of High Copper Reactor Pressure Vessel Weld Metal Toughness Properties," USNRC Report NUREG/CR-3582, EGG-MS-6388, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1983.

Server, W. L., "In-Place Thermal Annealing of Nuclear Reactor Pressure Vessels," USNRC Report NUREG/CR-4212, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Correlations

Corten, H. T. and Sailors, R. H., "Relationship Between Material Fracture Toughness Using Fracture Mechanics and Transition Temperature Tests," T&AM Report 346, University of Illinois, Urbana, IL, August 1971.

Dougan, J. R., "Relationships Between Charpy V-Notch Impact Energy and Fracture Toughness," USNRC Report NUREG/CR-2362, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1982.

Eason, E. D. and Nelson, E. E., "Improved Model for Predicting J-R Curves From Charpy Data, Phase I Final Report," USNRC Report NUREG/CR-5356, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.

Crack Arrest

Barker, D. B. et al., "A Report on the Round Robin Program Conducted to Evaluate the Proposed ASTM Standard Test Method for Determining the Plane Strain Crack Arrest Fracture Toughness K_{Ia} , of Ferritic Materials," USNRC Report NUREG/CR-4996, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1988.

Crosley, P. B. and Ripling, E. J., "Crack Arrest Fracture Toughness of A533 Grade B Class 1 Pressure Vessel Steel," MRL Report HSSTP-TR-8, Materials Research Laboratory, Inc., Glenwood, IL, March 1970.

Crosley, P. B. and Ripling, E. J., "Crack Arrest in an Increasing K-Field," MRL Report HSSTP-TR-27, Materials Research Laboratory, Inc., Glenwood, IL, January 1973.

Crosley, P. B. and Ripling, E. J., "Development of a Standard Test for Measuring K_{Ia} with a Modified Compact Specimen," USNRC Report NUREG/CR-2294, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1981.

Crosley, P. B. et al., "Cooperative Test Program on Crack Arrest Toughness Measurements," USNRC Report NUREG/CR-3261, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Hahn, G. T. et al., "Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Second Quarterly Progress Report for January–March 1975," Battelle Report BMI-1934, Battelle Columbus, Columbus, OH, May 1975.

Hahn, G. T. et al., "Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology

for Nuclear Pressure Vessel Steels, First Annual Progress Report for October 1974–September 1975,” Battelle Report BMI-1937, Battelle Columbus, Columbus, OH, August 1975.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Fourth Quarterly Progress Report for July–September 1975,” Battelle Report BMI-1939, Battelle Columbus, Columbus, OH, November 1975.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Fifth Quarterly Progress Report for October–December 1975,” Battelle Report BMI-1944, Battelle Columbus, Columbus, OH, March 1976.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Sixth Quarterly Progress Report for January–June 1976,” Battelle Report BMI-1951, Battelle Columbus, Columbus, OH, July 1976.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Second Annual Progress Report for October 1975–September 1976,” Battelle Report BMI-NUREG-1959, Battelle Columbus, Columbus, OH, October 1976.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Eighth Quarterly Progress Report for July–September 1976,” Battelle Report BMI-NUREG-1966, Battelle Columbus, Columbus, OH, February 1977.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Ninth Quarterly Progress Report for October–December 1976,” Battelle Report NUREG-0289, Battelle Columbus, Columbus, OH, July 1977.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Third Annual Progress Report for October 1976–September 1977,” USNRC Report NUREG/CR-0057, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1978.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Tenth Quarterly Progress Report for January–March 1977,” USNRC Report

NUREG/CR-0079, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1978.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Eleventh Quarterly Progress Report for April–June 1977,” USNRC Report NUREG/CR-0080, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1978.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Thirteenth Quarterly Progress Report for October–December 1977,” USNRC Report NUREG/CR-0518, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1978.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Quarterly Progress Report for January–March 1978,” USNRC Report NUREG/CR-0583, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Quarterly Progress Report for April–June 1978,” USNRC Report NUREG/CR-0652, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1979.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Quarterly Progress Report for October–December 1978,” USNRC Report NUREG/CR-0824, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1979.

Hahn, G. T. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Fourth Annual Progress Report for October 1977–September 1978,” USNRC Report NUREG/CR-0825, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1979.

Hoagland, R. G. et al., “Rectangular-DCB Specimens for Fast Fracture and Crack Arrest Measurements,” Battelle Report BMI-1933, Battelle Columbus, Columbus, OH, December 1974.

Rosenfield, A. R. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Progress Report for January–June 1979,” USNRC Report NUREG/CR-0991, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.

Rosenfield, A. R. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest

Methodology for Nuclear Pressure Vessel Steels, Progress Report for June–December 1979,” USNRC Report NUREG/CR–1555, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1980.

Rosenfield, A. R. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels, Progress Report for January–March 1980,” USNRC Report NUREG/CR–1601, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1980.

Rosenfield, A. R. et al., “Critical Experiments, Measurements and Analyses to Establish a Crack Arrest Methodology for Nuclear Pressure Vessel Steels (Final Report),” USNRC Report NUREG/CR–1887, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1981.

Shukla, A., Fourney, W. L., and Irwin, G. R., “Study of Energy Loss and Its Mechanisms in Homalite 100 During Crack Propagation and Arrest,” USNRC Report NUREG/CR–2150, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1981.

Dosimetry

Asgari, M., Williams, M. L., and Kam, F. B. K., “Determination of the Neutron and Gamma Flux Distribution in the Pressure Vessel and Cavity of a Boiling Water Reactor,” USNRC Report NUREG/CR–5449, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1990.

Baldwin, C. A., “Two- and Three-Dimensional Diffusion Theory Calculations for the Pool Critical Assembly Pressure Vessel Wall Benchmark Facility,” USNRC Report NUREG/CR–2579, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Baldwin, C. A., “Two-Dimensional Discrete Transport Theory Calculations for the Pool Critical Assembly Pressure Vessel Wall Benchmark Facility,” ORNL Report ORNL/CF–84/57, Oak Ridge National Laboratory, Oak Ridge, TN, March 1984.

Brackenbush, L. W., Reece, W. D. and Tanner, J. E., “Neutron Dosimetry at Commercial Nuclear Plants, Final Report of Subtask C: ³He Neutron Spectrometer,” USNRC Report NUREG/CR–3610, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

Chowdhury, P., Williams, M. L., and Kam, F. B. K., “Development of a Three-Dimensional Flux Synthesis Program and Comparison with 3-D Transport Theory Results”, USNRC Report NUREG/CR–4984, U.S. Nuclear Commission, Washington, D.C., January 1988.

Fero, A. H., “Westinghouse Class 3, Neutron and Gamma-Ray Flux Calculations for the VENUS PWR En-

gineering Mockup,” USNRC Report NUREG/CR–4827, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1987.

Guthrie, G. L. et al., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report January–March 1978,” USNRC Report NUREG/CR–0285, U.S. Nuclear Regulatory Commission, Washington, January 1978.

Guthrie, G. L. and Lippincott, E. P., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report October 1977–December 1977,” USNRC Report NUREG/CR–0127, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Guthrie, G. L. et al., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report July–September 1977,” USNRC Report NUREG/CR–0038, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1978.

Guthrie, G. L. et al., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report July–September 1978,” USNRC Report NUREG/CR–0551, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1978.

Guthrie, G. L. et al., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report April–June 1978,” USNRC Report NUREG/CR–0550, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1979.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report October–December 1978,” USNRC Report NUREG/CR–0720, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1980.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report January–March 1979,” USNRC Report NUREG/CR–1240, Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report July–September 1979,” USNRC Report NUREG/CR–1240, Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report October–December 1979,” USNRC Report NUREG/CR–1240, Vol. IV, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly

Progress Report January–March 1980,” USNRC Report NUREG/CR–1241, Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report April–June 1979,” USNRC Report NUREG/CR–1240, Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1981.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report April–June 1980,” USNRC Report NUREG/CR–1241, Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1981.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report January 1981–March 1981,” USNRC Report NUREG/CR–2345, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1981.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report October 1980–December 1980,” USNRC Report NUREG/CR–1241, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1981.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report October 1981–December 1981,” USNRC Report NUREG/CR–2345, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1982.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Irradiation Surveillance Dosimetry Quarterly Progress Report April 1981–June 1981,” USNRC Report NUREG/CR–2345, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1982.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report January 1982–March 1982,” USNRC Report NUREG/CR–2805, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.

Guthrie, G. L. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report April 1982–June 1982,” USNRC Report NUREG/CR–2805, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.

Johnson, J. O., Miller, L. F., and Kam, F. B. K., “Neutronics Model of the Bulk Shielding Reactor (BSR): Validation by Comparison of Calculations with the Experimental Measurements,” ORNL Report ORNL/

TM–7128, Oak Ridge National Laboratory, Oak Ridge, TN, May 1981.

Kam, F. B. K., ed., “Proceedings of the Fourth ASTM-EURATOM Symposium on Reactor Dosimetry, Radiation Metrology Techniques, Data Bases and Standardization, March 22–26, 1982, Gaithersburg, MD,” USNRC Conference Proceedings NUREG/CP–0029, Vols. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Kam, F. B. K. et al., “Pressure Vessel Fluence Analysis and Neutron Dosimetry,” USNRC Report NUREG/CR–5049, U. S. Nuclear Regulatory Commission, Washington, D.C., December 1987.

Lippincott, E. P. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report October 1982–December 1982,” USNRC Report NUREG/CR–2805, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Lippincott, E. P. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report January 1983–March 1983,” USNRC Report NUREG/CR–3391, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1983.

Lippincott, E. P. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report April 1983–June 1983,” USNRC Report NUREG/CR–3391, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Lippincott, E. P. and McElroy, W. N., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program Quarterly Progress Report October 1983–December 1983,” USNRC Report NUREG/CR–3391, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Lippincott, E. P. and McElroy, W. N., eds., “Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program Semiannual Progress Report October 1983–March 1984,” USNRC Report NUREG/CR–3746, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.

Lippincott, E. P. and McElroy, W. N., eds., “Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program Semiannual Progress Report April 1984–September 1984,” USNRC Report NUREG/CR–3746, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Lippincott, E. P. et al., “Evaluation of Surveillance Capsule and Reactor Cavity Dosimetry from H. B. Robinson

Unit 2, Cycle 9,” USNRC Report NUREG/CR-4576, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1987.

Maerker, R. E., “LEPRICON Analysis of Pressure Vessel Surveillance Dosimetry Inserted into H. B. Robinson-2 during Cycle 9,” USNRC Report NUREG/CR-4439, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1986.

Maerker, R. E., “Analysis of the NESDIP2 and NESDIP3 Radial Shield and Cavity Experiments,” USNRC Report NUREG/CR-4886, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.

Maerker, R. E., “Analysis of the VENUS-3 Experiments,” USNRC Report NUREG/CR-5338, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1979 Annual Report,” USNRC Report NUREG/CR-1291, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1980.

McElroy, W. N. et al., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1980 Annual Report (October 1, 1979–September 30, 1980),” USNRC Report NUREG/CR-1747, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1981.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: PCA Experiments and Blind Test,” USNRC Report NUREG/CR-1861, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1981.

McElroy, W. N. et al., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1982 Annual Report (October 1, 1981–September 30, 1982),” USNRC Report NUREG/CR-2805, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.

McElroy, W. N. et al., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1983 Annual Report (October 1, 1982–September 30, 1983),” USNRC Report NUREG/CR-3391, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: PCA Experiments, Blind Test, and Physics-Dosimetry Support for the PSF Experiments,” USNRC Report NUREG/CR-3318, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

McElroy, W. N. et al., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1984 Annual Report October 1, 1983–September 30, 1984,” USNRC Report NUREG/CR-3746, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: LWR Power Reactor Surveillance Physics-Dosimetry Data Base Compendium,” USNRC Report NUREG/CR-3319, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

McElroy, W. N. and Lippincott, E. P., eds., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1985 Annual Report, October 1984–September 1985,” USNRC Report NUREG/CR-4307, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1986.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: PSF Experiments Summary and Blind Test Results,” USNRC Report NUREG/CR-3320, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1986.

McElroy, W. N., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program 1986 Annual Report (October 1985–September 1986),” USNRC Report NUREG/CR-4307, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.

McElroy, W. N. and Gold, R., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: PSF Physics-Dosimetry Program,” USNRC Report NUREG/CR-3320, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1987.

McElroy, W. N. and Gold, R., ed., “LWR Pressure Vessel Surveillance Dosimetry Improvement Program: PSF Metallurgy Program,” USNRC Report NUREG/CR-3320, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1987.

Miller, L. F. and Williams, M. L., “Computational Methodology for the Oak Ridge Research Reactor (ORR) and Bulk Shielding Reactor (BSR): CrossSection Generation and Validation, Volume I,” USNRC Report NUREG/CR-3064, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Morakinyo, P. O., Williams, M. L., and Kam, F. B. K., “Analysis of the VENUS PWR Engineering Mockup Experiment—Phase I: Source Distribution,” USNRC Report NUREG/CR-3888, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Stallmann, F. W., Eastham, J. F., and Kam, F. B. K., “WINDOWS—A Program for the Analysis of Spectral

Data Foil Activation Measurements," ORNL Report ORNL/TM-6656, Oak Ridge National Laboratory, Oak Ridge, TN, December 1978.

Stallmann, F. W. et al., "Reactor Calculation 'Benchmark' PCA Blind Test Results," USNRC Report NUREG/CR-1872, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1981.

Stallmann, F. W., "LSL-M2: A Computer Program for Least-Squares Logarithmic Adjustment of Neutron Spectra," USNRC Report NUREG/CR-4349, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Williams, M. L. and Miller, L. F., "Computational Methodology for the Oak Ridge Research Reactor (ORR) and Bulk Shielding Reactor (BSR): The VICTORR Input Processing Code for the BOLD VENTURE System, Volume II," USNRC Report NUREG/CR-3064, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1986.

Williams, M. L., Landesman, M. and Kam, F. B. K., "Calculation of the Power Distribution in the VENUS PWR Mock-Up Benchmark using Two-Group Diffusion Theory," USNRC Report NUREG/CR-4647, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1986.

Williams, M. L., Childs, R. L. and Asgari, M., "Analysis of H. B. Robinson PWR Vessel Fluence for Cycle 10 Utilizing Partial Length Shield Assemblies," USNRC Report NUREG/CR-5530, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1990.

Environmentally-Assisted Cracking and Fatigue

Atteridge, D. G., Bruemmer, S. M., and Page, R. E., "Evaluation and Acceptance of Welded and Repair-Welded Stainless Steel for LWR Service, Annual Report for 1983," USNRC Report NUREG/CR-3613, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

Atteridge, D. G., Bruemmer, S. M., and Page, R. E., "Evaluation of Welded and Repair-Welded Stainless Steel for LWR Service, Quarterly Report for January-March 1984," USNRC Report NUREG/CR-3911 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.

Atteridge, D. G., Bruemmer, S. M., and Page, R. E., "Evaluation of Welded and Repair-Welded Stainless Steel for LWR Service, Quarterly Report for April-June 1984," USNRC Report NUREG/CR-3911 Vol. 2, U.S.

Nuclear Regulatory Commission, Washington, D.C., February 1985.

Atteridge, D. G., Bruemmer, S. M., and Page, R. E., "Evaluation of Welded and Repair-Welded Stainless Steel for LWR Service, Annual Report for 1984," USNRC Report NUREG/CR-3613 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.

Atteridge, D. G. et al., "Evaluation of Welded and Repair-Welded Stainless Steel for LWR Service, Semi-annual Report for October 1984-March 1985," USNRC Report NUREG/CR-3613 Vol. 3 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Atteridge, D. G. and Bruemmer, S. M., "Evaluation of Welded and Repair-Welded Stainless Steel for LWR Service, Annual Report for October 1984-September 1985," USNRC Report NUREG/CR-3613 Vol. 3 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Bamford, W. H., "A Summary of Environmentally Assisted Crack-Growth Studies Performed at Westinghouse Electric Corporation Under Funding from the Heavy-Section Steel Technology Program," USNRC Report NUREG/CR-5020, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1988.

Brothers, A. J. and Woodford, D. A., "The Effect of Cyclic Strain Aging on the Embrittlement of a Plain Carbon Steel Plate," GE Report GEAP-10140, General Electric Corporation, San Jose, CA, January 1970.

Brown, B. F., O'Dell, C. S., and Foley, R. T., "An Exploratory Study of Inhibition of Intergranular Stress Corrosion Cracking in Sensitized Type 304 Stainless Steel," USNRC Report NUREG/CR-0754, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1979.

Bruemmer, S. M., Charlot, L. A., and Atteridge, D. G., "Evaluation of Welded and Repair-Welded Stainless Steel for Light Water Reactor (LWR) Service, Compositional Effects on the Sensitization of Austenitic Stainless Steels," USNRC Report NUREG/CR-3918, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1984.

Clarke, W. G., Romero, V. M., and Danko, J. C., "Detection of Sensitization in Stainless Steel Using Electrochemical Techniques," GE Report GEAP-21382, General Electric Corporation, San Jose, CA, August 1976.

Clarke, W. G., "Reactor Primary Coolant System Pipe Rupture Study Method for Detection of Sensitization in Stainless Steel, Progress Report No. 42, October-December 1977," USNRC Report NUREG/CR-0155,

U.S. Nuclear Regulatory Commission, Washington, D.C., January 1978.

Clarke, W. G. and Romero, V. M., "Detection of Sensitization in Stainless Steel: II. EPR Method for Nondestructive Field Tests," GE Report GEAP-12697, General Electric Corporation, San Jose, CA, February 1978.

Clarke, W. G., "Reactor Primary Coolant System Pipe Rupture Study Method for Detection of Sensitization in Stainless Steel, Progress Report No. 43, January–March 1978," USNRC Report NUREG/CR-0306, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1978.

Clarke, W. G., "Reactor Primary Coolant System Pipe Rupture Study Method for Detection of Sensitization in Stainless Steel, Progress Report No. 44, April–June 1978," USNRC Report NUREG/CR-0567, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1978.

Clarke, W. G., "Reactor Primary Coolant System Pipe Rupture Study Method for Detection of Sensitization in Stainless Steel, Progress Report No. 45, July–September 1978," USNRC Report NUREG/CR-0541, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.

Clarke, W. G., "Reactor Primary Coolant System Pipe Rupture Study Method for Detection of Sensitization in Stainless Steel, Progress Report No. 46, October–December 1978," USNRC Report NUREG/CR-0834, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1979.

Clarke, W. G., "The EPR Method for the Detection of Sensitization in Stainless Steels," USNRC Report NUREG/CR-1095, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1981.

Cragolino, G., Czajkowski, C., and Shack, W. J., "Review of Erosion-Corrosion in Single-Phase Flows," USNRC Report NUREG/CR-5156, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.

Cullen, W. H. et al., "Fatigue Crack Growth of A 508 Steel in High-Temperature, Pressurized Reactor-Grade Water," USNRC Report NUREG/CR-0969, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.

Cullen, W. H. and Torronen, K., "A Review of Fatigue Crack Growth of Pressure Vessel and Piping Steels in High-Temperature, Pressurized, Reactor-Grade Water," USNRC Report NUREG/CR-1576, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1980.

Cullen, W. H., Torronen, K., and Kemppainen, M., "Effects of Temperature on Fatigue Crack Growth of A 508-2 Steel in LWR Environment," USNRC Report NUREG/CR-3230, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Cullen, W. H., ed., "Proceedings of the International Atomic Energy Agency Specialists' Meeting on Subcritical Crack Growth, Freiburg, Federal Republic of Germany, May 11–15, 1981," USNRC Conference Proceedings NUREG/CP-0044, Vols. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1983.

Cullen, W. H., "Fatigue Crack Growth Rates of A 508-2 Steel in Pressurized, High-Temperature Water," USNRC Report NUREG/CR-3294, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1983.

Cullen, W. H. et al., "The Temperature Dependence of Fatigue Crack Growth Rates of A 351 CF8A Cast Stainless Steel in LWR Environment," USNRC Report NUREG/CR-3546, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Cullen, W. H., "Fatigue Crack Growth Rates of Low-Carbon and Stainless Piping Steels in LWR Environments," USNRC Report NUREG/CR-3945, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.

Cullen, W. H., "The Effects of Sulfur Chemistry and Flow Rate on Fatigue Crack Growth Rates in LWR Environments," USNRC Report NUREG/CR-4121, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.

Cullen, W. H., Gabetta, G., and Hanninen, H., "A Review of the Models and Mechanisms for Environmentally-Assisted Crack Growth of Pressure Vessel and Piping Steels in PWR Environments," USNRC Report NUREG/CR-4422, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1985.

Cullen, W. H., ed., "Proceedings of the Second IAEA Specialists' Meeting on Subcritical Crack Growth, Sendai, Japan, May 15–17, 1985," USNRC Conference Proceedings NUREG/CP-0067, Vols. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1986.

Cullen, W. H., "Fatigue Crack Growth Rates in Pressure Vessel and Piping Steels in LWR Environments," USNRC Report NUREG/CR-4724, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1987.

Cullen, W. H. and Broek, D. R., "The Effect of Variable Amplitude Loading on A 533-B Steel in High-Temperature Air and Reactor Water Environments," USNRC Report NUREG/CR-4929, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.

Cullen, W. H. and Jolles, M. R., "Fatigue Crack Growth of Part-Through Cracks in Pressure Vessel and Piping Steels: Air Environment Results," USNRC Report NUREG/CR-4828, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1988.

Cullen, W. H., ed., "Proceedings of the Third International Atomic Energy Agency Specialists' Meeting on Subcritical Crack Growth, Held at Moscow, USSR, May 14–17, 1990," USNRC Conference Proceedings NUREG/CP-0112, Vols. 1 and 2, U.S. Nuclear Regulatory Commission, August 1990.

Czajkowski, C. J., "Testing of Nuclear Grade Lubricants and Their Effect on A540 B24 and A193 B7 Bolting Materials," USNRC Report NUREG/CR-3766, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.

Diercks, D. R., "Chemical Decontamination and Chemical Cleaning of LWR Components and Possible Interactions with Metallurgical Aging Effects," USNRC Report NUREG/CR-5180, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1988.

Fox, M. J., "Uniqueness of Boiling Water Reactor Primary Water Chemistry, Final Report October 1985–March 1986," USNRC Report NUREG/CR-4602, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1986.

Fox, M. J., "A Review of Boiling Water Reactor Water Chemistry, Science, Technology and Performance," USNRC Report NUREG/CR-5115, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1989.

Gabetta, G. and Cullen, W. H., "Application of a Two-Mechanisms Model for Environmentally-Assisted Crack Growth," USNRC Report NUREG/CR 4723, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Gerber, T. L., "Effect of Constraint and Loading Mode on Low-Cycle Fatigue Crack Initiation—Comparison with Code Design Rules," GE Report GEAP-20662, General Electric Corporation, San Jose, CA, October 1974.

Gorman, J., "Survey of PWR Water Chemistry," USNRC Report NUREG/CR-5116, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1989.

Hale, D. A., "Low Cycle Fatigue Evaluation of Primary Piping Materials in a BWR Environment," GE Report GEAP-20244, General Electric Company, San Jose, CA, September 1977.

Hale, D. A., Yuen, J. L., and Gerber, T. L., "Fatigue Growth in Piping and RPV Steels in Simulated BWR Water Environment," USNRC Report NUREG/CR-0390, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1979.

Hanninen, H. E., Vulli, M., and Cullen, W. H., "Surface Spectroscopy of Pressure Vessel Steel Fatigue Fracture Surface Films Formed in PWR Environments," USNRC Report NUREG/CR-4863, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.

James, L. A. and Williams, J. A., "Heavy Section Steel Technology Program Technical Report No. 21, The Effect of Temperature and Neutron Irradiation upon the Fatigue-Crack Propagation Behavior of ASTM A533 Grade B, Class 1 Steel," HEDL Report HEDL-TME 72-132, Hanford Engineering Development Laboratory, Richland, WA, September 1972.

James, L. A., "A Survey of the Effect of Heat-To-Heat Variations Upon the Fatigue-Crack Propagation Behavior of Types 304 and 316 Stainless Steels," HEDL Report HEDL-TME 75-37, Hanford Engineering Development Laboratory, Richland, WA, May 1975.

Jonas, O., "Erosion-Corrosion of PWR Feedwater Piping Survey of Experience, Design, Water Chemistry and Materials," USNRC Report NUREG/CR-5149, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1988.

Kassner, T. F. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report October 1988–March 1989," USNRC Report NUREG/CR-4667 Vol. 8, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1990.

Keck, R. G. and Griffith, P., "Prediction and Mitigation of Erosion-Corrosive Wear in Secondary Piping Systems of Nuclear Power Plants," USNRC Report NUREG/CR-5007, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1987.

Kiss, E., Heald, J. D. and Hale, D. A., "Low-Cycle Fatigue of Prototypic Piping," GE Report GEAP-10135, General Electric Corporation, San Jose, CA, January 1970.

Krempf, E., "Low-Cycle Fatigue Strength Reduction in Notched Flat Plates," GE Report GEAP-5410, General Electric Corporation, San Jose, CA, January 1967.

Krempf, E., "Influence of Stress/Strain Concentration and Mean Stress on Low-Cycle Fatigue Behavior of Three Structural Steels at Room Temperature," GE Report GEAP-5726, General Electric Corporation, San Jose, CA, September 1968.

Krempel, E., "Notched High-Strain Fatigue Behavior of Three Low-Strength Structural Steels," GE Report GEAP-5714, General Electric Corporation, San Jose, CA, January 1969.

Krempel, E., "The 550°F Notched High-Strain Behavior of Three Low-Strength Structural Steels," GE Report GEAP-10090, General Electric Corporation, San Jose, CA, August 1969.

Krempel, E., "The Effect of Strain Concentration on the Low-Cycle Fatigue of Three Structural Steels at Room Temperature and 550°F," GE Report GEAP-10170, General Electric Corporation, San Jose, CA, March 1970.

Kuzay, T. M., Halle, H. J. and Kasza, K. E., "Preliminary Review of Mass Transfer and Flow Visualization Studies and Techniques Relevant to the Study of Erosion-Corrosion of Reactor Piping Systems," USNRC Report NUREG/CR-5131, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1988.

Mager, T. R. and McLoughlin, V. J., "The Effect of an Environment of High Temperature Primary Grade Nuclear Reactor Water on the Fatigue Crack Growth Characteristics of A533 Grade B Class 1 Plate and Weldment Material," Westinghouse Report WCAP-7776, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, October 1971.

Mager, T. R. et al., "The Effect of Low Frequencies on the Fatigue Crack Growth Characteristics of A533 Grade B Class 1 Plate in an Environment of High-Temperature Primary Grade Nuclear Reactor Water," Westinghouse Report WCAP-8256, Westinghouse Electric Corporation, Pittsburgh, PA, December 1973.

Nichols, F. A., "Mechanistic Aspects of Stress-Corrosion Cracking of Type 304 Stainless Steel in LWR Systems," USNRC Report NUREG/CR-3220, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Park, J. Y. and Shack, W. J., "Intergranular Crack Propagation Rates in Sensitized Type 304 Stainless Steel in an Oxygenated Water Environment," Argonne Report ANL-83-93, Argonne National Laboratory, Argonne, IL, December 1983.

Park, J. Y. and Kupperman, D. S., "Ultrasonic and Metallurgical Examination of a Cracked Type 304 Stainless Steel BWR Pipe Weldment," Argonne Report ANL-84-1, Argonne National Laboratory, Argonne, IL, January 1984.

Romano, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quar-

terly Progress Report April 1–June 30, 1981," USNRC Report NUREG/CR-2331 Vol. 1 No. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1982.

Romano, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1981," USNRC Report NUREG/CR-2331 Vol. 1 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1982.

Romano, A. J., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 30, 1981," USNRC Report NUREG/CR-2331 Vol. 1 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Shack, W. J. et al., "Light-Water-Safety Research Program: Quarterly Progress Report April–June 1981," USNRC Report NUREG/CR-2437 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1981.

Shack, W. J. et al., "Light-Water-Safety Research Program: Quarterly Progress Report July–September 1981," USNRC Report NUREG/CR-2437 Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors: Critical Issues and Recommended Research," USNRC Report NUREG/CR-2541, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Shack, W. J., "Measurement of Throughwall Residual Stresses in Largediameter Type 304 Stainless Steel Piping Butt Weldments," ANL Report ANL-82-15, Argonne National Laboratory, Argonne, IL, March 1982.

Shack, W. J. et al., "Materials Science Division Light-Water-Safety Research Program: Quarterly Progress Report October–December 1981," USNRC Report NUREG/CR-2437 Vol. IV, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1982.

Shack, W. J. et al., "Materials Science Division Light-Water-Safety Research Program: Quarterly Progress Report January–March 1982," USNRC Report NUREG/CR-2970 Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1982.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors: Annual Report October 1981–September 1982," USNRC Report NUREG/CR-3292, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report April–June 1982," USNRC Report NUREG/CR-2970 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1983.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report July–September 1982," USNRC Report NUREG/CR-2970 Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1983.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report October–December 1982," USNRC Report NUREG/CR-2970 Vol. IV, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1983.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report January–March 1983," USNRC Report NUREG/CR-3689 Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report April–June 1983," USNRC Report NUREG/CR-3689 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors: Annual Report October 1982–September 1983," USNRC Report NUREG/CR-3806, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report July–September 1983," USNRC Report NUREG/CR-3689 Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1984.

Shack, W. J. et al., "Materials Science and Technology Division Light-Water-Reactor Safety Research Program: Quarterly Progress Report October–December 1983," USNRC Report NUREG/CR-3689 Vol. IV, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Shack, W. J. et al., "Light-Water-Reactor Safety Materials Engineering Research Programs: Quarterly Progress Report, January–March 1984," USNRC Report NUREG/CR-3998 Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

Shack, W. J. et al., "Light-Water-Reactor Safety Materials Engineering Research Programs: Quarterly Progress Report, April–June 1984," USNRC Report NUREG/CR-3998 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Annual Report October 1983–September 1984," USNRC Report NUREG/CR-4287, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.

Shack, W. J. et al., "Light-Water-Reactor Safety Materials Engineering Research Programs: Quarterly Progress Report October–December 1984," USNRC Report NUREG/CR-3998 Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1985.

Shack, W. J. et al., "Light-Water-Reactor Safety Materials Engineering Research Programs: Quarterly Progress Report January–March 1985," USNRC Report NUREG/CR-4490 Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report April–September 1985," USNRC Report NUREG/CR-4667 Vol. I, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report October 1985–March 1986," USNRC Report NUREG/CR-4667 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1986.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report April–September 1986," USNRC Report NUREG/CR-4667 Vol. III, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1987.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report October 1986–March 1987," USNRC Report NUREG/CR-4667 Vol. IV, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1987.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report April–September 1987," USNRC Report NUREG/CR-4667 Vol. V, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1988.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report October 1987–March 1988," USNRC Report NUREG/CR-4667 Vol. 6, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

Shack, W. J. et al., "Environmentally Assisted Cracking in Light Water Reactors Semiannual Report April 1988–September 1988," USNRC Report NUREG/CR-4667 Vol. 7, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1990.

Terrell, J. B., "Fatigue Strength Characterization of Smooth and Notched Piping Steel Specimens in 288°C Air Environments," USNRC Report NUREG/CR-5013, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.

Terrell, J. B., "Fatigue Strength of Smooth and Notched Specimens of ASME SA 106-B Steel in PWR Environments," USNRC Report NUREG/CR-5136, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1988.

Terrell, J. B., "Fatigue Strength of ASME SA 106-B Welded Steel Pipes in 288°C Air Environments," USNRC Report NUREG/CR-5195, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1988.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1982," USNRC Report NUREG/CR-2331 Vol. 2 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1982.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report April 1–June 30, 1982," USNRC Report NUREG/CR-2331 Vol. 2 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1983.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1982," USNRC Report NUREG/CR-2331 Vol. 2 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1982," USNRC Report NUREG/CR-2331 Vol. 2 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1983," USNRC Report NUREG/CR-2331 Vol. 3 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1983.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly

Progress Report April 1–June 30, 1983," USNRC Report NUREG/CR-2331 Vol. 3 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1983," USNRC Report NUREG/CR-2331 Vol. 3 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1984.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1983," USNRC Report NUREG/CR-2331 Vol. 3 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1984," USNRC Report NUREG/CR-2331 Vol. 4 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report April 1–June 30, 1984," USNRC Report NUREG/CR-2331 Vol. 4 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1984," USNRC Report NUREG/CR-2331 Vol. 4 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1985.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1984," USNRC Report NUREG/CR-2331 Vol. 4 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1985.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1985," USNRC Report NUREG/CR-2331 Vol. 5 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report April 1–June 30, 1985," USNRC Report NUREG/CR-2331 Vol. 5 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1985.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1985," USNRC

Report NUREG/CR-2331 Vol. 5 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1985," USNRC Report NUREG/CR-2331 Vol. 5 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1986," USNRC Report NUREG/CR-2331 Vol. 6 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1986.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report April 1–June 30, 1986," USNRC Report NUREG/CR-2331 Vol. 6 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1986.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1986," USNRC Report NUREG/CR-2331 Vol. 6 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1987.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1986," USNRC Report NUREG/CR-2331 Vol. 6 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1987," USNRC Report NUREG/CR-2331 Vol. 7 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Progress Report April 1–September 30, 1987," USNRC Report NUREG/CR-2331 Vol. 7 No. 2 and 3, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1988.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1987," USNRC Report NUREG/CR-2331 Vol. 7 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1988.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Progress Re-

port January 1–June 30, 1988," USNRC Report NUREG/CR-2331 Vol. 8 No. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1988.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1988," USNRC Report NUREG/CR-2331 Vol. 8 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1989.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1988," USNRC Report NUREG/CR-2331 Vol. 8 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1989.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report January 1–March 31, 1989," USNRC Report NUREG/CR-2331 Vol. 9 No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report April 1–June 30, 1989," USNRC Report NUREG/CR-2331 Vol. 9 No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1989.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report July 1–September 30, 1989," USNRC Report NUREG/CR-2331 Vol. 9 No. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1990.

Weiss, A. J., ed., "Safety Research Programs Sponsored by Office of Nuclear Regulatory Research, Quarterly Progress Report October 1–December 31, 1989," USNRC Report NUREG/CR-2331 Vol. 9 No. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1990.

Fracture Mechanics: Analysis

Atluri, S. N. et al., "NOZ-FLAW: A Finite Element Program for Direct Evaluation of Stress Intensity Factors for Pressure Vessel Nozzle-Corner Flaws," USNRC Report NUREG/CR-1843, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1981.

Atluri, S. N. et al., "OR-FLAW: A Finite Element Program for Direct Evaluation of K-Factors for User-Defined Flaws in Plates, Cylinders and Pressure-Vessel Nozzle Corner," USNRC Report NUREG/CR-2494,

U.S. Nuclear Regulatory Commission, Washington, D.C., April 1982.

Ball, D. G. et al., "OCA-II, A Code for Calculating Behavior of 2-D and 3-D Surface Flaws in a Pressure Vessel Subjected to Temperature and Pressure Transients," USNRC Report NUREG/CR-3491, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1984.

Ball, D. G. et al., "Stress Intensity Factor Influence Coefficients for Surface Flaws in Pressure Vessels," USNRC Report NUREG/CR-3723, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.

Ball, D. G. and Cheverton, R. D., "Adaptation of OCA-P, a Probabilistic Fracture-Mechanics Code, to a Personal Computer," USNRC Report NUREG/CR-4468, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1986.

Bass, B. R. and Bryson, J. W., "ORMGEN-3D: A Finite Element Mesh Generator for 3-Dimensional Crack Geometries," USNRC Report NUREG/CR-2997, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1982.

Bass, B. R. and Bryson, J. W., "ORVIRT: A Finite Element Program for Energy Release Rate Calculations for 2-Dimensional and 3-Dimensional Crack Models," USNRC Report NUREG/CR-2997, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Battiste, R. L. et al., "Stress Analyses of Flat Plates with Attached Nozzles, Volume 2 Experimental Analyses of a Flat Plate with One Nozzle Attached," ORNL Report ORNL-5044 Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, July 1975.

Beitch, L. and North, E. L., "PAPA—The Digital Computer Program for the Static Analysis of Structures Made Up of Plate and Panel Elements," GE Report GEAP-5553, General Electric Corporation, San Jose, CA, October 1967.

Bellucci, H. J., "Three-Dimensional Elastic-Plastic Stress and Strain Analyses for Fracture Mechanics: Complex Geometries," MARC Report No. 09177 (TR 75), MARC, Palo Alto, CA, November 1975.

Bryson, J. W., Callahan, J. P., and Gwaltney, R. C., "Stress Analyses of Flat Plates with Attached Nozzles. Volume 1 Comparison of Stresses in a One-Nozzle-to-Flat-Plate Configuration and in a Two-Nozzle Configuration with Theoretical Predictions," ORNL Report ORNL-5044 Vol. 1, Oak Ridge National Laboratory, Oak Ridge, TN, July 1975.

Bryson, J. W. and Swinson, W. F., "Stress Analyses of Flat Plates with Attached Nozzles. Volume 3 Experimental Stress Analyses of a Flat Plate with Two Closely Spaced Nozzles of Equal Diameter Attached," ORNL Report ORNL-5044 Vol. 3, Oak Ridge National Laboratory, Oak Ridge, TN, December 1975.

Bryson, J. W., Johnson, W. G., and Bass, B. R., "Stresses in Reinforced Nozzle-Cylinder Attachments under Internal Pressure Loading Analyzed by the Finite-Element Method—A Parameter Study," ORNL Report ORNL/NUREG-4, Oak Ridge National Laboratory, Oak Ridge, TN, October 1977.

Bryson, J. W., Johnson, W. G., and Bass, B. R., "Stresses in Reinforced Nozzle-Cylinder Attachments under External Moment Loadings Analyzed by the Finite-Element Method—A Parameter Study," USNRC Report NUREG/CR-0506, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1979.

Bryson, J. W., "ORVIRT.PC: A 2-D Finite Element Fracture Analysis Program for a Microcomputer," USNRC Report NUREG/CR-4367, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1985.

Bryson, J. W. and Bass, B. R., "ORMGEN.PC: A Microcomputer Program for Automatic Mesh Generation of 2-D Crack Geometries," USNRC Report NUREG/CR-4475, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Callahan, J. P., and Greenstreet, W. L., "Experimental and Analytical Investigations of the Structural Behavior of Nozzle-to-Shell Attachments," ORNL Report ORNL-TM-4163, Oak Ridge National Laboratory, Oak Ridge, TN, August 1973.

Cheverton, R. D., Iskander, S. K., and Bolt, S. E., "Applicability of LEFM to the Analysis of PWR Vessels Under LOCA-ECC Thermal Shock Conditions," USNRC Report NUREG/CR-0107, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1978.

Cheverton, R. D., Iskander, S. K., and Ball, D. G., "PWR Pressure Vessel Integrity During Overcooling Accidents: A Parametric Analysis," USNRC Report NUREG/CR-2895, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Cheverton, R. D. and Ball, D. G., "OCA-P, A Deterministic and Probabilistic Fracture-Mechanics Code for Application to Pressure Vessels," USNRC Report NUREG/CR-3618, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Dickson, T. L., Cheverton, R. D., and Shum, D. K., "Inclusion of Unstable Ductile Tearing and Extrapolated Crack-Arrest Toughness Data in PWR Vessel Integrity

Assessment,” USNRC Report NUREG/CR-5473, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1990.

Gray, R. A. and Loss, F. J., “Fracture Safety Considerations for HanfordN Reactor Coolant Piping,” NRL Report 7439, Naval Research Laboratory, Washington, D.C., August 1972.

Inversini, C. and Bryson, J. W., “ORPLOT.PC: A Graphic Utility for ORMGEN.PC and ORVIRT.PC,” USNRC Report NUREG/CR-4633, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.

Irwin, G. R. et al., “Basic Aspects of Crack Growth and Fracture,” NRL Report 6598, Naval Research Laboratory, Washington, D.C., November 1967.

Iskander, S. K., “Two Finite Element Techniques for Computing Mode I Stress Intensity Factors in Two- or Three-Dimensional Problems,” USNRC Report NUREG/CR-1499, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1981.

Iskander, S. K., Cheverton, R. D., and Ball, D. G., “OCA-I, A Code for Calculating the Behavior of Flaws on the Inner Surface of a Pressure Vessel Subjected to Temperature and Pressure Transients,” USNRC Report NUREG/CR-2113, August 1981.

Joyce, J. A. and Hackett, E. M., “Development of an Engineering Definition of the Extent of J Singularity Controlled Crack Growth,” USNRC Report NUREG/CR-5238, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1989.

Krishnamurthy, N., “Three-Dimensional Finite Element Analysis of Thick-Walled Vessel-Nozzle Junctions With Curved Transitions,” USAEC Report ORNL-TM-3315, Oak Ridge National Laboratory, Oak Ridge, TN, July 1971.

Levy, N. and Marcal, P. V., “Three-Dimensional Elastic-Plastic Stress and Strain Analysis for Fracture Mechanics, Phase I: Simple Flawed Specimens,” Brown Report HSSTP-TR-12, Brown University, Providence, RI, December 1970.

Levy, N. and Marcal, P. V., “Three-Dimensional Elastic-Plastic Stress and Strain Analysis for Fracture Mechanics, Phase II: Improved Modelling,” Brown Report HSSTP-TR-17, Brown University, Providence, RI, November 1971.

Loss, F. J. and Pellini, W. S., “Coupling of Fracture Mechanics and Transition Temperature Approaches to

Fracture-Safe Design,” NRL Report 6913, Naval Research Laboratory, Washington, D.C., April 1969.

Loss, F. J., Hawthorne, J. R., and Serpan, Jr., C. Z., “A Reassessment of Fracture-Safe Operating Criteria for Reactor Vessel Steels Based on Charpy-V Performance,” NRL Report 7152, Naval Research Laboratory, Washington, D.C., September 1970.

Loss, F. J., “Engineering Significance of Statistical and Temperature-Induced Fracture Mechanics Toughness Variations on Fracture-Safe Assurances,” NRL Report 7353, Naval Research Laboratory, Washington, D.C., December 1971.

Loss, F. J., Hawthorne, J. R., and Pellini, W. S., “Generalized Procedures for the Use of Plane Strain and Elastic Plastic Fracture Mechanics Options in the Modernization of Nuclear Standards,” NRL Report 7603, Naval Research Laboratory, Washington, D.C., September 1973.

Loss, F. J., Gray, Jr., R. A., and Hawthorne, J. R., “Significance of Warm Prestress to Crack Initiation During Thermal Shock,” NRL Report 8165, Naval Research Laboratory, Washington, D.C., March 1977.

Loss, F. J., “Concepts of Fracture Mechanics and Structural Integrity,” NRL Report 8085, Naval Research Laboratory, Washington, D.C., March 1977.

Merkle, J. G., Kooistra, L. F., and Derby, R. W., “Interpretations of the Drop Weight Test in Terms of Strain Tolerance (Gross Strain) and Fracture Mechanics,” USAEC Report ORNL-TM-3247, Oak Ridge National Laboratory, Oak Ridge, TN, June 1971.

Merkle, J. G., “A Review of Some of the Existing Stress Intensity Factor Solutions for Part-Through Surface Cracks,” USAEC Report ORNL-TM-3983, Oak Ridge National Laboratory, Oak Ridge, TN, January 1973.

Merkle, J. G., “An Elastic-Plastic Thick-Walled Hollow Cylinder Analogy for Analyzing the Strains in the Plastic Zone Just Ahead of a Notch Tip,” USAEC Report ORNL-TM-4071, Oak Ridge National Laboratory, Oak Ridge, TN, January 1973.

Merkle, J. G., “Analytical Relations Between Elastic-Plastic Fracture Criteria,” ORNL Report ORNL/NUREG/TM-27, Oak Ridge National Laboratory, Oak Ridge, TN, July 1976.

Merkle, J. G., “An Approximate Method of Elastic-Plastic Fracture Analysis for Nozzle Corner Cracks,” USNRC Report NUREG/CR-0472, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1978.

Merkle, J. G., “An Overview of the Low-Upper-Shelf Toughness Safety Margin Issue,” USNRC Report

NUREG/CR-5552, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1990.

North, E. L., "PAPA—Structural Analysis of Plates and Shells Using Trapezoidal and Triangular Plate Elements," GE Report GEAP-5471, General Electric Corporation, San Jose, CA, March 1967.

Pedersen, L. T. et al., "PNL Technical Review of Pressurized Thermal-Shock Issues (PWR)," USNRC Report NUREG/CR-2837, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Pedersen, L. T. et al., "PNL Technical Review of Pressurized Thermal-Shock Issues, Supplement 1: Technical Critique of the NRC Near-Term Screening Criteria," USNRC Report NUREG/CR-2837, Supplement 1, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1983.

Pellini, W. S. and Loss, F. J., "Integration of Metallurgical and Fracture Mechanics Concepts of Transition Temperature Factors Relating to Fracture Safe Design for Structural Steels," NRL Report 6900, Naval Research Laboratory, Washington, D.C., April 1969.

Puzak, P. P. and Loss, F. J., "Metallurgical and Mechanical Considerations in Selection of a Fracture-Safe Explosives Containment Vessel," NRL Report 7354, Naval Research Laboratory, Washington, D.C., January 1972.

Ritze, G. O., "Restart for the PAPA Program," GE Report GEAP-10007, General Electric Corporation, San Jose, CA, March 1969.

Rodabaugh, E. C., O'Hara, F. M. and Moore, S. E., "FLANGE: A Computer Program for the Analysis of Flanged Joints with Ring-Type Gaskets," ORNL Report ORNL-5035, Oak Ridge National Laboratory, Oak Ridge, TN, January 1976.

Rodabaugh, E. C. and Moore, S. E., "Flexibility Factors for Small ($d/D < 1/3$) Branch Connections with External Loadings," ORNL Report ORNL/Sub/2913-6, Oak Ridge National Laboratory, Oak Ridge, TN, March 1977.

Sauter, A., Cheverton, R. D., and Iskander, S. K., "Modification of OCA-I for Application to a Reactor Pressure Vessel with Cladding on the Inner Surface," USNRC Report NUREG/CR-3155, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1983.

Schwartz, C. W. et al., "SAMCR: A Two-Dimensional Dynamic Finite Element Code for the Stress Analysis of Moving CRacks," USNRC Report NUREG/CR-3891, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.

Simonen, E. P., Johnson, K. I., and Simonen, F. A., "Vessel Integrity Simulation Analysis (VISA) Code Sensitivity Study," USNRC Report NUREG/CR-4267, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1985.

Simonen, E. P. et al., "VISA-II Sensitivity Study of Code Calculations: Input and Analytical Model Parameters," USNRC Report NUREG/CR-4614, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1986.

Simonen, F. A., "The Impact of Nondestructive Examination Unreliability on Pressure Vessel Fracture Predictions," USNRC Report NUREG/CR-3743, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Simonen, F. A. and Woo, H. H., "Analyses of the Impact of Inservice Inspection Using Piping Reliability Model," USNRC Report NUREG/CR-3869, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Simonen, F. A. et al., "Reactor Pressure Vessel Failure Probability Following Through-Wall Cracks Due to Pressurized Thermal Shock Events," USNRC Report NUREG/CR-4483, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1986.

Simonen, F. A. et al., "VISA-II: A Computer Code for Predicting the Probability of Reactor Pressure Vessel Failure," USNRC Report NUREG/CR-4486, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Smith, C. W., Jolles, M., and Peters, W. H., "Stress Intensities for Nozzle Cracks in Reactor Vessels," VPI Report VPI-E-76-25 (ORNL/SUB/7015-1), Virginia Polytechnic Institute and State University, Blacksburg, VA, November 1976.

Smith, C. W. et al., "Stress Intensity Distributions in Nozzle Corner Cracks of Complex Geometry," USNRC Report NUREG/CR-0640, Washington, D.C., January 1979.

Stevens, D. L. et al., "VISA: A Computer Code for Predicting the Probability of Reactor Pressure-Vessel Failure," USNRC Report NUREG/CR-3384, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1983.

Stonesifer, R. B., Rybicki, E. F., and McCabe, D. E., "Development of Models for Warm Prestressing," USNRC Report NUREG/CR-4491, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1987.

Stonesifer, R. B., Rybicki, E. F., and McCabe, D. E., "Warm Prestress Modeling: Comparison of Models and Experimental Results," USNRC Report NUREG/

CR-5208, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.

Tso, F. K. W. et al., "Stress Analysis of Cylindrical Pressure Vessels with Closely Spaced Nozzles by the Finite-Element Method, Volume 1 Stress Analysis of Vessels with Two Closely Spaced Nozzles Under Internal Pressure," ORNL Report ORNL/NUREG-18/V1, Oak Ridge National Laboratory, Oak Ridge, TN, November 1977.

Tso, F. K. W. and Weed, R. A., "Stress Analysis of Cylindrical Pressure Vessels with Closely Spaced Nozzles by the Finite-Element Method, Volume 2 Vessels with Two Closely Spaced Nozzles Under External Force and Moment Loadings," USNRC Report NUREG/CR-0132, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1978.

Tso, F. K. W. and Weed, R. A., "Stress Analysis of Cylindrical Pressure Vessels with Closely Spaced Nozzles by the Finite-Element Method, Volume 3 Vessels with Three Nozzles Under Internal Pressure and External Loadings," USNRC Report NUREG/CR-0507 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1979.

Visser, C., Gabrielse, S. E., and VanBuren, W., "A Two-Dimensional Elastic-Plastic Analysis of Fracture Test Specimens," Westinghouse Report WCAP-7368, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, October 1969.

Yukawa, S., "Evaluation of Periodic Proof Testing and Warm Prestressing Procedures for Nuclear Reactor Vessels," GE Report HSSTP-TR-1, General Electric Company, Schenectady, NY, July 1, 1969.

Fracture Mechanics: Experimental — Component Testing

Abbatiello, A. A. and Derby, R. W., "Notch Sharpening in a Large Tensile Specimen by Local Fatigue," USAEC Report ORNL-TM-3925, Oak Ridge National Laboratory, Oak Ridge, TN, November 1972.

Bryan, R. H. et al., "Test of 6-Inch-Thick Pressure Vessels. Series 2: Intermediate Test Vessels V-3, V-4, and V-6," ORNL Report ORNL-5059, Oak Ridge Natl. Lab., Oak Ridge, Tenn., November 1975.

Bryan, R. H. et al., "Test of 6-in.-Thick Pressure Vessels. Series 3: Intermediate Test Vessel V-7A Under Sustained Loading," ORNL Report ORNL/NUREG-9, Oak Ridge Natl. Lab., Oak Ridge, Tenn., February 1978.

Bryan, R. H. et al., "Test of 6-in.-Thick Pressure Vessels. Series 3: Intermediate Test Vessel V-7B," USNRC Report NUREG/CR-0309, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1978.

Bryan, R. H. et al., "Test of 6-in.-Thick Pressure Vessels. Series 3: Intermediate Test Vessel V-8," USNRC Report NUREG/CR-0675, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1979.

Bryan, R. H. et al., "Pressurized-Thermal-Shock Test of 6-in.-Thick Pressure Vessels. PTSE-1: Investigation of Warm Prestressing and Upper-Shelf Arrest," USNRC Report NUREG/CR-4106, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Bryan, R. H. et al., "Test of 6-in.-Thick Pressure Vessels. Series 3: Intermediate Test Vessel V-8A—Tearing Behavior of Low Upper-Shelf Material," USNRC Report NUREG/CR-4760, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.

Bryan, R. H. et al., "Pressurized-Thermal-Shock Test of 6-in.-Thick Pressure Vessels. PTSE-2: Investigation of Low Tearing Resistance and Warm Prestressing," USNRC Report NUREG/CR-4888, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1987.

Cheverton, R. D., "Pressure Vessel Fracture Studies Pertaining to a PWR LOCA-ECC Thermal Shock: Experiments TSE-1 and TSE-2," ORNL Report ORNL/NUREG/TM-31, Oak Ridge National Laboratory, Oak Ridge, TN., September 1976.

Cheverton, R. D. and Bolt, S. E., "Pressure Vessel Fracture Studies Pertaining to a PWR LOCA-ECC Thermal Shock: Experiments TSE-3 and TSE-4 and Update of TSE-1 and TSE-2 Analysis," ORNL Report ORNL/NUREG-22, Oak Ridge National Laboratory, Oak Ridge, TN, December 1977.

Cheverton, R. D. and Iskander, S. K., "Application of Static and Dynamic Crack Arrest Theory to TSE-4," USNRC Report NUREG/CR-0767, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1979.

Cheverton, R. D. et al., "Pressure Vessel Fracture Studies Pertaining to the PWR Thermal-Shock Issue: Experiments TSE-5, TSE-5A and TSE-6," USNRC Report NUREG/CR-4249, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.

Cheverton, R. D. et al., "Pressure Vessel Fracture Studies Pertaining to the PWR Thermal-Shock Issue: Experiment TSE-7," USNRC Report NUREG/CR-4304, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

Cheverton, R. D. and Ball, D. G., "A Parametric Study of PWR Pressure Vessel Integrity During Overcooling Acci-

dents, Considering Both 2-D and 3-D Flaws,” USNRC Report NUREG/CR-4325, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

Corwin, W. R. et al., “Effects of Stainless Steel Weld Overlay Cladding on the Structural Integrity of Flawed Steel Plates in Bending, Series 1,” USNRC Report NUREG/CR-4015, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Corwin, W. R., “Heavy-Section Steel Technology Program Semiannual Progress Report for April–September 1987,” USNRC Report NUREG/CR-4219, Vol 4, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.

Corwin, W. R., “Heavy-Section Steel Technology Program Semiannual Progress Report for October 1987–March 1988,” USNRC Report NUREG/CR-4219, Vol 5, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.

Corwin, W. R., “Heavy-Section Steel Technology Program Semiannual Progress Report for April–September 1988,” USNRC Report NUREG/CR-4219, Vol 5, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.

Corwin, W. R., “Heavy-Section Steel Technology Program Semiannual Progress Report for October 1988–March 1989,” USNRC Report NUREG/CR-4219, Vol 6, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

Derby, R. W. et al., “Test of 6-Inch-Thick Pressure Vessels. Series 1: Intermediate Test Vessels V-1 and V-2,” ORNL Report ORNL-4895, Oak Ridge National Laboratory, Oak Ridge, TN, February 1974.

Domian, H. A., “Vessel V-8 Repair and Preparation of Low Upper Shelf Weldment,” USNRC Report NUREG/CR-2676, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1982.

Domian, H. A., “Vessel V-7 and V-8 Repair and Characterization of Insert Material,” USNRC Report NUREG/CR-3771, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Domian, H. A., “Low Upper-Shelf Toughness, High Transition Temperature Test Insert in HSST PTSE-2 Vessel and Wide Plate Test Specimens,” USNRC Report NUREG/CR-4711, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1987.

Grigory, S. C., “Tests of 6-in.-Thick Flawed Tensile Specimens, First Technical Summary Report, Longitudinal Specimens Numbers 1 Through 7,” SWRI Report

HSSTP-TR-18, Southwest Research Institute, San Antonio, TX, June 1972.

Grigory, S. C., “Tests of 6-Inch-Thick Flawed Tensile Specimens, Second Technical Summary Report, Transverse Specimens Numbers 8 Through 10, Welded Specimens Numbers 11 Through 13,” SWRI Report HSSTP-TR-20, Southwest Research Institute, San Antonio, TX, June 1972.

Grigory, S. C., “Tests of 6-Inch-Thick Flawed Tensile Specimens, Third Technical Summary Report, Longitudinal Specimens Numbers 14 Through 16, Unflawed Specimen Number 17,” SWRI Report HSSTP-TR-22, Southwest Research Institute, San Antonio, TX, October 1972.

Grigory, S. C., “Tests of 6-Inch-Thick Tensile Specimens, Fourth Technical Summary Report, Tests of 1-Inch-Thick Flawed Tensile Specimens for Size Effect Evaluation,” SWRI Report HSSTP-TR-23, Southwest Research Institute, San Antonio, TX, June 1973.

Grigory, S. C., “Heavy Section Steel Program Tests of 6-Inch-Thick Tensile Specimens, Sixth Technical Summary Report,” SwRI Project 03-2520, Southwest Research Institute, San Antonio, TX, April 19, 1974.

Holz, P. P. and Wismer, S. W., “Half-Bead (Temper) Repair Welding for HSST Vessels,” USNRC Report NUREG/CR-0113, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Holz, P. P., “Flaw Preparations for HSST Program Vessel Fracture Mechanics Testing; Mechanical-Cyclic Pumping and Electron-Beam Weld-Hydrogen Charge Cracking Schemes,” USNRC Report NUREG/CR-1274, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1980.

Mager, T. R., Yanichko, S. E., and Singer, L. R., “Fracture Toughness Characterization of HSST Intermediate Pressure Vessel Material,” Westinghouse Report WCAP-8456, Westinghouse Electric Corporation, Pittsburgh, PA, December 1974.

Merkle, J. G., Whitman, G. D., and Bryan, R. H., “An Evaluation of the HSST Program Intermediate Pressure Vessel Tests in Terms of Light-Water-Reactor Pressure Vessel Safety,” ORNL Report ORNL/TM-5090, Oak Ridge National Laboratory, Oak Ridge, TN, November 1975.

Merkle, J. G. et al., “Test of 6-In.-Thick Pressure Vessels. Series 3: Intermediate Test Vessel V-7,” ORNL Report ORNL/NUREG-1, Oak Ridge National Laboratory, Oak Ridge, TN, August 1976.

- Merkle, J. G. et al., "Test of 6-In.-Thick Pressure Vessels. Series 4: Intermediate Test Vessels V-5 and V-9 with Inside Nozzle Corner Cracks," ORNL Report ORNL/NUREG-7, Oak Ridge National Laboratory, Oak Ridge, TN, August 1977.
- Naus, D. J. et al., "Crack-Arrest Behavior in SEN Wide Plates of Quenched and Tempered A 533 Grade B Steel Tested Under Nonisothermal Conditions," USNRC Report NUREG/CR-4930, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1987.
- Naus, D. J., Keeney-Walker, J., and Bass, B. R., "High-Temperature Crack Arrest Behavior in 152-mm-Thick SEN Wide Plates of Quenched and Tempered A 533 Grade B Class 1 Steel," USNRC Report NUREG/CR-5330, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.
- Naus, D. J. et al., "SEN Wide Plate Crack-Arrest Tests Using A 533 Grade B Class 1 Material: WP-CE Test Series," USNRC Report NUREG/CR-5408, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1989.
- Naus, D. J. et al., "High-Temperature Crack-Arrest Tests Using 152-mm-Thick SEN Wide Plates of Low-Upper-Shelf Base Material: Tests WP-2.2 and WP-2.6," USNRC Report NUREG/CR-5450, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1990.
- Pugh, C. E., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January-March 1983," USNRC Report NUREG/CR-3334, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1983.
- Pugh, C. E., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April-June 1983," USNRC Report NUREG/CR-3334, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1983.
- Pugh, C. E., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July-September 1983," USNRC Report NUREG/CR-3334, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.
- Pugh, C. E. et al., "Heavy-Section Steel Technology Program—Five-Year Plan FY 1983-1987," USNRC Report NUREG/CR-3595, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for October 1983-March 1984," USNRC Report NUREG/CR-3744, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for April-September 1984," USNRC Report NUREG/CR-3744, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1984.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for October 1984-March 1985," USNRC Report NUREG/CR-4219, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for April-September 1985," USNRC Report NUREG/CR-4219, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1986.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for October 1985-March 1986," USNRC Report NUREG/CR-4219, Vol. 3, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for April-September 1986," USNRC Report NUREG/CR-4219, Vol. 3, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1986.
- Pugh, C. E., "Heavy-Section Steel Technology Program Semiannual Progress Report for October 1986-March 1987," USNRC Report NUREG/CR-4219, Vol. 4, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1987.
- Robinson, G. C., "Discussion of SwRI Model Parametric Tests," USAEC Report ORNL-TM-3313, Oak Ridge National Laboratory, Oak Ridge, TN, June 1971.
- Segaser, C. L., "System Design Description of the Intermediate Vessel Tests for the Heavy Section Steel Technology Program," USAEC Report ORNL-TM-2849, Revised, Oak Ridge National Laboratory, Oak Ridge, TN, July 1973.
- Smith, G. C., Holz, P. P., and Stelzman, W. J., "Crack Extension and Arrest Tests of Axially Flawed Steel Model Pressure Vessels," USNRC Report NUREG/CR-0126, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1978.
- Whitman, G. D. and Witt, F. J., "Heavy Section Steel Technology Program," USAEC Report ORNL-TM-3055, Oak Ridge National Laboratory, Oak Ridge, TN, November 1970.

Whitman, G. D., "Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1973," USAEC Report ORNL-4971, Oak Ridge National Laboratory, Oak Ridge, TN, July 1974.

Whitman, G. D., "Quarterly Progress Report on Reactor Safety Programs Sponsored by the Division of Reactor Safety Research for April–June 1974, 'Heavy-Section Steel Technology Program'," ORNL Report ORNL-TM-4655, Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, August 1974.

Whitman, G. D., "Quarterly Progress Report on Reactor Safety Programs Sponsored by the Division of Reactor Safety Research for July–September 1974, 'Heavy-Section Steel Technology Program'," ORNL Report ORNL-TM-4729, Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, November 1974.

Whitman, G. D., "Quarterly Progress Report on Reactor Safety Programs Sponsored by the NRC Division of Reactor Safety Research for October–December 1974, 'Heavy-Section Steel Technology Program'," ORNL Report ORNL-TM-4805, Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, March 1975.

Whitman, G. D., "Quarterly Progress Report on Reactor Safety Programs Sponsored by the NRC Division of Reactor Safety Research for January–March 1975, 'Heavy-Section Steel Technology Program'," ORNL Report ORNL-TM-4914, Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, June 1975.

Whitman, G. D., "Quarterly Progress Report on Reactor Safety Programs Sponsored by the NRC Division of Reactor Safety Research for April–June 1975, 'Heavy-Section Steel Technology Program'," ORNL Report ORNL-5021, Vol. 2, Oak Ridge National Laboratory, Oak Ridge, TN, September 1975.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1975," ORNL Report ORNL-TM-5170, Oak Ridge National Laboratory, Oak Ridge, TN, January 1976.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1975," ORNL Report ORNL/NUREG/TM-3, Oak Ridge National Laboratory, Oak Ridge, TN, April 1976.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1976," ORNL Report ORNL/NUREG/TM-28, Oak Ridge National Laboratory, Oak Ridge, TN, July 1976.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1976," ORNL Report ORNL/NUREG/TM-49, Oak Ridge National Laboratory, Oak Ridge, TN, October 1976.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1976," ORNL Report ORNL/NUREG/TM-64, Oak Ridge National Laboratory, Oak Ridge, TN, January 1977.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1976," ORNL Report ORNL/NUREG/TM-94, Oak Ridge National Laboratory, Oak Ridge, TN, April 1977.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1977," ORNL Report ORNL/NUREG/TM-120, Oak Ridge National Laboratory, Oak Ridge, TN, September 1977.

Whitman, G. D., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1977," ORNL Report ORNL/NUREG/TM-147, Oak Ridge National Laboratory, Oak Ridge, TN, December 1977.

Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1977," ORNL Report ORNL/NUREG/TM-166, Oak Ridge National Laboratory, Oak Ridge, TN, April 1978.

Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1977," ORNL Report ORNL/NUREG/TM-194, Oak Ridge National Laboratory, Oak Ridge, TN, May 1978.

Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1978," USNRC Report NUREG/CR-0106, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1978.

Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1978," USNRC Report NUREG/CR-0310, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1978.

Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1978," USNRC Report NUREG/CR-0476, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.

- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1978," USNRC Report NUREG/CR-0656, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1979.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1979," USNRC Report NUREG/CR-0818, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1979.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1979," USNRC Report NUREG/CR-0980, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1979.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1979," USNRC Report NUREG/CR-1197, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1980.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1979," USNRC Report NUREG/CR-1305, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1980.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1980," USNRC Report NUREG/CR-1477, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1980.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1980," USNRC Report NUREG/CR-1627, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1980.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1980," USNRC Report NUREG/CR-1806, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1980," USNRC Report NUREG/CR-1941, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1981.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1981," USNRC Report NUREG/CR-2141/VI, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1981.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1981," USNRC Report NUREG/CR-2141, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1981.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1981," USNRC Report NUREG/CR-2141, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1981," USNRC Report NUREG/CR-2141, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1982.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for January–March 1982," USNRC Report NUREG/CR-2751, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1982.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for April–June 1982," USNRC Report NUREG/CR-2751, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1982.
- Whitman, G. D. and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for July–September 1982," USNRC Report NUREG/CR-2751, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.
- Whitman, G. D., Pugh, C. E., and Bryan, R. H., "Quarterly Progress Report on the Heavy-Section Steel Technology Program for October–December 1982," USNRC Report NUREG/CR-2751, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1983.
- Whitman, G. D., "Historical Summary of the Heavy-Section Steel Technology Program and Some Related Activities in Light-Water Reactor Pressure Vessel Safety Research," USNRC Report NUREG/CR-4489, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.
- Witt, F. J., "Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1967," USAEC Report ORNL-4176, Oak Ridge National Laboratory, Oak Ridge, TN, January 1968.
- Witt, F. J., "Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending

February 29, 1968,” USAEC Report ORNL-4315, Oak Ridge National Laboratory, Oak Ridge, TN, October 1968.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1968,” USAEC Report ORNL-4377, Oak Ridge National Laboratory, Oak Ridge, TN, April 1969.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending February 28, 1969,” USAEC Report ORNL-4463, Oak Ridge National Laboratory, Oak Ridge, TN, January 1970.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1969,” USAEC Report ORNL-4512, Oak Ridge National Laboratory, Oak Ridge, TN, March 1970.

Witt, F. J. and Berggren, R. G., “Size Effects and Energy Disposition in Impact Specimen Testing of ASTM A 533 Grade B Steel,” USAEC Report ORNL-TM-3030, Oak Ridge National Laboratory, Oak Ridge, TN, August 1970.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending February 28, 1970,” USAEC Report ORNL-4590, Oak Ridge National Laboratory, Oak Ridge, TN, October 1970.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1970,” USAEC Report ORNL-4653, Oak Ridge National Laboratory, Oak Ridge, TN, April 1971.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending February 28, 1971,” USAEC Report ORNL-4681, Oak Ridge National Laboratory, Oak Ridge, TN, December 1971.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1971,” USAEC Report ORNL-4764, Oak Ridge National Laboratory, Oak Ridge, TN, April 1972.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending February 29, 1972,” USAEC Report ORNL-4816, Oak Ridge National Laboratory, Oak Ridge, TN, October 1972.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending August 31, 1972,” USAEC Report ORNL-4855, Oak Ridge National Laboratory, Oak Ridge, TN, April 1973.

Witt, F. J., “Heavy-Section Steel Technology Program Semiannual Progress Report for Period Ending February 28, 1973,” USAEC Report ORNL-4918, Oak Ridge National Laboratory, Oak Ridge, TN, February 1974.

Ying, S. P. and Grigory, S. C., “Tests of 6-Inch-Thick Tensile Specimens, Fifth Technical Summary Report, Acoustic Emission Monitoring of One-Inch and Six-Inch-Thick Tensile Specimens,” SWRI Report HSSTP-TR-24, Southwest Research Institute, San Antonio, TX, November 1972.

Fracture Mechanics: Experimental — Standard Specimen Testing

Carlson, K. W. and Williams, J. A., “The Effect of Crack Length and Side Grooves on the Ductile Fracture Toughness Properties of ASTM A533 Steel,” USNRC Report NUREG/CR-1171, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1979.

Davis, D. A., Vassilaros, M. G., and Gudas, J. P., “Specimen Geometry and Extended Crack Growth Effects on JI-R Curve Characteristics for HY-130 and ASTM A533B Steels,” USNRC Report NUREG/CR-3089, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1982.

Dodge, W. G. and Smith, J. E., “A Diagnostic Procedure for the Evaluation of Strain Data From A Linear Elastic Test,” ORNL Report ORNL-TM-3415, Oak Ridge National Laboratory, Oak Ridge, TN, November 1972.

Gudas, J. P. et al., “A Summary of Recent Investigations of Compact Specimen Geometry Effects on the JI-R Curve of High Strength Steels,” USNRC Report NUREG/CR-1813, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1980.

Hackett, E. M., Kirk, M. T., and Hays, R. A., “An Evaluation of J-R Curve Testing of Nuclear Piping Materials Using the Direct Current Potential Drop Technique,” USNRC Report NUREG/CR-4540, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.

Hiser, A. L. and Loss, F. J., “Alternative Procedures for J-R Curve Determination,” USNRC Report NUREG/CR-3402, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Hiser, A. L. and Terrell, J. B., “Size Effects on J-R Curves for A 302-B Plate,” USNRC Report NUREG/CR-5265, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1989.

Joyce, J. A., “Application of the Key Curve Method to Determining J-R Curves for A533B Steel,” USNRC Report NUREG/CR-1290, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1980.

Joyce, J. A., “Static and Dynamic J-R Curve Testing of A533B Steel Using the Key Curve Analysis Technique,” USNRC Report NUREG/CR-2274, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1981.

- Joyce, J. A., "Instability Testing of Compact and Pipe Specimens Utilizing a Test System Made Compliant by Computer Control," USNRC Report NUREG/CR-2257, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1982.
- Joyce, J. A. "Development and Verification of Conditions for Ductile Tearing Instability and Arrest," USNRC Report NUREG/CR-4528, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.
- Joyce, J. A. and Hackett, E. M., "Application of the Key Curve and Multi-Specimen Techniques to Dynamic J-R Curve Testing of Alloy Steel," USNRC Report NUREG/CR-4579, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.
- Joyce, J. A. and Schneider, C. S., "Application of Alternating Current Potential Difference to Drop Tower J-R Curve Measurement," USNRC Report NUREG/CR-4699, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1986.
- Joyce, J. A. and Hackett, E. M., "Development of an Analytic Key Curve Approach to Drop Tower J-R Curve Measurement," USNRC Report NUREG/CR-4782, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1986.
- Joyce, J. A. and Hackett, E. M., "Transition Range Drop Tower J-R Curve Testing of A106 Steel," USNRC Report NUREG/CR-4818, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1986.
- Joyce, J. A., "Ductile to Brittle Toughness Transition Characterization of A533B," USNRC Report NUREG/CR-5142, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.
- Joyce, J. A. et al., "Application of the J-Integral and the Modified J-Integral to Cases of Large Crack Extension," USNRC Report NUREG/CR-5143, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1988.
- Legge, S. A., "Effects on Fracture Mechanics Parameters of Displacement Measurement Geometry for Varying Specimen Sizes," Westinghouse Report WCAP-7926, Westinghouse Electric Corporation, Pittsburgh, PA, June 1972.
- Link, R. E. and Hays, R. A., "Investigation of Tearing Instability Phenomena in ASTM A106 Steel," USNRC Report NUREG/CR-4539, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.
- Loechel, L. W., "The Effect of Testing Variables on the Transition Temperature in Steel," Martin Marietta Report MCR-69-189, Martin Marietta Corporation, Denver, CO, November 20, 1969.
- Loss, F. J., Gray, Jr., R. A., and Hawthorne, J. R., "Investigations of Warm Prestress for the Case of Small T During a Reactor Loss-of-Coolant Accident," NRL Report 8198, Naval Research Laboratory, Washington, D.C., March 1978.
- Loss, F. J., ed., "Structural Integrity of Water Reactor Pressure Boundary Components," USNRC Report NUREG/CR-3228, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.
- Loss, F. J., ed., "Structural Integrity of Water Reactor Pressure Boundary Components, Annual Report for 1983," NUREG/CR-3228, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.
- Loss, F. J., ed., "Structural Integrity of Light Water Reactor Pressure Boundary Components—Four-Year Plan, 1984-1988," USNRC Report NUREG/CR-3788, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.
- Loss, F. J., ed., "Structural Integrity of Water Reactor Pressure Boundary Components, Annual Report for 1984," USNRC Report NUREG/CR-3228, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.
- Loss, F. J., ed., "Structural Integrity of Water Reactor Pressure Boundary Components, Annual Report for 1985," USNRC/CR-3228, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.
- Loss, F. J., ed., "Structural Integrity of Water Reactor Pressure Boundary Components, Annual Report for 1986," USNRC Report NUREG/CR-3228, Vol. 5, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.
- Loss, F. J., ed., "Proceedings of the Second CSNI Workshop on Ductile Fracture Test Methods, Paris, France, April 17-19, 1985," USNRC Conference Proceedings, NUREG/CP-0064, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.
- Mager, T. R., "Notch Preparation in Compact Tension Specimens," Westinghouse Report WCAP-7579, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, November 1970.
- Marcal, P. V., Stuart, P. M., and Bettles, R. S., "Elastic-Plastic Behavior of a Longitudinal Semi-Elliptic Crack in a Thick Pressure Vessel," Brown Report HSSTP-TR-28, Brown University, Providence, RI, June 1973.
- McCabe, D. E., "Plan for Experimental Characterization of Vessel Steel After Irradiation," USNRC Report

NUREG/CR-4636, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

McCabe, D. E., "Fracture Evaluation of Surface Cracks Embedded in Reactor Vessel Cladding, Unirradiated Bend Specimen Results," USNRC Report NUREG/CR-4841, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.

McCabe, D. E., "Fracture Evaluation of Surface Cracks Embedded in Reactor Vessel Cladding, Material Property Evaluations," USNRC Report NUREG/CR-5207, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1988.

McCabe, D. E., "Fracture Evaluation of Surface Cracks Embedded in Reactor Vessel Cladding," USNRC Report NUREG/CR-5326, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1989.

McEnerney, J. W., "Assessment of Lamellar Tearing," ORNL Report ORNL/NUREG/TM-171, Oak Ridge National Laboratory, Oak Ridge, TN, March 1978.

Merkle, J. G., "An Examination of the Size Effects and Data Scatter Observed in Small Specimen Cleavage Fracture Toughness Testing," USNRC Report NUREG/CR-3672, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Papaspyropoulos, V., Marschall, C. W., and Landow, M., "Predictions of J-R Curves with Large Crack Growth from Small Specimen Data," USNRC Report NUREG/CR-4575, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1986.

Paris, P. C., ed., "Proceedings of the US Nuclear Regulatory Commission CSNI Specialists Meeting on Plastic Tearing Instability," USNRC Conference Proceedings NUREG/CP-0010, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1980.

Riccardella, P. C. and Swedlow, J. L., "A Combined Analytical-Experimental Fracture Study of the Two Leading Theories of Elastic-Plastic Fracture (J-Integral and Equivalent Energy)," Westinghouse Report WCAP-8224, Westinghouse Electric Corporation, Pittsburgh, PA, October 1973.

Sanford, R. J. et al., "A Photoelastic Study of the Influence of Non-Singular Stresses in Fracture Test Specimens," USNRC Report NUREG/CR-2179, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1981.

Sutton, G. E. and Vassilaros, M. G., "Study of the Effects of Elastic Unloadings on the JI-R Curves From Compact Specimens," USNRC Report NUREG/CR-4283, U.S.

Nuclear Regulatory Commission, Washington, D.C., June 1985.

Theiss, T. J., "Recommendations for the Shallow-Crack Fracture Toughness Testing Task Within the HSST Program," USNRC Report NUREG/CR-5554, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1990.

Vassilaros, M. G., Gudas, J. P., and Joyce, J. A., "Experimental Investigation of Tearing Instability Phenomena for Structural Materials," USNRC Report NUREG/CR-2570 Rev. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1982.

Wilson, W. K. and Begley, J. A., "Variable Thickness Study of the Edge Cracked Bend Specimen," Westinghouse Report WCAP-8237, Westinghouse Electric Corp., Pittsburgh, PA, November 1973.

Witt, F. J. and Mager, T. R., "A Procedure for Determining Bounding Values on Fracture Toughness K_{Ic} at Any Temperature," USAEC Report ORNL-TM-3894, Oak Ridge National Laboratory, Oak Ridge, TN, October 1972.

Leak Detection

Kupperman, D. S., "Assessment of Leak Detection Systems for LWRs: Revision 1," USNRC Report NUREG/CR-4813 Rev. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1988.

Kupperman, D. S., Prine, D., and Mathieson, T., "Application of Acoustic Leak Detection Technology for the Detection and Location of Leaks in Light Water Reactors," USNRC Report NUREG/CR-5134, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1988.

NDE—Continuous Monitoring (Acoustic Emission)

Doctor, P. G., Harrington, T. P., and Hutton, P. H., "Pattern Recognition Methods for Acoustic Emission Analysis," USNRC Report NUREG/CR-0910, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1979.

Hutton, P. H., "Detection of Incipient Failure in Nuclear Reactor Pressure Systems Using Acoustic Emission," PNL Report BNWL-997, Pacific Northwest Laboratory, Richland, WA, April 1969.

Hutton, P. H., "Acoustic Emission Monitoring for Continuous Crack Detection in Nuclear Reactor Pressure Boundaries," PNL Report BNWL-1597, Pacific Northwest Laboratory, Richland, WA, November 1971.

Hutton, P. H. and Schwenk, E. B., "Program to Develop Acoustic Emission-Flaw Relationship for Inservice Monitoring of Nuclear Pressure Vessels, Progress Report No. 1, July 1, 1976–February 1, 1977," USNRC Report NUREG-0250-1, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1977.

Hutton, P. H. and Schwenk, E. B., "Program to Develop Acoustic Emission-Flaw Relationship for Inservice Monitoring of Nuclear Pressure Vessels, Progress Report, February 1–July 1, 1977," USNRC Report NUREG-0250-2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1977.

Hutton, P. H. et al., "Program to Develop Acoustic Emission-Flaw Relationship for Inservice Monitoring of Nuclear Pressure Vessels, Annual Report, July 1976–October 1977," USNRC Report NUREG/CR-0123, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Hutton, P. H. et al., "Program to Develop Acoustic Emission-Flaw Relationship for Inservice Monitoring of Nuclear Pressure Vessels, Progress Report, October 1977–January 1978," USNRC Report NUREG/CR-0124, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Hutton, P. H., Schwenk, E. B., and Kurtz, R. J., "Estimate of Feasibility to Develop Acoustic Emission Flaw Relationships for Inservice Monitoring of Nuclear Pressure Vessels," USNRC Report NUREG/CR-0800, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1979.

Hutton, P. H. et al., "Acoustic Emission Monitoring of ASME Section III Hydrostatic Test," USNRC Report NUREG/CR-2880, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1982.

Hutton, P. H. et al., "Acoustic Emission Monitoring of Hot Functional Testing," USNRC Report NUREG/CR-3693, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

Hutton, P. H. and Kurtz, R. J., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Quarterly Report, October 1983–March 1984," USNRC Report NUREG/CR-3825, Vols. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.

Hutton, P. H. and Kurtz, R. J., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Quarterly Report, April–September 1984," USNRC Report NUREG/CR-3825, Vols. 3 and 4, U.S.

Nuclear Regulatory Commission, Washington, D.C., March 1985.

Hutton, P. H. et al., "Acoustic Emission Results Obtained From Testing the ZB-1 Intermediate Scale Pressure Vessel," USNRC Report NUREG/CR-3915, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Hutton, P. H. and Kurtz, R. J., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Progress Report, October 1984–March 1985," USNRC Report NUREG/CR-4300, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

Hutton, P. H. and Kurtz, R. J., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Progress Report, April–September 1985," USNRC Report NUREG/CR-4300, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1986.

Hutton, P. H. and Kurtz, R. J., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Progress Report, October 1985–March 1986," USNRC Report NUREG/CR-4300, Vol. 3, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1986.

Hutton, P. H., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Progress Report, April 1986–September 1986," USNRC Report NUREG/CR-4300, Vol. 3, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1987.

Hutton, P. H., "Acoustic Emission/Flaw Relationship for In-service Monitoring of Nuclear Pressure Vessels, Progress Report, October 1986–March 1987," USNRC Report NUREG/CR-4300, Vol. 4, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1987.

Hutton, P. H. et al., "Acoustic Emission System Calibration at Watts Bar Unit 1 Nuclear Reactor," USNRC Report NUREG/CR-5144, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.

Pollock, A. A. and Wadin, J. R., "Application of Acoustic Emission as an On-Line Monitoring System for Nuclear Reactors, Biannual Progress Report for July 1, 1975–December 31, 1975," USNRC Report NUREG-0159, U.S. Nuclear Regulatory Commission, Washington, D.C., 1976.

Pollock, A. A. and Wadin, J. R., "Application of Acoustic Emission as an On-Line Monitoring System for Nuclear Reactors, Final Progress Report January 1, 1976–Sep-

tember 30, 1976,” USNRC Report NUREG/CR-0605, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.

Prine, D. W. and Clark, R. N., “Inspection of Nuclear Reactor Welding by Acoustic Emission, Final Report Phase 1, November 1974–November 1975,” GARD Report NUREG-0035-1, GARD, Inc., Niles, IL, February 1976.

Prine, D. W., “Inspection of Nuclear Reactor Welding by Acoustic Emission, Data Report November 1975–May 1976,” GARD Report NUREG-0035-2, GARD, Inc., Niles, IL, September 1976.

Prine, D. W. and Mathieson, T. A., “Inspection of Nuclear Reactor Welding by Acoustic Emission, May 1976–March 1977,” GARD Report NUREG-0035-3, GARD, Inc., Niles, IL, June 1977.

Prine, D. W. and Mathieson, T. A., “Inspection of Nuclear Reactor Welding by Acoustic Emission, Final Report November 1974–November 1977,” USNRC Report NUREG/CR-0461, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1978.

Prine, D. W. and Mathieson, T. A., “Inspection of Nuclear Reactor Welding by Acoustic Emission, Progress Report November 1977–November 1978,” USNRC Report NUREG/CR-0703, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1979.

Prine, D. W., Mathieson, T. A., and Filar, B. S., “Inspection of Nuclear Reactor Welding by Acoustic Emission,” USNRC Report NUREG/CR-1441, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1980.

NDE—In-Service Inspection

Bates, D. J., Doctor, S. R., and Heasler, P. G., “Stainless Steel Round Robin Test Centrifugally Cast Stainless Steel Screening Phase,” USNRC Report NUREG/CR-4970, PISC 3 Report No. 5, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1987.

Becker, F. L. et al., “Integration of NDE Reliability and Fracture Mechanics, Phase I Report,” USNRC Report NUREG/CR-1696-1, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1981.

Bush, S. H., “Reliability of Nondestructive Examination, Volumes I, II, and III,” USNRC Report NUREG/CR-3110-1, -2, and -3, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1983.

Busse, L. J. et al., “Characterization Methods for Ultrasonic Test Systems,” USNRC Report NUREG/

CR-2264, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Busse, L. J., Collins, H. D., and Doctor, S. R., “Review and Discussion of the Development of Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT),” USNRC Report NUREG/CR-3625, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.

Collins, H. D. and Gribble, R. P., “Siamese Imaging Technique for QuasiVertical Type (QVT) Defects in Nuclear Reactor Piping,” USNRC Report NUREG/CR-4472, U.S. Nuclear Regulatory Commission, Washington, D.C., 1986.

Cook, K. V. et al., “Ultrasonic Beam Spread Measurements in Thick Pressure Vessel Type Steel,” USNRC Report NUREG/CR-2485, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Cook, K. V., Latimer, P. J., and McClung, R. W., “Flaw Measurement Using Ultrasonics in Thick Pressure Vessel Steel,” USNRC Report NUREG-2661, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1982.

Cook, K. V., Latimer, P. J., and McClung, R. W., “Influence of Scanning Variables on Ultrasonic Response,” USNRC Report NUREG/CR-2967, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1982.

Crawford, S. L. et al., “Detection of Small-Sized Near-Surface Under-Clad Cracks for Reactor Pressure Vessels,” USNRC Report NUREG/CR-2878, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Deeds, W. E. and Dodd, C. V., “A Two-Dimensional Relaxation Program for Systems with Inhomogeneous Permeability,” ORNL Report ORNL/TM-5333, Oak Ridge National Laboratory, Oak Ridge, TN, June 1976.

Deeds, W. E., Dodd, C. V., and Scott, G. W., “Computer-Aided Design of Multifrequency Eddy-Current Tests for Layered Conductors with Multiple Property Variations,” ORNL Report ORNL/TM-6858, Oak Ridge National Laboratory, Oak Ridge, TN, October 1979.

Deeds, W. E. and Dodd, C. V., “Multiple Property Variations in Coaxial Cylindrical Conductors Determined with Multiple-Frequency Eddy Currents,” USNRC Report NUREG/CR-0967, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1979.

Doctor, S. R. et al., “Integration of Nondestructive Examination (NDE) Reliability and Fracture Mechanics, Semi-Annual Report, April 1984–September 1984,” USNRC Report NUREG/CR-4469, Vol. 1, U.S. Nuclear

Regulatory Commission, Washington, D.C., January 1986.

Doctor, S. R. et al., "Development and Validation of a Real-Time SAFT-UT System for the Inspection of Light Water Reactor Components, Semi-Annual Report, April 1984 to September 1984," USNRC Report NUREG/CR-4583, Vol. 1., U.S. Nuclear Regulatory Commission, Washington, D.C., May 1986.

Doctor, S. R. et al., "Evaluation and Improvement of NDE Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, October 1984-March 1985," USNRC Report NUREG/CR-4469, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, April 1985-September 1985," USNRC Report NUREG/CR-4469, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Doctor, S. R. et al., "Development and Validation of a Real-Time SAFT-UT System for the Inspection of Light Water Reactor Components, Annual Report, October 1984 to September 1985," USNRC Report NUREG/CR-4583, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1987.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, October 1985-March 1986," USNRC Report NUREG/CR-4469, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1987.

Doctor, S. R. et al., "Development and Validation of a Real-Time SAFT-UT System for the Inspection of Light Water Reactor Components, Annual Report, October 1985 to September 1986," USNRC Report NUREG/CR-4583, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, April 1986-September 1986," USNRC Report NUREG/CR-4469, Vol. 5, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, October 1986-March 1987," USNRC Report NUREG/CR-4469, Vol. 6, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1987.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, April 1987-September 1987," USNRC Report NUREG/CR-4469, Vol. 7, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1988.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, October 1987-March 1988," USNRC Report NUREG/CR-4469, Vol. 8, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1989.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, April 1988-September 1988," USNRC Report NUREG/CR-4469, Vol. 9, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1989.

Doctor, S. R. et al., "Nondestructive Examination (NDE) Reliability for Inservice Inspection of Light Water Reactors, Semi-Annual Report, October 1988-March 1989," USNRC Report NUREG/CR-4469, Vol. 10, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1990.

Dodd, C. V. and McClung, R. W., "Fuel Element Coolant Channel and Other Spacing Measurements by Eddy-Current Techniques," ORNL Report ORNL-TM-129, Oak Ridge National Laboratory, Oak Ridge, TN, March 1962.

Dodd, C. V., "Design and Construction of Eddy-Current Coolant-Channel Spacing Probes," ORNL Report ORNL-3580, Oak Ridge National Laboratory, Oak Ridge, TN, April 1964.

Dodd, C. V. and Deeds, W. E., "Electromagnetic Forces in Conductors," ORNL Report ORNL-TM-1835, Oak Ridge National Laboratory, Oak Ridge, TN, May 1967.

Dodd, C. V. and Deeds, W. E., "Analytical Solutions to Eddy-Current Coil Problems," ORNL Report ORNL-TM-1987, Oak Ridge National Laboratory, Oak Ridge, TN, November 1967.

Dodd, C. V. et al., "Some Eddy-Current Problems and Their Integral Solutions," ORNL Report ORNL-4384, Oak Ridge National Laboratory, Oak Ridge, TN, April 1969.

Dodd, C. V. and Lu, C. C., "Nondestructive Test for Measuring The State of Heat Treatment in Closure Welds," ORNL Report ORNL-TM-3024, Oak Ridge National Laboratory, Oak Ridge, TN, July 1970.

Dodd, C. V. and Simpson, W. A., "Thickness Measurements Using Eddy-Current Techniques," ORNL Report ORNL-TM-3712, Oak Ridge National Laboratory, Oak Ridge, TN, March 1972.

Dodd, C. V. et al., "The Analysis of Reflection Type Coils for Eddy-Current Testing," ORNL Report ORNL-TM-4107, Oak Ridge National Laboratory, Oak Ridge, TN, April 1973.

Dodd, C. V. et al., "Design Induction Probes for Measurement of Level of Liquid Metals," ORNL Report ORNL-TM-4175, Oak Ridge National Laboratory, Oak Ridge, TN, May 1973.

Dodd, C. V., Smith, J. H., and Simpson, W. A., "Eddy-Current Evaluation of Nuclear Control Rods," ORNL Report ORNL-TM-4321, Oak Ridge National Laboratory, Oak Ridge, TN, September 1973.

Dodd, C. V. and Deeds, W. E., "Calculations of Magnetic Fields from Time-Varying Currents in the Presence of Conductors," ORNL Report ORNL-TM-4958, Oak Ridge National Laboratory, Oak Ridge, TN, July 1975.

Dodd, C. V. and Deeds, W. E., "Scaling Relations for Eddy Current Phenomena," ORNL Report ORNL-5077, Oak Ridge National Laboratory, Oak Ridge, TN, November 1975.

Dodd, C. V. and Connell, G. D., "The NDT-Comp8 Microcomputer," ORNL Report ORNL/TM-5773, Oak Ridge National Laboratory, Oak Ridge, TN, March 1977.

Dodd, C. V. and Chitwood, L. D., "Three-Frequency Eddy-Current Instrument for Multiple Property Problems," ORNL Report ORNL-5495, Oak Ridge National Laboratory, Oak Ridge, TN, March 1979.

Dodd, C. V. and Cowan, R. F., "The NDT-COMP9 Microcomputer," USNRC Report NUREG/CR-1548, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1980.

Dodd, C. V., Whitaker, L. M., and Deeds, W. E., "An Eddy-Current Laboratory Test System Using Commercial Equipment," ORNL Report ORNL-6366, Oak Ridge National Laboratory, Oak Ridge, TN, April 1987.

Dodd, C. V. and Chitwood, L. D., "Three-Frequency Eddy-Current Instrument," USNRC Report NUREG/CR-5061, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1988.

Dotson, C. W., ed., "Reactor Safety Research Programs, Quarterly Report October-December 1979," USNRC Report NUREG/CR-1349, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1980.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April-June 1980," USNRC Report NUREG/CR-1454 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1980.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report July-September 1980," USNRC Report NUREG/CR-1454 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report October-December 1980," USNRC Report NUREG/CR-1454 Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1981.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report January-March 1981," USNRC Report NUREG/CR-2127 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1981.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April-June 1981," USNRC Report NUREG/CR-2127 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1981.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report July-September 1981," USNRC Report NUREG/CR-2127 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1982.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report October-December 1981," USNRC Report NUREG/CR-2127 Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1982.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report January-March 1982," USNRC Report NUREG/CR-2716 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April-June 1982," USNRC Report NUREG/CR-2716 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1982.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report July-September 1982," USNRC Report NUREG/CR-2716 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1983.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report October-December 1982," USNRC Report NUREG/CR-2716 Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report January-March 1983," USNRC Report NUREG/CR-3307 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April–June 1983," USNRC Report NUREG/CR-3307 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1983.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report July–September 1983," USNRC Report NUREG/CR-3307 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report October–December 1983," USNRC Report NUREG/CR-3307 Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report January–March 1984," USNRC Report NUREG/CR-3810 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1984.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April–June 1984," USNRC Report NUREG/CR-3810 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report July–September 1984," USNRC Report NUREG/CR-3810 Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1985.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report October–December 1984," USNRC Report NUREG/CR-3810 Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1985.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report January–March 1985," USNRC Report NUREG/CR-4318 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.
- Edler, S. K., ed., "Reactor Safety Research Programs, Quarterly Report April–June 1985," USNRC Report NUREG/CR-4318 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1985.
- Fairchild, R. C., "Improved Ultrasonic Non-Destructive Testing of Pressure Vessels," USNRC Report NUREG-0185, U.S. Nuclear Regulatory Commission, Washington, D.C., 1977.
- Foster, B. E., McClung, R. W., and Davis, E. V., "Penetrameter Sensitivity and Crack Detectability after Degradation of the Radiographic Procedure," USNRC Report NUREG/CR-0593, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1979.
- Frederick, J. R., Seydel J. A., and Fairchild, R. C., "Improved Ultrasonic Non-Destructive Testing of Pressure Vessels, Annual Progress Report, August 1, 1974–July 31, 1975," USNRC Report NUREG-0007-1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1976.
- Frederick, J. R., Fairchild, R. C., and Anderson, B. H., "Improved Ultrasonic Nondestructive Testing of Pressure Vessels, Annual Progress Report, August 1, 1975–July 31, 1976," USNRC Report NUREG-0007-2, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1977.
- Frederick, J. R. et al., "Improved Ultrasonic Nondestructive Testing of Pressure Vessels, Annual Progress Report, October 1, 1976–September 30, 1977," USNRC Report NUREG/CR-0135, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1978.
- Frederick, J. R. et al., "Improved Ultrasonic Nondestructive Testing of Pressure Vessels, Annual Progress Report, October 1, 1977–September 30, 1978," USNRC Report NUREG/CR-0581, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.
- Frederick, J. R. et al., "Improved Ultrasonic Nondestructive Testing of Pressure Vessels," USNRC Report NUREG/CR-0909, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.
- Ganapathy, S. et al., "Ultrasonic Imaging Techniques for Real-time Inservice Inspection of Nuclear Power Reactors," USNRC Report NUREG/CR-2154, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1981.
- Ganapathy, S. et al., "Investigation of Special Purpose Processors for Real-Time Synthetic Aperture Focusing Techniques for Nondestructive Evaluation of Nuclear Reactor Vessels and Piping Components," USNRC Report NUREG/CR-2703, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.
- Ganapathy, S. et al., "Design and Development of a Special Purpose SAFT System for Nondestructive Evaluation of Nuclear Reactor Vessels and Piping Components," USNRC Report NUREG/CR-4365, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.
- Good, M. S. and Van Fleet, L. G., "Status of Activities for Inspecting Weld Overlaid Pipe Joints," USNRC Report NUREG/CR-4484, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.
- Hagen, C. M., ed., "Reactor Safety Research Programs, Quarterly Report January–March 1980," USNRC Report NUREG/CR-1454 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1980.

Hall, T. E., "Interface and Installation Guide: SAFT-UT Utilities," PNL Report No. 6274, Pacific Northwest Laboratory, Richland, WA, 1987.

Hall, T. E., "SAFT-UT Utilities Guide to SAFT-UT Principles and Conventions," PNL Report PNL-6275, Pacific Northwest Laboratory, Richland, WA, 1987.

Hall, T. E., "SAFT-UT Utilities: Reference Manual," PNL Report PNL-6276, Pacific Northwest Laboratory, Richland, WA, 1987.

Hall, T. E., Reid, L. D., and Doctor, S. R., "The SAFT-UT Real-Time Inspection System—Operational Principles and Implementation," USNRC Report NUREG/CR-5075, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1988.

Hamlin, D. R. and Jackson, J. L., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT), Quarterly Progress Report November 1980—January 1981," USNRC Report NUREG/CR-1885, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1981.

Hamlin, D. R. and Jackson, J. L., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT), Quarterly Progress Report February–April 1981," USNRC Report NUREG/CR-1885, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1981.

Hamlin, D. R., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT)—Final Report," USNRC Report NUREG/CR-4078, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1985.

Heasler, P. G. et al., "Performance Demonstration Tests for Detection of Intergranular Stress Corrosion Cracking," USNRC Report NUREG/CR-4464, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.

Heasler, P. G., "An Evaluation of Factors Influencing Ultrasonic Inservice Inspection for Intergranular Stress Corrosion Cracks—Mini-Round Robin," USNRC Report NUREG/CR-4908, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1990.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report January 1–March 31, 1978," USNRC Report NUREG/CR-0086, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report April 1–June 30, 1978," USNRC Re-

port NUREG/CR-0341, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1978.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report July 1–September 30, 1978," USNRC Report NUREG/CR-0546, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1979.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report October 1–December 31, 1978," USNRC Report NUREG/CR-0681, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1979.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report January 1–March 31, 1979," USNRC Report NUREG/CR-0855, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1979.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report April 1–June 30, 1979," USNRC Report NUREG/CR-0962, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.

Hooper, J. L., ed., "Reactor Safety Research Programs, Quarterly Report July 1–September 30, 1979," USNRC Report NUREG/CR-1009, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1980.

Jackson, J. L., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT)—Analysis Before Test," USNRC Report NUREG/CR-0288, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1978.

Jackson, J. L., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT) Midyear Progress Report," USNRC Report NUREG/CR-0290, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1978.

Jackson, J. L., "Program for Field Validation of the Synthetic Aperture Focusing Technique for Ultrasonic Testing (SAFT-UT), Quarterly Progress Report, August–October 1980" USNRC Report NUREG/CR-1885, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1981.

Kupperman, D. S., Claytor, T. N., and Prine, D. W., "NDE of Stainless Steel and On-Line Leak Monitoring of LWRs: Annual Report October 1983–September 1984," USNRC Report NUREG/CR-4124 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Kupperman, D. S. et al., "NDE of Stainless Steel and On-Line Leak Monitoring of LWRs: Semiannual Report October 1984–March 1985," USNRC Report NUREG/CR-4368, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Kupperman, D. S. et al., "NDE of Stainless Steel and On-Line Leak Monitoring of LWRs: Annual Report October 1984–September 1985," USNRC Report NUREG/CR-4124 Vol. II, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.

Morris, C. J. and Becker, F. L., "State-of-Practice Review of Ultrasonic In-service Inspection of Class I System Piping in Commercial Nuclear Power Plants," USNRC Report NUREG/CR-2468, U.S. Nuclear Regulatory Commission, Washington, D.C., 1982.

Nestor Jr., C. W., Dodd, C. V., and Deeds, W. E., "Analysis and Computer Programs for Eddy Current Coils Concentric with Multiple Cylindrical Conductors," ORNL Report ORNL-5220, Oak Ridge National Laboratory, Oak Ridge, TN, July 1979.

Pate, J. R. and Dodd, C. V., "Computer Programs for Eddy-Current Defect Studies," USNRC Report NUREG/CR-5553, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1990.

Polky, J. N. and Miller, D. D., "An Ultra-High Speed Residue Processor for SAFT Inspection System Image Enhancement," USNRC Report NUREG/CR-4170, U.S. Nuclear Regulatory Commission, Washington, D.C., 1985.

Polky, J. N., "Development of a Real-Time Number Processor for SAFT Inspection," USNRC Report NUREG/CR-4634, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1986.

Simpson, W. A. et al., "Computer Programs for Some Eddy-Current Problems—1970," ORNL-TM-3295, Oak Ridge National Laboratory, Oak Ridge, TN, June 1971.

Spanner, J. C. et al., "Human Reliability Impact on In-service Inspection: Phase 1, Summary Report," USNRC Report NUREG/CR-4436 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Spanner, J. C. et al., "Qualification Process for Ultrasonic Testing in Nuclear Inservice Inspection Applications," USNRC Report NUREG/CR-4882, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1990.

Taylor, T. T. and Selby, G. P., "Evaluation of ASME Section XI Reference Level Sensitivity for Initiation of Ultrasonic Inspection Examination," USNRC Report NUREG/CR-1957, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1981.

Taylor, T. T., "An Evaluation of Manual Ultrasonic Inspection of Cast Stainless Steel Piping," USNRC Report

NUREG/CR-3753, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Triggs, T. J. et al., "Human Reliability Impact on Inservice Inspection: Review and Analysis of Human Performance in Nondestructive Testing (Emphasizing Ultrasonics)," USNRC Report NUREG/CR-4436 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Wheeler, W. A. et al., "Human Factors Study Conducted in Conjunction with a Mini-Round Robin Assessment of Ultrasonic Technical Performance," USNRC Report NUREG/CR-4600, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1986.

Piping: Analysis

Brothers, A. J. et al., "A Survey of Fracture Modes as Related to Reactor Primary Coolant Pipe Rupture," GE Report GEAP-4446, General Electric Corporation, San Jose, CA, May 1964.

Brust, F. W., "Approximate Methods for Fracture Analyses of Through-Wall Cracked Pipes," USNRC Report NUREG/CR-4853, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1987.

Eiber, R. J. et al., "Review of Through-Wall Critical Crack Formulations for Piping and Cylindrical Vessels," Battelle Report BMI-1883, Battelle Memorial Institute, Columbus, OH, May 1970.

Eiber, R. J. et al., "Cold Leg Integrity Evaluation—Phase I Final Report," USNRC Report NUREG/CR-0584, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1979.

English, W. F. and Gilman, J. D., "BWR Primary Piping Stresses for System Reliability Analysis," GE Report GEAP-5724, General Electric Corporation, San Jose, CA, September 1968.

Gibbons, W. S. and Hackney, B. D., "Survey of Piping Failures for the Reactor Primary Coolant Pipe Rupture Study," GE Report GEAP-4574, General Electric Corporation, San Jose, CA, May 1964.

Gilman, J. D., "Stress Intensity Factor for a Circumferential Through-Wall Crack in a Straight Pipe," GE Report GEAP-5557, General Electric Corporation, San Jose, CA, January 1968.

Kanninen, M. F., Popelar, C. H., and Broek, D., "A Critical Survey on the Application of Plastic Fracture Mechanics to Nuclear Pressure Vessels and Piping," USNRC Report NUREG/CR-2110, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1981.

Kanninen, M. F., ed., "Proceedings of the CSNI/NRC Workshop on Ductile Piping Fracture Mechanics," USNRC Conference Proceedings NUREG/CP-0075, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1988.

Klecker, R. et al., "NRC Leak-Before-Break (LBB) NRC Analysis Method for Circumferentially Through-Wall-Cracked Pipes Under Axial Plus Bending Loads", USNRC Report NUREG/CR-4572, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1986.

Mayfield, M. E., Rodabaugh, E. C., and Eiber, R. J., "Relevance of Fatigue Tests to Cold Leg Piping," USNRC Report NUREG/CR-0325, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1978.

Mayfield, M. E. et al., "Cold Leg Integrity Evaluation: Final Report," USNRC Report NUREG/CR-1319, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1980.

Moore, S. E. and Bryson, J. W., "Progress Report for the Design Criteria for Piping and Nozzles Program for the Two Quarterly Periods July 1 to Sept. 30 and Oct. 1 to Dec. 31, 1975," ORNL Report ORNL/NUREG/TM-18, Oak Ridge National Laboratory, Oak Ridge, TN, May 1976.

Moore, S. E. and Bryson, J. W., "Design Criteria for Piping and Nozzles Program Quarterly Progress Report for April-June 1976," ORNL Report ORNL/NUREG/TM-91, Oak Ridge National Laboratory, Oak Ridge, TN, February 1977.

Moore, S. E. and Bryson, J. W., "Design Criteria for Piping and Nozzles Program Quarterly Progress Report for July-September 1976," ORNL Report ORNL/NUREG/TM-107, Oak Ridge National Laboratory, Oak Ridge, TN, April 1977.

Moore, S. E. and Bryson, J. W., "Design Criteria for Piping and Nozzles Program Quarterly Progress Report for October-December 1976," ORNL Report ORNL/NUREG/TM-144, Oak Ridge National Laboratory, Oak Ridge, TN, September 1977.

Moore, S. E. and Mershon, J. L., "Design Criteria for the Spacing of Nozzles and Reinforced Openings in Cylindrical Nuclear Pressure Vessels and Pipe," USNRC Report NUREG/CR-2308, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Reynolds, M. B., "Fracture Mechanics and the Stability of Engineering Structures," GE Report GEAP-4678, General Electric Corporation, San Jose, CA, September 1965.

Reynolds, M. B., "A Failure Diagram for Axially Flawed Pipes," GE Report GEAP-5622, General Electric Corporation, San Jose, CA, April 1968.

Rodabaugh, E. C., Maxey, W. A., and Eiber, R. J., "Review and Assessment of Research Relevant to Design Aspects of Nuclear Power Plant Piping Systems," Battelle Report NUREG-0307, Battelle Columbus, Columbus, OH, July 1977.

Rodabaugh, E. C., Iskander, S. K., and Moore, S. E., "End Effects on Elbows Subjected to Moment Loadings," ORNL Report ORNL/Sub/2913/7, Oak Ridge National Laboratory, Oak Ridge, TN, March 1978.

Rodabaugh, E. C. and Moore, S. E., "Evaluation of the Plastic Characteristics of Piping Products in Relation to ASME Code Criteria," USNRC Report NUREG/CR-0261, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1978.

Rodabaugh, E. C. and Moore, S. E., "Stress Indices for Girth Welded Joints, Including Radial Weld Shrinkage, Mismatch and Tapered-Wall Transitions," USNRC Report NUREG/CR-0371, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1978.

Rodabaugh, E. C. and Moore, S. E., "Stress Indices and Flexibility Factors for Nozzles in Pressure Vessels and Piping," USNRC Report NUREG/CR-0778, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1979.

Rodabaugh, E. C., "Comments on the Leak-Before-Break Concept for Nuclear Power Plant Piping Systems," USNRC Report NUREG/CR-4305, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1985.

Simonen, F. A. and Goodrich, C. W., "Parametric Calculations of Fatigue Crack Growth in Piping," USNRC Report NUREG/CR-3059, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1983.

Simonen, F. A. et al., "Crack Growth Evaluation for Small Cracks in Reactor-Coolant Piping," USNRC Report NUREG/CR-3176, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1983.

Strosnider, J., Jr., ed., "Proceedings of the CSNI Specialist Meeting on Leak-Before-Break in Nuclear Reactor Piping," USNRC Conference Proceedings NUREG/CP-0051, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Tagart, S. W., "Mechanical Design Considerations in Primary Nuclear Piping," GE Report GEAP-4578, General Electric Corporation, San Jose, CA, March 1964.

Wilson, S. A., "Estimating Pipe Reliability by the Distribution of Time-to-Damage Method," GE Report GEAP-10452, General Electric Corporation, San Jose, CA, March 1972.

Wilson, S. A., "Estimating the Relative Probability of Piping Severance By Fault Cause," GE Report GEAP-20615, General Electric Corporation, San Jose, CA, September 1974.

Piping: Experimental

Ahmad, J. et al., "Elastic-Plastic Finite Element Analysis of Crack Growth in Large Compact Tension and Circumferentially Through-Wall-Cracked Pipe Specimen," USNRC Report NUREG/CR-4573, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Alzheimer, J. M. et al., "Pipe-to-Pipe Impact Program," PNL Report PNL-4954, Pacific Northwest Laboratory, Richland, WA, 1984.

Alzheimer, J. M., "Pipe-to-Pipe Impact Program," USNRC Report NUREG/CR-3231, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.

Brothers, A. J., "Fatigue Crack Growth in Nuclear Reactor Piping Steels," GE Report GEAP-5607, General Electric Corporation, San Jose, CA, March 1968.

Brothers, A. J., "Low-Cycle, Strain-Controlled Fatigue Crack Propagation in Nuclear Piping Steels," GE Report GEAP-10181, General Electric Corporation, San Jose, CA, May 1970.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, May–December 1966 Progress Report," Battelle Report BMI-1793, Battelle Memorial Institute, Columbus, OH, January 1967.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, July–September 1967 Progress Report," Battelle Report BMI-1817, Battelle Memorial Institute, Columbus, OH, October 1967.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, January–March 1968 Progress Report," Battelle Report BMI-1836, Battelle Memorial Institute, Columbus, OH, April 1968.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, April–June 1968 Progress Report," Battelle Report BMI-1847, Battelle Memorial Institute, Columbus, OH, July 1968.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, July–September 1968 Pro-

gress Report," Battelle Report BMI-1853, Battelle Memorial Institute, Columbus, OH, November 1968.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, Phase I Final Report," Battelle Report BMI-1866, Battelle Memorial Institute, Columbus, OH, July 1969.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture, May–September 1969 Progress Report," Battelle Report BMI-1873, Battelle Memorial Institute, Columbus, OH, October 1969.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture—Phase II, January–March 1970 Progress Report," Battelle Report BMI-1880, Battelle Memorial Institute, Columbus, OH, April 1970.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture—Phase II, April–June 1970 Progress Report," Battelle Report BMI-1887, Battelle Memorial Institute, Columbus, OH, July 1970.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture—Phase II, July–September 1970 Progress Report," Battelle Report BMI-1892, Battelle Memorial Institute, Columbus, OH, October 1970.

Eiber, R. J. et al., "Investigation of the Initiation and Extent of Ductile Pipe Rupture—Phase II, October–December 1970 Progress Report," Battelle Report BMI-1902, Battelle Memorial Institute, Columbus, OH, January 1971.

Eiber, R. J., Maxey, W. A., and Duffey, A. R., "Investigation of the Initiation and Extent of Ductile Pipe Rupture," Battelle Report BMI-1908, Battelle Memorial Institute, Columbus, OH, 1971.

Greenstreet, W. L., "Experimental Study of Plastic Responses of Pipe Elbows," ORNL Report ORNL/NUREG-24, Oak Ridge National Laboratory, Oak Ridge, TN, February 1978.

Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 30, July–December 1973," GE Report GEAP-10207-30, General Electric Corporation, San Jose, CA, March 1974.

Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 31, January–June 1974," GE Report GEAP-10207-31, General Electric Corporation, San Jose, CA, September 1974.

Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 32, July–December 1974," GE Report GEAP-10207-32, General Electric Corporation, San Jose, CA, March 1975.

- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 33, January–June 1975," GE Report GEAP-10207-33, General Electric Corporation, San Jose, CA, October 1975.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 34, July–December 1975," GE Report GEAP-10207-34, General Electric Corporation, San Jose, CA, February 1976.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 35, January–March 1976," GE Report GEAP-10207-35, General Electric Corporation, San Jose, CA, May 1976.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 36, April–June 1976," GE Report GEAP-NUREG-10207-36, General Electric Corporation, San Jose, CA, September 1976.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 37, July–September 1976," GE Report GEAP-10207-37, General Electric Corporation, San Jose, CA, November 1976.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 38, October–December 1976," GE Report GEAP-10207-38, General Electric Corporation, San Jose, CA, February 1977.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 39, January–March 1977," GE Report GEAP-10207-39, General Electric Corporation, San Jose, CA, May 1977.
- Hale, D. A., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 40, April–June 1977," GE Report GEAP-NUREG-10207-40, General Electric Corporation, San Jose, CA, August 1977.
- Hays, R. A., Vassilaros, M. G., and Gudas, J. P., "Fracture Analysis of Welded Type 304 Stainless Steel Pipe," USNRC Report NUREG/CR-4538 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1986.
- Heald, J. D. and Kiss, E., "Low Cycle Fatigue of Prototype Pipe Components," GE Report GEAP-10763, General Electric Corporation, San Jose, CA, January 1973.
- Hebble, T. L. et al., "Analysis of Delta-Ferrite Data from Production Stainless Steel Pipe Welds," USNRC Report NUREG/CR-3482, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.
- Hiser, A. L. and Callahan, G. M., "A User's Guide to the NRC's Piping Fracture Mechanics Data Base (PIFRAC)," USNRC Report NUREG/CR-4894, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1987.
- Hiser, A. L., "Fracture Toughness Characterization of Nuclear Piping Steels," USNRC Report NUREG/CR-5188, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1989.
- Kanninen, M. F. et al., "The Development of a Plan for the Assessment of Degraded Nuclear Piping by Experimentation and Tearing Instability Fracture Mechanics Analysis," USNRC Report NUREG/CR-3142 Vol. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1983.
- Kashima, K. and Wilkowski, G. M., eds., "Proceedings of the Seminar on LEAK-BEFORE-BREAK: Progress in Regulatory Policies and Supporting Research," USNRC Conference Proceedings NUREG/CP-0092, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1988.
- Kilsby, E. R., "A Survey of Water Reactor Primary System Conditions Pertinent to the Study of Pipe," GE Report GEAP-4445, General Electric Corporation, San Jose, CA, January 1964.
- Kilsby, E. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 1, April–June 1965," GE Report GEAP-4911, General Electric Corporation, San Jose, CA, July 1965.
- Kilsby, E. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 2, July–September 1965," GE Report GEAP-4964, General Electric Corporation, San Jose, CA, October 1965.
- Kilsby, E. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 3, October–December 1965," GE Report GEAP-5082, General Electric Corporation, San Jose, CA, January 1966.
- Kiss, E., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 27, April–June 1972," GE Report GEAP-10207-27, General Electric Corporation, San Jose, CA, July 1972.
- Kiss, E., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 28, July–December 1972," GE Report GEAP-10207-28, General Electric Corporation, San Jose, CA, February 1973.
- Kiss, E., "Reactor Primary Coolant System Pipe Rupture Study, Progress Report No. 29, January–June 1973," GE Report GEAP-10207-28, General Electric Corporation, San Jose, CA, August 1973.
- Klepfer, H. H., "Experimental and Analytical Program Recommendations—Reactor Pipe Rupture Study," GE

- Report GEAP-4474, General Electric Corporation, San Jose, CA, January 1965.
- Kramer, G. and Papaspyropoulos, V., "An Assessment of Circumferentially Complex-Cracked Pipe Subjected to Bending," USNRC Report NUREG/CR-4687, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.
- Nakagaki, M., Marschall, C. W., and Brust, F., "Analysis of Cracks in Stainless Steel TIG Welds," USNRC Report NUREG/CR-4806, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1986.
- Podlasek, R. J. and Eiber, R. J., "Investigation of Mode III Crack Extension in Reactor Piping," Battelle Columbus Laboratory Report to Oak Ridge National Laboratory for the AEC, December 1973.
- Podlasek, R. J. and Eiber, R. J., "Final Report on Investigation of Mode III Crack Extension in Reactor Piping," Battelle Columbus Laboratories, Columbus, OH, December 1973.
- Reynolds, M. B., "Fracture Toughness of Some Engineering Alloys," GE Report GEAP-5014, General Electric Corporation, San Jose, CA, March 1966.
- Reynolds, M. B., "Failure Behavior in ASTM A106B Pipes Containing Axial Through-Wall Flaws," GE Report GEAP-5620, General Electric Corporation, San Jose, CA, April 1968.
- Reynolds, M. B., "Failure Behavior of Flawed Carbon Steel Pipes and Fittings," GE Report GEAP-10236, General Electric Corporation, San Jose, CA, October 1970.
- Scott, P. M. and Brust, F. W., "An Experimental and Analytical Assessment of Circumferential Through-Wall Cracked Pipes Under Pure Bending," USNRC Report NUREG/CR-4574, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1986.
- Scott, P. M. and Ahmad, J. A., "Experimental and Analytical Assessment of Circumferentially Surface-Cracked Pipes Under Bending," USNRC Report NUREG/CR-4872, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.
- Scott, P. M., "Assessment of Design Basis for Load-Carrying Capacity of Weld-Overlay Repairs," USNRC Report NUREG/CR-4877, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 4, January–March 1966," GE Report GEAP-5147, General Electric Corporation, San Jose, CA, April 1966.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 5, April–June 1966," GE Report GEAP-5192, General Electric Corporation, San Jose, CA, August 1966.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 6, July–September 1966," GE Report GEAP-5279, General Electric Corporation, San Jose, CA, November 1966.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 7, October–December 1966," GE Report GEAP-5427, General Electric Corporation, San Jose, CA, February 1967.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 8, January–March 1967," GE Report GEAP-5474, General Electric Corporation, San Jose, CA, May 1967.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 9, April–June 1967," GE Report GEAP-5512, General Electric Corporation, San Jose, CA, August 1967.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 10, July–September 1967," GE Report GEAP-5554, General Electric Corporation, San Jose, CA, December 1967.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 11, October–December 1967," GE Report GEAP-5587, General Electric Corporation, San Jose, CA, March 1968.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 12, January–March 1968," GE Report GEAP-5637, General Electric Corporation, San Jose, CA, June 1968.
- Vandenberg, S. R., "Status of Pipe-Rupture Study at General Electric-II," GE Report GEAP-5653, General Electric Corporation, San Jose, CA, July 1968.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 13, April–June 1968," GE Report GEAP-5680, General Electric Corporation, San Jose, CA, September 1968.
- Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 14, July–September 1968," GE Report GEAP-5716, General Electric Corporation, San Jose, CA, December 1968.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 15, October–December 1968," GE Report GEAP-5770, General Electric Corporation, San Jose, CA, March 1969.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 16, January–March 1969," GE Report GEAP-10024, General Electric Corporation, San Jose, CA, April 1969.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 17, April–June 1969," GE Report GEAP-10072, General Electric Corporation, San Jose, CA, July 1969.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 18, July–September 1969," GE Report GEAP-10120, General Electric Corporation, San Jose, CA, October 1969.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Progress Report No. 19, October–December 1969," GE Report GEAP-10143, General Electric Corporation, San Jose, CA, January 1970.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Report No. 20, January–March 1970," GE Report GEAP-11069, General Electric Corporation, San Jose, CA, April 1970.

Vandenberg, S. R., "Status of Pipe-Rupture Study at General Electric Company-III," GE Report GEAP-10205, General Electric Corporation, San Jose, CA, June 1970.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Report No. 21, April–June 1970," GE Report GEAP-10207, General Electric Corporation, San Jose, CA, July 1970.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Report No. 22, July–September 1970," GE Report GEAP-10207-22, General Electric Corporation, San Jose, CA, October 1970.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Report No. 23, October–December 1970," GE Report GEAP-10207-23, General Electric Corporation, San Jose, CA, January 1971.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Progress Report No. 24, January–June 1971," GE Report GEAP-10207-24, General Electric Corporation, San Jose, CA, July 1971.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Quarterly Report No. 25, July–September 1971," GE Report GEAP-10207-25, General Electric Corporation, San Jose, CA, October 1971.

Vandenberg, S. R., "Reactor Primary Coolant System Rupture Study, Progress Report No. 19, October 1971–March 1972," GE Report GEAP-10207-26, General Electric Corporation, San Jose, CA, April 1972.

Vassilaros, M. G. et al., "J-Integral Tearing Instability for 8-Inch Diameter ASTM A106 Steel Pipe," USNRC Report NUREG/CR-3740, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Semiannual Report, March 1984–September 1984," USNRC Report NUREG/CR-4082, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1985.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Semiannual Report, October 1984–March 1985," USNRC Report NUREG/CR-4082, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1985.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Semiannual Report, April 1985–September 1985," USNRC Report NUREG/CR-4082, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Wilkowski, G. M. and Mayfield, M. E., eds., "Proceedings of the Seminar on LEAK-BEFORE-BREAK: International Policies and Supporting Research," USNRC Conference Proceedings NUREG/CP-0077, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1986.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Semiannual Report, October 1985–March 1986," USNRC Report NUREG/CR-4082, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1986.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Semiannual Report, April 1986–September 1986," USNRC Report NUREG/CR-4082, Vol. 5, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.

Wilkowski, G. M. et al., "Analysis of Experiments on Stainless Steel Flux Welds," USNRC Report NUREG/CR-4878, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Sixth Program Report, October 1986–September 1987," USNRC Report NUREG/CR-4082, Vol. 6, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Seventh Program Report, October 1987–December 1988," USNRC Report NUREG/CR-4082, Vol. 7, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1989.

Wilkowski, G. M. et al., "Degraded Piping Program—Phase II, Summary of Technical Results and Their Significance to Leak-Before-Break and In-Service Flaw Acceptance Criteria—Final Program Report, March 1984–January 1989," USNRC Report NUREG/CR-4082, Vol. 8, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1989.

Wilkowski, G. M. and Chao, K. S., eds., "Proceedings of the Seminar on LEAK-BEFORE-BREAK: Further Developments in Regulatory Policies and Supporting Research," USNRC Conference Proceedings NUREG/CP-0109, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1990.

Pressure Vessel Steels

Canonico, D. A., "Transition Temperature Considerations for Thick-Wall Nuclear Pressure Vessels," USAEC Report ORNL-TM-3114, Oak Ridge National Laboratory, Oak Ridge, TN, October 1970.

Canonico, D. A. and Berggren, R. G., "Tensile and Impact Properties of Thick-Section Plate and Weldments," USAEC Report ORNL-TM-3211, Oak Ridge National Laboratory, Oak Ridge, TN, January 1971.

Canonico, D. A. et al., "Use of Instrumented Charpy Tests to Determine Onset of Upper-Shelf Energy," ORNL Report ORNL-5086, Oak Ridge National Laboratory, Oak Ridge, TN, November 1975.

Canonico, D. A., "Significance of Reheat Cracks to the Integrity of Pressure Vessels for Light-Water Reactors," ORNL Report ORNL/NUREG-15, Oak Ridge National Laboratory, Oak Ridge, TN, July 1977.

Childress, C. E., "Fabrication History of the First Two 12-In. Thick ASTM A-533 Grade B, Class I Steel Plates of the Heavy Section Steel Technology Program," Documentary Report 1, USAEC Report ORNL-4313, Oak Ridge National Laboratory, Oak Ridge, TN, February 1969.

Childress, C. E., "Fabrication History of the Third and Fourth ASTM A-533 Steel Plates of the Heavy-Section Steel Technology Program," USAEC Report ORNL-4313-2, Oak Ridge National Laboratory, Oak Ridge, TN, February 1970.

Childress, C. E., "Fabrication Procedures and Acceptance Data for ASTM A-533 Welds and a 10-in.-thick ASTM A-533 Plate of the Heavy-Section Steel Technology Program," Documentary Report 3, USAEC Report ORNL-4313-3, Oak Ridge National Laboratory, Oak Ridge, TN, January 1971.

Childress, C. E., "Manual for ASTM A-533 Grade B Class 1 Steel (HSST Plate 03) Provided to the International Atomic Energy Agency," USAEC Report ORNL-TM-3193, Oak Ridge National Laboratory, Oak Ridge, TN, March 1971.

Childress, C. E., "Fabrication and Mechanical Test Data for Acceptance of the First Six 6-Inch-Thick Intermediate Test Vessels of the Heavy-Section Steel Technology Program," USAEC Report ORNL-TM-4351, Oak Ridge National Laboratory, Oak Ridge, TN, October 1973.

Childress, C. E., "Fabrication and Mechanical Test Data for the Four 6-Inch-Thick Intermediate Test Vessels Made from Steel Plate for the Heavy-Section Steel Technology Program," Documentary Report 5, ORNL-TM-5074, Oak Ridge National Laboratory, Oak Ridge, TN, January 1976.

Cook, K. V. and McClung, R. W., "Flaw Density Examinations of a Clad Boiling Water Reactor Pressure Vessel Segment," USNRC Report NUREG/CR-4860 Rev. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1988.

Cook, K. V., Cunningham, Jr., R. A., and McClung, R. W., "Detection and Characterization of Indications in Segments of Reactor Pressure Vessels," USNRC Report NUREG/CR-5322, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1989.

Diercks, D. R., "TMI-2 Vessel Investigation Project (VIP) Metallurgical Program, Progress Report January–September 1989," USNRC Report NUREG/CR-5524 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1990.

Diercks, D. R., "TMI-2 Vessel Investigation Project (VIP) Metallurgical Program, Progress Report October 1989–June 1990," USNRC Report NUREG/CR-5524 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1990.

Goodwin, G. M. and Nanstad, R. K., "Effect of Temperature on the Stress-Relaxation Response of a Pressure

Vessel Steel,” USNRC Report NUREG/CR-3728, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1984.

Hobson, D. O. and Nanstad, R. K., “Effects of Off-Specification Procedures on the Mechanical Properties of Half-Bead Weld Repairs,” USNRC Report NUREG/CR-3265, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Klier, E. P., Hawthorne, J. R., and Steele, L. E., “The Tensile Properties of Selected Steels for Use in Nuclear Reactor Pressure Vessels,” NRL Report 6649, Naval Research Laboratory, Washington, D.C., December 1967.

Klindt, K. K. and Canonico, D. A., “Evaluation of Discontinuities in HSST Twelve-Inch-Thick Plate,” USAEC Report ORNL-TM-4155, Oak Ridge National Laboratory, Oak Ridge, TN, June 1973.

Legge, S. A., “Analysis and Experimental Verification of the Thermal Behavior of a Four Inch Steel Section Undergoing Nuclear Heating,” Westinghouse Report WCAP-8022, Westinghouse Electric Corporation, Pittsburgh, PA, December 1972.

Loss, F. J., “Dynamic Tear Test Investigations of the Fracture Toughness of Thick-Section Steel,” NRL Report 7056, Naval Research Laboratory, Washington, D.C., May 1970.

Lundin, C. D. and Mohammed, S., “Effect of Welding Conditions on Transformation and Properties of Heat-Affected Zones in LWR Vessel Steels,” USNRC Report NUREG/CR-3873, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1989.

Mager, T. R., “Fracture Toughness Characterization Study of A533, Grade B, Class 1 Steel,” Westinghouse Report WCAP-7578, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, October 1970.

Pennell, W. E. and Pugh, C. E., “Mission Survey for the Pressure Vessel Research Users’ Facility (PVRUF),” USNRC Report NUREG/CR-5350, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1989.

Randall, P. N., “Gross Strain Measure of Fracture Toughness of Steels,” TRW Report HSSTP-TR-3, TRW Systems Group, Redondo Beach, CA, November 1969.

Randall, P. N., “Gross Strain Crack Tolerance of A533-B Steel,” TRW Report HSSTP-TR-14, TRW Systems Group, Redondo Beach, CA, May 1971.

Randall, P. N., “Effects of Strain Gradients on the Gross Strain Crack Tolerance of A533-B Steel,” TRW Report

HSSTP-TR-19, TRW Systems Group, Redondo Beach, CA, June 1972.

Shabbits, W. O., Pryle, W. H., and Wessel, E. T., “Heavy-Section Fracture Toughness Properties of A533 Grade B Class 1 Steel Plate and Submerged Arc Weldment,” Westinghouse Report WCAP-7414, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, December 1969.

Shabbits, W. O., “Dynamic Fracture Toughness Properties of Heavy Section A533 Grade B Class 1 Steel Plate,” Westinghouse Report WCAP-7623, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, December 1970.

Stallmann, F. W., “Theory and Practice of General Adjustment and Model Fitting Procedures,” USNRC Report NUREG/CR-2222, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1981.

Stallmann, F. W., “Curve Fitting and Uncertainty Analysis of Charpy Impact Data,” USNRC Report NUREG/CR-2408, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1982.

Stelzman, W. J., Berggren, R. G., and Jones, T. N., “ORNL Characterization of Heavy-Section Steel Technology Program Plates 01, 02 and 03,” USNRC Report NUREG/CR-4092, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1985.

Williams, J. A., “The Ductile Fracture Toughness of Heavy Section Steel Plate,” USNRC Report NUREG/CR-0859, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.

Radiation Embrittlement

Baldwin, C. A., “Neutron Spectral Characterization Calculations for the Fourth Nuclear Regulatory Commission Heavy Section Steel Technology 1T-CT Irradiation Experiments,” USNRC Report NUREG/CR-3311, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1983.

Baldwin, C. A., Kam, F. B. K., and Stallmann, F. W., “Neutron Spectral Characterization for the Fifth Heavy Section Steel Technology (HSST) Irradiation Series ‘Simulator Experiments’,” USNRC Report NUREG/CR-4031, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1984.

Baldwin, C. A., “Quality Assurance Assessment/Plan for the Fifth Heavy Section Steel Technology (HSST) Irradiation Study, ‘Neutron Exposure’,” ORNL Report OP-TS-QAA-1, Oak Ridge National Laboratory, Oak Ridge, TN, December 1984.

Cheverton, R. D. et al., "Impact of Radiation Embrittlement on Integrity of Pressure Vessel Supports for Two PWR Plants," USNRC Report NUREG/CR-5320, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1989.

Clarke, G. A., "An Evaluation of the Unloading Compliance Procedure for J Integral Testing in the Hot Cell, Final Report," USNRC Report NUREG/CR-1070, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1979.

Corwin, W. R., "Assessment of Radiation Effects Relating to Reactor Pressure Vessel Cladding," USNRC Report NUREG/CR-3671, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1984.

Corwin, W. R., Berggren, R. G., and Nanstad, R. K., "Charpy Toughness and Tensile Properties of Neutron Irradiated Stainless Steel Submerged-Arc Weld Cladding Overlay," USNRC Report NUREG/CR-3927, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

Corwin, W. R., "Heavy-Section Steel Irradiation Program Semiannual Progress Report for October 1989-March 1990," USNRC Report NUREG/CR-5591, Vol. 1, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1990.

Davidson, J. A. et al., "The Irradiated Dynamic Fracture Toughness of ASTM A533, Grade B, Class 1 Steel Plate and Submerged Arc Weldment," Westinghouse Report WCAP-8775, Westinghouse Electric Corporation, Pittsburgh, PA, October 1976.

Ebrahimi, F. et al., "Development of a Mechanistic Understanding of Radiation Embrittlement in Reactor Pressure Vessel Steels—Final Report," USNRC Report NUREG/CR-5063, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1988.

Guthrie, G. L. and Simonen, E. P., "Correlation Between Power and Test Reactor Data Bases," USNRC Report NUREG/CR-5328, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1989.

Haggag, F. M., Corwin, W. R., and Nanstad, R. K., "Irradiation Effects on Strength and Toughness of Three-Wire Series-Arc Stainless Steel Weld Overlay Cladding," USNRC Report NUREG/CR-5511, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1990.

Hawthorne, J. R. et al., "Radiation Damage Surveillance of Power Reactor Pressure Vessels," NRL Report 6349, Naval Research Laboratory, Washington, D.C., January 1966.

Hawthorne, J. R. and Loss, F. J., "The Effects of Coupling Nuclear Radiation with Static and Cyclic-Service Stresses and of Periodic Proof Testing on Pressure Vessel Material Behavior," NRL Report 6620, Naval Research Laboratory, Washington, D.C., August 1967.

Hawthorne, J. R. and Loss, F. J., "Availability of Data on Irradiated Materials as Related to Design Requirements for Water Cooled Reactor Pressure Vessels," NRL Report 6625, Naval Research Laboratory, Washington, D.C., August 1967.

Hawthorne, J. R. and Watson, H. E., "Hot Cell Equipment Developed for Remote Tension Test Specimen Evaluations at NRL," NRL Report 6765, Naval Research Laboratory, Washington, D.C., November 1968.

Hawthorne, J. R., Koziol, J. J., and Byrne, S. T., "Evaluation of Commercial Production of A 533-B Steel Plates and Weld Deposits with Extra Low Copper Content for Radiation Resistance," NRL Report 8136, Naval Research Laboratory, Washington, D.C., June 1977.

Hawthorne, J. R., "Exploratory Investigations of Low Charpy-V Upper Shelf Steels with Irradiation," NRL Report 8171, Naval Research Laboratory, Washington, D.C., December 1977.

Hawthorne, J. R., "Significance of Copper, Phosphorus, and Sulfur Content to Radiation Sensitivity and Postirradiation Heat Treatment of A 302-B Steel," USNRC Report NUREG/CR-0327, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1979.

Hawthorne, J. R., "Notch Ductility Degradation of Low Alloy Steels With Low-to-Intermediate Neutron Fluence Exposures," USNRC Report NUREG/CR-1053, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1979.

Hawthorne, J. R., "Evaluation of IAEA Coordinated Program Steels and Welds for 288°C Radiation Embrittlement Resistance," USNRC Report NUREG/CR-2487, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Hawthorne, J. R., "Status of Knowledge of Radiation Embrittlement in USA Reactor Pressure Vessel Steels," USNRC Report NUREG/CR-2511, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Hawthorne, J. R., "Significance of Nickel and Copper Content to Radiation Sensitivity and Postirradiation Heat Treatment Recovery of Reactor Vessel Steels," USNRC Report NUREG/CR-2948, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1982.

Hawthorne, J. R., Menke, B. H., and Hiser, A. L., "Light Water Reactor Pressure Vessel Surveillance Dosimetry

Improvement Program: Notch Ductility and Fracture Toughness Degradation of A 302-B and A 533-B Reference Plates from PSF Simulated Surveillance and Through-Wall Irradiation Capsules," USNRC Report NUREG/CR-3295, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Hawthorne, J. R. and Menke, B. H., "Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program: Postirradiation Notch Ductility and Tensile Strength Determinations for PSF Simulated Surveillance and Through-Wall Specimen Capsules," USNRC Report NUREG/CR-3295, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Hawthorne, J. R., "Exploratory Studies of Element Interactions and Composition Dependencies in Radiation Sensitivity Development," USNRC Report NUREG/CR-4437, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1985.

Hawthorne, J. R. and Hiser, A. L., "Experimental Assessments of Gundremmingen RPV Archive Material for Fluence Rate Effects Studies," USNRC Report NUREG/CR-5201, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1988.

Hawthorne, J. R., "An Exploratory Study of Element Interactions and Composition Dependencies in Radiation Sensitivity Development—Final Report," USNRC Report NUREG/CR-5357, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.

Hawthorne, J. R. and Hiser, A. L., "Influence of Fluence Rate on Radiation-Induced Mechanical Property Changes in RPV Steels: Final Report on Exploratory Experiments," USNRC Report NUREG/CR-5493, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1990.

Hiser, A. L., Loss, F. J., and Menke, B. H., "J-R Curve Characterization of Irradiated Low Upper Shelf Welds," USNRC Report NUREG/CR-3506, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1984.

Hiser, A. L., "Correlation of C_v and K_{Jc} Transition Temperature Increases Due to Irradiation," USNRC Report NUREG/CR-4395, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Hiser, A. L., "Post-Irradiation Fracture Toughness Characterization of Four Lab-Melt Plates," USNRC Report NUREG/CR-5216 Rev. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1989.

Hiser, A. L., "Correlation of Irradiation-Induced Transition Temperature Increases from C_v and K_{Jc}/K_{Ic} Data: Final Report," USNRC Report, NUREG/CR-5494,

U.S. Nuclear Regulatory Commission, Washington, D.C., March 1990.

Hobson, D. O. and Dodd, C. V., "Interim Report on the Creepdown of Zircaloy Fuel Cladding," ORNL Report ORNL/NUREG/TM-103, Oak Ridge National Laboratory, Oak Ridge, TN, May 1977.

Hobson, D. O. et al., "Analyses of Surface Displacements of Zircaloy Fuel Cladding in the HOBBIIE Creepdown Irradiation Experiments," USNRC Report NUREG/CR-1844, NUREG-74, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1981.

Hunter, C. W. and Williams, J. A., "Fracture and Tensile Behavior of Neutron-Irradiated A533-B Pressure Vessel Steel," HEDL Report HEDL-TME 71-76, Hanford Engineering Development Laboratory, Richland, WA, February 1971.

Loss, F. J. et al., "Analysis of Radiation Induced Embrittlement Gradients on Fracture Characteristics of Thick-Walled Pressure Vessel Steels," NRL Report 7209, Naval Research Laboratory, Washington, D.C., March 1971.

Loss, F. J. and Gray, Jr., R. A., "J-Integral Characterization of Irradiated Stainless Steels," NRL Report 7565, Naval Research Laboratory, Washington, D.C., September 1973.

Maerker, R. E. and Williams, M. L., "Calculations of Two Series of Experiments Performed at the Poolside Facility Using the Oak Ridge Research Reactor," USNRC Report NUREG/CR-2696, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1982.

Maerker, R. E. and Worley, B. A., "Activity and Fluence Calculations for the Startup and Two-Year Irradiation Experiments Performed at the Poolside Facility," USNRC Report NUREG/CR-3886, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1984.

Maerker, R. E., "Gamma-Ray Characterization of the Two-Year Irradiation Experiment Performed at the Poolside Facility," USNRC Report NUREG/CR-4039, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1985.

Mager, T. R. and Thomas, F. O., "Evaluation by Linear Elastic Fracture Mechanics of Radiation Damage to Pressure Vessel Steels," Westinghouse Report WCAP-7328 (Rev.), Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, October 1969.

Mager, T. R., "Post-Irradiation Testing of 2T Compact Tension Specimens," Westinghouse Report WCAP-7561, Westinghouse Electric Corporation, PWR Systems Division, Pittsburgh, PA, August 1970.

McGowan, J. J., "Tensile Properties of Irradiated Nuclear Grade Pressure Vessel Plate and Welds for the Fourth HSST Irradiation Series," USNRC Report NUREG/CR-3978, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1985.

McGowan, J. J., "Tensile Properties of Irradiated Nuclear Grade Pressure Vessel Welds for the Third HSST Irradiation Series," USNRC Report NUREG/CR-4086, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1985.

McGowan, J. J., Nanstad, R. K., and Thoms, K. R., "Characterization of Irradiated Current-Practice Welds and A533 Grade B Class 1 Plate for Nuclear Pressure Vessel Service," USNRC Report NUREG/CR-4880 Vols. 1 and 2, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1988.

Miller, L. F., Baldwin, C. A., and Johnson, J. O., "Neutronics Calculations for the Bulk Shielding Reactor Heavy Section Steel Technology Irradiation Experiment," ORNL Report ORNL/TM-8045, Oak Ridge National Laboratory, Oak Ridge, TN, February 1980.

Miller, L. F., "A Computerized Process Control System for the ORR-PSF Irradiation Experiment, Part 2: Mathematical Basis and Computer Implementation of the Temperature Control Algorithm," USNRC Report NUREG/CR-1710, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1980.

Miller, L. F., "Analysis of Temperature Data from the ORR-PSF Irradiation Experiment: Methodology and Computer Software," USNRC Report NUREG/CR-2273, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1981.

Miller, L. F. and Hobbs, R. W., "Data Acquisition and Control of the HSST Series V Irradiation Experiment at the ORR," USNRC Report NUREG/CR-3872, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1985.

Miller, L. F. et al., "Neutron Exposure Parameters for the Metallurgical Test Specimens in the Fifth Heavy-Section Steel Technology Irradiation Series Capsules," USNRC Report NUREG/CR-5019, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1988.

Miller, L. F. et al., "Neutron Exposure Parameters for the Metallurgical Test Specimens in the Sixth Heavy-Section Steel Irradiation Series," USNRC Report NUREG/CR-5409, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1990.

Perrin, J. S. et al., "Simulated Void-Box-Capsule Charpy Impact Test Results," USNRC Report NUREG/CR-3320 Vol. 5, EPRI Report NP-4630, Electric Power Research Institute, Palo Alto, CA, August 1986.

Potapovs, U. and Hawthorne, J. R., "The Effect of Residual Elements on 550°F Irradiation Response of Selected Pressure Vessel Steels and Weldments," NRL Report 6803, Naval Research Laboratory, Washington, D.C., November 1968.

Remec, I., Stallmann, F. W., and Kam, F. B. K., "Neutron Spectral Characterization for the Fifth Heavy Section Steel Technology (HSST) Irradiation Series, 'Neutronics Exposure Parameters'," USNRC Report NUREG/CR-4031, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1985.

Segaser, C. L., "Feasibility Study, Irradiation of Heavy Section Steel Specimens in the South Test Facility of the Oak Ridge Research Reactor," USAEC Report ORNL-TM-3234, Oak Ridge National Laboratory, Oak Ridge, TN, May 1971.

Stallmann, F. W. and Kam, F. B. K., "Neutron Spectral Characterization of the Second Nuclear Regulatory Commission Heavy Section Steel Technology 4T-CT Irradiation Experiment," USNRC Report NUREG/CR-0505, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1978.

Stallmann, F. W., Baldwin, C. A., and Kam, F. B. K., "Neutron Spectral Characterization of the Fourth Nuclear Regulatory Commission Heavy Section Steel Technology 1T-CT Irradiation Experiments: Dosimetry and Uncertainty Analysis," USNRC Report NUREG/CR-3333, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Stallmann, F. W., "Statistical Evaluation of Metallurgical Test Data in the ORR-PSF-PVS Irradiation Experiment," USNRC Report NUREG/CR-3815, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Stallmann, F. W., "Determination of Damage Exposure Parameter Values in the PSF Metallurgical Irradiation Experiment," USNRC Report NUREG/CR-3814, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1984.

Stallmann, F. W., Kam, F. B. K., and Baldwin, C. A., "Neutron Exposure Parameters for the Fifth Heavy Section Steel Technology Irradiation Series," USNRC Report NUREG/CR-4284, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1985.

Stallmann, F. W., "Analysis of the A 302-B and A 533-B Standard Reference Materials in Surveillance Capsules

of Commercial Power Reactors,” USNRC Report NUREG/CR-4947, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1988.

Stallmann F. W., Kam, F. B. K., and Taylor, B. J., “PR-EDB: Power Reactor Embrittlement Data Base, Version 1, Program Description,” USNRC Report NUREG/CR-4816, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1990.

Steele, L. E., Hawthorne, J. R., and Gray, Jr., R. A., “Neutron Irradiation Embrittlement of Several Higher Strength Steels,” NRL Report 6419, Naval Research Laboratory, Washington, D.C., September 1966.

Steichen, J. M. and Williams, J. A., “High Strain Rate Tensile Properties of Irradiated ASTM A533 Grade B Class 1 Pressure Vessel Steel,” HEDL Report HEDL-TME 73-74, Hanford Engineering Development Laboratory, Richland, WA, July 1973.

Stelzman, W. J. and Berggren, R. G., “Radiation Strengthening and Embrittlement in Heavy Section Steel Plates and Welds,” ORNL Report ORNL-4871, Oak Ridge National Laboratory, Oak Ridge, TN, June 1973.

Williams, J. A., “The Irradiation and Temperature Dependence of Tensile and Fracture Properties of ASTM A533, Grade B, Class 1 Steel Plate and Weldment,” HEDL Report HEDL-TME 73-75, Hanford Engineering Development Laboratory, Richland, WA, August 1973.

Williams, J. A., “Some Comments Related to the Effect of Rate on the Fracture Toughness of Irradiated ASTM A533-B Steel Based on Yield Strength Behavior,” HEDL Report HEDL-SA 797, Hanford Engineering Development Laboratory, Richland, WA, December 1974.

Williams, J. A., “The Irradiated Fracture Toughness of ASTM A533, Grade B, Class 1 Steel Measured with a Four-Inch-Thick Compact Tension Specimen,” HEDL Report HEDL-TME 75-10, Hanford Engineering Development Laboratory, Richland, WA, January 1975.

Williams, J. A., “Tensile Properties of Irradiated and Unirradiated Welds of A533 Steel Plate and A508 Forgings,” USNRC Report NUREG/CR-1158, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1979.

Williams, M. L., Remec, I., and Kam, F. B. K., “Neutron Spectral Characterization for the Fifth Heavy Section Steel Technology (HSST) Irradiation Series, ‘Neutronics Calculations’,” USNRC Report NUREG/CR-4031, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1985.

Residual Stresses

Rybicki, E. F. et al., “Residual Stresses at Girth-Butt Welds in Pipes and Pressure Vessels, Final Report, April 1, 1976 to June 30, 1977,” Battelle Report NUREG-0376, Battelle Columbus Laboratories, Columbus, OH, November 1977.

Rybicki, E. F., “Residual Stresses Due to Weld Repairs, Cladding and Electron Beam Welds and Effect of Residual Stresses on Fracture Behavior, Annual Report September 1, 1977 to November 30, 1978,” USNRC Report NUREG/CR-0559, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1978.

Rybicki, E. F., Shadley, J. R., and Sandhu, A. S., “Experimental Evaluation of Residual Stresses in a Weld Clad Plate and Clad Test Specimens,” USNRC Report NUREG/CR-4646, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Rybicki, E. F. and Stonesifer, R. B., “Computational Model for Residual Stresses in a Clad Plate and Clad Fracture Specimens,” USNRC Report NUREG/CR-4635, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1986.

Smith, G. C. and Holz, P. P., “Repair Weld Induced Residual Stresses in Thick-Walled Steel Pressure Vessels,” USNRC Report NUREG/CR-0093, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1978.

Steam Generators

Allen, R. P., Clark, R. L., and Reece, W. D., “Steam Generator Group Project Task 6—Channel Head Decontamination,” USNRC Report NUREG/CR-3841, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Alzheimer, J. M. et al., “Steam Generator Tube Integrity Program. Quarterly Report, January 1–March 31, 1977,” USNRC Report NUREG-0359, U.S. Nuclear Regulatory Commission, Washington, D.C., 1977.

Alzheimer, J. M. et al., “Steam Generator Tube Integrity Program Phase I Report,” USNRC Report NUREG/CR-0718, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1979.

Bickford, R. L. et al., “Eddy Current Round Robin Test on Laboratory Produced Intergranular Stress Corrosion Cracked Inconel Steam Generator Tubes,” USNRC Report NUREG/CR-3561, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.

Birks, A. S. et al., “Preliminary Report on Steam Generator Group Project—Task 9 NDE Round Robin,” PNL

Report PNL-5499, Pacific Northwest Laboratory, Richland, WA, 1984.

Bowen, W. M., Heasler, P. G., and White, R. B., "Evaluation of Sampling Plans for In-Service Inspection of Steam Generator Tubes: Part I," USNRC Report NUREG/CR-5161, U.S. Nuclear Regulatory Commission, Washington, D.C., 1988.

Bowen, W. M., Heasler, P. G., and White, R. B., "Evaluation of Sampling Plans for In-Service Inspection of Steam Generator Tubes: Modeling of Eddy-Current Reliability Data, Analytical Evaluations and Initial Monte Carlo Simulations," USNRC Report NUREG/CR-5161 Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1989.

Bradley, E. R. et al., "Steam Generator Group Project—Task 13 Final Report: NDE Validation," USNRC Report NUREG/CR-5185, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Semi-Annual Progress Report, January–June 1983," PNL Report PNL-4859, Pacific Northwest Laboratory, Richland, WA, 1983.

Clark, R. A. and Bickford, R. L., "Steam Generator Tube Integrity Program Leak Rate Tests, Progress Report", USNRC Report NUREG/CR-3562, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Semi-Annual Progress Report, July–December 1982," USNRC Report NUREG/CR-3580, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Annual Report—1982," USNRC Report NUREG/CR-3581, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1984.

Clark, R. A., Lewis, M., and Muscara, J., "Steam Generator Group Project Semi-Annual Progress Report January Through June 1984," PNL Report PNL-5267, Pacific Northwest Laboratory, Richland, WA, 1984.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Annual Report, 1983," USNRC Report NUREG/CR-4361, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Annual Report, 1984," USNRC Report NUREG/CR-4362, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1985.

Clark, R. A. and Lewis, M., "Steam Generator Group Project Semi-Annual Progress Report, January through June 1985," PNL Report PNL-5603, Pacific Northwest Laboratory, Richland, WA, 1985.

Clark, R. A. and Kurtz, R. J., "Compendium and Comparison of International Practice for Plugging, Repair and Inspection of Steam Generator Tubing," USNRC Report NUREG/CR-5016, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1988.

Doctor, P. G. et al., "The In-Service History of the Surry Unit 2A Steam Generator," PNL Report PNL-4880, Pacific Northwest Laboratory, Richland, WA, 1983.

Doctor, P. G. et al., "Steam Generator Group Project Progress Report on Data Acquisition/Statistical Analysis," USNRC Report NUREG/CR-3579, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.

Doctor, P. G. et al., "Steam Generator Group Project—Task 7: Final Report—Post-Service Baseline Eddy-Current Examination," USNRC Report NUREG/CR-5087, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1988.

Doctor, P. G. et al., "Steam Generator Group Project—Task 9: Final Report—Nondestructive Evaluation Round Robin, Vol. 1: Description and Summary Data," USNRC Report NUREG/CR-4849, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1989.

Doctor, P. G. et al., "Steam Generator Group Project—Task 9: Final Report—Nondestructive Evaluation Round Robin, Vol. 2: Raw Inspection Data," USNRC Report NUREG/CR-4849, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1989.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam-Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1978," USNRC Report NUREG/CR-0479, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1978.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam-Generator Tubing Program Quarterly Progress Report," USNRC Report NUREG/CR-0520, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1978.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1979," USNRC Report NUREG/CR-0764, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1979.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending

March 31, 1979," USNRC Report NUREG/CR-0918, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1979.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam-Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1979," USNRC Report NUREG/CR-1069, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1979.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending September 30, 1979," USNRC Report NUREG/CR-1372, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1980.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1979," USNRC Report NUREG/CR-1563, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1980.

Dodd, C. V. and Deeds, W. E., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending March 31, 1980," USNRC Report NUREG/CR-1828, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1980.

Dodd, C. V. and Deeds, W. E., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1980," USNRC Report NUREG/CR-1829, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1981.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending September 30, 1980," USNRC Report NUREG/CR-1982, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1981.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1980," USNRC Report NUREG/CR-2149, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1981.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1981," USNRC Report NUREG/CR-2305, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1982.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending September 30, 1981," USNRC Report NUREG/CR-2305, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1982.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1981," USNRC Report NUREG/CR-2305, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1982.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending March 31, 1982," USNRC Report NUREG/CR-2824, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1982.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1982," USNRC Report NUREG/CR-2824, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1983.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending September 30, 1982," USNRC Report NUREG/CR-2824, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., February 1983.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1982," USNRC Report NUREG/CR-3161, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1983.

Dodd, C. V., Deeds, W. E., and Smith, J. H., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending March 31, 1983," USNRC Report NUREG/CR-3200, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1983.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending June 30, 1983," USNRC Report NUREG/CR-3200, Vol. 2, September 1983.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Quarterly Progress Report for Period Ending September 30, 1983," USNRC Report NUREG/CR-3200, Vol. 3, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1984.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1983," USNRC Report NUREG/CR-3200, Vol. 4, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1984.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Semi-Annual Progress Report for Period Ending June 30, 1984," USNRC Report NUREG/CR-3949, Vol. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1984.

Dodd, C. V. et al., "Eddy-Current Inspection for Steam Generator Tubing Program Annual Progress Report for Period Ending December 31, 1984," USNRC Report NUREG/CR-3949, Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.

Dodd, C. V., Deeds, W. E., and McClung, R. W., "Improved Eddy-Current Inspection for Steam Generator Tubing, Progress Report for Period January 1985 to December 1987," USNRC Report NUREG/CR-5478, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1990.

Enderlin, W. I. and Baugh, J. W., "Vibration and Wear in Steam Generator Tubes Following Chemical Cleaning, Semiannual Report" USNRC Report NUREG/CR-4276, U.S. Nuclear Regulatory Commission, Washington, D.C., June 1985.

Enderlin, W. I. and Baugh, J. W., "Vibration and Wear in Steam Generator Tubes Following Chemical Cleaning, Final Report," USNRC Report NUREG/CR-4276 Vol. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1986.

Foster, B. E. et al., "Feasibility Studies for Nondestructive Testing of Duplex Tube-to-Tubesheet Joints and Tubes for an LMFBF Steam Generator," ORNL Report ORNL-5094, Oak Ridge National Laboratory, Oak Ridge, TN, December 1974.

Kurtz, R. J. and Lewis, M., "Steam Generator Group Project Semi-Annual Progress Report, January through June 1986," PNL Report PNL-6012, Pacific Northwest Laboratory, Richland, WA, 1986.

Kurtz, R. J., Lewis, M., and Clark, R. A., "Steam Generator Group Project: Annual Report, 1985," USNRC Report NUREG/CR-4848, U.S. Nuclear Regulatory Commission, Washington, D.C., April 1987.

Kurtz, R. J. and Lewis, M., "Steam Generator Group Project Annual Report—1986," PNL Report PNL-6150, Pacific Northwest Laboratory, Richland, WA, 1987.

Kurtz, R. J. et al., "Steam Generator Tube Integrity Program: Phase II, Final Report," USNRC Report NUREG/CR-2336, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1988.

Kurtz, R. J. et al., "Steam Generator Tube Integrity Program/Steam Generator Group Project—Final Summary Report," USNRC Report NUREG/CR-5117, U.S. Nuclear Regulatory Commission, Washington, D.C., May 1990.

McClung, R. W. et al., "Eddy-Current Inspection for Steam-Generator Tubing Program Quarterly Progress Report for Period Ending March 31, 1978," USNRC Report NUREG/CR-0164, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1978.

Morris, C. J. et al., "Eddy-Current Inspection of Inconel-600 Steam Generator Tubes at the Tube Sheet," USNRC Report NUREG/CR-1626, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1980.

Reece, W. D., Hoenes, G. R., and Parkhurst, M. A., "Steam Generator Group Project Progress Report—Task 3 Health Physics," USNRC Report NUREG/CR-3578, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1984.

Schwenk, E. B. and Wheeler, K. R., "Steam Generator Group Project Task 10—Secondary Side Examination," USNRC Report NUREG/CR-3843, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1984.

Schwenk, E. B., "Steam Generator Group Project Task 10—Secondary Side Examination Final Report," USNRC Report NUREG/CR-4850, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.

Sinclair, R. B., "Secondary Side Photographic Techniques Used in Characterization of Surry Steam Generator," USNRC Report NUREG/CR-3094, U.S. Nuclear Regulatory Commission, Washington, D.C., October 1984.

Tanner, J. E., Reece, W. D., and Scherpelz, R. I., "Steam Generator Group Project Progress Report—Task 3," PNL Report PNL-5269, Pacific Northwest Laboratory, Richland, WA, 1984.

Vagins, M. et al., "Steam Generator Tube Integrity Program, Annual Progress Report, January 1–December 31, 1977," USNRC Report NUREG/CR-0277, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1978.

Wheeler, K. R., "Initial Inspection of the Service Degraded Surry 2A Steam Generator, June 1982," PNL Report PNL-5268, Pacific Northwest Laboratory, Richland, WA, 1984.

Wheeler, K. R. et al., "Steam Generator Group Project. Task 8. Selective Tube Unplugging," USNRC Report NUREG/CR-3842, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1984.

Thermal Embrittlement (Cast Stainless Steel)

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Annual Report October 1982–September 1983," USNRC Report NUREG/CR-3857, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1984.

Chopra, O. K., and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Annual Report October 1983–September 1984," USNRC Report NUREG/CR-4204, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1985.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Annual Report October 1984–September 1985," USNRC Report NUREG/CR-4503, U.S. Nuclear Regulatory Commission, Washington, D.C., January 1986.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report October 1985–March 1986," USNRC Report NUREG/CR-4744 Vol. 1, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1986.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report April–September 1986," USNRC Report NUREG/CR-4744 Vol. 1, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., March 1987.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report October 1986–March 1987," USNRC Report NUREG/CR-4744, Vol. 2, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1987.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report April–September 1987," USNRC Report NUREG/CR-4744, Vol. 2, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., July 1989.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report October 1987–March 1988," USNRC Report NUREG/CR-4744, Vol. 3, No. 1, U.S. Nuclear Regulatory Commission, Washington, D.C., December 1989.

Chopra, O. K. and Chung, H. M., "Long-Term Embrittlement of Cast Duplex Stainless Steels in LWR Systems: Semiannual Report April–September 1988," USNRC Report NUREG/CR-4744, Vol. 3, No. 2, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1990.

Chopra, O. K. and Sather, A., "Initial Assessment of the Mechanisms and Significance of Low-Temperature Embrittlement of Cast Stainless Steels in LWR Systems," USNRC Report NUREG/CR-5385, U.S. Nuclear Regulatory Commission, Washington, D.C., August 1990.

Hiser, A. L., "Tensile and J–R Curve Characterization of Thermally-Aged Austenitic Cast Stainless Steels," USNRC Report NUREG/CR-5024, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1988.

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC, Add Vol.,
Supp., Rev., and Addendum Num-
bers, if any.)

NUREG-1426
Vol. 1

2. TITLE AND SUBTITLE

Compilation of Reports from Research Supported by the Materials
Engineering Branch, Division of Engineering

1965 - 1990

3. DATE REPORT PUBLISHED

MONTH | YEAR

May | 1991

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

Compiled by A. L. Hiser, Jr.

6. TYPE OF REPORT

Technical

7. PERIOD COVERED (Inclusive Dates)

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

Division of Engineering
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Same as above

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

Since 1965, the Materials Engineering Branch, Division of Engineering, of the Nuclear Regulatory Commission's Office of Nuclear Regulatory Research, and its predecessors dating back to the Atomic Energy Commission (AEC), has sponsored research programs concerning the integrity of the primary system pressure boundary of light water reactors. The components of concern in these research programs have included the reactor pressure vessel (RPV), steam generators, and the piping. These research programs have covered a broad range of topics, including fracture mechanics analysis and experimental work for RPV and piping applications, inspection method development and qualification, and evaluation of irradiation effects to RPV steels.

This report provides as complete a listing as practical of formal technical reports submitted to the NRC by the investigators working on these research programs. This listing includes topical, final and progress reports, and is segmented by topic area. In many cases a report will cover several topics (such as in the case of progress reports of multi-faceted programs), but is listed under only one topic. Therefore, in searching for reports on a specific topic, other related topic areas should be checked also.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

reactor pressure vessels, piping, fracture mechanics, non-destructive examination,
radiation embrittlement, dosimetry, environmentally-assisted cracking, fatigue, steam
generators, annealing, research reports

13. AVAILABILITY STATEMENT

Unlimited

14. SECURITY CLASSIFICATION

(This Page)

Unclassified

(This Report)

Unclassified

15. NUMBER OF PAGES

16. PRICE

THIS DOCUMENT WAS PRINTED USING RECYCLED PAPER

**UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555**

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

FIRST CLASS MAIL
POSTAGE & FEES PAID
USNRC
PERMIT No. G-67

ENGINEERING BRANCH, DIVISION OF ENGINEERING