



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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T-503

April 14, 1997

Carl Terry, BWRVIP Chair
Niagara Mohawk Power Company
Post Office Box 63
Lycoming, NY 13093

SUBJECT: BWR VESSEL AND INTERNALS PROJECT DRAFT REPORT: "A LITERATURE REVIEW OF THE REPAIR WELDING OF IRRADIATED STAINLESS STEEL MATERIALS" - REQUEST FOR WITHHOLDING INFORMATION FROM PUBLIC DISCLOSURE

Dear Mr. Terry:

By letter dated February 17, 1997, the Boiling Water Reactor Vessel and Internals Project (BWRVIP) submitted the proprietary Electric Power Research Institute (EPRI) draft report, "A Literature Review of the Repair Welding of Irradiated Stainless Steel Materials," dated November 30, 1996. This report was submitted as a means of exchanging information with the NRC staff for the purpose of supporting generic regulatory improvements related to the weld repairs of BWR internal components, and no formal review was requested. However, the NRC staff has compared your literature search to the one performed by the Office of Nuclear Regulatory Research (RES) in support of confirmatory research into welding of irradiated metals. RES has found several citations that may be of use to the BWRVIP in determining future activities related to welding of irradiated metals, and, as such, the supplemental citations are enclosed.

You requested that the above report be withheld from public disclosure pursuant to 10 CFR 2.790, in accordance with the letter and attached affidavit from Mr. Arthur Kenny of EPRI dated January 31, 1997. Mr. Kenny stated that the submitted information should be considered exempt from mandatory public disclosure for the following reasons:

- (i) The Report is not available in public sources. EPRI developed the Report only after making a determination that the Report was not available from public sources. It required a large expenditure of dollars for EPRI to develop the Report. In addition, EPRI was required to use a large amount of time of EPRI employees. The money spent, plus the value of EPRI's staff time in preparing the Report, show that the Report is highly valuable to EPRI. Finally the Report was developed only after a long period of effort of at least several months.
- (ii) A public disclosure of the Report would cause substantial harm to EPRI's competitive position and the ability of EPRI to license the Report both domestically and internationally. The Report can be properly acquired or duplicated by others only with an equivalent investment of time and effort.

We have reviewed your application, attached affidavit and the material in accordance with the requirements of 10 CFR 2.790 and, on the basis of your

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statements, have determined that the submitted information sought to be withheld contains proprietary commercial information.

Therefore, the versions of the submitted information marked as proprietary will be withheld from the public disclosure pursuant to 10 CFR 2.790(b)(5) and Section 103(b) of the Atomic Energy Act of 1954, as amended.

Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned to inspect the documents. If the need arises, we may send copies of this information to our consultants working in this area. We will, of course, ensure that the consultants have signed the appropriate agreements for handling proprietary information.

If the basis for withholding this information from public inspection should change in the future such that the information could then be made available for public inspection, you should promptly notify the NRC. You also should understand that the NRC may have cause to review this determination in the future, for example, if the scope of a Freedom of Information Act request includes your information. In all review situations, if the NRC makes a determination adverse to the above, you will be notified in advance of any public disclosure.

Sincerely,

(Original /s/ by C. Carpenter, Jr.)
C. E. Carpenter, Jr., Lead Project Manager
Materials and Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Enclosure: as stated

cc: See next page

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Sincerely,

A handwritten signature in dark ink, appearing to read 'C. E. Carpenter, Jr.', with a stylized flourish at the end.

C. E. Carpenter, Jr., Lead Project Manager
Materials and Chemical Engineering Branch
Division of Engineering
Office of Nuclear Reactor Regulation

Enclosure: as stated

cc: See next page

Literature Search: Confirmation of Underwater Welding Technology

"Breaking New Ground -- Under Water," The Nuclear Professional, Winter 1990, pp. 16-21.

Findlan, S.J. and M.K. Phillips, "Underwater Wet Welding for the Repair of Reactor Internals," BWR Reactor Pressure Vessels & Internals -- Inspection & Repair Workshop, Charlotte, North Carolina, July 16-18, 1991, Electric Power Research Institute, Palo Alto.

Grubbs, C.E. "Whitey", "Underwater Wet Welding (A State of the Art Report)," Proceedings of the 12th International Conference on Offshore Mechanics and Arctic Engineering, Glasgow, Scotland, June 20-24, 1993, pg. 111-118.

Jenco, J., "Underwater Maintenance Guide -- A Guide to Diving and Remotely Operated Vehicle Operations for Nuclear Maintenance Personnel", EPRI Report NP-7088, December 1990.

Mahan, G.D., "Wet Underwater Weld Repair of Feedwater Sparger Pipe", Welding Journal, January 1990, pp. 26-30.

Ogden, D. and T Joos, "Specification Stirs Underwater Electrode Development," Welding Journal, August 1990, pp. 59-61.

O'Sullivan, J.E., "Wet Underwater Weld Repairs of Susquehanna Reactor Internals", Excellent and Economic Nuclear Plant Performance, Proceedings of the Combined ANS Power Division Topical Meeting and ASME Nuclear Energy Conference, Newport, RI, Sept. 16-19, 1990, pp. 111-117.

Shah, V.N. and P.E. MacDonald, ed., "Boiling Water Reactor Vessel Internals", Aging and Life Extension of Major Light Water Reactor Components, Elsevier, 1993, pp. 750-786.

Smith, R.E. and W.J. Childs, "Development Program for In-Vessel Reactor Repair of Stress Corrosion Cracked Components," presented at the SMIRT 11 Post Conference Seminar No. 2: Assuring Structural Integrity of Steel Reactor Pressure Boundary Components, Taipei, Taiwan, August 26-28, 1991.

Tsai, C.L., "Underwater Welding, Cutting and Inspection", Welding Journal, February 1995, pp. 55-62.

White, R.A. et al., "Underwater Cladding with Laser Beam and Plasma Arc Welding," Welding Journal, January 1997, pp. 57-61.

Enclosure

Articles specific to welding irradiated stainless steel

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Goods, S.H. and N.Y.C. Yang, "Microstructural Damage and Residual Mechanical Properties in Helium-Bearing Gas Metal Arc Weldments," Metallurgical Transactions A, Vol. 23A, March 1992, pp. 1021-1032.

Ishiyama, Y., et al., "Post-irradiation Annealing Effects on Microstructure and Helium Bubbles in Neutron Irradiated Type 304 Stainless Steel," Journal of Nuclear Materials, Vol. 239, 1996, pg. 90-94.

Kanne, W.R. Jr., "Welding Irradiated Stainless Steel", Westinghouse Savannah River Co. Report WSRC-MS-93-619, 1993.

Kesternich, W. and R.V. Nandedkar, "On the Role of Helium in High Temperature Embrittlement of Irradiated Austenitic Steels," Effects of Radiation on Materials: 14th International Symposium, Vol. I, ASTM STP 1046, American Society for Testing and Materials, 1989, pp. 284-294.

Licina, G.J., A.J. Giannuzzi, J.A. Nevshermal, and T. Naughton, "Remediation of Nuclear Plant Piping and Components by Weld Reinforcement Repairs and Weld Buildups," Proceedings of the Fifth International Symposium on Environmental Degradation of Materials in Nuclear Power Systems -- Water Reactors, August 25-29, 1991, American Nuclear Society, pp. 383-389.

Mansur, L.K., "The Reaction Rate Theory of Radiation Effects," JOM, December 1996, pp. 23 - 32.

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Singh, B.N. and A.E. Foreman, "Nucleation of Helium Bubbles at Grain Boundaries During Irradiation," Effects of Radiation on Materials: 14th International Symposium, Vol. I, ASTM STP 1046, American Society for Testing and Materials, 1989, pp. 555-571.

Tanigawa, H., A. Kohyama, Y. Katoh, "A Modeling of Radiation Induced Microstructural Evolution Under Applied Stress in Austenitic Alloys," Journal of Nuclear Materials, Vol 239, 1996, pp. 80-84.

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Wang, C.A., M.L. Grossbeck, and B.A. Chin, "Threshold Helium Concentration Required to Initiate Cracking During Welding of Irradiated Stainless Steel," Journal of Nuclear Materials, Vol. 225, 1995, pp. 59-68.