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CHARACTERIZATION OF FUEL DISTRIBUTIONS IN THE THREE-MILE ISLAND UNIT 2 (TMI-2) REACTOR SYSTEM BY NEUTRON AND GAMMA-RAY DOSIMETRY

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IN THE THREE-MILE ISLAND UNIT 2 (TMI-2) REACTOR
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ABSTRACT

The resolution of technical issues generated by the accident at Three-Mile Island Unit 2 (TMI-2) will inevitably be of long range benefit. Determination of the fuel debris dispersal in the TMI-2 reactor system represents a major technical issue. In reactor recovery operations, such as for the safe handling and final disposal of TMI-2 waste, quantitative fuel assessments are being conducted throughout the reactor core and primary coolant system.

In addition to carrying out measurements for reactor recovery efforts, much can be learned from post-accident characterization of the TMI-2 fuel distribution. Indeed, these fuel assessment efforts provide unique data that can be used in light water (LWR) safety analyses. As a result, these data will eventually impact upon regulatory and licensing practices in the nuclear industry.

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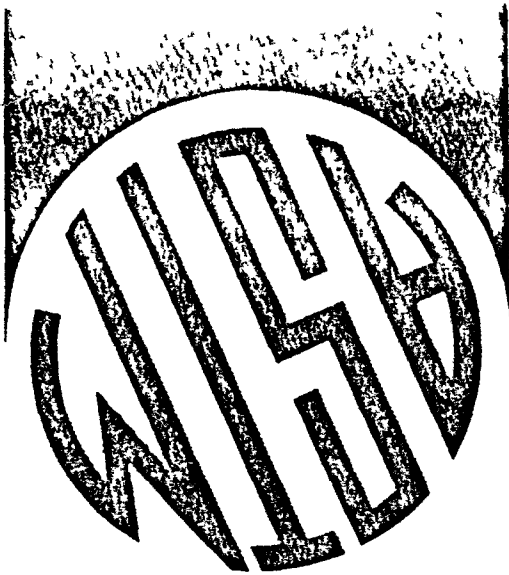
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TMI-2 fuel distribution assessments can be carried out nondestructively by neutron and gamma-ray dosimetry. In gamma-ray dosimetry, gamma-rays associated with specific fission products are measured. In neutron dosimetry, one measures neutrons generated from a combination of spontaneous fission and (α , n) reactions in the fuel.

Existing constraints preclude the application of many routine dosimetry methods for TMI-2 fuel characterization. These constraints arise from many origins, ranging from sensitivity and background considerations to practical day-to-day restrictions of TMI-2 recovery operations. Two highly specialized methods have been applied to overcome these constraints, namely solid state track recorder (SSTR) neutron dosimetry and continuous gamma-ray spectrometry with a unique Si(Li) Compton spectrometer.

Fuel assessment results will be presented for components in the primary coolant system and the reactor core region of TMI-2. Using SSTR neutron dosimetry and Si(Li) Compton continuous gamma-ray spectrometry, the quantity of fuel debris has been estimated in the demineralizers which maintained water purity in the TMI-2 coolant system. Additional fuel assessment experiments planned for the primary coolant system will be described. For fuel distribution characterization in the core region, results from SSTR neutron dosimetry exposures in the TMI-2 reactor cavity, (i.e., the annular gap between the pressure vessel and the biological shield) will be presented.



**Fifth ASTM-EURATOM
Symposium on
Reactor Dosimetry**

CALL FOR PAPERS

24-28 September, 1984
The GKSS Research Centre
Geesthacht (near Hamburg) Federal Republic of Germany



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Fifth ASTM-Euratom Symposium on Reactor Dosimetry

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A CALL FOR PAPERS is issued for the Fifth ASTM-Euratom Symposium on Reactor Dosimetry to be held 24-28 September, 1984 at the GKSS Research Centre, Geesthacht (near Hamburg), Federal Republic of Germany.

The symposium is sponsored by the Commission of the European Communities; ASTM Committee E-10 on Nuclear Technology and Applications; the U.S. Department of Energy (DOE); the U.S. Nuclear Regulatory Commission (NRC); and the U.S. Electric Power Research Institute (EPRI), all in cooperation with the International Atomic Energy Agency (IAEA).

The theme of the symposium is radiation metrology techniques, data bases, and standardization. Emphasis will be on the application and requirements for radiation metrology of irradiated fuels and materials in fission and fusion technology.

Papers are solicited on the following topics (involving light water reactors, fast breeder reactors, and fusion systems) as well as on related subjects:

- **characterization of environments**
- **irradiation monitoring of experiments**
- **adjustment codes and uncertainties**
- **benchmark fields and calibration procedures**
- **nuclear data needs and problems**
- **metrology techniques (new developments and improvements)**
- **radiation damage correlations and damage analysis**
- **techniques**

- **nuclear heating and gamma ray dosimetry**
- **neutron and gamma ray transport calculations**
- **LWR surveillance**

The symposium will be organized into oral presentations, poster sessions, and workshops. Through the courtesy of the Commission of the European Communities, simultaneous translations of the oral presentations will be provided in English, French, and German.

Prospective authors are requested to submit four copies of a 150-250 word abstract and the Paper Submittal Form below by **1 December, 1983** to the applicable program committee secretary. **Authors from the U.S.A. or Japan** should submit their abstracts to *E. B. Norris, Southwest Research Institute, 8500 Colebra Road, San Antonio, Texas 78284*. All other authors should submit their abstracts to *H. Rottger, Joint Research Centre, Petten Establishment, HFR Division, Postbus 2, 1755 ZG Petten (N.H.), The Netherlands*.

Authors will be notified by **8 March, 1984** of the acceptance (or rejection) of their papers. All authors will be asked to bring 125 copies of their final papers for distribution in Geesthacht at the opening of the symposium (these copies may also be sent in advance to an address to be determined later, arriving not later than the opening of the symposium). The *original* of the paper (on a special form to be provided) should be sent or given to H. Rottger (address above) by **24 September, 1984**.



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Paper Submittal Form

(Abstracts to be Attached)

SYMPOSIUM ON Fifth ASTM-Euratom Symposium on Reactor Dosimetry

TITLE OF PAPER: "Characterization of Fuel Distributions in the Three-Mile Island Unit 2 (TMI-2) Reactor System by Neutron and Gamma Ray Dosimetry"

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