TMI Unit-2 Technical Information & Examination Program

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Containment Airlock Door Freed

The **TI&EP Update** *is specifically designed to highlight data and information obtained as part of the TMI-2 Technical Information and Examination Program (TI&EP). As space permits, the* **TI&EP Update** *may feature certain TMI-related articles which, though not part of the TI&EP, would be of general interest to the scientific community.*

Groups Use TI&EP to Gather Unit-2 Generic Information

Four groups organized the TMI Unit-2 Technical Information and Examination Program (TI&EP) to gather valuable generic information about the Unit-2 accident. The four — the U.S. Department of Energy (DOE), the U.S. Nuclear Regulatory Commission (NRC), the Electric Power Research Institute (EPRI), and General Public Utilities Corporation (GPU) — compose the Coordination Group for the program.

EG&G Idaho, Inc., staffed the Technical Integration Office (TIO) for day-to-day management of the

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A small pin, which acts as a safety device, apparently caused the malfunction of the TMI Unit-2 containment door locking mechanism that prevented entry into the containment. On May 20, a two-man entry team spent 13 minutes trying to turn the containment door locking wheel before halting the effort (see photograph). TMI officials report that the pin has been freed, and the locking mechanism now appears to be operating properly.

Following extensive evaluation, a small hole was drilled into the containment door behind the pin, which freed the pin and allowed it to return to its normal position. TMI officials believe that corrosion may have frozen the locking mechanism.

Proper operation of the locking mechanism has since been verified, and the containment was entered on July 23. Information obtained during the containment purge and early entry will be reported in a future issue of the *TI&EP Update*. TMI officials stress that the airlock door can still be shut and sealed.

TMI Unit-2 containment door-locking mechanism malfunction aborted first entry attempt

TI&EP Establishes Data Bank For Nuclear Community

The Three Mile Island (TMI) Unit-2 Technical Information and Examination Program (TI&EP) is establishing a data bank of material related to the TMI-2 accident. The data bank will include data, analytical reports, and design review documents produced since the accident. The information will be stored on the Zytron computer system at the Electric Power Research Institute Nuclear Safety Analysis Center at Palo Alto, California. The data bank information will be available to program participants and others and will benefit the entire nuclear community by enhancing nuclear plant safety and reliability. Initially, all information retrieval will be through the Technical Integration Office. Information distribution will be done on microfiche. Future issues of the *TI&EP Update* will include instructions for information retrieval and will list both new documents acquired and data developed.

Any information you may have which could be a useful input to the data bank should be sent to the *TI&EP Update*, EG&G Idaho, Inc., PO Box 88, Middletown, PA 17057. Any questions concerning the type of information needed should be directed to Frank Kocsis, Configuration and Document Control Coordinator, phone number (717) 948-8486, FTS number 590-3933.

Unit-2 Generic Information

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program under contract to DOE. EG&G officials recently signed a contract with GPU to act as the interface between GPU and program agencies for work in the information and examination program. TIO will schedule work to be done and compile necessary documentation.

NRC licensing, inspection, and enforcement activities are unaffected by the contract. GPU and its contractors will perform all work within the Unit-2 facilities.

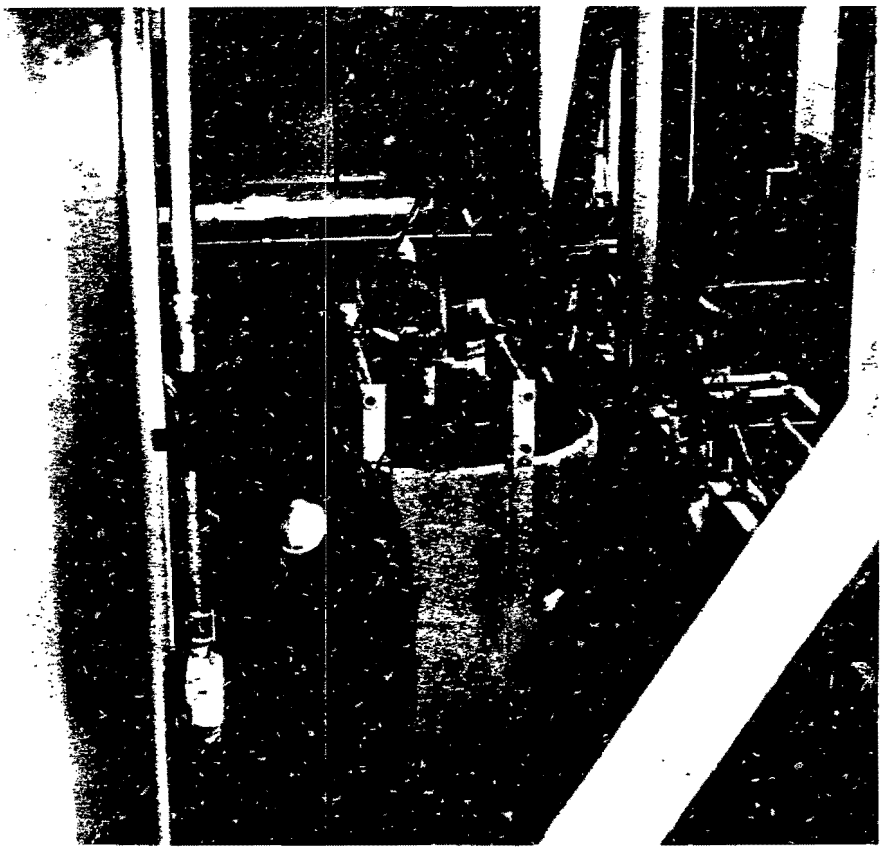
Analyses Completed on Containment Air Sample

EXXON Nuclear, EG&G, and GPU scientists recently completed analyses on air samples drawn from the Unit-2 containment building. The samples were taken in April, 1980, to provide data requested by the TMI Working Group. The samples were taken using a glove box and sampling apparatus installed in containment penetration 626. The analyses were completed on June 27, 1980. The results are presented in the table below.

Air sample analysis results

Isotope	Activity[a] (in microcuries per cubic centimeter)
tritium	$5 \pm 1 \times 10^{-5}$
carbon-14	$4 \pm 1 \times 10^{-7}$
iron-55	less than 6×10^{-11}
cobalt-58	less than 1×10^{-11}
cobalt-60	less than 1×10^{-11}
krypton-85	0.93 ± 0.07
strontium-89	$1.1 \pm 0.5 \times 10^{-10}$
strontium-90	$2.2 \pm 0.2 \times 10^{-10}$
ruthenium-103	less than 2×10^{-9}
ruthenium-106	less than 2×10^{-10}
iodine-129	$6 \pm 2 \times 10^{-11}$
cesium-134	$1.7 \pm 0.1 \times 10^{-10}$
cesium-137	$9.3 \pm 0.3 \times 10^{-10}$
uranium-235	less than 5×10^{-12}
uranium-238	less than 2×10^{-11}
plutonium-238	less than 8×10^{-12}
plutonium-239 and -240	less than 2×10^{-12}

[a] Less than indicates below detectable limits for the analytical techniques available.



Workmen changing EPICOR-II resin cask.

EPICOR-II Cleaning Waste Water

More than 365,000 gallons of contaminated water have passed through the EPICOR-II water treatment system as the first major step in cleaning up the Unit-2 facility at Three Mile Island.

The processing through a system of three large resin casks began last October with water from holding tanks in the auxiliary building. About 125,000 gallons remain to be processed.

The EPICOR-II system uses two filtering and demineralizing casks, each four feet in diameter by four feet high, and a final polishing cask that is six feet in diameter by six feet high. The water is decontaminated by filtration and ion exchange to extract strontium and cesium.

The resin casks are housed in a chemical cleansing building. The water moves into the system via shielded lines from the auxiliary building. If necessary, water can be cycled through the system a second time for additional purification.

A typical processing run handles about 17,000 gallons of water before the resin casks require changing (see photograph). Water samples are taken about every 1500 gallons at points before and after each filter. The processing rate averages 10 gallons a minute.

The water after processing is considered releasable under Environmental Protection Agency regulations, but is being stored in tanks on the island until a programmatic environmental impact statement is prepared. The spent resin casks also are stored in a shielded facility on the island.

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The *TI&EP Update* is issued by the EG&G Idaho, Inc., Technical Integration Office, Configuration Document Control Section, under contract DE-AM07-76ID01570 to the Department of Energy, PO Box 88, Middletown, PA 17057. Telephones (717)948-8586 or FTS 590-3933. W. W. Bixby is manager of the DOE-TMI Site Office. H. M. Burton is manager of the Technical Integration Office. D. M. Grigg is managing editor of the *TI&EP Update*.

Techniques Being Investigated for Early Core Damage Assessment

Insertion of an underwater television camera through a control rod drive mechanism nozzle may provide the first visual assessment of core damage in the TMI Unit-2 reactor vessel. The camera insertion is part of the potential early core damage assessment before the reactor vessel tophead is removed, according to Dennis E. Owen, Fuels Technical Coordinator of the Technical Integration Office, and George Kulynch of Babcock & Wilcox.

The core damage assessment may use three different approaches:

- Visual inspection of the core
- Temperature and flux mapping of the core
- Damage mapping of the core.

The visual inspection may use control rod drive mechanism (CRDM) and thermocouple penetrations in the reactor vessel head. Following removal of a CRDM, a radiation-hardened, underwater television camera may be inserted through the 2.5-inch-diameter opening in the CRDM nozzles, thus permitting visual inspection of the tops of the fuel elements. Visual examination of the peripheral areas of the core may be accomplished by inserting a borescope through some of the eight thermocouple penetrations. The thermocouple nozzles are on the outer perimeter of the vessel, where it is expected that the fuel may still be intact.

While the CRDM is removed, engineers could insert tooling to try to extract samples of core debris and determine whether any slumping of debris has occurred. Owen said the samples would be taken to a remote-handling hot cell for analysis. Analysis of samples would aid in planning the reactor core removal.

The temperature and flux mapping phase of the assessment could make use of instrument strings that run inside the reactor core. A small-diameter, swaged tube inside the strings, usually used for flux wires, provides a path for thermocouple insertion. The thermocouples would allow temperature measurements and locate physical blockages that might indicate coolant flow blockages within the core. Flux wires also are being considered for use in providing information about fuel distribution in the subcritical areas of the core.

The damage mapping phase of the assessment makes use of the instrument string guide tubes following withdrawl of the instrument string for analysis of the self-powered neutron detectors and other components. Both gamma and neutron detectors are under consideration for use in the instrument guide tubes to provide both radial and axial maps of the extent of reactor core damage, Owen said.

Additional detectors are being considered for insertion in the instrument guide tubes to check fuel redistribution, the extent of oxidation within the core, and mechanical strength of the core materials.

Local Residents Monitor Environmental Radiation

Each day in 12 Pennsylvania communities within a 5-mile radius of TMI Unit-2, specially trained residents take readings from radiation monitoring equipment located in municipal garages, firehouses, and sheds. These readings are part of the Citizens' Radiation Monitoring Program, a joint project of the U.S. Department of Energy (DOE), the Pennsylvania Department of Environmental Resources (DER), the Environmental Protection Agency (EPA), and Pennsylvania State University. Readings taken since May 15 show normal background radiation levels, according to G. R. Eidam, Radiation and Decontamination Project Coordinator for the Technical Integration Office.

Each day after the equipment readings are recorded, a DER employee collects the data for compilation. DER distributes the data each weekday to the General Public Utilities Corporation and local officials of the Nuclear Regulatory Commission, DOE, and EPA. The Pennsylvania governor's office releases the data to the news media.

Circumstances can alter the reading

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schedules, however. While krypton-85 was being purged from the TMI Unit-2 containment building, some communities chose to monitor the instruments either continuously or on an hourly basis. Residents of the communities can view and read the instruments at any time.

The program began early this year when DOE and DER representatives visited officials of 12 communities and explained the proposed monitoring concept. From a list of 50 people supplied by community officials, course organizers enrolled residents to attend 36 hours of radiation monitoring training presented by Pennsylvania State University faculty members over a 2-1/2-week period.

The course included a day of training at the Breazeale Nuclear Reactor Facility at Pennsylvania State University at State College, where the residents learned to take readings of argon-41 with the same equipment they would later use in their communities. They also participated in the calibration of the monitoring instruments, using a krypton-85 source inside a plastic tent.

The monitoring equipment includes a Ludlum 177 radiation monitor with an Eberline HP-260 two-inch-diameter probe, a Rustrak recorder, and a Lear Siegler Inc. gamma rate recorder. Eidam said the equipment selections were based on sensitivity for detecting beta-emitting radionuclides (i.e., krypton-85) and durability.

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