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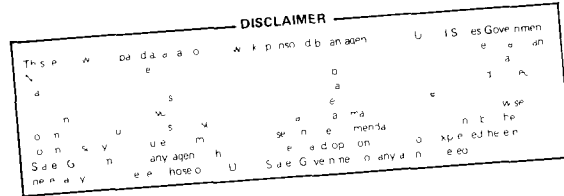
Technology Transfer

At Three Mile Island Unit 2^a

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The March 28, 1979 accident at the Three Mile Island Unit 2 (TMI-2) power plant represents the most severe test of nuclear power plant safety systems performance ever encountered in a commercial light-water reactor system. In a general way, this test was "successful" -- despite the severity of the accident, the engineered safety systems performed as they were designed to. While overall operation of safety systems is clear, many details concerning

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the accident and its effects are not. In its postaccident condition, therefore, TMI-2 presents unique opportunities to acquire information regarding accident sequences and their effects in light-water reactor systems. Specifically, research and development centering on TMI-2 can produce information that will enhance nuclear power plant safety and reliability. Technology transfer from TMI-2 research and development work to applications in the industry will result in long-lasting benefits for improving the safety and overall operations of light-water reactors. Conversely, technology exists in the industry for dealing with the cleanup at TMI-2. Recognizing the value of the "two-way" transfer of technological information, four organizations signed a Coordination Agreement¹ to structure a major program of cooperation in extracting information from TMI-2 during the cleanup process.

The Department of Energy (DOE) formulated a program at TMI-2 in concert with the Coordination Agreement. The DOE TMI-2 Information and Examination Program (TI&EP) aims to fulfill three general objectives. First, the TI&EP aims to obtain information from the TMI-2 accident for resolving specific safety and licensing concerns; modifying applicable standards, specifications, and regulations; and defining changes in design, maintenance, operation, and personnel training. Second, the TI&EP uses TMI-2 information to advance technology in decontamination work; radioactive waste immobilization and disposal; system requalification; damaged fuel handling; and plant, reactor, and safety engineering. Finally, the TI&EP distributes the information gained from the Program to others that are engaged in research and development, design, construction, operation, maintenance, and regulation of nuclear power plants.

The DOE Program is managed through the Technical Integration Office (TIO) at Three Mile Island. This TIO integrates the various Program activities and supervises information transfer. The TIO data bank collects, stores, and retrieves program information generated during the recovery and related R&D activities. Finally, a reporting system documents technical progress and distributes such information to government and industry on a regular basis.

The TMI-2 TI&EP is divided into two parts. The Data Acquisition Program (DAP) is primarily oriented to meet research objectives. The Waste Immobilization and Reactor Evaluation Program (WIRE) is primarily oriented to technology transfer and development of solutions to specific TMI-2 problems, but with the aim of industry-wide benefit.

The Data Acquisition Program provides information and appropriate new technology in the following disciplines:

Instrumentation, electrical, and mechanical equipment performance within the reactor containment and auxiliary buildings during and after the accident

Chemical, metallurgical, and physical behavior of fuel, clad, and core components during and after the accident

Fission product behavior, transport, and deposition during and after the accident

Nature and extent of accident-caused physical damage to reactor building surfaces, structural components, and equipment

Plant, system, and equipment decontamination performance

Postaccident radioactive waste processing and disposal methods and systems

Nuclear power plant public health and safety risks.

The Waste Immobilization and Reactor Evaluation (WIRE) Program provides information and appropriate new technology in the following disciplines:

Waste Immobilization

Handling, shipping, interim storage, and disposal of highly loaded resin and zeolite ion exchange media

Shipping, storage, research and development, and disposal of contaminated wastes unsuitable for commercial land disposal

Reactor Evaluation

Prehead removal core damage assessments

Reactor vessel head, upper plenum, and fuel debris removal and disposition research and development

Reactor disassembly data acquisition equipment and procedures development.

The TI&EP actively provides technology transfer not only from the nuclear industry to specific problems in the TMI-2 recovery but also from TMI-2 to specific applications in the industry. Examples of the two-way technology transfer are summarized below.

In May, 1981 the DOE recognized that more efficient disposal of high-activity zeolites from processing the 600,000 gallons of water in the TMI-2 reactor building could be realized if the zeolite were loaded to its full capacity in subsequent operations. A task force of individuals with expertise in processing, shipping, handling, and immobilizing waste was called upon to evaluate the zeolite loading. The conclusion of this task force was that the loading on each liner could be increased by a factor of six or from 10,000 Ci/ft³ to 60,000 Ci/ft³. In so doing, the number of canisters would be reduced from an estimated seventy-five to twelve canisters. This technology transfer from industry experts to a specific TMI-2 problem resulted in a savings in transportation and handling costs valued at nearly one million dollars. The reduced number of highly loaded zeolite canisters will be used in current DOE R&D activities, and will provide information on disposition options for high specific activity waste.

One of many examples of technology transfer from the TMI-2 R&D programs to the industry occurred in the instrumentation and electrical components area. Research identified that charge converters taken from TMI-2 failed as a result of accident-induced high radiation exposure. Because this information was transferred to the industry, the charge converters are now being redesigned. The manufacturer of the instrument in question offered

this comment on the transfer of information: "I personally am gratified to see that the information being developed as part of the TMI-2 recovery is being passed on to industry so we all can improve our products and services."²

During the upcoming year, the TMI-2 Programs will begin using an information feedback evaluation system designed by INPO to communicate and evaluate program results. This feedback system, called the Significant Event Evaluation and Information Network (SEE-IN), connects nuclear utilities by means of a computer conferencing system. The TI&EP will participate in SEE-IN and will thereby continue to communicate and receive significant information rapidly and effectively.

The use of the broad range of industry expertise with specific emphasis on the use of DOE laboratory contractors will ensure that the transfer of technology to TMI is maximized. As the TI&EP continues its work at TMI, it will investigate viable means for improving technology transfer both from the industry to TMI and from TMI to specific applications throughout the nuclear community.

REFERENCES

1. Coordination Agreement, TMI-2 Information and Examination Program, March 26, 1980.
2. Letter 81ESG-10871, C. V. Di Pol, Rockwell International to H. M. Burton, TMI-2 Programs Division Manager, "A summary of the action taken by Rockwell as a result of the postmortem on the failure of the charge converters," December 17, 1981.