

Three Mile Island—Six Years Later

## LITIGATION-FUNDED RESEARCH ON RADIATION SPARKS NEW CONTROVERSY



When a malfunction in the cooling system on March 28, 1979, damaged the fuel core of the nuclear power reactor at Three Mile Island, it not only created an accident that scared the public about the potential dangers of the industry—it also created a unique setting for scientific research.

Since the reactor accident six years ago at Three Mile Island (TMI) near Harrisburg, PA, the radiation released has propagated a multitude of scientific studies on measurements and dosimetry, monitoring systems, chemical reactions within the containment structure, health and environmental effects on the surrounding community, and assessment of public risk in general from future severe reactor accidents in any nuclear power plant.

In fact, the American Nuclear Society has called the TMI event “an experiment that no one would have dared suggest.”

The most controversial recent study, according to many experts in the field, is the Review of Dose Assessments by Jan Beyea, PhD, a nuclear physicist who serves as the senior energy scientist for the National Audubon Society. The study, funded by the TMI Public Health Fund, analyzes the major research done immediately after the accident.

Dr. Beyea’s general conclusion, published last August, from reviewing the official TMI dose assessment reports is: “None of the studies reporting dose estimates can be regarded as without defects in their methodology, and no calculation can be regarded as final.”

A. Bertrand Brill, MD, PhD, chairman of the Society of Nuclear Medicine’s Subcommittee on Risks of Low-Level Ionizing Radiation, pointed out that the differences in the dose calculations and estimated health impacts between the various presidential commissions’ reviews of TMI and Dr. Beyea’s are inconsequential and well within the errors of all dosimetry calculations.

“Essentially, what the Beyea report says is that the NRC, the DOE, the EPA, the FDA, the utility, and the states of Pennsylvania and Maryland didn’t know what they were doing when they measured radiation in the environment,” said Sydney Porter, Jr., ABHP, of Porter Consultants, Inc., in Ardmore, PA. “It impunes hundreds of scientists, and some of the finest health physicists in the country,” he added.

Immediately after the accident, Mr. Porter was called in to manage radioeffluent assessment, utility and off-site environmental assessment, and accident dosimetry for people suspected of being exposed to radiation.

Mr. Porter’s expertise was recently called upon again, this time by the law firm that is defending the TMI utility companies in hundreds of lawsuits. John Harkins, Esq., of Pepper, Ham-

ilton and Scheetz in Philadelphia, has requested that Mr. Porter work with a team of about 15 radiation experts from around the country to rereview all official TMI dose assessment studies. “I don’t particularly like this kind of work,” said Mr. Porter, “but someone knowledgeable about the accident had to see that the facts were made known.”

The TMI Public Health Fund has created “a strange amalgam of science and law,” in the words of Mr. Berger, who admitted that those two disciplines “don’t necessarily mix very well.”

Established in a court settlement on February 17, 1981, the TMI Public Health Fund’s stated purpose is “to investigate possible detrimental consequences of the accident and to improve radiation monitoring and emergency planning in the TMI area, as well as to investigate the health effects of low-level radiation and to develop a program of public education on the operation of the facility at TMI.”

Sylvia H. Rambo, U.S. District Judge for the Middle District of Pennsylvania, supervises the Fund, and she appointed David Berger, Attorneys at Law, to administer it. David Berger is also the plaintiff’s chief trial counsel in litigation against General

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Public Utilities and Metropolitan Edison, the TMI operators. A group called the American Nuclear Insurers of Mutual Atomic Energy Liability Underwriters provided \$5 million to set up this research fund, explained Jonathan Berger.

Dr. Beyea's review is the Fund's first project, and he proposes 16 more studies on dose assessment and health effects, for which the Fund will pay if the Court approves.

Although Mr. Porter was not at liberty to divulge the results of his reassessment of TMI dose estimates, he defended his original work, and said that his conclusions and those of many other scientists are being used and manipulated by critics.

"I'm a physicist," said Mr. Porter. "I measure radiation. I've been doing it for 30 years, and I think I know how to do it extremely well. When we were called into TMI, we did the best job we could, and we certainly called it the way it was. We had absolutely no axes to grind. In fact, we could have made a lot more money if we had concluded that more radiation had been released, because then we would have spent more money looking for it."

Karl Z. Morgan, PhD, former director of the health physics division at Oak Ridge National Laboratory, is the chairman of the TMI Public Health Fund's board of scientific advisors. He has served as a professional witness, testifying on the risks of ionizing radiation, in more than 50 court cases.

Last November, a judge in Wichita, KA, dismissed all testimony given by Dr. Morgan in a case involving four factory employees who claimed that radiation from radium instrument dials had caused the cancers these workers developed. Patrick F. Kelly, U.S. District Judge for the District of Kansas, said he had started out skeptical of the government's position in *Johnston vs. United States*, but his

"perception changed 180 degrees" after the 42-day trial.

"Dr. Morgan's testimony is stricken from this case as totally unreliable," said the judge, who also noted that Dr. Morgan was working on about 50 other radiation cases as the plaintiff's expert witness.

According to Mr. Berger, however, the Fund's research is being done in a "neutral" manner. "We're not out to provide a brief for the plaintiff's lawyer, or a white wash for a defense of the utility company," he said.

Dr. Beyea told *Newsline* that he was not worried about the appearance of lack of objectivity because the TMI Public Health Fund's administrators do not represent plaintiffs for health effects lawsuits, but only for economic loss cases.

When asked how the Fund's proposed health studies differ from those currently being done by George K. Tokuhata, DrPH, PhD, director of epidemiological research at the Pennsylvania Dept. of Health, Mr. Berger said that "we think that some of those studies have to be done by an independent analyst."

The state health department has published 16 health study reports since the accident, including a radiation dose assignment to individuals in the TMI vicinity. This report concluded that "the average likely" gamma dose was approximately 9 mrems, and the average maximum gamma dose was 25 mrems. "These results compare well with doses estimated by other investigators," concluded the study, directed by David Gur, ScD, professor of radiology at the University of Pittsburgh Graduate School of Public Health.

In addition, the maximum cumulative whole-body gamma dose to anyone off-site was estimated at no more than 100 mrems within ten miles of the plant. This low dose of radiation exposure in the TMI areas, which is no more than annual background radiation, is not expected to produce

any detectable health consequences among the local population, but long-term studies will continue, said Dr. Tokuhata, who is also professor of epidemiology and biostatistics at the University of Pittsburgh.

So far, studies conducted by the Pennsylvania Dept. of Health have not found any evidence of physical effects from the TMI accident, except for (a) psychological impacts and (b) effects of excess medication, such as tranquilizers and sleeping pills, taken by pregnant women, upon lower birth-weight babies born after the accident. During a presentation last September at an international biometric conference, Dr. Tokuhata said that "since the level of government-reported radiation doses has been challenged by some nuclear scientists, and because the potential chronic effects of psychological stress and related behavior disorders are largely unknown at this time, it is prudent to continue health surveillance over the accident-exposed population."

Dr. Tokuhata said that he started a comprehensive morbidity survey last month to study "anything unusual" in the exposed population, such as cancer, thyroid disease, mental disorders, or behavior abnormalities. In addition, a tumor registry in Pennsylvania went into operation in July of 1982, and now Dr. Tokuhata is contacting other states with similar registries to verify any new cancer cases among people who have moved out of the TMI area.

### Source term studies

Unrelated to the above-mentioned dose assessment and health studies, many researchers have investigated the general risks of a nuclear power accident's occurrence, and the projected radiation released.

Preliminary reports indicate that the possibility of a nuclear power plant accident that would release

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enough radiation to endanger the public is extremely low, and that current guidelines that define evacuation areas are too strict. Empirical data from the TMI accident sparked interest in reevaluating the subject.

The NRC is evaluating three reports on source terms, defined as the amount, composition (chemical and physical form), and timing of the projected release of radioactivity to the environment. To explain the timing factor, Jocelyn Mitchell, senior nuclear engineer at the NRC, said, "If the containment isn't going to fail for 12 hours, you have one kind of emergency planning situation, but if it's going to fail in 1.2 hours, you have another type."

"It appears that the risk of a severe accident with complications are extremely low, and that source terms could be reduced by at least a factor of ten—if not more," said Mel Silberberg, assistant director of Accident Source Terms for the NRC. In most cases, therefore, the radius of the evacuation area could be reduced to one mile or less, rather than the recommended ten miles.

Risk assessment guidelines currently in use are based on the Reactor Safety Study—An Assessment of Accident Risk in the United States (WASH-1400), approved in 1975. "The validity of the methodology used in the current guidelines needs to be reevaluated, considering new data and especially new computer capabilities," said Mr. Silberberg.

● *American Nuclear Society (ANS)*: The ANS presented the findings of its two-year analysis of the physics and chemistry of nuclear reactor accidents to the NRC last November. For large pressurized water reactors, calculated source terms ranged from one to several factors of ten times smaller than previous estimates, according to William Stratton, PhD, chairman of the ANS's Special Committee on Source Terms. The in-

vestigators reached a comparable conclusion for most boiling water reactors, mainly because water suppression pools prevent the escape of fission products. For certain accident sequences in some boiling water reactors, though, source terms were found to be closer to previous estimates—about one-third to one-half of those found in WASH-1400.

Radioactive iodine does not represent a major danger to the public, contrary to previous belief, because it does not release in gaseous form. Experience shows that iodine and cesium, both fission products, combine to form cesium iodine, which is readily soluble in water, clings to surfaces, and would not leave the containment building if released.

In addition, new evaluations of containment structures indicate that they are much stronger than previously believed, and breaches during an accident are highly unlikely because the internal pressures generated are not high enough.

● *Battelle Columbus Laboratories*: This private research institution, contracted by the NRC for a \$2-3 million study, concluded that radionuclide release to the environment after an accident is much lower than currently believed, according to research leader James Gieseke, PhD. "We now believe that containments will stay intact longer than previously believed because new computer calculations indicate that we previously overestimated pressures that build up during an accident and underestimated containment strength."

For some boiling water reactors and for some containment by-pass sequences, however, which are extremely plant-specific since it depends on the exact routing of pipes in different plants, the source terms were found to be comparable to those found in WASH-1400.

Battelle only considered what radionuclides would be released from the plant, and not meteorologic con-

ditions. The precise evacuation area, therefore, must be individualized for each accident.

● *Industry Degraded Core Rule-making Program (IDCOR)*: This \$15-million, four-year study, sponsored by 60 domestic and four foreign companies in the nuclear industry, was published last November. According to John R. Siegel, PhD, IDCOR's special project manager, the investigators drew three major conclusions: (a) the probability of a severe accident is extremely low, (b) the quantities and types of radionuclides released are likely to be much lower than previously calculated, and (c) risk to the public in the event of an accident is significantly lower than previously predicted, and much lower than the risk levels used to establish current emergency guidelines.

In fact, "The risk from potential severe nuclear power accidents is only one-millionth of the risk of normally occurring cancer fatalities for the population living within 50 miles of the plant," said Dr. Siegel.

—Linda E. Ketchum

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## JAMA SOLICITS NUCLEAR SUBMISSIONS

The editor of the *Journal of the American Medical Association* has invited Society members to submit original material for JAMA's third annual Hiroshima theme issue, scheduled to be published on August 2. "Consistent with the AMA's official position that there is no adequate medical response to nuclear war," said George D. Lundberg, MD, the Journal is looking for contributions on the subjects of radiation biology, nuclear medicine, and nuclear war.

Submit manuscripts to George D. Lundberg, MD, 535 N. Dearborn St., Chicago, IL 60610. (312) 645-5000.