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

• Industry Degraded Core Rulemaking 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

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.