

GUIDELINES FOR THE
RELEASE OF WASTE
WATER FROM NUCLEAR
FACILITIES WITH SPECIAL
REFERENCE TO THE
PUBLIC HEALTH
SIGNIFICANCE OF THE
PROPOSED RELEASE OF
TREATED WASTE WATERS
AT THREE MILES ISLAND



NCRP COMMENTARY No. 4

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Preface

In May of 1980, in response to public concerns over the proposed venting krypton from the Three Mile Island nuclear plant, the NCRP issued a report entitled, Krypton-85 in the Atmosphere - With Specific Reference to the Public Health Significance of the Proposed Controlled Release at Three Mile Island. That document was prepared in response to a request from Governor Thornburgh of the Commonwealth of Pennsylvania and in recognition of the NCRP's responsibilities, as stated in its congressional charter. The charter specifies, among other things, the responsibility to "collect, analyze, develop and disseminate in the public interest, information and recommendations about...protection against radiation." The study was also recognized as relating to the general problem of controlling releases to the atmosphere, of which the circumstances at TMI-2 were a special case.

The problem of releases of waste water from TMI-2 could raise similar scientific and public issues. Again, TMI-2 is a specific case of a general problem.

In 1980, the Nuclear Regulatory Commission (NRC) requested the NCRP to examine this issue. Recognizing that it could again serve the public interest, the Council established a Task Group to address this problem. The Task Group prepared a draft report which was reviewed by the Council in 1985. The members of the Task Group were:

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However, further proposals on release of the waste water at TMI-2 have been developed recently by GPU Nuclear. Therefore NCRP established a new Task Group to review the potential environmental impacts of these proposals.

The U. S. Nuclear Regulatory Commission has reserved to itself the decision on disposal of the waste water. As part of this process, the NRC issued, in 1981, a "Final Programmatic Environmental Impact Statement Related to Decontamination and Disposal of Radioactive Wastes Resulting from, March 28, 1979 Accident, Three Mile Island Nuclear Station, Unit 2." A supplement to the EIS is now out for public comment. This Commentary is intended to provide the NCRP's response to the request for public comment.

The System International (SI) units are used in this report but, with the exception of Section 5, are followed by the conventional units in parentheses in accordance with the procedure set forth in NCRP Report No. 82.

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The Council wishes to express its appreciation to the Task Group members and consultants for the time and effort devoted to the preparation of this Commentary.

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1. Introduction

The risk associated with the release of waste water from nuclear facilities, whether generated by accident or produced during "normal" operations, is of interest to the public and the nuclear industry. The presence of waste water at Three Mile Island (TMI) and proposals for its release represent a special case of this problem, the analysis of which is widely applicable.

In many situations, including the case at TMI, radionuclides other than tritium can be removed from the waste water by various processes. Tritiated water, however, cannot be separated and concentrated from ordinary water by conventional waste treatment techniques (Blomeke, 1964). Isotopic separations are available, but these are impractical for high volume, low concentration operations (IAEA, 1984). Thus, while radionuclides other than tritium can be removed from contaminated waste water, the tritium must be handled by other means. Therefore, the focus here is primarily on the disposal of tritiated waste water.

Because of the previous work on this subject, it is possible to apply existing knowledge and procedures to the situation at TMI.

The National Council on Radiation Protection and Measurements (NCRP) in 1979, published NCRP Report No. 62, Tritium in the Environment (NCRP, 1979). That report dealt with the available information on tritium in terms of its physical properties, production sources, physical transport, biological behavior, projected future production, waste management and long-term implications in the environment.

The Council, in 1984, published NCRP Report No. 76, Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment (NCRP, 1984). That report reviewed the current status of the application of radionuclide transport models from the point of discharge to the environment to the point of intake by man. Models are reviewed that describe the transport of radionuclides through the atmosphere, surface and groundwater, deposition on terrestrial surfaces and in sediments and accumulation in food products. Usage factors are considered that determine the intake of radionuclides by humans due to dietary habits, physiological parameters and living customs.

The information provided in the two cited NCRP reports is used in the analysis here of the public health significance of the disposal of waste water contaminated with tritium. Optional methods for release of tritiated waste water are reviewed, information about tritium provided, and environmental transport and pathways are examined and dosimetry discussed. Finally, doses and health effects resulting from waste water releases are given.

The degree of decontamination and techniques for waste water treatment discussed in this report are evaluated specifically for the situation at Three Mile Island. Although many of the principles may have applications at other facilities, the methods considered for treatment and the assessment given herein should not be applied to discharges at other facilities, nor is the degree of decontamination specified here recommended for all sites. Indeed, the treatment of radioactively contaminated waste water at other locations must be evaluated on a case by case basis.