

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

James E. Dyer, Director

In the Matter of)
)
Operating and Decommissioning) (10 CFR 2.206)
Power Reactors and)
Operating and Decommissioning)
Research and Test Reactors)

DIRECTOR'S DECISION UNDER 10 CFR 2.206

I. Introduction

By letter dated January 25, 2006, as supplemented by the letters dated February 2 and April 26, 2006, Mr. David Lochbaum, on behalf of the Union of Concerned Scientists and numerous other organizations and individuals (the Petitioners), filed a petition pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 2.206. The Petitioners requested that the U.S. Nuclear Regulatory Commission (NRC) respond to public concerns about nuclear reactors releasing water potentially contaminated with radioactive materials by taking the following action:

.... take enforcement action against all applicable licensees* by issuing a Demand for Information requiring them to submit on the docket answers to the following questions:

1. What are the systems and components at your licensed facility that contain radioactively contaminated water?
2. What methods are being used to monitor leakage of radioactively contaminated water from the systems and components identified in response to question 1?
3. What is the largest leak rate that can remain undetected by the monitoring methods identified in response to question 2?

4. What methods are being used to monitor the grounds around the facility for potential leakage of radioactively contaminated water from the systems and components identified in response to question 1?
 5. What assurance is there against a leak of radioactively contaminated water into the ground around your licensed facility from remaining undetected long enough to permit migration offsite in quantities exceeding federal regulations?
- * Applicable licensees' are those licensees as listed in Appendix A, "U.S. Commercial Nuclear Power Reactors," Appendix B, "U.S. Commercial Nuclear Power Reactors Formerly Licensed to Operate," Appendix E, "U.S. Nuclear Research and Test Reactors Regulated by NRC," and Appendix F, "U.S. Nuclear Research and Test Reactors Under Decommissioning" in the "NRC Information Digest: 2004–2005 Edition," NUREG-1350, Vol. 16, Rev. 1, published February 2005 by the Nuclear Regulatory Commission.

As the basis for the request, the Petitioners cited several examples of contamination at NRC-licensed facilities and cited NRC regulations requiring licensees to have controls limiting the release of radioactive materials and limiting the radiation dose individuals receive from the operation of NRC-licensed facilities. In a letter dated March 1, 2006, the NRC informed the Petitioners that their request was received and that the issues in the petition were being referred to the Office of Nuclear Reactor Regulation (NRR) for appropriate action.

In its March 1, 2006, letter, the NRC stated that it has responded to specific cases of unmonitored releases from nuclear power reactors and to general public concerns relating to possible groundwater contamination near NRC-licensed facilities. All available information on those releases shows no threat to the public health and safety. The NRC's actions have included conducting special inspections, assessing the extent and significance of groundwater contamination, revising NRC inspection guidance, and conducting a lessons-learned task force. The NRC staff issued Information Notice (IN) 2006-13, "Ground-Water Contamination Due to Undetected Leakage of Radioactive Water," dated July 10, 2006, describing recent instances of groundwater contamination. The NRC inspection reports regarding these instances are referenced in IN 2006-13. The task force has evaluated cases of unmonitored releases of

liquid effluents at nuclear power reactors and provided recommendations for possible changes in the NRC's regulation and oversight of power reactor facilities to NRC senior management. In addition, the NRC has held several meetings with licensees, industry groups, and other stakeholders regarding this matter and has committed to holding additional meetings or providing additional information.

The Petitioners have requested that the NRC issue a Demand for Information (DFI) requiring the subject licensees to provide specific information about the potential for unmonitored releases of liquid effluents containing radioactive materials and the licensees' ability to detect such releases before the contamination migrates beyond site boundaries. The administrative action of issuing a DFI is described in 10 CFR 2.204 as follows :

(a) The Commission may issue to a licensee or other person subject to the jurisdiction of the Commission a demand for information for the purpose of determining whether an order under § 2.202 should be issued, or whether other action should be taken, which demand will:

(1) Allege the violations with which the licensee or other person is charged, or the potentially hazardous conditions or other facts deemed to be sufficient ground for issuing the demand; and

(2) Provide that the licensee must, or the other person may, file a written answer to the demand for information under oath or affirmation within twenty (20) days of its date, or such other time as may be specified in the demand for information.

In addition, the NRC Enforcement Manual (available on the NRC Web site, (<http://www.nrc.gov/what-we-do/regulatory/enforcement/guidance.html>)) states:

A DFI is a significant action. It should be used only when it is likely that an inadequate response will result in an order or other enforcement action.

On April 5, 2006, the NRC conducted a meeting and teleconference with the Petitioners. The Petitioners further explained and supported their petition by providing additional information to the NRC's Petition Review Board (PRB). The transcript of this teleconference was treated as a supplement to the petition.

In addition to the April 5, 2006, meeting and teleconference with the Petitioners, the NRC staff has held several other public meetings on the topic of groundwater contamination near specific facilities and at NRC headquarters in Rockville, Maryland. Meetings with representatives from the Nuclear Energy Institute (NEI) and the nuclear power industry to discuss the issue and possible industry actions were held on March 22, May 9, June 21, and August 10, 2006. Many of the Petitioners participated in the public question and comment periods during these meetings.

The NRC staff sent a copy of the proposed Director's Decision (DD) to you and to NEI for comment by letters dated June 28, 2006. You provided comments in a letter dated July 20, 2006, and NEI provided comments in a letter dated July 28, 2006. The comments were considered by the NRC staff and are addressed in a publicly available memorandum (ML062410523).

The NRC staff has posted information regarding the meetings and other activities related to groundwater contamination on its Web site at <http://www.nrc.gov/reactors/operating/ops-experience/grndwtr-contam-tritium.html>. All publicly available documents related to this petition, including the transcript of the April 5, 2006, meeting and teleconference (Accession No. ML061230344), are available in the Agencywide Documents Access and Management System (ADAMS) and at the Commission's Public Document Room (PDR), located at One White Flint North, Public File Area O1 F21, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records are accessible

from the ADAMS Public Electronic Reading Room on the NRC Web site

<http://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS, should contact the NRC PDR Reference staff by telephone at 1-800-397-4209, 301-415-4737, or by e-mail to pdr@nrc.gov.

II. Discussion

The petition requests that the NRC issue a DFI seeking information on the potential for and monitoring of liquid radioactive leaks from the following operating and decommissioning reactors: (1) commercial nuclear power reactors and (2) research and test reactors (RTRs). These two groups are addressed separately in this Director's Decision.

1. Commercial Nuclear Power Reactors

With regard to power reactors, the staff agrees with the petitioners that radioactive liquid which leaks into the ground undetected on a plant site, should be identified and addressed by licensees before quantities of radioactive material migrate offsite which could result in NRC radiation dose limits for members of the public being exceeded. Although there have been a number of events where significant quantities of radioactive liquids were released to the ground in an unmonitored, unplanned manner, none of the events resulted in public radiation dose limits being exceeded because of the negligible health effects of the isotopes at the quantities and concentrations released. Given the above information that public radiation dose limits have not been exceeded, the staff concludes that a DFI to obtain information on groundwater contamination is not warranted due to the relatively low safety significance of the issue.

Nonetheless the NRC staff is pursuing this issue via other means. On March 10, 2006, the NRC Executive Director for Operations (EDO) chartered a Lessons Learned Task Force (LLTF) to assess the NRC regulatory framework in this area, and to make recommendations for change. The LLTF conducted a review from March through September 2006 and issued a

report dated September 1, 2006, containing 26 recommendations. The report was made publicly available in ADAMS on October 4, 2006 (ML062650312). NRC senior management has reviewed the LLTF report recommendations and issued a memorandum which tasks agency offices with addressing the recommendations.

During the meetings on May 9, June 21, and August 10, 2006, NEI described an industry initiative to improve management of inadvertent liquid radiological releases that includes the participation by licensees for all commercial nuclear power reactors, both operating and decommissioning. The initiative includes each licensee developing an action plan and completing an NEI questionnaire on potential sources of inadvertent releases of radioactive liquids, monitoring programs in place to detect unplanned releases of radioactive liquids, and past occurrences of inadvertent releases of radioactive liquids. Each licensee has completed responding to the questionnaire and submitted the results to the NRC. The NRC has made these responses available to the public by placing them on its website. Each licensee also has committed to increase reporting of liquid effluent leaks to the NRC and State or local governments, and share operating experience and best practices related to the control of liquid effluents with each other. Most of the future information related to the initiative will be available to the public in documents such as the annual effluents release reports, which are submitted to the NRC.

The NRC staff will continue to ensure the public health and safety through its reviews and inspection oversight of the industry and will continue to interact with NEI and licensees on the development and implementation of the initiative.

The NRC has concluded that a DFI to licensees for operating power reactors and shutdown power reactors undergoing decommissioning is not warranted. The NRC staff finds that the questionnaire responses substantially provide the information requested in the petition. Other forms of generic communication that would require a written response from licensees

may be pursued in the future, but are deemed unnecessary at this time. In accordance with established NRC procedures (NRR Office Instruction LIC-503, "Generic Communications Affecting Nuclear Reactor Licensees"), the NRC staff may describe in a Regulatory Issue Summary the agency's acceptance of the industry initiative as part of the longer term resolution of this issue, although the agency has not yet reached this conclusion.

Because the licensee responses to the NEI questionnaire results in a substantial amount of the information requested by the Petitioners being made available to the public, the NRC considers the portion of the petition related to power reactors to be granted in part. Petitioner's request that a DFI be used to obtain information is denied. The NRC will revisit the need to issue a generic communication or take other action regarding power reactor licensees if the NRC identifies additional concerns as a result of operating experience or as a result of the NRC staff's implementation of the recommendations of the LLTF.

2. Research and Test Reactors

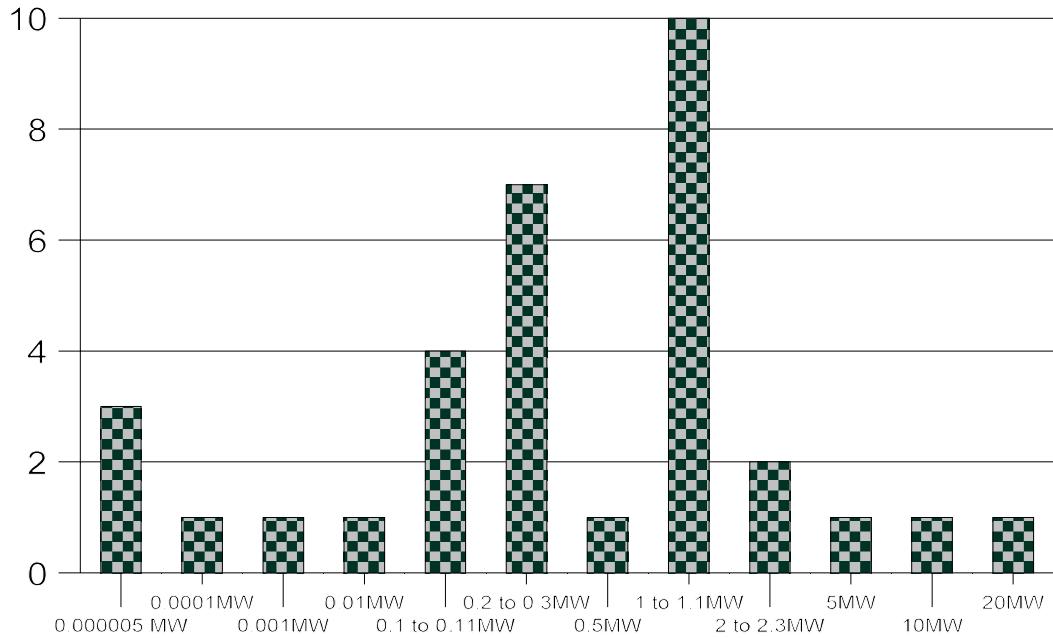
With regard to RTRs, the staff agrees with the petitioners that radioactive liquid which leaks into the ground undetected should be identified and addressed by licensees before quantities of radioactive material migrates offsite which could result in NRC radiation dose limits for members of the public being exceeded. Although there have been events where relatively small quantities of radioactive liquids were inadvertently released to the ground from NRC-licensed RTRs, none of the events resulted in public radiation dose limits being exceeded. Given the information presently available, the staff concludes that a DFI to obtain information on groundwater contamination is not warranted due to the low safety significance of the issue.

RTRs are not addressed by the industry initiative created to assess groundwater contamination at operating and decommissioning commercial nuclear power reactors. Nonetheless, the NRC staff is pursuing this issue via other means. The NRC staff made a presentation on this issue at the annual meeting of the National Organization of Test, Research

and Training Reactors (TRTR) in September 2006. Further, the NRC staff has assessed the licensed RTRs in terms of design, operating characteristics, inventories of radioactive liquids, operating histories, and the potential for unplanned, uncontrolled releases of liquid radioactive effluents.

RTRs differ from commercial power reactors in several ways that significantly reduce the potential for and associated consequences of a release of radioactive liquid effluents. The first difference is the sheer size difference, which can best be exemplified by licensed power levels and affects radioactive inventories, fluid inventories, system size, and associated contamination potential. As shown in Figure 1, operating RTRs regulated by the NRC range in power levels from 5 watts to a maximum of 20 megawatts (MW). In comparison, the reactor core of a typical power reactor has a thermal power level of 3,000 MW or more than a factor of 100 greater than the power level of the highest power-level RTR.

Figure 1: Number of RTRs by Thermal Power Level



In addition, most RTRs are operated as needed to support specific research or educational needs, while power reactors are generally operated continuously between refueling and maintenance outages. Specifically, most RTRs operate for relatively short times at power levels up to the licensed power. Although regulatory requirements are established for both RTRs and power reactors to ensure that a potential leak of radioactively contaminated water into the ground will not exceed public radiation dose limits, the low power levels together with the noncontinuous operation of RTRs result in a much lower inventory and much less potential for release or discharge of radioactive materials for RTRs than is associated with power reactors.

Another factor is that the volume of contaminated water at RTRs is much less than that routinely handled by power reactors. Further, the amount of inventory-makeup water at RTRs to address evaporation and controlled leakage is generally well established, monitored as required, and relatively small. Therefore, RTR licensees are likely to recognize even a small loss of water to the environment. This characteristic introduces a practical defense against the release of liquid effluents that supplements the environmental monitoring requirements in NRC regulations and RTR Technical Specifications. As part of the required programs, licensees assess the possibility of uncontrolled leakage of contaminated liquid and establish preventive measures and protective features. The NRC staff's evaluation of these measures and features at RTRs considers the facility footprint, which is smaller and closer to more highly populated areas than power reactors, but still provides reasonable assurance that potential leaks will not exceed public radiation dose limits.

A key factor is that NRC-licensed RTRs maintain radiological contamination of their liquids to a minimum, generally well below the levels allowed for release to the environment. This is accomplished by maintaining water chemistry within specified limits in these low power, low temperature reactors to minimize fuel leakage, activation, and corrosion. Further,

monitoring of radioactivity levels provides acceptable assurance that actions are taken to correct any problem to keep radioactivity levels low and provides confidence in understanding the magnitude and consequences of a release if it occurs.

To ensure that radiation hazards are identified, each licensee is required to make radiological surveys necessary to comply with the regulations and to evaluate the magnitude and extent of radiation levels and concentrations or quantities of radioactive material. As with power reactors, the requirements and operating practices for RTRs provide assurance that radiological exposures to the public remain well below the established regulatory limits and that conditions related to a release of radioactive material will be identified, evaluated and corrected. These measures significantly reduce the potential for groundwater contamination such as occurred at Brookhaven National Laboratories and eliminate or dramatically reduce the potential for groundwater contamination affecting public health and safety.

Each RTR and power reactor licensee also is required to keep records of information important to the safe and effective decommissioning of the facility. Such information includes records of spills or other unusual occurrences involving the spread of contamination in and around the facility when significant contamination remains after performing the cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas, as in the case of possible seepage into porous materials. These controls and records provide the information necessary for evaluation of the facility to meet the radiological criteria for license termination in 10 CFR Part 20, Subpart E, "Radiological Criteria for License Termination."

Past operating practices and controls on some RTRs undergoing decommissioning have led to the discovery of small amounts of radioactive materials outside the facility site boundaries. An example is the Plum Brook reactor previously operated by the National Aeronautical and Space Administration (NASA). The contamination near Plum Brook, which

occurred when the facility was operating, was discovered as part of the site characterization, decontamination, and planned release of the site. Such activities have been or are being performed at the other RTRs being decommissioned to ensure compliance with the requirements of 10 CFR Part 20, Subpart E. Further, NRC has performed and will continue to perform confirmatory radiological surveys to ensure radiological criteria for license termination are satisfied. Although contamination was found at Plum Brook, it was relatively low and did not impact public health and safety as we would expect for RTRs. For those RTRs being maintained in a safe storage condition (SAFESTOR) prior to active decommissioning (DECON), routine monitoring is sufficient to detect a loss of the very small inventory at these sites.

Based on the previous discussion, the NRC staff finds that NRC-licensed RTRs pose a minimal risk for a significant release of contaminated liquid effluents. We, therefore, conclude that a DFI or other generic action is not warranted to address the control of liquid effluents at operating or decommissioning RTRs and deny the petition as it relates to RTRs. The NRC staff will continue to inspect facilities to ensure they meet the requirements for control of radioactive materials and contamination. The NRC staff made a presentation on this issue at the TRTR annual meeting in September 2006. Further, the NRC staff will continue to evaluate the need for site-specific and generic communications and inspections on RTRs. The NRC staff will incorporate, as needed, such discussions or inspections into its routine site-specific licensing and oversight activities.

III. Conclusion

The NRC staff shares the concerns expressed by the Petitioners. The NRC staff is addressing the concerns related to commercial nuclear power reactors that are operating or undergoing decommissioning through its review and inspection oversight activities and by interacting with NEI and specific licensees in the industry initiative to prevent inadvertent liquid radiological releases, to better control the releases that may occur, and to better inform the

public of the releases. Because the NEI questionnaire provides the Petitioners with a substantial amount of the requested information, the portion of the petition related to power reactors is considered granted in part even though a DFI was not used as the mechanism to obtain the information. The NRC denies the portion of the petition related to RTRs because existing design and regulatory programs ensure that there is minimal risk for a significant release of contaminated liquid effluents and the NRC does not need additional information from the RTR licensees.

As provided in 10 CFR 2.206(c), a copy of this DD will be filed with the Secretary of the Commission for the Commission to review. As provided for by this regulation, the decision will constitute the final action of the Commission 25 days after the date of the decision unless the Commission, on its own motion, institutes a review of the decision within that time.

Dated at Rockville, Maryland, this 2nd day of November 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

J. E. Dyer, Director
Office of Nuclear Reactor Regulation