



UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899

July 12, 2012

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Request changes to NBSR Technical Specifications

Ref: Docket 50-184, TR-5 Facility License

Dear Sir,

The NIST Center for Neutron Research (NCNR) Test Reactor (NBSR) was relicensed in July of 2009. Since that time, the NCNR staff has identified several non-safety significant errors or need for clarification in the license (TR-5) Technical Specifications. These errors are essentially administrative in nature but, while they exist, do present operational issues for the facility. The NCNR requests an expeditious review of the proposed changes.

1.0 Environmental Monitoring Requirements

Two sections (3.7 and 4.7.2) of the TR-5 Technical Specifications disagree on the periodicity of environmental sampling. This discrepancy may have been caused during relicensing when a single broad section of the existing (pre-2009) TR-5 Technical Specifications dealing with environmental surveillances was converted to two separate sections following the recommended format of ANSI/ANS 15.1 (*American National Standard for the Development of Technical Specifications for Research Reactors*).

One section of the 2009 Technical Specifications (3.7) requires that environmental samples of soil, vegetation, air and surface water be performed under an environmental sampling program. The basis for that limiting condition of operation specifies that

“Grass samples are collected during the growing season, April through September, and soil samples during the non-growing season, October through March.”

This statement agrees with the NCNR sampling procedures and is the method used since 1969 under the NBSR environmental monitoring program. Section 4.7.2 (i.e. surveillance requirements for effluents) specifies that “Water, soil and vegetation samples shall be collected quarterly.” When sections 3.7 and 4.7.2 are read together and in the context of the four decades of a consistent sampling program it can be inferred that vegetation samples (grass) should only be collected when they are growing (i.e. April through September) and soil collected during the

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remainder of the year. Following Section 4.7.2 as currently written without referencing Section 3.7 would require quarterly soil and vegetation samples to be collected no matter the time of the year. Collecting dead grass to determine radionuclide uptake would make no sense and provide no useful data. Taking more frequent samples (every quarter) of soil would provide data but could not be compared to the previous forty years of non-growing season data without consideration of confounding environmental or weather variables that could make the data questionable. Years of environmental sampling data for the NBSR has shown that the facility has little to no impact to the environment and the existing sample frequency and method is adequate.

The NCNR requests the following changes to Section 3.7.1, 3.7.2, and 4.7.2:

1.1 Existing Technical Specifications (Proposed modifications are designated in italics)

3.7.1 Monitoring Systems and Effluent Limits

Applicability: Radiation monitoring systems

Objective: To detect abnormal levels or locations of radioactivity.

Specifications

The reactor shall not be operated unless:

- (1) Two of three gaseous effluent monitors are operable for normal air, irradiated air, and stack air.
- (2) One fission product monitor is operable or sample analysis for fission product activity is conducted daily.
- (3) One secondary coolant activity monitor is operable or a D₂O storage tank level monitor is operable.
- (4) Two area radiation monitors are operable on floors C-100 and C-200.
- (5) The primary tritium concentration is less than or equal to 5 Ci/l.
- (6) *An environmental monitoring program shall be carried out and shall include as a minimum the analysis of samples from surface waters from the surrounding areas, vegetation or soil and air sampling. [Remove (6) from the section and move to Section 3.7.2]*

When required monitors are inoperable, then portable instruments, survey or analysis may be substituted for any of the normally installed monitors in specifications (1) – (4) for periods of one (1) week or for the duration of a reactor run.

Basis

(6) *Area vegetation and soil samples are collected for analysis. Grass samples are collected during the growing season, April through September, and soil samples during the non-growing season, October through March. Thermoluminescent dosimeters or other devices also are placed around the perimeter of the NBSR site to monitor direct radiation. The continuation of this environmental monitoring program will verify that the operation of the NBSR presents no significant risk to the public health and safety. Since 1969, when the NBSR began routine power operation, the environmental monitoring program has revealed nothing of significance, thereby confirming that operation of the NBSR has had little or no effect on the environment.*

A report published in March 2003 supports the findings of previous studies conducted on the hydrology and geology of the NIST site and vicinity. No significant changes in the hydro-geologic systems or ground water use were identified. This report further verifies the assumptions and techniques developed in 1964. [Remove from this section and move to 3.7.2]

1.2 Changed Technical Specification (Proposed modifications are designated in italics)

3.7.2 Effluents

Applicability: Annual releases

Objective: To minimize exposures to the public.

Specification

The reactor shall not be operated unless:

- (1) The total exposure from effluents from the reactor facility to a person at the site boundary shall not exceed 100 mrem per calendar year, less any external dose from the facility. The limit shall be established at the point of release or measurement using accepted diffusion factors to the boundary. For halogens and particulates with half-lives longer than 8 days, a reconcentration factor shall be included where appropriate.
- (2) [Added from 3.7.1] *An environmental monitoring program shall be carried out and shall include as a minimum the analysis of samples from surface waters from the surrounding areas, vegetation or soil and air sampling.*

Basis

The criteria for determination of concentration limits specified above ensure that 10 CFR 20 (2007) limits are not exceeded at the site boundary. The allowance for dilution from the reactor building stack to the nearest site boundary is 1,000. This value of 1,000 from the diffusion view point is the minimum expected at the nearest site boundary under the least favorable

meteorological conditions. This number could be increased by one or two orders of magnitude if normal variations in wind speed and direction were considered. Because these variations are not considered, a one or two order of magnitude margin is inherent in this limit.

In specifying the limits on particulates and long lived (longer than 8 days) halogens, consideration was given to the possibility of biological reconcentration in food crops or dairy products. Using available information (Soldat, J.D., Health Physics 9, p. 1170, 1963), a conservative (both the COMPLY and CAP88 codes indicate that 700 is at least an order of magnitude higher than needed) reconcentration factor of 700 is applied. Thus, the limits for those isotopes are the Effluent Concentration Limits as specified in Appendix B, Table II of 10 CFR 20 (2007) multiplied by the 1,000 dilution factor divided by the 700 reconcentration factor; that is, 1.4 times the Effluent Concentration Limit.

For the purpose of converting concentrations to dose, the values of 10 CFR 20, Appendix B, Table 2 (2007), represent an annual dose of 50 mrem, except for submersion gases where they represent an annual dose of 100 mrem. It should be taken into consideration that the values for submersion gases are based on an infinite hemisphere geometry which is rarely achievable and therefore tends to overestimate the dose.

[Added from basis of 3.7.1]Area vegetation and soil samples are collected for analysis. Grass samples are collected during the growing season, April through September, and soil samples during the non-growing season, October through March. Thermoluminescent dosimeters or other devices also are placed around the perimeter of the NBSR site to monitor direct radiation. The continuation of this environmental monitoring program will verify that the operation of the NBSR presents no significant risk to the public health and safety. Since 1969, when the NBSR began routine power operation, the environmental monitoring program has revealed nothing of significance, thereby confirming that operation of the NBSR has had little or no effect on the environment.

A report published in March 2003 supports the findings of previous studies conducted on the hydrology and geology of the NIST site and vicinity. No significant changes in the hydro-geologic systems or ground water use were identified. This report further verifies the assumptions and techniques developed in 1964.

4.7.2 Effluents

Applicability: Environmental monitoring sampling program

Objective: To minimize radiation exposures outside of the confinement building.

Specifications

(1) Water, and soil or vegetation samples shall be collected quarterly with the exception that grass samples are collected during the growing season, April through September, and soil samples during the non-growing season, October through March.

(2) Thermoluminescent dosimeters shall be collected quarterly.

(3) Air sampling shall be done quarterly.

Basis

- (1) *Collecting and analyzing the water, and soil or vegetation samples on a quarterly basis will provide information that environmental limits are not being exceeded.*
- (2) Collecting and analyzing the thermoluminescent dosimeters on a quarterly basis will provide information that radiation limits are not being exceeded.
- (3) Sampling the air on a quarterly basis will provide information that release limits are not being exceeded.

2.0 Records Retention

For records specifically required for lifetime retention, ANSI/ANS 15.1 recommends applicable annual reports, if they contain all of the required information, may be used as lifetime records. Essentially, this allows annual summaries of total radioactive material released to the environment or total personnel radiation exposure to replace the raw data used to produce those summaries. The approved wording from ANSI/ANS 15.1, Section 6.8 was inadvertently modified during the preparation of the new TR-5 Technical Specifications. The NCNR requests Section 6.8 of the TR-5 Technical Specification be modified as shown below to follow ANSI/ANS 15.1.

2.1 Current TR-5 Technical Specification for Records (Proposed modifications are designated in italics)

6.8 Records

6.8.1 Records to be Retained for a Period of at Least Five Years or for the Life of the Component Involved if Less than Five Years

Records of this section may be in the form of logs, data sheets, or other retrievable forms. The required information may be contained in single or multiple records, or a combination thereof. Annual reports as described in the specifications of Section 6.7.1, to the extent the reports contain all of the required information, may be used as a record of the following:

- (1) Normal reactor operation logs, not including supporting documents such as checklists and log sheets. (Supporting documents shall be retained for a period of at least one year.)

- (2) Principal maintenance activities.
- (3) Special Reports.
- (4) Surveillance activities required by these Technical Specifications.
- (5) Solid radioactive waste shipped off-site.
- (6) Fuel inventories and transfers.
- (7) Reactor facility radiation and contamination surveys where required by applicable regulations.

6.8.2 Records to be Retained for at Least One Operator Licensing Cycle

Records of retraining and requalification of licensed operations personnel shall be maintained for the period the individual is employed or until the license is renewed.

6.8.3 Records to be Retained for the Life of the Reactor Facility

- (1) Gaseous and liquid radioactive effluents released to the environs.
- (2) Off-site environmental monitoring surveys required by these Technical Specifications.
- (3) Radiation exposure for all personnel monitored.
- (4) Drawings of the reactor facility.

**2.2 Proposed TR-5 Technical Specification for Records
(Proposed modifications are designated in italics)**

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- (3) Radiation exposure for all personnel monitored.
- (4) Drawings of the reactor facility.

The NCNR requests the NRC staff review and approve the proposed changes in a timely manner because the existing Technical Specifications are in conflict with the current and historic interpretation of the NCNR environmental monitoring methodology. If you require additional information, please contact Sean O'Kelly, NCNR Deputy Director at 301-975-6260.

Respectfully,



Robert Dimeo, Director
NIST Center for Neutron Research

I declare under penalty of perjury that the foregoing is true and correct.



Executed on July 12, 2012

cc: Xiaosong Yin, NRR/DPR/PRLB (12D20)
Craig Bassett, NRR/DPR/PROB (RGN II)
NCNR Docket File