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

March 23, 2011

Richard D. Thompson
Project Manager
Fuel Manufacturing Branch
Fuel Facility Licensing Directorate
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Agency
Washington, D.C. 20555

Dear Mr. Thompson,

As discussed in your telephone conversation with NIST Radiation Safety Officer Thomas O'Brien on February 17, 2011, NIST requests a revision of its renewal submission for NRC License number SNM-362. The revision requests changes to part (4) and the deletion of part (5) under the Ionizing Radiation Safety Committee (IRSC) section of Item 7 (Individuals Responsible for the Radiation Safety Program).The purpose of the change is to allow the IRSC the flexibility to arrange for a program review conducted by an entity external to NIST or by individuals within the NIST organization.

Enclosure #1 details the requested revisions. Enclosure #2 consists of the complete license renewal submission reflecting the requested changes.

Please direct any questions that you may have to Mr. O'Brien at 301-975-5801. Also, Mr. O'Brien provided with you with an electronic copy of this letter and the enclosures on March 23.

Sincerely,

Richard F. Kayser
Chief Safety Officer

Enclosures

cc: Mr. Thomas O'Brien

NIST

ENCLOSURE #1

Current Version in Item 7 of the License Renewal Application

IONIZING RADIATION SAFETY COMMITTEE (IRSC)

The Ionizing Radiation Safety Committee (IRSC) provides oversight of the operations and activities of NIST's radiation safety programs except for those operations and activities conducted under the NRC Test Reactor License (TR-5).

The IRSC provides the RSO with independent advice and oversight for the ionizing radiation safety program at NIST Gaithersburg.

Ionizing Radiation Safety Committee Duties

(1) Approving or rejecting requests for the acquisition and use, or changes in use, of radioactive material, including Source Users, Source Custodian, and use and storage locations (i.e., Radiation Facilities) , when such requests are transmitted by the RSO or designee or that they involve amending NRC license SNM-362.

(2) License Flexibility. Approve or reject proposed program changes and revisions to procedures previously approved by the NRC, without amendment of the license, in the areas listed below. Any such changes or revisions shall be documented and shall state the reason for the change and summarize the radiation safety matters that were considered prior to approval of the change.

a) Training Program for Individuals Working in or Frequenting Restricted Areas (NUREG-1556, Volume 11, Section 8.8)

b) Audit Mechanisms (NUREG-1556, Volume. 11, Section 8.10.1)

c) Radiation Monitoring Instruments Specifications and Procedures for Calibration (NUREG-1556, Volume. 11, Section 8.10.2)

d) Material Receipt and Accountability Administrative Procedures (NUREG-1556, Volume. 11, Section 8.10.3)

e) Occupational Dose Program (NUREG-1556, Volume. 11, Section 8.10.4)

f) Safe Use of Radionuclides and Emergency Procedures (NUREG-1556, Volume. 11, Section 8.10.6)

g) Survey Program (NUREG-1556, Volume. 11, Section 8.10.7)

h) Position titles and roles and responsibilities of individuals in Executive Management

(3) Review the circumstances of all reportable occurrences.

(4) Annually assess the performance quality of operations in one or more areas, such as the following, to provide assurance that the ionizing radiation safety program is functioning properly:

a) facility operation procedures;
b) training, qualification, and re-qualification of individuals using ionizing radiation;
c) actions taken to correct deficiencies in equipment, systems, structures, or methods of operation that affect radiation safety; and
d) emergency plans and implementation of related procedures.

(5) Arrange for an independent external auditor or auditors to audit the NIST-Gaithersburg Radiation Safety program annually for compliance and to evaluate the effectiveness of the program. The IRSC shall track and review the responses and actions taken.

Proposed Revision to Item 7 of the License Renewal Application

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h) Position titles and roles and responsibilities of individuals in Executive Management

(3) Review the circumstances of all reportable occurrences.

(4) Review the NIST-Gaithersburg Radiation Safety program content and implementation annually to evaluate the effectiveness of the program. The review may be performed by individuals internal or external to NIST, as designated by the IRSC. The results of the review shall be reported in writing to the IRSC Chair and the Gaithersburg RSO.

ENCLOSURE #2

ITEM 1: LICENSE ACTION TYPE
THIS IS AN APPLICATION FOR:

[ ] A. New License Not Applicable
[ ] B. Amendment to License No. XX-XXXXX-XX
[X] C. Renewal of License No. SNM-362

ITEM 2: APPLICANT'S NAME AND MAILING ADDRESS

The federal agency is the U.S. Department of Commerce (DOC), National Institute of Standards and Technology. The mailing address is:

National Institute of Standards and Technology
Attn: Radiation Safety Officer
100 Bureau Drive, Stop 1731
Room C125, Building 245
Gaithersburg, MD 20899-1731

ITEM 3: ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20899

NIST Gaithersburg Campus

Any location on the NIST Gaithersburg campus may be approved by Health Physics for the use, possession, and/or storage of radioactive material Such approval shall be based on the hazard assessment described in Item 9 of this application. Buildings 235 and 245 are the primary buildings where radioactive materials are used, possessed, stored, and/or consolidated for radioactive waste shipments.

Building 235 houses Radiation Facilities (primarily radioactive material laboratories) and the NIST Center for Neutron Research, a research reactor facility operated under the TR-5 license issued by the NRC. Building 245 houses Radiation Facilities as described in Item 9.

Off-Site Locations

For the purposes of training and of testing materials, instruments, and devices in field conditions, authorizations of limited scope and duration may be granted for the use of sealed sources at off-site locations subject to the following provisions:

- The proposal shall be reviewed and approved by Health Physics;

- NIST shall be responsible for the safe use of the radioactive material, which shall be controlled by an authorized and trained individual(s) who shall possess written operating instructions while engaged in the project;

- Written operating instructions shall include a hazard assessment, hazard mitigation plan, source security and control instructions, and incident response plan;

- Source or containment integrity shall be verified by appropriate testing for contamination prior to utilization;

- Use of devices shall conform to the manufacturer's recommendations, operating procedures, and the associated device specific license requirements. Such devices may include but are not limited to lead-in-paint detectors, density gauges, moisture gauges, explosives detectors, or similar devices;

- For sources not incorporated into a manufactured device, the total quantity of radioactive material for a single authorized use shall not exceed 100 times the activity listed in 10 CFR 20, Appendix C, or, for those radionuclides not listed in Appendix C, may not exceed 100 microcuries of activity;

- During use of the radioactive material, the area shall be controlled by the authorized and trained individual(s) to ensure the dose to members of the public shall not exceed 2 millirem in one hour or 100 millirem in one year; and

- Transportation of the radioactive material to and from the use location shall be conducted in accordance with all applicable U.S. Department of Transportation (DOT) requirements.

ITEM 4: PERSON TO BE CONTACTED ABOUT THIS APPLICATION

All inquiries regarding this application should be directed to the NIST Gaithersburg Radiation Safety Officer (RSO):

National Institute of Standards and Technology
Attn: Tom O'Brien, M.S., CHP.
Radiation Safety Officer
100 Bureau Drive, Stop 1731
Bldg. 245, Rm. C125
Gaithersburg, MD 20899-1731
(301) 975-5800

ITEM 5: RADIOACTIVE MATERIAL

NIST RADIOACTIVE MATERIAL LICENSE LIMITS

NUCLIDE	CHEM/PHYS FORM	POSSESSION LIMIT
A. Uranium enriched to less than 20 wt % in the U-235 isotope	Any form	30 grams of U-235
B. Uranium enriched to or greater than 20 wt % in the U-235 isotope	Any form	230 grams of U-235
C. Uranium-233	Any form	6 grams of U -233
D. Natural uranium	Any insoluble form Any soluble form	150 kilograms 9 kilograms
E. Uranium Depleted in U-235 (Primarily U-238)	Any insoluble form Any soluble form	42 kilograms 4 kilograms
F. Any separated Uranium isotope other than U-233, U-235, or U-238	Any form	1 Ci
G. Any Isotope of Plutonium, except Pu-238	Any form	20 grams or 1 Ci, each isotope whichever is more restrictive
H. Plutonium	Sealed sources (e.g., PuBe sources)	450 grams of plutonium
I. Plutonium enriched to more than 80% in the Pu-238 isotope	Any form	0.1 gram
J. Th–228	Any form	10 mCi
K. Th-229	Any form	5 mCi

L. Th-230	Any form	150 mCi
M. Th-232 (Natural Thorium)	Any form	7.5 mCi (69 kilograms)
N. Any Thorium other than Th-228, Th-229, Th-230, or Th-232	Any form	1 Ci
O. Radium	Any form	2 Ci
P. Radium	Sealed sources (includes RaBe sources)	8 Ci
Q. Co-60	Sealed sources (e.g., irradiators)	58,000 Ci
R. Cs-137	Sealed sources (e.g., irradiators)	9,000 Ci
S. Po-210	Sealed sources	20 Ci
T. Am-241	Sealed sources (e.g., AmBe)	40 Ci
U. Cf-252	Sealed sources	10 Ci
V. Sr-90	Sealed sources	5 Ci
W. Pm-147	Sealed Sources	3 Ci
X. I-125	Sources sealed in titanium or stainless steel	15 Ci
Y. Byproduct material Any nuclide of half-life less than 30 days Any nuclide of half-life more than 30 days except for the following nuclides: H-3 Au-198 Kr-85	Any form	4,000 Ci total 4 Ci 1 Ci, except for the following nuclides: 2,000 Ci 300 Ci 35 Ci

Cs-137, Mo-99, Tc-99m, and Xe-133 C-14 and Co-60 Ac-227 Am-241, 242m, and 243 Bk-247 Cf-249, 250, 251, 252, and 254 Cm-242, 243, 244, 245, 246, 247, 248, and 250 Np-236 and Np-237 Sm-146 and Sm-147		20 Ci each 5 Ci each 25 mCi 25 mCi each 25 mCi 25 mCi each 25 mCi each 25 mCi each 25 mCi each
Z. Any byproduct material with Atomic Number 3 to 83 except for the following nuclides: Ag-108m Eu-152 and Eu-154 Nb-94 Tb-158 Be-10 P-32 Os-194 Cd-113m Cl-36 I-130 Ho-166 Hf-178m and Hf-182 Bi-210m I-125 Sm-146	Any form- Neutron activated materials (e.g., research sample or sample container)	1,100 Ci total except for the following nuclides: 800 Ci 800 Ci each 800 Ci 800 Ci 500 Ci 400 Ci 350 Ci 200 Ci 200 Ci 200 Ci 10 Ci 100 Ci each 30 Ci 20 Ci 3 Ci
AA. Irradiated Fuel U-235	Pellets	0.25 grams

FINANCIAL ASSURANCE AND RECORDKEEPING FOR DECOMMISSIONING

As a federal facility, the National Institute of Standards and Technology will generate and implement a decommissioning plan at the time that operations are to be terminated and in accordance with Federal rules and regulations in effect at that time. Health Physics maintains the records of all approved source utilization, posted facilities, and surveillance activities. These records will form the basis for the decommissioning activities.

ITEM 6: PURPOSES FOR WHICH LICENSED MATERIAL WILL BE USED

NIST's primary mission is as a measurement science, standards, and technology laboratory. This license authorizes use of radiation sources for research and development, calibration and testing, and training activities. Authorized uses are primarily activities associated with the development and maintenance of radiation measurement standards, radioactivity assessment, the provision of radiation measurement services, and the study of radiation interactions and processes in materials.

There shall be no authorizations for intentional administration of radiopharmaceuticals or intentional direct exposures of human or live animal subjects, (i.e., no medical 10 CFR 35) or veterinary use. This condition does not in any way modify or limit the ability of NIST staff to consensually monitor and track any individuals who have received uptakes or medical administrations under other licenses.

ITEM 7: INDIVIDUALS RESPONSIBLE FOR THE RADIATION SAFETY PROGRAM

EXECUTIVE MANAGEMENT

The NIST Director has the ultimate responsibility for establishing and maintaining the ionizing radiation safety program at NIST and provides executive leadership on issues involving compliance with regulatory requirements and the conditions of the license.

The NIST Director is responsible for:

(1) Establishing and maintaining an effective ionizing radiation safety program;

(2) Appointing members of the IRSC, subject to NRC license requirements;

(3) Providing direction to the Chief Safety Officer (CSO) and Ionizing Radiation Safety Committee (IRSC), as necessary;

(4) Providing executive leadership on issues involving the status of the Gaithersburg site with regard to worker safety, regulatory compliance, and environmental impacts; and

(5) Reviewing IRSC recommendations and directing action on those recommendations as necessary to ensure radiation safety and regulatory compliance.

The NIST Chief Safety Officer is responsible for:

(1) Overseeing the establishment, implementation, and maintenance of ionizing radiation safety program at NIST supporting the SNM-362 NRC license; and

(2) Submitting applications for renewals of and amendments to NRC License Number SNM-362 pursuant to IRSC review and approval.

IONIZING RADIATION SAFETY COMMITTEE (IRSC)

The Ionizing Radiation Safety Committee (IRSC) provides oversight of the operations and activities of NIST's radiation safety programs except for those operations and activities conducted under the NRC Test Reactor License (TR-5).

The IRSC provides the RSO with independent advice and oversight for the ionizing radiation safety program at NIST Gaithersburg.

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(2) License Flexibility. Approve or reject proposed program changes and revisions to procedures previously approved by the NRC, without amendment of the license, in the areas listed below. Any such changes or revisions shall be documented and shall state the reason for the change and summarize the radiation safety matters that were considered prior to approval of the change.

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g) Survey Program (NUREG-1556, Volume. 11, Section 8.10.7)

h) Position titles and roles and responsibilities of individuals in Executive Management

(3) Review the circumstances of all reportable occurrences.

(4) Review the NIST-Gaithersburg Radiation Safety program content and implementation annually to evaluate the effectiveness of the program. The review may be performed by individuals internal or external to NIST, as designated by the IRSC. The results of the review shall be reported in writing to the IRSC Chair and the Gaithersburg RSO.

IRSC Membership, Organization, and Support:

(1) Membership: The Director of NIST shall appoint all members and their designated alternates to the committee for an indefinite term to be served at the Director's discretion. Members and alternates shall be selected on their ability to provide independent judgment and to ensure that the IRSC as a whole has a broad spectrum of expertise in the use of ionizing radiation sources.

The IRSC shall comprise a minimum of five (5) appointed members or their designated alternates. The following five (5) positions shall be voting *ex officio* members: Chief Safety Officer; Director, NIST Center for Neutron Research; Chief, Ionizing Radiation Division, Physics Laboratory; RSO, NIST Gaithersburg; and RSO, NIST Boulder. The Director of NIST may appoint additional members and alternates at the recommendation of the IRSC Chair, with selection based on subject matter expertise and the need for broad representation of the kinds of ionizing radiation research performed at NIST.

Members with full voting rights must be full-time Federal employees. Members of the IRSC shall have, at a minimum, a Bachelor of Science degree or equivalent professional training in their respective fields of expertise, and at least two years of relevant experience.

The committee may invite NIST employees and associates to participate in committee discussions and subcommittee work, but only as non-voting members and only if the associates provide individual views and not consensus advice. The Chair may also invite additional "non-voting" representatives of various stakeholders to participate in committee discussions.

(2) Organization: The Director of NIST shall appoint the IRSC Chair and Vice Chair for indefinite terms at his/her discretion. Members of the Health Physics Group staff shall not serve as Chair.

(3) Support: The IRSC Chair shall appoint a Recorder from the IRSC membership, or an administrative support person under the discretion and oversight of a member of the Committee. The Recorder shall be responsible to the IRSC Chair for basic administrative support of the IRSC, including notification of meetings, taking and distributing meeting minutes, correspondence, filing, and copying.

(4) Quorum Requirements: A quorum shall consist of the Chair and Vice Chair, the Gaithersburg RSO, and one-half of the remaining assigned members of the committee or their authorized alternates. In the case of the absence of a member and the member's alternate, the member may elect to authorize another member of the committee to vote for them in proxy, thereby satisfying the quorum requirements.

RADIATION SAFETY OFFICER (RSO)

The NIST Gaithersburg RSO, at a minimum, must be certified in Health Physics by the American Board of Health Physics or must have a Bachelor's degree in a science or engineering field and have at least five years of professional-level experience in applied Health Physics.

The RSO shall, in coordination with executive management and the IRSC, serve as the SNM-362 license manager and as the point of contact with the NRC. The RSO is responsible for managing the radiation safety program and all aspects of the utilization of ionizing radiation sources.

The RSO, or designee, has the authority, as delegated by the NIST Director, necessary to meet his responsibilities and to immediately stop any operations that may (1) compromise the health or safety of NIST employees and non-NIST personnel; (2) have an adverse impact on the environment or public; or (3) result in non-compliance with NRC, State, or local requirements.

The RSO responsibilities include:

(1) Establishing and maintaining an effective radiation safety program that allows for the safe and regulatorily compliant use of ionizing radiation sources in a manner that conforms to applicable Federal, State, and local regulations and NIST policy;

(2) Establishing and maintaining a system for hazard analysis, mitigation planning, and emergency response planning integrated into ionizing radiation source use protocols and Radiation Facility authorizations;

(3) Performing, or designating a member of the Health Physics Group to perform, hazard assessments on requests for the acquisition and use of radioactive material.

(4) Performing, or designating a member of the Health Physics Group to perform, hazard assessments on requests for the acquisition and use, or for changes in use, of radioactive material; transmitting requests that present a significant level of risk, e.g., a potential for adverse safety and health or regulatory compliance issues;

(5) Providing advice and assistance on radiological safety matters to individuals whose assigned duties involve the use of or exposure to ionizing radiation sources and working closely with the IRSC and NIST executive management in implementing the radiation safety program;

(6) Identifying radiation safety issues and initiating, recommending, providing, and verifying implementation of corrective actions;

(7) Assisting the IRSC in the performance of its duties, including providing timely information to the IRSC on issues and incidents with potentially significant adverse impact on radiation safety or regulatory compliance;

(8) Documenting and reporting metrics indicating the status of the radiation safety program to the IRSC, NIST management, and regulators as required;

(9) Establishing and updating guidance, procedures, instructions, and other requirements to promote radiation safety and regulatory compliance;

(10) Maintaining records of source acquisition, utilization, transfers, and disposal and;

(11) Maintaining written records documenting IRSC activities.

ITEM 8: TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

All individuals who are likely to receive more than 100 millirem of occupational exposures in one year (considering normal and off-normal conditions) shall receive training in accordance with 10 CFR 19 requirements and commensurate with their duties, responsibilities, and access to sources of ionizing radiation prior to receiving approval to work independently with radioactive materials or other sources of ionizing radiation.
Such individuals shall receive training in topics such as those listed below. The extent of these instructions shall be commensurate with the potential radiological health protection issues associated with the specific workplaces and personnel duties involved.

- Types of ionizing radiation sources and emissions;
- Biological risks associated with exposure to radioactive materials or sources of ionizing radiation;
- ALARA principles;
- ALARA tools and practices to minimize exposure, including time, distance, shielding, and contamination control;
- Purposes, functions, and use of protective devices, including engineered facilities and equipment (e.g., ventilation controls, shielding, interlocks, area radiation monitors, personnel contamination monitors), and personal protective equipment;
- Basic radiation and contamination monitoring equipment and practices;
- Procedures and requirements for control, security, storage, transfer, and use of radioactive materials at their workplaces;
- Agency and other rules and regulations and conditions of licenses, and responsibilities for observing and complying with these to the extent under the worker's control;
- Duties and responsibilities of management (e.g., Group Leaders and Division Chiefs), Source Custodians, Source Users, and Health Physics staff;
- Requirements for reporting to supervisors and the RSO any condition that may lead to or cause a violation of the rules, regulations, or conditions of licenses or an unnecessary exposure to radiation or radioactive materials;
- Reporting rights and responsibilities per 10 CFR 19 – NRC Form 3: Notice to Employees;
- Appropriate responses to warnings given in the event of any unusual occurrence or malfunction that may result in or involve excessive radiation or radioactive material exposure;
- Fire and other non-radiological safety and emergency response procedures, including emergency reporting, egress, and personnel accountability; and

- Principles and practices of personnel dosimetry, including the availability of radiation exposure reports.

Health Physics review of an individual's prior work experience and training in radiological safety may show that previous training or experience can be substituted for parts of the fundamental physics aspects of the training described above.

Evaluation of an individual's understanding shall be by methods such as direct testing of knowledge, performance observations, personal interviews, prior work experience, and dosimetry reviews. Health Physics shall maintain documentation of the training program records. All individuals requiring training shall receive refresher training biennially.

All individuals approved to work with the irradiators (those sources meeting 10 CFR 36 criteria) shall receive facility specific training annually.

All individuals approved to prepare packaging, labeling, and manifests of sources for shipment regulated by DOT shall receive appropriate biennial training.

ITEM 9: FACILITIES AND EQUIPMENT

Building 245 houses the majority of the Radiation Facilities at NIST which include an in-pool irradiator, panoramic beam and self contained irradiators, facilities containing primary beta/gamma standard sources for instrument and secondary source cross calibrations, californium and other neutron source and instrument calibration facilities, radiochemistry laboratories for standard source production, charged particle accelerators, and x-ray device facilities. Building 245 also houses two 10 CFR 36 vertical beam irradiators. Other buildings (e.g., Buildings 215, 217, and 227) contain Radiation Facilities (e.g., radioactive materials laboratories).

Health Physics review and approval for use of radioactive material in a Radiation Facility shall be based on a hazard assessment of the radionuclides, activities, physical forms, chemical and physical processes involved, and the hazard control and monitoring systems available in the Radiation Facility to ensure safety and security.

Hazard Assessment

Prior to the use of radioactive materials, a Hazard Assessment shall be performed. The Hazard Assessment shall consider issues such as:

- Doses and dose rates to individuals in posted areas of a Radiation Facility;
- Doses and dose rates to members of the public;

- Doses and dose rates in un-posted areas (hallways, adjacent areas, or areas outside of buildings);
- Contamination or dispersion of the material outside of a Radiation Facility;
- Contamination or dispersion of the material within a Radiation Facility;
- Personnel contamination or uptake; and
- Effluent release (airborne or liquid) of the material.

Hazard Control and Monitoring

The Hazard Controls shall consider issues such as:

- Shielding – both local and structural;
- Source utilization - limitations on source activity, physical manipulations, chemical processes, containment, spill control, and storage conditions;
- Ventilation controls - room ventilation, local ventilation, hoods, filtration;
- Radiological monitoring systems - installed and portable;
- Contamination control practices and monitoring systems;
- Posting and labeling requirements;
- Installed control systems - source shutters and interlocks;
- Incident or emergency control and mitigation systems - communications, fire detectors and other alarms, spill containment, and sinks and wash down systems; and
- Physical security monitoring and access control.

The Hazard Assessment may be based on experience from previous similar operations and the methodologies of facility classifications, radionuclide toxicity classification, and the modifying factors such as those discussed in the International Atomic Energy Agency (IAEA) Safety Series No 38, *Applying Radiation Standards in Radiotherapy*, Vienna, 2006 and the *Handbook of Health Physics and Radiological Health*, Third Edition, Williams & Wilkins, Baltimore, 1999, Chapter 11.

Hazard Assessments of Radiation Facilities shall be performed at the time of initial requests for use of the facility, during general use protocol reviews, and may be supplemented by additional reviews at the time of acquisition of sources. Radiation Facility conditions shall be reviewed by Health Physics staff during regular internal audit and surveillance activities.

Sealed Source Radiation Facilities

Sealed Source Radiation Facilities include two 10 CFR 36 vertical beam irradiators. NIST also utilizes beam calibration ranges, a pool type irradiator, and self-contained irradiators, all of which are not subject to 10 CFR 36.

NIST utilizes "low scatter" neutron instrument calibration Radiation Facilities using Cf-252, AmBe, PuBe, or RaBe sealed sources or neutron generators. NIST also utilizes neutron source calibration Radiation Facilities (manganese sulfate baths) and an ion chamber calibration range. A variety of other specialized Radiation Facilities, including those for the calibration of brachytherapy seeds, and gamma, x-ray, beta, and alpha spectroscopy are also utilized.

Unsealed Source Radiation Facilities

Laboratories approved for use of unsealed radioactive materials having activities above those listed in 10 CFR 20 Appendix C criteria shall, at a minimum, meet the requirements of a Type I laboratory (See *Handbook of Health Physics and Radiological Health*, Third Edition, 1999, Chapter 11). Most laboratories authorized for unsealed source work qualify as Type II laboratories.

Most radiochemistry laboratories are equipped with chemical fume hoods or other forms of local exhaust ventilation. The hoods may be configured with HEPA filters as required when source term analysis or measurement indicates the need for filtration to ensure effluent control. Hoods approved to be used for radioiodine standards preparation may be configured with activated charcoal filters for the duration of the batch operations when source term analysis or measurement indicates the need for filtration to ensure effluent control. Certain specialty hoods designed for significant use of acids are provided with scrubber wash down systems. Hoods required to be used for control of radiological operations shall be monitored quarterly for flow velocity. Any hood failing to meet the required average minimum face velocity of 80 linear feet per minute shall be taken out of service and operations suspended until appropriate corrective action is taken.

Any laboratory operations determined to have significant potential for exceeding 10% of the 10 CFR 20, Appendix B, Table 2, release limitations shall be monitored on an as needed basis.

NIST building 245 is equipped with holding tanks that collect liquids from specific sinks and floor drains in some radiochemistry laboratories. Liquid from these tanks shall be sampled and analyzed to ensure compliance with effluent release limitations in 10 CFR 20, Appendix B, Table 3, prior to any release to the sanitary sewer.

Personnel contamination monitors (e.g., hand and foot monitors) are placed in the near vicinity of some unsealed source Radiation Facilities. Survey instruments are available at key locations for use in unsealed source Radiation Facilities. Personnel contamination monitoring shall be required following work with unsealed sources.

ITEM 10: RADIATION SAFETY PROGRAM

For activities conducted under this license, the following time interval definitions apply:

- Biennially: at least once every two years with an interval not to exceed two and one-half years.
- Annually: at least once each year with an interval not to exceed 15 months.
- Semi annually: at least 2 times per year with an interval not to exceed seven and one-half months.
- Quarterly: at least 4 times per year with an interval not to exceed four months.
- Monthly: at least 11 times per year with an interval not to exceed six weeks.
- Weekly: at least 51 times per year with an interval not to exceed fourteen days.
- Daily: One time during each working day (does not include holidays or weekends or other times when the facility is closed.

10.1: AUDIT PROGRAM

Radiation Safety Program Audit

The Ionizing Radiation Safety Committee shall ensure that representatives, other than Health Physics staff, audit the radiation safety program annually, reviewing performance, quality of operations, and targeted aspects of protocols and procedures. The audit results shall be reported to the IRSC. The IRSC shall report any findings to appropriate NIST management.

Radiation Safety Program Report

Health Physics shall review and document program actions, surveillance monitoring, dosimetry trends, and other program metrics for each calendar year as the data required by the report become available. This report shall be submitted to the IRSC.

Radiation Facilities Quarterly Audit

Health Physics shall conduct quarterly audits of those Radiation Facilities approved and posted for use or storage of licensed radiation sources that have significant potential for radiation exposures or effluent releases in excess of 10% of the applicable limits. Audits shall include an assessment of radiological conditions and a review of security, posting, and labeling. Where feasible, such audits include observation and discussion of work practices with Source Custodians and/or Source Users. Results of these audits shall be documented and any identified needs for corrective action found during the audits shall be transmitted to Source Custodians or other appropriate individuals.

Radiation Facilities Annual Audit

Health Physics shall conduct annual audits of those Radiation Facilities approved and posted for use or storage of licensed radiation sources that do not have significant potential for radiation

exposures or releases in excess of 10% of the applicable limits. Audits shall include an assessment of radiological conditions and a review of security, posting, and labeling. Where feasible, such audits include observation and discussion of work practices with Source Custodians and/or Source Users. Results of these audits shall be documented and any identified needs for corrective action found during the audits shall be transmitted to Source Custodians or other appropriate individuals.

10.2: RADIATION MONITORING

Calibrated and functional survey instrumentation shall be maintained to support monitoring needs in each Radiation Facility where external dose rates are likely to reach the criteria for a radiation area as defined in 10 CFR 20 or where surface contamination control limits, as defined in Section 10.7, are likely to be exceeded. Survey instrumentation shall be available to support required monitoring activities.

All "in-service" instruments used for health and safety or regulatory compliance monitoring shall be routinely evaluated for functionality via a calibration and testing program which is based on guidance such as that found in relevant voluntary consensus standards and manufacturer's recommendations. Calibrations shall be performed using sources traceable to NIST primary standards. Any instrument that does not meet the calibration and testing requirements is considered to be "out-of-service".
Portable survey instruments used for dose rate measurements shall be calibrated annually or after repairs or modifications that could affect response.

Portable survey instruments used for contamination monitoring shall be calibrated electronically and source response checked annually or after repairs or modifications that could affect response.

Portable survey instruments shall be calibrated in accordance with recommendations from the manufacturers or written procedures. In general, instruments shall be evaluated at approximately 20 percent and 80 percent of each scale or decade as practicable. Instruments shall be removed from service if they can not be adjusted to within 20 percent of the expected value.

Records of calibrations and instrument QA shall be retained for inspection for a minimum of three years. "In-service" portable instrumentation shall be labeled to verify calibration.

Table 1 below describes the typical radiation detecting instruments available and their characteristics. Equivalent substitutions or alternative access arrangements are acceptable as long as there is no degradation of the radiation monitoring program.

Table 1. TYPICAL HEALTH PHYSICS INSTRUMENTATION

INSTRUMENT TYPE	TYPICAL NUMBER	RANGE
Liquid scintillator	1	counts per time, integrating
Smear counter (alpha/beta)	1	counts per time, integrating
Gamma spectrometer	1	Not Applicable
Alpha survey meter	1	0 to 50,000 cpm
Beta/gamma survey meter (thin window gm)	4	0 to 50,000 cpm
Extendible high range gamma survey meter	1	0 to 1000 rem/hr
Ion chamber	2	0 to 1 rem/hr
Neutron survey meter	1	0 to 5 rem/h
Area monitor	2	0 to 1 rem/h
Air sampler	1	Not Applicable
Personnel contamination monitor (beta)	2	Not Applicable
Thyroid bioassay counter	1	Not Applicable

10.3: MATERIAL RECEIPT AND ACCOUNTABILITY

Source Acquisition

All acquisition of licensed Special Nuclear Material (SNM), Source Material, and Byproduct Material from outside suppliers shall be approved by the RSO or designee.

Proposals to acquire sources shall be reviewed and approved or rejected based upon evaluation of issues such as:

- License limits and conditions;
- Intended radioactive material utilization and protocols;
- Facility and equipment compatibility;
- Source Custodian training, and skills;
- Source User training, and skills;
- Hazard analysis and control safety requirements;
- Dosimetry and monitoring requirements; and
- Inventory control, transfer, waste disposal, and effluent or disposition considerations.

Individuals Permitted to Possess and Use Licensed Material

A Source Custodian is an individual approved in writing by the RSO or designee, to be responsible for the primary control and accountability of radioactive material.
Source Custodian responsibilities, with respect to material accountability include:

(1) Coordinating with the Health Physics Group any transfers of custodianship, changes in utilization, shipments of sources to off-site entities, or disposal of waste;

(2) Maintaining source inventory records of utilization, decay-corrected activity, transfer, and disposal;

(3) Performing physical inventory verifications and reconciling documentary records as necessary;

A Source User is an individual approved in writing by the RSO or designee, to materially control, use, or otherwise manipulate radioactive material. With respect to material accountability, their responsibilities include identifying the use and/or storage locations of radioactive material to the Source Custodian.

Accountability of License Material

Health Physics shall maintain inventory records for unsealed licensed sources with activity greater than 10 CFR 20, Appendix C quantities and all sealed sources requiring leak testing. Source Custodians shall maintain inventory records for, and conduct an annual physical inventory of, all sealed and unsealed licensed sources under their responsibility that exceed this criteria. Source Custodians shall also comply with applicable shipment, transfer, and waste disposal requirements for unsealed licensed sources with activity greater than 10 CFR 20, Appendix C quantities and all sealed sources requiring leak testing under their responsibility.

License to license transfer of radioactive material to individuals or entities shall be made in accordance with appropriate DOT regulations and U.S. Nuclear Regulatory Commission (NRC) licenses, NRC Agreement State and/or U.S. Department of Energy (DOE) authorizations, or in the case of international transfers, in accordance with requirements of the appropriate licensing authority. The transfer of radioactive materials for research purposes to individuals or entities who are not required to possess a specific or broad scope NRC license, shall meet the requirements of 10 CFR 30.71 Schedule B and similar exemptions

Shipments of licensed radioactive material or devices containing licensed sources shall be coordinated with Health Physics to document proper packaging, labeling, and inventory control in accordance with applicable DOT and NRC regulations.

Special Nuclear Material Accounting and Control

Health Physics shall maintain the Special Nuclear Materials (SNM) accountability office for NIST and administer the accountability system. NIST shall report SNM materials transactions and balances to the NMMSS database system in accordance with the provisions of 10 CFR 70 and NUREG BR-006 and BR-007.

10.4: OCCUPATIONAL DOSE

It is NIST policy and practice to maintain risk to individuals ALARA commensurate with the beneficial application of ionizing radiation technologies. All individuals likely to exceed 10 percent of the applicable occupational exposure limits shall have their dose monitored. Dosimetry results shall be reviewed by Health Physics as part of the ALARA program.

External Dose Monitoring

Health Physics shall conduct a personnel external dosimetry program, using devices requiring processing and meeting quality assurance criteria as required by 10 CFR 20.1501, Subpart F, Surveys and Monitoring National Voluntary Laboratory Accreditation Program (NVLAP Accreditation)

Health Physics assigns dosimeters (including extremity dosimeters) to individuals likely to exceed 10 percent of regulatory limits based on the safety review of the facilities and source terms, and on knowledge of previous similar operations.

The dosimeters shall be processed and reviewed quarterly. Any result greater than 10 percent of the regulatory limit shall be reviewed by Health Physics and the IRSC, and reported to appropriate NIST management. Corrective action shall be taken as appropriate.

Results exceeding 10 percent of the limit in a year are reported to the monitored individual(s).

In addition to the dosimetry processed by a NVLAP accredited laboratory, where applicable, secondary direct reading dosimetry may be used for operations likely to exceed 10 percent of the limits and where direct or immediate monitoring results may aid in maintaining doses ALARA.

Internal Dose Monitoring:
Health Physics shall conduct, or cause to be conducted, appropriate in-vivo and/or in-vitro bioassay monitoring where work place monitoring hazard analysis or operational history indicates a reasonable potential for uptakes exceeding 10 percent of the applicable limits.

Analysis of significant positive bioassay results shall be used to assign values to the individual's dose of record. Any result greater than 10 percent of the regulatory limit shall be investigated and corrective action shall be taken as appropriate.

Direct or Area Monitoring
In lieu of specific personnel dosimetry (external or internal), direct area monitoring, sampling, or source term analysis may be performed and combined with occupancy, time and motion, or similar calculation based methods to assign the dose of record.

Personnel Contamination Monitoring
Personnel contamination monitoring shall be performed as indicated in the hazard analysis associated with a source specific protocol and when exiting contamination control zones. Any detectable skin contamination shall require initiation of decontamination procedures. Personnel decontamination efforts shall be discontinued if there is indication that continued efforts could result in damage to the skin and possible higher risks due to uptakes of material.

10.5: PUBLIC DOSE

Licensed material at NIST will be used, transported, stored, and disposed in such a way that the total effective dose equivalent (TEDE) to members of the public will not exceed more than 100 mrem in one year, and the dose in any unrestricted area will not exceed 2 mrem in any one hour.

10.6: SAFE USE OF RADIONUCLIDES AND EMERGENCY PROCEDURES

Safe Use of Radioactive Materials

Health Physics shall provide instructions on general topics for the safe use of radioactive materials to individuals whose assigned duties involve exposure to radiation or to ionizing radiation sources. These instructions shall be compatible with those published in the April 1999 version of NUREG 1556, Volume 11, Appendix R.

The responsibilities of Source Custodians, with respect to the safe use of radioactive material, include:

(1) Completing the appropriate hazard assessment for use of their radioactive material;

(2) Authorizing their radioactive materials for use only by approved and authorized Source Users and ensuring, prior to any such use, that Source Users are informed of the terms and conditions specific to the use of the radioactive materials;

(3) Ensuring that radioactive materials on their inventory are used safely and in accordance with regulatory and NIST radiation safety program requirements; and

(4) Completing all training required by applicable NRC licenses and by the NIST radiation safety program, to provide assurance that they will use radioactive materials safely, including maintaining security of, and access to, radioactive materials, and that they are prepared to recognize and respond appropriately to incidents involving radioactive materials to prevent the spread of contamination.

(5) Identifying to their management and the RSO, any issues that have, or may have, radiological safety significance or regulatory compliance implications.

The responsibilities of Source User, with respect to the safe use of radioactive material, include:

(1) Ensuring that their utilization, handling, and storage of radioactive materials are performed safely and in accordance with regulatory and NIST radiation safety program requirements;

(2) Using, handling, or manipulating only radioactive materials for which they have been trained and authorized by the appropriate Source Custodian;

(3) Ensuring that all proposed experiments or modifications to experiments have been approved prior to implementation;

(4) Having adequate and appropriate training, including all training required by applicable NRC licenses and by the NIST radiation safety program, to provide assurance that they will use radioactive materials safely, including maintaining security of, and access to, radioactive materials, and that they are prepared to recognize and respond appropriately to events or accidents involving radioactive materials to prevent the spread of contamination; and

(5) Identifying to their respective Source Custodian any issues that have, or may have, radiological safety significance or regulatory compliance implications.

Radiological Emergencies

Health Physics shall provide instructions for responding to spills or related personnel contamination incidents. These instructions shall be compatible with those published in the April 1999 version of NUREG 1556, Volume 11, Appendix R.

Health Physics staff shall have training in, and knowledge of, incident response practices. Training for individuals working with radioactive materials shall include how to recognize and respond to off-normal radiological conditions such as unexpected survey monitoring results, area contamination, personnel contamination, and failures of equipment.

Individuals working with radioactive materials shall be instructed to contact Health Physics for support as soon as an incident or emergency situation is identified and for after-hours response, to contact the on-site NIST dispatcher to request Health Physics support.

Emergency response personnel (e.g., the NIST Fire Protection Group) shall receive in-service training by Health Physics biennially on how to respond to security, fire, or other monitored alarm situations.

The NIST on-site emergency dispatcher maintains an emergency contact list which includes Health Physics staff.

Incident response equipment shall be maintained by Health Physics and positioned at appropriate locations.

Individuals authorized to use unsealed sources shall be trained in the basics of personnel contamination monitoring and decontamination procedures.

A NIST evaluation, which was based on our current license limits, indicated that the maximum dose to a person offsite due to release of radioactive material would not exceed 1 rem TEDE or 5

rem to the thyroid as required in 10 CFR 30.32 (i). The NRC approved this evaluation on December 10, 1993. Using this same evaluation methodology, the results indicate that an emergency plan(10 CFR 30.32) is not required for the proposed license limits in Item 5 as the maximum dose to a person offsite due to release of radioactive material would not exceed 1 rem TEDE or 5 rem to the thyroid as required in 10 CFR 30.32 (i).

Physical Security and Fire Protection:

Access to NIST buildings housing licensed radioactive material are monitored by a security system managed by the NIST Police Services Group. Where appropriate, additional physical key and/or card key control are used to secure laboratories and radioactive material storage locations. Additionally, where required, systems are in place to ensure conformance to the enhanced security and inventory control/reporting requirements for sources of concern.

Licensed radioactive materials shall be secured from unauthorized access by locked doors, cabinets, or similar measures when unattended.

NIST follows NFPA codes when designing and using its facilities. Laboratory buildings meet the requirements of NFPA 45, *Standard on Fire Protection Laboratories Using Chemicals.* Applicable NFPA Codes are used for building services and special hazards. Plans for building renovations are reviewed by the NIST Safety Office for code compliance.

NIST laboratories shall be monitored by a fire detection system that alarms in Physical Security and at the on-site Fire Station. Additional manual pull boxes are placed throughout NIST facilities.

NIST facilities are equipped with centrally monitored fire detection systems. Additionally, pull boxes and fire extinguishers are stationed at strategic locations throughout the facility in accordance NIST Fire Protection Group (FPG) recommendations.

Portable fire extinguishers are deployed throughout the laboratories and facilities according to the NIST Fire Protection Group recommendations in accordance with applicable NFPA standards. Building entrances and stairwells have standpipe connections; fire hydrants are located at various positions on the exterior of buildings.

10.7: RADIATION FACILITY SURVEYS

Health Physics shall perform and document routine surveys of posted radiation facilities to ensure health and safety and regulatory compliance. These surveys shall be based on the surveillance frequencies and methodologies in NUREG 1556, Volume 11, Appendix S, and other modifying factors such as source activity, physical form, containment, utilization, process knowledge, and operational history.

Typical actions and surveillance frequencies are provided in Table 2, but may be modified by Health Physics based on process knowledge, utilization and monitoring history, and levels of research activity.

Contamination control levels and resulting actions are defined in Table 3. Items and materials to be released for unrestricted use shall be processed in accordance with the clearance levels provided in Table 4. Decontamination efforts shall be made to achieve the goal of no detectable removable activity being present in any unrestricted area or on any equipment or materials released for unrestricted use.

Table 2. RADIATION FACILITY SURVEYS: FREQUENCY AND TYPE

Facility Description	Survey Type	Frequency
Facilities with dose rates greater than 5 millirem per hour at 30 cm from a surface, with active source transfers and/or utilization of sources .	Dose Rate Survey	Weekly, or as directed by the RSO
Facilities with dose rates greater than 5 millirem per hour with sources in storage or infrequent source transfers or utilization.	Dose Rate Survey	Quarterly
Facilities with active unsealed source utilization greater than 10 CFR 20, Appendix C quantities.	Contamination Survey (direct count rate and smear)	Weekly
Facilities with active unsealed source utilization less than 10 CFR 20, Appendix C quantities.	Contamination Survey (direct count rate and smear)	Quarterly
All other posted facilities.	Dose Rate Survey, if applicable Contamination Survey (direct count rate and smear), if applicable	Annually

Table 3. CONTAMINATION CONTROL ACTION LEVELS

Contamination Type/Level	Action
For alpha contaminants, greater than 200 dpm/100 cm^2 (removable)	Post as "Contamination Control Area" Restrict entry and use to as necessary and practicable. Consider appropriate contamination mitigation measures. Monitor upon exit.
For unknown beta/gamma contaminants or for known beta/gamma contaminants other than ^{14}C or ^{3}H, greater than 2,000 dpm/100 cm^2 (removable)	Post as "Contamination Control Area" Restrict entry and use to as necessary and practicable. Consider appropriate contamination mitigation measures. Monitor upon exit.
For ^{14}C, greater than 20,000 dpm/100 cm^2 (removable)	Post as "Contamination Control Area" Restrict entry and use to as necessary and practicable. Consider appropriate contamination mitigation measures. Monitor upon exit.
For ^{3}H, greater than 200,000 dpm/100 cm^2 (removable)	Post as "Contamination Control Area" Restrict entry and use to as necessary and practicable. Consider mitigation measures. Monitor upon exit.

Table 4. CONTAMINATION CLEARANCE LEVELS

Nuclide[1]	Average[2,3]	Maximum[2,4]	Removable[2,5]
Alpha emitters	100 dpm/ 100 cm^2	300 dpm/ 100 cm^2	20 dpm/ 100 cm^2
I-125, I-129	100 dpm/ 100 cm^2	300 dpm/ 100 cm^2	20 dpm/ 100 cm^2
I-126, I-131, I-133, & Sr-90	1,000 dpm/100 cm^2	3,000 dpm/ 100 cm^2	200 dpm/ 100 cm^2
Beta/gamma emitters except as otherwise noted	5,000 dpm/100 cm^2	15,000 dpm/ 100 cm^2	1,000 dpm/ 100 cm^2
H-3	50,000 dpm/100 cm^2	150,000 dpm/ 100 cm^2	1,000 dpm/ 100 cm^2

Notes:

[1] Where surface contamination by both alpha and beta-gamma emitting nuclides exist, the limits established for alpha and beta-gamma nuclides should apply independently.

[2] As used in this table, dpm means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrument.

[3] Measurements of average contamination should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[4] The maximum contamination level applies to an area of not more than 100 cm^2.

[5] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

Environmental and Unrestricted Area Monitoring

Health Physics shall conduct and document monitoring at appropriate locations within the NIST grounds and facilities as part of the documentation for demonstrating compliance with dose and dose rate limitations for members of the public.

Criticality Controls

The license limits stated in Item 5 do not allow possession and use of special nuclear material in any form except sealed Pu sources in quantities and forms sufficient to form a critical mass pursuant to the definitions of 10 CFR 70.4. That is, NIST license limits are less than the defined critical mass (assuming moderation and reflection) of 350 grams of contained U-235, 260 grams of U-233, 225 grams of Pu, or any combination of these in accordance with the unity rule or any form other than sealed Pu sources (mostly plutonium-beryllium neutron sources).

The work performed with SNM is in support of measurement science. This work includes production of SNM standard reference sources; measurement, characterization, and calibration of reference sources; and development and use of measurement devices that detect or incorporate SNM (such as fission chambers). Under this license there is no provision for the assembly or testing of critical or sub-critical assemblies.

Most discrete SNM sources are below the NMMSS reporting mass. Those that exceed the NMMSS reporting mass are segregated into three reporting areas in three separate buildings. The source acquisition approval process includes checks to verify and limit source inventories and use locations. This ensures no single location can aggregate a critical mass of SNM.

NIST commits to adequate practices to ensure that by applying the sum of the fractions rule, no combination of fissile uranium and plutonium exceeding 80 percent of a critical mass as specified in 10 CFR 70.4 shall be used or stored at any single location. Based on the low mass of the discrete sources, laboratory segregation, and inventory control, NIST requests continued exemption from the 10 CFR 70.24 requirements for placing criticality accident alarm systems in each laboratory using SNM sources.

Leak Tests

Sealed source leak testing shall be performed in accordance with the model set forth in NUREG 1556, Vol. 11, Appendix T. Unless otherwise specified by the sources respective SSD Registration Certificate, tests shall be performed semi-annually.

Each sealed source containing more than 100 microcuries of beta and/or gamma emitting material or more than 10 microcuries of alpha emitting material, other than H-3, with a half-life greater than

30 days and in any form other than gas, shall be tested for leakage and/or contamination semiannually.

In the absence of a certificate from a transferor indicating that a test has been made within 6 months prior to the transfer, a sealed source received from another entity shall not be put into use until tested for leakage.

The semi-annual leak test interval required by this section does not apply to sealed sources that are stored and not being used. However, any sealed source in storage must be leak tested prior to usage or removal from storage. This leak testing shall be performed no more than 6 months prior to the date of use or transfer.

The leak test shall be capable of detecting the presence of 0.005 microcuries of radioactive material on the test sample. The sample shall be taken from the sealed source or appropriate accessible surfaces of the container or from the device where the sealed source is mounted or stored in which one might expect contamination to accumulate. Records of leak test results shall be maintained for inspection by the USNRC in accordance with regulatory requirements.

If the test reveals the presence of 0.005 microcuries or more of removable contamination due to the sealed source radionuclide, NIST shall immediately withdraw the sealed source from use and shall cause it to be contained or decontaminated and repaired by a person licensed to make such repairs, or to be disposed of in accordance with USNRC regulations.

If tests indicate leakage from a source distributed or acquired in accordance with requirements of the sealed source registry or designed, manufactured, and tested in accordance with special form requirements, within 5 days after determining that a source has leaked, NIST shall file a report with the USNRC describing the source, test results, extent of contamination, apparent or suspected cause of source failure, and corrective action taken.

ITEM 11: WASTE MANAGEMENT

Radioactive waste shall be disposed of in a manner that protects the health and safety of NIST staff, members of the public, and the environment applying the ALARA policy both for the short-term handling phases and long-term storage or disposal phases of waste management. Radioactive waste is transferred to areas within buildings 235 or 245 where it is characterized and packaged for disposal. The primary radioactive waste streams are as follows:

Dry Active Low Level Wastes including:

- Gloves, wipes, paper, and miscellaneous containers and tools used during handling of licensed material or clean up of contaminated objects;
- Glassware, vials, dried filters, and other expendable chemistry equipment;
- Components and equipment contaminated or activated during use; and
- Activated sample materials or sample containers.

Liquid Wastes including:

- Liquid scintillation materials;
- Aqueous solutions of acids or bases used during chemistry processes;
- Water or cleaning liquids used during decontamination processes.

Health Physics shall train individuals who generate solid waste to ensure appropriate collection of all solid waste materials that could contain radioactivity. Wastes are segregated and collected in accordance with written procedures, documenting the source term, activity, physical and chemical state, and any other information necessary to ensure safety of the handlers and compliance with processor and disposal facility contractual and license requirements. On request from the individual, Health Physics collects the waste for packaging and shipment. The wastes shall be disposed of either by transfer to a licensed waste processing contractor or by shipping directly to a licensed disposal site.

If a contractor is used, the waste shall be packaged according to the contractor's instructions and in compliance with the appropriate shipping regulations. If the shipment is direct to a licensed disposal site, then all applicable waste-form regulations and restrictions on packaging shall be followed. If appropriate, wastes may be compacted on-site with a commercial compactor as part of the packaging process. Wastes that cannot be accommodated in drums are packaged in DOT compliant shipping containers as specified by the contractor.

Decay-In-Storage (DIS)

Health Physics may utilize Decay-in-Storage prior to disposal as provided in 10 CFR 20.2001(a)(2) and in accordance with the following conditions:

- Isotopes must have a half life of less than 120 days;
- Radioactive wastes shall be in stable chemical and physical forms prior to placement in storage. Incompatible materials shall not be stored together;
- Wastes shall be maintained in segregated storage for at least ten half lives;

- Following the decay period, wastes shall be monitored at the surface with an appropriate survey meter on the most sensitive scale (or an equivalently sensitive monitoring device) with no intervening shielding material, in a low background area;
- If monitoring results are indistinguishable from background, all radioactive material labels shall be removed or defaced and the material may be disposed of without regard to the radiological concerns (this does not release NIST from regulatory compliance regarding chemical or other physical waste disposal hazards); and
- If the monitoring detects additional activity above background, the waste shall be analyzed to identify longer half-life impurities and evaluated for disposal as radioactive waste.

The nature of NIST's mission as a measurement and standards laboratory often requires that materials or derived standards be maintained in inventory for extended periods for later analysis and future comparative measurements. At times, this may constitute a "Decay-in-Use" situation where, after more than ten half lives from the time of acquisition; the material activity is no longer viable for measurements. Under these conditions, the material shall be monitored by Health Physics with an appropriate survey meter on the most sensitive scale (or an equivalently sensitive monitoring device) with no intervening shielding material, in a low background area. If indistinguishable from background, the material may be removed from institutional controls or disposed of without regard to radiological properties, similar to clearance criteria as used for decay-in-storage.

Radioeffluents

Releases of liquid and gaseous radioeffluents shall be verified to be in compliance with the public dose limits specified in 10 CFR 20.1301 and in accordance with the requirements of 10 CFR 20.1302.

Radioeffluent releases into the air or water shall be assessed by sampling, direct measurement of the source terms, and/or calculation methods to ensure compliance with the release criteria. Records shall be maintained to document annual effluents and verify regulatory compliance.

In Buildings 235 and 245, some drains from specific radiochemistry laboratories and other areas are directed to a set of waste tanks. These tanks are sampled, analyzed, and released to the sanitary sewer in accordance with written procedures in compliance with 10 CFR 20.2003.

Bulk liquid wastes shall be collected and transferred to Health Physics. Health Physics shall determine the disposition of the waste, which may include release via the waste tanks or disposal by transfer to contracted processing brokers.

Incineration and On-site Burial

No on-site incineration or on-site burial of radioactive wastes shall be performed.

APPLICATIONS FOR CONTINUED EXEMPTIONS

NIST requests continued exemption from 10 CFR 36.27. This regulation requires a fire extinguishing system capable of extinguishing a fire without the entry of personnel into the irradiation room. The irradiation rooms housing the Part 36 panoramic irradiators are entirely of concrete construction. The rooms are limited in size so there is minimal opportunity for combustible materials to be stored in the area. NIST administratively limits storage of flammable materials in the rooms. As such, the NIST Fire Protection Group has determined that the most credible fire incident would be an electrical fire from the control, instrumentation, or lighting systems. They have further determined that this should not be sufficient to engulf or significantly endanger the source. The facility is arranged with fire detection systems that satisfy the other aspects of the regulation.

NIST requests continued exemption from the requirement in 10 CFR 36.31(a) that requires the key that operates the irradiator be attached to a portable radiation survey meter by a chain or cable. The key used to enter the irradiation room is captured in the lock when the door is opened. This means that physically the key cannot be moved out of its captured position if the door to the survey room is open. The distance from the lock to the source area is such that attaching the key to a survey meter would require a long chain that could be a trip hazard or get jammed in the chain of the access door when it is opening or closing. NIST procedure requires that a survey meter be used when entering the room. Additionally, in lieu of attaching a survey meter to the key, NIST has installed a radiation detector within the irradiation room. This detector indicates if the source is open and it is tested every day that the unit is in operation.

NIST requests continued exemption from the 10 CFR 70.24 requirements. This regulation requires a Criticality Accident Alarm System in each location where SNM is used or stored. In support of this continued exemption, NIST commits to adequate practices to ensure that by applying the sum of the fractions rule, no combination of fissile uranium and plutonium exceeding 80 percent of the critical mass of SNM as specified in 10 CFR 70.24 shall be used or stored at any single location. Based on the nature of the discrete sources, laboratory segregation, inventory control, and the low level counting requirements of many of our laboratories, Criticality Accident Alarm Systems shall not be needed in each laboratory using SNM sources.

FOR PURPOSES OF THIS LICENSE, THE FOLLOWING ACRONYMS APPLY

U.S. Department of Commerce	DOC
National Institute of Standards and Technology	NIST
U.S Department of Transportation	DOT
Ionizing Radiation Safety Committee	IRSC
NIST Fire Protection Group	FPG
National Voluntary Laboratory Accreditation Program	NVLAP
Health Physics	HP
Safety, Health and Environment Division	SHED
U.S Nuclear Regulatory Commission	NRC
As Low As Reasonably Achievable	ALARA
American National Standards Institute	ANSI
Code of Federal Regulations	CFR
U.S. Department of Energy	DOE
Disintegration Per Minute	DPM
NIST Center for Neutron Research	NCNR
Nuclear Materials Management Safeguards System	NMMSS
NRC Nuclear Regulatory Guidance	NUREG
Quality Assurance	QA
Radiation Safety Officer	RSO
Special Nuclear Material	SNM
Standard Reference Material	SRM
Sealed Source Device	SSD
Total Effective Dose Equivalent	TEDE

ITEM 12: FEES

Per conversation with Breeda Reilly of the NRC, the license renewal application fees are incorporated in the regular license fee payments. No additional payment is due at the time of this application.

ITEM 13: CERTIFICATION

AS THE CERTIFYING OFFICIAL ON BEHALF OF THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST), I UNDERSTAND THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON NIST.

NIST CERTIFIES THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35 , 36, 39, 40,and 70 AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

CERTIFYING OFFICER:

SIGNED: _____ DATE: 05/23/11

Richard F. Kayser