UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-0001

March 24, 1999

Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Materials Safety
and Safeguards
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

License No. SNM-362
Docket No. 070-00398

Subject: Request for Exemption to Portions of Part 36; Request for License Amendment

Gentlemen:

This letter is a complete submission for our request for exemption to various portions of 10 CFR Part 36 and for our request for amendments to license number SNM-362. It is intended to supersede our submissions of May 20 and Dec. 23, 1998 and all other submissions on these topics. It responds to the telephone conversations Tom Hobbs of NIST has had with Anthony Kirkwood and Sean Soong of your office and to correspondence on these issues.

We request amendment to license number SNM-362 to show exemptions for 10 CFR Part 36, Sections 23(a), 23(b), 23(c), 23(d), 27(a), 27(b), 31(a), and 67(a). We are not requesting exemption to any section of 10 CFR Part 36.51. Enclosure 1a shows justifications for these portions. Enclosure 1b is a plan view of the vertical beam facility with the modifications involved. Enclosure 1c is the emergency instruction document posted at the facility and Enclosure 1d is a safety analysis prepared for the facility. One part of Enclosure 2a is an updated Section 1.8, page I-1-3, of the NIST Materials License Document showing this change in special authorizations, with the revised portion indicated with a highlight mark, i.e., indicated with a vertical mark in the margin.

We request amendment to license number SNM-362 to change item 9 to show permission for off-site operations, by adding to the currently authorized place of use, the Gaithersburg, MD site, a phrase such as "and temporary job sites under NRC jurisdiction". If necessary, some statement concerning reciprocity for state licensed job sites should also be included.

We request approval of a change to our Materials License Document to delete line item no. 2 in Section 3.2.8 (B), page I-3-4, in order to conform to current regulatory issues. This will reduce the removable contamination action level for the teletherapy sealed sources to 0.005 microcuries. We request approval of a change to our Materials License Document to Section 2.11, page I-2-4, to reflect administrative changes at NIST that affect titles for persons performing the fire safety review procedures utilized for major facility change proposals. Enclosure 2a shows the new pages with highlight marks for changes.

We submit for information a change to our Materials License Document in Section 8.5, Table II.8-2, page II-8-2, to reflect the current NIST Materials License Summary. We submit for information a change to our Materials License Document in Section 9.6, page II-9-3, showing a complete revision to the fire protection section based on a thorough review of the existing fire safety protocols by the Fire Protection

NIST

Group at NIST. We submit for information a change to our Materials License Document in Section 10.2, pages II-10-2 and II-10-3, showing the current membership in our Ionizing Radiation Safety Committee. The members shown in the revised list meet the conditions of Section 2.3, page I-2-1, concerning fields of expertise. Enclosure 2b shows these changes, with ~~information to be changed struck through and with~~ new information to be inserted indicated with a highlight mark.

Upon approval of the changes proposed for Part I and review of the changes submitted for Part II of the NIST Materials License Document, new pages showing these changes, highlighted and dated, would replace existing pages.

Thank you for your attention to our requests. If you have further questions about these requests, please contact Mr. T. Hobbs at 301-975-5800, MAIL STOP 3541.

Sincerely,

L. E. Pevey, Chief
Occupational Health and Safety Division
(Materials License Manager)

enclosures

CC: U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

March 24, 1999
U.S. Nuclear Regulatory Commission

ENCLOSURES TO LETTER REQUESTING AMENDMENTS AND EXEMPTION TO SNM-362

Enclosure 1a - PART 36 JUSTIFICATIONS EXEMPTIONS
Enclosure 1b - PLAN VIEW OF VERTICAL BEAM IRRADIATION FACILITY
Enclosure 1c - EMERGENCY PROCEDURES
Enclosure 1d - VERTICAL BEAM IRRADIATION FACILITY SAFETY ANALYSIS
Enclosure 2a - PART I, NIST MATERIALS LICENSE DOCUMENT, CHANGES PROPOSED
Enclosure 2b - PART II, NIST MATERIALS LICENSE DOCUMENT, CHANGES SUBMITTED

PART 36 JUSTIFICATIONS EXEMPTIONS

Section 23(a), justification for exemption

The key that activates the control console, i.e., the key used to move the sources, must be in the console and in the ON position for the safety interlocks to be tested and for the runtime safety features to be active. To remove the key in order to gain access to the source room would mean that the test for operability of the safety features would not be possible. With that console key in the OFF position or removed, or with the room door open, the sources cannot be moved to the unshielded position. To modify the existing system would be prohibitively expensive and would offer no enhancement of safety. Therefore, we request that separate keys be permitted, one for the console and another for the room door.

Section 23(b), justification for exemption

Entry security is accomplished with multiple door interlocks; opening a door causes the source to return to the shielded position and, when the independent backup access control system is armed, notifies the security console, causing a security staff member to come to the area. Multiple radiation monitors in the room alert an entering person that a radiation level above normal exists. Modifying the independent backup access control system to provide automatic source shielding and local alarms would be prohibitively expensive and would offer no enhancement of safety. Therefore, we request exemption to the implied requirements of this section.

Section 23(c), justification for exemption

A radiation monitor provides audible and visible indications within the room when radiation levels exceed about 2 mR/h. Another radiation monitor provides a meter indication of the measured radiation level within the room under all conditions, and a visible and audible alarm when the room door is opened and a radiation level greater than about 2 mR/h has been detected since the last reset of the alarm, even though the radiation level no longer exceeds the trigger level. To modify the system to meet conditions of this section, i.e., to cause the system from section (b) to activate the alarm, would be excessive and provide no greater radiation safety features.

Section 23(d), justification for exemption

A complete inspection of the room by the operator precedes a source activation. The room has no vision obstructing equipment or apparatus. The beam catcher pit has a locked lid that is only unlocked for infrequent beam alignment procedures by the Responsible Facility Operator or his designated representative. An inspection relay with timed action must be activated as the operator leaves the area to start an activation. There can be no inadvertent occupancy after the inspection while the source moves from its shielded position. Therefore, we request exemption to the requirements of this section.

Section 27(a), justification for exemption

Activation of the heat and smoke detectors alert the security console and the fire protection console, causing response by the Fire Protection Group. The emergency procedures posted in the Control Room tell the operator to close the source shutters, if possible, at a fire condition. The implication is that the shutter would be closed unless the operator were incapacitated or had to flee a hazardous situation. To modify the system to cause automatic shutter activation at the fire detection system activation would be very expensive and would add incrementally to radiation safety.

Section 27(b), justification for exemption

Portable fire extinguishers are located in the control room and within the radiation room. No sprinkler system exists, thus, no flood control shut-off valve exists. No storage of combustibles in the room is permitted. A complete review by the Fire Protection Group has determined that the major fire hazard is electrical, with burning insulation and electrical sparks, and with too little heat to harm the shutter operating mechanism. Therefore, we request exemption from the requirements of this section.

Section 31(a), justification for exemption

A radiation monitor indicator just inside the door to the radiation room latches an alarm at the indicator when the radiation level inside the sliding lead door rises above about 2 mR/h. This triggers the visible and audible alarm when the door is opened following an irradiation procedure, even though the radiation level has fallen to normal, non-operating levels. To reset the alarm, the person entering the room must push a button located beside the meter, thus facing and observing the meter indicating the radiation level inside the sliding lead door. The key to the console must be in place and turned to energize the console before the tests required for an irradiation procedure can be performed. To open the door to observe that the interlocks that close the shutter function properly, the console key and the door key are simultaneously needed. Therefore, we request that we be exempted from the requirement for a survey meter to be attached to the key and the requirement that the console, or source control, key be the same key used for the door.

Section 67(a), justification for exemption

The automatic initiation of the visible and audible alarms upon opening the entry door following a beam-on procedure forces the entering person to reset the alarm before sliding open the lead door. Should the radiation level inside the lead sliding door still be elevated, the alarms will re-initiate. This avoids the possibility of human error in forgetting to carry, neglecting to check operability, mispositioning, neglecting to observe meter indications, or misreading the survey meter indication, or the possibility of an undetected survey meter malfunction.

BUILDING 245 – RADIATION PHYSICS

4' 2' 0' 4' 8'

BICRON MICROREM METER S/N 2738
5/5/98, 1300 PM, EME
(LEVELS IN MICROREM PER HOUR)

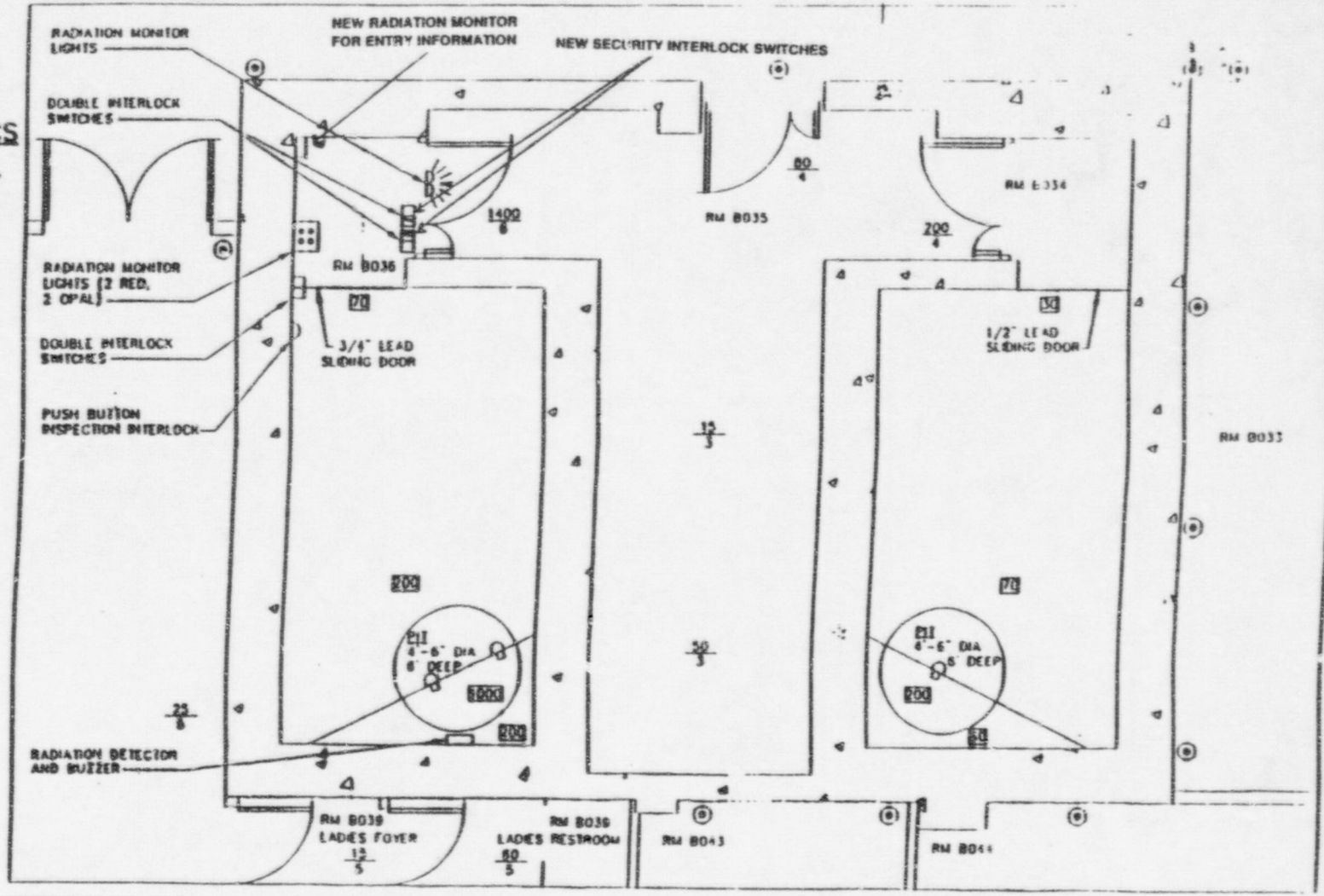
⑧ – READINGS SHOW BACKGROUND LEVEL. ALL READINGS ON FLOOR ABOVE AT BASEMENT LEVEL WERE BACKGROUND

□ – READINGS INSIDE RADIATION ROOMS, WITH SHUTTER CLOSED

#/# – READINGS WITH SAMPLE-SCATTERED BEAMS, SHUTTERS OPEN/CLOSED

ALL SAFETY FEATURES DUPLICATED IN ROOMS B034 AND B036

- RADIATION MONITOR LIGHTS (DOOR)
- RADIATION MONITOR LIGHTS (2 RED, 2 OPAL)
- PUSH BUTTON INSPECTION INTERLOCK
- DOUBLE INTERLOCK SWITCHES (3)
- RADIATION DETECTOR AND BUZZER



LED BY	DATE	SPONSOR	DATE	FIRE PROTECTION RES	DATE	DIV	DATE	PLANNING & ENGR OFF	DATE	PROJECT ENGR	DATE

ELAINE OLIVER 5-14-98

DRAWN BY DATE PROJECT

Enclosure 1b

EMERGENCY PROCEDURES

3/99

MALFUNCTION: If possible, close the source shutter. Insure the doors are locked against inadvertent entry and marked as malfunctioning. Call the Responsible Facility Operator and call Health Physics.

POWER FAILURE: On the first radiation room entry during or following a power outage, a portable survey meter must be carried into the radiation room to insure that the source shutter has closed.

FIRES: If possible, close the source shutter. Close and lock all doors. Proceed to a safe area, call the Emergency Number, and await the arrival of trained response personnel.

INJURIES: Call the Emergency Number. Provide first aid if trained. Otherwise, await trained response personnel.

Responsible Facility Operator
Paul Lamperti, ext. 5591

Alternate RFO
Jileen Shobe, ext. 5595

Emergency Number
ext. **2222**

Health Physics
ext. **5800**

VERTICAL BEAM IRRADIATION FACILITY
SAFETY ANALYSIS

3/99

This safety analysis concerns the facility in Building 245 that utilizes teletherapy-style source heads. Although the sources are not used for human exposures, the facility meets the conditions specified in 10 CFR Part 35.615(b). The sources are used for research and development projects, calibration of instruments, and irradiations of dosimeters and other materials. Customers include medical, commercial, federal and state government, and international facilities. There are three heads: one (1) in Room B034 and two (2) in Room B036, with the control console for all units in the middle room, B035, in Bldg. 245. The facility was built in the early 1960's and irradiations began in 1965. Through the ensuing years, modifications for operations and for safety purposes have been incorporated.

I. Access Control

Keys to the Control Room, B035, are restricted to members of the Radiation Interactions & Dosimetry Group of the Ionizing Radiation Division and to Health Physics. Access to keys to the beam rooms and to the operating console are restricted to authorized operators of the units.

II. Source Storage and Operations

For normal use of the facility sources, specified information is entered in the log book kept at the console. For situations other than normal irradiation procedures, e.g., for maintenance, the Responsible Facility Operator will record specific conditions and characteristics for the special circumstance in the same log book.

Prior to initiating an irradiation, the operator will ascertain that no person remains in the radiation room by visually examining the entire area before pushing the inspection interlock, located just inside the sliding lead door. Within thirty (30) seconds, the operator will slide the lead door shut and leave the room, closing the personnel entry door. The console key will be inserted in the console and the panel activated. The operator will open the shutter, go to the personnel entry door, listen to assure that the warning buzzer is sounding within the radiation room, and look up to see that the radiation lights are lit. Opening the door, the operator assures that the shutter automatically shields the source. After opening the door, the operator quickly notes the condition of the set of two (2) red and two (2) opal lights just outside the sliding lead door, assuring that the red lights go off and the opal lights come on, indicating that the source shutter has closed and that the interlocks have functioned correctly. The operator will reset the visual and audible alarm on the radiation monitor just inside the door. A single test will suffice for a series of irradiation procedures with no intervening period of non-operation.

If any of the preliminary tests does not demonstrate proper functioning, the operator will implement the Emergency Procedure for malfunctions. Following the safety check assurances, the operator closes the doors, as above, and the exposure procedure may be initiated. If the facility is to be operating and unattended for a period of more than four hours, the user is to arm the security alert system by calling the security console attendant.

III. Fire Safety

The Fire Protection Group has confirmed that the only source of ignition in the room is electrical. The Responsible Facility Operator permits no storage of flammables, explosives, or combustibles in the radiation room that can cause a fire threat to the integrity of the source capsules or the functioning of the shutter. Heat and smoke detectors are mounted at the ceiling level. These signal the security console in Bldg. 101 and at the Fire Station console of fire conditions. The fire protection personnel responding to a signal will stop at the personnel entry door and await the arrival of the Responsible

Facility Operator or Health Physics.

IV. Emergencies

An emergency instruction protocol is posted at the entrance to the facility. In case of facilty malfunction or fire, the operator is to close the shutter, if possible. The shutter automatically closes in case of electrical power or air pressure loss.

IV. Other Hazards

An individual may not work alone in the radiation room when the beam catcher pit is uncovered. Safety shoes and safety glasses should be considered to help avoid work-related injury.

V. Posting and Labeling

The source heads will be labelled with CRM signs with nuclide and dated quantity information. The personnel entry door will be labelled with CRM and with "Grave Radiation Danger" posters. Two (2) red and two (2) opal lights will be inside the personnel entry door, to indicate shutter closed (opal) or shutter open (red) condition. At least one (1) red light will be visible outside the personnel entry door to indicate shutter closed (light OFF) or shutter open (light ON) condition. The lights are triggered by a radiation monitor within the radiation room but not in the direct beam.

VI. Facility Supervisors

The Responsible Facility Operator is Paul Lamperti, ext. 5591. The alternate RFO is Jileen Shobe, ext. 5595.

VII. Operator Training

Operators will be annually trained and tested by Health Physics or by the Responsible Facility Operator or a designated alternate. Training will include safety features such as safety interlock assurance testing, emergency procedures, and contact lists for response personnel, e.g., Health Physics. A list of current trained operators will be maintained at the console, with annual updating. The Responsible Facility Operator will assure that interim training information on such matters as facility or operational changes, reports of incidents from this or similar irradiation facilities is made available to trained operators to supplement the training required for this facility.

INCIDENT ANALYSIS ADDENDUM

The maximum loading of 12 kCi of ^{60}Co yields a maximum exposure rate in the direct beam of about 108,000 R/h at a distance of 1.5 m down from the head. Using a rule-of-thumb of 0.1% for the exposure scattered at right angles from the direct beam (see: NCRP Report No. 49, Table B-2, page 59), that exposure rate would be 108 R/h. Thus a person inadvertently entering the room would be overexposed in about three minutes, a time quite adequate to notice that the shutter condition was not the normally closed position expected.

To date, after many thousands of individual source uses, there has never been a safety feature failure that permitted any person to put himself or herself at risk from an unshielded source. Safety features include at least nine individual interlocking shutter controllers for the entry door, the sliding lead door, air pressure, electrical power, and console switches, and at least seven individual interlocking warning controllers for the radiation monitor systems. In an elementary approach, using an extremely conservative statistical analysis, i.e., for the incredible event case, consider that there is a one-in-one thousand probability of failure for any individual shutter controller or radiation alert mechanism; then the overall probability of a failure that could lead to inadvertent overexposure is $(10^3)^{16}$, or one chance in 10^{48}.

Enclosure 2a

This enclosure is a set of the pages proposed as replacements for the existing pages in Part I of the NIST Materials License Document dated 6/19/97, with lines involved in changes highlighted.

PAGES INVOLVED
I-1-3
I-2-4
I-3-4

Enclosure 2b

This enclosure is a set of the pages submitted as replacements for the existing pages in Part II of the NIST Materials License Document dated 6/19/97, with lines involved in changes highlighted.

II-8-2
II-8-3
II-8-4 (new)
II-9-3
II-10-2
II-10-3
II-11-3
II-11-5

Among the types of activities that may be authorized, the following topical list illustrates typical projects that may exist. Also listed are those buildings that would most probably be involved in a particular type of activity, although special authorizations by Health Physics could alter the locations listed.

- materials and equipment irradiations - Bldgs 235 and 245
- source preparations - Bldgs 220-226, 235, and 245
- source calibrations - Bldgs 220-226, 235, and 245
- instrument calibrations - Bldgs 220-226, 235, and 245
- sample assays - Bldgs 220-226, 235, and 245
- source characterizations - Bldgs 220-226, 235, and 245
- instrument and device characterizations - Bldgs 220-226, 235, and 245
- reference or counting source uses - Bldgs 101, 220-226, 235, and 245
- radiochemistry - Bldgs 220-226, 235, and 245
- general research and development - Bldgs 101, 220-226, 235, and 245
- sources incorporated into devices or equipment - Bldgs 101, 220-226, 235, and 245
- miscellaneous, e.g., static elimination - Bldgs 101, 220-226, 235, and 245

1.8 Special Authorizations

a. We request that radioactive material use be authorized at off-site locations subject to the following provisions:

- the proposal is reviewed and approved by Health Physics and, if required, by the Ionizing Radiation Safety Committee.
- NIST is responsible for the safe use of the radioactive material, which is controlled by an authorized individual who possesses written operating instructions while engaged in the project.
- the radioactive material is an integral part of a measurement instrument or a contained source, such as a check or reference source.
- lead-in-paint detectors may not exceed 100 millicuries of cadmium-109 or americium-241 as sealed sources in each device, otherwise the total quantity of radioactive material for a single authorized use may not exceed ten times the activity listed in 10CFR20, Appendix C, or, for those radionuclides not listed in Appendix C, may not exceed one microcurie of activity.

b. We request authority to release contaminated equipment to uncontrolled areas in accordance with the USNRC's April, 1993 "Guidelines for decontamination of facilities and equipment prior to release for unrestricted use or termination of licenses for byproduct, source, or special nuclear material."

c. We request exemption from 10 CFR Part 36, Sections 23(a), 23(b), 23(c), 23(d), 27(a), 27(b), 31(a), and 67(a), in accordance with our letters of March 24, 1999.

Supervisory Health Physicist conduct radiation workplace safety observation tours at least quarterly for those workplaces that pose significant potential for radiation exposures or releases of radioactive materials, following written plans. Results of the tours are documented and corrective action needs found during the tours are transmitted to workplace supervisors in a timely fashion.

2.9 Investigations and Reporting of Off-Normal Occurrences

Health Physics, based on reports from Division Chiefs or workers, or on results of monitoring or surveillance, investigates suspected off-normal occurrences. The Chief, Occupational Health and Safety Division, reports these conditions to authorities and to management, as required by applicable regulations, procedures, and license conditions.

2.10 Records

Health Physics maintains documentation on the results of required monitoring and surveillance, the results of approved proposal reviews, off-normal occurrence investigations, and other radiological safety program information, sufficient to demonstrate the adequacy of the radiological safety program. The Ionizing Radiation Safety Committee documents and retains information on audits and provides reports to management as required. Retention times for documents are as required by regulations or for at least two years.

2.11 Fire Protection

A Fire Protection Group in the Facilities Services Division provides a trained fire and emergency response organization. Any proposed laboratory or facility construction or modification must be reviewed by and have the approval of such management interests as representatives of the Chief of the Occupational Health and Safety Division and the Chief of the Plant Division, and the Fire Protection Specialist or his designated representative. Members of the staff of the Fire Protection Group are trained to the equivalent of Fire Fighter III level. Maintenance of fire fighting equipment is conducted according to written procedures. Extensive pre-fire plans exist, with information on locations of radioactive materials, flammable materials, and other hazardous materials, and includes fire fighting protocols for those areas. The plans include locations of water supplies, storage areas, and other appropriate information. The Fire Protection Group maintains extensive documentation on maintenance and deployment of equipment, pre-fire planning, facility characteristics, training, results of actual occurrences, etc.

2. The periodic leak test required by this section does not apply to sealed sources that are stored and not being used. Prior to any use or transfer to another person, the source shall be leak tested within 6 months prior to the date of use or transfer.

B. The 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 kept in units of microcuries and maintained for inspection by the USNRC.

If the test reveals the following:

1. The presence of 0.005 microcuries or more of removable contamination from the sealed sources other than described below, or
2. An indication that the sealed source which is stored in the water pool for shielding purposes is leaking, then

NIST shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired by a person appropriately licensed to make such repairs or to be disposed of in accordance with USNRC regulations.

Within 5 days after determining that any source has leaked, NIST shall file a report with the Division of Fuel Cycle Safety and Safeguards, USNRC, Washington, D. C. 20555, describing the source, test results, extent of contamination, apparent or suspected cause of source failure, and corrective action taken. A copy of the report shall be sent to the Administrator of the NRC Regional Office for Region I.

8.4 Maps, Buildings, and Site Information

Attachment 1 contains a NIST site plan and a topographical representation, building locations on site, and floor plans for buildings. The site exhibits a gently rolling topography and contains both open and wooded areas. Buildings include a central complex of the main administration building and several general purpose buildings designed to contain laboratories that accommodate customary scientific research and development functions, buildings that house the support functions ranging from grounds management, heating and air conditioning, and the like, to procurement, and special purpose laboratory buildings that are dedicated to specific research and development functions. This last category includes the Reactor and the Radiation Physics Buildings, where the majority of the work involving radiation and radioactive materials is conducted.

8.5 License History

Table II.8-2 shows a chronological ordering of licensing history at NIST for radioactive materials. This history tracks licenses to the most recent renewal. In some cases, e.g., for 08-00566-05, the byproduct material license, a full history would extend to more than thirty years with many amendments and renewals. In 1980 a Materials License Manager was named to bear responsibility for licensing other than for the NIST Reactor. In 1985, five major licenses were consolidated into the single SNM-362 license.

TABLE II.8-2
NIST MATERIALS LICENSING SUMMARY

YEAR	LICENSE	ACTION (identifier)
1997	SNM-362	renewal
1990 - 1994	SNM-362	amendments 1 - 4
1985 - 1990	SNM-362	amendments 1 - 4
1985	08-00566-05, 08-00566-10, 08-00566-12, SMB-405, SNM-362	consolidation, incorporation into License No. SNM-362
1983	08-00566-05	Class I irradiator request
1982	all	Ionizing Radiation Safety Committee
	08-00566-05	change in limits (byproducts)
	all	personal dosimetry technique
1981	SNM-362	filter process (SNM)
	SNM-362	change in limits
	08-00566-10	renewal (teletherapy)
1980	SMB-405	license manager named (source)
1979	SNM-362	renewal
	08-00566-05	change in limits
1978	SMB-405	renewal
	08-00566-12	renewal (irradiator)
1977	08-00566-05	renewal

8.6 Changes in Procedures, Facilities, and Equipment

NIST employees and other individuals working on the NIST site are responsible for obtaining authorizations from Health Physics for radiation source acquisitions, for any modifications in radiation source use that might affect radiological safety, or for disposition of radiation sources. Division Chiefs are responsible for ensuring that staff members comply with radiological safety rules and that staff members are aware of radiological safety procedures. The Chief, Occupational Health and Safety Division, is charged with managing the radiological safety program and with representing the National Institute of Standards and Technology in all matters relating to materials licensing. The Chief, Health Physics, is charged with administering the radiation safety program at NIST, including maintaining documentation to demonstrate the adequacy of the radiological safety program. The Ionizing Radiation Safety Committee is responsible for reviewing major radiation facility proposals and significant proposals for use of radiation, including modifications to existing facilities, and for assuring the performance quality of operations that provide radiological safety assurance.

8.7 Examples of Operations That Might Be Conducted

As an example of the miscellany of types of work done at NIST, consider NCRP Report No. 58, *A handbook of radioactivity measurements procedures, second edition*. Of the fifteen consultants listed in the preface to the first edition, ten were from one working group within NIST (then NBS), as well as the chairman of the scientific committee. The preface to the second edition names twenty-four persons who made contributions to that edition. Of those, fifteen were NIST (then NBS) personnel, including Health Physics staff members. The wide variety of operational activities and of radionuclides described in the publication, essentially the product of only one of the groups at NIST, illustrates the extremely broad scope of work done at NIST.

For the specific nuclides listed in Table I.1-1, the following examples of research, development, and other activities will suggest the variety of operations involving radioactive materials at NIST. Uranium at any enrichment, from depleted through 99.9% ^{235}U, ^{233}U, any nuclide of plutonium, and thorium, might be used in metallurgical research, for beam transmission studies, in neutron beam research, for check sources, or as beam filters. Sealed sources of ^{238}Pu are used as thermal sources. PuBe, PuLi, and other sealed Pu-X sources are used in neutron research and are calibrated for customers. Sealed sources of ^{60}Co, ^{137}Cs, ^{210}Po (sometimes as PoBe), ^{241}Am, ^{252}Cf, or ^{90}Sr might be used in research requiring photon, neutron, or beta radiations, for instrument calibrations, in neutron physics research, medical device (implant seeds, eye irradiation applicators, etc.) calibrations and research, or basic nuclear chemistry and physics research such as half-life studies. Miscellaneous byproduct materials, including materials and containers irradiated in the NIST Reactor and brought out of the Reactor licensed area, might be used as check sources, in laboratory intercomparison tests and studies, for light sources, for basic radiochemistry and nuclear physics research, for sample preparations for authorized customers, or in research for medical or other specific laboratory types.

Wastes with short half-lives are treated by decay-in-storage. Disposal of decay-in-storage waste, as provided in 10CFR20.2001(a)(2), is in accord with conditions given in 10CFR35.92.

9.5 Chemical Systems

Nonradioactive chemical operations are the responsibility of the Environmental Compliance Group of the Occupational Health and Safety Division. Any facility or operation involving toxic materials is reviewed to insure compliance with appropriate regulations.

9.6 Fire Protection

The buildings and facilities at NIST were constructed in accordance with applicable regulations for Federal facilities in effect at the time of construction and are maintained under the fire protection auspices of the Fire Protection Group of the Facilities Services Division. The coverage by this trained fire and emergency response group includes around-the-clock fire, emergency medical, and hazardous material response capabilities

The Fire Protection Group reviews facility plans, including locations of fire hydrants, sprinkler systems layouts, access pathways, and other layout information related to fire fighting. The plans are maintained in the offices and workspace of the Fire Protection Group work area. Training of fire fighters is according to the State of Maryland and local County having authorization, in conjunction with NFPA. Materials and equipment available to the Fire Protection Group include appropriate vehicular firefighting apparatus, water supply systems, automatic sprinkler systems, portable fire extinguishers, protective clothing, and tools used in fighting a variety of fires, e.g., structural, vehicular, etc. Maintenance and deployment of fire fighting equipment is in accordance with NFPA codes. Extensive pre-fire plans have been developed incorporating information on location of radioactive materials, flammable substances, and hazardous materials storage areas. The plans include fire fighting protocols for those areas, with locations of water supplies, automatic fire fighting response mechanisms that might be employed, and other pertinent information. The Fire Protection Group maintains extensive documentation on deployment and maintenance of equipment, pre-fire planning, facility characteristics, training of personnel, results of actual occurrences, etc. Portable fire extinguishers are deployed according to NFPA 10; these are commonly dry chemical and CO_2 types. In addition, portable extinguishers are commonly located in each laboratory and building hallways. Portable fire extinguisher agency is determined by the fire load in the area of work. Building entrances and stairwells have standpipe connections; fire hydrants are located at various positions on the exterior of buildings. The loading dock of Building 245 has a sprinkler system.

Laboratories are monitored with automatic fire alarm devices activated by heat or smoke, or both. The fire alarm device type is determined by the fire hazard within the work area covered. Manual fire alarm boxes (pull stations) are located according to the NFPA code. Upon activation of any alarm, the signal is received at two locations: in the Fire Station in Bldg. 303 and in the Security Office in Bldg. 101.

radiation safety program.

10.1.4 Division Chiefs

Each Division Chief managing radiation work is responsible for the following:

a. Ensuring that staff members comply with radiation safety rules in implementing the NIST radiation safety policy;

b. Ensuring that staff members are aware of radiation safety procedures and receive training as required;

■ c. Reporting potential items of substantial safety hazard as defined in 10CFR21.3(k) to the Chief, Health Physics, within 24 hours of occurrence or discovery, except for items relating to the Reactor license which are to be handled according to that license; and

d. Reporting significant radiation safety matters to his or her supervisor.

10.1.5 Staff

NIST employees and other individuals working on the NIST site are responsible for the following:

a. Observing approved radiation safety rules;

b. Consulting with Health Physics early in the planning of operations that might involve radiation sources;

c. Obtaining authorization from Health Physics for radiation source acquisitions, for any modifications in radiation source use that might affect radiation safety, or for disposition of radiation sources;

d. Notifying Health Physics of any occupational radiation exposure from work at facilities other than NIST;

e. Immediately informing Health Physics upon discovery of loss or theft of any radioactive materials;

f. Immediately informing their supervisors and Health Physics of accidents involving radiation or radiation sources; and

■ g. Informing their supervisors of defects that could create a substantial safety hazard.

10.2 Organization

Members and alternates of the Ionizing Radiation Safety Committee are named by the Deputy Director of NIST. The current list, with organizational titles, is:

(Chair) Dr. Bert M. Coursey,	Director, Ionizing Radiation Division (IRD), Physics Laboratory (PL)
(Vice Chair) Dr. Richard M. Lindstrom,	Research Chemist, Nuclear Methods Group, ACD, CSTL
Dr. James M. Adams,	Research Physicist, Neutron Interactions and Dosimetry Group, IRD, PL
Mr. Jeffrey T. Cessna,	Research Chemist, Radioactivity Group, IRD, PL
Dr. Heather H. Chen-Mayer,	Research Chemist, Nuclear Methods Group, Analytical Chemistry Division (ACD), Chemical Science and Technology Laboratory (CSTL)

Mr. Keith H. Eggert,	Safety Engineer, Environmental Compliance Group, Occupational Health & Safety Division (OHSD), Office of the Director of Administration (Admin)
Mr. Douglas M. Eagleson,	Supervisory Health Physicist, Health Physics Group, OHSD, Admin
Mr. Thomas G. Hobbs,	Chief, Health Physics Group, OHSD, Admin
Dr. Santos Mayo,	Physicist, Semiconductor Electronics Division, Electronics and Electrical Engineering Laboratory (EEEL)
Mr. J. Franklin Mayo-Wells,	Staff Assistant for Technical Coordination/Operations, EEEL
Mr. Lyman E. Pevey,	Chief, OHSD, Admin
Dr. Henry J. Prask,	Physicist, Neutron Scattering Group, NIST Center for Neutron Research (NCNR), Materials Science and Engineering Laboratory (MSEL)
Dr. J. Michael Rowe,	Director, NCNR, MSEL
Dr. Francis J. Schima,	Research Physicist, Radioactivity Group, IRD, PL
Dr. Christopher G. Soares,	Research Physicist, Radiation Interactions and Dosimetry Group, IRD, PL
Dr. David S. Simons,	Leader, Analytical Microscopy Group, Surface and Microanalysis Science Division (SMSD), CSTL
Mr. Lester A. Slaback, Jr.,	Supervisory Health Physicist, Health Physics Group, OHSD, Admin
Ms. Cynthia J. Zeissler,	Physical Scientist, Analytical Microscopy Group, SMSD, CSTL

11.6 Surface Contamination

Table II.11-1, Controls and Action levels, and Table II.11-2, Administrative Action Levels and Actions, list controlling levels for surface contamination. Measurements for surface contamination checking and protective measures are described in sections II-11.1, II-11.4, and II-11.7 of this manual.

Hand and shoe monitoring may be performed with conveniently placed equipment; resuspension factors for transforming surface contamination levels to airborne activity concentrations are applied as described in section II-11.5 of this manual.

11.7 Shipping and Receiving

All radioactive materials received at NIST and all radioactive materials shipped from NIST are controlled by Health Physics. Usually, incoming packages are brought to the Health Physics receiving area in Building 245, unless alternate provisions are made with the ultimate recipient. In either case, surveys for compliance with transport regulations are made within time limits specified by the regulations. Health Physics and the recipient then survey the package and contents and determine if the shipment is acceptable for incorporation into the project for which the source is intended. Usually, outgoing packages are held in the NIST shipping area in Building 301 until Health Physics or a designated representative checks the package for compliance with transport regulations.

Type B shipments are made in accord with the provisions of the quality assurance program as detailed in a separately submitted document.

If an incoming shipment shows contamination at any level of packaging, the package is held in the Health Physics or other designated storage area until a decision is made, jointly between Health Physics and the recipient, on returning the source, decontaminating the source, disposing of the materials, or establishing proper controls for safe use of the source.

11.8 Posting and Labeling

Table II.11-1 shows control mechanisms and action levels under which radioactivity operations are permitted. The contamination limits shown represent a departure from customary practice in that specific nuclide limits are provided for beta-emitting nuclides when the identity of the nuclide is known. As an ALARA precaution, Health Physics requests decontamination of areas in which any detectable contamination above normal background levels are found. Health Physics review may result in a determination that actions other than described in this table should be implemented. Such alternate actions are documented by Health Physics.

11.9 Surveys

Health Physics performs weekly routine surveys of a laboratory in which unsealed radioactive material is utilized when the initial proposal or subsequent evaluation of the work environment demonstrates that levels could exceed the levels at which posting is required, as shown in Table II.11-1. As specified by Health Physics, the surveys could include smear tests of surfaces, radiation level tests, radiation quality tests, air activity contamination tests, or combinations of these, and other radiation safety assurance procedures. For special situations, such as maintenance, similar surveys, time and motion studies, or practice sessions on mock

contamination might be expected to accumulate. Sources will be immediately withdrawn from use and action taken to repair or dispose of the source, and appropriate actions taken to notify the NRC, if the following limits are exceeded for removable contamination:

- any indication of leakage from the irradiator sealed source in the water shielding pool.
- 0.005 microcuries or more from any other sealed source.

11.12 Respiratory Protection

Health Physics may issue dust stop or similar particulate breathing masks for dusty work environments. At the conclusion of the job, Health Physics retrieves the masks and prepares them for reuse.

11.13 Protective Clothing

Health Physics maintains a nominal supply of various protective clothing items, including gloves, shoe covers, coveralls, head covers, etc. These are freely available as needed for issue to laboratory workers using dispersable radioactive materials. For situations requiring protective clothing beyond the normal issue quantities, the requesting work unit may be asked to replenish the supply.

11.14 Reports and Records

The Chief, Occupational Health and Safety Division, documents management and authority notifications resulting from reports from Health Physics on off-normal investigations. Health Physics maintains documentation on routine and special radiological surveys, personnel monitoring, licensing interactions with NRC, instrument calibrations, ALARA reviews and findings, employee training and familiarization, environmental monitoring, and source control. The Chairperson of the Ionizing Radiation Safety Committee maintains records of meetings of the Committee, Committee audits, and special reviews and investigations by the Committee. Normal retention time for these records and documents is two years unless otherwise specified by regulations.

11.15 Administrative Control Levels

Table II.11-2 describes the administrative action levels and the actions taken at those levels to control radiation and radioactive materials in specific situations and under specific conditions.