NRC FORM 313 (3-2009) 10 CFR 30, 32, 33, 34, 35, 36, 39, and 40

U.S. NUCLEAR REGULATORY COMMISSION

APPLICATION FOR MATERIALS LICENSE

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 3/31/2012

Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

OFFICE OF FEDERAL & STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS
DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

LICENSING ASSISTANCE TEAM
DIVISION OF NUCLEAR MATERIALS SAFETY
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
612 E. LAMAR BOULEVARD, SUITE 400
ARLINGTON, TX 76011-4125

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S.NUCLEAR REGULATORY COMMISSION JURISDICTIONS.

1. THIS IS AN APPLICATION FOR (*Check appropriate item*)

- [ ] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER
- [X] C. RENEWAL OF LICENSE NUMBER 13-09639-05

2. NAME AND MAILING ADDRESS OF APPLICANT (*Include ZIP code*)

Indiana State University
Parson Hall
200 North 7th Street
Terre Haute, IN 47809

3. ADDRESS WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED

Main Campus
Terre Haute, IN 47809

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Dale Manwaring

TELEPHONE NUMBER

work 812-237-2050
cell 812-201-4080

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
   a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time.

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSE FEES (*See 10 CFR 170 and Section 170.31*)
FEE CATEGORY Exempt AMOUNT ENCLOSED $ -0-

13. CERTIFICATION. (*Must be completed by applicant*) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR 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 – TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Mark D. Green, Chief Research Officer	[signature]	5/16/12

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		
APPROVED BY				DATE	

PRINTED ON RECYCLED PAPER

RECEIVED MAY 2 9 2012

8.5	1.a. Hydrogen-3	b. Any	c. 250 millicuries
	2.a. Carbon-14	b. Any	c. 30 millicuries
	3.a. Phosphorus-32	b. Any	c. 180 millicuries
	4.a. Phosphorus-33	b. Any	c. 10 millicuries
	5.a. Sulfur-35	b. Any	c. 100 millicuries
	6.a. Iodine-125	b. Any	c. 45 millicuries
	7.a. Iodine-131	b. Any	c. 10 millicuries
	8.a. Chromium-51	b. Any	c. 50 millicuries
	9.a. Calcium-45	b. Any	c. 4 millicuries
	10.a. Rubidium-86	b. Any	c. 7 millicuries
	11.a. Cesium-137	b. Sealed source	c. 1 source not to exceed 10 millicuries

8.6 Authorized use:

a. In 8.5 above 1.a. through 10.a. will be used for laboratory research and development and student instruction as defined in 10 CFR 30.4.

b. 11.a. above the sealed Cesium-137 source will be used for calibration of the licensees survey instruments and Rose – Hulman Institute of Technology's survey instruments in accordance with the licensee's survey instrument calibration procedures and while in the physical presents of the Licensee's Radiation Safety Officer.

The 2 - Ra-226 sealed sources (Stock Equipment Co. #1-X2539) added to this license in amendment 20 have been disposed of to burial and are no longer to be listed on the license.

8.7 Radiation Safety Officer: Dale Manwaring is the Radiation Safety Officer (RSO) on this license. After training at Oklahoma State University under Dr. Howard Johnson in 1985-6 Dale trained for 5 years under Dr. John Swez with the former Co-60 NRC license # 13-09639-03 and the then Broad Scope A NRC license # 13-09639-05 at ISU. Since that time the RSO has had over 20 years of experience as assistant RSO and then RSO for the current NRC license # 13-09639-05 held at ISU.

8.7.1 Senior Management and chain of command: Senior Management is cognizant that the RSO must have sufficient authority, organizational freedom and management prerogative to communicate with and direct personnel regarding NRC regulations and license provisions. The Chief Research Officer at ISU will be the signing authority for the NRC license.

Oversight of the RSO and the Radiation Safety Program will be through the Vice President of Business Affairs, Finance and University Treasurer. Direct supervision will be through the Director of Environmental Safety. One or both of these people will communicate with the RSO and the NRC in matters such as NRC inspection (exit interviews) and quarterly reports from the RSO. The RSO will report to the Director through regular reports and meetings where necessary.

8.7.3 Duties of the RSO: The duties of the Radiation Safety Officer include, but are not limited to the following:

1. Maintain surveillance of overall activities involving radioactive materials, including monitoring and surveying of all areas in which radioactive materials are in use.
2. Determine compliance with rules and regulations, license conditions, and the approval of conditions for projects and research.
3. Monitor and maintain absolute and other special filtering systems associated with the use, storage and disposal of radioactive materials.
4. Provide necessary information on all aspects of radiation protection to personnel at all levels of responsibility, pursuant to 10 CFR Part 19.12 and 10 CFR Part 20.
5. Oversee proper delivery, receipt and conduct surveys of all shipments of radioactive material arriving or leaving ISU. This includes the oversight of proper labeling and packaging of all radioactive materials shipped to waste disposal from ISU.
6. Distribute and supervise the processing of personnel radiation monitoring devices, determine the need for and evaluate bioassays, monitor personnel radiation exposures and bioassay records for trends above "ALARA". Notify individuals and their supervisors of radiation exposures approaching maximum permissible limits and recommend appropriate remedial actions.
7. Conduct training programs and otherwise instruct personnel in proper procedures for the use of radioactive materials prior to use, at periodic intervals, and as required by changes in procedures, equipment and regulations.
8. Supervise and coordinate the radioactive waste disposal system including effluent monitoring and record keeping of waste storage and disposal.
9. Store radioactive materials not in current use including wastes awaiting disposal.
10. Perform inventory and leak testing on all sealed sources and calibration of radiation survey instruments.
11. Maintain an inventory of all radioactive material at ISU and limit the quantity of radionuclides to the amount authorized by the license.
12. Immediately terminate any activity that is found to be a threat to public health and safety or property.
13. Oversee the supervision of decontamination and recovery operations and maintain records of such incidents.
14. Maintain records of receipt, transfer and surveys as required by 10 CFR Part 30.51, "records" and subpart L, "records' of 10 CFR Part 20.
15. Provide periodic reports to licensee management.
16. Evaluate and approve permit applications as well as research proposals by individuals wishing to use radioactive materials at ISU.

Radiation Safety Officer Declaration of Authority

We certify that the individual named on this license to perform the function of Radiation Safety Officer:

1. Has read and understands the NRC regulations applicable to this license and is aware of the specific conditions of this license.
2. Has sufficient technical knowledge to perform the duties of Radiation Safety Officer.
3. Has and will continue to have sufficient time to perform the duties of Radiation Safety Officer.
4. Has and will continue to receive sufficient resources to accomplish the tasks required of the Radiation Safety Officer.
5. Is completely willing to perform the functions of the Radiation Safety Officer and
6. Has and will continue to receive the support of management of this licensee in ensuring that all licensed activities are conducted in accordance with NRC regulations and the specific terms of the license.

The Radiation Safety Officer has the authority to immediately stop any operations involving the use of radioactive materials in which health or safety may be compromised or may result in non-compliance with NRC regulations.

[signature] Radiation Safety Officer

5/15/12 Date

[signature] Certifying Official

5/16/12 Date

8.8 Training and requirements of education for Principal Investigators (PI), Radiation Workers (RW), and Ancillary Personnel (AP):

Principal Investigator requirements: all permit applicants must have at least an education level of BS or BA from a four year institution in the biological, medical, chemical, health physics or related fields. Most applicants have a PHD and many years of experience with radioactive materials but each will be evaluated for minimum requirements of education and at least 5 years of experience with requested radionuclides.

In addition to the above each new PI will be required to attend at least the first 2 hour session for radiation safety training conducted by the RSO. This will give the new employee an overview of the specific license conditions at ISU and a review of the NRC regulations.

Radiation Workers requirements: Each new student or employee assigned to work in a permitted area is required to attend the RSO's Radiation Safety Training Class or to pass the class exam with 80% or better results. This is a 10 hour study of proper procedures for handling radioactive materials at ISU.

1. Orientation during the first – 2 hour session consists of an introduction to the university's Radiation Safety Handbook. Special 'in house' rules. NRC form #3, the pregnancy rule, the 'ALARA' concept and location of pertinent regulations, licenses and other documents.
2. The remainder of the course 4 – 2 hour sessions consists of: Fundamentals of radiation, radioactivity measurements and biological effects from possible overexposure. Appropriate radiation safety procedures will be covered. The NRC 'ALARA' concept will be referred to throughout the remaining sessions. Hazards involved in handling each isotope used at ISU and how to safely store, use and dispose of these materials. Demonstration of the proper technique of use and surveillance and maintenance of monitoring equipment will be emphasized. And appropriate emergency and unsafe conditions response will be discussed.
3. There is a test conducted at the end of the last session which requires an 80 % correct response or better for each RW in order to begin working in the permitted area.

The RW is then moved into the specific research area where the PI will train the RWs in specific conditions and procedures different for each permit area. Classes are a combination of lecture/demonstrations and are all conducted by the RSO. Refresher courses are provided by the PI for each permit as necessary.

Ancillary Personnel Training: Ancillary personnel or non Radiation Workers who frequent permitted area are trained by the RSO. Each academic year security and custodial staff assigned to the Science Building are given a refresher course to remind them of potential hazards associated with entering radiation research areas at ISU. The brief class consisting of a 1 hour session involves:

A brief background of radiation work at ISU.

The meaning of radiation warning signs on doors and equipment in research areas.

Who the RSO is and where his office is located.

What is permitted to do inside a permitted area and what is not.

A brief tour of one of the active radiation areas, where practical, is provided to show where material is stored and how to avoid contact with material. Because the RSO position is now part time the burden of responsibility for monitoring ancillary personnel where requested falls on the PI in charge of the permitted area. The RSO remains in a supervisory capacity of all incidents and accidents and is in charge of permitted areas when on site.

8.9 Facilities and Equipment – Security for radioactive materials is taken very seriously at ISU. We pride ourselves on modern laboratories with easy access for students which runs contrary to good security practices. Our solution has been to develop a lock box system in all Radiation Permit Areas. The acrylic lock boxes contain all stock solutions of radioactive material attached inside refrigerators/freezers and cabinets. The acrylic boxes also help shield personnel from beta/gamma sources keeping exposure possibilities 'ALARA'.

Key access is allowed during experimentation by the PI, RW and the RSO also has access with a separate key. This ensures good security of radioactive materials in accordance with NRC regulations and minimizes exposure time in each permitted area. Radioactive waste is stored in locked cabinets also where practical after experimentation until removed by the RSO to our Radiation Waste Storage Facility.

All fume hoods in active permitted areas in the Science Building are filtered with HEPA and charcoal filters to maintain 'ALARA' for environmental effluents at ISU. The maintenance, calibration and monitoring of these filtered hoods is provided by the SOB of the Science Building along with supervision by the RSO.

Sewage disposal has a designated sink for all long lived isotopes and all sink disposal is done by the RSO only to this sink located in Science Building room 137. This sink is swipe tested each quarter to ensure 'ALARA' for others using this room.

All secured storage locations and equipment are marked with warning signs and ancillary personnel are made aware of the possible hazard behind these signs.

Laboratories used for radioisotope work at ISU have all been constructed of concrete block walls or poured concrete walls, floors and ceilings. Floors have been overlaid with tile or covered with a modern sealed seam wall to wall covering. Most bench tops are made of a synthetic non-porous surface. Walls are painted and drop ceilings with adequate lighting are provided. All laboratories with approved permits have a dedicated, filtered and calibrated fume hood for radioisotope work.

Each laboratory is classified based on the IAEA Safety Standards found in Appendix L. The classification of three types of labs is as follows:

A. Class A. labs are High Toxicity labs that use material from group 2, 3 and 4 and/or large amounts of total possession limits when the isotopes are totaled together. The amounts permitted exceed 100 millicuries total maximum permissible possession.
B. Class B. labs are those Moderate Toxicity labs that use materials from only group 3 and 4 and/or the total maximum possession limits of all isotopes is above 50 millicuries but below 100 millicuries.
C. Class C. labs are low toxicity labs that use only material from group 4 and/or whose total possession limit is less than 10 millicuries combined.

Based on the above classification each permit is considered at the time of application to ensure that adequate facilities and equipment are present for the work to be accomplished 'ALARA'.

Air monitoring and bioassay are available from the RSO where needed. In 1995 the last air monitoring of an I-126 was performed. That year the EPA Effluent Survey indicated that our total possession limit without Iodine isotopes was low enough to pass at level 1 on the EPA Survey. There has not been an Iodine-131 or 126 done since that time. Air monitor and bioassay have not been needed since but the instruments can be recalibrated if Iodine materials are ever ordered again.

8.10 Radiation Safety Program

8.10.1 Audit Program. The RSO annual audit consists of an internal revue of each aspect of the Radiation Safety Program. In general the basis for the revue relies on the RSO quarterly inspections. Inspections are performed unannounced and include but are not limited to surveys and monitoring of the permitted area for contamination and/or improper storage/use of materials. Checks are made of procedures if ongoing at the time of inspection and discussion of current activities is instigated if a PI or RW is present at the time of inspection.

The quarterly reports are added to the audit records along with training, effluent surveys and other program activities annually in order to evaluate the entire program. Any changes made by the NRC, RSO or the ISU administration are also considered that have occurred during the academic year. The assembly of all relevant materials allows for a thorough audit of the program and where the program can be improved or where mistakes have been made. Any changes made to the program are then incorporated in training sessions or where appropriate changed in the Safety Manual.

8.10.2 Radiation Monitoring Instruments. The RSO has two instruments used for basic radiation monitoring. A WB Johnson GM meter with external pancake probe and a Protean Instrument Corporation gas proportional instrument MPC 9400. The GM instrument is calibrated with a Cs-137 sealed source according to the method found in NUREG -1556 Vol. 11 Appendix O.

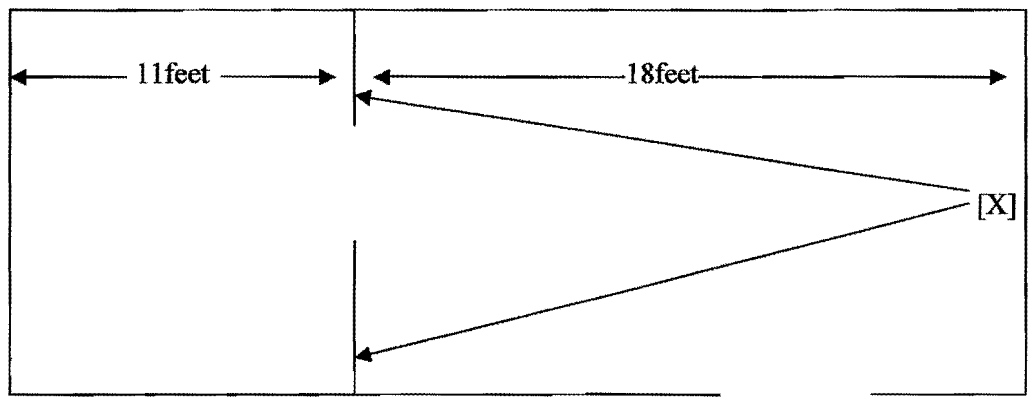
The gas proportional instrument is calibrated against a Tc-99 source at each use. Both instruments are calibrated in Science Building room 137A and the basic layout for Cs-137 calibrations is as follows:

The Cs-137 source is exposed through a ¼ inch port facing room S-137A during calibrations. A computer program calculates three distances from the source for each scale of the meter to be read based on decay over time. A mechanical probe holder is used for the first 2 meters so that exposure of the RSO can remain 'ALARA'.

Using this system three readings are taken for each scale using the true reading distances and meters are adjusted to be within the 20 % accuracy required by the NRC. Any instrument that does not fall in this category is removed from service and sent back to the company for repairs and recalibration.

The following diagram shows the basic layout for this simple calibration procedure:

The [X] marks the location in room 137A where the Cs-137 sealed source is located inside a three inch thick lead shield (a series of lead bricks covering all sides and top and bottom of the source).



Room 137A

With the source opened readings of all the spaces beyond room 137A are as follows:

Below the room in the basement of the Science Building room S-019A reads	.03 mR/hr.
Above on the second floor S-237 and S-239 reads	.03 mR/hr.
Room S-137 to the north reads	.04 mR/hr.
Room S-135 to the south reads	.02 mR/hr.
The public hallway west of the Radiation Safety Office reads	.03 mR/hr.
The reading directly in front of the open source at 6 meters reads	.05 mR/hr.
Background in room S-137A has been determined at	.05 mR/hr.

A NIST traceable C-14 standard can be used to determine efficiencies of the meter for weak beta emitting isotopes.

For H-3 which is the most frequently used isotope at ISU at present, liquid scintillation counters are normally used for contamination control by the PIs. The RSO uses the PIC MPC 9400 gas proportional counter in place of liquid scintillation for its ease in allowing the transporting of dry swipes from research labs back to the counter located in S-137A. This instrument is calibrated with a NIST traceable Tc-99 standard during each use of the proportional counter.

8.10.3 Material Receipt and Accountability.

The arrival of material at ISU is controlled in five basic steps.

1. All written requisitions for radioactive materials must have the signature of the RSO or his designate for the requisition to move forward.
2. Department secretaries develop an electronic requisition sent on to the Purchasing Department which also requires an electronic approval by the RSO. The Purchasing department has a standing order that only requisitions authorized by the RSO can move forward to a purchase order.
3. Once the purchase order is approved the Purchasing Department will affix an authorization code on the purchase order for the vendor. All vendors sending anything radioactive to ISU must deliver the material to the Radiation Safety Office.
4. Each of the three vendors authorized to fill orders for ISU has a copy of our License and the authorization code and have agreed not to fill orders from ISU that do not have this code.

5. Any radioactive material arriving at ISU without the pre approval of the RSO can be rejected if not authorized or exceeding possession limits or can be stopped at the Office of Radiation Safety and not delivered to the ordering personnel until all proper conditions are met.

All radioactive material arriving at ISU are delivered to the Radiation Safety Office. The RSO will inspect each package as a safety precaution before it is sent on to the ordering personnel. All material delivered to a PI will have a signature of record from the receiving lab.

There can be transfer of material from one lab to another as long as the receiving lab has proper possession limits for the material but this practice is not encouraged outside of individual departments.

All radioactive waste and removal of radioactive material from ISU is only allowed through the RSO and the use of authorized vendors for this task is the responsibility of the RSO. All effluents of radioactive material at ISU are monitored by the RSO as well.

This system has worked well for the last 15 years and we hope to continue this same method for receipt and accountability.

8.10.4 Occupational Dose. All personnel working with radioactive materials at ISU will wear personal dosimeters. This is an ISU policy and not a requirement of the NRC.

1. ISU will continue the practice of personnel monitoring not because it is a requirement of the NRC but because it serves as good protection against possible law suits. It is also an excellent method of monitoring 'ALARA' involving new procedures and personnel.

2. Because monitoring is not required in this license reporting requirements to the individual or the NRC are also not required.

8.10.6 Safe use of radionuclides and emergency procedures. ISU will adopt the NRC procedure for safe use and emergency procedures as listed in NUREG 1556 Vol. 11 Appendix R.

8.10.7 Surveys. ISU will perform surveys in accordance with the survey frequencies and contamination levels found in Appendix S of NUREG -1556, Vol. 11.

Leak Tests. ISU will perform leak tests published in Appendix T of NUREG – 1556, Vol. 11.

8.11 Waste Management.

1. ISU will use a commercial vendor for proper packaging, labeling and transportation of all long-lived solid waste material from its main campus in Terre Haute, IN.

2. All long-lived liquid waste presently at ISU is in the form of water soluble solutions. This minor liquid yearly total is collected by the RSO and disposed of by sewer disposal.

3. All long lived radioisotope scintillation fluids are collected by the RSO to ensure that the commercial transportation vendor can package and dispose of the material as non-radioactive waste (less than .05 microcuries/gr).

4. All other material with a half life under 120 days will be retained in storage at ISU's Radiation Waste Storage Facility until it has been held for 10 half lives. The solid material will be held in DOT approved 55 gallon drums as will scintillation fluids. All liquids other than scintillation fluids will be stored in glass containers with screw cap lids inside a five gallon secondary container.

a) as containers reach 10 half lives they will be surveyed for above background radiation and defaced for disposal solids in ordinary trash and liquids into the sewer.

b) Records of the collection, storage, monitoring and disposal of all waste will be maintained in the Office of Radiation Safety.

5. The Waste Storage Facility was reviewed and approved by the NRC in Notice No. 90-09 in May 1993. A copy of the above report is attachment #1.

Attachment #1 (Refer to Question 3a)

Rad-Waste Facility, Science Building
Indiana State University Campus
6th and Chestnut Streets,
Terre Haute, IN 47809

Basement Floor Plan

1st Floor Plan

2nd Floor Plan

Vertical Cross-section Plan

Floor Framing Plan

Indiana State University

Department of Physics

May 24, 1993

Ms. Cassandra F. Frazier
Nuclear Materials Licensing Section
U.S. Nuclear Regulatory Commission, Region III
799 Roosevelt Road
Glen Ellyn, IL 60137-5927
Attn: THIS IS NOT A NEW REQUEST BUT REFERENCES CONTROL NO. 94345

Dear Ms. Frazier:

In our letter to you dated November 20th, 1992 (From Dean Judy G. Hample) we requested approval of a new radioactive waste storage area (RAD-WASTE FACILITY) for continued storage of radioactive waste in the Science Building on the I.S.U. campus. We note that this facility is a replacement for an existing facility which is inadequate because of ventilation and space. As requested in your letter of March 15, 1993 we are responding to NRC information Notice No. 90-09. The storage facility is now completed and we wish to begin moving radioactive waste from the present inadequate storage area to our new facility as soon as possible.

1. Identification of Waste to be Stored

a. Specify any possession limit increases needed for interim storage of LLW.

No possession limit increases are necessary for extended interim storage of LLW. It was the original intention of the licensee to identify only a replacement storage facility for the inadequate existing facility. Most of the radionuclides at the licensee's site are short lived (e.g. ^{32}P, ^{35}S, ^{125}I. and ^{51}Cr). We are at 9.6% of total capacity for ^{3}H and 0.7% of total capacity for ^{14}C.

b. Identify the estimated maximum amount of LLW to be stored, both in terms of volume and activity, by radionuclide.

If we were to utilize these radioisotopes at our current rate (LLW) we can extrapolate to the following:

LLW Radionuclide Designation	1 year projected Amount	1 year projected Volume	10 year projected Amount	10 year projected Volume
^{3}H	48 mCi	12 cf	480 mCi	120 cf
^{14}C	0.7 mCi	2 cf	7 mCi	20 cf

The License Limit for ^{3}H is 500 mCi and for ^{14}C it is 100 mCi.

Terre Haute, Indiana 47809
(812) 237-2064

current rate (LLW) we can extrapolate to the following: table.

c. Characterize the LLW to be stored:
(1) Volume of waste by Class (A,B, or C)
(2) Physical form of the waste: solid, liquid, or gas

All of our LLW will be Class A. 10% of our LLW are projected to be liquid, the remaining will be solid.

(3) Waste processing: volume reduction, solidification or other treatment.

We anticipate procuring a volume reduction device (e.g. compactor) during our next fiscal year. This will reduce volume estimations by about 50% in Table I.

(4) Additional non-radiological properties of LLW (if any):

We will store toluene directly in scintillation vials which will be placed in C-17 D.O.T. approved 55 gallon transportation drums. Ventilation in all areas of the storage facility are adequate to remove any small traces of toluene. We plan to ship our scintillation vials periodically to an incineration company by way of a waste transportation company such as ADCO Services, whom we currently deal with.

d. Describe the amount and type of LLW currently being stored and processed.

The one year projections in Table I currently reflect our waste inventory.

e. Identify any additional permits or approvals necessary for storage.
There are no permits or approvals required by the State, EPA, State, or Local.

2. Plans for Final Disposal
a. Specify when disposal capacity will no longer be available to you and on-site storage will begin.

This is a difficult question to answer. Currently, our waste transportation company, ADCO Services, has informed us that the Barnwell, SC facility was reaffirmed for those States/Compacts currently approved. To the best of our knowledge, the Midwest Compact is approved.

Storage has already been in progress for several years; this is merely a change to a facility that will better service our needs.

b. Specify the State/Regional disposal facility to be used for ultimate disposal of your LLW and when that facility is scheduled to begin accepting LLW.

Indiana is a member of the Midwest Compact. It is not uncertain when the LLW disposal facility will begin accepting wastes. The best estimates now indicate that legislation will be enacted this year in Ohio to begin the site selection process. Mr. Gregg Larson, Executive Director of the Midwest Low-level Radioactive Waste Compact Commission indicated to me that the current projected date for accepting LLW is March of the year 2000.

c. Specify when you will begin shipping LLW to that facility and how long it will take for your estimated storage inventory to be moved out.

When we will begin shipping to LLW storage facility for the Midwest Compact is again uncertain but will begin as soon as possible after the projected opening date of March, 2000. We estimate that we can contract with LLW transportation services and have the storage facility cleared within 6 months. We do anticipate shipping long-lived isotopes out for a long as we are able.

3. Physical Description of Storage Area

a. Identify the location and provide a diagram of the LLW storage area which demonstrates where packages will be stored and how packages will be accessible for inspection purposes. Include the locations of waste processing equipment (if applicable), air sampling stations, effluent filters and any sources of flammable or explosive materials.

We have described the location and have provided a diagram of the LLW storage area in our communication to you of November 20, 1992, Attachment #2. We are attaching to this document an additional set of scaled plans of the constructed area as Attachment #1.

Air sampling will be done at the source of the exit air from the room of the facility. Flammable materials, such as scintillation vials, will be stored on the main floor in approved D.O.T. steel 55 gallon containers.

b. Specify the maximum volume of LLW that can be stored in the proposed waste storage area and relate this to annual volume of waste generated.

We can store a total of 300 cubic feet of long-lived LLW waste in our proposed storage area and yet leave 60 cubic feet for short-lived which we can recycle back to nonradioactive waste by decay. We estimate 14 cubic feet space for long-lived LLW annually.

c. Specify the type of building/structure in which the waste will be stored and demonstrate that the waste will be protected from weather at all times.

The RAD-WASTE structure is currently a part of the Science Building on the ISU campus and was constructed in 1967. The facility was converted from an existing double elevator shaft. It is poured concrete (facing the outside) with concrete block facing inside. It is situated in a stairway which is outside of the fire zone of the building.

d. Describe the measures to control access to the LLW storage area and thereby ensure security of the waste.

The basement floor contains an egress used only in the event of an emergency. Two doors are locked with separate keys between the public hallway and the radioactive waste storage facility on both the basement and first floor (main floor) areas. The second floor door is a steel door and is locked between public access and the radioactive waste storage facility. The second floor door will also display a radioactive warning sign to the public. The remaining two floors will display radioactive warning signs on the inside doors only.

e. Describe the ventilation system and how it will assure adequate ventilation of the storage area.

The RAD-WASTE storage area will be ventilated from the top of the structure with a 320 cfm continuous fan. Makeup air will arrive from the hallway and ultimately from the Science building itself. Makeup air is conditioned air so temperature and humidity will be controlled within the facility.

f. Describe the fire protection and suppression system to minimize the likelihood and extent of fire.

It was purposely decided not to place a fire suppression system within the facility since the facility itself is fire rated for at least a two hour protection rating (since it is a concrete/concrete block enclosure). All radioactive materials including scintillation fluids will be stored in C-17 D.O.T. approved 55 gallon steel drums.

g. Describe how the adverse effects of extremes of temperature and humidity on waste and waste containers will be avoided.

The ventilation system within the RAD-WASTE facility is a forced air system which exhausts air at the highest point in the building structure. Makeup air is provided from the hallway of the Science Building and hence the Science Building itself. Thus humidity and temperature extremes will be avoided.

h. Describe vulnerability to other hazards such as tornado, hurricane, industrial accident, etc.

Since the RAD-WASTE facility is simply an extension of the Science Building, it is constructed of the same building code and has identical safety factors to all hazards.

4. Packaging and Container Integrity

a. Describe the packages or containers to be used for storage of LLW, any hazards the waste may pose to their integrity, and the projected storage life of the packages or containers.

As mentioned previously, all radioactive waste materials usually come to the RAD-WASTE facility in plastic biohazard bags. They are categorized and placed into the appropriate C-17 D.O.T. shipping container which contain yet again a 4 mil plastic 55 gallon liner. Solids should pose no degradation to the container. Any chemicals or fluids are emptied into a plastic carboy the outside of which is then lined with a special clay absorbent material. The carboy is then stored in the D.O.T. shipping container. Of course, extensive record keeping will be emphasized. The projected storage life should be at least well into the period of time where the LLW can be shipped to the Midwest Compact before repackaging is necessary.

b. Describe your program for periodic inspections of LLW *packages to ensure that they retain their integrity and containment of LLW.*

Containers will be randomly opened and inspected for integrity with the results recorded. Opened containers will be then removed from the pool until all containers have been inspected at which time the procedure will recycle.

c. Describe your program and equipment (if applicable) for remote handling and/or repackaging damaged or leaking waste containers.

Ample room should exist within the facility for any repacking necessary. An overhead hoist hangs from the room of the structure with sufficient chain to reach even the basement level. The hoist is operable from all levels of the facility.

5. Radiation Protection

a. Describe your program for safe placement and inspection of waste in storage and maintaining occupational exposures as low as is reasonably achievable (ALARA). This program should include periodic radiation and contamination surveys of individual packages and the storage area in general, as well as posting the storage area in accordance with 10 CFR Section 20.203.

The RAD-WASTE facility was fabricated from an unused double freight elevator shaft. Most elevator shafts, including this one, extend below the ground level. This particular shafts extends 5 feet below basement level. The lowest basement level of the facility will have access panels to lower steel drums below basement level. Thus our most penetrating radioactive waste will take the opportunity of earth shielding. In addition, we have already begun and will continue a program of using film badges to monitor radiation doses on the walls of the facility facing towards the general faculty offices (Thus we are able to establish early baseline levels). These offices are located over 25 feet from the RAD-WASTE facility on the main floor. One faculty office directly adjacent on the main level already has a film badge on the nearest wall. Since the less penetrating waste will be stored on this level, there should be no significant dose to the general public whatsoever. We will install a continuous area monitor with alarm capability on the main floor. We will monitor randomly (just as in 4b) containers for surface contamination and the general area itself (floors, walls, etc.) These inspections will be incorporated into our normal monthly inspection period of users laboratories.

b. Describe projected exposure rates, needs for shielding (if any) and any changes in personnel monitoring which will be required as a result of waste storage.

The projected exposure rates to the general public will be virtually none because of our below earth facility; thus, needs for shielding are nonexistent. The only changes in personnel monitoring have been the acquiring of film badges to be used for area monitors.

c. Describe your procedures for responding to emergencies, including notification of and coordination with local fire, police, and medical departments.

In the event of an emergency concerning the RAD-WASTE area, a call to the emergency phone number on campus elicits a page call to the Radiation Safety Officer or his representative on campus. Local ISU Security personnel will be given tours of the facility in addition to basic introduction to radiation and radioisotopes handling. Information regarding the RAD-WASTE storage facility will also be disseminated to local fire departments. We have had an agreement for many years with the local hospital to handle emergency treatment of radiation accidents.

d. Describe your system for maintaining accurate records of waste in storage (including waste receipts or transfers from or to other licensees) to assure accountability.

Written records of waste in storage will be maintained just as they always have been under our current license. All records are kept in a relational computer database (dBASE IV)system running on IBM PC Compatible computers which are linked via a LAN network throughout the Science Building. The only transfers to other licensees we anticipate will to be to waste transportation services who will ultimately direct transportation to the Midwest Compact site.

6. Training

a. Describe your program for training personnel in procedures for packaging, handling placement, inspection, surveying and emergency response for LLW storage.

Only two individuals, the Radiation Safety Officer and the Assistant Radiation Safety Officer, will have access to the RAD-WASTE area. These two individuals will have sole responsibility for packaging, record keeping, health physics, etc. Thus there will be no need to train other personnel. The two individuals mentioned have already received Emergency Response Orientation Training from the U.S. Dept. of Energy.

7. Financial Assurance

a. Review the relevant sections of Parts 30, 40, and 70 regarding financial assurance for decommissioning. If your proposed maximum possession limits exceed the limits specified in Sections 30.35, 40.36, or 70.25, submit with your amendment request a decommission funding plan or certification of financial assurance. as appropriate.

The licensee has already filed a financial assurance plan for decommissioning. Since our proposed maximum limits are not estimated to be exceeded, no further action should be necessary.

8. Emergency Preparedness

a. Review the relevant sections of Parts 30, 40, and 70 regarding emergency preparedness. If your proposed maximum possession limits exceed the limits specified in Subsections 30.32 (i)(1), 40.31(j)(1), or 70.22(i)(3) you will be required to either demonstrate that an emergency plan is not needed or to develop and maintain a plan that meets the requirements of the aforementioned sections.

Our proposed maximum possession limits do not warrant a special emergency plan.

Sincerely yours,

John A. Swez

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