

February 25, 2010

United States Nuclear Regulatory Commission
Region III
2443 Warrenville Road, STE210
Lisle, IL 60532-4352
ATTN: Kevin Null

RE: License No: 24-17450-01
REF: Control number 318487

Dear Mr. Null,

As requested attached is the additional information;

1. Develop and submit a survey program for both radiation levels and contamination based on your laboratory classification system. Reference Appendix S to NUREG-1556, volume 11 for an acceptable program.
2. Describe in greater detail your program for monitoring exhaust from both fume hoods and glove boxes. Include the type and frequency of monitoring.
3. Clarify why you deleted the requirement that monitoring filters are analyzed at least weekly (ref. page 13 of your FAX dated 2/11/10), or commit to keeping this requirement in your radiation safety program).

Please feel free to contact me at 314-713-5276 if you have any questions or need any clarifications.

Sincerely,



John Snider
Radiation Safety Officer

Item 1;

"Develop and submit a survey program for both radiation levels and contamination based on your laboratory classification system. Reference Appendix S to NUREG-1556, volume 11 for an acceptable program."

Surveys

Surveys are performed to ensure that radioactive material is being contained and that exposures are kept ALARA. The frequency and areas being surveyed are determined by where radioactive materials are used and/or stored. The RSC reserves the right to evaluate the program and make changes to ensure that all necessary requirements are met, and to keep exposures ALARA.

Training

Before allowing an individual to perform surveys the RSO or qualified designee will ensure that the individual has sufficient training and experience to perform surveys independently.

Appropriate on-the-job-training consists of the following;

- Observing authorized personnel using survey equipment, collecting samples, and analyzing samples
- Using survey equipment, collecting samples, and analyzing samples under the supervision and in the physical presence of an individual authorized to perform surveys

Academic training may be in the form of lecture, videotape, or self-study and will cover the following subject areas;

- Principles and practices of radiation protection
- Radioactivity measurements, monitoring techniques, and using instruments
- Mathematics and calculations basic using and measuring radioactivity
- Biological effects of radiation

Survey Equipment and Facilities

With regards to survey equipment and survey samples;

- Survey samples will be analyzed in an area of the facility that is a low-background area to ensure achieving the required sensitivity of measurements
- A gamma counter system with a single or multi-channel analyzer can be used to count samples containing gamma-emitters (e.g., cesium-137, cobalt-60).

- A liquid scintillation or gas-flow proportional counting system can be used to count samples containing alpha-emitters and beta-emitters. Gamma-emitters may also be analyzed on a liquid scintillation or gas-flow proportional counting system if the efficiency of the system is great enough to achieve the required sensitivity for measurements.

Laboratory Survey Frequency Classification

Laboratory survey frequency will be calculated using;

- Table 9-2 group hazard classification
- Survey Frequency Category Table (Table S-1)
- Survey Frequency Category Modifier (Table S-2)

Table S-1 Survey Frequency Category

Table 9-2 Group	Low	Medium	High
1	< 370 kBq (10 μ Ci)	370 kBq (10 μ Ci) to 37 MBq (1 mCi)	> 37 MBq (1 mCi)
2	< 37 MBq (1 mCi)	37 MBq (1 mCi) to 3.7 GBq (100 mCi)	> 3.7 GBq (100 mCi)
3	< 3.7 GBq (100 mCi)	3.7 GBq (100 mCi) to 370 GBq (10 Ci)	> 370 GBq (10 Ci)
4	< 370 GBq (10 Ci)	370 GBq (10 Ci) to 37 TBq (1000 Ci)	> 37 TBq (1000 Ci)

Proportional fractions are to be used for more than one isotope.

Table S-2 Survey Frequency Category Modifiers

Modifying Factors	Factors
Simple storage	x 100
Very simple wet operations (e.g., preparation of aliquots of stock solutions)	x 10
Normal chemical operations (e.g., analysis, simple chemical preparations)	x 1
Complex wet operations (e.g., multiple operations, or operations with complex glass apparatus)	x 0.1
Simple dry operations (e.g., manipulation of powders) and work with volatile radioactive compounds	x 0.1
Exposure of non-occupational persons	x 0.1
Dry and dusty operations (e.g., grinding)	x 0.01

The object is to determine how often to survey the laboratory. To do this, multiply the activity range under LOW, MEDIUM, and HIGH survey frequency by the appropriate Modifying Factor to construct a new set of mCi ranges for LOW, MEDIUM, and HIGH survey frequency.

Survey Frequency:

- Low - Not less than once a month
- Medium - Not less than once per week
- High - Not less than once per normal working day

Radiation Level Surveys

Ambient radiation level surveys will be performed;

- In locations where workers are exposed to radiation levels that might result in radiation doses in excess of 10% of the occupational dose limits or where an individual is working in a dose rate of 0.02 mSv (2 mrem/hr) or more
- Where member of the public may receive a dose that exceeds 1 mSv (0.1 rem) in a year and the dose in any unrestricted area from external sources exceeds 0.02 mSv (2 mrem) in any one hour

Radiation level surveys will be performed on the frequency as stated above where they are required.

Contamination Surveys

Combined removable and fixed contamination shall be surveyed using appropriate radiation detection equipment. Removable contamination shall be detected and measured through a wipe test of the surface, which shall be counted in an appropriate counting instrument.

Contamination surveys should be performed;

- Where individuals are working with an unsealed form of radioactive material in an amount greater than or equal to 10% of the smallest annual limit on intake (ALI) (either the inhalation or ingestion ALI) listed for that Radionuclides in 10 CFR Part 20
- To evaluate radioactive contamination that could be present on surfaces of; floors, walls, laboratory furniture, and equipment
- After any spill or contamination event
- In adjacent unrestricted lab areas
- In all areas through which licensed materials is transferred and temporarily stored before shipment
- To evaluate contamination of users and their immediate work area, at the end of the day, when licensed material is used

Radiation contamination surveys will be performed on the frequency as stated above where they are required.

Individuals who work in restricted areas will also survey all exposed areas of the body and PPE before doffing personal protective clothing at the exit of the restricted area. Particular attention will be paid to the body, hair, bottoms of shoes, and the hands.

Acceptable Contamination Levels

Contamination found in unrestricted areas shall be immediately decontaminated to background levels. When it is not possible to get to background levels, the contamination amounts shall not exceed the contamination levels listed in Table S-3.

Table S-3 Acceptable Surface Contamination Levels

Nuclide ¹	Average ^{2,3}	Maximum ^{2,4}	Removable ^{2,5}
I-125, I-129	1.7 Bq/100 cm ² (100 dpm/100 cm ²)	5.0 Bq/100 cm ² (300 dpm/100 cm ²)	0.3 Bq/100 cm ² (20 dpm/100 cm ²)
I-126, I-131, I-133, Sr-90	16.7 Bq/100 cm ² (1,000 dpm/100 cm ²)	50.0 Bq/100 cm ² (3,000 dpm/100 cm ²)	3.3 Bq/100 cm ² (200 dpm/100 cm ²)
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	83.3 Bq/100 cm ² (5,000 dpm/100 cm ²)	250 Bq/100 cm ² (15,000 dpm/100 cm ²)	16.7 Bq/100 cm ² (1,000 dpm/100 cm ²)

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

² As used in this table, dpm (disintegration per minute) 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 instrumentation.

³ Measurements of average contaminant 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 cm².

⁵ The amount of removable radioactive material per 100 cm² 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.

When equipment or facilities that are potentially contaminated are to be released for unrestricted use, the above table provides the maximum acceptable residual levels. To the extent practicable, it is appropriate to decontaminate to below these levels. Surface contamination surveys should be conducted for both removable and fixed contamination

before facilities or equipment is released from restricted to unrestricted use, to ensure that they meet these limits.

Smear testing of a relatively uniform area shall be used to aid in comparing contamination at different times and places. A smear taken from an area of about 100 cm² is acceptable to indicate levels of removable contamination.

Survey Record Requirements

Area Level Survey Record;

Each area level survey shall include the following;

- A diagram of the area surveyed
- Ambient radiation levels with appropriate units
- Specific locations on the survey diagram where the level was measured
- Make and model number of instruments used
- Date the instrument was calibrated
- Name of the person making the evaluation and recording the results and date.

Contamination Survey Record;

Each area contamination survey record shall include the following;

- A diagram of the area surveyed
- Specific locations indicated by wipe number on the survey diagram where the wipe test was taken
- A matching numbered list with contamination levels with appropriate units shall be attached
- Make and model number of instruments used
- Calibration date of the instrument
- Background levels
- Name of the person making the evaluation and recording the results and date
- Surveyor's signature

Each item or equipment contamination survey record shall include the following;

- When practical the items or equipment will be diagramed. If it is not practical to diagram each item then a list will be generated
- Specific locations indicated by number on the equipment or item survey diagram where the wipe test or reading was taken
- A matching numbered list with contamination levels with appropriate units shall be attached
- Make and model number of instruments used
- Calibration date of the instrument
- Background levels

- Name of the person making the evaluation and recording the results and date
- Surveyor's signature

Protective clothing, skin, and personal clothing contamination surveys will be documented through a log at each exit of the area.

After any incident the contamination levels observed and procedures followed for incidents involving contamination of individuals shall be attached to the record. The record shall also include names of individuals involved, description of work activities, calculated dose, probable causes (including root causes), steps taken to reduce future incidents of contamination, times and dates, and the surveyor's signature.

In response to item 2;

“Describe in greater detail your program for monitoring exhaust from both fume hoods and glove boxes. Include the type and frequency of monitoring.”

Air Surveys

Air Monitoring Measurement of Radioactive Material in Air

Continuous air sampling is conducted in all areas while radioactive material is used. These areas are monitored through general room sampling and hood stack sampling. Samples are collected on a 24 hours a day, 7 days a week (24/7) basis and are normally analyzed weekly. Radioiodine air monitoring is performed during use of any iodine isotope and analyzed upon completion of the task or at the end of each day, whichever is sooner. More frequent analysis of air monitoring may be performed at the discretion of the radiation safety officer or radiation safety committee.

Admittance to areas where concentrations of radioactive material in the breathing zone exceed 25 percent of the values given in Table 1, Column 3, of Appendix B to 10 CFR 20 shall be restricted to emergency personnel making corrective actions until the level is reduced below this level.

The RSO will report to the Radiation Safety Committee (RSC) any results that are greater than 25% of the levels specified in 10 CFR 20, Appendix B. Any results that are greater than 25% of the levels specified in 10 CFR 20, Appendix B will be investigated by the RSC with cause and corrective action assigned.

If levels are greater than 0.6% of those listed in 10 CFR 20 Appendix B, Table 1, then the area must be posted as an Airborne Radiation Area.

Air Monitoring of Exhaust From Fume Hoods, Glove Boxes, and Other Enclosures

Fume hoods, glove boxes, and other enclosures designated for radioactive material use shall have a air sampling points installed before and after the filter to measure exhaust air. These points shall be monitored through samples collected on a 24 hours a day, 7 days a week (24/7) basis and are normally analyzed weekly. The samples are taken to determine filter efficiency. When breakthrough is detected the filter shall be changed.

Airborne Effluent Release Monitoring

Continuous sampling of air effluent is conducted at sampling points in and at the outside edge of each exhaust stack. These points are monitored through hood stack sampling.

Samples are collected on a 24 hours a day, 7 days a week (24/7) basis and are normally analyzed weekly to provide accurate measurements to estimate public exposure.

Samplers monitoring air effluent shall be checked and calibrated to verify the performance of effluent monitoring systems to ensure their reliability at least annually.

In response to item 3;

"Clarify why you deleted the requirement that monitoring filters are analyzed at least weekly (ref. page 13 of your FAX dated 2/11/10), or commit to keeping this requirement in your radiation safety program"

We are committed to keeping the requirement in our radiation safety program.