

Mobile Positron Emission Tomography

PURPOSE

This procedure provides general instructions for developing, maintaining, and documenting radiation protection procedures for preparation, calibration and administration of radiopharmaceutical doses; for control of exposures to patients, visitors and staff members; and for control of radioactive and/or contaminated materials used in the University of Utah's Mobile Positron Emission (PET) Tomography trailer.

POLICY

The **Radiation Safety Committee** is responsible for assuring that each individual who prescribes or uses any form of ionizing radiation in or on humans is properly qualified through training and experience that meets all regulatory requirements. Routine clinical uses of radionuclides for diagnosis or treatment are controlled by qualified physicians and are not subject to review or approval by the Radiation Safety Committee. Research or experimental applications of radiation to humans must be reviewed and approved by the Human Uses Subcommittee of the Radiation Safety Committee (RPR 40).

Radiation safety procedures for the use of radionuclides in the Mobile PET trailer, are prepared, implemented, and supervised by the **Mobile PET Director (MPD)**. The MPD submits a copy of all new or revised procedures involving any aspect of radiation protection to the University's **Radiation Safety Officer (RSO)** for review and documentation. The RSO submits comments, suggestions or proposed changes to the MPD for action. The RSO reports on the status and acceptability of the procedures to the RSC at least annually.

MOBILE FACILITY INFORMATION

As a facility employed and maintained under the auspices of the University of Utah radioactive

materials license, the base location for the PET facility is: University of Utah, Hunstman Cancer Institute, 2000 Circle of Hope, Salt Lake City, Utah 84132. The Mobile PET facility is a shared resource and will have letters of agreement for the use of this mobile facility at all the off site locations. Additional locations will be added by amendment request.

SPECIFIC PROCEDURES

Additional requirements related to the Mobile PET facility and the safe handling of PET radiopharmaceuticals are included in the following procedures:

Training

All PET nuclear medicine technologists will hold current certification and be licensed by the State of Utah.

Transport of the trailer will be done by contracted licensed drivers who will be trained in moving this unique facility and be trained relative to the radioactive materials.

Training provided to the truck drivers will include the name and telephone of the 24-hour contact to be called in the event of an emergency.

Security

During operation, the PET facility will be located on a dedicated parking pad located off public or private roadways.

The PET trailer is locked when personnel are not present. The trailer is equipped with an alarm system which would indicate an intruder, fire or power outage.

The security offices at each location will be alerted to the trailer's arrival and have a memorandum on file regarding their responsibilities for its security.

Emergency Procedures

Spills and other emergencies will be responded to according to established procedures described in RPR 45. The MPD shall ensure that all personnel and students have received appropriate spill and emergency training. Documentation of spill and emergency training shall be maintained by the MPD.

Package Receipt and Opening

Radioactive material will only be obtained from a manufacturer or individual meeting requirements contained in R313-32-300.

Packages containing radioactive material shall be handled in accordance with URC rules and 10CFR71

Delivery of radioactive material is made directly to the PET trailer hot lab.

Dose Calibrator: Calibration and Testing

Calibration of dose calibrators shall be performed in compliance with URC Rules in chapter R313-32. Calibration procedures will be based on methods in Appendix C of Guide DRC-Medical Addendum dated 07/96, with provisions that computer generated forms and graphs may be utilized, and linearity tests may be performed by decay and/or a commercial sleeve method.

Sealed Sources

All sealed sources will be entered into inventory and wipe testing performed at six-month intervals.

Sealed sources will be stored in the restricted areas.

Radiation Detection Equipment

Survey instruments to be used in the PET facility include an ionization chamber, Geiger counter, and BGO detector with scalar/timer.

Each day prior to use, survey instruments will be tested with a check source.

Survey instruments will be calibrated annually.

Decay in Storage (DIS)

After short-lived material has been stored and decayed to an activity not discernable from background it shall be surveyed in a low background area to determine that no radioactivity remains above release levels. All radioactive material labels should be removed or obliterated before disposal. Record of the disposal shall be kept in a log and maintained for the duration of the license.

Support Services

The Radiological Health Department shall be responsible for radiological evaluations, leak testing of sealed sources, and calibration of portable survey instruments in accordance with Radiological Laboratory Evaluations (RPR 50), Leak Testing of Sealed Sources (RPR 51), and Calibration and Use of Portable Survey Instruments (RPR 52).

REFERENCES

Davis, D.A. et al, "Dose Calibrator Activity Linearity Evaluations with ALARA Exposures," *Journal of Nuclear Medicine Technology*, Vol. 9, No. 4, 188-190, 1981.

International Commission on Radiological Protection:

Radiation Dose to Patients from Radiopharmaceuticals, ICRP Publication 53, 1987.

National Council on Radiation Protection and Measurements:

Radiation Protection for Medical and Allied Health Personnel, NCRP Report No. 105, 1989.

US Nuclear Regulatory Commission:

Guide for the Preparation of Applications for Medical Use Programs, Reg. Guide 10.8, Rev. 2, 1987.

Principles and Practices for Keeping Occupational Radiation Exposures at Medical Institutions As Low As Reasonably Achievable, NUREG-0267, Rev. 1, 1982.

Quality Management Program, Reg. Guide 8.33, 1991.

Radiation Protection Training for Personnel Employed in Medical Facilities, NUREG-1134, 1985.

University of Utah, *Radiation Safety Manual and Procedures*, Radiation Procedures and Records.

Utah Department of Environmental Quality, Division of Radiation Control:

Guide DRC-MED, July 1996.

Utah Radiation Control Rules, Standards for Protection against Radiation, Chapter R313-15.

Utah Radiation Control Rules, Medical Use of Radioactive Material, Chapter R313-32.

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PET TRAILER EVALUATION CHECK LIST
(Use in addition to RPR 50A.)

Responsible User: _____ **Group No.:** _____ **Date:** _____

Building: _____ **Room(s):** _____

EVALUATION CRITERIA	YES	NO
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Surveys:

- | | | |
|---|-----|-----|
| 1. Daily contamination surveys performed? | () | () |
| 2. Weekly contamination surveys performed? | () | () |
| 3. Records maintained and contain required data?
date of survey, plan of areas surveyed, trigger levels, detected dose rate in mrem/hr or removable contamination in dpm/100 cm ² , survey instrument used, model #, serial number, calibration date, surveyor initials | () | () |
| 4. Areas decontaminated if 2000 dpm/100 cm ² ? | () | () |

Waste Disposal:

- | | | |
|---|-----|-----|
| 1. Hold for decay methods adequate (decay of 10 half-lives)? | () | () |
| 2. Records of disposals maintained and contain required data?
date of disposal, date material was stored, radionuclides disposed, survey instrument used, serial number, calibration date, background dose rate, highest dose rate measured at surface, name of disposer | () | () |

Dose Calibrator:

- | | | |
|---|-----|-----|
| 1. Daily constancy check performed? | () | () |
| a. Records maintained and contain required data?
dose calibrator model and serial number, identity of radionuclide in check source, date of check, activity measured, checker initials | () | () |
| 2. Annual accuracy tests performed? | () | () |
| a. Records maintained and contain required data?
dose calibrator model and serial number, serial number of check source, identity of radionuclide in check source and its activity, date of test, results of test, signature of on-site RSO (NMTC) | () | () |

Responsible User: _____ Group No.: _____ Date: _____

Building: _____ Room(s): _____

EVALUATION CRITERIA	YES	NO
3. Quarterly linearity tests performed?	()	()
a. Records maintained and contain required data? dose calibrator model and serial number, calculated activities, measured activities, date of test, signature of on-site RSO (NMTC) Radiopharmaceutical name, prescription number, radionuclide, patient's name, measured activity of dosage, date and time of measurement, measurer's initials	()	()

Calibration and Reference Sources:

1. Sources requiring leak tests?	()	()
a. Additions?	()	()
b. Deletions?	()	()
2. Other check sources?	()	()
a. Additions?	()	()
b. Deletions?	()	()
3. Quarterly inventory performed?	()	()
a. Records maintained and contain required data? model and serial number of source, radionuclide and its nominal activity, location of source, signature of on-site RSO (NMTC)	()	()

Signature: _____