Operational Topic

This article describes potential enhancements of the annual radiation protection program review utilizing contextual information.

Contextual Information for the Potential Enhancement of Annual Radiation Protection Program Review Reports

*Robert J. Emery and Janet M. Gutiérrez**

Abstract: *Organizations possessing sources of ionizing radiation are required to develop, document, and implement a "radiation protection program" that is commensurate with the scope and extent of permitted activities and sufficient to ensure compliance with basic radiation safety regulations. The radiation protection program must also be reviewed at least annually, assessing program content and implementation. A convenience sample assessment of web-accessible and voluntarily-submitted radiation protection program annual review reports revealed that while the reports consistently documented compliance with necessary regulatory elements, very few included any critical contextual information describing how important the ability to possess radiation sources was to the central mission of the organization. Information regarding how much radioactive material was currently possessed as compared to license limits was also missing. Summarized here are suggested contextual elements that can be considered for possible inclusion in annual radiation protection program reviews to enhance stakeholder understanding and appreciation of the importance of the ability to possess radiation sources and the importance of maintaining compliance with associated regulatory requirements. Health Phys. 113(2):154–164; 2017*

Key words: *operational topics; radiation, ionizing; radiation protection; safety standards*

INTRODUCTION

Federal and state-equivalent radiation safety regulations require organizations possessing sources of ionizing radiation to develop, document, and implement a "radiation protection program" (RPP) that is commensurate with the scope and extent of permitted activities and sufficient to ensure compliance with basic radiation safety regulations (U.S. NRC 1998). The RPP must also be reviewed at least annually, assessing program content and implementation (U.S. NRC 1998).

While the practice of annually reviewing an organizations' RPP is certainly in line with the accepted precepts of continuous quality improvement, a convenience assessment of 26 RPP's suggests that critical contextual information is commonly absent. Lacking this information, an RPP does not seize upon the opportunity to underscore to the readers the importance of the radiation safety program and how it supports the central missions of the organization. This is especially true considering the amount of employee turnover that occurs in the work environment. It may be presumed that the readers of the RPP review report may fully comprehend what the radiation safety program does, but anecdotal evidence suggests this may not be the case.

METHODS

Through professional interactions with various safety programs across the U.S., combined with internet web searches, a convenience sample of 26 RRP's was assembled. The assembled reports summarized RPP's that exist to support private or public academic or research programs.

Upon review, each of the reports clearly documented compliance with necessary RPP regulatory elements as described in 10 CFR 20.1101 Subpart B (U.S. NRC 1998). But very important contextual information was consistently absent:

- The size and cost of the radiation safety program (number of staff, overall budget, major contracts and fees);
- The critical nature of the ability to possess sources of radiation to the core missions of the organization;

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- The number of permits possessed, their associated annual fees, and their expiration dates;
- The amounts of material possessed compared to the licensed possession limits; and
- Achievements and future needs.

The absence of this information could be inadvertently negatively impacting the image of the radiation safety program, as the underlying assumption is that readers are knowledgeable about the radiation program and what it does. This may be a risky assumption, particularly given the turnover of staff that occurs in the modern workplace. Reframing the approach of the RPP affords the opportunity to educate readers about the value of the radiation safety program.

Suggested contextual information

The radiation safety program at The University of Texas Health Science Center at Houston (UTHealth) is provided expert guidance by the institution's Radiation Safety Committee (RSC), which consists of faculty and staff from across the university. Each year, the radiation safety program presents its annual RPP to the RSC (included as an Appendix). Based on faculty feedback over the years, the radiation safety program has completed several novel projects that have helped articulate certain program aspects (Emery and McCrary 2003a and b; Emery and Gutierrez 2014) that have been included into the RPP along with some very useful contextual elements:

- Section 1: A brief description the radiation safety program and why it exists, and its main drivers
- Section 2: An executive summary of the report, highlighting achievements and future needs
- Section 3: The purpose and scope of the RPP and its annual review
- Section 4: A description of radiation source use at UTHealth
- Section 5: A summary of the size and scope of the radiation dosimetry program and associated ALARA efforts
- Section 6: A summary of the permits possessed by UTHealth and their associated expiration dates
- Section 7: A summary of regulatory inspection activity that occurred during the year
- Section 8: A summary of the radiation safety training activities carried out
- Section 9: A summary of the radioactive waste management program and associated cost savings
- Section 10: Security activities (section withheld)

Collectively, this contextual information has served to better inform the faculty and leadership of the important work that is carried out by the radiation safety program and the critical nature of the ability to possess sources of radiation are to the missions of the organization. Accordingly, the program has enjoyed strong upper management support and accolades from the faculty (Emery et al. 1996).

Additionally, thought should be given about the ease of reading the information provided in tables and figures. In general, tables should minimize to what is needed for the line borders, and for figures most of the ink should go toward displaying the information of interest. The reader will likely appreciate smooth flowing text and tables and figures that are easy to ascertain the intended message.

Summary

A successful radiation safety program functions largely in the realm of prevention, so it is critically important to be able to effectively articulate what the program does to upper management so that program support can be maintained. The required annual RPP review represents an opportunity to highlight the program through the inclusion of important contextual information. Including this type of information along with the required information can help frame an overall management perspective that looks at the overall perspective of radiation use at the institution.

Acknowledgments—The authors wish to express their sincere appreciation to the UTHealth Radiation Safety Committee for their guidance in the development of our radiation safety program.

REFERENCES

Emery RJ, Sawyer RL, Sprau DD. Assessing the service provided by an institutional radiation safety survey program. Health Phys 70: 741–743; 1996. DOI: 10.1097/00004032-199605000-00018.

Emery RJ, McCrary JR. Effectively displaying broad scope sublicensee radioactive material inventory allocations and possession quantities. Health Phys 85(Suppl 1):S39–S41; 2003a. DOI: 10.1097/00004032-200308001-00012.

Emery RJ, McCrary JR. A radiation protection program prospectus based on the collection of 10 years of key performance indicator data. Health Phys 85(Suppl 2): S89–S93; 2003b. DOI: 10.1097/00004032-200311002-00010.

Emery RJ, Gutiérrez JM. An updated radiation protection program prospectus based on 20 years of data describing program drivers and activities. Health Phys 107(Suppl 2): S153–S157; 2014. DOI: 10.1097/HP.0000000000000130.

U.S. Nuclear Regulatory Commission. Standards for protection against radiation: Radiation protection programs. Washington, DC: U.S. Government Printing Office; 10 CFR 20.1101 Subpart B; 1998.

RADIATION PROTECTION PROGRAM REVIEW CALENDAR YEAR 2016

UTHealth
The University of Texas
Health Science Center at Houston

Environmental Health & Safety

†We request that the ***Section 10: Security Review*** be withheld from Public Disclosure under Texas Government Code Section 552.101.

SECTION 1: DRIVERS FOR THE RADIATION SAFETY PROGRAM

The Radiation Safety Program (RSP) resides within the Environmental Health & Safety department of The University of Texas Health Science Center at Houston (UTHealth). The fundamental objective of the RSP is to ensure the safety of UTHealth faculty, staff, and students while enjoying the scientific benefits available through the use of radioactive materials and radiation-producing machines. Equally important is the need for protecting the general public and the environment from avoidable additional radiation exposure and contamination as the result of permitted activities at UTHealth.

The RSP consists of a Radiation Safety Officer (RSO), a RSP Manager and four Radiation Safety Specialists. The broad scope use of radioactive material, and consolidated x-ray and laser use play an important supporting role in efficient accomplishment of UTHealth's mission of educating health science professionals, discovering and translating advances in biomedical and social sciences and modeling the best practices in clinical care and public health. The RSP is driven by the research enterprise currently consisting of 138 authorized users of radioactive material, 427 radiation workers (radioactive permits at UTHealth) and one clinical area for diagnostic uses of radioactive material. The RSP also supports diagnostic clinical, veterinary and research uses of 131 x-rays and 74 lasers driven by the McGovern Medical School and School of Dentistry's use of these devices. Although we are experiencing a decrease in the research use, we have simultaneously expanded the *clinical enterprise within UT Physicians consisting of 5 lasers on two sites and 38 x-ray units on 28 sites across the greater Houston area.* Additionally, the RSP provides dosimetry services to UTHealth employees and medical residents working with radiation under Memorial Hermann Hospital's radiation permits and potentially elsewhere.

This review is specifically for UTHealth, however, select information has been included and underlined if it is not directly related to UTHealth.

UTHealth	***UT Physicians***	**Memorial Hermann Hospital**
Broad License L02###, Cyclotron in Storage License L03###, X-ray Registration R10### Laser Registration Z008##	*Radioactive Material License L05###* *X-ray Registration R2###* *Laser Registration Z018##*	Radioactive Material License L00### X-ray Registration R00###

SECTION 2: EXECUTIVE SUMMARY

During calendar year 2016 (CY2016), individuals working with sources of radiation under the auspices of UTHealth carried out biomedical research and clinical activities while maintaining a high level of safety. The major indicators of the level of safety include compliance with the local and state dosimetry limits, compliance with state safety regulations, the number of individuals trained and incidents involving radiation. The **Radiation Protection Program Review** describes these major indicators.

Important Milestones during CY2016

- Three inspections in 2016 by the Texas DSHS - Radiation Control (RC) resulting in no regulatory violations. The three inspections in 2016 consisted of one for the broad radioactive material license on the TMC campus, one security inspection and one x-ray inspection. In addition, the Radiation Safety Program assisted with *eight x-ray inspections and one radioactive material inspection* by the Texas RC for *UT Physicians* in 2016. *Three of the eight x-ray inspections* for *UT Physicians* were unannounced.
- No students, employees or medical residents exceeded their regulatory dose limits for radiation exposures.
- Implemented new Texas rules (effective March 2016) for Physical Protection of Category 1 and 2 Quantities of Materials (Increased Controls) impacting Radiation Safety Program oversight, access authorization plan, the security plan and features. These additional oversight mechanisms required additional radiation safety staff time and coordination with UT Police.
- UTHealth Mobile Stroke Unit's photograph was featured on the front page of the Health Physics Journal of the Operational Radiation Safety supplement in May of 2016 for the article entitled "Radiation Monitoring Results from the First Year of Operation of a Unique Ambulance-based Computed Tomography Unit for the Improved Diagnosis and Treatment of Stroke Patients by Gutiérrez, Emery, Parker, Jackson & Grotta. 110, S2, May 2016.
- EH&S maintained radiation regulatory compliance while providing oversight for 7 permits for radioactive materials, lasers and x-rays at both UTHealth and *UT Physicians*.
- RSP transitioned to fully electronic dosimetry records from its dosimetry vendor Landauer.
- Broad license was renewed in its entirety until January 31, 2026 after full review from the application submitted in December of 2009.
- Cyclotron license for the possession of activated components was renewed in its entirety till June 30, 2025, however condition 17 to provide logistical and planning efforts by August 31, 2018, and complete facility decommissioning by August 31, 2021 was imposed by Texas RC.
- UTHealth x-ray registration renewal application was submitted on November 8, 2016.
- EH&S participated in a handheld portable x-ray unit feasibility study with faculty of the School of Dentistry. Results were presented at the International Association for Dental Research on June 24, 2016 in Seoul, Korea.
- Performed baseline measurements within the Texas Medical Center for routine background radiation levels geographically positioned using the Polimaster device.

Anticipated Future Areas of Need for Radiation Safety Resources

- Strategic planning and funding are needed to complete stepped requirements including decommissioning of the cyclotron unit and activated components by August 31, 2021. Additionally, the potential degradation of key safety services, the impact to the University including the McGovern Medical School Building loading dock and the impact to radioactive material stored within the cyclotron vault are being considered.
- Texas DSHS Radiation Control has implemented routine unannounced inspections for x-ray machines. Radiation Safety will continue to work with the clinics to ensure they have sufficient records available for inspection.
- The RSP plans to enhance basic radiation safety training and include x-ray and laser safety training into current Human Resources learning management training system.
- Continued transition of routine safety records to electronic means such as contamination and safety surveys.
- Continued growth in highly complex research requiring multiple safety committee reviews
- To assist UTHealth residents, faculty and staffing working with radiation at Memorial Hermann Hospital and potentially other locations, EH&S has taken responsibility for the hand delivery and pick up on the dosimetry devices that takes a substantial amount of time for the monthly distribution. Additional EH&S time is spent when these individuals are not returning their badges in a timely fashion. The oversight for the dosimetry program for this group will continue to utilize a sizable amount of time for distribution, collection, and monitoring.

SECTION 3: PURPOSE AND SCOPE

Purpose

Each entity authorized by the Texas Department of State Health Services, Radiation Control to use sources of radiation is required to review the content and implementation of the radiation protection program at intervals not to exceed 12 months per 25TAC§289.202(e)(3). This program review requirement is applicable for Texas UTHealth Radioactive Material Licenses L02### and L03###, Certificate of X-ray Registration R10###, and Certificate of Laser Registration Z008##.

All items contained in this annual report for UTHealth are reviewed during regularly scheduled Radiation Safety Committee (RSC) meetings. In fact, the Radiation Safety Program was pragmatically reviewed 9 times during CY2016 at RSC meetings throughout the year. This report is intended to summarize the results for dissemination during the February 2017 RSC meeting or the next regularly scheduled meeting.

Scope

This program review outlines the significant occurrences during CY2016 for the UTHealth RSC and UTHealth management. All documents and data contained in this report excluding ***SECTION 10: SECURITY REVIEW*** are available upon request at the Environmental Health & Safety office (713-500-8100). We request ***SECTION 10: SECURITY REVIEW*** be withheld from Public Disclosure under Texas Government Code Section 552.101 for the protection of security sensitive information contained within.

SECTION 4: RADIATION SOURCE USE REVIEW FOR UTHEALTH

Permit	Type	Use Review as of Dec 31, 2016
License L02###	Broad License, Radioactive Material	138 Authorized Users (PIs) 264 mCi unsealed radioactive material 159 radioactive material laboratories
License L03###	Cyclotron in Storage	Decay in storage of cyclotron unit and activated components
Registration Z008##	Lasers	74 Class 3B and Class 4 Lasers 31 open beam class 3B and 4 lasers 43 imbedded class 3B and 4 lasers in class 1 laser systems
Registration R10###	X-rays	131 x-ray units in use on registration 109 dental x-ray units on registration, including 86 at SOD, 6 at Greenspoint, 2 at OCB on Van, 6 at HMC, 2 at Smith 1 PET/CT machine, 1 Ambulance with a CT 2 radiographic unit, including 1 bone densitometers 7 veterinary units 10 minimal threat including: 8 cabinet dental x-ray machines, 1 x-ray irradiator, & 1 cabinet x-ray machine for veterinary use 1 Industrial including: 1 surgical skills 5 electron microscopes exempt from registration
Not Applicable	MRI / NMR	3 units including: 1 for clinical MRI, 1 veterinary research MRI, 1 research NMR

SECTION 5: ALARA AND DOSIMETRY REVIEW

External Dosimetry

UTHealth routinely monitors personnel for radiation use on campus in accordance with the Texas regulations. For administrative purposes, the individuals issued monthly external dosimeters are considered "likely to exceed 10%" of the annual limits. The individuals issued quarterly external dosimeters are considered not "likely to exceed 10%" of the annual limits based on dosimetry provided for others performing similar tasks.

Starting in January 2009, UTHealth provides badges for UTHealth employees, medical residents and students working at Memorial Hermann Hospital and potentially other facilities. The specific programs including Cardiology & Diagnostic Faculty, Fellows & Residents using x-rays were identified as higher frequency users of radiation and an ALARA level of 10% (or 500 mrem) per month was assigned to these groups. An effective dose correction factor of 0.3 was applied to cardiology and faculty, fellows and residents wearing lead aprons utilizing x-ray machines per 25TAC§289.202(f)(5).

Dosimetry Review by Calendar Years

	2014	2015	2016	Comments for 2016
Exceeded Regulatory Limit	0	0	0	
Exceeded 10% of Regulatory Limit	0 14	0 14	0 14	0 at UTHealth 14 at MHH
Exceeded 10% of Declared Pregnancy Limit	1 1	0 0	0 0	0 at UTHealth 0 at MHH
Exceeded ALARA of 125 mrem in a single monitoring period	0	0	0	0 at UTHealth
Exceeded MHH Special X-ray Group ALARA of 500 mrem in a single monitoring period	0	0	0	0 at MHH
Individuals Badged Monthly	59	55	44	UTHealth
Memorial Hermann Hospital Permit / UTHealth Individuals	279	310	310	MHH
Individuals Monitors Badged Quarterly	354¥	196	142	UTHealth
Total Individuals Badged	692*	561	496	
Area Monitors	*	180	189	UTHealth

Gray and underlined designates occupational dose at Memorial Hermann Hospital permit.
¥In 2014, the total individuals badged quarterly also included the number of area monitors. In 2015 and 2016, the distribution of individuals and area monitors badged quarterly are shown.

10% of Regulatory Limit

All of the 14 individuals that exceeded 10% of the occupational dose limit were utilizing the radiation under the Memorial Hermann Hospital permit(s). No individuals working under UTHealth permits exceeded 10% of the occupational dose limit. The cumulative calendar year doses by partial participant number and group are provided. The dosimetry records of the Memorial Hermann individuals will continue to be monitored closely and those exceeding 10% of the cumulative year to date are communicated at least quarterly to MHH Radiation Safety through their MHH RSC via their RSO.

Group	CY2016 Deep Dose Assigned mrem	CY2016 Lens Dose mrem	CY2016 Shallow Dose mrem	Exceeded 10% in CY2015	If Yes, DDE in CY2015 mrem
Anesthesiology	457	1,531	1,519		
Cardiology Fellow	489	1,631	1,630	Yes	913
Cardiovascular Surgery	515	1,708	1,670	Yes	1,125
Cardiovascular Surgery	543	1,808	1,773		
Diagnostic Faculty	549	1,834	1,823		
Cardiology Faculty	637	2,120	2,087		
Cardiology Fellow	771	2,572	2,538		
Cardiology Faculty	895	2,984	2,889	Yes	886
Cardiology Fellow	897	2,991	2,937		
Cardiology Fellow	961	3,202	3,142	Yes	1,218
Cardiology Faculty	1,018	3,398	3,361	Yes	1,296
Diagnostic Faculty	1,134	3,775	3,659	Yes	931
Cardiovascular Surgery	1,235	4,117	4,073	Yes	549
Cardiology Faculty	1,444	4,813	4,722	Yes	1,736

ALARA Investigations

No individuals exceeded their ALARA investigation levels during a single monitoring period for CY2016. No ALARA communications to MHH Radiation Safety for their investigation of individuals working on Memorial Hermann's permits were required in CY2016. The dosimetry records of the Memorial Hermann individuals will continue to be monitored closely and those exceeding 10% of the cumulative year to date are communicated at least quarterly to MHH Radiation Safety.

Declared Pregnancy Program

- 16 individuals were enrolled in the declared pregnancy program during CY2016 including 4 UTHealth employees working on Memorial Hermann's permits.
- None of the declared pregnancy program participants exceeded the limits of 500 mrem per gestation period. No fetal monitors exceeded 50 mrem (10%) per gestation period. Within Memorial Hermann's permits no fetal monitors exceeded 50 mrem per gestation.

Internal Dosimetry

During CY2016, the Radiation Safety Program conducted a total of 3 precautionary bioassays, including one thyroid bioassay and two urine bioassays. All bioassays were performed as pre-exposure baseline assays or screening on EH&S employees or researchers planning to utilize radioactive iodine. None of these bioassays indicated any radiation intake or uptake had occurred, including none exceeding 2% or 10% of any applicable dose limit. No bioassays were conducted as a result of a spill of radioactive material in a research laboratory. Currently three researchers have periods of actively working with high activities such that the RSC may require pre-operational thyroid bioassays for I-123 and I-125 use. Storage does not require bioassays. No other researchers have periods of actively working with high activities required by the *Radiation Safety Manual*.

Area Monitor Review

Of the area monitors issued in 2016, all area monitors assigned to assess the general public accessible dose were in compliance with the general public dose limit of 100 mrem in a year. Area monitors continue to be placed within the new School of Dentistry (SOD) building for the dental x-ray machines, although the monitoring frequency has been reduced from 2012. The area monitors within the cyclotron vault are not readily accessible to the general public. These cyclotron vault readings also do not represent occupational doses as the workers utilize limited time and increased distance from these area monitor locations. Monitors close to 100 mrem will continue to be monitored closely.

Notification for Individuals with Greater than 100 mrem in a Year.
Notifications will be sent via e-mail in the month of February 2017 for all individuals that exceeded 100 mrem cumulatively for 2016. This notification will be distributed after the RSC is informed of the need to communicate this information. 50 individuals exceeded 100 mrem cumulatively for 2016 with only 4 at UTHealth radiation permits.

Summary Dosimetry Results
Employee exposures to radiation and uses of radiation in research and clinical settings were maintained As Low As Reasonably Achievable (ALARA) during CY2016. At UTHealth, there were no individuals working under UTHealth permits in CY2016 who exceeded 10% of any particular employee annual dose limit. Fourteen UTHealth employees working under Memorial Hermann Hospital permit(s) in CY2016 exceeded 10% of the annual dose limit. No individuals exceeded the regulatory dose limit. No individuals in the declared pregnancy program exceeded 500 mrem/gestation.

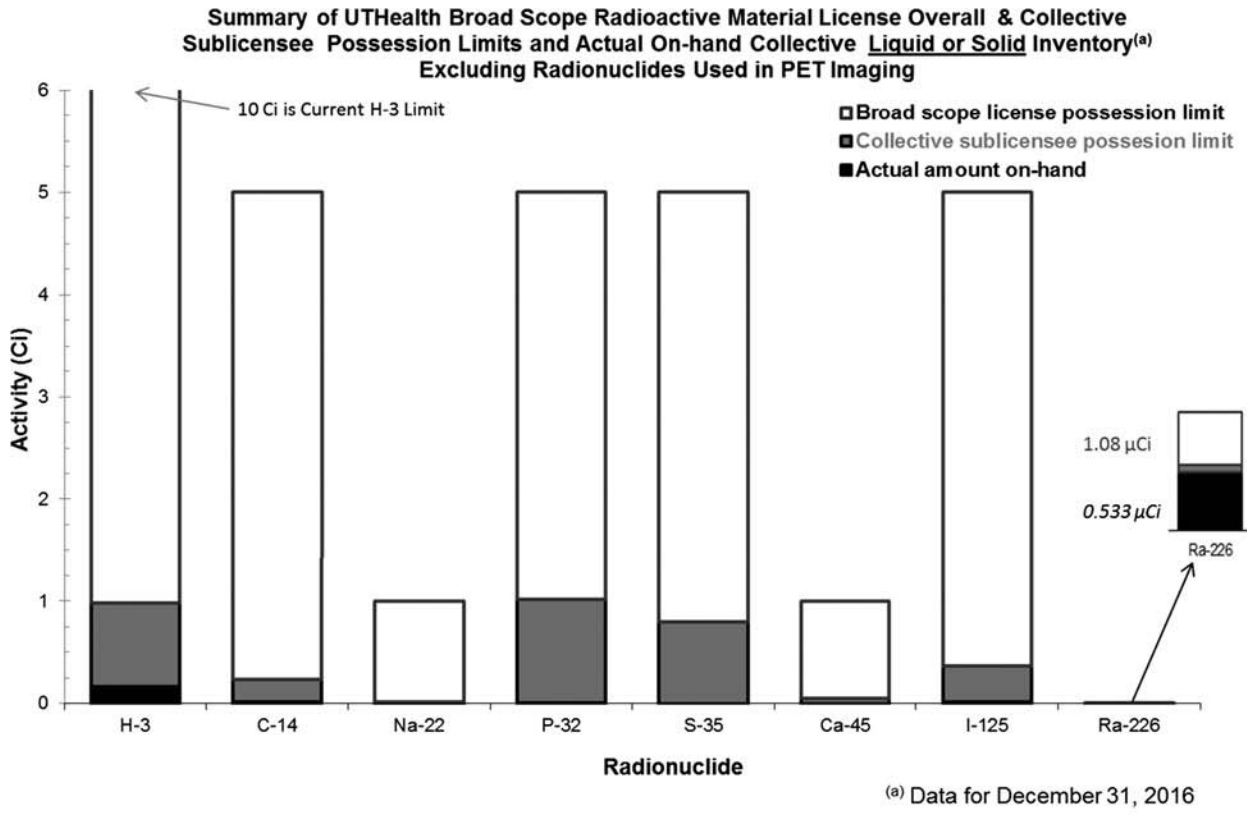
SECTION 6: REGULATORY & LICENSING REVIEW

Type of Permit	Broad License	Cyclotron in Storage	X-ray Machines	Lasers
Permit Number	License L02###	License L03###	Registration R10###	Registration Z008##
Expiration	January 31, 2026	June 30, 2025 Imposed Decommission by Aug. 31, 2021	Nov 30, 2016, Pending renewal, requested on November 8, 2016	Jun 30, 2018
Amendments in CY	2, Radiation Safety Committee change, renewal received	2, request to amend decommission conditions	3, increase dental x-rays at SOD, Separate MSU Ambulance and UTPB GPR into two sites, renewal requested	0
Scope of Permit	Enables RSC to grant variable quantities of radioactive materials for education, research and clinical PET use	Storage of cyclotron unit and associated activated components	Possess and operate radiation-producing devices for dental, veterinary, medical, and research use	Possess and operate Class 3B and 4 Lasers for research and medical use
Biennial Permit Fee	$40,794	$3,533	$8,848	$236

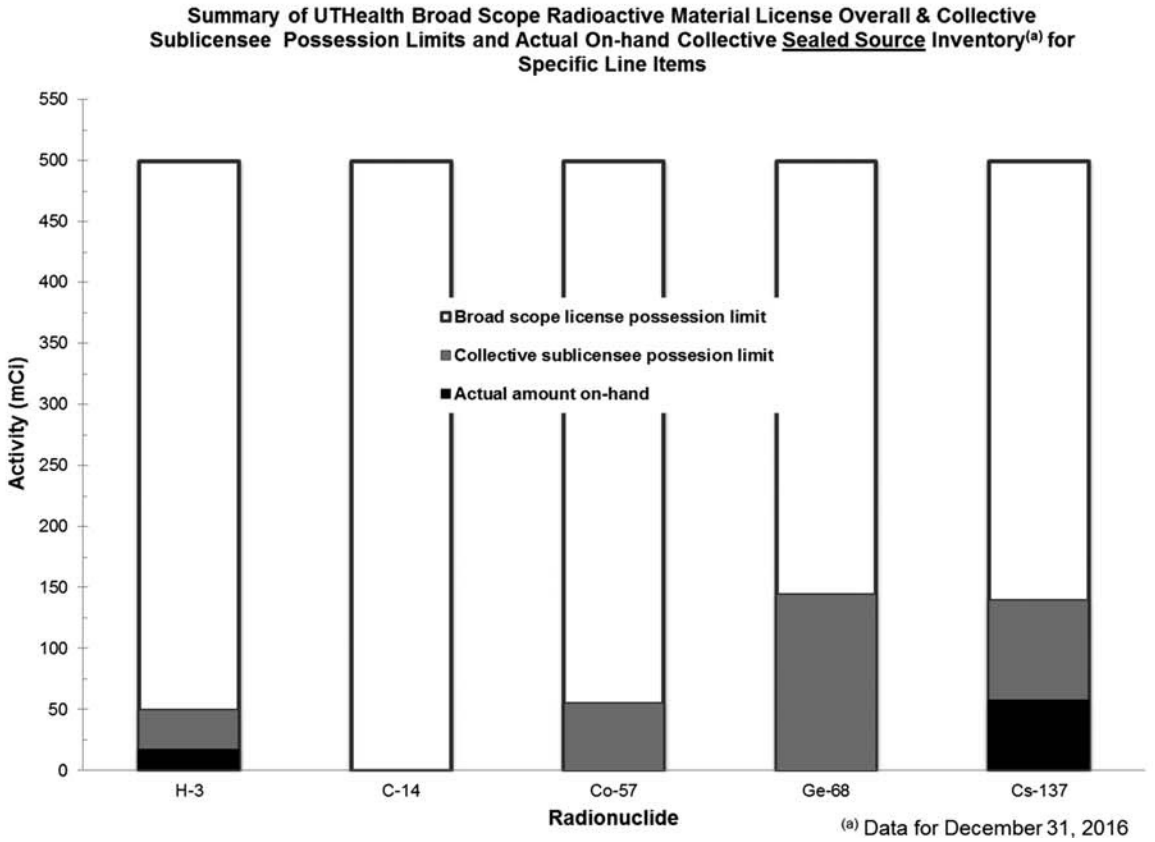
Cyclotron Decommissioning
On August 4, 2015, Texas DSHS renewed the license L03### and imposed the license condition to complete facility decommissioning by August 31, 2018. On December 16, 2015, UTHealth requested the facility decommissioning requirement be removed or amended. In processing the December 2015 amendment request, representatives of Environmental Health & Safety and Legal Affairs attended an informal hearing on June 29, 2016 in Austin, Texas. On November 15, 2016, the cyclotron license was amended to include the requirement for logistical and financial planning efforts and stepped requirements to be completed by August 31, 2018 and completion of facility decommissioning by August 31, 2021. On December 12, 2016, Dr. B###, the Chair of the Radiation Safety Committee sent a letter to M. T#### noting the importance of necessary financial planning for the UTHealth Cyclotron Facility Decommissioning to occur successfully.

Radiation Safety Manual and Supporting Documents
As needed, the UTHealth Radiation Safety Manual is updated. The Radiation Safety Manual was updated in August of 2016 and made available through the EH&S website. Enhancements included updating the Texas DSHS Radiation Control Program website information. The Radiation Safety Program assists in the Operating & Safety procedures for UTHealth as well as UT Physicians for radiation producing devices.

Liquid or Solid Inventory



Sealed Sources



SECTION 7: COMPLIANCE ACTIVITIES

Texas Department of State Health Services - Radiation Control

Results of recent routine inspections (2014 – 2016) by the Texas Department of State Health Services – Radiation Control are indicated. In August of 2016, Texas DSHS announced the recent return to the practice of conducting unannounced inspections of x-ray facilities.

Year	Inspection Date	Permit	Site / Building	Number of Notices of Violation
2014	Jan. 23, 2014	X-ray R10###	UTPB (GPR)	0
	Feb. 14, 2014	X-ray R10###	UCT (Employee Health Services)	0
	Mar. 27, 2014	X-ray R10###	Brownsville, CRU	0
	July 7, 2014	Broad License L02###	TMC	0
	July 7, 2014	Security L02###	TMC	0
	Oct. 21, 2014	X-ray R10###	Greenspoint Dental	0
2015	Feb. 11, 2015	X-ray R10###	MHH, PET Suite	0
	Feb. 11, 2015	X-ray R10###	MSB / MSE	0
	Mar. 19, 2015	Broad License L02###	South Campus (BBSB, SCRB3, SOD, site 007)	0
	Apr. 22, 2015	X-ray R10###	SRB	0
2016	Nov. 11, 2016	X-ray R10###	OCB Vans (Remote)	0
	Dec. 16-19, 2016	Broad License L02###	TMC	0
	Dec. 16-19, 2016	SecurityL02###	TMC	0

Radiation Protocol Sub-Committee for CT Systems (R10###) and FGI Procedures (R2####)

The Radiation Protocol Sub-Committee met in 2016 on April 26, 2016 and November 8, 2016. The minutes were reviewed by Radiation Control on January 4, 2017 for the X-ray inspection of the Mobile Stroke Unit (Ambulance containing a CT).

SECTION 8: TRAINING ACTIVITY REVIEW

Radiation Safety Training

During CY2016, the Radiation Safety Program provided radiation safety training to 382 individuals within UTHealth and the community.

Course	Number Trained	Audience
Basic Radiation Safety Tr. (6 hr) (8 courses)	55	UTHealth, License
Radiation Safety Officer Course (40-hr)	8	Radiation safety professionals within local and national community
Radioactive Material Shipping Training	5	UTHealth, License
Radiation Safety Awareness	0	Those individuals only tangentially involved with radiation
Laser Safety Training	1	UTHealth, Registration
Resident Dosimetry & Radiation Training, either online or in-person	26	UTHealth residents & local community
X-ray Safety Training	0	UTHealth and local community
Radiation Safety for Law Enforcement	98	UT Police
Radiation Safety Conference Lectures	128	National audience
Other Radiation Safety Tr.	61	UTHealth, local community
Total	**382**	

SECTION 9: RADIOACTIVE WASTE DISPOSAL REVIEW

During CY2016, UTHealth generated and processed the following radioactive waste as a result of research and clinical activities. Through compaction, vial shredding and other waste minimization techniques, the Environmental Protection Program was able to save tremendously through cost avoidance.

Radioactive Waste Review	Value for CY2015	Value for CY2016
Radioactive waste generated	274 ft^3	227 ft^3
Radioactive waste expenditures*	$0	$1,200
Environmental Protection Program Savings	$49,850	$43,850

*Not inclusive of supply or labor costs.

The RSC reviews the radioactive waste disposal program on a routine basis. The Committee strictly monitors the generation, storage, collection, processing, and ultimate disposal of radioactive waste at UTHealth.

The UTHealth Radiation Safety Officer has reviewed and approved this report prepared by the UTHealth EH&S Radiation Safety Program.

Robert J. Emery February 15, 2017

Robert J. Emery, DrPH, CHP, CIH, CSP, RBP, CHMM, ARM, CPP — Date