Winter 2024

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If the NIH is closed for business due to inclement weather, all deliveries of radioactive materials will be suspended except deliveries of patient use materials.

The DRS will store any incoming materials at the proper temperature until the Federal Government reopens at normal operating status. If a snow emergency is declared for Montgomery, Howard, or Baltimore counties in Maryland, deliveries to off-campus buildings will be suspended until the emergency status has ended.

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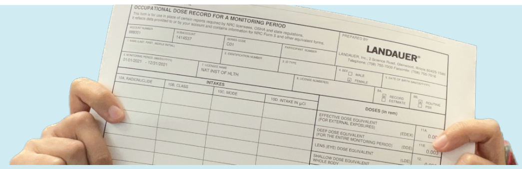


Annual Form 5: Be on the Lookout

Anyone who is officially monitored for external exposure to ionizing radiation during the year receives an annual summary report (NRC Form 5) informing them of how much dose was measured and recorded on their official record. Our dosimetry contractor assembles these reports in late February and transfers them to DRS for inclusion on our database and distribution to staff who were monitored. DRS will alert relevant staff via email that the Form 5 is available and provide a personalized link to access it electronically.

As we approach February, **please be sure to turn in all 2023 dosimetry** you may have in your possession so that it can be processed by our contractor in time for the Form 5 assembly. If you do not have your January 2023 dosimetry yet, please check with your dosimetry custodian and contact DRS immediately if not found.

As a reminder, anyone monitored for ionizing radiation exposure has the right to obtain their dose history at any time. If you wish to see your dose history anytime during the year, please contact the Dosimetry Program via email at dosimetry@mail.nih.gov to make the request in writing. Your NIH exposure history will be sent to you within 30 days.

Do you have an LSC (Liquid Scintillation Counter) you need assistance with?

I have an LSC and require assistance with maintenance

I have an LSC and require assistance with surplusing

I have, or anticipate receiving a new LSC that needs or will need to be inventoried by DRS

Chemiluminescence and Your Lab Results….

What is chemiluminescence? How does it affect liquid scintillation counting (one of the major means by which we analyze samples for radioactivity at NIH? Does the sample in figure 1 indicate massive contamination, or is there a better explanation for the results which we are seeing? Stay with me while we explore this and other questions.

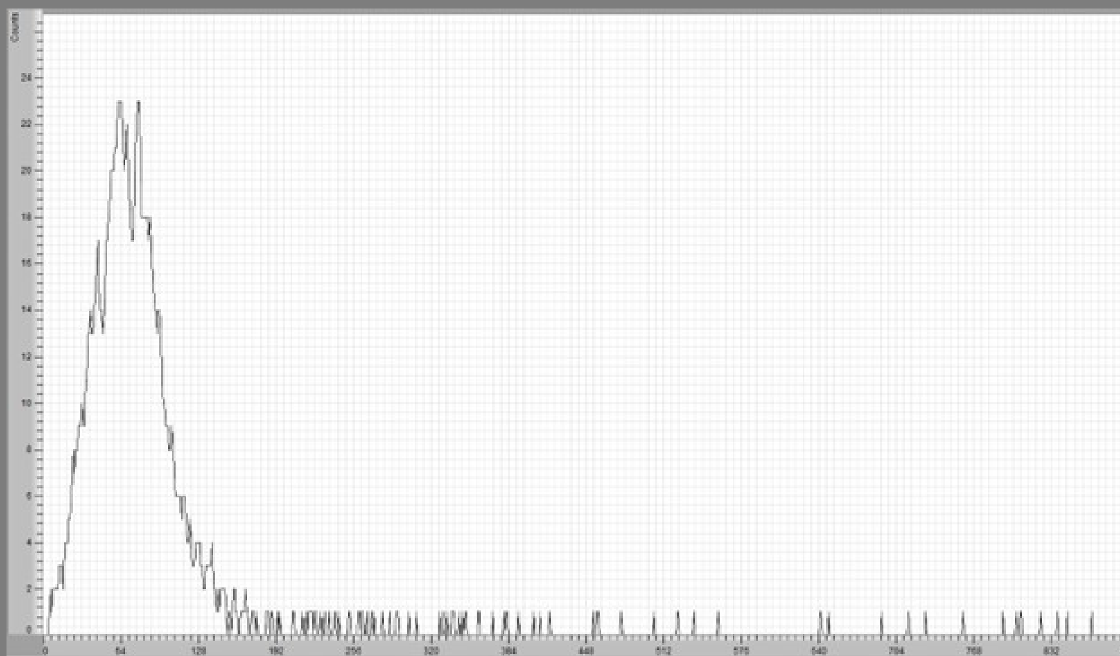
First, what is chemiluminescence? In liquid scintillation counting, radioactive events result in excitation of molecules in the scintillation cocktail which then de-excite by emitting visible light photons, which are then counted by the photomultiplier tubes. Unfortunately, radioactive emissions are not the only processes by which this can occur. Next summer, as you sit outside and admire the fireflies, remember that chemical reactions can also result in the release of visible light photons. Without a means to discriminate between chemical and radioactive processes, the light resulting from chemical reactions can be counted as radiation related events, leading to spurious false positives for radioactivity in a sample.

Cycle 1 Results

S#	CCPMA	CCPMB	CCPMC	DPM1	DPM2	DPM3	tSIE	MSG	LUM	MDCs-->	A:9.7	B:10.2	C:10.5	S#
Warning:A Quench set associated with this assay's nuclide was modified after being run.														
-1	1195	165	0	1854	216	0	859	E	7		>MDC	>MDC		-1
Missing vial 2.														
1	224	67	3	333	87	3	850	E	1		>MDC	>MDC		1
2	1132	102	24	1792	122	32	845	E	2		>MDC	>MDC	>MDC	2
3	954	38	0	1529	46	0	848	E	0		>MDC	>MDC		3
4	898	36	0	1436	44	0	852	E	2		>MDC	>MDC		4
5	516	106	0	787	139	0	851	E	0		>MDC	>MDC		5
6	663	0	0	1074	0	0	852	E	6		>MDC			6
7	303	0	0	491	0	0	849	E	4		>MDC			7
8	490	22	0	785	28	0	843	E	7		>MDC	>MDC		8
9	603	236	0	873	313	0	840	E	3		>MDC	>MDC		9
10	1109	36	0	1785	44	0	840	E	2		>MDC	>MDC		10
11	141	0	0	229	0	0	852	E	2		>MDC			11
12	145	2	0	233	3	0	848	E	4		>MDC			12
13	354	59	0	547	77	0	851	E	1		>MDC	>MDC		13
14	606	205	1	895	270	1	831	E	1		>MDC	>MDC		14
15	3048	86	0	4887	101	0	854	E	1		>MDC	>MDC		15
16	2082	486	0	3146	639	0	855	E	2		>MDC	>MDC		16
17	17	0	0	28	0	0	845	E	0		>MDC			17
18	0	0	0	0	0	0	842	E	13					18
19	101	66	0	135	88	0	834	E	2		>MDC	>MDC		19

(Figure 1: A sample which needs to be recounted due to excessive chemiluminescence)

Chemiluminescent events can be distinguished from radioactivity by several means. Radioactive events usually produce many photons in a short period of time (less than 18 nanoseconds). Chemiluminescence will generally produce photons of a different wavelength (characteristic of the chemical reaction) at a rate of one or a few at a time. There are two important results from this. First, in the case of chemiluminescence spectra (see figure 2), because the energy of an event is based on how many photons are collected within a certain time window, chemiluminescence peaks usually occupy the lower energy portions of the spectrum. Second, because only a few photons are produced at a time, the coincidence of both photomultiplier tubes, or in the case of Hidex instruments, all three photomultiplier tubes, is greatly reduced. For Hidex instruments, this results in a lowTriple to Double Coincidence Ratio (TDCR) value. For our example in figure 2, the TDCR value was 0.096. More typical TDCR values are around 0.400.



(Figure 2: Chemiluminescence spectrum on Hidex B (log-log graph)

Unfortunately, because of the very low energy of the tritium (H-3) beta decay events, chemiluminescence will often look like tritium contamination.

So, what are some measures we can take against chemiluminescence? Because what drives chemiluminescence is chemical, and chemical reactions often occur with a faster decay time, we can reduce chemiluminescence by letting samples sit for a period of time in a warm room. Because some chemiluminescence is caused by phosphorescent compounds which absorb light energy from the room, and then release it slowly, letting samples sit in a dark place can be especially beneficial. Some LSC counters (we did not pursue this option here) have the option to keep the samples cool during counting to inhibit chemical reactions during the counting process. And those of us in ANNLAB will often try to optimize parameters to improve the ability of our counting equipment to distinguish chemiluminescence from real radiation related events.

So, if you hear that your results are delayed due to chemiluminescence problems in counting, hopefully we can be patient with one another while we work through this particular technical problem.

We Might Have Something in Surplus for You...

If you are in need of some basic RAM-related item, such as a stepcan, or lucite container for radwaste, a carboy or maybe even some basic shielding, you may want to consider reaching out to your Area Health Physicist.

In Building 21, we have a stockpile of surplused items just like the ones I mentioned and potentially more. We retain these items as a service to you, the research community so that they don't go to waste. We can have them delivered to your lab in the event that we have something that meets your needs.

All items in surplus have already been surveyed and certified as being free of any radiological contamination. Delivery generally can be done in 1 to 2 business days if you are on our Main Campus. For satelite facilities, coordinate with your Area Health Physicist to come up with a timeframe that works for you. Please keep in mind that items are generally supplied on a first come first serve basis.

Staff Spotlight

DRS Bids Farewell to Outgoing Director, Cathy Ribaudo and Welcomes Jessica Mccormick-El (Divison Director) and Mike Roberson (Radiation Safety Officer)

Cathy Ribaudo, Retired from Federal Service in November, NIH Radiation Safety Officer and Division Director 2016-2023

After 35 years at NIH, the last 8 as Radiation Safety Officer, Cathy Ribaudo has bid a fond farewell to the Intramural Research community. Her retirement date was

Jessica has been Director of DOHS since April of 2020. She is a microbiologist and biosafety professional with a Ph.D. in microbiology and molecular genetics from Rutgers University. She earned her Registered Biosafety Professional Certification from ABSA International in 2010, directly after her graduate work, in part to her research technician experience in biosafety level 3 management, and the creation of the high containment and select agent program at what was then the University of Medicine and Dentistry of New Jersey (now Rutgers). In 2015, she passed the examination and became a specialist microbiologist with the National Certified Registry of Microbiologists through the American Society for Microbiology and shortly afterwards earned her credential as a Certified Biosafety Professional from ABSA International. She has hands on experience in biomedical, environmental and clinical microbiology research and teaching laboratories, and as an adjunct professor with experience translating her knowledge to

11/30/23. Many a researcher may remember her as their Area Health Physicist, as she began her NIH career in 1988 as part of the operations team performing lab visits. Over her career, she grew into more leadership roles within the Division of Radiation Safety, culminating as Division Director and RSO in January of 2016. Following her retirement in November, Mike Roberson is now the RSO, and Jessica McCormick-Ell (Director, Division of Occupational Health & Safety) is Acting Director, DRS. As she closed up her office, Cathy reminisced about the numerous adventures she experienced in her long tenure, including countless radioactive materials spills, security alarm responses and NRC inspections. While Radiation Safety saw much change over the decades of Cathy’s term, one thing that has not changed is the commitment to preserving staff and patient safety. We remain inspection-ready at all times, and maintain our customer service focus that Cathy prized so highly. Farewell to the outgoing RSO and welcome to the new!

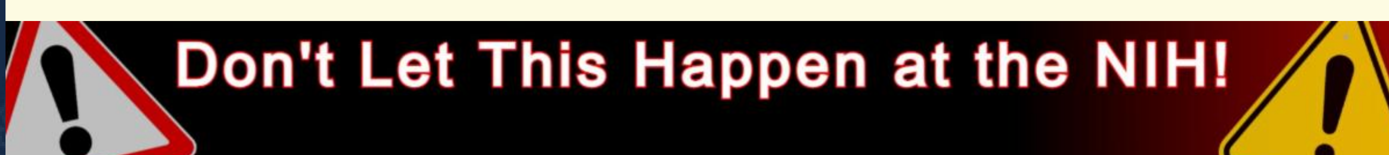
And with Cathy's departure, DRS would like to welcome our new, incoming Director, Dr. Jessica McCormick-Ell.

the teaching environment. As the Manager of the Biosafety Program and the Responsible Official for Rutgers, in addition to her bench experience in these areas, she has experience in applying biosafety and biosecurity principles to all areas, including current, emerging technologies in bioengineering and chemistry.

Warm welcome to Jessica McCormick-Ell, the new Acting Director of the Division of Radiation Safety as of December 2023.

Mike Roberson is our new Radiation Safety Officer. Congrats Mike!

And finally, congratulations to Mike Roberson in his new role as Radiation Safety Officer! Mike is a Certified Health Physicist with the American Board of Health Physics. Effective 1/2/24 Mike is now listed on our license with the Nuclear Regulatory Commission and will be in charge of overseeing regulatory-related aspects of the DRS operation. Mike has been a Health Physicist with DRS since August 1998 and has been instrumental in the success of every aspect of our program, so he has plenty of knowledge and experience to draw from. We at DRS all welcome him in his new role.



The following is a collection of recent enforcement actions taken by the NRC against other radioactive materials licensees and event notification reports made by licensees to the NRC.

Let's make sure these things don't happen at the NIH!

A Ge-68 sealed source was inadvertently shipped to an unlicensed facility. Reportedly, a positron emission tomography-computed tomography (PET/CT) unit, still containing the Ge-68 source, was removed from a medical facility in Washington state and shipped to an unlicensed Illinois facility. The unlicensed facility realized the radioactive source was still installed in the unit and reported the incident as a "found source." The parties involved are seeking the proper removal and return of the source to the Washington licensee. The Ge-68 sealed source was estimated to have a maximum activity of 11 mCi.

· A healthcare facility was treating an individual in their high dose rate (HDR) suite. During the treatment, while the Ir-192 source was exposed, it was noticed that the door to the suite was ajar. The treatment was immediately paused, and the physicist confirmed that the door was open. The door interlock was not functioning as required. The source should not have been able to extend while the door was open. The staff closed the door, put up caution tape, and maintained constant visual surveillance to ensure no one entered. Treatment was reinitiated and completed according to the written directive. The licensee performed an event reconstruction and surveyed at the open door with the Ir-192 source exposed. The highest dose rate of 0.3 mR/hr indicates that no member of the public would have received a dose exceeding public dose limits from this event.

· A healthcare facility reported an underdose of a patient during a lutetium 177 (Lu-177) treatment. The underdosing was due to a leakage in the administration line. The event involved an administration of 200 mCi of Lutathera (Lu-177) via syringe pump where a leak was identified during the infusion. At approximately 20 minutes into the infusion the patient reported a wet feeling on their hand. The infusion was halted immediately. It was identified that a small volume of radioactive liquid was present on the patient's hand having dripped down onto it. The site of the leak was identified to be the connection between the syringe pump apparatus and the patient. Bedding and materials adjacent to the patient were found to have absorbed most of the leaked material, though some had also leaked onto the floor coverings. Approximately 1/3 of the prescribed activity remained in the syringe. The skin dose to the patient's hand was estimated to conservatively be less than 10 rem (100 mSv). This is well below the level at which any tissue reaction is expected to occur.

So you think you no longer need to use radioactive materials; your research is changing. Is it safe to get inactivated on the DRS database? The DRS database is the

If you're an Individual User, your close-out role will simply be to account for the utilization and disposal of source vials you've used, so that inventory paperwork is properly documented. Always be sure to perform a thorough contamination survey after your daily use of radioactivity, so if any contamination is found it is resolved promptly.

What if your use of radiation is better categorized by a different user code? You might not be a bench researcher using open form sources of radioactivity, but consider – do you need to use an irradiator? Any x-ray equipment? Do you assist in preparing clinical protocols for Radiation Safety Committee review? Do you work in a Department where radiation is a secondary consideration (Clinical Pathology, Nursing, Facility Decommissioning staff, etc.)? These are all instances when you will still need to be Active in the DRS database, just with a different user code. Your training and dosimetry needs will be different from benchtop workers, but still need to be official tracking of radiation workers at NIH, including documentation of past inventory, training, dosimetry, bioassays, waste pick-ups, surveys, etc. All legacy records are documented, so even if your record gets inactivated, it remains (and can be reactivated if need be.) DRS is always cautious about inactivating anyone, because **there are downstream consequences!**

The action of turning a user record from Active to Inactive will prompt a few things to happen. **If you're an Authorized User, any posted labs, supervised users, and/or active radioactive material inventory will need to find a new AU assignment.** Ideally, these transfers should be discussed as part of succession planning if an AU is stepping out of the radiation business. All too often, source vials get abandoned as forgotten inventory, and this is problematic on many levels. AU responsibility for oversight of their lab staff's use of radioactive material, and of the lab infrastructure itself, is important to get passed on properly. Staff and labs cannot be orphaned. Even information about the legacy use of radioactive material is important knowledge to pass on, since long-lived contamination might be part of the lab infrastructure (to be dealt with during future renovations.) DRS will work with you to find a new AU to take on individual radiation workers, posted lab assignments and radioactive source vials if still needed.

tracked.

What if you need to be reactivated? For ANY user code, an inactive user can be reactivated – and this action will prompt a few things to happen. Training needs will be considered. If being reactivated within 4 years, generally no retraining is needed for most user types. If reactivated after more than 4 years, however; radiation safety training will need to be repeated. If being reactivated as an Authorized User, the Radiation Safety Committee may need to re-review your application. You may be prompted to complete any missed Refresher trainings over the period of absence. And for all radiation workers, of any user type, an updated Dosimeter Evaluation Form must be submitted.

If these reactivation steps seem daunting, perhaps it's best to keep your DRS record Active, for the small price of being prompted for a brief Refresher training every 3 years or so. However, we will support the NIH research community in any way needed, through inactivation and reactivation, close-out of labs, reassignment of personnel, transfers of source vials, etc. Contact a health physicist at (301) 496-5774.

Important Dates | Winter 2024

Jan 31	Feb 22	Mar 14
Deadline to turn in all 2023 dosimetry	NIH Radiation Safety Committee meeting	Celebrate Scientists Day

National Institutes of Health
Division of Radiation Safety
9000 Rockville Pike
Building 21
Bethesda, MD 20892
https://drsportal.ors.od.nih.gov

Hours of Operation:
Monday - Friday
7:00 am - 5:00 pm

After-hours/weekends:
Call NIH Emergency Communications Center:
(301) 496-5685

For more information contact:
Main: (301) 496-5774
Training: (301) 496-2255
Rad Waste Pickup: (301) 496-4451
Radioactive Shipping & Receiving: (301) 496-3277

RadiationSafety@nih.gov