July 2015 - April 2016 RAM NMED Events	
24 total events	
5 medical events	
1.	A patient was to receive a partial iodine-125 (I-125) prostate seed implant of 107 gray (Gy) followed by external beam therapy of 45 Gy and instead received the entire 160 Gy implant of seeds. This resulted in a 49.5% overdose for this fraction. No harm is expected to the patient; the external beam therapy was cancelled.
2.	A patient was to undergo an administration of yttrium-90 (Y-90) SIR Spheres. During administration of the Y-90 dose, the interventional radiologist (IR), radiation oncologist and medical physicist noticed a leak from a puncture site in the rubber stopper in the V-Vial delivery apparatus. The IR was not able to stop the leak with derma bond (glue recommended by the manufacturer for use when leaks occur). To prevent further contamination of the interventional radiology suite, the administration was aborted and all contaminated and potentially contaminated equipment were secured, double-bagged and placed into long-term storage in the nuclear medicine department. The medical physicist estimates that the patient received approximately 10% of the dose prescribed in the written directive, thus resulting in a medical event. The event appears to be due to pressure in the V-vial at the time of administration being high enough to push the dose through a puncture site made in the V-vial stopper during preparation of the dose. This preparation occurs at an out-of-state pharmacy that is contracted to provide unit doses. The pharmacy has since been contacted and, at the request of the reporting licensee, has changed their dose preparation methods to prevent a reoccurrence.
3.	A patient was scheduled for a yttrium-90 (Y-90) SIR Sphere procedure. The prescribed dose on the written directive was 10 mCi. The ion chamber measurements indicated a delivered dose of 7.81 mCi (-22.8% of prescribed dose). The authorized user forgot to change the lung and liver estimated doses on the pre-calculation worksheet. There should have been instructions for the Nuclear Medicine Technologist to draw up slightly more than the prescribed activity to account for the 2 mCi of Y-90 Sir-spheres in waste. An all-inclusive calculator will be used to ensure the preparations in the future. The RSO will review all future pre-administration and written directive records. The resulting administration is considered clinically appropriate with no unwanted effects to the patient.
4.	A 30-year-old female patient was treated with 61.2 mCi of iodine-131 (I-131) for thyroid cancer and released, with discharge instructions, at approximately 12 PM on 02/03/16. The patient then returned to the emergency room (ER) of the same hospital at 1:00 PM. However, the patient did not disclose the previous I-131 treatment to ER staff until approximately 1:00 AM on 02/04/16 at which point the ER staff immediately contacted radiation safety personnel. The patient was then segregated and all access to the original room was controlled and posted properly. Surveys were taken and all linens and other potentially contaminated materials were collected for proper storage and decay. A radiation survey performed at 9:30 AM on 02/04/16 estimated the potential maximum radiation exposure to staff to be 3 millirem. The hospital has introduced an additional pre-procedure-in-person interview process for all I-131 patients, and the I-131 patient release instruction form will be updated to include more specific and detailed instructions.

5.	On March 15, 2016 a written directive for 18.1 millicuries of yttrium-90 was written by the authorized user, and the residual activity in the vial measured 13.3 millicuries, or 73.5% of the prescribed dose. The cause was found to be that a different AU wrote the initial written directive based on an incorrect dose calculation. The discrepancy wasn't discovered until after administration.
2 radiography events	
1.	While performing pipeline radiography the licensee experienced a radioactive source disconnect in which the source became disconnected from the drive cable and was located within the collimator. The manufacturer was contacted and arrived to perform a source recovery. After a successful recovery with no over-exposures and upon inspection, it was noted that the control adaptor to the camera had become worn out, which allowed this disconnect to occur. The camera was taken out of service until repaired. The licensee revised its training and daily checks to include a misconnect test to prevent any future occurrences. The source was a 68 curie iridium-192 within a SPEC Model 150 camera.
2.	The licensee allowed one of their employees to exceed the annual whole-body exposure limit. On September 18, 2015 the employee's annual dose for the period through August 18, 2015 was discovered to be 4,044 millirem. The employee was then assigned to verify radiation area boundaries and work in the dark room of the trucks. On October 15, 2015 the employee's OSL result of 5195 millirem for the period ending September 18, 2015 indicated he had exceeded the annual limit of 5,000 millirem. At this point the employee was removed from all radiation work. On November 4, 2015, the annual exposure record was discovered to be 5315 millirem. On November 25, 2015 the licensee reported this event to the Nuclear Regulatory Commission, who then informed our Department. By the time the licensee took definitive action to limit the individual's exposure (September 18, 2015), the individual was already exposed over the limit in 10 CFR 20.2203(a)(2)(i). The licensee now plans to routinely review SRPD and OSL readings.
4 radium events	
1.	A vial of radium-226 luminous paint was discovered within a residential waste shipment. It was labeled UNDARK and was manufactured by the U.S. Radium Corporation. The vial had no removable contamination. The Department has secured the bottle for shipment with the next radium roundup.
2.	A sealed source of radium-226 (Ra-226) was found at a local scrap yard after setting off a radiation detector alarm. The reading of the Ra-226 source was 1.5 mR/hr at 2", or approximately 10 microcuries. The source had no removable contamination, and no overexposures occurred. The facility has been unable to determine where the source originated. The Department collected the source and will dispose of it with the next radium roundup.

3.	An outbound trailer was identified at a local Transfer Station as having radioactive materials above the PA Department of Environmental Protection limit of 10 µR/hr above background. A radiation survey was performed and the radioactive material was identified as radium-226 (Ra-226). The initial survey performed near the front driver side was identified with a maximum contact reading of 84 µr/hr. There was no detectable removable contamination on the exterior of the trailer. A single bag containing 71 devices was found containing Ra-226. The devices are military parachute ripcord arming devices. A measurement of one device had an exposure rate of 17 µR/hr (net) at 1 foot. The 71 devices total approximately 130 to 135 µCi. The sources are being held at a licensed secure location for pick-up in the Department's annual radium roundup. No over-exposures occurred, and no removable contamination was present on the devices.
4.	A new owner of a facility discovered a locked room with a lead "pig" inside that was labeled radium-226 100 mg. The Department sent an inspector to the location and verified the source was present. The former licensee failed to disclose the transfer of the source upon license termination in 2015. Currently the source has been contracted for removal to Ecology Services in Maryland.
1 shipping event	
1.	A licensee received a shipment of fluorine-18 (F-18) from a New Jersey radiopharmaceutical licensee with a maximum surface reading of 210 mR/hr. This exceeds the 10 CFR 71.47 limit of 200 mR/hr. The licensee observed that the screw top of the 'pig' was not secured properly (the thread of the lid and the body did not align); therefore, there was a gap in the shielding. The licensee then opened the package to examine the interior for any damage and determined that the lid of the secondary shield was not present. The licensee determined that there was no observable damage to the vial of F-18 contained within the package and no removable contamination was found.
4 lost or stolen events	
1.	An iodine-125 seed with an activity of 113 microcuries (µCi) was being used for radioactive seed localization of a breast lesion. After surgical excision of the breast tissue at an outpatient surgical center, the specimen was placed in a plastic bag and imaged radiographically to confirm the presence of the seed. At this point the seed was noted to be outside of the specimen tissue. The specimen was then transferred to a plastic container for transport to the main hospital pathology department. When the specimen was received at pathology on December 23, 2015, a survey indicated that there was no seed present. It is assumed that the seed became separated from the specimen during transport and remained in the plastic bag which was disposed of as biohazard waste. A survey of the surgical center was performed, but the seed wasn't located. The licensee will perform additional radiation surveys and document when the specimen is transferred from the specimen bag to the plastic cup to confirm that the seed is in the cup.

2.	Two iodine-125 seeds were being used for radioactive seed localization of a breast lesion and implanted in the right breast. The dose of each seed was 0.166 mCi. The patient then had surgery to remove the lesions. The first specimen was removed and imagining confirmed that the seed was within the specimen. The second specimen was removed; however, imaging showed the seed was not included in the specimen. After investigating, the seed was found within a small amount of tissue on the surgery table. The specimen and the small amount of tissue containing the seed were placed in a container and sent to pathology. However, pathology was not notified the seed was not within the specimen. When the specimen was removed from the container for dissection at pathology, the container was then rinsed and the loose seed went down the sink drain. The staff will be re-educated on the proper procedures, and specimens will not be transported to the pathology department until the imaging is complete and the location of the seeds are confirmed and communicated appropriately.
3.	On August 21, 1998, an NRC Licensee reported that a Troxler density gauge Model 4640B containing 8 millicuries of cesium-137 was stolen from their storage area in Petersburg, PA. Local law enforcement was notified, as well as NRC (NMED Item Number 980902). Seventeen years later, on December 22, 2015, a towing company from York, Pennsylvania, called Troxler informing them that while cleaning out a storage shed a gauge was found. Troxler's RSO contacted the Department and we followed with a call to NRC Region 1, where it was discovered that the gauge was from the still-open NMED event. It was learned that the NRC license was purchased by a current Pennsylvania licensee on March 11, 2008, and they maintain the license to this day. The current PA licensee took possession of the gauge and added it to their license.
4.	On Monday March 7, 2016, while conducting the six-month inventory check of the radioactive sources at a local power plant, one tritium exit sign containing approximately 10 curies of tritium was found missing. The last inventory check was conducted September 11, 2015, and the exit sign was present at that time. The sign was last known to be in good condition and not damaged. The licensee performed a thorough search of the location and surrounding areas, including interviews with all workers and contractors who were near the sign location. Refresher training was conducted for all personnel working in close proximity to tritium exit signs, and plans are in place to replace all remaining signs with non-radioactive ones by the end of 2016. There are no known exposures and no expected exposures
6 gauge events	
1.	During gauge standardization procedures two separate shutter issues occurred. The licensee discovered the event and notified the Department. The actuator cylinders in both gauges hydraulically seized causing the shutters to fail to close completely. All proper lock out / tag out procedures were followed and leak tests and survey data revealed no elevated radiation levels. A service provider was notified and replaced both shutter assemblies. At no point were employees exposed to excess levels of radiation. The gauges involved were Accu-Ray Model U-3 with a 1 curie americium-241 source and IRMS Model TG-2 with a 3 curie americium-241 source.

2.	The Department received a call from one of our licensees indicating that their Troxler gauge was run over with a sheepfoot compactor while on a job site. The compaction rod which houses the sealed source was detached from the gauge. The licensee secured the area and a departmental inspector arrived on site shortly after the event. The sources were found to have not been compromised, and the broken gauge was able to be placed into its transport case to be returned to the licensee for shipment back to Troxler. No overexposures occurred, and the licensee has implemented new procedures to prevent future events.
3.	The Department was notified by a licensee that a malfunction of a roll pin on a shutter handle occurred on their Berthold Model LB8010 gauge. This gauge contains 20 millicuries of cesium-137. The roll pin became dislodged which rendered the gauge shutter unusable in the closed position. The gauge was removed from service, and a service provider was contacted for repair. No overexposure occurred from this event.
4.	The Department was notified that an Instrotek Xplorer Model 3500 moisture density gauge containing 11 millicuries of cesium-137 and 44 millicuries of americium-241 became disabled from damage in Berwyn, Pennsylvania. The gauge was run over by a piece of heavy equipment. This damaged the gauge and it became unusable. The source rod was in the retracted position at the time of the incident and instrument readings confirmed that no damage to the source occurred. The gauge was taken out of service and transported to the manufacturer for servicing. No exposures occurred.
5.	During normal operations it was discovered that the weld on the collimator block failed on a Thermo Measure Tech Model 5204 alignment gauge containing 4 curies of cesium-137. The gauge was immediately placed out of service, and a service provider was contacted to perform repairs. The shutter was closed at the time of the event and no workers received any dose. The service provider replaced the collimator with a spare one and tested the gauge to assure everything was functioning properly. The preventative maintenance schedule that was developed in response to another gauge in a location with similar conditions was adapted to this gauge also. This will help to prevent further occurrences.
6.	During a routine maintenance check on a Ronan Engineering Model SA1-F37 gauge containing 10 millicuries of cesium-137, the roll pin failed when the shutter was being closed. The roll pin mechanism had become bound with foreign materials, making it difficult to close. The shutter was then manually closed with an adjustable wrench. No exposures occurred as a result of this event. The gauge was placed out of service, and the manufacturer was notified and has completed repairs The license replaced and secured the gauge cover so it would not become loose and fall off. The shutter checks are being completed at more frequent 2-month intervals, and the licensee has also begun utilizing electronic reminders to assure shutter checks are completed on time on the gauge.

2 contamination events	
1.	On Monday, February 22, 2016, a large orphan radium-226 source of unknown activity or origin was shredded at a western PA scrap metal Facility. The recycled material was then shipped to two different Ohio facilities where it was discovered during an inbound radiation scan on February 23, 2016. Extensive contamination occurred at one of the Ohio locations while contamination locations within PA have been segregated to the shredder with levels of over 400 millirem /hr being noted. The western PA facility monitors apparently missed the source both incoming and outgoing.
2.	A nuclear medicine technologist (NMT) was injecting a samarium-153 Quadramet dose of approximately 81 millicuries, when there was a problem with the tubing connection. A small amount of samarium-153 leaked. It is estimated that the amount was approximately 1 millicurie. The patient was released and sent home. The NMT then informed his supervisor, but radiation safety wasn't notified until the next day. Upon notification, radiation safety staff responded and noted fixed contamination on NMT's forearms and hands. Low levels of contamination were also noted on the floor, other NMTs' hands, soles of shoes, survey meters, chairs, countertops, keyboards, patient paper chart, and clothing. No adjacent contamination was found; however, a small amount of contamination was found within the NMT's car. The contaminated materials were bagged and stored for decay while the NMTs were decontaminated. The rooms affected were either closed for decay or precautionary measures were taken to facilitate continuing patient care. The hospital has re-educated staff to events that require immediate radiation safety notification along with revision of procedures and retraining of all staff on all applicable policies.