Contamination Spill 10/25/16
Animal Industries Annex Room 20

I Incident

Around 11:00 am on Tuesday, October 25th, two small vials, of the form shown in Figure 1, were loaded into a glovebox antechamber inside a glass beaker. These two samples contained 469 ± 9.38 μl of 4 M HNO_3 and 430 ± 8.6 μl mixture of TBP (30 vol.%) and kerosene. The two vials were part of a Plutonium Uranium Redox EXtraction (PUREX) experiment, with dissolved irradiated uranium fuel RSO 0079436. The estimated gamma activities of the two vials is shown in Table 1.

Figure 1: Image of vial type that leaked

Isotope	HNO_3 (μCi)	TBP (μCi)	Estimated Total (μCi)
^{144}Ce	5.70+/-0.06	0.118+/-0.003	5.82+/-0.06
^{154}Eu	0.054+/-0.002	0.0033+/-0.0002	0.057+/-0.002
^{125}Sb	0.24+/-0.01	0.0007+/-0.0006	0.24+/-0.01
^{106}Rh	6.3+/-0.3	0.240+/-0.005	6.5+/-0.4
^{134}Cs	0.359+/-0.01	0.00018+/-0.00006	0.36+/-0.01
^{137}Cs	4.58+/-0.1	0.0162+/-0.0001	4.6+/-0.1

Table 1: Activities in the two vials

The pump was turned on and air was pumped out of the antechamber until the pressure reached

approximately -100 kPa. At this point a pop was heard, and positive pressure was reinstated for the antechamber. Upon opening the antechamber, both vials were observed to have popped out of the glass beaker and spilled on absorbent paper, which was covering the tray inside the antechamber. An image of the antechamber with tray is shown in Figure 2.

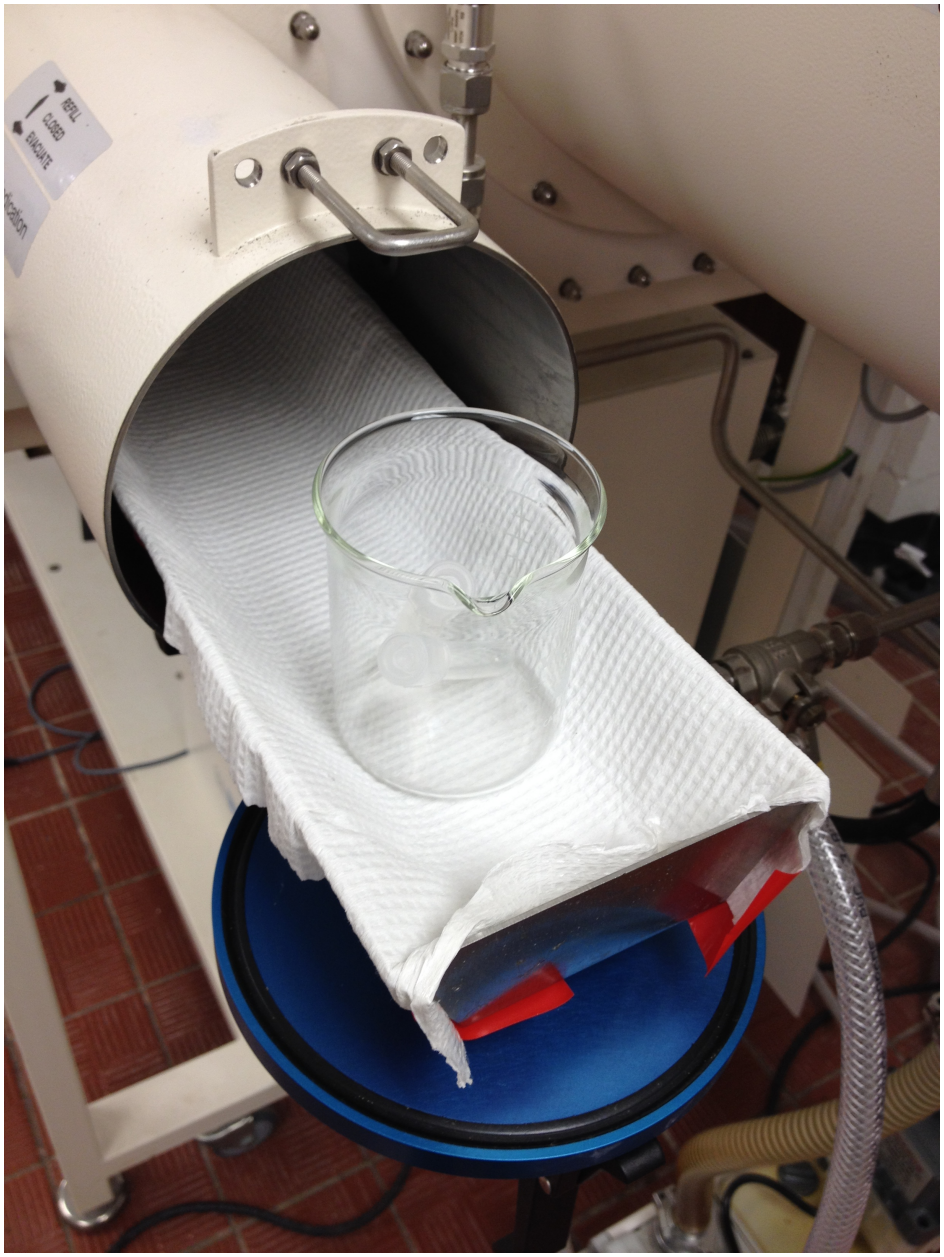

Figure 2: Antechamber tray with diaper paper covering

II Decontamination

Kevin Glennon performed the following tasks for the initial decontamination:

- Absorbent paper was layed down nearby and the two vials, with the glass beaker, were temporarily placed there (until decontaminated)

- The absorbent paper inside the antechamber was removed and thrown in the radioactive waste bin, and the tray was cleaned with radiacwash towelettes.
- During this time, Paul was being scolded

Both Paul and Kevin took swipes of several areas while decontamination ensued. Swipes of the outlet to the antechamber were clean *before* decontamination and concerns about radioactive material leaving the chamber to the pump were low. Keven left the lab and Paul continued to decontaminate the antechamber and took swipes of the area. After decontamination the majority of the cylinder of the antechamber was at background levels except the back portion of the cylinder nearest the glovebox, which were about 3 times background. Cleaning activities concluded around 5:00 pm.

III EHS Involvement

The following morning EHS was contacted and their assistance was requested to clear the antechamber and pump for use. Around 3:30 pm, Daniel Menchaca and Luis Rodriguez arrived at the laboratory. After asking about exactly what happened, they proceeded to swipe the area around the glovebox and antechamber, including the pump used for the antechamber. An alpha detector was used to check for loose contamination and we were asked to not work in the lab until the results for the swipes came in.

The following day (Friday), Luis informed me that the swipes were clean and that work in the lab could continue, but not in the glovebox until the antechamber was cleared. I asked if I could continue to decontaminate the antechamber and he said that was acceptable.

On Monday, both Daniel and Luis arrived around 10:00 am to take swipes of the antechamber.

After decontamination of the antechamber and taking swipes of the area, it is assumed that the majority of the contamination made its way to the radioactive waste.

IV Lessons learned

This contamination spill is mostly due to procedural oversight of Paul Mendoza. The experiments started this semester utilized a different vial type than in previous experiments, and the large vacuum created in the antechamber caused the new vials to spill. Procedures for transferring samples into the glovebox now entail that all samples need to be contained within a vial type that has a screw top, and should be parafilm wrapped as an extra precaution.