Interview with Ron Colle
Performed by: Jim Tracy and Rob Dimeo October 3, 2017

Can you talk some about the radium standards in the context of the vial in the Am-241 incident?

Around 1994/5 he had written a memo to management stating that the 1911 Curie and 1934 Honigschmid Radium standards were getting old and they should do something with them. In the memo, he proposed a research project where they would open these sources and distribute portions of the sources to other national labs for measurement. After receiving the memo, his management at the time (Bert Coursey) suggested that they look at the sources. After looking at the sources and noting serious discoloration of the glass, he wrote a memo (Feb 07, 1995) with options for these sources.

There is not much relevance of these sources to the current Am-241 vial/incident. The current theory for the Am-241 source is that radiolysis resulted in the buildup of Hydrogen. The radium standards ca~~n~~not are unlikely to build up pressure – there is platinum wire in the glass and the seal on that wire would ~~not~~ probably be ~~a~~ good enough to contain the ~~hydrogen~~ helium. Helium can also diffuse through the gas. The glass in the radium standards is fragile because of radiation damage (the window is blacked out on 2 of 3 samples).

Do you have any opinions on the vial rupture?

The cause of the Am-241 vial rupture is all over the map. He has no reliable theory. There are 2 current theories

replace vials with ampoules.

1. Alpha induced radiolysis created H2 which caused pressure to build up in the ~~vial~~ ampoule until it ruptured. His gut is telling him no. If this was ongoing he would have noticed it when opening ~~vials~~ over the last 40 years. He never noticed a pressure buildup when opening sources. He has opened numerous high activity (100 – 200 microcurie) Radium solution ~~vials that~~ ampoules had more activity and were older (sealed 40 years ago) than the Am-241 vial.

   He noted that pressure calculations are not reliable. They need to be done by someone who knows this better than him. He mentioned radiolysis forms completely different products if there are acids in the solution. He thinks the cause could have been something else. ①

   Most of his work has been with radium. He mentioned that the gammas from the radium could have disassociated the hydrogen that was produced by radiolysis (which would explain why there was no problem with the radium ~~vials~~). He has performed work with Am-241 beginning around 2005, but the activities he used were much lower (52 kBq in 2007) than that for the incident vial.

2. Maybe the ampoule failed because of the cleaning procedure. The ampoule was old (made in 1976) and glass ages over time. They do have an ampoule washing procedure – but this no longer works well. Cleaning could scratch the ampoule wall or create a small crack – these could lead to vial failure This could be the initiating "something else"

Very few perform work with high levels of transuranic material. The high activity in the incident ~~vial~~ is not common with transuranic material.

① Perhaps some overpressure ~~and~~ then something else initiated the rupture. – – like weakened glass (scratches & mini cracks) due to cleaning.

His first guess is that the ~~vial~~ would fail at the seal, but it doesn't seem like the ~~vial~~ failed at the seal. The pictures suggest explosive force and failure of the walls – he has no clue what would have caused it.

Has he had any ampoules fail? He had one, it was 40 years old and the ~~vial~~ cracked open down its length when he attempted to open it. The ampoule was very brown.

Do you know if there was any discoloration of the Am-241 ampoule? He has been told there was none.

Had there been any calculations done on all the vials? He had done some back of the envelope calculations prior to the incident, but these were associated with the radium standards. Bert Coursey initiated these calculations. This came up because Bert Coursey had been talking to someone at the Smithsonian about the radium sources they had. Back in the 1940's and 1950's radium was their bestselling SRM. In the 1980's Bert got rid of a lot of the radium their group had.

Would the original Am-241 manufacturer have provided a warning about pressure buildup? After viewing the calibration sheet for the source and being told that Dan Golas was the custodian. He believed the original source probably came in a screw top bottle and pressure buildup would not be an issue.

Do you have any opinions or beliefs on the incident?
He has no reliable theory. His group has mentioned it to their sister labs and he would not be surprised if their sister labs don't create a group to look into this.
Rounding up some of the old ~~vials~~ that have been washed and having the glass blower look at them for defects may be useful.