

A large plastic barrel was red-flagged at a steel scrap recycling unit. It had only 1-2" of sludge in the bottom with a contact dose rate of only 25 uR/hr...



A closer view of the meter...

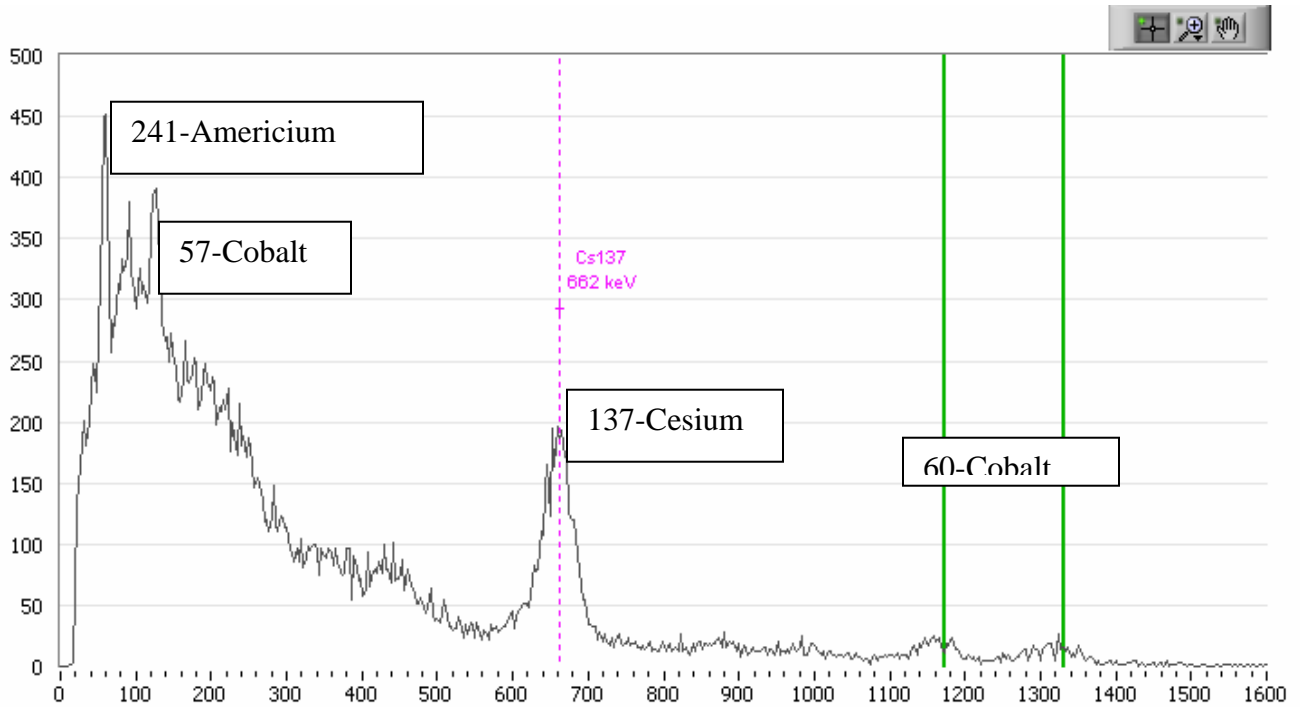


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**GR-135 (NaI) spectrum from sludge found in the bottom of a barrel.  
April 29, 2004.**

## Questions:

- 1) Is this a suspicious mix of radionuclides?
- 2) Should this material be in the public domain?
- 3) Should we investigate? If yes, how fast?
- 4) Could this be residue from a “dirty bomber”? If so why?
- 5) Where could these radionuclides have come from?
- 6) Who should be notified about this?

Radiation Safety Training – Nuclear Instrumentation Sales and Training – Inspections

**Update, June 5, 2004:**

The final analysis of the sludge has been carried out with a High Purity Germanium radiation detector with multi-channel analyzer. This instrument showed a mix of "Cobalt-60, Niobium-94, Antimony-125, Cesium-134, Cesium-137, Europium-154, Europium-155, Americium-241".

These radionuclides are consistent with production by a nuclear reactor and might be found in residue from the heat transport system and some irradiated fuel products. This suggests that a reactor site or other nuclear facility is responsible for the barrel.

The HPGe is a very high resolution lab instrument that is used as the final arbiter of what gamma emitting radionuclides are present in a sample. The SAIC-Exploranium GR-135 Identifier found 3 of the nuclides and missed the rest because a) the nuclides were not in the library in use, and b) the Sodium Iodide detector does not have the gamma peak resolution to differentiate peaks that are close in energy. Nonetheless, the GR-135 provided the necessary info to undertake an investigation, based on the unusual and potentially disastrous nuclide mix.