

# Free Release of Volumetric Material

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# Overview

- The NRC, under Industry pressure, killed the concept of “Below Regulatory Concern” in 1991.
- Free release of materials has become a big issue.
- Guidance is available but is suggestive rather than prescriptive.
- Unlike RETS, Station specific rules are our only option.

# Issues

- **Some material needs to be free released**
- **Rules should be clear and defensible**
- **One size does not fit all - gamma spec doesn't measure tritium or "see" through shielding.**
- **Gamma spec is only an appropriate tool in certain specific cases.**

# Issues

- A wise man told me that “The Beverly Hillbillies” was the worst thing that happened to the South in his lifetime.
- In a like sense, I say that “Star Trek” is the worst thing to happen to the science of Chemistry in my lifetime. (Spock’s damn tricorder)
- “Can’t you just point that thing at this pump and free-release it?” “Can’t you count it any faster?”

# Issues

- That attitude led into the “count it on the GeLi” response to any item that wouldn’t pass a frisker.
- Our response was “not so fast - presence of naturally occurring isotopes does not mean absence of plant isotopes. (see attached memo - 2/27/02)
- “What moron thinks this is an acceptable practice?” - opinion expressed by an esteemed guest at our facility.

# How could we help RP?

- We could set the boundaries around free release of volumetric (flowable) materials by gamma spectroscopy.
- We could not set boundaries for objects that do not meet calibrated geometries.
- We could provide guidance on use of gamma spectroscopy in qualitative analysis of materials for free release.

## Where did we start?

- **No detectable activity and environmental LLD's have been met.**
- **OK. Which environmental LLD's for which samples?**
- **“The Environmental LLD as a Survey Criterion”, H-401, Reactor Special Topics, Region I, Stephen Klementowicz.**
- **See Table 5-3 from Ginna ODCM.**

## What about the holes in Table 5-3?

Ginna inferred the following from H-401:

- The ratio of LLD's from water to other substances in the table are constant.
- For example, the LLD for Fe-59 in sediment should be 300 pCi/Kg since Cs-137 is 150 pCi/Kg.
- We filled in the holes for fish, food products, and sediment, as surrogates for materials to be counted.



## Work in progress

Ginna further inferred the following:

- If we met the a-posteriori MDA, we have demonstrated compliance with the a-priori LLD.
- Judgement must be applied to the specific material to determine which LLD category is applicable.
- LLD categorization includes evaluation of density, composition, and end use.
- If in doubt, use the more restrictive LLD.

# What is a reasonable effort?

- Set up the count to meet the applicable environmental LLD.
- Provide enough sample to meet the applicable calibrated geometry.
- LLD's of mixtures (like slurries) should be ratioed.
- Exceptions described in Table 4.12-1 c. of NUREG 0472 need to be documented and a discussion included in the Annual REMP report.

## Process knowledge? (A simple example)

- We discovered a crack in an elbow of a pipe to our retention tank.
- Excavated sediment from the vicinity of the elbow showed Cs-137.
- Absence of other nuclides and presence of Cs-137 at similar levels in background sediment samples led us to conclude “fallout” .
- Samples out of contact with the RCS more than 30 days shouldn't meet I-131 LLD.

# Qualitative Analysis by Gamma Spec?

- **Used in conjunction with RP surveys.**
- **Can identify presence of naturally occurring nuclides.**
- **Can not be used alone to release material.**
- **Shielding and size are challenges, (the arc-shunt episode).**

# Qualitative Analysis by Gamma Spec?

“Can’t you just point that thing at this stuff and free release it?”

- YES, if the “thing” we are pointing is a calibrated in-situ gamma spectroscopy system.
- See Canberra for details.  
(Not in our budget)

## 3 Points

- **Gamma spectroscopy can be an effective tool for free release of volumetric materials**
- **The rules must be clear, defensible, and procedural.**
- **NO DETECTABLE PLANT ACTIVITY!**  
**“It’s not just a good idea, It’s the Law!”**