



# **PUBLIC HEALTH**

**ALWAYS WORKING FOR A SAFER AND  
HEALTHIER WASHINGTON**

## **FERN-FSIS Radiological Exercise: The View from Incident Command**

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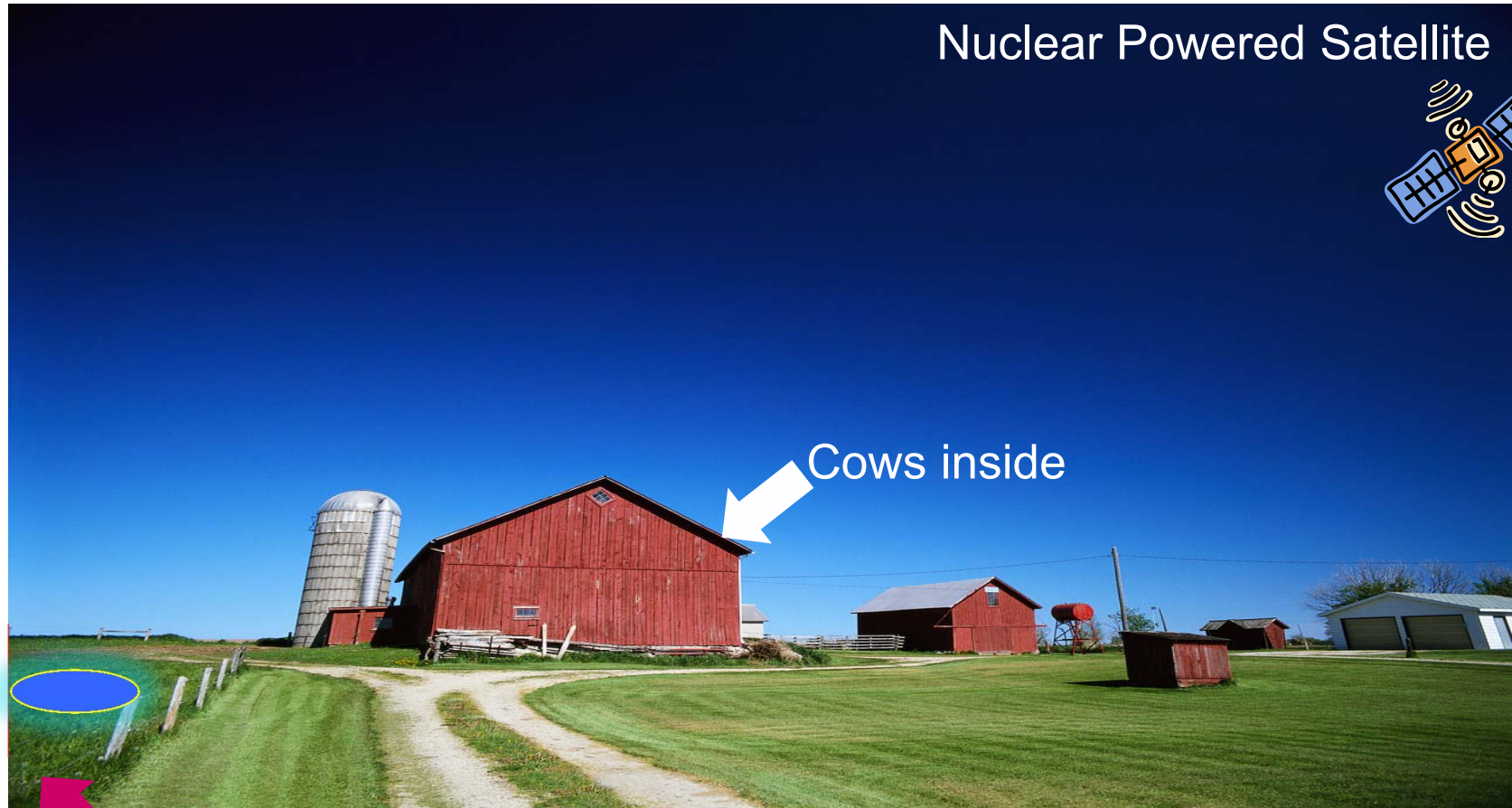
**APHL National Meeting, June 4, 2013, Raleigh, NC**

# Radiological Testing of FOOD

- What is the difference?

Environmental	Food
Water (pure), air filters (pure), soil (mixtures) sludges (mixtures), vegetation (mixtures)	Beverages (solutions/suspensions /emulsions), vegetables (mixtures), meats (mixtures)
Well established sample preparation methods	Sample preparation methods are just now being established
Distance and shielding mitigate hazards from $\alpha$ and $\beta$	Once ingested, there is NO distance nor shielding, hazards from $\alpha$ and $\beta$ are maximized

# The Scenario



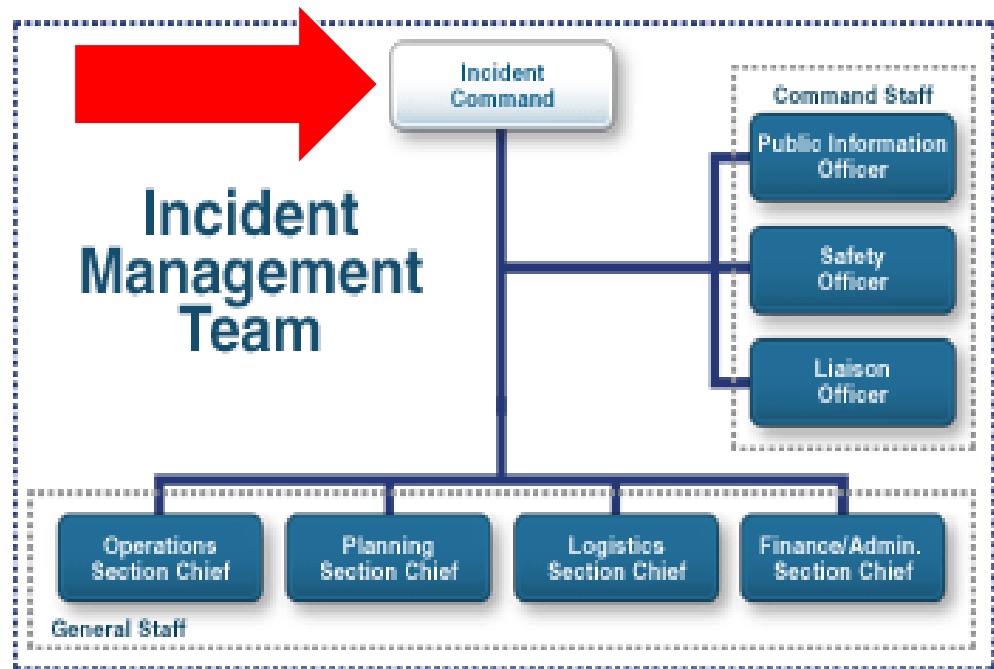
## First Responders

- Volunteer Fire Company
- Sheriff's Office
- Neighbors
- Local News
- Incident Command relocates to the local diner



## Incident Command - RADIATION

- Local: Fire/Sheriff
- State: Police/ Ag/ Environmental/ Health/ Radiation
- Federal:  
USDA-FSIS/  
FDA-CFSAN/  
USDoE-FRMAC/  
FBI/ USAF



# FERN Laboratories



Samples to:

- Connecticut
- New Hampshire
- New York
- New Jersey
- Virginia
- Washington



## Exercise Laboratory Tasks

For each sample of Hay and of Milk

- Gamma screen: Report in 12 hrs
- Gamma count: Report in 24 hrs
- Isotopic Strontium ( $\beta$ ): Report in 30 days
- Isotopic Plutonium ( $\alpha$ ): Report in 30 days
- Americium-241 ( $\alpha$ ): Report in 30 days



# Gamma Emitters: 12 Hours Later Incident Command Receives:

Nuclide	Co-60	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ru-106
DIL/3	None	4000	1333	<b>57</b>	<b>310</b>	453	150
Hay Bq/kg	7.14 – 26.2	61.1 – 960	39.2 – 670	<b>118 –</b> <b>1040</b>	71.4 – <b>820</b>	-11 – 0.0	
Milk Bq/L		25.9 – 33	10.2 – 12.7	<b>92 –</b> <b>103</b>	15 – 19.8	0.518 – 2.2	0 – 2.13

DIL = Derived Intervention Level (CFR)

Bq = Becquerel = 1 decay/second (PicoCuries?)

A measure of **ACTIVITY**, not hazard

(Milk contains ~50 Bq/L <sup>40</sup>K naturally)







## 24 Hours Later (and Beyond)

Nuclide	Co-60	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ru-106
DIL/3	None	4000	1333	<b>57</b>	<b>310</b>	453	150
Hay Bq/kg	7.14 – 98 (1)	61.1 – 823	39.2 – 557	<b>118 –</b> <b>1310</b>	71.4 – <b>846</b>	None Reported	
Milk Bq/L		25.1 – 29.5	10.0 – 14.2	<b>90.9 –</b> <b>109</b>	17.2 – 20.6	0.408 – 0.474	0 – 2.55

Milk is homogeneous so sampling error is low.

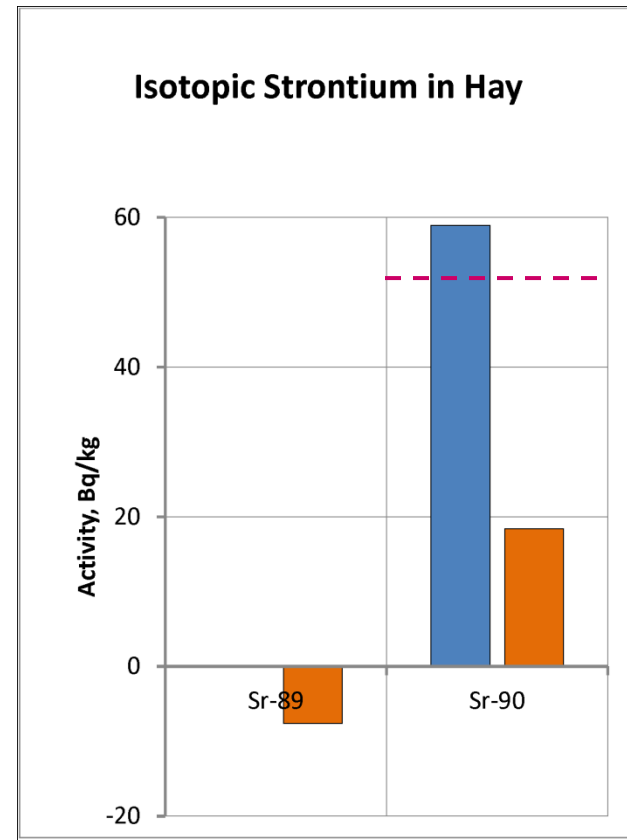
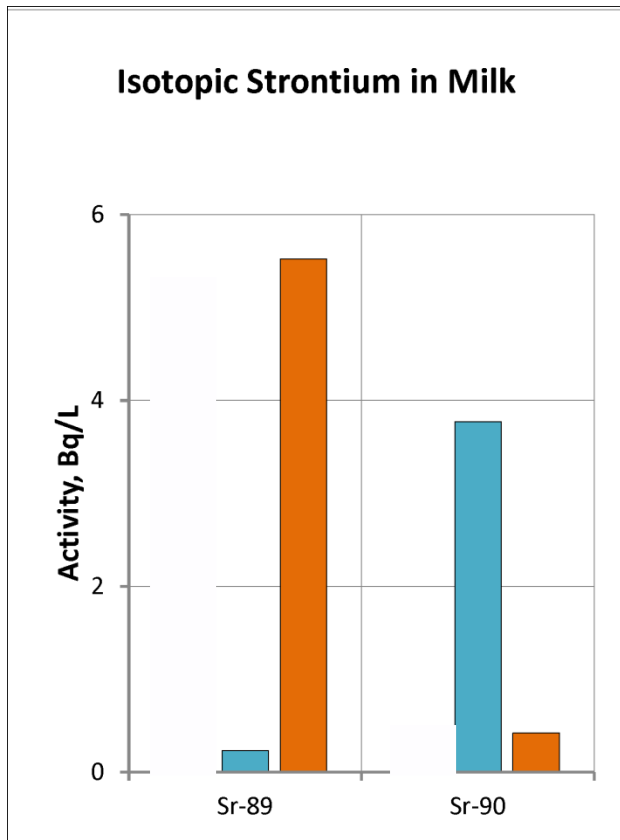
Hay is not at all homogeneous so sampling error accounts for the spread.

# Strontium- $\alpha$ $\beta$ Emitter

 Certified Level

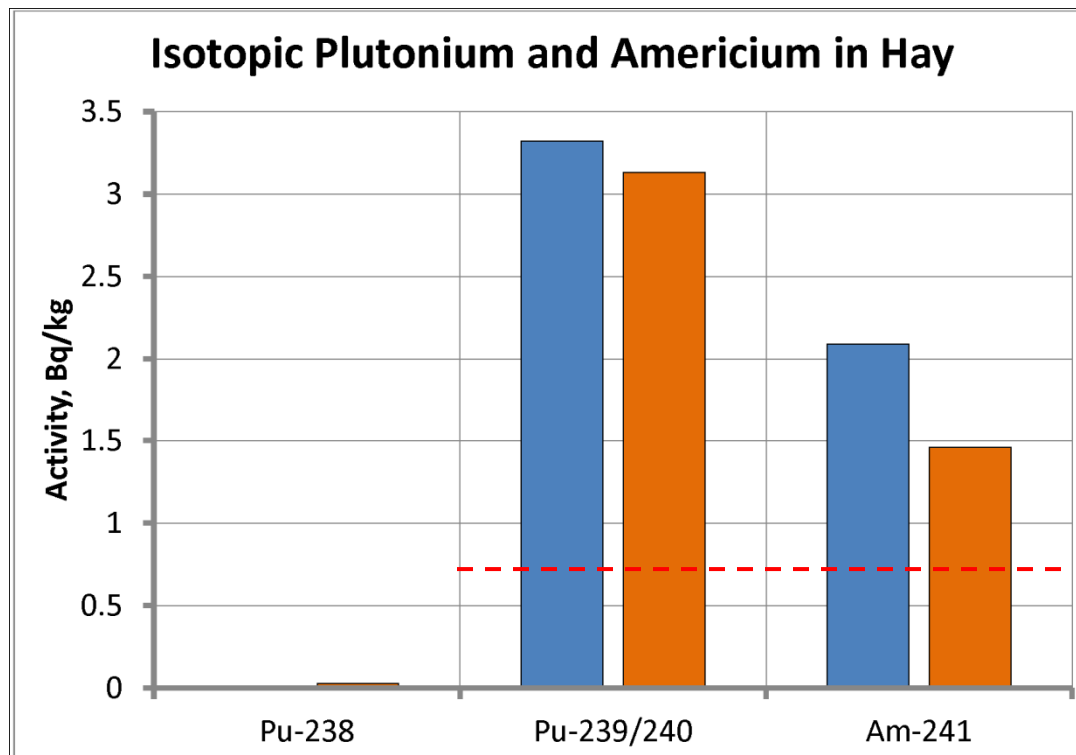
 Lab 1

 Lab 2



# Actinides- $\alpha$ Emitters

■ Certified Level      ■ Lab 1



Alpha emitters are  
**VERY** dangerous  
when ingested!

Heavy Plutonium  
and Americium are  
**BOTH** over the  
action level – in  
fact, over the DIL.



## Conclusions for Radiological Incident Command

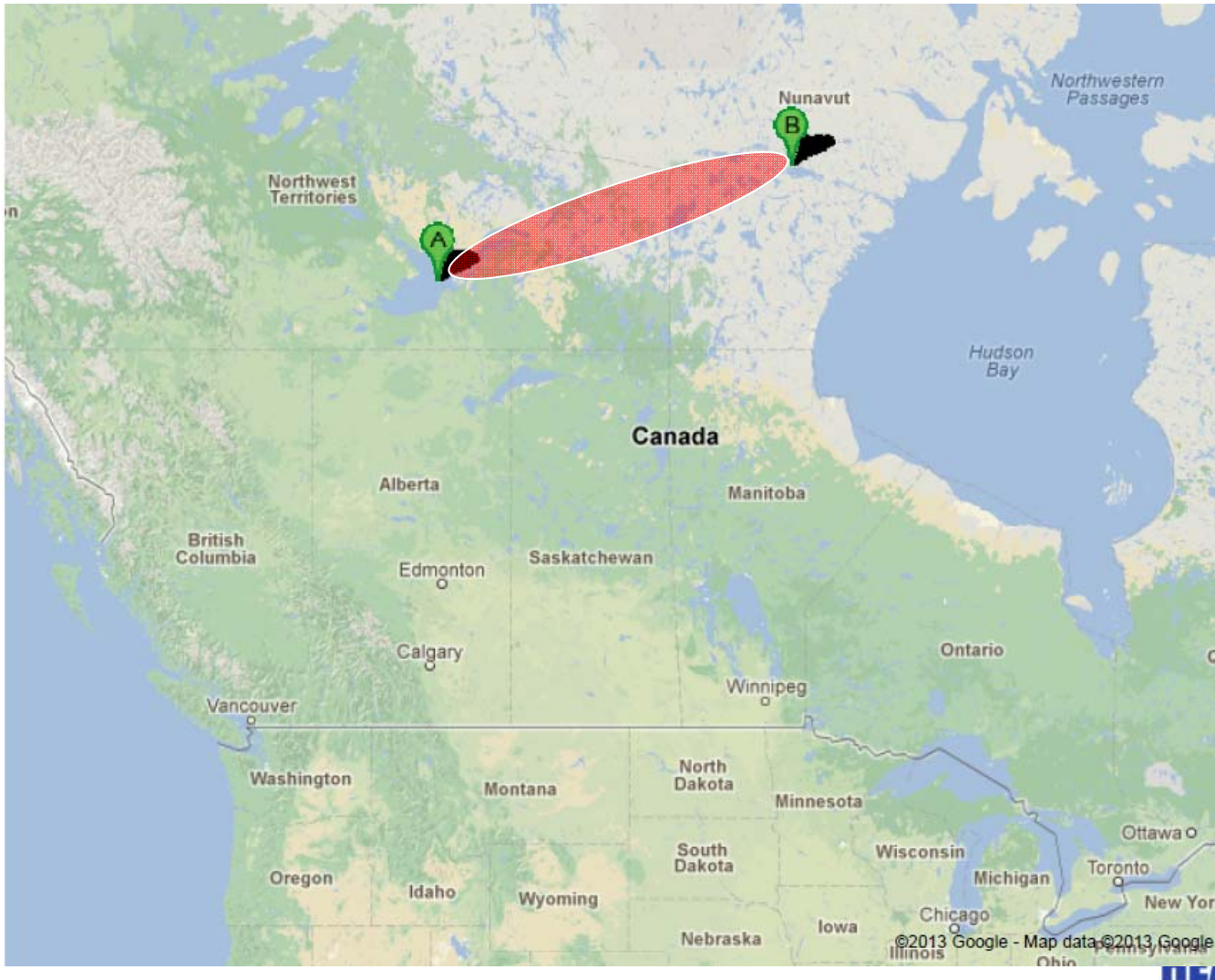
- Use multiple labs for full testing capability.
- Radiological measurement terminology is not common knowledge.
- Each STATE needs to have access to a trained Health Physicist for response.
- The whole situation may not be known for a month\*.

# Kosmos 954: The Real Thing



January 24, 1978

# Kosmos 954 Debris Field



- 48,000 square miles
- 12 major pieces recovered
- 10 fragments radioactive
- 1 lethally so-500 R/hr (5 Sv/hr)



**Thank you for your kind  
attention**

Counting in a radiation laboratory near you:  
FERN-FSIS Radiation Exercise 2013  
the sequel!

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