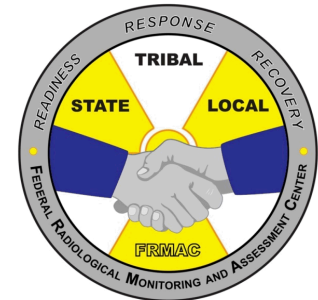




# Northern Lights 2016

## A FRMAC Laboratory Analysis Perspective

*FRMAC Laboratory Analysis Working Group*  
*SAND2017-XXXXX*



Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

# Overview

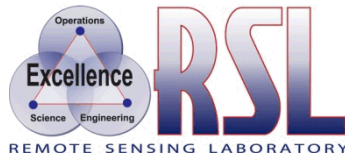


- FRMAC Lab Analysis Mission Overview
- NL16 Metrics
- NL16 Successes
- NL16 Lessons Learned
  - Analytical Challenges
  - Operational Challenges
  - Data Reporting Challenges
  - Communications Challenges

# Federal Radiological Monitoring and Assessment Center (FRMAC)



- **Multi-Agency** response effort conducted in two phases
  - Partners include: DOE, DoD, EPA, FDA, CDC, USDA
- Consequence Management Response Team (CMRT)
  - Phase I
  - Phase II
- Consequence Management Home Team (CMHT)
  - Off-location assets at the national laboratories



**MISSION:** Assist federal, state, tribal, and local authorities by providing timely, high-quality predictions, measurements, analyses and assessments to promote efficient and effective emergency response for protection of the public and the environment from the consequences of nuclear or radiological incidents.

# Federal Radiological Monitoring and Assessment Center (FRMAC)



- Mission: to assist with predictions, measurements, analysis and assessments related to radiological incidents
- Divisions of FRMAC
  - Sampling and Monitoring
  - Assessment
  - Health & Safety
  - Support
  - Liaison
  - Laboratory Analysis



# Laboratory Analysis Division Responsibilities



Mobile  
Labs

Local  
Fixed  
Labs

Analysis Needs Are  
Established

Collect sample/deliver to  
Hotline/Store Sample

Identify Laboratory

Prepare and ship  
sample

Receive and review  
laboratory results

Local  
Resources

Reachback

**NPDN**  
National Plant  
Diagnostic  
Network

**FERN**  
Food Emergency  
Response  
Network

**ELRN**  
Environmental  
LRN

**RRLN**  
Radiological  
Response  
Laboratory  
Network

**NAHLN**  
National  
Animal Health  
Laboratory  
Network

**LRN**  
Laboratory  
Response  
Network

**ICLN  
Portal**

**DLN**  
Department  
of Defense  
Lab Network

FOR THE SECRETARY  
OF THE ARMY  
FOR THE SECRETARY  
OF THE NAVY



# Northern Lights 2016 – Laboratory Participation



- 6 DOE/NAMP Labs
  - SRS, SNL, INL, ORISE, WIPP, LLNL
- EPA NAREL (ERLN)
- Food Emergency Response Network (FERN) through the ICLN
  - WEAC, MD DoH, NY DoH, TX DoH, WA PHL, WI PHL
- State of Minnesota Public Health Lab
- FRMAC Fly-Away Lab (onsite mobile lab during exercise)



# Exercise Metrics



Laboratory	Gamma Analyses	Sr-89/90 Analyses	# completed
Idaho National Laboratory	20	6	20
Savannah River Nuclear Solutions	20	6	26
ORISE/AEAV	20	6	26
Sandia National Laboratories	20		20
WIPP	20		20
<i>LLNL Radiochemistry group</i>	0	2	2
MN State Public Health lab	38	10	48
EPA NAREL	20	4	24
Texas DoH	3		3 (qualitative)
Washington PHL	3		3
Maryland DoH	3		3 (qualitative)
WEAC	3		3
Wisconsin PHL	3		3 (qualitative)
New York DoH	3		3

# NL16 Successes



- Incorporation of 14 off-site labs and the ICLN into a CM exercise of this magnitude
- Design and delivery from a commercial vendor of 210 test samples (75 spiked with fresh fission products) in 4 matrices; water, soil, air filter and vegetation
- Completion of non-routine and complex radiochemical analyses by all participating labs
  - Successfully redirected samples in 2 days cross country
  - One DOE lab completed analyses even in the face of Hurricane Matthew that shut their lab down for several days
  - Utilized ICLN portal and the new FRMAC Gamma Spectroscopist position to facilitate the interpretation of complex gamma data
- Successful utilization of the ICLN portal by FRMAC CM Home Team Lab Manager for coordination of off-site analyses and communication with the various laboratory networks



# NL16 Lessons Learned



## Analytical Challenges

- The most likely nuclear emergency scenarios may involve very complex source terms
- Sr-89/90 analysis methods did not meet exercise DQOs
- Requested Lc (critical level) values may be too low for the laboratory to achieve
- Many Labs have limited experience with fresh fission product samples that have complex gamma spectra
- Some labs lack sufficient gamma spec geometries and don't have modeling capabilities to provide quantitative results

# NL16 Lessons Learned



## Operational Challenges for Labs

- Volatile species of radionuclides are present in realistic sample media. Labs may need special equipment and permits to handle discharge during sample processing
- Some situations require extended shift work (or even 24 hour ops.)
- Some labs' standard operating procedures (SOPs) are not flexible enough to meet the Data Quality Objectives (DQOs) of an emergency response
- Labs can plan for the DQOs in Lab Analysis Manual
  - Google: FRMAC Laboratory Analysis Manual, PDF is the first link
- USDA permits may be required to process some types of samples

# NL16 Lessons Learned



## Data Reporting Challenges

- Need flexibility to report data for non-detected radionuclides
- It is unclear what a Level I and Level IV data package actually looks like
- It is unclear what records must be uploaded to the Web Portal
- FRMAC Web Portal has bugs to work out
- Labs cannot practice on the Web Portal prior to a drill/exercise

# NL16 Lessons Learned



## Communication Challenges

- More practice is needed in how FRMAC Lab Management communicates with off-site labs and how they interface with the ICLN
- Off-site labs sometimes feel “out-of-the-loop”
  - ICLN Coordinators need more practice keeping laboratories in the loop
- There is little experience with what an EPA-led FRMAC looks like compared to a DOE-led FRMAC



*Be Flexible !!*

# How Do I Get Involved or Prepare?



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# Questions, Comments, and Feedback