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National Nuclear Security Administration

Office of Nonproliferation and International Security (NIS)

www.nnsa.doe.gov

# Introduction to the Radiation Measurements Cross Calibration (RMCC) Project

Needs SAND #. This extracted from Amir's presentation

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**Sandia National Laboratories**

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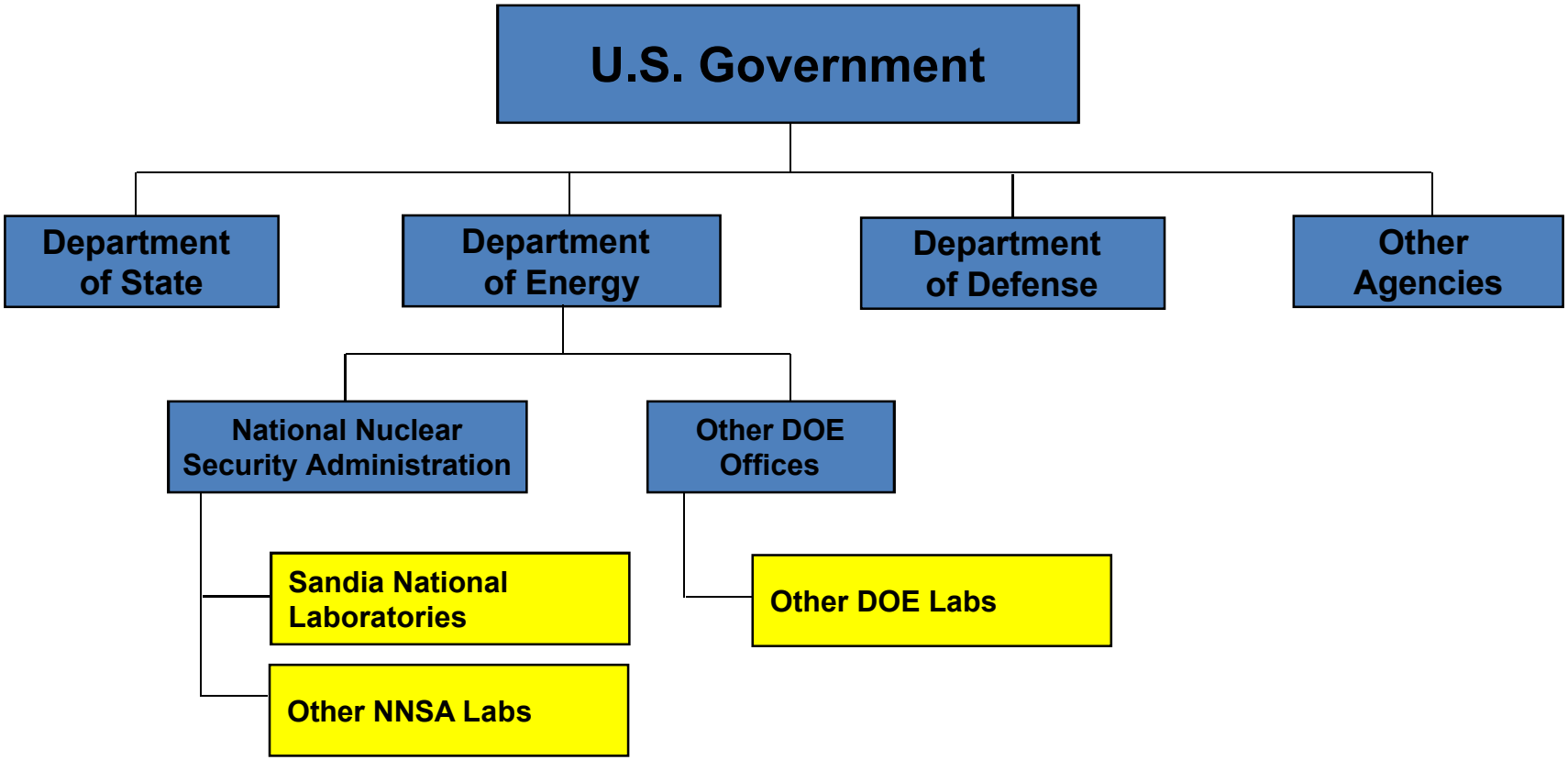
- **Safeguard** nuclear material to prevent its diversion for illicit use.
- **Control** the spread of WMD-related material, equipment, technology and expertise.
- **Verify** nuclear reductions and compliance with international nonproliferation treaties and agreements.
- **Develop** and implement nonproliferation and arms control policy.

# Relationship of Sandia National Laboratories to U.S. Government



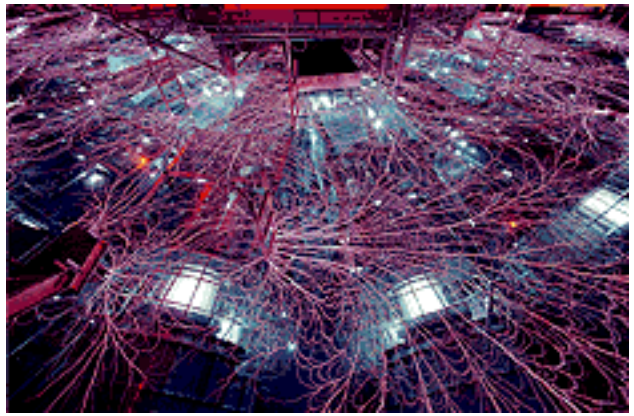
# Four Mission Areas

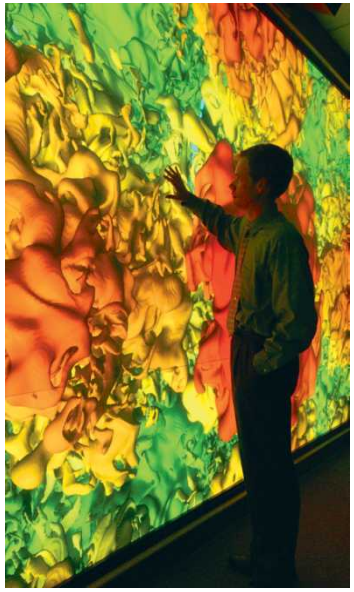
- Nuclear Weapons
- Defense Systems and Assessments
- Energy, Resources, and Nonproliferation
- Homeland Security and Defense

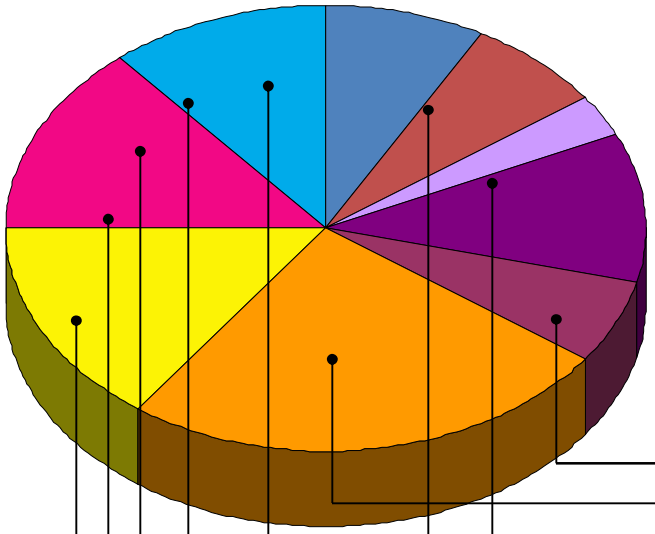

*Helping our nation secure a peaceful and free world through technology*

# Highly Skilled Workforce

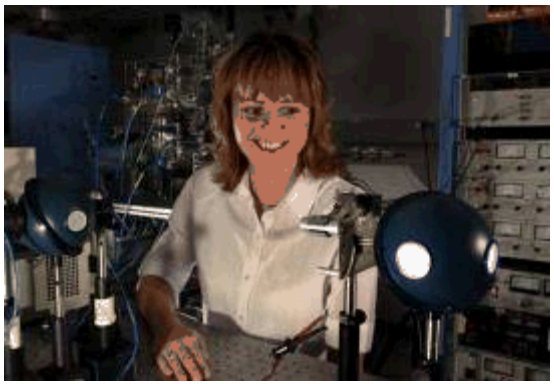
- More than 8,600 full-time employees
- More than 1,500 PhDs
- More than 2,700 MS/MAs
- 2,200 on-site contractors







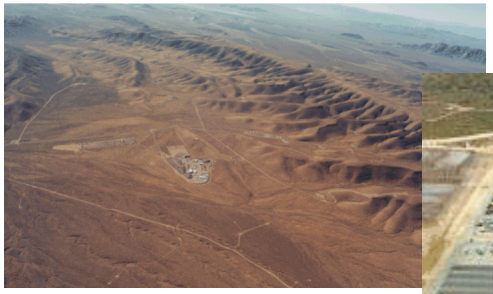
Mechanical Engineering - 16%
Electrical Engineering - 22%
Other Engineering - 15%
Other Science - 6 %
Physics - 6%
Chemistry - 6%
Math - 2%
Computing - 16%
Other Fields - 6 %



# Distributed Facilities to Meet National Needs


Kauai Test Facility, Hawaii

Tonopah Test Range, Nevada



Yucca Mountain, Nevada

WIPP, New Mexico

Pantex, Texas

Livermore, California

Office of Nonproliferation and International Security (NIS)

# Global Security Programs

*Creating sustainable technology-based system solutions through International cooperation to reduce the threat of WMD proliferation and terrorism*

Nuclear/Radiological Threats

Biological Threats

Global Security Engagement

Program Focus Areas


Sandia Science & Technology Base

International Business Infrastructure

Capabilities

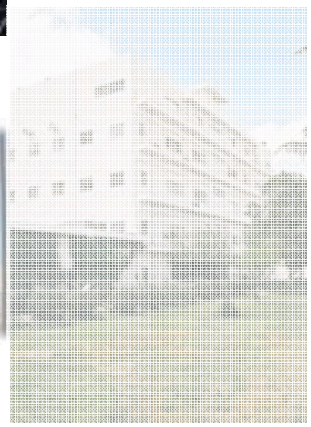
Cooperative Monitoring Centers

# Cooperative Programs

*Enabling International Technical Cooperation on Critical Security Issues*

Technology testing and demonstration


Technology integration and operation



Technology training courses and workshops

Visiting scholars program, research, and analysis

Technical collaborations and experiments

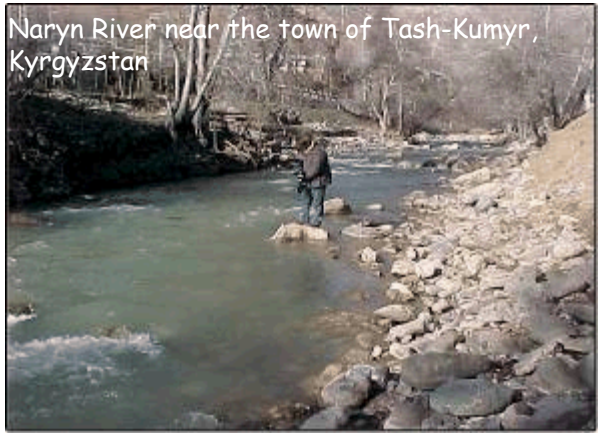
*Example of a Cooperative Project on Radiation Measurements*

Central Asia – Navruz Project

# Sampling Locations

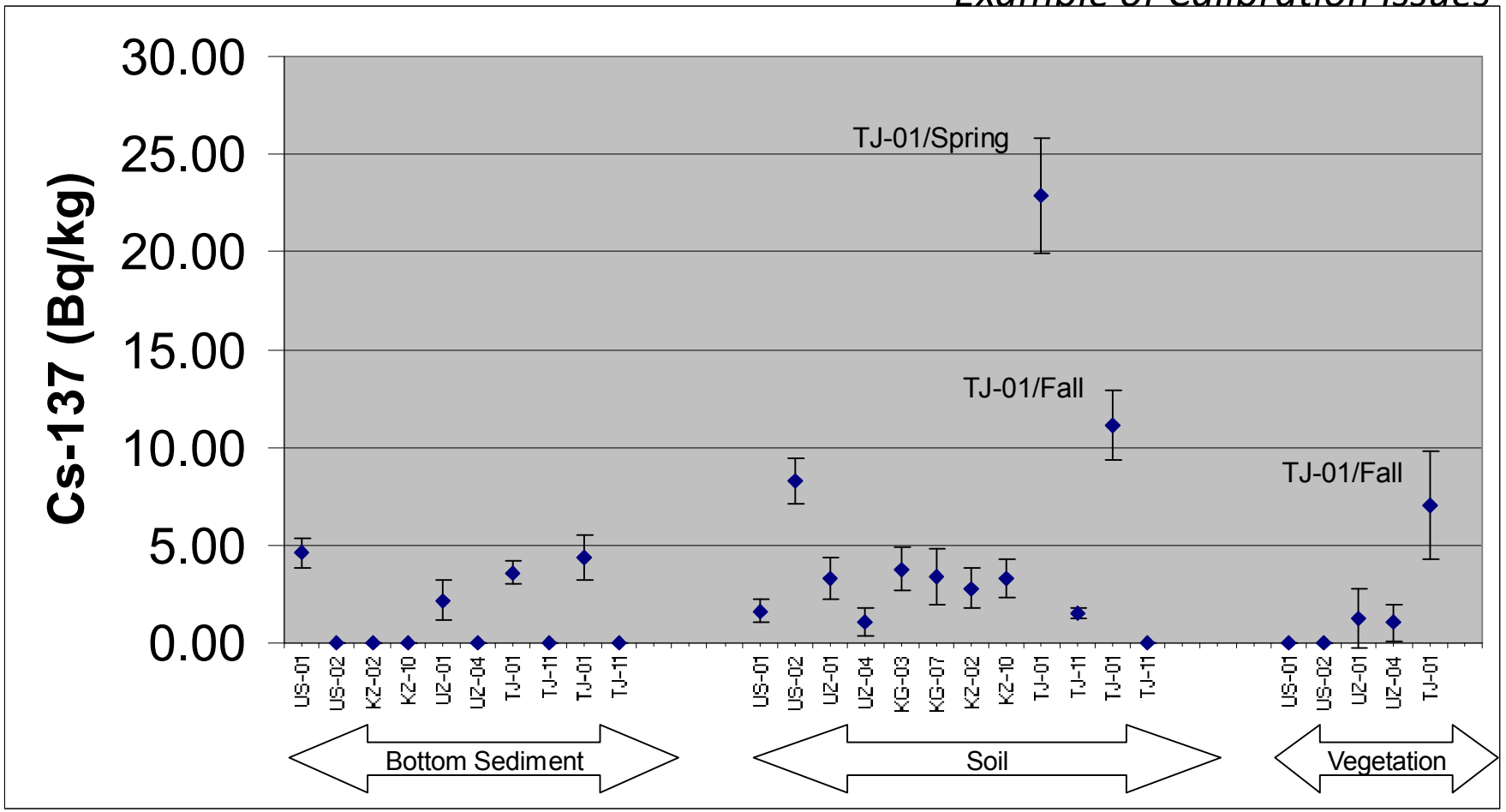






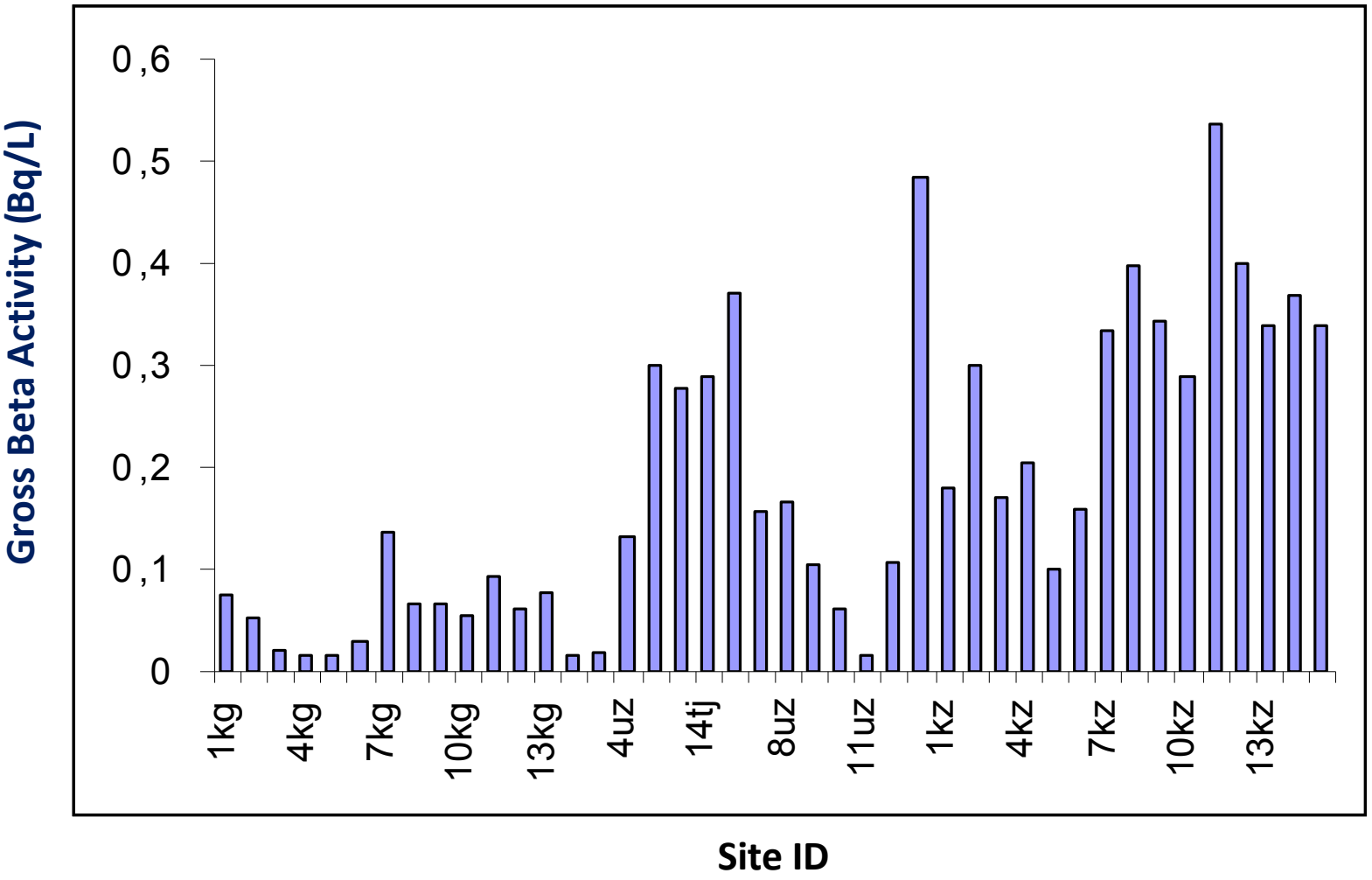

# Preliminary Results, Cs-137

*Example of Calibration Issues*



# Results of Water Sample Analyses

**Gross Beta Activity in water samples along the Syr Darya river**



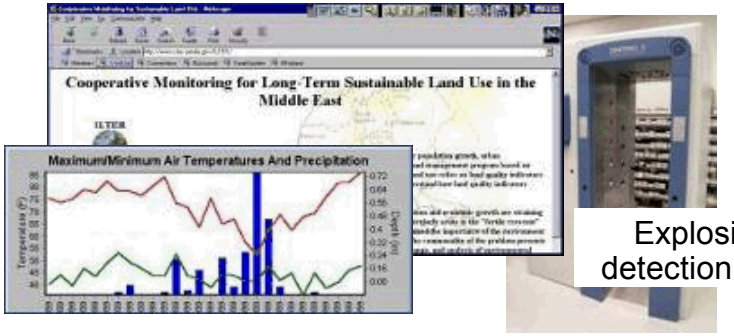
# Lessons Learned from Navruz and at SNL

- Inter-laboratory cross calibration is critical for generating meaningful data
- Cooperation on the Navruz project has led to a network of scientists in Central Asia who are addressing a number of important regional issues
- Independent performance testing programs are vital management tools to ensure quality data
- Regional support is critical to project success

# Middle East Program

- Gulf Nuclear Energy Infrastructure Institute, UAE
  - Training the next generation of nuclear energy leaders
- Middle East Scientific Institute for Security (MESIS) (Formerly CMC)-Amman, Jordan
  - Sister center to CMC in Albuquerque: *Providing indigenous solutions to local problems*
- Technical Collaborations
  - Middle East Disease Surveillance
  - Radiological Source Security
  - Natural Resources Studies
  - Water Security
  - Border Cooperation
  - Radiation Measurements Standards
  - Energy Security and the Role of Nuclear Energy
  - Nuclear safeguards capacity building

*GNEII Letter of Intent Signing March 2010*




Sustainable Land Use Project

Explosives detection portal

# Radiation Measurements Cross Calibration (RMCC) Project – The Motivation

- All countries in the Middle East have radiation measurement capabilities associated with:
  - Power and research reactors
  - Radioactive sources in medicine, commerce, industry
  - Responding to accidental or intentional radiation releases
  - Environment, health and safety
  - Detecting the presence of radioactive sources
  - Preventing the illicit use of radiological materials
  - Disposing of radioactive sources
- Improving and standardizing nuclear monitoring and measurement capabilities in the Middle East are essential elements of developing an approach to such concerns

# The First Step

- As a first step, develop a set of internationally recognized standards for laboratory radiation measurements in the Middle East
- The project consists of
  - Signup for the DOE proficiency testing program (MAPEP)
  - Receive test samples
  - Analyze and report
  - Follow-up with regional workshops to discuss the results and identify technical assistance needs
  - Participate in targeted studies by the IAEA labs in Seibersdorf

# First RMCC Workshop

- Co-hosted by the Kuwait Institute for Scientific Research (KISR), October 4-6, 2004

- Participation from Kuwait, Saudi Arabia, Qatar, UAE, Bahrain, Oman, and Jordan

# Second RMCC Workshop

- Co-hosted by the Supreme Council for the Environment and Natural Reserves (SCENR), Doha, Qatar, November 2005

- Participation from Kuwait, Saudi Arabia, Bahrain, Qatar, UAE, Oman, Jordan, and Yemen

# Third RMCC Workshop

- Co-hosted by the Ministry of Regional Municipalities, Environment and Water Resources (MRMEWR), Muscat, Oman, April 2007

- Participation from Kuwait, Bahrain, Iraq, Qatar, Oman, Jordan, and Yemen

# Fourth RMCC Workshop

- Co-hosted by the University of Bahrain and the Marine Emergency Mutual Aid Centre (MEMAC), Kingdom of Bahrain, March 2008;

- Participation from Kuwait, Saudi Arabia, Bahrain, Qatar, Oman, UAE, and Jordan


# 2008 RMCC Workshop Results

- First event hosted by the region
- Discussed MAPEP Results
- Lectures on radiochemistry techniques
- Reviewed Radiological Issues, Laboratory Quality Assurance and Quality Control
- Improved communications: email server and web site
- Discussed regional ownership (GCC / AAEA)

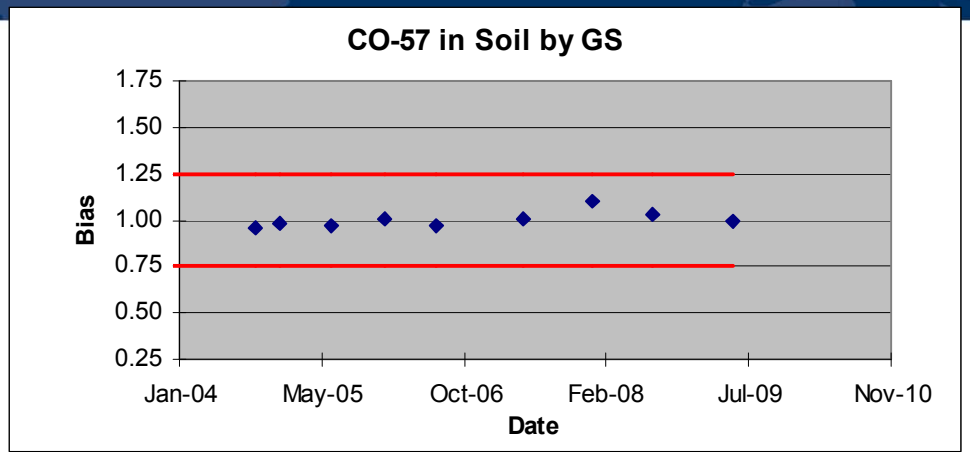
# Fifth RMCC Workshop

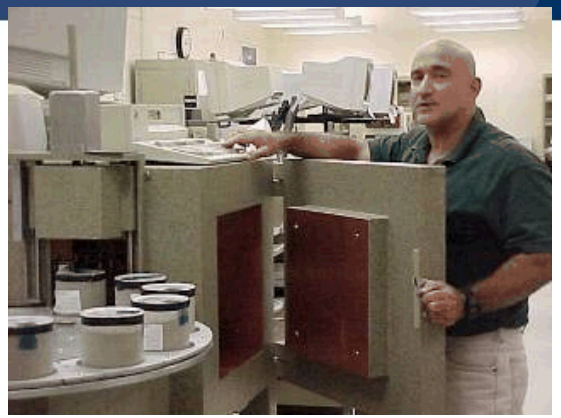
- Co-hosted by The Qatar University and The Qatar Petroleum (QP)
- Discussed NORM for the first time at RMCC
- First participation by France, Tunisia, and Morocco
- Lectures on radiation protection and Environmental Monitoring at Commercial Nuclear Power Plant
- Laboratory Quality Assurance and Quality Control

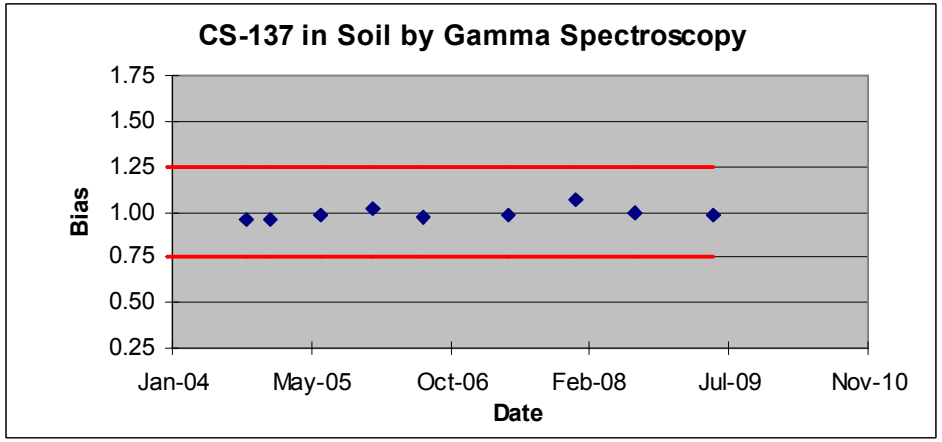
# Fifth RMCC Workshop

- Largest participation to date - 91
- Future Plans:
  - Continue communications: email server and web site
  - RMCC-VI, 2011, host Jordan
  - RMCC-VII, 2012, Morocco
  - Action Item:
    - Creation of RMCC Advisory Council
      - ✓ Identify gaps and recommend future actions

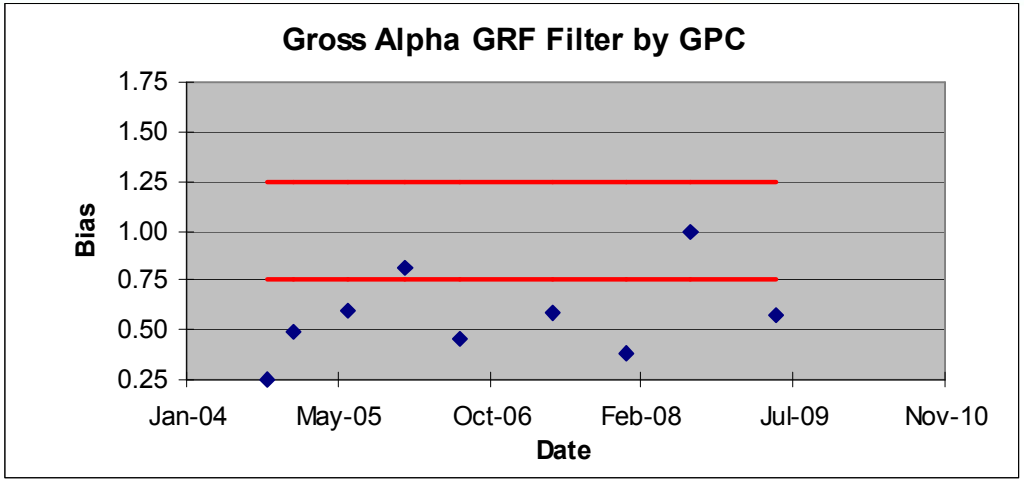
# MAPEP Results at SNL (example of an under control process)



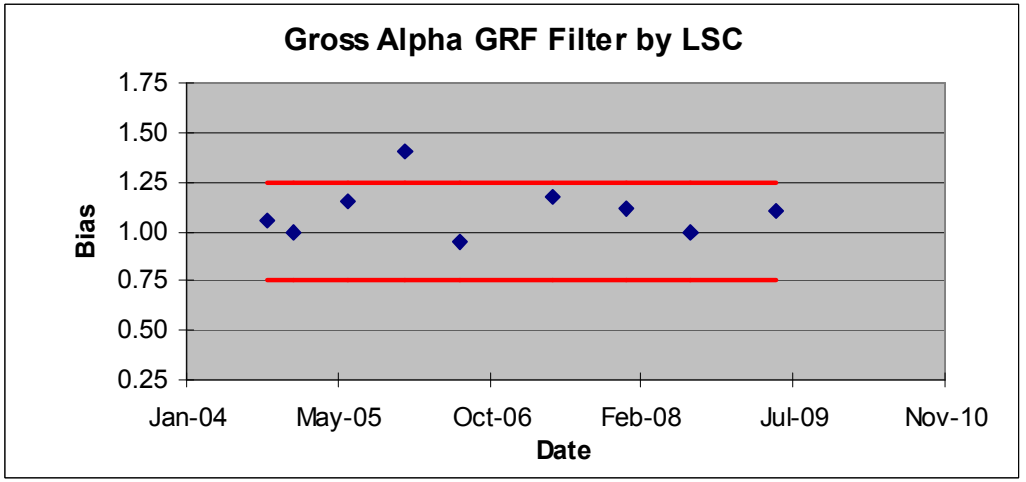



# MAPEP Results at SNL (Problem Case)



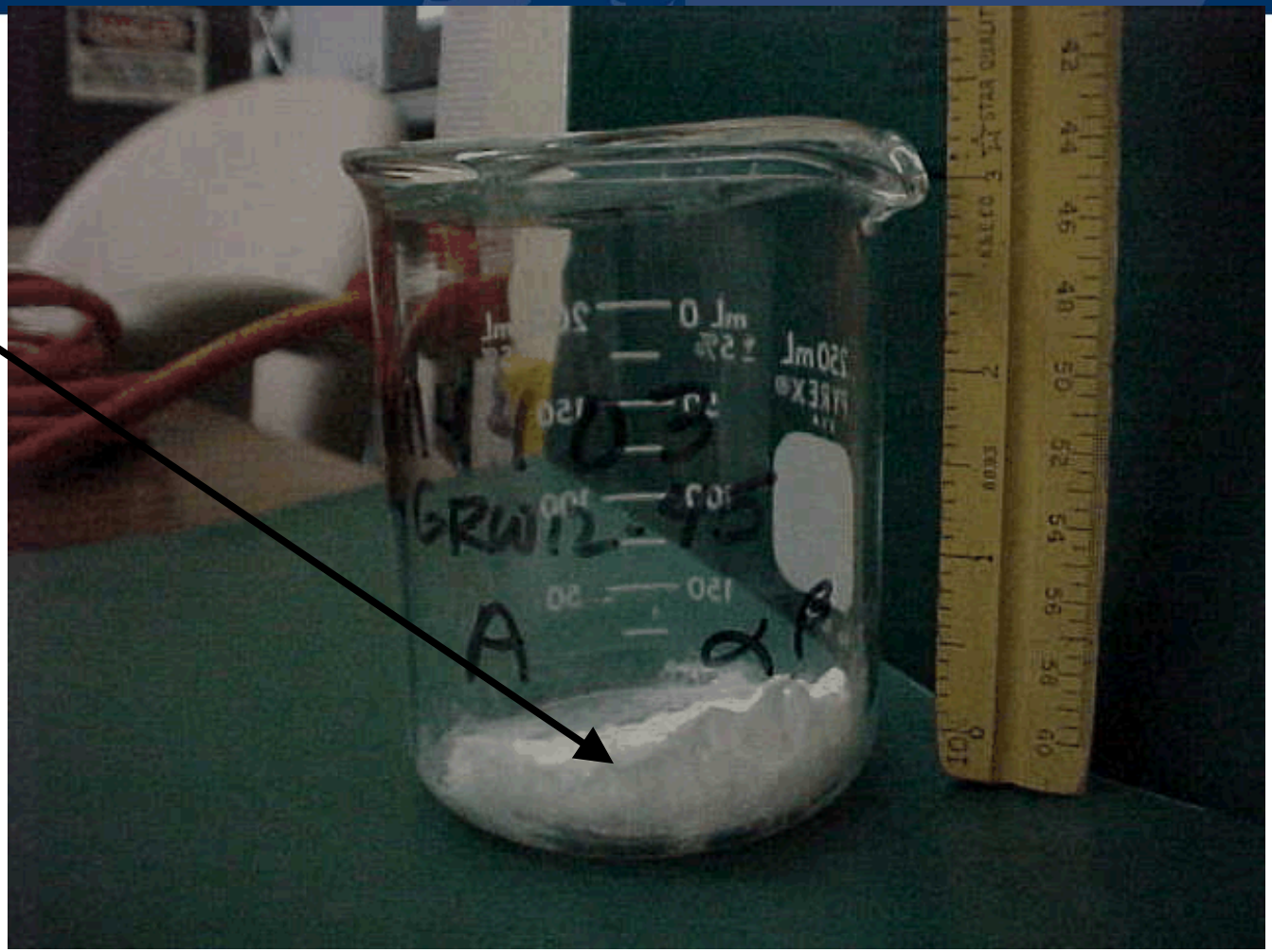

Problem caused by the self absorption of alpha particles in the filter.

Problem solved by using a different technique.



# MAPEP Results at SNL (Gross Alpha/Beta in Water)

High level of solids in the water sample



# The RMCC Project Benefits

- Increased confidence in data quality across the region
- Availability of a network of qualified labs for radiological measurements
  - Build up the capacity in the region to produce reliable radiological data
- Improved scientist-to-scientist communication
  - Provides a mechanism for sharing of agreed upon information
  - Enables scientists in the region to work cooperatively to create indigenous solutions to the problems in the region
  - Fosters the development of a network of scientific experts in the region
- Training Opportunities
  - Austria – The IAEA Labs in Seibersdorf
  - Germany – Federal Bureau for Radiation Protection
  - USA – Sandia National Laboratories
  - Regional Opportunities