



**U.S. Department of Energy (DOE)
Office of Environment, Health, Safety and
Security**

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Office of Sustainable Environmental Stewardship

Radiation Measurements Cross-Calibration (RMCC) X Workshop
United Arab Emirates
October 20-22, 2015

1



**DOE Mixed Analyte Performance
Evaluation Program (MAPEP)**

**Administered by DOE's
Radiological and Environmental
Sciences Laboratory (RESL)**

2



MAPEP Objectives



- Supports U.S. Department of Energy, and Analytical Services Program mission/objectives
- Addresses specific, routinely encountered analytical issues that affect result accuracy
- Test the accuracy of analytical procedures on a variety of real-world samples

3



RESL – Established Quality Systems



Accredited to ISO/IEC-17025:2005:

General Requirements for the Competence of Testing and Calibration Laboratories

(ISO Quality Standard for Laboratory Operations and External Dosimetry)

Accredited to ISO/IEC 17043:2010

General Requirements for Proficiency Testing

Accredited to ISO Guide 34:2009

General Requirements for Certified Reference Material Producer

National Institute of Standards and Technology (NIST)/RESL Radiological Traceability Program



4



RMCC Participation in MAPEP



- **2010** – 8 radiological labs and 2 inorganic labs
- **2011** – RMCC participation increased by 5 radiological labs for MAPEP Series 24 and 25
- **2012** – Total of 22 labs from RMCC participated in MAPEP Series 26 and 27
- **2013** – Total of 17 labs from RMCC participated in MAPEP Series 28 and 29
- **2014** – Total of 14 labs from RMCC participated in MAPEP Series 30 and 31

5




Current RMCC Participants in MAPEP



Lab Code	Laboratory Name	Country
IAEA99	International Atomic Energy Agency	Austria
ESDG99	Radiation Laboratory	Egypt
CPAL99	Chemical and Physical Analysis Laboratories Directorate	Jordan
JAEC99	Radiation Measurements Laboratory	Jordan
JCAL99	Royal Scientific Society, Environmental Instrumental Analysis Laboratory	Jordan
JNRC99	Jordan Nuclear Regulatory Commission	Jordan
BSC99	Supreme Council for Environment	Bahrain (New)
ERPD99	Ministry of Health Radiation Protection Department Laboratory	Kuwait
PDRL99	Physics Department Radiological Laboratory	Kuwait


6



Current RMCC Participants in MAPEP (cont.)

Lab Code	Laboratory Name	Country
LAEC99	Lebanese Atomic Energy Commission – Environmental Radiation	Lebanon
USED99	National Center for Nuclear Energy, Sciences and Techniques	Morocco
FMEC99	Foods and Water Laboratories Center	Oman
NCNS99	National Center for Nuclear Sciences and Technologies	Tunisia
ADFC99	Abu Dhabi Food Control Authority Laboratories	United Arab Emirates

7



MAPEP Updates

- MAPEP *System Usage Agreement*
- Technical highlights of MAPEP Series 31 and 32
- MAPEP Series 33 distribution
- New proficiency testing material:
 - Special Radiological Matrix XrM33
 - Radium-226 (*pending interest*)
- Technical assistance available from RESL

8



MAPEP System Usage Agreement



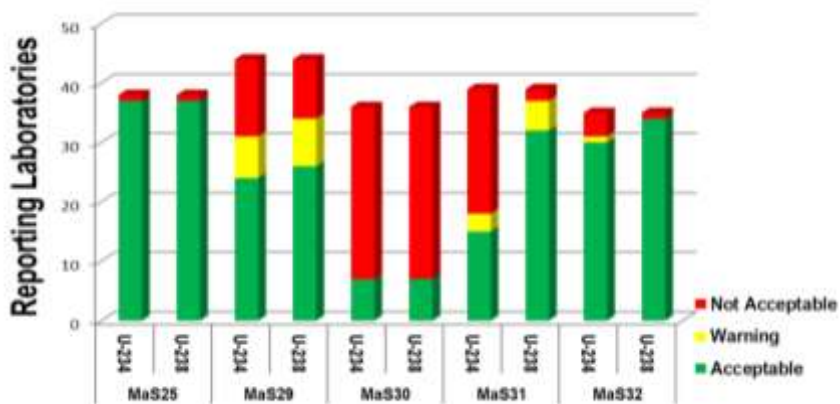
- Labs agree to abide by MAPEP's *System Usage Agreement* or *Export Control Agreement*





- Labs are required to update their *System Usage Agreement* every 6 months

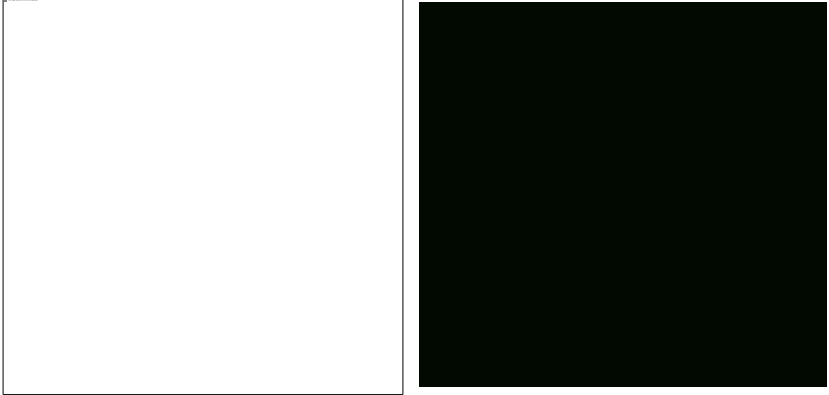


Uranium Results Reported by Alpha Spectrometry





 **RMCC Labs' Performance for MAPEP Series 31 and 32 Radiological Uranium-238 and Uranium-234** 

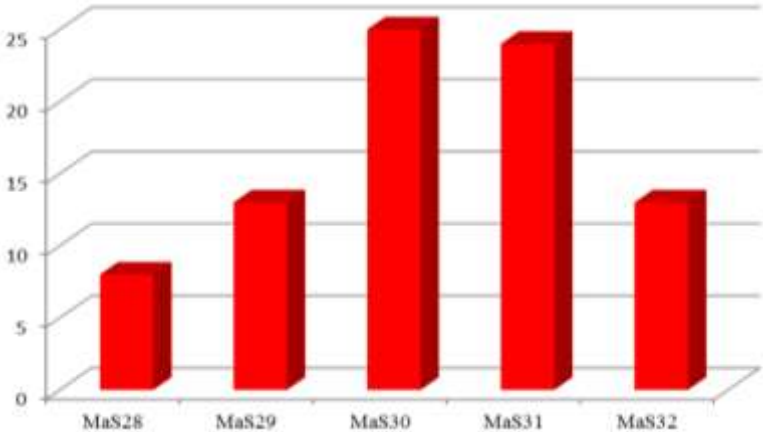
Office of Environment, Health, Safety and Security



11

 **MAS Uranium-234 Letters of Concern** 

Office of Environment, Health, Safety and Security



Sample ID	Letters of Concern
MaS28	9
MaS29	14
MaS30	26
MaS31	25
MaS32	14

12



Specifics Suggestions for Improvement



- Chemical dissolution techniques should address the common problems encountered in real-world samples
- Results obtained by acid leaching of the sample will not be accurate if insoluble compounds or insoluble matrix components are present, and there is no way to tell without proper analysis
- Leaching techniques should only be used when proven to be effective and demonstrated to produce accurate results equal to total dissolution methods

13

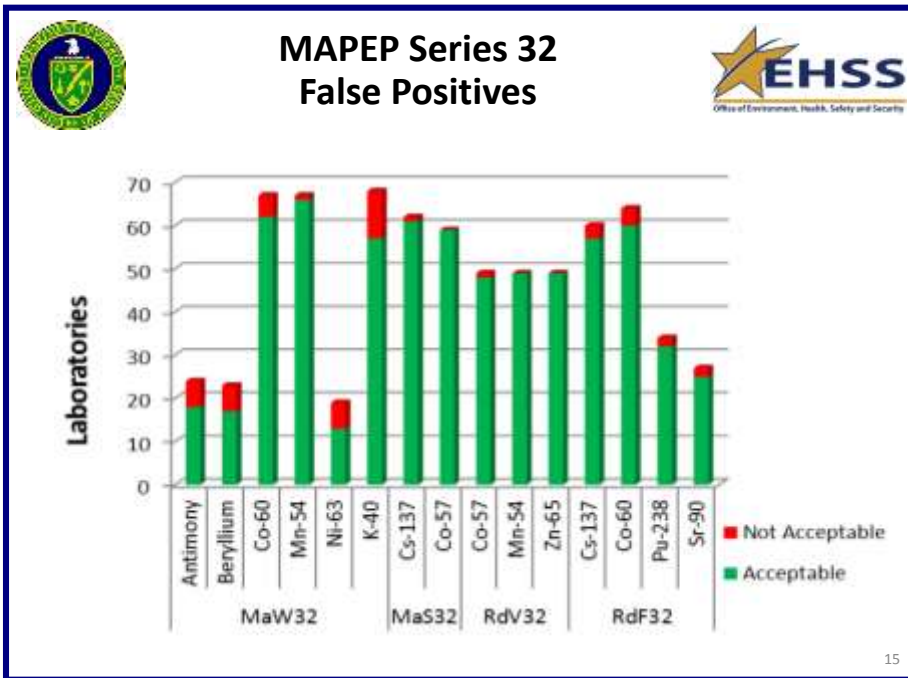


MAPEP Evaluations

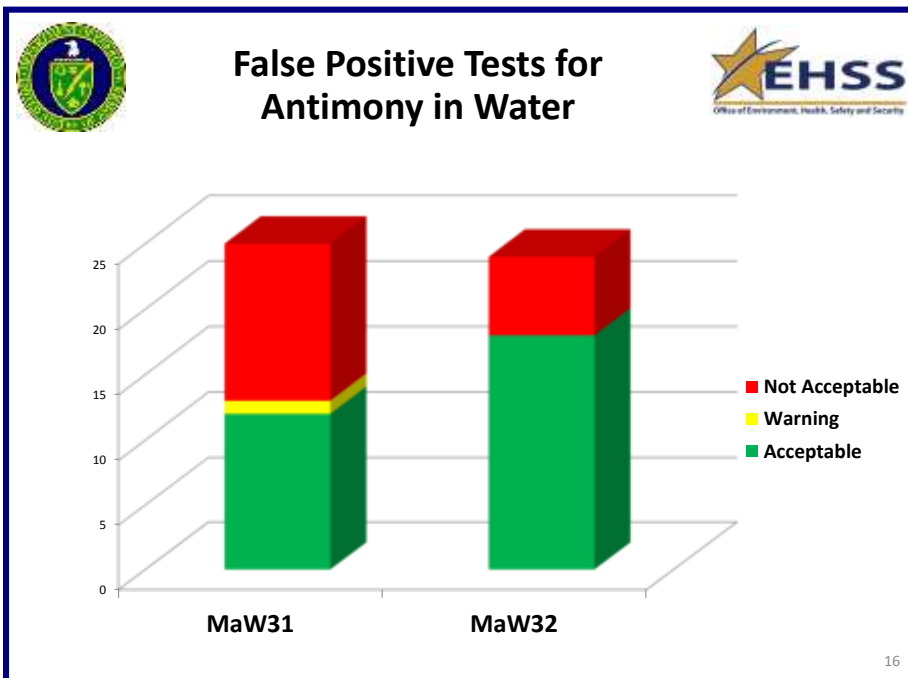


- Performance-based program and does not mandate the use of specific analytical techniques
- Evaluates analytical performance based on National Institute of Standards and Technology (NIST) - traceable reference values, not on experimentally determined consensus values

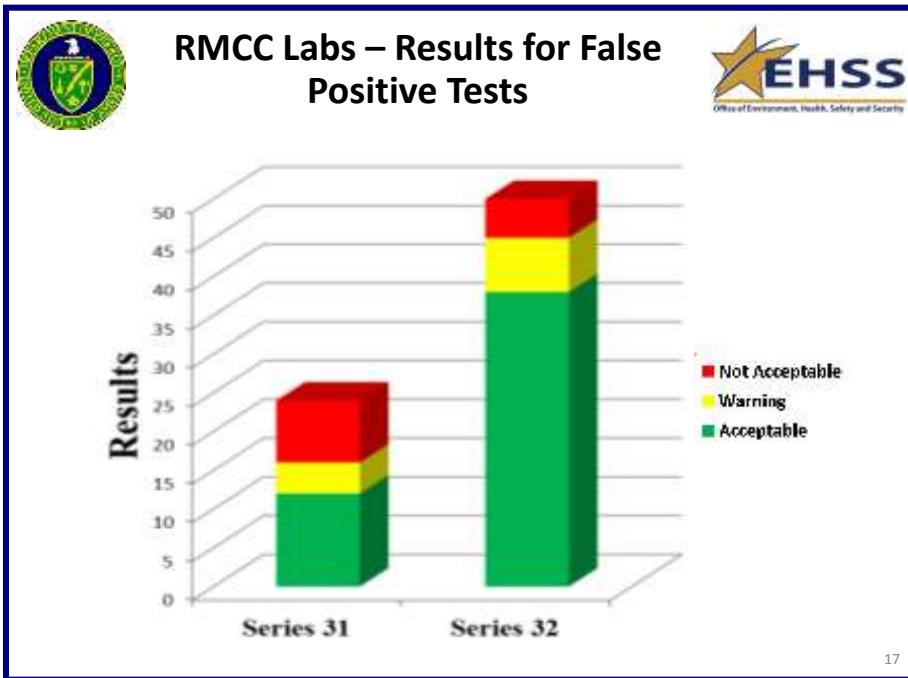
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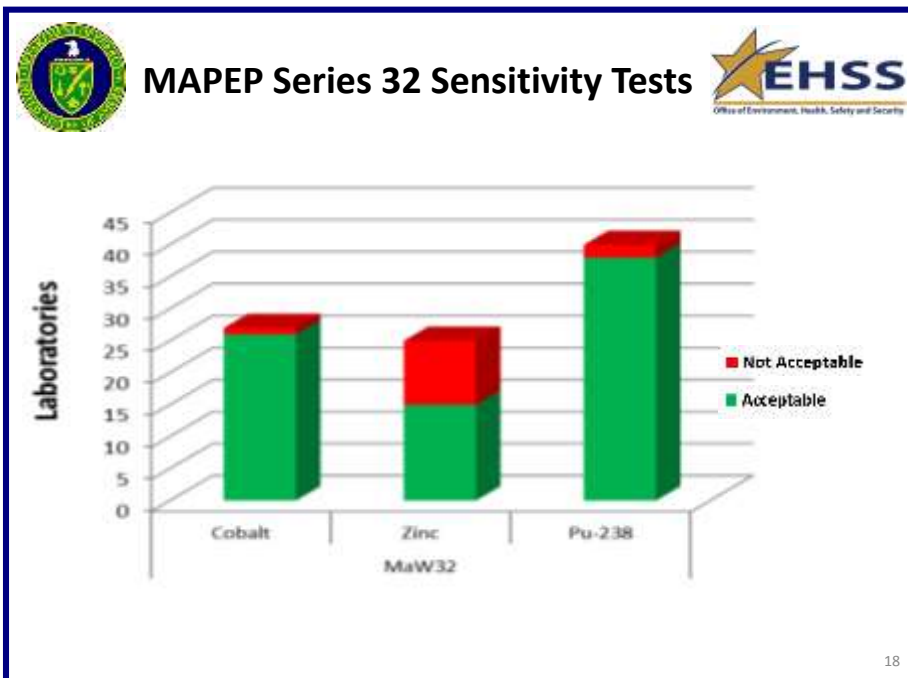
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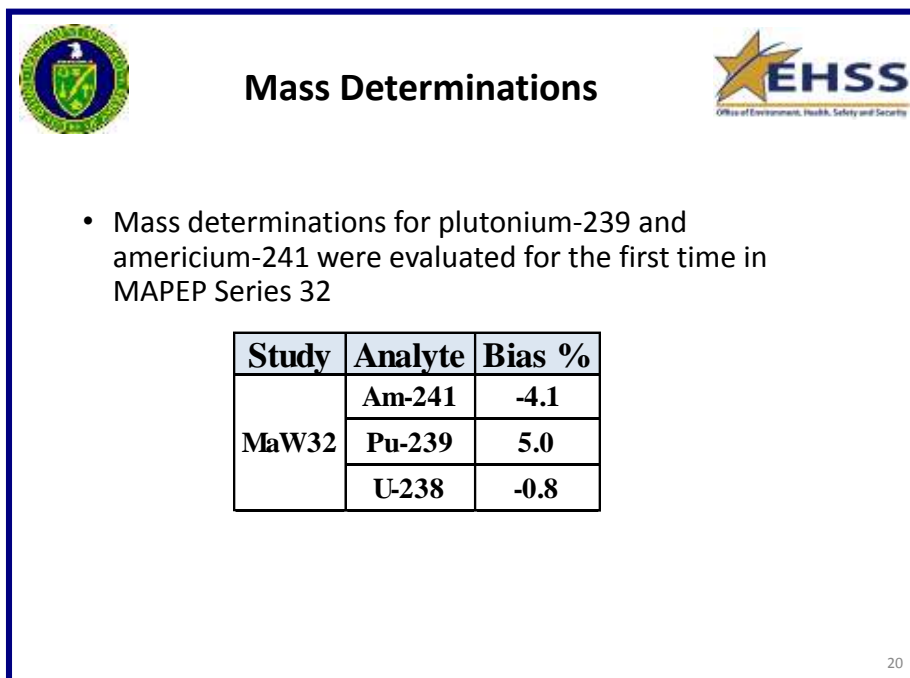
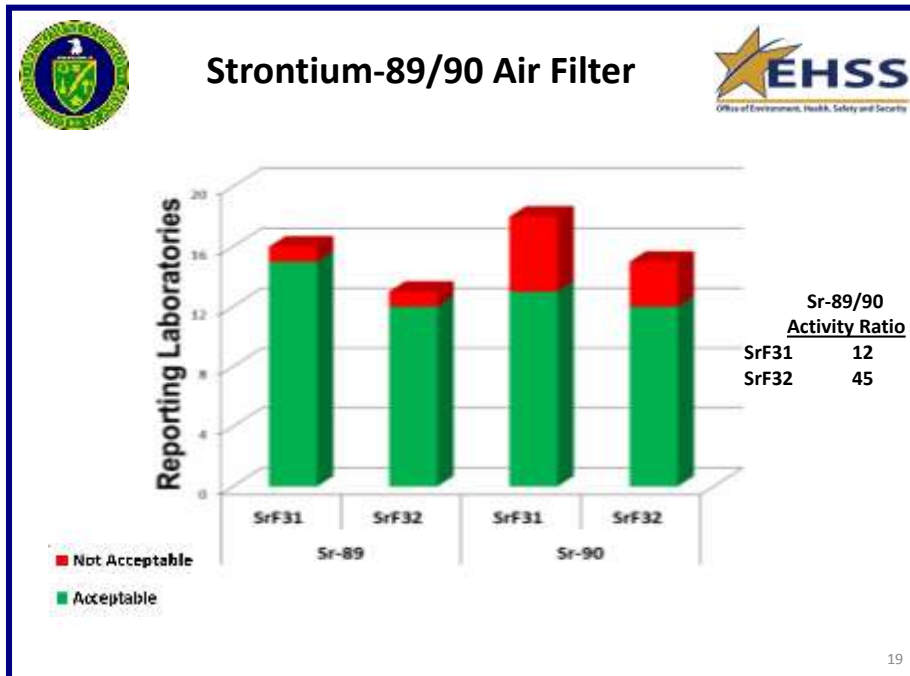
16




17




18





MAPEP Series 33 Distribution




MAPEP Series 33 Distribution to U.S. and International Labs:


- MAPEP Series 33 samples shipped in September 2015
- Reporting deadline for MAPEP Series 33 is November 18, 2015

	Mixed Analytes In Soil	Mixed Analytes in Water	Gross Alpha/Beta in Water	Radiological Analytes in Air Filters	Gross Alpha/Beta in Air Filters	Radiological Analytes in Veg.	Organic Analytes in Soil	Organic Analytes in Water	I-129 in Water	Sr-89/90 Filter	XrM
U.S. Labs	80	103	51	67	58	56	15	20	24	15	21
Foreign Labs	34	28	20	30	22	34	0	0	10	10	17
TOTAL LABS	114	131	71	97	80	90	15	20	34	25	38

21



Special Radiological Matrix XrM in MAPEP Series 33



- Undisclosed sample radionuclides/matrix
- Activity to be reported per sample
- Results will be evaluated based on bias from the known value
- Acceptance flags will not be assigned to results
- Not a punitive test; intended to promote increased scientific capability
- Designed to encourage participants to test their full analytical capabilities
- 38 laboratories requested the XrM sample
 - (4 RMCC laboratories requested the XrM sample)

22



Proficiency Testing for Radium-226



- Based on customer requests, RESL is considering a radium-226 proficiency testing material
 - Water and/or soil?
- Is there an RMCC interest in proficiency testing for radium-226?
 - E-mail MAPEP@ID.DOE.GOV

23



Technical Assistance



- RESL provided technical assistance to labs on sample dissolution techniques

Uranium-234 Bias Results

	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6	Lab 7
MaS30	-63%	-62%	-64%	-68%	-62%	-65%	-61%
MaS31	-3.8%	4.9%	-25.9%	-7.6%	1.7%	-13.1%	-0.8%

24



Reminders



- Use analytical methods and personnel that will ensure accurate results for:
 - Full sample dissolution
 - False positive and sensitivity tests
- New proficiency tests are available:
 - Strontium-89/90 air filter
 - Special Radiological Matrix XrM
 - Radium-226 (*possible*)
- RESL provides technical assistance:
 - (1) Participate in MAPEP
 - (2) Improve measurement performance

25



MAPEP Websites



<http://www.inl.gov/resl/mapep>

- Public access
- Statistical summary

<http://mapep.inl.gov>

- Requires account /password
- Used for reporting/reviewing data
- Various search utilities, historical performance reviews, graphs, individual laboratory reports, sample descriptions, and program information

26



Application to Participate in MAPEP



- To download the forms, go to: <http://www.inl.gov/resl/mapep>
- Send completed forms to: MAPEP@ID.DOE.GOV
- Any questions? Contact the MAPEP coordinator:

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27



MAPEP Contact Information



- **Guy Marlette:** 208-526-2532, marletgm@id.doe.gov, MAPEP coordinator
- **Shane Steidley:** 208-526-8249, steidlsd@id.doe.gov, MAPEP website data entry and reports
- **David Sill:** 208-526-8031, sillds@id.doe.gov, senior technical manager for chemistry and technical lead for radiological analyses
- **Leon Jensen:** 208-526-4591, jensenll@id.doe.gov, technical lead for stable inorganic analyses
- **Steve Bohrer:** 208-526-0784, bohrowse@id.doe.gov, technical lead for organic analyses

28



DOE Consolidated Audit Program (DOECAP)



- DOECAP links to MAPEP
- DOECAP issues a Priority I Finding to any DOECAP-audited lab that receives “Not Acceptable” results for two consecutive MAPEP proficiency tests (analyte/matrix)
- DOECAP sends a Notice of Priority I Finding to all DOE site office managers and DOECAP points of contact at the DOE sites



29



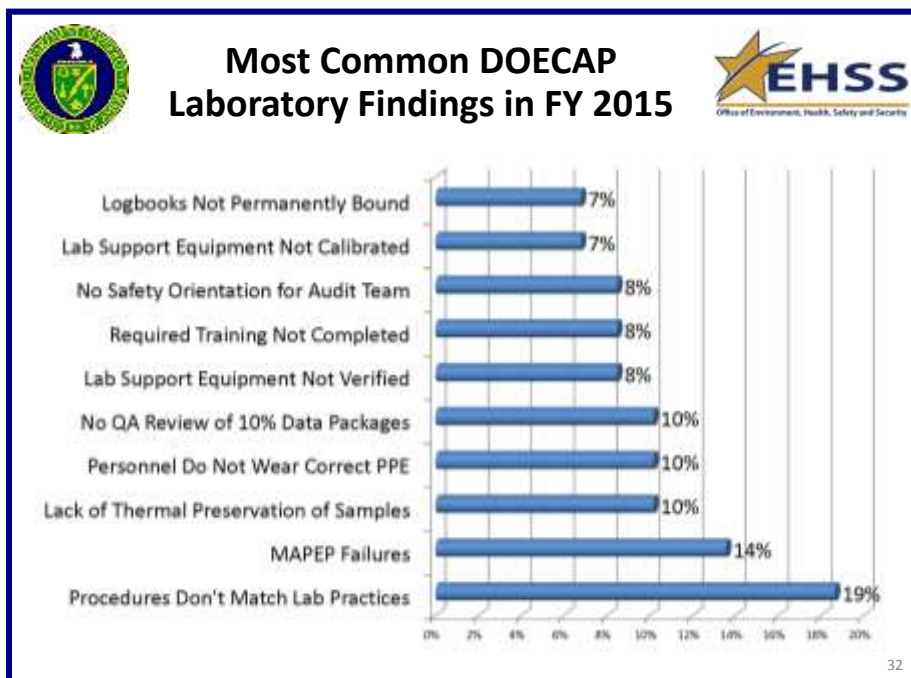
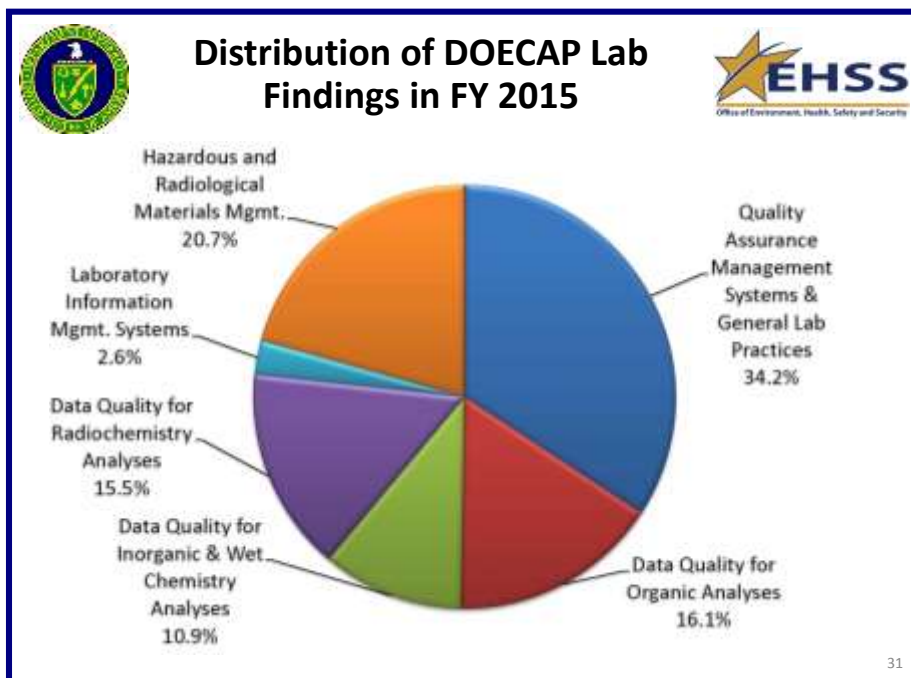
DOECAP Audits in Fiscal Year (FY) 2015




- 18 laboratory audits
- 9 waste treatment, storage, and disposal facility (TSDF) audits
- 1 TSDF audit surveillance to verify closure of corrective actions for a Priority I finding




30





Contact Information



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33



Thank You!



- **Nasser bin Nasser**, Kingdom of Jordan, Middle East Scientific Institute for Security
- **Alex Solodov**, United Arab Emirates, Khalifa University
- **Martie Larson**, U.S. Department of Energy, National Nuclear Security Administration, International Nuclear Safeguards
- **Dr. Amir Mohagheghi**, Sandia National Laboratories, Global Technology Engagement, Research Analysis
- **Dr. Matthew Sternat**, Sandia National Laboratories, Global Technology Engagement, Research Analysis

34



Questions?

