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Title: Analytical Capability of Plasma Spectrometry Team

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# **Analytical Capability of Plasma Spectrometry Team**

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**David Gallimore**

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Chemistry Division  
Los Alamos national laboratory**

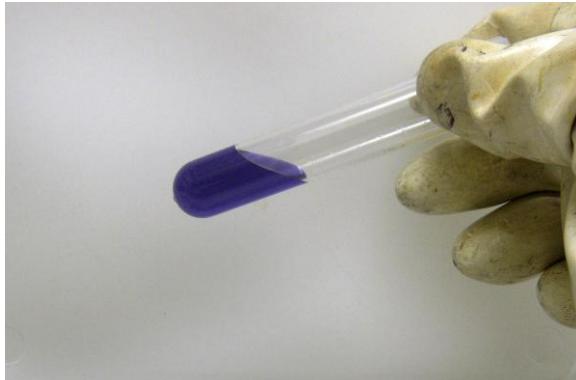
**July 23-24, 2012**

# What Kind of Samples We Analyze?

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- Pu and U metal
- Pu oxide for nuclear fuel
- $^{238}\text{Pu}$  oxide for heat source
- Nuclear forensic samples: filters, swipes

# What Kind of Sample Preparation We do?



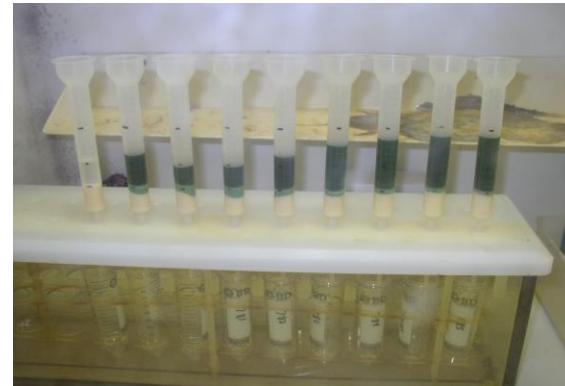
**Metal dissolution**



**Marple filter dissolution**



**Pu oxide closed vessel  
acid digestion**



**Column separation  
to remove Pu**

# What Techniques We Use for Trace Elemental Analysis?



**Glove box interfaced  
ICP-AES (IRIS,  
Thermo Electron)**



**Fume hood contained  
ICP-AES (Ultima 2,  
Horiba Jobin yvon)**



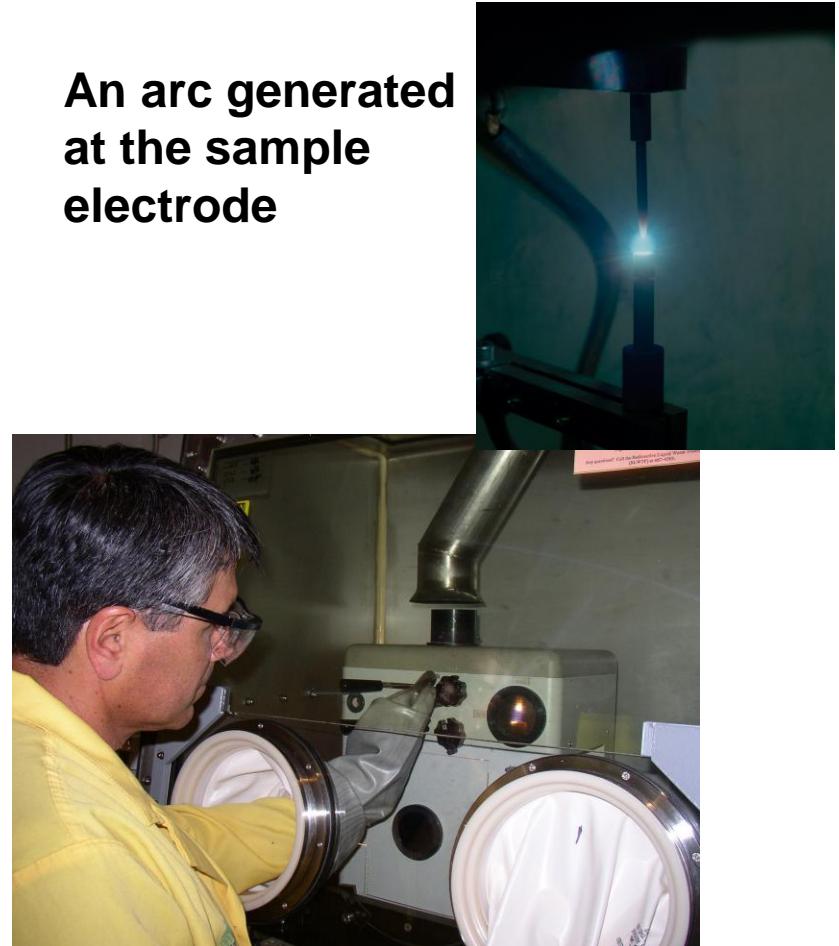
**Glove box interfaced ICP-MS (VG PQ2<sup>+</sup>)**  
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# Direct $^{238}\text{Pu}$ Oxide Analysis by DC Arc Spectrometry



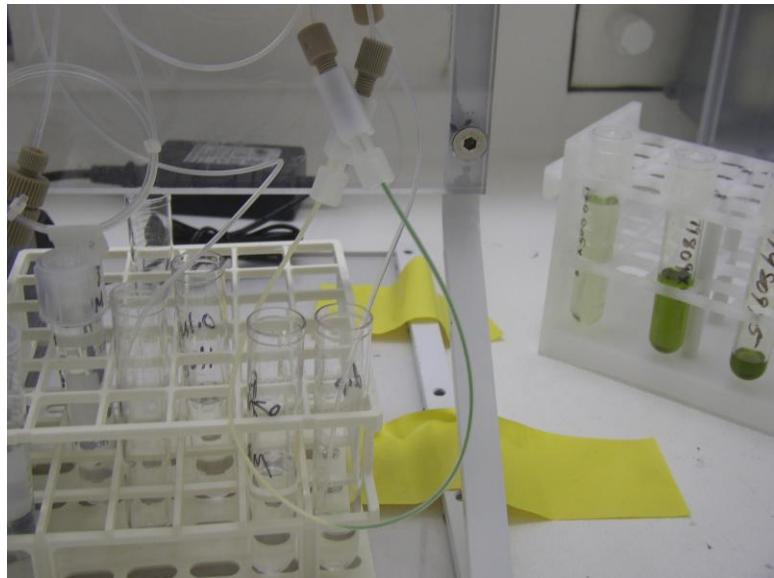
New generation DC arc spectrometer (Prodigy, Teledyne Leeman) designed for glove box

An arc generated at the sample electrode

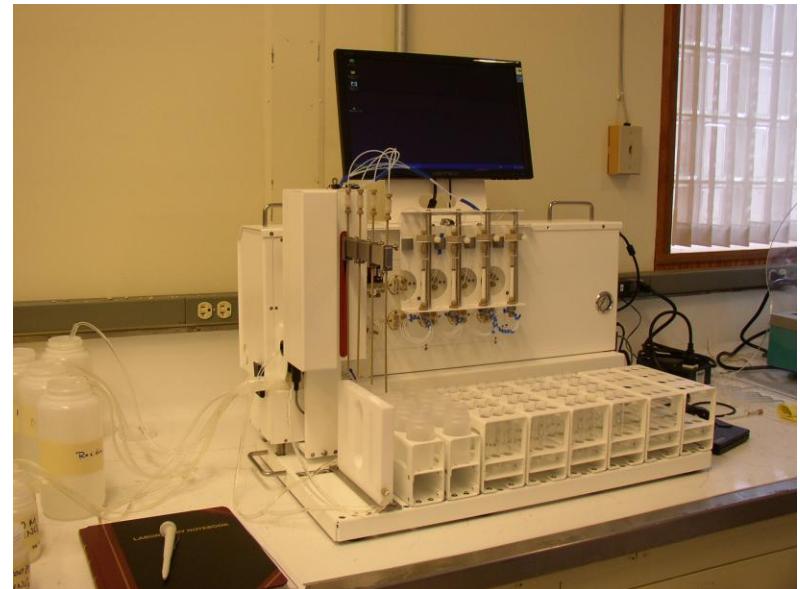


Glove box contained DC arc stand

# New Micro Column System Actinide Separation



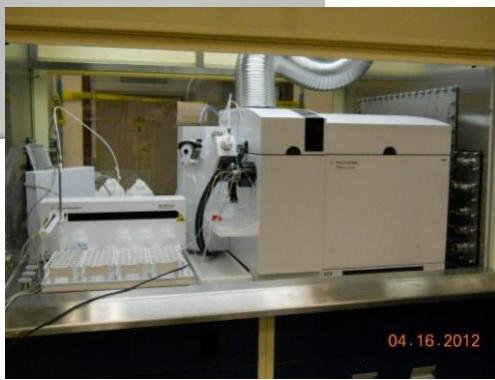
**Manual micro column separation  
for Pu- gas pressured extraction  
column to reduce raw material  
consumption and waste generation**



**Automated multi column actinide  
separation system designed by  
Staff in PS team and fabricated by  
J2 Scientific**

# What Is New?-RLUOB

## New Trace Element labs



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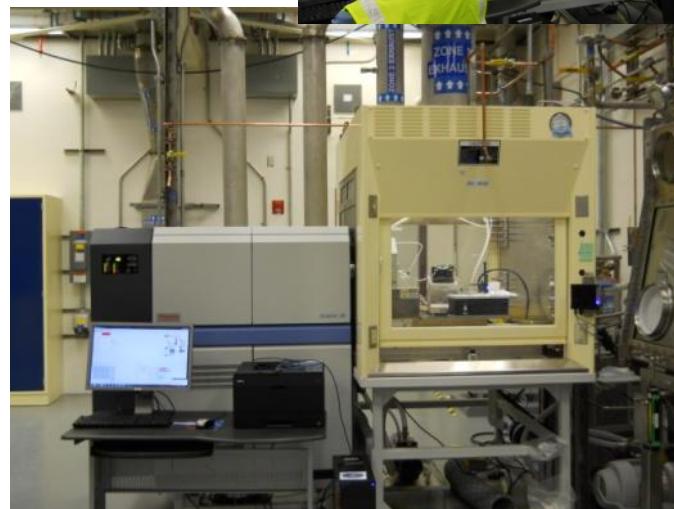
**ICP-AES (iCAP 6000, Thermo)**



**ICP-MS (X Series 2, Thermo)**

Slide 7

## What Is New?-RLUOB (cont.)



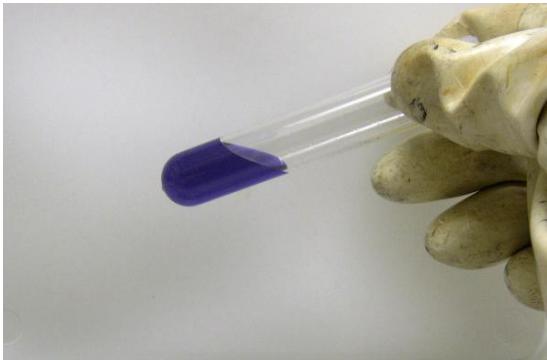
**ICP-AES (Prodigy, Teledyne Leeman) interfaced with glove box**

**High resolution ICP-MS (Element XR, Thermo)**

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Slide 8

# Sample Preparation



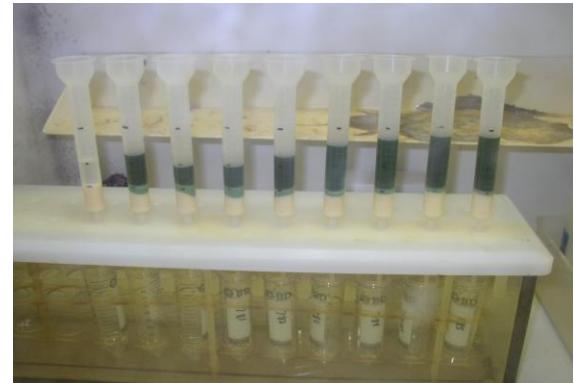
**Metal dissolution – Pu and U**



**Pu oxide closed vessel acid digestion – nuclear fuel**



**Marple filter dissolution - nuclear forensic**



**Column separation to remove Pu**