

ANALYTICAL LABORATORY AT IDAHO NATIONAL LABORATORY COUNTING EQUIPMENT STANDARDIZATION AND QUALITY CONTROL IMPROVEMENT

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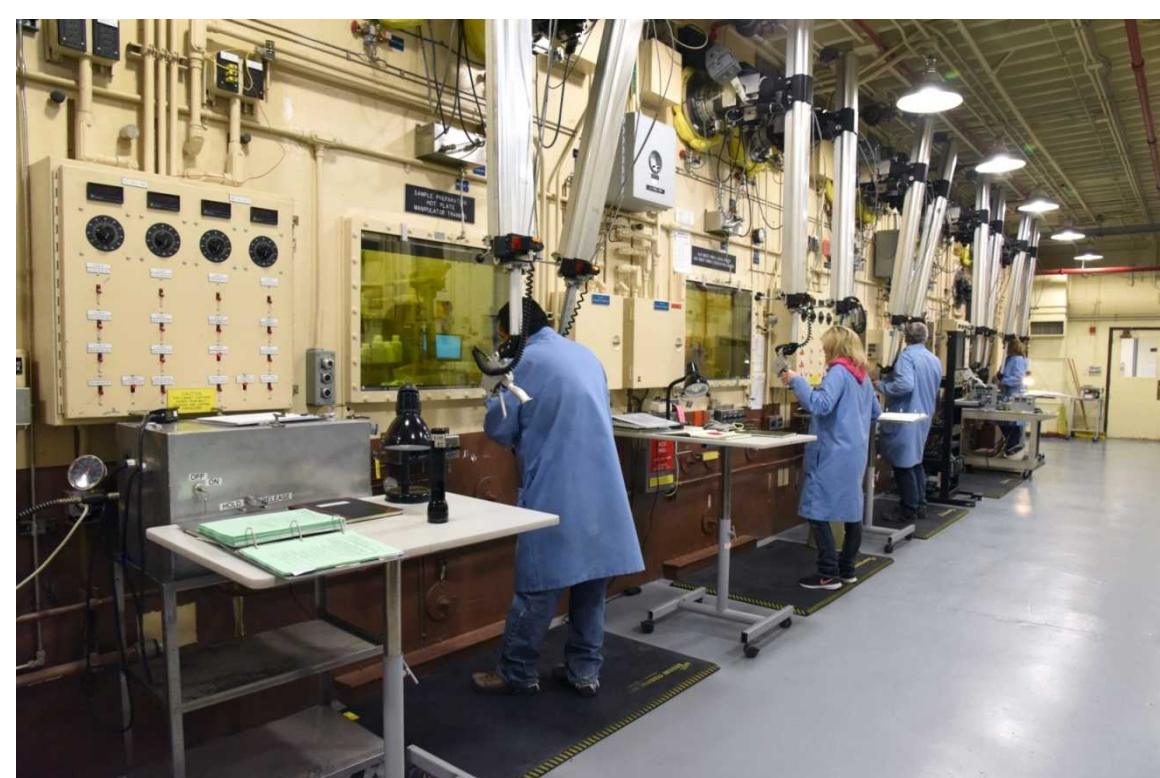
Analytical Laboratory at Idaho National Laboratory Counting Equipment Standardization and Quality Control Improvement

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Introduction

- The Analytical Laboratory (AL) is located at the Materials and Fuels Complex (MFC)
- MFC Mission and Vision¹: *Experiments and engineering that drive the world's nuclear energy future.*
- The AL mission² is to *perform chemical, radiochemical, physical, and nondestructive analysis measurements, and to conduct applied research and engineering development activities in support of MFC and INL programs.*

AL Capabilities



The AL has six interconnected hot cells for sample receipt and dissolution, shown top left, several gloveboxes and hoods for sample preparation, multiple mass spectrometry instruments, including ICP-AES (middle left), quadrupole ICP-MS (bottom left), and multi-collector ICP-MS (bottom right). Not pictured are TIMS, gas mass spectrometry, high-resolution ICP-MS, and Carbon, Nitrogen, Oxygen, and Hydrogen Analyzers.



The AL also has 6 gamma detectors, two liquid scintillation detectors (LSC), 28 alpha chambers, and an automatic gas flow proportional sample changer, as well as a four drawer gas flow proportion counter. Shown above is a portion of one of the counting areas at the AL, where one LSC detector, the alpha spectrometry system and one automatically sample changing gamma detector may be seen.

Programs Supported by AL

<p>Material Management and Minimization M3M includes MPRR, which was formerly known as RERTR. Develop high density, low enrichment fuels for use in test reactors to reduce proliferation risk.</p>	<p>TerraPower (CRADA) Develop travelling wave reactor concept</p>	<p>Fuel Cycle Technologies Develop nuclear fuel and waste management technologies to enable safe, secure, and sustainable expansion of nuclear energy.</p>	<p>FCT: Waste Forms Better methods for short- and long-term storage</p>	<p>The AL supports a variety of programs and facilities, several of which are listed in the figure to the left.</p>		
<p>Nuclear Scientific User Facility (NSUF)</p>	<p>Korea Joint Research Reactors CRADA for research reactor fuel qualification</p>	<p>FCT: Fuels Development Accident-tolerant fuels to make nuclear energy safer and more reliable</p>	<p>FCT: Aqueous Separations Recovery of unused uranium using liquid chemical processes</p>			
<p>Used Fuel Disposition Addressing long-term challenges</p>	<p>IFM Projects Fuel Disposition Spent Fuel Recovery Fire Water Upgrades for MFC/TREAT</p>	<p>TREAT Restart Restore U.S. transient testing capability</p>	<p>Joint Fuel Cycle Study Joint evaluation of electrochemical processing</p>	<p>Space Power Systems (SSPSF)</p>	<p>Advanced Reactor Technologies (Formerly VHTR/NGNP) Develop fuels for use in advanced gas reactors</p>	<p>Homeland Security Detection Training</p>

Equipment Improvements

- Increased documentation of instrumentation
- Re-calibration
 - Gamma Spectrometry
 - Gas Flow Proportional Counter
- Inflated alpha count rate in the presence of high beta activity in Liquid Scintillation
 - Changing scintillation cocktail
 - Dilution of sample
- Alpha Spectrometry
 - Testing separation
 - Tracer Recovery
 - Software

References:

- [1] <https://materialsandfuelscomplex.inl.gov/SitePages/Home.aspx>, accessed on 05/03/2018
- [2] <https://mfc.inl.gov/SitePages/Analytical%20Laboratory.aspx>, accessed on 04/19/2018

