

Analytical Laboratory

Characterization, Post-irradiation Examination, Fuel Fabrication

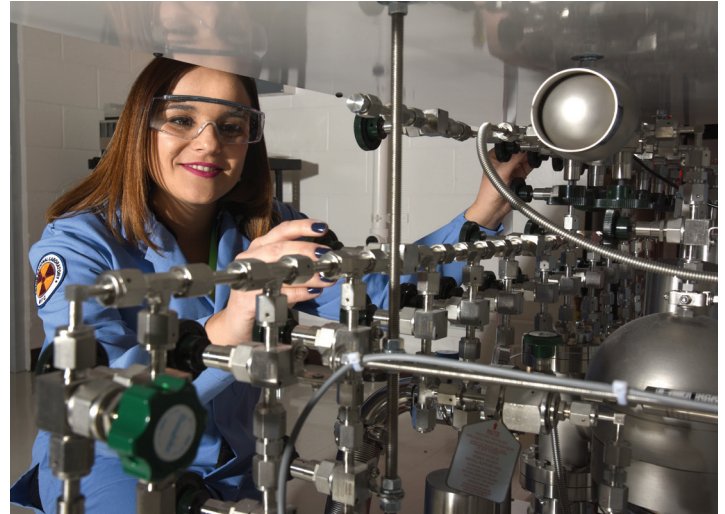
General Information

The Materials and Fuels Complex's Analytical Laboratory at Idaho

National Laboratory provides the chemical, radiochemical, physical, and other analytical data needed for various research and engineering development programs and for applied research and engineering development activities in support of advanced nuclear fuel design, waste management, environmental, and other INL programs.

The Analytical Laboratory receives a wide variety of samples from across INL, as well as outside entities, including irradiated and unirradiated fuels and materials, and samples needed for testing related to material accountability, radiation monitoring, process monitoring, and environmental monitoring. The laboratory also supports engineering development activities, such as the preparation of samples for irradiation testing.

The main features and equipment in the laboratory's A-wing include six interconnected hot cells, gloveboxes, a chemistry laboratory, a 5-ton overhead bridge crane, and other cask handling equipment. The primary features of the B-wing include state-of-the-art analytical instrumentation and general chemistry laboratories, inert-atmosphere gloveboxes, fume hoods, counting rooms, and assay equipment.



An analyst monitors the Analytical Laboratory's gas mass spectrometer.

The Analytical Laboratory maintains a wide variety of equipment typical of a standard chemistry laboratory, including furnaces, X-ray diffractometers, and equipment to test fundamental physical properties. The laboratory also hosts several unique fuel fabrication capabilities in the Casting Laboratory, including the INL-designed glovebox advanced casting system (GACS) furnace. This furnace casts metallic fuel samples containing transuranic elements with greater efficiency and less waste than previous designs.

Key Capabilities:

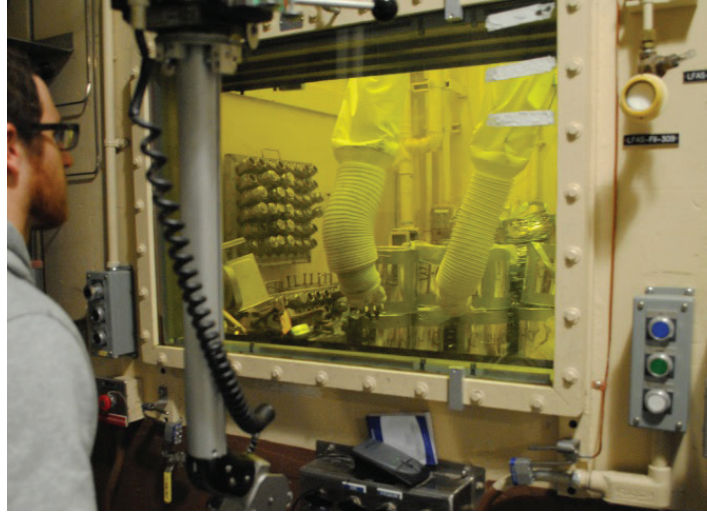
- Counting laboratory (Gamma, alpha spec, gas proportional counter)
- Gas Mass Spectrometer/Mass Spectrometers
- Vacuum/inert induction melting furnace

- Analysis and characterization of as-built and post-irradiated nuclear fuels and reactor components
- Analysis of hazardous, mixed, or highly radioactive wastes, other waste forms, and samples
- Analytical chemistry support for nuclear forensics
- Determinations of inorganic isotopic content constituents and radionuclides
- Radioisotope separation
- Characterization of engineered materials
- Expertise in characterization of engineered materials and the nuclear fuel life cycle

Changing the World's Energy Future

Analytical Laboratory

Technical Information



The current mission of the Analytical Laboratory (AL) is to (a) perform chemical, radiochemical and physical measurements; (b) provide nondestructive analysis measurements; and (c) conduct applied research and engineering development activities in support of advanced nuclear fuel design, waste management, environmental, and other programs conducted at the Materials and Fuels Complex and Idaho National Laboratory (INL). The mission is accomplished through a broad range of analytical chemistry capabilities.

As a result of this mission, AL receives a wide variety of samples from across INL, as well as from other outside entities. Sample types include liquids, solids, and irradiated/unirradiated fuel related to activities such as research and development, material accountability, radiation monitoring, process monitoring, and environmental monitoring. Engineering

development activities, such as the preparation of samples for irradiation testing, are also supported by the AL.

Basic Capabilities:

- Analysis and characterization of as-built and post-irradiated nuclear fuels and reactor components
- Analysis of hazardous, mixed, or highly radioactive waste; other waste form; and samples
- Analytical chemistry support for nuclear forensics
- Determinations of inorganic isotopic constituents and radionuclides
- Radioisotope separation
- Characterization of engineered materials
- Expertise in characterization of engineered materials and the nuclear fuel life cycle

Key Instruments:

- Hot cells (six - interconnected)
- Gloveboxes
 - Special form
 - Radiochemistry
 - Waste form testing
 - Casting lab
 - Wet prep
 - Fresh fuels
 - Carbon nitrogen oxygen hydrogen
 - Inductively coupled plasma – atomic emission (ICP-AES)
- Fume hoods
- Counting laboratory
 - Gamma
 - Alpha spec
 - Gas proportional counter
 - Scintillation
- Gas mass spectrometer
- Mass spectrometers
 - Inductively coupled plasma (ICP-MS)
 - ICP-AES
 - Multi-collector – inductively coupled plasma (MC-ICP-MS)
 - Thermal ionization
- Furnaces
- Glovebox advanced casting system (GACS) furnace
- Chemistry laboratory
- Bridge crane (5-ton, overhead, loading dock)

For more information

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