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INL and the Consortium for Verification Technology

A Brief Overview of Potential INL Capabilities and Resources to Support NNSA's CVT

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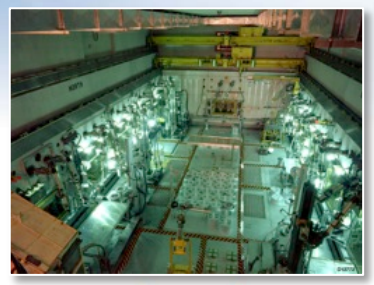
www.inl.gov

Idaho National Laboratory

Idaho National Laboratory

Mission: To ensure the nation's energy security with safe, competitive and sustainable energy systems and unique national and homeland security capabilities.



- 890 square miles
- 111 miles of electrical transmission and distribution lines
- 579 buildings
- 177 miles of paved roads
- 14 miles of railroad lines
- 4 reactors
- Mass transit system

ATR National Scientific User Facility

INL Wireless TEST BED

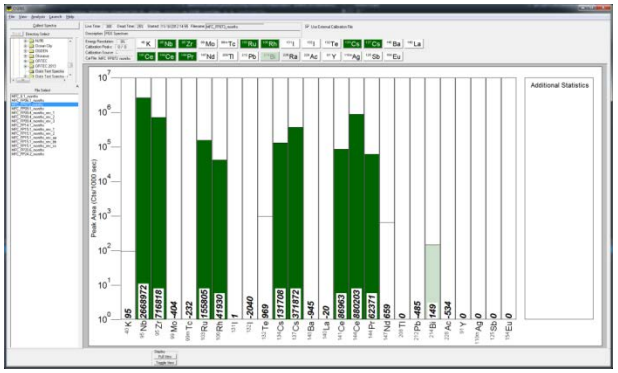
NRAC Nuclear & Radiological Activity Center (EVALUATION · TRAINING · RESEARCH)

INL Capability Alignment with the CVT Thrust Areas

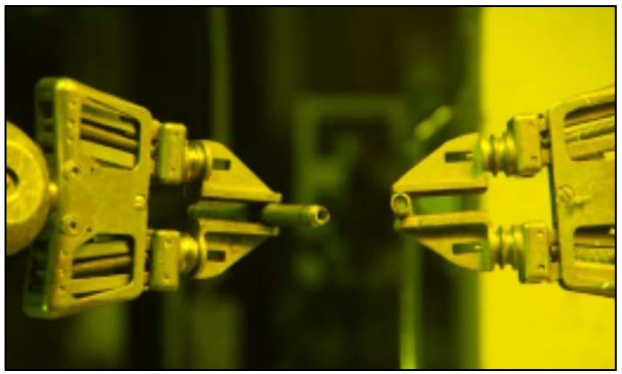
Thrust Areas	Sub Areas	INL Staff	INL Resources
1: Characterizing Gaps & Emerging Challenges	FMCT Verification Challenges	✓	✓
	Future Disarmament Treaties	✓	✓
2: Fundamental Physical Data, Data Acquisition & Analysis Techniques	Physics of Fission	✓	✘
	Data Analytics	✓	✘
	Data Acq. for High-Throughput Rad. Detector Systems	✓	✓
3: Advanced Safeguards Tools for Accessible Facilities	Neutron Multiplicity Counting	✓	✓
	Handheld/Portable Room Temp. Semiconductor g-Ray Imagers	✓	✓
	Stand-off Meas. using LIBS for Limited Access Areas	✓	✓
	Chain-of-Custody Detectors	✓	✓
4: Detection of Undeclared Activities and Inaccessible Facilities	Seismic Signatures	✘	✓
	Infrasound Signatures	✘	✓
	Atmospheric Radionuclide Sensing	✓	✓
	Signatures from Undeclared Fuel-Cycle Facilities	✓	✓
5: Disarmament Verification	Rad. Detection Systems for Arms Control & Treaty Verification	✓	✓
	Warhead Dismantlement Facility & Managed-Access Simulator	✓	✓
	Zero-Knowledge Neutron-based Verification System	✓	✓
	Limited Knowledge Transmission NRF	✓	✓
6: Education & Outreach	Multiple	✓	✓

INL Research Staff Interests Aligned with the CVT

- Development of automated, information-barrier software for assessing gamma-ray spectra for CTBT on-site inspections
  PI: Gus Caffrey; TA: 1, 5, & 6
- Study of nontraditional signatures and observables associated with reprocessing light-water reactor (LWR) fuel; evaluation of forensic signatures from LWR fuel
  PI: Kevin Carney; TA: 1, 4, & 6
- Development of passive and active interrogation methods for characterizing assemblies of SNM for safeguards, arms control, and treaty verification
  PI: David Chichester; TA: 1, 2, 3, 5, & 6
- Development of methods and instrumentals for ultra-trace mass and radiochemical analyses and the production of reference materials
  PI: Bob Hague; **TA: 1, 4, & 6**



Screen shot of the OSIRIS user interface, showing results of allowed gamma-ray results



Disassembly of an LWR fuel pin at INL for follow-on radiochemical analyses

Source-assisted multiplicity counting to determine multiplication, M, of an assembly of HEU

Potential INL Resource Support for the CVT

Working with Bulk SNM
(Thrust Areas: 1, 2, 3, 5, & 6)

Active interrogation & multiplicity counting; assaying SNM in a storage container

U & Pu Processing Facilities
(Thrust Areas: 1, 3, 4, & 6)

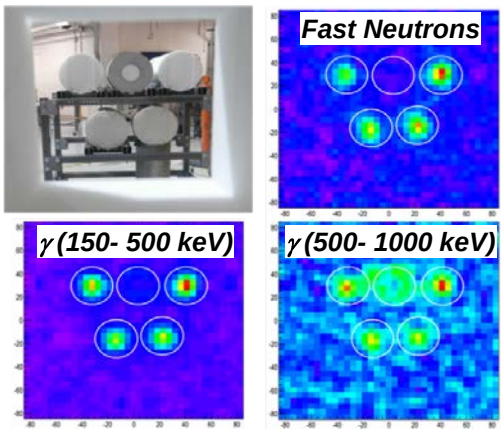
Multiple hot-cell facilities processing spent fuel; separating U, HEU, and Pu; downblending HEU

Explosives Test Range
(Thrust Areas: 4)

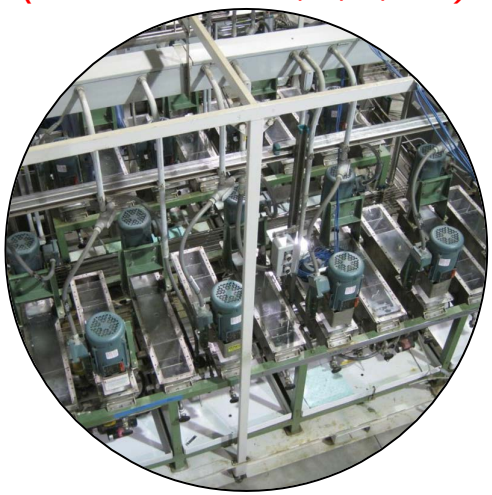
A 10-acre explosives test range supporting events with a max. charge weight of 20,000 lbs. TNT equivalent

Radiation Imager Trials
(Thrust Areas: 3 & 5)

Assessing imaging systems for arms control (example data from an ORNL system)



PUREX Pilot Plant
(Thrust Areas: 1, 2, 4, & 6)



Engineering scale solvent extraction pilot plant for nonproliferation R&D