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## Alternative Destructive Analyses (DA) Methods for Safeguards

The National Nuclear Security Administration's Office of Proliferation Detection's (PD) mission is to advance U.S. capabilities for detection of nuclear weapons development activities, including material production and movement. Nuclear Safeguards resides in PD's Office of Nuclear Nonproliferation Research and Development (DNN RD;). DNN RD; Safeguards focuses on the basic research needed for developing and demonstrating new technologies and capabilities that: 1) Improve the efficiency and effectiveness of current safeguards and 2) Strengthen existing safeguard measures to ensure timely detection of material diversion and undeclared material production.

Traditional destructive analyses methods require extensive efforts for obtaining samples, preparing samples, and analyzing samples. These efforts are both costly and time consuming; and have motivated several past RD; efforts toward minimizing sample preparation times and developing portable systems that can be applied in the field. The limitations of past RD; efforts (ie. mass spectroscopy) led DNN Safeguards RD; to investigate four laser-based DA options. Each of the options being investigated are required to have minimal to no sample preparation and when complete be implemented as a fieldable system. The four methods currently being investigated are:

- Handheld Operation for Uranium Sampling (HORUS) is a fieldable method based on the Argentine-Brazilian Agency for Accounting and Control of Nuclear Materials Cristallini technique (ABACC-Cristallini) technique.
- A fieldable atomic beam laser spectrometer for isotopic analysis that can measure isotopic composition of uranium samples with high sensitivity, resolution, and speed.
- A field-deployable High Performance InfraRed (HPIR) analysis technique for real-time uranium isotope measurements.
- Laser Induced Spectrochemical Assay for determination of Uranium Enrichment (LISA-UE)

This paper will discuss the basic science and the results to date associated with each of these alternative DA methods.

### Which "Key Question" does your Abstract address?

SGI1.3

### Topics

SGI1

### Which alternative "Key Question" does your Abstract address? (if any)

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