Integrated Waste Screening System (IWSS) Phase 1 Demonstration Program

Douglas Akers
Lyle Roybal
Idaho National Laboratory
Judd Hamilton –C3 Corporation

Idaho National Laboratory

Bakkan Shale Waste Issues

- Significant amounts of waste are being disposed of radioactive waste when EPA indicates that only a small fraction is radioactive
- Characterization of wastes is primarily done by sampling after a significant delay and may not produce accurate results
- There are significant regulatory challenges for the characterization and disposal of Bakkan wastes
- Stakeholders including the oil and gas industry, the insurance companies and the public have significant concerns about safety and disposal processes

IWSS Demonstration Objectives

- Adapt developed INL technology for the rapid characterization and segregation of Bakkan Shale wastes
- Develop the Packaged Waste Screener(PWS) component of IWSS for packaged filter socks tank and containerized wastes
- Perform validation and verification of the PWS technology at the INL on characterized packaged filter sock wastes
- Demonstrate the PWS at several North Dakota waste sites in a field environment. Discussions with Secure Energy Services and others
- Provide a validated demonstration of the IWSS for stakeholders including the Oil and Gas Industry, the State Health Department and the public
-

IWSS Background

- IWSS is based on technologies developed for the rapid characterization and segregation of nuclear waste
  - IWSS is highly automated and suitable for use by operators with limited training
  - Over 50000 barrels of transuranic waste have been measured with validation measurements performed using IWSS related technology
- IWSS is composed of 4 integrated measurement systems which utilize developed INL technologies

IWSS Background (continued)

- **IWSS is composed of 4 integrated measurement systems of which only the PWS will be demonstrated as part of this project**
  - **Packaged Waste Screener (PWS) – Packaged waste, tanks and piping waste**
  - **Volume Waste Screener (VWS) Conveyor based volume waste screening and segregation**
  - **Subsurface Waste Screener (SWS) – Characterize and monitor buried wastes**
  - **Brown Field Waste Screener (BFWS) – Characterization of surface or accident waste**

PWS INL Development Scope

- Perform initial hyper pure germanium and NaI(Tl) detector testing with Bakkan wastes (complete)
- Modify and test INL software to address Ra-226, Ra-228 and daughters as well as thorium. U-235 and U-238 are already included in the PWS software (under way)
- Obtain and characterize 2 drums of filter socks (under way)
  - Individual filter socks sampled and characterized
- Optimize PWS measurement and analysis process for non equilibrium wastes
- Optimize PWS for field environments using specialized software and hardware

North Dakota Field Demonstrations

- **Perform field demonstrations of the PWS technology with validation measurements to verify system operability**
- **Optimize the PWS system for field use including speed (nominally <1 minute per drum)**
- **Optimize PWS for non equilibrium wastes measured shortly after the filter socks are loaded**
- **Perform measurements at a Secure Energy Services or other radioactive waste handling site. Acquire samples and perform validation analyses.**
- **Demonstrate the technology for the State Health department and other stakeholders**

PWS Demonstration Schedule

- **Complete INL testing and demonstration- 11/1/14**
  - **Complete software development - 10/1/14**
  - **Complete filter sock drum testing and analysis – 11/1/14**
  - **Complete Interim report – 11/15/14**
- **Complete North Dakota Demonstration – 3/1/15**
  - **Begin testing in North Dakota – 12/1/15 (based on facility availability)**
  - **Complete testing in North Dakota – 2/1/15**
  - **Complete validation measurements and final report 3-1-15**

IWSS Characterization Systems General Characteristics

- Systems Design Approach
  - Detector selection based on Contaminants of Concern and cleanup levels – MDC dependent
  - Core software modules integrated based on analysis methods and detector selection results in rapidly developed custom software designed specifically for the site
  - Menu-driven software system usable by field technicians with minimal training
  - Real-time data acquisition and analysis with activity and equipment status alarms
  - Integral GPS system – all data are accurately located
  - Automated energy stabilization
  - Automated/documented energy calibration

IWSS Real-Time Characterization Systems (continued)

- Benefits
  - 100% area coverage compared to sampling
  - Rapid characterization shortly after waste generation
  - Ability to identify individual contaminants
  - Quantification of multiple contaminants
  - Complete documentation of all waste generated

Summary

- **Adapt developed INL technology to rapidly address the Bakkan Shale waste issues**
- **Developed prototype system available for testing within 1 month**
- **Testing in North Dakota within 2 months**
- **Full demonstration for stake holders within 6 months**