

IER 500: AWE-LLNL Measurement Campaign at DAF

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AWE-LLNL Measurement Campaign at DAF

- Hosted at DAF from Oct 23 - Nov 3, 2023
 - First week: Oxide measurements
 - Second week: Metal measurements
- Next trip hosted at DAF from Feb 26 – Mar 8, 2024

Challenges from the Most Recent Trip

- Labor contract disputes resulted in strikes throughout the first week
 - Halted operations at the DAF
 - Personnel were not allowed to access buildings
- FedEx shipment delays
 - Material was delivered to Sandia from AWE and handed to FedEx
 - Inclement weather in Memphis delayed all shipments to Nevada
 - AWE Equipment was delivered to Nevada in two separate shipments
 - Due to strikes FedEx would not deliver material until the following week

Accomplishments

- AWE Equipment was received by LLNL and transported to DAF
- We performed two weeks of measurements over a one-week period
 - 8 unique configurations were measured
 - All necessary background, neutron, and gamma-ray measurements completed
 - No equipment failures



AWE-LLNL Measurement Team

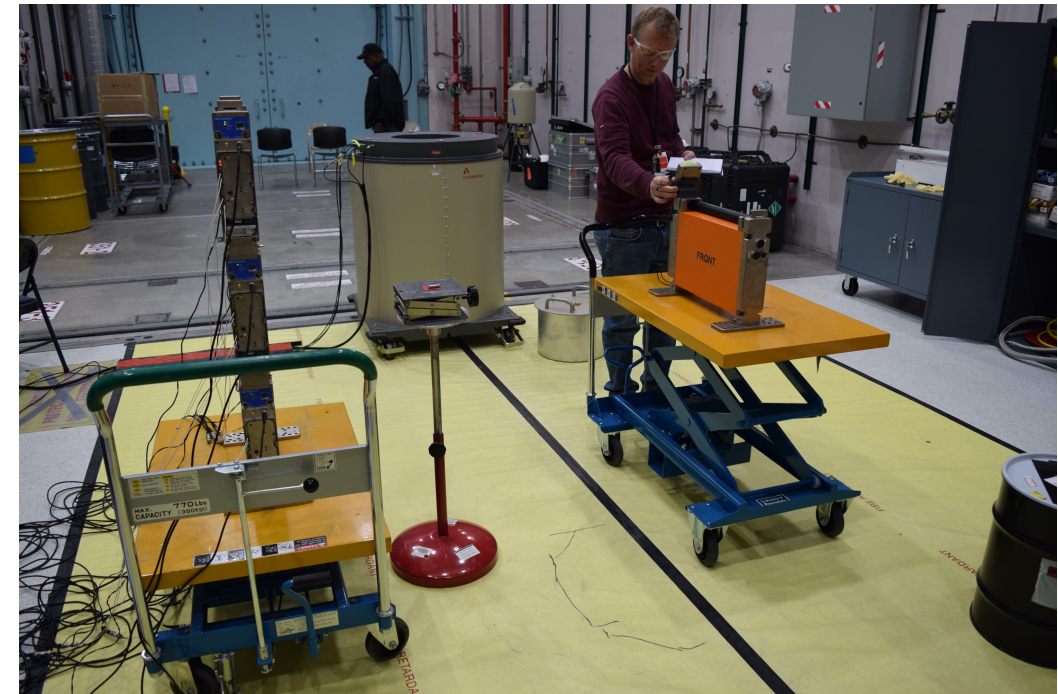
- Jointly led by teams from AWE and LLNL
 - Fissile Material Handlers
 - Neutron Scientists
 - Gamma Scientists
 - Nuclear Criticality Safety Personnel
 - Project Managers
 - Etc.



Sealed Radioactive Source encased in steel and plastic

Measurement Goals and Planning

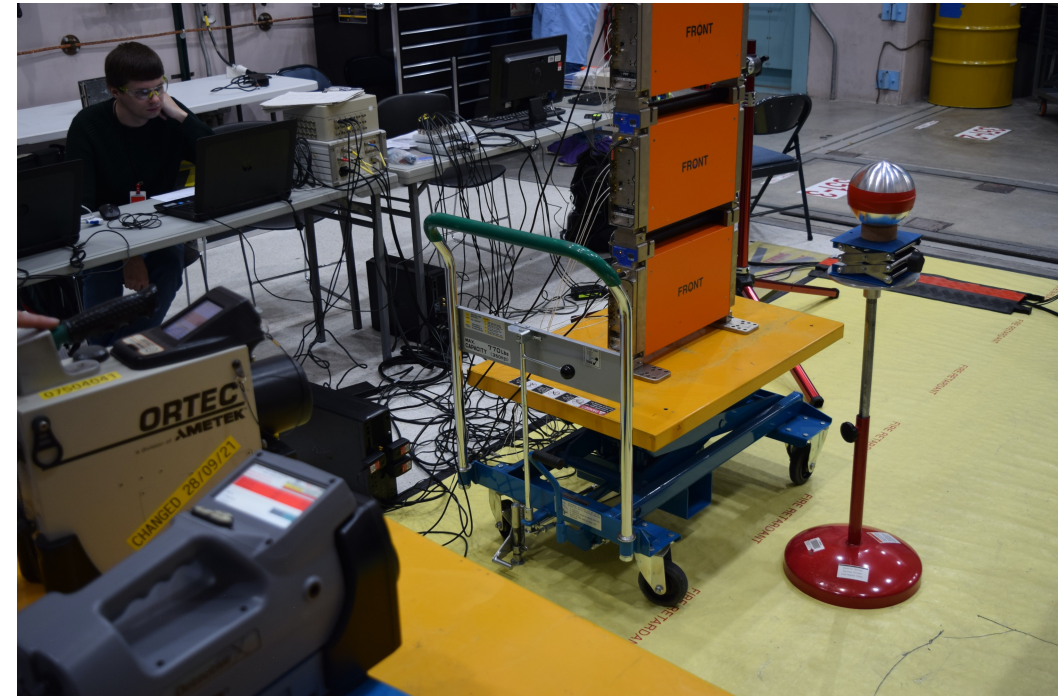
- AWE sought to begin to test and develop a fast neutron detection system based upon multiple liquid scintillator detectors
 - Previous trips were to prove the system worked
 - The most recent October campaign was an attempt to understand the differing response of the system to SNM types.
 - In theory the fast neutron system should easily determine if the SNM is oxide or metal due to the difference in energy of the (α,n) neutrons.



Sealed Radioactive Source elevated between detector equipment

Measurement Execution

- LLNL provided two reconfigurable measurement configurations
 - AWE was able to perform measurements using their liquid scintillator array for a variety of configurations and SNM type
 - Measurements also employed the Detective-X and LEMC
- AWE's work surrounding (α, n) signature supports ongoing benchmark work at LLNL



Sealed Radioactive Source encased in steel

Current Status

- LLNL now has a dedicated DAF team
 - 6 FTEs
 - 6-8 measurement campaigns per year
- Putting together a report on AWE-LLNL measurements
- LLNL is designing multiple Global Security benchmark experiments

Future Work

- AWE would like to come out to DAF at least twice a year
 - U-233 ZPPR plate measurements
 - Introduce a greater degree of realism in the item being measured
 - Supports the learning and development of CT responders
 - LLNL has already finalized criticality safety analysis for next trip
 - Aim to expand current capability
- LLNL is procuring and building:
 - Diagnostics equipment (detectors/hardware)
 - Software
 - Moderators and reflectors

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