

NCSP – AWE Collaboration

Criticality
Incident
Neutron
Dosimetry

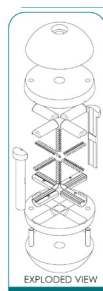
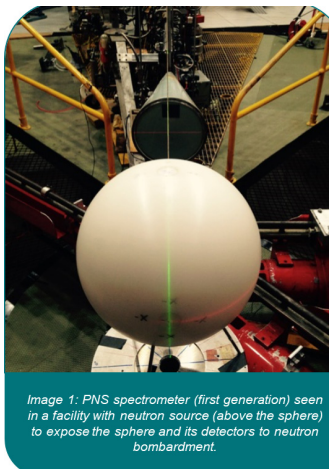


Image 2: Exploded view of all components of the second generation sphere assembly including and their relative positions to the neutron source and other the surrounding.



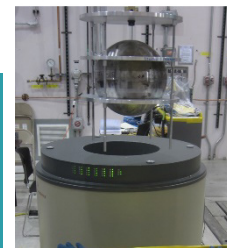
Image 3: Completed sphere with all components shown in place.

AWE



CIDAAS
IS820 &
IS859

Large
Epithermal
Multiplicity
Counter





U.S. Nuclear Criticality Safety Program (NCSP) Technical Program Review (TPR), February 2024

Appendix F International Collaborations

International Collaborations AWE UK Progress FY24 & Look Ahead

Matt Harker

Non-Destructive Assay (NDA)

Radiation Detection Group (RDG)/Physics/Science



Appendix F International Collaborations AWE UK

- **Criticality Incident Detection and Alarm System (IE12)** Simon Garbett, Graham Auld, Trevor Birkett
- **Neutron Time Correlation Measurement and Analysis Bulk Nuclear Material** Nigel Kelsall
- **Criticality Incident Dosimetry; inter-comparison trials** Phil Angus
- **Hands-on Criticality Safety Training** Chris Hodkinson, Mark Roydhouse

CIDAAS Testing (IE12) – Criticality Incident Detection System (CIDS) Update



MENSA Project at AWE

- One IS820 CIDS Rack – Currently at subsystem level testing (six out of eight complete). The next stage Factory Acceptance Testing (FAT) due April 2024.
- Three IS821 Detector Head Assemblies (DHA) – FAT completed last year.

AWE Refurbishment Project (multiple facilities)

- An order for a further eight IS820 CIDS Racks (with 140 IS821 DHAs) has now been approved, procurement and manufacture for the IS821 DHAs is underway.



IS859 Mini CIDS

- Intended to support the IS820 CIDS hot spares however, the system has been designed for a viable transition into a future portable CIDS.
- Prototype completed and approved, now preparing for stage two (conformance testing) later this year.

CIDAAS Testing (IE12) – Additional News



Supply of IS820 CIDS to external entities

- AWE continue to work with Ploughshare (MOD) to explore licencing.
- For US Govt applications supply under MDA is also being investigated.

White Sands Missile Range Testing

- Survivability testing using multiple IS821 DHA design adaptations to safeguard against component obsolescence.
- Provisional date of late-May 2024 provided.

GODIVA IV Testing

- Further testing on the IS820 CIDS post event capabilities.
- Provisional date of mid-May 2024 provided.

Criticality Audible Visual and Alarm System (CAVAS)

- A commercially available system providing audible and visual alarms when triggered by the IS820 CIDS.
- All four units have now undergone FAT, a fifth currently being manufactured (spare rack).

AWE System management

- Project ongoing to develop a site wide monitoring capability for CIDS and other systems to provide system status and access to post incident data for relevant personnel on our corporate IT platform.
- Proof of concept near completion, undergoing testing with latest systems connected.

TRIGA Reactor Characterisation AFRRI August 2023

- Phil Angus and colleagues produced experimental plan for the Aug '23 TRIGA reactor characterisation
- Unfortunate failure of the Visit Approval System for DoD sites meant no clearances for AWE staff in time to attend
- Phil & LLNL discussed transfer of LLNL PNS data to AWE
- Phil and team may model PNS response
- LLNL kindly sent Harshaw locket data which will be unfolded using CRISIS code
- Phil pursuing sharing access to CRISIS code with LLNL, no significant issues anticipated



Criticality Incident Neutron Dosimetry, Look Ahead



2024 Criticality Accident Dosimetry Intercomparison exercise

- **AWE plan to attend and participate**
- **Preparations have begun; equipment & logistics**
- **Likely to be the most significant experiment FY25, challenging neutron/photon field**

Criticality Incident Neutron Dosimetry, Look Ahead



Li-6 TLD Response

- Internal development work on Li-6 TLD responses & paired Li-6/7 systems
- To meet the challenges high photon:neutron ratio fields pose, e.g. unshielded TRIGA configuration

Neutron Spectrum Unfolding

- LLNL – AWE collaboration, LLNL keen to access AWE codes
- Considering monthly meetings to accelerate exchange
- AWE hoping to host a LLNL visit

Nuclear Material Control & Nuclear Security



Fast Neutron Liquid Scintillators: Bulk Material

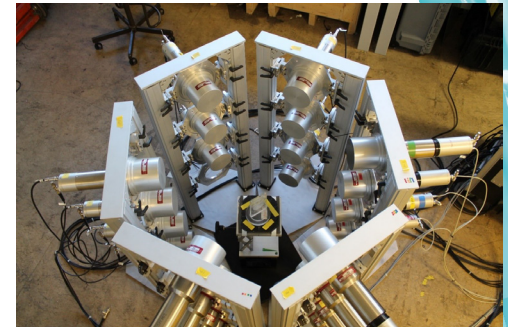
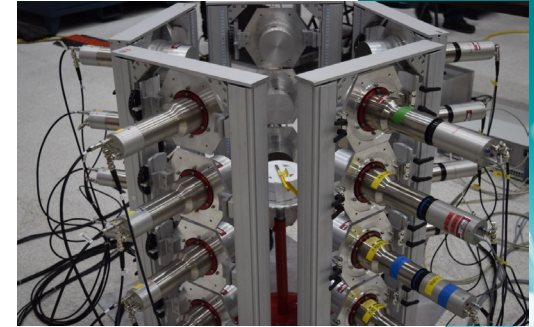
Oct-Nov '23 DAF Campaign 2 weeks

1st week hampered by equipment transport issues and industrial action

Enormous thanks to Paul Yap and Sam Varghese for their time & initiative collecting equipment from shipper

2nd week, 2 days Bulk Material measurements,

- Pu O₂, 1½" SS
- Pu metal, 1½" SS, mock HE



Nuclear Material Control & Nuclear Security Look Ahead



- **Feb-Mar '24 visit,**
- **Repair & Test LEMC,**
 - Mirion Tech Engineer Henry Portelles
- **Arrange for RoSPEC to return to UK**
- **Acquire high quality,**
 - High resolution gamma ray spectra
 - Neutron Time Correlation (^3He) data
- **from credible simulant threat objects**





Hands-on Criticality Safety Training

- **Two Criticality Safety Group (CSG) team members experiencing hands-on training at DAF January-February '24**
- **CSG plans to send all Assessors on DAF hands-on training with new recruits included going forward**
- **Thank you NCSP and DAF**