ORNL NCSP Training and Education Support for FY2022

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2023 NCSP Technical Program Review
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# ORNL Approved Training and Education Tasks for FY2022

<table>
<thead>
<tr>
<th>ORNL Training and Education (TE) Tasks</th>
<th>Budget ($K)</th>
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<td>ORNL-TE1</td>
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<tr>
<td>Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training and Education Program</td>
<td>99</td>
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<tr>
<td>ORNL-TE3</td>
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<tr>
<td>Hand-Calculation Primer Expansion, LA-14244-M</td>
<td>0 (C/O)</td>
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<td>ORNL-TE11</td>
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<td>Revision of the LA-12808 Nuclear Criticality Safety Guide</td>
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<td>ORNL-TE12</td>
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<td>Design of a Subcritical Assembly at ORNL for Use with the CSO Courses</td>
<td>0 (C/O)</td>
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<td>ORNL-TE14</td>
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<tr>
<td>Nuclear Criticality Safety Training and Pipeline Development</td>
<td>100</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>249</strong></td>
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ORNL TE1—Manage and Provide Instruction for the DOE Nuclear Criticality Safety Training and Education Program

• Q1
  – Archived FY 2021 course materials in accordance with the course procedure
  – Planning for the 2-week hands-on course in Jan 2022 was initiated

• Q2
  – Planned and executed the 2-week Hands–on course (22 NATM/8 Sandia/14 NCERC) from Jan. 31 – Feb. 11, 2022
  – Planning for the 1-week Sandia Manager/CSO course in April 2022 was initiated

• Q3
  – Planning for the 1-week NCERC Manager/CSO course in June 2022 was initiated
  – 1-week CSO/Manager Sandia course completed on schedule April 4-8, 2022, for 11 students (CSO course pilot)
  – 1-week CSO/Manager NCERC course completed on schedule June 6-10, 2022, for 11 students

• Q4
  – Planned and executed the 2-week Hands–on course (26 NATM/8 Sandia/14 NCERC) from Aug. 6 – 19, 2022

661 Students trained through FY22Q4 since 2012
NCSP T&E Courses – 2-Week Course Students Trained
FY12-FY23

Total Students: 482
NCSP Training and Education Course Statistics (2)

NCSP T&E Courses – Manager Course Students Trained
FY12-FY23

Total Students: 256
• **Status**: delayed

• Document completed in FY2022 – still in ORNL RES process

• Website complement completed and provided to LLNL for an addition to NCSET module #9 for Hand Calculations*

• Addition of new example problems in progress for typical NCS applications (single-unit and array problems)

• Solid angle method chapter has been revised due to variability of applicability

• Web-based sample problem complement in progress
  - All data needed to complete a problem will be available
  - HTML format—to be linked to NCSP website (NCSET modules) and linked to the NCSP training course
  - Graduate student work delayed by COVID-19 and transition to a new purchase order system

• NCSD topical paper submitted

• Follow-on papers on hand calculations to be published by authors

* Issues with implementation on NCSP website
ORNL TE11—Revision of the LA-12808 Nuclear Criticality Safety Guide

- **Status**: delayed due to resource issues
- Outline and reference compilation complete
- Recently developed subcritical limits will be referenced
- Updated critical mass curves generated for this document
- Document currently being drafted and will be completed by the end of FY23
ORNL TE12—Design of a Subcritical Assembly at ORNL for Use with the TE Courses

• Final design report completed in FY22 and published in Jan. 2023

• HALEU fuel; graphite reflected (AGN-201M fuel and assumptions)

• ORNL DOE field office and management continue to be supportive

• At least four experiments can be performed to examine 1. mass, 2. interaction, 3. moderation, and 4. effects of adding neutron absorbers to the assembly
ORNL TE14—Nuclear Criticality Safety Training and Pipeline Development (university proposal)

• Contracts finalized in late 2022; 5-year task

• Goal – speed up T&Q process at DOE sites
  – All DOE sites should benefit from this program

• Phase 1 – Program development
  – Outline the certificate program
  – Lecture material development
  – Record lectures
  – Material review
  – Website development
  – Exercise development

• Phase 2 – Hands-on training development
  – Recruiting
  – Course delivery
  – Student travel for hands-on training at Sandia, NCERC or the ORNL subcritical assembly
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