User Environmental, Safety, and Health Practices at the Center for Nanophase Materials Sciences

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April 21, 2015
Center for Nanophase Materials Sciences (CNMS) – Scott Hollenbeck, Operations/ESH Manager

- One of 5 Nanoscale Science Research Centers (NSRCs) created by the Department of Energy (DOE) as contribution to the U.S. Government National Nanotechnology Initiative (NNI)
- Started operations in 2006; merged with ShaRE (Shared Research Equipment User program) in 2014.
- Synergism between staff and Users, visitors, etc. creates a highly interactive, exciting, and stimulating research environment
- Researchers balance work on in-house research with work on user projects
  - 50% of staff time committed to working with users
  - 50% of staff time committed to in-house science
  - 80% of instrument time dedicated to users
  - 20% of instrument time for in-house science
NSRCs are part of the Office of Science “family” of ~30 User Facilities

Distribution of users in FY2013:
5 Nanoscale Science Research Centers
Geographically broad user base

Distribution of unique users for CNMS and ShaRE

- Foreign (8%)
- U.S. Industry (3%)
- Other Federal (8%)
- ORNL, non CNMS/ShaRE (13%)
- U.S. Academic (57%)

Average user spends 13 days at CNMS

“CNMS+ShaRE” combined supported 574 unique users in FY2014
CNMS User Proposal Proposal Process

- 2 proposal calls per year, short 2-page proposal
- Checkboxes for capabilities
- Appendix for neutron resources (mutual acceptance of reviewer scores)
- Evaluation based on technical research feasibility, science merit, and conformity with established ESH envelope
- Timeline of last call:
  - Deadline Oct. 22
  - Feasibility review
  - To reviewers Nov. 9
  - Selection Dec. 12
  - Notifications Dec. 15
  - 170 proposals received, 127 proposals approved
What CNMS Does Well (solutions and strategies to challenges)

Plan Training system with respect to Human Performance Improvement (HPI)

Anticipate human and process weaknesses, and eliminate or mitigate causal factors through consistency, capabilities, and systematic approaches. Eliminate hazards through engineering and administrative tools as well as focused training and oversight.

Staff Awareness – Promotion of Safety Culture

Responsibilities include checking user safety
Others (Operations) provide redundant checks
Human interaction and follow-up

Comprehensive User oversight

Users are escorted until training is complete; Lab Space Manager is completely satisfied
Limit activities: Certain processes cannot be done by user (i.e., adding waste to collection areas; operating high-end equipment, chemical manipulation)
Specific User training matrix (allows efficient and effective training)

<table>
<thead>
<tr>
<th>User title in SAP</th>
<th>SAP Position in Org</th>
<th>CNMS User Type</th>
<th>Minimum Training Requirements</th>
<th>by Group (Lab)</th>
</tr>
</thead>
<tbody>
<tr>
<td>User 1 50259987</td>
<td>ORNL Cyber Security User</td>
<td>ORNL Site Access Training, ORNL Chemical Hygiene Plan, CNMS Orientation, CNMS Chemical Hygiene Training, CNMS Personal Protective Equipment, CNMS RCRA Awareness Training</td>
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<tr>
<td>User 2 50259995</td>
<td>Lab User X-ray</td>
<td>ORNL Site Access Training (Q00204105), CNMS Orientation (Q00277581), ORNL Chemical Hygiene Plan (Q00222817), CNMS Chemical Hygiene Training (Q00277584), CNMS Personal Protective Equipment (Q00277517), CNMS RCRA Awareness Training (Q00277581), Rad Safety Training for RGD Operators (Q00242130), CNMS Benzene Safety (Q00242130), CNMS Hydrofluoric Acid (HF) &amp; Other Fluo (Q00242130), CNMS Cryogenic Safety Training (Q00242130), CNMS Nanoscale ESH for R&amp;D Operations (Q00242130)</td>
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<tr>
<td>User 3 50259995</td>
<td>ORNL Site Access Training, ORNL Chemical Hygiene Plan, CNMS Orientation, CNMS Chemical Hygiene Training, CNMS Personal Protective Equipment, CNMS RCRA Awareness Training, CNMS Hydrofluoric Acid (HF) &amp; Other Fluo, NRL Usage and Safety Manual</td>
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<tr>
<td>User 4 50259994</td>
<td>ORNL Site Access Training, ORNL Chemical Hygiene Plan, CNMS Orientation, CNMS Chemical Hygiene Training, CNMS Personal Protective Equipment, CNMS RCRA Awareness Training</td>
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</tr>
<tr>
<td>User 7 50259995</td>
<td>Clean Room User</td>
<td>ORNL Site Access Training (Q00204105), ORNL Chemical Hygiene Plan (Q00222817), CNMS Orientation (Q00277581), CNMS Chemical Hygiene Training (Q00277584), CNMS Personal Protective Equipment (Q00277517), CNMS RCRA Awareness Training (Q00277581), Rad Safety Training for RGD Operators (Q00242130), CNMS Laser Safety Awareness (Q00242130), CNMS Cryogenic Safety Training (Q00242130), CNMS Nanoscale ESH for R&amp;D Operations (Q00242130)</td>
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</tr>
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Note: Specific training requirements are tailored to each user's access and responsibilities within the laboratory.
CNMS User Facility Challenges

Not just dealing with one distinct group – Heterogeneous User Community

Incoming users span all levels of training and experiences; tenured Profs to undergrads – All “experts” in something but may do unfamiliar tasks (i.e., chemical manipulation, lasers, electrical, etc.) at CNMS

Coming from all varieties of institutions (academic, Industrial, government, domestic and foreign)
Cultural differences / language barriers

Programmatic Differences

Most user facilities are government funded and operated
More rigorous procedures (i.e., ESH) for which academic collaborators (Users) might be accustomed
Incidents deemed relatively “minor” outside DOE facilities can make headlines at CNMS

Tendencies/Error Precursors (Time-Pressure)

Visits can last a few hours, days, weeks or months!
In most cases, use of facilities is free however travel, lodging and incidentals are borne by users
Questions?