CBETA

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To: File
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Subject: **Safety principles and procedures at CLASSE for CBETA**

The culture of safety

CLASSE holds no higher priority than ensuring the health and safety of all personnel, collaborators, and facility visitors. These values are woven into the fabric of laboratory administration and operation. Synergistic relationships with CBETA, CLASSE and Cornell University provide important policy guidance, institutional support, and oversight. CBETA faces unique challenges in addressing the sometimes-disparate needs of staff, students, collaborators, and visitors – a diverse community.

The CLASSE approach to safety is built around three overlapping commitments to:

1. continuously provide a safe laboratory environment,
2. engender an abiding culture of safety in all personnel, and
3. address and anticipate safety challenges with proactive safety management.

CBETA and CLASSE seek to establish and maintain a culture of safety that entails much more than compliance with a set of rules. That culture is embodied by:

- every staff member taking responsibility for the safety of the staff, collaborators, and visitors,
- safety being valued on par with scientific achievement and/or task completion,
- safety concerns always being taken seriously and promptly addressed,
- safety challenges being approached with intellectual rigor,
- new activities being planned from the start with safety in mind,
- all participants receiving relevant safety training prior to undertaking hazardous activities and renewing training when required, and
- always striving for improved safety.

Such practices are self-reinforcing, but also can be undermined by even occasional lapses, so considerable vigilance on the part of supervisory personnel is required.

Maintaining compliance with applicable safety regulations and best practices is part of a culture of safety. CLASSE and CBETA work alongside Cornell University's Department of Environmental Health and Safety (EHS) to understand what these entail and to implement them in an effective manner. Prominent among such regulations are those applying to radiation safety (including a personal and area dosimetry program to record and confirm lack of exposure to ionizing radiation as well as strict procedures for commisioning new equipment and shielding), applicable OSHA standards, and fire, chemical, and cryogenic safety.

Safe laboratory environment

The first line of defense against potential hazards is a safe laboratory environment. Exterior doors to the Lab are locked outside of business hours – entry at off-hours is by keycard access or explicit permission of a staff member. The Wilson Laboratory fire alarm and detection system is a part of the centralized University system. State fire officials conduct inspections of the entire laboratory on an annual basis. Designated staff members are trained for specific roles in emergency situations.

Only trained and/or licensed personnel operate industrial equipment, such as cranes, forklifts, and large vehicles. Machine tools are periodically inspected for correct operation and presence of appropriate guards. A spill control plan is in place for oil-filled transformers. Safety Data Sheets are stored in notebooks near where the hazardous substances are used and appropriate safeguards are in place at the point of usage.

An arc-flash hazard study of laboratory high-voltage AC distribution panels has been completed and appropriate hazard labels are posted on electrical panels. A lock/tag/verify (lock-out/tag-out) program is in place to cover work near equipment with stored energy and/or remote power control, as is a policy governing hot work and welding. Personal protective equipment and safety training is made available to workers who need it, specific to their tasks.

Ionizing radiation

Sources of ionizing radiation in Wilson Lab are primarily the accelerators, but also include RF processing stations, CHESS x-ray beamlines, portable x-ray sources, and the occasional use of a sealed radioactive source. Hazards from radiation-producing equipment (RPE) are largely mitigated via engineering controls. Permanent shielding, generally consisting of concrete, lead, and/or iron, surrounds all RPE so as to restrict potential exposure outside its shielding to below 2 mrem in one hour or 100 mrem in one year, matching New York State regulations.

Locations just outside the shielding where radiation dose rates are expected to be below those levels, but which are potentially vulnerable to higher levels, are designated as “controlled areas”, in accordance with Cornell University policy and New York State regulations. Access to controlled areas is restricted to authorized personnel wearing radiation dosimeters (in “badge” form) or those accompanying a CLASSE host with a real-time readout dosimeter. Entrances to controlled areas are clearly signed.

Exclusion areas, inside which personnel should not be present during RPE operation, are protected by more sophisticated access controls. All entryways are equipped with interlocked gates and/or light beams that, if tripped during RPE operation, cut power to the RPE and cause audible and visible alarms. Radiation detectors monitor the radiation in controlled areas, and trip off the accelerator if conservative levels are exceeded. Exclusion area interlocks cannot be set until a full in-person search has been conducted. The integrity of interlock operation is verified by periodic operational tests of the interlock components.

Proactive safety management

Proactive safety management ensures that:

- specific safety responsibilities of each staff member, student, collaborator, or visitor are clearly delineated and communicated,
- appropriate training and resources are provided to those who need it,

- mechanisms are in place to maintain accountability and to establish and publicize appropriate safety-related policies,
- compliance with relevant university and governmental safety and environmental regulations and ordinances is attained, and
- intra-university resources are leveraged when helpful.

CLASSE has an online Safety Handbook. A central safety document database is home to procedures, radiation permit applications, meeting minutes, internal incident reports, and more. A university-wide Learning Management System tracks the training history, and holds and presents online training content.

Clear lines of accountability for performance related to safety have are crucial to superior safety achievement, especially in academic research settings. The CLASSE Safety Committee and Safety Director set, communicate, and implement laboratory safety policy. They speak and act with the imprimatur of the CLASSE Laboratory Director, who appoints both. Each CLASSE staff member is accountable to a supervisor. CBETA collaborators and visitors are accountable to the CLASSE Safety committee and to the CBETA Project Manager at Cornell.

Independent Safety Advisory Panel

A Safety Advisory Panel consisting of three non-Cornell-affiliated safety professionals is occasionally (about every 5 years) tasked with providing feedback and advice. In order to obtain independent feedback on CLASSE Safety Programs. The panel last visited CHESS and CLASSE on March 5, 2013, before CBETA began construction. Excerpting from the Executive Summary:

> *"Considering the complexity of CLASSE facilities and their wide spectrum of safety challenges, CLASSE appears to have a strong, well-functioning Safety Program and a well-developed safety culture shared by employees and management."*

CBETA will be included the next time that the Safety Advisory Panel is convened.