

APS User Safety Update (16 February 2005)

Electrical Safety

Personal safety:

Electrical safety awareness and compliance with APS/ANL safety policy is for your protection. It is the most important part of your work activity at APS/ANL. Safe work practices require knowledge of all potential hazards, and the application of safeguards and precautions that effectively minimize the risks these hazards create. If you do not know or understand the hazards associated with your work or the equipment you are using, stop the work and ask your CAT representative for guidance in developing safe work practices that minimize the hazards involved.

Electricity can KILL!

The human body (in dry conditions) has a resistance of ~100,000 ohms. In wet conditions the resistance is reduced to ~1000 ohms. Direct contact with 120 Volts in wet conditions can result in a current flow through the body of 120 milliamps. 16 milliamps causes involuntary muscular contraction whereby you may not be able to "let go", 20 milliamps causes paralysis of respiratory muscles (may be fatal), and 100 milliamps causes ventricular fibrillation.

YOU ARE RESPONSIBLE FOR YOUR ELECTRICAL SAFETY!!

- Be observant.
- Report any electrical work that needs to be done.
- Change your habits and work practices if they are unsafe.
- Do NOT attempt electrical work if you are **not** QUALIFIED and AUTHORIZED.

Recognize electrical hazards and exercise safe work practices:

- Prevent trip hazards - Do not run extension cords on the floor unless properly covered. It is suggested that cords be run overhead, 7 foot minimum where practicable. Extension cords are TEMPORARY (90 days).
- Prevent overloading - Do not overload multi-plugs. Do NOT plug extension cords into extension cords.
- Prevent shock – Do not use damaged or frayed cords. Do insure that cords have a ground pin. Do use Ground Fault Circuit Interrupters (GFCI) when using electric hand tools. Do NOT use metal ladders when working around electricity. Do NOT touch exposed wiring – report this to your management.
- Recognize your hazards – as part of your sector-specific orientation, you will be briefed on potential hazards and precautions of the beam line equipment you will be working with.

Electrical Equipment

Non-commercial equipment, including modified commercially manufactured equipment, must have appropriate engineered safeguards and must also be reported (e.g., as part of your experimental safety assessment) to your host in advance and made available for inspection, testing, and certification by ANL prior to use.

The Control of Hazardous Energy Sources - Lockout/Tagout (LOTO)

Types of Energy Sources

1. Electricity
2. Gas, steam & pressurized liquids, Compressed gases
3. Rotating parts
4. Springs
5. Raised loads

Do **NOT** work on any energized systems! If work must be performed and LOTO is required, **contact the resident user or Floor Coordinator to perform LOTO and insure over lock by person doing the work.** Work on cord and plug connected electrical equipment does not require LOTO as long as unplugging removes the energy source and the plug is under the exclusive control of the person doing the work.

Working on energized equipment

NOTE: Be aware that electrical equipment <50 Volts pose hazards as a consequence of high currents, and stored energy (even after the energy source has been removed). Particular care should be taken with equipment containing high capacitance and battery sources.

Performing work on an electrically charged circuit, or in close proximity to an exposed electrical circuit where the possibility exists to contact live parts at a potential of 50 volts or greater, is considered "working hot". Also, the act of using test instruments to verify that such circuits are de-energized prior to work is also classified as "working hot".

"WORKING HOT" IS NOT PERMITTED AT ANL/APS EXCEPT UNDER LIMITED CIRCUMSTANCES:

If you must work hot, before you begin you must be:

- Qualified (trained and knowledgeable) Minimal ANL training courses are ESH 114, ESH 371, & ESH 375
- Authorized (Argonne approval of your written procedures, training and knowledge of the work to be performed) - Contact your host or facility ES&H Coordinator for specifics.