Radiation Safety SOP

SCOPE/PURPOSE

Scope: This SOP applies to any department that uses a radiation source in an academic setting. Specifically, this currently applies to Biology, Physics and Chemistry.

Purpose: In conjunction with the Academic Chemical Management and Safety Program, this SOP exists to protect faculty, staff and students when working with radiation and radiation producing equipment.

IONIZING RADIATION

Ownership, storage, use, handling, and disposal of radioactive materials and radiation producing machines are subject to the Radiation Protection Rules, WAC 246-220 through 246-254, administered by the Washington State Department of Health. Please refer to these rules for detailed requirements regarding protection of employees and the public (e.g., students). Disposal of radioactive material is strictly regulated and must be coordinated with the Department of Health.

The following radioactive materials and radiation producing equipment is currently owned by the University.

Radioactive Materials

Physics (stored in a locked wall vault in Johnston room 137):

One large chunk of autenite (uranium oxide ore)

One small jar of autenite chunks

One set of alpha and beta cloud chamber sources

One mini-generator

Assorted sealed check sources

Chemistry (stored in a segregated location within the chemical storage room, Robinson 330):

Several jars of radioactive reagents

Radiation Producing Machines

Physics (stored in Johnston room 137):

One small cabinet-type tabletop x-ray machine, used for x-ray diffraction experiments. This equipment is periodically inspected by the Department of Health, documentation of which is kept on file with the CHO.

NON-IONIZING RADIATION

WISHA regulations (WAC 296-62-09005) establish permissible exposure limits for non-ionizing radiation, and requirements for employee supervision, training, equipment labeling, and signage.

Lasers

Laser light, because it is focused and coherent, has the potential to cause damage to skin and particularly to eyes. All lasers and laser systems and/or devices in the U.S. are classified into one of several classes. Corresponding labels are affixed to the laser or laser system.

Understanding the laser classification is a fundamental prerequisite for any discussion of laser safety. Class 2 lasers have a low hazard potential, Class 3 lasers pose a moderate hazard, and Class 4 lasers pose a high hazard.

The science departments own the following functional lasers (not including laser pointers):

Chemistry

- Class 2 helium-neon laser, 632 nm wavelength, < 5 milliwatts (mW), inside Perkin-Elmer infrared (IR) spectrometers (Robinson 329 and 241).
- Class 3b neodymium-YAG laser, 532-nm wavelength pulsed, 10-mW average, in the laser lab (Robinson 324).
- Class 3b diode laser, 785nm wavelength, >350mW, Turnkey Raman backscatter laser. (Robinson 324)

Physics

- Five Class 2 helium-neon lasers, various wavelengths, < 2 mW max.
- Class 3b diode laser, variable wavelength, 40 mW, in Room 119.
- Class 4 carbon dioxide laser, 30 watts, student-built.
- Class 4 ArF argon-fluorine laser, 183nm.
- Class 4 Nd: YAG, A-switched, 2 watts, 10 ns pulses, 4,000 Hz, 532nm.

Protective Measures

Access to all Class 3b and Class 4 lasers is restricted by specifically locked doors. Only faculty and students under faculty supervision may use these types of lasers.

Both Chemistry and Physics own goggles designed to protect against the specific wavelengths of light generated by their Class 3b and Class 4 lasers. All persons using these lasers must wear the goggles at any time that there is a hazard of direct or reflected exposure to the beam.

Training

All employees who use lasers are required to receive safety training appropriate for the instrument. This should be specific to the type(s) of laser they will be using. Those using shielded instruments should receive instruction to not compromise the shielding. Those using unshielded lasers should receive more in-depth training specific to the hazards of that laser and that training should be documented. Copies of the documentation should be kept by the department in a permanent training documentation file.

Information on laser safety is available in the "Laser Hazards" section of the OSHA Technical Manual, http://www.osha-slc.gov/dts/osta/otm/otm_iii/otm_iii_6.html

Ultraviolet Light

Biology, Chemistry and Physics own sources of ultraviolet (UV) radiation either in the form of 'black lights' or as a part of an instrument in which there is a UV source. Instrument sources are generally shielded and as long as they are used properly (i.e. covers not opened while in use) the risk is minimal. Unshielded sources such as hand held UV lights pose a risk to anyone around the source while in use.

Ultraviolet light can cause damage to the eyes and skin. Damage to skin can be similar to a sunburn or can cause unseen DNA damage that can lead to long-term issues such as skin cancer. Eyes are very sensitive to UV exposure and looking directly at a UV source can cause both immediate and long-term damage, such as cataracts. UV radiation can also cause the creation of toxic compounds in the air (ozone, nitrogen oxides, etc.). Ensure that adequate ventilation is employee whenever UV light is used.

The permissible exposure limits for UV light is contained in WAC 296-62-09005(5). Whitworth University does not own a meter for measuring UV exposure. To minimize exposure (especially eye exposure) when using hand held devices best practices shall be employed. While labs are occupied, it is the responsibility of the faculty or staff member to enforce these best practices.

- Never look directly into the UV light source.
- Do not shine it on your hand to 'see if it's on'.
- Whenever positioning (holding at an angle) to shine on a sample, be sure the source is pointed away from the user and others.
- Turn off sources before setting them down.

- Always set the source down in such a way that the source is shielded in case it was accidently left on.
- If equipment is set up to generate UV light while unattended, it should be placed so that it cannot be seen by passersby. Warning signs should be posted.

REVIEW

Dean, College of Arts and Sciences:	Noelle Wiersma	Nov 7, 2016
Chemical Hygiene Officer:	Joy Diaz	Nov 1, 2016
Department of Physics Chair:	John Larkin	Nov 16, 2016
Department of Biology Chair:	Craig Tsuchida	Nov 7, 2016
Department of Chemistry Chair:	Deanna Ojennus	Nov 11, 2016