

## Seeing The Light II – LASER Safely! Part I



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### Star Wars: In Our Physics Class?

Mention to students that they will be working with lasers in their study of light and then stand back! Students today still get excited about the use and applications of lasers. Why not? Laser technology has become part of their culture. Lasers are used in grocery store scanners, CD players, pointers, weapons, surgery, construction, tools, and more. Most lasers used in high school laboratories are continuous wave, low power (0.5-3.0 mW), helium-neon lasers or newer diode lasers. Use of lasers in the high school science laboratory is not only a student safety issue, but can also be a teacher safety issue.

### Experience: Is It The Best Teacher?

Region 7 Environmental Protection Agency had a case dealing with lasers in a high school science lab. The EPA agent did not actively investigate the number and types of lasers present in the school department, but instead stumbled across a serious laser safety hazard in the high school science department. The department possessed a low energy Uniphase class II laser (maximum power of less than 0.95 milliwatts) that is generally considered eye safe. This designation means that the unit is considered to be safe for use without protective safety glasses. The laser has been used primarily for demonstration purposes by the faculty. Unfortunately, one staff member took the demonstration process too far by pointing the beam directly into his eyes. The intent of these demonstrations was to show that not all

lasers were immediately dangerous. This practice was contrary to the conventional standards of laser safety and the recommendations of the manufacturer who stated that the beam should be treated with caution and no one should view the beam directly.

As a result of these demonstrations, the instructor may have caused long-term damage to his eyes. The instructor also showed that these demonstrations may have given students the wrong impression regarding the risks associated with the use and handling of lasers.

The EPA Agent addressed the problem by reviewing general laser safety and the operator's manual for the laser with the science faculty and school administration. During this discussion,

they also reviewed the potential long-term health effects and possible workmen's compensation issues associated with these demonstrations. As a result, the laser to eye demonstrations have been discontinued.

### Lessons learned:

1. Check to see if your school department owns or operates a laser. Review all uses and demonstrations. Do not assume that all uses are necessarily safe or appropriate. Check to make sure the unit is secured when not in use to prevent inappropriate student use.
2. Train or review laser usage with your staff to ensure everyone understands the safe and appropriate use of the devices available.
3. Depending on the power or type of laser(s) you have in your inventory, you may need to register the unit with your state health department.
4. All lasers should be treated with care and respect as a means to prevent accidental injury.

### What Class Is Your Laser In?

Lasers are classified primarily based on risk categories from many years of use in laboratories and industry. The chart below excerpted from the

*Lasers - continued next column*

What Class Is Your Laser In?		
CLASS	DESCRIPTION	COMMENTS
1	SAFE - <0.39 mW Power output	Either (1) output is so low it is inherently safe; or (2) the laser is part of a totally enclosed system.
2	LOW POWER: Visible CW and pulsed lasers <1.0 mW Power output	In the case of CW (continuous wave) lasers, eye protection is normally afforded by the natural aversion responses. Hazard may be controlled by relatively simple procedures
3A	LOW - MEDIUM POWER - <5.0 mW Power output	Extension of Class 2. Protection still afforded by natural aversion responses, but direct intrabeam viewing with optical aids may be hazardous. This must be controlled.
3B	MEDIUM POWER <500 mW Power output	Hazard from direct beam viewing and from specular reflections. More detailed control measures are necessary.
4	HIGH POWER - >500 mW Power output	Hazard from direct beam viewing, specular reflections and diffuse reflections. <i>Extreme caution required.</i>

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***Lasers - continued***

University of Edinburgh in England summarizes laser classification including class, description and comments on risk hazard, with added power limits in milliWatts or mW:

**Laser Classification**

Based on risk, only laser classified 1, 2 or 3A should be considered for use in high school level science courses.

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