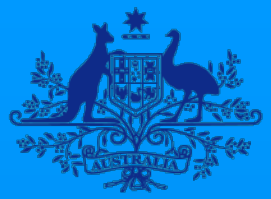
Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Latest developments in regulation of non-ionising radiation

Licence holder forum, 29 September 2009

Gavin Frith



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Outline

- Recent changes to regulation 4
- Changes to laser/OFCS classifications
- Classes / Hazard Levels 1M and 2M
- Clarification on what is an OFCS is
- Modifications to non-ionising apparatus
- Overview of RPS12 for UV apparatus
- Conclusions and questions

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Recent changes to regulation 4.

The ARPANS Regulations were updated on 4 December 2008. The changes included:

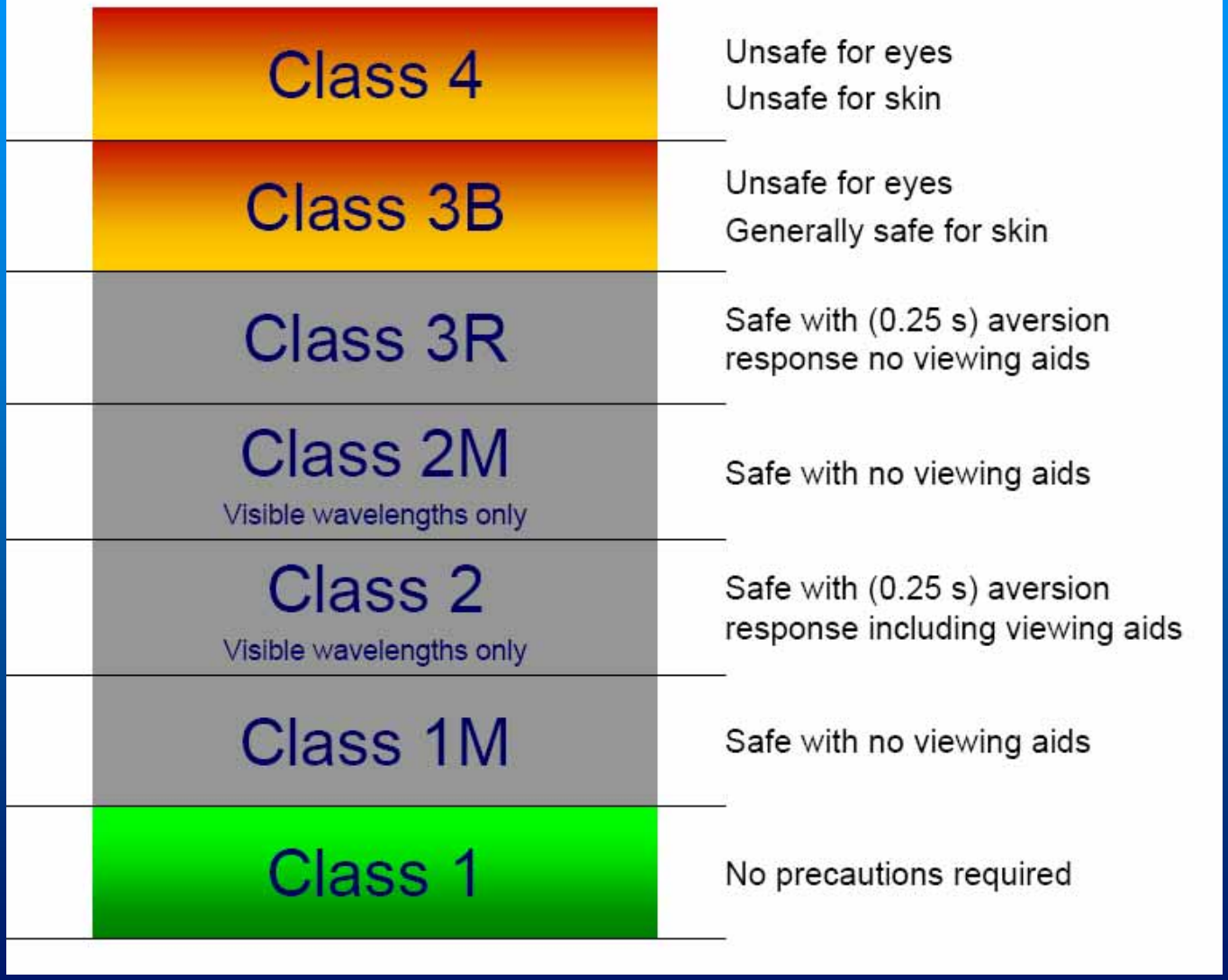
- Laser standard was updated from AS/NZS 2211.1:1997 to AS/NZS 2211.1:2004
- Optical fibre communication system (OFCS) standard was updated from AS/NZS 2211.1:1997 to AS/NZS 2211.2:2006
- UV protection standard was updated from RHS29 to RPS12

Changes in laser/OFCS classifications

- Class 3A and 3B(R) deleted for lasers
- Hazard Level 3A and k × 3A deleted for OFCSs
- Classes / Hazard Levels 1M, 2M and 3R introduced
- Limits for Class / Hazard Level 3B and 4 remain very similar for CW

Australian Government

Australian Radiation Protection and Nuclear Safety Agency



http://web.science.mq.edu.au/intranet/hr/ohs/lasers/documents/classifications.pdf

Class 1M and 2M

- Class 1M and 2M lasers have highly divergent or large diameter beams that exceed power or energy limits of Class 1 and 2 but do not exceed the maximum permissible exposure limits unless the beam is viewed with magnifying optics (*hence the M*) or too close to the source.
- For some lasers, the power/energy of Class 1M and Class 2M lasers may exceed the accessible emission limit (AEL) for Class 3R.
- Note: for OFCSs, hazard level ≡ laser class

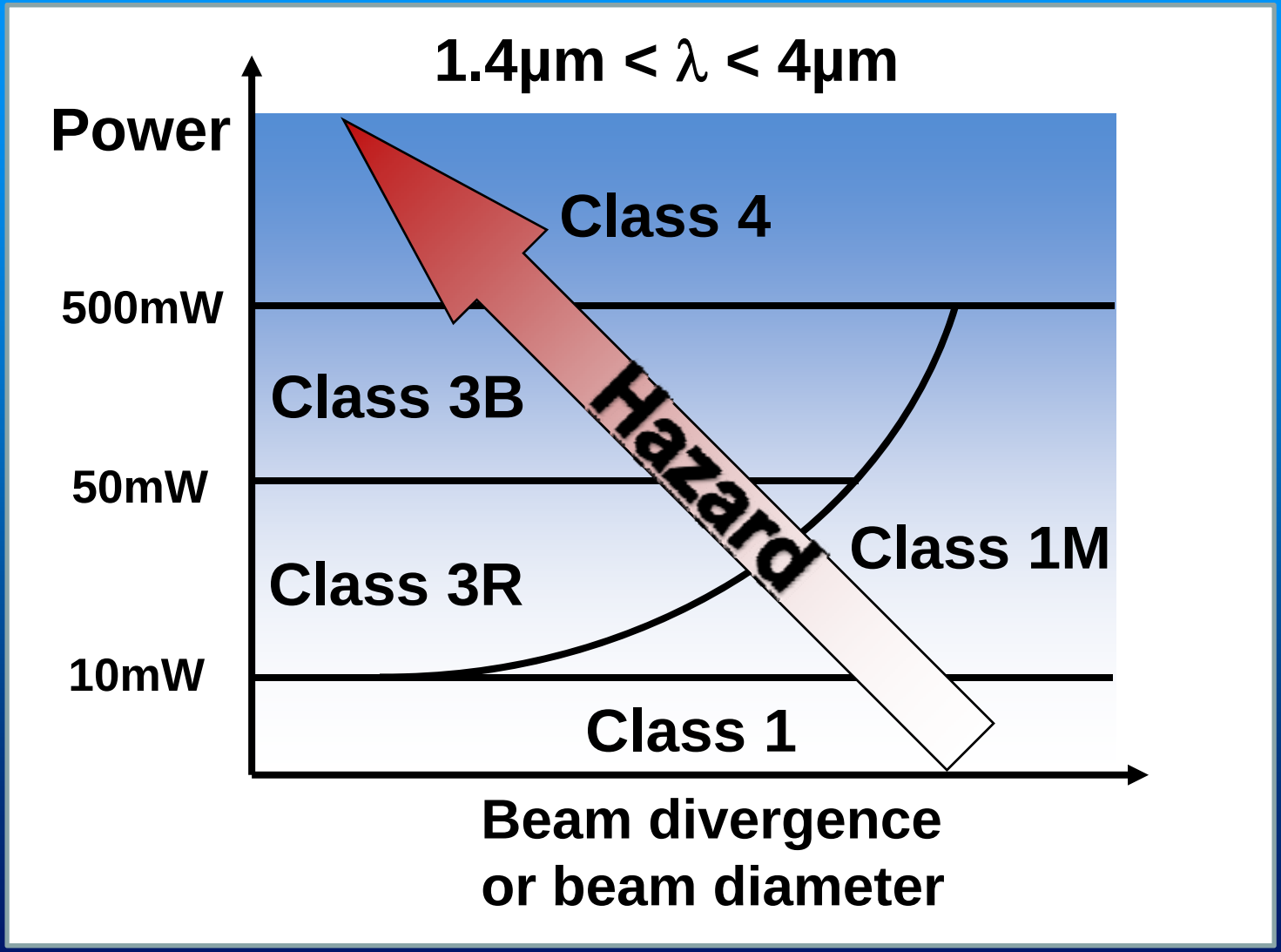

1.4µm < λ < 4µm
Power
Class 4
500mW
Class 3B
Hazard
50mW
Class 1M
Class 3R
10mW
Class 1
Beam divergence
or beam diameter

Table D.1 – OFCS power limits for 11 µm single mode (SM) fibres and 0,18 numerical aperture multimode (MM) fibres (core diameter < 150 µm)

21° full angle divergence

Wavelength and fibre type	Hazard level					
	1	1M	2	2M	3R	3B
633 nm (MM)	0,39 mW (–4,1 dBm)	3,9 mW (+5,9 dBm)	1 mW (0 dBm)	10 mW (+10 dBm)	See note to 3.9.	500 mW (+27 dBm)
780 nm (MM)	0,57 mW (–2,5 dBm)	5,6 mW (+7,5 dBm)	-	-	See note to 3.9.	500 mW (+27 dBm)
850 nm (MM)	0,78 mW (–1,1 dBm)	7,8 mW (+8,9 dBm)			e to 3.9.	500 mW (+27 dBm)
980 nm (MM)	1,42 mW (+1,53 dBm)	14,1 mW (+11,5 dBm)	-	-	See note to 3.9.	500 mW (+27 dBm)
980 nm (SM)	1,42 mW (+1,53 dBm)	2,66 mW (+4,2 dBm)	-	-	7,26 mW (+8,6 dBm)	500 mW (+27 dBm)
1 310 nm (MM)	15,6 mW (+12 dBm)	156 mW (+21,9 dBm)	-	-	See note to 3.9.	500 mW (+27 dBm)
1 310 nm (SM)	15,6 mW (+12 dBm)	42,8 mW (+16,3 dBm)	-	-	80 mW (+19 dBm)	500 mW (+27 dBm)
1 400 nm … 1 600 nm (MM)	10 mW (+10 dBm)	384 mW (+25,8 dBm)	-	-	See note to 3.9.	500 mW (+27 dBm)
1 420 nm (SM)	10 mW (+10 dBm)	115 mW (+20,6 dBm)	-	-	See note to 3.9.	500 mW (+27 dBm)
1 550 nm (SM)	10 mW (+10 dBm)	136 mW (+21,3 dBm)				500 mW (+27 dBm)

Hazard Level 3R = 5mW

Eyesafe wavelength

Hazard Level 3R = 50mW

Table D1 from AS/NZS2211.2:2006

Class 1M and 2M

- The regulations capture lasers with an AEL greater than the AEL of Class 3R.
- The regulations do not capture lasers that do not exceed the maximum permissible exposure limits mentioned in AS/NZS 2211.1:2004.
- The maximum permissible exposure may be exceeded if Class 1M and 2M lasers are viewed with magnifying optics.

→ If the AEL exceeds Class 3R and it is foreseeable that magnifying optics may be used to view the laser then it is a controlled apparatus.

What is an OFCS?

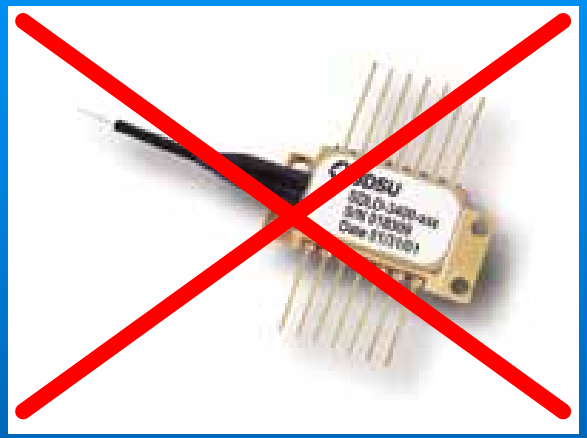
An OFCS is an engineered, end-to-end assembly for the generation, transfer and reception of optical radiation arising from lasers, LEDs or optical amplifiers, in which the transference is by means of optical fibre for communication and/or control purposes.

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

What is NOT an OFCS?

Fibre laser



Laser diode

Amplifier

Transmitter module

Note:

This is a laser system intended to be incorporated into an OFCS. By itself it is not a laser product or OFCS so it is not subject to regulatory control.

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Lasers/OFCSs no longer captured by the regulations.

- If a laser or OFCS no longer fulfils the definition of a controlled apparatus, it is no longer the subject of regulatory control.
- The item may be removed from your SIW.
- As with all inventory changes, its removal should be noted in your next quarterly report.

Modifications to non-ionising apparatus.

Non-ionising apparatus is subject to regulatory control if excess levels of radiation are accessible:

- in the course of intended operations
- under a reasonably foreseeable abnormal event
- under a reasonably foreseeable single element failure
- without the use of tools or specialised equipment to remove protective barriers or access panels.

Modifications to non-ionising apparatus.

By installing appropriate engineering safety features (e.g. shielding and interlocks), an apparatus may no longer require regulatory control.

It is important to note:

- Failure of an interlock switch constitutes a single element failure. Interlock mechanisms must therefore be *failsafe*.

- For particularly hazardous sources, the failure of engineering safety features could have significant implications for safety.
- If failure of an engineering safety feature could go undetected or lead to the maximum permissible exposure being exceeded within a very short period of time, modifications must be assessed by ARPANSA in accordance with regulation 51 before the item is removed from the SIW.
- Examples of this include enclosing Class 3B and 4 laser systems and fitting interlocks to biological safety cabinets.

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Overview of RPS12

Exposure limits in RPS12 remain the same as RHS29. The major change is the requirement for a UV radiation protection plan to be devised and implemented.

A radiation protection plan must cover:

- Training
- Risk assessment
- Hazard management
- Incident reporting

Questions

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

A special note on laser pointers

The importation of laser pointers into Australia is controlled under the Customs (Prohibited Imports) Regulations 1956. Customs officers may seize laser pointers above 1mW.

Australian Government

Australian Radiation Protection and Nuclear Safety Agency

A special note on laser pointers

NSW:

The Summary Offences and Law Enforcement Legislation Amendment (Laser Pointers) Bill 2008 prohibits the possession or use of laser pointers in public without a reasonable excuse.

VIC:

Laser pointers above 1mW are treated as non-firearm weapons.

WA:

Similar to NSW legislation