Australian Government
Australian Radiation Protection and Nuclear Safety Agency

Management Plan
for
Sun Protection

Supplementary Information

April 2010

Contents

Background

ARPANSA and RPS-12

What are they?

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a federal government agency responsible for protecting people and the environment from radiation. One of the ways ARPANSA does this is through writing codes and standards; these form a series of publications called the Radiation Protection Series which explain how to use radiation safely.

ARPANSA's *Radiation Protection Standard for Occupational Exposure to Ultraviolet Radiation* is the 12th publication of the Radiation Protection Series (i.e. why it's called RPS. 12) and explains how to protect workers from Ultraviolet Radiation. The Standard explains:

- what must be done to protect workers;
- who is responsible for protecting workers; and
- the Exposure Limits for UV(pp. 10-12).

Why has this Supplement and a Sample Management Plan been prepared?

The Management Plan for exposure to Ultraviolet Radiation fulfils a requirement of RPS.12 (quoted on page 4):

"*examples of a [plan for control of exposure to ultraviolet radiation] and the minimum elements required to be in the plan are given on the ARPANSA website*."

This supplement provides extra information e.g.:

- types of reflective surfaces and how much they reflect;
- causes of skin cancer and eye damage;
- things you can implement in the workplace to protect workers from UV.

Where can I find more information?

Table 1. Websites You Can Visit For More Information

WEBSITE:	WHAT IT SHOWS:
www.arpansa.gov.au	ARPANSA website main-page
www.arpansa.gov.au/AboutUs/index.cfm	what ARPANSA is and does
www.arpansa.gov.au/Publications/codes/rps.cfm	Radiation Protection Series homepage
www.arpansa.gov.au/Publications/codes/rps12.cfm	where and how to download the Standard for Occupational Exposure to UV

Ultraviolet Radiation/UV/UVR

What is it?

Put simply, UV is invisible rays or energy that mainly come from the sun. Other types of radiation that also come from the sun include:

- light (visible radiation)—the colour we can see; and
- heat (infrared radiation)—the heat we can feel from a car, a heater or the sun.

We can see light and feel heat but none of our senses can detect UV. That's why you get sunburnt at the snow yet it's freezing cold. Therefore, how hot it does not indicate how much UV there is. People often get confused about this since UV exposure is actually worst during the middle of the day (between about 12 and 2pm) NOT during the hottest part of the day (between 3pm-4pm).

Where does it come from?

Almost all UV we encounter comes from the sun. However, some UV also comes from artificial, man-made sources such as:

- mercury lamps;
- arc welders;
- fluorescent lamps;
- germicidal lamps;
- metal halide lamps;
- fluorescent sunlamps;
- fluorescent tubes;
- hydrogen lamps;
- deuterium lamps; and
- flash tubes.

Why is it dangerous?

UV is dangerous because if you are exposed to too much, it can cause :

- sunburn;
- skin cancer; and
- eye damage.

Where can I find more information? See the following websites:

- www.sunsmart.com.au/ultraviolet_radiation/understanding_uv
- www.arpansa.gov.au/RadiationProtection/FactSheets/is_UVIndex.cfm

1. Purpose and Objective

This section gives information on the risks this plan is intended to provide protection against.

Skin Cancer

What is skin cancer?

Put simply, skin cancer is an abnormal growth (tumour) of skin cells.

What causes skin cancer?

The main cause of skin cancer is UV from the sun. Normally, old damaged skin cells die and new ones take their place. This occurs in a very orderly, controlled process. However, when skin is exposed to high levels of UV, skin cells can become severely damaged causing them to not work properly. Skin cells that don't work properly can either grow abnormally or don't die as they're supposed to. These abnormal cells can then increase in number and if enough abnormal cells grow, can be seen as a small growth. This growth is known as a cancer, tumour or more commonly as a carcinoma. The type of cancer that forms depends on which skin cells grow abnormally. For example, squamous cell carcinoma is a cancer of squamous cells, basal cell carcinoma is a cancer of basal cells and melanoma is a cancer of melanocyte cells.

What types of skin cancer are there?

There are three main types of cancer:

- squamous cell carcinoma;
- basal cell carcinoma; and
- melanoma.

SQUAMOUS CELL CARCINOMA

Squamous cell carcinoma affect squamous cells which lie in the top-most layers of skin. These cells are important because they produce keratin—a tough fibrous protein that keeps skin moist yet tough. This cancer can spread to organs of the body and lymph nodes (parts of the body where immune cells grow). Squamous cell carcinoma is less common than basal cell carcinoma (see below) but growth is quicker and more aggressive. Once it spreads to the body, it becomes very difficult to control. For more information, see:

www.cancervic.org.au/about-cancer/cancer_types/skin_cancers_non_melanoma/#squamous_cell_carcinoma

BASAL CELL CARCINOMA

Basal cell carcinoma is a cancer of skin cells called basal cells—small, round cells that lie below squamous cells. Basal cells are important because they replace squamous cells which die every 30 days or so. Basal cell carcinoma is *the* most common skin cancer. Because it is slow growing and usually does, it is also easier to treat. For more information, see:

www.cancervic.org.au/about-cancer/cancer_types/skin_cancers_non_melanoma/#basal_cell_carcinoma

MELANOMA

Melanoma is a cancer of skin cells called melanocytes. Melanocytes are cells that produce melanin—the pigment that gives skin its tanned colour. When skin is exposed to the Sun, melanocytes respond by producing melanin which offer very small levels of UV protection. However, when melanocytes are exposed to too much UV from Sunlight, they can become damaged. Damaged melanocytes then begin functioning abnormally i.e. they begin growing very rapidly or don't die when they're supposed to. Melanoma is the rarest form of skin cancer but also the most aggressive and dangerous—1200 Australians die from melanoma each year.

www.cancervic.org.au/about-cancer/cancer_types/melanoma/

Who gets skin cancer; what burden does it place on tax payers?

Skin Cancer kills over 1700 Australians each year. Deaths from skin cancer equal the number of road toll deaths, and Australia has the highest rate of skin cancer in the world—four times the rate of Canada, USA and UK. Each year, 434,000 people are diagnosed with skin cancer despite it being almost entirely preventable. Excessive exposure to the Sun causes almost all skin cancers.

Skin Cancer costs Australian taxpayers over $300 million per year. Related absenteeism costs in excess of $50million per year with unknown costs to victims' families and friends. Insurance premiums continue to soar as more cases go to court.

More information can be found at**:**

- www.sunsmart.com.au/about_us/our_research/facts_and_stats_at_a_glance
- www.workcover.nsw.gov.au/formspublications/publications/Documents/skin_cancer_and_outdoor_workers_employers_0116.pdf

Sunburn

What is it?

Sunburn (also known as skin burn or erythema) is a reddening of skin and can often result in skin peeling or blisters.

What causes sunburn?

Sunburn occurs because skin cells have been over-exposed to UV. Being overexposed, skin cells become damaged triggering an immune response. The immune response causes an increase in the amount of blood near the skin surface—the reason for the erythema/redness. First signs of erythema are observed 3-5 hours after exposure and reaches maximum after 8-12 hours. Unlike other hazards to the skin, overexposure to UV is not noticed immediately i.e. you only notice after you've already been burnt. Mild erythema—from small overexposures—disappears within a few days. Higher overexposure results in:

- pain;
- skin swelling (oedema);
- blistering; and

- peeling.

How badly you burn after staying out in the Sun depends on:

- what time you're out in the Sun;
- how long you're out there for; and
- how well you're protected while out in the Sun.

How can you tell whether you have skin cancer?

Skin spots that have changed colour, size or shape are an indication of skin cancer. You should seek medical advice as soon as this occurs. This is important since the earlier you can detect cancer, they more successful the treatment will be. Although many cancers can be treated successfully, protection from the sun and prevention of skin cancer should always come first. For more information, visit the website below:

- www.sunsmart.com.au/download.asp?RelatedLinkID=273
- www.sunsmart.com.au/download.asp?RelatedLinkID=272

Eye Damage

Basics

UV can damage the eyes as well as the skin. Damage to the eyes is either:

- Immediate i.e. happens within about 48 hours
- Long term i.e. happens years later due to earlier over-exposures

Immediate Effects

The following 2 things happen within about 48 hours after being overexposed to UV:

- Photokeratoconjunctivitis
- Acute Cataract Formation

PHOTOKERATOCONJUNCTIVITIS

This eye disorder is commonly known as welder's flash or snowblindness. Two problems occur with this kind of eye damage (hence the name Photokeratoconjunctivitis):

- Keratitis—the clear front window at the front of the eye (the cornea) becomes inflamed; and
- Conjunctivitis—the clear window or membrane covering the 'white parts' of the eye (the conjunctiva) becomes inflamed.

Symptoms occur within a few hours and include the following:

- feeling of itchiness (as if sand is in the eye);
- swelling;
- loss of the superficial cells in the cornea;
- increased tearing; and
- severe pain due to photophobia (being sensitive to bright light).

ACUTE CATARACT FORMATION

Artificial Source(s) can cause cataracts (cloudiness of the eye lens that disturbs vision).

Long-Term Effects

The following 4 disorders can occur many years after the eyes have been over-exposed to UV.

- Pterygium;
- Pingueculum;
- Droplet Keratitis; and
- Cataracts.

PTERYGIUM

Pterygium is a fibrous or wing-like growth on the cornea (from the Greek *pteryg* meaning *wing* or *fin*). Symptoms include the cornea becoming opaque making vision difficult.

PINGUECULUM

Pingueculum is deposit of protein and fat on the conjunctiva—the clear window or membrane covering the 'white parts' of the eye. This often grows across into the cornea becoming pterygium and affecting vision.

DROPLET KERATITIS

Inflammation of the cornea that affects transparency (i.e. how much light enters the eye) causing objects to appear hazy and vision to be blurred.

CATARACTS

Results in a clouding of the lens that disturbs vision. In most cases it can be removed surgically.

2. Duties and Responsibilities

This section explains some of the safety aspects employers and employees are responsible for.

Maintaining a Plan—what should be considered.

Employers are responsible for maintaining a sun protection plan. Proper maintenance means employers should do the following:

- revise the plan at least every 2 years;
- consult with employees when writing or revising the plan;
- ensure employees know how to follow the plan; and
- ensure employees follow the plan.

Occupational Health and Safety Acts

What are they?

The Occupational/Workplace Safety Act of each jurisdiction[1] ensures the safety of employees while at work. Each jurisdiction has its own Occupational/Workplace Safety Act (see Table 2 below). This means the OH&S acts in each jurisdiction differ only slightly between one another such as:

- name of the act: some jurisdictions call them Occupational Health and Safety Acts while others call them Workplace Health and Safety or even Workplace Health, Safety and Welfare; and
- penalties: how high penalties are for certain elements/parts.

No matter the jurisdiction, *all* OH&S acts have the same:

- purpose—to keep employees safe at work;
- employer and employee duties and responsibilities (albeit in slightly different words).

In addition, Commonwealth, state and territory governments signed an intergovernmental agreement in July 2008 saying they will, "harmonise OHS legislation by 2011 or earlier". This means the few elements that are different will be changed to be more uniform. See Intergovernmental Agreement for Regulatory and Operational Reform in Occupational Health and Safety - RTF 227KB

Table 2. Where to Find Copies of OH&S Acts of Each Jurisdiction

Government	Website
Federal	www.austlii.edu.au/au/legis/cth/consol_act/ohasa1991273/
NSW	www.austlii.edu.au/au/legis/nsw/consol_act/ohasa2000273/
VIC	www.austlii.edu.au/au/legis/vic/consol_act/ohasa2004273/
SA	www.austlii.edu.au/au/legis/sa/consol_act/ohsawa1986336/
WA	www.austlii.edu.au/au/legis/wa/consol_act/osaha1984273/
TAS	www.austlii.edu.au/au/legis/tas/consol_act/whasa1995250/
QLD	www.austlii.edu.au/au/legis/qld/consol_act/whasa1995250/
ACT	www.austlii.edu.au/au/legis/act/consol_act/rpa2006228/
NT	www.austlii.edu.au/au/legis/nt/consol_act/rca263/

[1] **Jurisdiction** is the area in which a law (i.e. the Occupational or Workplace Health and Safety Act) or administrative power (i.e. Workcover) has authority. For example, Workcover NSW can only enforce the NSW Occupational Health and Safety Act in NSW, not in Victoria.

Why are they important?

The OH&S acts are important for employers (to protect their workers) and employees (to ensure they follow safety procedures so they protect themselves).

What employers are required to do under the Act?

The following, quoted directly from the Federal Occupational Health and Safety Act (1991), outlines what employers must do.

Employers must:

1. *take all reasonably practicable steps to protect the health and safety at work of their employees;*
2. *provide and maintain a working environment that:*
   - *is safe for the employer's employees and without risk to their health; and*
   - *provides adequate facilities for their welfare at work;*
3. *provide to the employees, in appropriate languages, the information, instruction, training and supervision necessary to enable them to perform their work in a manner that is safe and without risk to their health.*

Penalties for employers not complying with points 1, 2 and 3 are 3500 penalty units ($386,000 as of 2009).

What employees are required to do under the Act?

The following, quoted directly from the Victorian OH&S Act (2004), outlines what employees must do.

Employees must:

1. *take reasonable steps to ensure his or her own health and safety whilst at work;*
2. *cooperate with his/her employer —with respect to actions taken by the employer to comply with the Act;*
3. *not intentionally or recklessly interfere with or misuse anything provided at the workplace that is used for Occupational Health and Safety.*

Penalties for Employees not complying with points 1, 2 and 3 are 1800 penalty units ($210,276 as of 2009).

Has anyone been sued for not adequately protecting their employees?

A number of cases have occurred where the employer has been sued for negligence for not adequately protecting their workers. Insurance premiums will soar as more cases go to court. Web-links (below) give examples:

- www.wcc.nsw.gov.au/NR/rdonlyres/25524629-03D7-46F4-82BA-C8DD5A3EB7E9/0/WCC643404.pdf
- www.countycourt.vic.gov.au/CA256D90000479B3/Lookup/Judgments_R/$file/reeder_boral.pdf
- www.wcc.nsw.gov.au/wcc/ccr/12026-97.pdf

3. Assess the Risks

This section tells you what things to consider when assessing the exposure to the sun's UV.

UV Index

What is it?

The UV Index lets you how intense the Sun's UV rays are. Levels range from low UV (1-3) to extreme UV (11 or higher). The UV index increases as you get closer to the equator meaning on average, the UV Index would be worse in Brisbane than Tasmania. On a perfectly clear sky day, towns or cities equal distances away from the equator have the same UV i.e. Geraldton, Wiluna, Oodnadatta, Charleville and Brisbane have very similar UV Index because they are more-or-less the same distance from the equator.

Why is it important?

The UV index is important since it lets you know how intense the UV is. For example, when the UV is low, it is a good idea to be exposed to the sun because it helps your body produce vitamin D—vital for bone growth and strength. When the UV index is high, you need to be careful to avoid sunburn, eye damage or cancer.

When the UV Index is 3, it takes about 30 minutes for skin to redden or burn. At Very High or Extreme UV (UV Index of 12), skin will redden after only 11 minutes of exposure. To know when the UV Index will be 3 or higher in major Australian cities, see Table 3 below.

Table 3. Periods of the Year when UV Index is Above 3

CITY	TIME OF THE YEARS WHEN UV IS 3 OR HIGHER
Sydney	All year except June and July
Melbourne	All year except May, June, July and August
Brisbane	All year
Perth	All year except June and July
Darwin	All year
Hobart	All year except May, June, July and August
Adelaide	All year except June and July
Canberra	All year except June and July
Alice Springs	All year

Where can I find more information?

Table 4. Websites for Finding More Information On UV Index

WEBSITE	WHAT IT SHOWS:
www.bom.gov.au/jsp/ncc/climate_averages/uv-index/index.jsp	Real-time UV index for all the major Australian cities.
www.bom.gov.au/products/uvindex_national.shtml	Average UV Index for the whole country over: • the whole year; • each season (i.e. spring, winter etc.); or • each month.
www.cancer.org.au//policy/positionstatements/sunsmart/risksandbenefitsofsunexposure.htm	Benefits and detriments of exposure to the sun.

UV Alert

What is the UV Alert?

The UV Alert shows the:

- times when the UV index is forecasted to be 3 or higher e.g. UV Alert: 11:30am-2:25pm. This would mean that between 11:30am and 2:25pm, the UV index will be higher than 3; and
- absolute maximum UV Index is forecasted to reach during the day e.g. UV Alert max: 14.

Where does the UV Alert appear?

The Bureau of Meteorology issues a UV alert when the UV is forecast to reach 3 or higher (see www.bom.gov.au/announcements/uv/#web for more information). The UV Alert is also published in the same section as the weather forecast in major Australian newspapers. It is also reported during weather forecasts on television and radio.

Where can I find more information?

The SunSmart website provides more information and a UV alert poster:

www.sunsmart.com.au/resources/search.asp?ConfirmationFormSubmitted=true&ContainerId=resource_order_form_resources&FormSubmitted=true&Keywords=&category=All%20Resources&FormName=resourcessearchform&CurrentPage=2&ContentType=resource&Field010=workplace.

Reflective Surfaces

What are Reflective Surfaces; why are they important?

Reflective surfaces reflect UV. The rule-of-thumb is if sunlight can reflect off something, so can UV. Some material reflects a lot (e.g. snow) while others do not reflect much (e.g. grass). The more reflective these surfaces are, the more dangerous they are.

What are the types of reflective surfaces?

Examples of reflective surfaces include:

- water;
- reflective building glass;
- sand;
- rock;
- cement;
- snow;
- white/light-coloured/reflective paint;
- light coloured concrete; and
- unpainted, metallic surfaces i.e. corrugated steel or aluminium roofing.

How much UV do different types of material reflect?

Table 5. Percentage of UV Reflected by Different Material

MATERIAL	PERCENTAGE REFLECTED
Lawn grass, summer/winter	2.0 – 5.0
Grasslands	0.8 – 1.6
Soil, clay/humus	4.0 – 6.0
Asphalt roadway, new (black), old (grey)	4.1 – 8.9
House paint, white	22.0
Boat deck, wood/fibreglass	6.6% – 9.1
Open water	3.3
Open ocean	8.0
Sea surf, white foam	25.0 – 30.0
Beach sand, wet	7.1
Beach sand, dry, light	15.0 – 18.0
Snow, old/new	50.0 – 88.0
Concrete footpath	8.2 – 12.0

Source: Sliney DH. Physical factors in cataractogenesis: Ambient ultraviolet Radiation

Altitudes

Why is altitude important for UV exposure and risk assessment?

Altitude has a dramatic effect on the UV levels (shown as the UV index). In some cases, sun protective measures that are not necessary at low altitudes, are necessary at high altitudes. For example, periods of the year when the UV is low (i.e. during winter) may correspond to when there is snow fall. Snow reflects UV very well so the addition of this reflected UV would require employees to implement sun protective measures.

During Summer (during times when the UV is highest), the UV index can be 30% higher in areas of high altitude compared to sea level. It is therefore recommended that employers implement their Management Plan for Sun Protection in areas of high altitude throughout the year.

Higher altitudes are more dangerous than lower altitudes for two reasons**:**

- they are higher up (i.e. closer to the Sun so workers will be exposed to higher UV); and
- they are often covered in snow which is extremely UV reflective (see Table 5 above).

What effect does altitude have on exposure?

The UV index increases by about 4% every 300 metres. See Table 6 (below)

Table 6. Effect of Altitude on the UV Index

Altitude (metres above sea level)	**UV Index**					
0	2	3	4	5	6	7
300	2.08	3.12	4.16	5.20	6.24	7.28
600	2.16	3.25	4.33	5.41	6.49	7.57
900	2.25	3.38	4.50	5.63	6.75	7.88
1200	2.34	3.51	4.68	5.85	7.02	8.19
1500	2.43	3.65	4.87	6.09	7.30	8.52
1800	2.53	3.80	5.06	6.33	7.59	8.86
2100	2.63	3.95	5.26	6.58	7.90	9.21
2400	2.74	4.11	5.48	6.85	8.21	9.58
2700	2.42	3.42	4.42	5.42	6.42	7.42
3000	2.96	4.44	5.92	7.40	8.88	10.36

Adapted from data published by: Diffey BL (1992) Stratospheric ozone depletion and the risk of non-melanoma skin cancer in a British population. Phys Med Bioi 37: 2267-2279. Blumthaler M, Webb AR, Seckmeyer G, Bais AF, Huber M, Mayer B (1994) Simultaneous spectroradiometry; a study of solar UV irradiance at two altitudes. Geophys Res Lett 21: 2805-2808.

Risk Assessments

Who should perform them; what they should know

Someone performing a risk assessment should have a very good knowledge of the:

- work environment (i.e. what the conditions or hazards are present at the workplace or worksite i.e. very dusty, in the full sun, near hazardous machinery etc.); and
- work processes inside out (i.e. which, where, what and how jobs are done by each employee).

An example risk assessment can be found at the following websites:

- www.sunsmart.com.au/protecting_others/at_work/guidelines_and_policy/
- http://www.worksafe.vic.gov.au/wps/wcm/connect/dd881a004071f9149596dfe1fb554c40/uv_self_assessment_checklist.pdf?MOD=AJPERES

4. Control Measures

This section describes the different types of controls measures and control priorities.

What are Control Measures?

Control measures are things you do (or actions you take) to reduce the amount of UV you are exposed to. There are obviously many things you can do e.g. wear a hat and sunscreen, stand in the shade, or avoid the sun during the middle of the day. To list every single control measure would be tedious: there are hundreds of control measures and those used in one situation may not work in another. Instead, the Standard classifies control measures into 5 large categories called control priorities. These 5 control priorities are ranked (from a-e) in order of how effective they are and therefore, in what order they should be implemented. The list below shows control priorities in rank order:

a) Elimination
b) Substitution
c) Engineering Controls
d) Administrative Controls
e) Personal Protective Equipment

What is Elimination?

As stated in the Standard, Elimination means eliminate the hazard. For sun exposure, the hazard is the sun itself. Because you cannot eliminate the sun, other control priorities need to be implemented to reduce your exposure. Although Elimination does not apply to sun exposure it is included in the Standard because it does apply to artificial sources that also emit UV e.g. sun lamps, arc welders, germicidal lamps.

What is Substitution?

Substitution means substitute a source of UV that is less hazardous. Again, like Elimination, this does not apply to sun exposure i.e. you cannot substitute the sun. Although Substitution does not apply to sun exposure, it is included in the Standard because it does apply to exposure to artificial sources such as sun lamps, arc welders, germicidal lamps etc.

What are Engineering Controls?

Engineering Controls are physical changes to the workplace e.g. installing shade-sails, erecting market-type umbrellas, installing tinted windows in cars. Obviously, there are many changes you can make to your workplace. However, the two categories below classify the types of change you can make:

- Shade Provision
- Elimination of Reflected UVR.

Shade provision

Providing shade protects workers from UV. There are several ways of doing this such as installing:

- awnings;
- market-type umbrellas; or
- other structures (e.g. gazebos).

The following materials are extremely effective in blocking out UV:

- tiles;
- aluminium;
- tin;
- timber;
- polycarbonate;
- fibreglass;
- clear or tinted plastic; and
- heavy textiles such as canvas or thick umbrella fabric.

Polycarbonate, fibreglass and clear/tinted plastic block UV but let in heat. This means it can get very hot and may not be the best option if wanting to prevent secondary hazards (see below) such as heat stroke.

Shade-cloth and sail-cloth block out most UV but are not as effective as heavy textiles such as canvas.

If you intend to plant trees to offer shade, make sure they:

- do not drop branches or lose leaves in winter;
- have widely spreading branches;
- have dense leaf canopies; and
- are closely positioned to other trees to offer extra cover.

Elimination of reflected UV

Eliminating reflected UV is important to reduce your exposure (as discussed in section 3). In some situations, eliminating the reflective surface by removing it altogether is difficult. The best option is covering the reflective surface with something that is:

- dark in colour (ideally, it should be as close to black as possible);
- does not have a shiny surface;
- is thick and dense i.e. does not have holes or spaces which allows UV through
- does not create a secondary hazard;

For example, a dark coloured material or matte-finish black paint could be used.

Where can I find more information?

Table 7. Information on Engineering Controls

WEBSITE	WHAT IT SHOWS
www.sunsmart.com.au/download.asp?RelatedLinkID=295	Why shade is important. How to work out what shade you need. What type of shade you can implement. Where to get more information.
www.sunsmart.com.au/resources/search.asp?ConfirmationFormSubmitted=true&FormSubmitted=true&FormName=resourcessearchform&CurrentPage=1&ContainerId=resource_order_form_resources&ContentType=resource&Keywords=&category=All+Resources&Field010=workplace.	Scroll down to “Portable shade: tips for purchase and use flyer”.
www.arpansa.gov.au/uvrg/products.cfm#2	Textiles that have been UPF-tested by ARPANSA Contact details for manufacturers who have had their textiles UPF tested.
www.arpansa.gov.au/uvrg/products.cfm#5	Types of shade-structures which have been UPF-tested by ARPANSA Contact details for manufacturers who have their shade-structures UPF tested.
www.arpansa.gov.au/uvrg/products.cfm#6	Contact details of manufacturers or suppliers of other products and services i.e. window tinting films.

What are Administrative Controls?

Administrative controls are actions or behaviours employers and employees can take to reduce to their exposure. There are 4 types:

- scheduling;
- education and training;
- restriction of access; and
- signs.

Scheduling

Scheduling means organising the time(s) when workers are exposed to UV e.g.:

- do outdoor jobs or tasks earlier in the morning or later in the afternoon—when the UV levels are less intense);
- do tasks that can be done in shade or indoors during the middle of the day rather than in the morning or later afternoon;
- rotate employees between indoor/shaded and outdoor tasks so no single individual is exposed to too much UV.

Education and training

Education and Training ensures workers know the risks of over-exposure and know how to protect themselves from UV. The level of training should be proportional to the risk i.e. there's no point training an employee on how to protect themselves from the sun if they don't spend any time in the sun. A training program could include some of the following information:

- costs to society each year from skin cancer;
- deaths each year from skin cancer;
- number of new, skin cancer cases detected each year;
- the cause(s) of skin cancer;
- the risks and health effects of spending too much time in the sun;
- how to protect oneself from the sun;
- legal and monetary penalties for not protecting oneself from the sun;
- how to effectively examine one's own skin for signs of sun damage;
- how to follow the sun protection plan.

Restriction of access

This means restricting areas where employees can go. For example employers could:

- Restrict access of employees during certain times e.g.
  - restrict employees working during the middle of the day (when the UV is worst);
- Restrict access of employees in areas exposed to the full sun e.g.
  - restrict employees working in unshaded areas.

Signs

Signs should let employees know or remind them to be sun-safe and could show the following information:

- warning or reminding employees to wear sun protective clothing in certain areas, on certain days, at certain times;
- warning or reminding employees of the dangers of too much sun exposure;
- warning or reminding employees that it is against the law to not follow or avoid using sun-protective measures;
- how PPE (see below) should be worn correctly;
- what employees must do when control measures are implemented;
- how to protect oneself properly against the sun;
- what employees are expected to do with respect to sun exposure.

Signs should:

- comply with Australian Standards or international standards[2];
- be clear and unambiguous;
- be displayed only when appropriate (if you don't, employees will ignore them); and
- provide relevant information.

Where can I find more information?

You can find information for a training program from the following sources:

- Annex (see below);
- Cancer Councils of each state (see www.cancer.org.au then select your state) which have training material available such as:
  - videos;
  - online training;
  - brochures;
  - fact sheets;
  - posters; and
- staff who can give presentations/Sun-protection know-how.

What is Personal Protective Equipment (PPE)?

PPE are things you wear to protect yourself against the sun's UV. Of all the control measures available, this should be lowest on the priority list. i.e. implement the other control measures first. There are 4 types of PPE:

- Clothing;
- Hat;

[2] The Australian standard it should comply with is either *AS 1319—1983 Safety signs for the occupational environment* or *AS 2342—1992 Development, testing and implementation of information and safety symbols and symbolic signs.*

- Sunglasses; and
- Sunscreen.

Clothing

Clothing should have the following features:

- a UPF (see *what is UPF?* below) of at least 30 and complies with the Australian New Zealand Standard: *AS/NZS 4399:1996 Sun Protective Clothing—Evaluation And Classification*.
- cover as much unprotected skin as possible;
- be a long-sleeve shirt with a collar and long trousers;
- be shirts with elbow-length sleeves and knee-length shorts;
- be permeable to assist the evaporation of sweat;
- have loose cuff ankle and waste bands to allow air to circulate.

WHAT IS UPF?

The UPF—the Ultraviolet Protection Factor—tells you how UV-protective a garment or hat is. It is important clothes are tested to this standard since you can get burned through clothes e.g. those made of thinly woven fabric or light in colour. The UPF rating is calculated using the Australian/New Zealand Standard *AS/NZS 4399:1996 Sun Protective Clothing—Evaluation and Classification*—a standard ARPANSA helped develop. Garments or hats are tested according to the Standard; the result of those tests give the garment or a hat a rating of between 15-50+. 15+ gives good protection but 50+ gives excellent protection. The following factors contribute to the UPF-rating:

- composition of the yarns (cotton, polyester, etc);
- tightness of the weave or knit (the tighter, the better);
- colour (darker colours are better);
- stretch (stretched fabrics are thinner therefore lowering its UPF);
- moisture (many fabrics have lower ratings when wet);
- condition (worn and faded garments may have reduced ratings); and
- finishing (some fabrics are treated with UV absorbing chemicals).

Several labs, such as ARPANSA, can assess whether hats, garments or textiles pass the Standard.

MORE INFORMATION?

See Table 12 (page 25).

Hats

Normal, everyday hats should have the following features:

- a UPF of 50 and tested according to the Australian New Zealand Standard *AS/NZS 4399:1996 Sun Protective Clothing—Evaluation And Classification*;
- protect as much of the face, ears and neck; and
- be:
  - broad brimmed (minimum 8cm wide);
  - legionnaire; or
  - bucket.

If wearing hardhats or helmets, they should be worn with attachable, UPF 30+ rated:

- broad brims; or
- legionnaire covers with peak and flap at the back and sides.

Baseball caps are not sufficient; they do not protect the neck, ears and sides of the face adequately.

Sunglasses or protective eyewear

Normal everyday sunglasses will protect well against UV if they comply with the Australian New Zealand Standard *AS/NZS 1067:2003-Sunglasses and Fashion Spectacles*. To comply with the Standard, the following information must be supplied with every pair of assembled sunglasses and individual sunglass lenses:

- identification of manufacturer or supplier;
- lens category number and description (see Table 8 below); and
- for photochromic lenses, both lens categories shall be named and described.

Table 8. Requirement of Sunglasses with the AS/NZS 1067:2003 Standard

Lens category	Description	Additional markings
0	**Fashion spectacles - not sunglasses very** low sunglare reduction - some UVR protection.	NONE
1	**Fashion spectacles - not sunglasses** limited sunglare reduction - some UVR protection.	**NOT SUITABLE FOR DRIVING AT NIGHT**
2	**Sunglasses** - medium sunglare reduction and good UV protection	NONE
3	**Sunglasses** - high sunglare reduction and good UV protection	NONE
4	**Special purpose sunglasses** – very high sunglare reduction and good UV protection	**MUST NOT BE USED WHEN DRIVING**

Other protective features to look out for (in addition to compliance with the Standard) are Sunglasses that:

- are close-fitting;
- cover as much of the eyes as possible;
- have a high EPF rating of 9 or 10; and
- are tinted.

Protective Eyewear (e.g. those used in laboratories, building sites, industry, medicine) will protect well against UV if it complies with the Australian New Zealand Standard *AS/NZS 1337 Eye Protectors for Industrial Applications.* Protective Eyewear that meets this Standard will also have good UV protection.

To comply with the AS/NZS 1337:1992 standard, the following information must be etched or impressed into the eye protectors:

- The manufacturer's name, trade name or mark.
- The appropriate lens marking as given in Section 2 of the Standard and, where applicable, the appropriate marking as prescribed in AS/NZS 1338, Part 2 or Part 3.
- The appropriate marking as given in Table 3.2.

Where the design of the eye protector is such that the lenses are integral to the frame or front frame the above information may be etched or impressed into the frame instead.

Table 9. Marking of Filters

Type of filter	Filter Marking
General purpose low velocity impact	The letters 'HT' where the lens is heat-treated. The letters 'CT' where the lens is chemically toughened.
Medium velocity impact	As for general purpose low velocity impact and with the letter 'I'.
High velocity impact	The letter 'V'.
Hot solids and molten metal	The letter 'M'.

The following information must also be supplied with the eye protectors:

- The type of protector as given in Table 3.2 (a copy of Table 3.2. is given in Table 10 below).
- The appropriate marking as given in Table 3.3 (a copy of Table 3.3 is given in Table 11 below).

The information should be marked on the packaging, however alternative methods such as swing tags or adhesive labels may be used, provided that the required marking is readily visible and secured to the eye protector supplied.

Table 10. Marking of Assembled Eye Protectors and Packaging

Type of protector	Lends marking	Eye protector marking
Low impact	The letters 'HT' where the lends is heat tempered. The letters 'CT' where the lens is chemically tempered.	No requirements additional to Clause 3.5.1(a).
Medium impact	As for low impact and with the letter 'I'.	As for low impact and with the letter 'I'.
High impact	As for low impact and with the letter 'V'.	As for low impact and with the letter 'V'.
Molten metal and hot solids	As for low impact and with the letter 'M'.	As for low impact and with the letter 'M'.
Splashproof	As for low impact.	As for low impact and with the letter 'C'.
Dustproof	As for low impact.	As for low impact and with the letter 'D'.
Gastight	As for low impact.	As for low impact and with the letter 'G'.
Outdoor use, untinted	The letter 'O'.	As for low impact and with the letter 'O'.

Table 11. Marking of Packaging for Indoor or Outdoor Use Eye Protectors

Type of Lens	Required Marking
Untinted or laminated/double glazed	These eye protectors are intended for indoor use where no optical radiation hazards exist.
Outdoor untinted	These eye protectors are intended for indoor and outdoor use where no optical radiation hazards exist other than solar radiation. They are intended to provide adequate protection against ultraviolet radiation from the sun, but are not intended to provide protection against sun glare
Outdoor tinted	These eye protectors are intended for outdoor use where no optical radiation hazards exist other than solar radiation. They are intended to provide adequate protection against sun glare and ultraviolet radiation from the sun.

Other Protective features to look for—in addition to ensuring compliance with the standard—are Eye Protectors that:

- are close-fitting;
- cover as much of the eyes as possible;
- have a high EPF rating of 9 or 10; and
- are tinted.

For both sunglasses and protective eyewear, retailers, importers or distributors must ensure they comply with the Standard. If they don't, they can be penalised under the Fair Trading Act of each jurisdiction.

MORE INFORMATION?

See Table 13 (page 26).

S*unscreens*

Only sunscreens with an SPF (Sun Protection Factor) of 30+ should be used. To get 30+ protection from a 30+ sunscreen you must apply it correctly i.e. ensure you do the following:

- Put on plenty of Sunscreen. Most people don't put on enough reducing protection by 50-80% so they only get 15+ protection from a 30+ sunscreen.
- Use at least 35ml or 6 teaspoons to cover your entire body (for an average adult);
- Put at least 1 teaspoon of Sunscreen, on every application, to each:
  - arm;
  - leg;
  - front of body;
  - back of body; and
  - face.
- Apply Sunscreen to clean skin. If skin is dirty, the sunscreen won't be absorbed properly and its protection will be severely reduced.
- Reapply sunscreen every 2 hours. Most people remove sunscreen without even realising it. Sunscreen can be easily removed by:
  - sweat;
  - wiping your face or other parts of your body with your hand, arm or shirt-sleeve etc;
  - water;
  - rubbing off with sand;
  - rubbing against something like a wall; or
  - washed off in the shower.
- Apply sunscreen 20 minutes before going outdoors so it has to settle, dry; and form a protective film barrier on the skin. Sunscreen protects the skin by sitting under the first layers of dead skin. You should apply plenty of Sunscreen and rub it in well. This will allow the dead layers to absorb it, allow it to form a protective film barrier and protect the living skin underneath.

In some cases, oil-based sunscreens can cause dust to stick to the skin which is dangerous if the dust is hazardous to the skin or body. When this occurs, Alcohol or Vanishing Cream based sunscreens may be necessary if the employee is working in conditions where there is hazardous dust. After being applied, this sunscreen helps keep the skin dry—not sticky. Employers must look at the Material Safety Data Sheet (if available) to determine if dust is a health risk.

Where can I find more information?

Table 12. Where to find more information on PPE

	WEBSITE	WHAT IT SHOWS
Sunglasses	www.arpansa.gov.au/radiationprotection/factsheets/is_Sunglasses.cfm www.arpansa.gov.au/uvrg/products.cfm#2	Benefits of wearing sunglasses and what to look for when getting a pair. Suppliers of sunglasses that have been UPF tested.
	www.sunsmart.com.au/download.asp?RelatedLinkID=296	Benefits of wearing sunglasses and how UV damages the eyes.
Sunscreen	www.sunsmart.com.au/download.asp?RelatedLinkID=286 www.Sunsmart.com.au/Sun_protection/slop/	What to buy, how it works, why you should wear it and what is SPF. What sunscreen to choose and how to use it properly.
UPF	www.arpansa.gov.au/Services/upf/index.cfm www.arpansa.gov.au/uvrg/index.cfm www.arpansa.gov.au/uvrg/products.cfm	What it is, how its tested, and what garments or clothing rates high. What is UV resource guide, why is it used and what is contained in it. What products have been UPF tested and which companies sell these UPF-tested products.
	www.sunsmart.com.au/download.asp?RelatedLinkID=285.	What is UPF and what to look when choosing high-rating UPF clothing.
Hats	www.worksafe.vic.gov.au/wps/wcm/connect/wsinternet/worksafe/home/forms+and+publications/guidance+notes/import_sun+protection+for+construction+and+other+outdoor+workers	Examples of what hats to wear outdoors and examples of attachments to wear with bucket hats
	http://www.sunsmart.com.au/download.asp?RelatedLinkID=292.	What to look for when choosing a hat.

Table 13. Where to Find Copies of Fair Trading/Trade Practices Act of Each Jurisdiction

Government	Website
Federal	www.austlii.edu.au/au/legis/cth/consol_act/tpa1974149/
NSW	www.austlii.edu.au/au/legis/nsw/consol_act/fta1987117/
VIC	www.austlii.edu.au/au/legis/vic/consol_act/fta1999117/
SA	www.austlii.edu.au/au/legis/sa/consol_act/fta1987117/
WA	www.austlii.edu.au/au/legis/wa/consol_act/fta1987117/
TAS	www.austlii.edu.au/au/legis/tas/consol_act/fta1990117/
QLD	www.austlii.edu.au/au/legis/qld/consol_act/fta1989117/
ACT	www.austlii.edu.au/au/legis/act/consol_act/fta1992117/
NT	www.austlii.edu.au/au/legis/nt/consol_act/caafta286/

What to watch out for—Secondary Hazards

When implementing Control Measures, you should always watch out for Secondary Hazards. Secondary Hazards must not be caused by any Sun protective measures**.** Some examples of secondary hazards are listed below:

- Loose, Sun-protective clothing worn near outdoor machinery such as a post-hole digger/auger—may become entangled causing severe injury to the worker.
- Unventilated Sun protective clothing (clothing that doesn't breathe)—can cause workers to become heat-stressed if doing heavy manual labour.
- Sunglasses or fashion spectacles (even those tested the Australian Standard AS/NZS 1067: 2003 or with an EPF rating of 10)—do not provide sufficient protection against other dangers such as projectiles/sparks/chemicals used in industry, research and medicine.
- Hats that protect well against the Sun—do not protect against other hazards such as falling timber/stones (which hard-hats do protect against).
- Hazardous Dust—dust that is hazardous or causes damage to the skin—may be present in certain work situations.
    - It can cause a secondary hazard if an employee uses oil-based sunscreens.
    - Oil-based sunscreens cause dust to stick to the skin; this can be dangerous if the dust is hazardous or damaging to the skin or body.
    - Employers must look at the Material Safety Data Sheet (if available) and determine:
    - if there is dust; and
    - whether the dust is a health hazard.

References

Cancer Council Australia: www.cancer.org.au

SunSmart Australia http://www.cancer.org.au/cancersmartlifestyle/SunSmart.htm

Australian Radiation Protection and Nuclear Safety Agency www.arpansa.gov.au

Bureau of Meteorology http://www.bom.gov.au/

National Cancer Institute of the National Institutes of Health, USA http://www.cancer.gov/.

Workcover www.workcover.nsw.gov.au/

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McKinlay, A.F., Harlan, F., Whillock, M.J. (1998). Hazards of Optical Radiation: *A Guide to Sources Uses and Safety*. Bristol, Britain: IOP Publishing.

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