

SUN SAFETY AT WORK

**A MANAGEMENT SYSTEMS APPROACH TO
OCCUPATIONAL SUN SAFETY**

THOMAS TENKATE & PETER STRAHLENDORF

The logo for 'Sun Safety At Work' is located in the bottom right corner. It features the words 'SUN SAFETY' in a bold, dark blue font, with 'AT WORK' in a smaller, orange font below it. To the right of the word 'SUN' is a stylized orange sun icon with rays.

SUN SAFETY
AT WORK

Sun Safety at Work: A Management Systems Approach to Occupational Sun Safety

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For information on Sun Safety at Work, please visit: <https://sunsafetyatwork.ca/>

ABOUT SUN SAFETY AT WORK CANADA

Undertaken between 2014 and 2016, Sun Safety at Work Canada (SSAWC) was the first Canada-wide project to address sun safety for outdoor workers. The project initially enrolled 17 workplaces in Ontario, Nova Scotia, British Columbia, and New Brunswick with over 1000 workers participating. The workplaces developed multi-year action plans for sun safety and the project assisted the workplaces in implementing these plans over one year. Through engaging with the workplaces, the project developed a Model Sun Safety Program designed to be integrated into a workplace's existing Occupational Health and Safety Management System (OHSMS). The Model Sun Safety Program is described in this publication. To support this Program, the project also developed nearly 100 Canadian-focused sun safety resources which are freely available on the project's website (<https://sunsafetyatwork.ca>). Despite having a Canadian focus, the Model Sun Safety Program and most of the resources are able to be used in any country/location. Initiatives commenced by the project continue through the Sun Safety at Work Canada Working Group.

ACKNOWLEDGMENTS

Sun Safety at Work Canada was a project that enjoyed a high level of collaboration among researchers, policy makers and practitioners. The members of the project team represented the following organizations:

- Ryerson University, School of Occupational & Public Health
- Occupational Cancer Research Centre
- Sun Safe Nova Scotia
- Worksafe BC
- Carex Canada
- Canadian Dermatology Association
- Canadian Cancer Society
- Centre for Research Expertise in Occupational Disease
- Occupational Health Nurses Association of Nova Scotia
- Alberta Health Services.

Project staff were located around Canada to support participating workplaces and to develop resources. We acknowledge the expertise, dedication and enthusiasm of the project team and staff, and thank them for their efforts. The project would not have been possible without the involvement of workplaces around Canada. We are truly grateful for their involvement and support. The project received financial support from Health Canada through the Canadian Partnership Against Cancer. We are most grateful for this support.

PEER REVIEW

This publication has undergone peer-review by a range of OHS professionals, academics and clinicians. We thank all of the peer-reviewers for their time and constructive comments.

CONTENTS

About Sun Safety at Work Canada	i
Acknowledgments.....	i
Peer Review.....	i
Contents.....	ii
Introduction	iv
Scope.....	iv
Reference Publications.....	v
Abbreviations.....	vi
The Sun and Sun Safety.....	1
Important solar UV-related health conditions	2
UV Index & UV exposure limits	3
Heat from the sun	5
Important heat-induced conditions	6
Humidex & heat stress exposure limits.....	6
Why is Occupational Sun Safety Important?.....	7
What is a Sun Safety Program?	9
Model Sun Safety Program.....	11
Model Sun Safety Program Elements.....	15
Implementing a Sun Safety Program.....	16
How the Rest of this Guide is Organised.....	17
Step 1 – Core	18
Element 1.1 – Sun Safety Policy	19
Element 1.2 – Communication & consultation	22
Step 2 – Plan	24
Element 2.1 – Authority, accountability & responsibility.....	25
Element 2.2 – Role of the health and safety committee.....	30
Element 2.3 – Legal and other requirements.....	32
Element 2.4 – Sun safety risk assessment.....	34
Step’s 3 & 4 – Do.....	37
Introduction to Control Measures	37
Step 3 – Do: Control Measures	39
Element 3.1 – Elimination or substitution	40
Element 3.2 – Sun safe engineering controls.....	41
Element 3.3 – Controls that increase awareness of sun safety	44
Element 3.4 – Sun safe administrative controls (including Training)	45

Element 3.5 – Sun safety personal protection	49
Element 3.6 – Control verification & validation	54
Element 3.7 – ‘Off-the-job’ sun safety	55
Step 4 – Do: Support.....	56
Element 4.1 – First aid & incident notification.....	57
Element 4.2 – Return-to-Work.....	59
Element 4.3 – Preventive maintenance	60
Element 4.4 – Procurement	61
Step 5 – Check.....	62
Element 5.1 – Incident reporting and investigation.....	63
Element 5.2 – Workplace inspections.....	64
Element 5.3 – Documentation, records and statistics	65
Element 5.4 – Auditing & evaluation	67
Step 6 – Act	68
Element 6.1 – Management review & continuous improvement.....	69
Implementing a Sun Safety Program for Small Workplaces.....	70
Implementing a Sun Safety Program for Large Workplaces.....	72
Sun Safety Roles within a Workplace.....	73
Health and Safety Practitioner	73
Employee/Worker	74
Supervisors.....	75
Health and Safety Committees or Worker Representatives.....	76
Managers	77
Senior Managers	77
Procurement	78
Occupational Health Nurses	78
Occupational Hygienists.....	79
Family Members.....	79
References	80
Appendix 1 – Definitions.....	85
Appendix 2 – SSAWC Resources Linked to Sun Safety Program ‘Elements’	112
Appendix 3 – SSAWC Resources Listed by Type of Resource.....	118
Appendix 4 – Other Resources.....	120

INTRODUCTION

Welcome to *Sun Safety at Work: A Management Systems Approach to Occupational Sun Safety*. The purpose of this Guide is to assist workplaces to develop and implement effective and sustainable Sun Safety Programs to protect their workers. This Guide has been developed in Canada, but it is relevant for workplaces and locations around the world.

Sun Safety is considered to be the measures taken by a workplace to manage worker exposure to the sun to prevent adverse health effects from: (1) over-exposure to solar ultraviolet (UV) radiation, and (2) heat stress associated with exposure to the sun.

This Guide was developed with reference to best practices in occupational health and safety management, particularly the development and implementation of **Occupational Health and Safety Management Systems** or **Occupational Health and Safety Programs**.

A **Sun Safety Program** is an ‘organizational element’ of an *Occupational Health and Safety Management System/Occupational Health and Safety Program*, and is directed toward the effective prevention and management of health risks associated with sun exposure within the workplace.

This Guide provides a framework for a **Model Sun Safety Program**. A program such as this consists of a comprehensive range of elements which are directed towards best-practice sun safety and which link to the recognized elements of a broader OHS Management System/Program. This Guide will also describe how a Sun Safety Program can be implemented in both small and large workplaces.

SCOPE

The purpose of the Sun Safety Program described in this Guide is to provide a comprehensive program of elements, which together, help workplace parties (e.g. management, OHS professionals, health and safety committees or health and safety/worker representatives, supervisors, and employees) effectively implement sun safety within their workplace.

This Sun Safety Program is intended for: outdoor workers who are exposed to the sun; solar UV as a risk factor for eye and skin conditions (e.g. sunburn, skin cancer, eye cancer); heat from the sun as a risk factor for heat stress.

This Sun Safety Program is NOT intended for: indoor workers who have exposure to artificial sources of UV radiation (e.g. welding) or artificial sources of heat (e.g. ovens, furnaces) in circumstances where there is no exposure to heat from the sun.

The Guide has been designed with the specific intention that workplaces “embed” effective sun safety into their existing systems/programs and to encourage workplaces to consider sun exposure of their outdoor workers as an important workplace hazard that needs to be effectively managed.

REFERENCE PUBLICATIONS

The Sun Safety Program described in this Guide has been developed with reference to best practices in occupational health and safety management as presented in the following publications:

- *ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use*. International Organization for Standardization, Geneva, 2018. Available from: <https://www.iso.org/iso-45001-occupational-health-and-safety.html>
- *OHSAS 18001:1999 Occupational Health and Safety Management Systems: Specification*. British Standards Institute, London, UK, 2002. Available from: <https://shop.bsigroup.com/ProductDetail/?pid=000000000030087392>
- *Implementing an Occupational Health and Safety (OH&S) Program*. Canadian Centre for Occupational Health and Safety, Hamilton, ON, 2012. Available from: <https://www.ccohs.ca/products/publications/OHSProgram.html>
- *CSA Z1000-14 – Occupational health and safety management*. CSA Group, 2014. Available from: <https://www.csagroup.org/>
- *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014. Available from: <https://www.csagroup.org/>
- *Recommended Practices for Safety and Health Programs*, Occupational Safety and Health Administration, Washington, D.C., October 2016. Available from: <https://www.osha.gov/shpguidelines/>
- *Small Business Health and Safety Resource Manual*. Public Services Health & Safety Association, Toronto, ON, 2017. Available from: <http://www.pshsa.ca/sbrm/>
- *How to Implement a Formal Occupational Health and Safety Program*. Worksafe BC, Vancouver, BC, 2017. Available from: http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/howtoimplement_ohs.pdf

ABBREVIATIONS

ACGIH – American Conference of Governmental Industrial Hygienists

BCC – basal cell carcinoma

CCOHS – Canadian Centre for Occupational Health and Safety

CPR – cardio pulmonary resuscitation

CSA – Canadian Standards Association

DBT – dry bulb temperature

GT – globe temperature

ICNIRP – International Commission on Non-Ionizing Radiation Protection

IR – infrared radiation

IRS – Internal Responsibility System

JHA – job hazard analysis

JSA – job safety analysis

MED – minimum erythema dose

nm – nanometer

NMSC – non-melanoma skin cancer

NWBT – natural wet bulb temperature

OEL – occupational exposure limit

OHS – occupational health and safety

OHSMS – occupational health and safety management system

OHSP – occupational health and safety program

OTJ – off-the-job

PDCA – plan, do, check, act

PPE – personal protective equipment

RTW – return to work

SCC – squamous cell carcinoma

SED – standard erythema dose

SPF – sun protection factor

SSAWC – Sun Safety at Work Canada

TLV[®] – threshold limit value

UPF – ultraviolet protection factor

UV – ultraviolet radiation

UV-A – ultraviolet radiation A (315 to 400nm)

UV-B – ultraviolet radiation B (280 to 315nm)

UV-C – ultraviolet radiation C (100 to 280nm)

UVI – UV Index

WBGT – wet bulb globe temperature

WHO – World Health Organization

Note: Refer to **Appendix 1 – Definitions**, for specific definitions and explanations of these terms. Appendix 1 contains a broad range of definitions of terms found in this Guide.

THE SUN AND SUN SAFETY

Almost everyone is exposed to the sun to some extent and outdoor workers have the highest exposures of anyone. The sun emits energy in the form of radiation. The types of radiation emitted include ultraviolet (UV) radiation, visible radiation (i.e. light), and infrared (IR) radiation (i.e. heat). These are all part of the electromagnetic spectrum which is described in terms of wavelength. For UV radiation, the wavelength range is usually defined as being between 100 and 400 nanometers (nm), and it is divided into the following three categories [1]:

- UV-A: 315-400nm – all UV-A reaches the earth’s surface and so we are all exposed to this
- UV-B: 280-315nm – about 10% of UV-B reaches the earth’s surface due to filtering by the atmosphere, and
- UV-C: 100-280nm – this is completely filtered by the atmosphere, and in particular the ozone layer, so it does not reach the earth’s surface.

The relationship between UV-A, UV-B and UV-C is illustrated in **Figure 1**.

SOLAR UVA, UVB & UVC RAYS

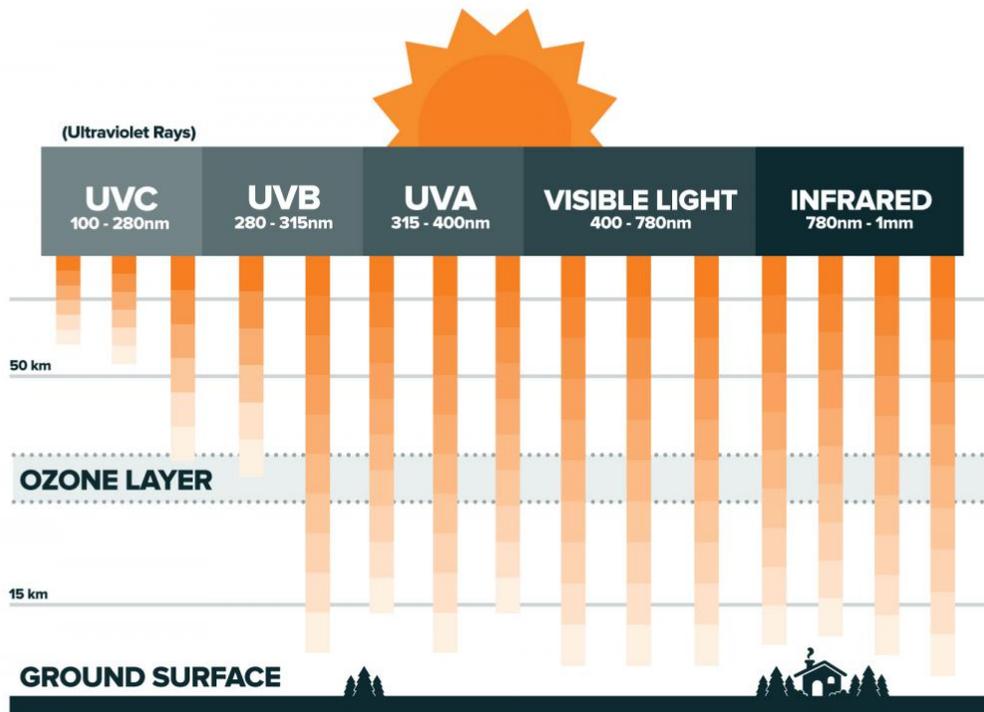


Figure 1. The Solar Radiation Spectrum

Because the energy of electromagnetic radiation is related to the wavelength (i.e. shorter wavelengths have higher energy and are more harmful to people), UV-B is more damaging than either UV-A, visible or IR radiation, and is the major cause of sunburn (also referred to as erythema), skin cancer and a range of eye conditions. However, the longer wavelengths (i.e. UV-A, visible, and IR radiation) also play a role in a range of skin and eye conditions, as well as being the main contributor to heat stress in outdoor workers.

Therefore, exposure to the sun is a workplace hazard, and workplaces should practice sun safety in order to manage this hazard and protect their workers. As mentioned previously, we consider **Sun Safety** to be the measures taken by a workplace to manage worker exposure to the sun to prevent adverse health effects from: (1) over-exposure to solar ultraviolet (UV) radiation, and (2) heat stress associated with exposure to the sun.

IMPORTANT SOLAR UV-RELATED HEALTH CONDITIONS

There is a range of skin and eye conditions associated with exposure to solar UV radiation. Some common conditions include:

Photokeratitis – this is an acute condition of the outer part of the eye as a result of exposure to ultraviolet radiation. When outdoors, it is specifically associated with exposure to UV-B, which is most strongly absorbed by the cornea and conjunctiva. Following a latent period (i.e. delay between exposure and symptoms) of between 6 and 12 hours, symptoms include inflammation of the conjunctiva, swelling of the eyelids, a sensation of ‘sand in the eye’, and photophobia (i.e. aversion to light). Corneal pain can be severe and can last up to 48 hours. Photokeratitis can be enhanced by airborne photosensitizers, such as coal-tar pitch (which has been known to affect roofers). It is also known to occur when there is a high amount of reflected UV, such as off water or snow. In the latter circumstances photokeratitis is referred to as ‘snow blindness’. It may also be called “welders’ arc” or “arc eye” when associated with UV exposures from artificial sources such as welding arcs.

Cataract – a cataract is an area of opacity (non-transparency) in the lens of the eye. It may obscure vision. It is a chronic condition and can result from long-term exposure to high levels of sunlight. There are a number of types of cataract. Cortical cataract is strongly linked to long-term solar UV-B radiation exposure. Solar UV exposure is considered to be a risk factor for nuclear cataract and posterior subcapsular cataract.

Erythema – is an acute condition and refers to reddening of the skin. As such, is it commonly called **sunburn**. It is a photochemical response of the skin (redness due to vasodilation and increased blood flow) following over-exposure to ultraviolet radiation, particularly UV-B. The level of erythema induced is described in terms of ‘minimal erythema dose’ (MED) or ‘standard erythema dose’ (SED).

Basal cell carcinoma (BCC) – this is the most common form of skin cancer in people. It arises from keratinocytes in the skin and is also described as being a **keratinocyte carcinoma** (previously known as **non-melanoma skin cancer**). It develops more frequently with age and is common on the face, scalp and neck. Exposure to the sun causes BCC. It is often initially noticed as a lump or a sore on the skin that does not heal.

Squamous cell carcinoma (SCC) – this is the second most common form of skin cancer in people. It is also a type of keratinocyte carcinoma (previously known as non-melanoma skin cancer). It tends to occur on parts

of the body which receive lots of sun exposure, e.g. face, ears, scalp and neck. Similar to basal cell carcinoma, it is often initially noticed as a skin sore which doesn't heal. As it tends to grow rapidly, early treatment is important and can be very effective.

Melanoma – this is the most serious form of skin cancer. It can be fatal if untreated. Melanomas are cancers which arise from pigment cells in the skin. In their early stages of development, melanomas are often identified as an unusual looking mole, or because a mole (or other skin spots) has changed color, shape or feel. Melanomas occur on all parts of the body, but often are seen on the back. They can grow and spread to other parts of the body quickly and so early detection and treatment is critical. Regular skin checks are therefore important, particularly for fair-skinned individuals and outdoor workers. People should check skin spots for the ABCDE's: are the skin spots **A**symmetrical, do they have an irregular **B**order, have different **C**olors, are increasing in **D**iameter or are they **E**volving or changing in some way? Exposure to ultraviolet radiation, particularly from the sun and some artificial sources (e.g. tanning devices), is the main cause of melanoma.

Worldwide, skin cancers are the most common of all cancers, with one in three cancers being a skin cancer [2]. Even though long-term exposure to the sun is a known risk factor for developing skin cancer, there are also a number of 'personal risk factors' which make certain people more susceptible. These include a history of sunburns (particularly as a child), fair skin, light hair and light coloured eyes, freckling easily following high sun exposure, a tendency to burn and not tan, and having a lot of moles. As such, outdoor workers who also have these personal risk factors are at much higher risk of developing skin cancer. To assist workers understand their 'personal risk' of skin cancer, one of the resources we developed was the *Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers*. It is available from our website

<https://sunsafetyatwork.ca/>

UV INDEX & UV EXPOSURE LIMITS

The UV Index is a measure of intensity of UV radiation from the sun and its effect on human skin. The UV Index uses a scale from 0 (low intensity) to 11+ (extreme intensity). The higher the index, the more sun protection is required. The World Health Organization (WHO) recommends that protection measures be used when the UV Index is 3 or above, and that additional protection be used when the UV Index is 8 or above [1]. In Canada, the UV Index at many locations is above 3 from 11am to 3pm daily between April and September [3]. It is important for a workplace with outdoor workers to be familiar with the UV Index and take the steps described in **Table 1** to protect their workers.

In addition to the UV Index as a measure of UV intensity/exposure for the general public, in the occupational health and safety field, occupational exposure limits exist for UV radiation. A widely used limit produced by the American Conference of Governmental Industrial Hygienists (ACGIH) is the threshold limit value (TLV®) for ultraviolet radiation. This exposure limit applies to both artificial sources of UV (e.g. lamps, welding arcs) as well as UV radiation from the sun. The exposure limit is based on protecting workers from acute effects of UV exposure (e.g. sunburn), with the assumption that long-term exposure at levels below the exposure limit will only contribute slightly to long term health risks (e.g. skin cancer).

Table 1: UV Index and Occupational Control Measures

UV Index	Level of Protection
1 – 2 (Low)	Minimal sun protection required
3 -7 (Moderate to High)	Protection Required: <ul style="list-style-type: none">• Between 11am - 3pm work tasks should be done in shade• Take breaks in the shade• Protective clothing appropriate to the work tasks should be worn.<ul style="list-style-type: none">○ Long sleeved shirts and pants○ UV protective eyewear○ Wide brimmed hat or hard hat with additional brim and neck flap○ Sunscreen and lip balm (minimum SPF 30)
8 – 14 (Very High to Extreme)	Extra Protection Required: <ul style="list-style-type: none">• Same as UV Index 3-7, except, between 11am – 3pm, work tasks should be rescheduled to avoid outdoor work<ul style="list-style-type: none">○ If rescheduling is not possible, work tasks should be done in shade

More information on using both the UV Index and the ACGIH TLV® for UV radiation for assessing UV risk for workers is provided in the **Sun Safety Risk Assessment** ‘element’ of the Sun Safety Program. A comparison between the UV Index, the ACGIH TLV®, and the time to sunburn (for fair skin) is shown in Table 2.

Table 2: UV Index and Various Exposures Times and Values [4]

UV Index	Time to Exceed ACGIH TLV® (min)	Time to sunburn for fair skin (min)
3	26.4	44.4
4	19.8	33.3
6	13.2	22.2
8	9.9	16.7
10	7.9	13.3
12	6.6	11.1
14	5.7	9.5

The exposure times in Table 2 are quite short considering that outdoor workers work outdoors all day. When it is further considered that for many locations in Canada the UV Index is 6 or greater in summer, this means that ‘technically’ the ACGIH TLV® can be exceeded in as little as 10 minutes (of cumulative exposure).

HEAT FROM THE SUN

For outdoor workers, extended exposure to the sun is also a significant risk factor for heat stress [5]. **Heat stress** happens when the body loses its ability to self-regulate body temperature [6]. Heat stress can cause a range of health conditions from heat rash and heat cramps, to more serious fainting and heat exhaustion, and to heat stroke, which can be fatal.

Because everyone responds differently to heat, workers should be aware of the following factors which increase their personal risk of heat stress [6]:

- Lack of acclimatization (i.e. how your body copes/adapts to a hot environment)
- Poor physical fitness or an unhealthy weight
- Age (i.e. both young people and those who are older are at higher risk)
- Flu, lack of sleep and other minor illnesses
- Re-occurring skin disorders (e.g. rashes, dermatitis, etc.)
- Caffeine, drugs, and alcohol can all cause dehydration and increase risk for heat stress
- Previous heat stroke
- Pre-existing medical conditions such as diabetes, heart disease, and central nervous system disorders
- Use of some medications (e.g. tricyclic antidepressants, phenothiazines, alkaloids, etc.)

The primary factors contributing to heat stress are shown in **Figure 2**.

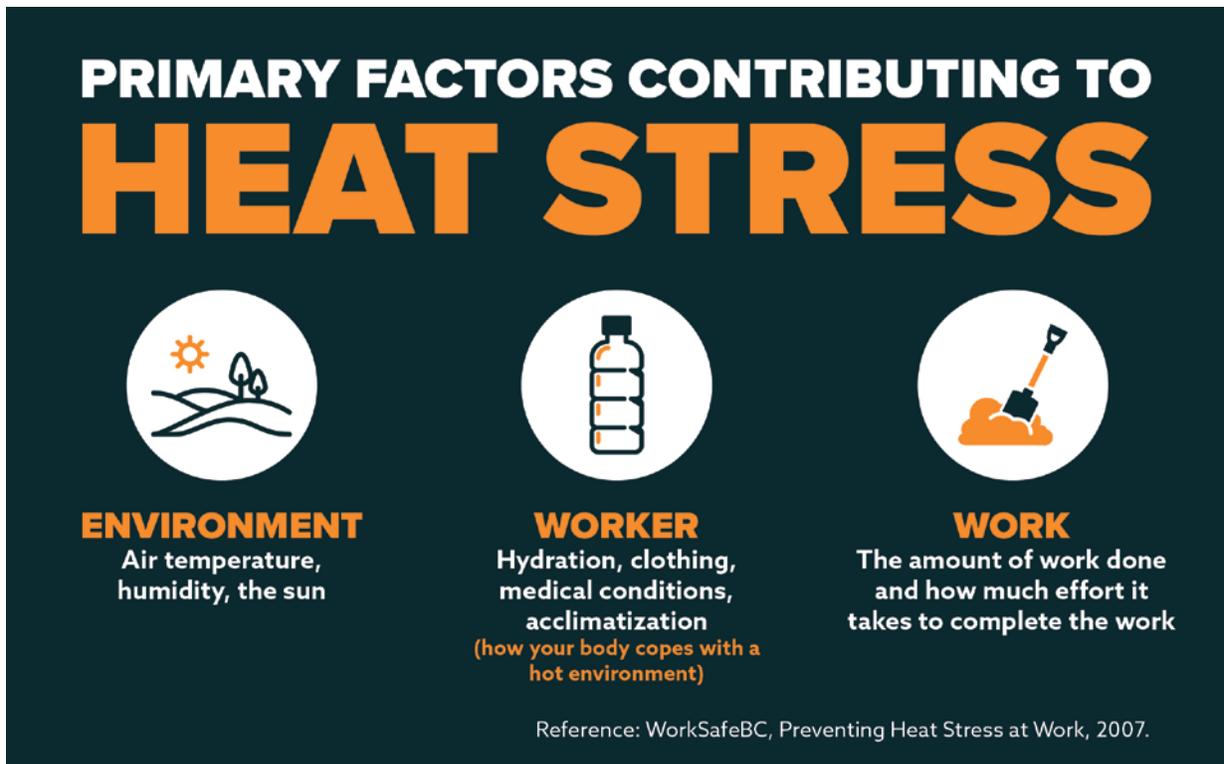


Figure 2: Primary Factors Contributing to Heat Stress

IMPORTANT HEAT-INDUCED CONDITIONS

There are a range of adverse health conditions caused by **heat stress**. These conditions are (from least to most serious):

Heat rash is the mildest heat-induced condition as a result of heat stress. It is caused by a hot humid environment and plugged sweat glands. Symptoms include a red bumpy rash with severe itching. Treatment includes avoiding hot environments and rinsing the skin with cool water.

Heat cramps are caused by heavy sweating which drains the body of salt. Symptoms include painful contractions of muscle tissue (spasms) in the stomach, arms or legs. Symptoms can occur suddenly. Treatment includes moving to a cool place, loosening clothing, and stretching and massaging cramped muscles. Electrolyte replacement is required. If the cramps do not go away then medical help should be sought.

Fainting (also known as heat syncope) is caused by fluid loss and inadequate water intake. Symptoms include sudden fainting after extended work, cool moist skin and a weak pulse. Medical attention is needed. CPR should be considered. If the person is conscious, offer sips of cool water.

Heat exhaustion is a serious heat-induced condition as a result of heat stress. It is caused by fluid loss and from the body's cooling system starting to break down. Symptoms include: heavy sweating; cool, moist skin; a body temperature above 38°C; weak pulse; weakness; nausea and vomiting; very thirsty; rapid panting or breathing; and blurred vision. Treatment includes moving the person to a cool shaded area, loosening or removing clothing, cool water to drink, fan and spray with cool water. It is a serious condition and medical aid is required.

Heat stroke is the most serious heat-induced condition as a result of heat stress. It can cause irreversible damage to the heart, lungs, kidneys and liver, and even death. Symptoms include: high body temperature (over 41°C) and any of the following: weak, confused, upset, or acting strangely; hot, dry, red skin (classic heat stress); profusely sweating (exertional heat stress); fast pulse; or headache or dizziness. In later stages, a person may pass out and have convulsions. Treatment includes removing clothing, fanning and spraying the person with cool water and offering sips of water if the person is conscious. Heat stroke is a medical emergency and an ambulance should be called immediately.

HUMIDEX & HEAT STRESS EXPOSURE LIMITS

The humidex is a Canadian invention. It is a measure of how hot we feel (i.e. perceived heat). It is based on the combined effects of high temperature and humidity. Humidity is the amount of water vapour or moisture in the air. In general, higher humidity makes the environment feel hotter because it is more difficult for sweat to evaporate off the skin. The higher the humidex, the greater the risk of heat stress. Humidex ranges are shown in **Table 3**.

Humidex generally decreases with increasing latitude. As such, very high humidex values are rare for many parts of Canada, apart from southern areas of Ontario, Manitoba, and Quebec. However, in addition to air temperature and humidity, there are a range of other factors that contribute to heat stress (e.g. clothing, work rate, radiant heat from objects, acclimatization and other personal factors). These factors also need to be considered when using the humidex to assess heat stress.

Table 3: General Humidex Ranges

Humidex Range	Degree of Comfort
20 – 29	Comfortable
30 – 39	Some discomfort
40 – 45	Great discomfort; avoid exertion
>45	Dangerous; heat stroke possible

In addition to using the humidex as a measure for heat stress, the other accepted approach is to measure the wet bulb globe temperature (WGBT), with this being the basis of the ACGIH’s TLV® for Heat Stress and Strain. Further details on the use of both the humidex and the WGBT for assessing heat stress risk are provided in the Sun Safety Risk Assessment ‘element’ of the Sun Safety Program.

WHY IS OCCUPATIONAL SUN SAFETY IMPORTANT?

For Canada, cancer is the leading cause of death, with one in four Canadians dying from cancer and one in two developing cancer in their lifetime [7]. As previously mentioned, worldwide skin cancers are the most reported type of cancer, with one in three cancers being a skin cancer [2]. Skin cancer is therefore an important public health issue for Canada and across the globe. Keratinocyte carcinomas (previously known as non-melanoma skin cancers) are the most commonly diagnosed cancer in Canada, with an estimated 78,300 new cases in 2015 (note: this was the latest year in which estimates were published) [8]. For melanoma, it was estimated that there would be 7,800 new cases and 1,300 deaths in 2019, with the mortality rate increasing each year [7]. From an economic perspective, the direct and indirect costs of skin cancer for Canada were estimated to be over \$531 million in 2004, with this number projected to rise to over \$921 million by 2031 [9]. The cost to the community of each case of keratinocyte carcinoma associated with occupational sun exposure is estimated to be over \$10,000 [10].

The most important risk factor for developing skin cancer is exposure to ultraviolet (UV) radiation [11,12], with **solar radiation** designated as a known human carcinogen [13,14]. The most important determinant of someone’s level of exposure is whether they are an outdoor worker [15]. Occupational sun exposure is considered to be a significant risk factor for the development of both keratinocyte carcinomas [16-24] and melanoma [25], but the association for melanoma is more complicated than that for keratinocyte carcinomas [26-30].

For outdoor workers, direct sunlight exposure is also their primary source of heat stress [5]. Heat stress is a spectrum of disorders that can occur as a result of the combination of sun exposure, hot weather and physical activity as the body loses its ability to thermo-regulate body temperature [31]. As previously mentioned, the most serious form of heat stress is heat stroke, which can cause irreversible damage to the heart, lungs, kidneys and liver. It is associated with increased risk of cardiovascular disease, ischemic heart disease, and chronic liver and renal failure. It also exacerbates underlying conditions such as diabetes [31-36]. High ambient temperatures have also been shown to increase mortality and hospital admissions for

cardiovascular and respiratory conditions [37-39], with anyone working outdoors under prolonged sun exposure being vulnerable to heat stress [36].

Typical outdoor worker sun/UV exposures are considered to be very high. Outdoor workers spend a significant proportion of their day in the sun [40] and individual worker exposures regularly exceed the recognized occupational exposure limits, often by many times [4, 41-43]. As part of the Sun Safety at Work Canada project we conducted a large exposure assessment study of participating workers. Four hundred and thirteen workers from 13 workplaces in 3 provinces participated in the exposure study and wore measurement badges for one workday in late summer. Three hundred and forty seven viable measurements were obtained. The average daily UV exposure was 6.1 SED, which is nearly 6 times the TLV®. Utility workers received higher exposures than did municipality workers, with workers in Ontario having the highest exposures of the three provinces. These results illustrate the very high daily UV exposures outdoor workers receive [44]. These results are also shown in Figure 3.

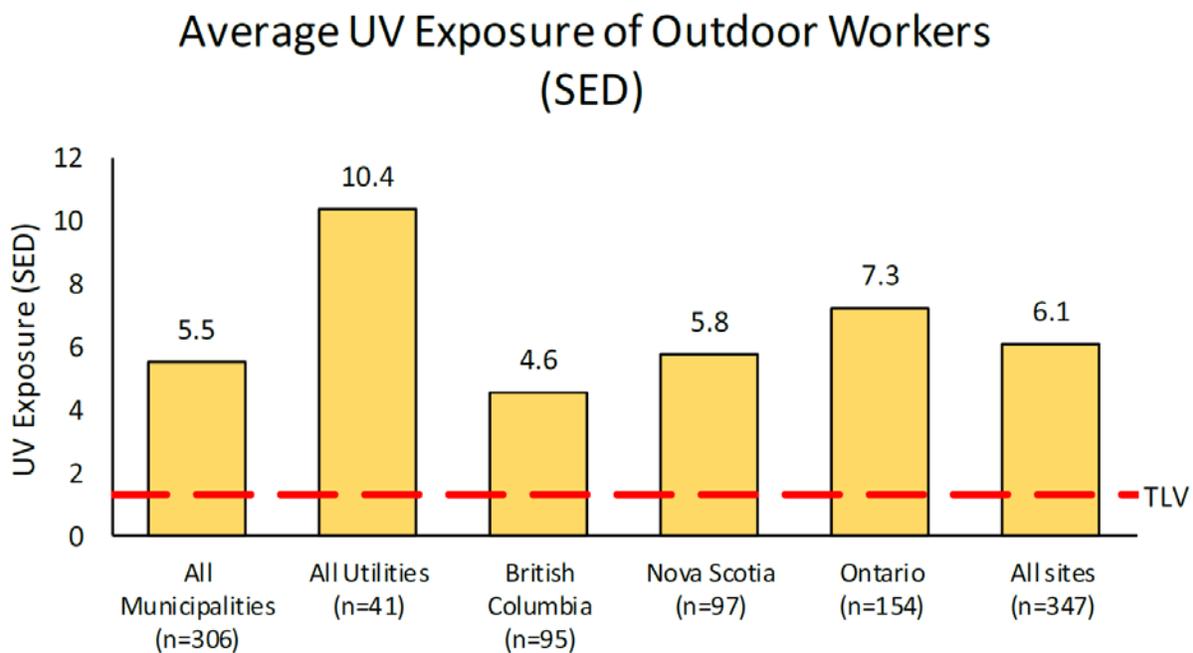


Figure 3: Average Daily UV Exposure of Outdoor Workers in Three Provinces in Canada

(Note: SED = Standard Erythema Dose)

Further, a large proportion of the workforce works outdoors. In Canada, there are between 1.5 million [45] and 5.4 million outdoor workers [40]. Solar radiation is also recognized as being the second most prominent carcinogenic exposure in Canada, with a majority of Canadian outdoor workers falling into the highest exposure category [45]. Despite the availability of guidance on a wide-range of protection measures [46-48], numerous studies have shown that implementing effective sun protection programs for outdoor workers continues to be highly challenging, with a low proportion of workers considered to be adequately protected

[40, 49-55]. Given all of this, the European Community has identified occupational exposure to ultraviolet radiation as one of the most important physical risks in the work environment [56].

Improving sun protection for outdoors workers is a strategic objective under the *Canadian Strategy for Cancer Control* [57]. Recent systematic reviews have indicated that there is growing evidence for the effectiveness of skin cancer prevention interventions for outdoor workers [58-61], and these are now recommended [62]. In Europe, interventions for skin cancer prevention are now considered to be most effective if focused on outdoor workers [63]. Finally, skin cancer prevention interventions are considered to show a good return on investment and have a large impact on population health [64-67].

WHAT IS A SUN SAFETY PROGRAM?

The **Model Sun Safety Program** as described in this Guide has been developed on the basis that it is to be part of an organization's *Occupational Health and Safety Management System (OHSMS)* or *Occupational Health and Safety Program (OHSP)*. In particular, it is that part of the OHSMS/OHSP which is directed towards the effective prevention and management of health hazards associated with sun exposure within the workplace.

We are mindful that workplaces already have a range of occupational health and safety systems/processes in place to protect workers. Therefore, the purpose of our Sun Safety Program is to assist workplaces in embedding sun safety within their existing systems/approaches. This means that there may be various ways in which workplace parties may wish to implement their Sun Safety Program, including:

- A workplace may have existing programs/plans to address solar UV radiation and/or heat stress, and so the elements described in this Sun Safety Program Guide may be selectively used to enhance the existing plans/programs/approaches; or
- A workplace may have an existing heat stress program/plan and wish to develop a complementary program to address solar UV radiation exposure, or vice-versa; or
- A workplace may have existing approaches/plans to address solar UV radiation and heat stress and may wish to develop one comprehensive plan for sun safety which addresses both issues in a coordinated way; or
- A workplace may not have existing plans/programs/approaches to address either solar UV radiation exposure or heat stress, and so may wish to develop a Sun Safety Program as a coordinated and documented program which describes all of the approaches which the workplace takes to address sun safety, and which is considered to be a 'program' of the workplace's OHSMS/OHSP.

As indicated in the **Appendix 1 - Definitions**, we recognize the difference between an **Occupational Health and Safety Management System (OHSMS)** and an **Occupational Health and Safety Program (OHSP)**. For the purposes of this Guide, we have adopted the approach that an OHSMS is consistent with and informed by *ISO 45001:2018*, *OHSAS 18001:1999* and *CSA Z1000-14*.

We have adopted the definition of an OHSMS as “the integrated set of organizational elements involved in the continuous cycle of planning, implementation, evaluation, and continuous improvement, directed toward the abatement of occupational hazards in the workplace” [68].

Such an approach emphasizes the role of continuous improvement and coordinated/comprehensive approach to addressing all of the occupational hazards faced within a workplace.

From a practical perspective, an OHSMS consists of policies, programs and procedures designed to reduce risk in the workplace. The bulk of an OHSMS consists of the many programs aimed at particular sets of problems or activities – e.g. training program, hearing conservation program, back care program. We recognize that sun safety will be only one of the issues which face outdoor workers and so it is important that the Sun Safety Program be integrated with the existing programs. Some programs are required by OHS legislation and others cover issues not mentioned in regulations but must be implemented under general duty clauses in legislation (refer to **Figure 4**).

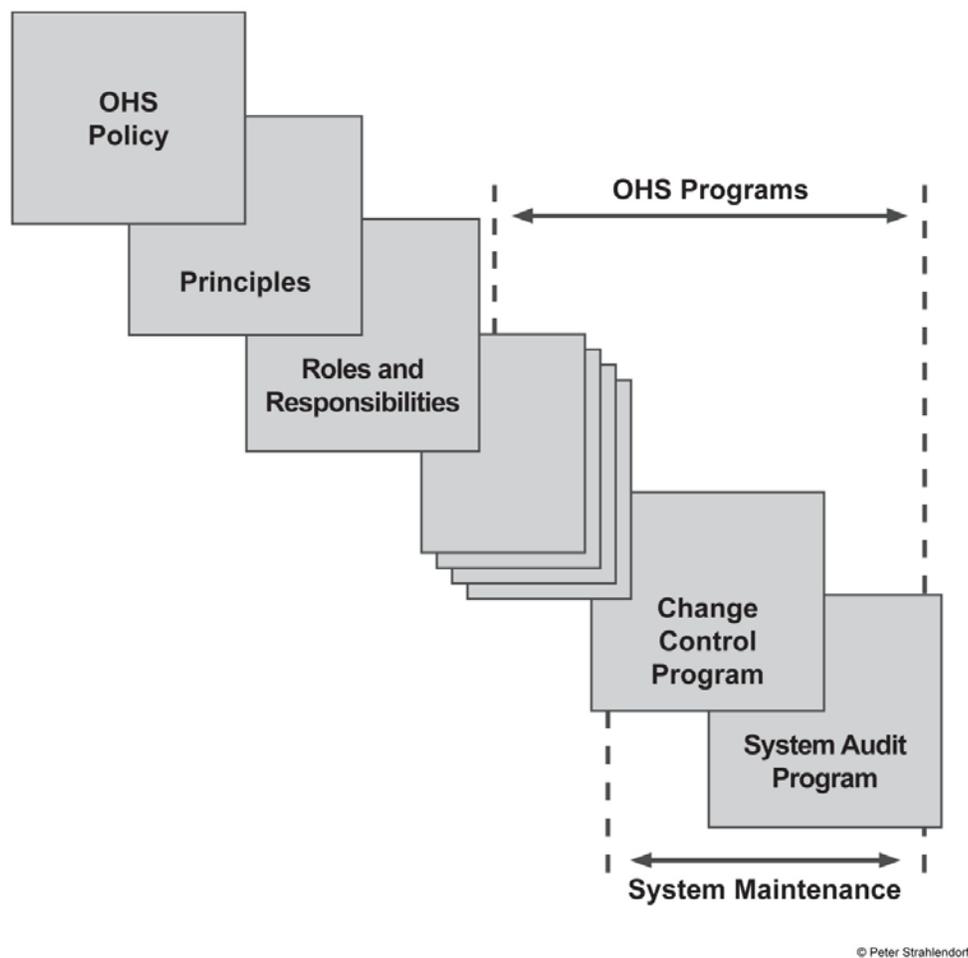


Figure 4. The OHSMS and OHS Programs

In regard to an OHSP, we recognize that the OHS legislation of most Canadian provinces uses the term “program” instead of “system” to refer to more of the operational aspects of an OHSMS, with the size of the workplace being a differentiating factor (i.e. smaller workplaces usually have a ‘program’ whereas large workplaces often have a ‘system’). Also, OHSP’s do not generally have the same emphasis on continuous improvement as is found in an OHSMS. As such, where a workplace is managing their OHS hazards within the context of an OHSP instead of an OHSMS, a “sun safety program” is then considered to be an element/suite of coordinated activities or measures within the overall OHSP, and it is that element which is focused on managing “sun safety”.

Despite the differences between an OHSMS and an OHSP, they are both based on the same framework/model of improvement, Plan-Do-Check-Act (PDCA). The steps of this model relate to OHS as follows:

- **Plan:** the plan step includes the following elements:
 - Development of an OHS policy which indicates a commitment to worker health and safety
 - The description of levels/roles of authority, accountability and responsibility relating to OHS
 - A description of the role of the workplace’s occupational health and safety committee (or worker representative) and the role of employee input and involvement in OHS
 - An identification of relevant legal and other requirements which impact OHS
 - A process for identifying and assessing workplace hazards, and
 - A process for identifying appropriate control measures.
- **Do:** this is the implementation of an operational phase, where the workplace implements the measures identified in the planning phase as being needed to control unacceptable risks from the hazards identified.
- **Check:** this is the checking and corrective action phase, where the workplace monitors how well the controls/system are working and then implements corrective action if needed, and
- **Act:** this reflects the need for ongoing high-level review of the OHSMS and a commitment to continuous improvement.

For a full OHSMS, there are recognized ‘elements’ for each of the above steps, with the workplace’s OHS policy forming the core/foundation of the OHSMS.

MODEL SUN SAFETY PROGRAM

When addressing sun safety as a specific workplace hazard, we have reviewed the recognized elements within the Plan-Do-Check-Act cycle as they relate to OHS in general, and have tried to indicate how sun safety may be appropriately addressed through each of the ‘elements’.

Our **Model Sun Safety Program** has been designed to follow the PDCA steps, with each of our ‘steps’ consisting of a series of sun safety ‘elements’ (refer to **Figure 5**).

Step 1: Core provides a foundation for the sun safety program and the core elements influence all of the other elements of the program. This is often referred to as the pre-plan step of a PDCA cycle. The two Core ‘elements’ of the Model Sun Safety Program are *Sun Safety Policy* and *Communication and Consultation*.

Step 2: Plan helps a workplace to:

- Review its current systems and processes for managing sun exposure of outdoor workers
- Establish appropriate systems for participation by workers and worker representatives
- Undertake an assessment of current workplace practices regarding sun exposure so as to understand the health and safety risks (e.g. skin cancer, heat stress) to workers
- As a result of this assessment, understand the effectiveness of current prevention and control measures and determine what further measures may be required to more effectively manage the health and safety risks identified

The four (4) Plan ‘elements’ of the Model Sun Safety Program are: *Authority, Accountability and Responsibility; Role of the Health and Safety Committee; Legal and Other Requirements; and Sun Safety Risk Assessment.*



Figure 5. Model Sun Safety Program

In the **Do** step, the workplace implements control and prevention measures in response to the outcomes of the risk assessment, particularly when the level of risk is deemed to be ‘not acceptable’. For our Model Sun

Safety Program, we have separated the usual PDCA ‘Do’ step into two steps: Do – Control Measures and Do – Support.

Step 3: Do – Control Measures provides specific sun safety control measures which are aligned with the ‘hierarchy of risk controls’ (i.e. *elimination, substitution, engineering controls, controls that increase awareness, administrative controls (including training), and personal protection* (see Figure 13 on page 37). The other elements of the Model Sun Safety Program included in this step are *control verification and validation, and off-the-job sun safety*.

Step 4: Do – Support provides activities/processes which support the implementation of control measures and which help to effectively manage risks from workplace hazards. These activities are common to the effective management of all workplace hazards and so the sun safety elements are part of the broader OHSMS. The Model elements in this step are *first-aid & incident notification, return to work, preventive maintenance, and procurement*.

Step 5: Check provides activities/processes which monitor how well the controls and other processes are working and then implements corrective action if needed. These activities are common to the effective management of all workplace hazards and so the sun safety elements are part of the broader OHSMS. The Model elements in this step are: *incident reporting & investigation; workplace inspection; documentation, records & statistics; and auditing & evaluation*.

Step 6: Act reflects the need for ongoing high level review of the OHSMS/sun safety program and a commitment to continuous improvement. The key element is *Management review & continuous improvement*.

For our Model Sun Safety Program, we have added some extra ‘elements’ which may not normally be associated with an OHSMS (e.g. off-the-job sun safety) and have not included some standard elements (e.g. emergency management) which are not related to managing sun safety as a workplace hazard. Wherever possible, we have tried to use language which is consistent with recognized OHS approaches, including ISO 45001:2018, OHSAS 18001:1999, CSA Z1000-14 and CSA Z1002-12.

As much as possible, the following considerations have been incorporated into, and have directed the design of, our Model Sun Safety Program:

- **Hierarchy of controls** – this is the accepted and fundamental concept that directs the selection of appropriate control measures, e.g. it is better to eliminate hazards before trying to control them.
- **Authority, Accountability and Responsibility** – specific activities at each level depends on the authority and control of the individual (e.g. executive, managers, supervisors, front-line workers) – all employees have a level of responsibility regarding OHS, and sun safety in particular. This consideration is emphasized through the **Internal Responsibility System (IRS)** – which includes the principle that everyone in an organization is responsible for OHS as an individual (refer to Element 2.1).
- **Scalability** – the program has been designed with the understanding that workplaces vary in size and complexity. As such, the program has been designed to be applicable to various sizes of workplaces and to allow for implementation over differing timelines.
- **Modularity** – the program has been designed to allow flexibility in the selection of elements based on existing approaches/controls and on work tasks specific to each workplace.

- **Linkage** – the program has been designed to link with other ‘programs’ in a workplace’s OHSMS, including training, purchasing, operations, auditing, personal protective equipment (PPE), etc.
- **Due diligence** – we consider that this is a principle that sets a high standard for performance in OHS: take every precaution reasonable in the circumstances (phraseology differs across jurisdictions).
- **Jurisdiction** – due to jurisdictional differences in OHS legislative requirements, the program has been designed from a perspective of ‘overarching’ principles/approaches which are ‘good practice’ for OHS, while also recognizing specific OHS requirements which are common across jurisdictions. Resources have been developed to provide a guide to implementation in various Canadian jurisdictions taking into account OHS legislative requirements (refer to Element 2.3).
- **Seasonality** – the program has been designed to enable implementation (i.e. program planning, development and implementation) which accounts for the significant seasonal differences (e.g. summer vs winter) in sun exposure which is experienced in Canada.
- **Contractors** – we recognize that for many workplaces, contractors represent a proportion of the workforce. We have tried to incorporate the sun safety responsibilities of contractors throughout the program elements.

It should also be remembered that the Plan-Do-Check-Act (PDCA) model provides a **step-wise approach to developing an OHSMS/Sun Safety Program**. As such, when developing a Sun Safety Program, the PDCA steps should be implemented in the following order: (1) Core, (2) Plan, (3) Do – Control Measures, (4) Do – Support, (5) Check, and (6) Act.

Sun Safety Resources:

To assist with implementation, an extensive range of resources were developed by the SSAWC project for use with the various elements of the Model Sun Safety Program. These resources are designed to provide detailed information for specific aspects of implementation for each element (e.g. risk assessment process for UV radiation). A full set of resources is listed in **Appendix 2** and **Appendix 3**, and specific resources for use with each element of the Model Sun Safety Program are listed in the following pages when discussing the specific elements.

This Guide therefore provides an overview of our Model Sun Safety Program, and describes the resources available to support the development and implementation of the program.

MODEL SUN SAFETY PROGRAM ELEMENTS

The **Elements** of our **Model Sun Safety Program** are listed below in Table 4. There are different ways to group these elements and Table 4 groups them by both ‘task’ and PDCA Step. For some readers, grouping the elements by task may assist in understanding how the elements fit together.

Table 4: Model Sun Safety Program Elements Listed by Task and PDCA Step

Task	Model Sun Safety Program Elements	PDCA Steps
Policy and organizational arrangements	Sun Safety Policy	Core
	Statements of authority, responsibility and accountability, with respect to sun safety	Plan
	Role of the health and safety committee with respect to sun safety	Plan
	Legal and other requirements	Plan
Risk assessment	Sun safety risk assessment	Plan
Control measures	Elimination or substitution	Do – control measures
	Sun safety engineering controls	Do – control measures
	Sun safe controls that increase awareness	Do – control measures
	Sun safe administrative controls	Do – control measures
	Sun safety personal protection	Do – control measures
	Control verification and validation	Do – control measures
Incident response & post-incident management	First aid and incident notification	Do – support
	Incident reporting and investigation	Check
	Return to work	Do – support
Support elements	Preventive maintenance	Do – support
	Communication and consultation	Core
	Workplace inspections	Check
	Documentation, records and statistics	Check
	Procurement	Do
	Auditing and evaluation	Check
	Management review and continuous improvement	Act
	‘Off-the-job’ sun safety	Do – control measures

IMPLEMENTAING A SUN SAFETY PROGRAM

In addition to following the specific step-wise approach for development provided by the PDCA model, the following generic steps for implementing a Sun Safety Program may be useful:



HOW THE REST OF THIS GUIDE IS ORGANISED

In the following sections we introduce each ‘Step’ of our Model Sun Safety Program. For each ‘Step’ we describe the Sun Safety Program ‘elements’ in detail. For each ‘element’, the following topics are discussed:

- **Scope/Description:** a description is provided for the element and its key sun safety attributes.
- **Implementation:** considerations for implementing the element within an OHSMS/OSHP are discussed.
- **SSAWC Resources:** resources produced by the Sun Safety at Work Canada (SSAWC) project for that program element are listed. These resources are free and are accessible for download from the ‘[Resource Library](https://sunsafetyatwork.ca)’ of the Sun Safety at Work Canada website <https://sunsafetyatwork.ca>. The resources are made available under Creative Commons License CC BY-NC-SA 4.0 to encourage sharing and use. All resources are available in English, and many are also available in French and some in Spanish. Resources are provided in file formats which enable easy integration and use of the content, and a number of the resources are designed to allow workplaces to co-brand the resource with their own logo prior to printing. A full list of SSAWC resources is provided in **Appendix 2** and **Appendix 3**.
- **Other Resources:** key resources related to the element and available from other sources are listed.

We also provide tips on how to build and implement your own program.

STEP 1 – CORE

The **Core** step provides a foundation for the Sun Safety Program and the core elements influence all of the other elements of the program. The two Core elements of the Model Sun Safety Program are:

- *Sun Safety Policy*, and
- *Communication and Consultation*.

These elements will now be discussed in detail.

'Core' Implementation Tips:

Get 'Buy In'

Commitment, leadership and effective participation are critical for a successful Sun Safety Program. It is important to have buy in and involvement from managers, workers, the **health and safety committee (or worker representatives)**, and others (for example, union representatives). Take the time to talk to everyone involved and address any concerns. Getting buy in may require highlighting the **legal requirements** for the Sun Safety Program (refer to Element 2.3) and making the case for why sun safety is needed (refer back to 'Why Occupational Sun Safety is Important' on page 7).

Start a Sun Safety Working Group

Starting a Sun Safety Working Group is a way to get and maintain buy in. It also helps to make sure the Sun Safety Program is useful and relevant to everyone at the workplace.

ELEMENT 1.1 – SUN SAFETY POLICY

SCOPE/DESCRIPTION

Within the OHSMS/OHS Program, the **OHS Policy** provides statements which guide all of the organization’s actions regarding OHS. The OHS policy should describe the organization’s overall intention, vision and direction for how it manages OHS. It often includes:

- Commitment from top management regarding the importance and organizational priority of both preventing illness and injury and implementing effective systems and processes to achieve this.
- Commitment to comply with legal responsibilities
- A description of the organization’s objectives for OHS, and
- A description of the general OHS responsibilities of individuals at all levels of the organization (front line to CEO).

A **Sun Safety Policy** is a policy statement made by the organization regarding its commitment to providing a Sun Safe workplace. Depending on what hazard-specific policies are already in place, this may take the form of an overarching Sun Safety Policy (which addresses both solar UV radiation and heat stress), or may address heat stress and solar UV radiation separately (refer to **Figure 6**). A workplace may also wish to frame this policy in terms of ‘working in a hot outdoor environment’. Whatever approach an organization wishes to take, the important point is that sun safety should be included at a policy level when addressing OHS hazards within a workplace.

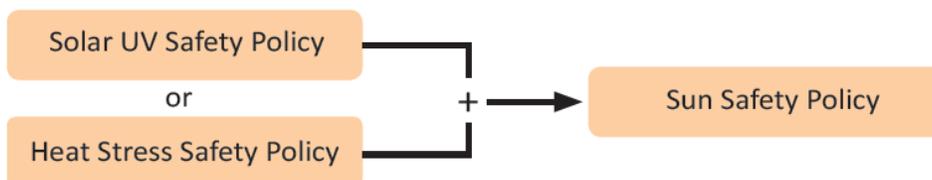


Figure 6: Sun Safety Policy Options

Some workplaces may already have a specific approach/format for OHS hazard-specific policies or policy statements. In these cases, we would encourage you to continue to use these approaches/ formats and include a new policy or policy statement for sun safety. If an organization does not have a specific approach/format for OHS hazard-specific policies, a range of examples are provided in the resources section. Involvement of the health and safety committee (or health and safety/worker representative) may be very helpful in drafting the Sun Safety Policy. No matter which approach is used by an organization, we would encourage you to include the following considerations in a Sun Safety Policy/policy statement:

- **Management commitment** – a commitment by the organization that it will provide a ‘sun safe’ workplace which aims to prevent over-exposure to solar UV radiation and prevent heat stress in outdoor workers.

- **Principles** – these are concepts which frame the organization’s philosophy/approach to addressing OHS and sun safety in particular. These may include:
 - Sun safety is recognized as a priority for the workplace
 - Sun safety is everyone’s responsibility (the IRS philosophy)
 - Recognition of the legal obligations the organization has to protect workers from over-exposure to the sun
 - The importance of worker involvement in the policy process and valuing employee feedback and participation.
- **Background/Rationale** – this would include a statement/description of why sun safety is an important workplace issue and why it important for this organization.
- **Scope** – who does the policy apply to? Such as, all departments/units who employ outdoor workers.
- **Objectives** – these are measurable objectives/targets for sun safety, and may include:
 - To implement a comprehensive Sun Safety Program which is reviewed annually
 - To undertake risk assessments (initially and periodically when changes occur) to identify high risk jobs and select control measures
 - To implement control measures appropriate for the job/task and to monitor their effectiveness
 - To provide ongoing training and education for employees regarding sun safety.
- **Responsibility** – some policies include a section on *Authority, Responsibility and Accountability* of employees across the organization, whereas for other policies, these are described in a separate document.
- **Definitions** – a list of relevant definitions relating to sun safety
- **Documentation** – an identification of relevant documentation associated with implementing the policy

IMPLEMENTATION

As indicated previously, a Sun Safety Policy forms the core, or foundation, of the Sun Safety Program. As such, it is the first step in implementing a sun safety program. The specific steps in developing and implementing a Sun Safety Policy include:

1. Establish a working group or other procedure through which appropriate representatives from the workplace are charged with overseeing the development of the policy
2. Establish a process for reviewing current practices and receiving feedback on worker and management perspectives regarding sun safety
3. Develop a first draft of the policy
4. Circulate the draft policy for review by both worker and management representatives
5. Revise the policy based on comments received
6. Forward the policy for review by the relevant internal authorities, e.g. Health and Safety Committee, Health and Safety/Worker Representative, Management, etc.
7. Implement the policy, including appropriate communication throughout the organization
8. Review and evaluate the policy on a regular basis, e.g. annually.

For a Sun Safety Policy to be effective, the following are critical during development [69]:

- Involvement from both management and worker representative

- The policy must be consistent with the workplace’s operational objectives
- The policy should address the ‘real’ needs of the workplace and so must be seen as being relevant for and by both workers and management
- The policy needs to be accepted as being as equally important as other OHS policies

As the Sun Safety Policy is part of the workplace’s Sun Safety Program, further details on the considerations for implementing a comprehensive Sun Safety Program are provided in the sections of this Guide titled *Implementing a Sun Safety Program for Small Workplaces* and *Implementing a Sun Safety Program for Large Workplaces*.

SSAWC RESOURCES

Policy-Related Resources

- *Sun Safety Policies* (factsheet)
- *Sun Safety Policy Example – Small Workplace*
- *Sun Safety Policy Example – Large Workplace*
- *Solar Ultraviolet Radiation Safety Policy Example – Small Workplace*
- *Solar Ultraviolet Radiation Safety Policy Example – Large Workplace*
- *Heat Stress Safety for Outdoor Workers Policy Example – Small Workplace*
- *Heat Stress Safety for Outdoor Workers Policy Example – Large Workplace*
- *Sun Safety Policy Checklist*

Background Information Resources

- *Sun Exposure at Work Increases Risk of Skin Cancer* (fact sheet)
- *Solar UV & Outdoor Work* (fact sheet)
- *Heat Stress & Outdoor Work* (fact sheet)
- *Work/Rest Cycles* (fact sheet)
- *Heat Stress – Watch for the Signs* (fact sheet)
- *Acclimatization* (fact sheet)

OTHER RESOURCES

Example sun safety policies are also available in the following web-accessible resources:

- *Sun Safety For Outdoor Workers: A toolkit for policy development* (Niagara Region Public Health, 2013). Available from: https://www.niagararegion.ca/living/health_wellness/workplace/pdf/sun-safety-workplace-handbook.pdf
- *Be Sunsible* <https://besunsible.healthiertogether.ca/>
- *Guide on Exposure to Solar Ultraviolet Radiation (UVR)* (Safe Work Australia, 2013). Available from: <https://www.safeworkaustralia.gov.au/doc/guide-exposure-solar-ultraviolet-radiation-uvr>

ELEMENT 1.2 – COMMUNICATION & CONSULTATION

SCOPE/DESCRIPTION

An ongoing challenge for a workplace is the effective communication of OHS issues and information both within the organization and with external stakeholders. Effective communication is critical to the successful management of OHS hazards.

An important aspect of a **Sun Safety Program** is the active participation of workers and worker representatives from across the organization as well as participation from all levels of the organization. An OHSMS requires a very high level of employee involvement. This is because workers have a lot to gain from a successful OHSMS as well as the most to lose if the system fails. Workers also tend to know the most about their jobs and the hazards inherent in doing their work. A high level of employee involvement will usually mean a greater level of buy in from individuals.

IMPLEMENTATION

A workplace needs to have a well-established, documented and understood system of OHS communication. This includes identifying what, when and how information should be communicated, who is to undertake/be involved in the communication, and to whom the information should be communicated.

It is important to have active participation by workers in OHS, and sun safety in particular, through [70]:

- Having opportunities to be involved in the design and implementation of the Sun Safety Program
- Having access to information they need to effectively contribute to the Sun Safety Program and to do their jobs safely
- Encouraging the reporting of health and safety concerns, including incidents of over-exposure to the sun and adverse health outcomes such as skin cancer and heat stress

SSAWC RESOURCES

A large range of the resources produced by the SSAWC project are designed to increase sun safety communication and consultation within the workplace. This includes training resources such as:

- Factsheets (on a broad range of topics)
- Toolbox/safety talks
- Presentations (power-point slides)
- Videos, and
- Posters

A range of implementation resources are also available, such as:

- Various assessment tools, such as the workplace risk assessment tools for UV radiation and for heat stress, personal risk assessment tools for skin cancer and heat stress, as well as the *Sun Safety Program – Baseline Assessment, Sun Safety Action and Evaluation Plan, Sun Safety Inspection Checklist*, and the *Incident Investigation Report*.

- UV Index posters
- Heat Stress Alert and Heat Stress Warning posters

A full list of resources is provided in **Appendix 2** and **Appendix 3**.

OTHER RESOURCES

Appendix 4 – Other Resources provides a comprehensive list of resources available from many organizations associated with sun safety, skin cancer prevention and heat stress prevention. Some of these are:

- Be Sunsible (Alberta Health Services): <https://besunsible.healthiertogether.ca/>
- Sun Safe Colorado at Work: <http://work.sunsafecolorado.org/>
- Sun Safe Workplaces (UK): <http://www.sunsafeworkplaces.co.uk/>
- What's Your Sun Safety IQ? (American Cancer Society):
<http://www.cancer.org/healthy/toolsandcalculators/quizzes/sun-safety/index>
- Take the Quiz - Skin Cancer (American Cancer Society):
<http://www.cancer.org/healthy/toolsandcalculators/quizzes/skin-cancer-quiz/index>
- Sun Sense (Canadian Cancer Society): <https://www.cancer.ca/en/prevention-and-screening/reduce-cancer-risk/get-involved-on/sunsense/?region=on>
- Screen Me (Melanoma Network of Canada): <https://sunaware.ca/>

STEP 2 – PLAN

The **Plan** step of the Model Sun Safety Program helps a workplace to:

- Review its current systems and processes for managing sun exposure of outdoor workers
- Establish appropriate systems for participation by workers and worker representatives
- Undertake an assessment of current workplace practices regarding sun exposure to understand the health and safety risks (e.g. skin cancer, heat stress) to workers from sun exposure
- As a result of this assessment, understand the effectiveness of current control and prevention measures and determine what measures may be required to more effectively manage the health and safety risks identified.

The four (4) **Plan** elements of the Model Sun Safety Program are:

- Authority, Accountability and Responsibility
- Role of the Health and Safety Committee and/or worker representatives
- Legal and Other Requirements, and
- Sun Safety Risk Assessment

These elements will now be discussed in detail.

'Plan' Implementation Tips:

Baseline Assessment

A comprehensive assessment of your current sun safety practices is needed to understand how effective they are. It is also an important way to obtain worker feedback. The *Sun Safety Program – Baseline Assessment* can be used for this task. This Baseline Assessment includes reference to other resources associated with the 'Plan' elements, such as roles and responsibilities, legal issues, and risk assessment.

Action Plan

Developing an 'Action Plan' helps to document and prioritize program elements that need enhancing or implementing. It should include a timeline for taking the actions. The 'Action Plan' should also identify who is responsible and what resources are needed. Management and/or the Health and Safety Committee often need to review the 'Action Plan'. The *Sun Safety Action and Evaluation Plan* can be used for this task. For many workplaces, developing and implementing a comprehensive Sun Safety program will take a number of years. As such, having a timeline for implementation is important. Some workplaces initially implement initiatives that are 'easier' in order to gain buy in and momentum, with the 'harder' or more costly initiatives scheduled for later in the timetable.

ELEMENT 2.1 – AUTHORITY, ACCOUNTABILITY & RESPONSIBILITY

SCOPE/DESCRIPTION

OHS legislation in most jurisdictions is based on a philosophy of personal responsibility. Everyone at a workplace – from front-line worker to CEO – should be engaged in OHS as an intrinsic part of their job. This approach to OHS has been called the Internal Responsibility System (IRS), as named in the Ham Royal Commission Report of 1976 (refer to **Figure 7**) [71].



Figure 7. OHS Responsibility Framework

The employer has the primary responsibilities. But the employer organization is not a “black box”. Every individual has OHS responsibilities. The role of external entities, such as government regulators and inspectors is not to make the workplace safe for people, but to ensure that those internal to the workplace are fulfilling their obligations.

Within the IRS, there is a distinction to be made between those with “direct responsibility” and those with “indirect” or “contributive responsibility” (refer to **Figure 8**).

The OHS professional and workplace OHS committees are not directly responsible for OHS. Their role primarily is to assist those with direct responsibility. They assist when the IRS is not working effectively. In a more positive way, they advise and consult on the development, implementation and monitoring of the elements of the OHSMS.

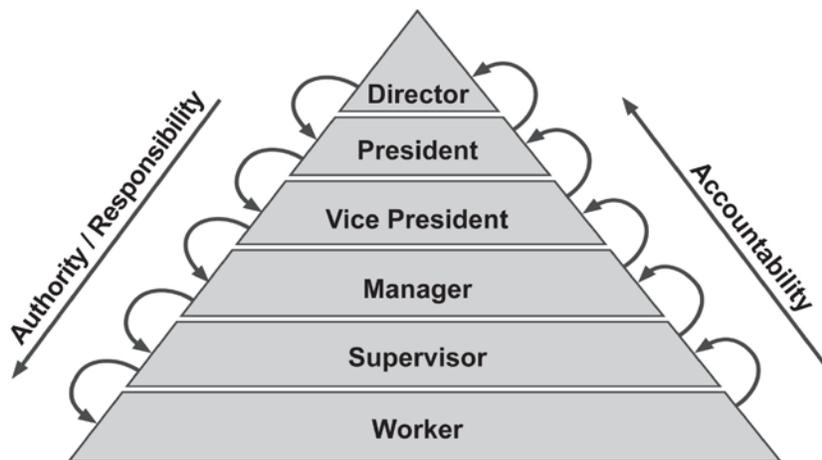
The IRS can exist prior to law; it is simply a good way to organize to reduce risk. When expressed in OHS legislation, it is the employer and the individuals with direct responsibility who have the primary legal duties and who are most susceptible to prosecution should they fail to carry out their duties effectively.



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Figure 8. Internal Responsibility as Described by the IRS

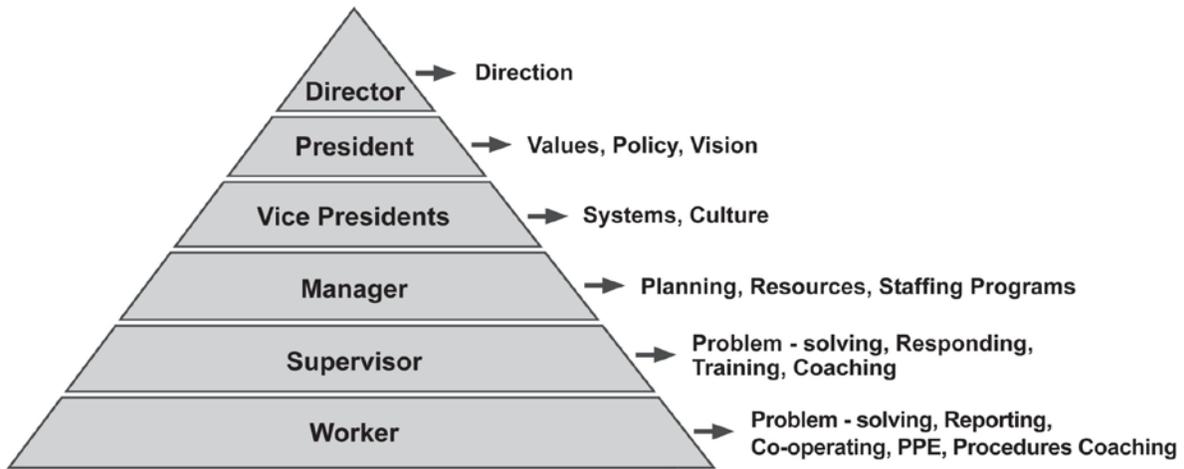
“Responsibility” and “authority” are delegated downwards through the employer organization. Everyone has both responsibilities for OHS and sufficient authority to carry out those responsibilities (refer to **Figure 9**). **Responsibility** refers to obligations or duties which each person has, particularly as described in OHS legislation. **Authority** refers to the recognized power to engage in OHS activities and the ability to direct others to engage in OHS. **Accountability** relates to being ‘held to account’ – performance review – to ensure that responsibilities are in fact carried out, and that authority has been exercised properly.



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Figure 9. Responsibility and Authority Within an Organization

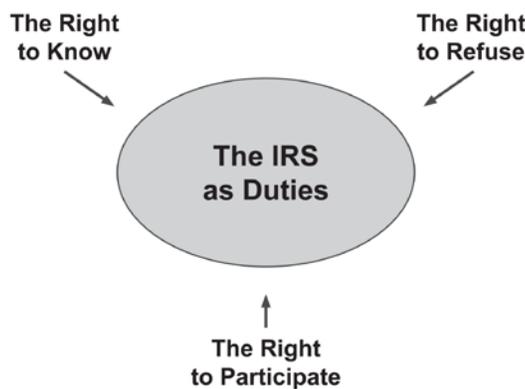
While everyone does OHS, people do different things depending on their authority and control. Senior officers are responsible for policy and leadership. Managers are primarily engaged in staffing, budgets, resource allocation and program development. Front-line supervisors are concerned with training and work procedures. Front-line workers apply their training, follow procedures and are on the look out for contraventions, defects and hazards (refer to **Figure 10**). There is much knowledge that is never written down. Everyone has workplace-specific knowledge and experience that can be used to reduce risk. The power of the IRS is that it is the only approach that takes full advantage of everyone’s unique knowledge and experience.



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Figure 10. Different Levels of the Organization do Different OHS Activities

While the IRS is primarily about duties, it also includes the three worker rights that are articulated in most jurisdictions. The ‘right to know’ about hazards and controls is usually expressed in law as “duties to tell” on the part of the employer and supervisor. The ‘right to refuse’ unsafe work is a failsafe mechanism for when the usual processes in the IRS are not working well. The ‘right to participate’ is usually expressed through the role of Worker Representatives and workplace Health and Safety Committees. The rights are ancillary or secondary. They are important for the main core of the IRS to work properly (refer to **Figure 11**).



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Figure 11. The IRS as Duties and Rights

An important element of an OHSMS is what are often described as “roles and responsibilities”. This is where the IRS is set out, whether it is called the “IRS” or not. If an OHSMS is not built around the framework of the IRS it is unlikely to be effective. The IRS is the “people framework” of an OHSMS. Without it an OHSMS is likely to remain a three-ring binder – a paper exercise. Each program has more specific activities for individuals. Everyone should know what they must do under the OHSMS, and by checking the OHSMS it should always be clear who is supposed to be doing what under each program.

IMPLEMENTATION

The relevance of the IRS to sun safety lies in the development of a Sun Safety Program within an OHSMS, and which is based on the participation of everyone in the organization. The Model Sun Safety Program identifies workers, supervisors, managers and senior officers as all having responsibilities (as well as appropriate authority and accountability) to ensure a sun safe workplace. These responsibilities may be found in a number of places in the OHSMS – in the general statements of responsibility, authority and accountability in a “roles and responsibilities” element and in more specific forms set out in a workplace’s Sun Safety Policy and the particular activities in the Sun Safety Program. There are many ways of describing the activities that individuals at different levels of the organization would have for sun safety. They may include the following:

Front-Line Workers:

- Following regulatory procedures (if any)
- Following employer's procedures in the sun safety program
- Following supervisor's procedures for sun safety that are location and time specific
- Identifying defects, contraventions and dangers relating to sun safety
- Identifying opportunities for improvements in reducing sun risks
- Applying discretion to solve sun safety problems
- Reporting unsolved problems and opportunities for improvement with respect to sun safety

Supervisors:

- Coaching and training regarding sun safety
- Job observation with respect to compliance with sun safety procedures
- Job planning for sun safety at particular locations or for specific activities
- Safety talks and tailboard conferences regarding sun safety
- Enforcement of rules and regulations for sun safety
- Discipline for willful non-conformance with sun safety rules and regulations
- Taking problems and opportunities regarding sun safety to managers

Managers:

- Development and implementation of a sun safety program
- Ensuring adequate resources (staffing, budgeting, equipment) for sun safety
- Sun safety program performance evaluation
- Training and leadership for supervisors for sun safety
- Holding supervisors accountable for sun safety

- Considering system wide problems regarding sun safety
- Taking problems regarding sun safety and opportunities for improvement to more senior management

Senior Managers (Officers):

- Sun Safety Policy
- Ensuring competent professionals to advise on sun safety program
- Sufficient resource allocation for a sun safety program
- Sun safety leadership
- Holding managers accountable for sun safety
- Ensuring periodic "system audits" that include auditing of the sun safety program

As noted, OHS worker representatives and OHS workplace committees are not directly responsible for OHS. Their role in a sun safety program is of two general kinds. They should be involved in the planning and development of the sun safety program. They provide advice on the implementation of the program. They may be involved in auditing the program. Second, they should be involved in problem-solving with regard to sun safety issues; particularly when the individuals in the IRS are not functioning properly. Different jurisdictions have differing degrees of involvement of representatives and committees in their legislation. Collective agreements may also affect the degree of involvement.

SSAWC RESOURCES

- *Roles & Responsibilities Example – Heat Stress Safety Program for Outdoor Workers*
- *Roles & Responsibilities Example – Solar Ultraviolet Radiation Safety Program*

OTHER RESOURCES

Generic (i.e. non-sun safety) examples and discussion on the issues of accountability, authority and responsibility associated with OHS Programs is available from a range of resources including:

- *Implementing an Occupational Health and Safety (OH&S) Program*. Canadian Centre for Occupational Health and Safety, Hamilton, ON, 2012.
- *Small Business Health and Safety Resource Manual*. Public Services Health & Safety Association, Toronto, ON, 2017. Available from: <http://www.pshsa.ca/sbrm/>
- *Occupational Health and Safety Toolkit for Small Business* (Worksafe Alberta): <https://open.alberta.ca/publications/occupational-health-and-safety-tool-kit-for-small-business>
- *Closing the Loop: Setting up a Health & Safety System in Your Small Business* (Workplace Safety and Prevention Services): <https://www.wspss.ca/WSPS/media/Site/Resources/Downloads/Closing-the-Loop-Generic-Version.pdf?ext=.pdf>
- *Policy and Program Templates – Responsibilities* (Infrastructure Health and Safety Association): <https://www.ihsa.ca/resources/responsibilities.aspx>

ELEMENT 2.2 – ROLE OF THE HEALTH AND SAFETY COMMITTEE

SCOPE/DESCRIPTION

Canadian OHS legislation provides for the set-up and operation of a Health and Safety Committee. This is a joint worker-management team that helps the employer to create and maintain a safe and healthy workplace. The size and make-up of the committee is described in OHS legislation and often depends on the size of the workplace. The role of the committee is also described in legislation and this can vary among jurisdictions. In general, the health and safety committee helps the employer to recognize and evaluate workplace hazards, and to develop, implement and evaluate the workplace's OHSMS or OHSP. The committee plays an important role in recommending action, with the employer ultimately responsible for health and safety at the workplace.

Please note: when we refer to Health and Safety Committee, we also include reference to worker Health and Safety Representatives where appropriate.

IMPLEMENTATION

The Model Sun Safety Program recognizes that the Health and Safety Committee plays an important role in developing, implementing and evaluating a workplace's Sun Safety Program. This includes:

- Overseeing an assessment of current workplace practices and control measures regarding sun exposure
- Recommending measures which may be required to more effectively manage the health and safety risks identified
- Reviewing and implementing the workplace's systems and processes for managing sun exposure of outdoor workers

SSAWC RESOURCES

A discussion of the role of Health and Safety Committees with respect to sun safety is provided in the following resources:

- *Legal Issues in Sun Safety for Canadian Workplaces*
- *Roles & Responsibilities Example – Heat Stress Safety Program for Outdoor Workers*
- *Roles & Responsibilities Example – Solar Ultraviolet Radiation Safety Program*

OTHER RESOURCES

Generic (i.e. not sun safety) discussion on the role of Health and Safety Committees and OHS Programs is available from a range of resources including:

- *Health and Safety Committees Reference Guide*. Canadian Centre for Occupational Health and Safety, Hamilton, ON, undated. <http://www.ccohs.ca/products/publications/hscomm.html>
- *Implementing an Occupational Health and Safety (OH&S) Program*. Canadian Centre for Occupational Health and Safety, Hamilton, ON, 2012. <https://www.ccohs.ca/products/publications/OHSPProgram.html>

- *Small Business Health and Safety Resource Manual*. Public Services Health & Safety Association, Toronto, ON, 2017. Available from: <http://www.pshsa.ca/sbrm/>
- *Occupational Health and Safety Toolkit for Small Business* (Worksafe Alberta): <https://open.alberta.ca/publications/occupational-health-and-safety-tool-kit-for-small-business>
- *Closing the Loop: Setting up a Health & Safety System in Your Small Business* (Workplace Safety and Prevention Services): <https://www.wsps.ca/WSPS/media/Site/Resources/Downloads/Closing-the-Loop-Generic-Version.pdf?ext=.pdf>
- Policy and Program Templates – *JHSC/Health & Safety Representative* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/hs_rep.aspx

ELEMENT 2.3 – LEGAL AND OTHER REQUIREMENTS

SCOPE/DESCRIPTION

The purpose of OHS legislation is to protect workers from hazards on the job. In Canada, there are 14 jurisdictions – one federal, ten provincial, and three territorial – each having their own OHS legislation. For most people, the legislation which applies is that of the province or territory in which you work [69].

General Duty for OHS

In general, all Canadian OHS legislation provides for specific duties for employers as well as for specific individuals. Employers have an overall responsibility (often referred to as the ‘general duty’) to provide a healthy and safe workplace. As it is impossible for OHS legislation to provide requirements for all occupational hazards, the ‘general duty’ places an obligation on employers to ensure that employees are protected from occupational hazards which are not specifically covered in the legislation but which are likely to occur in their particular workplace.

IMPLEMENTATION

Sun exposure of outdoor workers is often one of the occupational hazards not specifically addressed in legislation. Despite this, under the ‘general duty’, employers who have outdoor workers still need to make sure that the sun exposure of their workers is appropriately controlled to ensure that adverse health outcomes (e.g. sunburn, skin cancer, heat stress) do not occur. In general, employers operationalize this responsibility through undertaking a risk assessment and implementing control measures in-line with the outcomes of the risk assessment.

In addition to legal requirements, a comprehensive OHSMS also takes into account ‘**other requirements**’, which may come from [72]:

- Customers
- Corporate commitments
- An organization’s collective agreement obligations, and
- Voluntary participation in local, provincial, federal or international programs which focus on OHS

SSAWC RESOURCES

- *Legal Issues in Sun Safety for Canadian Workplaces* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Alberta* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in British Columbia* (information sheet)
- *Legal Issues in Sun Safety for Federal Workplaces in Canada* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Manitoba* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in New Brunswick* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Newfoundland and Labrador* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in the Northwest Territories* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Nova Scotia* (information sheet)

- *Legal Issues in Sun Safety for Workplaces in Ontario* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Prince Edward Island* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Quebec* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in Saskatchewan* (information sheet)
- *Legal Issues in Sun Safety for Workplaces in the Yukon* (information sheet)

OTHER RESOURCES

Occupational Health and Safety legislation for provinces, territories and federal workplaces can be accessed through the website of the Canadian Legal Information Institute (CanLII): <https://www.canlii.org/en/>

Most provinces will also have information sheets on specific workplace hazards and how these are regulated within their jurisdiction. An example is *Ultraviolet Radiation in the Workplace* from the Ontario Ministry of Labour: <https://www.labour.gov.on.ca/english/hs/pubs/uvradiation/>.

General OHS examples/resources include:

- Policy and Program Templates – *Legislation* (Infrastructure Health and Safety Association): <https://www.ihsa.ca/resources/legislation.aspx>

ELEMENT 2.4 – SUN SAFETY RISK ASSESSMENT

SCOPE/DESCRIPTION

Sun safety risk assessment is an important technical element of the Model Sun Safety Program. Its purpose is to help a workplace identify and understand:

- The occupational **hazard** posed by **exposure** to the sun
- **Who** is exposed and **what levels** of sun exposure they receive
- **What** protection/control measures are currently in place
- What are the **risks** to workers and the organization from over-exposure of workers to the sun
- What additional control measures may be appropriate and how much are these able to reduce the risks identified

The generic risk assessment process includes [73]:

- **Hazard identification** – for a sun safety risk assessment, the sun is the identified hazard. However, the different wavelengths of radiation emitted by the sun produce different adverse health effects. For example, the ultraviolet range of wavelengths is responsible for skin and eye conditions, such as sunburn and skin cancer, whereas the infrared wavelengths produce heating effects associated with heat stress.
- **Risk analysis** – this involves an assessment of the levels of sun exposure which different workers/job tasks have, and an assessment of the level of risk posed to workers from this exposure. The risks assessed relate to the adverse health effects from over-exposure.
- **Risk evaluation** – this involves comparing the estimated risk/s against given criteria to determine the significance of the risk. In our case, the evaluation criteria primarily come from occupational exposure standards (e.g. ACGIH TLV®s for UV and Heat Stress and Strain).

Please note: the risk assessment process described in this element of the Sun Safety Program refers to assessing risks for an organization and is based on the level of sun exposure of their workers and the work tasks undertaken. For the adverse health outcomes we wish to prevent by implementing a Sun Safety Program, individuals also have an inherent/personal level of risk which varies based on factors such as skin type and history of sun exposure (for skin cancer), and underlying health conditions (for heat stress).

IMPLEMENTATION

Due to the different health outcomes for sun exposure, we recommend two separate risk assessment processes – one for skin and eye conditions from exposure to solar UV radiation, and the other for heat stress from sun exposure. For both of these risk assessment processes, we recommend the following three (3) steps in undertaking a comprehensive sun safety risk assessment:

1. **Operational review** – this helps a workplace gain an understanding of the operational environment and factors which increase the risk of adverse health conditions from sun exposure of their outdoor workers. This is the key risk assessment step for solar UV radiation, and is an important ‘contextualizing’ step for heat stress.

2. **Job Safety Analysis** – this is a more detailed analysis of exposures and control measures for specific positions/work tasks identified as being at an elevated risk.
3. **Daily assessment** – during seasons/months of elevated risk (as identified during the operational review step), additional daily assessment procedures are necessary. This is particularly important for heat stress, where an assessment of the **WBGT** or **Humidex** is necessary on a daily basis (including multiple measurements per day) and then appropriate actions taken in response to identified ‘trigger’ values.

The relationship between the three steps recommended for sun safety risk assessment and the generic risk assessment steps is shown in **Figure 12**.



Figure 12. Sun Safety Risk Assessment Steps

SSAWC RESOURCES

A detailed description of the risk assessment approach for solar UV radiation and heat stress, along with supporting resources to implement the risk assessments is provided in the following resources:

Solar UV Radiation:

- *Solar UV Radiation Risk Assessment for Outdoor Workers: Technical Guide*
- *Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review*
- *UV Index* (poster, for posting daily UV Index values and actions to take)
- *Daily Procedure – Solar UV*
- *Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers*

Heat Stress:

- *Heat Stress Risk Assessment for Outdoor Workers: Technical Guide*
- *Heat Stress Risk Assessment for Outdoor Workers: Operational Review*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan*
- *Heat Stress Daily Assessment procedure – WBGT*

- *Heat Stress Daily Assessment Procedure - Humidex*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex*
- *Heat Stress Alert (poster)*
- *Heat Stress Warning (poster)*
- *Personal Risk Assessment: Heat Stress for Outdoor Workers*

OTHER RESOURCES

A wide range of resources are available which describe generic OHS risk assessment approaches. These include:

- *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control.* CSA Group, 2014. <http://www.csagroup.org/services/worker-and-workplace-safety/>
- CCOHS – *Risk assessment:* https://www.ccohs.ca/oshanswers/hsprograms/risk_assessment.html
- CCOHS – *Job safety Analysis:* <https://www.ccohs.ca/oshanswers/hsprograms/job-haz.html>
- Safe Work Australia – *Model Code of Practice: How to Manage Work Health and Safety Risks:* <https://www.safeworkaustralia.gov.au/book/model-code-practice-how-manage-work-health-and-safety-risks>
- PSHSA – *Risk Assessment and Job Hazard Analysis:* <https://www.pshsa.ca/resources/risk-assessment-and-job-hazard-analysis>
- Policy and Program Templates – *Hazard Assessment, Analysis & Control* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/hazard_assessment_analysis_control.aspx

STEP'S 3 & 4 – DO

In the **Do** step, prevention and control measures are implemented in response to the outcomes of the risk assessment, particularly when the level of risk is deemed to be 'not acceptable'. For our Model Sun Safety program, we have separated the 'Do' step into two steps: **Step 3: Do – Control Measures** and **Step 4: Do – Support**.

INTRODUCTION TO CONTROL MEASURES

A well established principle in OHS is the 'hierarchy of risk controls'. This provides the underlying approach to identifying and implementing **control measures**. Using this hierarchy, the most effective controls should be implemented first, with the less effective controls implemented in order and only considered when control is not achieved using more effective controls. The hierarchy is shown in **Figure 13** [73].

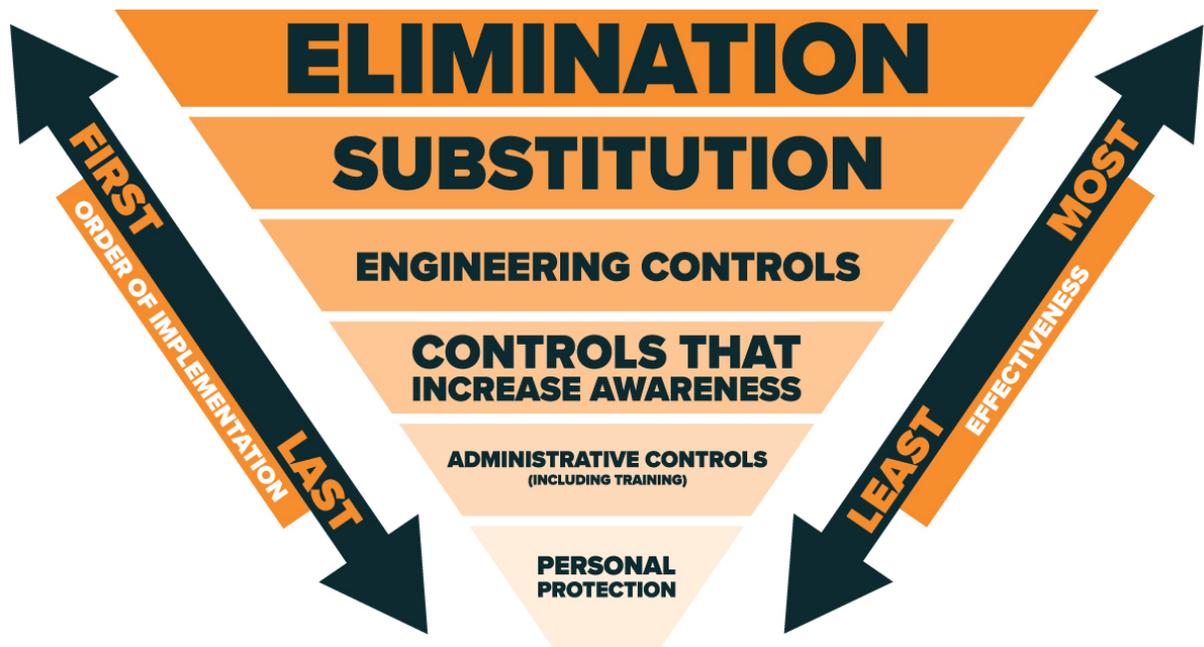


Figure 13: Hierarchy of Risk Controls

Control measures can also be considered at three points between the source and the worker:

- The most effective level of control addresses the hazard at its source (through elimination or substitution)
- The next most effective level of control is to intervene between the source and the worker (i.e. through engineering controls and systems that increase awareness)
- The least favorable level of control is to implement measures at the point of the worker (i.e. administrative controls or personal protective equipment)

As indicated by this approach, the use of **personal protection** is the least favorable approach to controlling workplace hazards, even though it is often considered (mistakenly) as the control option of first choice. It should be clear that the reason for personal protection being the ‘last line of defense’ is that if it fails, the worker will be directly exposed. In many cases, it is necessary to use a combination of control measures in order to effectively manage the risk of a hazardous exposure.

For effective management of sun exposure, a combination of control measures is normally required. The key personal protection and control measures for workers (what we refer to as our ‘six simple steps’) are listed in **Table 5**. Note – these ‘six simple steps’ are not listed in order of importance or implementation – they are all important!

Table 5. Six Simple Steps for Prevention and Control of Occupational Sun Exposure

Solar UV Safety/Skin Cancer Prevention	Heat Stress Prevention
1. Cover up – wear loose clothing, long sleeves and pants	1. Know the signs and symptoms of heat stress
2. Protect your eyes – use UV protective eyewear	2. Watch out for symptoms in yourself and others
3. Cover your head, neck and ears – wear a wide brimmed hat, hard hat with a brim and use a neck flap	3. Wear sunscreen, a hat, and lightweight, loose-fitting clothing
4. Take your breaks in the shade – get out of the sun when you can, especially between 11am and 3pm, when UV radiation is the strongest	4. Drink water often – avoid drinks with alcohol or caffeine
5. Use sunscreen and lip balm – use at least an SPF 30 broad spectrum, water resistant sunscreen and don’t forget to reapply	5. Take breaks in the shade and more often on hot days
6. Be skin safe – report changes in skin spots and moles to your doctor as soon as possible – early detection is important	6. Know how your workplace deals with heat stress

Our Model Sun Safety Program recommends control measures that align with, and should be implemented according to, the hierarchy of risk controls.

STEP 3 – DO: CONTROL MEASURES

The **Do – Control Measures** are specific sun safety control measures aligned with the ‘hierarchy of risk controls’. These are:

- Elimination or substitution
- Engineering controls
- Controls that increase awareness
- Administrative controls, including training and education
- Personal protection
- Control verification and validation
- Off-the-job sun safety

These Sun Safety Program ‘elements’ will now be discussed in detail.

‘Do – Control Measures’ Implementation Tips:

Worker Buy In:

It is important to get worker buy in and acceptance of the control measures to be enhanced or implemented. This can be through:

- Starting with ‘easy wins’, such as adding sun safety education and training
- Considering ways to include all staff in activities, especially those who work in remote locations
- Planning a launch for the sun safety program
- Involving workers in daily job planning
- Including workers in the decision-making for what personal protection to buy and having a selection of PPE for workers to choose from
- Being proactive about any negative perceptions which the public or other stakeholders may have (for example, worker rest breaks as part of enhanced work-rest regime for heat stress)

Off-the-job sun safety:

Look for ways to encourage workers to be more sun safe outside of work. This includes:

- Having shade, sun safety messaging and sun safety promotional material or prizes at corporate events (for example BBQs and family days)
- Adding sun safety messaging to pay slips
- Providing fun educational activities that workers can take home for their kids

ELEMENT 3.1 – ELIMINATION OR SUBSTITUTION

SCOPE/DESCRIPTION

The most effective control measure is to **eliminate** the hazard at its source, therefore eliminating or removing the risk entirely. This is often done by designing or redesigning the workplace or the work task. **Substitution** can eliminate or reduce the risk by ‘substituting’ a safer process or material for the more hazardous process/material. Therefore, the hazard is controlled at its source.

IMPLEMENTATION

In the case of sun exposure of outdoor workers, the control measures of elimination and substitution are generally not possible and so from the hierarchy of risk controls perspective, we are left with using the less effective control measures. However, some ‘administrative’ and ‘engineering’ controls may be considered to provide a level of elimination or substitution.

SSAWC RESOURCES

Even though total elimination of sun exposure is not possible for outdoor workers, some ‘administrative’ and ‘engineering’ control measures can provide partial elimination from exposure. These include:

- Rescheduling of work activities to times of the day which have lower UV levels
- Having workers take breaks in the shade (whether this is natural or man-made)
- Ensuring vehicles have shading/canopies/cabins to provide a barrier to direct sun exposure
- Attaching films/tinting to windows
- Eliminating highly reflective surfaces (where possible), and
- Implementing work/rest cycles to prevent heat stress

These various measures are described in the following resources:

- *Daily Procedure – Solar UV*
- *Work/Rest Cycles* (fact sheet)
- *Shade* (fact sheet)
- *Protection from Solar UV Radiation within Motor Vehicles* (fact sheet)
- *Reflective Surfaces* (fact sheet)
- *Sun Safety Inspection Checklist*

OTHER RESOURCES

- OHS Answers Fact Sheets – Hazard Control (CCOHS):
http://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html
- *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014. <http://www.csagroup.org/services/worker-and-workplace-safety/>

ELEMENT 3.2 – SUN SAFE ENGINEERING CONTROLS

SCOPE/DESCRIPTION

Engineering controls are those which separate the worker from the hazard by designing safety features into the work area, plant or equipment. These are often be described as ‘physical barriers’ as opposed to ‘behavioral barriers’. These generally include:

- Equipment and workplace design
- Automation of the work process to remove the need for worker interaction with the hazard
- Containment of the hazard at the source, particularly through ventilation, dilution and extraction systems
- Guarding of equipment or machinery to minimize the potential for worker contact with hazardous situations

IMPLEMENTATION

For controlling sun exposure, engineering controls include the following considerations:

Shade

Where possible, workers should work in shade or take breaks in shade as this is an effective way of reducing solar UV exposure and controlling heat stress. There is either ‘built’ shade, which includes permanent and temporary shade structures, or ‘natural’ shade, which is usually provided by vegetation (e.g. trees). The following factors determine the effectiveness of shade in providing protection [74]:

- **Reflection** – amount of reflected solar UV from surrounding environment, particularly from highly reflective surfaces. Generally hard smooth surfaces reflect more solar UV than do softer rougher surfaces.
- **Skyview** – this is the amount of sky that can be seen from within the shade. The more sky directly visible, the less protection provided by the shade.
- **Shade characteristics** – the amount of protection provided by man-made shade depends on:
 - (1) How much solar UV is able to be transmitted through the material (e.g. some shade sails have a wide weave and so can transmit a lot of UV, whereas opaque materials such heavy canvas or metal transmit very little, or no, UV. Polycarbonate, fiberglass and clear/tinted plastic are good at blocking UV but let heat in); and
 - (2) The design, with structures where the roofs have large overhangs and side protection providing the best shade. For trees, the best shade is provided by trees which have dense foliage and their canopy is close to the ground. However, tree shade is variable due to season, the angle of the sun and cloud cover, and is non transportable.

Overall, built or natural shade can provide good solar UV protection, but the amount of protection can vary depending on a range of factors. In the work environment, permanent shade structures on vehicles and equipment may be possible, with temporary shade from portable tents available for some work tasks.

Natural shade is also available in a range of outdoor work environments and workers should be encouraged to seek shade as much as possible.

Reflective surfaces

In addition to direct exposure to solar UV radiation from the sun, worker exposure is also determined by the amount of reflected solar UV they receive. Reflected solar UV is particularly important for eye exposure and the development of eye conditions. Broadly, UV reflectance of surfaces is shown in **Figure 14**.

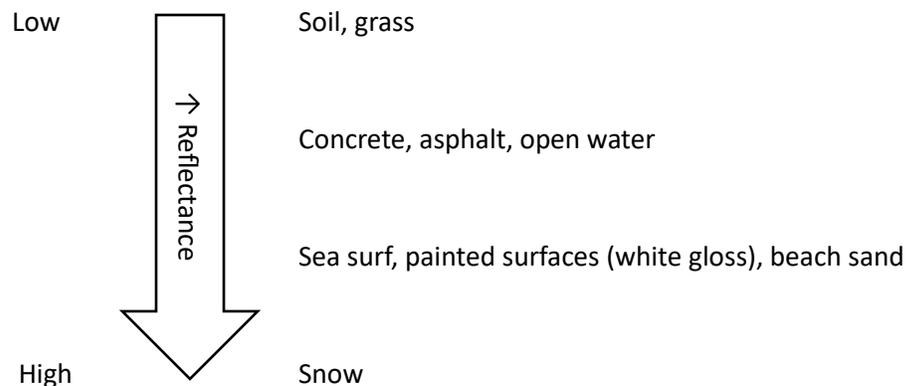


Figure 14. UV Reflectance of Various Surfaces [75]

For workers, additional protection, generally Personal Protective Equipment (PPE), particularly eye protection, should be provided when they are working around highly reflective surfaces.

Transmission through windows

Window glass generally provides good protection against UV-B radiation, but can transmit substantial amounts of UV-A radiation. For workers who spend a lot of their time in vehicles, driving with the windows up/closed will provide good protection from solar UV.

The amount of UV which can pass through glass depends on the type, colour and thickness of the glass, with the most important factor being the type of glass [76]. In motor vehicles, windscreens are generally made from laminated glass, which provides very good protection by blocking most of the UV rays (both UV-A and UV-B). Side and rear window of vehicles are usually made from tempered glass, which blocks most of the UV-B rays but can let through a lot of UV-A.

Clear and tinted window films can be applied to windows to provide additional protection for workers. These films can be applied to vehicle windows after production and can reduce the amount of UV transmitted by side windows by over 99% [77]. Before installing window films to vehicles, please consult provincial vehicle/highway regulations. In some jurisdictions, tinted windows may not be allowed.

Use of cooling systems

When workers are in a vehicle with the window's closed, air conditioning is needed to ensure that the potential for heat stress of occupants is minimized. In circumstances where a vehicle is stationary, the vehicle will need to be parked in shade and/or the air conditioning should still be operating. Some jurisdictions have regulations which restrict vehicle idling; these may need to be reviewed to allow idling during peak UV periods.

For certain work tasks, specialized cooling systems may be required to reduce the potential for heat stress. Cooling fans can be used when the air temperature is below skin temperature (i.e. 35°C) and when the humidity is below 70%.

SSAWC RESOURCES

- *Shade* (fact sheet)
- *Protection from Solar UV Radiation within Motor Vehicles* (fact sheet)
- *Reflective Surfaces* (fact sheet)

OTHER RESOURCES

- OHS Answers Fact Sheets – *Hazard Control* (CCOHS):
http://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html
- *Sample Management Plan for Sun Protection: Supplementary Information* (Australian Radiation and Nuclear Protection Agency, 2010):
http://www.arpansa.gov.au/pubs/rps/rps12_Supplementary_Information_Sun_Protection.pdf
- *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014. <http://www.csagroup.org/services/worker-and-workplace-safety/>

ELEMENT 3.3 – CONTROLS THAT INCREASE AWARENESS OF SUN SAFETY

SCOPE/DESCRIPTION

When hazards are present, measures should be used to improve workers' ability to detect and identify the hazard. This often includes warning systems (e.g. lights and alarms) and warning signs and other indicators to raise worker awareness of the potential for exposure.

IMPLEMENTATION

For controlling sun exposure, signage which highlights sun safe practices, and factsheets which discuss specific issues of interest, can raise workers' awareness of the hazard and can provide guidance as to what prevention and control measures should be followed.

SSAWC RESOURCES

- *UV Index* (poster, for posting daily UV Index values and actions to take)*
- *Heat Stress Alert* (poster)*
- *Heat Stress Warning* (poster)*
- *Heat Stress & Outdoor Work* (fact sheet)
- *Heat Stress – Watch for the Signs* (fact sheet)
- *Protect Your Skin and Eyes from the Sun* (poster)*
- *Protect Yourself from Heat Stress* (poster)*
- *Solar UV & Outdoor Work* (fact sheet)
- *Sunscreen Facts* (fact sheet)

* Note: the posters listed above can be co-branded by a workplace. They allow a workplace to include their own logo on the poster. This can help the employer demonstrate commitment to sun safety and also helps to gain more buy in from employees.

OTHER RESOURCES

- OHS Answers Fact Sheets – *Hazard Control* (CCOHS):
http://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html
- *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014. <http://www.csagroup.org/services/worker-and-workplace-safety/>

ELEMENT 3.4 – SUN SAFE ADMINISTRATIVE CONTROLS (INCLUDING TRAINING)

SCOPE/DESCRIPTION

In general, administrative controls improve workers' ability to safely interact with the hazardous product, process or service [73]. They generally involve implementing or amending systems or procedures to ensure that risks from exposure to the hazard are controlled. They are often referred to as 'behavioural' controls in contrast to 'engineering' controls (also referred to as 'physical' controls). They include [73]:

- Placing restrictions on access to certain work areas
- Worker training
- Safe work procedures
- Policies and approaches for rescheduling or reorganizing work tasks

IMPLEMENTATION

Sun Safe Work Practices and Procedures

Safe work practices are basically guidelines on how to safely perform a hazardous task. They outline in general terms what needs to be done, particularly if the task does not have to be performed exactly the same way every time [69].

Safe job procedures are more detailed and provide a precise sequence of steps to safely perform a task the same way every time [69].

For controlling sun exposure, safe work practices are more likely to be appropriate than safe job procedures. These may include:

- Daily procedures for supervisors to assess solar UV radiation risk and heat stress risk
- When and how to use specific personal protection, e.g. sunscreen, hats, cooling vests
- When and how to implement rescheduling of work tasks to non-peak UV periods. This is an effective way to reduce workers' overall UV exposure because seventy percent of our total UV exposure from the sun occurs within 3 hours each side of noon [78]. If a worker is able to work or take their lunch break in the shade or between 11am and 1pm, their overall UV exposure can be reduced by up to 40% [79]
- Reorganize work tasks to limit exposure (i.e. to spread exposure over a number of workers)
- Maintaining hydration (i.e. supply of drinking water)
- When and which heat stress response actions are to be implemented in reaction to the Daily Assessment (refer to 'Sun Safety Risk Assessment' element), particularly administrative measures such as work/rest cycles and the consumption of water and other fluids

Sun Safe 'Rules' for Employees and Contractors

Rules come from within the organization and help the workplace to meet or exceed legal obligations [69]. These rules:

1. Need to apply to all workers and subcontractors who may be exposed
2. Need to be simple and easily understood by workers, and

3. Should be easy to monitor and enforce by supervisors (and perhaps co-workers)

For controlling sun exposure, rules may include:

- All identified sun safe personal protection needs to be worn/used at all times and in accordance with the sun safe work practices or a supervisor's directions
- Sun safe protection measures (e.g. engineering controls, PPE) need to be maintained in good condition proactively and repaired immediately if broken
- All employees should be aware of, and look out for, signs of heat stress and other adverse effects of sun exposure on their co-workers
- Frequency of water breaks when temperatures/humidex increase

Post-exposure rules may include:

- All incidents involving adverse effects from over-exposure to the sun (e.g. sunburn, photokeratitis, heat stress) need to be reported
- First aid is to be obtained promptly for all incidents of over-exposure to the sun and the treatment administered should be reported

Sun Safe Training and Education

Training and education of all workers about sun safety is important so that workers:

- Are aware of the risks of over-exposure
- Understand the safe work practices, procedures and rules of the workplace as they relate to sun safety
- Have appropriate knowledge and skills to protect themselves effectively, including recognizing signs and symptoms of over-exposure on co-workers, and
- Can provide effective suggestions and advice regarding reducing exposure

A key role of OHS education is to empower workers to take a more active role in making their workplace safer. Key elements of an OHS training and education program are [80]:

- Needs assessment, consisting of a hazard/risk assessment, profile of the worker group, and background on the social context of the training
- Gain support from key people within the workplace, including management, workers and worker representatives
- Establish education and training objectives and content, particularly so as to address skills, attitudes, individual behavior, and social action
- Select the education and training methods, with different methods being appropriate for achieving different objectives
- Delivering the training and education
- Evaluation and follow-up

Training and education for sun safety will normally be incorporated into existing OHS training activities. These activities occur from the time a new worker starts (i.e. orientation training) and continue on an ongoing basis. Refresher training through tailgate/toolbox talks and other similar techniques can be highly effective. Reinforcement of key sun safety messages and practices should occur whenever there is an

incident of over-exposure. In addition to basic training on sun safety, different types and levels of training may be appropriate at different times of the year (particularly due to the seasonal nature of higher levels of sun exposure), for workers undertaking specific tasks, and for supervisors/managers. A [training matrix](#) can be used to keep track of what training is appropriate for which workers and when this training is to be undertaken.

SSAWC RESOURCES

Sun Safety at Work provides an extensive array of ‘administrative control’ resources for sun safety, both solar UV radiation and heat stress. These include procedures, guides, record templates, posters, videos, fact sheets, and safety/toolbox talks.

Sun Safe Work Practices and Procedures:

Solar UV Radiation:

- *Solar UV Radiation Risk Assessment for Outdoor Workers: Technical Guide*
- *Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review*
- *UV Index* (poster, for posting daily UV Index values and actions to take)
- *Daily Procedure – Solar UV*

Heat Stress:

- *Heat Stress Risk Assessment for Outdoor Workers: Technical Guide*
- *Heat Stress Risk Assessment for Outdoor Workers: Operational Review*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan*
- *Heat Stress Daily Assessment procedure – WBGT*
- *Heat Stress Daily Assessment Procedure - Humidex*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex*
- *Heat Stress Alert* (poster)
- *Heat Stress Warning* (poster)

Sun Safe Training and Education:

Sun Safety:

- *Using the Training Resources* (guide)
- *Sun Safety Facts*
- *Off-the-Job Sun Safety* (fact sheet)
- *Sun Safety at Work: Worker Video* (video)
- *Sun Safety at Work: Employer Video* (video)
- *Facilitator Guide and Worksheet for the Sun Safety at Work: Worker Video* (guide)

Solar UV Radiation:

- *Solar UV Exposure Training for Employees* (PowerPoint presentation)
- *Solar UV Exposure Training for Supervisors* (PowerPoint presentation)

- *Solar Ultraviolet Radiation (Safety talk for a day with high UV Index)*
- *Protect Your Skin and Eyes From the Sun (poster)*
- *Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers*
- *Sun Exposure at Work Increases Risk of Skin Cancer (fact sheet)*
- *Solar UV & Outdoor Work (fact sheet)*
- *Shade (fact sheet)*
- *Sunscreen facts (fact sheet)*
- *Protection from Solar UV Radiation Within Motor Vehicles (fact sheet)*
- *Reflective Surfaces (fact sheet)*
- *Personal Protection (fact sheet)*
- *Photosensitizing Substances (fact sheet)*

Heat Stress:

- *Heat Stress Training for Employers (PowerPoint presentation)*
- *Heat Stress Training for Supervisors (PowerPoint presentation)*
- *Heat Stress for Outdoor Workers (Safety talk for an expected high humidex day)*
- *Protect Yourself from Heat Stress (poster)*
- *Personal Risk Assessment: Heat Stress for Outdoor Workers*
- *Heat Stress & Outdoor Work (fact sheet)*
- *Work/Rest Cycles (fact sheet)*
- *Heat Stress – Watch for the Signs (fact sheet)*
- *Acclimatization (fact sheet)*

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for range of organizations which provide OHS and sun safety training resources. Examples include:

- Policy and Program Templates – *Safe Work Practices/Job procedures* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/safe_practices_procedures.aspx
- Policy and Program Templates – *Company Health & Safety Rules* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/company_hs_rules.aspx
- Policy and Program Templates – *Training, Orientation and Communications* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/training_orientation_communications.aspx

ELEMENT 3.5 – SUN SAFETY PERSONAL PROTECTION

SCOPE/DESCRIPTION

Control measures for personal protection include anything worn or used by an individual worker to provide protection to themselves. Personal protection is considered to be the last line of defense and should be only used when other control measures are not possible or have not provided sufficient protection/control.

Personal protective equipment (PPE) is a subset of personal protection.

Personal protection is considered to be the least effective method of control because:

- It does not get rid of the hazard (if it fails there is no second chance)
- Workers often find it difficult and uncomfortable to wear/use
- It has to fit or be used properly to be effective
- It has to be the right type for the hazard
- Workers need training on how to use it appropriately
- It raises enforcement issues for supervisors

When personal protection is necessary, it should be used as part of a comprehensive Personal Protection Program which includes the following elements [80]:

- **Hazard evaluation** – to achieve a proper match between the protective measure and the risk, it is necessary to know the:
 1. Nature and magnitude of the hazards
 2. Length of time for which the protection measure (e.g. device) is expected to perform at the particular level of protection
 3. Physical activity which will be undertaken while wearing or using the personal protection
- **Selection** – personal protection needs to be selected which is appropriate for the hazard, the level of protection needed and the work activities being undertaken. For many personal protection devices there are standards/guidelines for selection (e.g. CSA Z94.3.1-09; CSA Z94.1-15).
- **Fitting** – any protective device almost always needs to be fitted properly so that it is able to provide the level of protection for which it was designed. A comfortable fit also improves use and acceptance by the wearer.
- **Training and education** – as the use of personal protection may affect normal behavior/action, and as correct fitting and use is important to ensure that the required level of protection is provided, worker training is necessary to ensure proper use and care of the equipment. In addition, training is also needed to help workers understand the need for the use of the devices and the benefits they will receive from correct use. Don't forget that training of supervisors is also critically important.
- **Maintenance and repair** – equipment maintenance, repair and replacement should be considered to be ongoing costs of operating a Personal Protection Program to ensure the effectiveness of the protection.

IMPLEMENTATION

Personal protection for sun exposure should provide a high ultraviolet protection factor (UPF) (e.g. UPF greater than 30) and provide coverage to as much of the worker's body as possible. However, personal

protection should also allow workers to stay cool during hot weather. Sun safe personal protection measures include:

Clothing

The most effective means of providing personal protection from sun exposure is through the use of clothing. The best sun protective clothing is long sleeved shirts with collars and long pants. Some workers may be resistant to wearing long clothing in summer due to concerns about over-heating. Recent research has shown that the use of long clothing does not significantly increase body temperature while providing good UV protection [81]. The use of breathable and purpose-designed sun protective clothing can help to alleviate workers' concerns.

Most fabrics will provide good protection from the sun, with the following factors shown to improve UPF [78]:

- **Weave** – the tighter the weave the better UV protection. This is the most important consideration for clothing design
- **Thickness** – thicker fabrics transmit less UV radiation, but can be hotter to wear
- **Stretching** – the greater the stretch in the fabric, the more UV is able to penetrate
- **Colour** – generally darker colours with higher dye concentration absorb more solar radiation (so can transmit less), but can also be hotter to wear
- **Water** – depending on the fabric, most fabrics transmit more UV when they are wet
- **Washing** – for many fabrics, particularly cotton and polycotton, protection is increased after the first washing and remains high over the life of the garment
- **Additives** – some fabrics have additional UV absorbing compounds added to them to improve their UV protection

In addition to these fabric considerations for general work wear, purpose-designed UV protective clothing is also available which provides a very high UPF – this clothing will be marked as UV protective and will have the UPF (usually 50+) indicated on the label.

Clothing should also be of a design which enables workers to stay as cool as possible in hot weather. This includes being made of fabrics which are permeable to allow for sweat evaporation and where appropriate for the job task, have loose cuffs (on shirts and pants) and vents to allow for air circulation.

Hats and hard hats

Wearing a hat can provide good protection for the scalp, face, ears, eyes and neck. However, the level of protection is generally less than what might be expected (usually it is equivalent to an UPF of 2 to 4) [82]. This is because hats provide shading, whereas solar UV exposure to the face is due to a range of factors including the orientation of the sun, the amount of scattered and reflected solar UV radiation, and the tasks being undertaken by the wearer.

Features of hat design which influence the level of protection include [82]:

- Broad brimmed hats and legionnaire style hats provide the most protection
- Broad brimmed hats, with wide brims of 7.5cm or more can provide good protection to nose, cheek, neck, ears and chin

- Baseball style caps provide good protection to the nose, but little protection to the cheek and chin, and no protection to the ears or neck
- Legionnaire style hats provide good protection to the nose, ears and neck, but less protection to the cheeks and chin

Hat material should be of a fabric which has a high UPF (e.g. greater than 50).

Hard hats should be selected, used and maintained in accordance with CSA Z94.1-15. They usually provide similar solar UV protection as baseball caps. To improve the protection provided, the following hard hat attachments are recommended:

- Broad brim, usually of a lightweight material with a UPF of 30+
- Neck flap to protect neck, ears and side of face

Sunglasses and protective eyewear

Our eyes are very sensitive to UV radiation and so all outdoor workers should wear eye protection all year round. For workers who do not require ‘protective eyewear’ as described in CSA Z94.3.1-09 [83], good quality sunglasses will provide excellent UV protection, particularly if they are close-fitting and wrap-around in design.

It is difficult to judge how much UV protection sunglasses will provide based on their price, colour or the darkness of their lenses. It is important to look for labelling that describes the type and amount of protection provided. In Canada, manufacturers follow voluntary industry standards when labelling sunglasses. These group sunglasses into the following categories [84]:

- **Cosmetic sunglasses** – these have lightly tinted lenses and block less UV and visible light than do other sunglasses. They are not recommended for driving or for outdoor workers.
- **General purpose sunglasses** – these block between 60 and 92% of visible light and UV-A, and between 95 and 99% of UV-B radiation. These are recommended for outdoor workers, particularly when the sun is strong enough to make you squint.
- **Special purpose sunglasses** – these block very high levels of visible, UV-A and UV-B radiation and are suitable for prolonged sun exposure. These are recommended for outdoor workers, but not when they are driving.

Protective eyewear for use in a workplace setting is described in CSA Z94.3.1-09. Depending on the work tasks being undertaken, different protective eyewear is appropriate. This includes various classes of spectacles, goggles, welding helmets, non-rigid helmets and face shields. For bright sun exposure, class 1A spectacles are recommended – these are light weight spectacles with side shields. If work tasks involve the potential for exposure to flying objects/particles, sparks, chemicals, etc., other classes of spectacles or goggles are more appropriate (refer to **Table 6**).

Protective eyewear that is compliant with the CSA standard will have: (1) a certification mark on the frame and on the packaging; (2) a manufacturer’s mark on the lens; and (3) have permanently attached side shields.

Table 6. Classes of Protective Eyewear (as described in CSA Z94.3.1-09) [83]

Class	Examples
1	1A – spectacles with side protection 1B – spectacles with side and radiation protection
2	Goggles (with or without ventilation)
3	Welding helmets
4	Welding hand shields
5	Non-rigid welding helmets with hoods
6	Face shields
7	Respirator facepieces

Lenses for protective eyewear can be made of a number of materials (in order of impact resistance): polycarbonate, trivex, plastic, or glass. Polycarbonate lenses have the added benefits of being lightweight and having in-built UV absorbing properties. Tinted, photochromic or polarized lens are recommended for outdoor use to assist with glare reduction.

The proper care and maintenance of eyewear is important to ensure that it provides optimum protection. This includes:

- Using water or a lens cleaning fluid to ‘wet’ clean the lenses
- Replacing pitted or scratched lenses, as they may impair vision or have reduced impact resistance (workers are also less likely to use scratched or pitted eyewear)
- Protecting eyewear when not in use by keeping them in cases or containers

The CSA Z94.3.1-09 three rules of protective eyewear are [83]:

- **Be sure it fits**
- **Maintain it properly**
- **Wear it!**

Sunscreen

Sunscreen that is broad spectrum, water resistant and have a minimum SPF (sun protection factor) of 30 can provide effective protection from sun exposure if used correctly. However, sunscreen is considered to be the least favorable of the personal protection measures for use in the occupational environment because:

- It can be difficult to apply and reapply in a manner that provides sufficient protection, particularly when sweating
- Workers often don’t like using sunscreen and so its effectiveness is compromised
- Some work tasks are incompatible with the use of sunscreen

Tips for using sunscreen effectively include:

- Apply sunscreen generously and use more than you think you need to – most people find it hard to apply sunscreen evenly and thickly enough to all exposed skin areas, so the ‘real’ level of protection is often less than expected.
- Reapply regularly – this helps to provide continued protection, which can be decreased due to work activities, sweating, or from an inadequate initial application.
- Sunscreen and insect repellent can be used safely at the same time. Apply sunscreen first, and then insect repellent. Combination products are generally less effective than applying separate products.
- Always check the expiry date on the bottle – sunscreen stored in hot locations (e.g. inside vehicles) can deteriorate more quickly.

A list of sunscreens recognized by the Canadian Dermatology Association are available on its website:

<https://dermatology.ca/public-patients/recognized-products/sunscreen/>

Cooling wear

Purpose-designed cooling wear is available to provide additional cooling for workers in a hot environment. This includes vests, neck shades, towels, headwear and bandanas which either work on the principle of evaporative cooling or use in-built replaceable ice/cooling packs. Some of these are designed to be used with hard hats.

SSAWC RESOURCES

- *Personal Protection* (fact sheet)
- *Sunscreen Facts* (fact sheet)
- *Photosensitizing Substances* (fact sheet)
- *Reflective Surfaces* (fact sheet)

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for range of organizations which provide OHS and sun safety advice on personal protection. Specific resources include:

- OHS Answers Fact Sheets – *Designing an Effective PPE Program*, CCOHS (2017):
<https://www.ccohs.ca/oshanswers/prevention/ppe/designin.html>
- Policy and Program Templates – *Personal Protective Equipment* (Infrastructure Health and Safety Association): <https://www.ihsa.ca/resources/ppe.aspx>

ELEMENT 3.6 – CONTROL VERIFICATION & VALIDATION

SCOPE/DESCRIPTION

Verification is the process of checking that the risk controls have been implemented, whereas **validation** is the process of checking that the controls are effective in reducing risk [73].

Some approaches to verify and validate the controls include physical inspection, observation of worker use, testing, exposure assessment, tracking of incidents and employee feedback [85].

IMPLEMENTATION

Key questions to determine if the controls are effective include [85]:

- Is the risk posed by the original hazard reduced?
- Have any new risks been created?
- Are new risks appropriately controlled?
- Are the monitoring processes adequate?
- Have workers and supervisors been adequately informed and trained (supervisor training is particularly important for both verification and validation)?
- Are any other control measures required?
- Has the effectiveness of the control measured been appropriately documented?
- Can anything else be done to control exposure to this hazard?

SSAWC RESOURCES

- *Sun Safety Inspection Checklist* (template)
- *Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition* (template)

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for range of organizations which provide OHS and sun safety advice on control measures.

ELEMENT 3.7 – ‘OFF-THE-JOB’ SUN SAFETY

SCOPE/DESCRIPTION

A ‘best practice’ indicator of the effectiveness of any OHSMS is how it impacts the practices/ behaviours of workers when they are not at work. It is a test of the effectiveness of OHS training and leadership whether workers have ‘internalized’ the motivation to reduce risk. As outdoor workers tend to have much higher recreational sun exposure than do indoor workers [40], an effective sun safety program should also influence worker sun safety practices when they are not at work.

IMPLEMENTATION

Off-the-job actions a worker can take to protect themselves and their family include:

- Be aware of personal risk factors for skin cancer or heat stress
- Do regular self-examinations for skin cancer/sun damage
- Visit family doctors/dermatologists regularly (e.g. annually) for a skin exam
- When outdoors and undertaking recreational activities, apply our ‘six simple steps’ (Table 5, page 38) for protecting skin and preventing heat stress
- As sun exposure early in life is an important risk factor for skin cancer, make sure that children are effectively protected at home, at school, and when undertaking recreational activities
- Educate kids about sun safety

SSAWC RESOURCES

- *Off-the-Job Sun Safety* (fact sheet)
- *Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers*
- *Personal Risk Assessment: Heat Stress for Outdoor Workers*

OTHER RESOURCES

Refer to ‘Off-the-Job Sun Safety’ in **Appendix 4 – Additional Resources**

STEP 4 – DO: SUPPORT

The **Do-Support** step of the Sun Safety Program provides activities/processes which support the implementation of control measures and help to effectively manage risks from workplace hazards. These activities are common to the effective management of all workplace hazards and so the sun safety elements are part of the broader OHSMS. The elements in the Do-Support step are:

- First aid and incident notification
- Return to work
- Preventive maintenance, and
- Procurement

These sun safety elements will now be discussed in detail.

'Do – Support' Implementation Tips:

Resourcing:

Work with the assistance of the Health and Safety Committee to get resources for new control measures or to update existing measures. The logistics of implementing new control measures can be challenging – buy in and feedback from workers, supervisors and managers is important (for example, for choosing and understanding 'front line' factors for implementing sunscreen, hats, eyewear, long clothing, cool water).

ELEMENT 4.1 – FIRST AID & INCIDENT NOTIFICATION

SCOPE/DESCRIPTION

Each jurisdiction's OHS legislation includes requirements for **first aid** within the workplace. The minimum requirements are often determined by the number of employees and the hazards present in the workplace. The requirements usually include the:

- Number and certification of first-aiders
- Contents of first aid supplies
- Availability of first-aiders
- Provision of first aid facilities
- Response procedures in the event of an accident/injury, and
- Recording and/or notification of events

IMPLEMENTATION

First aid procedures for sun safety are dependent on the health condition of the worker:

- **Sunburn** (also known as **erythema**): workers should be removed from the sun and the skin should be cooled using cold compresses or by taking a cool shower. Moisturizing creams such as those containing aloe may also be helpful. Rehydration is also important and the affected worker may also have a headache so pain relief medication may also be needed. The sunburned areas should be covered so that there is no further sun exposure.
- **Photokeratitis** (also known as snow blindness or welders' flash): cool wet compresses can be applied to the eyes, anti-inflammation eye drops can be used, pain relief medication may also be helpful, and the worker should recover in locations which are dark.
- **Heat stress**: for **heat rash** and **heat cramps**, moving the worker to a cool area and applying cool compresses can be helpful, along with fluid-replacement drinks. For heat-related **fainting (heat syncope)** and **heat exhaustion**, seek medical attention and cool the person down by moving to a cool area, applying cool compresses and replacing lost fluids. **Heat stroke** is very serious and is a medical emergency. An ambulance should be called and actions taken to cool the worker.

If a sun over-exposure incident does occur, a written record of the incident and what first aid was provided should be made. This can be done in a **first aid treatment record/logbook**. Further, relevant supervisors and managers should be notified along with the workplace's OHS practitioner and the Health and Safety Committee. In some cases, notification to the regulator may be necessary. Further details on incident reporting and investigation are provided in Element 5.1.

SSAWC RESOURCES

- *Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition* (template)

OTHER RESOURCES

- *First aid advice for sunburn and heat stress*, Government of Canada: <https://www.canada.ca/en/health-canada/services/sun-safety/first-aid-advice-sunburn-heat-illness.html>
- OHS Answers Fact Sheets – *First aid – general*, CCOHS (2018): https://www.ccohs.ca/oshanswers/hsprograms/firstaid_general.html

ELEMENT 4.2 – RETURN-TO-WORK

SCOPE/DESCRIPTION

Return-to-work is the process of safely returning employees to the workplace in a timely way, following an injury/accident/health condition. The legal requirements for return-to-work vary among Canadian jurisdictions. The workplace will need to make an assessment of each individual's situation, based on medical recommendations. If an employee is not able to directly return to their previous job, another suitable job or arrangements for a graduated return to work can be investigated.

IMPLEMENTATION

For sun over-exposure incidents, the return-to-work processes will depend on the health condition of the worker. For **sunburn** and **photokeratitis**, these conditions fully resolve within a day or two and so the worker should be fit enough to return to their job once the condition subsides. For heat-related conditions, a worker may be able to return to work relatively soon and resume normal duties in the event of a minor condition. For serious conditions, such as **heat stroke**, the worker may take some time to recover and as they are at a higher risk of heat stress, may require graduated return to work arrangements or a reallocation of job tasks.

SSAWC RESOURCES

The workplace's normal arrangements/procedures for managing the return-to-work of an injured worker should also be implemented for a worker who has been over-exposed to the sun and has sustained an adverse health condition.

OTHER RESOURCES

The legal requirements for return-to-work are usually found in each jurisdiction's Workers' Compensation legislation. Details about Canadian provincial and federal Workers' Compensation legislation and processes are available at:

- https://www.ccohs.ca/oshanswers/information/wcb_canada.html
- <http://www.canoshweb.org/Legislation/All/>

Other resources include:

- Policy and Program Templates – *Return to Work* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/return_to_work.aspx

ELEMENT 4.3 – PREVENTIVE MAINTENANCE

SCOPE/DESCRIPTION

Preventive maintenance makes sure that tools and equipment are safe to use through proactive activities as opposed to reactive maintenance (e.g. fix it after it fails). Elements of a Preventive Maintenance Program include [86]:

- Hazard/risk assessment to determine critical parts
- Qualifications of maintenance personnel and operators
- Ongoing inspection and maintenance
- Pre-operation checks
- Systematic replacement of parts
- Worker and supervisor training
- Recording keeping, and
- Program monitoring

IMPLEMENTATION

As this applies to all tools and equipment within a workplace, any equipment or tools used to control sun exposure (e.g. canopies on tractors, portable shade structures, PPE, monitoring equipment for UV and heat stress) should be included in the broader Preventive Maintenance Program.

SSAWC RESOURCES

The workplace's normal arrangements/procedures for managing preventive maintenance of tools and equipment should be followed, but should include consideration of any tools/equipment which have a role in sun safety.

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for range of organizations which provide OHS advice on OHSMSs/OHSPs and preventive maintenance. Examples include:

- Policy and Program Templates – *Tool and Equipment Maintenance* (Infrastructure Health and Safety Association): <https://www.ihsa.ca/resources/tool equip maintenance.aspx>

ELEMENT 4.4 – PROCUREMENT

SCOPE/DESCRIPTION

It is important to have in place procedures for evaluating and managing the **procurement** of products, supplies, equipment and materials. This helps to identify the best product for the intended purpose, and helps determine whether there are any hazards associated with these goods and what the risks are for use. If a product/supply is identified as presenting a risk to workers, appropriate steps need to be implemented to control the risk.

IMPLEMENTATION

Any equipment or tools used to control sun exposure (e.g. canopies on tractors, portable shade structures, personal protective equipment) should be included in the workplace's broader Procurement Program. Due to the highly seasonal nature of controlling sun exposure, workplaces should be mindful of (1) when products/services need to be ordered to have them available for spring/summer, and (2) the different procurement needs for winter sun protection.

A Procurement Program should be based on a policy principle that OHS requirements need to be considered during the procurement process. Employees responsible for procurement also need training on the need to consider OHS requirements when procuring resources. The cheapest product is often the less effective product from an OHS perspective.

SSAWC RESOURCES

The normal arrangements/procedures of a workplace for procurement of products, supplies, equipment and materials should be followed, but they should include consideration of those resources needed for sun safety. Consideration should also be given to the seasonal nature of controlling sun exposure and therefore the relevant timelines for procurement of sun-safety-related resources. For example, attempting to purchase a large volume of sunscreen in July may be subject to a delay in supply.

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for range of organizations which provide OHS advice on OHSMSs/OHSPs and procurement.

STEP 5 – CHECK

The **Check** step of the Sun Safety Program provides activities/processes which monitor how well the controls and other processes are working and then implements corrective action if needed. These activities are common to the effective management of all workplace hazards and so the sun safety elements are part of the broader OHSMS. The elements in the Check step are:

- Incident reporting and investigation
- Workplace inspections
- Documentation, records and statistics
- Auditing and evaluation

These sun safety elements will now be discussed in detail.

'Check' Implementation Tips:

Evaluation:

Develop an **Evaluation Plan** to determine whether the **Action Plan** has improved sun safety, and to what extent.

Periodic Review:

Use the results of the evaluation and a review of **documentation** for periodic reviews (for example, annually) of the Sun Safety Program. This helps to ensure that the most effective and appropriate sun safe measures are being implemented.

Communication and Consultation:

Put processes in place to make sure workers can be involved in the evaluation and periodic review of the Sun Safety Program. Open communication about the results and an ability for everyone in the workplace to participate in determining new priorities is critical to the ongoing effectiveness of the program. The role of the Health and Safety Committee and Worker Representatives is very important in ensuring effective and open communication within the workplace.

Keep up-to-date:

Keep up-to-date about technologies and equipment to improve your sun safety controls, and have a process in place to get updates on new recommendations for sun safe practices and new research findings.

ELEMENT 5.1 – INCIDENT REPORTING AND INVESTIGATION

SCOPE/DESCRIPTION

Whenever a workplace **incident/accident** occurs, appropriate internal (i.e. within the workplace) and external (i.e. to the appropriate regulatory/compensation/insurance entity) reporting is required. The internal workplace procedures often commence with the first-aid response/record, but should also include an **incident report**. In response to an incident, most **jurisdictions** require the workplace to undertake an investigation to determine the cause of the incident and to put in place measures to prevent it from reoccurring. This investigation is often undertaken by the supervisor and/or the OHS coordinator, and often there is involvement by the Health and Safety Committee and Worker Representatives.

Even though each jurisdiction will have their own definition of what a ‘reportable’ incident is, if an incident due to sun over-exposure does occur, it is good OHS practice to initiate internal reporting and investigation even if reporting to the jurisdiction is not explicitly required. Such a response will enable the workplace to identify factors which lead to the incident and will enable the workplace to put in place measures to prevent a reoccurrence.

IMPLEMENTATION

When undertaking an investigation into a sun safety incident, it is good OHS practice to inquire into the **root causes** of the event. It is important to investigate all of the underlying factors in the chain of events which lead to/combined to produce the incident. It is important to remember that there is rarely a single cause of an incident – it usually involves a series of factors. The ‘root causes’ are usually associated with elements of the OHSMS. The usual incident/accident investigation process used for other workplace hazards should also be used for a sun safety incident, but with consideration of the hazard-specific characteristics associated with occupational exposure to the sun.

SSAWC RESOURCES

- *Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition* (template)

OTHER RESOURCES

- OHS Answers Fact Sheets – *Incident Investigation*, CCOHS (2017): <https://www.ccohs.ca/oshanswers/hsprograms/investig.html>
- Audits, Inspections and Investigations, in: *ILO Encyclopedia of Occupational Health and Safety*: <https://www.iloencyclopaedia.org/contents/part-viii-12633/audits-inspections-and-investigations>
- Policy and Program Templates – *Accident Investigation & Reporting* (Infrastructure Health and Safety Association): https://www.ihsa.ca/resources/accident_investigation.aspx

ELEMENT 5.2 – WORKPLACE INSPECTIONS

SCOPE/DESCRIPTION

Regular workplace **inspections** are required to be undertaken by OHS legislation, although the details vary by jurisdiction. In most jurisdictions, the Health and Safety Committee or Worker Representatives are involved in inspections. The purpose of workplace inspections is to identify and correct unsafe conditions, practice and behaviours. They are also a good way for workers to raise concerns, help supervisors/managers gain a better understanding of the jobs and tasks, and help the workplace to comply with its legislative obligations.

Inspections can be undertaken at different frequencies (i.e. daily, weekly, monthly and yearly), with each of these generally having a different purpose and often being undertaken by different people within the workplace. Employees are encouraged to undertake informal daily inspections of the workplace to identify hazards and then take action to reduce the risks from exposure. Formal inspections are often undertaken using an **inspection checklist** and are often done weekly/monthly. For utility and construction crews, a supervisor (foreperson, lead hand) may do an inspection of a new location (e.g. for shade opportunity).

IMPLEMENTATION

Considerations of sun safety should be included within the regular Inspection Program of a workplace. Inspection checklists can include considerations for:

- Proper use of sun safety personal protection
- Condition and location of canopies and other shade structures
- Changes in job tasks which require additional sun safety control/protection measures, and
- Sun safe behaviours/practices of workers.

Anyone undertaking a workplace inspection should receive appropriate training on how to conduct the inspection and how to complete the inspection checklist correctly. An important element of an Inspection Program is post-inspection ‘root cause’ analysis and follow-up procedures to ensure that appropriate changes are made.

SSAWC RESOURCES

- *Sun Safety Inspection Checklist* (template)

OTHER RESOURCES

- OHS Answers Fact Sheets – *Effective Workplace Inspections*, CCOHS (2017):
<https://ccohs.ca/oshanswers/prevention/effectiv.html>
- Audits, Inspections and Investigations, in: *ILO Encyclopedia of Occupational Health and Safety*:
<https://www.iloencyclopaedia.org/contents/part-viii-12633/audits-inspections-and-investigations>
- Policy and Program Templates – *Workplace Inspections* (Infrastructure Health and Safety Association):
https://www.ihsa.ca/resources/workplace_inspections.aspx

ELEMENT 5.3 – DOCUMENTATION, RECORDS AND STATISTICS

SCOPE/DESCRIPTION

Keeping **records** of safety programs, activities (e.g. inspections and risk assessments), plans, equipment and training is required under OHS legislation (whether express or implied). These records provide evidence that the workplace can reasonably do all it can to prevent illness and injury. Review and analysis of these records and the calculation of particular statistics is a way for the workplace to review the effectiveness of its OHSMS, and identify areas for improvement [69]. These reviews are often done monthly and yearly and help the workplace identify trends and issues for action. Monthly safety summaries may include [86]:

- Data on the number of workers hired and trained
- Number of safety talks and attendance
- Number and outcomes of hazard/risk assessments
- Number and details of first-aid treatments
- Number and details of inspections
- Number and details of incidents
- Number and outcomes of incident investigations, and
- Number and details of training sessions

IMPLEMENTATION

For sun safety, records to be kept will include:

- Sun safety risk assessments (i.e. operational reviews, job safety analysis, and daily assessments)
- Changes in control measures
- First aid records
- Workplace inspections
- Incident reports and investigations

The outcomes of these will normally be collated in the monthly safety summaries.

A document control process is also important to ensure [72]:

- Review and approval of documents by appropriate people
- Revision of documents when needed
- Easy access and availability of documents
- Appropriate storage and security of documents, and
- Removal of obsolete documents and archiving when necessary

SSAWC RESOURCES

- *Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review*
- *UV Index* (poster, for posting daily UV Index values and actions to take)
- *Daily Procedure – Solar UV*

- *Heat Stress Risk Assessment for Outdoor Workers: Operational Review*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan*
- *Heat Stress Daily Assessment procedure – WBGT*
- *Heat Stress Daily Assessment Procedure - Humidex*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT*
- *Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex*
- *Heat Stress Alert (poster)*
- *Heat Stress Warning (poster)*
- *Sun Safety Inspection Checklist (template)*
- *Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition (template)*
- *Sun Safety Program – Baseline Assessment (template)*
- *Sun Safety Action and Evaluation Plan Template (template)*

OTHER RESOURCES

Refer to 'OHSMSs/OHSPs' in **Appendix 4 – Other Resources**. Examples include:

- Policy and Program Templates – *Statistics and Records* (Infrastructure Health and Safety Association):
https://www.ihsa.ca/resources/statistics_records.aspx

ELEMENT 5.4 – AUDITING & EVALUATION

SCOPE/DESCRIPTION

An **audit** is a systematic and documented process to obtain and objectively evaluate evidence on whether all of the elements of an OHSMS/Sun Safety Program have been implemented, and to determine how effective the OHSMS/Sun Safety Program is in protecting workers [87]. Audits are a high-level review of a workplace's OHS policies and procedures, and can also help determine [69]:

- The level and effectiveness of worker participation
- Compliance with OHS legislation and other requirements
- How well evaluations, actions and reviews have been implemented, and
- The effectiveness of improvements in policies, practices and procedures

Audits should be completed each year and can be undertaken by someone internal to the workplace or by an external auditor. They may also be triggered due to significant changes in workplace operations or for other reasons which are viewed as having a significant impact on worker health and safety [87]. The role of the Health and Safety Committee and Worker Representatives should be considered. **Evaluation** refers to analysis as well as the processes through which the workplace ensures that all preventive and corrective actions, including those identified through workplace inspections and audits, are recorded and tracked to ensure they are successfully implemented [69].

IMPLEMENTATION

A review of how well the various elements of the Sun Safety Program have been implemented and how effective the protection measures should be included in a broader OHSMS audit. However, if there are significant operational changes or situations which indicate that workers are at significant risk, an audit of the Sun Safety Program could be undertaken independently of the broader OHSMS audit. Processes to monitor and evaluate the implementation of sun safety prevention and corrective actions should also be included with the broader OHSMS evaluation.

SSAWC RESOURCES

- *Sun Safety Inspection Checklist* (template) (can be used for annual audits/reviews)
- *Sun Safety Action and Evaluation Plan Template* (template)

OTHER RESOURCES

- Audits, Inspections and Investigations, in: *ILO Encyclopedia of Occupational Health and Safety*: <https://www.iloencyclopaedia.org/contents/part-viii-12633/audits-inspections-and-investigations>
- *OHS management audit instruments: summary of a literature review*, Institute for Work and Health, 2006: <https://www.iwh.on.ca/summaries/sharing-best-evidence/ohs-management-audit-instruments>

STEP 6 – ACT

The **Act** step of the Sun Safety Program reflects the need for ongoing high level review of the OHSMS/Sun Safety Program and a commitment to continuous improvement. The main element is:

- Management Review and Continuous Improvement

This sun safety element will now be discussed in detail.

'Act' Implementation Tips:

Periodic Review:

Periodically review the processes under the Check Step to ensure that Evaluation Plans result in effective changes to the Sun Safety Program.

Ensure that the Evaluation Plans under the Check Step include monitoring the development of better sun safety controls and practices for their suitability for adoption.

Engage in leadership activities to ensure that the IRS is functioning effectively to execute elements of the Sun Safety Program.

Periodically review the functioning of the Sun Safety Program as an element of the OHSMS.

ELEMENT 6.1 – MANAGEMENT REVIEW & CONTINUOUS IMPROVEMENT

SCOPE/DESCRIPTION

The **management review** of the Sun Safety Program should be undertaken by senior management periodically to ensure that it continues to be [72]:

1. **Suitable** – does the program meet the requirements of ISO 45001:2018, OHSAS 18001 or CSA Z1000-14 or the Model Sun Safety Program, and the workplace’s needs and commitments, including those of workers and regulators?
2. **Adequate** – are sufficient resources available to maintain/improve the sun safety program?
3. **Effective** – is the Sun Safety Program getting results and effectively protecting workers?

The management review should also determine actions necessary to address issues which have been identified through workplace inspections or audits, and determine how effective follow-up/corrective actions have been for issues raised by previous management reviews [87]. Concerns raised by Health and Safety Committees and Worker Representatives should be similarly addressed.

IMPLEMENTATION

Even though management review is considered to be a cumulative and ongoing process, it should be undertaken more formally once a year. It is also important for senior management to consider trends which may indicate a problem with the effectiveness of the Sun Safety Program, and to take account of broader influences on the workplace and on workplace operations which may impact the Sun Safety Program [87]. There should also be an ongoing process for identifying opportunities for **continuous improvement** of the Sun Safety Program including [87]:

- Reviewing current control and prevention measures
- Reviewing the best available technologies and procedures to address residual risk, and
- Implementing a strategy for continuous improvement

Overall, there should be strong commitment from senior management to providing oversight of the Sun Safety Program along with commitment for continuous improvement of the program.

SSAWC RESOURCES

- *Sun Safety Inspection Checklist* (template) (can be used for annual reviews)
- *Sun Safety Action and Evaluation Plan Template* (template)
- *Sun Safety Program – Baseline Assessment* (template)
- *Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review*
- *Heat Stress Risk Assessment for Outdoor Workers: Operational Review*

OTHER RESOURCES

Refer to ‘OHSMSs/OHSPs’ in **Appendix 4 – Other Resources**

IMPLEMENTING A SUN SAFETY PROGRAM FOR SMALL WORKPLACES

We recognize that staying on top of occupational health and safety (OHS) can be difficult for small businesses. However, all jurisdictions have minimum OHS requirements for employers.

The basis of all OHS within a workplace is a Health and Safety Policy. This is a written commitment from the employer that outlines how it will approach health and safety.

Depending on the number of employees, a Health and Safety Program may also be required. This is a version of an Occupational Health and Safety Management System (OHSMS) that is more manageable for smaller workplaces. The Health and Safety Program of each workplace will be unique to the hazards found in the workplace.

Small businesses that employ outdoor workers should recognize the sun as a workplace hazard and implement processes to keep workers safe as part of their Health and Safety program.

Across jurisdictions, there are some elements common to all Health and Safety Programs. Elements of our Model Sun Safety Program align with these common elements and provide resources to assist a small business to implement a manageable version of a Sun Safety Program (refer to **Table 7**).

Table 7. Sun Safety Program Elements Mapped to Common Elements of Health and Safety Programs

Common Elements of a Health & Safety Program	Model Sun Safety Program Elements
OHS Policy/Policy Statement	Sun Safety Policy
Assign responsibilities, accountabilities and authorities for OHS matters and the program	Authority, accountability & responsibility
Responsibilities of and support for the health and safety representative/officer or committee	Role of the health and safety committee Legal and other requirements
Identification and assessment of workplace hazards	Sun safety risk assessment
Control measures to eliminate or reduce the risks from the hazards identified	Do-control measures
Inspection program	Workplace inspections
Worker training and education	Sun safe administrative controls (including training & education)
Emergency preparedness, including first aid requirements	Sun safety first aid and incident notification
Incident reporting and investigation	Incident reporting and investigation

There are 3 ideas that a small employer should consider:

1. **Scalability** – small employers should feel free to “scale down” most of the elements of the Model Sun Safety Program described in this Guide. However, the ultimate test is what is “reasonable” for a small

employer to do. The test of “reasonableness” comes in when considering the employer’s “general duty” to take all reasonable care, or do everything reasonably practicable. It is the general duty that justifies a small employer doing something less complex and demanding than a large employer would be required to do.

2. **Modularity** – the elements of a Sun Safety Program are modular. It’s like a buffet at a restaurant. Take what you think you need (as a reasonable employer).
3. **Supervisors** – it is advisable to examine the list of activities that a supervisor can engage in for sun safety (refer to the section on ‘Sun Safety Roles Within a Workplace’, page 73). For many small employers, the employer may also be wearing the hat of “supervisor”. What a small employer ought to do can be distilled down – in general – to what a supervisor should do.

The following are some basic sun safety measures all small workplaces can implement:

- **Scheduling:** given the weather (humidex, UV index), should some jobs be scheduled for other times that are cooler or have a lower UV Index?
- **Employee selection:** who is or should be acclimatized to the hot work? Especially consider this for any new workers or workers who have been away
- **Information:** for employees potentially exposed to the sun, have they received general information about UV radiation, skin cancer, and heat stress?
- **Job planning:** based on the forecast temperature/humidex and the work to be done each day, can the supervisor: assess the site and the work to determine the level of physical activity needed for the tasks; identify if there are heat sources other than the sun; and then determine whether certain tasks may place workers at-risk of heat stress?
- **Pre-work safety talks:** can supervisors reiterate sun safety information and add specific precautions coming from job planning to these talks?
- **Sun safety control measures:** is there shading? Work rest scheduling? Task rotation? Cool break areas? Water supplies? Head protection? Clothing? Sunglasses? Sunscreen?
- **Coaching:** will the supervisor discuss sun safety with workers during the day?
- **Know the signs and symptoms:** can the supervisor and workers detect early symptoms of sunburn and heat stress? Do they know what to do if early symptoms appear?
- **Early detection:** will the supervisor suggest to workers exposed to the sun that they discuss early detection of skin cancer with their family doctor?
- **Off-the-job sun safety:** will the supervisor suggest to workers that they consider off-the-job sun safety for the whole family?

SSAWC RESOURCES

- *Sun Safety Programs for Small Employers* (fact sheet)

OTHER RESOURCES

Refer to ‘Small Business OHS Resources’ in **Appendix 4 – Other Resources**

IMPLEMENTING A SUN SAFETY PROGRAM FOR LARGE WORKPLACES

Large workplaces will normally have an Occupational Health and Safety Management System (OHSMS) or Occupational Health and Safety Program (OHSP) based on standards such as ISO 45001:2018, OHSAS 18001:1999 or CSA Z1000-14. These systems/programs help a workplace to manage health and safety risks from hazards within their workplace in a coordinated, integrated and comprehensive way.

When addressing sun exposure for outdoor workers as a specific workplace hazard, our **Model Sun Safety Program** is designed to be one program of the range of programs in a workplace's OHSMS/OHSP.

Our Model Sun Safety Program consists of a series of elements which align with the elements of an OHSMS/OHSP and are represented in the Plan-Do-Check-Act cycle of continuous improvement. For some of these elements, consideration of the sun safety implications should be embedded within existing workplace practices (e.g. return-to-work, preventive maintenance, procurement, inspections and investigations). However, for other elements (e.g. Sun Safety Policy, sun safety risk assessment, sun safety control measures, training and education) there are specific sun safety approaches that can be implemented. For these elements, we provide a comprehensive range of **resources** that are designed to help workplaces implement strategies to ensure they have a sustainable sun safe work environment.

SSAWC RESOURCES

For a full listing of SSAWC resources, refer to **Appendix 2 – SSAWC Resources Linked to Sun Safety Program Elements** or **Appendix 3 – SSAWC Resources Listed by Type of Resource**. These resources are available for download from <https://sunsafetyatwork.ca>

OTHER RESOURCES

Refer to **Appendix 4 – Other Resources** for a full range of resources available from a broad range of organizations.

SUN SAFETY ROLES WITHIN A WORKPLACE

Depending on the role a person has in a workplace, there may be some aspects of sun safety that they will be more interested in. In this section we list a range of “roles” within a workplace and provide some suggestions about considerations, information, and resources on sun safety which are applicable to these roles.

HEALTH AND SAFETY PRACTITIONER

You are a Health & Safety Practitioner. There are many titles for a Health & Safety Practitioner: Coordinator, Advisor, Officer, Manager, and so on. You are not directly responsible for health and safety. Instead you advise, consult, educate, promote, and so on. You assist everyone else in the organization with their OHS efforts. One of your tasks is to initiate, plan, develop, implement and monitor OHS programs, such as a Sun Safety Program. You want to improve your existing Sun Safety Program or you want to create one. You may have some very specific interests. The topics below are covered in the Resource Library of the website <https://sunsafetyatwork.ca>:

- You need to persuade senior management of the need for a Sun Safety Program
- You need an overview of the Plan-Do-Check-Act approach to a Sun Safety Program
- What are the elements of a mature Sun Safety Program for a large employer?
- Why it is important to scale down a Sun Safety Program for small employers?
- Identifying linkages between a Sun Safety Program and other programs in your OHS Management System
- Ensuring the participation of Health & Safety Committees and Worker Representatives
- The importance of ownership of sun safety activities by workers, supervisors, managers and others
- Leadership activities of senior management
- Are there specific legal requirements for sun safety (radiation and heat)
- The seasonal planning cycle for sun safety
- Identifying people at risk
- What does it mean to eliminate or reduce exposure to the sun (design controls)?
- Technical aspects of measurement of exposure
- Detailed risk analysis
- Engineering controls
- Administrative controls
- Why the supervisor is the key person for many sun safety activities

- Personal Protective Equipment (PPE)
- Procurement issues
- First aid for workplace incidents
- Notifications for workplace incidents
- Investigating workplace incidents
- Return to work issues (and acclimatization)
- Verification and auditing
- Record-keeping
- Change control and continuous improvement
- Contractor issues
- Off-the-job sun safety (sun safety for the whole family)
- An index of sun safety resources
- A dictionary of sun safety terms

EMPLOYEE/WORKER

You are an employee without any of the other roles listed here. OHS Acts have different words and definitions for the employee or worker. In most jurisdictions individuals can wear multiple hats (e.g. “worker” and “supervisor” simultaneously). Employees should not be passive recipients of sun safety initiatives. Individual employee ownership and engagement is critical for the success of a Sun Safety Program. How can you participate and what resources can you expect? You will likely want to know what other people are doing (or supposed to be doing) under a Sun Safety Program. You may have some very specific interests. The topics below are covered in the Resource Library of the website

<https://sunsafetyatwork.ca>:

- Why sun safety matters to you?
- Are you at particular risk of skin cancer or heat stress?
- What is meant by a Sun Safety Program?
- What is the role of your supervisor in a Sun Safety Program?
- What is the role of the Health & Safety Practitioner in a Sun Safety Program?
- What is the role of the Health & Safety Committee or Worker Representative in a Sun Safety Program?
- What are the signs of skin cancer?
- What are the symptoms of heat stress?
- Why a “buddy system” for sunburn and heat stress is important

- Participation in on-site assessment and job planning
- Selecting and using sun safety PPE
- Sun screens
- Hydration
- Acclimatization
- Return to work issues
- Work/ rest schedules
- Notification of sun safety incidents
- Work refusals
- Creative initiatives and your role in continuous improvement
- What should you be asking your family doctor?
- Why is Off-the-Job sun safety important for your whole family?

SUPERVISORS

Job titles vary, but we consider anyone who directs the work or activity of other workers to be a ‘supervisor’. Unless otherwise stated, we are referring to the front-line supervisor. Very little success can be achieved for a Sun Safety Program unless supervisors are on board. Many sun safety activities can only be done by a supervisor. In many jurisdictions in Canada a supervisor has personal legal duties for workplace health and safety independent of the employer’s duties. Supervisors have to take all reasonable care both as an agent for the employer and on their own account. You may have some very specific interests. The topics below are covered in the Resource Library of the website <https://sunsafetyatwork.ca>:

- Why the supervisor is the “key person” in a Sun Safety Program
- Do you have a personal legal responsibility for sun safety beyond the employer’s duties?
- How can your manager help you?
- How can the Health & Safety Practitioner help you?
- Thinking ahead – scheduling and task assignment for the days to come
- Site assessment
- New employees/ workers
- Job planning
- The importance of employee/ worker participation
- Task analysis
- Training

- Safety talks
- Tailgate sessions
- Tool box talks
- Incident recall technique for sun safety
- PPE issues
- Hydration
- Coaching and job observation
- Establishing and continuing a “buddy system” for sunburn and heat stress
- Warning signs of heat stress
- Sunburns
- Encouraging reports of sun safety incidents
- First aid
- Internal notification for sun safety incidents
- External notification for sun safety incidents
- Investigating sun safety incidents
- Work refusals
- Work/rest schedules
- Acclimatization
- Return to work
- Record-keeping
- Change control and continuous improvement
- Off-the-job sun safety for the whole family

HEALTH AND SAFETY COMMITTEES OR WORKER REPRESENTATIVES

You are a member of a Health and Safety Committee or you are a Worker Representative. The requirements for each can be complex and vary between Canadian jurisdictions. One issue across Canada is the degree to which the OHS legislation requires the Committee or the Representative to be involved in the development of something like a Sun Safety Program. In some jurisdictions a Committee may “establish” a program. In others, the Committee will “participate” in the development of a program. In others, the Committee will “advise” or “consult” on the employer’s development of a program. So one of the first issues for you is to determine the degree of involvement you should have with a Sun Safety Program.

But whether you are “establishing”, “participating” or “advising” you will probably have the same interests as a large employer. You will be looking at sun safety from an OHS Management System perspective. So, as for a large employer, all the resources provided on the website might be significant, and should be reviewed. The primary focus should be on the elements of a Model Sun Safety Program.

MANAGERS

You are a mid-level manager. Supervisors report directly or indirectly to you. You may be responsible for such functions as budgeting, staffing, planning, resource allocation, crew assignments, supervisor development, and so on. The success or failure of employees and supervisors in their sun safety activities depends on you.

Few OHS Acts in Canada have separate and express duties for manager. In most jurisdictions where there is an express general duty for supervisors, the meaning of “supervisor” will include “managers”. That means you will have an obligation to consider what is necessary for sun safety independent from the employer’s concern. In other jurisdictions, “employer” is defined to include managers as “agents” for the employer. In which case, you will have to take on the employer’s duties, including the employer’s general duty, personally. For an employer that is a corporation, it must be kept in mind that a corporation is a legal fiction as a “person” and that, in reality, an employer’s duties will only be fulfilled if the manager is acting properly on behalf of the employer.

You should first consider what the requirements are for large employers. You will be looking at sun safety from an OHSMS perspective. So, as for a large employer, all the resources provided on the website might be significant, and should be reviewed. The primary focus should be on the elements of a Model Sun Safety Program.

You should also review what it is the Health & Safety Practitioner’s concerns are regarding the initiation, planning, developing, implementing and monitoring for a Sun Safety Program. The Health & Safety Practitioner assists others, but is not directly responsible. When it comes to what is needed in terms of time, money, resources, people, and so on, it is the manager who is responsible for ensuring that others have what they need.

Where front-line supervisors report to you as a manager, you will want to review the techniques that supervisors should be using to reduce risk under a Sun Safety Program. Supervisors have to be trained and normally it would be the manager who will have to know enough about the supervisor’s activities to be able to train the supervisor. It is the manager who must hold supervisors accountable for their OHS responsibilities. Managers must be able to respond appropriately when supervisors raise concerns or put forward proactive suggestions.

SENIOR MANAGERS

You are an officer or director of the organization. Perhaps you are the owner of a small business. Why might a Sun Safety Program be necessary for your organization? You need to see the big picture. You need to ensure compliance. Leadership to ensure engage of everyone in a Sun Safety Program is important. The topics below are covered in the Resource Library of the website <https://sunsafetyatwork.ca>:

- Why sun safety is important
- Why a Sun Safety Program is your best option
- Do you have personal responsibility for sun safety?
- What is the employer's overall responsibility for sun safety?
- Why personal ownership of sun safety by everyone is important
- What your Health & Safety Practitioner can do for you
- Why participation of Health & Safety Committees and Worker Representatives is important
- Leadership activities for sun safety
- Is verification, auditing and record-keeping being done?

PROCUREMENT

You are responsible for procuring sun safety Personal Protective Equipment (PPE), devices, sunscreen, etc. You know that cost isn't the only criterion for purchasing equipment and supplies. You will have some very specific interests. The topics below are covered in the Resource Library of the website

<https://sunsafetyatwork.ca>:

- Head protection
- Sunglasses
- Clothing
- Sun screens
- Water
- Tablets
- Shading devices
- Training materials
- Posters and signage

OCCUPATIONAL HEALTH NURSES

Often it is only large employers that employ Occupational Health Nurses. Some OH Nurses act as consultants. The OH Nurse might be the only Health & Safety Practitioner in the workplace. OH Nurses have different skill sets than OHS generalists. They can go further with certain sun safety activities than others. You may have some very specific interests. The topics below are covered in the Resource Library of the website <https://sunsafetyatwork.ca>:

- Health promotion and sun safety
- First aid for sun safety incidents

- Skin cancer surveillance
- Acclimatization
- Coaching individual employees/workers
- Workers' compensation issues
- Return to work issues
- Drug effects and sun safety
- Off-the-Job sun safety for the whole family

OCCUPATIONAL HYGIENISTS

Occupational hygienists are highly trained OHS Practitioners who specialize in identifying, assessing and controlling exposure to workplace hazards. Depending on the size and hazards at a workplace, there may be an occupational hygienist on staff, or they may be called in when needed as a consultant. For sun safety, they have a critical role in risk assessment and for evaluating the effectiveness of control measures.

Resources and information for occupational hygienists:

- Sun safety risk assessment
- Control measures for solar UV and heat stress
- All our sun safety resources
- Links to sun safety resources from other organizations
- Glossary for sun safety terms

FAMILY MEMBERS

Today an employee's family members can easily check what is available from a family member's employer by looking at the employer's website. Is there an off-the-Job sun safety component to a workplace Sun Safety Program? What is available in the way of information and resources about sun safety? You will have some very specific interests. The topics below are covered in the Resource Library of the website

<https://sunsafetyatwork.ca>:

- Why should you be concerned about sun safety for your working family member?
- Does your family member's employer have Sun Safety Program?
- What should you be looking for in a good Sun Safety Program?
- What you should ask your family doctor about skin cancer?
- Sun safety activities outside the workplace for the whole family
- Sun screens
- Clothing
- Symptoms of heat stress

REFERENCES

1. World Health Organization. *Intersun: The Global UV project – A Guide and Compendium*. WHO, Geneva, 2003. <http://www.who.int/uv/publications/intersunguide/en/>
2. World Health Organization. Skin Cancers – how common is skin cancer? <https://www.who.int/uv/faq/skincancer/en/index1.html>
3. Marrett, L.D., Chu, M.B.H., Atkinson, J., Nuttall, R., Broomfield, G., Hershfield, L. and C.F. Rosen. *An update to the recommended core content for sun safety messages for public education in Canada: A consensus report*. Canadian Journal of Public Health, 2016. 107(4-5): p. e473-e479.
4. Gies, P., K. Glanz, D. O’Riordan, T. Elliott, E. Nehl. *Measured occupational solar UVR exposures of lifeguards in pool settings*. American Journal of Industrial Medicine, 2009. 52: p. 645-653.
5. Ontario Ministry of Labour. *Health and safety guidelines - heat stress*. 2012: http://www.labour.gov.on.ca/english/hs/pubs/gl_heat.php
6. Worksafe B.C. *Preventing Heat Stress at Work*. Worksafe B.C., Vancouver, 2007. <https://www.worksafebc.com/en/resources/health-safety/books-guides/preventing-heat-stress-at-work>
7. Canadian Cancer Society's Steering Committee on Cancer Statistics, *Canadian Cancer Statistics 2019*, Canadian Cancer Society: Toronto, 2019.
8. Canadian Cancer Society's Steering Committee on Cancer Statistics, *Canadian Cancer Statistics 2015*, Canadian Cancer Society: Toronto, 2015.
9. Krueger, H., D. Williams, M. Chomiak, I. Trenamn. *The Economic Burden of Skin Cancer in Canada: Current and Projected (Final Report)*, Canadian Partnership Against Cancer: Toronto, 2010.
10. Mofidi, A., Tompka, E., Spencer, J., Kalcevich, C., Peters, C.E., Kim, J., Song, C., Mortazavi, S.B., P.A. Demers. The economic burden of occupational non-melanoma skin cancer due to solar radiation. *Journal of Occupational and Environmental Hygiene*, 2018. 15(6), p. 1-11.
11. Elwood, J.M., *Who gets skin cancer – individual risk factors*, in *Prevention of Skin Cancer*, D.J. Hill, J.M. Elwood, and D.R. English, Editors. 2004, Kluwer: Dordrecht.
12. Staples, M., M. Elwood, R.C. Burton, J.L. Williams, R. Marks, G.G. Giles. *Non-melanoma skin cancer in Australia: the 2002 national survey and trends since 1985*. Medical Journal of Australia, 2006. 184(1): p. 6-10.
13. International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans - Volume 100: A Review of Human Carcinogens, Part D: Radiation* World Health Organization, Editor 2012, International Agency for Research on Cancer: Lyon.
14. National Toxicology Program, *Report on Carcinogens, Twelfth Edition*, 2011, Department of Health and Human Services: Washington, D.C.
15. Kimlin, M.G. and T.D. Tenkate, *Occupational exposure to ultraviolet radiation: the duality dilemma*. Reviews on Environmental Health, 2007. 22(1): p. 1-37.
16. Beral, V. and N. Robinson, *The Relationship of Malignant Melanoma, Basal and Squamous Skin Cancers to Indoor and Outdoor Work*. British Journal of Cancer, 1981. 44: p. 886-891.
17. Green, A., G. Beardmore, V. Hart, D. Leslie, R. Marks, D. Staines. *Skin Cancer in a Queensland Population*. Journal of the American Academy of Dermatology, 1988. 19(6): p. 1045-1052.
18. Marks, R., D. Jolley, A.P. Dorevitch, T.S. Selwood. *The Incidence of Non-Melanocytic Skin Cancers in an Australian Population: Results of a Five-Year Prospective Study*. Medical Journal of Australia, 1989. 150: p. 475-478.
19. Ramirez, C.C., D.G. Federman, and R.S. Kirsner, *Skin cancer as an occupational disease: the effect of ultraviolet and other forms of radiation*. International Journal of Dermatology, 2005. 44: p. 95-100.
20. Suarez-Varela, M.M., A.L. Gonzalez, and E.F. Caraco, *Non-melanoma skin cancer: an evaluation of risk in terms of ultraviolet radiation exposure*. European Journal of Epidemiology, 1992. 8(6): p. 838-844.

21. Bauer, A., T.L. Diepgen, and J. Schmitt, *Is occupational solar ultraviolet irradiation a relevant risk factor for basal cell carcinoma? A systematic review and meta-analysis of the epidemiological literature*. *British Journal of Dermatology*, 2011. 165: p. 612-625.
22. Diepgen, T.L., M. Fartasch, H. Drexler, J. Schmitt. *Occupational skin cancer induced by ultraviolet radiation and its prevention*. *British Journal of Dermatology*, 2012. 167(Suppl. 2): p. 76-84.
23. Schmitt, J., A. Seidler, T.L. Diepgen, A. Bauer. *Occupational ultraviolet light exposure increases the risk for the development of cutaneous squamous cell carcinoma: a systematic review and meta-analysis*. *British Journal of Dermatology*, 2011. 164: p. 291-307.
24. Loney, T., Paulo, M.S., Modenese, A., Gobba, F., Tenkate, T., Whiteman, D.C., Green, A.C., John, S.M. *Global evidence on occupational sun exposure and keratinocyte cancers*. *British Journal of Dermatology*, 2020. <https://onlinelibrary.wiley.com/doi/10.1111/bjd.19152>
25. Gandini, S., F. Sera, M.S. Catanuzza, P. Pasquini, O. Picconi, P. Boyle, C.F. Melchi. *Meta-analysis of risk factors for cutaneous melanoma: II. Sun exposure*. *European Journal of Cancer*, 2005. 41(1): p. 45-60.
26. Diepgen, T.L. and V. Mahler, *The epidemiology of skin cancer*. *British Journal of Dermatology*, 2002. 146(Suppl. 6): p. 1-6.
27. Elwood, J.M. and J. Jopson, *Melanoma and Sun Exposure: An Overview of Published Studies*. *International Journal of Cancer*, 1997. 73: p. 198-203.
28. Gallagher, R.P. and T.K. Lee, *Adverse effects of ultraviolet radiation: a brief review*. *Progress in Biophysics and Molecular Biology*, 2006. 92: p. 119-131.
29. Green, A., D. Battistutta, V. Hart, D. Leslie, D. Weedon. *Skin cancer in a subtropical Australian population: incidence and lack of association with occupation. The Nambour Study Group*. *American Journal of Epidemiology*, 1996. 144(11): p. 1034-1040.
30. Vagero, D., G. Ringback, and H. Kiviranta, *Melanoma and Other Tumours of the Skin Among Office, Other Indoor and Outdoor Workers in Sweden 1961-1979*. *British Journal of Cancer*, 1986. 53: p. 507-512.
31. Centers for Disease Control and Prevention. *Extreme heat*: <http://www.bt.cdc.gov/disasters/extremeheat/>.
32. Chao, T.C., R. Sinniah, and J.E. Pakiam, *Acute heat stroke deaths*. *Pathology*, 1981. 13: p. 145-156.
33. Garcia-Rubira, J.C., J. Aquilar, and D. Romero, *Acute myocardial infarction in a young man after heat exhaustion*. *International Journal of Cardiology*, 1995. 47: p. 297-300.
34. Rubel, L.R. and K.G. Ishak, *The liver in fatal exertional heat stroke*. *Liver*, 1983. 3: p. 249-260.
35. Government of Victoria. *Staying healthy in the heat: who is at most risk?* 2010. <http://health.vic.gov.au/environment/heatwaves-publications.htm>.
36. Wallace, R.F., et al., *Prior heat illness hospitalization and risk of early death*. *Environmental Research*, 2007. 104: p. 290-295.
37. Koken, P.J.M., et al., *Temperature, air pollution and hospitalization for cardiovascular diseases among elderly people in Denver*. *Environmental Health Perspectives*, 2003. 111(10): p. 1312-1317.
38. Lin, S., et al., *Extreme high temperatures and hospital admissions for respiratory and cardiovascular diseases*. *Epidemiology*, 2009. 20(5): p. 738-746.
39. Linares, C. and J. Diaz, *Impact of high temperatures on hospital admissions: a comparative analysis with previous studies about mortality*. *European Journal of Public Health*, 2008. 18: p. 317-322.
40. Marrett, L.D., E.C. Pichora, and M.L. Costa, *Work-time sun behaviours among Canadian outdoor workers: results from the 2006 National Sun Survey*. *Canadian Journal of Public Health*, 2010. 101(4): p. 119-122.
41. Gies, P. and J. Wright, *Measured solar ultraviolet radiation exposures of outdoor workers in Queensland in the building and construction industry*. *Photochemistry and Photobiology*, 2003. 78(4): p. 342-348.
42. Hammond, V., A.I. Reeder, and A. Gray, *Patterns of real-time occupational ultraviolet radiation exposure among a sample of outdoor workers in New Zealand*. *Public Health*, 2009. 123: p. 182-187.

43. Siani, A.M., G.R. Casale, R. Sisto, A. Colosimo, C.A. Lang, M.G. Kimlin. *Occupational exposures to solar ultraviolet radiation of vineyard workers in Tuscany (Italy)*. *Photochemistry and Photobiology*, 2011. 87: p. 925-934.
44. Peters, C.E., Pasko, E., Strahlendorf, P., Holness, D.L., Tenkate, T. *Solar ultraviolet radiation exposure among outdoor workers in three Canadian provinces*. *Annals of Work Exposures and Health*, 2019. 63(6): p. 679-688 <https://doi.org/10.1093/annweh/wxz044>
45. Peters, C.E., A.-M. Nicol, and P.A. Demers, *Prevalence of exposure to solar ultraviolet radiation (UVR) on the job in Canada*. *Canadian Journal of Public Health*, 2012. 103(3): p. 223-226.
46. Australian Radiation Protection and Nuclear Safety Agency, *Management Plan for Sun Protection: Supplementary Information*, Australian Radiation Protection and Nuclear Safety Agency, Editor 2010: Melbourne.
47. Australian Safety and Compensation Council, *Guidance note for the protection of workers from the ultraviolet radiation in sunlight*, Australian Safety and Compensation Council, 2008, Australian Government: Canberra.
48. Vecchia, P., M. Hietanen, B.E. Stuck, E. van Deventer, S. Niu, eds. *Protecting Workers from Ultraviolet Radiation*. International Commission on Non-Ionizing Radiation Protection: Germany, 2007.
49. Girgis, A., R.W. Sanson-Fisher, and A. Watson, *A Workplace Intervention for Increasing Outdoor Workers' Use of Solar Protection*. *American Journal of Public Health*, 1994. 84(1): p. 77-81.
50. Shoveller, J.A., C.Y. Lovato, L. Peters, J.K. Rivers. *Canadian national survey on sun exposure and protective behaviours: outdoor workers*. *Canadian Journal of Public Health*, 2000. 91(1): p. 34-35.
51. Stepanski, B.M. and J.A. Mayer, *Solar Protection Behaviors Among Outdoor Workers*. *Journal of Occupational and Environmental Medicine*, 1998. 40(1): p. 43-48.
52. Borland, R.M., B. Hocking, G.A. Godkin, A.F. Gibbs, D.J. Hill. *The Impact of a Skin Cancer Control Education Package for Outdoor Workers*. *Medical Journal of Australia*, 1991. 154: p. 686-688.
53. Lewis, E.C., J.A. Mayer, and D. Slymen, *Postal workers' occupational and leisure time sun safety behaviors (United States)*. *Cancer Causes and Control*, 2006. 17: p. 181-186.
54. Pichon, L.C., J.A. Mayer, D.J. Slymen, J.P. Elder, E.C. Lewis, G.R. Galindo. *Ethnoracial differences among outdoor workers in key sun-safety behaviors*. *American Journal of Preventive Medicine*, 2005. 28(4): p. 374-378.
55. Salas, R., J.A. Mayer, and K.D. Hoerster, *Sun-protective behaviors of Californian farmworkers*. *Journal of Occupational and Environmental Medicine*, 2005. 47: p. 1244-1249.
56. European Agency for Safety and Health at Work, *New and Emerging Risks in Occupational Health and Safety*, 2009, European Agency for Safety and Health at Work: Luxembourg.
57. National Sun Safety Committee, *Strategic directions for the primary prevention of skin cancer in Canada*. *Canadian Strategy for Cancer Control*, 2006.
58. Glanz, K., D.B. Buller, and M. Saraiya, *Reducing ultraviolet radiation exposure among outdoor workers: state of the evidence and recommendations*. *Environmental Health*, 2007. 6(22): p. 1-11.
59. Kutting, B. and H. Drexler, *UV-induced skin cancer at workplace and evidence-based prevention*. *International Archives of Occupational and Environmental Health*, 2010. 83: p. 843-854.
60. Reinau, D., et al., *Outdoor workers' sun-related knowledge, attitudes and protective behaviours: a systematic review of cross-sectional and interventional studies*. *British Journal of Dermatology*, 2013. 168: p. 926-940.
61. Horsham, C., J. Auster, M.C. Sendall, M. Stoneham, P. Youl, P. Crane, T. Tenkate, M. Janda, M. Kimlin. *Interventions to decrease skin cancer risk in outdoor workers: update to a 2007 systematic review*. *BMC Research Notes*, 2014. 7: 10.
62. Community Preventive Services Task Force. *Guide to Community Preventive Services. Preventing skin cancer: interventions in outdoor occupational settings*. <http://www.thecommunityguide.org/cancer/skin/education-policy/outdooroccupations.html> August 2013.

63. de Vries, E., M. Arnold, E. Altsitsiadis, M. Trakatelli, B. Hinrichs, E. Stockfleth, J. Coebergh, EPIDERM Group. *Potential impact of interventions resulting in reduced exposure to ultraviolet (UV) radiation (UVA and UVB) on skin cancer incidence in four European countries, 2010-2050*. British Journal of Dermatology, 2012. 167(Suppl. 2): p. 53-62.
64. Carter, R., R. Marks, and D. Hill, *Could a national skin cancer primary prevention campaign in Australia be worthwhile?: an economic perspective*. Health Promotion International, 1999. 14(1): p. 73-82.
65. Vos, T., R. Carter, J. Barendregt, C. Mihalopoulos, L. Veerman, A. Magnus, L. Cobiac, M. Bertram, A. Wallace. *Assessing Cost-Effectiveness on Prevention (ACE-Prevention): Final Report*, 2010, University of Queensland & Deakin University: Brisbane & Melbourne.
66. Shih, S.T.-F., R. Carter, C. Sinclair, C. Mihalopoulos, T. Vos. *Economic evaluation of skin cancer prevention in Australia*. Preventive Medicine, 2009. 49: p. 449-453.
67. Kyle, J.W., J.K. Hammitt, H.W. Lim, A.C. Geller, L.H. Hall-Jordan, E.W. Maibach, E.C. De Fabo, M.C. Wagner. *Economic evaluation of the US Environmental Protection Agency's SunWise Program: sun protection education for young children*. Pediatrics, 2008. 121(5): p. e1074-e1084.
68. Robson, L.S., Clark, J., Cullen, K.L., Bilecky, A., Severin, C., Bigelow, P., Irvin, E., Culyer, A.J., Mahood, Q. *Effectiveness of occupational health and safety management systems: a systematic review*. Institute for Work and Health, Toronto, 2005. <https://www.iwh.on.ca/scientific-reports/effectiveness-of-occupational-health-and-safety-management-systems-systematic>
69. Canadian Centre for Occupational Health and Safety *Implementing an Occupational Health and Safety (OH&S) Program*. CCOHS, Hamilton, ON, 2012.
70. *OSHA Safety and Health Program Management Guidelines*. November 2015 Draft for Public Comment, Occupational Safety and Health Administration, Washington, D.C., 2015.
71. Ham, J. *Report of the Royal Commission on the Health and Safety of Workers in Mines*. Ontario Ministry of the Attorney General, Toronto, 1976.
72. Kausek, J. *OHS 18001 – Designing and implementing an effective health and safety management system*. Government Institutes, Maryland, 2007.
73. *CSA Z1002-12 – Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014.
74. Parisi, A.V. Turnbull, D.J. *Shade provision for UV minimization: a review*. Photochemistry and Photobiology, 2014. 90(3): p. 479-490.
75. Sliney, D.H. *Physical factors in cataractogenesis: ambient ultraviolet radiation and temperature*. Investigative Ophthalmology and Visual Science, 1986. 27(5): p. 781-790.
76. Almutawa, F., Vandal, R., Wang, S.Q., Lim, H.W. *Current status of photoprotection by window glass, automobile glass, window films, and sunglasses*. Photodermatology, Photoimmunology and Photomedicine, 2013. 29(2): p. 65-72.
77. Bernstein, E.F., Schwartz, M., Viehmeyer, R., Arocena, M.S., Sambuco, C.P., Ksenzko, S.M. *Measurement of protection afforded by ultraviolet-absorbing window film using an in vitro model of photodamage*. Lasers in Surgery and Medicine, 2006. 38(4): p. 337-342.
78. Gies, p.H., Roy, C.R., Toomey, S., McLennan, A. *Protection against solar ultraviolet radiation*. Mutation Research, 1998. 422(1): p. 15-22.
79. Parisi, A., Kimlin, M. *Effects of simple measures to reduce the occupational solar UV exposure of outdoor workers*. Journal of Occupational Health and Safety – Australia and New Zealand, 1999. 15(3): p. 267-272.
80. International Labour Office. *Encyclopedia of Occupational Health and Safety*. <http://www.iloencyclopaedia.org/>
81. Sinclair, W.H. Brownsberger, J.C. *Wearing long pants while working outdoors in the tropics does not yield higher body temperatures*. Australian and New Zealand Journal of Public Health, 2013. 37(1): p. 70-75.

82. Australian Radiation and Nuclear Safety Agency. *Fact Sheet – Sun protection using hats*. ARPANSA, Yallambie, 2016.
<https://www.arpansa.gov.au/sites/g/files/net3086/f/legacy/pubs/factsheets/SunProtectionUsingHats.pdf>
83. CSA Z94.3.1-09 *Selection, use, and care of protective eyewear*. CSA Group, 2009.
84. Health Canada. *It's Your Health – Sunglasses*, 2010. <https://www.canada.ca/en/health-canada/services/healthy-living/your-health/products/sunglasses.html>
85. CCOHS. *OSH Answers Fact Sheets – Hazard Control*, 2018.
https://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html
86. Infrastructure Health and Safety Association. *Policy and Program Templates – Statistics and Records*.
https://www.ihsa.ca/resources/statistics_records.aspx
87. CSA Z1000-14 – *Occupational health and safety management*. CSA Group, 2014.
88. World Health Organization. *Global Strategy on Occupational Health for All*. WHO, Geneva, 1994.
http://www.who.int/occupational_health/publications/globstrategy/en/index5.html
89. Rooney, J.J., Vanden Heuvel, L.N. *Root cause analysis for beginners*. Quality Progress, 2004. July: p. 45-53.

APPENDIX 1 – DEFINITIONS

The following are a broad range of definitions which are relevant to sun safety and sun safety programs. Because some of these terms may be interpreted differently or have a range of valid definitions, we have included this list in order to ensure that readers are aware of the way in which we have used/interpreted these terms when developing this Sun Safety Program.

Note: any word/term which is in **bold** is contained in this list of definitions.

Accident

An accident is any unplanned event which causes **harm** to people or damage to property. See also **Incident**

Acclimatization

Acclimatization refers to the ability of our bodies to adapt to working in a hot environment. The initial benefits of acclimatization can be seen within a few days of increased physical activity, but the longer-term benefits take a few weeks of constant exposure to hot environments. Acclimatization can also be lost quite quickly, within a matter of days of non-exposure to elevated temperatures and work rates. Given these considerations, outdoor workers often do not work for long enough at high enough temperatures to become acclimatized. Acclimatization also varies among individuals, with people who are not physically fit or who have a range of underlying health conditions taking longer to become acclimatized.

Accountability

Accountability is the process of being “held to account”. A person may have **responsibilities** under a **Sun Safety Program**, but accountability is about whether the person has fulfilled his or her responsibilities. A person may have **authority** under a Sun Safety Program to make certain decisions, but accountability is about whether the person has exercised their authority properly. The person who delegates responsibility and authority should hold the delegatee accountable.

ACGIH

American Conference of Governmental Industrial Hygienists. A professional not-for-profit organization that provides authoritative standards (i.e. **Threshold Limit Values, TLV®s**) for workplace health and safety, including exposure standards for heat stress and UV radiation exposure.

Act

Act is the fourth and last phase of the **Plan-Do-Check-Act** cycle and reflects the need for ongoing high-level review of the **OHSMS** and a commitment to **continuous improvement**.

Action Limit

An action limit is a level of exposure which is lower than the **occupational exposure limit (OEL)** but represents a level of exposure at which action should be taken to reduce worker exposure. It is generally one-half of the OEL.

Acute

An acute exposure is a short term exposure. An acute health effect is one that appears a short time after exposure (minutes and hours). A **sunburn** is an acute effect.

Administrative controls

Administrative controls are “people-centred” measures such as employee selection, training, coaching, job rotation, and so on, that are used to reduce risk in the workplace. In the “Hierarchy of Controls”,

administrative controls are considered after engineering controls have been put in place, and before **Personal Protection** (or Personal Protective Equipment, **PPE**) is considered. The optimal situation is that after engineering and administrative controls are in place, the **residual risk** will be so low that PPE will not be necessary.

Anemometer

An anemometer is a device used to measure air speed. A dry wind enhances evaporation and therefore assists with cooling the body.

Audit

An audit is a systematic and documented process to obtain and objectively evaluate evidence on whether all of the elements of an **OHSMS/Sun Safety Program** have been implemented and to determine how effective the OHSMS/Sun Safety Program is in protecting workers [87]. Audits are therefore a high-level review of a workplace's OHS policies and procedures, and can also help a workplace to determine [69]:

- The level and effectiveness of worker participation
- Compliance with OHS legislation and other requirements
- How well evaluations, actions and reviews have been implemented, and
- The effectiveness of improvements in policies, practices and procedures

Authority

It is not enough under a **Sun Safety Program** to assign **responsibilities**; individuals should also understand what their authority is to make certain decisions under a Sun Safety Program. An individual should be held **accountable** for both fulfilling their responsibilities and for exercising their authority.

Basal cell carcinoma (BCC)

Basal cell carcinoma (BCC) is the most common form of **skin cancer** in people. BCCs arise from keratinocytes in the skin and are described as being a **non-melanoma skin cancer**. They develop more frequently with age and are common on the face, scalp and neck. Exposure to the sun causes BCC. They are often initially noticed as a lump or sore on the skin that does not heal.

Broad spectrum sunscreen

A broad spectrum **sunscreen** is one which is effective for both the UVA and UVB portions of **ultraviolet radiation**.

Buddy system

An employee working in the sun may not be aware that they are developing a bad sunburn, or that they are showing early signs of heat stress. A co-worker may spot the problem first. A "buddy system" is an informal measure introduced by a supervisor such that everyone is informed and motivated to assist in early detection of sun safety problems.

Carcinogen

A carcinogen is something which can cause cancer.

Carcinoma

Carcinoma refers to malignant tumours which form from the outer skin (epithelial cells).

Cataract

A cataract is an area of opacity (non-transparency) in the lens of the eye. It may obscure vision. Over-exposure to sunlight can cause cataracts.

Check

Check is the third of the four phases of the **Plan-Do-Check-Act** cycle and is the checking and corrective action phase. The workplace monitors how well the controls and other processes are working and then implements corrective action if needed.

Chronic

Something is chronic that is persistent, prolonged or repeated. As opposed to **acute**. A chronic exposure is a long-term exposure.

Comfort zone

The temperature range over which the majority of individuals feel comfortable.

Conjunctiva

The conjunctiva is a clear, thin membrane which covers the front of the eye and lines the inside of the eyelids.

Consultation

In many **jurisdictions** there is a legal requirement for employers to “consult” with the **Health and Safety Committee** or **Health and Safety Representative** when developing, implementing and monitoring a program such as a **Sun Safety Program**. Consultation should be early enough, and substantive enough, that the Committee or Representative can have a significant impact on the program or policy in question. In some jurisdictions, the word “participation” is used; a stronger term for the Committee’s or Representative’s involvement.

Continuous improvement

Continuous improvement is the ongoing process for identifying and assessing opportunities for improving the OHSMS/Sun Safety Program, including reducing the **residual risk** associated with outdoor work activities. This includes [84]:

- Reviewing current control and prevention measures
- Reviewing the best available technologies and procedures to address residual risk, and
- Implementing a strategy for continuous improvement

Control

Controls are “protective or preventive measures that reduce risk.” [85]. Refer to CCOHS – Hazard Control: https://www.ccohs.ca/oshanswers/hsprograms/hazard_control.html

Control measures

Control measures are **controls** which are implemented to protect workers. They can also be considered at three points between the **source** and the worker:

1. The most effective control addresses the hazard at its source (through **elimination** or **substitution**)
2. The next most effective level of control is to intervene between the source and the worker (i.e. through **engineering controls** and systems that increase awareness),
3. The least favorable level of control is to implement measures at the point of the worker (i.e. **administrative controls** or **personal protection**). See also **Hierarchy of Risk Controls**.

Cooling Wear

Cooling wear are cooling systems that are designed to provide additional protection for workers in a hot environment. This includes vests, neck shades, towels, headwear, and bandanas. The cooling wear either

works on the principle of evaporative cooling (if they are wetted prior to use), or it works through built-in replaceable ice/cooling packs. Some of these are designed to be used with hard hats. These personal cooling systems have been shown to be quite effective in reducing heat stress. However, the extra weight of the devices and the potential for interference with work tasks needs to be considered.

Core

The **core** phase of the **Model Sun Safety Program** provides a foundation for the sun safety program and the core elements influence all of the other elements of the program. The two elements of the Model Sun Safety Program are **Sun Safety Policy** and Communication and Consultation.

Core temperature

Core temperature refers to the core body temperature of a person. It is the 'operating' temperature of a person. A significant increase or decrease in core temperature results in negative health effects. **Heat stress** causes an increase in core body temperature. The 'healthy' core temperature of a person is within a narrow range around 37°C.

Cornea

The cornea is the transparent membrane covering the front portion of the eye. It is the part of the eye which absorbs the shortest wavelengths of UV radiation (which have the highest energy and so can produce the most damage). A common adverse condition is **photokeratitis**.

Corrective action

Corrective actions are those taken to eliminate the cause or causes of nonconformities in the OHSMS/Sun Safety Program. These actions try to solve real-life problems with the view of trying to stop the **nonconformity** occurring again.

Cramps

See **Heat cramps**.

CSA Z94.3-07

Canadian Standard *CSA Z94.3-07 Industrial Eye and Face Protectors*. Provides requirements for industrial eye protection (also known as **protective eyewear**). Eye protection for exposure to bright sun is classified as Class 1A, with the lens to provide radiation protection and with side shields to be fitted and also provide radiation protection.

CSA Z94.3.1-09

Canadian Standard *CSA Z94.3.1-09 Selection, use, and care of protective eyewear*. Provides guidance on selection, use and care of eye protection described in CSA Z94.3-07.

CSA Z1000-14

Canadian Standard *CSA Z 1000-14 Occupational health and safety management*. Provides requirements for an **occupational health and safety management system** (OHSMS).

CSA Z1002-12

Canadian Standard *CSA Z 1002-12 Occupational health and safety – Hazard identification and elimination and risk assessment and control*. Describes methods that can be used in **occupational health and safety** to identify **hazards**, **eliminate** hazards, and **analyze** the **risk** associated with hazards which cannot be eliminated. It also provides guidance on the application of risk **control measures**.

Cutaneous

Referring to the '*cutis*', i.e. the skin.

Daily Assessment

The third of three risk assessment steps we recommend for undertaking a comprehensive **sun safety risk assessment** for either solar UV radiation or heat stress. This relates to assessment procedures (e.g. for heat stress these are **WBGT** or **Humidex**) which can be undertaken on a daily basis and which will determine whether additional control measures are needed based on current environmental conditions.

Dermatitis

Dermatitis is a group of acute and chronic skin diseases based on inflammation processes of the skin due to infections, physical or chemical agents.

Dermatology

Dermatology is a branch of medicine concerned with diseases of the skin. A dermatologist is a specialist in dermatology.

Dermis

The dermis is the part of the skin just under its very superficial part, the epidermis. It is a skin layer with important functions such as nutrition of the skin cells and protection of the inner biologic tissues, rich in elastic and collagen fibers and blood vessels.

Design control

Design control is often included as an **engineering control**. It involves two considerations that come before other physical controls. **Elimination** of the hazard – does an initial assessment of the hazard indicate that it can be removed from the workplace? This can include isolating the hazard in time or space. The second consideration is **substitution** of a lesser hazard.

Do

This is the second of the four phases of the **Plan-Do-Check-Act** cycle and is the implementation and operational phase; where the workplace implements **prevention measures** and **control measures**. In the **planning phase** these measures were identified as being needed to control unacceptable **risks** from the **hazards** present. Control measures are identified and implemented according to the **hierarchy of risk controls**.

Do-Control Measures

This is the component of the **Do** phase of the **Model Sun Safety Program** in which **control measures** are identified and implemented according to the **hierarchy of risk controls**.

Documentation

Documentation refers to record-keeping for elements of a Sun Safety Program. Documentation can take many forms, from a supervisor's notebook to training records to audit reports. Documentation is not itself "**due diligence**" unless a regulation calls specifically for a record. Documentation is one form of proof of due diligence (the training is the due diligence, the training records are the evidence of due diligence).

Dose

In toxicology the dose of a toxic agent means the quantity (generally expressed in units of energy/mass) of that agent able to reach the target, possibly inducing an effect. When considering solar UV dose, we often use the term *Radiant Exposure*. See **Radiant Exposure**.

Dry Bulb Temperature

The dry bulb temperature is the reading from a simple thermometer that gives the ambient air temperature. It is one of three temperatures that combine to produce the **Wet Bulb Globe Temperature (WBGT)**.

Due Diligence

Due diligence is expressed several ways, commonly as “take every precaution in the circumstances to protect a worker.” Also common is “take all reasonable care ... “ or “do everything reasonably practicable ...” Due diligence can be a **general duty** of an employer or an individual as well as a legal defence. Even if an Occupational Health and Safety Act and its regulations say nothing about sun safety, a person with a general duty to be duly diligent would have a legal obligation to consider engaging in sun safety activities that are appropriate in the circumstances (meaning the risk).

Duty

A duty is an obligation that is mandatory. A “right”, on the other hand, is at the discretion, or option, of the right-holder. Duties found in OHS statutes are called statutory duties. Different persons have different duties (employers, supervisors, workers, etc.). A **general duty** is a broad, open-ended duty to take care that is not dependent on details in the regulations. A regulation-dependent duty in an OHS statute has its content spelled out in the regulations (a regulation-dependent duty often uses the term “prescribed” to mean the details are found in the regulations). Some duties are express duties – they are set out in the legislation in black and white. Other duties are implied duties. An employer’s duty to ensure that supervisors are competent contains an implied duty to train supervisors.

Education

Education can be considered to be a structured approach to learning which focuses on the development of knowledge and reasoning. See also **training**.

Electromagnetic radiation

A type of radiation which consists of varying electric and magnetic fields that can travel through space and carry energy.

Electromagnetic spectrum

Electromagnetic radiation is grouped by **wavelength** and is generally arranged in order of frequency or wavelength to form the electromagnetic spectrum. The shorter the wavelength of the radiation, the higher the frequency and the higher its energy. It is the higher energy which causes more biological damage. The electromagnetic spectrum (from shortest to longest wavelength) is: gamma rays, x-rays, **ultraviolet (UV) radiation**, visible radiation, **infrared radiation**, microwave radiation, radiofrequency radiation, extremely low frequency fields. Our concern in sun safety is primarily with UV, visible and infrared radiation (heat).

Elimination

Elimination is the most effective control measure in the **hierarchy of risk controls**. It is more effective to eliminate the hazard at its **source**, therefore eliminating or removing the **risk** entirely. This is often done by designing or redesigning the workplace or the work task. Eliminating the sun is obviously not feasible, although it can be said that transferring outdoor tasks to indoors is “eliminating the sun” (it is really putting a barrier between the sun and the worker).

Engagement

Worker engagement, or worker participation, is critical to success in OHS. In a Sun Safety Program it is desirable that workers are motivated to identify and assess risk from the sun, and to take appropriate action, rather than being passive. Education is a key element in ensuring worker engagement.

Engineering controls

Engineering controls are “physical controls” for reducing risk, rather than “people-centred” controls (**administrative controls**). Examples are ventilation, shading, reflective surfaces, UV filtering glass, and so on. In the **hierarchy of risk controls**, engineering controls should be considered before administrative

controls. An optimal situation would be where engineering controls have reduced risk so low that **administrative controls** or **personal protection** are not needed. It is important to be clear that engineering controls do not include **PPE**.

Epidermis

The epidermis is the outer layer of the skin. It provides a barrier to environmental agents. It consists mainly of keratinocyte cells. See also **Dermis** and **Keratinocyte Carcinoma**.

Erythema

Erythema refers to reddening of the skin and is commonly called **sunburn**. It is a photochemical response of the skin (redness due to vasodilation and increased blood flow) following over-exposure to **ultraviolet radiation**, particularly **UV-B**. The clinical endpoint is described in terms of **minimal erythema dose** or **standard erythema dose**.

Evaluation

Evaluation is a systematic and deliberate process of judging the merits of something in comparison to a given criteria or standard. For our **Sun Safety Program**, this includes the assessment of how effective **control measures** are in reducing risk to workers.

Evaporation

Evaporation is the change from a liquid to a vapor. Energy is needed to change a liquid to a vapor. When sweat evaporates from the skin it means the sweat is changing from liquid water on the skin to water vapor in the air. The water vapor moving away from the skin is taking heat energy with it, and so there is a cooling effect at the surface of the skin. A breeze flowing over the skin will increase evaporation and therefore increase cooling of the skin. However, if the air near the employee's skin is very **humid** (high in water vapor content) then sweat will have less of an ability to evaporate. If the air is so humid it is saturated with water vapor, then a breeze will not be effective in evaporating the sweat and it will not have a cooling effect. See also **natural wet bulb temperature**.

Evaporation rate

Evaporation rate is the speed at which a liquid changes to a vapor. More specifically, it refers to the speed at which sweat evaporates from the skin. Evaporation rate is affected primarily by wind over the surface of the skin and the level of humidity in the air. The greater the wind, the greater the evaporation. The greater the humidity, the slower the evaporation. The greater the evaporation rate, the greater the degree to which heat leaves the body and the body cools.

Exposure

Exposure refers to contact of a person with a chemical or physical agent (e.g. radiation from the sun). The amount of exposure is important in determining the level of **risk** posed by a **hazard**.

Exposure limit

An exposure limit is a level of exposure (e.g. dose of radiation, concentration of chemical in air) below which has been determined to result in an acceptable **risk** to those being exposed (e.g. general public, workers). The acceptable level of **exposure** is usually based on an understanding of the adverse health effects from exposure to the **hazard** and the levels of exposure required to produce these adverse effects. As the values for exposure limits are typically derived from experimental studies, an exposure limit should not be considered as separating 'safe' from 'unsafe' exposures, but as providing a guide to 'relative safety' versus 'possible adverse effects'. See also **Occupational Exposure Limit**.

Fainting

The technical term for fainting is **syncope**, which is a temporary loss of consciousness as a result of a diminished supply of blood to the brain. Heat stress may result in syncope. See **Heat syncope**.

First aid

First aid involves steps that **workplace parties** can take immediately when detecting **harm** to reduce the effects of **exposure**. It is usually distinguished from “**medical aid**” which involves assistance from health care professionals. The workers’ compensation regimes in each province and territory in Canada will have a definition of first aid.

Federal Workplace

A workplace to which Part II of the *Canada Labour Code* applies. The *Canada Labour Code* is a federal Act. Occupational health and safety legislation in the federal jurisdiction has been consolidated under this Part of the *Canada Labour Code*. The Code applies to the following workplaces:

- Banks
- Railways, cross-border highway transportation (trucking, busing, courier)
- Air transportation (airlines and airports);
- Cross-border ferries, tunnels, dams and bridges
- Canals
- Telecommunications (telephone, radio and television broadcasting and cable system;
- Cross-border pipelines;
- Shipping and shipping services, harbors, stevedoring and lighthouses
- Grain elevators licensed by the Canadian Grain Commission, and certain feed mills and feed warehouses, flour mills, and grain seed cleaning plants
- Federal public service and persons employed by the public service and about 40 Crown corporations and agencies
- Indian reserves, and
- Exploration and development of petroleum on lands subject to federal jurisdiction (the territories)

A summary of Part II of the **Canada Labour Code** can be found at: <https://www.canada.ca/en/employment-social-development/services/health-safety/reports/summary.html>

General Duty

A general duty is a regulation-independent, open-ended duty found in legislation that does not mention a specific hazard or control. Its purpose is to cover hazards and controls not mentioned in the regulations. A general duty usually uses phrases such as “take every precaution reasonable in the circumstances”, “take all reasonable care” or “do everything reasonable practicable”. It requires an on-going assessment of risk. Even if sun safety is not mentioned in an OHS Act and regulations, a person with a general duty will have an obligation to control exposure to the sun where the risk warrants it.

Glare

Glare refers to reflected light from smooth and/or white surfaces, including water, snow and ice. Hence, sunlight can cause eye problems even in winter.

Globe Temperature (GT)

Globe temperature is a measure of **radiant heat** within a workplace environment. It is one of three temperatures that combine to produce the **Wet Bulb Globe Temperature (WBGT)**.

Guideline

A guideline is a standard that is not law in itself. It can take many forms – a code, a protocol, a formalized practice. A guideline can have legal effect in two ways – if the guideline is adopted by reference into an Act or a regulation (its content then becomes law), or if it is used in an argument about what is “reasonable” when considering **due diligence**.

Harm

Harm is “physical injury or damage to health” [73].

Hazard

A hazard is anything, which by its nature (inherent, intrinsic), has the potential to do **harm**. In a workplace, a hazard is any source/agent (e.g. **ultraviolet radiation**) which has the potential to harm a worker. Refer to CCOHS – Hazard and Risk: https://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html It is important to understand that “**hazard**” and “**risk**” are different, but related concepts.

Hazard assessment

Hazard assessment refers to the process of evaluating a **hazard**, primarily in terms of **risks** from **exposure** to the hazard. Hazard assessment includes the identification of the hazard, its characterization, the nature and severity of harm from the hazard, and the probability that harm will result from the hazard.

Hazard Identification

Hazard identification is the process of finding, listing and characterizing hazards within the workplace [73]. This is the first step of a **sun safety risk assessment**, where the sun is the identified **hazard**. However, the different **wavelengths** of radiation emitted by the sun produce different adverse health effects. For example, the **ultraviolet** range of wavelengths is responsible for skin and eye conditions, such as sunburn and skin cancer, whereas the **infrared** wavelengths produce heating effects.

Hazardous event

“An event that can cause harm.” A hazardous event can occur over a short period of time or over an extended period of time [73].

Hazardous situation

“A circumstance in which a person is exposed to at least one hazard.” The exposure can result in harm immediately, at some point in the future, or over a period of time [73].

Health & Safety Committee

Depending on where you are in Canada, there may be legal requirements for a workplace health and safety committee. The Committee typically has both employee and employer representatives on it. The Committee will have varying degrees of participation in the development, implementation and monitoring of the Sun Safety program. Committees have different names in different jurisdictions.

Health & Safety Practitioner

A person with education, training and experience in OHS. Such a person may have many different job titles in different workplaces: advisor, manager, consultant, coordinator, etc. There are a number of professional designations that a health and safety practitioner may possess: Canadian Registered Safety Professional (CRSP), Canadian Registered Safety Technician (CRST), Certified Safety Professional (CSP), Certified Health and Safety Consultant (CHSC), Certified Industrial Hygienist (CIH), etc. Importantly, the health and safety practitioner is not directly responsible for OHS, but is in the workplace to advise, consult, educate, promote, etc.

Health & Safety Worker Representative

Depending on where you are in Canada, there may be legal requirements for a workplace health and safety worker representative. Usually for a workplace with fewer than 20 employees there is no workplace **Health and Safety Committee**, just one or more worker representatives. Worker representatives will have varying degrees of participation in the development, implementation and monitoring of the **Sun Safety Program**.

Health Canada

Is the day-to-day term for the federal Department of Health. Health Canada provides OHS services to the federal civil service.

Heat

Heat is the transfer of energy from one body to a cooler body. Cold is simply the absence of heat.

Heat cramps

Heat cramps are a **heat-induced condition** as a result of **heat stress**. They are caused by heavy sweating which drains the body of salt. Symptoms include painful contractions of muscle tissue (spasms) in the stomach, arms or legs. It can occur suddenly. Treatment includes moving to a cool place, loosen or remove clothing, and stretching and massaging cramped muscles. Electrolyte replacement is required and if the cramps do not go away, medical help should be sought.

Heat exhaustion

Heat exhaustion is a serious **heat-induced condition** as a result of **heat stress**. It is caused by fluid loss and from the body's cooling system starting to break down. Symptoms include: heavy sweating; cool, moist skin; a body temperature above 38°C; weak pulse; weakness; nausea and vomiting; very thirsty; rapid panting or breathing; and blurred vision. Treatment includes moving the person to a cool area, loosen or remove clothing, cool water to drink, fan and spray with cool water. It is a serious condition and medical aid is required.

Heat generating equipment

Some equipment in the workplace is hot. Examples are engines, boilers, ovens, containers of tar or asphalt, etc. Heat from heat generating equipment can be transferred to an employee three ways. If an employee's body touches the equipment, heat is transferred directly by conduction. If hot air or other gas or vapor comes off the equipment and reaches the employee's body, there can be heat transfer by convection. The hot equipment also gives off infrared radiation which can heat the employee's body; this is heat transfer by radiation. An outside worker near heat generating equipment will be experiencing heat from the sun (infrared radiation and hot air) as well as infrared radiation and hot air from the equipment.

Heat rash

Heat rash is the mildest **heat-induced condition** as a result of **heat stress**. It is caused by a hot, humid environment and plugged sweat glands. Symptoms include red bumpy rash with severe itching. Treatment includes avoiding hot environments and rinsing the skin with cool water.

Heat stress

Heat stress happens when a body loses its ability to self-regulate body temperature. For outdoor workers, the sun is the biggest cause of heat stress. The primary factors for heat stress are:

- Environment – air temperature, **humidity** and the sun
- Worker – **hydration**, clothing, medical conditions, **acclimatization**, and
- Work – the amount of work done and how much effort it takes to complete the work

Heat stroke

Heat stroke is the most serious **heat-induced condition** as a result of **heat stress**. It can cause irreversible damage to the heart, lungs, kidneys and liver, and even death. Symptoms include: high body temperature (over 41°C) and any of the following: weak, confused, upset, or acting strangely; hot, dry, red skin (classic heat stress); profusely sweating (exertional heat stress); fast pulse; or headache or dizziness. In later stages, a person may pass out and have convulsions. Response includes calling an ambulance, removing clothing, fan and spray the person with cool water and offer sips of water if the person is conscious. Heat stroke is a medical emergency and an ambulance should be called immediately.

Heat syncope

Heat syncope, also known as **fainting**, is a **heat-related health condition** caused by fluid loss and inadequate water intake. Symptoms include sudden fainting after extended work, cool moist skin and a weak pulse. Medical attention is needed and the person should be assessed for Cardio Pulmonary Resuscitation (CPR). If the person is conscious, offer sips of cool water.

Heat-induced conditions

The range of health conditions caused by **heat stress**. These conditions are (from least to most serious): **heat rash, heat cramps, fainting, heat exhaustion, heat stroke**.

Hierarchy of risk controls

This provides the underlying approach to identifying and implementing **control measures**. Using this hierarchy, the most effective controls should be implemented first, with the less effective controls implemented in order and only considered when control is not achieved using more effective controls. The hierarchy is (in order of most effective to least effective) [73]:

1. **Eliminate** the hazard
2. **Substitute** other materials, process or equipment
3. **Engineering controls**
4. Systems that increase **awareness** of potential hazards
5. **Administrative controls**
6. **Personal protection**.

Often it is necessary to implement multiple controls at the same time.

Humidex

The Humidex is a Canadian invention and is a measure of how hot we feel (i.e. perceived heat). It is based on the combined effects of high temperature and humidity. For the general public, the Humidex ratings are: 20-29 = comfortable; 30-39 = some discomfort; 40-45 = great discomfort, avoid exertion; >45 = dangerous, heat stroke possible. Humidex generally decreases with increasing latitude, with very high Humidex values rare for most parts of Canada, except for southern areas of Ontario, Manitoba and Quebec.

Reference: *Environment Canada Humidex website*: <https://www.canada.ca/en/environment-climate-change/services/seasonal-weather-hazards/warm-season-weather-hazards.html#toc7>

Humidex-Based Heat Response Action Plan

A Humidex-based heat response plan has been published by the [Occupational Health Clinics for Ontario Workers Inc.](#) This is a simplified way of assessing **heat stress** and protecting workers. The plan translates **WBGT** into **Humidex** values to provide an estimate of heat stress and assigns specific response actions based on Humidex values. Along with WBGT, it is a heat stress assessment method recommended for use as part of a **daily assessment** for heat stress.

Humidity

Humidity is the relative level of water vapor in the air. The higher the humidity, the higher the level of water vapor in the air. Humidity has an important effect on the ability of sweat on an employee's skin to evaporate and therefore cool the skin. High humidity means less evaporation of sweat and therefore less cooling from evaporation of sweat. The **Humidex** is an index that shows the relative level of water vapor in the air. See **evaporation**.

Hydration (De-hydration)

Our bodies need water to survive. Hydration refers to the amount of water which gets to our cells, tissues and organs. Our bodies need to retain a balance between water and electrolytes; if we lose water (i.e. become dehydrated) systems within our body are affected and can start to function less effectively and may shut down. Symptoms of dehydration include: loss of urine or urine becoming darker, dry mouth, sleepiness, fatigue, excessive thirst, headache, confusion and dizziness. It is important to drink plenty of water to avoid dehydration.

Incident

An unwanted event arising from the normal course of work that results in, or could have resulted, in **harm**. Usually includes both **accidents** and close calls.

Incident recall technique

It is workers who understand the most about their workplace, equipment, materials, and processes. Workers are encouraged to recall situations and incidents that could have led to unwanted events and exposures, but that did not. Identifying "close calls" leads to proactive steps to eliminate or reduce their causes. Incident recall technique is intended to uncover events which were not reported but which could have been serious under different circumstances. It is an issue whether sun burn should be considered an incident and worth reporting.

Incident Report

The reporting of an incident; includes the reporting of accidents regardless of the degree of harm, as well as close calls.

Infrared (IR) radiation

This is the form of **electromagnetic radiation** that has a wavelength range of 770nm to 1,000,000nm (i.e. 1mm); this is longer than **visible radiation** and shorter than microwave radiation. It produces heating effects in the skin and eyes.

Inspection

An inspection is defined as a: (1) deliberate, systematic scrutiny or examination of an activity; or (2) thorough, close, critical examination, checking or testing against established criteria or standards. Regular workplace inspections are required to be undertaken by OHS legislation. The purpose of a workplace inspection is to identify and correct unsafe conditions, practice and behaviors. They are also a good way for workers to raise concerns, help supervisors/managers gain a better understanding of the jobs and tasks, and help the workplace to comply with their legislative obligations. An inspection is a proactive activity, as opposed to an **investigation**, which is triggered by an unwanted event (e.g. **incident** or **accident**). Inspections may be done by workers, supervisors, committee members or health and safety practitioners.

Inspection Checklist

An inspection checklist is a guide that structures an inspection. It usually lists common hazards and expected controls along an inspection route. It is used in planned, formal **workplace inspections**.

Internal Responsibility System (IRS)

The IRS is the policy foundation of OHS legislation across Canada. The IRS means that everyone in an organization is personally responsible for OHS. Individuals should engage in OHS activities that are appropriate for the person's level of authority and control. The IRS is represented in OHS legislation by duties for all workplace parties; the heaviest duties being on the employer. The IRS also consists of the three worker rights: the right to know about hazards and controls (usually expressed legally as duties on the part of the employer and supervisor to advise and educate about hazards and controls); the right to refuse unsafe or dangerous work; and the right to participate in OHS decision-making, usually through representation on a health and safety committee or by a health and safety representative. A Sun Safety Program should consider what each level of the organization should be responsible for under the program.

Investigation

An investigation is a detailed systematic search to uncover facts and determine the truth of the factors (who, what, where, why and how) of an incident. It is reactive, as opposed to the proactive nature of an **inspection**. An investigation program should contain standards as to what will trigger an investigation. It is considered good practice to investigate minor events and close calls and not just serious **incidents** or **accidents**. An investigation should aim to determine the root causes of an incident, and not just the immediate superficial causes.

Ionizing radiation

Ionizing radiation refers to that portion of the electromagnetic spectrum with short wavelengths, high frequency and high energy (the latter being sufficient to ionize atoms, which can cause much biological damage). In sun safety we are primarily interested in **non-ionizing radiation** (ultraviolet and infrared radiation from the sun).

Irradiance

Irradiance describes the amount of radiation received by a person at the point where it makes contact. This is a fundamental value for radiation measurement. However, it relates to **exposure** at one time-point only. It has the unit Watt per square meter (W/m^2). For exposure over a period of time (e.g. a work day), refer to **radiant exposure** or **dose**.

ISO 45001:2018

This is an international standard on **occupational health and safety management systems** (OHSMSs). Its full title is: *ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use*. It is published by the International Organization for Standardization, Geneva. Further details are available from: <https://www.iso.org/iso-45001-occupational-health-and-safety.html>

Job Hazard Analysis (JHA)

A process to identify which portions of an employee's duties contain hazards, whether items, events or activities. JHA in the case of sun safety should identify which employees have sun exposure as a hazard and which portions of an employee's duties involve sun exposure. It is a broader technique than **Job Safety Analysis** (Task Analysis), which examines a specific assigned task for its hazards and existing controls.

Job Observation

Job observation refers to the generic technique of observing a task being performed to determine whether training is being applied and procedures and rules are being followed.

Job Planning

In some workplaces job planning refers to the activities that engineers might engage in prior to a work crew being dispatched to a site. In the context of a Sun Safety Program, we mean the activities engaged in by the

supervisor at a work site prior to employees commencing work on that particular day. It usually precedes an activity such as a **tailgate session**. A supervisor's job planning is most effective when there is consultation with employees.

Job Safety Analysis (JSA)

Job Safety Analysis (Task Analysis) is a technique which focuses on the hazards involved in a particular assigned task. It is a technique to be used where the task has already been identified as a task involving a hazard. The object is to identify and eliminate those parts of the task that are particularly hazardous. The goal is to end up with a set of simple and safe steps which are often call standard operating procedures or safe operating procedures. It is a narrower technique that **Job Hazard Analysis**.

Jurisdiction

Jurisdiction is the area or subject matter that is under the authority or control of someone or something. In law, there are three main types of jurisdiction. Geographic jurisdiction refers to an area that is under a legal authority such as a level of government. OHS legislation of a province applies only to the area of that province on a map. Federal geographic jurisdiction covers the map of Canada. Subject matter jurisdiction refers to the subject matter area that is under the authority or control of someone or something. OHS as a subject matter is split between federal and provincial jurisdiction depending on whether a workplace is constitutionally a federally regulated workplace or a provincially regulated workplace. Workers' compensation is not considered to be the same subject matter constitutionally as OHS. Workers' compensation is under provincial jurisdiction. Administrative jurisdiction refers to how a level of government allocates its own subject matter jurisdiction between its Ministries or Departments.

Keratinocyte Carcinoma

The recently introduced and preferred term for Non-Melanoma Skin Cancer (NMSC), but with specific reference to **Basal Cell Carcinoma** and **Squamous Cell Carcinoma**. Refer to **Non-Melanoma Skin Cancer**.

Keratitis

Keratitis is inflammation of the **cornea** of the eye. It can be caused by exposure to the sun. See **photokeratitis**.

Latency period

Latency period is the time between exposure to a potentially harmful agent and when the injury or harm appears. Skin cancer, for example, may develop some time after exposure to the sun.

Leadership

Leadership in an OHS context refers to actions which a leader engages in so as to motivate others to perform at a higher level than otherwise. In OHS, we often refer to "leadership at all levels" on the understanding that it is not only senior people in the organization who can inspire others to higher levels of OHS performance.

Likelihood

Is "the chance of something happening", which can be described as a probability or a frequency over a given time period [73].

Malignant

Malignant is a term applied to a tumor which is cancerous and capable of undergoing **metastasis** (invasion of surrounding tissue and/or blood or lymphatic dissemination in other tissues).

Management commitment

It is often said in OHS that management commitment is a pre-condition to success in OHS. Management commitment is shown by policy, leadership and the dedication of resources.

Management review

A review by senior management of the effectiveness of the OHS management system; usually done through an **audit** of the management system.

Manager

A manager is a person higher up the organizational chart than a front-line **supervisor**. OHS legislation may include managers within a definition of “supervisor” or within a definition of “employer”. Accordingly, managers may have **general duties** for either supervisors or employers. Under a Sun Safety Program, consideration should be given to the roles and responsibilities of managers, as distinct from others in the organization.

Medical aid

The assistance provided to an employee by a health care professional following an unwanted incident. A visit to a hospital emergency room would normally count as medical aid. It is more serious than most instances of “first aid” which usually occur at the workplace and which are often provided by fellow employees. The workers’ compensation regimes in each province and territory in Canada will usually have definitions for first aid and medical aid. Notification requirements may depend on whether assistance is classified as “medical aid”.

Melanoma

Melanoma is the most serious form of **skin cancer**. It can be fatal if untreated. Melanomas are cancers which arise from pigment cells in the skin. They are usually noticed in their early stages as being an unusual looking mole, or because they have changed color, shape or feel. Melanomas occur at all parts of the body, but often are seen on the back. They can grow and spread to other parts of the body quickly and so early detection and treatment is critical. Regular skin checks are important. People should check skin spots for the ABCDE’s: are the spots Asymmetrical? with an irregular Boarder, having different Colors, an increasing Diameter or are they Evolving or changing in some way? Each year in Canada there are over 6,500 new cases and over 1,000 deaths, with the rate of new cases increasing each year. Exposure to ultraviolet radiation, particularly from the sun and some artificial sources (e.g. tanning devices) is the main cause of melanoma. See also **skin cancer** and **non-melanoma skin cancer**.

Metastasis

A process by which cancer cells spread throughout the body from their original source.

Micron

One millionth of a metre, used when describing wavelengths. See also **nanometer**.

Minimal erythema dose (MED)

Minimal erythema dose is the UV exposure that will produce a just-perceptible erythema 8 to 24 hours after someone has been exposed. Unfortunately, the MED is not a ‘standardized’ measure because it relates to a specific individual. **Standard erythema dose** is now often used instead of MED.

Model Sun Safety Program

Our Model Sun Safety Program is a **program** of an **OHSMS** which is focused on the effective prevention and management of health risks associated with sun exposure at a workplace.

Monthly Safety Summary

Monthly safety summaries collate workplace safety data on a monthly basis. The data collected may include:

- Data on the number of workers hired and trained
- Number of safety talks and attendance
- Number and outcomes of hazard/risk assessments
- Number and details of first-aid treatments
- Number and details of inspections
- Number and details of incidents
- Number and outcomes of incident investigations, and
- Number and details of training sessions

Analysis and review of these data help a workplace identify trends and issues for action.

Nanometer (nm)

The unit of measure for wavelength. A nanometer (nm) is a one-billionth of a meter (10^{-9} m).

Natural Wet Bulb Temperature (NWBT)

Natural wet bulb temperature (NWBT) is a measure of both the effect of wind and humidity on evaporation of sweat from the employee's skin. It is one of three temperatures that combine to produce the **Wet Bulb Globe Temperature (WBGT)**.

Nonconformity

This is any deviation from a specified standard or nonfulfillment of a requirement of the OHSMS/Sun Safety Program.

Non-ionizing radiation

This is radiation which does not have enough energy to ionize matter which it interacts with. The lowest wavelength (i.e. highest energy) of radiation which is non-ionizing is 100nm, which is the lowest boundary of ultraviolet radiation. Non-ionizing radiation includes **ultraviolet radiation, visible radiation, infrared radiation**, microwaves and radiowaves.

Non-melanoma skin cancer (NMSC)

Non-melanoma skin cancer (NMSC) refers to skin cancer which is not melanoma. The primary NMSCs are **basal cell carcinoma (BCC)** and **squamous cell carcinoma (SCC)**. Outdoor workers are at a much greater risk of NMSCs than are indoor workers. Recent estimates indicate that around 5,000 new cases of NMSC occur in outdoor workers in Canada each year.

Notification

A requirement for notifying a specific person or entity following an unwanted event. It often occurs as soon as reasonably possible after the event. It is much simpler than "reporting". Its purpose is usually to trigger another person's or entity's attendance or action. A supervisor notifying senior management or a worker health and safety representative after an employee's heat stroke would be an "internal notification". In many jurisdictions there are requirement for "external notifications" to regulators, which will often trigger a visit by an inspector or officer.

Occupational Exposure Limit (OEL)

An occupational exposure limit is a level of exposure (e.g. dose of radiation, concentration of chemical in air) which has been determined to result in an acceptable **risk** to nearly all workers at that level or below during the normal course of their workday (generally considered to be 8 hours a day and 40 hours per week). An OEL should not be exceeded under normal working conditions. A widely recognized OEL is the **Threshold Limit Value** (TLV[®]) published by the **ACGIH**. In the case of UV radiation, the TLV[®] was also adopted as an international exposure limit by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Occupational Health and Safety (OHS)

Occupational health and safety (OHS) is considered to be a multidisciplinary activity aimed at [85]:

- Protecting and promoting the health and safety of workers by preventing and controlling occupational diseases and accidents, and by eliminating occupational factors and conditions hazardous to health and safety at work
- Developing and promoting a healthy and safe work environment
- Enhancing the physical, mental and social well-being of workers

Occupational Health and Safety Management System (OHSMS)

For our **Sun Safety Program** we have adopted the following definition of an OHSMS: "An OHSMS is the integrated set of organizational elements involved in the continuous cycle of planning, implementation, evaluation, and continuous improvement, directed toward the abatement of occupational hazards in the workplace" [68]. Sometimes an OHSMS is referred to as an **Occupational Health and Safety Program**. Key standards which describe requirements of an OHSMS are **ISO 45001:2018**, **OHSAS 18001:1999** and **CSA Z1000-14**.

Occupational Health and Safety Policy

An OHS **policy** is a general and simple set of statements setting out, among other things, the importance of OHS to the organization. It is a foundational element of an OHS Management System (**OHSMS**). The other elements of the OHSMS "fulfill" the OHS policy. The OHS policy is sometime confused with an **OHS Program** or a procedure. A particular OHS program, such as a Sun Safety Program will have its own policy statement, setting out the importance and intent of the program.

Occupational Health and Safety Program (OHSP)

Often an **OHSMS** is referred to as an OHSP, with the OHS legislation of most Canadian provinces using the term "program" instead of "system" to refer to more of the operational aspects of an OHSMS. OHSPs generally not having the same level of emphasis on continuous improvement as is found in an OHSMS. Where a workplace is managing their OHS hazards within the context of an OHSP instead of an OHSMS, a **Sun Safety Program** is then considered to be an element/suite of coordinated activities or measures within the overall OHS program which is focused on managing **sun safety**.

OHSAS 18001:1999

OHSAS 18001 is the name of a model OHS management system that is similar in structure and function to ISO 14001. It is based on the Plan-Do-Check-Act cycle, which, if followed, should result in an OHSMS appropriate to the organization.

Off-the-Job (OTJ) safety program

An Off-the-job safety program consists of activities and measures in the workplace which encourage employees to initiate safety activities at home for the protection of the employees and their families. A sun safety program may be linked to an OTJ program in that education in the workplace about sun safety can be applied to sun exposure off the job to the worker and his or her family.

Operational Review

The first of three risk assessment steps recommended for undertaking a comprehensive **sun safety risk assessment** for either solar UV radiation or heat stress. This helps a workplace to understand the operational environment and factors which increase the risk of adverse conditions of outdoor workers as a result of exposure to the sun.

Organizational arrangements

Sometimes referred to as “roles and responsibilities” in an OHSMS. Organizational arrangements set out the **responsibilities, authority and accountability** for each person involved with a **Sun Safety Program**.

Participation

In some jurisdictions, the **Health & Safety Committee** or **Health & Safety Representative** is required to “participate” in the development, implementation and monitoring of a program such as a Sun Safety Program. It is a stronger term than “consultation”. As well, it is desirable for employees to participate generally in OHS activities. For example, a supervisor should encourage participation of employees in site assessment, job planning and so on. A “buddy system” is a good example of employee participation.

Personal Protection

Personal protection refers to any **control measure** worn or used by an individual worker to provide protection to themselves. Personal protection is considered to be the last line of defense and should be only used when other control measures are not possible or have not provided sufficient protection/control. When personal protection is necessary, it should be used as part of a comprehensive Personal Protection Program which includes elements such as hazard evaluation, selection, fitting, training and education, and maintenance and repair. Personal protection for sun exposure should provide a high **ultraviolet protection factor (UPF)** (e.g. UPF greater than 30) and provide coverage to as much of the worker’s body as possible. However, personal protection should also allow workers to stay cool during hot weather. Sun safe personal protection measures include: clothing; hats and hard hats; sunglasses and **protective eyewear**; **sunscreen**, and cooling wear.

Personal Protective Equipment (PPE)

Personal Protective Equipment is equipment used by a worker to provide personal protection. For sun safety it includes equipment to provide head protection (e.g. hats and hard hats), eye protection (e.g. safety glasses and sunglasses), skin protection (e.g. protective clothing), and cooling.

Photokeratitis

Photokeratitis is an acute condition of the outer part of the eye as a result of exposure to **ultraviolet radiation**. It is specifically associated with exposure to **UV-B** and **UV-C** (where human exposure to UV-C is mostly from select artificial sources, not the sun), which are most strongly absorbed by the **cornea** and **conjunctiva**. Following a latency period (i.e. delay between exposure and symptoms) of between 6 and 12 hours, symptoms include inflammation of the conjunctiva, swelling of the eyelids, a sensation of ‘sand in the eye’, and photophobia (i.e. aversion to light). Corneal pain can be severe and can last up to 48 hours. Photokeratitis can be enhanced by airborne **photosensitizers**, such as coal-tar pitch and has been known to affect roofers. It also is known to occur when there is a high amount of reflected UV, such as off water or snow. It is also referred to as ‘snow blindness’ and “welders’ arc” or “arc eye” when associated with UV exposures from artificial sources such as welding arcs. See also **keratitis**.

Photosensitivity

Photosensitivity is an abnormally high sensitivity of the skin or eyes to UV radiation. It can be produced through ingestion, inhalation, or skin contact with substances known as **photosensitizers**. Symptoms will

vary depending on the level of **UV** exposure, the type and amount of photosensitizer exposed to, and personal factors such as skin type, age and sex, and previously developed sensitivity [47].

Photosensitizer

A photosensitizer is a substance which causes photosensitivity. They can be found in industrial chemicals, drugs, plants, and some essential oils and fragrances.

Plan

This is the first of the four steps/phases of the **Plan-Do-Check-Act** cycle and provides the basis for the sun safety program. It builds on the **Core** step/phase and includes elements which provide:

1. A description of levels/roles of responsibility, authority and accountability relating to OHS
2. A description of the role of the workplace's Health and Safety Committee or Worker Representative and the role of employee input and involvement in OHS
3. Identification of relevant legal and other requirements which impact OHS, and
4. A **sun safety risk assessment** process for identifying and assessing workplace **hazards**, and a process for identifying appropriate **control measures**.

Plan-Do-Check-Act

Plan-Do-Check-Act, PDCA, is a model of continuous improvement. It consists of four steps/phases (**plan, do, check, act**) in a continuous implementation cycle. It forms the basis of **OHSMSs** and is the basis of our **Model Sun Safety Program**.

Policy

A guide to action, expressing important principles, values or beliefs, that should be followed by individuals in the organization in order to attain stated goals and to provide consistency of decisions.

Practices

Practices are typical or traditional work activities that are not as formalized as **procedures**.

Prescribed

Where a duty in an Act (a statute) says to do something "as prescribed", that usually means "prescribed by the regulations made under that Act". That is, the duty is 'regulation dependent'. In contrast, 'general duties' are 'regulation independent'.

Preventive Maintenance

Preventive maintenance is maintenance done on a regular basis without waiting for equipment or machinery to fail. The higher the risk of harm from equipment or machinery failures, the greater the need for preventive maintenance. It is proactive maintenance rather than reactive maintenance.

Probability

Is "the extent to which an event is likely to occur." It can be expressed on a scale from 0 to 1, where 1 means an event is certain. It can be expressed as classes or ranks [73].

Procedure

A procedure sets out the steps that must be taken to perform a task. Procedures are more formal than **practices**, and are often in written form. A procedure is usually an outcome of an assessment such as **Job Safety Analysis**. Procedures are usually the basis of **training**.

Procurement

Sometimes referred to as “purchasing”; the activities involved in obtaining supplies for use in the workplace. In a Sun Safety Program, items such as water, PPE, and sun screens need to be procured effectively and efficiently.

Program

A "program" is a set of coordinated activities and measures focused on addressing a specific hazard or set of related hazards, and which contributes to managing **OHS** within a workplace. This is a critical component of a workplace's **Occupational Health and Safety Management System (OHSMS)**.

Protective Measure

This is “a means used to reduce risk.” [73]. See also **controls** and **control measures**.

Protective Eyewear

Industrial eye protection as described in Canadian Standard **CSA Z94.3-07 Industrial Eye and Face Protectors**. This provides protection for the eyes from impact, splashing and radiation. Eye protection for exposure to bright sun is classified as Class 1A, with the lens of the eyewear to provide radiation protection and with side shields to be fitted (which also provide radiation protection).

Psychrometer

A psychrometer is an instrument consisting of wet- and dry-bulb thermometers for measuring relative humidity.

Radiant Exposure

Radiant exposure, also referred to as **dose** or exposure dose, is the time integral of **irradiance** and represents the amount of radiation a worker has been exposed to over a period of time (e.g. a work day). Its unit of measurement is the Joule per square meter (J/m^2).

Radiant heat

Radiant heat describes the heat energy (from **infrared radiation**) coming from sources other than the sun which may contribute to the worker’s overall heat load. For example, a worker next to hot tar or asphalt will experience more than just heat from the sun. See also **Globe Temperature**.

Radiant temperature

Radiant temperature is the temperature resulting from a body absorbing radiant heat energy.

Reflective surfaces

Snow, water, ice and smooth surfaces can reflect sunlight and increase a worker’s exposure to solar radiation.

Regulations

Regulations are made under the authority of an Act (a statute). They are not passed by a legislature but usually by a cabinet. They are almost always more detailed than their parent Act. They can be changed relatively quickly. They provide the content for regulation-dependent duties in the Act. Where there are specific legal requirements for protection against heat stress and radiation, they will almost always be found in the regulations. Regulations are not guidelines; they are just as much “law” as the parent Act.

Residual risk

“The risk remaining after a hierarchy of risk controls has been implemented” [73]. It can also be considered to be the risk that remains after a previous step has been completed.

Return to Work (RTW)

The process of safely returning employees to the workplace in a timely way following an injury/accident/health condition. The legal requirements for return to work vary among Canadian jurisdictions.

Risk

Risk is a function of the severity of **harm** and the likelihood of the occurrence of that harm. Refer to CCOHS – Hazard and Risk: https://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html

Risk analysis

Risk analysis is a “process for comprehending the nature of hazards and determining the level of risk” [73]. A “process” is a set of interrelated or interacting activities that transforms inputs into outputs [73]. It is a basis for **risk evaluation** and decisions about **risk control**. Information can include current and historical data, theoretical analysis, informed opinions, and the concerns of stakeholders. It includes **risk estimation** [70]. For a **sun safety risk assessment**, risk analysis involves an assessment of the levels of sun exposure which different workers/job tasks have, and an assessment of the level of risk posed to workers from this exposure. The risks assessed relate to the adverse health effects from over-exposure, such as **sunburn**, **photokeratitis**, **skin cancer**, and **heat-induced conditions**.

Risk assessment

Risk assessment is the overall process of hazard identification, risk analysis and risk evaluation [70]. Risk assessment can be done at an OHSMS level, but it can also be done on a very informal basis. A good example is a **JSA**. Another example is a “**tailgate talk**”, where a crew leader, with worker involvement, assesses the risk of UV/heat exposure for that particular day, and considers any variations in controls.

Risk control

Risk control refers to “actions implementing risk evaluation decisions.” It can involve monitoring, re-evaluation, and compliance with decisions [73]. See also **control** and **control measures**.

Risk criteria

Risk criteria are “the terms of reference against which the significance of risk is evaluated” [73]. Risk criteria are based on organizational objectives and external and internal contexts. They can be derived from standards, legal requirements, policies, and other sources. For **sun safety risk assessment**, relevant exposure standards are the **ACGIH TLV**®s for ultraviolet radiation and heat stress and strain, the **UV Index**, and **Humidex**.

Risk estimation

Risk estimation is “a process used to assign values to the **likelihood** and **consequences** of a **risk**” [73]. It can consider costs, benefits, the concerns of stakeholders, and other variables, as appropriate, for risk evaluation [73].

Risk evaluation

Risk evaluation is “the process of comparing an estimated **risk** against given **risk criteria** to determine the significance of the risk” [73].

Risk reduction

Risk reduction refers to “actions (use of preventive and protective measures) taken to lessen the likelihood of harm, the severity of harm, or both” [73].

Root cause

Root causes are the fundamental and underlying reasons why an adverse event occurred. Root causes are [89]: (1) specific underlying causes; (2) those that can reasonably be identified; (3) those that can be fixed; and (4) those for which general recommendations for prevention can be made.

Rules

Rules are “do’s and don’ts” associated with work. They are not guidelines and they are usually phrased more simply than procedures. They can be based on OHS regulations or they may go beyond regulations in their specificity. They may be formal and written or they may be “rules of the moment” devised by a supervisor given the work circumstances. They usually imply discipline or other supervisory response when not followed.

Safe Job Procedures

Safe job procedures are **procedures** to be followed to perform a job or task safely.

Safe Work Practices

Safe work practices are **practices** to be undertaken to perform a work activity in a safe way.

Seasonality

A Sun Safety Program exhibits seasonality in the sense that there is a natural sequence of activities throughout the year. PPE for use in July and August would often have to be ordered earlier in the year. Training required under a Sun Safety Program would also have to be scheduled prior to peak sun season.

Shade structures

Shade structures are a type of **engineering control**. Working in the shade obviously reduces the risks from sun exposure. Tents and awnings are typical shade structures. They may be portable or fixed in position.

Site assessment

Site assessment is a technique typically used by construction or utility crews to assess risk at a new work location. It is usually done by a supervisor and provides the basis for a **tailgate session**. A site assessment from a Sun Safety Program perspective would involve consideration of such things as: locations for shade and breeze; availability of drinking water; and radiant heat sources that can add to heat stress from the sun, etc.

Skin cancer

Skin cancer is cancer of the skin. It is the most common form of cancer in the world, with 1 in 3 cancers being a skin cancer. There are over 80,000 new cases of skin cancer each year in Canada, with the numbers increasing. Exposure to **ultraviolet radiation**, particularly from the sun, is the primary cause of skin cancer. Outdoor workers are at a much greater risk of skin cancer than are indoor workers. The main types of skin cancer are **basal cell carcinoma**, **squamous cell carcinoma** and **melanoma**. Most skin cancers (particularly the **non-melanoma skin cancers**) can be treated effectively if identified early. However, each year in Canada there are around 1500 to 2000 deaths, most of these are from melanoma.

Solar UV Radiation

The sun is the main source of **ultraviolet (UV)** radiation. Less than 10% of the sun’s emission is UV radiation. However, due to its short **wavelengths** and high energy, it is highly effective at causing damage to the skin and eyes. The shortest wavelengths (i.e. less than 280nm) are completely absorbed by the Earth’s ozone layer.

Source

Is “an item or activity having a potential for a consequence” [73]. In terms of sun safety, the ‘sun’ is the source of the **hazard** we are interested in.

Squamous cell carcinoma (SCC)

Squamous cell carcinoma (SCC) is the second most common form of **skin cancer** in people. It arises from keratinocytes in the skin and is described as being a **non-melanoma skin cancer (see also keratinocyte carcinoma)**. It tends to occur on parts of the body which receive lots of sun exposure, e.g. face, ears, scalp and neck. Similar to basal cell carcinomas, they are often initially noticed as a skin sore which doesn’t heal. As they tend to grow rapidly, early treatment is important and can be very effective.

Standard erythema dose (SED)

Standard erythema dose is a ‘standardized’ dose for exposure to UV radiation. One SED equals 100 J/m² of ‘erythemal effective UV exposure’. It is equal to half of a Minimum Erythemal Dose (MED) for someone who has fair skin (i.e. it equals half of the dose to cause sunburn for someone with fair skin). See also **Minimum Erythema Dose**.

Substitution

Substitution is the second most effective **control measure** in the **hierarchy of risk controls**. Substitution can eliminate or reduce the **risk** by ‘substituting’ a safer process or material for the more hazardous process/material.

Sunburn

Sunburn is an adverse **acute** health condition of the skin associated with over-exposure to **ultraviolet radiation**. When human skin is exposed to ultraviolet radiation, it causes cell injury and inflammation, along with repair processes to address the cell injury. The signs and symptoms of sunburn are redness (**erythema**) and painful skin, and in severe cases fever, chills, nausea, vomiting, weakness and fainting. It is literally a burn of the skin. The severity of the symptoms increases with increasing exposure. Erythema can occur within 30 minutes or so, but for most people it starts between 2 and 6 hours after exposure. It is often the most painful between 6 and 48 hours after exposure. The burn continues to develop for a number of days, followed by peeling and itchiness for up to a week. Treatment includes applying cold compresses to the skin area along with products such as aloe vera and vitamin E to help reduce the inflammation. Rehydration with fluids and medication for pain relief may also be needed. The earlier treatment is started the more effective the healing process. Sunburn is a significant risk factor for developing **skin cancer**. See also **Erythema**.

Sun Protection Factor (SPF)

Sun protection factor is a rating assigned to **sunscreen** to indicate the level of protection provided from **UV radiation**, and specifically describes the effectiveness of a sunscreen in preventing **sunburn**. It is the ratio of UV **dose** a person would receive without sunscreen to the dose received wearing sunscreen. For example, an SPF 30 sunscreen would result in a UV dose 30 times less than if sunscreen had not been used. However, as sunscreens can be hard to apply correctly and consistently to all exposed skin areas, and as they can be rubbed off or be impacted by water/sweat, the actual SPF of a sunscreen for the wearer will often be much lower than that listed on the label.

Sun safety

Measures taken to manage outdoor worker exposure to the sun and which prevents: (1) adverse health effects, such as eye and skin conditions, from exposure to **solar ultraviolet (UV) radiation**; and (2) **heat-induced conditions** from **heat stress** associated with exposure to the sun in combination with the physical activity of outdoor work activities. For the purposes of our **Model Sun Safety Program**, sun safety does not include exposure to heat sources in the absence of the sun as a heat source, but does include heat sources

which exist simultaneously with the sun as a heat source, for example, when undertaking work such as roofing (tar) and road construction (asphalt).

Sun Safety Policy

A Sun Safety Policy is a brief statement about the importance of **sun safety** in the workplace. It indicates commitment to the reduction of **risk** to workers from exposure to the sun. Other elements of a **Sun Safety Program** carry out the intent of the Sun Safety Policy. The workplace's **Health and Safety Committee** will be involved to varying degrees depending on the **jurisdiction**.

Sun Safety Program

A Sun Safety Program is considered to be an 'organizational element' of an **OHSMS** and it is that element/component/program which is directed towards managing the risks to worker health associated with sun exposure at the workplace.

Sun Safety Risk Assessment

Sun safety risk assessment is an important technical element of a **Sun Safety Program**. It refers to the process used to assess the health risks of worker exposure to the sun. For the **Model Sun Safety Program**, two separate risk assessment processes are recommended – one for skin and eye conditions from exposure to solar **UV radiation**, and the other for **heat stress** from sun exposure. For each of these risk assessment processes, the following three steps are recommended: **Operational Review, Job Safety Analysis, and Daily Assessment**.

Sunscreen

A cream, lotion, spray or gel, which can be applied to the skin to reduce the amount of **UV radiation** penetrating the skin. There are two types of sunscreens. Inorganic/physical sunscreens reflect and scatter UV and visible radiation by providing an opaque barrier on the skin surface from a thin film of inert metal particles. Organic/chemical sunscreens work by absorbing UV radiation. See also **Broad spectrum sunscreen** and **Water resistant sunscreen**.

Supervisor

A supervisor has the authority to direct another person's work. Definitions vary among **jurisdictions**. A supervisor may be a person in charge of an area. We mean a "front line supervisor" rather than a manager. Normally a crew leader or a foreperson would be considered a supervisor. In some jurisdictions a supervisor will have a **general duty** to take all reasonable care to protect workers.

Syncope

See **Heat syncope**.

Tailboard session

See **Tailgate session**

Tailgate session

A tailgate session is a brief, informal gathering of an outdoor work crew where the work site and the job plan are discussed. It is an opportunity to review sun safety issues. See also **toolbox talk**.

Task analysis

See **Job Safety Analysis**

Threshold Limit Value (TLV®)

A threshold limit value is an **occupational exposure limit** (OEL) published by the **ACGIH**. It represents the level of a substance (e.g. concentration of a chemical in the air, dose of radiation) below which a worker can

be exposed day after day over a working lifetime without developing adverse health effects. It is based solely on the scientific evidence regarding health effects and does not take into account economic or technical feasibility. For **ultraviolet (UV) radiation**, the TLV[®] is based on threshold data (i.e. the minimum exposure needed to produce the specific biological effect) for both **erythema** and **photokeratitis**. A curve representing a limiting value for exposure at each wavelength in the UV spectrum was developed, with the lowest **dose** being 30 J/m² at 270 nm. This is equivalent to approximately 1.0 to 1.3 **SED**, which is approximately one-half of an **MED** for a fair skinned person (i.e. skin type I or II). There is also a TLV[®] for **heat stress** and this is based on the **WBGT**.

Tinting

The windows of work vehicles may be tinted, or colored, so as to reduce the transmission of solar UV radiation through the glass. This is often done by applying a window film consisting of layers of polyethylene terephthalate (PET), a polyester resin. Window tinting is particularly effective, with studies showing a UV reduction of more than 99% when films have been attached to the side and back windows of vehicles. However, there can be restrictions on the use of tinting in some jurisdictions due to safety/visibility concerns.

Toolbox talk

A very short and informal talk in the workplace, often given by an employee, on an OHS topic. Many other names such as “dock talk” or “break talk”. Sun safety issues may be the subject of a toolbox talk. Off-the-job topics may also be covered in a toolbox talk. See also **tailgate** session.

Training

Training is an administrative control; a form of **education** which usually focusses on correct behavior or skill development as the desired outcome. A Sun Safety Program will have training elements.

Ultraviolet Protection Factor (UPF)

Ultraviolet protection factor (UPF) is a rating used to describe how much protection fabrics and materials provide from UV radiation. It provides an indication of the ability of the material to block UV radiation passing through it. A fabric/material with a UPF 40 allows only 1/40th or 2.5% of the UV radiation striking it to pass through, i.e. therefore blocking 97.5% of the incident UV radiation. For fabrics and materials to be considered to be ‘sun protective’ they should have a UPF of at least 15 (i.e. allows 6.7% of UV to penetrate). A UPF of 40 or more is considered to provide ‘excellent’ UV protection.

Ultraviolet (UV) radiation

This is a type of **electromagnetic radiation**. It is the highest energy form of **non-ionizing radiation** and is part of the **electromagnetic spectrum**. It consists of radiation with **wavelengths** between 100nm and 400nm. In the electromagnetic spectrum it is between x-rays and **visible radiation**. It has the following three sub-groups: UV-C radiation is the highest energy, with wavelengths between 100nm and 280nm; UV-B radiation has wavelengths between 280nm and 320nm; UV-A has wavelengths between 320nm and 400nm. The sun is the main source of UV radiation, along with some high intensity artificial sources (e.g. welding arcs). Wavelengths in the UV-C region are completely absorbed by the Earth’s ozone layer. UV-B radiation is the primary cause of sunburn and skin cancer, with UV-A radiation also associated with skin cancer.

UV-A

UV-A is the longest of the wavelength bands of ultraviolet radiation and is therefore the lowest energy UV radiation. It consists of those wavelengths between 320nm and 400nm. See also **ultraviolet radiation**.

UV-B

UV-B is the middle range of wavelength bands of ultraviolet radiation and consists of those wavelengths between 280nm and 320nm. Exposure to UV-B is the primary cause of sunburn and skin cancer. See also **ultraviolet radiation**.

UV-C

UV-C is the shortest of the wavelength bands of ultraviolet radiation and is therefore the highest energy UV radiation. It consists of those wavelengths between 100nm and 280nm. Due to filtering of UV-C by the ozone layer, human exposure to UV-C radiation by humans is primarily from artificial sources of UV such as welding arcs and lighting systems.

UV Index

The UV Index was initially introduced in Canada in 1992 and was then adopted internationally by the World Health Organization in 1994. The purpose of the UV Index is to provide a simple description (in a single number) of the solar UV exposure received by the public and workers, with recommended protective actions based on increasing UV Index values. The UV Index values range from 0 to around 20, with the following categories: low (less than 2), moderate (3 to 5), high (6 and 7), very high (8 to 10), and extreme (11 and above). The WHO recommends that protection measures be used when the UV Index is 3 or above, and that additional protection be used when the UV Index is above 8. In Canada, the UV Index in many locations is above 3 from 11am to 3pm daily between April and September.

Validation

Validation is the process of checking that the controls are effective in reducing risk. Some approaches to verify and validate the controls include physical inspection and observation of worker use, testing, exposure assessment, tracking of incidents and employee feedback.

Verification

Verification is the process of checking that the control measures have been implemented. Some approaches to verify and validate the controls include physical inspection and observation of worker use, testing, exposure assessment, tracking of incidents and employee feedback.

Visible radiation

Visible radiation is a type of **electromagnetic radiation**. It consists of radiation with wavelengths between 400nm and 700nm. It is visible to the human eye. It does not cause any skin damage but can cause serious eye damage. It can also contribute to a body's heat load.

Water resistant sunscreen

A water resistant sunscreen is a sunscreen which retains its stated **SPF** after a specified time (either 40 minutes or 80 minutes) in water or from sweating. These sunscreens are not considered to be water proof. It is always important to reapply sunscreen following swimming or sweating.

Wavelength

A property of electromagnetic radiation. It is the distance (in meters) between the peaks of the electromagnetic waves. For **ultraviolet radiation**, its wavelengths are between 100nm and 400nm.

Wet Bulb Globe Temperature (WBGT)

The wet bulb globe temperature (WBGT) provides an index of the environmental conditions which contribute to heat stress and is the basis for the **TLV[®]** for **heat stress**. It is influenced by air temperature, radiant heat, air movement and humidity. It is often measured using a 'heat stress monitor' – this device automatically calculates WBGT based on the measurement of:

- Air temperature (i.e. **dry bulb temperature**)
- Radiant heat (i.e. using black wet bulb thermometer to measure **globe temperature**), and
- The cooling effect of evaporation caused by air movement (i.e. using a wet bulb thermometer to measure **natural wet bulb temperature**).

Worker

“Worker” is defined differently in the OHS statutes across Canada. In some statutes, the word “employee” is used instead. A worker usually has duties, including a **general duty** to take care. Workers usually have the three worker rights. Sometimes “worker” is defined to include non-employees. It may or may not be defined to include supervisors and managers.

Workers’ compensation

Workers’ compensation systems are provincially run insurance systems that replace the common law rights of workers and their families to sue employers and others for losses from accidents and disease. An otherwise federally regulated workplace is under the workers’ compensation system of the province that workplace is located in. Medical aid for sun-induced injuries will usually be paid for through workers’ compensation. A worker away from work due to sun-induced injury will have wage replacement (some % of usual wage) through the workers’ compensation system. It is an issue in each provincial **jurisdiction** what notice must be given to the workers’ compensation authority regarding sun-induced injuries and what benefits are allowed.

Workplace parties

Under the philosophy of the **Internal Responsibility System** (IRS), “workplace parties” refers to everyone in the organization as an individual, as well as the employer (and other entities – contractors, constructors, etc. – depending on the OHS legislation). When considering workplace health and safety committees, “workplace parties” will often mean two groups – labor and management (or employees and employer).

Work/rest cycle

A work/rest cycle describes a worker’s pattern of work and rest/recovery within a workday. It is both a consideration of the heat stress assessment using **WBGT**, and can also be used as a **control measure** when an elevated **risk of heat stress** is identified, i.e. more and longer periods of rest are initiated as risk increases. See also **sun safety risk assessment**.

APPENDIX 2 – SSAWC RESOURCES LINKED TO SUN SAFETY PROGRAM ‘ELEMENTS’

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Core	Sun Safety Policy	<ul style="list-style-type: none"> • <i>Sun Safety Policies</i> (factsheet) • <i>Sun Safety Policy Example – Small Workplace</i> • <i>Sun Safety Policy Example – Large Workplace</i> • <i>Solar Ultraviolet Radiation Safety Policy Example – Small Workplace</i> • <i>Solar Ultraviolet Radiation Safety Policy Example – Large Workplace</i> • <i>Heat Stress Safety for Outdoor Workers Policy Example – Small Workplace</i> • <i>Heat Stress Safety for Outdoor Workers Policy Example – Large Workplace</i> • <i>Sun Safety Policy Checklist</i>
	Communication & consultation	A wide range of the resources can be used for communication and consultation.
Plan	Authority, accountability & responsibility	<ul style="list-style-type: none"> • <i>Roles & Responsibilities Example – Heat Stress Safety Program for Outdoor Workers</i> • <i>Roles & Responsibilities Example – Solar Ultraviolet Radiation Safety Program</i>
	Role of the health and safety committee	<ul style="list-style-type: none"> • <i>Legal Issues in Sun Safety for Canadian Workplaces</i> • <i>Roles & Responsibilities Example – Heat Stress Safety Program for Outdoor Workers</i> • <i>Roles & Responsibilities Example – Solar Ultraviolet Radiation Safety Program</i>
	Legal and other requirements	<ul style="list-style-type: none"> • <i>Legal Issues in Sun Safety for Canadian Workplaces</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Alberta</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in British Columbia</i> (information sheet) • <i>Legal Issues in Sun Safety for Federal Workplaces in Canada</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Manitoba</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in New Brunswick</i> (information sheet)

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Plan (cont.)	Legal and other requirements (cont.)	<ul style="list-style-type: none"> • <i>Legal Issues in Sun Safety for Workplaces in Newfoundland and Labrador</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in the Northwest Territories</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Nova Scotia</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Ontario</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Prince Edward Island</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Quebec</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in Saskatchewan</i> (information sheet) • <i>Legal Issues in Sun Safety for Workplaces in the Yukon</i> (information sheet)
	Sun safety risk assessment	<ul style="list-style-type: none"> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Technical Guide</i> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review</i> • <i>UV Index</i> (poster, for posting daily UV Index values and actions to take) • <i>Daily Procedure – Solar UV</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Technical Guide</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Operational Review</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan</i> • <i>Heat Stress Daily Assessment procedure – WBGT</i> • <i>Heat Stress Daily Assessment Procedure - Humidex</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex</i> • <i>Heat Stress Alert</i> (poster) • <i>Heat Stress Warning</i> (poster)

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Do – Control Measures	Elimination or substitution	<ul style="list-style-type: none"> • <i>Daily Procedure – Solar UV</i> • <i>Work/Rest Cycles</i> (fact sheet) • <i>Shade</i> (fact sheet) • <i>Protection from Solar UV Radiation within Motor Vehicles</i> (fact sheet) • <i>Reflective Surfaces</i> (fact sheet) • <i>Sun Safety Inspection Checklist</i>
	Sun safety engineering controls	<ul style="list-style-type: none"> • <i>Shade</i> (fact sheet) • <i>Protection from Solar UV Radiation within Motor Vehicles</i> (fact sheet) • <i>Reflective Surfaces</i> (fact sheet)
	Controls that increase awareness of sun safety	<ul style="list-style-type: none"> • <i>UV Index</i> (poster, for posting daily UV Index values and actions to take) • <i>Heat Stress Alert</i> (poster) • <i>Heat Stress Warning</i> (poster) • <i>Heat Stress & Outdoor Work</i> (fact sheet) • <i>Heat Stress – Watch for the Signs</i> (fact sheet) • <i>Protect Your Skin and Eyes from the Sun</i> (poster) • <i>Protect Yourself from Heat Stress</i> (poster) • <i>Solar UV & Outdoor Work</i> (fact sheet) • <i>Sunscreen Facts</i> (fact sheet)
	Sun safety administrative controls	<p>Sun Safe Work Practices and Procedures:</p> <p><u>Solar UV Radiation:</u></p> <ul style="list-style-type: none"> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Technical Guide</i> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review</i> • <i>UV Index</i> (poster, for posting daily UV Index values and actions to take) • <i>Daily Procedure – Solar UV</i> <p><u>Heat Stress:</u></p> <ul style="list-style-type: none"> • <i>Heat Stress Risk Assessment for Outdoor Workers: Technical Guide</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Operational Review</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan</i> • <i>Heat Stress Daily Assessment procedure – WBGT</i>

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Do – Control Measures (cont.)	Sun safety administrative controls (cont.)	<ul style="list-style-type: none"> • <i>Heat Stress Daily Assessment Procedure - Humidex</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex</i> • <i>Heat Stress Alert (poster)</i> • <i>Heat Stress Warning (poster)</i> <p>Sun Safe Training and Education:</p> <p><u>Sun Safety:</u></p> <ul style="list-style-type: none"> • <i>Using the Training Resources (Guide)</i> • <i>Sun Safety Facts</i> • <i>Off-the-Job Sun Safety (fact sheet)</i> • <i>Sun Safety at Work: Worker Video (video)</i> • <i>Sun Safety at Work: Employer Video (video)</i> • <i>Facilitator Guide and Worksheet for the Sun Safety at Work: Worker Video (guide)</i> <p><u>Solar UV Radiation:</u></p> <ul style="list-style-type: none"> • <i>Solar UV Exposure Training for Employees (Power-point presentation)</i> • <i>Solar UV Exposure Training for Supervisors (Power-point presentation)</i> • <i>Solar Ultraviolet Radiation (Safety talk for a day with high UV Index)</i> • <i>Protect Your Skin and Eyes From the Sun (poster)</i> • <i>Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers</i> • <i>Sun Exposure at Work Increases Risk of Skin Cancer (fact sheet)</i> • <i>Solar UV & Outdoor Work (fact sheet)</i> • <i>Shade (fact sheet)</i> • <i>Sunscreen facts (fact sheet)</i> • <i>Protection from Solar UV Radiation Within Motor Vehicles (fact sheet)</i> • <i>Reflective Surfaces (fact sheet)</i> • <i>Personal Protection (fact sheet)</i> • <i>Photosensitizing Substances (fact sheet)</i>

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Do – Control Measures (cont.)	Sun safety administrative controls (cont.)	<p><u>Heat Stress:</u></p> <ul style="list-style-type: none"> • <i>Heat Stress Training for Employers</i> (Power-point presentation) • <i>Heat Stress Training for Supervisors</i> (Power-point presentation) • <i>Heat Stress for Outdoor Workers (Safety talk for an expected high Humidex day)</i> • <i>Protect Yourself from Heat Stress</i> (poster) • <i>Personal Risk Assessment: Heat Stress for Outdoor Workers</i> • <i>Heat Stress & Outdoor Work</i> (fact sheet) • <i>Work/Rest Cycles</i> (fact sheet) • <i>Heat Stress – Watch for the Signs</i> (fact sheet) • <i>Acclimatization</i> (fact sheet)
	Sun safety personal protection	<ul style="list-style-type: none"> • <i>Personal Protection</i> (fact sheet) • <i>Sunscreen Facts</i> (fact sheet) • <i>Photosensitizing Substances</i> (fact sheet) • <i>Reflective Surfaces</i> (fact sheet)
	Control verification and validation	<ul style="list-style-type: none"> • <i>Sun Safety Inspection Checklist</i> (template) • <i>Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition</i> (template)
	'Off-the-job' sun safety	<ul style="list-style-type: none"> • <i>Off-the-Job Sun Safety</i> (fact sheet) • <i>Personal Risk Assessment: Sun and Skin Cancer for Outdoor Workers</i> • <i>Personal Risk Assessment: Heat Stress for Outdoor Workers</i>
Do – Support	First aid and incident notification	<ul style="list-style-type: none"> • <i>Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition</i> (template)
	Return to work	Nil
	Preventive maintenance	Nil
	Procurement	Nil
Check	Workplace inspections	<ul style="list-style-type: none"> • <i>Sun Safety Inspection Checklist</i> (template)
	Documentation, records and statistics	<ul style="list-style-type: none"> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review</i> • <i>UV Index</i> (poster, for posting daily UV Index values and actions to take) • <i>Daily Procedure – Solar UV</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Operational Review</i>

PDCA Steps	Sun Safety Program Elements	SSAWC Resources
Check (cont.)	Documentation, records and statistics (cont.)	<ul style="list-style-type: none"> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Monitoring Plan</i> • <i>Heat Stress Daily Assessment procedure – WBGT</i> • <i>Heat Stress Daily Assessment Procedure - Humidex</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the WBGT</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Daily Assessment Record for the Humidex</i> • <i>Heat Stress Alert (poster)</i> • <i>Heat Stress Warning (poster)</i> • <i>Sun Safety Inspection Checklist (template)</i> • <i>Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition (template)</i> • <i>Sun Safety Program – Baseline Assessment (template)</i> • <i>Sun Safety Action and Evaluation Plan Template (template)</i>
	Incident reporting and investigation	<ul style="list-style-type: none"> • <i>Incident Investigation Report: Over-Exposure to Solar UV Radiation Causing Sunburn or a Heat-Induced Condition (template)</i>
	Auditing and evaluation	<ul style="list-style-type: none"> • <i>Sun Safety Inspection Checklist (template) (can be used for annual audits/reviews)</i> • <i>Sun Safety Action and Evaluation Plan Template (template)</i>
Act	Management review and continuous improvement	<ul style="list-style-type: none"> • <i>Sun Safety Inspection Checklist (template) (can be used for annual reviews)</i> • <i>Sun Safety Action and Evaluation Plan Template (template)</i> • <i>Sun Safety Program – Baseline Assessment (template)</i> • <i>Solar UV Radiation Risk Assessment for Outdoor Workers: Operational Review</i> • <i>Heat Stress Risk Assessment for Outdoor Workers: Operational Review</i>

APPENDIX 3 – SSAWC RESOURCES LISTED BY TYPE OF RESOURCE

Factsheets:

- Acclimatization
- Heat Stress and Outdoor Work (Eng, Fr, Sp)
- Heat Stress – Watch for the Signs (Eng, Fr)
- Legal Issues in Sun Safety for Canadian Workplaces
- Legal Issues in Sun Safety for Workplaces in Alberta
- Legal Issues in Sun Safety for Workplaces in British Columbia
- Legal Issues in Sun Safety for Workplaces in Federal Workplaces
- Legal Issues in Sun Safety for Workplaces in Manitoba
- Legal Issues in Sun Safety for Workplaces in New Brunswick
- Legal Issues in Sun Safety for Workplaces in Newfoundland and Labrador
- Legal Issues in Sun Safety for Workplaces in Northwest Territories
- Legal Issues in Sun Safety for Workplaces in Nova Scotia
- Legal Issues in Sun Safety for Workplaces in Nunavut
- Legal Issues in Sun Safety for Workplaces in Ontario
- Legal Issues in Sun Safety for Workplaces in Prince Edward Island
- Legal Issues in Sun Safety for Workplaces in Quebec
- Legal Issues in Sun Safety for Workplaces in Saskatchewan
- Legal Issues in Sun Safety for Workplaces in Yukon
- Off-the-Job Sun Safety
- Personal Protection
- Photosensitizing Substances
- Reflective Surfaces
- Shade
- Sun Safety program for Small Employers
- Solar UV and Outdoor Work (Eng, Fr, Sp)
- Protection from solar UV radiation within motor vehicles
- Sun Exposure at Work Increases Risk of Skin Cancer (CAREX Infographic) (Eng, Fr)
- Sun Safety Facts (Eng, Fr)
- Sun Safety Policies
- Sun Safety Program Elements
- Sunscreen Facts (Eng, Fr)
- Work/Rest Cycles

Note: All resources are available in English (Eng), while some are also available in French (Fr) and Spanish (Sp).

Templates/Examples:

- Action Plan and Evaluation Template
- Heat Stress Policy – Large Workplace
- Heat Stress Policy – Roles and Responsibilities
- Heat Stress Policy – Small Workplace
- Incident Investigation Report Example
- Sun Safety Inspection Checklist
- Personal Risk Assessment – Heat Stress for Outdoor Workers

- Personal Risk Assessment – Sun and Skin cancer for Outdoor Workers
- Sun Safety Policy Checklist
- Risk Assessment – Heat Stress Daily Assessment Record – WBGT
- Risk Assessment – Heat Stress Daily Monitoring Plan
- Self-study Baseline Assessment
- Solar UV Policy – Large Workplace
- Solar UV Policy – Roles and Responsibilities
- Solar UV Policy – Small Workplace
- Sun Safety Policy – Large Workplace
- Sun Safety Policy – Small Workplace

Posters:

- Heat Stress Alert (co-brandable, Eng, Fr)
- Heat Stress Warning (co-brandable, Eng, Fr)
- Protect Your Skin and Eyes from the Sun (co-brandable, letter size, tablet size, Eng, Fr, Sp)
- Protect Yourself from Heat Stress (co-brandable, letter size, tablet size, Eng, Fr, Sp)
- UV Index (co-brandable, Eng, Fr)

Procedures/Guides:

- Daily Assessment Procedure – Humidex
- Daily Assessment Procedure – WBGT
- Daily Solar UV Procedures
- Risk Assessment – Heat Stress Operational Review
- Risk Assessment – Technical Guide
- Risk Assessment – Solar UV Operational Review
- Risk Assessment – Solar UV Technical Guide
- Using the Training Resources Guide

Presentations:

- Presentation for Supervisors on Heat Stress
- Presentation for Supervisors on UV
- Presentation for Workers on Heat Stress
- Presentation for Workers on UV
- Safety Talk on Heat Stress (Eng, Fr)
- Safety Talk on Solar UV (Eng, Fr)

Videos:

- Video for Employers (Eng, Fr)
- Video for Workers (Eng, Fr)

APPENDIX 4 – OTHER RESOURCES

The following links are provided for people wishing to find further information on a range of topics to support the development of their sun safety program for outdoor workers.

OHSMSs/OHSPs

ISO 45001:2018 Occupational health and safety management systems – Requirements with guidance for use. International Organization for Standardization, Geneva, 2018. Available from: <https://www.iso.org/iso-45001-occupational-health-and-safety.html>

OHSAS 18001:1999 Occupational Health and Safety Management Systems: Specification. British Standards Institute, London, UK, 2002. <http://www.bsigroup.com/en-GB/ohsas-18001-occupational-health-and-safety/>

Canadian Centre for Occupational Health and Safety (CCOHS) – Health and Safety Programs: <https://www.ccohs.ca/oshanswers/hsprograms/>

Implementing an Occupational Health and Safety (OH&S) Program. Canadian Centre for Occupational Health and Safety, Hamilton, ON, 2012. Available from: <http://www.ccohs.ca/products/publications/OHSProgram.html>

CSA Z1000-14 – Occupational health and safety management. CSA Group, 2014 <http://www.csagroup.org/services/worker-and-workplace-safety/>

Recommended Practices for Safety and Health Programs, Occupational Safety and Health Administration, Washington, D.C., October 2016. Available from: <https://www.osha.gov/shpguidelines/>

Worksafe BC – Health and Safety Programs: <https://www.worksafebc.com/en/health-safety/create-manage/health-safety-programs>

Government of Canada – *Hazard Prevention Program Guide:* <https://www.canada.ca/en/employment-social-development/services/health-safety/reports/hazard-prevention.html>

Infrastructure Health and Safety Association – *Policy and Program Templates and Resources:* http://www.ihsa.ca/resources/policy_program_resources.aspx

Small Business OHS Resources

Worksafe Alberta – *Occupational Health and Safety Toolkit for Small Business:* <https://open.alberta.ca/publications/occupational-health-and-safety-tool-kit-for-small-business>

Workplace Safety and Prevention Services – *Closing the Loop: Setting up a Health & Safety System in Your Small Business:* <https://www.wsps.ca/WSPS/media/Site/Resources/Downloads/Closing-the-Loop-Generic-Version.pdf?ext=.pdf>

Public Services Health and Safety Association (PSHSA) – *Small Business Health and Safety Resource Manual:* <http://www.pshsa.ca/sbrm/>

Worksafe Saskatchewan – *Small Business Health and Safety Log Book:* http://www.worksafesask.ca/wp-content/uploads/2014/10/Log-Book_Nov-2018_FINAL-web.pdf

Small Business BC – *7 Steps to Improving Health and Safety:* <http://smallbusinessbc.ca/article/seven-steps-improving-health-and-safety/>

Sun Safety Policy and Programs

Be Sunsible (Alberta Health Services): <https://besunsible.healthiertogether.ca/>

Sun Safe Colorado at Work: <http://work.sunsafecolorado.org/>

Sun Safe Workplaces (UK): <http://www.sunsafeworkplaces.co.uk/>

Sun Safety For Outdoor Workers: A toolkit for policy development (Niagara Region Public Health, 2013):
https://www.niagararegion.ca/living/health_wellness/workplace/pdf/sun-safety-workplace-handbook.pdf

Cancer Council Australia – *Sun Protection in the Workplace*: <http://www.cancer.org.au/preventing-cancer/sun-protection/sun-protection-in-the-workplace.html>

Safe Work Australia – Guide on exposure to solar ultraviolet radiation:
<https://www.safeworkaustralia.gov.au/doc/guide-exposure-solar-ultraviolet-radiation-uvr>

Australian Radiation and Nuclear Protection Agency – *Sample Management Plan for Sun Protection*:

http://www.arpansa.gov.au/pubs/rps/rps12_Sun_Protection_Management_Plan.pdf

http://www.arpansa.gov.au/pubs/rps/rps12_Supplementary_Information_Sun_Protection.pdf

Exposure Standards:

Australian Radiation and Nuclear Protection Agency (ARPANSA) – *Radiation Protection Standard for Occupational Exposure to Ultraviolet Radiation (2006)*:

<http://www.arpansa.gov.au/Publications/Codes/rps12.cfm>

International Commission on Non-Ionizing Radiation Protection (ICNIRP) – Ultraviolet Radiation:

<http://www.icnirp.org/en/frequencies/uv/index.html>

American Conference of Governmental Industrial Hygienists (ACGIH) – TLV®s for ultraviolet radiation and for heat stress: <http://www.acgih.org/tlv-bei-guidelines/policies-procedures-presentations/overview>

Solar UV Radiation:

ICNIRP – Ultraviolet Radiation: <http://www.icnirp.org/en/frequencies/uv/index.html>

World Health Organization – ultraviolet radiation: <http://www.who.int/uv/en/>

International Agency for Research on Cancer (IARC) – Monograph 100D:

<http://monographs.iarc.fr/ENG/Monographs/vol100D/>

Environment Canada – *Ozone and UV Monitoring* (including UV Index):

<http://exp-studies.tor.ec.gc.ca/clf2/e/main.html>

Heat Stress:

Ontario Government – Managing Heat Stress at Work: <https://www.ontario.ca/page/managing-heat-stress-work>

Occupational Health and Safety Council of Ontario – *Heat Stress Awareness Guide*:

<https://www.ohcow.on.ca/edit/files/heatstressawareness/Heat%20Stress%20Awareness%20Guide.pdf>

Occupational Health Clinics for Ontario Workers – *Humidex Heat Response Plan*:

https://www.whsc.on.ca/Files/What-s-New/OHCOW_Humidex-Heat-Stress-Response-Plan

Worksafe BC – Heat Stress: <https://www.worksafebc.com/en/health-safety/hazards-exposures/heat-stress>

Government of Canada – Canadian Climate Normals:
http://climate.weather.gc.ca/climate_normals/index_e.html

Health and Safety Risk Assessment

CSA Z1002-12 – *Occupational health and safety – Hazard identification and elimination and risk assessment and control*. CSA Group, 2014. <http://www.csagroup.org/services/worker-and-workplace-safety/>

CCOHS – *Risk Assessment*: https://www.ccohs.ca/oshanswers/hsprograms/risk_assessment.html

CCOHS – *Job Safety Analysis*: <https://www.ccohs.ca/oshanswers/hsprograms/job-haz.html>

Safe Work Australia – *Model Code of Practice: How to Manage Work Health and Safety Risks*:
<https://www.safeworkaustralia.gov.au/doc/model-code-practice-how-manage-work-health-and-safety-risks>

PSHSA – *Risk Assessment and Job Hazard Analysis*: <https://www.pshsa.ca/resources/risk-assessment-and-job-hazard-analysis>

‘Off-the-Job’ Sun Safety

Canadian Dermatology Association (CDA) – printable resources: <https://dermatology.ca/public-patients/sun-protection/free-printable-resources/>

George the Sun Safe Superstar (Skcin: The Karen Clifford Skin Cancer Charity):
<http://www.skcin.org/ourWork/georgeTheSunSafeSuperstar.htm>

Sun Safe Summer Activity Pack (Skcin: The Karen Clifford Skin Cancer Charity):
<http://www.skcin.org/downloads/SunSafeSummerActivityPack.pdf>

American Academy of Dermatology – How to do a skin self-exam (video):
<https://www.youtube.com/watch?v=iS27V22uNIM>

Sun Safety and Skin Cancer booklet (Skcin: The Karen Clifford Skin Cancer Charity):
<http://www.skcin.org/downloads/SkcinBooklet2014.pdf>

What’s your sun safety IQ? (American Cancer Society):
<http://www.cancer.org/healthy/toolsandcalculators/quizzes/sun-safety/index>

Take the Quiz - Skin Cancer (American Cancer Society):
<http://www.cancer.org/healthy/toolsandcalculators/quizzes/skin-cancer-quiz/index>

Sun Sense (Canadian Cancer Society): <https://www.cancer.ca/en/prevention-and-screening/reduce-cancer-risk/get-involved-on/sunsense/?region=on>

SunAware (Melanoma Network of Canada): <https://sunaware.ca/>

Sun Safety for Kids: <http://sunsafetyforkids.org/index.html>

Agencies and Organizations

Canadian Dermatology Association (CDA): <http://www.dermatology.ca/>

Canadian Cancer Society (CCS): www.cancer.ca

Health Canada: <http://www.hc-sc.gc.ca/index-eng.php>

Environment and Climate Change Canada: <https://www.canada.ca/en/environment-climate-change.html>

Canadian Centre for Occupational Health and Safety (CCOHS): <https://www.ccohs.ca/>

National Institute for Occupational Health and Safety (NIOSH, USA): <http://www.cdc.gov/niosh/>

Cancer Council Australia – Sun Protection in the Workplace: <http://www.cancer.org.au/preventing-cancer/sun-protection/sun-protection-in-the-workplace.html>

ICNIRP – Ultraviolet Radiation: <http://www.icnirp.org/en/frequencies/uv/index.html>

World Health Organization – ultraviolet radiation: <http://www.who.int/uv/en/>

Government of Canada – Sun Safety: <https://www.canada.ca/en/health-canada/services/sun-safety.html>

Centers for Disease Control and Prevention (CDC, USA): http://www.cdc.gov/cancer/skin/basic_info/sun-safety.htm

American Cancer Society: <http://www.cancer.org/healthy/besafeinthesun/index>

Ontario Sun Safety Working Group: <http://www.uvnetwork.ca/>

National Council on Skin Cancer Prevention (USA): <http://www.skincancerprevention.org/>

Skcin: The Karen Clifford Skin Cancer Charity (UK): <http://www.skcin.org/>

European Skin Cancer Foundation: <http://www.escf-network.eu/en/welcome/home.html>

Skin Cancer Foundation: <https://www.skincancer.org/>

Euroskin (European Society for Skin Cancer Prevention): <https://www.euroskin.eu/en/>

World Cancer Research Fund – *Skin Cancer Statistics*: <https://www.wcrf.org/dietandcancer/cancer-trends/skin-cancer-statistics>