Work health and safety procedure

Document number  PN066P21  Version 2.2
Objective reference  A13882079  1 September 2017

Bitumen

Managing the risks of working with bitumen and bituminous products.

Note: This is a reformatted version of the procedure last published in July 2013 with some minor changes (refer to the change history). The procedure is under review.
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Overview

Roads and Maritime Services managers must ensure that appropriate systems are in place to identify, assess and control workers’ exposure to bitumen. Additionally, managers must ensure that workers are provided with relevant information, training, instruction and supervision in the safe use, handling and emergency response requirements (for example bitumen burns cards) of bitumen products.

Workers should be able to conduct their work without a risk to their health and safety. For their part, they need to take necessary precautions to prevent and effectively manage the potential hazards and risks of working with bitumen.

Industry partners are required to meet work health and safety (WHS) legislative requirements and have in place appropriate safety management systems.

Designers of Roads and Maritime infrastructure must eliminate or control (where elimination is not reasonably practicable) the possibility of injury or damage caused by work with bitumen during the construction, use, maintenance or demolition of infrastructure.
Introduction

Work with bitumen refers to road construction and maintenance work involving:

- All aspects of ‘cold’ bitumen work (such as crack sealing or jointing and road maintenance using cold mix with emulsions applied at ambient temperature)
- ‘Hot' bitumen products, which are those applied above ambient temperature. These include blending or heated bitumen binders, asphalt batch plant product, laying asphalt, stabilisation of granular materials with hot foamed bitumen, sprayed sealing with hot cutback or polymer modified bitumen or crack sealing with hot sealants
- Bitumen binders include cutback bitumen (with added solvents), bitumen emulsion (with chemically treated water), modified binders (including suitable storage with correct product signs and classification under Dangerous Goods) and oxidised bitumen.

Purpose

Roads and Maritime's safe systems of work aim to eliminate any exposure to risk to workers\(^1\) and the public from work with bitumen. In locations where the risks cannot be eliminated, controls must be implemented to minimise the risks.

It is intended that as an outcome of this procedure:

- The risk of injury to workers will be managed
- Workers will be consulted in the risk management process
- Roads and Maritime will provide appropriate WHS training, instruction, information and supervision in relation to work with bitumen
- Safe systems for managing work with bitumen will include:
  - Emergency planning
  - Emergency procedures.

Scope

This procedure covers all Roads and Maritime workplaces and includes:

- All workers
- Other duty holders who carry out work for Roads and Maritime
- Those (such as visitors) who are likely to be directly affected by safety issues relating to work with bitumen.

This procedure does not cover hazardous chemicals (refer to the procedure Hazardous chemicals).

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\(^1\) See Definitions
Consultation

Roads and Maritime must consult with all duty holders (including designers, manufacturers and suppliers) to ensure the risk of injury is managed. Roads and Maritime must consult with workers on undertaking work with bitumen safely.
Risk management

WHS risk management is integral to Roads and Maritime’s planning and operational processes. Effective risk management requires consultation between workers involved in the work activity. Managers, supervisors and workers should use a systematic process to identify, assess, control and review hazards (refer to the procedure WHS risk management).

1 Identifying hazards

When identifying the hazards of working with bitumen, managers should consider:

- Recommended maximum exposure limits (for example for fumes)
- Safety data sheets (SDSs)
- Using descriptive labels
- Information provided by manufacturers and suppliers
- Hazardous substance registers, such as ChemWatch
- Industry publications and training materials.

2 Assessing and recording risks

A risk assessment is required when:

- Workers manufacture, use, handle, transport, transfer or store bituminous product or material
- Workers are potentially exposed to hazardous material through inhalation, ingestion or skin contact
- When conducting a risk assessment, workers should include the following information:
  - Any written descriptions of the work activity being undertaken (for example laying hot asphalt)
  - Critical aspects of work processes and sequences
  - Chemicals and hazardous substances in the materials used or emanating from the work processes (for example hot bitumen mixed with water can be explosive)
  - Consultative feedback on the critical aspects, length of work and environmental conditions applying at the time of work
  - Information about potential exposures and adverse health effects reported after these exposures
  - Results of walk-through inspections to better understand and assess risks, to ascertain whether the appropriate control measures are in place
  - Nature and severity of each hazard associated with the work
  - Degree of exposure of all workers in the vicinity of the workplace
  - Results of reviews relating to the adequacy of existing controls
  - Previously recommended control measures.
The following examples indicate failure of risk control measures, and require a review of the risk assessment:

- The presence of dust, mist or fumes visible in the air and where there are persistent or widespread complaints of illness, discomfort, irritation or excessive odour
- Bitumen is not contained
- Defective or poorly maintained equipment
- Safe working procedures are not being observed
- Air monitoring shows that airborne concentrations approach or exceed acceptable exposure levels
- Ill-health associated with exposure has been detected by health monitoring.

3 Generic hazard control measures

After identifying the hazards, risks and levels of risk for each risk, it is now necessary to identify and implement appropriate hazard controls. Where no single measure is sufficient, a number or combination of controls is usually required.

Among potential control measures at the worksite, general controls include:

- Developing, reviewing and applying safe work methods statements (SWMS) for work with bitumen
- Selecting, procuring, maintaining, using and disposing of substances – including bitumen modifiers, solvents and additives – in compliance with the Work Health and Safety Regulation 2017 (WHS Regulation) and the code of practice Managing risks of hazardous chemicals in the workplace
- Consulting and verifying that all work practices, procedures, plant and processes are safe to proceed with
- Ensuring all workers are inducted into bitumen work safety and receive annual refresher training delivered in an approved format by competent persons
- Ensuring all vehicles and construction plant used on-site are fit for their respective purposes and designed to a minimum Australian or international standard, for example with appropriate guarding. Vehicles and construction plant should also have safe access, so that regular quality control assessments and maintenance can be conducted
- Ensuring vehicles and drivers are licensed; and mobile plant operators hold Roads and Maritime plant safety certificates\(^2\) (and contractors hold their equivalent), which must be verified as current. Safe operation of vehicles must be monitored continuously
- Proper servicing and maintenance of all plant, in accordance with manufacturers and suppliers standards
- Site traffic control plans, vehicle movement plans and worker on foot/site marshals training are delivered with procedures to ensure safe worker on foot/plant separation principles are followed by all persons on site
- Specific controls for fatigue, ultraviolet or other harmful radiation, personal dehydration and heat stress

\(^2\) See the procedure Plant operator training and assessment
• Ensuring emergency plans are developed for the specific worksite and emergency information panels are displayed on sides of vehicles carrying dangerous goods (HAZCHEM and UN Numbers), emergency contact numbers and Transport Management Centre (131700), where appropriate

• Ensuring specific bitumen first aid safety is prepared and bitumen burns cards are ready for use on site (Appendix B).

For information on purchasing, handling, storage and disposal of hazardous chemicals, please refer to the procedure *Hazardous chemicals.*

### 4 Monitoring and review of control measures

All activities involving the use of hazardous chemicals or flammable bituminous products should be eliminated where possible and, at a minimum, all hazard control measures reviewed when:

• Existing risk control measures do not work eg workers complain of being unwell as a result of site work

• A new hazard or risk is identified or there is a change in workplace conditions that could cause new and different risks

• As a result of subsequent consultation

• A worker or their health and safety representative (HSR) requests it. This may be based on the belief the existing controls do not address workers’ safety requirements adequately

• Following a change to a hazardous chemical, safety data sheets (SDS) or the hazardous chemical register

• Test results from health monitoring indicate a worker may have been exposed to a hazardous chemical

• Any advice on the test result where a worker may have contracted a disease, injury or illness as a result of carrying out work using, handling, generating or storing of bituminous substances that required health monitoring

• Monitoring of airborne contaminants shows concentration levels above relevant exposure standards

• At least every 12 months.

### 5 Emergency plans

Risk control for bitumen work must include emergency preparedness and response strategies for potentially serious hot surfaces, fire and explosions of bitumen materials and plant. Emergency planning must:

• Address supervision and any special arrangements needed for dealing with emergencies in remote or isolated areas

• Ensure all workers, including designated site emergency response teams, are trained in the first-aid treatment of bitumen burns and relevant emergency response fire-fighting procedures
- Include management plans to cease or not commence work under specific bushfire ratings
- Ensure that workers involved in work with bitumen are aware of SDS
- Ensure that project documentation and site signage includes details of the site emergency contact nominee, including a 24-hour contact number
- Include site-specific induction documentation – in particular, current contact details for local emergency and public medical facilities
- Involve regular emergency drills
- Ensure that the site-specific WHS plan details:
  - Procedures for dealing with fire and explosion risks
  - Exclusion zones where boil over of tankers or spray trucks is possible
  - Instructions on raising the alarm in the event of an emergency
  - How to summon emergency services
  - How to declare an emergency occurrence.

Roads and Maritime must consult with workers about potential emergency situations that may occur on each project. If new or specific situations are identified as further potential workplace hazards, new measures must be added to ensure that these potential emergency situations are planned for.

6 Training and capability

Workers are to be trained in the management of risks arising from all work involving bitumen and associated work.

The training must:
- Be appropriate to the associated risks identified in the risk assessment
- Cover different types of bituminous products and the hazards associated with each type of product, for example the use of quick lime, hydrated lime, slurry, hot foamed bitumen, polymer modified bitumen (the use of rubber granules)
- Incorporate the safe use of equipment used in handling bituminous substances, including binders, agents, emulsifiers and oxidisers
- Description of the hazards associated with spray trucks and tankers
- Include supervisors who manage workers who work with bituminous substances
- Cover the correct use, care and storage of personal protective equipment (PPE) and also cover the subject of hygiene (in relation to working with hazardous substances)
- Include emergency and evacuation procedures.

A review of the training outcomes should be conducted to identify whether there is a need for any further training. Workers should be consulted to help identify training needs. Training should be reviewed when the risk assessment is reviewed. Information and instruction should be evaluated to ensure the content is clearly understood by workers. Evaluation could be done by on-the-job observation or through consultation.

Task-specific bitumen safety induction training must be delivered by approved qualified persons for all new construction workers. This, in addition to General Construction
Induction Training, must meet the requirements of the WHS Regulation. Site-specific inductions focusing attention on safe work method statements, as applied to bitumen work, must be undertaken on each project site.

Supervisors of work with bitumen must be qualified in the appropriate industry-specific bituminous surfacing competency units, as prescribed in the RII09 Resources and Infrastructure Industry Training Package.
# Roles and responsibilities

<table>
<thead>
<tr>
<th>Role</th>
<th>Responsibilities</th>
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</table>
| **Roads and Maritime** (through its managers from the executive to the front line) **must:** | Ensure compliance and systems are in place by:  
- Ensuring Roads and Maritime managers engage in compliance strategies and making sure that systems are in place to manage potential WHS risks arising for workers engaged in work with bitumen  
- Appropriately defining WHS responsibilities and ensuring that appropriate resources (including financial and time) are provided to enable effective hazard and risk management for Roads and Maritime workers. |
| **Managers must:**            | Ensure implementation of systems to minimise the risks of working with bitumen by:  
- Applying this procedure fully  
- Ensuring workers and other duty holders are made aware of their responsibilities  
- Making sure that workers and contractors are consulted when identifying, assessing and effectively controlling potential hazards  
- Providing supervision and ongoing consultation, training and education in safe systems for work with bitumen. |
| **Workers must:**             | Follow legislative and Roads and Maritime safety requirements by:  
- Complying with all instructions provided, including the information in this procedure  
- Assisting managers and supervisors apply the appropriate safety measures when handling or engaging in work with bitumen  
- Taking necessary precautions to protect themselves when engaged in work with bitumen  
- Actively supporting and participating in WHS consultation activities in relation to safe systems of work. |
| **Industry partners must:**   | Fulfil their obligations by:  
- Complying with legislative and Roads and Maritime requirements to eliminate or minimise risks to workers engaged in work with bitumen  
- Participating in consultation, in relation to work with bitumen at Roads and Maritime worksites. |
# Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ADGs</td>
<td>Australian Dangerous Goods, as defined under the Dangerous Goods (Road and Rail Transport) Act and Regulation.</td>
</tr>
<tr>
<td>Asphalt</td>
<td>A mixture of bituminous binder and aggregate with or without mineral filler, produced hot in a mixing plant, which is delivered, spread and compacted while hot.</td>
</tr>
<tr>
<td>Bituminous emulsion</td>
<td>A liquid product in which a substantial amount of bitumen (with which some oil may be mixed) is suspended in a finely divided condition in water by means of emulsifying and stabilising agents.</td>
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<tr>
<td>Hazard</td>
<td>A situation, condition or source that has the potential to lead to negative consequences, harm or loss. A hazard is not the negative outcome itself.</td>
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</tbody>
</table>
| Hazardous chemical           | Hazardous chemical means a substance, mixture or article that satisfies the criteria for a hazard class in the GHS (including a classification referred to in Schedule 6 of the WHS Regulations), but does not include a substance, mixture or article that satisfies the criteria solely for one of the following hazard classes:  
  (a) acute toxicity—oral—category 5;  
  (b) acute toxicity—dermal—category 5;  
  (c) acute toxicity—inhalation—category 5;  
  (d) skin corrosion/irritation—category 3;  
  (e) serious eye damage/eye irritation—category 2B;  
  (f) aspiration hazard—category 2;  
  (g) flammable gas—category 2;  
  (h) acute hazard to the aquatic environment—category 1, 2 or 3;  
  (i) chronic hazard to the aquatic environment—category 1, 2, 3 or 4;  
  (j) hazardous to the ozone layer.  
| Manager                      | A person responsible for planning and directing the work of a worker or group of workers, monitoring their work, and taking corrective action. |
| Physicochemical hazards      | These are physical or chemical properties of a substance, mixture or article that pose risks to workers other than health risks, as they do not occur as a consequence of the biological interaction of the chemical with people. They arise through inappropriate handling or use and can often result in injury to people and/or damage to property as a result of the intrinsic physical hazard. Examples of physicochemical hazards include flammable, corrosive, explosive, chemically reactive and oxidising chemicals. |
| Safety data sheet (SDS)      | Safety data sheets, previously called material safety data sheets (MSDSs), are documents that provide information on the properties of hazardous chemicals and how they affect health and safety in the workplace. For example an SDS includes information on:  
  - the identity of a chemical  
  - health and physicochemical hazards  
  - safe handling and storage procedures  
  - emergency procedures  
  - disposal considerations  
SDS should always be referred to when assessing risks in the workplace. |
### Term | Definition
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Worker | Any person who carries out work in any capacity at a Roads and Maritime workplace – Roads and Maritime employees (including labour hire, apprentices and trainees); professional services contractors and consultants; contractors, subcontractors and their employees; outworkers; students gaining work experience; and volunteers.

### Work with bitumen
See Introduction

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**References**

#### Roads and Maritime references

<table>
<thead>
<tr>
<th>Doc no</th>
<th>Title</th>
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<tbody>
<tr>
<td>EFS-23</td>
<td>Environmental factsheet Dangerous goods</td>
</tr>
<tr>
<td>PN066P17</td>
<td>Procedure Hazardous chemicals</td>
</tr>
<tr>
<td>PN066P02</td>
<td>Procedure WHS risk management</td>
</tr>
<tr>
<td>PN066P11</td>
<td>Procedure Safe work method statements (SWMS)</td>
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<tr>
<td>PN066P14</td>
<td>Procedure Plant operator training and assessment</td>
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#### External references

<table>
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<th>Source</th>
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<tbody>
<tr>
<td>RII09 Resources and Infrastructure Industry Training Package</td>
<td>training.gov.au</td>
<td>Training package details</td>
</tr>
</tbody>
</table>
# Appendices

## A  Hierarchy of controls – working with bitumen

Always start looking for controls from the top. Eliminate the risk wherever reasonably practicable. If that is not possible, then work down the hierarchy list. Use Administrative and PPE (below-the-line) controls with above-the-line controls. Below-the-line controls need frequent review.

<table>
<thead>
<tr>
<th>Control</th>
<th>Examples</th>
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<tbody>
<tr>
<td><strong>ELIMINATE</strong></td>
<td>▪ Blending bitumen only in properly prepared plant</td>
</tr>
<tr>
<td></td>
<td>▪ Using reliable high quality hose fittings or valve clamps with all bitumen plant</td>
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<td></td>
<td>▪ Enabling supplies of materials/solvents in a ready-cut and sized form rather than carrying/cutting processes onsite</td>
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<td></td>
<td>▪ Prohibiting the heating of bitumen on days declared as fire restricted.</td>
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<tr>
<td><strong>SUBSTITUTE</strong></td>
<td>▪ Replacing higher risk substances with lower risk substances</td>
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<td></td>
<td>▪ Using approved non-sparking tools</td>
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<td></td>
<td>▪ Safe fit out of plant, particularly at entry and exits</td>
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<td></td>
<td>▪ Changing application methods of bitumen to avoid exposure.</td>
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<tr>
<td><strong>ISOLATE</strong></td>
<td>▪ Remote operation of a process to avoid fumes</td>
</tr>
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<td></td>
<td>▪ Distancing bituminous product from people, so that direct contact is avoided</td>
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<td></td>
<td>▪ Having thermal shielding systems in place, where necessary</td>
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<td></td>
<td>▪ Exclusion of water from bitumen at elevated temperature</td>
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<td></td>
<td>▪ Limit workers and operating plant in close proximity.</td>
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<td><strong>ENGINEER</strong></td>
<td>▪ All plant fitted with warning devices, SWL, anti-slip surfaces</td>
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<td></td>
<td>▪ Safely venting vapours from bitumen whilst heating</td>
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<tr>
<td></td>
<td>▪ Testing bitumen transfer hoses regularly</td>
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<td></td>
<td>▪ Controlling OVER spray to prevent unintended application of product</td>
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<tr>
<td></td>
<td>▪ Containment systems to avoid escape of hot bitumen</td>
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<tr>
<td></td>
<td>▪ Mechanically attached test jet containers for foamed bitumen</td>
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<td></td>
<td>▪ Test solvents, cutter oils and other bitumen additives to be assured they do NOT contain water</td>
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<td></td>
<td>▪ Closed tanks and vessels, so water and other emulsions do not enter, particularly during fire suppressant action or emergency tank cooling</td>
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<td></td>
<td>▪ Daily plant inspection reports</td>
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<td>▪ Safe storage of materials</td>
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<td>▪ Safety barriers.</td>
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<tr>
<td><strong>TRAINING &amp; ADMIN</strong></td>
<td>▪ Following correct procedures for ignition of LPG burners</td>
</tr>
<tr>
<td>(safe work practices)</td>
<td>▪ Provision of adequate fire-fighting equipment and training</td>
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<tr>
<td></td>
<td>▪ Signage to be used for warning of hot surfaces</td>
</tr>
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<td></td>
<td>▪ Placards on all vehicles/plant carrying dangerous goods</td>
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<tr>
<td></td>
<td>▪ Appropriate PPE to be worn to mitigate contact with hot surfaces or product</td>
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<td>▪ Reducing the period of exposure in hot bitumen work.</td>
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<tr>
<td>Control</td>
<td>Examples</td>
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<tr>
<td></td>
<td>▪ Regular cleaning of contamination/spillages</td>
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<tr>
<td></td>
<td>▪ Providing correct labelling, safe storage and disposal of chemicals</td>
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<tr>
<td></td>
<td>▪ Prohibiting eating, drinking and smoking in work area</td>
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<tr>
<td></td>
<td>▪ Keeping lids on containers when not in use</td>
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<td></td>
<td>▪ Providing and using facilities for effective decontamination</td>
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<td></td>
<td>▪ Traffic management plan.</td>
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<td>▪ PPE should be used in conjunction with other controls to increase protection.</td>
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</tbody>
</table>
Advice to Medical Professionals

BURNS caused by bitumen require special medical treatment. Consultation with a burns specialist experienced in bitumen burns is advisable in the first instance.

Partial Thickness Burns
After adequate cooling, the bitumen should be left in place and covered with a Tulle dressing containing paraffin or a burn ointment containing paraffin, e.g. SSD (silver sulphadiazine).

Such treatment will have the effect of softening the bitumen enabling it to be gently removed over a period of days. As a result of the natural re-epithelialisation of the wound any remaining bitumen will peel off in time.

Full Thickness Burns
Active removal of the bitumen should be avoided unless primary surgical treatment is being considered due to the location and depth of the wound. In such cases removal of the bitumen is best carried out in the operating theatre between the second and fifth day after the burn occurred.

By the second day the capillary circulation has usually recovered and the bed of the wound is such that a specialist can assess the depth to which the burn has penetrated. There are normally no secondary problems such as infections to contend with before the sixth day. However, it is essential to commence treatment using paraffin based substances from the day of the accident to facilitate removal during surgery.

Circumferential Burns
Where hot bitumen completely encircles a limb or other body part the cooled and hardened bitumen may cause a constricting effect. In the event of this occurring the adhering bitumen must be softened and/or split to prevent restriction of blood flow.

Burns to the Eye

No attempt should be made to remove the bitumen by unqualified personnel.
The patient should be referred urgently for specialist medical assessment and treatment.

NOTE: The cold bitumen will form a waterproof, sterile layer over the burn which will prevent the burn from drying out. Should specialist advice indicate that removal of the bitumen is necessary, the recommended medium for bitumen removal is paraffin oil.

Call for an Ambulance by dialling 000 immediately for any serious burn or medical complaint.
ATTACH the Bitumen Burns Card to the casualty.

NOTE: A work colleague trained in these procedures should accompany the injured party to Hospital to support the casualty and notify treating medical staff about the details on the reverse side of this Bitumen Burns Card.

Please make sure a Bitumen Burns Card is attached to or travels with the casualty to Hospital and that medical staff are aware of the contents.
Document control

**Owner**
WHS Risk Manager

**Approval**
General Manager Work Health and Safety

**File name**
procedure-pn066p21

**Online location**

**Objective ID**
A13882079

**Publication n°**
RMS 16.408

**Template**
Objective ID: A10508605
Objective label: WHS procedure template

Change history

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<th>Issue</th>
<th>Date</th>
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<tr>
<td>2.2</td>
<td>01/09/2017</td>
<td>Updated following WHS Regulation 2017 superseding WHS Regulation 2011. No other changes.</td>
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<tr>
<td>2.1</td>
<td>24/08/2016</td>
<td>Reformatted to current WHS procedure template</td>
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<td></td>
<td></td>
<td>Updated references to legislation</td>
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<td></td>
<td></td>
<td>Correction – requirement for supervisors to be qualified (section 6)</td>
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<td></td>
<td></td>
<td>Minor wording changes</td>
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<td></td>
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<td>Updated definitions table in line with current legislation</td>
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<td></td>
<td></td>
<td>Applied HoC graphics to appendix</td>
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<tr>
<td>2.0</td>
<td>10/07/2013</td>
<td>No change history available</td>
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Feedback

Contact WHS Branch with feedback on this document at: onermssms@rms.nsw.gov.au