Heights rescue procedure on rolling stock

Document no.	Work description
SMS-06-SW-1336	This Safe Work Instruction (SWI) outlines the heights rescue procedure that is to be undertaken in a post-fall rescue on the top of rolling stock diesel loco's (Endeavour, Xplorer, XPT and Hunter Class). **Scope** This SWI applies to Communications & Control Systems division (C&CS) staff conducting work on the roof of rolling stock, accessed via high walkway or platform gantry located at the XPT Maintenance Centre (Sydenham), Endeavour/Xplorer Maintenance Centre (Eveleigh) and Endeavour Maintenance Centre (Broadmeadow). The actual work tasks that are carried out are outside the scope of this document. Refer to the relevant SWMS/SWIs.
Review date 31/03/2012	**References** • OHS Act 2000 • OHS Regulation 2001 • AS/NZS 1891.1: Industrial fall-arrest systems and devices - Safety belts and harnesses • AS/NZS 1891.2: Industrial fall-arrest systems and devices - Horizontal lifeline and rail systems • AS/NZS 1891.3: Industrial fall-arrest systems and devices - Fall-arrest devices • AS/NZS 1891.4: Industrial fall-arrest systems and devices - Selection, use and maintenance • WorkCover NSW Safe Working at Heights Guide • WorkCover Safety Guide: Use of fall-arrest systems • WorkCover NSW Code of Practice "Safety Line Systems" 1995 • SMS-06-GD-0240 Working At Heights • SMS-06-GD-0241 Fall Arrest Systems • SMS-06-GD-0252 Working On Roofs • SMS-06-FM-0253 Belts and Harness Assemblies Inspection Checklist • SMS-06-SW-0254 Fall Arrest Systems (Anchorages) • SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices) • SMS-06-SW-0256 Fall Arrest Systems (Harnesses, Lanyards and Attachment Hardware) • SMS-06-SW-0257 Fall Arrest Systems (Industrial Rope Access) • SMS-06-SW-0258 Fall Arrest Systems (Inspection and Maintenance) • SMS-06-SW-0259 Fall Arrest System (Safety Lines)

Responsible supervisor *Insert name in BLOCK letters*	PPE and precautions	Competencies or qualifications	Licences or permits required
LINE MANAGER	• Harnesses, shock absorbing lanyards and attachments (snap hooks, karabiners) • Suspension Trauma Safety Strap • Rescue Equipment – Descending Rescue Device, Rescue Pole • Safety boots • Hard hat	• Rail Industry Safety Induction (RISI) • OHS Construction Induction Training Card • Course in Safe Work at heights • Course in Heights rescue	

Tools and equipment required

- Harnesses, shock absorbing lanyards and attachments (snap hooks, karabiners)
- Suspension Trauma Safety Strap
- Rescue Equipment - Descending Rescue Device, Rescue Pole
- First Aid kit

IF CONTROL MEASURES ARE NOT SUITABLE AND MAJOR CHANGES ARE NEEDED, CONDUCT A RISK ASSESSMENT AND DEVELOP NEW CONTROLS ACCORDING TO SMS-06-PR-0104 WORKPLACE RISK MANAGEMENT.

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General	All users of personal fall protection systems, and others involved with work at a height, should understand the implications of when a person that has fallen and then comes to fall arrest supported by a harness, which initially saves him, but minutes later may kill them due to suspension trauma. This rescue procedure describes the actions that should be undertaken, which include: • Preventing prolonged suspension • Identifying signs and symptoms of suspension trauma • Performing rescue and treatment as quickly as possible

Rescue Equipment	Dedicated rescue equipment should consist of additional Harnesses, shock absorbing lanyards and attachments (snap hooks, karabiners); a Descending Rescue Device or Winch; Rescue Pole; and Suspension Trauma Safety Straps.		
	Descending Rescue Device	This is a simple, safe, and efficient method of rescue, escape, or evacuation from height. The unit does all the work, reducing the chance of operator error. Features: • Automatic controlled descent • Able to raise fallen person then automatically lower to ground. • Handle control to fully raise person • Light weight • Complete with double action hooks • Fail safe descent control • Kermantle ropes used • No friction or wear on ropes • Individually pre-use inspected • 12 monthly inspections required	
	Rescue Pole	The rescue pole is an essential piece of rescue gear that is designed to work with an Automatic Descending Rescue Device. It extends to 3.6 metres, and features an attachment loop that holds the snap hook in position.	
	Suspension Trauma Safety Straps	The Suspension Trauma Safety Strap allows the worker to stand up in their harness to relieve the pressure being applied to the arteries and veins around the top of the legs. The continuous loop design allows both sides of the harness to relieve the pressure being applied to the legs. The strap accommodates either one foot or both feet in the loop at a time.	

Pre-Work	Before any work is undertaken the following actions must be in place: • The rescue equipment must always be present at the worksite and ready for use in the event of a worker falling. • In addition, Suspension Trauma Safety Straps should be attached to a workers harness before commencing work at heights. The pack can be attached around the harness web at the hip, where it is easily assessable. • Rescue personnel must be on stand-by and within close proximity of the worksite.

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After Fall – Fall Arrest

Suspension Trauma

After a sustained fall, the harness works effectively in supporting the worker. However, in this post-fall suspension position, several unfortunate things occur that aggravate the problem.

- Firstly, the harness webbing exerts pressure on the legs veins, compressing them and reducing the blood flow back to the heart.
- Secondly, the harness keeps the worker in an upright position which leaves the legs relatively immobile while awaiting rescue.

This combination of webbing pressure and lack of leg motion can lead to **suspension trauma**, a result of blood accumulating in the legs and in turn reducing the amount of circulation.

If the worker is not rescued promptly, serious injury or death may occur as the brain, kidneys, and other organs are deprived of oxygen.

Harnesses can become deadly whenever a person is suspended for duration of over 5 minutes in an upright position with legs relaxed straight beneath the body.

After 5 minutes in an upright position they are highly likely to be unconscious (but rescuers attending the scene may not realise the seriousness of the situation).

15 minutes later the casualty may be dead.

Warning

It is critically important that rescue be undertaken quickly – within 10 minutes.

Recognizing the on-set of suspension trauma

The possible signs and symptoms of suspension trauma can start to be seen in 2-3 minutes and can include:

- Faintness
- Nausea
- Breathlessness
- Dizziness
- Sweating
- Unusually low heart rate
- Unusually low blood pressure
- Paleness
- Hot flushes
- Shin tone may appear grey in colour
- Loss of vision
- Increased heart rate.

Suspension Trauma Relief – Reducing the risk

The Suspension Trauma Safety Strap allows for increased comfort, balance and improved circulation in the legs to avoid the potential negative health impacts of suspension trauma, whilst suspended and awaiting rescue.

After a fall, the pack that is attached to the harness is quickly unzipped, and the web loop and hook straps are deployed.

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After Fall – Fall Arrest (cont)	Suspension Trauma Relief – Reducing the risk (cont)	If a Suspension Trauma Safety Strap is not available, a conscious casualty should be instructed to keep their legs active and as high as possible, to stimulate circulation of the blood.
		Warning The Suspension Trauma Safety Strap can delay the effects of suspension trauma, but they only work on conscious and able casualties, so they are not an alternative to rescue.

Rescue	Establish contact with fallen worker	• Rescue personnel must first try to make contact with the casualty and establish if they are conscious or unconscious. If they are unconscious then time is of the essence. • The aim is to have the casualty recovered within 10 minutes. • Rescue personnel must continuously monitor the suspended worker for signs and symptoms of suspension trauma.
	Request assistance	Contact the site manager: • inform them of the situation; • request additional rescue and first aid assistance at ground level for receiving the casualty; and • advise to contact the emergency services and request an ambulance.
	Rescuer access & positioning	• When transferring across to the roof of the loco, rescue personnel are required to use two lanyards so that they are always connected. • Connect the first lanyard to the protected walkway before transferring across to the loco's roof. Once across, connect the second lanyard to a suitable anchorage point or safety line and release the first lanyard. • The rescuer must make sure that they work in "fall restraint" at all times whilst conducting the rescue procedure.
	Rescue Procedure	When initiating the actual rescue, it is imperative that the following steps are followed: 1. Connect the Descending Rescue Device to an anchorage point or fall arrest system. The anchor for the rescue equipment should be in a position where the device can be operated easily and safely. 2. Attach the rope grab device (snap hook) to the rescue pole, which will lock into the open position. 3. Lower the line with the rescue pole towards the casualty. When the snap hook is through the D-ring located between the shoulder blades of the casualties harness, the rescuer gives it a gentle tug and it will lock securely onto the casualty. 4. Use the Descending Rescue Device to lift the casualty up sufficiently to allow their lanyard to be released from the anchorage point. 5. The Descending Rescue Device is now supporting the casualty, who now can be lowered in a controlled way to safety. 6. During this part of the rescue, a competent first aider should be present to assist the casualty and provide the necessary first aid and Suspension Trauma treatment.
		  
		Warning The usual first aid procedures do not apply when treating suspension trauma. It is vitally important that the casualty is not moved immediately into a horizontal position.

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Post Rescue - Treatment	Toxic shock	Once rescued, the rescue personnel must ensure that the casualty receives standard suspension trauma resuscitation. Casualties must not be laid flat rapidly because of the risk of stale blood from the legs rushing back to the heart and vital organs. This rush of de-oxygenated and toxic blood can cause death by heart attack or, a few days later, of organ failure.
	Suspension trauma recovery position	Suspension trauma victims will require unusual post-rescue positioning. The recommended procedure is to take from 30 to 40 minutes to gradually recline the casualty from kneeling, then to a sitting position before fully in a lying down position. This action partially closes the femoral artery allowing any pooling of the blood to be slowly released back towards the heart. The blood is then able to be re-processed, preventing orthostatic and toxic shock. During this process the harness is not to be removed from the casualty, but the straps are to be gradually loosened.
	Health examination	Owing to the possibility of damage to vital organs (the result of suspension trauma), it is recommended that all recovered casualties should be taken to their nearest Accident and Emergency Unit for examination and observation. Possible delayed effects, such as kidney failure, which is not unusual in these cases, are difficult to assess on the scene.

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