



# EEA SAFETY RULES NEWSLETTER

OCTOBER 2001

## CONTENTS:

1. Introduction
2. Safety Workshop
3. Safety Strategy & Policy Group Happenings
4. EEA Technical Guides
  - Use of Personal Fall Arrest Systems
  - Guide to Climbing Electricity Transmission and Distribution Lattice Steel Structures in New Zealand
  - Supervision
  - Use, Inspection, and Testing of Low Voltage Electrical Appliances, Cords and Protective Devices
5. SR-EI Rule 412: Recipients Responsibility for Safety
6. Assurances
  - Introduction
  - Principles Applying to Assurances
  - The Use of Assurances
  - Planning for Permit Issue When an Assurance is Involved
  - Relationship Between Assurances and Operating
  - Communication and Interpretation
7. Use of LV Neutrals as Temporary Earthing Points
  - Introduction
  - LV 400V Neutral as HV Earth
  - Temporary Driven Earths
  - Conclusions
8. Publications Referenced in SR-EI and GSG-EI
9. Boundary Marking

## **1. Introduction**

This Safety Rules Newsletter is the second for 2001. It provides an update on safety rules requirements, issues and interpretations, as well as an update on publications referred to in SR-EI and GSG-EI.

An important event this next month is the Safety Workshop, which is an opportunity for industry people to discuss safety issues which are important to them, as well as study future trends and directions.

The newsletter is a communication channel between the EEA and the industry practitioners. Any questions, suggestions and points for consideration are always welcome.

## **2. Safety Workshop**

The EEA Safety Workshop 2001 will be held in Wellington on Wednesday and Thursday 17-18 October. The theme of the workshop is "Safety Management in Today's Workplace". The programme offers a range of speakers and issues that are relevant to the work of managers and safety professionals in the electricity supply industry.

The Workshop will address key issues relating to the review of OSH legislation, SR-EI and GSG-EI issues, EnergySafe issues, as well as a range of specific workplace safety issues, including temporary earthing, working at heights, supervision, work on roads, accident trends and investigations, live work etc. There will also be an opportunity in open session for you to raise specific safety matters you may have.

One of the underlying themes of the workshop is safe behaviour issues with keynote presentations (Day 1) and a subsequent workgroup discussion (Day 2) on the development and implementation of behaviour based safety programmes as a means of building on existing safety systems within the industry. User experience indicates that employee driven culture change that promotes improvement in safe work behaviour has the potential to significantly improve safety performance. The workgroup discussion will look at critical success factors for achieving safe behaviour and issues/challenges for implementation.

Two keynote speakers from Australia - Alex Jankiewicz and Trevor Gilson - will guide participants through this subject.

We encourage you and other members of your organisation who have a stake in achieving improved safety performance to attend the EEA Safety Workshop 2001. A workshop dinner (which is included in your registration fee) will be held on the evening of Wednesday, 17 October for delegates and invited guests.

The workshop will be held at the West Plaza Hotel in Wellington. A programme and accommodation details are available on the EEA website. Registration can be made via the EEA office ([admin@eea.co.nz](mailto:admin@eea.co.nz))

## **3. Safety Strategy & Policy Group Happenings**

Our most valuable secretary was suddenly taken very ill in late July. We assure him that his great work is being progressed, and wish him all the best.

Remember that all inquiries regarding safety should continue to be made to the EEA ([admin@eea.co.nz](mailto:admin@eea.co.nz))

The key issues which the committee is addressing at this time, in addition to inquiries and interpretations of the rules, include:

- Managing the development of the Guide for Electrical Safety (equivalent to the 'Green Book')
- ECP 34
- Recognition of live work standards
- Development of EEA Technical Guides;
  - Supervision
  - Climbing Electricity Transmission and Distribution Lattice Steel Structures in NZ
  - Access to Poles and Towers
- Co-ordination with Australia, particularly the ESAA

#### **4. EEA Technical Guides**

##### **4.1 Use of Personal Fall Arrest Systems (PFAS)**

In the April newsletter reference was made to the development of the EEA Technical Guide "Use of Personal Fall Arrest Systems". This guide is now available on the EEA website [www.eea.co.nz](http://www.eea.co.nz)

##### **4.2 Guide to Climbing Electricity Transmission and Distribution Lattice Steel Structures in New Zealand**

The EEA Technical Guide "Guide to Climbing Electricity Transmission and Distribution Lattice Steel Structures in New Zealand" has been finalised and is now on the EEA website [www.eea.co.nz](http://www.eea.co.nz)

This Guide sets minimum criteria for climbing lattice steel transmission and distribution structures. The Guide allows free climbing only for ascent and descent of structures, and only for those persons who are competent to do so. For all work and movement beyond the 'ascent/descent route' full attachment is required. Persons not competent to free climb must use an appropriate fall arrest system.

The publication of this Guide begins a 2 year implementation/trial period as previously agreed between industry representatives, OSH and the EEA, at the completion of which (or earlier if required) the Guide will be reviewed. A number of activities are required to be completed. These may impact upon you and are:

1. Contractors should review their work procedures, and safety equipment in terms of the requirements of the new guide, identify the changes required and implement training, procedures etc as soon as practicable.
2. The EEA "Lanyard Working Party" will complete work to optimise safety harness and lanyard combinations for use in applying the Guide.
3. Companies working on towers may need to purchase appropriate safety equipment, and issue revised work procedures where necessary, and train staff in the new equipment and work procedures. (**Note: It is envisaged that steps 1-3 will take approximately 6 months to complete.**)
4. Requirements of the new Guide are implemented, and ongoing development of work procedures and safety equipment by industry continues as necessary. (**Note: The date by which individual contractors will be expected to be fully complying with the requirements of the new Guide, will be the subject of negotiation between asset owners (predominantly Transpower) and contractors.**)

5. At the completion of the 2 year period (July 2003 or earlier if required), a formal stakeholder review of the Guide will be undertaken.  
*(Note: The Guide will be subject to continuous review during implementation. It may prove desirable to revise it before the end of the 2-year period if significant implementation problems are encountered.)*

In addition to the implementation process listed in steps 1-5 above, (which relates directly to climbing of towers), there are also some more broadly related activities happening in parallel.

1. A study of fall arrest issues related to the climbing of substation gantries.
2. A study of structure fall arrest attachment point strengths (mainly climbing steps).

The equivalent requirements for work on poles are being developed.

#### 4.3 Supervision

The meaning of supervision is an issue which the Safety Strategy & Policy Group has been grappling with for some years. The HSE Act is specific about the requirements for supervision, both for trainees and for employees generally. The Electricity Act also addresses supervision. Various prosecutions under the HSE Act have been successful on the basis that there was inadequate supervision. Of relevance to the ESI is the Linework case, plus two appeals where the original judgement was upheld in both the High Court and the Court of Appeal.

The Group has also recently been addressing the issue of SR-EI rule 412 (see section 5 of this newsletter), and the responsibilities of recipients.

The Group has commissioned the preparation of an EEA Technical Guide on Supervision. This is currently in preparation and will be the subject of a presentation at the October safety workshop.

#### 4.4 Use, Inspection, and Testing of Low Voltage Electrical Appliances, Cords and Protective Devices

The draft of this Guide is now complete and it is in its final consultation phase.

### 5. SR-EI Rule 412: Recipients Responsibility For Safety

The July 2000 edition of SR-EI attempted to clarify the role of the recipient with respect to supervision of work under a permit. See Section 3 Background, paragraph a., rule 412, and the note at the end of rule 504.

The April newsletter contained the list of principles which the Safety Strategy & Policy Group determined as applying to SR-EI rule 412, and invited comment. Comment was received from two persons and the principles were generally concurred with.

The Safety Strategy & Policy group has determined that further progress on this issue will be incorporated into the Technical Guide on Supervision which is being developed to address this and other supervision related issues (see section 4.3 of this newsletter)

### 6. Assurances

#### 6.1 Introduction

Earlier this year there were two significant incidents that compromised **employee** safety involving **assurances**. These have been investigated by the parties concerned, and a

request made that the issues be covered in the newsletter. Compliance with SR-EI requirements for **assurances** is essential for safety.

Note: The highlighted words in this article have the meanings defined in Section 2: Definitions, of SR-EI.

## 6.2 Principles Applying to Assurances

SR-EI defines an '**Assurance**' as;

'A statement made by the **employee** controlling an **equipment** isolation point to the **issuer** of a **permit** that:

- a. **safety measures** have been applied as specified, and
- b. those **safety measures** will remain in place until the **issuer** instructs otherwise.'

SR-EI applies the term **assurance** only to **permits**. The **assurance** is an administrative system to enable the **issuer** to request an employee controlling **equipment** not under the control of the **issuer**, to apply **safety measures** required for a **permit**.

Because the **safety measures** applied for the **assurance** are a part of the **permit**, the **assurance** can be received and returned only by the **permit issuer**.

The term **assurance**, because it is so critical to safety, must be used only where it is specifically needed by SR-EI.

Isolations and/or earthing applied under an **assurance** become part of the isolations and earthing for the **permit**, ie they are **safety measures**.

Both the **employee** issuing the **permit** (and receiving the **assurance**) and the **employee** providing the **assurance** must be **competent** to do so.

The **employee** providing the **assurance** is responsible for the adequacy and accuracy of the **safety measures**. It is not possible for the **issuer** or the **recipient** to check the **safety measures**, and they must rely on the **assurance**.

The **employee** providing the **assurance** and the **permit issuer** must communicate directly with each other.

## 6.3 The Use of Assurances

The **issuer** is required by SR-EI rule 501a. to ensure that all required **safety measures** have been applied before a **permit** is issued.

Sometimes **safety measures** for **permit** issue, e.g. isolation and/or earthing, need to be applied to **equipment** that is not under the control of the **issuer**, and the **issuer** must then request that **safety measures** be applied to such **equipment** to achieve an agreed **equipment** state. The **employee** who has operational control of that **equipment** must apply the necessary **safety measures** and then provides an **assurance** to the **issuer** that the **safety measures** required to achieve the agreed **equipment** state have been applied and will remain in place until the **issuer** instructs otherwise.

SR-EI rules 502,507,512 and 516 deal with **issuer** requirements relating to **assurances**.

For the **assurance** process to work effectively, the **issuer** must be quite specific about the point of connection that must be **isolated**, and the nature of the isolation required, eg for steam or gas lines. The **employee** providing the **assurance** must be quite specific that the requested isolation has been provided, and this statement is the essential content of the **assurance**. Detail of the **safety measures** that have been applied may also be provided,

but this is not essential, as the **issuer** and/or **recipient** are not expected to know if they are adequate or correct.

It is critical that **safety measures** applied for an **assurance** remain in place until the **issuer** instructs that they may be removed. The locking where practicable and tagging of isolation points required by SR-EI rule 602c. and the locking and tagging of earth switches required by SR-EI rule 602g. provide some of the systems used to ensure that this requirement is complied with.

Only when the **permit(s)** to which the **assurance(s)** relate has/have been returned and cancelled, must the **issuer** state to the **employee** providing the **assurance** that the **assurance** is no longer required.

The **employee** providing the **assurance(s)** may remove the **safety measures** only when he /she has verified that all **assurances** (and **permits**) affected by the **safety measures** have been returned and cancelled.

Note: Any alterations to existing **assurance safety measures** must be made only when this has been agreed between **recipient(s)**, **issuer(s)** and the **employee** providing the **assurance(s)**.

#### 6.4 Planning for Permit Issue When an Assurance is Involved

Planning is essential in the delivery of safety. As part of the planning process for **permit** issue, if there is a need for an **assurance**, it must be identified and correctly notified, at the planning stage, to the other party, using **industry procedures**.

#### 6.5 Relationship Between Assurances and Operating

The term **assurance** belongs only to the **permit** process. Following switching, a statement given by one **employee** with operational control to another that switching operations to remove **equipment** from service for transfer of control have been carried out is not an **assurance**. Subsequent actions to apply **safety measures** when requested by the **issuer**, and the notification of those to the **permit issuer**, are an **assurance**.

#### 6.6 Communication and Interpretation

The recent incidents highlighted the need for effective, precise communication, using the correct terminology and the need to verify that both parties have the same understanding of the requirements.

The communication must have no ambiguity or room for misinterpretation.

## 7. Use of LV Neutrals as Temporary Earthing Points

Hec Sutherland of Alstom raised a question regarding the acceptability of using the LV neutral as a temporary earthing conductor. The issue was passed to Tony Mitton for comment. Tony's report follows, and it must be noted that this method of earthing is deemed suitable for 11kV and 33kV systems only.

### *“7.1 Introduction*

*I have investigated the practice of using the LV 400 V AC neutral as a temporary earthing point for HV distribution earthing, as raised by Mr Hector Sutherland. My comments and conclusions are detailed below.*

*It should be noted that provided the correct isolation and proving dead procedures are used on the HV circuits then the risk of energisation is, in most cases, negligible*

## 7.2 LV 400 V Neutral as HV Earth

The use of an LV 400 V neutral as an earth connection is recommended in the first instance by SREI Appendix B (5).

An LV neutral provides an effective earthing method and will normally result in a much lower impedance than any other form of temporary earthing at the work site (eg driven rods). It will provide a low impedance path for fault current and minimise any voltage rise at the earthed equipment. Underground HV cables that are screen bonded at both ends and also bonded to the LV neutral provide a very effective earthing system since a direct path for fault current is available via the screen.

If the LV neutral is adequately sized for the HV fault current (as required by SREI) then the consequences are unlikely to be significant. During the fault a voltage will appear on the LV neutral system. This voltage will depend on the impedance and extent of the neutral system. If the impedance is very low (eg  $<0.5 \Omega$ ) then voltages will be relatively low (eg  $< 2 \text{ kV}$ ) and will decrease along the neutrals as the distance from the fault increases. These voltages are unlikely to cause serious damage except that failure of mains powered telco equipment in consumers' premises is becoming more common for HV into LV neutral faults.

For an 11 kV system, a maximum voltage of 6.35 kV can result but this is very unlikely since the fault would have to be close to a strong source and the LV neutral impedance would need to be high (eg  $> 5 \Omega$ ).

## 7.3 Temporary Driven Earths

In urban areas, if temporary earths (such as driven rods) are used and are completely segregated from the LV neutral (and, if they exist, HV cable screens), then the earth impedance will be substantially higher. While the protection schemes should still operate correctly, there can be very high voltages appearing on both the earthed equipment and the local ground surrounding the driven rods.

Where separate earths are used on HV cables or overhead lines (eg rural areas) then additional precautions may be required (such as equipotential bonding mats, earthing cluster mounts).

## 7.4 Conclusions

### Urban Areas (Overhead & Underground HV)

- a) For most installations, the risk of an HV livening and associated earth fault is considered negligible provided appropriate steps have been taken to isolate the circuit.
- b) Should the HV system become energised, no significant earth fault current will result if all three phases are properly bonded together.
- c) The use of the LV neutral is appropriate (provided it is adequately sized) since it will provide the most effective earth for the HV system, minimising any voltage rise. Voltages will appear on the neutral but are not likely to be a significant hazard (ie negligible risk to other persons).
- d) Should an HV earth fault occur then the LV neutral itself is unlikely to rise to hazardous levels although adequate equipotential gradient control should be installed around RMUs and kiosks.

### Rural Areas (Overhead HV)

- a) For most installations, the risk of an HV livening and associated earth fault is considered negligible provided appropriate steps have been taken to isolate the circuit.
- b) The risk is higher on long lines where more than one circuit of the same or higher voltage exists on a pole and are in service.
- c) Should the HV system become energised, no significant earth fault current will result if all three phases are properly bonded together.

- d) *The use of the LV neutral should be discouraged since the overall LV neutral impedance is unlikely to be low enough to prevent substantial LV neutral voltage rise and consequent damage to nearby telco equipment and possible risk to other persons.*
- e) *Separate local temporary earthing should be used in combination with equipotential bonding to ensure voltage gradients across linemen and workplace are kept below hazardous levels (eg cluster mounts, equipotential mats)."*

## 8. Publications Referenced in SR-EI and GSG-EI

GSG-EI makes reference to over 70 external publications, and SR-EI makes reference to 25, most of which are the same as those in GSG-EI. From time to time these references are amended. Listed below are the references which have been identified as having changed. Also listed are some references not stated in the rule books, but which may have relevance.

The previous newsletter (April 2001) listed some changes to publications. In summary these were:

- The Approved Code of Practice for Cranes is now available. [www.osh.dol.govt.nz](http://www.osh.dol.govt.nz)
- Crane Safety Manual for Operators/Users is now available. (See April newsletter for purchase details)
- AS/NZS 1891.4 *Industrial Fall Arrest Systems and Devices Part 4: Selection Use and Maintenance* 2000 has been issued.

The following publications have also changed:

- (a) OSH Publications. (Available at [www.osh.dol.govt.nz](http://www.osh.dol.govt.nz))
  - (i) The Approved Code of Practice for Pressure Equipment (Excluding Boilers) (2001)  
This ACOP specifies the requirements for materials, design, manufacture, installation, repair, alteration, maintenance, servicing, inspection, commissioning, testing and operation of pressure equipment, except boilers.
  - (ii) Guidance Notes on Providing First Aid Equipment, Facilities and training to Meet the Requirements of the Health & Safety in Employment Act 1992 and Regulations 1995 (2000).  
Rules 109 and G109 referred to the *Guidance Notes on Providing First Aid Training* 1996. These are now superseded by the above publication. The OSH website states that 'these guidance notes are intended for the use of:
    - Anyone responsible for first aid in places of work
    - Employers who need to have trained first aid personnel in places of work
    - First aid personnel in places of work
    - Persons responsible for the maintenance of first aid equipment and facilities in places of work
    - Organisations and instructors involved in the training of first aid personnel, and
    - Individuals and organisations wishing to become first aid trainers.
  - (iii) Workplace Exposure Standards Effective from 2001 (2001)  
Section 4 Background, and rules G409, G501, 910 refer to the 1994 version of the WES standard.
  - (iv) A Guide to Safety with Chainsaws (1999)  
Rule G605 refers to the 1993 version of this guide.
  - (v) Guidelines for Safe Stacking and Storage (1998)  
Rule G317 refers to the 1989 version of these guidelines.
  - (vi) A Guide to Safety in Tree Felling and Crosscutting (2001)  
Rules G605 and G 808 refer to the 1994 version.
  - (vii) Danger: Eyes at Work (2000)  
Rule G1002 refers to the 1993 version of this.



- (viii) **Safe Access (1992)**  
Rule G909 refers to this document, which has now been deleted as its provisions are covered by the Construction Guidelines.
- (b) **Standards**
- (ix) **AS/NZS 2604 *Sunscreen Products – Evaluation and Classification* (1998)**  
Rule G1009 refers to the 1993 version
- (x) **AS/NZS 3760: 2001 *In-service safety inspection and testing of electrical equipment***  
Rule G814 refers to the 2000 version. The EEA is preparing a Technical Guide on the 'Inspection and Testing of Low Voltage Electrical Appliances, Cords, and Protective Devices'. When complete this guide will be available to EEA members.
- (xi) **NZS 5811: 1981**  
This Standard has been withdrawn and superseded by AS/NZS 1891 Parts 1 and 4. It remains referenced in the Electricity Regulations 1997, Regulation 35. EEA members should also refer to the EEA Technical Guide 'Use of Personal Fall Arrest Systems'. This Standard is referred to in rules G1007 and 1007.
- (xii) **AS/NZS 4836: 2001 *Safe working on low voltage electrical installations***  
Rules G108 and 108 refer to the draft of this Standard.
- (xiii) **ASTM F496: 2001**  
Rule 1009 refers to this Standard.
- (c) **Miscellaneous**
- (xiv) **HERA Report R7-43 Draft H&S Guidelines for Fabrication Workshops**  
Rule G801 refers to this report. It has been withdrawn and HERA recommend using the WTI of Australia Technical Note No 7 also referred to in this rule.
- (xv) **Safe Working Practices for Electricians and Electrical Workers – MoC - 1990**  
A draft of an equivalent document is being prepared by the EEA.
- (xvi) **National Radiation Laboratory Codes of Practice**  
For current codes refer to the NRL website [www.nrl.moh.govt.nz/publish](http://www.nrl.moh.govt.nz/publish)
- (xvii) **Power Crane Association *Policy Guidelines for Crane Lifted Work Platforms***  
Rule G708 refers to this policy. The policy has been superseded by the OSH ACOP for Cranes.

#### Publication Update:

- (xviii) The Approved Code of Practice for Load Lifting Rigging is still under development, with no publication date available.
- (xix) Additional OSH publications available include the following. These have not been reviewed for significance or relevance to the ESI.
  - All terrain vehicle (ATV) safety – rider training (1998)
  - Advice for Employees on Working safely with Hazardous Substances (MOSHH) (1997)
  - Stress and Fatigue, Reducing their Impact - advice for employers and employees
  - Stress and Fatigue, Their impact on health and safety in the workplace (1998)
  - Update on Synthetic Glass Wool (2001) (This update concludes that 'the most relevant evidence points to an absence of risk for developing serious long-term respiratory disease from typical uses of glass wool fibre of the type discussed (in the update). There is no good evidence to the contrary. However, safety can be further guaranteed by adoption of prudent control measures, ...')
  - Confined Space: Planning entry and working safely in a confined space (2001)

## 9. Boundary Marking

Over the past few years Transpower has sponsored trials of a marker system for use in station structures where there is live equipment adjacent to equipment to which a permit has

been applied. The marking system was first seen in Quebec Hydro, and has been developed for use in NZ by Alstom.

Alstom were awarded the 2001 EEA Safety Award for their work on this system, and are to make a presentation on it at the EEA Safety Workshop. Subsequent newsletters will give further detail of the system.

**EEA Safety Strategy and Policy Group  
October 2001**

**Disclaimer:**

The Safety Rules Newsletter should always be used in conjunction with the applicable legislative and OSH safety and health requirements. If there is uncertainty as to information contained in the newsletter, specialist advice should be sought. The Electricity Engineers' Association of NZ (Inc) (EEA) and the electricity industry representatives involved in formulating the newsletter, accept no liability or responsibility for any error in or omission from the newsletter, or any injury, loss, damage (including indirect or consequential loss or damage), or any other claims whatsoever caused by or resulting from any reliance on, or failure to rely on, the Safety Rules Newsletter.