



# Safety Lines



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## Rock Solid?

Recently an accident occurred which serves as a reminder that the rock beneath your feet (or crane) is not always as solid as it seems. A 60-tonne mobile crane overbalanced when positioning a 1-tonne load (including hook) within its operating radius. The cause of the accident was subsidence under an outrigger.

The ground had been inspected and the potential hazard identified. The problem area was excavated to 600 mm where flat rock was found extending to about 1.5 m<sup>2</sup>. This appeared to be a solid base surrounded by soft ground on three sides.

Approximately 2 m<sup>2</sup> of heavy timber packers were used under the outrigger pad and on loading, 50 mm compaction was noted.

The crane made several lifts with heavier loads at maximum allowable radius and no further compaction was observed. The following day there was no noticeable settlement and it was decided that operations could continue from the crane's current position.

During positioning of the load the rear outrigger (over the suspect area) slowly moved downwards about 500 mm causing the crane to tip. The operator was able to take evasive action by lowering the load, retracting the boom, and slewing the jib, thereby avoiding personnel and cushioning the impact. There was no injury and crane damage was minimal.



The crane which overturned during the lifting operation.

The site was examined after the accident and it was found that the rock formation was a 1200 mm wide x 200 mm thick cantilevered shelf over soft ground. The rock had fractured and rotated 60° under load causing the outrigger to slip off the packers and allowing the weight to be transferred to the underside of the outrigger.

This accident highlights the care required in carrying out the sometimes difficult task of assessing the ground bearing capacity and correct blocking (packing) of the outrigger pads. The following points need to be considered:

- It may sometimes be necessary to consult a person with expertise in soil types, such as a civil engineer, to determine if the required



support is available or if some ground works are needed to provide an adequate base. Repositioning may be a viable alternative to using a marginal area.

- Extensive ground probing from different angles will be necessary and the use of a penetrometer may be justified.
- AS 2550.1-1993 *Cranes – Safe use – General requirements* offers some information on safe

bearing pressures of different soil types for crane outriggers.

- The Power Crane Association *Crane Safety Manual* illustrates the blocking of outrigger pads.
- An accurate level indicating system, possibly with an adjustable preset tilt alarm, can provide warning of imminent collapse of outrigger support.

## Traction Engine Safety

Ever since the dawn of the industrial age steam engines have been a source of fascination, and this is still evident at the frequent weekend public exhibition days held by enthusiast bodies throughout the country. Many and varied are the exhibits at these events including a large number of traction engines, a proportion of which is shown off under steam, in transport mode or driving plant. Such occasions are usually a great success and pass off without any significant safety incident.

More recently it was quite a different story in Medina, Ohio, where a 90-year-old traction engine (often referred to as a 'tractor' or 'train') exploded killing five people and injuring many more, including children. The machine was said to have been well maintained and was operated at much reduced pressure.

The explosion ripped the boiler apart, launched the machine (of approximately 20 tonnes) over five metres into the air, expelling scalding oil, water and steam in the process, and shot chunks of metal more than 100 metres away.

It appears that the cause of the accident was low water level. In this scenario the crown plate, which is normally well covered by water to allow heat transfer to keep it within operating temperatures, would have been exposed to very high temperature. Any water subsequently coming into contact with the overheated crown plate would have immediately flashed to steam causing a dramatic and rapid increase in pressure, overwhelming safety devices and structure alike. A similar end result could alternatively have followed from plastic deformation of the crown plate. All the complex technical details of this incident may never

be fully reconstructed, but it does reinforce one fundamental principle of the operation of shell boilers. Maintain an adequate water level at all times.

As a result of this tragedy, regulation of traction engine safety in Ohio, and in the USA generally, naturally came under intense scrutiny. Safety regulation of these machines varies greatly in the USA and even, it seems, within states. But what about here in New Zealand?

It may come as a surprise to learn that these engines are not covered by the PECPR Regulations, but come under the Boiler Lifts and Cranes Act. This Act is administered by the Ministry of Transport and will in due course be replaced in part by a Traction Engine Safety Act, which is being developed by the Ministry of Transport. It is proposed that compliance with the new Act would not be monitored by any government agency but would be enforceable by Police, LTSA and OSH.

Responsible owners of traction engines engage professional inspectors to examine their machines even although there is not an enforced inspection regime at this time. This is very prudent and the acquisition of a certificate of inspection in this way provides for both safety and public assurance. Also in most cases traction engines are not allowed to be exhibited at fairs and other events unless they have such certification.

The *Code of Practice for Steam Driven Vehicles* is available from:

**New Zealand Industry Training  
Organisation  
Ground Floor  
12 Alma Street  
Hamilton  
Telephone: (07) 839 7370**

**Postscript: It seems that the boiler was in poor condition and the cause of failure more complex than first realised. Refer to: <http://www.doli.state.mn.us/boilerohio.html>**

## Building Maintenance Unit (BMU) Incident

An incident occurred where a bolted connection to a slewing ring failed, causing two fatalities. This failure could have been avoided if the correct inspection and maintenance procedures had been followed.

It is recommended that all slewing rings fitted to BMUs be inspected and the fixing bolt material grade and applied torque be checked against the manufacturer's specifications to ensure safe operation.

A guidance document entitled *Building Maintenance Units and Powered Swinging Stages* can be downloaded free from the Internet. To locate it go to [www.osh.dol.govt.nz](http://www.osh.dol.govt.nz) then click on "Learn about health and safety law" (click on the graphic), "OSH publications on legislation", then "Construction and Building Maintenance".

## New Recognised Inspection Body

The following organisation is now recognised under Regulation 25 of the Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations 1999 as an overseas inspection body providing fabrication inspection services:

**International Business & Mercantile  
Reassurance Company**  
690 E. Lamar Blvd. – Suite 580  
Arlington  
Texas 76011  
United States

## New Pressure Vessels Code of Practice

An *Approved Code of Practice for Pressure Equipment (Excluding Boilers)* was gazetted on 6<sup>th</sup> September 2001, and shall come into force on 4<sup>th</sup> October 2001. The code will not be issued in hard copy but is available for free download from our website [www.osh.dol.govt.nz](http://www.osh.dol.govt.nz). The code can be found by clicking on "Learn about health and safety law (click the graphic)", "OSH publications on Legislation", then "Approved Codes of Practice (ACoP)".

## Cranes Code of Practice – A Reminder

Appendix A of the *Approved Code of Practice for Cranes* covers the fitting of safe load indicators to cranes. The particular reminder is that the appendix states 'Existing cranes not complying with this appendix have until 1 January 2003 to comply'. Certificates of Inspection can therefore still be issued for existing cranes, as above, until the expiry date of the certificate is 1 January 2003.

## Email Reminder

Many people have already asked to be reminded when *Safety Lines* is posted on the Internet. If you would like to be included on our early warning system please send your email address to:

**[sl-list@osh.dol.govt.nz](mailto:sl-list@osh.dol.govt.nz)**

As a navigation aid we intend to include in the reminder a link directly to the *Safety Lines* location.

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## Live *Safety Lines* Amendments

We always endeavour to be sure of our facts and provide reliable information in *Safety Lines*, but just occasionally we need to backtrack and put something right. Although *Safety Lines* is a quarterly newsletter, since it is now in exclusively electronic format changes can be made very quickly.

In future editions of *Safety Lines*, updated information, such as a correction or late-breaking snippet for added value to an article, will be incorporated into the current website edition in a highlighted format. The nature of the highlighted formatting will be relevant to the change (such as coloured text, strikeout, etc.) but its purpose will be to draw attention to an area of alteration. This will apply during the currency of the publication (up to the date of issue of the next edition). Corrections will also still be noted in the usual way in a following issue.

This is principally to minimise the delay in effecting corrections, for people who rely on published information (such as inspection body addresses). Before utilising information from a printed copy of the current *Safety Lines*, it is advisable to check the live web edition for highlighted changes. In the case of past issues, please check subsequent issues for any relevant corrections.

If you are aware of any error which appears in *Safety Lines* please notify the editor.

## Corrections to *Safety Lines* Issue 50

### Correction #1

(Name and address of inspection body)

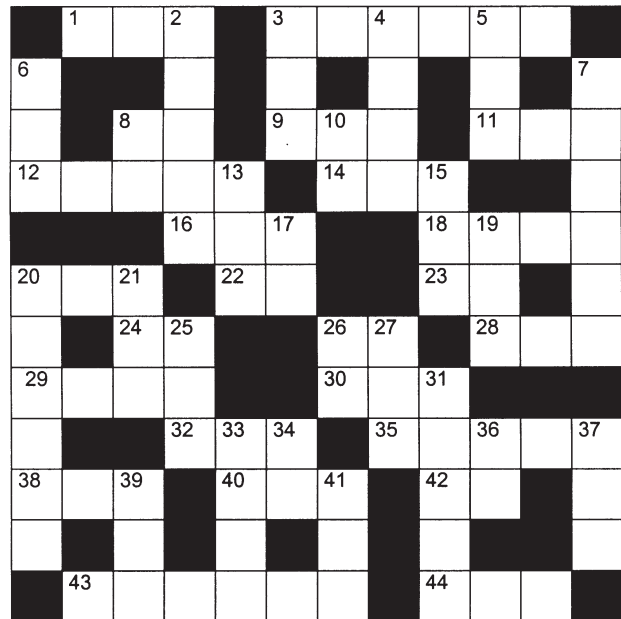
**Nippon Kaiji Kyokai**  
**4-7 Kioi-Cho**  
**Chiyoda-Ku**  
**Japan**

### Correction #2

(Inspection body omitted)

**Ethical Inspection & Testing Ltd.**  
**PO Box 40 306**  
**Upper Hutt**  
**Wellington**  
**Technical Manager: Mike Donnellan**  
**Phone (04) 528 8057**  
**Fax (04) 528 6008**

## Puzzle Place



Answers include abbreviations and acronyms.

### ACROSS

- 1 Slides over snow
- 3 One who runs off to marry
- 8 Plural of I
- 9 Expressing disgust
- 11 Greek letter
- 12 Sugar coating
- 14 Seek an answer
- 16 Destroy
- 18 Accreditation authority
- 20 Pressure unit
- 22 System of units
- 23 Medical title
- 24 UK esteemed scientific body
- 26 Gaseous element
- 28 Before (archaic)
- 29 Instrument
- 30 Statement of preferred work practices
- 32 Rainy
- 35 Gentle reminder
- 38 Standards organisation
- 40 Small bed
- 42 Rhenium
- 43 Take advantage of
- 44 Finish

### DOWN

- 2 Institution
- 3 Big bird
- 4 \_ and ahs
- 5 And so on
- 6 Imperial pressure
- 7 Sausage treatment
- 8 US state
- 10 High level drawing
- 13 Includes air, according to schedule 1
- 15 Young goat
- 17 Ratio
- 19 100 square metres
- 20 C plus 273
- 21 Knack
- 25 Stitch
- 26 Unwelcome abbreviation on audit report
- 27 A long time
- 31 Force air or inert gas through boiler
- 33 Repeat
- 34 \_ and fro
- 36 Prefix of removal
- 37 Type of crane
- 39 Unit of resistance
- 41 Short third day

Answers can be obtained by email from [robin.bain@osh.dol.govt.nz](mailto:robin.bain@osh.dol.govt.nz).

## Answers to *Safety Lines* Issue 50 Crossword

### Across

- 1 HSNO  
3 ACoP (Approved code of practice)  
6 OAPs (Old age pensioners)  
8 Equipment  
12 Bel  
14 VGA  
16 PSI  
17 Units  
19 Rated  
21 UV  
22 SAE  
23 Boiler  
24 IANZ  
25 ET  
27 BMS (Boiler management system)  
30 BLEVE (Boiling liquid expanding vapour explosion)  
31 IPENZ  
33 Data

### Down

- 1 HSE  
2 OKI  
3 Aim  
4 Pot  
5 As (Symbol for arsenic)  
7 Pressure  
9 Unattended  
10 Proud  
11 No  
12 BP  
13 Li  
15 FIFO (First-In-First-Out)  
18 Sill  
19 RSI  
20 AAA  
23 BPM (Beats per minute)  
26 TV  
27 Bed  
28 Sit  
29 One  
30 BA (BD would also do)  
31 IT  
32 PA

*Safety Lines* is a publication of the Engineering Safety Unit of the Occupational Safety and Health Service, Department of Labour, PO Box 3705, Wellington.

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