

# Safety Lines



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## Gas-Fired Boiler Incident

A near miss with a gas-fired boiler has been brought to the attention of Engineering Safety. This incident illustrates the traps that can occur when an unsatisfactory design modification cures an immediate problem but creates a major latent defect.

The boiler was an under 15 HP unit that had been relocated and converted from oil to natural gas firing. The operator had started the boiler, left it on auto control and returned to his normal production workstation remote from the boiler house.

The boiler start-up process had not been completed when the operator returned to his normal workstation.

This incident came to attention when gas was smelt in the yard outside the boiler house. A supervisor was called and, on seeing no flame in the boiler, shut it down and isolated the gas supply. It is estimated that unburnt gas was released for about 30 minutes.

### The Investigation

It took some time to establish why the gas safety shut-off valve had opened when no flame was present. The investigation found the following:

- The flame-sensing circuit had been modified. A relay had been fitted in the panel and this was energised by the supply to the pilot solenoid

valve. The supply to the UV sensor was taken through a normally-open contact on the relay, which closed when the pilot valve was energised. Thus pre-start checks for a flame were ineffective due to isolation of the sensor. (It is thought that the modification had been carried out to prevent lockout in the event of an extended flame die out time on shutdown. It had been found that this would occur with the burner on this boiler.)

- It was found that operation of the flame-failure sensor was defective and would signal a flame when none was present. This appeared to have been caused by tracking due to an accumulation of dirt on the UV sensor connection pins. (The condition of the UV flame sensor could not be easily checked as it was situated in the burner draft tube.)

As a result of the above findings it was considered that the following sequence of events had occurred:

- The burner management system did not detect the UV sensor signal a false flame on start up because of the circuitry modifications noted above.
- A normal purge was completed, followed by an ignition spark and opening of the pilot gas solenoid. This, in turn, energised the relay and



brought the UV sensor into the flame sensing circuit at the time the pilot would normally have ignited. On this occasion the pilot did not ignite, the UV sensor incorrectly sensed a flame, the main gas safety shut-off valves opened and the burner went to high fire. No flame was present and unburnt gas was discharged to atmosphere via the boiler stack.

The following remedial works were carried out:

- The faulty sensor was replaced.
- The retrofitted relay and circuitry used to modify the flame sensing circuit was removed.
- Adjustments were made to the air/gas ratios and the burner diffuser repositioned. (This reduced the flame die out time on shutdown.)

Other matters that arose from the investigation of the incident were:

- The lack of a circuit diagram and the condition of the panel resulted in a recommendation that the boiler management system be rewired and as-built drawings prepared.
- There was no record of gas certification for the boiler gas system. (The owner was under the impression that survey and certification under the PECPR Regulations had satisfied all statutory

responsibilities for this plant. While this survey comprehensively covers the pressure parts of boilers and checks on safety controls including flame failure systems, it does not fully cover gas supply systems.)

- The burner system did not comply with the relevant gas burner standard. It was recommended that the system should be upgraded to comply with BS 5885 Pt 1 and include high and low gas pressure switches and an additional safety shut-off valve for the pilot gas supply.
- Boiler maintenance procedures should be amended to include regular cleaning of the internal surfaces of control panels.
- On completion of the system upgrade, a gas certificate is to be issued.

This incident highlights the dangers that can result from modifications being made to controls by persons with a limited knowledge of the system requirements. On this occasion quick action by an operator kept the site safe from what could have been a disastrous explosion. It also highlights the need for regular maintenance and testing of boiler safety controls to ensure that they have not become ineffective due to failure, damage or accumulation of dirt.

## Revision of ISO 9000 Series Quality Management System Certification Standards

This year will see the release of the revised ISO 9000 series of Standards. This revision will be part of a regular review process, which, under ISO protocols, must take place at least every five years. The emphasis of the revision is to make organisations focus on achieving customer satisfaction, rather than meeting internal measures of quality management.

The revision process has two phases. The first includes the completion of four draft stages and publication of the revised international standard ISO 9000:2000 family. The second has the ISO 9000:1994 and the ISO 9000:2000 series of standards coexisting for a fixed transition period.

Progress to date has seen the completion of the first three drafts, namely the First Committee Draft, Second Committee Draft and the Draft International Standard. Release of the Final Draft International Standard is scheduled for the third quarter of 2000. Publication of

the completed international standard is expected in the fourth quarter of 2000.

The current ISO 9000 series comprises some twenty standards. The ISO 9000:2000 revision will reduce this number to three. It is expected that this reduction will simplify interpretation and application. The three standards in the revised series will be:

- **ISO 9000:2000 - Quality Management Systems** -Fundamentals and vocabulary;
- **ISO 9001:2000 - Quality Management Systems** - Requirements; and
- **ISO 9004:2000 - Quality Management Systems** - Guidance for performance improvement.

The new standards aim to establish effective systems for successful business management in the organisations that implement them. The basic principles they will espouse are:

- **Customer-focus.** Organisations depend on their customers and therefore should understand current and future customer needs, meet

customer requirements and strive to exceed customer expectations.

- **Leadership.** Leaders establish unity of purpose and direction of the organisation. They should create and maintain the internal environment in which people can become fully involved in achieving the organisation's objectives.
- **Involvement of people at all levels.** People at all levels are the essence of an organisation and their full involvement enables their abilities to be used for the organisation's benefit.
- **Process approach.** A desired result is achieved more efficiently when related resources and activities are managed as a process.
- **System approach to management.** Identifying, understanding and managing a system of interrelated processes for a given objective improves the organisation's effectiveness and efficiency.
- **Continual improvement.** Continual improvement should be a permanent objective of the organisation.
- **A factual approach to decision making.** Effective decisions are based on the analysis of data and information.
- **Mutually beneficial supplier relationships.** An organisation and its suppliers are interdependent, and a mutually beneficial relationship enhances the ability of both to create value.

The current ISO 9001, 9002 and 9003 standards will be incorporated into a single document, ISO 9001:2000. The philosophy of this new standard will emphasise:

- **Top management involvement.** Management, at a level at which matters are rarely referred any higher for decision, must be actively involved with and support the management system.
- **Internal communication.**

- **Process model.** The outcome must be satisfactory. The emphasis is now on producing an acceptable outcome as opposed to implementing particular procedures.
- **Being customer focused.**
- **Continual improvement.** Organisations must actively seek ways of improving current practices.
- **Being outcome focused.** Organisations must produce product acceptable to the customer.
- **Competency.** Organisations must assess the skills required of its personnel and personnel must be competent.
- **Control during changes.** Organisations shall ensure change is satisfactorily controlled and that quality is maintained during change.

A significant change that will be implemented by the new ISO 9001 standard is that organisations performing design or development will be required to include design or development in their certification scope. Design or development will be broadly interpreted to include design or development of forms, software, marketing campaigns, etc. as well as other design/development activities.

To assist a smooth transition from existing certification, a three-year transition period will be allowed from issue of the ISO 9000:2000 series. Current certification will remain valid during the transition however, before the end of this period an organisation will need to adjust to the requirements of the revised standard for their certification to be maintained.

Additional assistance in making the transition to the revised standard will be provided by certification bodies in New Zealand. They will, following release of the Final Draft International Standard, be prepared to audit clients against the provisions of the draft. Until the international standard is published, certification would be issued only against the relevant ISO 9000:1994 series standard but areas requiring attention, if the final draft is to be satisfied, would be highlighted.

## Engineering Staff Contact Details

Contact details for staffs are as follows:

	Phone:	Fax:	E-mail:	Post/Delivery Details
Bryn George	(04) 915-4433	(04) 915-4370	Bryn.George@osh.dol.govt.nz	Aurora House
Peter Williamson	(04) 915-4461	(04) 915-4370	Peter.Williamson@osh.dol.govt.nz	62 The Terrace
Geoff Edwards	(04) 915-4435	(04) 915-4370	Geoff.Edwards@osh.dol.govt.nz	PO Box 3705
Mato Dugalic	(04) 915-4460	(04) 915-4370	Mato.Dugalic@osh.dol.govt.nz	Wellington

## Availability of Archive Files for Equipment

Engineering Safety gets many queries about accessing technical data for equipment that was design verified and or inspected prior to the privatisation of the Marine Division of the Ministry of Transport.

Marine & Industrial Safety Inspection Services Ltd now hold these files. Where appropriate, access to this data can be arranged by contacting M&I.

The key reference required by M&I when searching for a file, is the five or six digit "official" number issued for the equipment. (This is the number stamped on the equipment following the inspection just prior to it entering service.) M&I find it helpful, for an archive search, if the old Marine Division or an M&I reference number is also supplied. The availability of these two numbers normally means that the original file would be located. However, M&I say that on some occasions a search may not be successful because the file has been destroyed.

M&I advise that owners of equipment and others who require access to technical data must show that they have rights to it. Ownership of equipment does not necessarily give a right to access this data. Where a right to access is not held, the applicant must obtain permission from the holder of this right. The holder may be the original designer/manufacturer or, where these persons or organisations no longer exist, the new holder of these rights. M&I say they can generally track down the holder of the rights to data and that they may be able to assist with getting the required permission.

Once permission is obtained, M&I say they are usually able to locate the files and produce copies of the documents within two days.

To get more information, including the cost of this service, and to arrange copies of archived documents, please contact:

**Sue Williams**  
**Customer Services Co-ordinator, Technical Services Group**  
**Marine & Industrial Safety Inspection Services Ltd**  
**PO Box 27-347, Wellington**  
**Phone (04) 382 9666 Fax (04) 385 9311**

## Code of Practice for Pressure Equipment

A draft *Code of Practice for the Design, Operation, Maintenance and Servicing of Pressure Equipment* has been prepared and is now available. A copy of the draft can be obtained from Engineering Safety or downloaded as a word document or PDF file from the OSH web site at:

<http://www.osh.dol.govt.nz/order/catalogue/draft.shtml>

## Media Release: Dangers with Gas-Fired Ovens

The Ministry of Consumer Affairs' Energy Safety Service (ESS) today warned of the dangers of serious accidents that may occur if gas-fired ovens are not properly used and maintained. The ESS has investigated two recent explosions in gas-fired ovens, one of which killed a worker. Gas-fired ovens may be used by the baking, food-drying painting and other industries.

"Our message to the owners and operators of gas-fired ovens is simple: Have them checked regularly by a qualified expert in gas-fired commercial and industrial equipment," said the Ministry's Standards and Safety Manager, Tony Leverton.

"We also encourage owners and operators to register their gas-fired ovens with us, so that we can keep them up-to-date with safety information."

The ESS recommends the following safety precautions for gas-fired ovens:

### *Direct-fired ovens*

- A qualified expert should check carbon monoxide levels inside the oven at least every three months, or any time the internal circulation dampers are adjusted.
- Dampers on the oven's flue pipes can increase carbon monoxide production and may need to be removed. If they are used, the dampers should be checked for any movement or blockage prior to start-up each day.

### *Indirect-fired ovens*

- Corrosion around the oven's combustion chamber and heat exchanger may cause an explosion or carbon monoxide poisoning, especially if the oven has been used for many years without inspection, or

if parts can't be accessed easily. A qualified expert should check the oven as soon as possible.

Consider using an explosion relief device on all types of ovens. This may not be automatically fitted on smaller ovens.

All gas-fired ovens should also be checked for negative pressure inside or around the oven. This can cause a malfunction in the burner equipment, abnormal flames or carbon monoxide poisoning. Filtered air sources may need to be installed.

### ENDS

For more information, contact:

**Tony Leverton**  
**(04) 474 2693 (w)**  
**(04) 476 3293 (h)**  
**Mobile 025 481 801**

*The above media release was provided by the Ministry of Consumer Affairs' Energy Safety Service. Ed.*

## A Gag on Safety

Engineering Safety received this photograph and the background information from Mike Donnellan of Donnellan and Associates, Upper Hutt.

The photograph shows a safety valve that had been made inoperative by a gag. It was supposedly protecting a pressure reducing station on a steam line. It has now been replaced.



Gagged safety valve

The complete steam system had been installed many years ago and the valve with gag was recently 'discovered' by workmen who were clearing asbestos insulation from the plant.

Extensive enquiries were made but no one at the plant could recall this gag or suggest any reason as to why it had been installed.

There may be a requirement for gags (or other means of disabling safety devices) when testing or commissioning equipment but, because of the significant risks they can create, a controller must carefully manage their use.

Engineering Safety requires controllers of plant, where there may be a need for a safety device to be disabled, to prepare procedures which strictly control such practice. These procedures must specify:

- The occasions when disabling of safety devices would be required. (Engineering Safety would expect this to be limited to testing and commissioning activities. Disabling a safety device must not be a palliative for some other problem requiring correction.)
- The persons able to authorise the disabling of safety devices.
- The controls needed in order to avoid compromising safety when a safety device is disabled.
- The controls needed in order to avoid overlooking a disabled safety device when equipment recommences service.

## HERA 2000 Training Programme

Activity	Dates
Welding inspection	19-23 June 4-8 September 13-17 November
Radiographic theory and interpretation of weld radiographs	8-12 May 18-22 September
Surface methods	7-11 August
Ultrasonic testing theory and ultrasonic weld testing	22-26 May 2-6 August
Ultrasonic wall thickness	1-2 June
Management appreciation in non-destructive testing	17 May 25 October
Coatings inspection Home study Block courses	All year 24-25 August

The venue for these courses is:

**HERA House**  
**17-19 Gladding Place**  
**MANUKAU CITY**

For more information contact:

**Peter Hayward**  
**Phone (09) 262 2885**  
**Fax (09) 262 2856**

## When a Controller Refuses to Carry Out Repairs Recommended By An Inspection Body

Engineering Safety has had reports of controllers who have taken exception to not being issued with a certificate of inspection straight after their survey. This has occurred when the inspector has found significant problems with the equipment and has required remedial action.

Under the Health and Safety in Employment Act 1992, Sections 7, 8, 9 and 10, controllers have a duty to identify, and eliminate, isolate or minimise, significant hazards in the workplace. When an inspection body declines to issue a certificate of inspection, and provides the reason why, they are, in effect, identifying the hazards for the controller. OSH would expect the controller to eliminate, isolate or minimise the hazard by carrying out the recommended repairs, prior to the certificate of inspection being issued by the inspection body.

Regulation 10(2) of the Pressure Equipment, Cranes and Passenger Ropeways Regulations requires controllers to take all practicable steps to ensure that no equipment is operated unless it has a current certificate of inspection.

Engineering Safety draws readers attention to the lead article in *Safety Lines* issue number 34 which discusses ethics and the obligation an equipment inspector has to report serious breaches of the regulations to the regulatory authority.

## Code of Practice for the New Zealand Lift Industry

The New Zealand Lift and Escalator Association has produced, in consultation with OSH, a *Voluntary Code of Practice for Health and Safety Issues in the New Zealand Lift Industry*.

The stated purpose of this code "... is to provide a practical source of information relative to the vertical transportation industry in relation to environmental health and safety for their employees, customers and the environment".

The New Zealand Lift and Escalator Association have recommended that the Occupational Safety and Health

Service accept this document as an approved code of practice for the vertical transportation industry.

The cost of the code is \$10.00 incl. GST. To obtain a copy or to get further information, please contact:

Mr Garth Wylie  
Secretary  
New Zealand Lift and Escalator Association  
Private Bag 92-066  
Grafton  
Auckland  
Ph: (09) 367 0935  
Fax: (09) 367 0914

### **Safety Lines: Update of Index**

An insert updating the *Safety Lines* index is included with this issue.

*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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