



1 January 1998 to 31 December 2000

summary of reported electrical and gas accidents

Revised and reprinted January 2002



energysafetyservice
te ratonga whakaruru pūngao

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January 2002

The Energy Safety Service (ESS) was set up in December 1999 to bring a clearer focus to safety, supply quality, and measurement across the Gas and Electricity sectors. The ESS combined the former Offices of the Chief Electrical Engineer (OCEE) and the Chief Gas Engineer (OCGE). The ESS is aligned with the Ministry of Consumer Affairs, but is accountable to the Minister of Energy.

A summary of reported electrical accidents was formerly published every six months by the OCEE. The last published paper copy of electrical accident summaries was for the first half of 1998. In order to provide information for people who don't have access to the Internet, and to maintain a continuity of summary information on paper copy, we have decided to fill the gap and publish a summary of notifiable electrical and gas injury accidents for the last three years - 1998, 1999 and 2000.

This publication covers all gas and electrical accidents notifiable under the Gas Act 1992, and the Electricity Act 1992 (except electrically caused fires). This booklet is the first of a series to be produced by ESS. Electrical and gas accident summaries will be produced on an annual basis from 2001 on.

The ESS is keen to strengthen and maintain its links with the electrical and gas industries, as well as to promote and enhance safety for workers, consumers and the public. We see this publication as a valuable means of communicating our interest and supporting competency standards for workers in these industries. You will find reading the accident summaries a valuable way to learn from the mistakes of others.

The ESS supports the widest possible discussion of energy safety, supply quality and measurement issues. We look forward to a long and productive partnership with the electricity and gas industries, consumers and the general public – one that will underpin our vision of 'safe energy – safe people'.



Keith Manch
General Manager
Ministry of Consumer Affairs



Tony Leverton
Group Manager
Energy Safety Service

Background

Historically, the two separate units, OCEE and OCGE, administered the Electricity and Gas Acts and carried out accident investigations. There were some small differences in the philosophy of investigation and data collection. Therefore the accident data available for analysis are not fully consistent across the two energy sources.

The Energy Safety Service is currently undertaking a project that will integrate the data management systems for reporting electrical and gas incidents. This project is expected to be completed by 2002.

Data Collection and Recording

This booklet also contains graphs with information on accident numbers in occupational groups, and causal factors. There are two major differences in electrical and gas accident data collection and recording that may have some significance:

- 1 All notifiable electrical and gas accidents represent loss that is above the specified threshold under the Act. For this publication, a notifiable gas accident means an accident causing fire and/or explosion and/or gas poisoning. A notifiable electrical accident means an electric shock (which might cause burns) or a fall - not an electrically caused fire.
- 2 Electrical accident investigators specified a single causal factor for electrical accident, whilst gas accident investigators specified up to four causal factors for each gas accident. This latter approach is based on the philosophy that the loss can be avoided (or reduced) by removing at least one of the identified causal factors.

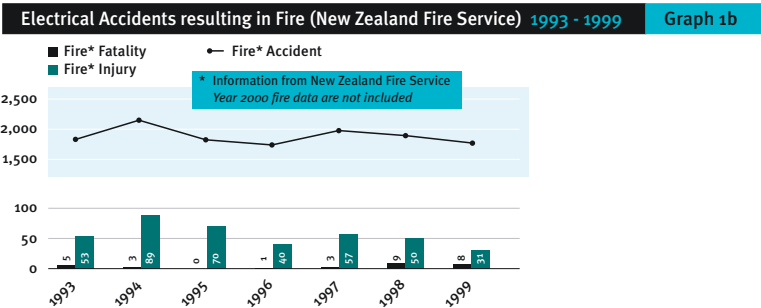
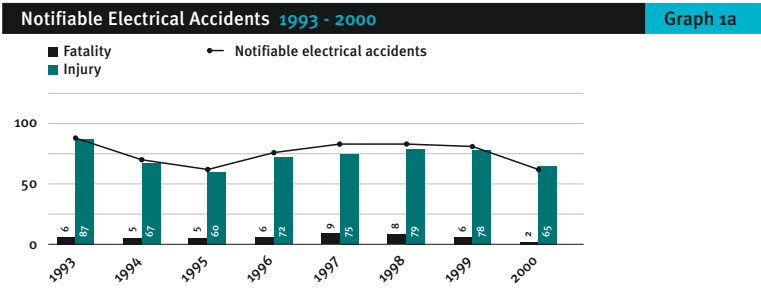
Reporting Accidents

There is always a case for greater reliability and improved accuracy of information arriving at the ESS. We have found that the more serious the accident, the higher the chance of notification and the more accurate the information is. There are a number of reasons for this, including the greater likelihood of publicity for more serious accidents.

Unfortunately, some types of electrical or gas incident are not easy to discover until they create a fatal or very serious accident, such as carbon monoxide

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poisoning or significant property damage. It is in the interests of all parties - industry, consumers, and the public - for full and early reporting of accidents. By this means, the ESS can monitor practices and behaviours, and take early action on improving safety before death, injury, or serious loss occurs.

ESS receives more early and accurate information from the energy industry (including licensed workers) than from the general public - except for LPG accidents. In all areas we urge those involved in electrical or gas accidents to redouble efforts so that a truly comprehensive account can be compiled of New Zealand’s energy safety record.

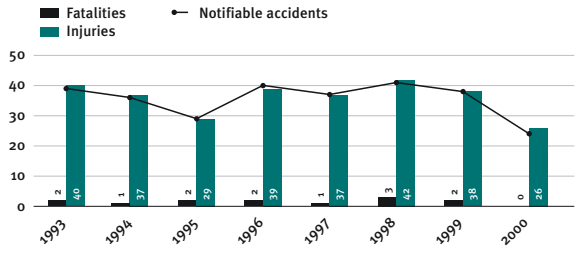
Electrical Accidents (Graphs 1a and 1b)

- Graph 1a has information on all notifiable electrical accidents and graph 1b has information on electrically caused fires.
- The New Zealand Fire Service has supplied data on electrically caused fires (graph 1b), although fire data for the year 2000 are not shown in this graph.

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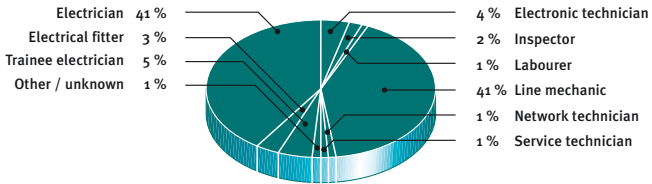
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Notifiable Electrical Accidents to Electrical Workers 1993 - 2000 Graph 2



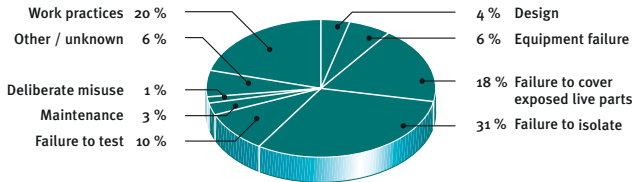
Notifiable Electrical Accidents to Electrical Workers 1993 - 2000 Graph 3

by worker category

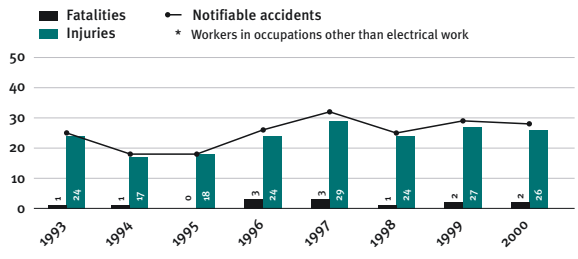


Notifiable Electrical Accidents to Electrical Workers 1993 - 2000 Graph 4

by causal factor



Notifiable Electrical Accidents to People In Other Occupations* 1993 - 2000 Graph 5



- There appears to be no statistical change in electrical fires or electric shock accidents on an absolute basis. However, the results have not been adjusted for changes in power usage or use of appliances.
- There is no statistical trend in the number of fatal accidents to electrical workers, other occupations, and the general public over the eight years from 1993 to 2000.

Electrical Workers (Graphs 2, 3 and 4)

- There is no significant change in the number of accidents (and injuries) occurring to electrical workers over the last eight years, but there is a significant change in the type of injury received by workers. It appears that more electrical workers are receiving burn injuries, probably as a result of attempting to work live. Graph 2 shows the numbers of accidents, fatalities, and injuries to electrical workers from 1993 to 2000.
- Over eighty percent of electrical workers' accidents happen to either electricians (41%) or line mechanics (41%). Line mechanics had about six percent less accidents than electricians, but the number of fatalities and injuries to both were the same for the last eight years. Graph 3 shows the percentages of notifiable electrical accidents to different categories of electrical workers from 1993 to 2000.
- The immediate causes of up to 80% of accidents to electrical workers were unsafe work practices, failure to test before work is undertaken, failure to isolate live lines, and failure to use adequate barriers, or cover-up live parts. About one third of accidents involving line mechanics were due to not following work practices and a quarter were due to failure to cover exposed live parts. For electricians, about half of the accidents were due to failure to isolate, and one seventh due to failure to cover exposed live parts. Graph 4 shows the causal factors for notifiable electrical accidents to electrical workers from 1993 to 2000.

People in Other Occupations (Graphs 5, 6 and 7)

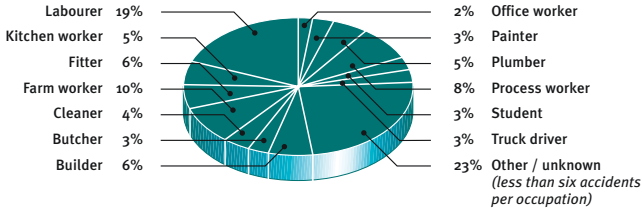
- Over the 1993 to 2000 period, the numbers of electrical accidents to workers in occupations other than electrical work rose slowly. Graph 5 shows the numbers of electrical accidents, fatalities and injuries from 1993 to 2000 to workers in other occupations.

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Notifiable Electrical Accidents to People In Other Occupations* 1993 - 2000 **Graph 6**

by occupation

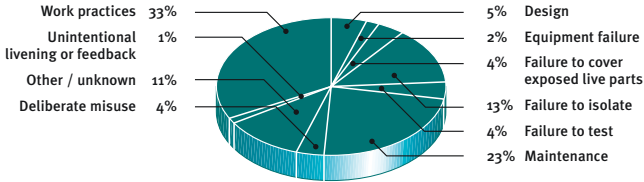
* Workers in occupations other than electrical work



Notifiable Electrical Accidents to People In Other Occupations* 1993 - 2000 **Graph 7**

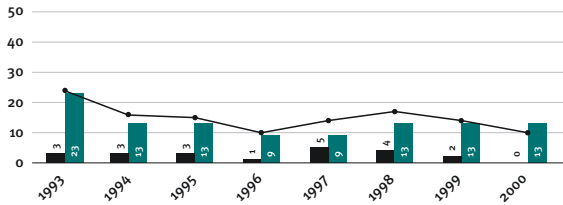
by causal factor

* Workers in occupations other than electrical work



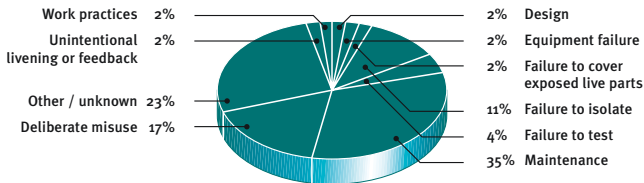
Notifiable Electrical Accidents – to the General Public 1993 - 2000 **Graph 8**

■ Fatalities ● Notifiable accidents
■ Injuries



Notifiable Electrical Accidents – to the General Public 1993 - 2000 **Graph 9**

by causal factor



- Labourers (19%), farm workers (10%), process workers (8%), builders and fitters (6%), plumbers and kitchen workers (5% each) are the most at-risk groups. Graph 6 shows the percentages of notifiable electrical accidents to different categories of workers from 1993 to 2000.
- More than half the accidents were due to unsafe work practices, failure to isolate live electrical parts, failure to cover exposed live parts, or failure to test. About a quarter were caused by a lack of maintenance of electrical appliances and fittings. Graph 7 shows the causal factors for notifiable electrical accidents to workers in occupations other than electrical work from 1993 to 2000.

General Public (Graphs 8 and 9)

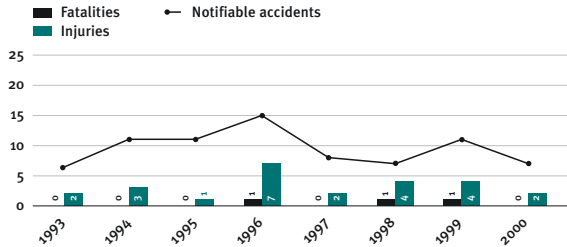
- Over the eight years of data collection, the number of electrical injuries to the general public indicates a small decrease. This is due to a higher number of injuries in 1993. The last seven years data shows no statistical change in the level of injury to the general public. Graph 8 shows the numbers of electrical accidents, fatalities and injuries from 1993 to 2000 to the general public.
- One third of the electrical accidents to the general public were caused by a lack of maintenance of electrical appliances, wiring and fittings. Deliberate actions or the misuse of electrical appliances and fittings caused one sixth of the accidents to the general public. Graph 9 shows the causal factors for notifiable electrical accidents to the general public from 1993 to 2000.

Gas Accidents (Graphs 10, 11, 12 and 13)

- There were 110 notifiable LPG incidents from 1993 to 2000 and 71 for natural gas. Graph 10 shows the numbers of notifiable natural gas accidents, fatalities and injuries from 1993 to 2000.
- There was no statistical change in number of notifiable natural gas accident fatalities or injuries in the period from 1993 to 2000. There were three natural gas fatal accidents (a total of three deaths) in the eight years. There were no fatal accidents during 2000 but, in both 1998 and 1999 there was one fatal accident. During the eight year period, there were 19 accidents that resulted in 21 people being injured.

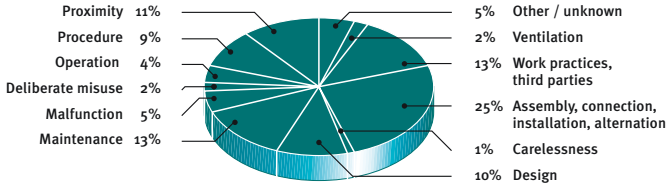
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Notifiable Natural Gas Accidents 1993 - 2000 Graph 10

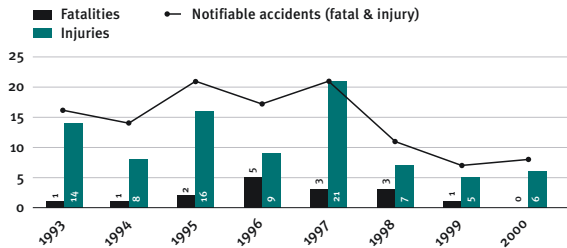


Notifiable Natural Gas Accidents 1993 - 2000 Graph 11

by causal factor

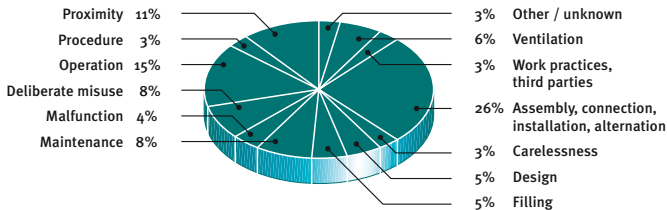


Notifiable LPG Accidents 1993 - 2000 Graph 12



Notifiable LPG Accidents 1993 - 2000 Graph 13

by causal factor



- Graph 11 shows the causal factors for notifiable natural gas accidents, fatalities and injuries from 1993 to 2000. A quarter of the natural gas accidents could have been avoided if appropriate care was taken during installation (assembly, connection and installation) of the gas system. Thirteen percent of the accidents could have been avoided by maintaining gas appliances and supply systems. The same number of accidents could have been avoided by good working practices by gas workers and other utility supply (or contract) workers.
- Graph 12 shows the numbers of notifiable LPG accidents, fatalities, and injuries from 1993 to 2000. There were 13 fatal LPG accidents (a total of 16 deaths) in the period from 1993 to 2000. Six fatal accidents occurred in buildings and three in caravans. Another four accidents occurred in a car, van or truck, or outside.
- Four of the 13 fatal LPG accidents, involved appliances that produced high levels of carbon monoxide which led to seven fatalities. Another four accidents, resulting in four fatalities, were due to substance abuse. The remaining five fatalities were caused by fire/explosion (in five separate accidents).
- There were 55 LPG injury accidents that injured 80 people in the same period. However, for 1999 and 2000 there was a significant reduction in the number of notifiable incidents and injury-causing incidents (and number of people injured).
- Graph 13 shows the causal factors for notifiable LPG accidents, fatalities and injuries from 1993 to 2000. About a quarter of the LPG notifiable accidents occurred due to inappropriate installation (assembly, connections and installation). Fifteen percent of accidents could have been eliminated if the appliance and fittings were operated correctly. Eleven percent of LPG accidents could have been prevented by keeping flammable material away from appliances. Eight percent could have been avoided by proper maintenance of appliances and fittings.

Plans for the Year 2001/02

The Energy Safety Service is committed to safeguarding people and property from the dangers of electricity and gas. We oversee the safety, supply quality, and measurement requirements of the Electricity Act 1992 and the Gas Act 1992 by:

- Developing and applying internationally accepted standards to New Zealand's systems of electricity and gas safety, supply quality and measurement.
- Networking with other interested national and international organisations.
- Publicising energy safety, and advising consumers and business about the safety of energy products and services.
- Ensuring gas and electrical appliances and fittings are safe for use in New Zealand through industry surveillance and product monitoring.
- Undertaking investigations, corrective action and enforcement.

As well as our ongoing work, some of the specific activities that we will be undertaking in the year 2001/02 to achieve our vision of 'safe energy – safe people' are:

- Implementing the Government's decisions on clarifying the responsibilities for workplace safety, and product and public safety in the electricity and gas areas, through the *EnergySafe* programme.
- Working with the electrical industry to jointly develop a strategic approach to safety, including an agreed plan for action.
- Working with the gas industry to develop a consumer education programme under the 'Delivering Gas Delivering Safety' Action Plan. This will include the production, promotion, and distribution of gas safety pamphlets and posters and LPG swing tags with safety messages.
- Producing, promoting, and distributing a booklet on electrical safety aimed at the householder.
- Introducing new declaration schemes for gas and electrical appliances.
- Reviewing and updating a wide range of electrical and gas standards.

- Developing and implementing a communications strategy that provides Maori with relevant and timely information on electrical and gas safety.
- Reviewing (and revoking where necessary) Codes of Practice for electrical and gas safety.
- Surveying new installations to assess workmanship, competence and compliance levels.
- Auditing a number of early childhood centres to assess their compliance with electrical and gas safety provisions.
- Surveying domestic gas installations.
- Auditing rural community electrical safety, and publishing results and recommendations.
- Surveying cable communications (workmanship, competence and safety) to assess compliance levels.
- Surveying high voltage installations and works to assess compliance.

Part 1**Electrical Workers****Number:** 98/003**Voltage:** 11,000**Result:** Fatal electric shock**Location:** Works

A trainee line mechanic was electrocuted when a wire reinforced extension ladder he was carrying, contacted an 11,000 volt overhead line.

The trainee was clearing the site after assisting a line mechanic to carry out earth testing on a single wire earth return system.

He was carrying the extension ladder up a steep bank, and it is believed he may have lost his grip of the ladder and made a grab for it as the ladder fell towards the line. The ladder fell into the line and the line made contact with the wire reinforced stile of the ladder.

As a result of this accident, the company was looking at using ladders with non exposed reinforcing in the stiles, or fibre-glass ladders.

Number: 98/006

Voltage: 400
Result: Burns
Location: Commercial

An electrician was working on a switchboard disconnecting cables. He removed a neutral cable and the bare end contacted the live side of a fuse carrier causing a short circuit. He received burns to his hand as a result.

Number: 98/010

Voltage: 400
Result: Burns
Location: Industrial

A trainee electrician was measuring current on cables supplying ovens. He was using a clip-on ammeter to take the measurements and as he moved the conductors to get the ammeter over the conductors, a flashover occurred. He received burns to his hands and arms.

The cables he was taking measurements from, were contained in an aluminium trunking that had isolation switches mounted on either side. Cable holes through the trunking were not bushed, which left a sharp edge for the cables to contact as they were moved causing the insulation to be cut. As the cables were moved, in order to get the clip on ammeter positioned, the sharp edge of the trunking pierced the insulation of one of the cables causing a flashover.

The isolation switches mounted on the

trunking were of plastic construction and had a slightly smaller cable hole than the hole in the trunking.

The circuit involved in the accident did not have local protection but was controlled by a triple-pole isolator in the switchboard. This caused the 160 amp main fuse to blow at the incoming supply.

Other circuits were protected by 63 amp triple-pole circuit breakers.

The installation was approximately one year old and the switchboard did not have marking labels identifying the circuits.

An investigation revealed that the installer had mistaken the isolating switches for circuit breakers during installation.

Number: 98/012

Voltage: 400
Result: Electric shock
Location: Industrial

An electrician was working on an old three-phase switchboard. He had drilled a hole in the base of the switchboard and was attempting to fit a plastic bush in the hole. As he tried to screw the two halves of the bush together the top of his hand touched the live busbar supplying fuses.

The switchboard should have been isolated or the busbar covered with insulating material.

Number: 98/015

Voltage: 11,000
Result: Electric shock
Location: Works

While a tree trimming crew was trimming trees, a branch which had been cut, was not adequately controlled. It simultaneously contacted a live 11,000 volt line and the boom of the elevated work platform (EWP).

A worker on the ground was in contact with the EWP and received an electric shock.

It should be stressed that while work from an EWP is in progress near live lines, everyone on the ground should be kept clear of the equipment involved. And, when trimming trees near overhead lines, the cuttings should be kept small enough to prevent contact between live conductors and other items.

Number: 98/017

Voltage: 11,000
Result: Electric shock / fall
Location: Works

A line mechanic was investigating a fault on an 11,000 volt line. Earlier in the day it had been reported that a small grass fire had been seen near the base of a power pole where the fault was believed to be.

The line mechanic located a faulty jumper lead on the pole near where the fire had been. He called for assistance and prepared to carry out replacement of the jumper lead. In preparation for the work

he isolated the line, positioned a ladder at the pole and attached temporary earths to the neutral conductor.

The line mechanic then proceeded to test and earth the 11,000 volt line. At this time he was positioned below the 400 volt lines.

He then moved higher on the ladder to attach the temporary earths and in doing so removed his safety belt from around the pole. At this point his forearm contacted the 400 volt conductors and he received a shock and fell to the ground.

Investigations following the accident revealed that the 11,000 volt supply did not isolate the 400 volt supply. The 400 volt supply was fed from a different transformer even though it was on the same pole.

The live line tester used for the 11,000 and 400 volt test contained a switch for the two voltage settings. It is believed that the switch may have been set in the higher voltage range when the test was carried out on the 400 volt lines.

The line mechanic did not have his arms covered and was not wearing insulating gloves.

Number: 98/020

Voltage: 3,300
Result: Electric shock and burns
Location: Industrial

An electrician received an electric shock and burns whilst carrying out maintenance work which involved testing the 3,300 volt cables at an industrial plant. The cables had been isolated, but the 3,300 voltage transformers had been left in circuit. The electrician opened a VT cubicle on the switchboard and received an electric shock and burns when he reached in to remove the primary fuses on the voltage transformer. On receiving the shock, the electrician fell from the short stepladder he was on to the switchroom floor. He had stopped breathing and required CPR. He was taken to hospital and discharged the next day.

The electrician had failed to identify the correct set of voltage transformers. The VT cubicle opened contained energised equipment. In addition, the electrician had failed to test and to wear insulating gloves. It was fortunate that competent assistance was immediately to hand and that the fault level on the system was reduced through the use of a neutral earthing resistor on the supply transformer.

Number: 98/023

Voltage: N/A
Result: Fall
Location: Works

A line mechanic was working on a ladder attempting to raise an insulator with a rope. As he leaned back in his safety harness, his belt came undone and he fell to the ground, causing bruising and a sprain injury.

When the clip and pole strap were examined they were found to be in good condition, it was concluded that the line mechanic may not have completely engaged the clip.

The company had a safety training day and reminded staff of the need to visually check that the pole strap clip is fully engaged before putting weight on the belt.

Number: 98/024

Voltage: 400
Result: Burns
Location: Works

A line mechanic and an electrician both suffered flash burns to the face as a result of a phase to phase short circuit while working on a distribution box.

The workers were replacing a jumper between the incoming red phase cable terminal and the red phase of a 100 amp triple pole fuse unit. The fuse carriers were in a triple-pole block with the supply terminals separated by insulated partitions but exposed at the front. The work was carried out live by removing the fuses from the triple-pole unit, as there were several businesses fed from this distribution box in the area.

The line mechanic connected the jumper to the live supply stud, which meant that the other end of the jumper was live, and was checking the jumper for length against the triple-pole fuse unit when the cable lug contacted the yellow phase causing a short circuit flashover.

The two workers received flash burns to their faces; the line mechanic taking the full force of the ensuing arc.

Number: 98/029

Voltage: 100 DC
Result: Burns
Location: Industrial

A technician was carrying out maintenance work on a bank of lead acid batteries. He noticed water on top of one of the batteries and tilted the battery to drain the water and in doing so the battery terminals made contact with another battery causing a flashover. The flashover caused one of the batteries to explode rupturing the battery case.

The technician's face and upper body was doused with acid from the exploding battery. Nearby workers washed him down with water.

After the accident, the battery terminals were covered with insulated rubber boots to prevent any similar accidents.

Number: 98/031

Voltage: 400
Result: Burns
Location: Works

An electrician was attempting to fit a plastic insulating barrier to the rear of a live switch which was mounted on a control panel. The barrier was difficult to fit from the rear so the electrician decided to work from inside the live switch. He removed the door from the live switch and reached inside in an attempt to position the barrier. He made contact with the live phase terminals of the switch and he received an electric shock and burns.

The control panel was still at the commissioning stage and could have been isolated. It had only recently been livened and tagged as being live.

Number: 98/033

Voltage: 230
Result: Burns
Location: Commercial

An electrical service technician was working on a chiller control panel, when the pliers he was using slipped and fell onto the exposed live contacts of the main isolating switch.

The technician received flash burns to his face and hands.

Number: 98/034

Voltage: 400
Result: Burns
Location: Commercial

An electrician was carrying out work on a distribution board when a flashover occurred causing burns to his hands and arms.

The work involved dividing up the services for various clients for separate metering.

The electrician had isolated the supply for the distribution board at a fuse switch which had the cover removed.

At the time of the accident there were several cables hanging loose from one of the distribution panels. It was believed that a neutral conductor fell into the main switch contacting a live phase terminal resulting in a flashover.

The electrician was wearing overalls that were a mixture of cotton and polymer. This fabric melted onto his skin causing additional burns.

Number: 98/038

Voltage: 400
Result: Burns
Location: Works

Whilst an electrician was working in a 400 volt switchgear chamber, a hand file resting on the bottom of the chamber was bumped and caused the shutter covering the busbars to be lifted. The file then entered the busbar chamber sufficiently to contact the live busbar causing an earth fault between the busbar and the metal side of the chamber. The ensuing flash ionised the air in the busbar chamber and caused the other two phases to fault as well, before the protection operated on earth fault.

The design of the switchgear was such that the shutter had to be lifted on both sides to fully expose the busbar but, by lifting one side of the shutter, a small gap was created, sufficient for the hand file to be pushed into.

The manufacturer of the switchgear will be notifying all present and future users of this type of switchgear of the possibility of this happening if tools are allowed to be placed in the chamber.

Number: 98/039

Voltage: 11,000
Result: Electric shock
Location: Works

A line mechanic was trying to place his safety belt around a pole. He contacted the live top of an 11,000 volt drop out fuse. This caused him to fall off the ladder and onto a metal road barrier. This resulted in internal injuries and broken bones.

He had carried conductors up the ladder instead of using a rope. He was therefore rushing to attach his safety belt so that he would be able to pull the conductors off the road they were crossing.

Number: 98/040

Voltage: 400
Result: Burns
Location: Works

A trainee line mechanic was told to fit fuse carriers to a fuse pillarbox. When he opened the pillar box he found that the fuse bases had not been fitted, he proceeded to test the unterminated cables with a voltage tester before connecting the fuse bases.

He touched one of the cables with the voltage detector probe and accidentally shorted it across two phases. The resultant flashover caused him to receive burns to his hand.

The trainee was not authorised to carry out work on live cables.

Number: 98/042

Voltage: 11,000
Result: Electric shock
Location: Works

Two line mechanics were replacing temporary line breaks in an 11,000 volt overhead line. The line mechanics were using a truck mounted crane with a personnel bucket to reach the lines. The line mechanic in the bucket thought he received a tingle as the bucket touched the line and the line mechanic on the ground received a shock from the truck he was leaning on at the time.

The line mechanics stated that they misunderstood the instructions and presumed that the line had been isolated.

They failed to test to ensure that the lines were isolated and did not apply temporary earths to the line prior to commencing work.

Number: 98/044

Voltage: N/A
Result: Broken arm
Location: Works

A line mechanic received a broken arm and dislocated shoulder when his safety belt broke. The cause for the failure was not determined. The belt had been routinely inspected in accordance with the requirements of the regulations. All other belts were checked by the company but no defects were detected.

Number: 98/045

Voltage: 11,000
Result: Burns
Location: Works

During a paralleling operation of two 11,000 volt feeders, a line mechanic was splashed with oil from a circuit breaker which failed as he was closing it.

The circuit breaker appeared to be in good condition until it was operated. The line mechanic was sprayed with oil and taken to hospital to have his eyes flushed.

The switchgear was examined and an insulated rod, which is part of the operating mechanism, appears to have flashed over causing the switch to fault. The oil was also found to be contaminated indicating that the problem had been there for some time.

The company has since instigated a policy of periodic testing of the oil in this type of circuit breaker.

Number: 98/046

Voltage: 230
Result: Electric shock
Location: Commercial

A trainee electrician was working on an isolated submain when he received an electric shock. An investigation revealed that, some time in the past, a neutral circuit had failed and a new wire had been run to a junction box with neutrals connected to the isolated submain that the trainee was working on. Consequently he received an electric shock when the neutral circuit was in operation.

The installation was a number of years old and it was difficult to determine who might have connected the neutral to the wrong submain.

Number: 98/047

Voltage: 400
Result: Burns
Location: Commercial

An electrician received burns to his face as a result of a short circuit in a main switch. The main switch operating mechanism had failed and dropped down onto the live busbars as the switch was operated.

The switch had been in operation for some years and showed no visible signs of failure.

Other main switches on the switchboard were checked and found to be in need of replacement.

Number: 98/055

Voltage: 400
Result: Burns
Location: Works

A line mechanic was attempting to put a live low voltage jumper cable back into a service main fuse when the bare end contacted a neutral connection.

The line mechanic suffered a burn to his hand.

At the time of the accident the line mechanic was not wearing insulating gloves nor was he paying close attention to what he was doing.

Number: 98/056

Voltage: 400
Result: Burns
Location: Works

A line mechanic was connecting a live low voltage service main to a three-phase fuse holder in an underground fuse pillar. As he attempted to tighten a cable fixing screw, his screwdriver slipped and shorted across a second phase. The resulting flashover caused the hot metal to splash into the line mechanic's face. He suffered minor burns to his hands and face.

The fuse base was an older type that did not have barriers separating the terminals. This allowed the screwdriver to come into contact with other phases.

The company has changed its procedures so that pillar-box connections are made prior to making the cable live.

Number: 98/059

Voltage: 400
Result: Electric shock
Location: Commercial

An electrician received an electric shock when he was connecting mains cables into a junction box.

A new main switchboard and mains cables had been installed in the building. The line company had tested the mains cables and identified the neutral conductor. The cables were terminated at the transformer and then the mains were livened. The electrician working on the cables in the junction box received a shock from the earthed metal box.

An investigation of the cables revealed that one of the phase conductors had been damaged in the trench, and because of the wet conditions, was giving a low resistance reading. It was assumed when tests were carried out that this was the neutral conductor. The actual neutral conductor was then connected to one of the phases, resulting in the main earth and all the metal earthed parts in the switchroom becoming live. As the main earth impedance was high there was insufficient current to operate the main fuse.

Number: 98/060

Voltage: 11,000
Result: Burns
Location: Works

Four line mechanics were burned with hot oil when an 11,000 volt switch exploded in a ground mounted substation shortly after a transformer change. The substation had earlier been damaged by a motor vehicle.

Number: 98/061

Voltage: 400
Result: Burns
Location: Commercial

An electrician received burns to his hands and face as a result of a phase to phase flashover. He was attempting to remove a three phase circuit breaker and had released the fixing screws, when the circuit breaker dropped down onto live busbars causing a short circuit. The ensuing flashover caused him to suffer burns.

Number: 98/063

Voltage: 11,000
Result: Fatal
Location: Works

Repairs were being made to a cross-arm on an 11,000 volt line when a line mechanic is understood to have fallen whilst climbing a ladder, receiving fatal injuries. The accident occurred late in the evening and the weather conditions at the time were wet and windy. The site did not have vehicle access and lighting conditions were poor. The pole was located at one side of a gully and was supporting a long span.

Number: 98/067

Voltage: 400
Result: Burns
Location: Works

A line mechanic suffered burns to his hands and face as he attempted to terminate a cable in a ground mounted pillar box.

The cable had been installed some time prior to the accident and was left live and capped.

A voltage detector was used to establish if the cable was live or dead. One staff member thought that the detector indicated that the cable was live, however another staff member told the victim that the cable was dead as it was not joined to the supply ring.

The line mechanic continued to terminate the cable without further testing, and when he went to cut the cable, a flashover occurred.

The company's procedure was to test prior to working to ensure safety. All staff had test equipment on site but this was not used.

Number: 98/068

Voltage: 400
Result: Burns
Location: Industrial

An electrician was removing a miniature circuit breaker (MCB) from a control panel. He requested a shutdown of the control panel so that he could remove the MCB, but due to production pressure, he decided to remove the MCB live.

He removed metal panel doors, and insulated covers from the control panel in order to get to the terminal screws for the MCB. He disconnected the busbar connections to the MCB and then proceeded to remove the fixing screws holding the MCB, at this point a flashover occurred.

On investigation it was found that the MCB had dropped and made contact with the two phases of the busbars. The ensuing flashover caused the 1,000 amp protection to operate.

The company policy was not to work on live equipment if it could possibly be avoided. If live equipment was to be worked on it was to be done accompanied by a competent assistant and with the appropriate work practices.

Number: 98/070

Voltage: 230
Result: Electric shock
Location: Commercial

An electrician was installing cables in a commercial building when his drill made contact and damaged a TPS cable in the wall cavity. He received a hand-to-hand electric shock from the drill and earthed fire sprinkler pipe. This caused him to fall from the ladder.

Number: 98/071

Voltage: 400
Result: Burns
Location: Works

A line mechanic received burns to his face and neck whilst carrying out work in a live distribution pillar. He was using a socket spanner to tighten a terminal stud nut when he shorted live parts to the earthed metal enclose of the pillar. Staff have now been issued with insulated tools for this work.

Number: 98/073

Voltage: 400
Result: Burns
Location: Industrial

An electrician removed the rear cover from a motor control panel. He assumed that the panel cover gave access to a cable duct and that there were no exposed live parts inside. As he removed the cover, it slipped and made contact with live terminals inside the panel. The contact resulted in a phase to earth fault and the resulting flashover caused him to receive burns to his hand.

Number: 98/074

Voltage: N/A
Result: Fall
Location: Works

A line mechanic fell from a ladder as he was attempting to fit a pole strap for his safety belt around the pole. He received spinal injuries.

Number: 98/076

Voltage: 230
Result: Fatal electric shock
Location: Domestic

An electrician was installing a power circuit for a gas hot water boiler. The boiler was mounted on an external wall of the house. The electrician decided to loop a power circuit from a socket outlet in the lounge of the house that was close to the outside wall. He removed the socket outlet fixing screws, and pushed the socket outlet to one side in order to drill a hole through the floor plate for the new circuit. Because the flush box for the socket outlet was fitted well back from the plasterboard he was able to get his drill down to the floor plate without removing the box, or disconnecting the wires. He left the socket outlet live in order to minimise the loss of power to other socket outlets in the house.

He drilled through the floor plate, pushed a short length of fencing wire through the hole, and attached the new circuit cable to the fence wire. He went under the house and proceeded to pull the new cable down under the floor. As he was pulling on the fencing wire, the bent over end attached to the new circuit, caught one of the existing live circuits and pierced the phase conductor causing the fencing wire to become live resulting in a fatal electric shock.

The power circuit was protected by a 16 amp miniature circuit breaker and did not trip due to insufficient current.

Events summary: The installation was approximately 15 years old and appeared to be in good condition. A commercially manufactured consumer unit containing miniature circuit breakers protected the circuits.

It is presumed that the electrician was aware that the socket outlet was live, but made the decision not to isolate the circuit. It is common practice to loop circuits from existing socket outlets, and in a lot of cases it necessitates the removal of the flush box in order to gain sufficient room to drill or get to the new circuit. This would also mean that the socket outlet would have to be isolated and disconnected.

In this case there was sufficient room to alleviate the need to remove the flush box and allow for the socket outlet to remain connected and live.

There have been a number of accidents involving electrical workers who fail to isolate circuits or fail to cover up live parts.

Number: 98/077

Voltage: N/A
Result: Fall
Location: Works

A pole gave way above ground level while a ladder was being climbed prior to tying off at the top. The ladder slipped around the pole and a line mechanic fell five metres to the ground fracturing his wrist, elbow, foot and vertebrae.

Number: 98/078

Voltage: 400
Result: Electric shock
Location: Works

A line mechanic was testing an 11,000 / 400 volt transformer in a workshop when he tripped and accidentally made contact with live 400 volt terminals.

Number: 98/080

Voltage: 11,000
Result: Electric shock and burns
Location: Works

A line mechanic received serious burns when he made contact with an energised line. Due to an operating error, the line had not been isolated. No visible earths were installed at the work site. The line mechanic was to unbind the line from the insulators in order to change over the line to a new pole when the accident occurred. Work was being carried out with the line mechanic suspended in his safety belt attached to a truck mounted crane type-lifting device.

Number: 98/081

Voltage: 230
Result: Electric shock
Location: Domestic

During the rewiring of a house, an electrician received an electric shock. The electrician was removing old wiring from metal conduit. He tested the circuit and did not get any indication of voltage. He

began to pull the cables out of the conduit and as the bare end touched his hand he received an electric shock.

An investigation revealed that some days earlier, another electrician had removed a light fitting in another room and had connected the bare wires into a connector. One of the neutral wires had come loose so that when the circuit was tested there was no neutral connection and the electrician thought that the circuit was dead.

Number: 98/082

Voltage: 230
Result: Electric shock
Location: Industrial

An electrician was rewiring lighting fittings. He removed the circuit fuse and proceeded to disconnect the lighting fitting. When he separated the neutral conductors, he received an electric shock. An investigation revealed that other lighting circuits were wired using the same neutral which caused a back-feed to liven the neutral causing him to receive an electric shock.

The installation was over 15 years old and it was impossible to identify who carried out the installation.

The company is carrying out tests on all lighting circuits to establish if other circuits have the same problem. Once the problems are identified the circuits will be rewired.

Number: 98/083

Voltage: 230
Result: Fall
Location: Commercial

Whilst using an extension bit to drill in a wall cavity to install data cabling, an electrician received an electric shock when the tip of the drill penetrated an existing live 230 volt cable. He was working from a ladder and was also holding onto a water pipe when he received the shock, which caused him to fall from the ladder. The electrician was hospitalised overnight for observation. He suffered bruising to the back.

Number: 98/084

Voltage: 11,000
Result: Burns
Location: Works

A pole broke as a line mechanic was removing conductors from the cross arm causing the line mechanic, who was attached to it with his pole strap, to fall suffering fractures to his wrist, elbow, heel and vertebrae. The pole was checked for safety prior to climbing.

Number: 99/001

Voltage: 400
Result: Burns
Location: Commercial

Two electricians were working on a distribution switchboard. One electrician was attempting to fit a circuit breaker and the other electrician was taking notes for the connection of current transformers. As the first electrician was preparing to fit a 100 amp circuit breaker, by removing the insulated caps from the three-phase busbar assembly, either a phase to phase or a phase to earth short circuit occurred. The resulting flashover caused both electricians to receive burns to the face, forearms, and hands.

The distribution switchboard being worked on was an essential supply board. The electrician was moving cables from the non-essential board to the essential board. The switchboard was extensively damaged.

Number: 99/002

Voltage: 400
Result: Burns
Location: Commercial

An electrician was working on a live switchboard and was attempting to tighten an earth cable stud. He was using an adjustable spanner, which slipped and contacted a live cable. The cable was covered in heat-shrink sleeving, however the force of the spanner contact punctured the insulation of the sleeving causing a flashover. He received burns to his hand.

Number: 99/005

Voltage: 230

Result: Burns

Location: Works

A line mechanic was carrying out maintenance work on a nine metre concrete streetlight pole. The task was to replace a street lighting relay. The line mechanic was working in an elevated work platform and was in the process of connecting a neutral wire when the spanner he was using contacted the live phase conductor causing a flashover, causing him to receive burns.

Number: 99/006

Voltage: 400

Result: Electric shock

Location: Works

An electrician was sent to investigate an electrical outage following a report that power lines at a road crossing had been brought down.

On arrival at the site the electrician found that the three phase lines were broken and one phase was wrapped around the neutral conductor which was still in place.

In order to isolate the supply at the pole-mounted transformer, he had to climb the pole. As he reached the bottom of the cross arm he grabbed the cross arm brace and received an electric shock.

He came down from the pole put on his rubber insulating gloves climbed back up the pole and isolated the supply.

Tests were carried out on the pole following the accident that revealed there was no voltage present at the cross arm.

Number: 99/010

Voltage: 300

Result: Burns

Location: Domestic

An electrical inspector was rewiring a load control ripple relay and was moving wires in the back of the switchboard. He moved the mains cables and caused a phase to phase short circuit. He received burns to his hand.

Number: 99/011

Voltage: 11,000

Result: Burns

Location: Works

A line mechanic received burns to his upper body when he was carrying out live line glove and barrier work on 11,000 volt lines. The glove and barrier team was working from an elevated work platform and were replacing insulators. They had secured the centre phase with a wire strainer. The line mechanic was standing clear of the contact area and was getting ready to remove the old insulator when it appears that he fell onto the lines and caused two conductors to clash. This caused him to suffer third degree burns to his chest.

Number: 99/012

Voltage: 230
Result: Electric shock
Location: Commercial

An electrician was installing cabling in a false ceiling, and he had removed a number of ceiling tiles in order to gain access to the space above. One of the ceiling tiles had a ceiling rose attached which became dislodged and was dangling from its cable. The electrician put his hand on the ceiling rose, which still had its cover in place, in order to push it back into position. One of the mounting screws was live and he received an electric shock. The mounting screw had popped back inside the ceiling rose and came into contact with a live terminal. It appears that there are two looping terminals in this type of ceiling rose which are too close to the fixing screw holes and if a screw is pushed back it can come into contact with a live terminal.

This issue was taken up with the manufacturer of this accessory.

Number: 99/013

Voltage: 400
Result: Fatal
Location: Domestic

A trainee electrician was electrocuted when he attempted to join a live three phase neutral screen cable to the underground mains he had installed for a new domestic residence. The apprentice failed to identify that one phase of the cable was live and was feeding another two properties down the right-of-way.

Number: 99/014

Voltage: 400
Result: Burns
Location: Commercial

An electrician and a trainee electrician were given the job of removing a mains cable from a switchboard. The electrician disconnected the three-phase connections from the circuit breaker and the trainee was told to cut off the neutral and earth cable lugs. As the trainee attempted to cut off the cable lugs, the cable cutter made contact with the live busbar and the earthed metal of the switchboard. This resulted in a flashover causing a 1000 amp circuit breaker to trip.

The trainee received flash burns to his eyes, forearm and fingers.

Number: 99/015

Voltage: 400
Result: Burns
Location: Commercial

A 70 amp three pole main switch had been turned off and the cover was being removed when the switch flashed over between phases. Dampness was evident inside the cover and it would appear that moisture had entered either along the mains conductor or condensation due to the environment in which the switchboard was located.

Number: 99/016

Voltage: 11,000
Result: Fatal
Location: Works

A line mechanic was working on the replacement of a hardwood timber pole with a concrete pole and changing cross arms on the poles. The work involved changing over the power lines, which consisted of an 11,000 volt line and a 400 volt line.

The work wasn't complete and a decision was made to temporarily re-energise the lines, as the work could not be completed by the authorisation deadline. The all-clear was given and the earth sticks were removed. When the lines were energised there was a flash and sparks, and the line mechanic received an electric shock and ended up slumped in his safety belt. The other workers lowered him and CPR was

applied until emergency services arrived. The line mechanic died on the way to the hospital. Another line mechanic on the pole also received an electric shock when the line was energised.

Number: 99/020

Voltage: 400
Result: Burns
Location: Works

A contractor from a cable television company damaged a 400 volt cable while installing a metal termination pedestal and received burns to his face. The pedestal was being hammered in to the ground when the supporting spikes damaged a live cable that the worker had not identified.

Number: 99/021

Voltage: 400
Result: Burns
Location: Industrial

An electrician was working on a motor control centre (MCC) that had been shut down and isolated for maintenance. The electrician's job was to fit fuse bases to a set of live terminals supplied from a bus bar chamber in the MCC. In order to fit the fuses, he had to remove a plastic shroud which insulated the terminals and carry out a modification to allow the fuses to fit. When he attempted to refit the shroud, a flashover occurred. As a result of the flashover, he received burns to his hands. The MCC was extensively damaged.

Number: 99/025

Voltage: 11,000

Result: Burns

Location: Works

An electrician was sent to find a fault on an 11,000 volt underground cable. The cable supplied power to a business district and had faulted late one evening. He was isolating sections of the cable with the help of the network controller, who was giving instructions on which switches to close in order to locate the area of the fault.

The electrician was closing an oil-immersed switch onto the cable when the switch exploded. The cast iron top on the switch cover fractured causing flaming oil to erupt and engulf the substation. The electrician received burns as he ran to the exit door.

Number: 99/026

Voltage: 230

Result: Burns

Location: Industrial

An electrician was carrying out maintenance on an electric crane and had cleaned the contacts of a hoist drum controller using a can of solvent-based contact cleaner. After spraying, the contactors were operated a number of times in the unenergised position.

The covers were replaced on the drum contactors, the power was turned on, and the main hoist lowered to allow work to be carried out at floor level. When the controller was moved back to the off position, the spark from opening the contacts ignited the fumes from the contact cleaner.

The electrician suffered first degree burns to his arm.

The event was caused by using a flammable contact cleaner and not allowing the liquid to evaporate and the fumes to dissipate before refitting the covers and operating the controls.

Number: 99/029

Voltage: 400
Result: Burns
Location: Industrial

An electrician received burns to his hands when he attempted to remove a circuit breaker from an energised motor control centre. Whilst removing the circuit breaker one of the phase leads used to connect onto the busbar shorted to the metal frame.

Number: 99/031

Voltage: 400
Result: Burns
Location: Commercial

An electrician was disconnecting and reconnecting cables connected to a contactor in a switchboard, so that they could be passed through current transformers. The cables that he was working on were supply cables from a generator. The generator was isolated at the time but the mains cables were live. He successfully connected two of the three phases and was working on the last phase when he accidentally touched a live phase cable which caused a flashover. He received burns to his face and neck.

Number: 99/033

Voltage: 400
Result: Burns
Location: Industrial

A trainee electrician working on an industrial switchboard was removing insulation from the tips of busbar termination spades with a knife when the blade contacted an adjacent phase causing a flashover. The resultant flashover caused an arc to form. As a result the trainee suffered burns to his hands and face.

The company had arranged for a shutdown of the switchboard so that a new circuit and circuit breaker could be fitted in a switchboard. The trainee decided to fit the circuit breaker while the switchboard was still live.

Number: 99/034

Voltage: N/A
Result: Fall
Location: Works

A line mechanic climbed a redundant power pole in order to remove the services from it. When he cut the conductors, the pole failed at the base and the pole fell over causing the line mechanic to fall to the ground which resulted in a broken rib. The line mechanic did not tie the head rope to the pole and did not fasten his safety belt to the pole.

The pole was not checked for soundness prior to climbing and the pole was not supported when the load was taken off, ie the conductors removed.

Number: 99/035

Voltage: 400
Result: Electric shock
Location: Commercial

Inadvertent contact was made with the 400 volt DC fuse terminals when replacing a cabinet door. Fuses on a battery charger unit were exposed and close to the door. A worker made contact with the live terminals as he was adjusting the door.

Number: 99/042

Voltage: 400
Result: Burns
Location: Works

An electrical faultman received burns to his hands whilst connecting a neutral screen service cable in an underground service cable. It would appear that he inadvertently shorted the cable to earth.

Number: 99/044

Voltage: 110
Result: Electric shock
Location: Industrial

An avionics technician received an electric shock whilst using a test set. It was found that the cord connector used for the test set had the earth conductor cut. A voltage of 110 volts was measured on the metal case of the test set.

Number: 99/045

Voltage: 400
Result: Burns
Location: Industrial

A service technician was working adjacent to an industrial switchboard when arcing was noticed on the pan below. When he went to investigate further, it flashed over, causing burns to his face and hands. The cause was a loose terminator, which had burned the circuit breaker case and flashed over.

Number: 99/051

Voltage: 11,000
Result: Electric shock
Location: Works

A line mechanic was ascending a pole when he touched the cross arm brace that was live due to it being in contact with a phase tail.

The electric shock he received caused him to fall from the pole. Injuries from the fall included broken ribs, a punctured lung and abrasions.

Number: 99/053

Voltage: 400
Result: Burns
Location: Works

A cable jointer was terminating a live cable to the connection point of a fuse switch. He was using an uninsulated socket. As he attempted to screw a bolt into the fuse switch termination, the bolt slipped and made contact with an adjacent phase. The resulting flashover caused the cable jointer to receive burns to his face.

Number: 99/054

Voltage: 230
Result: Electric shock
Location: Works

A trainee line mechanic was instructed to connect a service main to a domestic installation. When he attempted to open the terminal screws at the pole fuse, he found that the screws had been damaged. He told his supervisor that the pole fuse would have to be changed, so the supervisor went to the truck to find a new pole fuse. The trainee decided at this point to cut the live phase cable away from the fuse and in doing so received an electric shock. He slipped from the ladder and was suspended in his safety belt. The supervisor got him down and carried out first aid.

Number: 99/057

Voltage: 400
Result: Electric shock
Location: Industrial

An electrician received an electric shock whilst working on busbars on an industrial main switchboard. The circuit breaker was closed by another electrician working on the control circuit. The isolation method should have included a warning notice.

Number: 99/059

Voltage: 11,000
Result: Burns
Location: Works

An older style oil filled ring main unit was being operated when it exploded and blew part of the roof off a substation building and caused serious burns to the operator. The switch may have been inadvertently placed in or close to the earth position during operation.

Number: 99/061

Voltage: 230
Result: Electric shock
Location: Commercial

A trainee electrician received an electric shock when he attempted to move some cables from a flush box. The apprentice was told to ensure that all of the light switches in a new installation were in the off position prior to livening an installation.

The trainee found that a switch had not been fitted and called out to see if the circuit was live. Before receiving confirmation, he attempted to pull out the cables. As he removed the cables from the box, his thumb brushed against the exposed live end of one of the cables and he received an electric shock.

Number: 99/063

Voltage: 230
Result: Electric shock
Location: Commercial

While carrying out a check of a switchboard, an electrician made inadvertent contact with live, exposed parts of a fuse base (there being no fuse carrier in place) and received an electric shock.

Number: 99/066

Voltage: 400
Result: Burns
Location: Industrial

An electrician was working on the main distribution board of a boiler house. He had isolated the motor control module and was in the process of installing an electrical overload unit to the gear plate of the individual starter cubicle. While drilling holes in the gear tray, the tip of the drill made simultaneous contact with the gear tray and the vertically mounted busbars situated behind the starter gear tray. The busbars were still alive because he was unable to isolate them without removing the power from the entire switchboard.

As a result of the contact, a flashover occurred causing the electrician to receive burns.

Number: 99/067

Voltage: 400
Result: Burns
Location: Industrial

While repositioning a conductor in an old switchboard, an electrical worker's screwdriver slipped and shorted between a live busbar and the board's metal frame causing him to receive burns.

Number: 99/069

Voltage: 400
Result: Burns
Location: Works

An electrical worker was completing a through joint on a live cable when a cable faulted, causing burns to his hands. The fault was due to an internal failure of a phase conductor to the neutral screen.

Number: 99/070

Voltage: 230
Result: Electric shock
Location: Commercial

An electrician received an electric shock when he incorrectly wired a fluorescent fitting by transposing a neutral connection. There were two power supplies and the electrician had only isolated one.

Number: 99/071

Voltage: 230
Result: Electric shock
Location: Commercial

A trainee electrician was assisting in work that involved the relocation of a switchboard. Whilst reconnecting the cables he was requested to liven a lighting circuit by running a new feed. However, whilst reconnecting another circuit he received an electric shock and burns when he touched a cable which had been livened due to back feed from the livened circuit.

Number: 99/074

Voltage: 400
Result: Electric shock and burns
Location: Industrial

An electrician was altering the position of a set of DIN rail-mounted cable terminals to an alternate position within a motor control centre. During the process of moving and marking the section of rail, a flashover occurred between the rail, a live phase and earth in the motor control centre starter cell. He received a shock which caused minor burns to his forearms and face, as well as flash burns to his eyes.

Number: 99/079

Voltage: 600
Result: Burns
Location: Works

An electrician was repairing a fault on an underground low voltage water heating control cable feeding from a ground-mounted transformer. On setting up the test set, the equipment was plugged into the power outlet and the test leads into the test set. The worker picked up the other end of the test leads and contacted the uninsulated portion of the alligator clips, which gave him an electric shock of 20 to 30 seconds, which resulted in burns.

Number: 2000/001

Voltage: 11,000
Result: Burns
Location: Works

While carrying out work, two electrical workers received burns when one of the workers caused a live lead to contact another phase, resulting in a flashover.

Number: 2000/004

Voltage: 11,000
Result: Burns
Location: Works

During the maintenance of an air break switch in a 33,000 volt substation, an insulator failed causing nearby workers to receive flash burns. Earlier that day there had been a fault at the substation and investigation found that an insulator had failed on the dropper supplying an air break switch. It was during the replacement of the faulty insulator that a second insulator failed approximately two metres away - showering the workers with sparks.

The work was being carried out in an isolated section of the substation away from the area where the insulator faulted.

Number: 2000/007

Voltage: 400
Result: Electric shock
Location: Works

Two line mechanics were isolating a 3-phase low voltage service line. One went up the ladder and pulled out two fuses and found that the third was stuck so he came down to get some tools. The second worker, thinking the line was isolated, went up to unbind the conductors and received an electric shock when contact was made with the line phase and the neutral conductors.

Number: 2000/014

Voltage: 11,000
Result: Electric shock
Location: Works

While a pole was being changed using live line procedures, a conductor broke and fell to the ground causing a line mechanic on the ground to receive an electric shock from the step potential. A fire was also started as a result of the lost conductor, which was old 7/16 copper.

Number: 2000/016

Voltage: 230
Result: Electric shock
Location: Commercial

An apprentice electrician received a shock from a live cable in a roof space.

Number: 2000/017

Voltage: 230
Result: Electric shock
Location: Commercial

An electrician had removed the covers on the terminals of a commercial oven in order to find a fault. He attempted to move the oven with the power on and the terminal cover removed. As he moved the oven, his hand made contact with the live terminals and he received an electric shock.

Number: 2000/020

Voltage: 400
Result: Electric shock
Location: Industrial

An electrician was investigating a fault on a motor control centre. The original fault reported was that the motor would not turn off. He turned off the isolator on the motor control centre, opened the cell door, and proceeded to test the circuits in the cell. He presumably found one of the fuses had blown and returned to the workshop to get a replacement fuse. On his return, he attempted to remove the fuse attachment nut with an open-ended spanner. The spanner made contact with an adjacent fuse end cap, causing a 400 volt flashover.

Examination of the motor control cell after the accident showed that the isolating switch was in the on position. This meant that the fuses were live when

he attempted to unscrew the nuts. The isolator must have been in the on position for him to test for voltage across the fuses in order to decide that one of the three fuses had blown.

What is not known is if he turned the switch off after testing or, if he left the switch on and did not test it before attempting to remove the nut.

What is significant is that when the cell was checked in the workshop, it was found that the switch mechanism could be set in mid position and that the spring action could then turn the switch on. The manufacturer was notified of the fact and asked for an explanation. The company responded stating that this type of switch has not been manufactured for a number of years and that they have changed the design, eliminating the possibility of the switch being set in the mid position.

Number: 2000/021

Voltage: 230
Result: Electric shock
Location: Commercial

An alarm technician was attempting to connect loose wire that had fallen out of junction box. He came into contact with live cable in ceiling space. He received an electric shock and fell to the floor. The technician was not registered to carry out this type of work.

Number: 2000/022

Voltage: 230
Result: Burns
Location: Commercial

An electrician was installing a miniature circuit breaker in a switchboard. His pliers made contact between two live phase pins, causing a flashover. He received burns to his face and hands.

Number: 2000/024

Voltage: 400
Result: Burns
Location: Industrial

While working in a live motor control cubicle, an electrician dropped a terminal bar, which shorted live terminals causing a flashover. He received burns to his hand and eyes.

Number: 2000/025

Voltage: 11,000
Result: Burns
Location: Works

A cable layer cut through a live 11,000 volt cable that had been incorrectly identified. He received burns to his hands. The cable had not been spiked, as it was believed that it was a dead cable under repair. There was also another 11,000 volt cable in the vicinity.

Number: 2000/026

Voltage: 230
Result: Electric shock
Location: Commercial

A computer technician was working on a computer processor when he received a shock from the power supply box. The power supply box was removed and destroyed before investigation of the fault could be undertaken.

Number: 2000/027

Voltage: 400
Result: Burns
Location: Industrial

An electrician attempted to reterminate a faulty circuit to a motor control cubicle that was left on. A flashover occurred when the electrician was carrying out close examination, causing him to receive burns.

Number: 2000/029

Voltage: 110
Result: Electric shock
Location: Industrial

During testing of a control valve, an aircraft electrician received an electric shock. He livened the part on the workbench and proceeded to carry out an inspection. When he touched the body of the valve, he received an electric shock. The part he was testing should have been grounded, in case stray voltages were present. The service manual had a pink section that gave caution to the worker, but he failed to read this section.

Number: 2000/030

Voltage: 110
Result: Electric shock
Location: Industrial

An electrician received a shock from a transducer he was carrying out tests on. The transducer, used on aircraft, had a live chassis at 110 volts AC. The electrician had checked the operating manual and there was no mention of the chassis earth. The manual is to be corrected and re-issued.

Number: 2000/032

Voltage: 230
Result: Electric shock
Location: Works

A line mechanic received an electric shock as he was removing a cross arm brace above low voltage conductors. When he removed the brace, it fell down and contacted a low voltage conductor. His back was resting on a bare neutral conductor and he received an electric shock from his hand to his back. He was not wearing insulating gloves at the time.

Number: 2000/034

Voltage: 400
Result: Electric shock
Location: Domestic

A flashover occurred when an electrician was checking phase rotation on a polyphase check meter. He attached one lead and, as he attached the second, a flashover occurred, causing him to receive burns to his hand. The meter was sent away for examination to identify the cause of the short circuit.

Number: 2000/036

Voltage: 400
Result: Burns
Location: Commercial

An electrician was fitting a finish strip to the base of a newly installed switchboard, when the spanner he was using came into contact with an exposed bolt on the live parts in the busbar chamber. The busbar chamber panel had been removed at some stage to allow access to fit the finishing strip. The electrician received serious burns to hands, knees, neck and face from the high fault level short circuit, which occurred. The electrician was wearing shorts and a t-shirt at the time of the accident.

Number: 2000/039

Voltage: 230
Result: Electric shock
Location: Industrial

A technician was removing test leads from test equipment when he received an electric shock. A loose connection had melted the insulation on the lead exposing live parts.

Number: 2000/045

Voltage: 230
Result: Electric shock
Location: Works

An electrician received a shock from a street lighting circuit. He isolated the circuit, which had a bank of capacitors connected to it. When he touched the cable terminals, he received a shock. The capacitor was charged at 230 volts. It is usual to discharge the capacitor before working on the circuit.

Number: 2000/046

Voltage: 230
Result: Electric shock
Location: Works

A line mechanic was working on a cast iron fuse box. After opening the front panel, he placed his screwdriver on the top left hand screw that held up the top insulating cover in place. At this point the bottom terminals of the fuse flashed over. He received flash burns to his wrist and face.

Number: 2000/051

Voltage: 11,000
Result: Burns
Location: Industrial

An electrical fitter received serious burns when he accessed a live 11,000 volt cable termination cubicle to measure up the fitting of current transformers. The switchboard was under construction and was partially livened.

Number: 2000/052

Voltage: 230
Result: Electric shock
Location: Industrial

A trainee electrician was replacing a lamp in an Edison screw lampholder in a streetlight. The streetlight was on when he touched the threaded part of the lampholder, which was live. He fell from the stepladder and cracked a bone in his elbow.

Number: 2000/062

Voltage: 400
Result: Electric shock
Location: Works

Work was being carried out on 11,000 and 400 volt power lines to reinstate them following a motor vehicle accident.

An electrical faultman was first on the scene and had carried out isolation switching on advice from the network owner's control room operator in order to isolate the power. Following the isolation, other staff arrived on site and began the task of reinstating the power lines.

While the power lines were being reinstated, a representative from the network company arrived on site and suggested that, in order to restore power to some commercial properties, the line crew could cut line breaks in the 11,000 volt lines to isolate the damaged power pole and allow power to be temporarily restored. This work was carried out following a check along the lines to establish how the lines were connected.

Mid-span breaks were made and temporary earthing was redone on the circuit inside the breaks to the 11,000 volt lines. The HV line was livened after the mid-span breaks had been made, and work continued on the LV lines. At this point a trainee line mechanic received an electric shock.

The LV circuit was tested and found to be live. Further investigation of the circuit revealed that there was a LV cable backfeeding the overhead LV power lines. The single line wiring drawing did not indicate that there was a cable feeding the overhead LV supply nor was the control room operator aware of this when the isolation was carried out.

Electrical accidents must be notified immediately (section 16 of the Electricity Act 1992). This can be done by freephone on: **0800 104 477**

An Electrical Accident Notification Report must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

A report form can be found at the back of this book and online by visiting the Energy Safety Service web site at:

www.ess.govt.nz

Part 2

Other Occupations



Number: 98/005

Voltage: 10,000

Result: Electric shock

Location: Commercial

A surveyor received an electric shock when he contacted an electric fence with his head while bending over a fence. The shock knocked him to the ground and he was taken to hospital for observation.

The electric fence installation was checked and no faults were found.

Number: 98/007

Voltage: 11,000/400

Result: Burns

Location: Works

A hydraulic auger was being used to drill holes for street lighting poles damaged a 400 volt and 11,000 volt cable.

The labourer using the auger went to investigate why the auger had jammed. He withdrew the auger from the hole and found fragments of black plastic on the drill bit, the cable then faulted causing flames to erupt from the hole. He received burns as a result.

Prior to the accident, the local supply authority had been at the work site to investigate an electrical outage. The supply authority representatives asked if there had been any cable strikes as a result of the drilling operation. Staff at the site advised that they were not aware of any cable damage and the circuit was therefore reset. This caused the cable fault.

The workers carrying out the drilling operation did have plans of the underground services in the area, but this particular hole position had caused a problem and it was necessary to drill in a different position. This brought the drilling close to the buried cables.

Everyone concerned was advised to have the local supply authority identify all buried cables prior to continuing with the work.

Number: 98/008

Voltage: 6,600
Result: Burns
Location: Works

A breaking bar pierced an in-service 6,600 volt steel wire armoured cable. This resulted in a flashover causing a labourer to receive severe burns.

Number: 98/011

Voltage: 230
Result: Electric shock
Location: Commercial

A cleaner was wiping an electronic scale when she received an electric shock. The cleaner asked one of the staff to move the scales and he also received a shock. An investigation of the accident revealed that the supply cord for the scales had been damaged. The earth conductor had been cut through and the phase conductor had some of the insulation missing.

The scale was mounted on a stainless steel swivel base which was not bonded to earth and, when the swivel base was moved, the electrical cord with the exposed phase conductor touched the body of the scale making it live.

The company has since had the socket outlets repositioned to stop the cord from being trapped, and has had RCDs fitted to all portable equipment.

Number: 98/013

Voltage: 230
Results: Burns
Location: Industrial

There was an explosion in the garage area located in the basement of a building. An investigation revealed that petrol fumes had been present in a vehicle pit used to repair vehicles, and when the pit lights were turned on, a faulty lampholder on a fluorescent lighting fitting in the pit sparked, igniting the petrol fumes.

A man who was standing near the pit received burns to his legs as a result of the explosion.

It is believed that petrol may have leaked into the pit from one of the cars that parked over the pit during the night. The pit has since been filled in with sand and concrete poured over the top.

Number: 98/016

Voltage: 230
Result: Electric shock
Location: Commercial

A student was working in a supermarket cleaning benches. The student picked up an electric fan and received an electric shock.

An inspection of the electric fan revealed that the cover plate on the base was missing exposing live electrical connections.

Staff were required to report any damaged equipment to a supervisor. In this case, it had not been done.

Number: 98/018

Voltage: 50
Result: Electric shock
Location: Industrial

A meat worker picked up an electric stamp machine which was sitting in a bucket of water and received an electric shock.

The stamp machine had been left in the bucket of water overnight for cleaning and had been left switched on.

When she touched the stamp machine, she received a tingle and although the operating voltage was only 50 volts, she received an electric shock causing pain in her arm.

The procedure for cleaning the stamp machines has been changed to ensure that:

- Power is not left on, and;
- they are not fully immersed in water.

Number: 98/025

Voltage: 230
Result: Electric shock
Location: Commercial

A plant nursery worker received an electric shock when she cut through a flexible cord supplying power to a vapouriser in a greenhouse. The flexible cord was lying in the flowerbeds at the time of the accident, and as the worker cut the flowers, she also cut into the live flexible cord. Following an investigation the company removed the cord and installed RCDs for the circuits in the plant nursery area.

Number: 98/028

Voltage: 230
Result: Electric shock
Location: Commercial

A plumber was working from an aluminium ladder using an electric drill connected to an extension cord. He received an electric shock as he touched the metal ceiling tile rails. An examination of the electric drill and extension cord did not reveal any faults. It is believed that the plug on the electric drill was not completely entered into the socket outlet on the extension cord allowing the plug pins to make contact with the aluminium ladder he was standing on. When he touched the earthed metal ceiling tile rail, he received an electric shock.

The plumber was not using a RCD nor an isolating transformer at the time of the accident.

Note: A socket outlet is now available that has a recess for the plug to fit into to prevent accidental contact with plug pins.

Number: 98/030

Voltage: 11,000

Result: Electric shock

Location: Works

A line mechanic, and an arborist who was on the ground, were using an elevated work platform (EWP) vehicle to prune trees near overhead lines.

The line mechanic was moving the boom of the EWP into position near an 11,000 volt line when the elbow of the boom made contact.

The truck became live and when the arborist touched the truck (just as it became live), he received an electric shock.

The line mechanic then lowered the EWP and attended to the arborist.

People working and moving machinery in the vicinity of live lines should elect a safety observer when positioning machinery such as an EWP.

The company did not have a formal induction procedure for new staff, and had no formal record of known hazards available to staff before commencing work.

The company has since amended its procedures for the induction of new staff,

which includes a special section for non-line mechanics such as tree trimming staff. The company has also issued a hazard identification sheet to be used by staff prior to the commencement of work. As a follow up to this a number of safety training days have been programmed.

A site audit system has also been put into place for site audits, for work carried out during business and after hours.

Number: 98/032

Voltage: 230

Result: Electric shock

Location: Commercial

A person received an electric shock when he touched a broken switch on a light fitting in his employer provided dormitory bedroom.

The switch was replaced and staff were told to report faulty equipment to the maintenance department.

Number: 98/035

Voltage: 230

Result: Electric shock

Location: Commercial

A plumber was re-roofing a building and had laid out the new roofing iron in preparation for drilling fixing holes.

The plumber borrowed a short extension lead to add to his own extension lead and proceeded to drill the holes. At this point he received an electric shock from the

case of the drill, lost his balance and fell to the ground.

An inspection of the extension leads revealed that the short extension lead the plumber borrowed had no earth connection. The earth lead had been terminated but the insulation had not been removed, which effectively meant that there was no connection. The electric drill, which had a metal case, had an earth fault which made the case live.

An isolating transformer or RCD was not being used.

Number: 98/036

Voltage: 230
Result: Electric shock
Location: Commercial

An air conditioning technician was working on a refrigeration unit from a ladder. He reached around the back of the unit and his hand contacted the live terminals of a pressure switch. He received an electric shock.

Another technician was called to investigate the problem and found that the pressure switch cover was missing. This cover was found at the back of the unit covered in dust, indicating that it must have been off for some considerable time.

Enquiries were made to try to identify the last person to work on the unit, but the owner was unable to offer any help.

Number: 98/041

Voltage: 11,000
Result: Burns
Location: Works

A cable crew was installing underground cables, and thrust boring below a concrete footpath outside a house. One of the crew bent down into the hole while the other person reversed the thrust borer. As the borer was reversed, it made contact with an 11,000 volt underground cable.

The cable exploded and flames erupted from the hole that the first crew person was leaning into. He received burns to his face and hair.

The person operating the thrust borer was pushed back by the explosion but was not injured.

The cable crew did not ensure that it was safe to bore by obtaining service plans for the area.

The company has since given an assurance that plans will be obtained before carrying out any thrust boring.

Number: 98/048

Voltage: 6,600

Result: Burns

Location: Works

A labourer was fitting kerbing boxing in a city street. In order to secure the boxing, he was driving metal spikes into the road. One spike penetrated a 6,600 volt underground cable. The labourer received burns to his hands and arms.

The supervisor had obtained plans for the underground services in the area, but did not mark them out before starting work.

Number: 98/049

Voltage: 11,000

Result: Burns

Location: Works

A plumber received flash burns when he damaged an 11,000 volt cable. An 11,000 volt cable had been laid across the corner of the property prior to the residence being constructed. When the sewer was installed some 35 years back, the protective slabs over the cable had been removed and the cable was encased in the bolster cement around the earthenware pipe.

Although it was known by the property owner that the cable was there (a legal easement being obtained by the cable owner), it was not expected that the cable would be cemented in with the sewer pipe. The plumber was using a cold chisel to remove the cement, when he struck the

cable. He received burns to his right hand, which required hospital treatment. Prompt first aid on site (i.e. by cooling the burn under a tap) reduced the severity of the injury.

The main causes were the earlier interference with the cable and a failure to take adequate precautions when excavating around cables.

Number: 98/050

Voltage: 11,000

Result: Electric Shock

Location: Works

A digger was being used to clear an open drain at the side of a road. The boom of the digger contacted an 11,000 volt overhead power line, and a truck driver who was standing next to the digger received an electric shock. The line tripped as a result of the contact and one of the lines came down.

The company had applied for and received a permit to work within 1.5 metres of the line, but the digger operator did not ensure that the boom remained below 1.5 metres.

Number: 98/052

Voltage: 110,000
Result: Burns
Location: Works

During a tower painting operation, a painter working on the cross arm moved within flashover distance from an insulator. The ensuing arc caused him to suffer severe burns.

Number: 98/057

Voltage: 230
Result: Electric Shock
Location: Commercial

A show home was shifted onto a new site and connected to a supply of electricity. An employee of the housing company was on a ladder and received an electric shock when he made contact with the metal roof tiles, causing him to fall off the ladder. He was admitted to hospital for overnight observation.

A tough plastic sheathed cable had been trapped under a roof purlin and a nail had damaged the cable. The transportation of the building may have been sufficient to finally cause insulation failure of the cable and liven the roof.

Number: 98/062

Voltage: 230
Result: Electric shock
Location: Industrial

A machine operator was changing belts on a drill press when she received an electric shock. An inspector confirmed that she received the shock from the exposed live parts of the limit switch. It appears that the switch and method of mounting were not suitable for this application.

Number: 98/064

Voltage: 11,000
Result: Burns
Location: Works

A fencing contractor received burns when his tractor-mounted post hole borer made contact with an 11,000 volt overhead electric line. The contractor did not have permission from the network owner to work within four metres of the power line.

Number: 98/069

Voltage: 11,000
Result: Electric shock
Location: Commercial

A farmer was moving a rotating boom type irrigator when the boom tilted and made contact with the terminals of an 11,000 volt pole mounted transformer. An earth fault occurred which caused the circuit protection to operate. The farmer

was touching the irrigator at the time and received a hand to foot shock and burns to his hand.

The farmer was not sure how the irrigator tilted and came into contact with the terminals of the transformer; it may have been the weight of water in the boom causing an imbalance and the boom to pivot.

He said that he had been using the irrigator the night before, and when he went to move it to a new position it must have tipped and contacted the transformer. He normally fitted a stop block to the irrigator to ensure that it was about five to ten metres away from the end of the paddock and clear of the lines.

Number: 98/072

Voltage: 11,000

Result: Fatal electric shock

Location: Commercial

The stock manager at a farm property was sent to position and connect an irrigation system in a paddock. It appears that he vertically raised a seven metre length of pipe, which contacted an 11,000 volt overhead line and he received a fatal electric shock. The power line was measured at the site as being six metres above ground.

The power line supplied power to an irrigation pump and was positioned above a fence dividing two paddocks.

The farm owner's son found the victim some time after the accident.

At an interview, the owners of the property stated that the stock manager was aware that a power line ran above the fence line where he was working.

It is thought that the stock manager may have raised the pipe vertically in order to shake a rabbit from the pipe. A rabbit was seen in the pipe after the accident.

The power line protection had indicated that an earth fault had occurred around the time that the farm worker would have been working on the irrigation system. The circuit protection tripped and then automatically reset. This is a normal condition for the protection system in this type of installation.

The line height complied with the Electrical Code of Practice 34, which requires a height of 5.5 metres at this type of location.

Number: 98/075

Voltage: 230
Result: Electric shock
Location: Commercial

A labourer received an electric shock as he attempted to coil up an extension lead.

The extension lead was plugged into a socket outlet located in an office. The lead was run outdoors some distance to an area that was a busy thoroughfare, used by forklift trucks and other vehicles.

During the course of its use, the extension lead became badly damaged, probably by a fork lift truck, and although a RCD protected the lead, it did not protect the labourer as he came into contact with the phase and neutral conductors.

Since the accident the company has installed a socket outlet close to the work place.

Number: 98/079

Voltage: Not Known
Result: Electric shock
Location: Industrial

A trainee machine operator received burns to his fingers when he removed the covers of a drying oven at the rear of the machine, and put his hand inside to clear a blockage. The drying oven uses high frequency energy to cure laminated timber. He received burns to his fingers.

The machine had a barrier surrounding the drying oven with warning notices on the entry gates, but no means of automatic isolation.

The machine operators were aware of the need to isolate the drying oven prior to removing covers, but on this occasion the trainee did not isolate the machine before removing covers to gain entry to the drying oven.

Number: 99/004

Voltage: 230
Result: Electric shock
Location: Industrial

A process worker received an electric shock when he was using an assembly press. The press had an electrical fault and had blown a fuse. The press operator replaced the blown fuse and may have removed the starter cover to identify a fault, or left the cover loose. When he reached out to push the start button, his finger touched a live terminal in the starter panel and he received an electric shock.

Number: 99/007

Voltage: 400

Result: Electric shock

Location: Industrial

A labourer was working on the installation of roof supports on a construction site. He gained access to the roof supports by a metal ladder. When he went to climb down the ladder he was seen to be in difficulty and co-workers, who thought he was having a heart attack, went to help him. When one of his co-workers touched him, he too received an electric shock. His co-workers then realised he was suffering from an electric shock and attempted to pull him down the ladder.

An investigation revealed that the ladder had been placed on a three-phase extension cord. The outer sheath of the lead was damaged and the foot of the ladder damaged a conductor thus livening the ladder. The labourer had been in contact with the live ladder and the earthed metal of the roof structure.

Number: 99/008

Voltage: 230

Result: Fatal electric shock

Location: Commercial

A farmer received a fatal electric shock when he came into contact with the live terminals on a pump motor. The farmer had climbed under a woolshed to work on a water pump. As he attempted to open a valve near the pump, the electric motor cover broke off and he contacted the live terminals inside the cover.

Number: 99/009

Voltage: 230

Result: Fatal electric shock

Location: Commercial

A farmer received a fatal electric shock when he was working on a water pump that supplied water from a creek.

He was priming a water pump and had asked his wife to turn on the power at the house. The pump was supplied with power from a socket outlet located in a carport attached to the house.

An investigation of the supply to the pump revealed that a total of seven extension cords were used to reach the pump from the house. Some of the extension cords were buried just below the ground.

The examination of the extension cords revealed that two of the cords had the phase and neutral connections transposed. One extension cord had only two cores, and so was missing the earth connection.

Because there was no earth conductor on one of the cords, a voltage could have been present, due to moisture in any of the cord plugs and sockets or even the pump motor at the body of the pump at the time of the accident, causing the electrocution.

Number: 99/017

Voltage: 230
Result: Burns
Location: Commercial

A handyman went to switch off a faulty MCB in a hotel kitchen switchboard when it exploded causing burns to his hand. The circuit breaker was closed onto a short circuit which was later repaired by an electrician.

Number: 99/018

Voltage: 230
Result: Electric shock
Location: Industrial

A pipe fitter was using an electric angle grinder supplied through a RCD. However the RCD kept tripping and after a number of trippings, he replaced the lead but did not plug it into the RCD unit. When he continued working, he received an electric shock from the grinder.

Number: 99/019

Voltage: 400
Result: Electric shock
Location: Commercial

An airport worker received an electric shock as he attempted to plug an aircraft starter unit lead into a socket outlet on the tarmac of an airport.

Investigation revealed that one of the phase conductors in the plug had come loose and had contacted the earth conductor causing a flashover in the plug. The worker received a burn to his hand.

Number: 99/023

Voltage: 11,000
Result: Electric shock
Location: Commercial

Labourers were erecting a 12 metre length of continuous spouting at a new house. The house was on a hill section. In front of the house on the road side, but at roof level in relation to the building were 11,000 volt and 400 volt power lines. As they moved the spouting onto scaffolding the outer end came into contact with the power line.

The electric current passed through the spouting and the scaffolding with partial current flowing through the labourer. The contact caused an 11,000 circuit breaker to trip.

Arc burns were visible on the spouting, scaffolding and fascia board of the house.

The labourer received an electric shock and went to hospital for a check up. The company has since issued instruction to reduce the length of spouting where there is danger of contact with live power lines.

Number: 99/024

Voltage: 230
Result: Electric shock
Location: Commercial

A demolition contractor was removing walls in a high rise building when he received an electric shock from an exposed cable in a wall. An electrician had isolated the electrical circuits prior to the demolition team starting. An investigation revealed that the air conditioning supply was fed from a switchboard several floors below. The electrician responsible for the isolations failed to check all of the circuits, and thought that when he removed the main fuses for the floor that all circuits were dead.

There was no indication on the local switchboard that other circuits were supplying power to the air conditioning units.

Number: 99/027

Voltage: 11,000
Result: Electric shock and burns
Location: Works

A worker was digging a trench. He struck an 11,000 volt cable and the cable exploded in the trench. He received minor burns and suffered from shock as a result of the explosion.

The company that engaged him was warned of the dangers of carrying out excavations without seeking advice on services below ground.

Number: 99/028

Voltage: 11,000
Result: Burns
Location: Industrial

Carpenters were preparing the footing for a retaining wall, prior to a concrete pour. They had placed the reinforcing cage in the trench and the drainage contractor asked them to place pipes under the reinforcing steel to allow services to pass through later.

Live power cables ran along the side of the trench and were partially exposed. One of the carpenters was driving a steel pin into the ground to secure the formwork when an explosion erupted and a flame shot out of the ground burning his hand.

The exposed cable that ran part way along the edge of the trench disappeared in the area where the steel pin was driven into the ground.

The company had a power company map showing the location of the cable and presumed that the cable followed the path along the line of the trench.

Number: 99/032

Voltage: 400
Result: Burns
Location: Works

A labourer digging a trench with a jackhammer penetrated a live 400 volt cable which exploded causing burns to his hands and face.

The workers had plans of cable services in the area, but the services were not marked out.

Number: 99/036

Voltage: 11,000
Result: Burns
Location: Industrial

While uncovering an 11,000 volt cable to obtain a level surface, a landscape gardener received burns when he accidentally cut into the insulation on the cable, causing a short circuit.

Number: 99/039

Voltage: 230
Result: Electric shock
Location: Domestic

A teacher picked up the cord to an overhead projector and received an electric shock from a damaged plug top.

Number: 99/040

Voltage: 6,600
Result: Burns
Location: Works

A labourer received flash burns to his eyes when he pierced a live 6,600 volt cable with a crowbar. No plans had been obtained from the power company before the work commenced.

Number: 99/041

Voltage: 230
Result: Electric shock
Location: Commercial

A receptionist's hand came in contact with a live bare lead on an electric jug. The company has since asked all staff to report equipment that requires attention.

Number: 99/043

Voltage: 11,000
Result: Burns
Location: Works

A contract labourer using a posthole borer and crow bar damaged an 11,000 volt cable, causing outage and receiving burns. The contractor did not have construction plans on site.

Number: 99/047

Voltage: 230
Result: Electric shock
Location: Commercial

An amusement arcade worker received an electric shock from a roller door as he was attempting to operate the control buttons with a metal rod. An investigation revealed that a remote push button had not been connected and the wires left taped.

The worker had made contact with the cable, a metal rod, and the earthed metal of the roller door.

Number: 99/048

Voltage: 230
Result: Electric shock
Location: Commercial

A labourer was cleaning a socket outlet while it remained alive with a screwdriver and rag. In the process, he received an electric shock.

On the day of the accident, the area was experiencing an exceptionally heavy rainfall.

Investigation of the scene found that water had been flooding over a guttering, causing water to run down the inside of a section of PVC conduit into the socket outlet.

The socket outlet was protected by a RCD, which kept tripping each time it was reset.

An inspector disconnected the faulty circuit and advised the owner to get an electrician to carry out the necessary repairs.

Number: 99/050

Voltage: 400
Result: Electric shock
Location: Works

A labourer, working for a gas supplier, received an electric shock when he cut a power cable with hand operated pipe cutters. The light coloured sheath on the cable had turned yellow over time and was mistaken for a gas pipe.

Number: 99/055

Voltage: 400
Result: Burns
Location: Works

During excavations on a road, a roading contractor had located a group of power cables. In order to remove a concrete slab from above the cables, he struck the slab with a crowbar, causing the cable to fault, which resulted in the contractor receiving burns.

Number: 99/056

Voltage: 230
Result: Electric Shock
Location: Commercial

A cleaner at a school received an electric shock when he made contact with a fire alarm bell. The bell had been wired to run on 230 volts, and had exposed live metal parts. The cleaner received a hand to hand shock whilst cleaning the wall with a damp cloth and holding on to an aluminium door. The bell circuit was changed to 24 volts.

Number: 99/058

Voltage: 230
Result: Electric shock
Location: Industrial

A builder's labourer received an electric shock whilst drilling into a wall when the drill bit made contact with a live cable.

Number: 99/062

Voltage: 22,000
Result: Burns
Location: Works

A builder was carrying out work in an enclosed substation in preparation for concreting the floor. The work was to seal the floor area and box around the cables so that they could be sealed with foam after the concrete was poured.

The builder had cut some timber and was nailing this alongside the cable to form a seal against the concrete. He was using a

gas powered nail gun and as he attempted to nail the timber a nail penetrated the cable. This caused the oil filled cable to explode in a ball of fire. The builder received burns to his legs, arms and head. He managed to get out into the street where passers-by offered assistance.

Number: 99/064

Voltage: 60
Result: Burns
Location: Industrial

An aircraft engineer was working on an aircraft starter generator and found a loose terminal that contacted the body of the aircraft. This caused burning and arcing, resulting in burns to his fingers.

Number: 99/065

Voltage: 230
Result: Electric shock
Location: Industrial

A process worker placed his hand on a beam and received an electric shock when he made contact with live parts of a ceiling rose which did not have the cover fitted.

Number: 99/073

Voltage: 230
Result: Electric shock
Location: Commercial

A vacation worker received an electric shock while kneeling down on a stainless steel bench and touching an over-sink water heater during cleaning. It was determined that they received a shock due to moisture tracking at the steam switch which was being wiped down at the time of the accident.

Number: 99/075

Voltage: 24
Result: Fall
Location: Commercial

Whilst putting in an alarm cable, a spark occurred between the cable and the sprinkler pipe. This caused the alarm installer to react thinking that someone had livened the cable at mains voltage. It appeared that he struck his head on the pipework above and knocked himself out. There was a voltage of 24 volts present on the cable.

Number: 99/076

Voltage: 11,000
Result: Burns
Location: Works

A farmer was shifting an irrigator by hitching it to a tractor when the irrigator's boom was caught by a gust of wind and made contact with the 11,000 volt overhead line. The current flowed through the irrigator's boom and through the tyres, into the ground. As a result, the farmer received burns to his foot and ankle.

Number: 99/077

Voltage: 230
Result: Electric shock
Location: Works

A communications technician was on top of a ladder strapping his harness belt around the power pole. As he threw the belt around the pole he made physical contact with an existing cable tv amplifier which housed a 230 volt power supply, the metal case of which was live. The worker received an electric shock and fell to the ground, receiving minor injuries to his arm and knee.

Number: 2000/003

Voltage: 230
Result: Electric shock
Location: Commercial

A ceiling erector was working from a stepladder removing insulation when he attempted to cut through a twin tough plastic sheathed cable with a pair of tinsnips. He received an electric shock from the hand holding the tinsnips through to his other hand which he was using to hold on to a steel beam.

Number: 2000/005

Voltage: 230
Result: Fatal
Location: Industrial

A fitter was working outdoors at an industrial complex fitting boards over a sump containing a saturated brine solution using a double insulated electric drill. The fitter either slipped whilst drilling or he dropped the drill into the sump and retrieving it caused him to be electrocuted. He was found some time later lying across the sump. No additional protection was used on the lead supplying the drill although a portable RCD was adjacent to the outlet and available for use.

Number: 2000/008

Voltage: 33,000
Result: Electric shock
Location: Works

A worker received burns when he was cutting away concrete with a chisel to expose a fibre optic cable when he struck a live electric cable.

Number: 2000/010

Voltage: 11,000
Result: Burns
Location: Works

While excavating for a new fence post using an electric breaker, a worker pierced a live high voltage underground cable and received burns.

Number: 2000/011

Voltage: 11,000
Result: Electric shock
Location: Works

Whilst digging a hole with a jackhammer, a worker hit an underground live electric cable and received an electric shock.

Number: 2000/12

Voltage: 400
Result: Electric shock
Location: Industrial

A butcher at a meat works received an electric shock when he entered a sheep-stunning race to remove an animal. Staff had been specifically instructed not to enter this equipment whilst the warning lights were on. It was found that the interlock switch to shut the plant down was not adjusted correctly due to wear.

Number: 2000/018

Voltage: 230
Result: Fatal electric shock
Location: Commercial

A 15 year old student working on a family farm was electrocuted while using a dagging machine. Six sheep were also electrocuted. Investigation showed that the dagging machine became live at 230 volts because of damage to the insulation on the wiring entering the dagging machine. The normal earth return path was not available as the earth in the extension cord supplying the dagging machine was not continuous over the length of the cord and the socket outlet supplying the extension cord had spread earth contacts. The return current path to earth in this instance was through the victim's body and the sheep.

A RCD or isolating transformer was not being used although an isolating transformer was available.

Number: 2000/023

Voltage: 230
Result: Electric shock
Location: Industrial

A welder climbing a ladder received an electric shock from an extension lead and fell from the ladder. The extension lead was damaged and had exposed live conductors.

Number: 2000/028

Voltage: 230
Result: Electric shock
Location: Industrial

A worker received an electric shock from a 230 volt cable that was live and not terminated.

Number: 2000/033

Voltage: 230
Result: Electric shock
Location: Industrial

A meat worker attempted to operate a push button control station and received an electric shock. The rubber boot on the push button was damaged and allowed water to enter the contact area which caused the operator to receive an electric shock.

Number: 2000/035

Voltage: 230
Result: Electric shock
Location: Domestic

A plumber was putting a flashing cover over a cable tray on a roof. He drilled holes for fixing screws and as he screwed the screw in, it penetrated a cable causing a short to earth. The cable fault caused a flashover and he received burns to his hand.

Number: 2000/037

Voltage: 230
Result: Electric shock
Location: Commercial

A swimming pool attendant received an electric shock from a dosing pump when he used a screwdriver to adjust the speed. The pump control knob was missing and he used a screwdriver, which had a damaged handle. The screwdriver blade had been pushed to the top of the handle exposing the metal of the blade. The adjusting knob had been pushed sideways and the shaft had made contact with a live terminal. The pump was repaired and put back into service.

Number: 2000/038

Voltage: 230
Result: Electric shock
Location: Commercial

A plumber received an electric shock while working under the floor of a school. A damaged 2.5mm buried tough plastic sheathed cable was in contact with a galvanised pipe. It would appear that the cable had been damaged for some time - most likely from a previous renovation job.

Number: 2000/040

Voltage: 230
Result: Electric shock
Location: Commercial

A car groomer received an electric shock from a vacuum cleaner cord. The vacuum cleaner was used for car grooming and a young woman was using it to clean a car when the cord sparked. She stopped work and told the manager that the cord was faulty, she then told other staff not to touch the cord. The victim decided to find out what had happened and ran his hand along the cord; when his hand reached the part that had sparked, he received an electric shock and fell to the ground.

The company had a portable RCD, which was not in use at the time. Socket outlets with RCDs have now been fitted to ensure that they are always in the circuit.

Number: 2000/041

Voltage: 230
Result: Electric shock
Location: Commercial

A kitchen hand at a fast food outlet received an electric shock when he removed a cooking basket from behind a vat. The plug top and lead were damaged, exposing live parts.

Number: 2000/042

Voltage: 33,000
Result: Burns
Location: Commercial

The accident occurred when a farm worker lifted a 10 metre length of aluminium irrigation pipe to clear a blockage and made contact with a 33,000 volt line. The victim sustained severe burns to the hands and feet and also suffered nerve damage.

Number: 2000/043

Voltage: 230
Result: Electric shock
Location: Domestic

A labourer installed insulating foil under a house using a staple gun. He stapled a live cable and when he touched the foil he received a shock. He immediately turned off the main switch for the house and got an electrician to check the wiring.

Number: 2000/044

Voltage: 230
Result: Electric shock
Location: Industrial

While washing down plant, a process worker received an electric shock. It was determined that the enclosure was cracked, which permitted the entrance of moisture thus livening the components and causing the worker to receive an electric shock.

Number: 2000/047

Voltage: 230
Result: Electric shock and burns
Location: Commercial

A cleaner received an electric shock and burns to his hand when the extension lead on a backpack vacuum cleaner he was about to use, faulted.

Number: 2000/049

Voltage: 230
Result: Electric shock
Location: Industrial

While repairing a bench saw during the lunch hour, a welder made contact with live parts of the motor. He suffered a left shoulder injury and was off work for 42 days.

Number: 2000/54

Voltage: 230
Result: Electric shock
Location: Commercial

A caterer received an electric shock when she unplugged an appliance. There were a number of appliances plugged into multi-boxes at the site, which was outdoors in a marquee. It is assumed that contact was made with the male contact of the plug top or moisture was present. The company has since adopted the practice of using RCDs.

Number: 2000/055

Voltage: 230
Result: Electric shock
Location: Domestic

A painter received an electric shock when he touched an overhead service main at the point of entry to a house. The service main had deteriorated and both the phase and neutral conductors had insulation missing.

The network owner carried out a survey on the condition of service mains in the area and sent out a warning of the danger of working near service mains.

Number: 2000/057

Voltage: 230
Result: Electric Shock
Location: Commercial

A worker in a fast food restaurant received an electric shock when she attempted to plug in a mobile meat freezer. The plug top on the appliance lead had been dropped, and the back of the plug had come off exposing the connections. The worker was aware of the broken plug top but still continued to use the freezer. A RCD was connected to the power circuit, which operated during the accident.

Number: 2000/058

Voltage: 230
Result: Electric shock
Location: Commercial

A nurse aide received a shock from a plug as she attempted to unplug an appliance. The plug top came off the plug exposing live terminals.

The plug had apparently been taped up with cellotape, which had come loose.

The electrician at the hospital did not have the appliance on his list for testing.

Number: 2000/059

Voltage: 230
Result: Electric shock
Location: Commercial

An office worker received an electric shock when she touched an over sink water heater. The water heater had a broken earth connection and the steam vent for the heater was blocked causing steam to enter the electrical terminal housing. This livened the metal case of the water heater.

Number: 2000/060

Voltage: 230
Result: Electric shock
Location: Commercial

A cleaner using a floor polisher received an electric shock. An inspection found that the connections to the polisher were incorrect. The load side of the operating switch had both the phase and earth wires connected together. This meant that when the switch was operated, the body of the polisher was live, as the incoming earth was not connected. The appliance was reconnected correctly.

Number: 2000/063

Voltage: 400
Result: Electric shock
Location: Industrial

A truck driver received an electric shock when he touched an electrical cubicle in a cartdock. The cable supplying the cubicle had been damaged at the entry during building alterations, causing the cubicle to be livened.

Electrical accidents must be notified immediately (section 16 of the Electricity Act 1992). This can be done by freephone on: **0800 104 477**

An Electrical Accident Notification Report must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

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Part 3

General Public



Number: 98/001

Voltage: 230

Result: Fatal electric shock

Location: Domestic

A 14-year-old student was attempting to plug an air compressor power lead into an electrical extension lead, in the garage of a two-storey house.

A witness stated that the student collapsed as the plug was inserted into the socket. It was later determined that the student received a fatal electric shock.

An examination of the plug top, on the end of the lead connected to the compressor, revealed that the moulded rubber body adjacent to the pins and connection screws was broken away, leaving the live parts exposed as the plug top was inserted into the socket. The plug top had the blue and brown wires transposed, but this did not contribute to this accident.

The extension lead with its socket outlet, which was used to supply power to the compressor lead, was examined and found to be in good condition and wired correctly.

The extension lead was in turn plugged into a socket outlet mounted on a wall in the garage. This was also checked and found to be wired correctly.

The most likely cause of the accident was the plug top on the power lead connected to the compressor. As the plug top was inserted into the socket outlet on the end

of the extension lead, the student's fingers would have been able to make contact with live parts. The student was not wearing shoes at the time and the garage floor was wet providing a low resistance path to earth.

Number: 98/002

Voltage: 400
Result: Electric shock
Location: Works

A truck mounted crane contacted and brought down an electric line that crossed a main road.

In a nearby paddock, a cow contacted the fallen power line and fell to the ground. The owner of the cow went to find out why it was lying down and she received an electric shock from the cow.

The trucking company did not have permission from the owner of the power line to pass under it with an over-height load.

Number: 98/004

Voltage: 11,000
Result: Burns
Location: Works

Power lines clashed during a severe storm and hot copper fell as a result of a flashover.

The circuit protection operated as a result of the lines making contact.

A child playing below the lines received minor burns from the falling hot copper.

Number: 98/009

Voltage: 230
Result: Electric shock
Location: Domestic

Two electric lawn mowers were offered for sale at a garage sale. They were purchased with the intention of recycling some of the parts. When the purchaser got them home, he tried them out. He touched a lead near the handle of one mower and received an electric shock and burns to his hand.

The flexible extension lead had been joined with tape at a point near the switch on the handle of the mower. The insulation had partially come off exposing the live bare conductors.

New Zealand Electrical Code of Practice 53 that came into force on 30 October 1997 covers the sale of used electrical appliances for recycling and reconditioning.

Number: 98/014

Voltage: 230
Result: Electric shock
Location: Domestic

A student was using two extension leads to work outside. The lead that was connected to the supply had two plug tops connected to it. This meant that the plug top on the end of the lead had live pins. She touched the live pin as she attempted to connect the second lead and received an electric shock.

The leads were removed from the house and the owner was notified of the problem.

Number: 98/021

Voltage: 230
Result: Electric shock
Location: Domestic

A young person received an electric shock from a caravan when he touched the door. He was standing bare foot on a lawn and thrown to the ground.

The caravan was connected by an extension lead to a domestic 10 amp socket outlet. The 10 amp socket outlet was tested and the earth contacts were found to have spread to the extent that no earth contact was made and the neutral was making limited contact.

The contacts in the socket outlet were bent back into their original positions and the caravan lead removed. The owner of the caravan was told to have the socket outlet replaced.

Number: 98/022

Voltage: 10,000
Result: Electric shock
Location: Commercial

A youth required medical attention when he tripped and remained in contact with an electric fence at a youth camp. The fence had been mounted at about 300mm above the ground to control a pet pig.

Number: 98/026

Voltage: 230
Result: Electric shock
Location: Domestic

A child received an electric shock when he put his hand through a hole in a carpet and made contact with a live cable. The cable had previously been used to supply a floor mounted socket outlet in a shop.

Two shops had been made into one large one by removing a wall. Carpet had been laid prior to the two shops being made into one. During the installation of the carpet, a floor mounted socket outlet had been removed to allow the carpet to be laid. The carpet was cut to allow the cable to enter the socket outlet but the socket was never fitted.

Prior to the accident, the hole in the carpet was covered by a desk which was removed when the wall between the two shops was knocked down.

The socket outlet was replaced and an inspection was carried out to ensure the rest of the installation was safe.

Number: 98/027

Voltage: 230
Result: Burn
Location: Domestic

The victim was using an electric jug when the cord faulted where it entered the base of the appliance.

It is believed that the victim received a flashburn when the cord faulted. The jug cord was permanently connected to the jug and it had failed at this point.

Number: 98/037

Voltage: 230
Result: Electric shock
Location: Domestic

A homeowner was standing on an aluminium ladder scraping paint below the gutter on a house. The overhead mains supplying the house were open wire overhead lines. The tails to the mains entry box were old rubber covered conductors and part of the insulation on the phase conductor was missing, exposing the live conductor.

As he attempted to scrape paint work, his hand or arm contacted the live conductor and he received an electric shock. His other hand was in contact with earthed metal spouting that had indirect contact with earth.

Number: 98/043

Voltage: 230
Result: Electric shock
Location: Domestic

One phase of a two-phase service main supplying a house developed an earth fault causing the roofing iron to become live. An electrician was called and found that a roofing nail had penetrated the cable some years previously and over time the cable faulted.

The electrician isolated the faulty phase and began to install a new supply cable. Because the house had a flat roof, some of the roofing iron had to be removed to enable a new supply cable to be installed. The home owner was assisting the electrician to pull the new supply cable through the roof space when he received an electric shock.

The electrician tested the roof and found that a lighting circuit on the other phase had also been hit by a roofing nail and had livened another section of the roof.

The house was built about 25 years ago and was constructed with open beam ceilings. This left approximately 75mm for the roofing battens. The cables had been slotted into the battens, which brought them close to the roofing iron.

Number: 98/051

Voltage: 230
Result: Fatal electric shock
Location: Commercial

The victim was using the facilities at a sauna outside of the normal opening hours, and wanted to use the spa bath. The spa water was cold, so he decided to see if the water heater was working. It appears that he may have removed a cover from an electrical contactor that was part of the control system for the spa pump and heater.

He had also unplugged one of the flexible cords, which was used to supply power to the electrical contactor.

It appears from burn marks on the phase pin of the plug that he received a fatal shock from the flexible lead. He had bare feet and standing in a damp area at the time of the accident.

Investigation of the circuitry showed that the two flexible leads used to supply power to the electrical contactor had their phase (live) conductors connected together. This meant that if either lead was unplugged the exposed phase pin would be live.

The spa had been in the premises for 11 – 12 years, according to the owner. Due to the age of the installation, it was impossible to identify the person responsible for the wiring.

Number: 98/053

Voltage: 230
Result: Electric shock
Location: Domestic

A homeowner received an electric shock when she touched the door of a freezer. The freezer was tested and the earth conductor was found to be live. An investigation revealed that the earth wire had blown off at the back of the socket outlet and was contacting the phase wire.

Number: 98/054

Voltage: 25,000
Result: Fatal electric shock
Location: Works

A tourist climbed onto the roof of an electric train and touched the overhead traction line, receiving a fatal electric shock.

Number: 98/058

Voltage: 11,000
Result: Electric shock
Location: Works

A property owner was using a handsaw to trim branches from an 11,000 volt line when he received an electric shock. He was taken to the local hospital for observation and discharged some four hours later. The line company was arranging for the offending branches to be cleared from the line. The homeowner had not advised the line company that he wanted the trees encroaching the line to be trimmed.

Number: 98/065

Voltage: 230
Result: Fatal electric shock
Location: Domestic

A child was electrocuted when he came into contact with a washing machine. The socket outlet into which the appliance was plugged into, had earth pins which had spread and were not making an electrical contact. On the machine, the phase cable to the braking coil was rubbing against the gearbox housing and the cable insulation was damaged, livening the metal body of the appliance. A three-pin plug top had been fitted to the appliance supply lead which the phase and neutral conductors were transposed.

Number: 98/066

Voltage: 230
Result: Electric shock
Location: Domestic

A child received an electric shock and burns to hands and chest when he plugged in a discarded bed lamp he had found. The lamp was removed by his parents before it could be investigated.

Number: 99/003

Voltage: 1,600 DC
Result: Burns
Location: Commercial

A young person on a moving electric train climbed onto the roof and came into contact with a live 1600 volt DC overhead power line supplying the train.

A second young person climbed onto the roof of the train and attempted to free his friend. He also received an electric shock. He climbed down and notified the train driver that his friend was on the roof of the train. The train driver stopped the train and lowered the pantograph in order to isolate the train from the power supply. The young person had fallen into the pantograph well and was trapped when the pantograph was lowered.

Both people received electric shocks and burns. Both had been drinking prior to boarding the train. (Police later laid charges.)

Number: 99/022

Voltage: 230
Result: Electric Shock
Location: Domestic

A homeowner received an electric shock from a clothes dryer when she removed the rear cover to gain access to the printed circuit board. It appears that the dryer had an intermittent fault and would not always start. When the printed circuit board was touched the dryer would start. On this occasion when she touched the printed circuit board she received an electric shock. Prior to the accident, a new printed circuit board had been fitted but the fault had reappeared and the homeowner continued to put her hand inside the panel in order to make the dryer work.

Number: 99/030

Voltage: 230
Result: Fatal electric shock
Location: Domestic

A child received a fatal electric shock from a multi socket outlet box when he inserted a key into the live slot. The multi-box was used to supply power to a television and video recorder in the lounge of a house.

This was the second fatal accident involving children and multi-boxes in the previous four years. A recommendation was sent to AS/NZS Standards for shutters to be fitted to multi-boxes as a standard.

Number: 99/037

Voltage: 230
Result: Electric shock
Location: Domestic

A homeowner received an electric shock while in the shower. Investigations revealed that the main neutral had burnt off in the service pillar due to a loose connection.

Number: 99/038

Voltage: 230
Result: Electric shock
Location: Domestic

Due to a phase neutral transposition of overhead mains after a pole replacement, a homeowner received an electric shock from an outside water tap.

Number: 99/046

Voltage: 11,000
Result: Fatal electric shock
Location: Works

A woman received a fatal electric shock when the motor vehicle she was in hit a pole and brought down live 11,000 volt conductors. It was understood that the victim was half out of the vehicle.

Number: 99/049

Voltage: 230
Result: Burns
Location: Domestic

A woman was using a hair dryer. A few seconds after turning the hair dryer on, it emitted a loud bang and a flash where the cord entered the hair dryer. She received minor burns to her hand.

Number: 99/052

Voltage: Unknown
Result: Burn
Location: Commercial

A person was undergoing a dental procedure using electrical medical apparatus and received a burn to his lip and leg caused by incorrect use of the apparatus. Medical staff using the equipment are now required to have specific competency training.

Number: 99/060

Voltage: 230
Result: Electric shock
Location: Domestic

A woman was changing a lamp in a light fitting when she received an electric shock. The fitting had a brass lamp holder, was of metal construction, and was not earthed.

Number: 99/068

Voltage: 230
Result: Electric shock
Location: Commercial

A child was drinking water from a drinking fountain when she received an electric shock caused by a fault in the sub-circuit wiring. Investigation revealed that there was inadequate bonding and no effective main earth electrode.

Number: 99/072

Voltage: 230
Result: Electric shock
Location: Domestic

A child went to the rescue of his cousin who was receiving an electric shock from an air compressor. The rescuer grabbed his cousin by the arms to try to pull him off and got stuck himself. He too received a shock from the air compressor. The rescuer managed to pull free. He then tackled his cousin off the machine.

Number: 99/078

Voltage: 230
Result: Electric shock
Location: Domestic

A person received an electric shock whilst connecting a new PC. The power supply cord with moulded plugs at each end had the phase from the supply-end connected to the earth terminal at the load-end, resulting in the rear case of the computer drive unit achieving 230 volt potential.

Number: 99/080

Voltage: 230
Result: Electric Shock
Location: Works

A street light cover plate had been removed and a wire was hanging out. A child touched the wire and received an electric shock.

Number: 2000/002

Voltage: 230
Result: Electric shock and burns
Location: Domestic

The accident happened in the kitchen of a house. The fan switch of the rangehood above the stove was jammed and would not operate on the front of the hood. A person was trying to free the switch with a screwdriver behind the front panel. A shock was received from the terminals or wiring around the switch. This resulted in burns to the finger and thumb of the left hand.

Number: 2000/006

Voltage: 230
Result: Electric shock
Location: Domestic

A young child received a severe electric shock when he contacted a metal gate attached to the house. The house was of stucco construction and the structure had become live due to a defective high voltage insulator on an air break switch on the network breaking down to earth. The transferred voltages appeared at the house due to the raising of the neutral from the high voltage earth back through the supply transformer MEN point. The wire mesh used in the stucco cement plaster cladding on the house made contact with earth from metallic water pipes and electrical conduits. The metal gate fixings were also in contact with the wire mesh.

Number: 2000/009

Voltage: 230
Result: Electric shock
Location: Commercial

A child received an electric shock at a public swimming pool when he touched a metal floodlight stand adjacent to the pool. Insulation on the cable connection at the floodlight had failed most likely due to UV degradation and presence of pool chemicals, causing the metal floodlight stand to become live. The pool did not have RCD protection fitted on these floodlight circuits.

Number: 2000/013

Voltage: 230
Result: Electric shock
Location: Commercial

A child received an electric shock and burns when he contacted a metal serving bench on a fast food caravan. The bench was live due to a faulty warming oven and the earth in the food caravan inlet was open circuit, having burned through at some stage. The food caravan did not have a current warrant of electrical fitness. Two other young people also received electric shocks.

Number: 2000/015

Voltage: 230
Result: Electric shock
Location: Domestic

An individual received an electric shock when touching the electric fry pan thermostat. The phase wire was exposed through the out sheath of the lead.

Number: 2000/019

Voltage: 230
Result: Burns
Location: Domestic

A man climbed next to a jammed roller door's motor to release the brake to allow the door to be moved manually. His watch contacted live parts and he received an electric shock that burnt his hand.

Number: 2000/031

Voltage: 230
Result: Electric Shock
Location: Domestic

A teenager received an electric shock from a table lamp when she used a hair clip to operate the switch. The plastic cover on the switch was broken and the live metal plunger was exposed. She used a hair clip to push down on the metal plunger and received an electric shock and burns to her finger. The table lamp was disposed of.

Number: 2000/048

Voltage: 11,000
Result: Burns
Location: Works

A 15 year old received serious burns when he made contact with live parts on a berm-mounted 11,000 volt oil switch unit. It appears that the busbar extension end cover had been removed previously by unauthorised persons. The youth was removing the heat shrink cover from one of the busbars when a flashover occurred.

Number: 2000/050

Voltage: 230
Result:: Electric Shock
Location: Domestic

A newspaper article reported that a five-year-old boy had received severe burns to his thumb and middle finger after playing with a power cord. The police officer that visited the scene said the cord had plugs at both ends and one of them was plugged into a live socket.

An electrical inspector was contracted to visit the scene of the accident for investigation.

Number: 2000/053

Voltage: 230
Result: Electric Shock
Location: Commercial

A student received an electric shock while plugging a light into a lighting rail. The lighting rail had not been switched off.

Number: 2000/056

Voltage: 230
Result: Electric shock
Location: Domestic

A homeowner came into contact with live overhead service main cables when he was painting his house. The service main had deteriorated near the point of entry, exposing the phase and neutral conductors.

The local supply authority carried out a survey of the condition of service mains in the area and also sent out flyers warning of the danger of working near service mains.

Electrical accidents must be notified immediately (section 16 of the Electricity Act 1992). This can be done by freephone on: **0800 104 477**

An Electrical Accident Notification Report must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

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Part 4

Gas Workers



Date: 10/04/1998

Location: Napier City

Gas type: LPG

Accident type: Fire

Description of loss: A gasfitter was hospitalised with first and second degree burns to the face, arms, and legs.

Events summary: An additional pipe from a LPG tank to a vapouriser was being installed. The craftsman gasfitter thought that he had closed down the vapouriser and that the vapouriser pilot flame had been extinguished. He then proceeded to purge the line of air by opening the valve at the tank. LPG escaping from the open end of pipe in the vapouriser compound ignited and burnt another gasfitter stationed there as an observer. The craftsman gasfitter reportedly turned off the LPG immediately and the victim was treated with cold water. Ambulance and Fire Service were called. The pilot light was extinguished and the pipe connected to the vapouriser was purged. The maintenance consultant had instructed contractors not to proceed without his supervision.

Date: 09/10/1998

Location: Wellington City
Gas type: Natural
Accident type: Fire and explosion

Description of loss: Flash burns to two gas contractors, one treated and discharged, other hospitalised with moderate to serious burns to face and throat (from inhalation). Water and explosion damage to house. The window of the house opposite was blown in.

Events summary: Two mains and service contractors were shifting a residential service without first isolating at the mains. Service had been excavated and cut at the base of the meter riser when the initial explosion occurred. Ignition was probably from an electric jackhammer used for excavation. A gas fire extended to a wall of the house and the workers tried to extinguish it by backfilling a trench and using a garden hose.

Shortly after the arrival of the Fire Service, a second explosion occurred, blowing weatherboard off the house and breaking windows in the house opposite. A third, less intense, explosion occurred some minutes later. Gas may have migrated under the house due to the trench backfilling.

Date: 27/09/1999

Location: Manukau City
Gas type: Natural
Accident type: Explosion

Description of loss: Gasfitter hospitalised for four days with fractures to his lower back and bruising. Moderate damage to oven (distortion of side panels and doorframe); appliance out of operation until cause determined.

Events summary: A factory had five direct-fired commercial ovens in continuous use for drying cereals. Following a three-monthly servicing (which found no significant problems), erratic operation of one oven was reported. A gasfitter noticed unburned products of combustion and confirmed high CO and O₂ output using a flue gas analyser. While the gasfitter was working on an oven, an internal explosion blew the oven door open, knocking over the ladder. The gasfitter was admitted to hospital with injuries to his head and lower back suffered in the fall. The Occupational Safety & Health Service was notified, and the other four gas-fired ovens on the site were checked. The investigator concluded probable ignition of carbon monoxide build-up inside the oven, by flame run-on following burner lockout, or burning product.

Part 5

Other Occupations



Date: 02/06/1998

Location: Wellington City

Gas type: Natural

Accident type: Overheating

Description of loss: Water damage, major to floor and ceiling, also loss of food. The restaurant was out of commission for a week.

Events summary: Hot flue gases from a water heater triggered the sprinkler system. The water heater's flue was displaced. A contractor working on re-roofing may have disturbed the flue.

Also noted: the accident revealed non-accident related charring of wooden framing close to the flue due to inadequate clearances.

Date: 24/07/1998

Location: North Shore City

Gas type: LPG

Accident type: Explosion

Description of loss: The death of a worker from severe head injuries. Another worker received medical attention for flash burns, lacerations and concussion. There was extensive damage to a bakery oven and factory.

Events summary: An engineering company was contracted to refurbish bakery equipment. A gas-fired oven surplus to New Zealand requirements was to be renovated for shipping overseas. While refurbishing the oven, the technician noticed a "too rich" smell

of gas on passing the oven door, and immediately turned the oven off at the control box. He then went to shut off the gas supply at the control box. Two or three seconds later, an explosion inside the oven blew the oven door off its hinges. The door landed on an electrician, and the service technician was also injured. Another employee turned off the LPG at the cylinder immediately. Ambulance were called and took the injured men to hospital. Police and the Occupational Safety and Health Service were notified at the request of the Ambulance Service. The electrician died the following day.

The explosion cause was not definitely determined, but it was probably the build-up of LPG from the relieving regulator, drawn into the oven by an air circulation fan, where an explosion was ignited by the hot external surface of the combustion chamber.

Date: 26/09/1998

Location: Hamilton City
Gas type: Natural
Accident type: Fire, gas leak or escape

Description of loss: Substantial damage to building (corner and roof) and 30 tonne hoist.

Events summary: The company reconditioned transformers in a six month old building. A pipe bend downstream of the meter had a small hole that had been galvanised over during manufacture. Work on a safety valve immediately

upstream from the bend, the previous month may have initiated a leak suspected to have been ignited by an overhead electrical cable arcing. Once fire had started, the pipework melted, releasing a full flow of gas into the fire. A solenoid valve eventually closed, cutting fuel to fire, possibly when a cable supplying the valve burnt through.

Date: 18/10/1998

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: Two people hospitalised with burns and smoke inhalation, one for three to four days. Fire damage to a workshop building.

Events summary: A LPG torch in a workshop was used to remove air bubbles from resin in a badge-making operation. A torch was accidentally knocked off a bench, starting a fire. A man suffered burns trying to get to cylinders, which vented. The wind spread the fire to a fence, outbuildings and an 11,000 volt line. The Fire Service extinguished it and an ambulance took two people to hospital.

Date: 13/12/1998

Location: North Shore City
Gas type: Natural
Accident type: Fire, gas leak or escape

Description of loss: Worker hospitalised for two days with moderate burns to arms, leg and face.

Events summary: A telecommunications contractor using a heatshrinking torch on a telecommunications cable melted through a nearby medium pressure polyethylene service pipe. This caused gas to escape, ignition and moderate injuries. The worker had been using an insulation blanket but had not moved it in step with work.

Date: 16/05/1999

Location: Auckland City
Gas type: Natural
Accident type: Explosion

Description of loss: Large furnace severely damaged, minor damage to building.

Events summary: A furnace was started up and the main flame ignited and the temperature rose to operating temperature. Then the main flame went out, triggering 'flame out' and 'burner lockout' alarms which shut the furnace down automatically. On the second attempt, re-ignition was successful, but the flame failed again, but this time the failure was apparently not registered by the flame supervisor unit, so no alarms went off. Gas and air mixture continued

to flow into firebox at low flame rate until an explosion severely damaged the furnace. The burner lockout alarm only came on afterwards. Although the plant was operating correctly, deficiencies were found in flame sensors that might account for the explosion.

Date: 24/09/1999

Location: Hamilton City
Gas type: Natural
Accident type: Other

Description of loss: A mains worker was hospitalised for observation for two days. Damage to power cable.

Events summary: A mains worker employed by a contractor to a gas company was working in a bellhole in a driveway. Mistaking a yellow coloured 400 volt power cable for a polyethylene gas pipe, he cut into it with hand-operated power cutters. He received an electric shock requiring hospitalisation. The cable was repaired and the bellhole backfilled.

Note: Also recorded in Notifiable Electrical Accidents as 99/50.

Date: 07/01/2000

Location: South Taranaki District
Gas type: Natural
Accident type: Explosion

Description of loss: Extensive damage to a drier drum, burner, feed screws and gas pipework.

Events summary: An explosion occurred at a factory processing animal by-products in a gas-fired dryer normally in continuous operation. Extensive damage to the appliance resulted. The controller was found to be of a type that requires daily shutdown for safety reasons. No definite cause was found. A malfunction of the controller was possible as the type was inappropriate for the installation.

Date: 20/01/2000

Location: Manawatu District
Gas type: Natural
Accident type: Fire

Description of loss: Damage to a burner fan impeller and loss of about 16 hours production.

Events summary: At a factory there had been trouble with a pressure switch on a printing machine making lamination for packaging. The exhaust damper controlling combustion products and process vapours were apparently adjusted to increase the drying temperature. It may have been closed off too far, causing backpressure to the burner and flame reflux into the fan

casing (solvents from the process were probably involved as well). Staff shut down the machine and called the Fire Service.

Date: 04/02/2000

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: A factory was gutted, with 90% structural damage and 95% of contents destroyed at a cost of \$18M. Four fire-fighters were taken to hospital. All were discharged the same day.

Events summary: An industrial fryer had been having combustion problems (overheating). An extraction fan had been installed, and flue shielding reinforced after an earlier fire in the ceiling near the flue, but a cooling fan was still required.

On the morning of the fire, there was an electrical fault in the cooling fan, so the fryer was left running on low. Signs of overheating were noticed about an hour before the fire alarm was triggered and the building evacuated. Shift engineers on the roof saw flames around the flue and turned the fryer off. The Fire Service arrived promptly, but most of the production area was involved, and the LPG supply pipe ruptured. The factory was gutted and four fire-fighters received minor injuries.

The seat of the fire was a hot spot where the flue passed through steel-clad polystyrene ceiling tiles. Negative air

pressure in the factory (due to the number of extraction fans) impairing combustion in the fryer was an underlying factor. Metallurgical evidence indicated flue temperatures around 470°C at the hot spot. Expanded polystyrene liquefies when overheated, and forms a combustible gas above 200°C.

Date: 19/02/2000

Location: Christchurch City
Gas type: LPG
Accident type: Explosion, gas leak or escape

Description of loss: Two people were hospitalised. There were burns to the face, hands and elbows of one who received the main blast. He required lengthy treatment following discharge. There was slight damage to a caravan.

Events summary: A caravan with LPG installation was hired to a race track for heating and selling food. When the gas fryers were ignited an explosion occurred, injuring two people. They were taken to hospital and race track officials put out the fire. Leakages were found at several points of installation including an open T-joint with no plug. This meant that gas was passing freely from an 18mm hole. The hire company had been modifying the LPG installation to suit the purposes of hirers. Although the supply cylinders were 20kg, the hire company had not been using gasfitters.

Date: 22/06/2000

Location: North Shore City
Gas type: Natural
Accident type: Fire

Description of loss: There was significant damage to an 11,000 volt electrical cable and to overhead telephone lines. Minor burns to the hands of a cable jointer. Surrounding structures were damaged by fire or heat.

Events summary: A power company was moving an 11,000 volt cable underground. A cable jointer was in the excavation heatshrinking with a LPG torch, in preparation for joining the overhead line to the underground 11,000 volt line. The worker inadvertently played the LPG torch on the gas service, which ruptured and ignited. The resulting fire then ruptured and ignited the gas main. The fire occurred around 2:00 p.m. The Fire Service were notified of the gas fire around 3:15 p.m. Fire-fighters stood under partially burnt overhead lines to play hoses on a house at risk. A double squeeze-off was carried out by an emergency response crew, and the gas was shut off by 4:30 p.m. Significant damage was done to nearby utilities and house exteriors.

There was a failure to use appropriate protection for exposed gas services, and an apparent lack of awareness of the hazard. The worker involved was experienced, but had no specific training in gas hazards and there was no heat blanket on the site. It was also noted that he was alone in trench at the time after working a full day.

Date: 11/09/2000

Location: Hutt City
Gas type: Natural
Accident type: Fire

Description of loss: There was fire and water damage to a heater, roof and surrounding area. This caused lost business.

Events summary: Water reportedly entered a café near a gas-fired water heater, during a rainstorm four days prior to the fire. About that time, a heat-associated smell was noticed, but was dismissed when it was not confirmed. The Fire Service was called after automatic fire alarms were heard and smoke was seen in the roof area. Fire had started in the ceiling space above an alcove at the entrance to the kitchen. This contained the distribution switch board and water heater. There was considerable damage to the heater, roof and surrounds. The fire was possibly caused by the proximity of the flue to an inadequately protected wooden roof beam. It was also noted that the electrical wiring was too close to the flue.

Date: 05/12/2000

Location: Wanganui District
Gas type: Natural
Accident type: Overheating

Description of loss: A water heater was damaged beyond repair.

Events summary: Natural gas water heaters were being installed outside four new chalet cabins in a holiday park. A new section of service with a riser behind each unit had been laid the previous week. After commissioning, the occupants of the chalet had noticed a smell of gas, but were aware of gas work and merely closed the window. But when the hot water was turned on, there was a distinct bang, and the flow stopped. Water was gushing under the building. The problem was reported to the park office. The caretaker discovered that the water heater was very hot, turned off the power and water toby, and then called the installer.

There was overheating due to failure of the solenoid valves to close when the water flow stopped. Apparently gas continued to burn so the water in the heat exchanger boiled. The investigator concluded that there was damage to solenoids that must have been due to overpressuring, most likely from brief exposure to the test pressure of the new pipe before the appliance was commissioned.

Part 6

General Public



Date: 03/02/1998

Location: Wellington City

Gas type: Natural

Accident type: Gas leak or escape, fire

Description of loss: Extensive fire damage to water heater, and damage to timber wall behind.

Events summary: A new external instantaneous water heater had been fitted that morning.

After using the shower around 4 p.m., the resident noticed smoke coming in an upstairs window and looked out to see the new water heater on fire. He turned off the gas supply at the meter and called the Fire Service. The fire was controlled quickly and the water heater checked. A mismatched pipe union under the appliance had leaked. The installer was not a registered gasfitter.

Also noted: the unit was mounted on combustible surface (timber wall) without a fireproof sheet as recommended by the manufacturer. However, the investigator did not consider this a factor in the accident.

Date: 05/02/1998

Location: Whangarei District
Gas type: LPG
Accident type: Gas inhalation

Description of loss: Death due to asphyxia from accidental inhalation of LPG.

Events summary: A family was preparing for a camping trip. The victim stayed at home to pack while his wife went shopping with the children. He dismantled the barbecue for travelling; the cylinder was disconnected with the flexible hose and regulator still attached. He took the grillers and cylinder into washroom, apparently to clean them. It is suspected that he was affected by LPG escaping from cylinder valve, and collapsed soon after. On arrival home, his wife called to him, but got no response. She entered the washroom by the carport door and found him slumped on the floor against the wall. There was a strong smell of gas, and she could hear it hissing from cylinder sitting on washing machine. She turned the cylinder valve off and rang for the ambulance. Resuscitation was attempted, but the man was already dead.

Date: 15/04/1998

Location: Tasman District
Gas type: LPG
Accident type: Fire

Description of loss: House burnt out.

Events summary: The householder connected an unused cylinder and attempted to ignite the cabinet heater for first time since the previous winter. When the igniter was pushed, it flared more than usual at the ceramic plaque, so no further attempt was made to start it. Two more flare-ups followed, with flame running from base of heater up the front face, reaching about 6 feet. Unable to reach the gas valve and turn it off, the owner decided to shift the heater outside through kitchen. There he caught it on a mat, tipped over backwards, and the cylinder fell out of the heater. He tried to douse the fire with a bucket of water – to no avail. The hose had parted from heater, and the loose end was spraying a jet of burning gas around the kitchen. The householder and his companions dialled 111 and left the house. The Fire Service got the fire under control within 15 minutes of arrival, but the house was gutted.

Date: 05/06/1998

Location: Hutt City
Gas type: LPG
Accident type: Fire

Description of loss: Fire damage to lounge, bedroom, and roof of house. Loss of contents. Three people were taken to hospital suffering from mild smoke inhalation.

Events summary: A tenant lit a cabinet heater in the lounge early in the morning and went to shower as usual. About five minutes later, they were alerted by voices and smoke entering around the bathroom door. They discovered fire in the lounge. A smoke alarm in the hall was not activated. Two other tenants also saw flames shooting from the back of the heater up the wall. The tenants left the house, and the fire took hold, causing significant damage. The fire was brought under control in 30 minutes. The Fire Service noted clothing around the heater. The investigating Fire Safety Officer also considered that the heater was too close to combustible furniture.

Date: 03/06/1998

Location: Timaru District
Gas type: LPG
Accident type: Fire

Description of loss: Fire damage to flat. Death of pets.

Events summary: Clothing was drying on a fireguard about 45cm (operating instructions require a 75cm distance) in front of a cabinet heater. The heater was supplied by a cylinder that had been filled some time before the accident. Fire broke out. The occupants escaped and called the Fire Service, but the flat was severely damaged.

Date: 14/06/1998

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: Extensive fire and water damage to the interior of a two-storey house.

Events summary: A cabinet heater was in a second-floor bedroom, where there were also candles. Gas leaking from cylinder valve was ignited, apparently by candle flame. It is not known if the heater was going. The resulting fire caused extensive damage to interior before being extinguished by the Fire Service.

Also noted: use of cabinet heater in sleeping quarters.

Date: 02/07/1998

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: Minor fire damage.
Cost of restitution.

Events summary: The householder had prepared an existing fireplace (infilling) using standard 9mm plasterboard and timber framing. A heater was installed by the gas company but no certificate was issued. On the afternoon of the incident, the heater was lit as normal. The householder was in the room when he noticed smoke issuing from a hole above the heater and called the Fire Service. They removed the surround and extinguished the fire before major damage occurred. The timber framing that was too close to the deflector plate on the heater had dried out and spontaneously combusted. The fireplace was subsequently relined with fire resistant rock board and the heater replaced by a similar one.

Date: 27/07/1998

Location: Wellington City
Gas type: Natural
Accident type: Fire

Description of loss: Fire damage to a stove and timber walls and the ceiling of a kitchen in the vicinity, extending into roof. Fire damage to a water heater (had to be removed). Smoke damage to dining room.

Events summary: The residents left the house on business, forgetting a pot of cooking oil being heated to fry chips. The oil boiled over and caught fire.

Date: 11/09/1998

Location: Wellington City
Gas type: Natural
Accident type: Incomplete combustion
(CO poisoning)

Description of loss: Death of a young woman. Possible mild poisoning of another person.

Events summary: An instantaneous multipoint water heater installed in the bathroom supplied a bath/shower and hand basin in same room. The woman was found dead in the bath. The coroner's inquest found death by drowning while unconscious from carbon monoxide poisoning, caused by faulty gas water heater installation.

The room was poorly ventilated. Debris from the fibre cement flue had partly blocked the heat exchanger and allowed

spillage of combustion products under light wind conditions. The short height of the heater's flue and the small size of the bathroom had led to a build-up of carbon monoxide. The coroner's inquest also recommended a review of gas heater standards and more formal training in their construction, installation and design.

Date: 06/12/1998

Location: Christchurch City
Gas type: LPG
Accident type: Gas Inhalation

Description of loss: Death of youth from inhalation of lighter refill gas.

Events summary: The cause of death was found to be self-administered inhalation of butane gas from an aerosol can, resulting in displacement asphyxia. Death being unintended.

Date: 28/12/1998

Location: Wellington City
Gas type: LPG
Accident type: Explosion

Description of loss: Damage to barbecue, windows (blown out), awnings, decking and other nearby furniture.

Events summary: A gas barbecue was in use on a balcony outside a fourth floor city apartment. There was a flash and explosion that caused some damage to surroundings but injured no one. Pressure relief was activated. The Fire Service attended and ten people were evacuated from the building. A loose connection was found.

Date: 04/01/1999

Location: Nelson City
Gas type: LPG
Accident type: Explosion, fire

Description of loss: Moderate burns to face, arms and hand; severe burns to one leg. Destruction of garage and contents, including two cars. Substantial damage to the dwelling and contents.

Events summary: A couple just back from holiday had parked their station wagon in the garage, with the motor still running. While the wife went into the house, the husband began unloading the luggage. When a bag was lifted, its strap caught on the valve of a cylinder lying on its side in the rear of the car, and liquid LPG escaped. Before the husband could

turn off the valve, gas exploded, throwing him out of the garage and causing burns. He went to warn his wife, who was already calling emergency services. Fire took hold rapidly as the full cylinder continued to vent. Two cars, a garage and part of the house were destroyed. A second explosion occurred shortly after the first crew of firefighters arrived. The injured man used a neighbour's shower while awaiting an ambulance.

Date: 20/03/1999

Location: Manukau City
Gas type: LPG
Accident type: Fire

Description of loss: Death of young boy. Woman hospitalised with burns. Fire damage to building.

Events summary: A fire occurred in a sleepout - a converted garage connected to house, which had no smoke alarm. A relative tried to rescue the young boy, but he died in fire and she was hospitalised with burns. The Fire Service heard a hissing sound at the scene, and found a 9kg LPG cylinder with a valve open, along with cigarette lighters.

The Fire Service believes that the child was playing with a cigarette lighter and turned on the cylinder.

Date: 04/04/1999

Location: Manukau City
Gas type: Natural
Accident type: Explosion

Description of loss: The death of man from pneumonia following serious burns (30%) to his face, arms and upper body. Moderate explosion damage to kitchen, ceiling razed, some charring of woodwork and paint, and plastic fittings melted.

Events summary: A tenant who was an experienced handyman had previously carried out repairs on a gas cooker in his flat. On the evening of the accident, it was apparently giving trouble, so he partially dismantled it before going to bed. In the process, a burner control valve may have been inadvertently turned on. At about 11:00 p.m., unable to sleep, he got up and decided to try out the grill by making toast. When the grill ignited, accumulated gas in the kitchen also ignited in a flash explosion, causing serious burns to his upper body, head and arms, but only moderate damage to room.

Having doused himself in a cold bath, the tenant, who had no phone, went to a neighbour's house for help. The Fire Service and Police were notified, and an ambulance was sent to take him to hospital. The injured man died in hospital three weeks after the accident.

Date: 16/04/1999

Location: Invercargill City
Gas type: LPG
Accident type: Other

Description of loss: Young child hospitalised for about three weeks with burns to his back.

Events summary: A four-year-old boy was playing with toys on a hall carpet near a gas heater, apparently by himself. When the thermostat on the heater increased gas flow, a puff of flame ignited child's night attire. He received burns to the back requiring hospitalisation for about three weeks. There was no evidence of malfunction in heater, which is still in use.

Date: 18/04/1999

Location: Waimakariri District
Gas type: LPG
Accident type: Fire

Description of loss: Total loss of lounge fittings and furniture, and ceiling and roof trusses were charred. Heat damage to dining room and kitchen.

Events summary: A cabinet heater spluttered when operated on low, so the owners no longer used this setting. They had returned another heater and complained to the retailer about noise, but were assured that this was normal. The cylinder had been refilled the previous day and used for two hours with the heater on medium.

The house was left in the charge of a friend of the family while the owners were away overnight. Unaware of the problem with the heater, which he had never used, he turned it on low, noting that the ignition was slow and noisy. Later that evening, he went out leaving the heater going unattended in corner of lounge. A neighbour noticed the fire soon after midnight, and Fire Service was called. Damage was mostly confined to lounge.

Date: 01/05/1999

Location: Palmerston North City
Gas type: Natural
Accident type: Gas leak or escape, fire

Description of loss: Severe burns to the right side of face around the eye.

Events summary: A resident was using a hotplate when he noticed a strange flame. He bent down to look under the bench and saw that it was coming from the supply pipe. Reaching to turn off the isolation valve, he received burns to the face.

A gasfitter attended the same evening to test the installation. The pressure was correct with the hotplate still isolated, but dropped with it back online. The union between the valve and the appliance regulator was found to be less than hand tight, and the problem was remedied by tightening this joint.

Date: 06/05/1999

Location: Wellington City
Gas type: Natural
Accident type: Fire

Description of loss: Serious fire damage to a house, particularly the hall and ceiling. Building uninhabitable.

Events summary: A space heater in an upstairs hallway was going when three tenants in the lounge smelt smoke. Seeing a fire had started in the ceiling void, they raised the alarm and left. The Fire Service called the gas company for assistance. A member of the gas company leakage crew attended and shut the valve at the gas meter (access was difficult as the outside stairs had been built over the meter). Severe localised damage to the house occurred. The Fire Service noted displacement of the flue and asked the gas company to provide assistance with the heater. The fire was probably caused by pyrolysis of timber framing due to disengagement of the flue from the heater. Hot gases were unlikely to have caused immediate ignition, but would pyrolyse the timber leading eventually to spontaneous combustion. High winds reported on the day of the fire would exacerbate this.

Date: 11/06/1999

Location: New Plymouth District
Gas type: Natural
Accident type: Gas leak or escape, explosion

Description of loss: Structural damage to study: wall linings forced out, ranch slider windows shattered; also garage roller doors buckled. House owner treated at hospital for cuts to the head and hand.

Events summary: The house was built and connected to gas in 1973, and the original carport was converted to a garage and study some time later. The gas service line ran under the carport. The year before the accident, the owners were provided with a "scratch and sniff" folder containing advice on what to do if they smelt gas. A gas odour was noticed outside the house the week before the accident, but it was not reported to the gas company. The owners were unaware of the service line under the garage so the smell was taken to be mildew caused by water leak.

After evening work in the study, the owner turned off the switch at the socket supplying a lamp and electric heater. An explosion occurred, forcing him back from the desk and causing minor injuries and some structural damage. The Fire Service were called in, made the scene safe and called the gas company. The owner was treated in hospital and discharged the same evening. A corroded steel service was found and later replaced by polyethylene.

Date: 29/07/1999

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: Lounge and kitchen gutted, smoke damage to bedroom and internal porch. Total contents loss.

Events summary: A cabinet heater in the lounge was burning on one plaque. Two pre-school children were in the lounge while their mother showered. When she returned about five minutes later, the lounge was engulfed in flames. The cabinet heater was found lying on its side against the remains of the sofa. The cabinet heater was either too close to combustible materials or tipped over. The Fire Service were unsure if water spray from a hose would have overturned it. However it was noted that the heater was easily moved, as it was on castors.

Date: 02/09/1999

Location: Hutt City
Gas type: LPG
Accident type: Explosion, fire

Description of loss: Two people were hospitalised with moderate burns. A flat was gutted with severe damage to another, smoke damage to two others.

Events summary: A hired LPG cooker in the flat was lit around lunchtime. During cooking, a hiss of gas from the cylinder was heard. After about an hour, an explosion occurred, injuring two of the four occupants and causing severe damage. Three adjoining flats were empty. A pupil at a nearby school raised the alarm. The Fire Service attended and the injured were hospitalised with moderate burns.

Gas accidents and incidents must be notified immediately (section 17 of the Gas Act 1992). This can be done by freephone on: **0800 104 477**

A Gas Accident and Incidents Notification Report must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

A report form can be found at the back of this book and online by visiting the Energy Safety Service web site at:
www.ess.govt.nz

Date: 02/09/1999

Location: Wellington City
Gas type: Natural
Accident type: Fire

Description of loss: Extensive fire damage to flat, especially in the ceiling area. Tenants obliged to move out.

Events summary: A flat had been vacant about six weeks, during which the gas had been cut off and the meter removed by an unidentified agent. New tenants in the flat had no hot water, and so contacted the landlord. The landlord called the “plumber” who usually serviced his properties, instructing him to make the gas operational and liaise with the tenants.

The tenants were unable to obtain satisfactory hot water the next day and after an attempt in the evening, heard a crackling noise behind the heater and discovered fire. The Fire Service was called and then both tenants left the house as fire had already reached the roof. The fire spread rapidly and caused extensive damage. Disengagement of the flue from the flue spigot had permitted hot gases to enter the wall cavity and ignite timber. Repiling of the building the week before the accident may have dislodged it.

Also noted: the “plumber” called in by the landlord had previously been employed without any problems. However, he was not registered or authorised to carry out gasfitting.

Date: 14/10/1999

Location: Wairoa District
Gas type: LPG
Accident type: Explosion

Description of loss: Third degree burns to the palm of the right hand, off work all week, and possibly requiring surgery. Superficial burns to the face and other hand.

Events summary: A hunter in a bush hut with a companion got out of his sleeping bag, zipped up his swanndri and went to start the camp cooker. He found the valve of the cooker inadvertently left open. In pushing a replacement cartridge in place, the cartridge was punctured by the valve stem before fully attached to the cooker. As he tried to close the valve, gas ignited in a fireball, apparently caused by static electricity (probably from the nylon sleeping bag and long woollen swanndri jacket with a nylon zip). He received severe burns to one hand.

Also noted: The canister was being changed indoors, contrary to good practice and in poor light. Cold and lack of air movement in the hut allowed vapour to accumulate.

Date: 12/11/1999

Location: Wanganui District
Gas type: Natural
Accident type: Fire

Description of loss: Considerable damage to property and chattels, loss of trade.

Events summary: At a restaurant, a wok containing fat flared up and ignited a filter in the extractor system. The resulting fire in turn set the building alight, causing considerable damage. In the previous few weeks, four new wok burners and new pipework for the cooking bench had been installed, work for which no certification had been received at the time of the accident. Although recent gasfitting was not thought to have contributed to the fire, the outlet was disconnected until the installation was tested and certified.

Date: 18/11/1999

Location: Auckland City
Gas type: Natural
Accident type: Gas leak or escape, explosion

Description of loss: The electrical switchboard of an apartment block was badly damaged, and the roof of the switchboard room blown off. The glass framing of the apartment entrance and atrium were badly damaged, with many broken windows. There was structural damage to an adjacent garage and lesser damage to the doors of an adjacent garage.

Events summary: In 1991, a gas company carried out high-pressure rehabilitation in the area. A new polyethylene service was inserted into the old service by contractors. They had procedures for identifying and removing items such as valves with a minimum of evacuation, but in this case they did not remove the old gate valve or block the access hole. At some stage, a round toby cover that more closely resembled a water toby was installed replacing the standard gas toby. The actual water toby with almost identical valves was within a few centimetres.

On the afternoon of 17 November 1999, several residents saw a man working on the "water" tobies. None of the residents had hired anyone to carry out work on plumbing or gas, and the water utility has no record of any work done there. The workman mentioned a smell of gas to some. Residents smelled gas that

afternoon and also noticed a lower than normal gas pressure in their appliances, but they did not report this to the utility. The gas exploded at around 6:10 a.m. the next morning in the electrical switchboard room for the building. Ignition probably occurred when the security lighting was automatically switched off. After the explosion, a valve on the old service was found to have been screwed down (probably by the workman seen previous day), squeezing shut and severing the inserted polyethylene service.

Date: 08/12/1999

Location: Wellington City
Gas type: Natural
Accident type: Fire

Description of loss: Extensive fire damage to house.

Events summary: The building was vacant and available for sale or lease. Fire causing extensive damage occurred when the building was apparently unoccupied. There was evidence of gas usage after the final customer meter reading was found. There were investigations by the Police and the Fire Service. The meter indicated that one cubic meter of gas had been used since the final customer reading. There was also evidence of a sofa in close proximity to heater.

Date: 18/03/2000

Location: Manawatu District
Gas type: LPG
Accident type: Explosion

Description of loss: A man was hospitalised with severe burns. An explosion caused damage to the caravan.

Events summary: The occupant of a caravan had used a cooker the night before the accident. The supply was reportedly not isolated at the cylinder. The next morning the occupant went to boil water and when the cooker ignited a flash appeared at a low level. He reportedly did not smell gas. He had turned to the door when the explosion occurred, blowing him outside and causing extensive damage to the caravan. The Fire Service attended and found both taps of the cooker on full and that the plastic hose of the cylinder had come off the cylinder with the force of the explosion. The gas may have been left on from the previous night. Poor ventilation may have lead to gas build-up at a low level.

Date: 04/03/2000

Location: Christchurch City
Gas type: LPG
Accident type: Fire

Description of loss: Damage to a refrigerator unit, caravan window and exterior walls.

Events summary: A caravan owner connected a refrigerator onto the gas supply to check if it would cool. The unit had just been installed the day before. The controls were at the bottom of the appliance close to the LPG hose. After four hours, the refrigerator caught fire. The owner called the Fire Service, turned off the gas and played the garden hose on the fire. The LPG hose was too close to the combustion chamber. There was also possible overheating of the combustion chamber.

Date: 28/04/2000

Location: South Wairarapa District
Gas type: LPG
Accident type: Incomplete Combustion (CO Poisoning)

Description of loss: A couple were hospitalised with suspected carbon monoxide poisoning.

Events summary: Two tourists were staying in a cottage on a farm station. The LPG griller was being used as a heater, possibly in the sleeping area. Before the accident, the griller had been run for 24 hours and then turned off at midnight. One person had felt dizzy the night before the incident. The man woke in the night with breathing problems and went to the toilet with an open window where he found it difficult to stand up. Returning to the sleeping area, he found his wife unconscious. He crawled out to get help. His wife was taken out to fresh air and after about 15 minutes she gradually regained consciousness. The Ambulance Service was called, and a rescue helicopter using high-flow oxygen took the tourists to a hospital within two hours of incident. They were both discharged from hospital not long after arrival.

Carbon monoxide poisoning was attributed to a build-up of carbon monoxide from incomplete combustion in the gas griller. The griller was not designed for use as a heater and was 15-18 years old.

Date: 07/08/2000

Location: South Taranaki District
Gas type: LPG
Accident type: Fire

Description of loss: Fire damage to a kitchen.

Events summary: The occupant of a flat had a 12" stainless steel pot on a camping ring burner and was trying to heat it on the slow setting. This was left on for about five hours. The cooker burned through the wooden bench underneath and tipped over, pointing at a wall, which then ignited. The fire station was situated opposite the flat and were able to act quickly, so only localised damage was caused before the fire was extinguished.

Date: 18/08/2000

Location: Rotorua District
Gas type: LPG
Accident type: Explosion

Description of loss: Three windows of a caravan were broken, two others were distorted by the blast. There was minor fire damage to the interior.

Events summary: A LPG cylinder, purchased three months before, was refilled on the day of the accident with some difficulty, and connected to supply the caravan stove. The owner and a lodger were inside the caravan when there was a rush of gas and an explosion in the oven. Neither were injured, but several windows were broken or distorted. There was evidence that a ring inside the QCC fitting was damaged.

Date: 20/08/2000

Location: Kawerau District
Gas type: LPG
Accident type: Fire

Description of loss: There was extensive fire damage to a living room and contents. Smoke damage elsewhere.

Events summary: A second-hand cabinet heater was operating in the living room. It caught fire and set the curtains alight. There was extensive damage to the living room before the fire was extinguished by the Fire Service. There had been ignition of a gas leak from the hose or connection area. A faulty hose connection was suspected. The heater, bought at a garage sale about three weeks before the fire, had not been serviced, and had only been used for three days.

Date: 13/09/2000

Location: Wanganui District
Gas type: Natural
Accident type: Fire, gas leak or escape

Description of loss: There was internal damage to a cooker - possibly beyond repair.

Events summary: The oven had been turned on prior to the incident. When the top gas rings were lit, a slow ignition and flash of gas to the side was noticed, but there were no obvious problems so the tenants continued cooking. Then the smoke alarm went off, and they found flames coming through the sides of the cooker at the connection to the hob, and also through the front tap hole. The tenants called the Fire Service, turned off the oven and hob taps, and doused the cooker with water.

The leakage was caused by a blockage at the hob burner venturi due to the removal of fibreglass insulation from the oven sides to the top of the stove by mice. The air intake port into the venturi of the right front hob burner was partially blocked, so some gas spilled and accumulated below the hob spillage plate. This gas was smelled by the tenants. There was also burning around the gas control tap and injector evidence of light-back prior to the incident.

The tenants had moved into the house (unoccupied some months) a few weeks before the incident. Gas supply was reinstated and soundness tested by the

supplier's gasfitter, but not the appliance as no one was home. The cooker was later checked by another gasfitter because of the smell of gas when in use. He tested the flame failure connection and repaired a small leak at the meter, but did not do a full leakage test, assuming the supplier had done so before occupation.

Date: 07/12/2000

Location: Upper Hutt City

Gas type: Natural

Accident type: Explosion and fire

Description of loss: There was extensive structural damage to a house. The owner was taken to hospital for observation after suffering smoke inhalation.

Events summary: Just after using hot water to wash her hands, the owner heard a muffled explosion. On investigation, she discovered brown smoke in the vicinity of a water heater and called the Fire Service. The fire caused serious damage to the bathroom and laundry area. The cause was undetermined, but there was probably a gas leak in the control box area (possibly union to the pilot), followed by ignition of combustibles near the gas burner. Inadequate ventilation to the water heater cupboard was possibly a factor. The water heater had been serviced three times in four and a half years of ownership.

Gas accidents and incidents must be notified immediately (section 17 of the Gas Act 1992). This can be done by freephone on: **0800 104 477**

A Gas Accident and Incidents Notification Report must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

A report form can be found at the back of this book and online by visiting the Energy Safety Service web site at: www.ess.govt.nz



NOTIFICATION REPORT — Electrical Accidents



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Electricity accidents must be notified immediately.
(section 16 of the Electricity Act 1992)

The Notification Numbers are:

All hours accident notification service **0800 104 477**
Freefax **0800 SAFE ENERGY / 0800 723 336**

An **Electrical Accident Notification Report** must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

The address is at the bottom of this page

When reporting, please photocopy this form to preserve your book, or download a copy from www.ess.govt.nz

Details of victim

Name _____ Male Female

Address _____

Age _____ Occupation _____ Company _____

Place and time of accident

Place of Accident _____

Date of Accident ____ / ____ / ____ Time of accident _____ am pm

Causes

Description of accident (attach full details of accident including sketches/photographs) _____

Possible cause(s) of accident _____

continues 1/2

Injuries

Type of injuries (tick or number) Fatal Nonfatal
Was medical treatment required? Yes No
Was resuscitation applied? Yes No
Method of resuscitation _____

DAMAGE

Describe any damage or loss incurred by the accident _____

Name(s) of any witness, investigator or other person who could provide information _____

Address and contact number _____

EQUIPMENT INVOLVED

Equipment involved (type) _____ Voltage
Condition of equipment involved _____ Date Installed ____ / ____ / ____
Electrical protection involved (type) _____
Did it operate correctly? Yes No
If "No", state reason it did not operate _____

NOTIFIER

Name of person reporting accident _____
 Owner Occupier Regd. Person Employer Other _____
Company _____
Address _____

Telephone (____) _____ Facsimile (____) _____
Date ____ / ____ / ____

NOTIFICATION REPORT — Gas appliance and installation accidents



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Gas accidents must be notified immediately.
(section 17 of the Gas Act 1992)

The Notification Numbers are:

All hours accident notification service **0800 104 477**
Free Fax **0800 SAFE ENERGY / 0800 723 336**

A **Gas Accident Notification Report** must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

The address is at the bottom of this page

When reporting, please photocopy this form to preserve your book, or download a copy from www.ess.govt.nz

SECTION A Gas appliance & installation incidents or accidents

Date of incident ____ / ____ / ____ Time of incident _____ am pm

Address and/or exact location _____

Gas type

- CNG LPG Natural (except CNG)
 Tempered LPG Biogas

Accident type (tick all applicable)

- Fire Gas leak or escape Explosion
 Overheating CO poisoning (incomplete combustion)
 Other (please specify) _____

Environment

- Building Outside Caravan/mobile home
 Car, van or truck Other (please specify): _____

Losses involved (tick all applicable)

- Property damage Injury Fatality
 Other (please specify) e.g. lost time _____

continues 1/4

Equipment type (Tick all applicable and complete Section B)

- | | | | |
|---|---|--|------------------------------------|
| Appliance | <input type="checkbox"/> Commercial | <input type="checkbox"/> Industrial | |
| <input type="checkbox"/> Cabinet heater | <input type="checkbox"/> Fixed space heater | <input type="checkbox"/> Laundry dryer | <input type="checkbox"/> Vaporiser |
| <input type="checkbox"/> Barbecue | <input type="checkbox"/> Cooker | <input type="checkbox"/> Oven | <input type="checkbox"/> Fryer |
| <input type="checkbox"/> Light | <input type="checkbox"/> Water Heater | <input type="checkbox"/> Refrigerator | <input type="checkbox"/> Boiler |

CNG Station

- | | | |
|------------------------------------|--|---|
| <input type="checkbox"/> Dispenser | <input type="checkbox"/> Storage vessel | <input type="checkbox"/> Compressor |
| <input type="checkbox"/> Container | <input type="checkbox"/> Installation pipework | <input type="checkbox"/> Other (please specify) _____ |

Summary description of events surrounding incident or accident (attach sketches, photos etc)

Actions to ensure safety at scene (e.g. soundness test, odorant check, emergency services callout)

Description of loss (injuries, extent of damage, costs etc)

Causal Factor(s) (tick all applicable)

- | | | |
|---|--|--|
| <input type="checkbox"/> Alteration | <input type="checkbox"/> Assembly | <input type="checkbox"/> Carelessness |
| <input type="checkbox"/> Connection problem | <input type="checkbox"/> Design fault | <input type="checkbox"/> Filling of cylinder |
| <input type="checkbox"/> Installation | <input type="checkbox"/> Maintenance lacking | <input type="checkbox"/> Manufacturing defect |
| <input type="checkbox"/> Misuse | <input type="checkbox"/> Operator error | <input type="checkbox"/> Proximity to combustibles |
| <input type="checkbox"/> Record error | <input type="checkbox"/> Supervision lacking | <input type="checkbox"/> Third party damage |
| <input type="checkbox"/> Ventilation poor | <input type="checkbox"/> Working procedure error | <input type="checkbox"/> Workmanship lacking |

Suspected cause(s) and/or significant factors _____

Remedial action taken or recommended (to minimise the chance of recurrence elsewhere)

Owner / user or person working on or near equipment

Name _____ status (e.g owner, hirer, servicer) _____

Contact details _____

Occupation (of worker or user)

Gas Worker Other Worker General Public

Affected parties (person(s) affected by loss)

Name _____ Occupation (if relevant) _____

Contact details _____

Age (if relevant) _____

Notifier (person completing this form)

Name _____ Date notified _____

Other persons (person(s) who may assist with enquiries)

Name _____ Occupation (if relevant) _____

Contact details _____

Other reports (Attach, or provide name & contact details) _____

SECTION B Gas equipment details

Appliance

Manufacturer _____ Make _____

Model/serial no. _____ Manufacture date or age of appliance _____

Rating (output / pressure etc) _____ Date installed or purchased _____

Installer _____ Certifier _____

Last service details _____

Portable LPG

Regulator fitted? Yes No

Connection to regulator or cylinder (type)

Screwed by spanner Quick-fit / clip-on Q.C.C.

Screwed by hand (with spring Loading) Yes No

Other (please specify) _____

Container (type) _____ Refillable Disposable

Nett capacity of LPG container _____

Container & value details (markings) _____

Regulator details (make & markings) _____

Adaptor details (markings or type) _____

Installation (type) Pipework Flue Control / safety
 Device Building-related Ventilation

Pipe material PE Copper Steel
 Other (please specify) _____

Joining Weld & solder Mechanical Other (adhesive)

CNG station

Storage vessel Cascade Bottle test dates
 Bullet Relief setting Date ____ / ____ / ____

Compressor

Make _____ Model _____

Relief setting _____ Date ____ / ____ / ____

Dispenser _____

Make _____ Model _____

Hose markings Semiconducting ? Yes No

Other (please specify) _____

NOTIFICATION REPORT — Gas Distribution Accidents



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Gas accidents must be notified immediately.
(section 17 of the Gas Act 1992)

The Notification Numbers are:

All hours accident notification service **0800 104 477**
Free Fax **0800 SAFE ENERGY / 0800 723 336**

A **Gas Distribution Accident Notification Report** must also be completed. This should be filed with the Energy Safety Service within two weeks of the incident.

The address is at the bottom of this page

When reporting, please photocopy this form to preserve your book, or download a copy from www.ess.govt.nz

Date of incident ____ / ____ / ____ Time of incident ____ am pm

Address and/or exact location _____

Gas type (tick all applicable)

- Natural Tempered LPG
 Landfill

Accident type

- Fire Gas leak or escape Explosion
 Overheating CO Poisoning (incomplete combustion)
 Other (please specify) _____

Environment

- Building Outside Underground
 Other (please specify) _____

Losses involved

- Property damage Injury Fatality
 Other (please specify) e.g. lost time _____

Notifiable under the Gas Act?

- Yes No Not sure

continues 1/4

Equipment type

Main Service District regulator station
 Customer measuring station Sales gate station
 Meter Other (please specify) _____

Equipment details (Pipes)

Material PE Cast Steel
 Other (please specify) _____
Pressure HP IP MP
 LP Size _____ KPa/WG _____
Jointing Hf (heat) Ef (electro) Weld
 Mechanical Other (please specify)

Equipment details (regulators and meters)

Make _____ Model _____
Pressure _____ Last service details _____

Summary description of events surrounding incident or accident (attach sketches, photos etc)

Actions to ensure safety at scene (e.g. soundness test, odorant check, emergency services callout) _____

Description of loss (Injuries, extent of damage, costs etc) _____

Causal factor(s) (tick all applicable)

- | | | |
|--|-------------------------|---------------------|
| <input type="checkbox"/> Carelessness | Communications | Corrosion |
| <input type="checkbox"/> Design fault | Maintenance lacking | Material defect |
| <input type="checkbox"/> Misuse | Working procedure error | Record error |
| <input type="checkbox"/> Supervision lacking | Third party damage | Training inadequate |
| <input type="checkbox"/> Workmanship lacking | Other _____ | |

Suspected cause(s) and/or significant factors _____

Remedial action taken or recommended (to minimise the chance of recurrence elsewhere) _____

Owner / persons involved or reporting incident

Name _____

status (e.g employee, contractor) _____

Organisation _____

Contact details _____

Notifier (person completing this form)

Name _____

Date notified _____

Contact details _____

Other persons (person(s) who may assist with enquiries)

Name _____

Occupation (if relevant) _____

Contact details _____

Other reports (attach, or provide name & contact details)

Name _____

Date of report _____

Contact details _____

