



Energy & Water  
Ombudsman NSW

This is a determination of the Energy & Water Ombudsman NSW under Clause 6 of the Constitution of The Energy & Water Ombudsman NSW scheme.

### **Introduction**

This determination relates to a claim from a small business customer for compensation for damage sustained to a printing machine – Mr D.

By way of introduction I wish to note that during its seven years of operation, EWON has dealt with a large number of complaints from customers in relation to claims for damage. Overall, this has proved to be a complex and difficult area.

There appears to be no certainty for electricity suppliers or customers in relation to responsibility/liability for damage caused by electricity incidents. Although NSW electricity providers generally incorporate into their customer contracts a position of no responsibility/liability for damage caused by electricity incidents, in practice they pay many claims by customers on an ex gratia, without prejudice basis.

Electricity providers have adopted different approaches to customer claims so that there is no consistency in response across NSW utilities.

It appears that insurance companies are increasingly excluding ‘electrical’ incidents from their coverage, and directing policy holders back to their electricity provider for redress.

As a result of these factors, the position regarding claims for customers is not clear.

It is worth noting that the Essential Services Commission of Victoria has issued a guideline about compensation of customers. This guideline has had the effect of significantly reducing the need for the Energy & Water Ombudsman (Victoria) to be involved in customer claims for compensation.

In my view there does not appear to be any sound reason for an inconsistent approach by electricity providers in NSW to customer claims for damage. We cannot see any competitive advantage to a different approach by companies, and it does not seem equitable for customers to be treated differently in relation to claims depending on the distribution area in which they live. We have called for discussion of these issues by

relevant stakeholders, including electricity distributors, regulatory bodies, and consumer groups.

In the absence of any clear guidelines for customer claims in NSW, it has been left to my office to investigate claims that have been denied by distributors. My determination in individual matters does not create any precedent, but simply reflects an attempt to resolve each case in relation to its individual circumstances.

I believe that the development of standards for claims in NSW will benefit customers, their electricity providers, and the general community.

### **The Complaint**

Mr D lodged a claim for damage to a printing machine with his electricity supplier on 6 March 2003.

Mr D advised that at approximately 11.40am on 16 December 2002 his business premises experienced a gradual loss of power followed by a total interruption to supply, which lasted until around 3.15pm. Mr D informed EWON he was in his office overlooking the factory when the power supply problems started. He attended first to the servers for his PCs, which are protected by a UPS, and, by the time he shut these down, his factory had lost all power. His printing machine was printing at the time of the outage.

Mr D called the machine company when the printing machine failed to restart after the electricity supply was restored. The repairer who inspected the machine advised “the MOR which had been running on impression at the time of the [supply] disruption would not start after the restoration of the power supply”. The burnt out control board for the main drive was subsequently replaced. Mr D made a claim to his supplier for compensation of \$15089.50 for the repair costs. The machine was approximately eight years old and at the time it was damaged had made approximately 85 million impressions. The expected life of the machine is approximately 200 million impressions.

In his statement of claim to the supplier Mr D said that the power failure appeared to result in the loss of one phase of his three-phase supply at the time. The printing machine continued to operate when the first phase was lost and then cut out completely when the second phase was lost. In his accompanying letter Mr D stated that in the electrical engineer’s opinion “losing power immediately would have been ok; it was the gradual loss that caused the damage”.

Mr D provided a repair invoice dated 11 February 2003 that indicated the cost of the new motor drive unit was \$12450.23 while the labour costs and call out fee were \$1187.50 and \$80 respectively. The GST was \$1371.77 bringing the quantum claimed to \$15089.50. Mr D advised he was only claiming for the repair costs for his machine and was not seeking compensation for the loss of two production days totalling around \$6000.

The supplier wrote to Mr D on 25 March 2003 and declined to pay the claim on the basis that while their records confirmed there had been an unplanned interruption, this

was an event that was beyond their reasonable and practical control. The company also recommended that as three phase motors are susceptible to damage as a result of a loss of one phase of supply, he should consult his electrician regarding the installation of phase fail equipment.

Mr D wrote to EWON on 28 March 2003 asking for a review of the decision. In particular he queried that this supply incident was outside of the supplier's control "as this event [was] the third major problem that has occurred in the supply of energy not only to our premises but to many other businesses in our immediate area". He further advised that when he first occupied the building he discovered that:

*"one of the two existing electricity feeds to the complex we and 6 other tenants occupy was found to be burnt out due to an overload. [the supplier] acknowledged they [were] aware of the problem and admitted it was a low priority repair until we complained extensively as there was not enough power coming into the building to service our business and the rest of the complex. Since this time we have had 2 major losses of supply, which I believe was the writing on the wall that [the supplier] ignored leading to this event".*

### **The Supplier's Response**

The supplier's *Investigation Report* to EWON dated 4 April 2003 confirmed that there was a protection operation at 12.45pm on 16 December 2002 that tripped supply to Distribution Substation [number...]. The interruption was caused by a fault within the substation transformer, which caused the internal high voltage fuses to explode. Supply was restored approximately three and a half hours later via low voltage interconnection. The supplier received two other claims from customers in the area as a result of this incident.

The supplier advised EWON this interruption to supply was beyond their reasonable control as it was due to a fault within an oil-filled distribution substation unit. The supplier denied the claim on the basis of the terms of the *Customer Contract* which advise customers that the company does not make, or imply, any guarantee of supply and customers need to be aware that their electricity supply might be interrupted without notice at any time.

### **EWON's Investigation**

In the course of our investigation of this matter we considered in detail the information provided by the supplier and Mr D. We also commissioned three reports by an experienced independent electrical engineer to assist our investigation given the information in the company's high voltage interruption report referring to a suspected transformer fault and the recovery and examination of high voltage fuses, and the apparent lack of any internal report on the company's investigation of the supply incident. The independent engineer also considered the specific damage sustained to Mr D's printing machine.

## Technical Advice

### *The customer's equipment*

The independent engineer noted that the printing machines are among the leading printing machines in the industry. His report confirmed that the part of the machine that failed at the time of the network incident is the converter power part SLT of the direct-current main drive. The direct-current main drive is a precision variable speed drive that is controlled by a power converter control board SRK. The manufacturer has advised that the motor control system will “report” if a phase voltage is missing or is too low. However, the independent engineer also noted that “it is not clear from the information provided as to exactly how the reported information is utilized by the drive system (if at all)”. Furthermore, given that the printing machine was more than 8 years old at the time of the incident, “it is likely that the technology incorporated into the drive is at least 10 years old and potentially 20 years old (given design cycles, etc by manufacturers”.

The control circuitry associated with the printer determines the level of capability of the printer to protect itself from abnormal conditions that occur on the electricity network. The independent engineer concluded:

- “from the description provided by [the manufacturer], it appears that this particular drive only has fairly rudimentary capability to protect itself from phase voltage disturbances on the network”
- the printing press had already been in successful service for 8 years and had demonstrated a capability of operating without failure under a variety of voltage conditions. However, “it is quite possible that the protection arrangements incorporated into the direct current main drive may not have been able to cope with the particular conditions in this instance”
- although the printer should not have failed as a result of the incident, the printer “should not have been subjected to the level of abnormal voltage conditions that were experienced”.

### *The Network Event*

In his report dated 6 February 2004 the independent engineer highlighted the limited information the supplier had available regarding the circumstances underpinning this network event. He confirmed the internal fault in the 600kVA transformer within Distribution Substation [number..] and the explosion of a high voltage fuse within the 11kV switchgear supplying the transformer. The resulting arcing did not, apparently, initiate a fire and there was no escalation of the fault beyond the switchgear.

The independent engineer also emphasised that the supplier did not have any report available regarding an investigation of the failure of the transformer and the failure of the high voltage fuse even though “*an explosion of this type [of a high voltage fuse] is both abnormal and a matter of concern*” and despite the fact that the company’s *Faults, Outages and Damage* report indicated that the HV fuses were to be recovered and examined. The standard life of a distribution transformer is 40-50 years however

it appears that the nature of the damage sustained to the transformer meant it was no longer serviceable and it was discarded. The independent engineer emphasised that:

*As a minimum, I would have expected that an inspection report would have been prepared to test the failed transformer associated with any decision to scrap the transformer. Further, given the potential consequences of an explosive failure of the high voltage fuse, I would have expected that some investigation would have occurred to reach a conclusion as to why the explosive failure occurred.*

The conclusions of the independent engineer's report were:

- the load readings provided by the company for Distribution Substation [number...] which supplies Mr D's installation indicates that this "was heavily overloaded" with the overload apparently in the order of 40%-50%. Given that "the overload on the substation is 40-50%, the overload persisted for possibly 8 hours and the 2002/3 summer was a very hot summer, it is quite possible that if the transformer actually failed, the transformer failure was as a result of the overload due to the excessive temperature rise of the transformer"
- he could not be "totally satisfied" that the failure of the high voltage fuse was due to transformer failure. There was also a strong possibility that the cause of the incident "is actually the failure of the fuse itself", given that the company provided no transformer testing report
- although a forensic investigation of the fuse elements would indicate the nature of the current that the fuses were carrying at the time of the failure, the company had not carried this out
- if there was an internal failure of the transformer itself, it is possible that internal arcing and inter-turn short-circuits could have occurred which resulted in a wide variety of conditions. As the high voltage fuse failed explosively, abnormal arcing conditions would have been present during the period of the fuse failure. Without an on-line monitor to examine retrospectively exactly what happened it is really purely speculative as to the extent of abnormal voltages that were present
- for these reasons, the company's assertion that the failure of the transformer was beyond their reasonable control was open to question as "*the monitoring of the loading of the network and controls on what equipment is connected to the network is the responsibility of [the company]*". On this basis, "it could easily be argued that the customer's equipment was subjected to an unnecessary disturbance. If the disturbance had not happened, it is most likely that the printing machine would not have failed".

On reviewing this independent technical report, EWON requested some additional information and, in particular, clarification as to whether it was reasonable for the supplier to have apparently overloaded the transformer by up to 44% without taking corrective action.

### *The second report*

The independent engineer provided a revised report to EWON on 7 June 2004 following the supplier's provision of some of the additional information requested. In addition to their previous advice, the company had confirmed:

- there had been no detailed investigation regarding the transformer failure
- the fuse had failed to operate correctly due to overload
- the failed fuse's cartridge was fitted with a striker pin that would normally operate when the fuse tripped. However, in this instance, the nature of the fault caused the fuse cartridge to rupture open and failed to trip the fuse switch
- the switchgear itself was damaged and had to be replaced.

The conclusions of the independent engineer's second report were:

- the absence of a test report confirming that the transformer was beyond repair was "quite surprising" as he expected this would be "a minimum requirement to satisfy financial and audit requirements"
- the supplier had not responded to his specific enquiries relating to the load applications that were relevant to Distribution Substation [number..] in 2001 and 2002 and the expected top oil temperatures and maximum winding temperatures
- the company were apparently aware of the level of overload as MDI [Maximum Demand Indicator] readings were taken in both September 2002 and October 2002. The transformer failed in December 2002 and it was "reasonably foreseeable" that the summer loading on the substation was likely to be higher than the October 2002 reading
- despite being aware of the level of the overload, no emergency action was taken by the company to off-load the substation
- while 44% overload on distribution transformers for short durations is not problematic under some circumstances, for extended periods of overload measured in spring, where the load is related to an industrial/commercial load, where there appears to be additional load connections and the load in summer would be higher, corrective action should have been taken
- the company "should well have foreseen the potential for severe overload and taken action to minimise the risk to the network"
- the replacement transformer was of increased capacity - 750kVA- due to the overload on the substation
- the company had confirmed that the switchgear did have a 3-phase tripping mechanism or fuse "striker pin" installed. However, due to the destructive failure of the fuse, the mechanism was not activated. Where such a feature is installed, however, it is reasonable to expect that it would operate when required

- the supply interruption that occurred was as a result of the transformer being overloaded. “Either the transformer failed prematurely due to the extent of the overload resulting in a high impedance fault or the level of overload resulted in the current through the fuse being in a zone where it could not clear the overload. In either instance, this is a condition that is a result of the supplier’s actions, or rather, lack of action that in my view was not beyond its reasonable control”.

On reviewing this revised report, EWON informed Mr D on 24 June 2004 that the technical expert’s conclusions indicated that there was a basis for EWON to continue the investigation and to discuss a negotiated settlement. The company reviewed the report but declined to reconsider their original decision not to make any offer of compensation. The company also indicated to EWON on 16 July 2004 that they intended conducting a further investigation into this matter and advised EWON on 8 September that they expected to receive information in the following week. The technical expert subsequently contacted EWON on 11 October 2004 advising that he had received a response from the company on his interpretation of the load readings. He emphasised that he had requested this response prior to the finalising of his report in June 2004 and referred to the following point made in that report:

*[the company’s] subsequent response was silent on this matter and thus it is taken that [the company] do not dispute the level of overload.*

#### *The third report*

The independent engineer provided a third report to EWON on 10 January 2005 based on the company’s provision of additional information, including their advice that the MDI readings they had provided previously to the independent engineer were maximum demands expressed in amps, not kVA maximum demands.. Following their further investigation, the company concluded that the failed transformer had not been overloaded.

On reviewing the revised substation loading information the supplier had provided, the independent engineer concluded that the estimated maximum load on the failed transformer “is likely to be between 109% and 123% of the cyclic rating of the transformer.” He further noted that:

- prior to finalising his previous report on 7 June 2004, the supplier had been requested to confirm his interpretation of the load readings but as “[the company’s] subsequent response was silent on this matter” he had concluded that the company did not dispute the level of overload
- “although the level of overload is clearly nowhere near as high as was contemplated in the original analysis [as referred to in the two earlier reports] nevertheless the transformer exceeded its cyclic rating and it is not beyond realistic possibilities that the failure is related to the overload of the substation coupled with the fact that the transformer insulation has reached its end-of-life (as a result of the overload)”
- “whereas the company initially concluded that the fuse operated due to the transformer failure, in their subsequent advice they confirmed that the failure is

actually attributable to the failure of the fuse itself. As a detailed investigation does not appear to have been carried out it is unknown if this failure was due to:

- a) mechanical failure of the fuse elements and/or
  - b) fuse attempting to clear a current less than its “minimum breaking current”
- in light of their revised information relating to the level of loading on the substation, the company “now believe that the failure of the fuse was possibly due to high impedance turn to turn low voltage fault in the transformer. The high voltage fuse would only be seeing minimum breaking current (ie between fuse rating and 3 x fuse rating). This type of fault causes heat and pressure build up in the fuse until the fuse fails.” However, the company had only hypothesised that this may have been a possible cause and “no evidence has been produced to confirm whether the transformer did in fact fail as a result of a turn-to-turn low voltage fault”. Even if this were the case, the failure of the fuse due to loading conditions “cannot be eliminated as details of the examination of the faulty transformer have not been provided”
  - “on the balance of probabilities, the sequence of events is likely to have been that the overload resulted in an inter-turn fault which resulted in a fault current that the fuse was not able to clear. This resulted in the switchgear failure, the failure of the switch-fuse to operate correctly and to trip the 3 phases but rather result in single phase conditions”
  - from the information available, “abnormal voltages” would have been present during the first fuse failure and it appears that Mr D’s facility “was subjected to an initial “brown out” condition. When the second fuse operated, essentially a complete outage would have been experienced, although the measured voltage at the mains terminals would be dependent on capacitive effects. During the transformer failure conditions, and/or the fuse operation / failure phase it is likely that voltage spikes would have occurred and equipment connected on the low voltage side may have been subjected to these conditions”.

### **Analysis of the information**

EWON’s investigation considered the information obtained from all sources listed above. Mr D has disputed that the supply incident on 16 December 2002 was beyond the supplier’s reasonable control as he had formerly complained to the supplier about several supply problems impacting his business premise. EWON’s review has indicated that these earlier incidents seem to relate to Mr D’s installation’s service mains rather than to the network. The company also confirmed with EWON in December 2004 that they had no concerns relating to Mr D’s application for increased load associated with the connection of the printing machine to the network.

It is agreed that an event occurred on the network at the time claimed and in the manner outlined by the customer. The company have indicated that the previous transformer supplying Mr D’s premise was not overloaded and the interruption resulted from the explosive failure of a high voltage fuse that was possibly due to high impedance turn to turn low voltage fault within the transformer. The company have emphasised that this is an event beyond their practical control. The company have not disputed that this incident could have caused the damage claimed but have



emphasised in their response to Mr D that he should seek advice on the installation of phase fail protection equipment from his electrical contractor.

The advice provided by the independent electrical engineer would tend to suggest that it is not possible to state conclusively that the supply interruption that occurred on 16 December 2002 was beyond the supplier's reasonable control. The expert has indicated that the supplier's contention that this was the case would be a reasonable position if the transformer failure "*were just a random equipment failure*". However, the limited information available as to the failure of the transformer and the high voltage fuse would tend to suggest that the technical aspects of this matter might not be so straightforward.

EWON acknowledges the responsibility of business customers in particular to take reasonable steps to mitigate the risk of damage to three-phase equipment susceptible to supply variations by installing devices such as phase fail relay protection. According to the independent expert's advice, it seems that Mr D's printing machine had some protection arrangements incorporated into the direct current main drive but that these may not have been able to cope with the particular supply conditions applying at the time of the supply event on 16 December 2002.

The expert has also indicated that while there appears to be a direct causal relationship between the disturbance on the distribution network and the failure of the printing press, "*it is not possible to conclude whether the exact failure mechanism was due to the presence of [a] voltage event generated externally to the equipment or whether the nature or absence of phase voltages during the disturbance contributed to the failure of the drive system*". Furthermore, although the company's additional information in September 2004 led to the independent expert qualifying some of the conclusions in his two earlier reports, he has consistently emphasized that the apparent lack of any formal records associated with the investigation of the transformer and fuse failures has meant that:

*"it is still not clear whether the overload condition was purely due to the load connected to the transformer or related to a high impedance failure within the transformer. The lack of a test report for the failed transformer makes it impossible to come to a clear conclusion"*.

While he has acknowledged the difficulty of carrying out investigations in the area of fuse failure, the expert has expressed "surprise" that there is no report on the transformer failure and has emphasized that in regard to the failure of the fuse and the related damage to the switchgear "*there are significant OH&S issues that arise from such an incident*". The expert has concluded that in the absence of this detail, and based on the company's advice that the failure was due to the overload of the transformer in a low-level fault condition, the fuse failure was related to the loading on the transformer.

The independent expert has acknowledged that the revised information provided by the company on 20 September 2004 indicates that although the level of overload on the transformer "*is clearly nowhere near as high as was contemplated in the original analysis, nevertheless, the transformer exceeded its cyclic rating*". While this level of overload "*would not have been considered critically high such as to require*

*emergency ... corrective action...it is not beyond realistic possibilities that the failure is related to the overload of the substation coupled with the fact that the transformer insulation has reached its end-of-life (as a result of the overload)". Nevertheless, "the monitoring of the loading of the network and controls on what equipment is connected to the network is the responsibility of [the company]. Whether adequate controls are in place to monitor actual load or to control the addition of load to the network puts into question the claim that the event is beyond the reasonable control of [the company]"*.

The independent expert has indicated that a possible cause of the "abnormal" network incident, which impacted Mr D's supply appears to have been a contingency, that was within the company's reasonable control. In the light of this advice and in the absence of any detailed investigation and reporting by the company regarding the faulty transformer that might facilitate a more conclusive position, the task of determining the degree to which the failure of the network equipment was beyond the supplier's reasonable control is, in the circumstances of this matter, extremely difficult to assess.

This results in a situation where there is an unavoidable element of doubt. In this situation, it appears reasonable for the benefit of this doubt to go to the customer.

## **Conclusion**

The supplier disagrees with the technical advice to EWON by our independent technical experts. This disagreement is with the conclusion of our experts rather than with their qualifications or expertise.

Given the available information, EWON is not in a position to comment further on the technical aspects of the claim. However, in a situation where there is credible technical information to support Mr D's position, I believe it is reasonable for the benefit of any doubt to go to the customer.

Under the provision of Clause 6 of the Constitution of the Energy & Water Ombudsman NSW scheme I therefore determine that the supplier should pay the sum of \$5500 to Mr D as settlement of his claim. This amount allows some offset of the repair costs plus a small gesture acknowledging the incorrect information provided to him in June 2004 when informed of the conclusions of the expert's finalised report and for the inconvenience and delay this occasioned.

Under the EWON Constitution, this decision is binding on the supplier. Mr D may elect within twenty-one days whether or not to accept this decision. If Mr D accepts the decision, he will fully release the company from all claims, actions, etc in relation to this complaint. In the event that Mr D does not accept my decision, he may pursue his remedies in any other forum he may choose, and the company is then fully released from the decision.

Clare Petre  
Energy & Water Ombudsman NSW

2 September 2005