

## System Event Report

### Otahuhu 220 kV Fault – 15 February 2006

#### Summary

On 15th February 2006 at 09:34 hrs, a series of phase-to-phase faults occurred at the Otahuhu substation end of the Otahuhu-Whakamaru 3 circuit. Auto-re-closure operations occurred following the first two faults. The protection systems inhibited auto reclosure for the third fault. The post event review confirms that all three faults were cleared by grid protection relays operating correctly.

Momentary low voltages were experienced across the upper North Island during the faults. Around 200 MW of load disconnected following the first fault. Generating units at Southdown and Glenbrook tripped following the third fault.

Following the third fault, the Otahuhu-Whakamaru 3 circuit was out of service as were generating units at Southdown and Glenbrook. The voltage stability limit (following a contingent event) for transfer into the Upper North Island with these assets out of service is around 1565 MW. The post fault voltage stability limit was quite close to the pre-fault load in the Upper North Island (1519 MW).

The combination of around 200 MW of load disconnecting during the fault and the other generating units in the Upper North Island riding through the faults and supporting voltage recovery following the faults ensured that the power system was not in danger of voltage collapse.

These power system events highlight the importance of the correct operation of protection schemes and the ability of generating units to ride through faults on the power system.

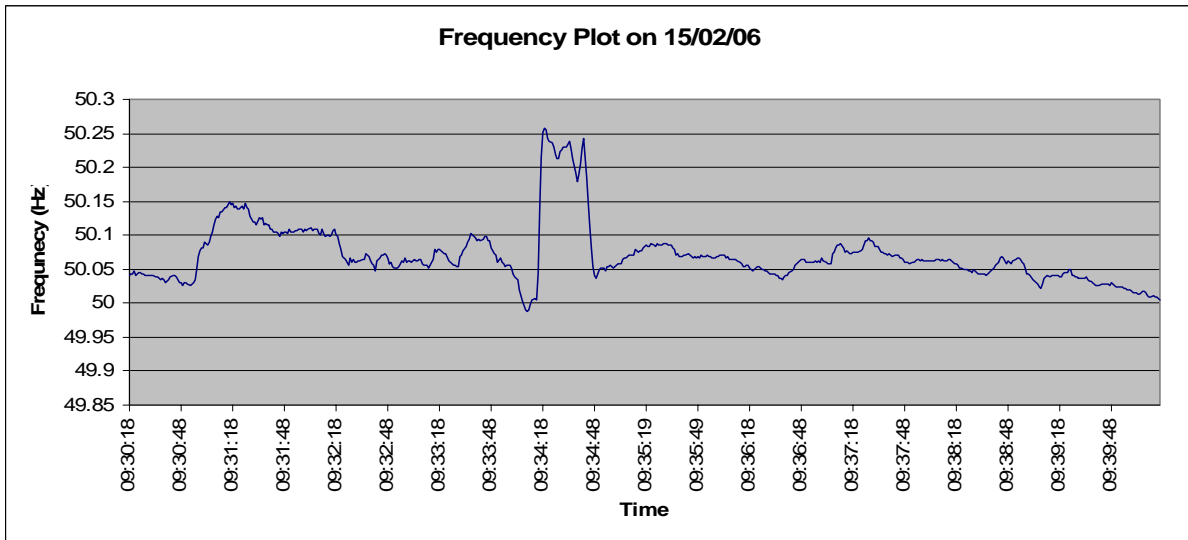
#### 1 Description

At 09:34 hrs on 15 February 2006, a disconnecter on the Otahuhu-Whakamaru 3 circuit developed a fault between the yellow and blue phases. The voltage on the Otahuhu 220kV bus reduced to 113kV at this time. The fault was cleared quickly (within 120 ms) and the voltage at the bus then recovered to normal. A subsequent successful auto-reclose operation occurred after 1 second.

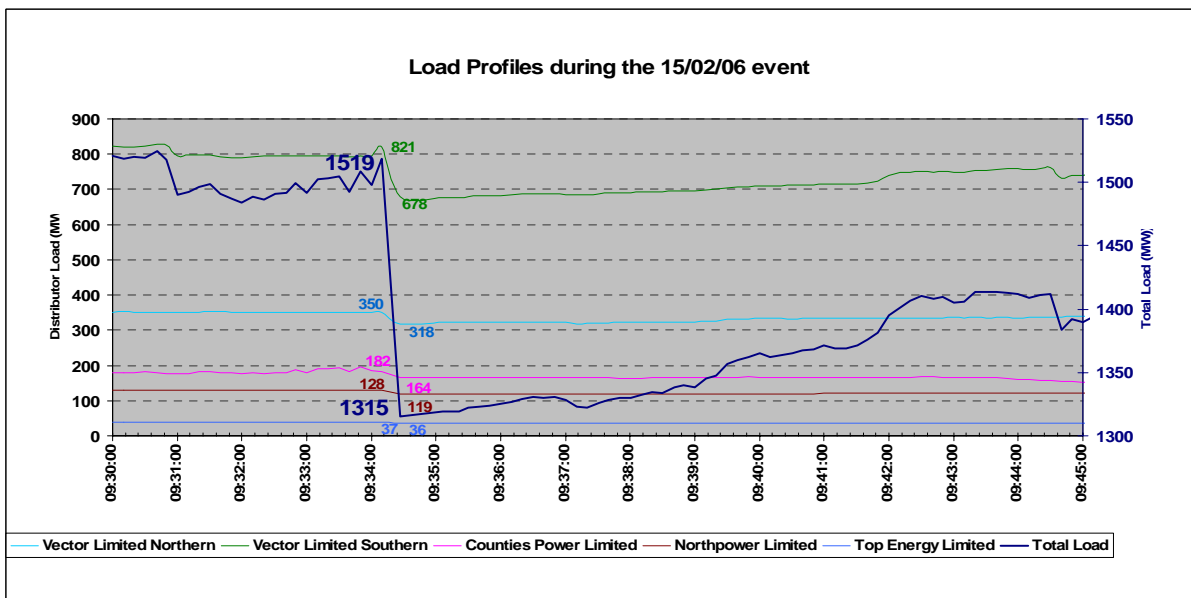
Twenty four seconds later the yellow to blue phase fault was re-established (dropping the bus voltage to 108kV) this was followed by another quick clearance and auto-reclose operation. Following re-closure, a third fault of the same nature resulted in another quick clearance. Auto-reclose was then locked out with the Otahuhu-Whakamaru 3 now de-energised.

Around 200 MW of load disconnected following the first fault. Generating units at Southdown and Glenbrook tripped following the third fault resulting in a loss of 90 MW of generation in the region. The loss of load caused power system frequency to temporarily move outside the normal band (49.8 to 50.2 Hz). Power system frequency was returned to around 50.05 Hz following the third fault.





Around 200 MW of demand was lost following the first fault. About half of this load reappeared within 10 minutes.



## 2 Actions

On 22<sup>nd</sup> February 2006, the System Operator requested Asset Owners in the Auckland region to provide information on the performance of assets and loads to the series of faults that occurred.

The System Operator wishes to thank those Asset Owners who responded to the request. The information provided has been useful to help us understand what happened during and following the faults, and has helped validate assumptions and models used to determine power system capability limits. It has also helped establish if connected assets performed as would be expected.

Following the analysis of the information provided, the System Operator will be seeking further details on the performance of some grid assets with the respective asset owners. This review will be in accordance with the processes set out in the rules and the System Operator policy statement.