

ELECTRICAL ACCIDENTS

Presentation to The Association of Municipal
Electrical Undertakings
21 St Technical Convention
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INTRODUCTION

This presentation gives an outline of a recent accident which recently took place in Buffalo City.

The accident was the catastrophic failure of an 11kV switch panel at the Chiselhurst Substation in East London.

Chiselhurst Switch House Fault

Chiselhurst Switch House:

- Was constructed about 38 years ago.
- Provides an electricity supply to about 7 suburbs, parts of the central business district, the Frere Hospital and the commercial area in Vincent.
- Has a firm capacity of 32 MVA.
- Is located adjacent to a 132/33kV substation known as Stoneydrift.

The South Wales 11kV Board Consists of:

- 3 Incoming circuit breakers each supplied from a 33/11kV 16 MVA transformer
- 2 Bus section circuit breakers
- 14 Feeder circuit breakers.

Circumstances surrounding the failure:

- The Vincent No 3 feeder cable had previously faulted.
- The remaining two feeders to Vincent Switch House are of unequal cable size and therefore do not share the load equally. (ie One 300 mm sq. and one 120 mm sq.)

- In order to prevent overloading of either of the two feeder circuits to Vincent, the circuit breakers were evidently operated simultaneously.
- The result of this was an explosion which caused major damage to one section of the switch board.

Photographic Slides:

The Vincent No 1 Feeder Panel

Damage to the wall behind the operator.

View of Panel Wiring with Door Open.

A general view of the panel

A close up view of the underside of the panel showing the spouts

Damage to the paint on the wall behind the switch.

Rear view of the panel

View of the CT chamber

Evidence of separation of the insulation on the spouts of the no. 2 feeder.

Annealed tulip contacts on the Vincent No 2 feeder

No. 1 oil circuit breaker showing damage to cable side of the breaker

Close up view of the oil circuit breaker.

Sequence of events: 1 St Fault

- Vincent No 1 circuit breaker was closed together with Vincent No 2 circuit breaker.
- Vincent No. 1 circuit breaker developed a fault on the feeder side of the breaker and tripped.
- The fault was sustained via the Vincent No. 2 cable as the bus section switch was closed at the Vincent Switch House.

Second Fault.

A secondary busbar fault developed after a period of about 30 minutes. The 33 kV circuit breaker supplying the 16 MVA transformer failed to trip and had to be operated manually. The entire board was then isolated and the clean up process was commenced.

Other Factors

- The Switchgear fault was attributed to an annealed Tulip Connection on the No. 2 Vincent feeder.
- This is of concern as a similar fault occurred on the same switch board in 1999.

In Conclusion

- The entire switch board is considered to have reached the end of its useful life and will be replaced.
- The operator spent 3 months in hospital and sustained serious burns on his body, hands and legs. He is still undergoing treatment for his burns, but the psychological scars may take much longer to heal.

Thank You