Exhibit 279 "Rediscovered"

from the
(records of the)
Board of Inquiry into
the Occurrence of
Bush and Grass Fires
in Victoria

Citation: VPRS 13230/P1/10
"Exhibits : Folder 11. No. 270 - 280"

DCG:MJH D12-2-0D

ELECTRICITY SUPPLY DEPARTMENT

T.Ext. 2713

Copy for LINE DESIGN ENGINEER, 10th Floor.

LINE DESIGN ENGINEER

CHIEF DISTRIBUTION ENGINEER 20th February, 1969.

Copy to: ACDE(D), LDE

L.V. CONDUCTOR CLASHING TESTS

1. Purpose

To establish whether metal particles falling from low voltage aerials, after arcing caused by clashing of the conductors, would retain sufficient heat to ignite inflammable material, such as dry grass, leaves, etc., under conditions of high temperature and low humidity.

2. Typical Case

It was decided to test a typical case of l.v. rural reticulation comprising a centre tapped 10 kVA transformer supplying 6/1/144 A.C.S.R. actives and 6/1/118 neutral strung in 350' spans with 6'-0" sag, 120°F ground clearance being 16'-0". Protection is by a 45 ampere fuse on the two active conductors, and clashing of one active with the neutral is by far the most likely occurrence.

3. Location

A rural line complying with the above requirements (with the exception of ground clearance) was located in Eastern Metropolitan Branch at Keysborough approximately one mile south of Cheltenham Road. It was decided to clash the conductors in the second span of this installation at a distance of approximately 500 ft from the transformer.

4. Test

The test was carried out at 2.00 p.m. on Wednesday, 12th February. Weather conditions were: temperature 75°F; wind velocity and direction E.S.E. at 15 mph, with gusts estimated at 20 mph.

One active conductor and the neutral conductor were slackened off to give a ground clearance of 17'-0" and to make clashing easier. The active conductor was swung away from the neutral by means of a hot stick and allowed to clash with the neutral on the return swing.

Butchers' paper was spread along the ground beneath the centre of the span, allowance being made for wind drift of falling particles.

Two clashings (with consequent blown fuses) were carried out and incandescent particles were observed to reach the ground, missing the paper.

The position of the paper was rearranged and, on the third test, one of the incandescent particles bounced along the paper for a distance of approximately 3 ft, burning small holes in the paper at each bounce (total five holes).

5. Conclusion

From the test carried out, it has been concluded that arcs produced by conductor clashing on conductors supplied by small capacity transformers result in incandescent particles reaching the ground with sufficient heat capacity to ignite inflammable material under dry, hot, summer conditions.

LINE DESIGN ENGINEER

D12-2-0

BWC/WMcC D12-2-0

T.Ext. 2723

CHIEF DISTRIBUTION ENGINEER

25th March, 1969.

Memo. to: All Branch Managers

Copy to: A/LDE, ACDE(F), ConE, PE.

CONDUCTOR CLASHING UNDER HIGH WINDS

As you are no doubt aware, there have been suggestions made that some of the recent summer fires were associated with clashing of live conductors. It is undoubtedly possible for emitted fragments to reach the ground in an incandescent state, and one can only speculate about the possibility of such fragments igniting undergrowth.

From time to time one hears of cases of conductors clashing under high wind conditions, but no recent comprehensive survey appears to have been made into the extent of the problem. I should be obliged, therefore, if you could let me have your thoughts on the matter, backed up where possible by any statistics or particular examples you are able to cite. I should be particularly interested in any cases where clashing may have occurred on lines having separations in accordance with the appropriate standard graphs (Drawing Nos. VX9/7021/9, VX9/7040/5, VX9/7040/6, VX9/7130/9).

Should instances in this category be at all general, it may be necessary to either modify the graphs or to recommend more widespread use of in-span spreaders. While either of these remedies should be effective, I am anxious not to precipitate "over-design", and field experience seems the only real way of assessing the question.

To summarise, the study is essentially one of probability, and the dilemma one of reconciling aesthetic and economic design with safe and reliable operation. Your assistance in developing a reasonable solution would be appreciated.

(Signed) H. K. RICHARDSON

CHIEF DISTRIBUTION ENGINEER

440-10

D12-2-0

DEPARTMENTAL

STATE ELECTRICITY COMMISSION OF VICTORIA

Telephone:

Extension No. 21

MANAGER, BARWON BRANCH

DUPLICATE

To CHIEF DISTRIBUTION ENGINEER

Date 15th April, 1969.

CONDUCTORS CLASHING IN HIGH WINDS

In reply to your memorandum of 25th March, 1969 (BWC:WMcC), the use of aluminium as an aerial conductor has resulted in an increase in the number of instances of conductors clashing in high winds, as evidenced by fault reports. However, as the total number of these faults is small and the cause remedied with reasonable ease, the situation is not viewed with any great concern.

All known cases of clashing have occurred between low voltage conductors, although a small number of high voltage faults could have resulted from this cause also. In the majority of cases, the conductors remained in the same plane and in all cases they were the result of conductors on the same crossarm and of the same circuit clashing.

Investigation has shown that slack spans (3' in 132' and slacker) are the major cause of trouble, although leaning poles and twisted crossarms have contributed. Over the past two years approximately 100 fibre glass spreaders have been installed in slack spans suspected of causing faults, while a lesser number of suspected cases have been rectified by straightening poles or resagging conductors. In no cases have the spacings specified on Drawings VX9/7021/9, VX9/7040/5, VX9/7040/6 and VX9/7130/9, been found inadequate.

As a very large proportion of clashing has occurred between the switchwire and adjacent larger conductors, it could well be that consideration should be given to the ultimate removal of all switchwires in lieu of installation of individual lamp control (Lumatrol or similar). This should be economically feasible, particularly in new subdivisions and would provide the added advantages of additional crossarm space for the remaining conductors and elimination of the complex and sometimes hazardous control system associated with centralised street lighting control.

J. J. Carlin/MM

MANAGER, BARWON BRANCH

74-443-10

Copy 69/4694

DEPARTMENTAL

RDV:RG D12-2-0

STATE ELECTRICITY COMMISSION OF VICTORIA

Telephone:

Extension No. 232

MANAGER, GIPPSLAND BRANCH

To CHIEF DISTRIBUTION ENGINEER

Date 16th April, 1969.

ELECTRICITY SUPPLY DEPARTMENT
REC'D 21 APR 1969
ACK'D ANS'D
REFERRED TO
ATTENTION
REPORT
NOTING

CONDUCTOR CLASHING UNDER HIGH WINDS

In reply to your letter dated 25th March (reference BWC/MMcC), I wish to advise that within this Branch we have not had any cases of conductors clashing that can be attributed to the clearances as nominated by the standard graphs being insufficient.

W. J. Stevenson

MANAGER, GIPPSLAND BRANCH.

RURAL FIRES
BOARD OF INQUIRY
EXHIBIT 281
DATE

FJS:LEP D12-2-0
69/667 Tel.Ext. 59

ELECTRICITY SUPPLY DEPARTMENT

Copy for CHIEF DISTRIBUTION ENGINEER

T-EXT

MANAGER, WIMMERA BRANCH

CHIEF DISTRIBUTION ENGINEER

22nd April, 1969.

CONDUCTOR CLASHING UNDER HIGH WINDS

With reference to your request of the 25th March, 1969, the following information, from this Branch, is offered:-

1. There are few known cases of high voltage conductors clashing during high winds that could possibly be attributed to inadequate design clearances. Most of the few cases that have occurred were where there had been pole or guy movement or crossarm twisting, causing sag variations.

2. Because of experience in the earlier years of pole and guy movements and bird life activities, the adoption on three phase high voltage lines of bird spacing has minimised the probability of high voltage conductors clashing during high winds.

3. Conductor spacing in low voltage construction has generally been found satisfactory, with the exception of -

   (a) The case of 6/1/.093 A.C.S.R. switchwire run with heavier low voltage conductors.

   (b) Slack spans with 7'6" offset crossarms.

W. Thurlow

MANAGER, WIMMERA BRANCH

440-10

DEPARTMENTAL

RJH:WMC D12-2-0

STATE ELECTRICITY COMMISSION OF VICTORIA

Telephone:

Extension No. 31

ELECTRICITY SUPPLY DEPARTMENT
REC'D 28 APR 1969
ACK'D ANS'D
REFERRED TO ATTENTION REPORT NOTING

To CHIEF DISTRIBUTION ENGINEER

MANAGER, SOUTH WESTERN BRANCH

Date 23rd April, 1969.

CONDUCTOR CLASHING UNDER HIGH WINDS :

Your letter dated 25th March, 1969 (BWC:WMcC), invites our comments about conductor clash in high winds and associated fire risks. Our recent experiences with a number of fires started in various ways from Commission assets has led us to consider these matters and we are happy to set down our present thoughts.

Initially, however, we feel that there are two factors which must be accepted. The first of these is that at any given time there will be parts of a distribution system which do not accord with laid down design standards because a number of factors cause conductors to get out of sag, and this generally increases the risk of them striking together. The second point is that no matter what design standards are used or how elaborate our construction may become, there will sometimes arise conditions of wind, or conditions of wind borne debris, that will cause conductors to clash.

Having said these things we can look at some statistics which show how our system stood up to the very severe buffeting it received last January and record that during January we had 26 ground fires believed to have been caused by our assets. A further four fires have occurred since January making a total of 30 for the year to date.

A segregation of these thirty fires in various cause categories shows the following :-

Growing trees or wind borne tree debris contacting lines	-	10
Pole and crossarm fires	-	4
Conductor failure	-	4
Structure failure	-	3
Birds	-	3
Fuse, failure to drop out	-	2
Conductor clash with no known external agency, H.V. to L.V.	-	2
L.V. only	-	1
Surge diverter failure	-	1

We consider that the above tabulation shows that the problem of conductor clash without the assistance of an outside agency is not the main problem because there are only three cases in 30 events and further we don't know whether the sag condition of the conductors contributed to the clashing or not.

We would be loath to see the widespread introduction of in span spreaders because care must be taken in introducing measures which depend heavily on the availability of elevating platform vehicles for their erection.

It seems reasonable to assume, we think, that there is not much wrong with our design standards, but that there are problems of maintaining assets within acceptable tolerances of the standard. In this Branch we have many miles of steel, and the smaller sizes of copper and cadmiun copper conductors in poor condition and this coupled with trees presents our greatest maintenance problem.

MANAGER, SOUTH WESTERN BRANCH

Copy 64/5761

ELECTRICITY SUPPLY DEPARTMENT

Copy for CDE

KWB:RPK D12-2-0
T-EXT

MANAGER, MALLEE BRANCH

CHIEF DISTRIBUTION ENGINEER

8th May, 1969.

CONDUCTOR CLASHING UNDER HIGH WINDS

In reply to your letter dated 25th March, 1969 (BMC:McC), the following information is submitted in relation to instances whereby conductor clashing under high winds, could cause fires.

1. No trouble has been experienced with mid-span separation on h.v. lines where this conforms to appropriate standards. The only instances which have occurred over the years have been due to adjacent foliage preventing free movement of one conductor during wind conditions.

2. During adverse conditions considerable trouble has been experienced with five wire L.v. construction. These instances were directly related to either seven foot off-set crossarm construction or where street light conductors had not been over tensioned which is the present standard technique to overcome this problem.

For some time, therefore, we have shunned seven foot off-set crossarm construction in favour of eight foot six inch crossarm construction and with proper attention to the street light conductor we have not experienced similar trouble.

By far the most predominant cause for conductor clashing would appear to be the loss of standard separations due to turning and twisting of poles and crossarms. This can be critical with light conductor/long span, h.v. construction. It is also prevalent in short span l.v. construction particularly limit spans in slack stringing schedules. Bending of poorly selected unguyed poles can also accentuate the problem by oversagging conductors.

We feel, however, that present standards are otherwise quite satisfactory as general practice and that regular inspection and attention should retain our aerial assets in a safe condition.

W. McCulloch (JO)
MANAGER, MALLEE BRANCH

FSC 13-60 RJ

Copy 69/9296

DEPARTMENTAL EHS:EAB D12-2-0

STATE ELECTRICITY COMMISSION OF VICTORIA

TELEPHONE:

EXTENSION No. 32

MANAGER, MIDLAND BRANCH

To CHIEF DISTRIBUTION ENGINEER

Date 1st July, 1969.

CONDUCTOR CLASHING UNDER HIGH WINDS

In reply to your letter of 25th March, 1969 (BWC:WMcC), investigations within this branch have shown that the greatest proportion of conductor clashing incidents reported have occurred in slack spans of l.v. conductor.

The most troublesome areas are Bacchus Marsh, Melton and Sunbury, especially in locations where entry into a street is such to exclude the use of a guy behind the tee-pole and a slack span is used to gain access to the street.

The immediate step taken to remedy this problem has been to fit mid-span spreaders. Other suggestions are:

1. Minimise the number of slack spans by use of side-walk guys.

2. When slack spans must be used employ the tightest stringing that can be tolerated by unguyed poles. When stringing A.C.S.R. conductor slack, coiling of the wire may still be evident when pulled up to design tensions, hence tighter stringing is sometimes necessary for the sake of appearance; it then minimises the clashing problem.

3. The use of 8'6" crossarms for slack spans even though design sags are less than 3'9". This tends toward "over-designing", but construction gangs have commented that slack stringing to standard construction drawings is difficult and that there is a tendency for the sag to change sometime after the line has been erected.

J. F. Pearce

MANAGER, MIDLAND BRANCH

copy 69/9139

DEPARTMENTAL L.E:GJH D12-2-0

STATE ELECTRICITY COMMISSION OF VICTORIA

ELECTRICITY SUPPLY DEPARTMENT

Tel. Ext. 21

ACTING MANAGER, NORTHERN BRANCH

To CHIEF DISTRIBUTION ENGINEER Date 8th July, 1969.

CONDUCTORS CLASHING UNDER HIGH WINDS

In reply to your memorandum (BWC/WMcC) of 25th March, 1969, we have now completed an investigation into causes of conductors clashing in the area under our control. As we know of no cases of conductors clashing, where existing design requirements are met, we can only assume that these requirements are adequate.

We are only aware of a relative small number of cases of conductors clashing and in all these cases we have found that the construction did not conform with present day design criteria. For example, conductors out of sag; incorrect pole or conductor spacing etc.

One of the causes of conductors clashing in the past could be attributed to trees being in close proximity to power lines, however, during the last few years this Branch has introduced greater clearances when clearing trees, and it is therefore expected that we will prevent future cases of conductors clashing, due to this cause.

In the past we have also found that 22kV transpositions, when constructed to Drawing No. VX9/7023/10, are liable to conductor clashing, caused by flocks of galahs. During the past few years, to overcome this hazard, we have increased the vertical separation by an additional foot.

T. Wiseman

ACTING MANAGER, NORTHERN BRANCH

Conductor Clashing file

BWC:DD
D12-2-0 D

ELECTRICITY SUPPLY DEPARTMENT

T. Ext. 2724

Copy for Line Design Engineer, 10th Floor.

CHIEF DISTRIBUTION ENGINEER

1st September, 1969.

Memo to: All BMs

Copy to: LDE, Cons, PE, ADE(E)

CONDUCTOR CLASHING BETWEEN HIGH & LOW

Further to my letter of the 25th March, 1969, it is now advised that analysis of the replies received has failed to spotlight any general inadequacy of standard separations. Most of the reported incidents seem to relate to clashing of low voltage conductors, particularly where slack spans and/or small-section switch wires are involved. Very few h.v. incidents were reported, except where involving some outside agents such as trees, birds, flying debris, etc. Accordingly, it is desired to record -

(i) No alteration is contemplated of the separations specified in drawing nos. VX9/7041/9, VX9/7040/5, VX9/7040/6, VX9/7130/9.

(ii) Discretionary use of fibre glass spreaders is recommended on l.v. spans where a particular local problem is encountered.

(iii) Individual switching of street lights by means of photo electric cells is being investigated as a possible alternative to switch wires.

In this regard, a quantity of cells will shortly be despatched to branches and you are invited to install them in suitable locations.

CHIEF DISTRIBUTION ENGINEER