



Department of Consumer
and Employment Protection

Code of Practice

Power Line Crossings of Navigable Waterways in Western Australia

This document is issued as Amendment No.1 to the publication
*Guidelines for Electricity Transmission and
Distribution Work in Western Australia*
which was first published by the Director of Energy Safety
in December 1998

Issued by:
Director of Energy Safety
January 2003

Preface

This document is Amendment No.1 to the publication *Guidelines for Electricity Transmission and Distribution Work in Western Australia* which was published by the Director of Energy Safety in December 1998 and issued under the authority of Section 33AA of the *Electricity Act 1945* (WA).

This Amendment No.1 to *Guidelines for Electricity Transmission and Distribution Work in Western Australia* is carried out by:

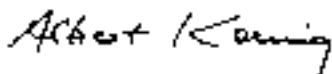
- (a) In the "Table of Contents", **after** "Appendix G – Electric Shocks and Accidents", **adding new text** "Appendix H – Power Line Crossings of Navigable Waterways in Western Australia".
- (b) In the section "4.2.9 Water Crossings", **replacing the text** "Water crossings (overhead and underground) shall be designed, constructed, installed and maintained in a manner that complies with the requirements of appropriate authorities, including the installation and maintenance of appropriate signage" **with** "Water crossings (overhead and underground) shall be designed, constructed, installed and maintained in a manner that complies with Appendix H".
- (c) After the section "Appendix G – Electric Shocks and Accidents", **inserting** *Appendix H – Code of Practice - Power Line Crossings of Navigable Waterways in Western Australia* (the text of which follows and is to be inserted into the principal document).

This Code of Practice sets out the means for electricity network operators to ensure they adopt safe practices for power line crossings of navigable waterways in Western Australia.

It was developed following extensive industry and public consultation. The practices set out are considered to be the minimum required to ensure the safety of the public and other users of waterways with power line crossings.

Suggestions and comments to improve the Code are welcomed and should be forwarded to:

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APPENDIX H

CODE OF PRACTICE – POWER LINE CROSSINGS OF NAVIGABLE WATERWAYS

Definitions

For the purpose of this Code:

“Navigable Water” is defined as water with a depth of at least 450 mm and where it can be reasonably expected that a ship, boat or barge could gain access either by being launched off a transport vehicle or by passing along the waterway. This includes rivers, lakes, inlets and any other inland waterway as well as non-permanent waterways that may be expected to flow at a depth of 450 mm or more from time to time.

“Maximum water level” is to be taken as the highest astronomical tide (HAT) as referred to on navigation charts, or the level of the flood which can be reasonably expected once every 25 years based on the methodology provided in the publication *Australian Rainfall and Runoff* published by the Institution of Engineers Australia, whichever is the higher water level.

“Readily accessible to the ocean” is to be taken as where the “navigable water” is within 20 km (water route length) of the open ocean, has a “maximum water level” of at least 2.5 m and is not obstructed by any bridge or structure with a 12 m or less clearance from the “maximum water level”.

“Spit posts” are posts erected in the bed of a waterway such that they protrude above the surface of the water and carry signs providing information for persons navigating the waterway.

General Requirements

Crossings of waterways by overhead power line conductors and underground power cables shall be designed, constructed, installed and maintained in a manner that complies with this Code and with the requirements of the appropriate authorities. This includes the installation and maintenance of appropriate and clearly visible signage or suitable markers which indicate the presence of the overhead conductors or underground cables.

Crossings of “navigable waterways” by power lines with a nominal operating voltage up to and including 33 kV shall be by means of underground cable laid under the bed of the waterway or on the bed of the waterway. Existing overhead lines may be retained pending removal, or replacement with underground cable, for no more than five years from the date of the publication of this Code. In the interim, arrangements must be made to ensure that they comply with the requirements for overhead line crossings within six months of the publication of this Code. An exception is permitted for power lines (of any voltage) crossing non-permanent “navigable waterways”; in such cases the lines may be permanently erected and retained.

Overhead Power Line Crossings

Each crossing shall comply with the requirements for overhead line clearance above "maximum water level" and signs and markers provided in accordance with this Code within 12 months of its publication.

Where a line crosses over navigable water:

- a) The clearance of overhead conductors to the water shall meet the requirements of the table "Minimum Conductor Clearances over Navigable Waterways" at any time, with the water level being taken as the "maximum water level".
- b) The Network Operator shall make arrangements with the appropriate authorities for the provision, installation and maintenance by the Network Operator of clear and permanent signage warning of the presence and hazards of overhead power lines, indicating their location. Such signs shall be erected in the following ways:
 - in the waterway (similar to speed limit signs) on "spit posts" or on channel markers protruding above the "maximum water level", when approaching the line by water both upstream and downstream at least 100 m before overhead line conductors cross the waterway;
 - at all boat launching ramps providing access to the body of water which is crossed by overhead line conductors within 5 km of the overhead power line; and
 - by attachment to any bridge or structure, which crosses the waterway within 5 km of the overhead power line.
- c) The Network operator shall fit markers to the live conductors of any overhead line. The markers shall be a suitable reflective material that can be easily seen from the surface of the water or from a low flying aircraft in all levels of light between the period 30 minutes before sunrise and 30 minutes after sunset.

All signs and markers and overhead line crossings shall be inspected on site at least once every six months and maintained in good order by the Network Operator who shall keep records of the inspections and maintenance carried out.

Network Operators shall maintain records describing the voltage of the overhead power line, its location and minimum clearance above "maximum water level". The records shall be reviewed for currency at the time of the site inspections and updated at that time, whenever new power circuits are installed, or when any changes are made to existing power circuits. This information shall be provided to the appropriate authority responsible for preparation of navigation charts and information to persons operating vessels on the waterway at least once per year and at the time the records are updated.

Care shall be taken to avoid the hazards presented by overhead lines at locations where it can be reasonably anticipated that fishermen casting fishing lines may tangle them into the overhead conductors, such as in the vicinity of bridges and jetties.

TABLE - Minimum conductor clearances over navigable waterways

Nominal system voltage (U) for exposed or insulated conductor (volts)	Over the surface at the maximum water level <u>not</u> readily accessible to the ocean (as defined for navigable water) (mm)	Over the surface at the maximum water level readily accessible to the ocean (as defined for navigable water) (mm)
U ≤ 33 000	15 000	30 000
33 000 < U ≤ 132 000	16 000	30 000
132 000 < U ≤ 220 000	17 000	30 000
220 000 < U ≤ 330 000	17 500	30 000
330 000 < U ≤ 500 000	18 500	30 000

Underground Power Cable Crossings

Each crossing shall comply with the requirements of this Code and in particular the requirements of this section.

Provision shall be made for mechanical protection of the cable which is to be effectively fixed or buried in such a way that it is protected from exposure to damage due to embankment erosion. The cable shall also be protected from exposure through scouring of the bed of the waterway by flow of water, by mechanical dredging or ready damage from the anchors of vessels.

The Network Operator shall make arrangements with the appropriate authorities for the provision, installation and maintenance of clear and permanent signage warning of the presence and hazards of underground cable crossings, indicating their location. Such signs shall be erected at all boat launching ramps providing access to the body of water which is crossed by underground cables within 5 km and on each bank of the waterway at the point where the underground cable crosses the waterway.

All signs and markers and underground cable crossings shall be inspected on site at least once every six months and maintained in good order by the Network Operator who shall keep records of the inspections and maintenance carried out.

Network Operators shall maintain records describing the voltage of the underground cable, its location and depth relative to the bed of the waterway.

The records shall be reviewed for currency at the time of the site inspections and updated at that time, whenever new power circuits are installed, or when any changes are made to existing power circuits. This information shall be provided to the appropriate authority responsible for preparation of navigation charts and information to persons operating vessels on the waterway at least once per year and at the time the records are updated.