**Q. [Account 361.2 – Underground Cables] – As it relates to the rebuttal discussion for Account 361.2 – Underground Cables as set forth on pages 14 through 19 of Appendix B, please provide all specific quantitative analyses, with all underlying documentation, performed to substantiate the expectations on page 19 of Appendix B that, due to the level of direct buried cable and the harsh freezes and thaw cycles, one would expect the Company would experience shorter lives than others in the industry.**

A. The direct buried underground cable in service at Newfoundland Power is a mixture of XLPE and TR-XLPE cable. TR-XLPE cable has been available since the early 1980s, and has been in use by Newfoundland Power since that time. TR-XLPE is a proprietary technology of The Dow Chemical Company ("Dow").

Attachment A is a Dow brochure describing the attributes of TR-XLPE cable. According to Attachment A, XLPE cables are expected to last 20 to 25 years, while TR-XLPE cables are projected to last for more than 40 years. Attachment A further indicates that the service life of XLPE and TR-XLPE cables will vary depending on a number of factors, including operating conditions.

Among the harsh operating conditions to which direct buried cable is exposed in Newfoundland Power's service territory are recurring freeze and thaw cycles which are characteristic of winter weather on the island of Newfoundland. This weather phenomenon is not relied upon to justify reducing the service life estimate of underground cable. Rather, it supports not increasing the service life estimate of Newfoundland Power's underground cables significantly beyond the life expectancy indicated in Attachment A.

The current depreciation study recommends a service life of 45 years for underground cables. This service life estimate: (i) is consistent with the life expectancy indicated by Dow for TR-XLPE cable, (ii) is reasonable considering the operating conditions in Newfoundland Power's service territory, and (iii) reflects that Newfoundland Power has a substantial amount of the shorter life expectancy XLPE cable still in service.

**TR-XLPE Cable Brochure**

Creating Sustainable Value
for the Wired World

Dow Wire & Cable

# TR-XLPE Technology and Product – For Enhanced Performance and Long Life Medium Voltage Cables

Tree retardant cross linkable polyethylene (TR-XLPE) formulation is one of the proprietary technologies of The Dow Chemical Company that was first launched and commercialized in early 1980's. It incorporates a very unique and powerful additive that is able to spread and to slow down the diffusion process of conductive species through solid dielectrics -- cross linkable polyethylene, such as water, ions and other conductive species. This would result in a reduction of local electrical stress enhancement and electrical degradation in wet conditions, such as water treeing.

TR-XLPE products and technology used in medium voltage distribution power cables gave benefits of reduced system costs and longer service life. The excellent field-performance attributes and extended service life data obtained from the TR-XLPE cable that were already put underground for over 20 years in North America, provided very convincing and encouraging evidence of this innovative technology.

Dow TR-XLPE clinched its initial sales in the China and Singapore marketplace for submarine power cables (10 to 20 kV), and power cables designed for services inside petrochemical complexes and nuclear power generation plants (10 to 35 kV). The continuous improvement of the living standard in China and the fast development in its urban areas have made the replacement of underground cable more difficult and less cost efficient. Therefore, the high performance and long life medium voltage distribution cable is the ideal choice to secure a reliable and high efficiency electric power distribution system.

Dow TR-XLPE compound can provide the significant benefits when co-extruded with Dow high performance semi-conductive materials for both conductor shield and insulation shield. Because TR-XLPE is still predominantly based on polyethylene, thus the same machine and processing technique can be applied during the manufacturing process as the conventional XLPE.

As a general guideline and comparison, well made XLPE cables are typically expected to last 20-25 years on average, while TR-XLPE cables are projected to last for more than 40 years. However, the data may vary as it depends on the cable location, installation method, and operating conditions, etc.

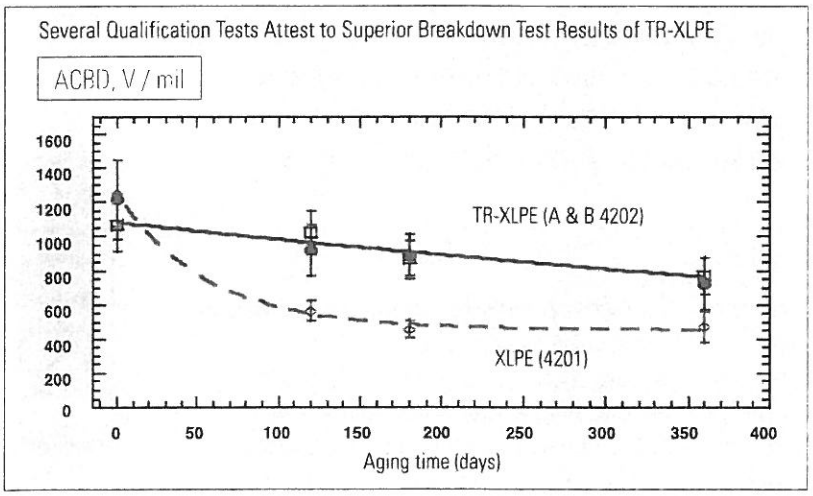
Wire & Cable Asia Pacific

**Table 1: Basic property data of HFDB-4202 NT EC, HFDB-0586 and HFDA-0693**

| | | |
|---|---|---|
| HFDB-4202 NT EC | Density at 23°C | 0.92 g/cm³ |
| | Tensile Strength | 20 MPa |
| | Elongation | 500% |
| HFDB-0586 BK | Density at 23°C | 1.10 g/cm³ |
| | Tensile Strength | 16 MPa |
| | Elongation | 300% |
| HFDA-0693 BK | Density at 23°C | 1.16 g/cm³ |
| | Tensile Strength | 13.2 MPa |
| | Elongation | 320% |

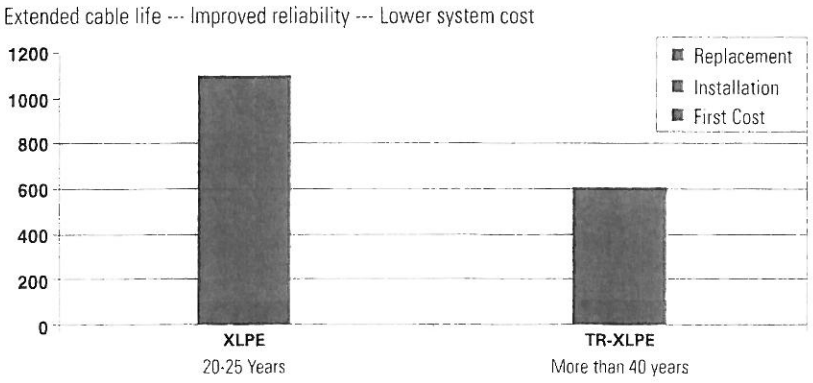
Figure 1 and Figure 2 show the performance advantages of TR-XLPE over XLPE in AC breakdown voltage and projected years of service life.

**Figure 1: AWTT performance (TR-XLPE vs. XLPE)**




ANSI / ICEA S-649-2004 Specification
Accelerated Water Tree Test (AWTT)

**Figure 2: Projected years of cable service life (TR-XLPE vs. XLPE)**

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