Section 502.2 of the ISO Rules, *Bulk Transmission Line Technical Requirements*
Technical Work Group Review
June 12, 2017Meeting Minutes

Location: AESO offices
Room 2539

Time: 9:30 am – 3:00 pm

Attendees	
Industry Participants	AESO
[redacted] – ATCO Electric Ltd.	[redacted] – Chair
[redacted] – ATCO Electric Ltd.	[redacted] – Consultant
[redacted] – ATCO Electric Ltd.	[redacted] – Regulatory Coordinator
[redacted] – AltaLink Management Ltd.	
[redacted] – AltaLink Management Ltd.	
[redacted] (via teleconference) – EPCOR Distribution & Transmission Inc.	
[redacted] (via teleconference) – Independent Consultant	

Agenda Item A: Call to Order and Introductions

- The Chair called the meeting to order at 9:30 am and called for introductions.
- In the introductions, it was noted that [redacted] was attending the meeting to represent ATCO Electric Ltd.'s (ATCO) FAC-008 technical team to understand the interface between Section 502.2 of the ISO rules, *Bulk Transmission Line Technical Requirements* (Section 502.2) and the standard.

Agenda Item B: Section 502.2 Review

The Chair walked the group through the latest draft of Section 502.2 noting participants' earlier comments received via email from TWG members and previous meetings of the TWG:

1. Subsections 3 & 4 [Functional Specifications]
   A concern was raised in regards straddling of versions for functional specifications during project changes:

   AtlaLink: Looking at circumstances where the project Functional Specification (FS) can straddle the earlier version and a new revision. Does this automatically change project requirements regardless of the original FS requirements?

   AESO Response: If the FS straddles rule revisions, the FS will reference a rule and revision date. The content of the FS should govern. However, the TFO may discuss revisions to the FS with the AESO if they wish to incorporate elements of the new Rules into the FS.

   AltaLink: Apparently, some AESO Project Managers have been taking a different interpretation; even referencing draft versions.

   AESO Response: The FS provides the basis for the project. No draft rules should be referenced in the FS, only the rules in effect when the FS is prepared (along with other project-specific requirements). AESO Project Managers are familiarizing themselves with updated rules and ensuring their consistent application across projects and FS.

   TWG Recommendation: No further discussion or changes required to subsection 4.

2. Subsections 5(a) & 5(b) [Any Extension, Tap or Addition to Any Bulk Transmission Line]

   AltaLink: The space in the "1 500 meters" notation can be read as one (1) 500 meters. This can be confusing and can lead to misinterpretation.

   AESO Response: Agreed that this can be misinterpreted and is not standard engineering notation.

   TWG Recommendation: TWG recommended removing the space or inserting a comma after the thousand digit.

   Action Item: The AESO will resolve this issue.

   AltaLink: Rather than specifying an absolute 1500m before Section 502.2 applies, this limit should be represented as a percentage of existing line length.

   AESO Response: The AESO position is that exposure to risk increases with absolute length, not percentage of original line length. The AESO does not support this change.

   TWG Recommendation: No recommendation.

   Action Item: No further action proposed

3. Subsection 9(1)(c) [Other Code Requirements]

   AltaLink: Subsection 9(1)(a) provides the "Alberta Electrical Utility Code" as one reference for provisions and requirements that must be met. Subsection 9(1)(c) also provides "the version of Canadian Standards Association C22.3 No.1, Overhead Systems standard referenced in the Alberta Electrical Utility Code" as one of the references. As it stands, the AEUC references CSA C22.3 making 9(1)(c) redundant.

   TWG Recommendation: Consensus among TWG that subsection 9(1)(c) should be removed.

   Action Item: The AESO will remove subsection 9(1)(c).

4. Subsection 10(1)(a) [Weather Loading Return Periods]

   ATCO: Subsection 10(1)(a) refers to a 50 year return for 138kV/144kV weather loadings. However, 138/144kV are exempted from wet snow loadings in the subsequent section 12 (wet snow loadings). This could be confusing, noted that some engineers presumed this meant wet snow loading should be applied to 138/144kV construction.

   AESO Response: The 138/144kV exemption is only for wet snow loading, not the other weather loads which are probability based (i.e., wind). Subsection 10 provides the generic return period, and subsections 11 and 12 discuss how it applies to wind loading and combined wet snow loading, respectively. The AESO requested RWG suggestions to improve clarity.

   TWG Recommendation: No recommendation. Unable to resolve with limited time in meeting.

Action Item: ATCO agreed to take this away and, if necessary, propose alternate wording for TWG consideration.

5. Subsection 11(3) [Weather Loading for Wind]

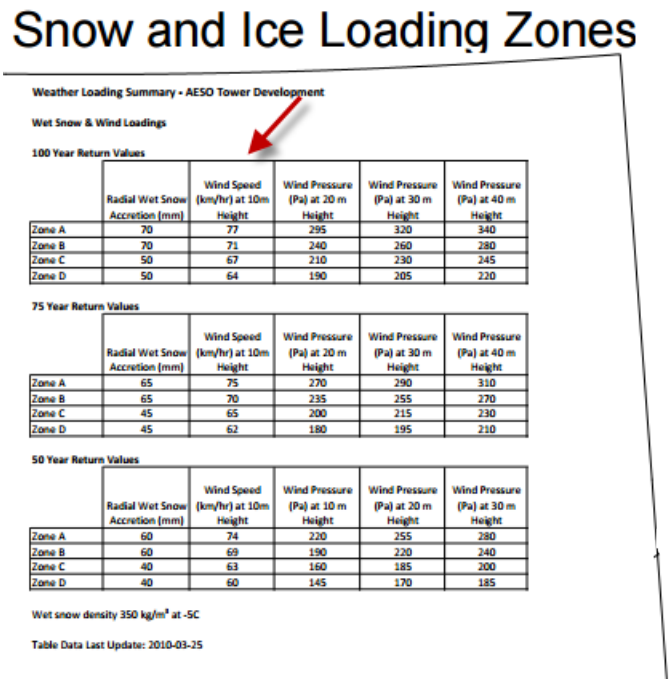
ATCO: The version of the reference: "ASCE Manual of Practice 74 – *Guidelines for Electrical Transmission Line Structural Loading, Third Edition*" is hard coded. If there are releases of newer versions, this will not provide the most current.

AESO Response: When the TWG proposed this wording, we were sensitive to the fact that the ASCE 74 group was proposing some changes which we felt might conflict with our local experience in Alberta. The Rules already take exception to their proposed gust effect factor and we were not certain what other changes would be proposed. The TWG felt it would be better to refer to the specific edition (version) at this time.

Recommendation: Keep reference to 3rd edition of ASCE Manual of Practice 74 in Section 502.2 for now.

6. Subsection 12(1) [Combined Wet Snow and Wind Loading Map]

ATCO: Subsection 12(1) references the combined wet snow and wind loading map available on the AESO website. The snow and ice loading map has a table of wind speeds and pressure at various heights. Engineers may use this inappropriately as gust factors are not specified. Not everyone may understand the underlying inputs and are adjusting wind pressure values based on exposure categories, etc. instead of using the wind pressures provided in the table.



Snow and Ice Loading Zones

Weather Loading Summary - AESO Tower Development

Wet Snow & Wind Loadings

100 Year Return Values

	Radial Wet Snow Accretion (mm)	Wind Speed (km/hr) at 10m Height	Wind Pressure (Pa) at 20 m Height	Wind Pressure (Pa) at 30 m Height	Wind Pressure (Pa) at 40 m Height
Zone A	70	77	295	320	340
Zone B	70	71	240	260	280
Zone C	50	67	210	230	245
Zone D	50	64	190	205	220

75 Year Return Values

	Radial Wet Snow Accretion (mm)	Wind Speed (km/hr) at 10m Height	Wind Pressure (Pa) at 20 m Height	Wind Pressure (Pa) at 30 m Height	Wind Pressure (Pa) at 40 m Height
Zone A	65	75	270	290	310
Zone B	65	70	235	255	270
Zone C	45	65	200	215	230
Zone D	45	62	180	195	210

50 Year Return Values

	Radial Wet Snow Accretion (mm)	Wind Speed (km/hr) at 10m Height	Wind Pressure (Pa) at 10 m Height	Wind Pressure (Pa) at 20 m Height	Wind Pressure (Pa) at 30 m Height
Zone A	60	74	220	255	280
Zone B	60	69	190	220	240
Zone C	40	63	160	185	200
Zone D	40	60	145	170	185

Wet snow density 350 kg/m³ at -5C

Table Data Last Update: 2010-03-25

Independent Consultant: Pressure values shown in the map tables are fixed. They should not be adjusted using exposure, gust, or elevation modifiers. They were derived from a wet snow accretion model, not based upon wind models.

AESO Response: Suggest removal of the wind velocity column to remove the designer's ability to incorrectly adjust the wind pressure.

Recommendations: The TWG recommended to: (i) add an explanatory note to the map tables; (ii) remove the wind velocity column from the snow and ice loading zones map to avoid confusion in using the wind velocity to re-calculate the pressure; and (iii) add some discussion to the ID to provide information on this.

Action Item: The AESO agreed to make these changes.

7. Subsection 11(1) [Weather Load for Wind]

AESO: The TWG previously identified the following problems with contours on the probability-based wind maps on the AESO's website: (i) some maps continue to have crossing contours (a physical impossibility); and (ii) some contour lines for the 50yr return appear to be missing or incorrectly labeled. The current maps do not appear to have been fully revised per the TWG recommendations

Action Item: The AESO to verify and prompt for the correction and updates to contours in the wind loading maps.

8. Subsection 14 [Failure Containment Loading]

TWG: Identified the following incorrect subsection references and wording clarifications:

- Subsection 14(1)
  Decision: Replace reference to subsection 14(8) to 14(7). There is no subsection 14(8).

- Subsection 14(1)(c)
  Decision: Replace "avoid" with "limit the extent of".

- Subsection 14(2)(a)
  Decision: Remove "suspension type" and apply to all structures.

- Subsection 14(3)
  Decision: Replace all references to "ground wire" with "shield wire". Align ID.

- Subsection 14(5) - A case was raised where some group that this requirement meant losing all the structures on one side of the tower.
  Decision: Although the provision here is clear with the designer engineers, the description might be misinterpreted, clarify description in an ID discussion. The AESO will clarify wording and possibly add a diagram to the ID for subsection 14(5).

- Subsection 14(7) [last line]
  Decision: Replace reference to 14(4) with 14(2) as it applies to the previous two requirements.

9. Subsection 15 [Overload and Strength Factors for Reliability Based Loadings]

AltaLink: Use of overload factor is a deterministic reference, not reliability based design. There is no overload factor, replace with just "load factor".

Action Item: The AESO will replace “overload factor” with “load factor” in subsection 15.

10. Subsection 16 [Conductor Selection]

    Recommendation: TWG suggested clarifications to wording in subsection 16(1)(b) & (d).

    Action Item: The AESO will revise the wording of subsection 16(1)(b) & (d) as suggested.

11. Subsection 17 [Sequence of Failure]

    Action Item: AESO to review and assess the appropriateness of the authoritative “must” in subsection 17(1).

12. Subsection 18 [Overhead Shieldwires]

    Recommendation: Reference to “equivalent performance with a shield wire” for lightning protection alternatives in subsection 18(7) has been removed across drafts.

    Action Item: The AESO will look at wording on performance equivalent to overhead shield wires.

    Recommendation: Fix typo in subsection 18(4)(b)

    Action Item: The AESO will correct typo by adding a space between “and” and “withstanding”.

13. Subsection 19 [Aeolian Vibration Control]

    Recommendation: Correct inconsistent references to the aluminum conductor (ACSR) in subsection (19)(6).

    Action Item: The AESO will make references to ACSR consistent and move “steel reinforced” after “aluminum conductor”.

14. Subsection 21(1) [Basic Design Clearances]

    AltaLink: Reference to CSA C22.3 is not necessary because AEUC already makes this reference and lists all exceptions.

    Recommendation: Remove reference to the CSA C 22.3.

    Action Item: The ATCO will remove the reference to CSA C 22.3 in subsection 21(1)

15. Subsection 25 [Insulators]

    Independent Consultant: Requested clarification of “high contamination areas” in subsection 25(1)(b).

    Action Item: ATCO to research IEEE or IEC specification/definition of “high contamination area” so that clear reference can be made. Report findings back to AESO so Section 502.2 can be updated.

    Consultant: Suggested the word “combined” be added to subsection 25(2)(6) before the reference to mechanical and electrical rating.

Action Item: The AESO will insert “combined” before “mechanical and electrical rating”

16. Subsection 27 [Conductor Emergency Thermal Ratings Methodology]

AltaLink: With changes to the emergency rating period, subsection 27(2) is no longer relevant and should be removed.

Recommendation: Remove this requirement as it serves no purpose.

Action Item: The AESO will remove subsection 27(2).

17. Subsection 29 [Hardware Requirements]

Consultant: Requested clarity on reference to ASTM A370 in subsection 29(1) as it provides a wide range of possible test procedures for different purposes.

Action Item: The AESO will check reference to ASTM, include the words clarifying which tests are required.

Agenda Item C: ID 2010-005R Review

#14 Failure Containment Loading

Recommendation: change “may” be changed to “should” in fifth paragraph.

Action Item: The AESO will replace “may” with “should”.

#15 Overload and Strength Factors

Recommendation: Review whether this section for correctness. The original wording seems to have changed from past recollections. 60286 has guidelines for strength determination, not specifically for strength factors.

AESO Response: Similar to Rules; reference to “overload factors” should be “load factors”.

Action Item: The AESO will compare current wording with original and verify changes and also check with content of CSA C22.3 No 60286 to confirm correct wording.

#16 Conductor Selection

Recommendation: Change “TFO may” to “TFO should”

Action Item: AESO will change “TFO may” to “TFO should”

TWG: Regarding loading levels and cost of losses, discussed ATCO using 40 years instead of 20 years referenced in the ID for their conductor optimization studies.

AESO Response: 20 years is considered more of a minimum; 40 was great.

Recommendation: No further changes proposed at this time.

#25 Insulators

Recommendation: paragraph 1 not aligned with the rule; silicone is not mandatory.

Action Item: The AESO will review Rule and ID to ensure they are aligned.

#27 Conductor Emergency Thermal Ratings Methodology

Recommendation: 30 minutes has been change to 10 minutes for emergency thermal ratings in the Rule

Action Item: The AESO will change 30 min to 10min in first paragraph and delete second paragraph as it is no longer pertinent.

Other Important Considerations - Radio interference

Recommendation: Check whether the requirement for measurements within 6 months of construction completion is in the latest edition of ICES-004.

Action Item: ATCO to check latest version and verify whether there is a 6-month requirement. Provide findings to AESO to update ID as required.

Meeting adjourned at 2:45 pm