The Narragansett Electric Company

d/b/a National Grid (Rhode Island Reliability Project)

EFSB Docket No. SB-2008-02

SupplementalTestimony of

Todd G. Kopoyan, P.E.

June 4, 2009

Q. Please state your full name and business address.

A. My name is Todd Kopoyan. My business address is 176 Worcester Providence Turnpike, Suite 102, Sutton, MA.

Q. Have you previously filed testimony in this matter?

A. Yes, I filed prefiled testimony in RIPUC Dkt. No. 4029 on February 20, 2009. I understand that the prefiled testimony from RIPUC Dkt. No. 4029 will be incorporated in this proceeding.

Q. In your February 20, 2009 testimony you indicated that outage availability will significantly influence the construction schedule of the West Farnum project. Has additional outage review been conducted to determine the impact of outages on the project?

A. Yes, outage planning has progressed considerably since February.

Q. What have been the results of this additional analysis?

A. We have reconsidered our original plan of a hybrid Air Insulated Switchgear (AIS)/ Gas Insulated Switchgear (GIS) four-bay, breaker-and-a-half substation and have decided to develop an all-GIS four-bay, breaker-and-a-half substation.

Q. Why has the design been changed?

A. The number and duration of 345 kV outages required for the hybrid plan would introduce significant stresses and reliability exposure to the electric system that we feel could and should be mitigated. The all-GIS design would reduce the number of required outages in that there would no longer be a need to upgrade the existing ring bus and the GIS could be completely installed and tested without affecting the existing electric facilities at West

Farnum. Furthermore, the cost of construction inefficiencies and overtime premiums associated with the hybrid design help to offset the additional equipment cost associated with the all-GIS design.

As background, originally the outage plan for the hybrid design consisted of two sets of outages. The first set was to cutover the protection and controls of each existing breaker to the new control house ("P&C outages") and a second set to re-terminate the existing 345 kV elements (i.e. lines, transformers, buses) into their new positions ("termination outages"). These outages alone strain the electric system; however, further engineering revealed that additional outages would be required. It was determined that the existing ring bus does not meet current design standards with regards to withstanding the projected short circuit forces. The need to rebuild the entire existing ring bus creates a third set of outages ("ring bus outages"). The ring bus outages and the majority of the P&C outages are unique to the hybrid design. In addition, although both designs contain termination outages, those associated with the hybrid design are significantly longer than those of the all-GIS design. It is estimated that total outages associated with the hybrid design will last approximately 286 days, whereas outages associated with the all-GIS design will last approximately 36 days.

Lastly, one or more breakers in the ring will be open for the duration of the P&C outage period -- approximately 3 months. There is no expedient way to restore the ring once the protection and control cutovers begin. In addition to the outage quantity and durations of the hybrid design, this ring bus exposure was also a significant concern.

Q. How does this alter the proposed work at West Farnum from that described in your testimony submitted on February 20, 2009.

A. The new design at West Farnum Substation includes the following:

- four bays (instead of two) of new 345 kV GIS consisting of twelve (instead of six) circuit breakers and associated disconnects and buswork;
- a new building to house the GIS which will be approximately 20 feet longer than that in the original proposal;
- a new control house for the relay and control equipment (same as in the original proposal);
- five (instead of two) new transmission line termination structures;
- the addition of the new 345 kV circuit breaker in the existing AIS and the upgrades to the existing 345 kV AIS bus are no longer needed. The existing 345 kV AIS ring bus will be removed at the end of the project.

These revisions are shown in the revised Figure 4-10 and described in revised paragraph 4.3.7 of the ER which are attached as attachments TGK-3 and TGK-4, respectively.

Q. Are there other benefits from the all-GIS design?

A. Yes, another benefit of the all-GIS arrangement is that the relocation of the 315 line is no longer required so there would be no need to expand the substation northeast into the wetlands.

Q. What are the other benefits and disadvantages of the all-GIS design?

A. Because the GIS will be indoors, its equipment will be shielded from the elements. This will extend the equipment's useful life. Also, operation of the substation will be

facilitated since the operators are not exposed to the elements. There is an environmental disadvantage in that the all-GIS design requires approximately 5% more SF6 gas than does the hybrid design.

Q. How does the cost of the two options compare?

A. Current study grade estimates (i.e. +/- 25%) show that the all-GIS option ($64.9 M) is approximately $0.8 M (1.2%) more than the hybrid option ($64.1 M) in 2009 dollars.

Q. Does this conclude your supplemental testimony?

A. Yes, it does.

Attachments

TGK-3	Revised Figure 4-10 of the ER
TGK-4	Revised paragraph 4.3.7 of the ER