Sub-Regional RTEP Committee
PJM South July 26, 2016
Questions submitted by PJM Stakeholders

1) Slide 2 – B1696
   a) What other alternatives were considered beside the currently proposed installation of a breaker and half scheme at Idylwood? Provide cost and performance details for each alternative considered.

      Answer:
      This project was initially presented at the June 9, 2011 TEAC meeting as a conversion from the existing straight-bus arrangement to a conventional (i.e. "air insulated") breaker-and-a-half arrangement with a potential in-service target date of May 2016. The use of a "GIS" breaker-and-a-half arrangement, with a projected cost of $55M and a revised potential in-service target date of May 2017, was presented and discussed at the August 21, 2013 Southern Sub-Regional RTEP meeting and subsequently presented at the September 12, 2013 TEAC meeting. Idylwood is located at the intersection of two major transmission corridors and is an electrical transmission hub and major distribution substation. As an electrical transmission hub, Idylwood Substation is presently the terminus for five 230kV transmission lines and is a key component to supplying the energy required to keep up with the growth in Northern Virginia. As a major distribution substation, Idylwood presently has one 168 MVA and two 84 MVA, 230-34.5kV transformers, and fourteen 34.5kV distribution circuits that directly supply power to more than 22,300 local Fairfax County residents and businesses in communities that include Merrifield, southern Tysons Corner, and the cities of Falls Church and Fairfax. Rebuilding the 230kV bus using GIS equipment will resolve the identified NERC criteria violations and serve to maximize the utilization of space at Idylwood Substation, ensuring that it will continue to support the regional growth while minimizing impact to the surrounding communities. For these reasons, no other alternatives were considered.

   b) What is the breakdown of the cost increase for this project by component listed in the 'Reason for cost increase' section?

      Answer:
      At the July 26, 2016 Southern Sub-Regional RTEP meeting, the projected cost estimate increased from $55M to $80M and the projected in-service target date was revised to February 2020. A breakdown of the $25M cost increase is as follows:
      $7.6M – increased labor rate and number of hours estimated
      $6.0M – increase number of GIS breakers from 15 to 18 to include highside breaker at each distribution transformer
      $0.5M – replace 230kV capbank

$1.6M – due to outage restrictions requiring 230kV temp bus modifications and addition of 2 SF_6 breakers as part of temporary (3 year) feed to existing distribution transformers
$0.7M – due to revised system protection standards $0.5M – increase in grading and clearing
$0.5M – construction fence (sound fence)
$1.1M – contract civil engr/permitting and sound studies
$0.2M – project management and field supervision
$5.8M – transmission line work
$24.5M = TOTAL of above (rounded to $25M)

c) Can the original bus just be replaced to mitigate the thermal violations?

Answer:
No. The breaker-and-a-half arrangement was proposed to resolve the identified NERC violations and operational performance issues associated with the straight-bus. It should be noted that the breaker-and-a-half arrangement was also proposed in anticipation of the need to terminate either a future 2nd Clark-Idylwood 230kV line or an Idylwood-Spring Hill 230kV line, as identified and presented at the June 9, 2011 TEAC meeting. The driver for the 2nd Clark-Idylwood 230kV line was subsequently mitigated and the cancellation of that project was discussed at the August 21, 2013 Southern Sub-Regional RTEP meeting. However, at that same meeting, the need for a new Idylwood-Scott's Run 230kV line was presented and discussed. The Idylwood – Scott's Run project is now a baseline approved project. It should be further noted that, in July 2014, PJM identified violations associated with the 2015 RPM model that were mitigated by accelerating a temporary up-rate (parallel conductor with existing bus) that was planned to accommodate the target date delay from 2016 to 2017.

d) Provide a breakdown of the project costs related to The Thermal Violation and Operational Performance

Answer:
The project was approved as a single baseline upgrade to resolve **all** of the identified issues without distinction being made as to the driver. Therefore, no cost allocation by driver will be attempted.

2) Slide 3 – B1792

a) What is the breakdown of the cost increase for this project by component listed in the 'Proposed Revised Solution' section?

Answer:
The original cost estimate of $26,000,000 was a ballpark cost estimate for rebuilding the line and installing a 230kV four breaker ring bus. The revised detailed cost estimate is broken down as follows:

Line Work	
$32,691,354	33 Line Rebuild - completed in 2014
Substation work in construction and to be completed Dec 2016 -	
$13,906,796	Substation
$170,144	Chase City Related Scope
$192,099	Clover Related Scope
$600,000	Oil containment Modifications *
$450,000	Real Estate
$350,000	Telecommunications - Additional requirements at Chase City *
$1,150,000	Site Prep
$600,000	Retirement of Halifax Sub
$50,220,000	Revised Project Cost Estimate
	* waiting on final estimate

b) How big of an issue is Halifax with regards to it being in a flood plain?

Answer:
Approximately half of the existing Halifax substation is located in a flood plain (red shaded area) as shown by the map below.

Halifax is located very close to the water, only about 200 feet from Banister Lake. It was only feasible to expand towards the lower part of the yard, further into the flood plain. Expanding further into the flood plain would put more equipment at risk and would not be considered good engineering practice.

There is also the potential need in the future for a third 230-115kV transformer at Halifax which is not possible in the present location.

c) Has Halifax substation ever flooded, when, for how long, what was the operational impact from each flood?

Answer:
Dominion does not have an official record of flood events at Halifax substation. However, Dominion personnel recall water levels in the substation up over the cable trough for the control cables, usually during storms. If the water level would have risen above the control cabinets or the control house, they would have removed the relay panels and de-energized the DC in the station. Flooding results in severe corrosion of the DC equipment. Another Dominion employee recalled a flooding event at Halifax due to Hurricane Fran in 1996. Water came up to the bottom of the breaker cabinets and Dominion was very close to taking action. Another Dominion employee recalled a flooding event in the 1970's when water got into the control house but does not remember if the station was taken out of service. These events would not have been officially recorded.

d) What other alternatives were considered? Berms, flood containment, etc…

Answer:
No other alternatives were considered at this site as it relates to mitigation of the flooding concerns.

e) Provide any other alternatives review or discussed for the Operational Performance portion of the current B1792 project. Provide details on why Dominion chose the alternative it did and any cost justification for this alternative.

Answer:
Project b1792 was presented at the 2011 TEAC meeting as a rebuild of line #33 - Chase City to Halifax and a four breaker 230kV ring bus at Halifax. The project was proposed because it resolved the N-1 and N-1-1 thermal violations and eliminated the motor operator scheme at Halifax. This project was approved by PJM as a baseline project with no discussion of making a separate Operational Performance component.

3) Slide 5 – B2458
a) What are the thermal ratings of the Earleys to Aulander and Aulander to Woodland 115kV line segments?

Answer:

Ratings for Line 54 Earleys to Woodland

Segment	Summer STE Rating
Earleys to Aulander	118 MVA
Aulander to Woodland	118 MVA

4) Slide 7, 8
a) Break out baseline and supplemental projects (reducing them by the contribution in aid of construction)

Answer:
The latest PJM slides separated this slide into two projects, a baseline (slide 8) and a supplemental (slide 21). The latest slides on the PJM website are dated 8/8/16 (v4).

5) Slide 11
   a) Is the cost of $350k the cost per breaker?

      Answer: Yes. This is reflected in the revised slides (V4 posted 8/8/16).

6) Slide 13 – S0920
   a) Break out cost estimate for detailed cost and real estate cost.

      Answer:

Palmer Springs - S0920 - Major Components		
Engineering	$	320,428.00
Project Management Support	$	22,069.00
Right of Way (includes $387,650 for real estate)	$	497,100.00
Permitting	$	71,794.00
External Cost	$	3,383.00
Site Work	$	865,150.00
Project Start Up / Operating Costs	$	97,055.00
Control Enclosure	$	660,978.00
Substation Electrical (Bus Work, Foundations, etc)	$	677,743.00
Transmission Breakers	$	943,371.00
WT/CCVT/Arresters	$	426,765.00
115kV PVT	$	351,191.00
System Protection	$	767,272.00
Construction Management / Field Supervision	$	165,001.00
	$	**5,869,300.00**

   b) What are the MW-miles for the radial transmission line from Palmer Springs to Beechwood DP?

      Answer:
      The Palmer Springs to Beechwood DP line has 34.2 MW-miles based on the loads in the 2021 RTEP case.

7) Slides 14, 15, 16 – S0921
   a) Provide cost breakdown by each substation, if possible

Answer:

$7,270,814	(Lone Pine Substation Estimate)
$6,348,724	(Pamplin Substation [Expansion] Estimate)
$6,330,482	(Lunenburg Substation)
$2,443,576	(Twitty's Creek Substation)
$5,078,132	(Transmission Estimate - Lone Pine Substation)
$2,690,229	(Transmission Estimate - Lunenburg Substation)
$1,591,868	(Transmission Estimate - Pamplin Substation)
$817,571	(Chase City Substation Estimate)
$445,170	(Crewe Substation Estimate)
$492,267	(Farmville Substation Estimate)
$8,140	(Fort Picket Substation Estimate)
$8,140	(Jetersville Substation Estimate)
$104,546	(Victoria Substation Estimate)
$149,313	(Willis Mountain Substation Estimate)
$33,778,972	Total

b) What caused the cost overruns?

Answer:
The original cost was a ballpark cost. The latest cost is based on a detailed cost estimate. Therefore, the cost increase is due to the refined cost estimate.

8) Slide 18, 19

a) Request was made to modify the slides to be more specific on what distribution issue is being supported by the project.

Answer:
Slide 18 – Sligo Switches and Circuit Switcher

Sligo Transformer #1 requires load relief for winter loading and for both summer and winter transformer contingencies. Sligo transformer #1 contingency exceeds the mobile transformer rating by the winter of 2016.

Slide 19 - Farmville 230kV Circuit Switcher

Farmville Transformer #3 has no external ties and the contingency is mobile dependent all of the time. The winter peak exceeds the mobile rating and the summer peak will soon exceed the rating as well.

9) General: For projects citing physical security as the driver, please specify if the TO is using the PJM criteria or its own. If using its own, please provider the criteria.

Answer:
The physical security measures to protect Dominion's substations are designed to address the vulnerabilities and countermeasures necessary to meet the mandatory NERC Security Standard CIP-014-2. Specifically, Dominion (as the Transmission Owner) performed the following to comply with the NERC Security Standard CIP-014-2:

- Requirement R1: The Company performed (and will continue to perform) a risk assessment.
- Requirement R2: Obtained third-party verification of risk assessment
- Requirement R3: Coordinated with the Transmission Owner
- Requirement R4-R6: Evaluated potential threats and vulnerabilities of a physical attack, developed and implemented a security plan, and had an unaffiliated third-party review the evaluation and security plan.

It is important to note that CIP-014-2 requires the Transmission Owner (TO) to comply with Requirements R1 - R6.

Due to the sensitive nature of Critical Infrastructure Protection, Dominion considers the assessment, the assessment results, and associated security plan strictly confidential.