Julia Brown
jbrown@oktlaw.com
416.981.9353

September 29, 2020

BY EMAIL

The Board of Commissioners of Public Utilities
Prince Charles Building
210-120 Torbay Road
St. John's, NL, A1A 2G8

Re: Newfoundland and Labrador Hydro – 2021 Capital Budget Application

Dear Ms. Blundon:

Please find enclosed the Labrador Interconnected Group's Requests for Information numbered LAB-NLH-001 to LAB-NLH-015.

Please do not hesitate to contact us with any questions regarding the enclosed.

Respectfully,
Olthuis, Kleer, Townshend LLP
PER:

JULIA BROWN
LAWYER

JB/

IN THE MATTER OF the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 ("EPCA") and the *Public Utilities Act*, RSN 1990, Chapter P-47 ("Act");

AND IN THE MATTER OF an Application by Newfoundland and Labrador Hydro ("Hydro") for an Order approving: (i) its 2021 Capital Budget pursuant to s. 41(1) of the Act; (ii) its 2021 capital purchases and construction projects in excess of$50,000.00 pursuant to s. 41(3)(a) of the Act; and (iii) for an Order pursuant to s. 78 of the Act fixing and determining its average rate base for 2017,2018 and 2019

Requests for Information
by the Labrador Interconnected Group

LAB-NLH-001 to LAB-NLH-015

September 29, 2020

Requests for Information Regarding the 2021 Capital Budget Application

LAB-NLH-1. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades

a) Please provide a high-level overview of a) major works carried out in Labrador West since the Labrador City Distribution Upgrade and voltage conversion works in the last decade, and b) the works proposed in the present CBA, as well as those foreseen therein.

WABUSH TERMINAL STATION UPGRADES

LAB-NLH-2. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, page 2 (p. 428 pdf)

Citation 1:

> The customer load in western Labrador is forecast to reach 379.9 MW by winter 2020–2021 and 383.3 MW by the end of the 25-year study period. The transfer capability of the existing Labrador West transmission system in winter is 350 MW under normal operating conditions with all of Hydro's assets in service. Under existing system conditions, power supplied to IOC and Wabush Mines must be limited such that the total coincident peak for the system does not exceed 350 MW. As such, Hydro does not recommend deferring this project another year.
>
> To increase the transmission capability of the system beyond 350 MW, new transmission infrastructure is required. In the absence of such upgrades, Hydro must establish specific operating limits and procedures for curtailing industrial customers.
>
> If upgrades to the Wabush Terminal Station are not implemented and SC3 is not available for long-term operation, supply to industrial customers must be curtailed when the Labrador West transmission system peak load exceeds 350 MW under normal operations. Additionally, there is no capacity available to supply potential future developments.
>
> Further, if a transformer at the Wabush Terminal Station was to fail, there is insufficient power transformer capacity to meet the forecast peak load. In this case, there would be a number of potential customer impacts. As the Wabush Terminal Station does not have spare transformers or access to mobile transformer units, it would take a minimum of two years to source and install a new transformer due to the long unit lead times and the short construction season in western Labrador.

Citation 2 (p. 8-9, 454-455 pdf):

> A projected load review of the curtailment and interruptible requirements in Labrador West concluded that with the existing system capacity of 350 MW, industrial customers could be interrupted between to 50 times a year during the winter months. Interruptions were predicted to range from 4 hours up to 122 hours in the winter months.

a) Please provide a copy of the cited load review, and indicate for which years the quoted results apply.

b) Please estimate the year-by-year curtailment that has been and would be required by IOC and Wabush Mines in order to respect the 350 MW limit, in the event that the proposed project is deferred.

c) Please explain how that curtailment has been and would be allocated between the two companies, with and without the assumption that IOC retains ownership of SC3.

d) Please provide an estimate of the annual likelihood of failure of one of the Wabush Terminal Station transformers.

e) Please describe the cost of making a spare or mobile transformer available to the Wabush Terminal Station.

LAB-NLH-3. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, Attachment 3, Lab West System Expansion Study, Wabush Terminal Station Recommended Upgrades, page 2 (p. 448 pdf)

Citation:

> Each transmission line has the following thermal limits, based upon a 50˚C conductor temperature:
>
> - 425 A @ 30˚C;
> - 638 A @ 15°C; and
> - 921 A @ -15˚C.

a) Based on these current limitations, please provide the transmission capability of each of these two 230 kV transmission lines, at each of the three ambient temperatures mentioned. Insofar as these values exceed the 350 MW mentioned earlier, please explain the difference.

Preamble:

> Table 2 on page 4 (p. 450 pdf) presents the year-by-year load P50 and P90 forecasts for western Labrador for the 25-year study period.

b) Please break down the year-by-year load P50 and P90 forecasts for western Labrador for the 25-year study period, distinguishing between:

i) Residential loads,

ii) Existing cryptocurrency loads,

iii) Other general service loads,

iv) Additional cryptocurrency loads,

v) Existing industrial loads, and

vi) Additional industrial loads.

LAB-NLH-4. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, Attachment 3, Lab West System Expansion Study, Wabush Terminal Station Recommended Upgrades, page 5 (p. 451 pdf)

Citation:

The following criteria were defined for the transmission system in western Labrador as part of the Labrador Interconnected System Expansion Study.

- No loss of load for:
  - Loss of a synchronous condenser;
  - Loss of a capacitor bank; and
  - Loss of a power transformer.
- Loss of load is permitted for:
  - Loss of a 230 kV transmission line.

With respect to transformer contingencies, the following Transmission Planning Criteria also applies to the transmission system in western Labrador:

> Transformer additions at all major (≥230 kV) terminal stations (i.e. two or more transformers per voltage class) shall be planned on the basis of being able to withstand the loss of the largest unit (i.e. installed spare transformer capacity) such that all firm loads can be supplied during system peak.

The reliability implications of these criteria are presented in this report.

a) Please explain where and when these criteria were determined, and by what process.

i) Where they reviewed and approved by Board?

ii) Are they mandatory or discretionary?

iii) Hypothetically, if Hydro were to determine that, with the loss of the largest unit, 1 MW of firm load would have to be curtailed for one hour at system peak, and that avoiding that curtailment would require an investment of $50 million, would it be able to exercise judgement about proceeding with that investment?

b) Please elaborate on the extent to which Hydro can and does exercise its judgment in comparing the costs and benefits of transmission investments.

LAB-NLH-5. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, Attachment 3, Lab West System Expansion Study, Wabush Terminal Station Recommended Upgrades, page 6 (p. 452 pdf)

Citation:

> The transfer capability of the Hydro-owned assets in winter is 350 MW under normal operating conditions with all equipment in service. This is due to voltage limitations at the Wabush Terminal Station. With SC3 in service, the transfer capability is increased to 385 MW in winter. The additional 35 MW of non-firm capacity is available for IOC's exclusive use and is currently not available as a source of capacity for other customers. Excluding SC3, the loss of a synchronous condenser reduces capacity to 285 MW.

a) Please explain the voltage limitations at the Wabush Terminal Station and how they limit transfer capability of the Hydro-owned assets in winter to 350 MW under normal operating conditions with all equipment in service.

b) Please confirm or correct our understanding from the Citation that SC3 is currently in service, but only available for IOC's exclusive use.

LAB-NLH-6. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, Attachment 3, Lab West System Expansion Study, Wabush Terminal Station Recommended Upgrades, page 9 (p. 455 pdf)

Citation:

> Due to the split bus configuration of the Wabush Terminal Station, the transformer capacity is evaluated on a per-bus basis. The non-firm transformer capacity for each 46 kV bus is 278.3 MVA, while the firm transformer capacity for each bus is 195 MVA.
>
> Bus B2 typically carries 57% of the station's total load, as it supplies IOC, Wabush Mines, and the Town loads, whereas B1 only supplies IOC load. Therefore, for the Peak P90 Forecast case for 2045–2046, the total load supplied on B2 would be 228 MVA which exceeds the firm transformer capacity for B2.
>
> Therefore, there is a violation to Transmission Planning Criteria as there is insufficient power transformer capacity to meet peak forecasted load for n-1 contingency situations. As is the case for all other Hydro terminal stations, such a violation would trigger the requirement for the installation of additional power transformer capacity. This requirement is further justified in the following sections.

a) Please confirm that:

i) IOC is served by both Bus B1 and Bus B2, and that all other Wabush Terminal Station loads are served by Bus B2, and

ii) the value of 228 MVA was determined by multiplying the typical value of 57% to the forecast P90 load.

b) Please indicate if there is any possibility of transferring more of IOC's load to Bus B1 in order to free more capacity for load growth in the areas served by Bus B2. If so, please describe in general terms what works would be required to do so.

LAB-NLH-7. Re: CBA, Rev. 1, vol. II, Wabush Terminal Station Upgrades, Attachment 3, Lab West System Expansion Study, Wabush Terminal Station Recommended Upgrades, page 9 (p. 455 pdf)

Citation 1 (p. 12, page 458 pdf):

> Since the Labrador Expansion Study was filed in 2018, SC3 has been fully commissioned by IOC and is now operational by nature of a short term operational agreement. This agreement allows SC3 to provide additional capacity for the sole use of IOC and is not available to other Labrador West customers.
>
> Hydro is currently in negotiations with IOC with respect to exploring long-term operating arrangements for SC3 where these assets would be available to support all customers. In support of these negotiations, Hydro engaged Stantec Consulting Ltd to develop cost estimates for alternative sources of reactive support to ensure firm supply for loads in western Labrador. Based on results on this analysis, the purchase of a 60 MVAR capacitor bank and 27 MVAR reactor would present the lowest cost alternative if SC3 were not available as a long-term solution. The Labrador West Voltage Support Cost Estimate Summary prepared by Stantec is provided in Appendix D. (underlining added)

Citation 2 (p. 14, page 460 pdf):

> However, negotiations with IOC are ongoing with respect to the long-term operation of SC3. While a decision will be made with respect to SC3 later in 2020, other upgrades at the Wabush Terminal Station are required irrespective of the outcome of these negotiations. These proposed system additions include the installation of two, new 125 MVA transformers and the installation of a 23 MVar capacitor bank.

Citation 3 (Appendix D, p. 3 (p. 483 pdf)

> In 1997-1998, a failure occurred on synchronous condenser two (SC-2) at the Wabush Terminal Station (WAB TS). To restore full operational capacity to the Wabush Terminal Station (WAB TS), a third synchronous condenser (SC-3) was installed and connected to Bus 2 (Bus 15) in an emergency scenario to act as a replacement while SC-2 repairs were completed. The SC-3 asset is wholly owned by the Iron Ore Company of Canada (IOCC). After SC-2 was repaired, SC-3 was removed from service and minimal maintenance completed. In 2012, IOCC reestablished the SC-3 project with the goal of putting SC3 in service permanently, in the WAB TS. Construction commenced in 2012 and the unit was partially commissioned in September 2014 and was never released for service.

…

The preferred Alternative of 2018 Study involved the addition of a 23MVAR capacitor bank for voltage support and replacement of transformers T4 and T5 with 125MVA units. This solution assumed that IOC's SC3 unit with its 60MVAR reactive power capability and 27MVAR reactor was available in the base solution without being purchased from IOC. This option gives a firm Labrador West transmission capacity of 383MW with the single loss of any major transmission element with the exception of the 230kV transmission lines. Overall, this solution requires the addition of 83MVARs of reactive voltage support, SC3 and 23MVARs of capacitor banks.

Citation 4 (Appendix D, p. 8 (p. 488 pdf)

Cost Estimate Summary - Options 1 -4		
Option #1	New 23 MVAR Capacitor Bank (including purchase of SC-3)	$ 32,578,000.00
Option #2	New 83 MVAR Capacitor Bank plus 27 MVAR Reactor	$ 7,540,000.00
Option #3	New +60 MVA Synchronous Condenser plus 23 MVAR Capacitor Bank	$ 21,928,000.00
Option #4	New +83/-27 MVAR Static VAR Compensator	$ 20,942,000.00

Citation 5 (Appendix D, p. 7 (p. 487 pdf)

4.0 Summary

In the fall of 2019, NLH completed an estimate for the design, supply, installation and commissioning of three new 25 MVAR Cap Banks. As part of that analysis, IOCC were informed the overall price was approx. $14.8 million. The NLH estimate is considered a higher level, conservative estimate to install capacitor banks and associated equipment. This was based on a general maturity level of the work scope and is considered an AACE Class 5 cost estimate. The Stantec estimate is based on a work scope with a much higher level of definition and therefore more appropriate to be defined as a Class 3 cost estimate. The differences between the estimate classes account for the variation in the overall project costs. The AACE Generic Cost Estimate Classification Matrix can be found below in Table #5:

a) Please reconcile the statement in Citation 3 that SC3 was never released for service with the statement in Citation 1 that it has been "fully commissioned".

b) Please provide an update concerning discussions with IOC regarding SC3 since the CBA was filed in July 2020.

c) Please confirm that the costs for Options 1-4 described in Citation 4 are additional to the $11.6 million cost of the Wabush Terminal Station Upgrades proposed in the 2021 CBA.

d) Please explain their relationship to the four options addressed in the Stantec Report (Appendix D) to the "three new 25 MVAR Cap Banks" referred to in Citation 5, for which NLH completed an estimate for design, supply, installation and commissioning in 2019.

e) Please confirm that if Option #2, which has costs 3-4 times lower than the other options, is retained SC3 will no longer be needed. In that eventuality, would it provide any additional benefit to IOC?

f) Please confirm that the cost estimate for Option 1 is based on the book value of SC3. If, as it appears in Option 2, Hydro can obtain equivalent service at a far lower cost, is it reasonable to attribute this value to SC3? Please elaborate.

WABUSH SUBSTATION UPGRADES

LAB-NLH-8. Re: CBA, Rev. 1, vol. II, Wabush Substation Upgrades, page 3 (p. 549 pdf)

Citation:

> The substation has a total installed capacity (at 25°C ambient) of 37.3 MVA. The firm transformation capacity of the substation is 20.6 MVA. Load forecasts indicate that the peak demand for the Wabush Substation is expected to reach 22.3 MW by the winter of 2021. The substation's firm capacity has already been exceeded by approximately 10% and load forecasts predict that peak loads will increase. There is therefore a violation to Transmission Planning Criteria as there is insufficient power transformer capacity to meet peak load Additional details of the load forecast are provided in Section 2.2 of Attachment 1.

a) Please confirm that the cited value for firm transformation capacity of the substation of 20.6 MVA is based on NLSO ratings, whereas it was 25.5 MW under the Distribution Planning criteria previously in place.

b) Please provide P50 and P90 load forecasts for the Wabush Substation for the 25-year planning period, and explain how they were derived, updating those presented in the 2018.

c) Have any changes in the analysis of alternatives been made since the 2018 TES, other than updating cost information? If so, please elaborate.

LAB-NLH-9. Re: CBA, Rev. 1, vol. II, Wabush Substation Upgrades, pages 4-6 (p. 550-552 pdf)

Preamble:

> Four alternatives and their costs are presented.

a) Please confirm that these are the same alternatives as were presented in the 2018 TES. If not, please indicate the differences.

b) Please provide a table comparing the costs of each of the four alternatives in i) the 2018 TES and ii) the present CBA.

c) Please confirm that, while the proposed configuration is the least-cost alternative in both studies, the difference in costs between it and the other alternatives is considerably lower in the present study than in the 2018 TES.

d) Please compare the proposed alternative to each of the others taking into account a) the cost differential, and b) any differences in service benefits.

e) In particular, please describe any benefits that might be associated with the Flora Lake Terminal Station alternative, in a scenario where there is substantial industrial load growth in Labrador West and new supplies are required.

LAB-NLH-10. Re: CBA, Rev. 1, vol. II, Wabush Substation Upgrades, Attachment 1 (Labrador West 46 kV System Expansion, Wabush Substation Recommended Upgrade), page 4 (p. 563 pdf)

Preamble:

> The P50 Wabush load forecast for 2043-44 has decreased by about 800 kW, and the P90 forecast by 1500 kW, since the 2018 Labrador Transmission Expansion Study (Appendix C, page 6).

a) Please elaborate on the causes underlying the reduction in the Wabush load forecast since the 2018 TES.

b) For each year, please distinguish between:

i) residential loads,

ii) existing cryptocurrency (or data centre) loads,

iii) additional cryptocurrency (or data centre) loads,

iv) other loads.

LAB-NLH-11. Re: CBA, Rev. 1, vol. II, Wabush Substation Upgrades, Attachment 1 (Labrador West 46 kV System Expansion, Wabush Substation Recommended Upgrade), page 5 (p. 564 pdf)

> A complicating factor in consideration of power transformer capacity at the Wabush Substation is that assessments for the station have historically been performed by Distribution Planning. However, in 2017, equipment operating in Labrador City and Wabush at 46 kV became the responsibility of the Newfoundland and Labrador System Operator ("NLSO") and was therefore reclassified from distribution to transmission.
>
> It is noted that Distribution Planning and Transmission Planning practices for the calculation of transformer ratings are different for reasons that are summarized in the sections below. For the purposes of this investigation, power transformer capacity will be investigated from both standpoints.
>
> The primary difference in the rating calculation methodologies relates to the consideration of ambient temperature. Distribution Planning applied the 0°C ambient temperature ratings when rating the Wabush Substation transformers. The NLSO standard involves the application of a 25°C ambient temperature ratings to all loading scenarios, including summer, spring/fall and winter.
>
> The rationale for this difference is explained in the following excerpt from the NLSO Transmission Facilities Rating Guide:
>
> > For transmission planning purposes, the summer, spring/fall and winter rating limits of all power transformers and autotransformers will be equal to the nameplate rating at 25°C ambient as provided by the manufacturer.
> >
> > Given the time requirements for the procurement of a new transformer(s), once installed unit(s) reach nameplate rating the increase in transformer rating limit associated with lower ambient air temperatures at time of system peak (i.e. spring/fall and winter) available from transformers designed to CAN/CSA-C88-M90 is allocated as operational margin to avoid loss of transformer life due to excessive loading in the period between transformer reaching 100% of nameplate rating and installation of additional transformer capacity following transformer failure in multiple transformer installations. (underlining added)

a) Please confirm that, under the Distribution Planning criteria, the firm transformer rating of 25.5 MVA would be adequate to meet Wabush forecast P90 loads until after 2045-2046.

b) Please explain the underlying reason, if any, why the Wabush Substation should be governed by transmission criteria rather than distribution criteria.

LAB-NLH-12. Re: CBA, Rev. 1, vol. II, Wabush Substation Upgrades, Attachment 1 (Labrador West 46 kV System Expansion, Wabush Substation Recommended Upgrade), page 8 (p. 567 pdf)

Citation 1 (page 8, p. 567 pdf):

> As per Table 3, the firm transformer capacity at the Wabush Substation is 25.5 MVA when calculated in accordance with Distribution Planning methodology. On this basis, available transformer capacity is calculated in Table 6. The table indicates that, for a P50 load forecast, available capacity is at 2.5 MW for the coming winter and will be reduced to 1.4 MW by the end of the 25-year study period. For a P90 load forecast, available capacity is at 2.1 MW for the coming winter and will be reduced to 0.9 MW by the end of the 25-year study period.
>
> Table 5: Available Firm Transformer Capacity at Wabush Substation (Assuming Distributing Planning Ratings for Power Transformers)
>
> | | Available Firm Capacity (MW) | |
> |---|---|---|
> | | P50 Forecast | P90 Forecast |
> | 2020–2021 | 2.5 | 2.1 |
> | 2045–2046 | 1.4 | 0.9 |
>
> On the basis of the above, load growth in the range of 2.1 MW to 2.5 MW would trigger a requirement for increased transformer capacity.
>
> The operational risk associated with having limited available transformer capacity must be assessed in the context in the Town of Wabush, where there is an appreciable risk for incremental load above the baseline load forecast. In recent months, Hydro has been approached with multiple prospective developments in this area, including an industrial park. The cyclical nature of the iron ore industry is also a consideration where commodity price increases may result in rapid development in the area. (underlining added)

Citation 2 p. 11, p. 570 pdf):

> If Distribution Planning power transformer ratings are applied, load growth in the order of 2.1 MW to 2.5 MW could be accommodated before addition power transformer capacity is required. However, such an approach does not allow for any operational margin and transformer overloading would not be permitted.
>
> If unforeseen load growth were to occur in the Town of Wabush, such as a sudden boom cycle in the iron ore industry, there would be no capacity to accommodate new customers until additional transformer capacity were installed. As stated above, the resulting load restriction would be in effect for a period that may exceed two years while new transformers were being procured. It is also noted that such a restriction at the Wabush Substation would be more onerous than those currently in place in Labrador as all new customer interconnections would be prohibited, without exception.

> Alternatively, normal load growth could be permitted, but proponents of any major unforeseen developments in the Town of Wabush would be delayed until incremental transformer capacity were placed in service. Such an approach would be in line with existing load restrictions; however, it is Hydro's objective is that once the Network Addition Policy and the Labrador Transmission System Expansion Plan have been fully reviewed and recommended outcomes are in place, the transmission system shall be planned in a manner that has appropriate flexibility to accommodate economic development. (underlining added)

a) Please confirm that the reference to "load growth in the range of 2.1 MW to 2.5 MW" (Citation 1) refers to load growth over and above the 2045-46 P90 forecast.

LABRADOR CITY L22 VOLTAGE CONVERSION

LAB-NLH-13. Re: CBA, Rev. 1, vol. II, Labrador City L22 Voltage Conversion, page 1 (p. 609 pdf)

Citation:

> The Cooper Hill Substation, located in Labrador City, supplies 4.16 kV power via distribution line 22 ("L22") which services the Labrador Mall and approximately 35 residential customers. L22 is the only distribution line originating from the Cooper Hill Substation, where the voltage is stepped down through transformer T1 from 46 kV to 4.16 kV. In the event of a failure of Cooper Hill T1it is estimated that restoration of L22 would take approximately one week.

a) Please situate this project in the context of the Labrador City voltage conversion works undertaken over the last 15 years.

   i) Is Cooper Hill the only substation that was remains at 4.16 kV? If not, please describe what portions of the Labrador City distribution system have been converted, and which have not.

   ii) Why was Cooper Hill not converted as part of the Labrador City Distribution Upgrade?

LAB-NLH-14. Re: CBA, Rev. 1, vol. II, Labrador City L22 Voltage Conversion, page 1 (p. 609 pdf)

Citation:

> This project involves the voltage conversion of L22 to 25 kV, and the connection of L22 to a distribution line originating in the Vanier Substation. This will involve the purchase and installation of five MVA 25 kV/600 V pad-mounted distribution transformers and one 1 MVA 25 kV/600 V pad-mounted distribution transformer to serve as a spare.

a) Please provide a block diagram showing the relationships between the Cooper Hill and Vanier Substations, L22, and any other relevant portions of the Labrador City distribution system.

HAPPY VALLEY LINE 7

LAB-NLH-15. Re: CBA, Rev. 1, vol. II, Labrador City L22 Voltage Conversion, page 1 (p. 609 pdf)

Citation 1:

> Power delivery on long heavily loaded distribution lines is constrained by the large amount of voltage drop that occurs over the long distance. This voltage drop increases as the load on the line increases. To compensate for this Hydro installs voltage regulators that can boost the line voltage up to an acceptable level and increase the amount of load that can be supplied. As both Sheshatshiu and North West River are located at the end of Line 7 multiple points of voltage regulation are required to maintain acceptable voltage levels. Voltage regulation for Line 7 is provided at the Happy Valley Terminal Station and voltage regulators HV7-VR2, HV7-VR3, and HV7-VR1 located along the feeder as indicated in Figure 1. Figure 2 shows a picture of a typical set of 200 A voltage regulators used by Hydro.
>
> Analysis has indicated that due to the recent load growth in Sheshatshiu and North West River, voltage regulators HV7-VR3 and HV7-VR1 are operating above their planning rating. To ensure reliable distribution system operation past 2021, Hydro proposes to replace these voltage regulators to address the situation.

Citation 2 (page 3):

> Historical Peak Load in Sheshatshiu and North West River is not available on an annual basis. Instead, peak load information is collected by installing temporary meters when required. The peak load for the entirety of Line 7 is recorded at the Happy Valley Terminal Station and has shown steady load growth.

Citation 3 (page 4, note 4):

> This forecast estimate was created using the Happy Valley System Forecast and multiplying it by the average load contribution of Line 7 to the system peak.

a) Please provide the analysis that indicates that voltage regulators HV7-VR3 and HV7-VR1 are operating above their planning rating.