



Decision Making for Aging UPS

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Decisions are always imperfect.

- Theodore Isaac Rubin

Background

Hope Creek and Salem are different vendor plants.

In 2007, PSEG moved the simulators 12 miles from Salem to the plant site.

Prior to the move both simulators shared an UPS.

Hope Creek moved first so a new UPS was purchased.

When Salem moved, moved the existing UPS.

Separate UPS and batteries for each simulator.

Both UPS require vendor support for repairs.

Both simulator UPS had experienced equipment failures and were operating on bypass.

Replaced the capacitors in Hope Creek but had a pending repair for cooling fans. Unknown if replacing the cooling fans would resolve the issue or if inverter replacement would be required.

Pending work order for repair of the Salem UPS.

Elevation letter written by corporate oversight due to issues with the UPS.

Evaluated Options

- 1. Repair and maintain both UPS.**
- 2. Place both simulators on one UPS and abandon one UPS.**
- 3. Replace both large UPS with smaller UPS and surge suppression for specific loads.**

Process for deciding

1. **Cost analysis**
2. **Benchmark**
3. **Evaluate Risk**

Goal - What was the best economical choice with an acceptable risk?

Cost Analysis for Restoration of Both UPS

UPS	System	Estimate	Notes for Estimate
<i>Hope Creek</i>	<i>Inverter Fans</i>	<i>\$1,500</i>	<i>Based on received T&ME</i>
<i>Hope Creek</i>	<i>Inverters (potential)</i>	<i>\$10,000</i>	<i>Estimates from vendor</i>
<i>Hope Creek</i>	<i>AC Caps & Batteries</i>	<i>\$34,139.84</i>	<i>Recommended by vendor (T&ME)</i>
<i>Salem</i>	<i>Inverters</i>	<i>\$10,000</i>	<i>Based on HC inverter estimates</i>
<i>Salem</i>	<i>Batteries</i>	<i>\$22,464</i>	<i>Based on HC T&ME for batteries</i>
<i>Hope Creek</i>	<i>Maintenance Contract</i>	<i>\$8,897.92</i>	<i>1 Year Maintenance Contract</i>
<i>Salem</i>	<i>Maintenance Contract</i>	<i>\$8,897.92</i>	<i>1 Year (estimate based on HC)</i>
Potential Total		\$95,899.68	

Cost Analysis for Repair of Hope Creek and Tie In Salem Loads

UPS	System	Estimate	Notes for Estimate
<i>Hope Creek</i>	<i>Inverter Fans</i>	<i>\$1,500</i>	<i>Based on received T&ME</i>
<i>Hope Creek</i>	<i>Inverters (potential)</i>	<i>\$10,000</i>	<i>Estimates from vendor</i>
<i>Hope Creek</i>	<i>AC Caps & Batteries</i>	<i>\$34,139</i>	<i>Recommended by vendor (T&ME)</i>
<i>Reconfigure Power Supllies</i>		<i>Unknown</i>	<i>Converting to new maintenance support from corporate vice</i>
<i>Hope Creek</i>	<i>Maintenance Contract</i>	<i>\$8,898</i>	<i>1 Year Maintenance Contract</i>
Potential Total		\$54,537	

Option 3 – Install Small UPS and Surge Suppression

Install UPS for important computer systems:

- 1. Main Simulator Computers/Instructor Station**
- 2. Stimulated/Proprietary Computer Systems**
 1. SPDS
 2. P250
 3. Feedwater Control
 4. Digital EHC
 5. Radiation Monitoring

Install Surge Suppression on loads important loads such as I/O.

Option 3 - Cost

Salem Cost: \$ 3,040.71 (CDW) or \$2,661.22 (Amazon)

Hope Creek Cost: \$2,673.71 (CDW) or \$2,410.50 (Amazon)

Seventeen Responses

- 11 are using larger single UPS.
- 6 are using smaller distributed UPS.

Users of smaller distributed UPS did not identify any significant issues.

Good feedback that identified items for consideration, such as providing surge suppression to the I/O.

Thanks to the USUG Members.

Risk = Frequency x Consequence

Since moving to site there had been < 10 unexpected loss of power to one or both simulators. One was caused by failure of an UPS.

One equipment failure related to loss of power. DEHC touchscreen failed when repowered.

Conclusion

Option 3 with abandoning the larger UPS and providing protection with smaller UPS and Surge Suppression.

Challenges – Testing and Replacing Batteries

Advantages – Automatic shutdown of computers based on UPS voltage.