Pre-Submittal Meeting

License Amendment Request Addressing:

Portable Lighting for Operator Manual Actions

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wolf creek nuclear

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Background

- Wolf Creek credits 8-hour fixed emergency lighting (Big Beam) for illuminating safe shutdown equipment and access/egress paths to the equipment for the following:
  - Fire requiring Control Room evacuation
  - Fire outside the Control Room
  - Non-fire event resulting in the loss of all AC power

Problem

- Since spring of 2020 Wolf Creek has had numerous issues with individual reliability of 8-hour fixed emergency lighting units:
  - Station Top Equipment Issue
  - Maintenance Rule (a)(1)
  - Flooded lead acid battery type battery used is maintenance intensive

Resolution Plan

- Approved by Plant Health Committee:

1. Replace existing flooded type lead-acid battery with a sealed battery of equivalent capacity that is less maintenance intensive.

2. Submit a License Amendment Request (LAR) to the Nuclear Regulatory Commission requesting that in some instances portable lighting (hard hat mounted headlamps) be credited as the primary emergency lighting means for the illumination of safe shutdown equipment and access egress routes to the equipment.
   - Control Room and Auxiliary Shutdown Panel areas will continue to credit 8-hour fixed emergency lighting.
   - Remaining fixed emergency lighting will be downgraded to 1.5-hour Life Safety.

Regulatory Requirement

- Wolf Creek is committed to the USAR 9.5E comparison response to 10 CFR 50 Appendix R:

10 CFR 50 Appendix R, Section III.J	Wolf Creek USAR 9.5E Comparison Response
Emergency lighting units with at least 8-hour battery power supply shall be provided in all areas needed for operation of safe shutdown equipment and in access and egress routes thereto.	The Power Block Complies. As stated in Section 9.5.3.2.3, emergency lighting units with eight hour batteries are located in all plant areas required for operation of safe shutdown equipment and also those areas necessary for access and egress.

License Basis

- Facility Operating License Condition 2.C(5)(b) - The licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

  - The proposed change to credit portable lighting in lieu of 8-hour fixed emergency lighting is considered a potentially adverse change that would require prior NRC review and approval.

Precedent

- Plants with NFPA 805 fire protection license basis have evaluated the use of flashlights for illuminating operator actions in lieu of fixed emergency lighting.
  - Evaluations were approved as part of the NFPA 805 LAR submittal process.

- Historically, via the exemption process, the NRC has approved limited use of flashlights in lieu of fixed 8-hour emergency lighting. Reference NRC Accession Numbers below:

ML011990375	ML013460187	ML003765204
ML020290207	ML003779008	ML091310132
ML020530077	ML012670091	ML021190569
ML010920013	ML003671489	

Portable Lighting Details

- Dual light headlamp
- Lightweight and impact resistant
- LED lights
- Multiple methods for mounting to hardhat
- Uses rechargeable battery or two CR123 batteries
- Headlamp charging station
- Battery charge level indication

Headlamp Specifications

Parameter	Spotlight Mode			Floodlight Mode			
	Turbo	High	Med	Low	High	Med	Low
Output – Lumens (ft-candle)	1000 (92.9)	400 (37.2)	130 (12.1)	50 (4.6)	400 (37.2)	130 (12.1)	8 (0.7)
Run Time (hours)	2	22	42	97	21	50	300
Distance (ft)	534	331	187	121	180	98	19.6

Illumination Comparison – Headlamp to 8-Hour Big Beam

- Headlamp – rechargeable battery, discharged on Hight Spotlight
- Emergency light with AC power removed and single beam aimed at target
- Illumination levels at 5 ft. and 10 ft. from target measured in ft-candle

Type	Light Mode	Fully Charged Battery		Battery Discharged 8-hours		Battery Discharged 16-hours	
		5 ft.	10 ft.	5 ft.	10 ft.	5 ft.	10 ft.
Headlamp (Rechargeable Battery)	Turbo - Spot	116.6	34.4	105.4	34.8	108.4	33.1
	High - Spot	64.3	19.2	57.6	19.3	58.2	18.8
	Med - Spot	20.4	6.1	18.2	6.1	18.5	6.0
	Low - Spot	8.3	2.5	7.5	2.5	7.6	2.4
	High - Flood	17.9	5.6	17.2	6.0	17.4	5.8
	Med - Flood	5.8	1.8	5.4	1.8	5.5	1.8
	Low - Flood	0.3	0.0	0.3	0.0	0.3	0.0
Big Beam 8-Hour Emergency Light	AC Power Off	3.8	1.4	2.6	1.3	N/A	N/A

Photos of Illumination Testing at 8-Hours

Big Beam Emergency Light

Headlamp with Rechargeable Battery – High Spotlight Mode

Defense in Depth

- Existing fixed emergency lights will remain in place and aimed per current design but be downgraded to 1.5-hour Life Safety
- Spare batteries and headlamps will be strategically located in the plant
- Photoluminescent labels provided for post-fire safe shutdown equipment

Conclusion

- The resulting emergency lighting strategy will involve a diverse approach utilizing the following:
  - 8-hour fixed battery units for locations required to be manned for safe shutdown support.
  - Portable lighting for illuminating implementing procedures, safe shutdown equipment, and the access/egress routes to the equipment.
  - 1.5-hour battery units for illuminating firefighting activities, life safety access/egress, and ancillary lighting to portable lighting

Questions?