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June 30, 2017

Hubert Bell
Inspector General
U.S. Nuclear Regulatory Commission
One White Flint North
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SUBJECT: Palo Verde Unit 3 Emergency Diesel Generator

Dear Mr. Bell:

On January 4, 2017, the NRC issued a license amendment (ML17004A020) allowing the Unit 3 reactor at the Palo Verde Nuclear Generating Station to continue operating for up to 62 days with one of its two emergency diesel generators (EDGs) out of service. That EDG had been severely damaged in December 2016 when a cylinder catastrophically failed during a surveillance test run. The repairs could not be completed within the existing 10-day allowed outage time in the operating license, so the licensee applied for, and received, a one-time amendment extending the allowed outage time to 62 days. The NRC's decision to extend the Unit 3 EDG allowed outage time to 62 days contradicts at least four very similar decisions; three made prior and one made 22 days later:

1. **December 5, 2006**: The NRC issued Amendment No. 164 to the operating licenses for Palo Verde Units 1, 2 and 3 extending the allowed outage time for one inoperable EDG from 72 days to 10 days.

2. **February 21, 2007**: The NRC issued a White finding for one of two EDGs on Palo Verde Unit 3 being non-functional for 18 days.

3. **June 2015**: The NRC did not approve an emergency license amendment request that sought to extend the allowed outage time for one of two EDGs for DC Cook Unit 1 to be inoperable to 65 days.

4. **January 26, 2017**: The NRC recommended that a petition for rulemaking seeking to decouple the a loss of coolant accident from a loss of offsite power from the licensing basis be terminated due to lack of need and numerous unresolved issues.

UCS sincerely believes that the apparent discontinuities between the four cited NRC decisions and the agency's extended EDG allowed outage time decision for Palo Verde Unit 3 constitute *prima facie* evidence warranting investigation by the Office of the Inspector General (OIG). At best, the disparate NRC answers for essentially the same questions reflect insufficient and ambiguous guidance that enables the staff to make contradictory decisions. At worst, the 62-day allowed outage time for the Unit 3 EDG departed from tried and true NRC decisions for improper reasons. UCS therefore respectfully requests that the OIG formally investigate the January 4, 2017, amendment issued by the NRC and at least the four

seemingly related decisions we have identified to determine whether inconsistent decisions have been made, and if so, the reasons.

Additional information on the four related decisions follows.

December 5, 2006: Palo Verde amendment extending inoperable EDG outage time to 10 days

On December 5, 2006, the NRC issued Amendment No. 164 (ML063350074) to the Palo Verde Unit 1, 2 and 3 operating licenses extended the allowed outage time for one EDG being out of service from 72 hours to 10 days. Page 2 of the NRC staff's Safety Evaluation issued in support of that amendment stated:

> During plant operation with both EDGs operable, if a LOOP occurs, the ESF electrical loads are automatically and sequentially loaded to the EDGs in sufficient time to provide for safe reactor shutdown or to mitigate the consequences of a design-basis accident (DBA) such as a loss-of-coolant accident (LOCA).

UCS reads this passage to mean that the engineered safeguards (ESF) electrical loads are connected to the EDGs in event of a loss of offsite power (LOOP) for two possible scenarios: (1) safe reactor shutdown when no other accidents occur, and (2) mitigation of a loss of coolant accident should it occur during a LOOP event. To confirm that the "or" in the passage does not bifurcate the events into a LOOP and safe shutdown event and a LOCA without an associated LOOP event, UCS consulted the Updated Final Safety Analysis Report (UFSAR) for Palo Verde (ML072250215 and ML072250202).

UFSAR Section 8.3.1.1.4, Standby Power Supply, stated:

> The standby power supply for each safety-related load group consists of one diesel generator complete with its accessories and fuel storage and transfer systems. … Each load group is independently capable of safely shutting down the unit or mitigating the consequences of a loss-of-coolant-accident (LOCA).

UFSAR Section 8.3.1.2.1, Failure Mode and Effects Analysis, stated:

> A failure mode and effects analysis for the ESF ac and dc load groups is given in table 8.3-5. Table 8.3-5 shows that no single component failure will result in the simultaneous loss of ac power to both load groups. In accordance with single failure criteria, only one failure is assumed to occur in the system following a LOCA.

UFSAR Section 8.3.1.2.2, Compliance with Design Criteria and Guides, explained how the design of the offsite and onsite power systems conformed to General Design Criteria and Regulatory Guides. UFSAR Section 8.3.1.2.2.1, Criterion 17, Electric Power Systems, described how the design conformed to General Design Criterion 17:

> An onsite electric power system is provided to permit functioning of structure, systems, and components important to safety. With total loss of offsite power, the onsite power system provides sufficient capacity and capability to assure that:
>
> > A. Specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences.

> B. The core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.[1]
>
> The onsite electric power system includes a two-load group Class 1E system. The two load groups are redundant in that each load group, independent of the other, is capable of assuring the requirements of paragraph 8.3.1.2.2.1, listings A, and B. Sufficient independence is provided between redundant load groups to ensure that the postulated single failures affect only a single load group to the extent of total loss of that load group.

UFSAR Section 15.6.5, Loss-of-Coolant Accidents, described the designs and results from associated safety analyses that demonstrate that workers and the public will be adequately protected in event of a small, medium, or large break loss of coolant accident.

UFSAR Section 15.6.5.2.3 listed the assumptions used in the safety analyses of small break loss of coolant accidents. The second assumption listed was "Loss of offsite power at time of reactor trip." The sixth assumption listed was "Single failure: Loss of one diesel."

Thus, it is irrefutably clear that the design and licensing bases for Palo Verde assume that a LOCA and LOOP could occur concurrently. Neverthess, the NRC staff did not consider a concurrent LOCA/LOOP when granting the 62-day allowed outage time amendment.

February 21, 2007: White finding for Palo Verde Unit 3 EDG being non-functional for 18 days

By a report dated December 6, 2006 (ML063400561), the NRC issued the results from a special inspection conducted following the failure of an emergency diesel generator (EDG) at Palo Verde Unit 3. The NRC proposed a White finding. Page A3-3 of the Significance Determination Evaluation performed by the NRC staff evaluated a performance deficiency that existed for 58 days. The NRC staff assumed that the affected EDG had a 25 percent chance of failing to start during the first 40 days and a 100 percent chance of failing during the remaining 18 days. (The break point was the last successful test of the EDG that happened 40 days into this 58 day period.)

The licensee contested the proposed White finding. By letter dated February 21, 2007 (ML070530206), the NRC affirmed its White finding after meeting with the licensee about their objections. That letter stated:

> These two violations resulted in EDG A not being able to perform its safety function between September 4 and September 22, 2006.
>
> The NRC's preliminary assessment of the safety significance of these inspection findings, which is documented in Attachment 3 of NRC Inspection Report 05000528; 05000529; 05000530/2006-012, resulted in an upper bound increase in core damage frequency (CDF) of 8.5E-6/year, or White and close to the White/Yellow threshold for safety significance.
>
> During the Regulatory Conference, APS also asserted that adding the risk associated with the 40-day period, in which there was a higher probability of failure of EDG A, to the risk from the 18 days when the EDG was known to be unavailable was, in essence, a double counting of the risk impact. For our final analysis, the NRC only assessed the 18 day period of EDG A unavailability.

[1] This UFSAR statement is especially significant because when the NRC staff reviewed General Design Criterion 17 for the January 4, 2017, amendment, they apparently neglected consideration of a design basis LOCA.

Thus, the NRC issued a White finding for a Unit 3 EDG being non-functional for 18 days without considering that it may have been impaired during the prior 40 days.

Nearly a decade later, the NRC would allow Unit 3 to operate for up to 62 days with a non-functional EDG — more than three times the duration that prompted the greater-than-green enforcement action.

Furthermore, a 40-day period with a 25 percent chance of EDG failure to start followed by an 18-day period with a 100 percent chance that an EDG would be unavailable was determined by the NRC staff to approach the White/Yellow risk threshold. Yet, the NRC staff issued an amendment allowing this same reactor to operate for up to 62 days with a 100 percent chance that an EDG would be unavailable. That 62-day period would simply have to represent even higher risk than the near White/Yellow risk threshold calculated a decade earlier—unless some key factors are neglected.

June 2015: Non-approval of Cook amendment extending inoperable EDG out time to 65 days

The owner of the DC Cook nuclear plant in Michigan asked the NRC on May 28, 2015 (ML15149A412), for permission to operate the Unit 1 reactor for up to 65 days with one of two EDGs out of service. The operating licensee for Unit 1 already allowed one EDG to be out of service for up to 14 days. During testing of an EDG on May 21, 2015, inadequate lubrication caused one of the bearings to be severely damaged. Repairs were estimated to require 56 days.

The NRC emailed the owner questions about the 65-day EDG AOT on May 28 and May 29 (ML15149A217). Among the questions asked by the NRC was how Unit 1 would respond to a design basis LOCA concurrent with a LOOP and a single failure of the only remaining EDG.

The NRC neither approved nor disapproved the request for a 65-day EDG allowed outage time for Cook Unit 1. On June 1, 2015, the owner formally withdrew its request (ML15154B045) for the 65-day EDG AOT and shut down the Unit 1 reactor. The Unit 1 reactor was restarted on July 29, 2015 (ML15211A515).

Although the NRC did not formally deny the license amendment request for Cook Unit 1 while approving a very similar license amendment request for Palo Verde Unit 3, the agency treated the two nearly identical situations significantly different. In the Cook case, the NRC staff asked the owner how Unit 1 would respond to a concurrent LOCA/LOOP with the single failure of the in-service EDG during the proposed 65-day period for repairs of the broken EDG. Cook is not designed to handle a LOCA/LOOP with both EDGs unavailable; hence, the owner's decision to shut down Unit 1 during the repairs.

But the NRC staff treated Palo Verde Unit 3 differently. On page 15 of the Safety Evaluation it issued with the January 4, 2017, license amendment, the NRC staff stated "*Offsite power sources, and one train of onsite power source would continue to be available for the scenario of a loss-of-coolant accident*." Unlike the Cook Unit 1 case, the NRC staff assumed that a LOCA at Palo Verde Unit 3 would not happen concurrently with a LOOP or with the single failure of the in-service EDG. Not only did the NRC staff contradict its deliberations at Cook Unit 1, it also contradicted the design and licensing bases at Palo Verde as described above in the December 5, 2006, section of this letter.

January 26, 2017: Recommended termination of rulemaking petition decoupling LOOP/LOCA

In SECY-17-0013 dated January 26, 2017 (ML16341A820), the NRC staff sought the Commission's approval to terminate rulemaking seeking to decouple a LOOP from a LOCA. Via the Staff Requirements Memorandum dated April 21, 2017 (ML17110A512), the Commission unanimously approved termination of this rulemaking effort.

Page 4 of SECY-17-0013 stated "*it is unlikely that any licensee would seek licensing basis changes that would rely on the proposed rule*." The NRC staff issued SECY-17-0013 merely 22 days after it issued the amendment changing the LOCA/LOOP licensing basis for Palo Verde Unit 3 at the licensee's request and about 18 months after it received a similar license amendment request for Cook Unit 1. The NRC staff need not speculate about licensees' intentions—two licensees had already sought licensing basis changes to decouple LOOP from LOCA as sought by the proposed rule.

Page 3 of the draft Federal Register Notice (FRN) attached to SECY-17-0013 stated:

> This proposed rulemaking would provide licensees an option to relax the current analysis requirements for considering a loss of offsite power (LOOP) to occur coincident with a large-break loss-of-coolant accident (LOCA) (the LOOP/LOCA rulemaking).

The Palo Verde Unit 3 license amendment similarly relaxed its current requirements. Given the relaxation requests from Cook and Palo Verde, it is not wild speculation to presume that another licensee, or even these licensees again, would seek to relax the current requirements.

The FRN pointed out that a rulemaking seeking to redefine the large-break LOCA ECCS analysis requirements had been proceeding in parallel with the LOCA/LOOP relaxation rulemaking. The FRN indicated that the industry discontinued support for this LOCA ECCS rulemaking in June 2008 and the Commission approved termination of the rulemaking in April 2016. Thus, it's not a case where the LOCA/LOOP rulemaking is unnecessary because a comparable outcome will be achieved by the LOCA ECCS rulemaking—both rulemakings have now been terminated.

Pages 5 and 6 of the FRN described the NRC's work on the LOCA/LOOP rulemaking, including several unresolved issues: "*LOOP/LOCA frequency determinations, seismic contributions to break frequency, the maintenance of defense-in-depth, and the treatment of delayed LOOP and double sequencing issues*."

On page 6 of the FRN, the NRC staff wrote:

> The NRC staff determined that these issues would need to be adequately addressed in order to complete a regulatory basis that could support a proposed LOOP/LOCA rulemaking.

On pages 7 and 8 of the FRN, the NRC staff wrote:

> The NRC staff determined that these issues would need to be adequately addressed in order to complete a regulatory basis that could support a proposed LOOP/LOCA rulemaking. To complete a fully developed regulatory basis for the LOOP/LOCA rulemaking, the NRC staff would need to ensure that these areas of uncertainty are adequately addressed as part of the rulemaking activity.

Three times in the FRN the NRC staff explicitly cited issues that had not been "adequately addressed" regarding the LOCA/LOOP rulemaking. It is very hard to understand how the numerous safety issues that had not yet been adequately addressed to decouple LOOP from LOCA for the proposed rulemaking could magically become addressed at roughly the same time for the NRC staff to decide that the public would retain adequate protection throughout the 62 days that Palo Verde Unit 3 might operate with only one EDG in service.

Need for Independent Inquiry into Apparently Inconsistent Decision-Making

UCS cannot reconcile the NRC's decisions in the above four cases with its decision to allow Palo Verde Unit 3 to operate for up to 62 days with one EDG unavailable. OIG seems most capable of examining these matters and determining whether all five decisions are consistent with regulations, policies, and practices and, if not, recommending appropriate remedies. UCS urges you to have OIG conduct an independent inquiry. If all five decisions are consistent, OIG's report would help UCS and other stakeholders better understand why. If there are inconsistencies, OIG's report would help the agency achieve better consistency in the future. Two of the NRC's five Principles of Good Regulation seem challenged by the apparent inconsistencies: Clarity and Reliability. A third, Independence, with its stated goal that "Final decisions must be based on objective, unbiased assessments of all information, and must be documented with reasons explicitly stated" may also be challenged.

UCS appreciates your consideration of this matter and looks forward to OIG's report.

Sincerely,

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