UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
1600 E. LAMAR BLVD
ARLINGTON, TX 76011-4511

January 17, 2017

MEMORANDUM TO: Kriss M. Kennedy, Regional Administrator

THRU: Troy W. Pruett, Director ***/RA/***
Division of Reactor Projects

FROM: Geoffrey B. Miller, Chief ***/RA/***
Project Branch D

SUBJECT: MANAGEMENT DIRECTIVE 8.3 EVALUATION FOR PALO VERDE UNIT 3 EMERGENCY DIESEL GENERATOR FAILURE

Pursuant to Regional Office Policy Guide 0801, "Management Directive 8.3 and Inspection Manual Chapter 0309 Reactive Team Inspection Decisions, Implementation, and Documentation for Power Reactors," the enclosed table provides the Management Directive 8.3 evaluation for determining that a Special Inspection Team inspection will be conducted at Palo Verde for the catastrophic failure of the Unit 3 emergency diesel generator.

Concur with Recommendation: ***/RA/*** 1/17/17
Kriss M. Kennedy Date
Regional Administrator

Enclosures:
MD 8.3 Decision Documentation Form (Deterministic and Risk Criteria Analyzed)

CONTACT: Geoffrey B. Miller
817-200-1173

MANAGEMENT DIRECTIVE 8.3 EVALUATION FOR PALO VERDE UNIT EMERGENCY DIESEL GENERATOR FAILURE, JANUARY 17, 2017

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ADAMS ACCESSION NUMBER: ML17018A123

■ SUNSI Review By: JLD		ADAMS ■ Yes ☐ No	☐ Publicly Available ■Non-Publicly Available		☐ Non-Sensitive ■ Sensitive	Keyword: MD 3.4/A.7
OFFICE	RIV:SPE:DRP	SRA:DRS/PSB2	C:DRP/D	D:DRS	D:DRP	
NAME	JDixon	DLoveless	GMiller	AVegel	TPruett	
SIGNATURE	***/RA Geoff Miller for/***	***/RA/***	***/RA/***	***/RA/***	***/RA/***	
DATE	12/27/16	1/5/17	1/9/17	1/9/17	1/10/17	

OFFICIAL RECORD COPY

MANAGEMENT DIRECTIVE 8.3
DECISION DOCUMENTATION FORM
(Deterministic and Risk Criteria Analyzed)

PLANT:	Palo Verde Unit 3	**EVENT DATE:**	12/15/2016
RESPONSIBLE BRANCH CHIEF:	Geoffrey Miller	**EVALUATION DATE:**	12/21/2016

BRIEF DESCRIPTION OF THE SIGNIFICANT OPERATIONAL EVENT OR DEGRADED CONDITION:

On December 15, 2016, during a scheduled surveillance test run of the Unit 3 B Train Emergency Diesel Generator, with the diesel generator loaded to approximately 50 percent, the control room received a low lube oil emergency trip annunciator. The area operator reported a large amount of smoke and oil, and large metal debris that had been expelled from the engine. Palo Verde declared an ALERT at 0410 [MST] based on an explosion resulting in visible damage to a safety system required for safe shutdown (HA2.1).

The licensee determined that there had been a catastrophic failure of a connecting rod for cylinder 9 to include crankcase damage and engine internal parts being ejected from the crankcase. Palo Verde Fire Department responded and no fire was observed. The Alert was terminated at 0636 [MST]. The cause of the failure appears to be cyclic fatigue. Unit 3 remains on line at 100 percent power. No other safety functions were impacted. No personnel injuries occurred. Unit 3 was in a ten-day shutdown technical specification action for an emergency diesel generator being inoperable per TS 3.8.1.B. The licensee requested and NRR granted an extension of the completion time of the shutdown action statement to a total of 21 days, which expired on January 5, 2017. Prior to the expiration, the licensee requested, and NRR granted, a second extension of the completion time to a total of 62 days, which will expire on February 15, 2017.

Palo Verde emergency diesel generators are Cooper-Bessemer Model KSV-20. This same diesel experienced a catastrophic failure of a connecting rod for cylinder 9 in 1986. Connecting rod 9R failed during the startup testing program. Based on current information this failure is being attributed to connecting rod 9R. This engine has approximately 3500 run time hours since the repair in 1986.

A search of operating experience identified two other Cooper-Bessemer failures, both at South Texas. In 1989 South Texas emergency diesel generator 22 had a connecting rod for cylinder 4 fail. In 2003 emergency diesel generator 22 had a connecting rod for cylinder 9 fail.

Palo Verde last performed UT testing of the connecting rods for emergency diesel generator B in October 2013 and did not identify any deficiencies.

Y/N	DETERMINISTIC CRITERIA
N	Involved operations that exceeded, or were not included in, the design bases of the facility
	Remarks:
Y	Involved a major deficiency in design, construction, or operation having potential generic safety implications
	Remarks: A potential generic safety issue could be present in that 3 of 4 failures have occurred in cylinder 9.
N	Led to a significant loss of integrity of the fuel, primary coolant pressure boundary, or primary containment boundary of a nuclear reactor
	Remarks:
N	Led to the loss of a safety function or multiple failures in systems used to mitigate an actual event
	Remarks:
Y	Involved possible adverse generic implications
	Remarks: Several licensees use Cooper-Bessemer emergency diesel generators which could have similar generic implications.
N	Involved significant unexpected system interactions
	Remarks:
Y	Involved repetitive failures or events involving safety-related equipment or deficiencies in operations
	Remarks: The same diesel failed in the same cylinder location in 1986 after approximately 3500 run hours.
N	Involved questions or concerns pertaining to licensee operational performance
	Remarks:

CONDITIONAL RISK ASSESSMENT

IF IT IS DETERMINED THAT A RISK ANALYSIS IS NOT REQUIRED - ENTER NA BELOW AND CONTINUE TO THE DECISION BASIS BLOCK

RISK ANALYSIS BY: David Loveless	DATE: 12/16/2016

Brief description for the basis of the assessment (may include assumptions, calculations, references, peer review, or comparison with licensee's results):

The increased ICCDP per day from a failed diesel generator is 1.24×10^{-7}. Therefore, during the 30 days since the last time the machine was loaded the ICCDP was approximately 3.7×10^{-6}. Qualitatively, if this were a run-time failure mode, as we believe, the exposure time for accumulated risk would date back to January 2016 and result in a higher accumulated risk. Palo Verde has implemented modifications, which lower the risk of a loss of offsite power that are not currently modeled in the site-specific SPAR. The modifications and the run-time failure model would be evaluated as part of a review of any performance deficiency identified by the inspection team.

THE ESTIMATED CONDITIONAL CORE DAMAGE PROBABILITY (CCDP) IS: >~3.7×10^{-6}

WHICH PLACES THE RISK IN THE RANGE OF: SIT

RESPONSE DECISION

USING THE ABOVE INFORMATION AND OTHER KEY ELEMENTS OF CONSIDERATION AS APPROPRIATE, DOCUMENT THE RESPONSE DECISION TO THE EVENT OR CONDITION, AND THE BASIS FOR THAT DECISION

DECISION AND DETAILS OF THE BASIS FOR THE DECISION:

The branch recommends that a Special Inspection be performed because of the potential generic implications, the failure may be repetitive, and the risk significance of the diesel failure along with a potential for a common mode failure mechanism.

BRANCH CHIEF REVIEW: ***/RA/*** Geoffrey B. Miller	DATE: 1/17/17
DIVISION DIRECTOR REVIEW: ***/RA/*** Troy W. Pruett	DATE: 1/17/17

ADAMS ACCESSION NUMBER:
EVENT NOTIFICATION REPORT NUMBER (as applicable):
E-mail to NRR_Reactive_Inspection@nrc.gov