



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SUPPLEMENTAL SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

STATION BLACKOUT RULE (10 CFR 50.63)

ARIZONA PUBLIC SERVICE COMPANY

PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

DOCKET NOS. 50-528, 50-529 AND 50-530

1.0 INTRODUCTION

The NRC staff's Supplemental Safety Evaluation (SSE) pertaining to the Arizona Public Service Company's (the licensee's) responses to the Station Blackout (SBO) Rule, 10 CFR 50.63, was transmitted to the licensee by letter dated January 4, 1993. The staff's SSE found the licensee's proposed method of coping with an SBO to be acceptable provided the licensee implements the 3-month load tests of the proposed alternate ac (AAC) power source (the gas turbine generators (GTGs) in accordance with NUMARC 87-00, Item B.10, or describe what other means it intends to implement to demonstrate that a 95% reliability is being maintained.

The licensee provided a response to the staff's SSE by letter dated March 8, 1993. By enclosure to the letter, the licensee concluded that the monthly start (unloaded) tests (20 tests per year) and the semi-annual loaded (start and run) tests (4 tests per year) to be adequate for demonstrating 95% reliability of Palo Verde Nuclear Generating Station (PVNGS) GTGs.

The staff's evaluation of the licensee's response follows.

2.0 EVALUATION

2.1 Licensee Response

The licensee's response references NUMARC 87-00, Item B.10, which states that the alternate AC (AAC) source shall be started and brought to operating conditions that are consistent with its function as an AAC source. The licensee states that an unloaded operability test will be performed on each of the two 100% capacity GTGs on a monthly basis in accordance with manufacturer's recommendations. This will include the initiation of a GTG start signal and will be considered successful upon receipt of a "Ready to Load" signal from the GTG control system. The licensee further states that once per refueling outage, roughly equating to once every six months, each GTG will be tested at load for a sufficient period to achieve stable operating parameters (temperatures, pressures, voltages, etc.). In addition, on approximately an 18-months interval, each GTG will be tested to demonstrate

9304200336 930414
PDR ADDCK 05000528
P PDR

AAC capability. This test will include a timed start (within the one-hour time period specified for SBO) and operation of each GTG at rated load.

The licensee's response references NUMARC 87-00, Item B.13, which states that system reliability should be maintained at or above 0.95 per demand, as determined in accordance with NSAC-108, "Reliability of Emergency Diesel Generators at U.S. Nuclear Power Plants," methodology. The licensee states that the GTGs are electrically connected to, and can only be significantly loaded through, the PVNGS Units 1, 2, and 3 non-safety-related switchgear that furnishes normal offsite power to the Train "A" safety-related switchgear. Transients caused by equipment failure or operator error during load testing of the GTGs could affect the reliability of the power source to safety-related loads. Therefore, the GTGs will be load tested during each refueling outage (approximately once every six months) in Modes 5 or 6, when both trains of safety-related power are not required.

The licensee indicates that there will be 20 unloaded start tests and 4 start-and-load tests per year. This will provide sufficient data to demonstrate the 95% reliability. The licensee considers the unloaded start tests to be an important consideration in the reliability of the GTGs since industry data (IEEE Standard 493-1990) and experience (the Millstone, Unit 1 Individual Plant Examination for Severe Accident Vulnerabilities, dated March 1992) show that most failures of GTGs occur in the start cycle of the unit, not in its ability to accept load once it is started.

2.2 Staff Evaluation

The staff agrees with the licensee that the load testing of the GTG will require connection to the PVNGS, Units 1, 2, and 3 non-safety-related switchgear that furnishes normal offsite power to the Train "A" safety-related switchgear. Transients caused by equipment failure or operator error during load testing of the GTG could affect the reliability of the power source to safety-related loads. The staff also agrees with the licensee that the monthly unloaded tests (20 tests per year) and approximately semi-annual loaded tests (4 tests per year) will furnish sufficient data to demonstrate the 95% reliability of the PVNGS GTGs. The staff finds the licensee's response acceptable, and hence, the SSE issue regarding the 3-month load test of the proposed AAC power source, is resolved.

3.0 SUMMARY AND CONCLUSION

The staff has reviewed the licensee's March 8, 1993, response to the staff's January 4, 1993, supplemental safety evaluation (SSE) pertaining to the licensee's providing a sufficient data base to demonstrate the required 95% reliability of the GTG under load. The staff concludes that the licensee's response is acceptable and hence, SSE issue regarding the 3-month load test of the proposed AAC power source, is resolved.

Date: April 14, 1993

Principal contributor: A. Pal, Electrical Engineering Branch, NRR



1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100