



DS09
W. Hodges
C. Antonescu

2-17-98
63 FR 7844

#9 RECEIVED

Palo Verde Nuclear
Generating Station

James M. Levine
Senior Vice President
Nuclear

1978 APR 17 1998
TEL (602)393-5300 Mail Station 7602
FAX (602)393-6077 P.O. Box 5033
Phoenix, AZ 85072-2034

RULES & DIR. BRANCH
U.S. NRC

102-04110-JML/AKK/SAB/GAM
April 9, 1998

Rules and Directives Branch
Office of Administration
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN 50-528/529/530
Comments on NRC Draft Regulatory Guide DG-1029, "Guidelines for
Evaluating Electromagnetic and Radio-Frequency Interference in
Safety-Related Instrumentation and Control Systems"

In the February 17, 1998, Federal Register (63 FR 7844), the NRC solicited comments on Draft Regulatory Guide DG-1029, "Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems." APS has reviewed the draft Regulatory Guide and is providing the enclosed comments for consideration. In addition to the enclosed comments, APS endorses the comments being provided by the Nuclear Energy Institute (NEI). No commitments are being made to the NRC by this letter.

Please contact Mr. Scott Bauer at (602) 393-5978 if you have any questions or would like additional information regarding this matter.

Sincerely,

JML/AKK/SAB/GAM/rjh
Enclosure

cc: E. W. Merschoff
K. E. Perkins
M. B. Fields
J. H. Moorman

9804230168 980409
PDR REGGD
XX. XXX C PDR

Arizona Public Service Company

Comments on Draft Regulatory Guide DG-1029, "Guidelines for Evaluating Electromagnetic and Radio- Frequency Interference in Safety-Related Instrumentation and Control Systems"

1. **General:** The draft Regulatory Guide should address the currently approved methodologies established in EPRI Topical Report TR-102323, "Guidelines for Electromagnetic Interference Testing in Power Plants," and the associated NRC Safety Evaluation Report dated April 17, 1996. The EPRI Topical Report is a sound basis for EMI/RFI programs and is in use by the industry
2. **Alternative Methods and Criteria:** The draft regulatory guide is very prescriptive and provides few options beyond MIL-STD testing. Regulatory Guides have traditionally described, in rather simple terms, the requirements to be met and the methods which NRC have found to acceptably meet these requirements.

The evolution of electronic control equipment and suppliers requires the maintenance of multiple commercial qualification options. Several trends made such options imperative. Many more manufacturers of electronic control equipment seem to be gearing up to meet the acceptance criteria of commercial standards particularly internationally recognized standards. Additionally, as noted in NUREG/CR-6431, the Department of Defense is moving away from the use of MIL-STD-461/2 qualification in favor of Commercial-off-the-shelf (COTS) equipment with commercial EMI/RFI testing qualifications. Recognition of an industry supported standard like International Electrotechnical Community (IEC) standard 1000 needs to be given serious consideration. If such an option is not available, then these complementary trends may result in a U.S. nuclear power plant market having to pay high premiums for a unique set of qualification tests.

3. **Applicability to New and Replacement Equipment Only:** The draft guide should be revised to clarify the applicability of the guidance to new and replacement equipment installed after initial acceptance of the guide by a nuclear power plant operator.
4. **Impact of Test Methods on Plant Operations:** The guidance recommended by the draft regulatory guide appears to depend heavily on testing, particularly testing during equipment installation. Such guidance would appear to be more applicable to new nuclear plants than to existing plants. Accomplishing

Comments on Draft Regulatory Guide DG-1029

such testing for existing power plants would be extremely costly and would involve a fair amount of risk (i.e. plant testing itself could generate EMI/RFI induced equipment misoperations).

The types of testing described in DG-1029 appear to be more suitable to factory or qualification/certification type testing rather than field testing. The equipment and skills needed to conduct and evaluate the results of such testing are fairly specialized and not generally available at operating nuclear plants. In particular, the test methods of Sections 4 and 5 of DG-1029 describe and endorse a battery of tests of this nature.

"Low tech" methods of addressing EMI/RFI concerns need to be considered by the draft regulatory guide. Such methods are often the most effective, from both a cost and performance perspective. Examples of "low tech" methods include administrative exclusion of sources of EMI/RFI, magnetic shielding and error checking schemes (typically applied to digital systems).

5. **Section A, Page 2, Paragraph 2:** Section A, page 2, paragraph 2, makes the statement that "The technical basis behind selecting these particular practices is given in ...a draft of NUREG/CR-6431..." The finalization of this draft NUREG could potentially impact the guidance provided in the draft regulatory guide. It is requested that finalization of the draft regulatory guide be withheld until all reference sources are completed.
6. **Section B, Discussion:** A significant majority of all electrical noise is conductively coupled and is a design and maintenance issue for operating plants. The issue is addressed by the implementation of design and installation practices for instrumentation grounding provided by IEEE Std. 1050-1996. This standard is endorsed by the draft regulatory guide. EPRI TR-102323 also addresses conducted susceptibility and should be addressed by the regulatory guide.
7. **Regulatory Position C.1:** The first sentence of this position implies that there are new requirements for the design of safety-related instruments to assure "that structures, systems, and components important to safety are designed to accommodate the effects and to be compatible with the environmental conditions associated with nuclear power plant service conditions." IEEE Std. 279, paragraph 3 (7) and (8), which is endorsed by 10CFR50.55a(h), specifically require consideration of service conditions that can affect the performance of safety-related equipment that perform a protection function. It is suggested that the "Introduction" section address the environmental design bases requirements for safety-related equipment stated in IEEE Std. 279.
8. **Regulatory Position C.1:** The statement in paragraph 2 that the limit for EMI/RFI exposure is 8 dB below the specified operating envelope(s) is not consistent with MIL-STD-462D which states a value of 6 dB.

Comments on Draft Regulatory Guide DG-1029

9. **Regulatory Position C.3:** MIL-STD-461D, 11 January 1993 superseded MIL-STD-461C, 4 August 1986. Paragraph 4 of the "Foreword" of 461D states that substantial changes were made from previous editions. Some requirements were eliminated, others significantly changed, and new requirements added. Thus, unless there is a compelling regulatory reason for endorsement of 461C, it would seem that the regulatory guide should endorse the most recent release of the standard.
10. **Regulatory Position C.4:** The introductory paragraph should indicate that the associated operating envelopes are based on the limits specified in MIL-STD-461D.
11. **Regulatory Position C.4.1:** The CE101 emission limits given in MIL-STD-461D are different than those shown in Figure 4.1. The values given in Figure 4.1 are based on the limits given in CE01 of 461C. An example of mixing two different sets of requirements—see statement in regulatory position C.3 that specifies no mixing and matching of test criteria.
12. **Regulatory Position C.4.3:** The end point shown in Figure 4.3 as 127 dB at approximately 50 kHz does not agree with the end point shown in Figure CS101-1 in 461D (116 dB at 50 kHz).
13. **Regulatory Position C.4.4:** The operating envelope shown in Figure 4.4 does not agree with Figure CS114-1 of 461D. It should be noted that CS101-1 shows a decrease in the envelope below 1 MHz. For the most limiting curve the decrease is 40 dB at 10 kHz.
14. **Regulatory Position C.4.4:** Figure 4.5 limits do not agree with RE101-1 or RE101-2 of 461D or Figure 6-13 (RE01) of 461C.
15. **Regulatory Position C.4.7:** Figure 4.7 operating limits are different than those limits shown in Figure RS101-1 of 461D.
16. **Regulatory Position C.5:** The foreword of MIL-STD-462D, paragraph 4, states that this standard is designated at revision "D" to coincide with its companion document, MIL-STD-461. Revisions "A," "B," and "C" of MIL-STD-462 were never issued. Therefore, the requirements given in this position should be re-evaluated and, if applicable, addressed in Regulatory Position C.4.
17. **Regulatory Position C.6:** Section C.6, page 26, paragraph 2 describes Location Categories (A, B, C) and Exposure Levels (High, Medium, Low) which are outlined in IEEE C62.41-1991. As stated in DG-1029, acceptable surge withstand capability (SWC) levels are "...based on a Category B location and a Low to Medium Exposure Level." Category B (feeders and short branch circuits within 10 meters from the service entrance) appears to

Comments on Draft Regulatory Guide DG-1029

be arbitrarily conservative for most nuclear plant circuits of concern. First, the term "service entrance" is not standard terminology used for nuclear plant electrical distribution systems. Thus, it is not clear where the service entrance is. Second, if one conservatively assumes the service entrance point is at the unit substation (medium to low voltage transition point), feeding I&C circuits of concern, most of these circuits would be Category A (long branch circuits greater than 10 meters from the service entrance). In any case, such detailed and prescriptive guidance is out of place in a Regulatory Guide.

18. **Regulatory Position C.6:** IEEE Std. C62.41, "IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits," addresses industrial and residential systems and equipment. Power generation station grounding and surge protection is based on industry design standards and implemented by means of a design specification. The design specification is generally more specific in the degree of protection and testing required by the design. The guidance provided by this regulatory position does not help the designer for addressing power related interference problems.

The I&C's susceptibility to power line fluctuations is characterized by several different parameters including voltage level, frequency stability, harmonic distortion, noise, etc. A parameter like voltage level is a result of the power source alone. Harmonic distortion, noise or phase voltage imbalance is determined by an interaction of the computer load and the power source. Specifications for power supply equipment address these effects by means of acceptable tolerances for:

- Voltage regulation
- Voltage disturbances (momentary under-voltage, transient over-voltage)
- Voltage harmonic distortion
- Noise
- Frequency variation
- Frequency rate-of-change
- 3-Phase voltage unbalance
- 3-Phase load unbalance
- Power factor
- Load demand

Power source specifications are determined by calculations by the designer on the basis of the design requirements for the station. The designer may use guidance provided in the National Electrical Code (not mandatory) and IEEE Std. 493 (IEEE Recommended Practice for Design of Reliable Industrial and Commercial Power Systems) to establish design requirements.

Comments on Draft Regulatory Guide DG-1029

19. **Value/Impact Statement, Pages 33-34:** DG-1029 states, "Therefore, costs associated with the implementation of this guide are expected to be minimal." The basis for this statement is the claim that this guidance is consistent with established practices currently applied throughout the commercial power industry.

Implementation of the guidance provided in the draft regulatory guide is expected to significantly increase costs above those currently being experienced. Factors that contribute to the increased costs include:

- The cost of EMI/RFI testing for all of the replacement equipment that will be needed over the next several years. This cost will be especially high if the draft guidance is applied to all equipment, including non safety-related equipment.
- The cost of providing adequate assurance that the design of this equipment is being maintained.
- The cost of developing and implementing programmatic controls to insure that all of the necessary EMI/RFI requirements are met, including documentation, maintenance, design, unintentional emissions, intentional emissions, etc.

Contrary to the NRC's assertion in the statement of Impact, the costs to the industry to augment current environmental programs are likely to be significant without a significant benefit to the public health and safety.

When approved, draft Regulatory Guide DG-1029 could be considered to impose a regulatory staff position that is either new or different from a previously applicable staff position. The imposition of a new or different staff position would require a backfit analysis in accordance with 10 CFR 50.109.