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1999 NOV 29 PM 5: 21

RULES & DIR. BRANCH  
US NRC

64 FR 58107  
Oct. 28, 1999



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VIRGINIA POWER

November 23, 1999

GL99-058

Chief, Rules Review and Directives Branch  
U.S. Nuclear Regulatory Commission  
Mail Stop T-6-D59  
Washington, DC 20555-0001

**NUREG-1709; SELECTION OF SAMPLE RATE AND  
COMPUTER WORDLENGTH IN DIGITAL INSTRUMENTATION  
AND CONTROL SYSTEMS**

Virginia Power appreciates the opportunity to comment on the Draft NUREG-1709. This report focuses on two aspects of digital systems, sample rate and wordlength, and provides an informative discussion on the potential impact of these items on the accuracy, time response and stability of digital systems for monitoring, protection and control applications.

Sample rate and wordlength issues are addressed in this report in an isolated manner and are not placed in the context of a total digital system design. The concerns raised are valid but they represent only a small fraction of the many design considerations required to develop a successful digital system.

There are numerous existing NRC and industry standards and guidelines which do address the total process of digital system design, including the issues raised in this draft report. It appears from the content of the draft report and the absence of pertinent existing documents in the Reference section, that no attempt was made to coordinate the review guidance presented in this report with existing guidance.

Consideration should be given to integrating the concerns raised in this draft report with existing guidance on NRC review of digital systems rather than creating a separate review with a limited and narrow focus.

PDR NUREG 1709 C

Additional specific comments are included in an attachment.

If you need further information, please contact either:

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Respectfully,



For:

James H. McCarthy, Manager

Nuclear Licensing and Operations Support

Attachment

**VIRGINIA POWER COMMENTS**  
**NUREG-1709; SELECTION OF SAMPLE RATE AND**  
**COMPUTER WORDLENGTH IN DIGITAL INSTRUMENTATION**  
**AND CONTROL SYSTEMS**  
**NOVEMBER 23, 1999**

<p>Analog and digital systems should be more closely related</p>	<p>It would be useful to more closely relate analog systems to digital systems. For example, analog systems have gain and offset errors which are analogous to those of digital systems. Likewise, analog systems have frequency response errors which correspond to those caused by sample rate problems in digital systems.</p>
<p>Error magnitude relative to analog systems should be addressed</p>	<p>The report should give an idea of the relative error magnitudes when compared to analog systems. For example, in Section 3.1.2 it should be noted that the least significant bit error introduced by A/D converters is much smaller than the measurement uncertainty of most analog instrument channels.</p>
<p>Round off errors, Section 4.2.2, should be addressed</p>	<p>Section 4.2.2 should note that significant round off error can occur when doing addition and subtraction with floating point numbers when the operands differ in magnitude.</p>
<p>Report should be coordinated with existing guidance.</p>	<p>It appears from the content of the draft report and the absence of the documents listed below in the Reference section, that no attempt was made to coordinate the review guidance presented in this report with existing guidance. Consideration should be given to integrating the concerns raised in this draft report with existing guidance on NRC review of digital systems rather than creating a separate review with a limited and narrow focus. Existing guidance documents include:</p> <p>NUREG/CR-6082, "Data Communications"</p> <p>NUREG/CR-6083, "Reviewing Real-Time Performance of Nuclear Reactor Safety Systems"</p> <p>Branch Technical Position HICB-14, "Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems"</p> <p>Branch Technical Position HICB-21, "Guidance on Digital Computer Real-Time Performance"</p> <p>ANSI/ISA-S67.04, "Setpoints for Nuclear Safety-Related Instrumentation"</p> <p>Draft Reg. Guide DG-1045, "Proposed revision 3 to Reg. Guide 1.105, Instrument Setpoints for Safety Systems" (Endorses ISA S67.04)</p>