

GENERAL ELECTRIC

NUCLEAR ENERGY BUSINESS OPERATIONS
GENERAL ELECTRIC COMPANY • 175 CURTNER AVENUE • SAN JOSE, CALIFORNIA 95125

June 10, 1985

MFN-085-85

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: H. L. Thompson, Director
Division of Licensing

Gentlemen:

SUBJECT: IN THE MATTER OF 238 NUCLEAR ISLAND GENERAL ELECTRIC STANDARD
SAFETY ANALYSIS REPORT (GESSAR), DOCKET NO. STN 50-447; EMERGENCY
RESPONSE INFORMATION SYSTEM (ERIS)

Reference: 1) Letter, G. G. Sherwood to H. L. Thompson, "In the Matter of
238 Nuclear Island General Electric Standard Safety Analysis
Report (GESSAR) Docket No. 50-447; Emergency Response
Information System (ERIS)", May 9, 1985

Enclosed is information pertinent to the resolution of the open item on "clutter"
related to the General Electric Emergency Response Information System (ERIS)
displays.

Attachment 1 is a letter from our human factors consultant Anacapa Sciences,
Inc. which provides additional information regarding the Anacapa evaluation of
ERIS displays discussed in Technical Report 550-1 (transmitted by Reference 1).
The letter establishes that the human factors specialists who assessed ERIS:

- 1) Concluded that a large amount of information is presented but all of it
is needed to facilitate operators' decisions.
- 2) Did not find the display screens to be cluttered.

This has been discussed with the NRC staff.

As a result of comments by the NRC Human Factors Specialist (L. Betracchi),
General Electric has reassessed the abbreviations used in the RPV and containment
control system status indicator text. It was found that the total number of
letters could be reduced by about 20 percent without compromising the usefulness
of the displays. The RPV display using the revised abbreviations is shown in
Attachment 2.

8506140242 850610
PDR ADOCK 05000447
F PDR

E003
1/1

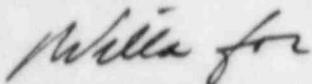
Mr. H. L. Thompson
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Considering both the assessment of our human factors consultant and the input from the NRC, General Electric concludes that modifying displays as shown in Attachment 2 is reasonable. Accordingly, General Electric is prepared to agree to this change for GESSAR if this will resolve the clutter issue.

If you have any questions or comments, please contact H. C. Pfefferlen on (408) 925-3392.

Very truly yours,



Glenn G. Sherwood, Manager
Nuclear Safety and Licensing

GGs:ca1/K06068*

cc: L. Beltracchi (NRC)
D. Scaletti (NRC)
L. Gifford (GE Bethesda)

Mr. H. L. Thompson
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GGS:ca1/K06068*

bcc: A. L. Bashford
C. F. Christensen
J. E. Klimaszewski
W. J. Roths
R. C. Stirn
J. J. Post
K. E. Gregoire
H. C. Pfefferlen
D. L. Foreman
R. L. Gridley
R. Villa
J. F. Lesyna



ANACAPA SCIENCES, INC.

RECEIVED
APR 4 1985

W. J. ROHS

2 April 1985

Mr. W.J. Roths, M/C 213
Manager, Electronics and Computer
Systems Engineering
General Electric Company
175 Curtner Avenue
San Jose, California 95125

Dear Mr. Roths:

This letter is in response to Mr. Keith Gregory's request on 29 March 1985 for additional information regarding our evaluation of ERIS displays, which was reported in "Human Factors and Performance Evaluations of ERIS," Anacapa Sciences, Inc., Technical Report 550-1, dated July 10, 1984. Specifically, additional comments were requested on the issue of "clutter" in the RPV Control displays (original identifying numbers were 113-123) and the Containment Control displays (original numbers were 125-130).

The general issue of display clutter includes at least the following components: amount and necessity of the information displayed, degree of display integration, familiarity of the subject matter to the intended users, and the degree to which parts of the display can be scanned individually to extract specific information. Each of these component issues are discussed below.

One measure of clutter is the degree to which too much information, some of which is not necessary, is presented in a single display. While the ERIS displays in question each present a large amount of information, each item of information contributes to an operator's quick grasp of plant conditions--one of the primary purposes of a safety parameter display system like ERIS. These displays have already been streamlined to remove unnecessary detail in the time trends and the status bars; each of the remaining items of information is operationally important to the range of situations that would require use of ERIS. Reducing the current amount of information on a given screen would require the addition of other screens, which would increase the operator's search time for pertinent information and would impose additional operator memory requirements, to relate information from different screens.

Another measure of clutter is the degree to which displayed information is poorly integrated. A display is considered poorly-integrated when the intended user must consciously work at extracting important information and important relationships among different items of information. A display is considered well-

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integrated when it matches the cognitive processing of the intended user so that key information and relationships are evident without extensive searching, remembering, and thinking. Objective quantification of this measure is elusive. Descriptively speaking, however, well-integrated displays generally have the following features:

- All of the information required to complete some important decision or action is located on one screen, not distributed across several screens. (Achieving this goal sometimes requires the presentation of a relatively large amount of information on a single screen.)
- Information is not presented in a large number of separate windows.
- Items of information are appropriately coded as symbols or words and appropriately juxtaposed to facilitate decision or action sequences or to facilitate the extraction of important relationships among items of information.

Two human factors specialists, who were concerned initially about the possibility of clutter in the displays in question, quickly discovered the good match between the information that was displayed and that which was required to facilitate operators' decisions in responding to simulated transients. Experienced operators who represented intended ERIS users did not report clutter as a problem with these displays, though given specific opportunities to do so.

The intended user's familiarity with the subject matter represented in a display must be considered in assessing issues of clutter. While displays for the general population of non-experts (e.g., automated bank tellers, airport flight information displays, etc.) must be very simple to transmit their messages unambiguously and quickly, displays for trained experts (e.g., air traffic control displays, tactical warfare consoles, etc.) can present somewhat higher densities of information and still be considered uncluttered **in the context of the expert user**. Somewhat different standards must be used for assessing clutter in systems to be used by experts than in systems to be used by non-experts. While it is not suggested that system developers can rely on expert operators to sort out information in poorly-designed displays, it must be noted that human factors engineers cannot use the general population as a reference for assessing clutter in displays for special populations. As discussed above, two human factors specialists soon realized the good match between the displayed information in ERIS and the operators' task requirements.

A display may be considered cluttered when the intended user tries to scan a part of it to extract some specific item of information, but finds it difficult

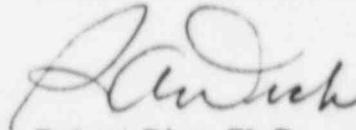
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to do so because other items of information interfere. Such interference may be due to the number of items of information; their placement in the overall layout; or perceptually-confusing symbology, terms, fonts, colors, or intensities used to represent the items. During the assessment of ERIS displays, neither the experienced operators nor the human factors specialists found this type of clutter to be a problem. While the above-referenced report discusses some problems in the selection of codes for certain types of information, these problems were not manifested as clutter per se.

In summary, the human factors specialists who assessed ERIS did not find the RPV and Containment Control display screens to be cluttered. In fact, compared to several other safety parameter display systems extant during the period of the assessment, these screens were generally more streamlined and easier to comprehend in the ERIS system than in similar screens for the other systems.

Sincerely,

ANACAPA SCIENCES, INC.

A handwritten signature in cursive script, appearing to read "R. Dick", is written over the typed name.

Robert Dick, Ph.D.
Principal Scientist

RD/bg

423

RPU CONTROL--FR/TEMP

CNTMT

CNDS/FW

WTR AVAIL	RPU PR	PWR AVAIL	PMP RUN
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CRD

WTR AVAIL	RPU PR	PWR AVAIL	PMP RUN
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RCIC

WTR AVAIL	RPU PR	PWR NA	PMP OFF
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HPCS

WTR AVAIL	RPU PR	PWR AVAIL	PMP RUN
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LPCS

WTR AVAIL	RPU PR HI	PWR AVAIL	PMP OFF
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LPCI

WTR AVAIL	RPU PR HI	PWR AVAIL	PMP OFF
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SHTDN COOLING

CLG AVAIL	RPU PR HI	PWR AVAIL	PMP OFF
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RWCU

CLG AVAIL	PWR AVAIL	PMP RUN
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TURBINE CONTROL

CLG AVAIL	VAC AVAIL	H. PWR AVAIL	ULU OP
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TURBINE BYPASS

CLG AVAIL	VAC AVAIL	H. PWR AVAIL	ULU OP
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MSL DRAINS

CLG AVAIL	U. PWR AVAIL	ULU SHT
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SLC

LIG AVAIL	PWR AVAIL	PMP OFF
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DG

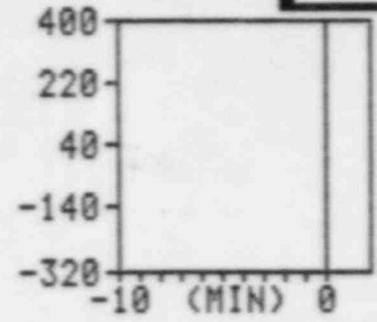
SRU

MSIU

GROUP

SCRAM

RPU LEVEL IN >TAF
IN

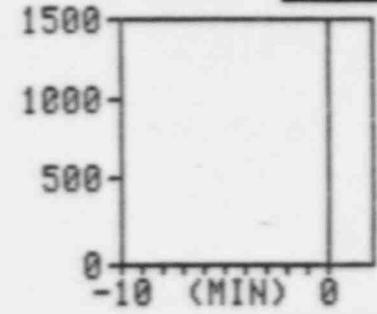


TRIP HI 52

SCRAM LO 9

TAF -162

RPU PRESS PSIG



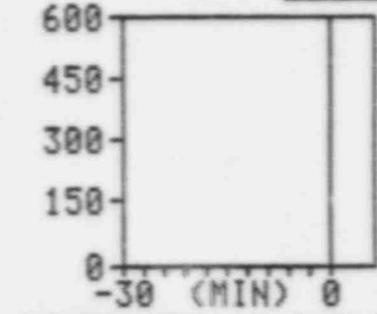
POOL LD

HEAT CAP

SRU LIFT 1103

100% BPV 995

RPU TEMP °F



RIVER BEND 30-MAR-1984 10:00:00

COMPLETE

ATTACHMENT 2