UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

May 20, 1996

NRC INFORMATION NOTICE 96-29: REQUIREMENTS IN 10 CFR PART 21 FOR REPORTING AND EVALUATING SOFTWARE ERRORS

Addressees

All holders of operating licensees or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to the inability of a computer code supplier to contact all of its customers regarding software errors that could be significant to safety. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid potential problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Boeing Computer Services (BCS) has submitted numerous 10 CFR Part 21 notifications to the NRC identifying errors in the ANSYS and GTSTRUDL finite element analysis computer programs supplied by BCS to the nuclear industry. BCS supplied these computer programs to architect-engineering firms, consultants, and licensees of nuclear power plants, but was not aware of the specific applications of the software or the potential safety significance of the end results. Because BCS was unable to evaluate the potential safety significance of these errors, BCS forwarded the information to its customers for evaluation in accordance with the notification requirements of 10 CFR Part 21. This information was also sent to the NRC. Several examples of the types of errors are described briefly in Attachment 1.

The notifications involved more than 150 errors accumulated since 1992. The NRC staff reviewed the information about the software errors and found that many of them were minor and were limited to particular subroutines and functions. The staff also found, however, that some of the errors could be significant to safety because of potentially inaccurate engineering analyses and design computations (i.e., structural, piping, material, stress, thermal, fluid, containment integrity, and other such engineering analyses and computations). The staff could not determine the actual safety significance of the errors because it lacked sufficient information regarding (1) whether any nuclear licensees actually used the computer programs containing the errors, (2) which specific safety-related structures, systems, and components were analyzed using the computer programs, and (3) to what extent licensee use

of the affected programs would have contributed to incorrect analysis or design outcomes that would have affected plant safety.

BCS could not reach several of its affected customers. Therefore, those customers could not evaluate the errors for safety significance as required by 10 CFR Part 21. As a partial corrective measure, the NRC issued a letter on December 16, 1993, (Accession Number 9401030217), to each of BCS' affected customers requesting a summary of their evaluations and responses to the error notices to assess their safety significance and potential generic implications. Twenty of BCS' customers responded and indicated, in general, that their evaluations had concluded that there was no significant safety impact on past or present work due to the software errors, thereby precluding the need for Part 21 reporting to the NRC. Their responsibilities under Part 21 were, therefore, considered to be complete.

However, according to a March 5, 1996, letter from BCS to the NRC (Accession Number 9603120351), six affected customers could not be contacted and the concern remains that there may be some instances in which the errors have not been evaluated for safety significance. The six customers were

- Echo Energy Consultants, Oakland, California
- Tenera Engineering Services, Berkeley, California
- Nuclear Applications and Systems Analysis Company, Tokyo, Japan
- Nuclear Power Services, Secaucus, New Jersey
- Reactor Controls, San Jose, California
- Gibbs and Hill, Inc., New York, New York

Discussion

Errors in computer codes used in safety-related applications are subject to evaluation as deviations in basic components to determine their reportability as defects pursuant to the provisions of 10 CFR Part 21. Part 21 requires that suppliers of basic components, or services associated with basic components, evaluate deviations or notify the customers if the supplier does not have the capability to perform the evaluation. Deviations must be evaluated for potential safety significance to determine whether the deviation could create a substantial safety hazard and thus be classified as a defect. In many cases, suppliers of basic components do not have sufficient information to perform an adequate evaluation because they do not know the particular use or safety function as installed in nuclear plant applications. The intent of 10 CFR Part 21 is to ensure that users of basic components are made aware of any potential defects that could create a substantial safety hazard. Therefore, licensees that procured computer code services from the six BCS customers that could not be contacted may wish to identify themselves to BCS for placement on the BCS service list in order to receive future error notices directly from BCS.

Information Notice 85-52: "Errors in Dose Assessment Computer Codes and Reporting Requirements under 10 CFR Part 21" is a related generic communication.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Walter P. Haass, NRR
(301) 415-3219
Internet:wph@nrc.gov

Egan Y. Wang, NRR
(301) 415-1076
Internet:eyw@nrc.gov

Attachments:
1. Examples of Error Notifications for ANSYS and GTSTRUDL Computer Codes
2. List of Recently Issued NRC Information Notices

Attachment filed in Jacket,

Examples of Error Notifications for ANSYS and GTSTRUDL Computer Codes

1. ANSYS Class 3 Error Report 95-11, March 30, 1995

   Description of error:

   In POST1, the reaction solution (PRRSOL command) will be incorrect for the master node of a coupled set unless all of the set's slave nodes are selected.

   First incorrect version(s): Rev. 5.0
   Component products Rev. 5.0A
   Corrected in: Rev. 5.2
   Component product Rev. 5.2

2. ANSYS Class 3 Error Report 95-01, February 6, 1995

   Description of error:

   (1) The command "SBCDELE.APSF" deletes edge pressure from associated elements in addition to the expected normal pressures.

   (2) The command "SBCDELE.KT" deletes keypoint temperature specifications, but not fluences.

   (3) The command "SBCLIST.KT" does not list specified keypoint fluences where no keypoint temperature is specified.

3. Georgia Institute of Technology GTICES Program Report Form No. 95.03, February 16, 1995

   Description of error:

   GTModeler aborts when adding a FZ restraint using plane mode in Edit Joints following the creation of a PZ loading on an element in the XY plane.

   Severity Level: Urgent

   Affected version(s): all previous and including 94.01

4. Georgia Institute of Technology GTICES Program Report Form No. 95.04, February 27, 1995

   Description of error:

   The contents of a joint/member/load group are incorrectly altered when joint/member/loads contained in the group are deleted (DELETIONS mode) and new joint/members/loads are created.

Severity Level: Minor

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
96-28	Suggested Guidance Relating to Development and Implementation of Corrective Action	05/01/96	All material and fuel cycle licensees
96-27	Potential Clogging of High Pressure Safety Injection Throttle Valves During Recirculation	05/01/96	All holders of OLs or CPs for pressurized water reactors
96-26	Recent Problems with Overhead Cranes	04/30/96	All holders of OLs or CPs for nuclear power reactors
96-25	Transversing In-Core Probe Overwithdrawn at LaSalle County Station, Unit 1	04/30/96	All holders of OLs or CPs for nuclear power reactors
96-24	Preconditioning of Molded-Case Circuit Breakers Before Surveillance Testing	04/25/96	All holders of OLs or CPs for nuclear power reactors
96-23	Fires in Emergency Diesel Generator Exciters During Operation Following Undetected Fuse Blowing	04/22/96	All holders of OLs or CPs for nuclear power reactors
96-22	Improper Equipment Settings Due to the Use of Nontemperature-Compensated Test Equipment	04/11/96	All holders of OLs or CPs for nuclear power reactors
96-21	Safety Concerns Related to the Design of the Door Interlock Circuit on Nucletron High-Dose Rate and Pulsed Dose Rate Remote Afterloading Brachytherapy Devices	04/10/96	All U.S. NRC Medical to the Licensees authorized to use brachytherapy sources in high- and pulsed-dose-rate remote afterloaders

OL = Operating License
CP = Construction Permit

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Original signed by Brian K. Grimes

Brian K. Grimes, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Walter P. Haass, NRR
(301) 415-3219
Internet:wph@nrc.gov

Egan Y. Wang, NRR
(301) 415-1076
Internet:eyw@nrc.gov

Attachments:
1. Examples of Error Notifications for ANSYS and GTSTRUDL Computer Codes
2. List of Recently Issued NRC Information Notices

DOCUMENT NAME: 96-29.IN Tech Editor has reviewed and concurred on 04/23/96
*See previous concurrence

To receive a copy of this document, indicate in the box: "C" = Copy without enclosures "E" = Copy with enclosures "N" = No copy

OFFICE	TECH CONT		BC:PECB		(A)D:DRPM	
NAME	EWang*		AChaffee*		BGrimes	
DATE	04/23/96		05/09/96		05/15/96	

OFFICIAL RECORD COPY

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Walter P. Haass, NRR
(301) 415-3219
Internet:wph@nrc.gov

Egan Y. Wang, NRR
(301) 415-1076
Internet:eyw@nrc.gov

Attachments:
1. Examples of Error Notifications for ANSYS and GTSTRUDL Computer Codes
2. List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\EYW\BCSINFNT.EYW (reviewed by Bagchi 5/96)
*See previous concurrence
To receive a copy of this document, indicate in the box C=Copy w/o attachment/enclosure E=Copy with attachment/enclosure N = No copy

OFFICE	PECB		TECH ED		BC:PECB	BC:HQMB		(A)D:DRPM	
NAME	EWang:jkd*		RSanders*		AChaffee	SBlack/RG for*		BGrimes	
DATE	4/23/96		4/23/96		5/6/96 VSB	4/25/96 w/comments		4/ /96	

OFFICIAL RECORD COPY
mkw

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Walter P. Haass, NRR
(301) 415-3219
Internet:wph@nrc.gov

Egan Y. Wang, NRR
(301) 415-1076
Internet:eyw@nrc.gov

Attachments:
1. Examples of Error Notifications for ANSYS and GTSTRUDL computer codes
2. List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\EYW\BCSINFNT.EYW
*See previous concurrence

To receive a copy of this document, indicate in the box C=Copy w/o attachment/enclosure E=Copy with attachment/enclosure N = No copy

OFFICE	PECB		TECH ED		BC:PECB		BC:HQMB		(A)D:DRPM	
NAME	EWang:jkd*		RSanders*		AChaffee		SBlack/RG for*		BGrimes	
DATE	4/23/96		4/23/96		4/ /96 √SB		4/25/96 w/comments		4/ /96	

OFFICIAL RECORD COPY

mkw

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Brian K. Grimes, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contacts: Walter P. Haass, NRR
(301) 415-3219
Internet:wph@nrc.gov

Egan Y. Wang, NRR
(301) 415-1076
Internet:eyw@nrc.gov

Attachments:
1. Examples of Error Notifications for ANSYS and GTSTRUDL computer codes
2. List of Recently Issued NRC Information Notices

DOCUMENT NAME: G:\EYW\BCSINFNT.EYW

To receive a copy of this document, indicate in the box C=Copy w/o attachment/enclosure E=Copy with attachment/enclosure N = No copy

OFFICE	PECB		TECH ED		BC:PECB		BC:HQMB	E	(A)D:DRPM	
NAME	EWang:jkd		RSanders		AChaffee		SBlack RG for w/comment		BGrimes	
DATE	4/23/96		4/23/96		4/ /96		4/25/96 #1 4/24		4/ /96	

OFFICIAL RECORD COPY