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To: Collins, NRR

AUTHOR: Zoltan Rosztoczy

AFFILIATION: AZ

ADDRESSEE: Nils Diaz

SUBJECT: General Design Criteria (GDC)

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DEDMRS  
DEDR  
BEDM  
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RES

ACTION: Appropriate

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

Ref: LTR-03-0438  
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August 11, 2003  
12

MEMORANDUM TO: Annette Vietti Cook  
Secretary of the Commission

FROM:

Nils J. Diaz

SUBJECT:

ZEETECH PROPOSAL

I have reviewed the proposal sent to me on June 26, 2003 by Dr. Zoltan R. Rosztoczy, President, Zeatech, Inc (copy attached). I find that the proposal has technical merit and could be compatible with the staff activities intended to risk-inform the overall NRC reactor regulations, the project called the "coherence" effort.

Please forward my comments to the NRC staff (e.g., Office of Nuclear Reactor Regulation) for consideration as appropriate.

cc: Commissioner Edward McGaffigan  
Commissioner Jeffrey Merrifield  
Samuel Collins, OEDO  
William Borchardt, NRR

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# Zeetech, Inc.

13542 N. Placita Montanas de Oro • Oro Valley, AZ 85737-8685 • Tel: 520-297-2131 • Fax: 520-297-2234

June 26, 2003

Dr. Nils Diaz, Chairman  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Chairman Diaz:

Time flies; it was almost four years ago that I introduced you as our Keynote Speaker for PSA-99 at the Willard Hotel in D.C. I have since been following NRC's activities directed toward updating the regulations. I am convinced that at this time the greatest help to ongoing NRC programs, as well as to industry initiatives, would be issuance of an updated General Design Criteria (GDC) -- design criteria that is risk-informed, performance based, and applicable to all reactor types. Designers have always been able to find relatively simple and inexpensive solutions to safety issues as long as the ground rules were known at the design phase.

This would also be an efficient way to address policy issues. An updated GDC would identify all policy issues that need to be addressed. The policy issues could be considered by the Commission as an interrelated set rather than separate items. The draft GDC could be used to show how design requirements change with policy options.

The time is ripe for an updated GDC. Over thirty years of experience has been gained since the GDC was issued; there have been major developments, especially in risk analysis; rule changes are being considered that need policy guidance; and various new nuclear plant designs are on the drawing board. Corporate memory is slowly fading away; there are only a few of us left who participated in formulation of the original GDC.

Drafting of an updated GDC is not as difficult as it may appear to be if people with the right background are available to do the work. The enclosed proposal indicates how the update can be accomplished in a short time (10 calendar months) with minimal expenditures (~ \$200K).

I am sending this proposal directly to you because I am convinced that, while everyone would benefit from this work, the Commissioners would benefit the most.

I can be reached at 520-297-2131.

Sincerely,

  
Zoltan R. Rosztoczy, Ph.D.  
President, Zeetech, Inc.

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CHAIRMAN REC'D

ZT-036

**General Requirements for  
Nuclear Power Reactors**

**A Proposal Submitted to  
The U.S. Nuclear Regulatory Commission**

**by Zoltan R. Rosztoczy, Ph.D.  
President, Zeetech, Inc.**

**June 26, 2003**

**Zeetech, Inc.  
13542 N. Placita Montanas de Oro  
Tucson, Arizona 85737-8685**

## Background

During the past decade, NRC initiated numerous efforts to improve and update the regulations. Close to 3000 years of operating experience with U.S. nuclear power reactors indicates that the regulations, in general, are appropriate and provide the desired public safety. However, an abundance of new information became available; technology advanced; new analytical methods were developed; and new, different designs have been proposed. The new information and new technology suggests changes in the regulations. The Commission has recognized the need for having updated, risk-informed, performance-based regulations.

Various NRC initiatives, for example, the 1993 NRC Regulatory Review Group Report, the 1995 Probabilistic Risk Assessment Policy Statement, the cornerstones of safety in the Reactor Oversight Process, the 1999 Plan for Risk-Informing the Technical Requirements in 10 CFR 50, the 2003 Plan for Resolving Policy Issues Related to Licensing Non-Light Water Reactor Design, and the ongoing initiatives of Reconstructing Regulations and the Coherence Project, advanced NRC's thinking on regulatory reform and produced results. Most of the results provided outlines and options on how to proceed. Some of them resulted in actual changes in one or two selected rules.

Parallel with NRC's effort, the nuclear industry is also advocating major changes in the regulations. The industry's goal is the same as NRC's, namely, have in place general, risk-informed, performance-based regulations as soon as possible. In order to help NRC to accomplish this goal, the industry proposed a rather complete new 10 CFR 53 to be inserted in the existing regulations. The industry, however, stopped short of sponsoring a rulemaking on the proposed Part 53. Apparently, they think it is NRC's responsibility to keep the regulations updated in a form that is applicable to new designs.

While various initiatives are on the right track, they are not likely to produce a complete set of updated general requirements in the near future. Most of the initiatives follow a bottom-up approach, starting the work with individual rules. A more effective and more efficient approach would be to update, improve, and generalize NRC's basic requirements as they are spelled out in the General Design Criteria section of the Regulations. All of these could be accomplished in a single step. The new GDC would provide regulatory guidance designers need in order to come up with simple inexpensive solutions to safety issues, and it would identify and resolve a set of very important policy issues. Thus, it would provide the needed guidance for the licensing review of new designs as well as it could eliminate unnecessary expenditures by operators of existing plants. The new GDC would, also, accelerate the execution of all ongoing NRC programs dealing with regulatory improvements.

An obvious question is: why hasn't this been done already? I do not know the answer. However, a likely contributor could be that words like "complete set" of "general" criteria indicate a large, complex, expensive program. This is not the case. Updating the GDC does not need to be a complex project and it does not need to be expensive. As

shown below, a relatively simple, inexpensive project can produce the needed improvements.

### **Task Description**

The project will accomplish two tasks:

1. Develop an updated draft off Appendix A to Part 50 – General Design Criteria for Nuclear Power Plants.
2. Identify all Policy Decisions needed for development of the General Design Criteria. Propose one or more viable resolutions for each Policy Issue.

#### **Task 1, Updated Appendix A**

The current Appendix A is applicable only to water-cooled nuclear power plants similar to designs common in the late 1960s. Because the criteria were developed only for certain designs, it contains, in many cases, detailed descriptive requirements specific to these designs. All requirements specific to a certain design will be removed from Appendix A, and when it is applicable, it will be replaced with requirement generic to all designs.

General criteria specifying acceptable performance levels for systems accomplishing the three safety functions, e.g. reactivity control, heat removal, and confinement of radioactive materials, will be formulated. The single failure criterion presently in use will be replaced with a probabilistic approach.

Design basis accidents will be defined in general terms, that is applicable to all reactor types. Similarly, acceptance criteria for design basis accidents will be provided in general terms. Please note that current regulations do not define design basis accidents, neither do they set general criteria for design basis accidents.

Current regulations require performance of a PRA without indicating which severe accidents need to be considered in the design or setting acceptance criteria for the PRA. The proposed new GDC will specify those severe accidents that must be considered and will provide proposed acceptance criteria. The criteria would be used to judge the acceptability of the design in terms of severe accidents prevention and in terms of protection provided in case of severe accidents. The criteria will be consistent with NRC's severe accident policy.

When the current regulations were developed, risk assessment methods were in the early phases of development. While risk considerations always played a role in the establishment of regulatory requirements, methodology was not available to support specific requirements. A thorough effort will be made to take advantage of the current

state-of-the-art of risk assessment and the Commission's Safety Goals in the formulation of the new GDC. Thus the proposed GDC will be risk-informed.

NRC frequently applied the defense in depth principle in reactor safety. The basic interpretation was that public safety should not depend entirely on one system, one component, one barrier, one procedure, or one analysis. There should always be a backup. Our evaluation is not perfect; we have to somehow cover the unknown. There will be built into the proposed GDC an appropriate amount of defense in depth. "Appropriate" means that it will be sufficient to cover the above-mentioned concerns, but will not place unnecessary burden on the designer and on the operator of the plant.

Experience gained during the past forty years through the licensing and operation of over 100 nuclear plants in the U.S. provided valuable information on the usefulness and practicality of the GDC. The observation from both industry and regulators is that the GDC had great value; it helped the designers as well as operators and regulators to do a better job. Past experience will be factored into the formulation of the proposed GDC.

The product of this task will be a draft set of General Design Criteria. It will be complete, addressing all design issues that need to be addressed in a high level set of criteria. It will be general; the intent is that it will be applicable to all reactor types. If for practicality it will be necessary to set limitations on the applicability of the GDC, those limitations will be identified. The GDC will also be performance-based. Preparation of the draft GDC will complete this task. Review by the NRC staff and the Commission, and potential future rulemakings on this issue are beyond the scope of this task.

## **Task 2, Policy Decisions to Support Development of the GDC**

During formulation of the GDC, a number of important policy decisions will emerge. Some of them have already been mentioned above, namely

- Replacement of the Single Failure Criterion
- Definition of Design Basis Accidents
- General Performance Criteria for Systems Providing Protection in Case of Design Basis Accidents
- Definition of Severe Accidents that need to be considered in the Evaluation of the Design
- Criteria addressing Severe Accident Prevention and addressing Protection of the Public in case of Severe Accidents

- Required Defense in Depth Measures; How much Defense in Depth is enough?

It is likely that a few more policy decisions will be identified. The total number of needed policy decisions will probably be about a dozen. Each of these decisions will be clearly identified.

Every identified policy decision will be discussed; potential resolution of the issue will be identified. A selected resolution of the issues will be built into the proposed GDC. The effect of this selection as well as other options on the GDC will be noted.

Information provided with the selected resolutions will permit and facilitate a revision to the GDC should the Commission arrive at a different set of policy decisions than those proposed in the draft GDC. Not knowing what decision the Commission might arrive at, the effort needed to revise the draft GDC is not included in the resource requirement. It is not part of this task. However, it would be a small effort relative to the formulation of the proposed GDC.

#### Schedule

It is estimated that the project, including both Task 1 and Task 2, can be completed within 10 calendar months.

#### Resource Requirements

Dr. Rosztoczy will do formulation and drafting of the proposed GDC. He has over 35 years of experience with the formulation, application, and interpretation of Design Criteria for light-water cooled nuclear power plants and approximately ten years of experience with the review and formulation of design criteria for advanced reactor design. His personal involvement throughout the years in many of the issues that will be addressed in the GDC will permit him to proceed faster on this assignment than other individuals or groups of individual could. Thus, he is uniquely qualified to perform the above tasks. Dr. Rosztoczy's résumé is attached.

Dr. Rosztoczy will need the help of a few, selected individuals knowledgeable in PWR, BWR, Gas-Cooled Reactor, Heavy-Water Reactor, and Liquid Metal Cooled Reactor Design. He will also need the help of NRC representatives to discuss technical issues involved in this project.

The industry consultants will be selected during the first month of the project and expected to number 6 to 8 individuals. At appropriate times during the course of the project, Dr. Rosztoczy will visit once or twice with each of the consultants to discuss pre-selected topics. Additional communications will be handled by phone and E-mail. If required, the consultants will be paid for their participation in the project. Otherwise it

will be the consultant's employer's prerogative to donate the consultant's time for this purpose.

It is anticipated that during the course of the project there will be bimonthly technical meetings with NRC representatives in Rockville. Selected issues will be identified for each meeting ahead of time.

A proposed budget estimate follows:

***Direct Labor:***

| <i>Name</i>   | <i>Hours</i> | <i>Rate/Hour</i> | <i>Total</i> |
|---------------|--------------|------------------|--------------|
| Dr. Rosztoczy | 1300         | \$120            | 156,000      |
| Consultants   | 200          | \$150            | 30,000       |

***Travel:***

|                         |             |                   |
|-------------------------|-------------|-------------------|
| 6 trips to Rockville    | 2 days each | 6,000             |
| 8 trips to Consultants  | 1 to 2 days | <u>6,400</u>      |
| <b><i>Subtotal</i></b>  |             | 198,400           |
| <b><i>Fee (10%)</i></b> |             | <u>18,840</u>     |
| <b><i>TOTAL</i></b>     |             | <b>\$ 218,240</b> |

**ZOLTAN R. ROSZTOCZY**  
13542 N. Placita Montanas de Oro  
Oro Valley, Arizona 85737-8685  
(520) 297-2131

### **Summary of Qualifications**

- Twenty-six years of management experience with the nuclear industry and with the U.S. Government.
- Comprehensive technical knowledge of engineering principles with particular knowledge of the thermal hydraulic design and safety evaluation of nuclear power plants.
- Exceptional knowledge of NRC's regulations, licensing activities and decision making process; familiarity with DOE's operation.
- Development and execution of major agency-wide programs in nuclear reactor safety and research. Strong organizational skills, ability to develop and execute projects on schedule and within budget.
- Strong communications skills, both oral and written. Extensive teaching experience.
- Ability to find simple, creative solutions to complex technical and administrative problems.

### **Employment History**

1993-Present *Zeetech, Inc., Technical and Management Consulting*

Performed work for the following clients: U.S. Nuclear Regulatory Commission; The Hungarian Nuclear Regulatory Agency, Paks Nuclear Power Plant; GPU Nuclear; Three Mile Island and Oyster Creek Nuclear Power Plants; University of Maryland; Scientech Inc.; and Brookhaven National Laboratory.

1973-1993 *U.S. Atomic Energy Commission and U.S. Nuclear Regulatory Commission*

Served as Senior Executive for 14 years. Managed various units of the Office of Nuclear Reactor Regulation and later the Office of Nuclear Regulatory Research. Played a key role in the formulation and implementation of the ECCS Rule. Directed the Agency's Equipment Qualification Program. Was responsible for the thermal hydraulic design review of all reactor applications, and for oversight of NRC's computer code development programs for safety analysis. Was involved in drafting of the Severe Accident Policy Statement. Developed programs for implementation of the Severe Accident Policy (IPE and IPEEE). Handled