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

SEP 2 6 2003

Information Systems Laboratories, Inc.
ATTN: James Meyer
11140 Rockville Pike, Suite 500
Rockville, MD 20852

SUBJECT: TASK ORDER NO.13 UNDER CONTRACT NO. NRC-04-02-054

Dear Mr. Meyer:

This letter definitizes Task Order No. 13 in accordance with the enclosed statement of work. The period of performance for Task Order No. 13 is September 29, 2003 to June 1, 2004. The task order estimated cost and fixed fee is set forth as follows: Estimated Costs:$263,532 Fixed Fee:$17,980 CPFF Total:$281,512. $50,000 in funds is hereby allotted to this task order. The accounting data for this task order is set forth as follows: RES ID: RES-C03-460 APPN: 31X0200 B&R:36015110203 JCN:Y6520 BOC: 252A Amount Obligated This Action:$50,000.

Please indicate your acceptance of Task Order No.13 by having an official authorized to bind your organization execute three copies of this document, by signing in the space provided, and return two copies to me. You should retain the third copy for your records. All other terms and conditions of this task order remain unchanged.

Should you have any questions, regarding this task order, please contact me on (301) 415-8168.

Sincerely,

Stephen M. Pool, Contracting Officer
Division of Contracts
Office of Administration

ACCEPTED: _____ (See page 2 of SOW)
NAME

VP
TITLE

9/29/03
DATE

TEMPLATE - ADM001

ADM002

STATEMENT OF WORK
NRC-04-02-054 TASK ORDER 13

TITLE: Break Size Redefinition Supporting Calculations

I. BACKGROUND

NRC staff is currently revising the Code of Federal Regulations, 10CFR50.46, to allow a "risk-informed" treatment of several parameters. One of the major changes that is being considered is a reduction in the maximum break size that is assumed in a loss of coolant accident (LOCA) analysis. Rather than assuming a double-ended guillotine break in one of the major reactor coolant system (RCS) pipes, the break may be restricted to an area of less than 1.0 ft^2. While the precise definition of this new maximum has not yet been determined, it is clear that the smaller break area will have a significant effect on LOCA analysis and potentially provide applicants with opportunities to enhance plant operation. In addition, since size alternate break locations such as leaks directly from the reactor vessel may be risk significant, the new rule must also take these locations into account.

One of the key problems in formulating a new rule affecting break size is estimating what might occur with plant operation once the rule is changed and industry takes advantage of the new features. To help formulate the rule change and regulatory guides that will clarify the staff's intent, the staff must anticipate what an analysis under the new rule might be like. Calculations to investigate the impact of break size reduction must be performed before the rule is finalized.

II. OBJECTIVE OF PROPOSED WORK

The objective of this task is to quantify the effect of break size reduction and alternate break locations on margin to existing acceptance criteria. Questions that must be addressed include:

a. What magnitude of power uprate, diesel delay time, and peaking factor increases would a risk-informed treatment of maximum break size and locations enable? Is LOCA still limiting, or would DNB or some other scenario become more limiting? If DNB or another scenario becomes more limiting, would this meet the desired intent of the SRM which is to focus attention on more risk-significant accidents?

b. Do existing thermal-hydraulic codes remain adequately validated at modified plant operating conditions? That is, do we have experimental data to support the peak linear heat rates that may be enabled by the new maximum break size? Similarly, are transients in integral facilities such as ROSA, Semiscale, BETHSY and others still representative of new transients? Are new integral effects tests necessary to support the proposed changes to the regulations?

c. If the staff defines the maximum credible break size as X ft^2, does increasing it to X + 10% send results "over a cliff", or is there margin for error in selection of the new maximum break size?

d. What would be the consequence of a double-ended large break LOCA if the plant is uprated and equipment availability is not as restrictive?

To assist the staff in addressing these and other questions, an analysis program is needed to examine the impact of the risk-informing breaks to the RCS. For this investigation, assume that the maximum credible break size can be a 12-inch equivilant diameter break in the primary RCS piping. To satisfy the objective that risk-significant breaks anywhere in the RCS be considered, breaks of major branch lines will also considered.

III. SCOPE OF WORK:

The work is to be be completed in the following order: Tasks 1, 2, 3a (4-inch case), 4a (4-inch case), 5, 3a (remaining cases), 3b-f, 4a (remaining cases) and 4b-f.

Task 1: Background Development

(a) Select two candidate plants for analysis. Since PWRs are expected to be most impacted by break size reduction, Westinghouse 3- and 4-loop PWRs might be the best choices. The candidate plant must have an accurate input deck that can be converted to a format suitable for the TRACE code. If would be beneficial to staff's program of risk-informing 10CFR50.46 if the candidate plants had a high quality PRA so that overall risk could also be considered.

(b) Perform a literature survey of realistic large and small break calculations performed with best estimate assumptions on safety injection (i.e. assuming off-site power available and no failures).

10/17/03

Estimated Completion Date: ~~9/22/03~~
Estimated Level of Effort: 0.25 staff-month

Task 2: Large Break LOCA Reference Case

(a) For the plant selected, simulate a three break spectrum of double-ended guillotine cold leg breaks assuming loss of off-site power and the loss of one diesel generator. Best estimate decay heat is to be assumed.

(b) Simulate a double-ended guillotine cold leg break assuming off-site power is available, and no safety-related equipment failures. Best estimate decay heat is to be assumed.

Estimated Completion Date: 11/01/03
Estimate Level of Effort: 1.0 staff-month

Task 3: Risk-Informed LOCA Reference Case

(a) Assuming loss of off-site power and the loss of one diesel generator make the following calculations with best estimate decay heat. The plant operating condition will be assumed to be "as is," with no benefit derived from the smaller break size.

a. 4-inch, 10-inch and 12-inch cold leg breaks
b. Pressurizer surge line break
c. Safety Injection line break
d. Steam generator manway failure
e. CRDM failure
f. Instrumentation tube failure

These calculations will establish a reference point for safety margin with the current plant operating condition. The calculations consider the range of cold leg breaks likely to be most limiting, and also breaks of major branch lines and vessel penetrations.

Estimated Completion date: 12/01/03
Estimated Level of Effort: 3 staff-months

Task 4: Risk-Informed LOCA Case

(a) Review the list of plant operational changes being considered by the Westinghouse Owners Group and NEI for the candidate plants in the sensitivity study. From this, make an educated guess at what changes could be accommodated if some or all of the calculations in the previous step became the new design basis. A possible condition would be a total power increase of 5%, FQ = 2.8, FDH = 1.8, and diesel delay time of 60 seconds. A new steady-state will be generated for each plant and DNB margin evaluated. (If the minimum DNBR is not satisfied, reduce power or peaking factor.) Refer to this as the "risk-informed" plant.

As in Task 3, the following cases are to be run:

a. 4-inch and 10-inch cold leg breaks
b. Pressurizer surge line break
c. Safety Injection line break
d. Steam generator manway failure
e. CRDM failure
f. Instrumentation tube failure

Estimated Completion Date: 2/01/04
Estimated Level of Effort: 4 staff-months

Task 5: Severe Accident Large LOCA

(a) A three break spectrum of double-ended cold leg break calculations will then be performed for the risk-informed plant. However, like the calculations in Task 2B best estimate safety injection system performance will be assumed. That is, both diesels will be assumed operational. Loss of off-site power will again be assumed so that the diesel delay time has an impact.

The objective of this calculation is to determine if the acceptance criteria are met or to what extent they are exceeded. If the acceptance criteria are exceeded, a rod census will be used to estimate how many of the rods approach melt.

Estimated Completion Date: 12/30/03
Estimate Level of Effort: 1 staff-month

Task 6: Final Report

The calculations from Tasks 1 to 5 are to be documented in a comprehensive report. This report will describe the sensitivities observed, and identify limiting scenarios for a risk-informed

revision of break size and location. A set of breaks to be part of a new design basis for LOCA analysis is to be proposed. Finally, recommendations for MELCOR calculations to examine consequence of double-ended guillotine breaks under a risk-informed rule are to be made.

Estimated Completion Date: 6/01/04
Estimated Level of Effort: 1 staff-month

IV. REPORTING REQUIREMENTS

Letter reports are due upon completion of Tasks 1, 2, 3, 4, and 5. The total effort is to be described in a final comprehensive report in NUREG format as stated in Task 6.

NEW STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS

The U.S. Nuclear Regulatory Commission (NRC) began to capture most of its official records electronically on January 1, 2000. The NRC will capture each final NUREG-series publication in its native application. Therefore, commencing January 1, 2000, please submit your final manuscript that has been approved by your NRC Project Officer in both electronic and camera-ready copy.

All format guidance, as specified in NUREG-0650, Revision 2, will remain the same with one exception. You will no longer be required to include the NUREG-series designator on the bottom of each page of the manuscript. The NRC will assign this designator when we send the camera-ready copy to the printer and will place the designator on the cover, title page, and spine. The designator for each report will no longer be assigned when the decision to prepare a publication is made. The NRC's Publishing Services Branch will inform the NRC Project Officer for the publication of the assigned designator when the final manuscript is sent to the printer.

For the electronic manuscript, prepare the text in WordPerfect 8, and use any of the following file types for charts, spreadsheets, and the like.

File Types to be Used for NUREG-Series Publications	
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This list is subject to change if new software packages come into common use at NRC or by our licensees or other stakeholders that participate in the electronic submission process. If a portion of your manuscript is from another source and you cannot obtain an acceptable electronic file type for this portion (e.g., an appendix from an old publication), the NRC can, if necessary, create a tagged image file format (file extension.tif) for that portion of your report.

Note that you should continue to submit original photographs, which will be scanned, since digitized photographs do not print well.

If you chose to publish a compact disk (CD) of your publication, place on the CD copies of the manuscript in both (1) a portable document format (PDF); (2) a WordPerfect 8/9 file format, and (3) an Adobe Acrobat Reader, or, alternatively, prints instructions for obtaining a free copy of Adobe Acrobat Reader on the back cover insert of the jewel box.

V. MEETINGS AND TRAVEL REQUIREMENTS

Regular status meetings will be held at either the NRC or ISL office. No travel is required.