AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

BPA NO.	1. CONTRACT ID CODE	PAGE	OF PAGES
		1	1

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
001	See Blk 15C.	RES-04-069-M001	

6. ISSUED BY CODE 3100

U.S. Nuclear Regulatory Commission
Div of Contracts
Two White Flint North - MS T-7-I-2
Attn: Rachel Glaros (301) 415-0115
Washington, DC 20555

7. ADMINISTERED BY (If other than Item 6) CODE 3100

U.S. Nuclear Regulatory Commission
Div of Contracts
Two White Flint North - MS T-7-I-2
Attn: Rachel Glaros (301) 415-0115
Washington, DC 20555

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

INFORMATION SYSTEMS LABORATORIES, INC

10070 BARNES CANYON ROAD
SAN DIEGO CA 921212722

CODE | FACILITY CODE

(X) | 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

10A. MODIFICATION OF CONTRACT/ORDER NO.
GS23F0060L DR-04-04-069

X | 10B. DATED (SEE ITEM 13)

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment of each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

B&R No.: 46015110203 Job Code: Y6492 BOC: 252A
Appropriation Number: 31X0200.460 $16,560.00

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(X)	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: GS-23F-0060L - FAR 52-212-4(c)
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 2 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The purpose of this modification is to add a new within scope task for a peer review of LOCA Frequencies. Specific changes to the delivery order are as follows:

A. Dr. Corwin Atwood is hereby added as a key person under delivery order section A.5 entitled, "2052.215-70 Key Personnel."
B. Attachment One - Statement of work is hereby deleted in its entirey and replaced with the attached Statement of dated July 27, 2004.
C. The total amount funded is hereby increased by $16,560.00, from $200,000.00 to $216,560.00.
D. The total contract value is hereby increased by $16,560.00, from $402,604.10 to $419,164.10.
E. All other terms and conditons of the delivery order remain unchanged.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)
James F. Meyer, V.P.	ROBERT B. WEBBER CONTRACTING OFFICER
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED 8/10/04
16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED 8/12/04

STANDARD FORM 30 (REV. 10-83)

TEMPLATE - ADM001

ADM002

United States Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
STATEMENT OF WORK – ATTACHMENT 1 TO DELIVERY ORDER NO. DR-04-04-069
REVISED JULY 27, 2004

TITLE: SUPPORT IN RISK-INFORMING 10 CFR 50 PART 46 AND GENERAL DESIGN CRITERION 35

I. BACKGROUND

In NRC report, SECY-02-0057, "Update to SECY-01-0133, 'Fourth Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendation on Risk-Informed Changes to 10 CFR 50.46, Emergency Core Cooling System (ECCS) Acceptance Criteria'," the staff recommended the development of risk-informed approaches to technical requirements in 10 CFR 50.46 concerning loss of coolant accident (LOCA) acceptance criteria and evaluation models.

In its March 31, 2003, staff requirements memorandum (SRM) on this paper, the Commission directed the staff to undertake a number of rulemakings, one of which was to prepare a proposed rule to allow, as a voluntary alternative, a redefinition of the design basis large break LOCA.

Significant challenges have been identified which must be resolved before rulemaking can be initiated. These challenges include: determining the alternate maximum break size risk metric, determining appropriate limitations on what can be modified in a plant, controlling the total risk change, establishing the potential for "reversal" of changes, establishing the appropriate Probabilistic Risk Assessment (PRA) scope, determining the extent to which redefinition of large break LOCA may effect other parts of 10 CFR Part 50, understanding what defense-in-depth considerations are important and deciding what mitigation capability should be retained for break sizes between the new maximum design basis LOCA size and the double-ended guillotine (DEG) break of the largest pipe in the system.

Successful development of the Part 46 rule also requires an understanding of how the maximum LOCA break size impacts the design of a nuclear plant. For design basis analysis, the number, size, capacity, response time, and design capacity of installed systems impacts the plant response to the full LOCA spectrum. The break spectrum is subjected to the most challenging postulated conditions (e.g., worst time in core life, worst single failure, coincident loss of offsite power (LOOP), worst break location). For design basis LOCAs, acceptable fuel performance must be demonstrated with these assumptions using evaluation models acceptable to the NRC. Design basis LOCAs also play a role in radiological consequence assessment, containment pressure analyses, other structural analyses, and equipment environmental qualification. These Structures, Systems and Components (SSCs) also function to respond to a number of different design basis events. It is important, then, to understand how changes to the plant design basis, such as, changes to the required spectrum of LOCAs analyzed, would impact the need for and response of these SSCs.

An expert elicitation process has been employed to generate the LOCA break size frequencies which will form an integral basis for revising 10 CFR 50 Part 46. As part of this on-going effort the NRC staff is planning to peer review major aspects of the expert

elicitation process to help insure that the results achieve maximum credibility. A portion of the peer review will consist of a re-examination of the statistical basis used to derive the results.

II. OBJECTIVE

As indicated, risk-informing 10CFR50.46 raises many difficult technical issues that must be defined, understood and evaluated so as not to inadvertently authorize changes to the plants that were not intended and would not be authorized otherwise. The objective of this contract is to provide support to the Office of Research (RES) as they attempt to resolve the technical challenges associated with the development of a proposed rule. The support is expected to consist primarily of detailed calculational risk results obtained using state-of-the-art calculational tools and models, to be provided by NRC, and modified for this project by the contractor, as necessary. The risk calculations should incorporate knowledge gained from other on-going activities, such as, thermal hydraulic calculations also being performed for this program.

The contractor will work with the nuclear plants designs and their system models which are also being analyzed by other divisions in RES for this rulemaking activity. These other evaluations attempt to gather thermal hydraulic and other plant performance information. This information will help the staff and contractors understand how the plant performs under assumptions postulated to result from a proposed rule and what key factors are expected to impact plant risk. Once that is understood, the contractor may modify the standard plant risk models to, for instance, take selected systems out of service or change the system success criteria, to determine how risk changes as a result in comparison to the original plant configuration.

The scope of the SOW is being modified as described in this paragraph. Contractor assistance is to be provided in the performance of a peer review of statistical aspects of the expert elicitation process employed in development of the revised loss-of-coolant accident (LOCA) break size frequencies for use in the risk-informed reevaluation of 10 CFR 50.46, Appendix K to 10 CFR Part 50, and GDC 35. The NRC staff intends to look to the contractor for a portion of the support required in performing the statistical component of the peer review.

III. WORKSCOPE

This section describes the work required of the contractor to provide technical support to the staff as they proceed with rulemaking to risk-inform 10 CFR 50.46. RES has developed this statement of work to address technical issues as directed by the Commission in the SRM on risk informed changes to 10 CFR 50.46, dated March 31, 2003. A draft Integrated RES Task Plan (IRESTP) has been developed which describes the Office's planned efforts to address the technical issues associated with the rulemaking, including those described here. The contractor will interact with other RES contractors performing related work sponsored by other divisions of RES, as described in the IRESTP, and will integrate the results of that work, as necessary, into their efforts.

Task 1. Risk Evaluation of Thermal-Hydraulic Sensitivity Study Results–Thermal hydraulic case studies are being conducted using the TRACE code to better understand how a selected plant will respond to postulated plant changes which might result from a revision to 10 CFR 50.46. Plant changes may include such things as power uprates, changes in core peaking factors, and

changes in diesel start times. Studies may also attempt to determine plant performance in the severe accident realm using the MELCOR code. These studies are described in the draft IRESTP, Tasks 2 and 3, attached to this Statement of Work, and are being performed by the Division of Systems Analysis and Regulatory Effectiveness, RES. Following the preliminary thermal hydraulic scoping studies of a selected plant, the contractor shall evaluate the impact on risk metrics, e.g., core damage frequency (CDF) and large early release frequency (LERF) of proposed plant changes. The risk evaluations should take into account the changes in the plant profile, such as, changes in the safety margins and defense-in-depth features, postulated to occur as a result of the voluntary implementation of a proposed rule and as verified by the thermal hydraulic analyses. The risk evaluations should include the effect of changes in safety margins on the following PRA models and assumptions:

- initiating event frequencies
- success criteria
- human actions
- accident sequences and accident propagation assumptions

IRESTP Tasks 2 and 3 included the selection of a surrogate plant for calculation purposes. The same plant should be used by the contractor for this task. Standardized plant analysis risk (SPAR) models with are based upon the NRC code, SAPHIRE, or other appropriate tool as approved by the Project Officer prior to use, will be used for these evaluations.

Estimated Completion Date: November 30, 2004

Task 2. Evaluation of Broader Change to Single Failure Criterion–The contractor shall assist the staff in exploring the feasibility of replacing the single failure criterion with a reliability based criterion incorporating concepts such as common mode failure. The contractor will work with the staff and other NRC contractors to develop and review candidate criteria. In so doing, the contractor will assist the staff to evaluate the pros and cons of the postulated criteria. Calculation efforts will be involved to demonstrate the impact on plant risk of changes postulated to the single failure criterion.

The contractor shall modify a plant risk model, such as a SPAR model, which is based upon an operating plant designed to the current single failure criterion, using a set of assumptions designed to replicate how the plant design basis might change in response to the various replacement criteria. The contractor shall then evaluate the change in plant risk.

Estimated Completion Date: January 31, 2005

Task 3. Development of Regulatory Guide–The contractor shall provide assistance to the staff in the development of a regulatory guide. This guide will provide assistance to the nuclear industry concerning implementation of risk-informed changes to 50.46 requirements as recommended by the staff and approved by the Commission. The guidance to be provided will be based upon results generated from this or related work being performed by other RES divisions. As such, the contractor will provide assistance in integrating input obtained from these activities into the guidance document.

Estimated Completion Date: October 31, 2005

Task 4 - Peer Review of LOCA Frequencies - This review shall consist of a panel, one peer reviewer from ISL and one or two additional members from other organizations, to assess the processing methodology associated with the expert elicitation which estimated LOCA frequencies. Expert elicitation was used to incorporate service experience and probabilistic fracture mechanics insights in order to develop the estimated frequencies.

The scope of peer review involves:

* Review the technical approach and the processing methodology in the LOCA frequency expert elicitation process.

* Provide comments on the adequacy and reasonableness of the processing methodology and technical approach used. This will involve assessing whether the processing methodology developed to estimate LOCA frequencies is adequate for the intended use, and identify any relevant issues which have been excluded or are insufficient.

* The peer review will identify both strengths and weaknesses in the processing methodology. Key assumptions are to be reviewed to determine if they are appropriate, and if they have a significant impact on the results. Deficiencies should be identified with recommendations on how each could be addressed and resolved.

The peer review is expected to be performed in two steps:

Step-1: In the first step, a preliminary review is to be performed of the available draft report on the technical development of LOCA frequency distributions (Ref.7) and supporting documentation. This step should be completed prior to the peer review meeting. Draft documents are not public and may not be distributed to any other parties. A 1 - 2 day presentation on the draft report and results will be made by the RES staff during a meeting to be scheduled on a mutually agreed upon date. The reviewers are to develop preliminary comments on the processing methodology during this step and submit requests for additional information, as appropriate.

Step-2: In the second step, a thorough review is to be performed of Ref. 7 and other associated information required by the peer reviewer. This step will commence after the peer review meeting described in Step 1. A detailed report from each peer review member shall be completed by August 31, 2004. NRC staff shall review the report, and NRC comments shall be incorporated into the report as appropriate by the contractor. Panel members may be contacted by the NRC to provide clarification during this period.

The peer review panel may schedule additional discussions (e-mails, phone calls) as needed. The Project Manager for this task will facilitate and arrange these discussions and meetings as appropriate.

NRC Technical Monitor/RES Peer Review Panel Coordinator:

Carolyn Fairbanks
Mail Stop: T-10E10
Materials Engineering Branch, DET
Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

Phone: 301-415-6719
Fax: 301-415-5074
E-mail: cxf1@nrc.gov

Estimated Level of Effort: 0.8 staff-months from modification award
Completion Date: August 31, 2004
Deliverable: Technical Letter Report detailing comments from the peer reviewer

IV REPORTING REQUIREMENTS

Monthly Letter Status Report: Work efforts, progress, problems and plans for the next period in each of the above tasks should be documented in a monthly letter status report (MLSR). The report should include financial information, such as estimated contract amount, funds obligated to date, total costs incurred during reporting period, total costs incurred to date, details on costs incurred, balance of obligations, and balance of obligations to complete task order.

V DELIVERABLES AND DELIVERY SCHEDULE

For all tasks 1 through 3, a draft report is due 1 month prior to the completion date listed in each task. The final report **for all tasks** is due on the completion date listed in each task.

The MLSR should be submitted to NRC by the 15th of each month starting the second month of the task order, covering the prior month.

Reports should be in form such that the contractor could easily convert it to a NRC NUREG/CR report, once the work is reviewed by NRC staff and it is finalized.

All reports and the MLSR should be provided to the project manager (PM), the technical monitor (if different from the PM) and the RES management analyst. A copy of the MLSR should also be provided to the contract specialist.

VI MEETINGS AND TRAVEL

The contractor project manager shall plan to meet with NRC staff at headquarters in Rockville, Maryland, approximately 10 times during the contract period for one day each time to discuss the results of the on-going work and intermediate results. In addition, frequent conference calls are expected.

For Task 4, it is anticipated that there will be 1 or 2 trips, by 1 person, for 1-2 day(s) each to NRC Headquarters in Rockville, Maryland to conduct meetings and discussions on the subject matter and to perform the peer review.

VII PERIOD OF PERFORMANCE

The task order will cover the period which extends 18 months from the date of award.

VIII QUALITY ASSURANCE

Prior to submitting deliverables to the NRC, the contractor shall incorporate sufficient review and quality checks to ensure that the deliverable is technically sound, the assumptions made in the analysis are appropriate and have been adequately justified.

IX GOVERNMENT FURNISHED INFORMATION

NRC will provide SAPHIRE-based SPAR models of nuclear power plants, as well as copies of the SAPHIRE analysis code. A copy of the Draft IRESTP, Tasks 2 and 3, and SRM will also be provided.

For Task 4 – NRC published reports (e.g. References 7 and 8) will be provided as well as other information generic to the elicitation process

X REFERENCES

1. SECY-98-300, "Options for Risk-Informed Revisions to 10 CFR Part 50 - "Domestic Licensing of Production and Utilization Facilities," December 1998. This is the first SECY paper which described three "high level" options for risk-informing 10 CFR Part 50. Option 1 simply consisted of leaving Part 50 as is. Option 2 involved making changes in the scope of structures, systems and components related to special treatment rules (the current rulemaking activity for 10 CFR 50.69). Option 3, described herein, involved making changes to specific regulatory requirements, such as 10 CFR 50.44 and 50.46.

2. SECY-99-264, "Proposed Staff Plan for Risk-Informing Technical Requirements in 10 CFR Part 50," November 1999, described the overall staff plan for Option 3.

3. SECY-00-0198, "Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control)," provided a description of proposed changes to 50.44 and a proposed framework for considering other changes to Part 50.

4. SECY-01-0133, "Status Report on the Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.46 (ECCS Acceptance Criteria)," provided preliminary feasibility studies recommending risk-informed changes to Part 50.46.

5. SECY-02-0057, "Update to SECY-01-0133, "Fourth Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.46 (ECCS Acceptance Criteria)," provided specific recommendations for changes to 50.46 in the areas of ECCS break size definition, ECCS

acceptance criteria, ECCS reliability and ECCS evaluation model. On March 31, 2003, the Commission provided the latest staff requirements memorandum (SRM) providing their guidance to the staff.

6. Staff Requirements Memorandum, March 31, 2003, pertaining to SECY-02-0057.

7. US NRC, (non-public) Draft NUREG, "Technical Development of Loss-of-Coolant Accident (LOCA) Frequency Distributions." Title subject to change. Tentative completion date of draft NUREG, June 2004.

8. SECY-04-0060, "Loss-of-Coolant Accident Break Frequencies for the Option III Risk-Informed Reevaluation of 10 CFR 50.46, Appendix K to 10 CFR Part 50, and General Design Criteria (GDC) 35," April 13, 2004.
b
Note: All SECY reports are available at www.nrc.gov.

XI ATTACHMENTS

1. Draft Integrated Office of Research Task Plan (IRESTP), Tasks 2 and 3, covering Risk-Informed 10 CFR 50.46 Technical Support, February 2004.

STATEMENT OF WORK – ATTACHMENT 1

Draft Integrated Office of Research Task Plan

Risk-Informing 10 CFR 50.46

Task 2. Thermal-Hydraulic Analysis of LOCA (RES/DSARE)

Task 2A. Background development -Select a candidate plant for analysis. The candidate plant must have an accurate input deck that can be converted to a format suitable for the TRACE code. Perform a literature survey of realistic large and small break calculations performed with best estimate assumptions on safety injection (assuming off-site power available and no failures). ***(Completed)***

For the plants 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. 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. ***(2nd Quarter FY04)***

Perform base case "as-operated" LOCA analyses for candidate PWR plants including 4, 10 and 12 inch breaks, pressurizer surge line, SI, SG manway, CRDM failure and instrument tube failure. These will establish a reference point for current safety margin. ***(2nd Quarter FY04)***

Task 2B. Perform risk-informed LOCA analyses. 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, postulate what changes could be accommodated if some or all of the changes became the new design basis. For example, possible changes include a total power increase of 5%, increased peaking factors and diesel start time of 60 seconds. A steady-state result for breaks up to the new redefined large break LOCA will be generated for each plant and the departure from nucleate boiling (DNB) margin evaluated. This becomes the "risk-informed" plant. Run the same cases as in Task 2A. ***(3rdQ FY04)***

Task 2C. Comparison of base case and risk-informed LOCA analyses. Assess: (a) what magnitude of power uprate, diesel delay time, and peaking factor increases a risk-informed treatment of maximum break size and locations would enable, (b) if LOCA is still limiting, or would DNB or some other scenario become more limiting, (c) 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, (d) 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? ***(3rdQ FY04)***

Task 2D. Accident analysis needs. Evaluate whether existing thermal-hydraulic codes remain adequately validated at modified plant operating conditions. That is, does experimental data 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?
(4thQ FY04)

Task 3. Thermal-Hydraulic Sensitivity Studies for Beyond Design Basis LOCA
(RES/DSARE)

Task 3A. Three break spectrum. For a three break spectrum of large cold leg breaks assess the risk impacts after incorporating potential plant changes, e.g., power uprates, peaking factor increases and diesel start time delays. Determine if current Appendix K acceptance criteria is exceeded and, if so, by how much. *(4thQ FY04)*

Task 3B. New success criteria for beyond DB LOCA. Recommend whether it is feasible to develop a revised ECCS success criteria for breaks beyond the revised DB LOCA which will maintain a coolable fuel geometry. Assess the consequence of a double-ended large break LOCA if the plant is uprated and equipment availability is not as restrictive as currently required? *(4thQ FY04)*

Task 4. Risk-Significance Evaluation of Redefined LOCA Break Sizes and Frequencies
(RES/DRAA)

For selected plants, calculate the contributions of various LOCA sizes to total plant CDF. These calculations should be based upon redefined LOCA sizes and their new frequencies. The plant-specific SPAR models will be used for these evaluations. Limited evaluations will be performed to calculate LERF as well, when those SPAR models are available. The plants selected should include two to four from each reactor vendor. The results should provide plant-specific risk insights on the impact of redefined LOCA sizes.

This task will also study the various candidate risk acceptance criteria. For example, RG 1.174 provides a basis for accepting plant changes based upon risk considerations. This task will evaluate the pros and cons of various acceptance criteria in an attempt to uncover potential implications and surprises. *(4thQ FY04)*