



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

Information Systems Laboratories, Inc.  
ATTN: Mr. James F. Meyer  
Vice President & Manager  
11140 Rockville Pike, Suite 500  
Rockville, MD 20852

Subject: TASK ORDER NO. 5, ENTITLED, "DEVELOPMENT OF STRATEGIES FOR  
PRIORITIZATION OF RESEARCH PROJECTS USING FORMAL DECISION  
METHODS" UNDER CONTRACT NO. NRC-04-01-067

In accordance with Section G.4, Task Order Procedures, of the subject contract, this letter definitizes Task Order No. 5. This effort shall be performed in accordance with the enclosed Statement of Work.

Task Order No. 5 shall be in effect from June 24, 2002 through December 31, 2002, with a cost ceiling of \$86,962.80. The amount of \$80,895.63 represents the total estimated reimbursable cost, and the amount of \$6,067.17 represents the fixed fee.

Accounting data for this task order is as follows:

B&R No.: 26015110197  
Job Code: Y6406  
BOC Code: 252A  
APPN No.: 31X0200.260  
OBLIGATED AMOUNT: \$86,962.80

The following individuals are considered to be essential to the successful performance of the work hereunder:

[REDACTED]

The Contractor agrees that such personnel shall not be removed from the effort under the task order without compliance with Contract Clause H.1, Key Personnel.

The issuance of this task order does not amend any terms or conditions of the subject contract.

Your contacts during the course of this task are:

Technical Matters: N. Prasad Kadambi  
Technical Monitor  
(301) 415-5896

Contractual Matters: Anita Hughes  
Contract Specialist  
(301) 415-6526

Please indicate your acceptance of this task order by having an official who is authorized to bind your organization, execute three copies of this document in the spaces provided below and return two copies to the Contract Specialist. You should retain the third copy for your records. If you have any questions regarding the subject modification, please contact Anita Hughes, Contract Specialist on (301) 415-6526.

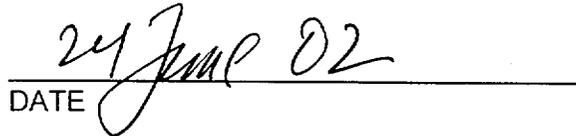
Sincerely,



Mary H. Mace, Contracting Officer  
Contract Management Branch No. 1  
Division of Contracts and Property Management  
Office of Administration

Enclosure: As stated

ACCEPTED:

  
NAME  
TITLE  
DATE

**STATEMENT OF WORK**  
**Task Order No. 05 under Contract No. NRC-04-01-067**

**TITLE: ASSESS AND IMPROVE REGULATORY EFFECTIVENESS**

TASK ORDER 5 TITLE: DEVELOPMENT OF STRATEGIES FOR PRIORITIZATION OF  
RESEARCH PROJECTS USING FORMAL DECISION METHODS

Project Manager: Sidney Feld, RES - (301)-415-6193  
Technical Monitor: N. Prasad Kadambi, RES - (301) 415-5896  
Designated Alternate: George F. Lanik, RES - (301) 415-7490

1.1 Background

Decision theory is recently being applied to many aspects of nuclear and other technologies (see "A methodology for the prioritization of operating experience in nuclear power plants", R. Weil & G. E. Apostalakis, Reliability Engineering and System Safety 74 (2001) 23-42).

Experience has shown that a decision theoretic approach has the following benefits:

- A. The methodology forces an organization to look at the objectives of its prioritization decisions;
- B. It removes much subjectivity from the process;
- C. It makes the process more transparent;
- D. It improves accuracy;
- E. It reduces burden on those performing the prioritization.

A decision theoretic approach is expected to require a reasonable investment of resources and time at the front end so as to reap such benefits. The prioritization methodology provides a general framework suitable for application in a wide variety of settings. However, application of the methodology is specific to the decision context. For example, prioritization of research for advanced gas-cooled reactors can be expected to be quite different from that for operating reactors, primarily because of the difference in operating experience. This task order focuses on the Advanced Reactor Research Plan as a means for demonstrating any viable techniques that are developed.

The three major headquarters program offices of the NRC, RES, NRR, and NMSS, each use the four performance goals of the agency to prioritize their work, but do so in different ways. The prioritization models differ to such an extent that it is unlikely that a common approach may emerge from modifications among them. Under the circumstances, decision theory represents an approach that could permit a fresh start to be made so that the common factors which play dominant roles in the decision making of each office can be given greater weight, and hence develop a common prioritization method.

In addition, the staff has stated to the ACRS that we recognize the merits of their recommendations on formal decision making methods and that we will explore the feasibility of applying these methods in our work. Performance-based regulation was mentioned as the first area in which aspects of the method were being examined. A formal process for assessing the utility of research projects in terms of performance relative to the agency performance goals appears to be feasible from the readily available literature. A more thorough study of the literature is needed to develop an authoritative basis for such proposals.

Also, in the context of the Research Effectiveness Review Board report to the Commission on August 24, 2001 (SECY-01-0163) the staff has stated that the value of a common prioritization approach is being assessed with consideration being given to the need for flexibility to accommodate specific needs within each of the three major NRC arenas. It would be beneficial for the staff to explore formal decision methods from this perspective as well so that the next report to the Commission can express progress, if it is possible.

The Division of Systems Analysis and Regulatory Effectiveness (DSARE), Office of Nuclear Regulatory Research (RES) is responsible for RES's program to Assess and Improve Regulatory Effectiveness. This program incorporates concepts of effectiveness reviews and performance-based approaches. Hence, this task order contract is the appropriate vehicle to conduct the proposed work.

## 1.2 Objective

The objective of Task Order No. 5 is to support DSARE in the development of a NUREG/CR document which provides the technical basis for developing a more detailed proposal for agency-wide prioritization using formal decision making methods. A limited application for the Advanced Reactor Research Plan will be used as the basis to assess the capabilities of the methodology proposed.

## 1.3 Work Requirements

Task Order 5: The Contractor shall prepare a technical basis document in the format of a NUREG/CR as provided in NUREG-0650, "Preparing NUREG-Series Publications." The content of the NUREG/CR will be worked out under the direction of the Technical Monitor such that it provides for the essential characteristics of a formalized decision theoretic approach. The NUREG/CR shall address each of the benefits identified under A. through E. of the "Background" section. A qualitative comparison with the outcomes from the traditional process would be included, pointing out those aspects of the formal approach which account for improvements. The published work in this area shows that the most important aspects of a decision theoretic approach is to be as explicit and structured as possible in identifying all factors which contribute to arriving at a priority. The emphasis is not so much on being quantitative as with being explicit and structured. The structure provides for hierarchical representation as well as explicit display of relationships. Where appropriate, the methodology can provide for expert judgement elicitation, provided it can be done effectively and efficiently.

#### 1.4 Technical and Other Special Qualifications Required

Personnel must be familiar with or be capable of developing rapid familiarity with the nature and content of the NRC's research program and the driving forces behind it. For example, a publicly available document, "Review and Evaluation of the Nuclear Regulatory Commission Safety Research Program" (NUREG-1635, Vol. 4) has been issued by the ACRS. This report contains the recommendation that the staff initiate a program of research to investigate how best to use formal decision making methods in regulatory decisions. Understanding the background and context of this recommendation should not be an issue that requires much involvement of the Technical Monitor or take more than a couple of hours of time.

To the extent that risk information and performance concepts are used to evaluate and assess the performance attributes of research programs, personnel need to be familiar with the NRC's use of PRA technology and constructs which structure objectives. Personnel need to grasp the context of Commission directions in documents such as the White Paper on "Risk-Informed and Performance-Based Regulation". Finally, based on previous performance, personnel must have demonstrated the capability to deal with complex technical issues and identify innovative approaches to regulatory issues.

#### 1.5 Level of Effort

The estimated level of effort is 700 staff-hours.

#### 1.6 Period of Performance

Task Order No. 5 shall commence on June 24, 2002, and expire on December 31, 2002.

#### 1.7 Deliverables

<u>Task</u>	<u>Completion Date</u>
1. First draft of a White Paper which summarizes the readily-available technical literature which offers the most promise for developing the prioritization methodology. The paper should also identify the areas of focus for the more detailed literature search.	Four weeks after Task Order 5 is initiated.
2. Final draft of White Paper providing the comprehensive literature search with recommendations for a prioritization process.	Twelve weeks after Task Order 5 is initiated.
3. First draft of NUREG/CR applying the prioritization method to the Advanced Reactor Research Plan.	Twenty weeks after Task Order 5 is initiated.

4. Final draft of NUREG/CR providing the results of the application of the prioritization process and recommendations on generalizing it to a wider range of settings.	Twenty-six weeks after Task Order 5 is initiated.
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1.8 Meetings

The Contractor shall attend a two-hour meeting between the NRC and the contractor at least twice every month during the task order's period of performance. The date, time, and location of the meeting will be determined by the NRC Technical Monitor.

1.9 NRC Furnished Materials/Equipment

The NRC shall provide the contractor with a copy of the Advanced Reactor Research Plan (subject to the normal considerations of agency pre-decisional documents) and internet addresses of relevant documents or copies of such documents if they are not available on the internet for use under this task order:

1.10 Financial and Technical Status Reports

The contractor shall submit reports in accordance with Sections F.3 and F.4 of the basic contract within 15 calendar days after the end of the reporting period.