



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

July 28, 1982

Mr. Steven C. Sholly
1346 Connecticut Avenue, N.W.
Dupont Circle Building, Suite 1101
Washington, DC 20036

IN RESPONSE REFER
TO FOIA-82-273

Dear Mr. Sholly:

This is in response to your letter dated June 18, 1982, in which you requested, pursuant to the Freedom of Information Act, documents discussing FY 1981 NRC Research Order No. 60-81-195 for Sandia National Laboratories and all documents discussing accidents designated as "SST1," "SST2," "SST3," and "SST4".

On July 19, 1982, a meeting was held between Roger Blond, Office of Nuclear Regulatory Research, and yourself. During this meeting, Mr. Blond discussed in detail all of the work ongoing in the area of interest. He provided you with a number of related documents and bibliographies. Mr. Blond also indicated that as soon as copies of present work (NUREG-0773 and NUREG/CR-2239) are available these would be forwarded directly to you.

Subsequent to your meeting with Mr. Blond you have spoken with Nina L. Toms, a member of my staff. You and Mrs. Toms have agreed that your July 19 meeting has been responsive to your request.

Should you have any further questions regarding your request, please contact Nina L. Toms at 492-8133.

This completes NRC's action on your request.

Sincerely,

J. M. Felton, Director
Division of Rules and Records
Office of Administration

APR 14 1981

Mr. H. E. Roser, Manager
Albuquerque Operations Office
U. S. Department of Energy
P.O. Box 9800
Albuquerque, New Mexico 87115

Dear Mr. Roser:

FY 1981 NUCLEAR REGULATORY RESEARCH ORDER NO. 60-81-195 FOR SANDIA NATIONAL LABORATORIES

Please authorize Sandia National Laboratories to execute the program described in the enclosed NRC Order.

If this meets with your approval, it is requested that acceptance be indicated on the enclosed form and the original be returned to the NRC Controller and a copy to this office.

Sincerely,

Robert M. Bernero, Director
Division of Systems and Reliability
Research

- Enclosures:
1. NRC Order
 2. Program Brief

- cc w/enclosures:
- R. W. Barber, DOE/NSC
 - D. D. Mayhew, DOE/ASEV:DFS
 - D. C. Aldrich, SNL

- DISTR
- Subj
 - Circ
 - Chron
 - Riggs:rdg
 - A. Puglise, CON
 - A. Burda, CON
 - J. Martin, SRR
 - R. Blond, SRR
 - C. Johnson, SRR
 - R. Bernero, SRR
 - L. S. Tong, RES
 - RES:D
 - Wylbur

A26
(H)

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PDR

OFFICE	RES:BCMB	RES:BCMB	RES:SRR	RES:SRR	RES:SRR	RES:SRR	RES:AF
NAME	Riggs	Batson/Hayes	Marlton/Blond	Johnson	Rowson	Bernero	Scruggs
DATE	4/7/81	1/81 1/81	4/7/81 4/7/81	4/8/81	4/9/81	4/9/81	4/13/81

60-81-195

STANDARD ORDER FOR DOE WORK

DATE

APR 14 1981

ISSUED TO: (DOE Office)

Albuquerque Operations Office

ISSUED BY: (NRC Office)

Division of Systems & Reliability Research

ACCOUNTING CITATION

APPROPRIATION SYMBOL

31X0200.601

B&R NUMBER

6060

FIN NUMBER

A1269-1

PERFORMING ORGANIZATION AND LOCATION

Sandia National Laboratories

WORK PERIOD - THIS ORDER

FIXED

ESTIMATED

FROM:

10/1/80

TO:

9/30/81

FIN TITLE

NRC/FEMA Interagency Agreement
EMW-E-0575, Emergency Planning

OBLIGATION AVAILABILITY PROVIDED BY:

A. THIS ORDER

\$ 150,000

B. TOTAL OF ORDERS PLACED PRIOR TO THIS DATE WITH THE PERFORMING ORGANIZATION UNDER THE SAME "APPROPRIATION SYMBOL" AND THE FIRST FOUR DIGITS OF THE "B&R NUMBER" CITED ABOVE.

\$ 17,319,000

C. TOTAL ORDERS TO DATE

(TOTAL A & B)

\$ 17,469,000

D. AMOUNT INCLUDED IN "C" APPLICABLE TO THE "FIN NUMBER" CITED IN THIS ORDER.

\$ 150,000

FINANCIAL FLEXIBILITY:

- FUNDS WILL NOT BE REPROGRAMMED BETWEEN FINs. LINE D CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.
- FUNDS MAY BE REPROGRAMMED NOT TO EXCEED ± 10% OF FIN LEVEL UP TO \$50K. LINE C CONSTITUTES A LIMITATION ON OBLIGATIONS AUTHORIZED.

STANDARD TERMS AND CONDITIONS PROVIDED DOE ARE CONSIDERED PART OF THIS ORDER UNLESS OTHERWISE NOTED.

ATTACHMENTS:

THE FOLLOWING ATTACHMENTS ARE HEREBY MADE A PART OF THIS ORDER:

- STATEMENT OF WORK
- ADDITIONAL TERMS AND CONDITIONS
- OTHER

SECURITY:

- WORK ON THIS ORDER IS NOT CLASSIFIED.
- WORK ON THIS ORDER INVOLVES CLASSIFIED INFORMATION. NRC FORM 187 IS ATTACHED.

REMARKS: A final work package (189a) reflecting approved FY 1981 resources and scope should be furnished within 60 days. Five copies should be sent to the Office of Nuclear Regulatory Research and one copy to the NRC Controller.

ISSUING AUTHORITY

ACCEPTING ORGANIZATION

SIGNATURE

Robert M. Bernero
Robert M. Bernero, Director

SIGNATURE

TITLE

Division of Systems & Reliability Research

TITLE

DATE

8209260067
PPR

RES/DSRR
FY 1981 PROGRAM BRIEF

TITLE: NRC/FEMA Interagency Agreement
EMW-E-0575, Emergency Planning

CONT: FIN NO: A1269
CONTRACTOR: Sandia
SITE: Albuquerque
STATE: New Mexico

NRC TECHNICAL MONITOR: R. M. Blond/J. A. Martin
PRINCIPAL INVESTIGATOR: D. C. Aldrich
BUDGET ACTIVITY: 6060
FY 1981 SCOPE;

FY 1981 OBLIGATION: \$150K

1. BACKGROUND

Under Interagency Agreement No. EMW-E-0575, copy attached, between NRC and the Federal Emergency Management Administration, NRC has agreed to perform research studies in three areas, two of which have been assigned to DSRR/RES and one to I&E. This Brief pertains to Project Objectives a) and b) of the agreement assigned to RES/DSRR, having the following purposes:

- a) Accident Consequences - A Study of the Sensitivity to Timing and Extent of Protective Actions
- b) Study of the Potential Efficacy of Ad Hoc Respiratory Protection by the Public During a Radiological Emergency

It is recognized in the Agreement that NRC and its contractors (Sandia, though not named as such in the Agreement) have the capability to perform these studies expeditiously, whereas FEMA does not. In the Agreement, cost estimates of \$100K and \$50K were made for tasks a) and b), respectively. This FIN NO. A1269 was created under B & R 6060 to implement the Agreement.

Objective

This Program Brief will implement two of three NRC obligations under the Interagency Agreement between NRC and FEMA.

Scope

The results of these studies will provide NRC and FEMA a more substantive basis for protective action planning and emergency response decisions by providing more specific information on the efficacy of various protective action scenarios for various accident scenarios.

2. WORK REQUIRED

Task 1. Protective Action Sensitivity Studies

Provide a sensitivity analysis of the benefits of various protective action scenarios for various reactor accident scenarios. Variations in the following parameters shall be studied: warning time, delay time after warning; evacuation

speed; distance within which evacuation would be effected; fractions of people evacuating and remaining in an area; and dose reduction factors for shelter, respiratory protection and thyroid blocking. For various iterations on these parameters, display various calculated consequences and their probabilities. A range of reactor sites typical of the industry shall be considered (i.e. high, low and medium population densities at various distances). Provide insights, obtained from these studies, noting especially points of diminishing returns of benefits, if any, with regard to the distance to which an evacuation might be effected for various accident scenarios.

Task 2. Ad Hoc Respiratory Protection

Perform studies of the benefits (dose and health effects reductions) that could occur in an emergency, from reductions of doses due to inhalation of radioactive aerosols, by using various household materials (e.g. towels, handkerchiefs), for respiratory protection. Measure the transmission through such materials, of particles in the respiratory range (0.4 to 10 microns) and gaseous forms of iodine and noble gases. Estimate the leakage that might be expected around materials held over the nose and mouth and, to the extent practicable, obtain such information using human subjects or mannikins.

3. REPORTING REQUIREMENTS

Monthly Letter Status Reports

Monthly letter status reports shall be submitted to NRC per the requirements of paragraph 3.1, Exhibit 1, Chapter 1102, of the NRC manual (Procedure for Placement of Work with the Department of Energy).

Interim and Final Technical Reports

Technical reports discussing progress and results completed under Tasks 1 and 2 shall be submitted to the NRC during FY 1981. To the extent that the results are used and reported in NUREGs prepared under other NRC contracts, they need not be reported separately.

4. MEETINGS AND TRAVEL

Travel by contractor personnel to NRC Headquarters and sub-contractor sites is anticipated and authorized to the extent required for the performance of the Tasks summarized in Section 2 of this Program Brief. No foreign travel is anticipated.

5. NRC FURNISHED MATERIAL

No special reports, equipment or other material will be provided by NRC.

6. PERIOD OF PERFORMANCE

See Form 173 (first page of this order).

7. TECHNICAL DIRECTION

NRC Technical Monitors are R. M. Blond and J. A. Martin, Jr. (FTS 492-8388).

8. DISPOSAL OF PROPERTY

This program does not require disposal of property. -----

1. INTERAGENCY AGREEMENT NO. **EMW-E-0575** 2. EFFECTIVE DATE **10-1-80** SUBJECT/REQUISITION NO. **01692**

4. ISSUED BY
Federal Emergency Management Agency
Telecommunications Branch (GSA Bldg, RM. B-307)
Washington, DC 20472
Attn: Jill Chester (202)566-1752

5. NAME, TITLE & PHONE NUMBER OF EACH GOVERNMENT PROJECT OFFICER FOR BOTH AGENCIES
Robert Jaske, Asst. Director for Scientific Policy, Plans & Preparedness (202)523-5422

(FEMA FO)
Roger Blond, Senior Risk Analyst, Office of Nuclear Regulatory Research (301)492-8388 Tasks A and B

(Other Agency's Project monitoring)
Brian Crimes, Director, Division of Emergency Preparedness, NRC, (301)492-7415, Task C

6. AGENCY PERFORMING SERVICE
Nuclear Regulatory Commission
Washington, D. C. 20555
Attn: E. Kevin Cornell, Deputy Executive Director

7. PROJECT TITLE
Agreement with the Nuclear Regulatory Commission

8. PROJECT OBJECTIVE
a) A study on accident consequences at Nuclear power plants
b) A study of the potential efficacy of Ad Hoc respiratory protection by the public during a radiological emergency
c) A study to develop generic evaluation criteria for determining adequacy of prompt notification systems around nuclear power facilities.
(See pages 1 of work item for details)

9. PERFORMANCE PERIOD OF AGREEMENT
October 1, 1980 - September 30, 1981

10. ACCOUNTING AND APPROPRIATION DATA
81-1-2216-2570-2-6330

11. DOLLAR VALUE OF AGREEMENT
\$254,000

12. FUNDING (The Federal Emergency Management Agency agrees to advance/reimburse funds up to the dollar amount of this agreement, upon receipt of a properly executed Standard Form 1080 or 1081. The appropriate form must be executed in original and six copies, be identified with agreement number and accounting data, and transmitted to the following office for funds action.)

Federal Emergency Management Agency
Telecommunications Branch (GSA Bldg, Room B-307)
Washington, D.C. 20472
Attn: Jill Chester

[Any funds not utilized for the performance of the work defined in this agreement must be returned to the Federal Emergency Management Agency.]

13. PURSUANT TO THE AUTHORITY OF
P.L. 81-774 - Section 710(d)

[The Federal Emergency Management Agency may enter into this agreement. The person executing this agreement has a written delegation of authority to do so on behalf of the agency.]

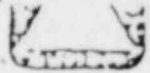
14. SIGNATURE OF PERSON AUTHORIZED TO SIGN
E. Kevin Cornell

DATE
2/26/81

16. SIGNATURE OF PERSON AUTHORIZED TO SIGN
DATE

15. TYPE NAME & TITLE OF PERSON AUTHORIZED TO SIGN
E. Kevin Cornell, Deputy Exec. Dir. for Operations

17. TYPE NAME & TITLE OF PERSON AUTHORIZED TO SIGN
DONNA M. DARLINGTON, Contracting Office
FEDERAL EMERGENCY MANAGEMENT AGENCY



FEDERAL EMERGENCY MANAGEMENT AGENCY

Washington D.C. 20472

INTERAGENCY AGREEMENT

between the

FEDERAL EMERGENCY MANAGEMENT AGENCY

and the

NUCLEAR REGULATORY COMMISSION

I. Purpose:

a. Accident Consequences - Sensitivity to Timing and Extent of Protective Actions

In the event of certain (major) types of accidents at nuclear power plants, decisions must be made regarding the extent and timing of protective action recommendations to be made to the public. NUREG-0654/FEMA-REP-1, Appendix 1, provides some guidance with regard to the timing and extent of predetermined protective action recommendations. The guidance contained in Appendix 1 was based on the information generated in the Reactor Safety Study, as modified by a limited number of calculations made subsequent to the Study. It is imperative that we have available to all concerned -- FEMA, State and local emergency response agencies, NRC licensees, and the public -- the best information we can provide in this regard.

The NRC and its contractors currently have the capability to perform calculations of the consequences of various accident scenarios assuming various protective action scenarios. We desire that such capabilities be used by the Nuclear Regulatory Commission (NRC) to provide a sensitivity study of various consequences of light water reactor accidents and functions of: warning time (time before a major release, at which the potential for a major release of radioactivity would be clearly recognized by an operator); delay time (the subsequent elapsed time before the public would commence a protective measure); evacuation speed; distance within which evacuation would be effected; fractions of people evacuating and remaining within an area; and dose reduction factors for shelter, respiratory protection and thyroid blocking agents. For the various iterations on these parameters we desire to have displayed various calculated consequences (health effects and costs) and their various probabilities. The calculations should include such estimates for the range of reactor sites typical of the industry, i.e., high, medium, and low population density at various distances from the sites.

We expect that the results of such calculations will provide insights for both emergency planning and emergency response purposes. As an example, we would expect to be able to observe points of diminishing returns with regard to the matter of the distances to which an evacuation might be recommended for various accident scenarios.

Estimated Cost: \$100,000.

b. Study of the Potential Efficacy of Ad Hoc Respiratory Protection by the Public During a Radiological Emergency

In NUREG-0654/FEMA-REP-1, Revision 1 (November 1980), criteria are established for acceptable radiological emergency plans. Items G.1.c., J.6.a., J.10.d., J.10.k., and J.10.m. of FEMA-REP-1 address the matter of respiratory protection, either directly or as implied. One method of providing respiratory protection by the public would be the use of commonly and readily available household materials such as towels, handkerchiefs, and items of clothing. Experiments performed in the 1950s, using human subjects (H. G. Guyton, H. M. Decker, and G. T. Anton, *AMA Archives of Industrial Health*, 20:91-95, 1959) indicate that respiratory protection using household items can provide significant dose savings via the inhalation pathway. However, little additional information has been found in the literature in this regard. Further, the efficacy would be strongly dependent on particle size, for which even less information is available. FEMA is thus in the position of requiring consideration of protective actions for which the experimental basis is weaker than desired.

To alleviate this situation and provide a firmer basis for our recommendations, a program of research is required to: (i) confirm the earlier results, if possible; (ii) measure the transmission of various sized particles through various household materials; (iii) measure the transmission through such materials of gaseous forms of iodine and noble gases; (iv) estimate the leakage that might be expected around materials held over the nose and mouth; and (v) to the extent practicable, obtain such data using human subjects or mannequins.

Estimated Cost: \$50,000.

c. Study to Develop Generic Evaluation Criteria for Determining Adequacy of Prompt Notification Systems Around Nuclear Power Facilities

No evaluation criteria exists for use in reviewing the adequacy of prompt notification systems designed to alert the population around nuclear power facilities during a radiological emergency.

At a nuclear power facility with the prompt notification system designed and ready for installation and pre-implementation review (Trojan nuclear power plant); develop generic evaluation criteria while reviewing their design and evaluate the system for adequacy. Using the

evaluation criteria at high density demographic nuclear facilities, the contractor will review the prompt notification system design to determine the adequacy of the design and verify the evaluation criteria can be used generically. Facilities selected for this review are Indian Point, Zion, and Three Mile Island nuclear power facilities.

Estimated Cost: \$104,000

II. Reports

The Nuclear Regulatory Commission shall advise FEMA on status of studies upon request.

Draft copies of all final reports shall be supplied to FEMA's Project Officer as they become available.

Final reports shall be completed at conclusion of the studies.

III. Project Officers:

Mr. Robert T. Jaske, Assistant Director for Scientific Policy, Radiological Emergency Preparedness Division, Office of Plans and Preparedness, Federal Emergency Management Agency, USA Bldg, Rm. 5022, Washington, DC 20472, will serve as the FEMA project officer. He may be reached on (202)523-5422.

Mr. Roger Blond, Senior Risk Analyst, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, will be the project officer for tasks a and b. He may be reached on (301) 492-8388.

Mr. Brian Grimes, Director, Division of Emergency Preparedness, Office of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555, will be the project officer for task c. He may be reached on (301) 492-7415.