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DEPARTMENT OF ENERGY  
ENERGY - OPERATING EXPENSES AND CAPITAL ACQUISITION

SCHEDULE 189  
ADDITIONAL EXPLANATION FOR OPERATING OBLIGATIONS

<u>Brookhaven National Laboratory</u>		<u>GK-Multi-Resource</u>		
<u>Laboratory</u>		<u>Mission Resource</u>		
1. <u>Contractor:</u>	<u>Contract No.:</u>	<u>Task No.:</u>		
Associated Universities, Inc.	EY-76-C-02-0016			
2. <u>Project Title:</u>	<u>189 No.:</u>			
Human Health Effects from Energy Generation Medical Studies of the People of the Marshall Islands Accidentally Exposed to Fallout				
3. <u>Budget Activity No.:</u>	4. <u>Date Prepared:</u>			
GK-01-02-01-1-(a) (000032)	March 1978			
5. <u>Method of Reporting:</u>	6. <u>Working Location:</u>			
Scientific Meetings Scientific Journals	Brookhaven National Laboratory			
7. <u>Person in Charge:</u>	8. <u>Project Term:</u>			
R. A. Conard (664-3577)	Continuing			
<u>Principal Investigator:</u>	From:	To:		
R. A. Conard K. D. Knudsen H. S. Pratt W. J. Grant				
9. <u>Person-Years:</u>				
	<u>FY 1978</u>	<u>Pres. Bud. FY 1979</u>	<u>Rev. Req. FY 1979</u>	<u>FY 1980</u>
<u>Direct Person-Years</u>				
Scientific & Professional	5.0	3.5	4.0	3.5
Others	7.0	4.0	7.0	7.0
Guests & Research Collaborators	2.0	2.0	2.0	2.0
Total	14.0	9.5	13.0	12.5
10. <u>Costs (In Thousands of Dollars):</u>				
	<u>FY 1978</u>	<u>Pres. Bud. FY 1979</u>	<u>Rev. Req. FY 1979</u>	<u>FY 1980</u>
Research Division	305	317	462	472
Hospital Division	115	103	103	111
Research Costs	420	420	565	583
Total Research Obligations	420	425	570	589
Equipment Obligations	1	5	5	10
11. <u>Reactor Concept:</u>	12. <u>Materials:</u>			

Human Health Effects from Energy Generation  
Medical Studies of the People of the Marshall  
Project Title: Islands Accidentally Exposed to Fallout GK-01-02-01-1-(a)

13. Publications:

The following citation was previously listed only as submitted:

Conard, R. A. Summary of thyroid findings in Marshallese 22 years after exposure to radioactive fallout. Radiation-Associated Thyroid Carcinoma, L. J. DeGroot, Editor, pp. 241-257, Grune & Stratton, New York, 1977.

14. Scope:

a) 200 Word Summary:

The primary objective is the determination of the life-time effects of fallout radiation on the Marshallese who were accidentally exposed to radioactive fallout on March 1, 1954. Medical Surveys of these people are conducted at quarterly intervals, and an unexposed Rongelap population is examined for comparison. The surveys, carried out jointly by Brookhaven National Laboratory under the auspices of the Department of Energy, and the Trust Territory of the Pacific Islands, are of great importance in view of the development in this population of growth impairment in some exposed children, thyroid lesions, and one case of acute leukemia.

b) Supplement to 200 Word Summary:

Post-exposure surveys in the Marshall Islands have been conducted for 23 years. In addition to the 244 people originally exposed, a group of 150 unexposed Marshallese are examined for a "comparison population" to assess late effects of radiation from fallout. The continuing development of thyroid neoplasms, and the appearance of one case of acute leukemia, indicate the need for frequent examinations. In addition to routine physical, hematological, and other laboratory examinations, the surveys involve special studies related to aging, malignancy, reproduction and measurement of body burdens of radionuclides resulting from the slight contamination remaining on the islands. Thyroid patients are returned to the United States for complete hospitalization and surgical treatment. In view of the diverse medical problems and their management, a Physician and a Physician's Assistant are in residence at Kwajalein and make regular trips to Rongelap, Majuro and Utirik to supervise care and perform interim examinations of the exposed Marshallese.

15. Relationship to Other Projects:

The studies of the exposed Marshallese are closely related to the Radiation Effects Research Foundation studies in Japan and to the studies of the 23 Japanese fishermen exposed at the same time as the Marshallese to fallout. Radiation still ranks as one of the more important hazards that must be considered in the DOE program. The effects of fallout exposure in the Marshallese provide valuable information, particularly with regard to thyroid effects from radioiodine exposure, that may relate to a reactor accident in the remote event that such should occur. The Marshallese data are used in

Human Health Effects from Energy Generation  
Medical Studies of the People of the Marshall  
Islands Accidentally Exposed to Fallout

Project Title:

GK-01-02-01-1-(a)

15. Relationship to Other Projects: (Cont'd)

analysis of such accidents, such as for the Rasmussen report. The data are also quoted in other reports such as the NCRP, ICRP, BIER, and those of the United Nations.

The Safety and Environmental Protection Division of this Laboratory conducts radiological personnel and environmental surveys of contaminated Marshall Islands and inhabitants. These studies are closely coordinated with the Medical Surveys.

16. Technical Progress in FY 1978:

In response to requests by the people of Rongelap and Utirik, DOE agreed (February 1977) to assist the Trust Territory in an expanded health care program for the people living at Rongelap and Utirik Atolls. Accordingly during the March 1977 survey (23 years post-exposure) all Marshallese living on these atolls, who wished it, were given complete medical and laboratory examinations similar to those in the exposed group. Greater physician-patient relationship was attained by lengthening the stay on these islands. Quarterly visits were also conducted at Rongelap and Bikini, but due to misunderstandings between the Utirik people and the Resident Physician, the latter was requested not to return. Recently, however, the people have requested that he return and it is expected the quarterly visits to Utirik will be resumed.

The health status of the people examined was found to be generally good. Thyroid abnormalities continued to be the only definite findings related to radiation exposure. During the past year, thyroid surgery was done on two exposed Marshallese (a 43-year-old Rongelap man and a 50-year-old Utirik man) and on one 66 year-old unexposed Rongelap man. The latter had a thyroid cancer but the two exposed people had benign lesions.

There have now been 39 thyroid abnormalities (32 with surgery) among the 244 exposed Marshallese (35% of the Rongelap people and 5.8% of the Utirik people). The occurrence of three thyroid cancers in the exposed Utirik population (compared with four in the Rongelap group) appears to implicate radiation exposure in the etiology but the high incidence is puzzling since it is greater than would be predicted based on Rongelap and Japanese data, and there does not appear to be any increase in benign thyroid tumors in the group compared to the much greater prevalence in the Rongelap group. Because of the uncertainty of the incidence of thyroid tumors in unexposed Marshall Islanders and in order to obtain better statistics, during the past year thyroid examinations were included on all unexposed Rongelap and Utirik people on any of the Marshall Islands visited. It is hoped that this study will be extended to include thyroid surgery when indicated. Also in order to help solve the Utirik dilemma re-evaluation of radiation doses from fallout to the Utirik people, including the thyroid, has begun.

Human Health Effects from Energy Generation  
Medical Studies of the People of the Marshall  
Islands Accidentally Exposed to Fallout

Project Title: GK-01-02-01-1-(a)  
16. Technical Progress in FY 1978: (Cont'd)

During the past year the bill authorizing compensation to certain of the Utirik and Rongelap people for radiation injuries has been signed by the President and preparations are under way to initiate these payments.

A study of diabetes, a serious disease in the Marshall Islands, was initiated several years ago and continues. During the past year an intestinal parasite survey was started at Rongelap Atoll with studies of stool specimens and serological testing (immunofluorescence).

Anthelmintic therapy (Vermox) has been started on nearly the entire population. A large percentage of the people had positive stools for parasites, and it is hoped that these parasites may be virtually eliminated in this island group by the treatment regimen.

As part of the expanded medical studies a trailer is being obtained for laboratory purposes at the Hospital at Ebeye and will be used by the Resident Physician and his assistant.

A program to educate the people of Rongelap and Utirik regarding radiation and its effects was implemented during the past year. During the time of the annual surveys lectures were given to the people by members of the medical team and in addition Dr. Naidu, of Brookhaven remained on Rongelap island for over a month indoctrinating the people about radiation.

Radiological monitoring of people living on Rongelap, Utirik, and Bikini, including radiochemical analyses of urine samples and whole body gamma-spectrographic analyses, was done. Evaluation of low-levels of plutonium detected in the urines of Bikini and Rongelap people continues. It is still uncertain if contamination of urine samples may be a factor. A disturbing finding was a sudden increase in the  $^{137}\text{Cs}$  levels in the Bikini people although still well below the MPBB. It was apparent that the people had been eating the locally grown breadfruit and pandanas. The course of action to be taken with regard to the Bikini people is uncertain at this time.

Two new physicians are being hired for the program. Dr. W. Grant will replace Dr. K. Knudsen as the Resident Physician and Dr. H. Pratt will eventually replace Dr. R. Conard when he retires. In addition, a Physician's Assistant, Mr. Richard Coppola, has been hired and will join the Resident Physician at Kwajalein to assist in medical care in the islands. This acquisition is in relation to the expanded medical program described above.

The attitudes of the Rongelap and Utirik people toward the examinations has improved, due partly to a better understanding of the objectives of the medical team as a result of the increased educational program, and partly to an improved attitude of the Marshallese politicians. However, activist groups from Japan and a law firm in the United States continue to cause unrest among the people.

Human Health Effects from Energy Generation  
Medical Studies of the People of the Marshall  
Islands Accidentally Exposed to Fallout

Project Title: GK-01-02-01-1-(a)

17. Expected Results in FY 1979:

In view of the serious late effects of fallout exposure, continued medical surveillance of the exposed populations is mandatory. Special examinations for the thyroid abnormalities, as well as for neoplasia of other organs and tissues, and other late effects must be continued. Other studies that will be pursued include:

A. Thyroid Control Study: It is hoped that DOE funds will be approved for carrying out thyroid surgery in the United States on unexposed Rongelap and Utirik people in the extended control study where such surgery is indicated.

B. Re-evaluation of dosimetry of the Utirik people, including thyroid doses.

C. Study of the nature and treatment of diabetes in the Marshallese.

D. Intestinal parasite study in the Rongelap people and the treatment program with possible expansion of the treatment program to other atolls.

E. Studies with Dr. Raymond Popp (Oak Ridge) for frequency of isoleucine substitution in hemoglobin of Marshallese blood as an index of somatic mutations associated with radiation exposure and aging.

F. Studies of polymorphism and rare protein variants in the blood cells from children of exposed and unexposed parents. Dr. James Neal at the University of Michigan has expanded his battery of tests for these variants and has agreed to reactivate these studies in Marshallese children.

G. An expansion of the educational program for the Marshallese living on the contaminated islands of the northern Marshalls. Dr. Naidu has agreed to visit Utirik for a month, and lectures at the time of the visits by the medical team are planned. A booklet on radiation and its effects is planned. This program is carried out in collaboration with the Safety and Environmental Protection Division at BNL.

H. Evaluation of body burdens of radionuclides in the people living in the northern Marshall atolls will be done jointly with Safety and Environmental Protection Division of this Laboratory who have recently been assigned the monitoring responsibilities.

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18. Expected Results in FY 1980:

Continuation of the medical surveys of the Marshallese is anticipated on an indefinite basis. Emphasis will be placed on examinations for thyroid abnormalities, cancer, hematologic disorders, and other possible effects of radiation exposure. Evaluation of internal body burdens of radionuclides in

Human Health Effects from Energy Generation  
Medical Studies of the People of the Marshall

Project Title: Islands Accidentally Exposed to Fallout GK-01-02-01-1-(a)

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18. Expected Results in FY 1980: (Cont'd)

personnel and environmental radiological monitoring will continue to be an important part of the program.

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19. Description and Explanation of Major Materials, Equipment and Subcontract Items:

Capital Equipment - FY 1980:

None

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20. Proposed Obligations for Related Construction Projects:

None.