OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION • NUCLEAR DIVISION
Contract No. W7405-eng-26

716941

PROGRAM AND BUDGET PROPOSAL

TA Regulation Activities
PROGRAM

1. CONTRACTOR UNION CARBIDE CORPORATION NUCLEAR DIVISION	CONTRACT NO. W7405-eng-26	TASK NO.
2. PROJECT TITLE Health Protection--Plutonium Excretion Code		189 NO.
3. BUDGET ACTIVITY NO. TA-01-19-02	4. DATE PREPARED November, 1974	

5. METHOD OF REPORTING
- [ ] MONTHLY
- [ ] OPEN LITERATURE
- [ ] QUARTERLY
- [x] TOPICAL
- [ ] SEMI ANNUAL
- [ ] OTHER (Specify)
- [ ] ANNUAL

6. WORKING LOCATION: OAK RIDGE, TENNESSEE
- [x] X-10 SITE
- [ ] ORGDP SITE
- [ ] Y-12 SITE
- [ ] OTHER (Specify)
- [ ] MELTON VALLEY

7. PERSON IN CHARGE
J. W. Poston

PRINCIPAL INVESTIGATOR(S)
G. G. Warner
W. S. Snyder

8. PROJECT TERM
FROM: TO: FY 75
- [x] NEW WORK
- [ ] ESTABLISHED PROGRAM

	FY 1975	FY 19	FY 19
9. MAN YEARS			
a) SCIENTIFIC	0.3		
b) OTHER TECHNICAL	---		
TOTAL	0.3		
10. FUNDING			
OPERATING COSTS:			
a) DIRECT SALARIES	8,000		
b) MATERIALS & SERVICES	3,000		
c) SUBCONTRACTS	---		
d) INDIRECT EXPENSES	9,000		
TOTAL OPERATING COSTS	20,000		
OBLIGATIONS FOR CAPITAL EQUIPMENT NOT RELATED TO CONSTRUCTION	None		

11. REACTOR CONCEPT

12. MATERIALS

REPOSITORY GERMANTOWN
COLLECTION 7723
BOX No. 6/12 #6078
FOLDER M, H&S-21 (1975)
(HNL)

00108

1098398

13. PUBLICATIONS:

1. Snyder, W. S., M. R. Ford, and G. G. Warner, "A Study of Individual Variation of Excretion of Plutonium by Man and of Its Significance in Estimating the Systemic Burden," Proceedings of the 13th Annual Bioassay and Analytical Chemistry Meeting, October 12-13, 1967, UCRL-18140, CONF 671048 (April 1968).

2. Snyder, W. S., M. R. Ford, and G. G. Warner, "The Use of Excretion Data to Predict the Systemic Body Burden of Plutonium," Proceedings on Diagnosis and Treatment of Deposited Radionuclides, Richland, Washington, May 15-17, 1967, (N. V. Drukkery, D. Reidel, Dordrecht-Holland).

3. Snyder, W. S., "A Method of Interpreting Data Which Allows for Statistical Fluctuation of the Data," Proceedings of Symposium on the Assessment of Radioactive Organ and Body Burdens, Stockholm, Sweden, November 22-26, 1971 (IAEA, Vienna, 1972).

14. SCOPE:

A number of computer codes have been described which interpret the urinalysis data of an employee to obtain an estimate of plutonium or, alternatively, his body burden. All of these codes are based essentially on a model for excretion following a single intake to blood which predicts excretion in terms of a power function. That is, the fraction of a single intake (to blood) excreted t days postexposure is given as $bt^{-\beta}$. An employee's exposure plausibly may be considered to consist of a series of single exposures, and the computer codes define a series of intakes at various times which, according to the model, would suffice to some degree of approximation to account for the excretion pattern as measured.

Langham et al.[1] seem to have been the first to use this model for excretion of plutonium when they analyzed the data on some 15 terminal patients who were given ^{239}Pu complexed with citrate by IV injection. They also analyzed excretion data of employees and found that the excretion curves which described the trend of the patient data seemed to be in accord with the data on the employees. In this sense the model may be said to be supported by data out to five or more years postexposure.

Few attempts have been reported for taking statistical fluctuations of the excretion data into account in a systematic way. Analysis of the statistical day-to-day fluctuations of excretion data of the hospital patients has been completed by the Medical Physics and Internal Dosimetry Section. The different trends seen in the individual patients, and the different results found when the data are analyzed in terms of various models or methods of curve fitting have been examined also. A computer code has been completed which allows one to explore to some extent the influence of each source of variability on the estimated systemic burden. This code is suitable for use in a bioassay program for plutonium.

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[1] W. H. Langham, S. H. Bassett, P. S. Harris, and R. E. Carter, Los Alamos Scientific Laboratory LA-1151 (1950).

15. RELATIONSHIP TO OTHER PROJECTS:

This work bears directly on the evaluation of exposure to plutonium based on the interpretation of urinalysis results. It is anticipated that AEC licensees will employ this computer program in their bioassay programs.

16. TECHNICAL PROGRESS IN FY 1974:

None. New work.

17. EXPECTED PROGRESS IN FY 1975:

The Directorate of Regulatory Standards will issue a Regulatory Guide on Bioassay for Plutonium. This guide is scheduled for release in late FY 75. Included in the guide will be reference to a document which describes a computer program acceptable for interpreting measurements of urinary excretion of plutonium. This program has been in use at the Oak Ridge National Laboratory for several years, but a complete description of the program has not been published. This code was developed by W. S. Snyder and his colleagues in the Health Physics Division. It is proposed that the Section prepare a topical report which gives a full description of the program in use at ORNL. The report will provide detail and instructions sufficient to permit independent setup and operation of the program by other potential users. It is expected that the documentation of this program, including the publication of a topical report describing the program, will be completed before the end of FY 75.

18. EXPECTED PROGRESS IN FY 1976:

None.

19. DESCRIPTION AND JUSTIFICATION:

	Cost Estimates for FY 75
a. Major Procurement and Fabrication	-----
b. Subcontracts and Consultants	-----
c. Technical Services	
Technical Information Services	1,000
Utilities	1,000
d. Computer and Programming	
Programming Assistance	500
Computer Costs	500
e. Capital Equipment Obligations	-----