

1. AMENDMENT/MODIFICATION NO. Five (5)	2. EFFECTIVE DATE	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO. (If applicable)
5. ISSUED BY U.S. Nuclear Regulatory Commission Division of Contracts Washington, D.C. 20555	CODE	6. ADMINISTERED BY (If other than block 5)	CODE

7. CONTRACTOR NAME AND ADDRESS General Research Corporation 5383 Hallister Ave. P.O. Box 6770 Santa Barbara, CA 93111	CODE	FACILITY CODE	8. AMENDMENT OF SOLICITATION NO. DATED _____ (See block 9) <input checked="" type="checkbox"/> MODIFICATION OF CONTRACT/ORDER NO. NRC-02-77-183 DATED 9/30/77 (See block 11)
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9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offerors 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 signing and returning _____ copies of this amendment; (b) By acknowledging receipt of this amendment on 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 ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE 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 such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

50-19-03-02-1 B6127-9 (Increase \$16,550.00)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a) ☐ This Change Order is issued pursuant to _____
The Changes set forth in block 12 are made to the above numbered contract/order.

(b) ☐ The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c) ☒ This Supplemental Agreement is entered into pursuant to authority of Limitation of Funds Clause 1-7.202-3(b),
1-2404.2(c) and changes 1-7.404-5

12. DESCRIPTION OF AMENDMENT/MODIFICATION

A. The Statement of Work is Modified as Indicated Below:

1. Revision of the Task 2 Draft Report
The Task 2 draft report will be developed further to provide the following information requested by NRC.

FRC will delineate and describe the factors which can influence the persistence of movement of waste constituents from the burial site. This requirement will be satisfied by providing a preliminary estimate on the fate of 9 representative compounds identified in the trench waters at Maxey Flats and for which detailed monographs are available from the Task 1 effort. Each compound will be evaluated to determine the natural degradation/removal processes which determine its ultimate fate. Specifically, Table 1 will be completed. This information will be developed to a level of detail sufficient to permit us to rank these compounds in terms of their relative ability to escape the SLBF site and the relative hazards posed. Included will be a description of each of each of the processes, a discussion of the parameters which may effect them and pertinent examples: i.e. compound X is very water soluble.

13. ☐ CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT ☒ CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN _____ COPIES TO ISSUING OFFICE

14. NAME OF CONTRACTOR/OFFEROR Michael F. Hadro (Signature of person authorized to sign)	17. UNITED STATES OF AMERICA BY D.J. Dougherty (Signature of Contracting Officer)		
15. NAME AND TITLE OF SIGNER (Type or print) MICHAEL F. HADRO Director, Management Support Services	16. DATE SIGNED AUG 5 1979	18. NAME OF CONTRACTING OFFICER (Type or print) D.J. Dougherty	19. DATE SIGNED 8/13/79

hence it is expected to leave the trench with percolating rain water, etc.

In addition to the above, FRC will review numerous NRC comments pencilled into the Task 2 draft report and respond as appropriate utilizing information already at hand. Specifically, answers to the following questions suggested by NRC, will be included.

1. What shallow land burial facility (SLBF) parameters are affected, either negatively or positively, by chemicals in the waste?
2. What chemicals will degrade the SLBF performance and enhance migration of radioactive and chemically toxic wastes? This question refers to chemicals present or expected to be present and refers to releases of chemicals themselves or the effect of chemicals on releases of radioactive materials (chelates).
3. What chemical concentrations are needed to damage SLBF performance?

FRC will require the services of R.L. Perrine, Ph.D. (curriculum vita attached) to assist in the Task 2 revisions, particularly in transport phenomena. (Not to exceed 5 days at \$240.00 per day)

A draft of the revised Task 2 report will be submitted to NRC for approval before incorporation into the final report.

2. Revision of the Task 3 Draft Report

The Task 3 draft report will be revised in response to NRC comments. In particular, FRC will describe an approach to the development of a relative toxicity index. The approach will delineate the deficiencies of the existing data base and will identify areas of research required for the development of a complete numerical index.

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In addition to the above, FRC will respond to numerous NRC comments pencilled into the Task 3 draft report (and discussed in Reference 2) and respond as appropriate, utilizing information already at hand.

A draft of the revised Task 3 report will be submitted to NRC for approval before incorporation into the final report.

3. Completion of the Integrated Final Report Including Task 4 Results

Task 4 recommendations will be developed as part of the final report which will integrate the results of all tasks (1 through 4).

The Task 4 analysis will include answers to the following specific questions suggested by NRC.

1. How can SLBF features be modified to mitigate the consequences of the releases, if they occur and are significant?
2. What chemical concentrations would be hazardous to reclaimers?
3. Do UF, the DOW polymer, asphalt, or cement solidification agents present chemically significant problems in disposal?
4. Does the disposal of low-level waste present a chemical hazard to operating personnel?
5. Is there a transportation hazard associated with the chemical properties in low-level wastes?
6. If non-fuel cycle wastes are incinerated, what effects can be expected regarding chemical toxicity? How do other volume reduction systems affect the chemical toxicity of wastes?

²Letter from Tim Johnson (NRC) to Ralston Stalb (GRC), dated March 3, 1979, and containing minutes of their January 31st meeting with Jean Scholler at FRC.

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7. When should radioactive wastes be sent to hazardous chemical waste sites because of chemical properties? What are the regulatory implications?
8. Should non-fuel cycle wastes be segregated?
9. Are there specific chemicals which should be monitored (based on chemical toxicity, migration rate, etc.). What monitoring procedures are likely to be necessary?

The final report will provide specific recommendations for regulation of the control of chemical wastes at SLBF sites.

The answers to questions 1, 2, 6, 7 and 8 above will consist of a general discussion of the associated issues.

FRC will require the services of E.R. Johnson Associates (principally, M.W. Pellittieri) for the completion of Task 4 and the integrated final report. The funds requested include the travel costs associated with a trip from Washington, D.C. to the FRC facility at San Raphael, California, and a stay of approximately one week for M. Pellittieri.

TABLE 1 PROPOSED ADDITIONS TO TASK II REPORT
NATURAL DEGRADATION/REMOVAL PROCESSES
ASSOCIATED WITH COMPOUNDS IDENTIFIED IN TRENCH WATER AT MAXEY FLATS

Representative
Compounds

Degradation/Removal Processes

<u>Soil Adsorption</u>	<u>Chemical Degradation</u>	<u>Photochemical Reactions</u>	<u>Thermal Degradation</u>	<u>Biodegra- dation</u>	<u>Chemical Complexation</u>	<u>Ion Exchange</u>	<u>Precipi- tation</u>	<u>Filtra- tion</u>	<u>Volati- lization</u>
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Organic

1,4-dioxane
oxalic acid
diacetone
alcohol
1,1,-tri-
chloroethane
1-octanol
1,1-diethoxy-
ethane
cresols
(o,m,p)
toluene
di-2-ethylhexyl
phthalate

POOR ORIGINAL

Inorganic

barium
cadmium
chromium
copper
lead
zinc

*Although it is realized that other organic compounds might have been selected, the ones shown are representative samples of the various classes. (Monographs have been prepared for these compounds).

B. In consideration of the foregoing the following equitable adjustment is made.

1. The estimated total amount of this contract is increased by \$16,550.00 from \$138,157.00 to \$154,707.00. The revised estimated cost is \$153,003.00 and the fixed fee remains at \$1,704.00.
2. The revised authorized not-to-exceed total for the Inter-Entity Work Agreement with Flow Resources Corporation is \$103,616.00 an increase of \$12,018.00.
3. The revised authorized sub contract funding level with E.R. Johnson is increased by \$4,101.00 to a new total of \$31,506.00.

C. The period of performance is extended by one month to October 31, 1979.