27
12-17-78
8 Sep. 1978

UCID- 17989

Lawrence Livermore Laboratory

BIOSAY, A COMPUTER PROGRAM TO STORE AND REPORT BIOASSAY DATA

G. E. Williams and J. R. Parlagreco

December 1978

This is an informal report intended primarily for internal or limited external distribution. The opinions and conclusions stated are those of the author and may or may not be those of the laboratory. Prepared for U. S. Department of Energy under contract No. W-7405-Eng-48.

MASTER

UNCLASSIFIED AND UNCONTROLLED COPY IS UNLIMITED

BIOSAY, A COMPUTER PROGRAM TO STORE AND REPORT BIOASSAY DATA*

G. E. Williams and J. R. Parlagreco
Hazards Control Department
Lawrence Livermore Laboratory
University of California
P. O. Box 5505
Livermore, California 94550

ABSTRACT

BIOSAY is a computer program designed to manipulate bioassay data. Using BIOSAY, the Dosimetry Group can generate a report suitable for an individual's dosimetry record. A second copy of this report may be mailed to the individual who provided the sample or the area health physicist for review. BIOSAY also contains a data sorting option which allows all the results for particular individuals, or groups of individuals with common attributes, to be separated from the data base. The computer code is written in a conversational tone with aids which make it usable by even casual users of the computer system.

NOTICE
This report was prepared as an account of work sponsored by the U.S. Department of Energy. Neither the U.S. Department of Energy nor the U.S. Government, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

28

* Work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore Laboratory under contract number W-7405-ENG-48

INTRODUCTION

The bioassay data storage and reporting computer code, BIOSAY, can be used in two operating modes. The first and probably most useful mode rearranges data from punch cards and produces two listings. One listing is arranged by sample frequency and can be circulated through the Health Physics Group for review. The other, titled "PLS-CUT-ME", provides two abbreviated summaries of bioassay results--one to be mailed to the employee and one for dosimetry records.

The second operating mode allows the operator to select sublistings of samples from a large data file. This mode helps the Health Physics Group audit the bioassay program for a given area of the Laboratory or for a given type of analysis. It also permits all samples for a given individual to be conveniently reviewed at one time.

DATA INPUT

In order to enter data, punch cards must be prepared according to the format of Appendix A. An identification (ID) card with a file name such as NEWDATA must precede the data cards. BIOSAY will ask the computer operator the name of the data file early in the program; therefore, the card deck with the data should be read into the system before executing the code. Appendix B contains the types of entries possible on the data cards. Because BIOSAY keys on certain words or character strings, only those entries listed should be used. Also, all entries must be right justified.

The data cards are formatted to provide the most information storage possible. Because all the information related to a particular bioassay result cannot be recorded on a single data card, a key to other data is supplied in the form of the analysis number. The analysis number allows one to return to the master data books and look up additional information for the particular sample. The master data logs contain such information as the sample volume, problems encountered in analyzing the sample, and the radionuclides that may be present.

Employee ID Number

The employee identification (ID) number must be entered in columns 1-6 on the data card. BIOSAY uses the ID number to order the data file and thereby facilitate subsequent searches. Without the proper ID numbers, searches for particular individuals become impossible.

Name

The last name and first name and/or initials of each employee may be entered in columns 8-27 on the data card. Although BIOSAY will not search for individuals by name, the name provides a convenient check against the ID number requested. For example, if you request Joe Smith's results under his ID number but receive a result with the name John Jones, you may suspect John Jones' identification number was incorrectly typed.

Sorting the data by identification number also alphabetizes the list, allowing one to scan the entire data file and find names out of alphabetical order. If names appear out of alphabetical order, it may be due to incorrect employee ID numbers.

Nuclide

The Nuclide columns (28-32) allow one to identify the nuclide to which an individual may have been exposed. For example, "MFP" designates that a mixed-fission-product analysis was performed and is usually synonymous with a gross beta analysis. "ALPHA" means a gross alpha analysis was performed and no particular nuclide or nuclides were thought to be present. Although some samples may be identified as "AM241", "CM244", or other transplutonic element exposures, generally only a gross alpha analysis was conducted. "PU239" or "PU238" designate plutonium exposures for which a plutonium separation was made as part of the analysis. Uranium analysis requires a special technique because of the low specific activities of depleted, natural, and enriched uranums. Exposure to any one of these three uranium forms would be recorded as "U238". Details of the precise analytical techniques used are available from the Bioassay Laboratory and are coded under "METHODS" in columns 79 and 80.

Sample Date

The Sample Date (columns 34-39) may be the date the sample was taken, received to be analyzed, or counted. To determine which of these dates was used, one must consult either the master log book maintained by the Bioassay Laboratory or the Dosimetry Group's exposure files. Usually, the date the sample was taken is used if available.

Results

The Results columns (41-48) allow entries as large as 9999999 and as small as 0.001 to be entered. The units are assumed to be in micrograms per litre for uranium results, disintegrations per minute per litre for mixed fission products and in disintegrations per minute per sample for all other results. If no detectable activity is present, 0.0 is entered in the results columns followed by "ND" in the error columns.

Error

The Error columns (50-51) list the standard error. If one standard error is equal to or greater than 99 percent, "99" is entered in the error columns. If no activity is detected, "ND" is entered.

Sample Type

Two columns (53 and 55) follow the Results and Errors columns. The first indicates the type of material, "U" for urine, "F" for fecal, "B" for blood, "S" for sputum, and "N" for nose swipe. The second column contains the type of exposure--"R" for routine analysis and "S" for special sample.

Address

The Building and L-code (columns 57-63) sections of the data card contain the present address of the individual sampled.

Frequency

The sampling frequency may be entered in the Frequency column (65) as "W" for weekly, "M" for monthly, "Q" for quarterly, "S" for semiannually, or "A" for annually.

Exposure Location

Columns 67-70 are used for the building or trailer where an exposure may have occurred.

Analysis Number

The analysis number is entered in columns 72-76 on the data card and is the number under which data are recorded in the master log book kept by the Bioassay Laboratory.

Method

The analytical method used by the Bioassay Laboratory to process a sample is listed in columns 79-80. Details of these methods may be requested from the Bioassay Laboratory.

RUNNING THE BIOSAY CODE

Once you become sufficiently familiar with the computer system to log in, retrieve files, output files, and read in a card deck, running the BIOSAY code is relatively easy. Two appendices, C and D, outline these steps in sufficient detail to permit a novice to successfully execute the program. The following is a brief description of what the code will do in either its UPDATE or SEARCH running modes.

UPDATE Mode

After you have prepared a card deck according to the format of Appendix A and have observed the conventions described earlier, you can run the UPDATE part of BIOSAY. When you respond to the question "SEARCH or UPDATE" with "UPDATE" BIOSAY sets up nine files, including one file for each of the sample frequency categories (annual, semiannual, etc.), the PLS-CUT-ME file, a POSITIVES file, and a NEXT MONTH file.

BIOSAY first sorts the data alphabetically and then by frequency, placing each sample in the appropriate frequency file. The PLS-CUT-ME file requires that BIOSAY print each employee's name, address, and result in a format that can be easily understood by the employee. As part of this report, the code looks at the result and the error. If the standard error exceeds 33% of the result for routine samples or 50% for special samples, the notice that is mailed to the employee will indicate no detectable activity. If the standard error is smaller than these limits, the result exceeds the level of detection, and the record for that individual is stored in a file called POSITIVES for the health physicist to investigate.

A NEWDATA file may be merged with the master data file, DATA, by using the system routine TRIX AC. This combined file may then be used to exercise the SEARCH option. When BIOSAY is executed and the SEARCH option is chosen,

the code will ask for a data file. You can use either the new DATA file just created by merging the old DATA file with the NEWDATA file or a previously created and sorted DATA* file. Appendix D describes how to run the SEARCH option on a previously sorted file DATA*.

SEARCH Mode

BIOSAY allows the computer operator to choose from one to nine attributes for samples stored in the data file. For example, the operator may seek all samples for a given individual, using the ID number or only those samples given in a certain year and analyzed for a certain nuclide. Any combination of answers to the set of questions asked is possible with one exception. In all cases, the operator must select whether the sample is routine or special.

A word of warning is necessary at this point. When searches involve more than one parameter, all parameters must match exactly before BIOSAY will report the sample. For example, if you ask for all routine MFP samples for John Doe in Building 151, BIOSAY will find only those samples. It will not report John Doe's MFP sample submitted at Building 332 nor any special samples. Therefore, searches should be as broad as possible.

After you complete a search, you may terminate the program by typing "NO" or by depressing the Return key following the "MORE FROM PRESENT FILE..." question. Should you wish to conduct other searches, simply type "MORE". The code will create an output file containing all the searches performed for a given code run, which may be printed using the ALLOUT system routine described in Appendix D.

SUMMARY

BIOSAY will sort a deck of data cards containing bioassay information and will produce several output files that may be printed by the operator. One of these lists may be mailed to the employee as a means of reporting

negative results. The code also provides a means for scanning large data lists and for extracting only those results the Health Physicist wishes to audit. The code is simple to execute and suitable for the casual computer system user.

EMPLOYEE		ID	NAME		NUCLIDE	SAMPLE	DATE	RESULT	ERROR	SAMPLE	ADDRESS	L-CODE	FREQUENCY	EXPOSURE	ANALYSIS	METHOD													
		NUMBER								TYPE				LOCATION	NUMBER														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1														

APPENDIX B. Permissible Entries for the Data Cards

Column	Type of Entry	Acceptable entries
1-6	Employee number	6-digit integer
8-27	Employee name	Last name, comma, other names and/or initials
28-32	Nuclide analyzed	MFP, ALPHA, PU239, PU238, U238, AM241, CM244 or other nuclides (maximum of 5 characters)
34-39	Date	Month, day, year 2 digits each
41-48	Results	Floating point number between 9999999. and 0.000 (F 8.3 format)
50-51	Error	One standard deviation as a percentage of the result
53	Sample type	U for urine, B for blood, F for feces, N for nose swipe
55	Sample type	R for routine, S for special
57-60	Address	Building or trailer number, i.e., B253 or 2532
61-63	L code	3-digit L code
65	Frequency	W = weekly M = monthly Q = quarterly S = semiannually A = annually
67-70	Location of exposure	Building number, i.e., B253
72-76	Analysis number	Integer value of the analysis number assigned to a given sample by the Bioassay Laboratory
79-80	Method	The analytical method used to process the samples: 1 - Gross alpha technique; since 1957 2 - Gross beta technique; since 1974 3 - Plutonium separation technique; since 1963 4 - Fluorometric uranium technique; since 1974 5-99 - Reserved for future revised techniques

APPENDIX C. Execution of the UPDATE Option

To prepare to run the program, sign on to the computer.

1. Type the letter "R".
2. The teletype should respond by typing "IDR".
3. Then enter "88 A 316MHC" and depress the "RETURN" key.
4. The teletype will respond with several messages, including the amount of time left in the bank and any programs executing under the Health Physics account number. If the last thing typed is "ACTIVE NONE", you are ready to proceed.

```
IDR 88 A 316MHC
NIL
03.844  ACTIVE  NONE
```

Retrieve the program from storage.

1. Type the word "XPORT" and depress the "RETURN" key.
2. The teletype will type a period "." when it is ready to receive a command.
3. After the period, type "READ .R [BIOSAY]"; then depress the "RETURN" key.
4. In a few minutes the teletype should complete the command and type you a message to that effect. Type "END" and depress the "RETURN" key. If the machine is slow and you get tired of waiting, type "END", depress the "RETURN" key, and sign off by holding down the "CONTROL" key and typing the letter "D". You may continue later by signing on as above.

```
XPORT
.READ .R [BIOSAY]
S/O. BEGIN .R:BIOSAY
.S/O. DONE R:BIOSAY
END

ALL DONE
```

Run the program in the UPDATE mode.

1. Type "BIOSAY" and depress the "RETURN" key.
2. Respond as requested by the program. Below is an example of a run. Note that the file containing bioassay data must be in your file list before beginning the program.

```

BIOSAY
SEARCH OR UPDATE ?
UPDATE
TYPE FILE NAME      NEWDATA
IS IT SORTED ?
NO
ALL DATA READ (23)
IF THE INPUT FILE WAS NOT SORTED, I HAVE SORTED IT
IN THAT CASE, THE UPDATED, SORTED FILE HAS A * ADDED TO ITS
NAME. PLEASE SAVE THAT FILE.

```

ALL DONE

Print out the results.

1. To receive a copy of the results, execute the "ALLOUT" routine illustrated below.
2. For additional copies, simply execute the "ALLOUT" as many times as necessary.

```

ALLOUT PJET 17 LIST. END T90
  BIOSAY ? NO
  DATE* ? NO
  +BIO/1101 ? NO
  NEXT-MONTH ? YES
  THIS-MONTH ? YES
  WEEKLY ? YES
  MONTHLY ? YES
  QUARTERLY ? YES
  SEMI-ANNUAL ? YES
  ANNUAL ? YES
  PLS-CUT-ME ? YES

  ALL DONE

```

APPENDIX D. Execution of the SEARCH Option

To prepare to run the program sign on to computer.

1. Type the letter "R".
2. The teletype should respond by typing "IDR".
3. Then enter "88 A 316MHC" and depress the "RETURN" key.
4. The teletype will respond with several messages including the amount of time left in the bank and any programs executing under the Health Physics account number. If the last thing typed is "ACTIVE NONE", you are ready to proceed.

```
IDR 88 A 316MHC
NIL
P 0002.993 ACTIVE NONE
```

Retrieve the program and data base from storage.

1. Type the word "XPORT" and the "RETURN" key.
2. The teletype will type a period "." when it is ready to receive a command.
3. After the period, type "READ .R [BIOSAY DATA*]"; then depress the "RETURN" key.
4. In a few minutes, the teletype should complete the command and give you a message to that effect. Type "END" and depress the "RETURN" key. If the machine is slow and you get tired of waiting, type "END", depress the "RETURN" key, and sign off by holding down the CONTROL key and typing the letter "D". You may continue later by signing on as above.

```
XPORT
.READ .R [BIOSAY DATA*]
9/0. BEGIN .P:BIOSAY
10/0. BEGIN .P:DATA*
9/0. DONE P:BIOSAY
10/1. DONE P:DATA*
END

ALL DONE
```

Run the program in the SEARCH mode.

1. Type "BIOSAY", and depress the "RETURN" key.
2. Respond as requested by the program. Below is an example of the program questions and possible responses. Note that simply depressing the "RETURN" key is equivalent to a "NO" response and that the appropriate information can be substituted for the "YES" response.

```

BIOSAY
SEARCH OR UPDATE ?
SEARCH
TYPE FILE NAME
DATA*
IS IT SORTED ?
YES
TYPE YES OR NO AFTER EACH TYPE OF INFORMATION YOU WANT
ID NUMBER ?      YES
TYPE ID NUMBER      123400
NUCLIDE ?          YES
NUCLIDE NUMBER OR TYPE      MFR
SAMPLE TYPE ?      NO
SAMPLE FREQ. ?      NO
ELDS. ?
DATE OPER. ?
INIT. RESULT ?      YES
TYPE MINIMUM VALUE OF RESULT NEEDED IN FLOATING PT.
EX: .04      50.
ANALYSIS NUMBER ?      NO
ROUTINE SAMPLE: TYPE R* SPECIAL SAMPLE: TYPE S      R
MORE FROM PRESENT FILE - - - OR NEW FILE ?
NO
IF THE INPUT FILE WAS NOT SORTED, I HAVE SORTED IT
IN THAT CASE, THE UPDATED, SORTED FILE HAS A * ADDED TO ITS
NAME. PLEASE SAVE THAT FILE.
THE OUTPUT FILE IS CALLED      OUT/0829

ALL DONE
  
```

Print out the results.

1. To receive a copy of the results, execute the "ALLOUT" routine illustrated below. Use the output file name provided by the teletype rather than the one in the example.

```

ALLOUT PJET 17 OUT/0829 BOX T90

ALL DONE
  
```

Other options:

You may select other running options in addition to the "SEARCH" routines.

1. To receive a list of all bioassay results, enter "SEARCH ALL" in response to the first question following execution of BIOSAY. The output file is MASTERLIST and can be printed out using the "ALLOUT" routine above, substituting MASTERLIST for the output file name.
2. If you wish to search a data base other than the main list stored as DATA*, you may select this file at the beginning of the program or switch to another file when the program asks.

NOTICE

"This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately-owned rights."

NOTICE

Reference to a company or product name does not imply approval or recommendation of the product by the University of California or the U.S. Department of Energy to the exclusion of others that may be suitable.

Printed in the United States of America

Available from

National Technical Information Service

U.S. Department of Commerce

5285 Port Royal Road

Springfield, VA 22161

Price: Printed Copy \$: Microfiche \$3.00

	Domestic			Domestic	
<u>Page Range</u>	<u>Price</u>		<u>Page Range</u>	<u>Price</u>	
001-025	\$	4.00	326-350	\$	12.00
026-050		4.50	351-375		12.50
051-075		5.25	376-400		13.00
076-100		6.00	401-425		13.25
101-125		6.50	426-450		14.00
126-150		7.25	451-475		14.50
151-175		8.00	476-500		15.00
176-200		9.00	501-525		15.25
201-225		9.25	526-550		15.50
226-250		9.50	551-575		16.25
251-275		10.75	576-600		16.50
276-300		11.00	601-up		1
301-325		11.75			

Li Add \$2.50 for each additional 200 page increment from 601 pages up.