

USER'S GUIDE to SRL Data Reports

ABSTRACT

This document provides a detailed description of Data Reports of the western quadrangles that have been prepared by Savannah River Laboratory (SRL) personnel for the National Uranium Resource Evaluation (NURE) program. The Guide includes descriptions of (1) sample collection and field measurements; (2) format, abbreviations, and codes used in data tables; (3) graphical presentation and maps; and (4) quality assurance programs for sample collection and analysis.

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## INTRODUCTION

This document provides a detailed description of Data Reports of the western quadrangles that have been prepared by Savannah River Laboratory (SRL) personnel for the National Uranium Resource Evaluation (NURE) Program. The format described here was established for Data Reports in mid-1978. The descriptions of tables and figures are general enough to be applied to future Data Reports. However, some minor changes in format may be made as the program progresses.

SRL participation in the NURE Program is summarized in NURE-SRL progress reports (SRL-138).

## SAMPLE COLLECTION AND FIELD MEASUREMENTS

Sampling personnel were trained by SRL staff members according to procedures in published SRL documents. In the western quadrangles, the principal document was the Training Manual for Water and Sediment Geochemical Reconnaissance (Price and Jones, 1979).

A minimum of five sediment sub-samples was composited from each stream site. A minimum of ten sediment sub-samples was collected for each soil site. An approximately 400-g sample of sediment passing a 420-micrometer screen (U.S. Std. 40 mesh) was collected at each site. In some areas a second fraction passing through a 1000-micrometer screen (U.S. Std. 18 mesh) but not passing through a 420-micrometer screen was also collected.

Dissolved ions in individual water samples were concentrated in the field on portions of ion exchange resin (GJBX-77(77)). The resin was subsequently analyzed at SRL. Special procedures not included in the training manual were employed in certain areas; for example, special ground water samples were collected for the analysis of helium.

A figure in the paper text illustrates the field form completed at each sample collection site. Entries are self-explanatory. The manual (Price and Jones, 1979) describes in detail the equipment and techniques (including criteria for site selection) for collecting samples and for making field measurements.

Normal density for ground water and surface sampling in rural areas varies from 13 to 25 square kilometers (5 to 10 sq mi) per site. The density of surface sampling may be increased in areas in which few ground water samples can be collected. Supplemental samples may be collected at sites of high radioactivity or other locations considered by the sampler to be of relatively high uranium potential.

Sampling site locations are marked precisely on compilation maps. The maps are returned to SRL for determination of geographic coordinates. An electronic digitizer (SRL-138) is used to measure and verify latitude and longitude for each site, and these data are then entered into the SRL-NURE data base. These data are recorded with four decimal places, but should be considered reliable only to three decimal places.

Ground water sampling sites and SRL ID numbers are shown on a plate in the report. Print modes for this plate are shown in figure 1 on this microfiche. Well and spring sites are distinguished by the use of a plus (+) for wells and a circle (o) for springs. Surface sampling sites and SRL ID numbers are shown on a plate in the report. Print modes for this plate are shown in figure 2 on this microfiche.

\*\*\*\*\* Figure 1 \*\*\*\*\*

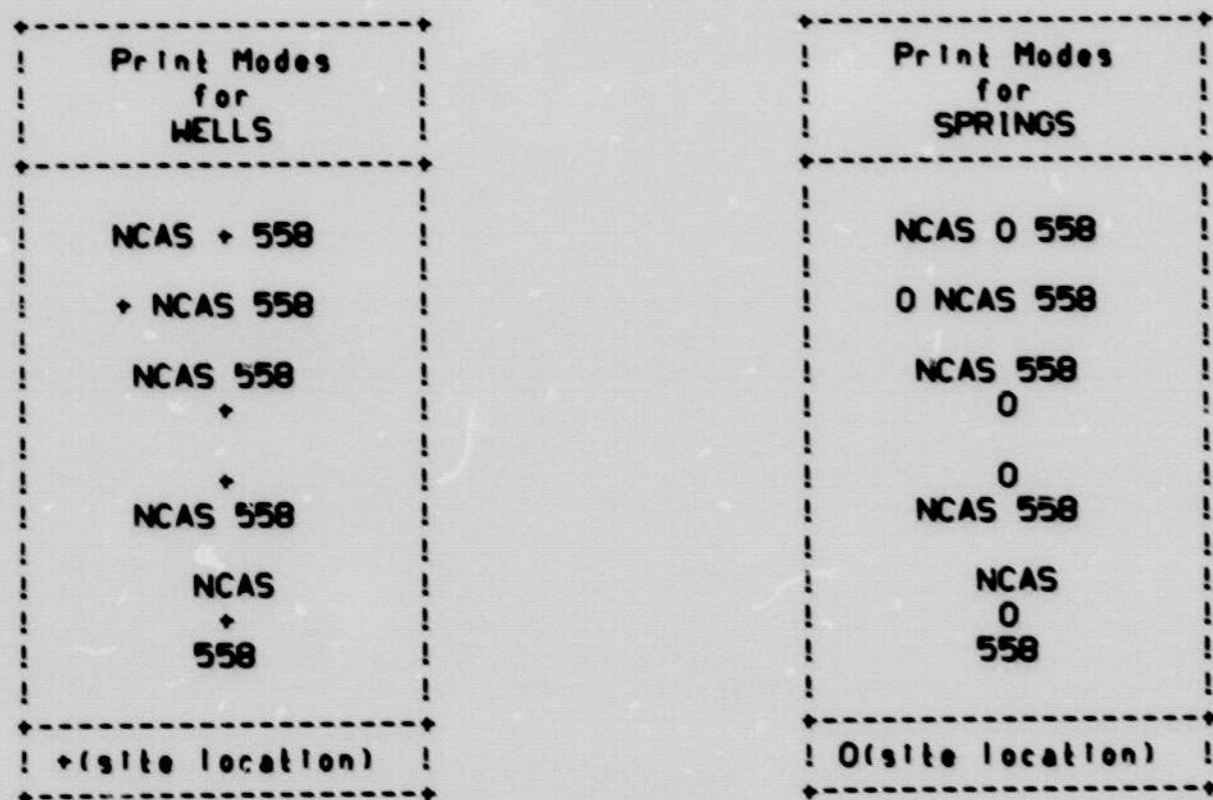


Figure 1. Print modes for Ground Water Sampling Site Identifiers.

\*\*\*\*\* Figure 2 \*\*\*\*\*

```
Print Modes
for
Surface Sites

NCAS + 023
+ NCAS 023
NCAS 023 +
NCAS 023
+
+
NCAS 023
NCAS
+
023

!(site location)!
```

Figure 2. Print modes for Surface Sampling Site Identifiers.



## DATA PRESENTATION

In each SRL Data Report, sampling point coordinates, field data, and the most important field measurements and analytical data are presented together. These measurements are also presented in areal distribution figures. Other field and analytical data are given in tables only. Each element also has a statistical summary figure.

Detailed cumulative frequency plots are included in the margins of the 1x2 degree map figures. All samples are included in the cumulative frequency plots and values are summed from highest to lowest for plots on the maps. These cumulative frequency plots also show the relationship between cumulative frequency and standard deviation and cover the complete range of samples.

### 1. Columnar Entries for Ground Water Data

The data for ground water are normally presented in table A-1.

#### SRL Identification Number

Each SRL Identification (ID) site code consists of seven characters. The first two characters give the 1x2 degree National Topographic Map Series (NTMS) quadrangle from which the sample was collected. The map codes are entered as characters 3 and 4; these represent 15-minute quadrangles. Codes used are listed in paper text in each report. Samples are numbered sequentially within each map unit (characters 5, 6, and 7). Numbers begin with 501 in each map unit for ground water and are generally consecutive. Columns 8 and 9 identify the type of sample used for irradiation; water samples are irradiated as resins, symbolized by an R in column 8.

#### DOE Identification Number

Each sample is assigned a DOE ID number. The number consists of 28 characters as follows:

- 1-2 State (table 1)
- 4-10 Latitude of the site
- 12-19 Longitude of the site
- 21 Laboratory code (SRL = 4)
- 23-24 Sample type (table 2)
- 26-28 Replication code. Generally, only original samples (-000) are reported in the Data Releases.

#### pH

Normally pH will be in the range of 4.0 to 9.5. Values far outside this range may suggest instrument malfunction or pollution. Missing data are indicated by an "M".

#### COND

Conductivity, measured in micromhos/cm.

#### AKMXD

Alkalinity as milliequivalents of sulfuric acid required per liter of sample (meq/l) to titrate to a pH of approximately 4.5 (end-point for bromocresol-green/methyl-red indicator solution).

#### DPTH

Depth of the well in feet, if known. This number is generally provided by the householder. An estimate of the confidence in this number is given in table A-2. "U" indicates that the well depth is not known. Springs are coded as having a depth of 0 feet.

#### U

Uranium in ground water is determined by delayed neutron counting after concentrating the uranium on ion exchange resin. U is reported in parts per billion (PPB).

Table 1

STATE	CODE	STATE	CODE
Alabama.....	01	Nevada.....	32
Arizona.....	04	New Hampshire.....	33
Arkansas.....	05	New Jersey.....	34
California.....	06	New York.....	36
Connecticut.....	09	North Carolina.....	37
Delaware.....	10	Ohio.....	39
District of Columbia..	11	Oklahoma.....	40
Florida.....	12	Oregon.....	41
Georgia.....	13	Pennsylvania.....	42
Idaho.....	16	Rhode Island.....	44
Illinois.....	17	South Carolina.....	45
Indiana.....	18	Tennessee.....	46
Kentucky.....	21	Texas.....	48
Louisiana.....	22	Utah.....	49
Maine.....	23	Vermont.....	50
Maryland.....	24	Virginia.....	51
Massachusetts.....	25	Washington.....	53
Michigan.....	26	West Virginia.....	54
Mississippi.....	28		
Missouri.....	29		

Table 1. State Codes used in DOE Identification Number.

Table 2

<u>NUMBER</u>	<u>SAMPLE TYPE</u>
50.....	Stream sediment from flowing stream, sieved <149 micrometers and dried <=110 degrees C.
51.....	Stream water, filtered through <=0.8 micrometer filter at the site.
52.....	Well water, filtered through <=0.8 micrometer filter at the site.
53.....	Spring water, filtered through <=0.8 micrometer filter at the site.
54.....	Lake water, filtered through <=0.8 micrometer filter at the site.
55.....	Lake sediment.
56.....	Glacial till.
57.....	Peat.
58.....	Soil, sieved > 420 micrometers and < 1000 micrometers.
59.....	Soil, sieved < 149 micrometers.
60.....	Stream sediment from dry stream, sieved > 420 micrometers and < 1000 micrometers, and dried <= 110 degrees C.
61.....	Stream sediment from dry stream, sieved < 149 micrometers and dried <= 110 degrees C.
62.....	Talus.
63.....	Volcanic neck.
64.....	Playa sediment.
65.....	Hot springs, sinter.
56-69.....	Spare numbers(*).

\*: to be noted in individual reports as necessary.

\*\* : the 28-character DOE-GJ identification number for NURE samples contains two digits to denote sample type. Positions 50 through 69 have been set aside for SRL use.

Table 2. Type Codes used in DOE Sample Identification Number(\*\*).

Values have been rounded to appropriate significant figures. Values for uranium are reported for all samples analyzed; however, analyses <0.040 ppb exhibit a high coefficient of variation. Missing data are indicated by "M". Where all analytical data for a sample are missing, samples will generally be analyzed and reported in a supplementary report.

#### U/COND

Uranium concentration in ppb multiplied by 1000 and divided by conductivity is listed in this column. This value gives an approximation of the ratio of uranium to total dissolved solids.

#### HELIUM

Helium is determined for selected quadrangles using a specially developed mass spectrometric procedure (SRL-138.3b). When available, helium values are reported in standard cubic centimeters of helium per 1000 liters of air (cc He/1000 l, i.e., ppm by volume). The measurement is made on a 2 cc air-gap above a 300 cc water sample. This method introduces an almost unvarying 5.2 ppm helium background from air; thus, all samples are above detection limit.

#### Other Key Elemental Analyses

Other elements analyzed were determined by neutron activation analysis (unless otherwise noted) and are listed alphabetically. Concentrations are reported in ppb. Values below detection limit are indicated by a minus (-). For example, -3 means that the sample contains less than 3 ppb of that element. If the background is so high that an accurate estimate of the minimum detection limit is not available, a period (.) is used to indicate not only that the element was not detected, but also that the detection limit is unusually high for that sample. Missing data are indicated by an "M".

#### 11. Columnar Entries for Supplementary Ground Water Data

SRL Identification Number

same as in table A-1

Supplementary Elemental Analyses

Same format as table A-1

#### SAMPDATE

The date of sampling (month/day/year). For example, 7/15/77 is July 15, 1977.

#### TEAM

This number identifies the sampling personnel and is used by SRL for quality assurance monitoring.

#### ROCKTYPE

This code identifies the predominant rock type present in the immediate vicinity of the sample site. The types listed are:

- |                             |                              |
|-----------------------------|------------------------------|
| 1 Other (explained on back) | 6 Clastic-coarse             |
| 2 Volcanic - Felsic         | 7 Sandstone                  |
| 3 Volcanic - Mafic          | 8 Shale                      |
| 4 Plutonic - Felsic         | 9 Carbonate                  |
| 5 Metamorphic               | 0 Unconsolidated valley fill |

#### CONTAMN

The activities/contaminants columns indicate those nearby activities which may influence the analytical results. They are very important entries, chosen from the given list. The most significant activity and/or source of contamination is listed under CONTAMN4. Other activities, if considered important, are listed under CONTAMN3, CONTAMN2, and CONTAMN1, in descending order of importance.

- |          |                             |             |
|----------|-----------------------------|-------------|
| CONTAMN1 | 1 Other (explained on back) | 6 Garbage   |
| CONTAMN2 | 2 None                      | 7 Farming   |
| CONTAMN3 | 3 Chemical                  | 8 Grazing   |
| CONTAMN4 | 4 Smelting                  | 9 Oil field |
|          | 5 Mining                    |             |

#### FORM

This code indicates the geologic formation surrounding the sampling site. The first letter and the next three consonants in the formation name are entered. In the same way, the age is entered if the name of the formation is unknown. For example, a rock of Cambrian age is entered as "CMBR". If neither the formation nor the age is known, "UNKN" is entered.

#### ODOR

Odors of all samples are noted. The entries in this column and their meanings are:

- 1 Other (explained on back of field form)
- 2 None
- 3 H<sub>2</sub>S (hydrogen sulfide)
- 4 Oil

#### TEMP

The water temperature at the time of sampling is recorded in this column. The water temperature is recorded in degrees Celsius to the nearest whole degree.

#### DEPTHCON

Confidence in the values of well depths is listed in this column. The possible entries are:

- 1 Certain
- 2 Probable
- 3 Possible
- 4 Educated Guess
- 5 Unknown

Any site with "U" listed in DPTH should have "5" listed for DEPTHCON.

#### WELLOC

The positions at which samples are taken are listed in this column. The positions listed are relative positions in plumbing systems. The entries and their meanings are:

- 1 Other (explained on back of field form)
- 2 Immediately after storage tank
- 3 From pipe before storage tank
- 4 Direct from pump
- 5 Direct from well or spring
- 6 From municipal system

#### WELCLASS

Sampled wells are classified by use. The classes of wells recognized here are:

- |                             |                           |
|-----------------------------|---------------------------|
| 1 Other (explained on back) | 4 Livestock               |
| 2 Domestic                  | 5 Irrigation              |
| 3 Municipal                 | 6 Industrial - Commercial |

#### SCINT

A gamma-ray scintillometer reading in counts per second is recorded at the sampling site.

#### III. Columnar Entries for Sediment Data

Sediment data (and accompanying water quality measurements) are presented in tables B-1, B-2 and B-3.

#### SRL Identification number

Each SRL identification (ID) site code consists of seven characters. The first two characters give the 1 x 2 degree NTMS quadrangle in which the sample was collected. Map codes are entered as Characters 3 and 4; these represent 15-minute quadrangles. Codes used are listed in paper text in each report. Sites are numbered sequentially within each map unit (Characters 5, 6, and 7). Numbers begin with 001 in each map unit for stream sites and are generally consecutive. Columns 8 and 9 represent the sample analyzed. In most reports, the S1 fraction (finer than 149 micrometers (U.S. Std. 100 mesh)) was analyzed. S0 and S2 mean that coarser (149 micrometers to 1000 micrometers) or finer (<75 micrometers) fractions, respectively, were analyzed. Specific fractions will be identified in individual reports as necessary.

#### DOE Identification Number

Each sample is assigned a 28-character DOE ID number as described for table A-1.

FORM, ODOR, pH, COND, UM/CM, AKMXD, MEQ/L

Same format as table A-1.

#### Key Elemental Analyses

The first three elements are listed in order of importance; other key elements are listed alphabetically.



Concentrations of each element (in PPM) are determined by neutron activation analysis (unless otherwise noted). Values have been rounded to appropriate significant figures. Note that the elemental (not oxide) concentration is quoted in this table. Values below detection limit are indicated by a minus (-). For example, -3 means that the sample contains less than 3 ppm of that element. If background limit is not available, a period (.) is used to indicate not only that the element was not detected, but that the detection limit is unusually high for that sample. Missing data are indicated by "M".

#### IV. Columnar Entries for Supplementary Sediment Data

##### SRL Identification Number

Same as in table B-1.

##### Supplementary Elemental Analyses

Same format as table B-1.

##### SAMPDATE

The date of sampling, month/day/year. For example, 7/15/79 is July 15, 1979.

##### TEAM

This number identifies the sampling personnel and is used by SRL for quality assurance monitoring.

##### ROCKTYPE

This and following columns contain codes describing the sample site characteristics. Rocktype identifies the predominant rock type present in the immediate vicinity of the sampling site. The types listed are:

- |                             |                              |
|-----------------------------|------------------------------|
| 1 Other (explained on back) | 6 Clastic - coarse           |
| 2 Volcanic - mafic          | 7 Sandstone                  |
| 3 Volcanic - felsic         | 8 Shale                      |
| 4 Plutonic - felsic         | 9 Carbonate                  |
| 5 Metamorphic               | 0 Unconsolidated valley fill |

### SEDSIZE

This code reflects the nature of the loose sediment material at the sampled site.

- |                             |                 |
|-----------------------------|-----------------|
| 1 Other (explained on back) | 4 Silt and Clay |
| 2 Pebbles and coarser       | 5 Organic muck  |
| 3 Sand                      |                 |

### STMWIDTH AND STMDEPTH

- |               |              |
|---------------|--------------|
| 1 Dry         | 5 2 to 4 ft  |
| 2 <1/2 ft     | 6 4 to 8 ft  |
| 3 1/2 to 1 ft | 7 8 to 16 ft |
| 4 1 to 2 ft   |              |

An estimate of the average width and depth of the stream over the 100 to 200 feet of stream length where the sample was taken.

### STMFLOW

- 1 Dry
- 2 Slow
- 3 Moderate
- 4 Fast
- 5 Torrent

### STMLEVEL

- 1 Dry
- 2 Low
- 3 Normal
- 4 High

The water description provides an indication of the general condition of the water at the time of sampling. STMFLOW indicates the rate of flow using the listed descriptors at the sampled location (i.e., if a stream is sampled in rapids, the 4 (Fast) or 5 (Torrent) may apply; but if the same stream were sampled above or below the rapids, the 2 (Slow) or 3 (Moderate) descriptors might be more accurate). STMLEVEL describes the water level relative to its apparent normal level.

### VEGTYPE

- 1 Other (explained on back)
- 2 Forest
- 3 Desert Scrub
- 4 Grassland
- 5 Saltbrush
- 6 Marsh

### VEGDENS

- 1 Sparse
- 2 Moderate
- 3 Dense

These descriptors reflect the amount and type of plant growth in the immediate area of the sample location. The density is a subjective observation made in relation to visibility, ease of access, etc. The type of vegetation reflects the dominant plant type at or near the sample location.

#### RELIEF

- 1 0 to 10 ft
- 2 10 to 50 ft
- 3 50 to 200 ft
- 4 >200 ft

Relief is an indicator of local surface expression.

#### COMPOSIT

COMPOSIT shows the number of subsamples taken at each site that are composited to give the sieved sample for that site.

#### CONTAMN

The activities/contaminants columns indicate those nearby activities which may influence the analytical results. They are very important entries, chosen from the given list. The most significant activity and/or source of contamination is listed under CONTAMN4. Other activities, if considered important, are listed under CONTAMN3, CONTAMN2, and CONTAMN1, in descending order of importance.

CONTAMN1	1 Other (explained on back)	6 Garbage
CONTAMN2	2 None	7 Farming
CONTAMN3	3 Chemical	8 Grazing
CONTAMN4	4 Smelting	9 Oil field
	5 Mining	

#### WATERTEM

The water temperature, taken at the time of sampling, is coded under WATERTEM. The water temperature is recorded in degrees Celsius to the nearest whole degree.

#### V. Graphical Data and Maps

All measurements in tables A-1 and B-1 and the elemental concentrations from tables A-2 and B-2 are displayed as areal distributions (symbol plots) if there is enough data to make the figures meaningful. Histograms and cumulative frequency plots are also given. The symbols for the areal distribution plot figures are derived from the statistical distribution of the measurements within the quadrangle being reported. Symbols are based upon the percentile range of the data rather than the absolute values for convenient comparison of elements with widely differing concentration ranges.

QUALITY ASSURANCE FOR SAMPLE COLLECTION

Three to ten percent of the sampled sites were routinely checked by SRL personnel or by a separate subcontractor to assure that the reported field locations were accurate. Details of the quality assurance program are given in NURE-SRL progress reports (SRL-138).

Field measurements were checked for approximately 2% of the sites. Where important variations occurred, the sampling subcontractor was required to repeat measurements for the area in question.

REFERENCES FOR USER'S GUIDE

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GJBX-77(77). Proceeding of Symposium on Hydrogeochemical and Stream Sediment Reconnaissance for Uranium in the United States, Grand Junction, Colorado, March 16 and 17, 1977: DOE-GJO Document No. GJBX-77(77).<sup>a</sup>

Price, V., and Jones, P. L., 1979, Training Manual for Water and Sediment Geochemical Reconnaissance: SRL Document DPST-79-219, E. I. du Pont de Nemours & Co., Inc., Savannah River Laboratory, Aiken, South Carolina.

SRL-138, NURE-SRL Progress Reports:

1. Savannah River Laboratory Quarterly Reports: Hydrogeochemical and Stream Sediment Reconnaissance - Eastern United States: National Uranium Resource Evaluation Program: E. I. du Pont de Nemours & Co., Inc., Savannah River Laboratory, Aiken, South Carolina.

No.	Quarter	SRL Document No.	DOE-GJO Document No. <sup>a</sup>
a	January-March 1975	DPST-75-138-1	GJBX-5(76)
b	April-June 1975	DPST-75-138-2	GJBX-6(76)
c	July-September 1975	DPST-75-138-3	GJBX-7(76)
d	October-December 1975	DPST-75-138-4	GJBX-8(76)
e	January-March 1976	DPST-76-138-1	GJBX-17(76)
f	April-June 1976	DPST-76-138-2	GJBX-27(76)
g	July-September 1976	DPST-76-138-3	GJBX-63(76)
h	October-December 1976	DPST-76-138-4	GJBX-6(77)
i	January-March 1977	DPST-77-138-1	GJBX-35(77)
j	April-June 1977	DPST-77-138-2	GJBX-55(77)
k	July-September 1977	DPST-77-138-3	GJBX-90(77)
l	October-December 1977	DPST-77-138-4	GJBX-37(78)
m	January-March 1977	DPST-76-138-1	GJBX-66(78)

2. Savannah River Laboratory Semiannual Reports; Hydrogeochemical and Stream Sediment Reconnaissance - Eastern United States; National Uranium Resource Evaluation Program; E. I. du Pont de Nemours & Co., Inc., Savannah River Laboratory, Aiken, South Carolina.

no.	Period	SRL Document No.	Document No. <sup>4</sup>
a	April-September 1978	DPST-78-138-2	GJBX-13(79)

3. Savannah River Laboratory Semiannual Reports; Hydrogeochemical and Stream Sediment Reconnaissance; National Uranium Resource Evaluation Program; E. I. du Pont de Nemours & Co., Inc., Savannah River Laboratory, Aiken, South Carolina.

no.	Period	SRL Document No.	Document No. <sup>4</sup>
a	October 1978-March 1978	DPST-79-138-1	GJBX-86(79)
b	April-September 1979	DPST-79-138-2	GJBX-13(79)

<sup>4</sup> DOE-GJO reports are available on microfiche from the Grand Junction Office, DOE, for \$6.00. Prepaid orders should be sent to: Bendix Field Engineering Corporation, Technical Library, P. O. Box 1569, Grand Junction, Colorado 81501. Checks or money orders should be made out to Bendix Field Engineering Corporation, the operating contractor for DOE's Grand Junction Office.