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Prepared for the U. S. Department of Energy  
Assistant Secretary for Resource Applications  
Grand Junction Office, Colorado

**MASTER**

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## PRICE 1° x 2° NTMS AREA, UTAH

### DATA REPORT (ABBREVIATED)

NATIONAL URANIUM RESOURCE  
EVALUATION PROGRAM

HYDROGEOCHEMICAL AND STREAM  
SEDIMENT RECONNAISSANCE

J. R. COOK



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PREPARED FOR THE U. S. DEPARTMENT OF ENERGY UNDER CONTRACT DE-AC09-76SR00001

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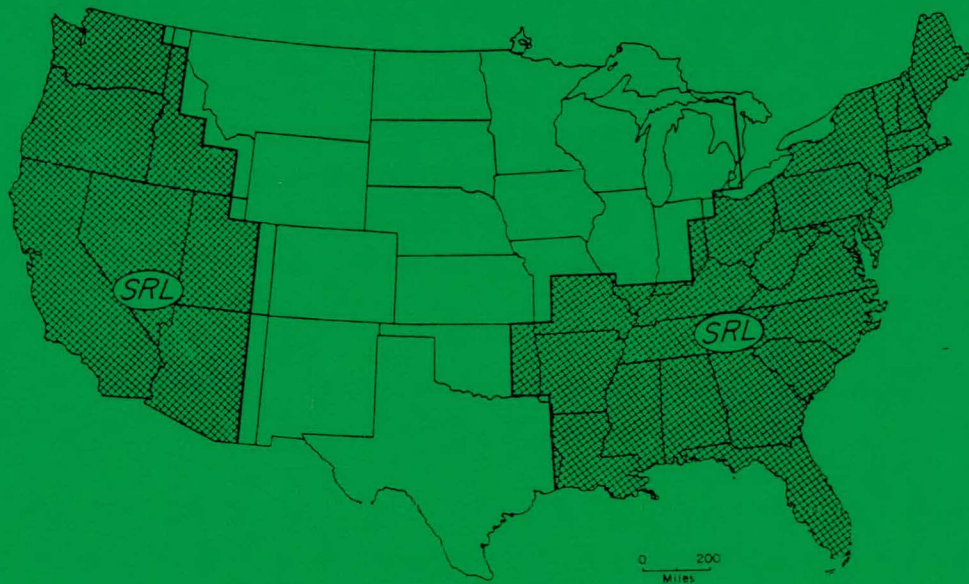
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EVALUATION PROGRAM**

**HYDROGEOCHEMICAL AND STREAM  
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by

**J. R. COOK**

Approved by

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Publication Date: July 1980

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## ABSTRACT

This abbreviated data report presents results of ground water and stream/surface sediment reconnaissance in the National Topographic Map Series (NTMS) Price 1° x 2° quadrangle. Surface sediment samples were collected at 1444 sites, at a target sampling density of one site per 13 square kilometers (five square miles). Ground water samples were collected at 137 sites. Neutron activation analysis (NAA) results are given for uranium and 16 other elements in sediments, and for uranium and 9 other elements in ground water. Mass spectrometry results are given for helium in ground water. Field measurements and observations are reported for each site. Analytical data and field measurements are presented in tables and maps.

Data from ground water sites (on microfiche in pocket) include (1) water chemistry measurements (pH, conductivity, and alkalinity), (2) physical measurements where applicable (water temperature, well description, and scintillometer reading), and (3) elemental analyses (U, Al, Br, Cl, Dy, F, He, Mg, Mn, Na, and V).

Data from sediment sites (also on microfiche in pocket) include (1) stream water chemistry measurements from sites where water was available (pH, conductivity, and alkalinity), and (2) elemental analyses for sediment samples (U, Th, Hf, Al, Ce, Dy, Eu, Fe, La, Lu, Mn, Sc, Sm, Na, Ti, V, and Yb). Sample site descriptors (stream characteristics, vegetation, etc.) are also tabulated. Areal distribution maps, histograms, and cumulative frequency plots for most elements; U/Th, U/Hf, U/(Th+Hf), and U/La ratios; and scintillometer readings at sediment sample sites are included on the microfiche.

Uranium concentrations in sediments of the Price quadrangle are relatively low, with a maximum value of 14.7 ppm. The mean of the logs of uranium values in sediments is 0.38, which corresponds to a value of about 2.4 ppm. Many of the lowest uranium concentrations occur in the northern part of the San Raphael Swell, in the southeastern portion of the quadrangle (see areal distribution plots on microfiche). Ground water sampling sites are too widely dispersed to allow preliminary interpretation.

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**MICROFICHE**

**(In Pocket)**

**PRICE TABLES**

Tabulated reconnaissance data and elemental concentrations in surface sediment samples and ground water samples (Tables A-1, A-2, B-1, B-2, and B-3).

**PRICE SEDIMENT PLOTS**

Areal distribution maps, histograms, and cumulative frequency plots for elemental U, Th, Hf, La, Sm, Eu, Dy, Yb, Lu, Al, V, Ti, Mn, Fe, Sc, and Na; for conductivity, alkalinity, and pH; for log (U/Hf), log (U/Th), log (U/La), and log (U/Th + Hf) ratios; and for scintillometer readings at sediment sampling sites.

**PRICE GROUND-WATER PLOTS**

Areal distribution maps, histograms, and frequency distribution plots for elemental U, F, Na, Mg, Al, Cl, Mn, Br, Dy, V, and He; for conductivity, alkalinity, pH, and U x 1000/conductivity; and for scintillometer readings at ground water sampling sites.

**SURFACE SAMPLE SITE LOCATIONS IN THE PRICE QUADRANGLE**

**GROUND WATER SAMPLE SITE LOCATIONS IN THE PRICE QUADRANGLE**

**USER'S GUIDE**

**MAPS**

**(In Pocket)**

Plate 1 - Geologic Map of the Price 1° x 2° NTMS Quadrangle

Plate 2 - Mineral Occurrences in the Price Quadrangle

DATA REPORT: PRICE 1° x 2° NTMS QUADRANGLE

INTRODUCTION

The National Uranium Resource Evaluation (NURE) program was established to evaluate domestic uranium resources in the continental United States and to identify areas favorable for uranium exploration. The Grand Junction Office (GJO) of the Department of Energy (DOE) is responsible for administering the program. The Savannah River Laboratory (SRL) is responsible for hydrogeochemical and surface sediment reconnaissance (HSSR) of 3.9 million square kilometers (1,500,000 square miles) in 37 eastern and western states.

The data presented here are reconnaissance data intended for use in identifying broad areas for further study. While care has been taken to provide reliable sampling and analyses, verification of individual analyses is beyond the scope of this report. The data should be viewed statistically because "one-point anomalies" may be misleading. Regional trends, however, should be reliable.

This report is one of a series presenting data obtained by SRL reconnaissance. Additional analyses may be released in later **Supplemental Data Reports**. All data will be available on magnetic tape from:

GJOIS Project  
UCC-ND Computer Applications Department  
4500 North Building  
Oak Ridge National Laboratory  
P.O. Box X  
Oak Ridge, TN 37830

Sampling procedures are described in a field manual assembled specifically for this program (Price and Jones, 1979). A summary of the SRL development program in support of the reconnaissance is available in SRL-NURE progress reports (SRL-138). SRL data reports (SRL-146) have been open-filed for other western quadrangles (Figure 1).

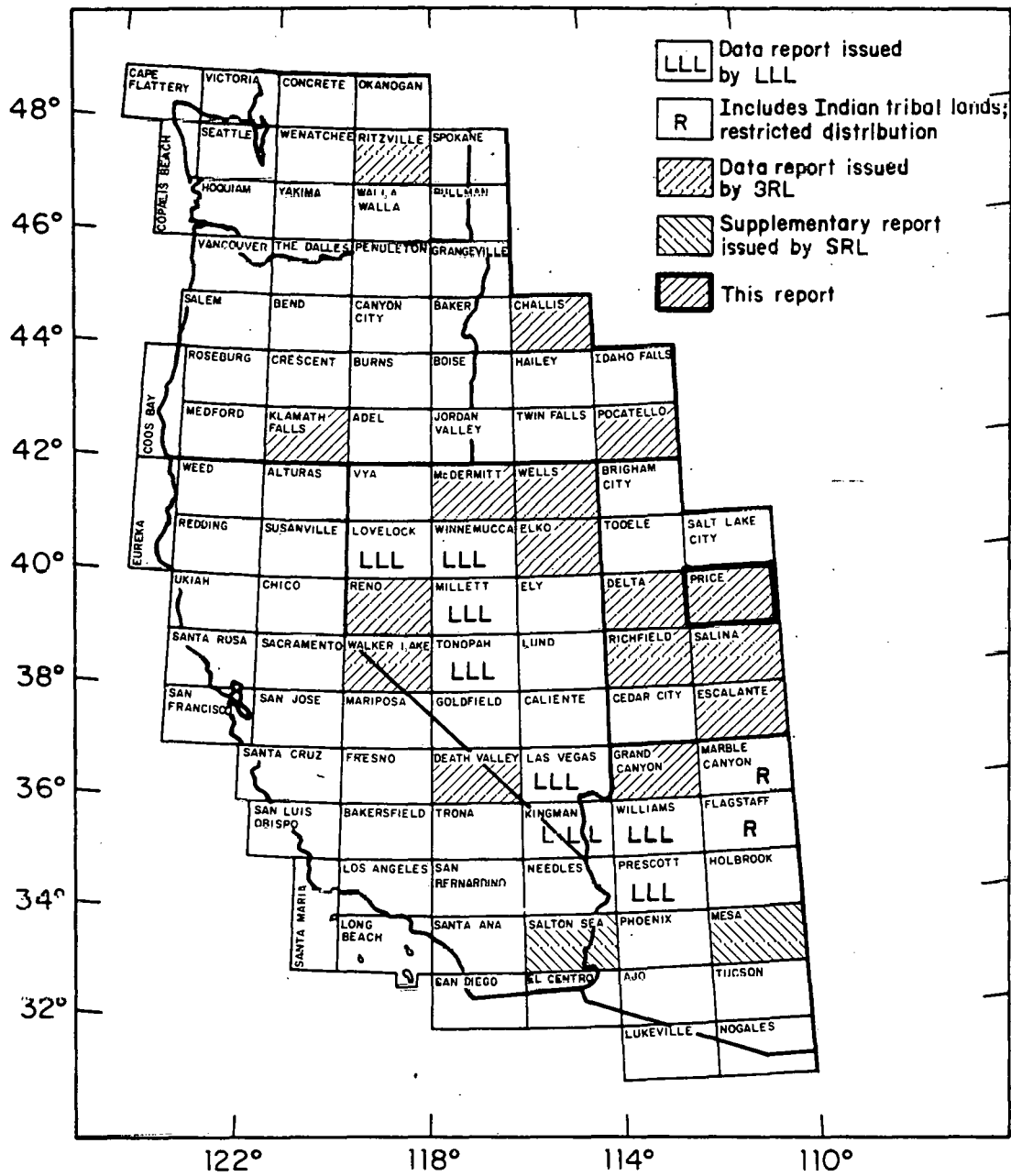


FIGURE 1. Location Map for the Price 1° x 2° NTMS Quadrangle

SRL reports titled **Basic Data Report** or **Data Report** include geologic descriptions and a somewhat more complete description of the HSSR program. These reports and reports titled **Data Report (Abbreviated)** include neutron activation analyses (NAA) done at SRL. Reports titled **Supplemental Data Report** include analyses done by methods other than NAA. Not every quadrangle will be described in both **Data Reports [or Data Reports (Abbreviated)]** and **Supplemental Reports**.

## **FACTORS AFFECTING THE DATA**

### **General**

Sediment and ground-water samples were collected during the spring and summer of 1979. The lack of surface-water samples is due to the arid climate of the Price quadrangle (NOAA, 1977). The scarcity of ground-water sites is due to both the aridity and the low population density of the area.

### **Quality Assurance**

#### **Sample Collection**

Sampling teams marked each sampling site on an SRL-approved map and completed a field data form for every sample. An SRL subcontractor checked 105 sediment and 15 ground-water sampling sites during March 1980. No evidence was discovered of deliberate malfeasance by the sampling teams. Ninety-seven percent of the sites checked were found to be located within 800 m (0.5 mi) of the locations plotted on sample maps. Thus, the goals of a regional reconnaissance have not been compromised by map errors. Details of the quality assurance program are given elsewhere (SRL-138).

#### **Analytical Standards**

Sediment Standards SRL 2.2, 3.1, and 4.1 were analyzed along with NURE sediment samples. Analyses of these standards provide routine checks of the analytical equipment and software. Tables 1a, 1b, and 1c contain the results from the standards run during the same time period as the sediment samples. These results give a good estimate of the precision of the data and can be used in estimating bias between this and other SRL reports.

TABLE 1

Accuracy and Precision of Analyses of SRL Standards

a. SRL 2.2 Standard

| <u>Element</u> | <u>Number*</u> | <u>Mean,<br/>ppm</u> | <u>Standard<br/>Deviation</u> | <u>Coefficient<br/>of Variation,<br/>%</u> | <u>Nominal<br/>Value,<br/>ppm**</u> |
|----------------|----------------|----------------------|-------------------------------|--|-------------------------------------|
| U              | 183            | 21.1                 | 3.4                           | 15.9                                       | 22.2                                |
| Th             | 174            | 106                  | 15.9                          | 15.0                                       | 125                                 |
| Hf             | 165            | 134                  | 29.9                          | 22.4                                       | 173                                 |
| Al             | 183            | 8300                 | 4000                          | 48.8                                       | 6500                                |
| Ce             | 159            | 499                  | 83                            | 16.5                                       | 614                                 |
| Fe             | 172            | 7300                 | 2200                          | 29.6                                       | 6700                                |
| Mn             | 179            | 262                  | 116                           | 44.3                                       | 300                                 |
| Sc             | 175            | 3.1                  | 2.8                           | 90.5                                       | 3.9                                 |
| Na             | 178            | 147                  | 101                           | 69.2                                       | 145                                 |
| Ti             | 180            | 11,800               | 2800                          | 24.1                                       | 13,200                              |
| V              | 182            | 31.8                 | 5.8                           | 18.2                                       | 34.7                                |
| Dy             | 179            | 23.5                 | 9.7                           | 41.1                                       | <22                                 |
| Eu             | 115            | 2.5                  | 1.7                           | 68.5                                       | 2.5                                 |
| La             | 174            | 284                  | 81.9                          | 28.7                                       | 301                                 |
| Lu             | 162            | 2.3                  | 0.4                           | 18.7                                       | 2.9                                 |
| Sm             | 164            | 37.2                 | 14.9                          | 40.2                                       | 51.3                                |
| Yb             | 158            | 15.2                 | 3.59                          | 23.1                                       | 18.2                                |

\* Number of determinations.

\*\* See Reference SRL-138, No. 16 [GJBX-160(79)], pp. 20-22.

TABLE 1

## b. SRL 3.1 Standard

| <u>Element</u> | <u>Number*</u> | <u>Mean,<br/>ppm</u> | <u>Standard<br/>Deviation</u> | <u>Coefficient<br/>of Variation,<br/>%</u> | <u>Nominal<br/>Value,<br/>ppm**</u> |
|----------------|----------------|----------------------|-------------------------------|--|-------------------------------------|
| U              | 175            | 41.1                 | 4.7                           | 11.5                                       | 41.3                                |
| Th             | 167            | 142                  | 22.9                          | 16.2                                       | 162                                 |
| Hf             | 64             | 6.1                  | 3.4                           | 56.4                                       | 7.4                                 |
| Al             | 174            | 39,400               | 5700                          | 14.5                                       | 30,600                              |
| Ce             | 149            | 772                  | 126                           | 16.3                                       | 903                                 |
| Fe             | 167            | 15,300               | 3700                          | 24.4                                       | 15,200                              |
| Mn             | 17             | 273                  | 202                           | 73.8                                       | 289                                 |
| Sc             | 169            | 4.0                  | 1.2                           | 30.2                                       | 4.2                                 |
| Na             | 169            | 932                  | 180                           | 19.6                                       | 901                                 |
| Ti             | 136            | 5300                 | 1100                          | 20.4                                       | 6100                                |
| V              | 170            | 45.3                 | 7.9                           | 17.4                                       | 54.4                                |
| Dy             | 162            | 51.2                 | 19.7                          | 38.4                                       | 50†                                 |
| Eu             | 138            | 3.8                  | 1.6                           | 42.3                                       | 3.9                                 |
| La             | 168            | 414                  | 69.7                          | 16.9                                       | 443.                                |
| Lu             | 152            | 4.0                  | 0.8                           | 19.2                                       | 4.4                                 |
| Sm             | 158            | 63.8                 | 29.9                          | 46.8                                       | 69.2                                |
| Yb             | 157            | 28.7                 | 5.28                          | 18.2                                       | 29.9                                |

\* Number of determinations.

\*\* See Reference SRL-138, No. 16 [GJBX-160(79)], pp. 20-22.

† Only one laboratory reported a value for dysprosium.

TABLE 1

## c. SRL 4.1 Standard

| <u>Element</u> | <u>Number*</u> | <u>Mean,<br/>ppm</u> | <u>Standard<br/>Deviation</u> | <u>Coefficient<br/>of Variation,<br/>%</u> | <u>Nominal<br/>Value,<br/>ppm**</u> |
|----------------|----------------|----------------------|-------------------------------|--|-------------------------------------|
| U              | 179            | 0.53                 | 0.08                          | 15.6                                       | 0.58                                |
| Th             | 77             | 2.8                  | 1.2                           | 43.8                                       | 2.1                                 |
| Hf             | 121            | 3.0                  | 1.3                           | 43.6                                       | 4.4                                 |
| Al             | 180            | 73,000               | 11,100                        | 15.2                                       | 66,700                              |
| Ce             | 100            | 48.4                 | 16.2                          | 33.4                                       | 44                                  |
| Fe             | 172            | 75,700               | 11,300                        | 14.9                                       | 87,300                              |
| Mn             | 175            | 1760                 | 290                           | 16.8                                       | 1970                                |
| Sc             | 172            | 15.4                 | 4.3                           | 27.9                                       | 21                                  |
| Na             | 177            | 16,900               | 2600                          | 15.5                                       | 15,100                              |
| Ti             | 162            | 23,100               | 5500                          | 23.9                                       | 25,200                              |
| V              | 177            | 240                  | 41.8                          | 17.1                                       | 273                                 |
| Dy             | 34             | 3.9                  | 3.1                           | 80.4                                       | <22                                 |
| Eu             | 81             | 1.4                  | 0.9                           | 63.4                                       | 1.2                                 |
| La             | 151            | 15.8                 | 4.20                          | 26.5                                       | 18.6                                |
| Lu             | 87             | 0.24                 | 0.12                          | 51.5                                       | 0.28                                |
| Sm             | 143            | 3.1                  | 1.8                           | 59.19                                      | 4.2                                 |
| Yb             | 32             | 2.6                  | 1.4                           | 54.68                                      | 1.6                                 |

\* Number of determinations.

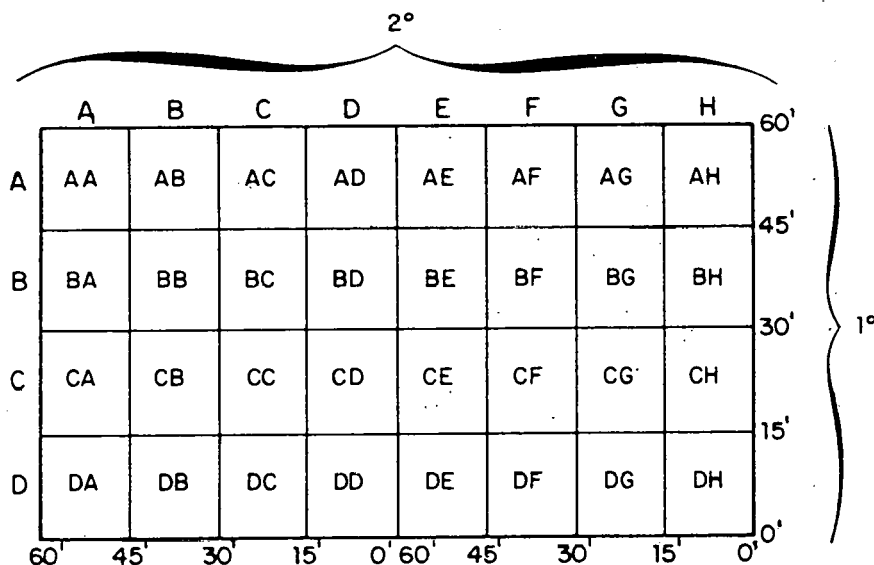
\*\* See Reference SRL-138, No. 16 [GJBX-160(79)], pp. 20-22.

Periodically, DOE intersite comparison standards are analyzed. An independent quality assurance program based on these standards is conducted for DOE by Ames (Iowa) Laboratory (D'Silva, et al.).

#### DESCRIPTION OF DATA TABLES

This section of the report summarizes the type of data tabulated on microfiche. Ground-water analyses and site descriptions are tabulated in Tables A-1 and A-2, both of which can be found on the microfiche titled PRICE TABLES. Sediment analyses and site descriptions are tabulated in Tables B-1, B-2, and B-3, which are also on the microfiche titled PRICE TABLES.

Table A-1 begins with the sample's SRL identification number, which is composed of four letters and a three-digit number. The first two letters identify the quadrangle. PE is the two-letter designator for the Price 1° x 2° NTMS quadrangle. The third and fourth letters define which 15-minute quadrangle contains the sampling site (see chart below).



Numbers from 001 to 499 designate surface sites. Numbers from 501 to 999 designate ground-water sites. The first sediment sample, therefore, taken from the extreme northeastern portion of the Price 1° x 2° NTMS quadrangle would be PEAH001.

Other entries on Table A-1 include a DOE identification number; pH, conductivity, alkalinity, and scintillometer readings; analyses for U, Br, Cl, F, He, Mn, Na, and V; and the ratio of uranium-to-conductivity (multiplied by 1000 for convenience; U x 1000/cond.). All entries are self-explanatory except those noted below (see also the **USER'S GUIDE**).

DOE ID is a 28-digit number that includes the following parts:

Digit Number

|       |  |
|-------|--|
| 1-2   | State (See Table 1 in the <b>USER'S GUIDE</b> )  |
| 4-10  | Latitude of site   |
| 12-19 | Longitude of site  |
| 21    | Laboratory code (4 = SRL)  |
| 23-24 | Sample type (See Table 2 in the <b>USER'S GUIDE</b> ).                                     |
| 26-28 | Replication code. Generally only original samples (-000) are reported in the Data Reports. |

Table A-2 shows SRL identification number; concentrations of Al, Dy, and Mg; sampling date; sample collection team number; and the following characteristics of the well or spring that was sampled:

|          |                                   |
|----------|-----------------------------------|
| WATRTEMP | Water Temperature, in °C.         |
| WELDEPTH | Depth of well in feet.            |
| DPTHCONF | Confidence in depth measurement.* |
| WELCLASS | Classification of well use.*      |

\* Definitions of entries under these headings are detailed in the **USER'S GUIDE**.

SMPPPOINT            Point in plumbing system where water was  
                         taken.\*

WELLODOR            Presence of hydrogen sulfide or other odor.

Sediment analyses and site descriptions are tabulated in Tables B-1, B-2, and B-3, which are on the microfiche labeled PRICE TABLES.

Table B-1 includes SRL and DOE identification numbers similar to those described above for ground-water sites. Table B-1 also includes scintillometer readings, pH, conductivity, and alkalinity of stream water, plus elemental concentrations of U, Th, Hf, Ce, Fe, Mn, Na, Sc, Ti, and V.

Table B-2 (Supplementary Data - Sediments) includes the SRL identification number and concentrations of Al, Dy, Eu, La, Sm, Yb, and Lu.

Table B-3 (Supplementary Data - Sediments) includes the SRL identification number of the following entries:

|   |  |
|---|--|
| SAMPTYPE                                    | Type of soil, sediment, etc., sampled (See Table 2 in the <b>USER'S GUIDE</b> ). |
| ROCKTYPE                                    | Type of rock underlying sampling site.*  |
| SEDSIZE                                     | Dominant size of particles in sediment at site.*                                 |
| STRWIDTH<br>STRDEPTH<br>STRFLOW<br>STRLEVEL | Size and flow rate of stream at sampling site.*                                  |
| VEGTYPE                                     | Dominant type of vegetation at site.*  |
| VEGDENS                                     | Vegetation density at site.*   |
| RELIEF                                      | Local relief at site.*   |
| COMPOSIT                                    | Number of subsamples blended into sample.  |

\* Definitions of entries under these headings are detailed in the **USER'S GUIDE**.

|          |   |
|----------|---|
| CONTAMN1 | Activities or contaminants that may affect      |
| CONTAMN2 | the material sampled.*                          |
| CONTAMN3 |   |
| CONTAMN4 |   |
| FRMATION | The rock formation that underlies the site.*    |
| ODOR     | Odors detected in sampled material.*            |
| WATRTEMP | Water temperature in °C.                        |
| SAMPDATE | Date sample was collected.                      |
| TEAM     | Numerical designator of sample collection team. |

Further details of how the field data are recorded can be found in the **USER'S GUIDE** and in Price and Jones (1979).

#### Elemental Analyses

Concentrations of each element are reported in parts per million (ppm) by weight for sediments, and in parts per billion (ppb) for water. Values have been rounded to appropriate significant figures. Note that elemental (not oxide) concentrations are quoted in this table. Values below detection limits are indicated by a minus (-). For example, -3 means that the sample contains less than 3 ppm of that element. If background is high, a period (.) is used to indicate that the element was not detected, and that the detection limit is not estimated for that element. Missing data are indicated by "M". All analytical results are missing when there was insufficient sample for analysis.

\* Definitions of entries under these headings are detailed in the **USER'S GUIDE**.

## BIBLIOGRAPHY

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Price, V., and Jones, P. L., 1979, **Training Manual for Water and Sediment Geochemical Reconnaissance:** SRL Internal Doc. DPST-79-219, E. I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S.C.

SRL-138, **Savannah River Laboratory Quarterly and Semiannual Reports, Hydrogeochemical and Stream Sediment Reconnaissance, -National Uranium Resource Evaluation Program:** E. I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S.C.

| No. | Period                  | SRL Doc. No.  | DOE-GJO<br>Doc. No.* |
|-----|-------------------------|---------------|----------------------|
| 1   | January-March 1975      | DPST-75-138-1 | GJBX-5(76)           |
| 2   | April-June 1975         | DPST-75-138-2 | GJBX-6(76)           |
| 3   | July-September 1975     | DPST-75-138-2 | GJBX-7-(76)          |
| 4   | October-December 1975   | DPST-75-138-4 | GJBX-7(76)           |
| 5   | January-March 1976      | DPST-76-138-1 | GJBX-17(76)          |
| 6   | April-June 1976         | DPST-76-138-2 | GJBX-27(76)          |
| 7   | July-September 1976     | DPST-76-138-2 | GJBX-63(76)          |
| 8   | October-December 1976   | DPST-76-138-4 | GJBX-6(77)           |
| 9   | January-March 1977      | DPST-77-138-1 | GJBX-35(77)          |
| 10  | April-June 1977         | DPST-77-138-2 | GJBX-55(77)          |
| 11  | July-September 1977     | DPST-77-138-3 | GJBX-90(77)          |
| 12  | October-December 1977   | DPST-77-138-4 | GJBX-37(78)          |
| 13  | January-March 1978      | DPST-78-138-1 | GJBX-66(78)          |
| 14  | April-September 1978    | DPST-78-138-2 | GJBX-13(79)          |
| 15  | October 1978-March 1979 | DPST-79-138-1 | GJBX-86(79)          |
| 16  | April-September 1979    | DPST-79-138-2 | GJBX-160(79)         |
| 17  | October 1979-March 1980 | DPST-80-138-1 | GJBX-146(80)         |

\* 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, CO 91501. Checks or money orders should be made out to Bendix Field Engineering Corp., the operations contractor for DOE's Grand Junction Office.

SRL-146, SRL-NURE Data Reports, E. I. du Pont de Nemours & Co.,  
Savannah River Laboratory, Aiken, S.C.

| No. | NTMS 1° x 2°<br>Quadrangle | SRL Doc. No.   | DOE-GJO<br>Doc. No.* |
|-----|----------------------------|----------------|----------------------|
| 1   | Winston-Salem†             | DPST-77-146-1  | GJBX-6(77)           |
| 2   | Spartanburg                | DPST-77-146-2  | GJBX-09(78)          |
| 3   | Charlotte                  | DPST-78-146-1  | GJBX-40(78)          |
| 4   | Greenville                 | DPST-78-146-2  | GJBX-47(78)          |
| 5   | Winston-Salem††            | DPST-78-146-3  | GJBX-58(78)          |
| 6   | Greensboro                 | DPST-78-146-4  | GJBX-74(78)          |
| 7   | Knoxville                  | DPST-78-146-5  | GJBX-75(79)          |
| 8   | Scranton                   | DPST-78-146-6  | GJBX-02(79)          |
| 9   | Athens                     | DPST-78-146-7  | GJBX-20(79)          |
| 10  | Harrisburg                 | DPST-79-146-1  | GJBX-31(79)          |
| 11  | Portland                   | DPST-79-146-2  | GJBX-28(79)          |
| 12  | Glens Falls                | DPST-79-146-3  | GJBX-44(79)          |
| 13  | Augusta                    | DPST-79-146-4  | GJBX-43(79)          |
| 14  | Dyersburg                  | DPST-79-146-5  | GJBX-58(79)          |
| 15  | Poplar Bluff               | DPST-79-146-6  | GJBX-63(79)          |
| 16  | Hartford                   | DPST-79-146-7  | GJBX-94(79)          |
| 17  | Williamsport               | DPST-79-146-8  | GJBX-152(79)         |
| 18  | Newark                     | DPST-79-146-9  | GJBX-128(80)         |
| 19  | Albany                     | DPST-79-146-10 | GJBX-140(79)         |
| 20  | Atlanta                    | DPST-79-146-11 | GJBX-129(79)         |
| 21  | Delta, Richfield†††        | DPST-79-146-12 | GJBX-161(79)         |
| 22  | Walker Lake                | DPST-79-146-13 | GJBX-107(80)         |
| 23  | McDermitt, Wells†††        | DPST-79-146-14 | GJBX-117(80)         |
| 24  | Reno                       | DPST-79-146-15 | GJBX-108(80)         |
| 25  | Death Valley               | DPST-79-146-16 | GJBX-135(80)         |
| 26  | Flagstaff††††              | DPST-79-146-17 | (I)                  |
| 27  | Marble Canyon              | DPST-79-146-18 | (I)                  |
| 28  | Grand Canyon               | DPST-79-146-19 | (in process)         |
| 29  | Pocatello                  | DPST-79-146-20 | (in process)         |
| 30  | Mesa                       | DPST-80-146-1S | GJBX-81(80)          |
| 31  | Salton Sea                 | DPST-80-146-2S | GJBX-113(80)         |
| 32  | Ritzville                  | DPST-80-146-3  | (in process)         |
| 33  | Elko                       | DPST-80-146-4  | (in process)         |
| 34  | Challis                    | DPST-80-146-5  | GJBX-91(80)          |
| 35  | Klamath Falls              | DPST-80-146-6  | (in process)         |
| 36  | Salina                     | DPST-80-146-7  | (in process)         |
| 37  | Escalante                  | DPST-80-146-8  | (in process)         |
| 38  | Price                      | DPST-80-146-9  | (this report)        |

† Sediment only. †† Ground water only.  
 ††† SRL analyses of samples collected by Lawrence Livermore Laboratory.  
 †††† Abbreviated report; geology, hydrology, and data discussion sections are omitted.  
 S Supplemental Data Reports. (I) Indian tribal lands; restricted distribution.