U.S. GEOLOGICAL SURVEY CIRCULAR 931

Arizona Mineral Resource Data: Information Available Through the U.S. Geological Survey Mineral Resource Data System

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By Jocelyn A. Peterson

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Arizona Mineral Resource Data: Information Available Through The U.S. Geological Survey Mineral Resource Data System

By Jocelyn A. Peterson

INTRODUCTION

The Arizona portion of the Mineral Resource Data System (MRDS; formerly the Computerized Resource Information Bank, CRIB) file is now accessible to the public. This portion of the file currently comprises approximately 3,300 records which contain information on the location, geology, and production of metallic- and a few nonmetallic-mineral commodities in Arizona. These records are stored in a mainframe computer at the U.S. Geological Survey (USGS) in Reston, Va. The data are dynamic; new information is added as it becomes available, and existing records are corrected as errors are found. Public inquiries may be addressed to the Regional MRDS Representative at the U.S. Geological Survey, 12201 Sunrise Valley Drive, Reston, VA 22092, or at the U.S. Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025. Procedures for public access can be obtained through either of these representatives.

Several methods of retrieval are available for MRDS records, including computer printouts of entire records or parts of records, and (or) map plots for selected areas. All retrieval forms allow highly selective searches of the file so that the user can obtain the specific information required.

Arizona MRDS records provide a source of resource information compiled from published literature, private reports and files, and field examinations by the reporters. The information is nonproprietary.

Most of the Arizona MRDS records are for metallic-mineral commodities, although data are also included for uranium and asbestos, which are important fuel and nonmetallic-mineral commodities, respectively. The file omits information on construction materials such as sand and gravel, industrial minerals, geothermal resources, organic fuels, and coal, either because such materials are widespread and generally available, the information about these commodities is included in other data bases, or the commodity is not geologically or economically important in Arizona.

Acknowledgements.--Compilation relies on data from many sources. Some of the many people who have organized and entered data into the Arizona portion of the file include Kris H. Johnson, Robert K. Hall, Jan L. Zigler, Daniel J. Bright, Joy L. Harner, Edward Geary, and Royce Jones, all of the USGS in Menlo Park, Calif.; and Don E. Gest, Susan R. Calder, Frances A. Roth, Peter H. Laraba, Ed H. DeWitt, Kathryn L. Steinzig, and Ignacio J. Rogriguez, all of the Arizona Bureau of Geology and Mineral Technology (ABGMT). While at the ABGMT, Jan Wilt compiled comprehensive information about the molybdenum occurrences in Arizona, and much of the molybdenum information in the Arizona records was extracted from her compilation. Special thanks are due to Donald F. Huber of the USGS in Menlo Park, Calif., who coordinated the contracts with the ABGMT. Several geologists of the USGS made their field notes available for entry into the file; these geologists include Roger P. Ashley, Roger D. Dockter, Warren E. Yeend, William J. Keith, and Norman G. Banks. To these and others who provided data and assistance for the completion of the Arizona records, I am very grateful.

PURPOSE OF THE ARIZONA MRDS RECORDS

MRDS records in general and the Arizona MRDS records in particular are designed to be working reference sources for solving various administrative and geologic problems. The data can be used to assess known and potentially locatable mineral resources, to provide a first-time look at the mineral deposits within a new study area, and to serve as a research tool for compiling regional metallogenic data.

COMPLEMENTARY FILES

Arizona MRDS records complement other resource files containing data pertaining to organic fuels, water resources, geothermal resources, and coal resources, as described briefly by the Office of the Data Administrator (1983). Information about the economic factors of production of metallic- and nonmetallic-mineral commodities is stored in the Minerals Availability System (MAS) of the U.S. Bureau of Mines (1974). Those MRDS records for Arizona which can be linked to records in MAS are indicated in the file-link field of each MRDS record. MAS information is available from the U.S. Bureau of Mines, Western Field Operations Center, E. 315 Mountgomery Avenue, Spokane, WA 99107.

DESCRIPTION OF THE RECORDS

The Arizona portion of the MRDS file currently contains 3,301 records similar to those listed in table 1, which shows one record with a large amount and one with a small amount of information to illustrate the range of information contained in each record, whereas most records lie somewhere between the two examples. An individual record may contain information about the deposit's location, the commodities present, its exploration history, the size and shape of the deposit, mining information, geologic data, and at least one reference (Keefer and Calkins, 1978). Generally, these references include one or two main published references to which the user can refer

for additional information, although some of the records were generated solely from field notes or unpublished nonproprietary file data.

Locational information is stored in at least one of three ways: latitude and longitude; universal-transverse-mercator (UTM) coordinates; and township, range, and section. Those deposits that could not be located to within a mile of their actual site are omitted from MRDS.

Much of the production data for Arizona is currently stored on magnetic tape and is not yet in a form compatible with MRDS. When transformation of these data to an MRDS-compatible format is complete, they will be entered into MRDS.

The Arizona portion of MRDS contains records on large operational mines, mined-out localities, small mines, prospects, and occurrences. Records for mines that have produced more than 100 tons of ore are fairly complete, whereas information about small mines, prospects, and occurrences is less systematically included and reflects, in part, the amount of information about the commodity and (or) the objectives of the reporter.

The MRDS file is accessed by a storage-and-retrieval system known as the General Information Processing System (GIPSY), which allows for the change of existing information, entering of new information, and deletion of old or incorrect information. It is also the means by which MRDS is accessed during a retrieval.

SOURCES OF INFORMATION

The data collected for the Arizona records came from various sources within the USGS and the ABGMT. Most of these data came from published literature, both old and recent. At the outset, skeletal records were constructed from U.S. Bureau of Mines card files and State commodity sheets for Arizona housed at the former Conservation Division of the USGS (now part of the U.S. Bureau of Land Management, but no longer a distinct organizational entity). These records were subsequently expanded into the current data set by updating the existing information and by adding records for mines not in the original list. Several M.S. and Ph.D. theses provided data on specific districts or mines. The ABGMT drew on their numerous files of notes and clippings and used information from MAS. Finally, several records were assembled from data collected by USGS geologists during the Resource and Land Information (RALI) program carried out in 1973-74; these records are concerned primarily with small unnamed prospects.

COVERAGE AND ACCURACY

The Arizona records are a compilation of known information primarily based on a search of existing literature and unpublished files. Each record has been checked for location accuracy to within one mile of the reported location, although most location data are much more accurate. A designation of accuracy as "accurate" or "estimated" was recently instituted for MRDS records and all newer records include these designations. On older records, this information was filled in during a final check of the data. To locations that were reported within a quarter-section or where I thought I knew how the reporter had filled in the data, I assigned the designation of "accurate"; to all other locations, I assigned the designation of "estimated."

Because of the many people working on the compilation simultaneously and because of the changing standards of reporting over the many years during which these data were collected, earlier records varied widely and were inconsistent. Therefore, once most of the records were stored in the computer, an effort was made to update the data to the current standards. Keypunching errors are also inevitable in a data base this large. To minimize such problems, several fields were checked and changed as necessary. In addition to adding a designation of "accurate" or "estimated" to the locations in older records, the latitude and longitude of each record were checked to ensure that they fell within the quadrangle reported in the record. If they did not, the location (or on some records the quadrangle) was changed. The ABGMT recently redefined the mining districts in Arizona, so records with older district names have been changed to conform with these new names.

Several fields, most commonly those for mineralogy and deposit type, may have the designation "unknown." This designation ordinarily means that the source documents did not provide this information and that the reporter was unable to extrapolate the information from nearby localities or to infer it from the geology of the area. Also, any of the required fields found blank at the final check of the record were given the designation "unknown" because insufficient time was available to check the geologic maps and literature for each deposit. Deposits with no entry for deposit name were designated "unnamed deposit." Deposits without a yes or no production designation were generally presumed not to have produced, on the basis of other information in the record; a few deposits were designated undetermined ("und"); and a few others indicated a small production.

Of course, every record could not be proofread in detail to correct spelling or keypunching errors, but an effort was made to correct spelling errors in the ore-mineralogy field.

Mention needs to be made about the deposit-size designation for some of the Colorado Plateau uranium deposits. The literature commonly does not cite a size for individual deposits, but only for districts, so the reporter used this district designation for each deposit. Where this usage has been followed, one of the comments fields alerts the user to this fact.

MAPS OF MINERAL OCCURRENCES

The following maps (figs. 2-23) provide a visual overview of the contents of the Arizona portion of MRDS and give a general indication of the overall sizes of the various deposits (although deposit size does not necessarily indicate the importance of the given commodity within the deposit). The main geologic provinces of Arizona—the Basin and Range, the Colorado Plateau, and the Plateau/Basin and Range transition zone (fig. 1)—are reflected in the distribution of mineral commodities. The maps are arranged in the following order: Base metals (Cu, Pb, Zn), ferroalloy metals (Fe, Mn, Mo, V), precious metals

(Au, Ag), uranium, tungsten, mercury, asbestos, barium (as barite), and less abundant metals (Sb, As, Be, Cd, Se, Te, Bi, Cr, Co, Ni, Li, Nb + Ta, the rare-earth elements, Th, Sn). These maps were compiled directly from the computer and have not been edited or reviewed for conformity with USGS standards and nomenclature. At the small scale of these maps, many points are not resolvable, but better resolution can be obtained by compiling at a larger scale.

REFERENCES CITED

Keefer, E. K., and Calkins, J. A., 1978, Description of individual data items and codes in CRIB: U.S. Geological Survey Circular 755-B, p. B1-B32.

Office of the Data Administrator, compiler, 1983, Scientific and technical, spatial, and bibliographic data bases and systems of the U.S. Geological Survey, 1983, including other Federal agencies (revised ed.): U.S. Geological Survey Circular 817.

U.S. Bureau of Mines, 1974, The Bureau of Mines minerals availability system and resource classification manual: U.S. Bureau of Mines Information Circular 8654, 199 p.

FIGURES 1-23; TABLE 1

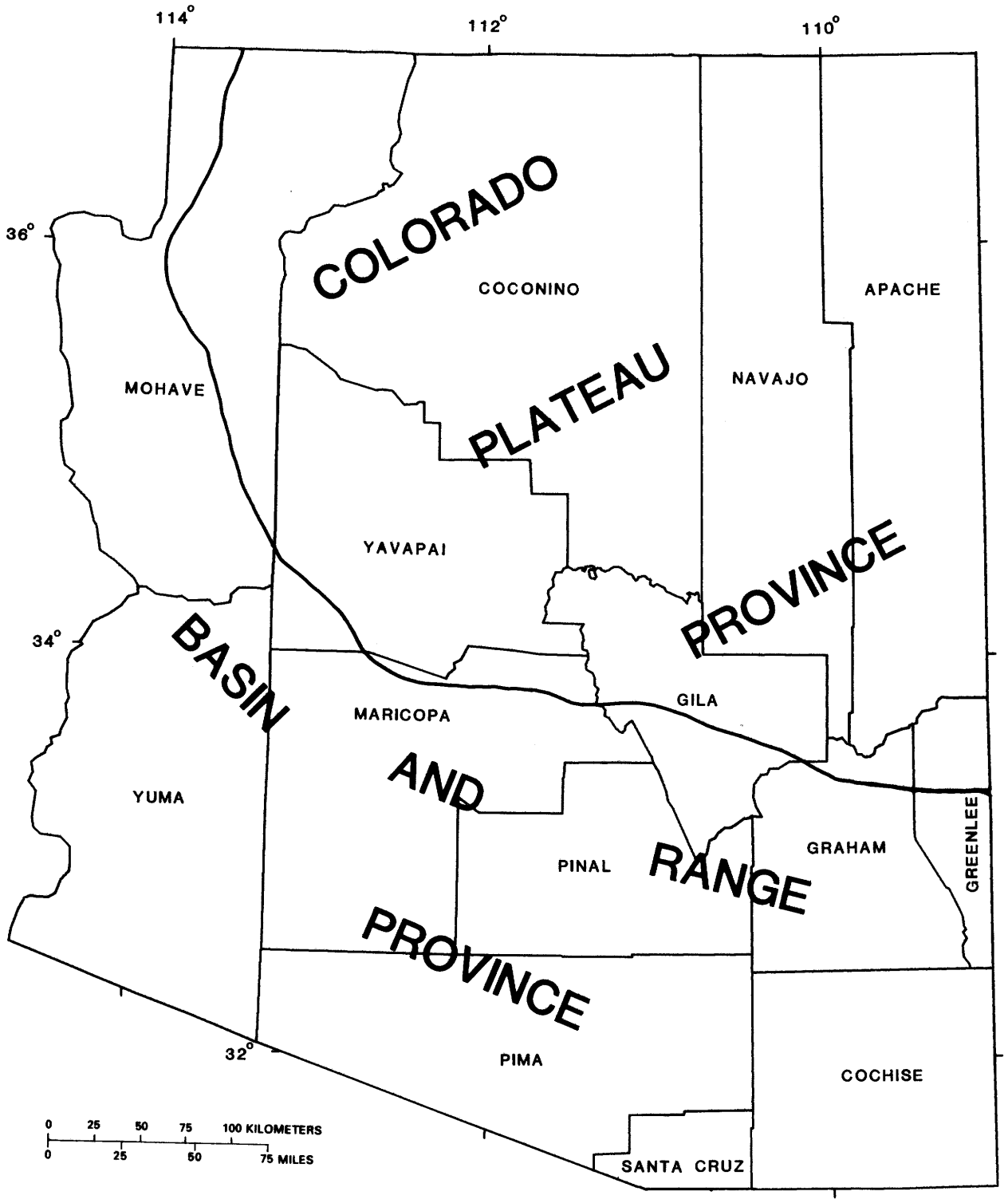

Figure 1.--Sketch map of Arizona showing physiographic provinces and county boundaries.

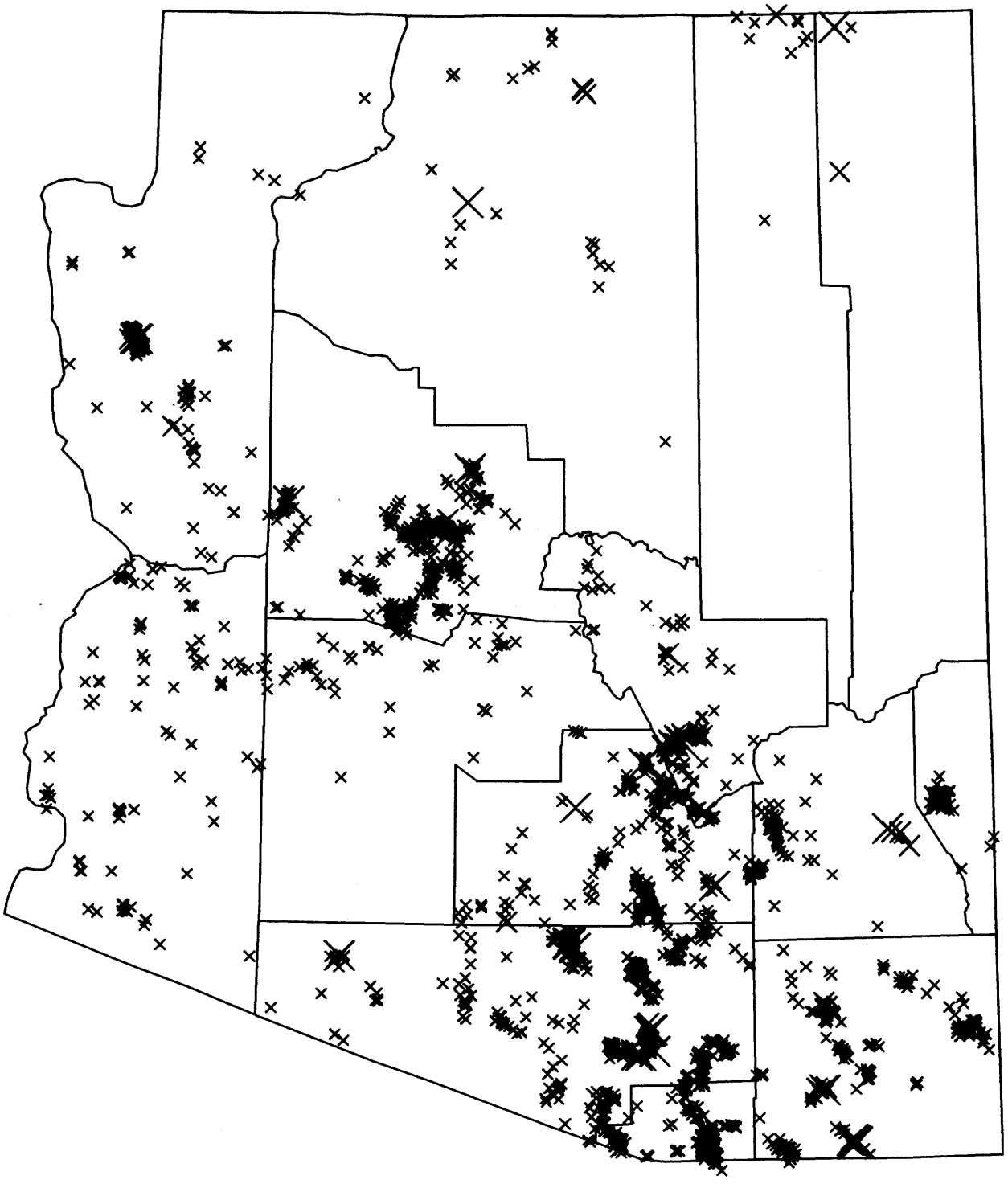

Figure 2.--Deposits and occurrences of copper (X's) listed in the Arizona MRDS records.
Note.--In this and the following figures (2-23) sizes of symbols indicate relative sizes of deposits and occurrences, but not necessarily amounts of the specified commodity present.

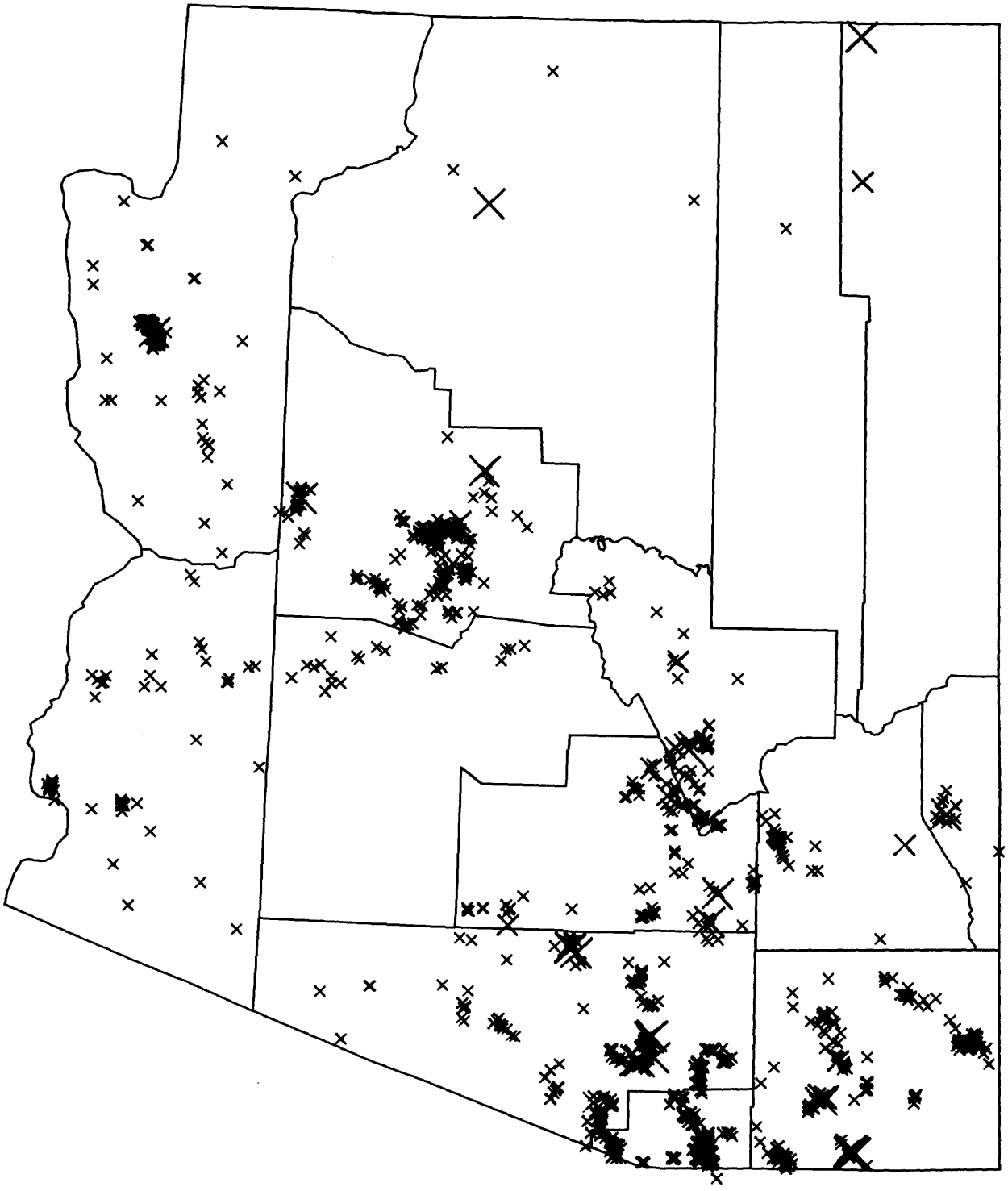

Figure 3.--Deposits and occurrences of lead (X's) listed in the Arizona MRDS records.

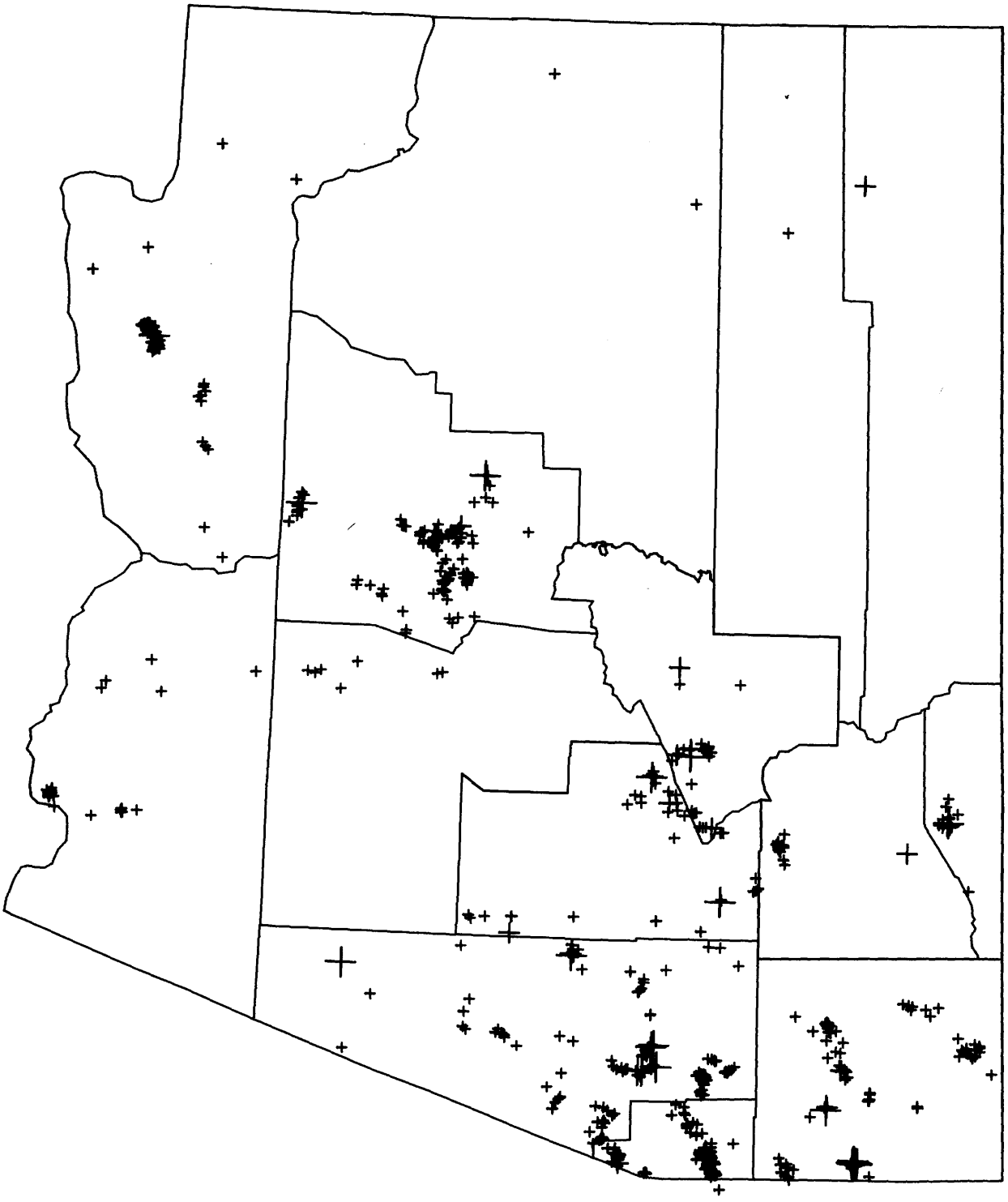

Figure 4.--Deposits and occurrences of zinc (crosses) listed in the Arizona MRDS records.

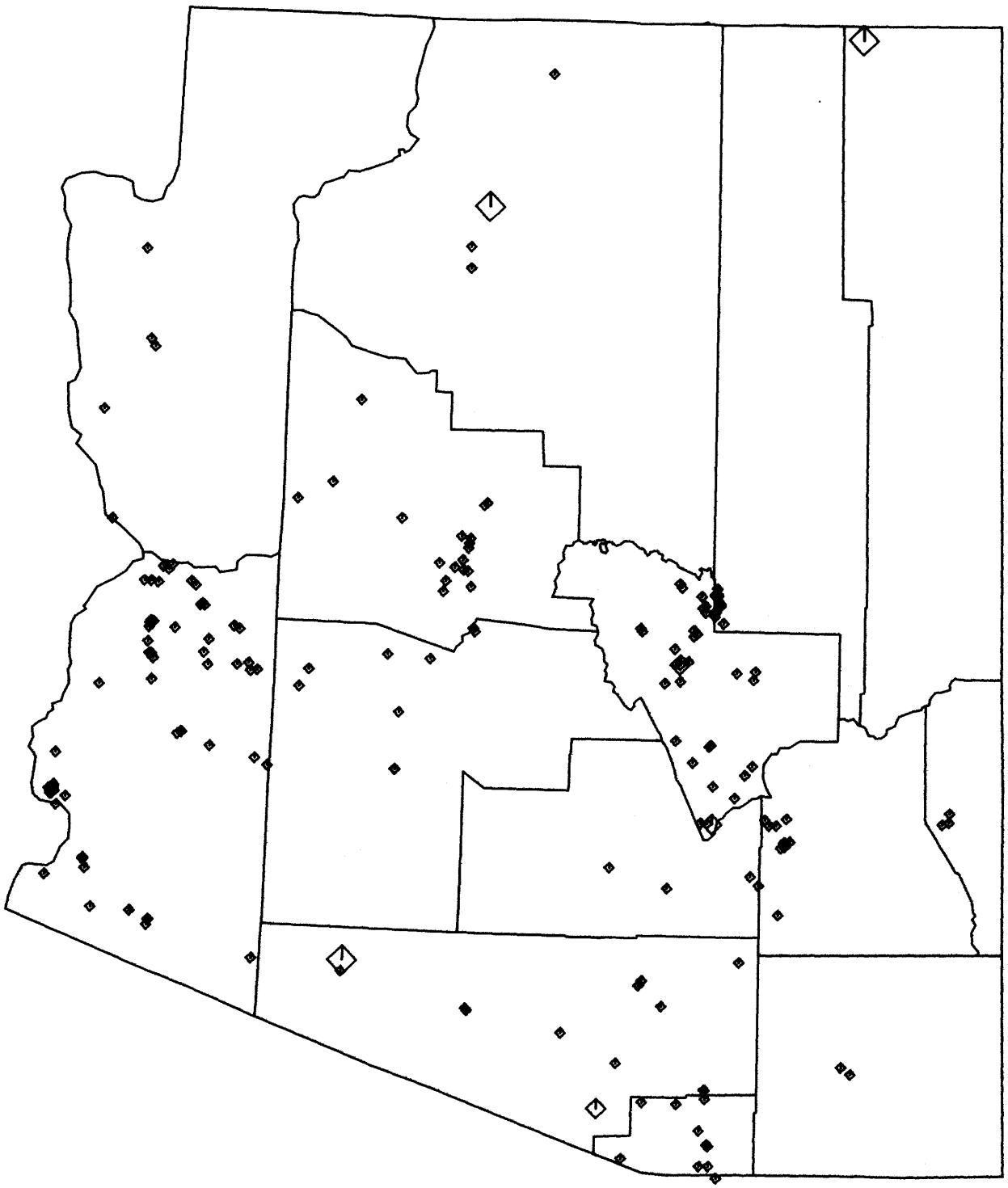

Figure 5.--Deposits and occurrences of iron (diamonds) listed in the Arizona MRDS records.

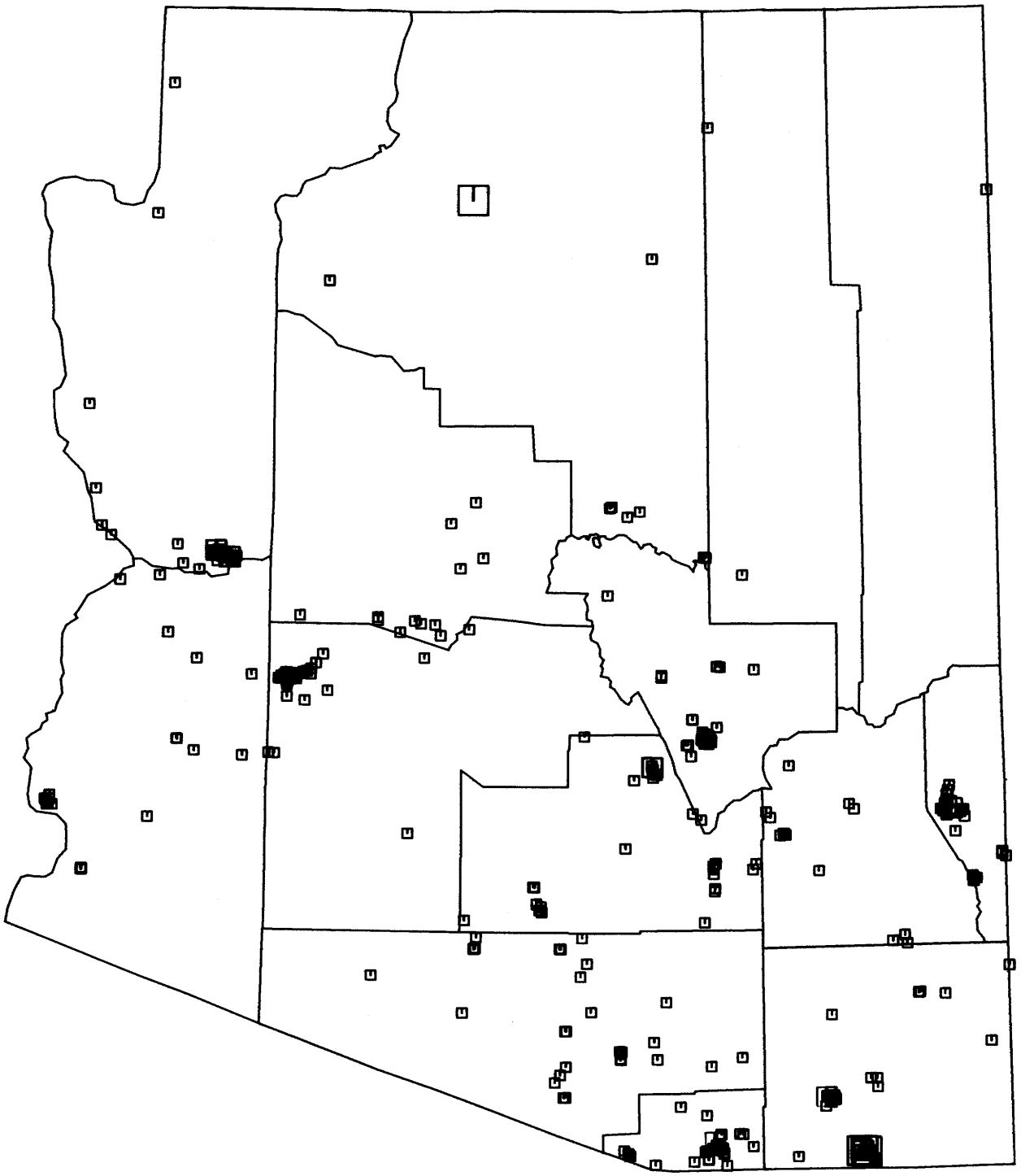

Figure 6.--Deposits and occurrences of manganese (squares) listed in the Arizona MRDS records.

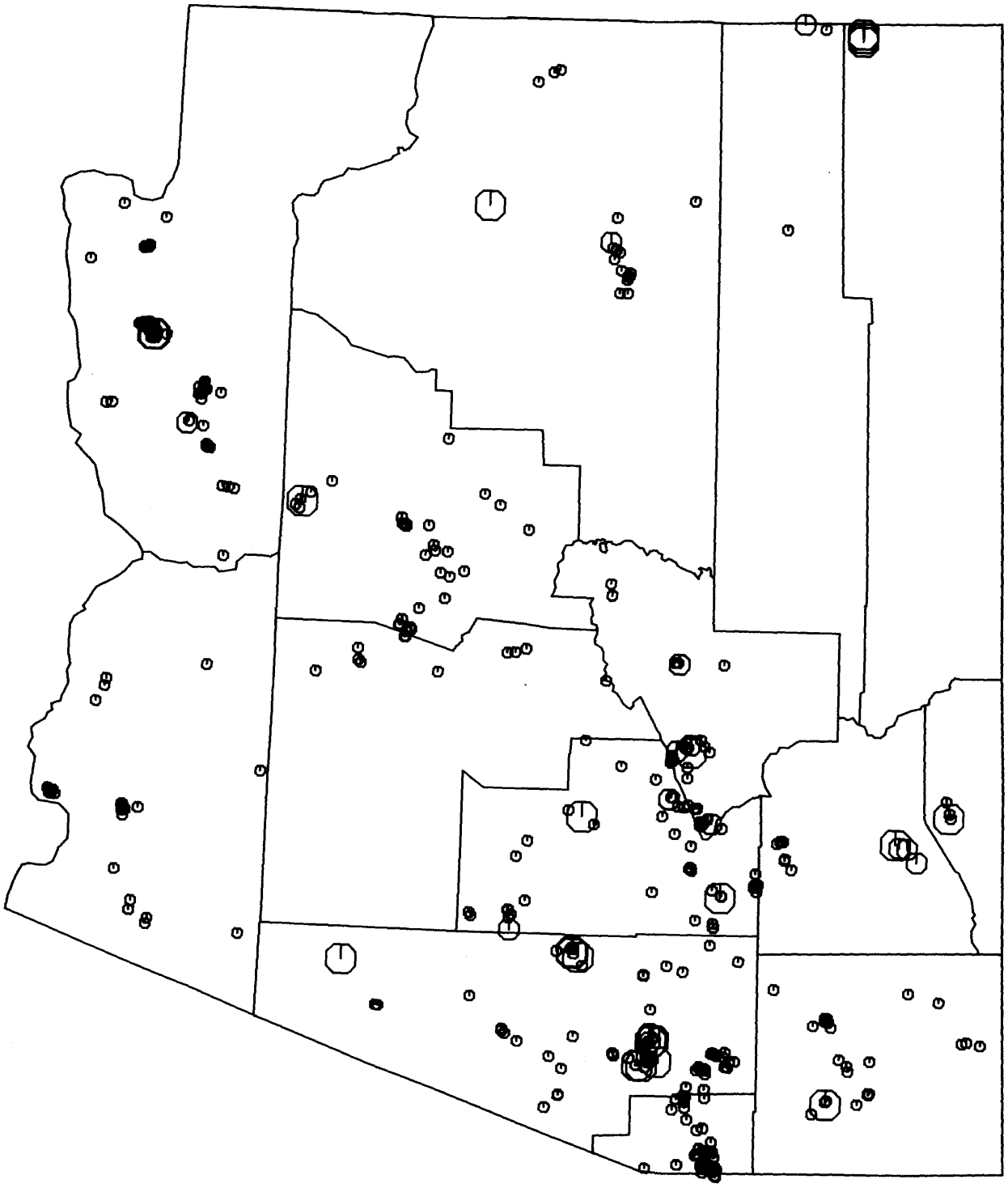

Figure 7.--Deposits and occurrences of molybdenum (octagons) listed in the Arizona MRDS records.

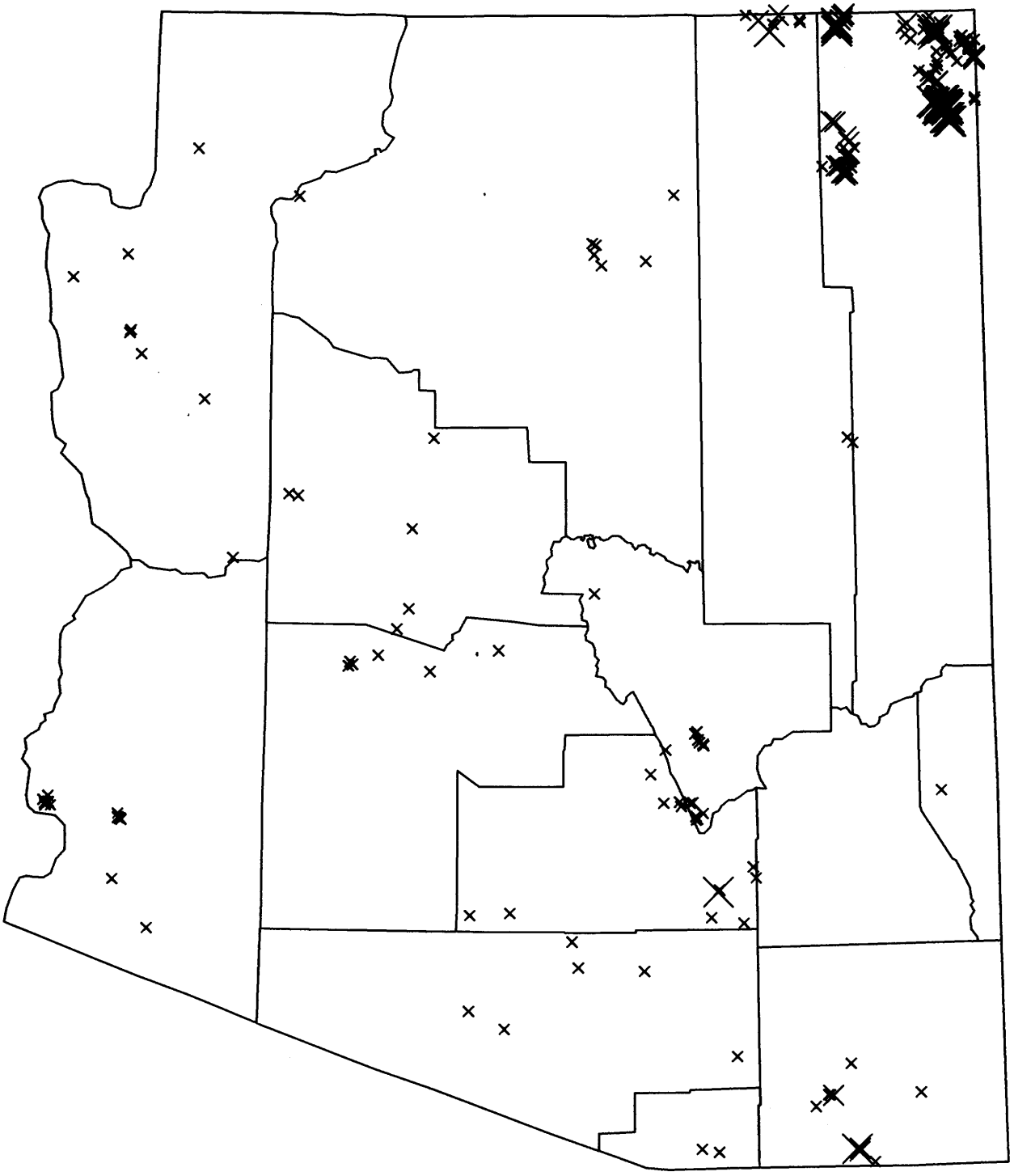

Figure 8.--Deposits and occurrences of vanadium (X's) listed in the Arizona MRDS records.

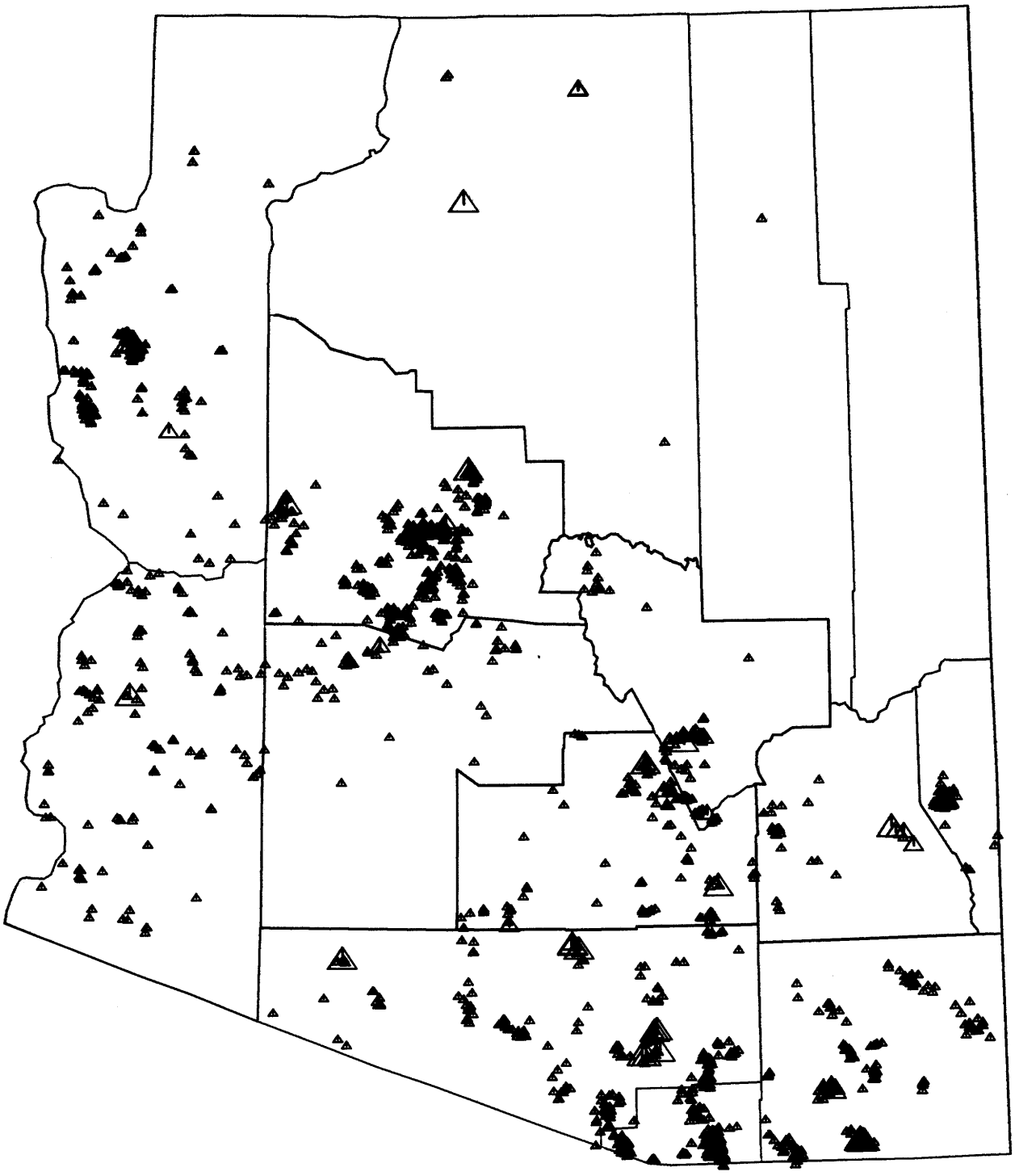

Figure 9.--Deposits and occurrences of gold (triangles) listed in the Arizona MRDS records.

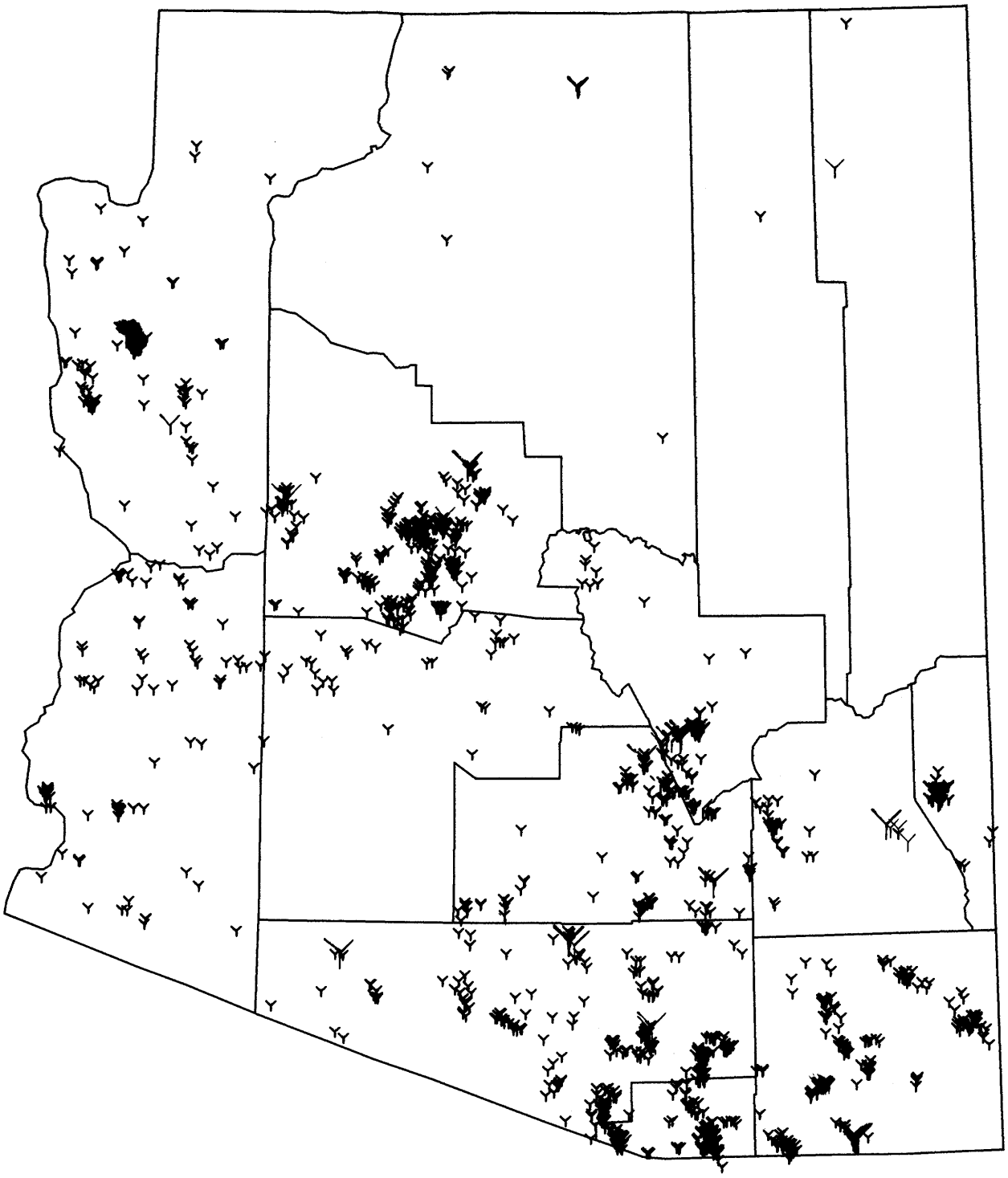

Figure 10.--Deposits and occurrences of silver (Y's) listed in the Arizona MRDS records.

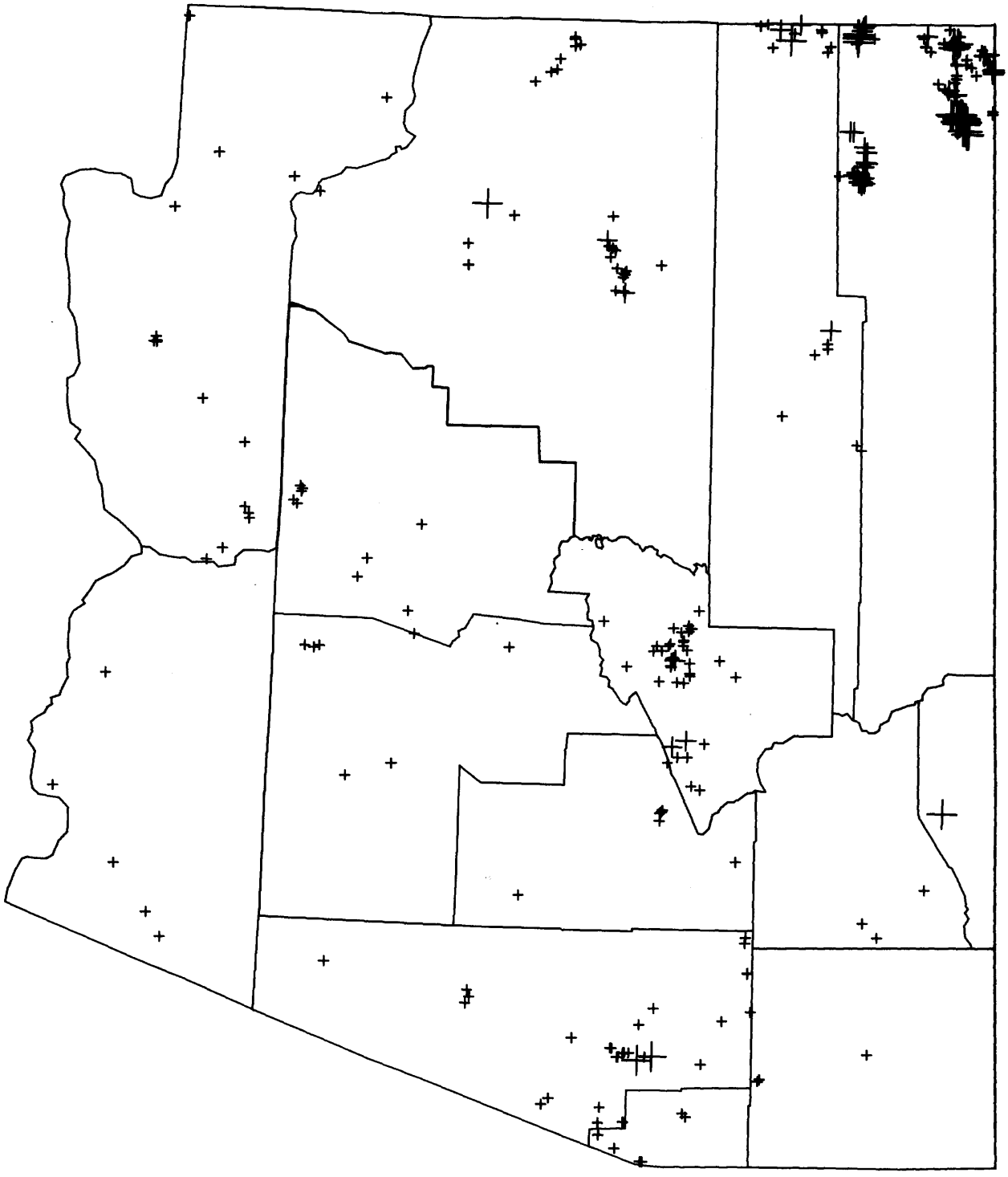

Figure 11.--Deposits and occurrences of uranium (crosses) listed in the Arizona MRDS records.

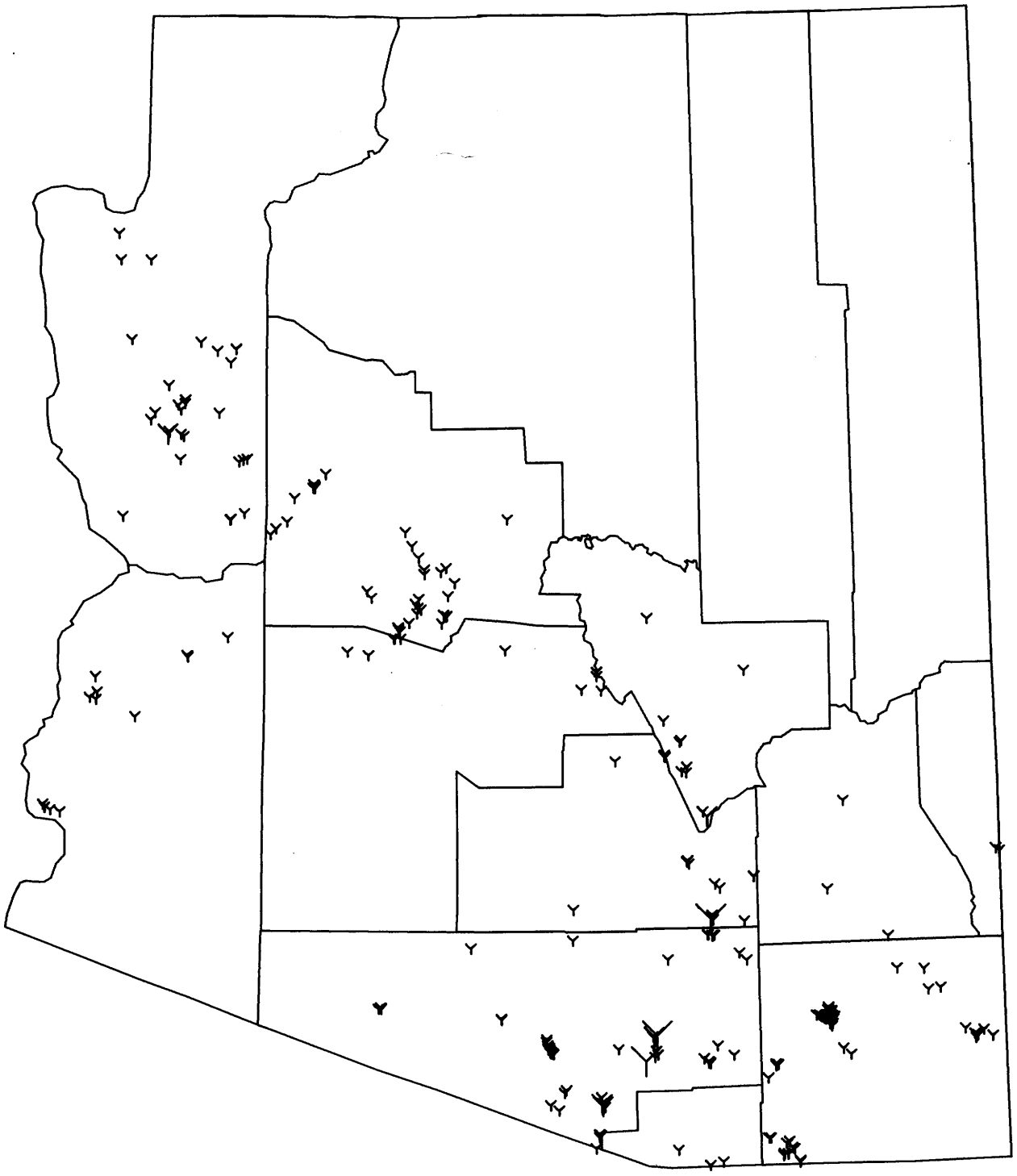

Figure 12.--Deposits and occurrences of tungsten (Y's) listed in the Arizona MRDS records.

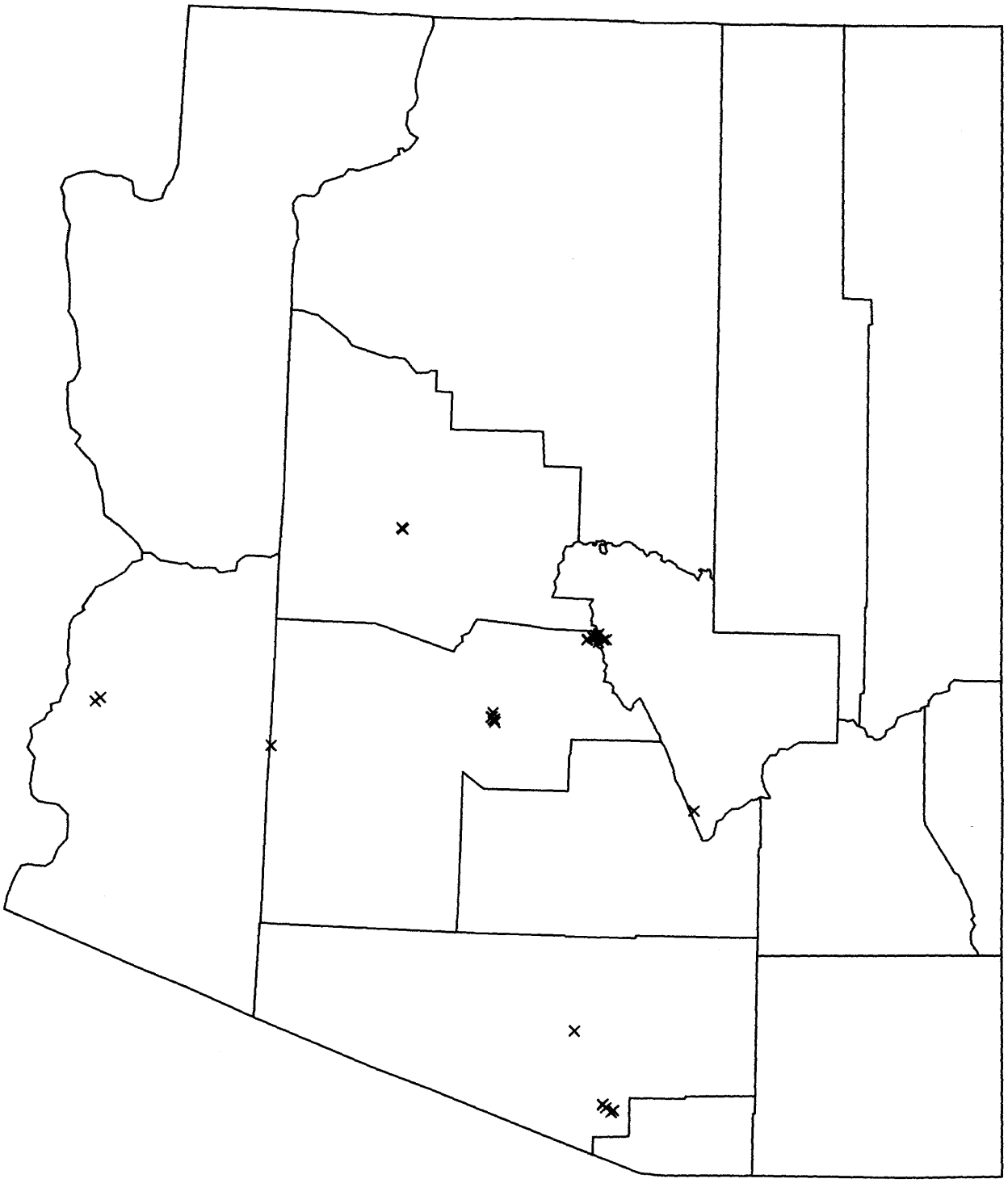

Figure 13.--Deposits and occurrences of mercury (X's) listed in the Arizona MRDS records.

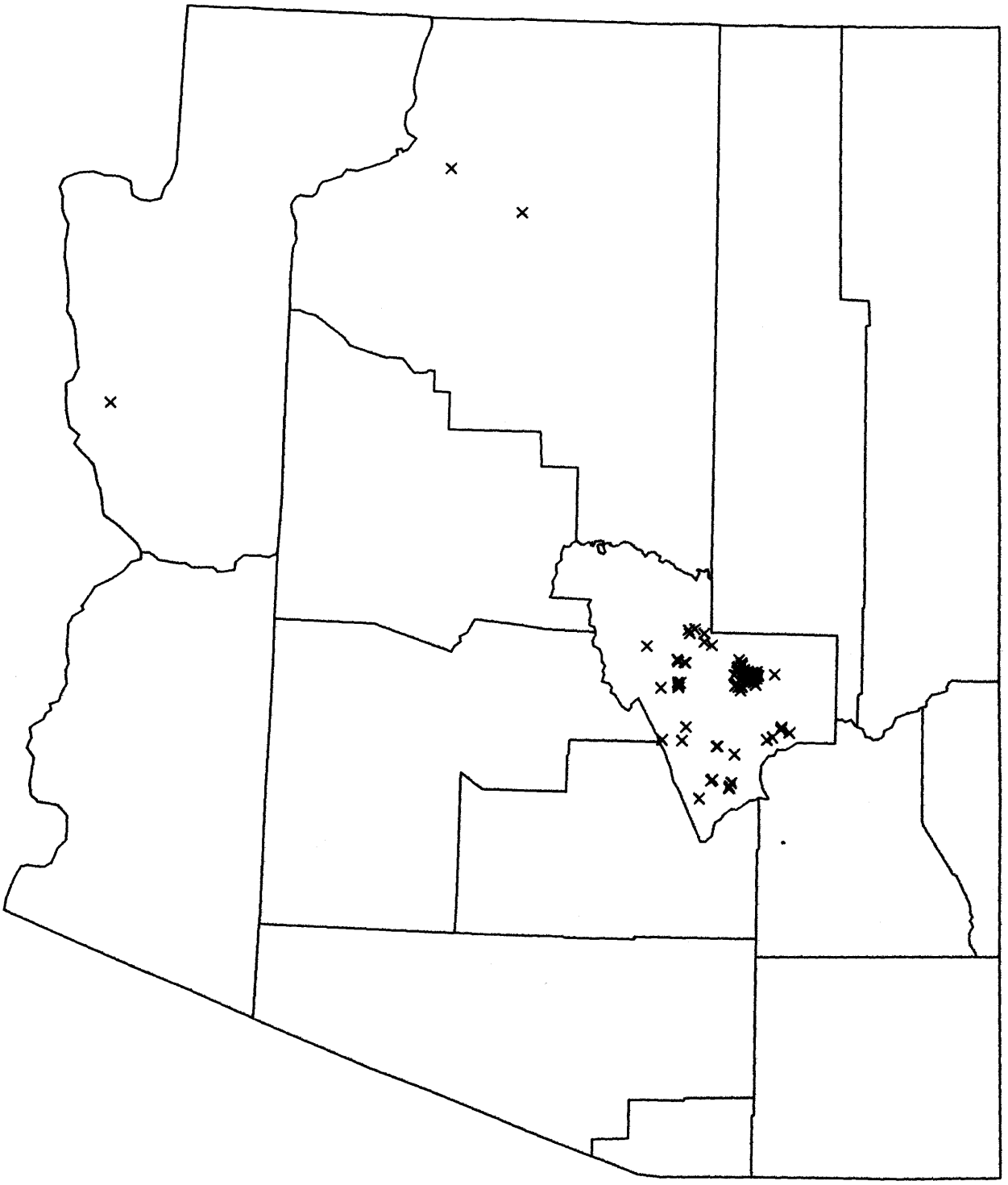

Figure 14.--Deposits and occurrences of asbestos (X's) listed in the Arizona MRDS records.

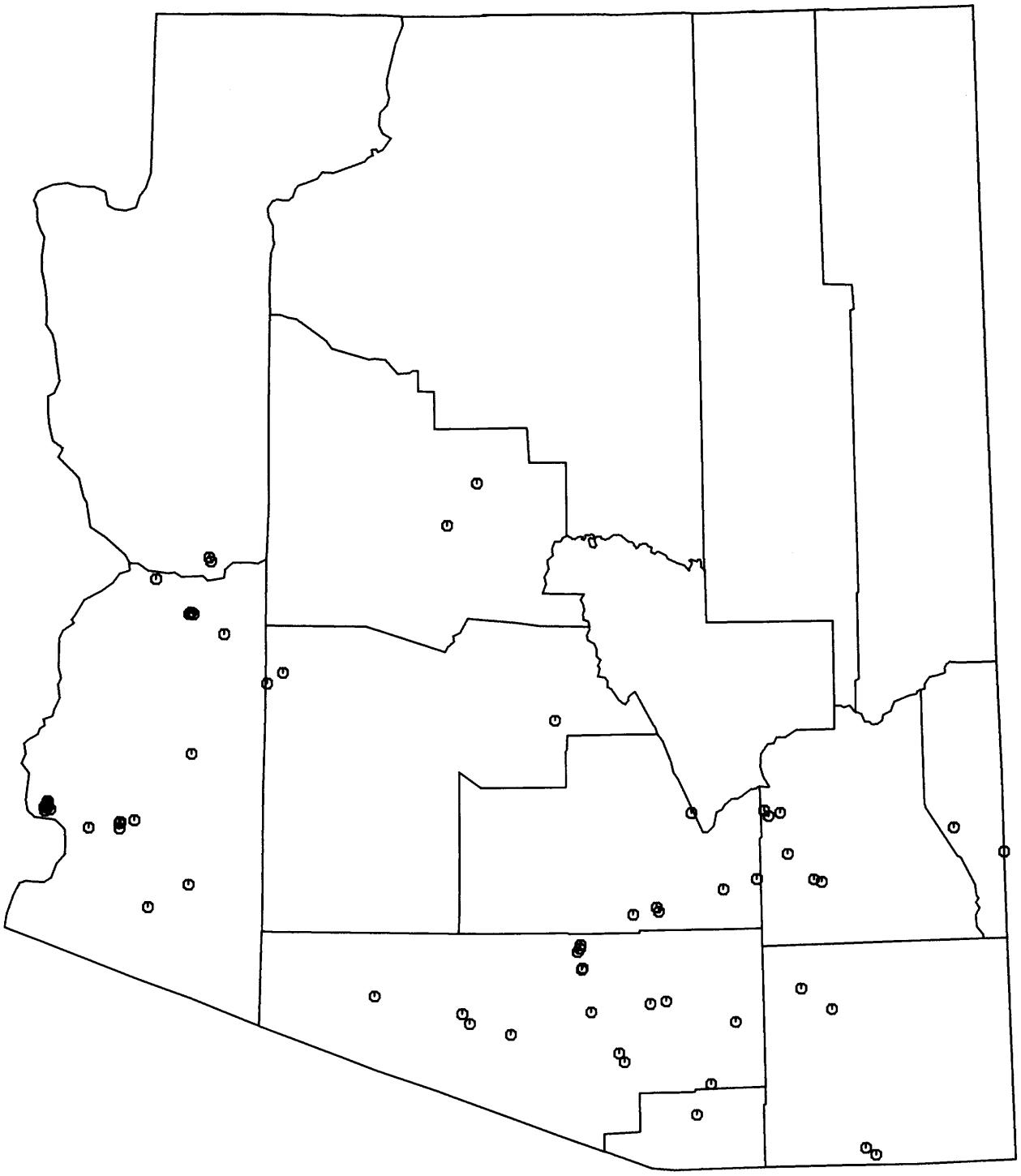

Figure 15.--Deposits and occurrences of barite (octagon) listed in the Arizona MRDS records.

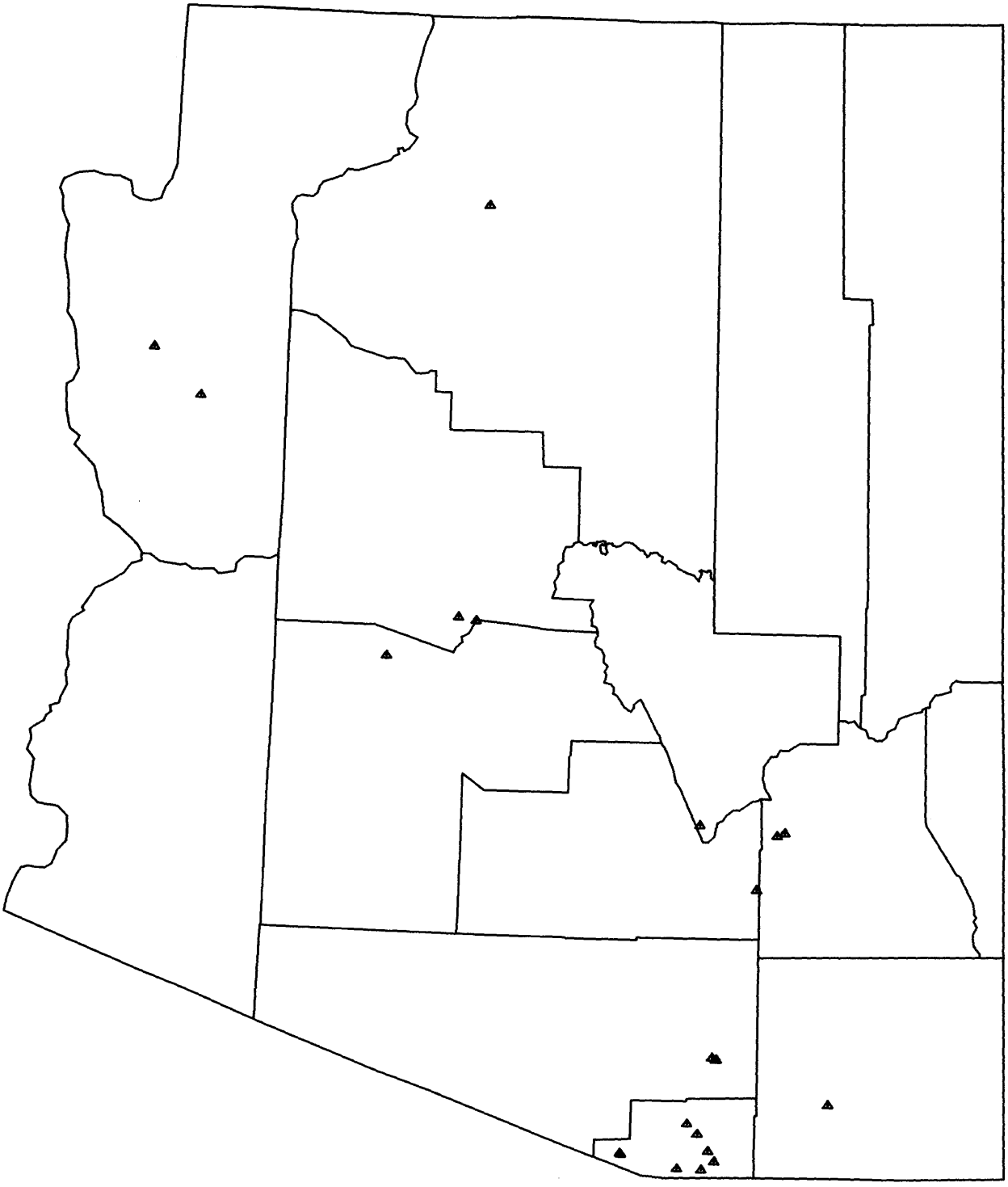

Figure 16.--Deposits and occurrences of antimony (triangles) listed in the Arizona MRDS records.

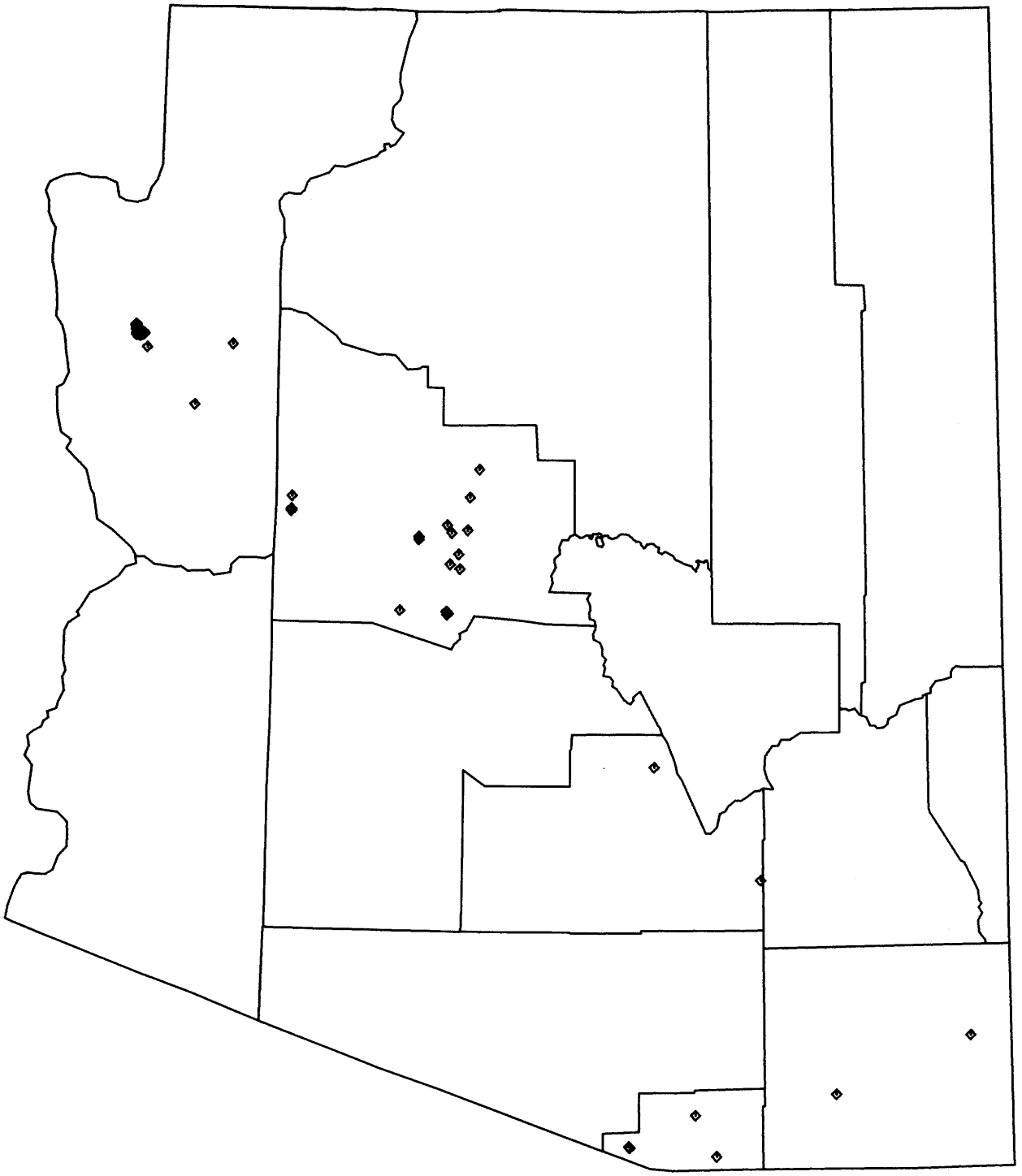

Figure 17.--Deposits and occurrences of arsenic (diamonds) listed in the Arizona MRDS records.

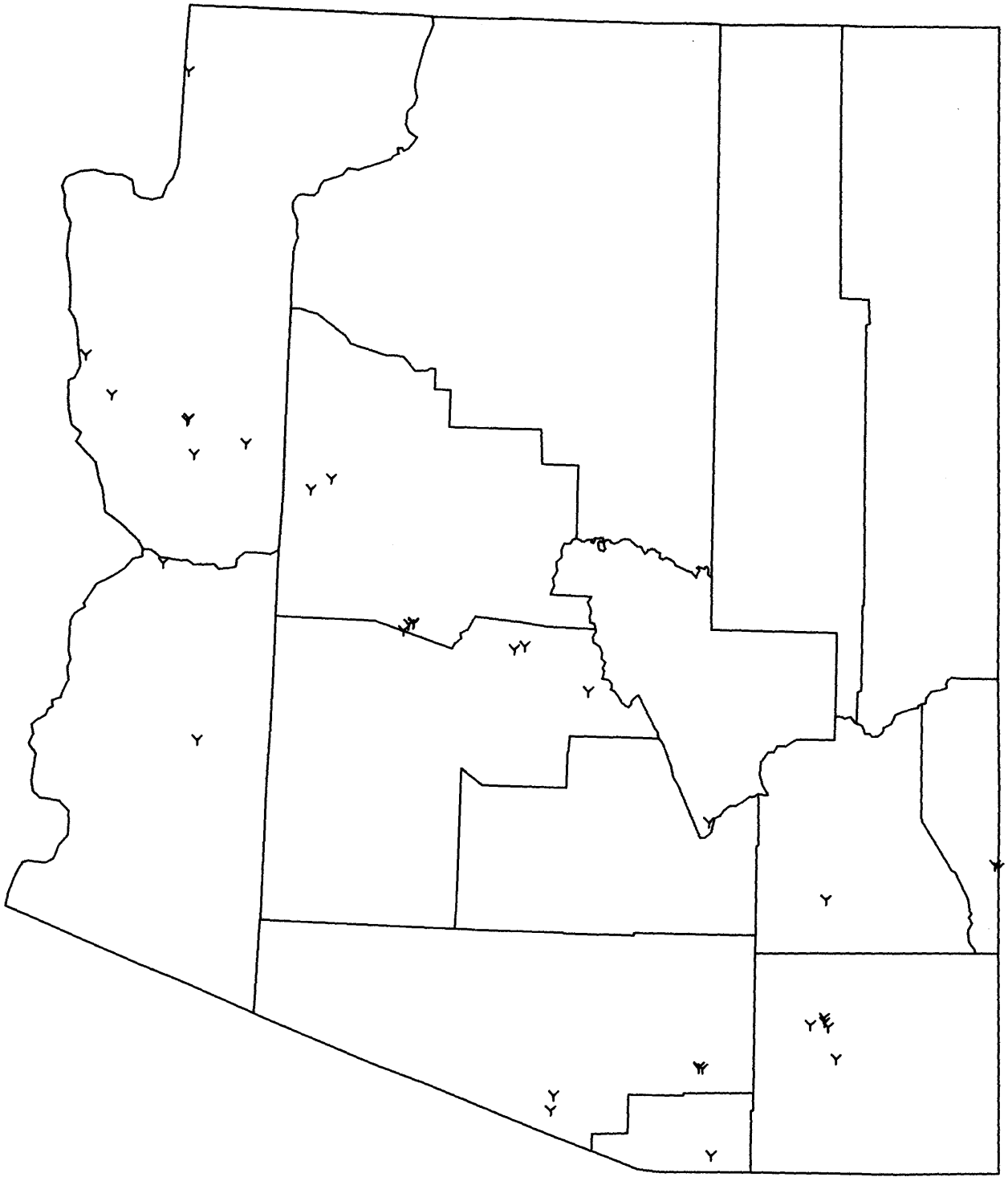

Figure 18.--Deposits and occurrences of beryllium (Y's) listed in the Arizona MRDS records.

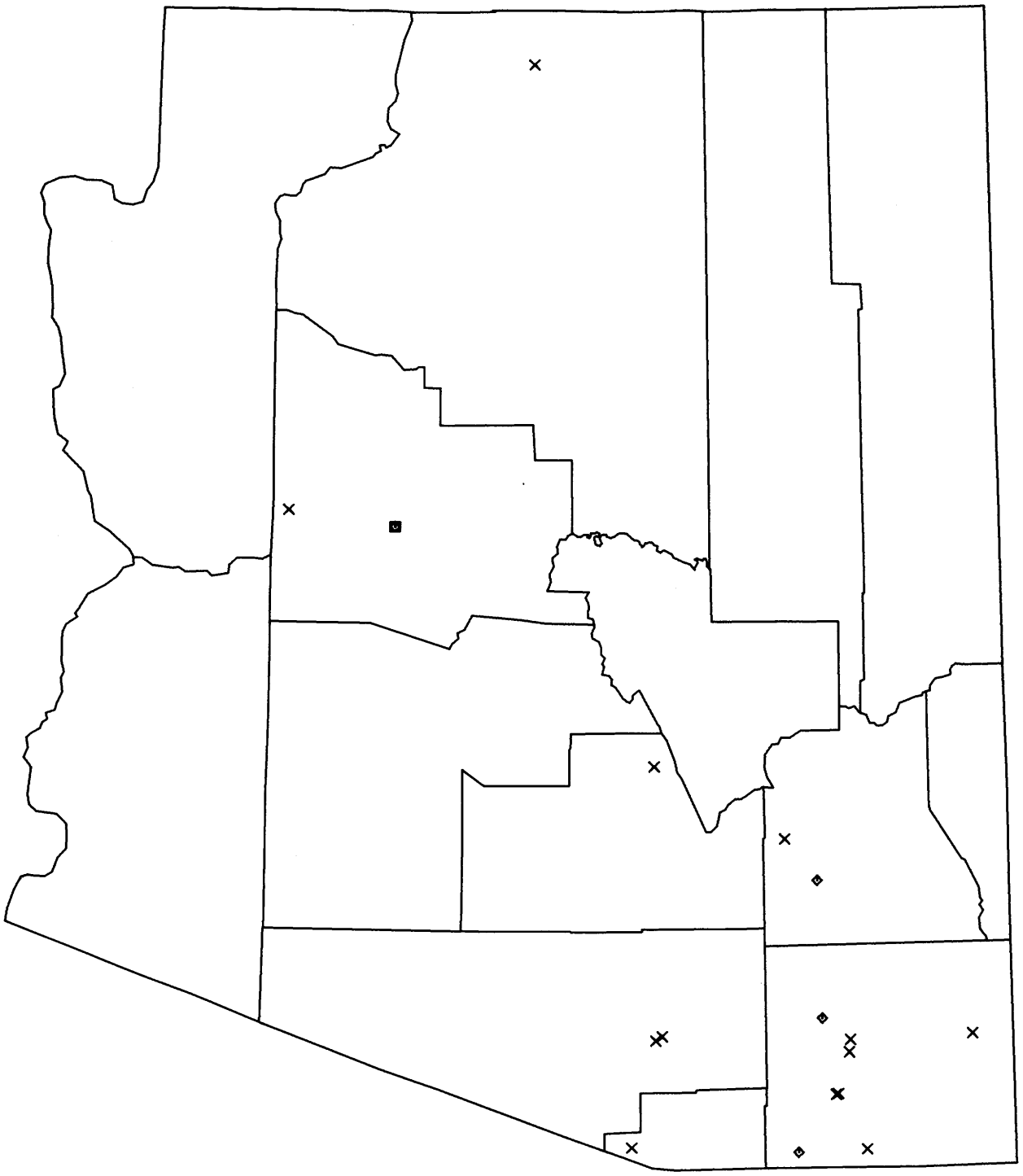

Figure 19.--Deposits and occurrences of cadmium (X's), selenium (square), and tellurium (diamonds) listed in the Arizona MRDS records.

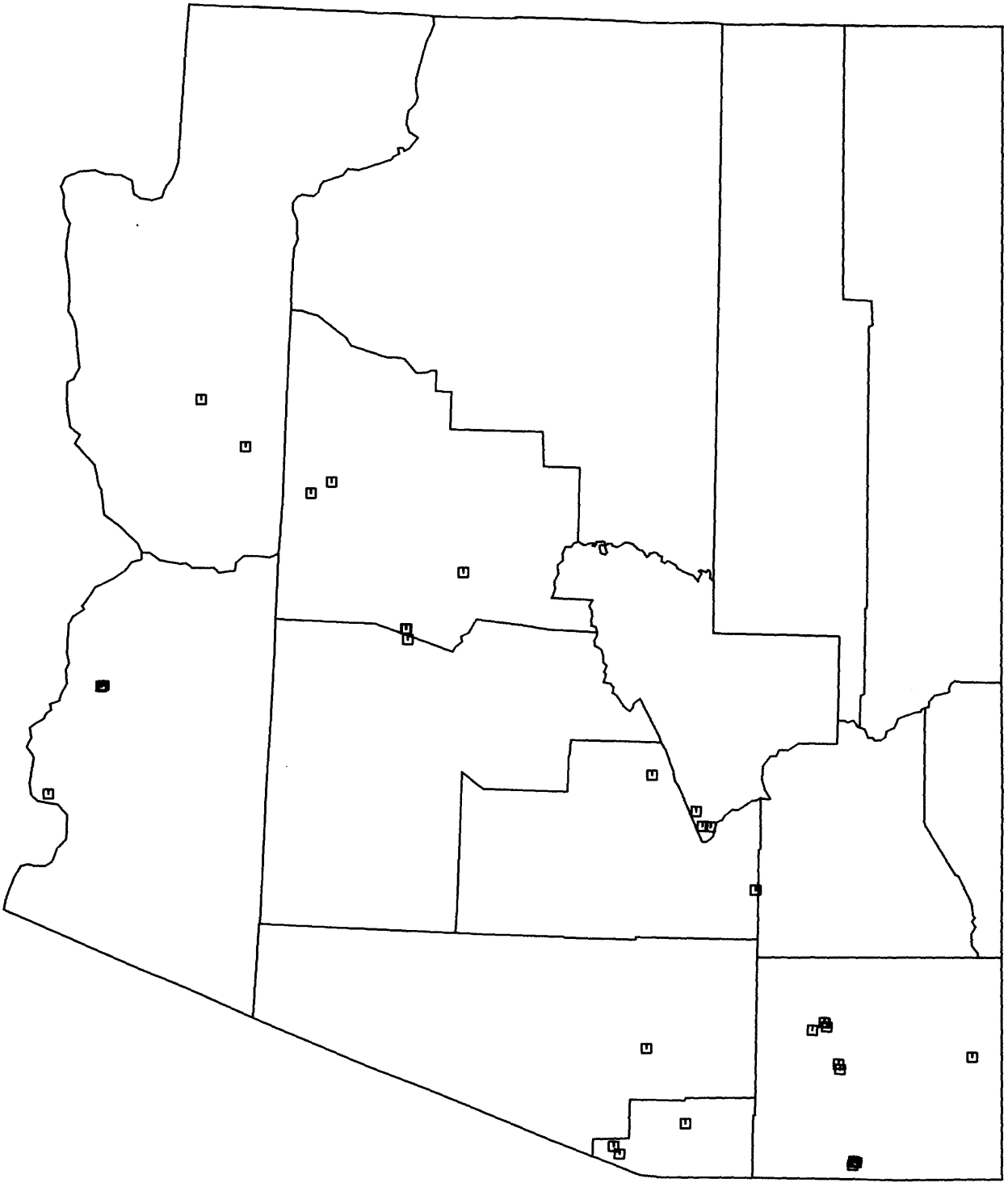

Figure 20.--Deposits and occurrences of bismuth (squares) listed in the Arizona MRDS records.

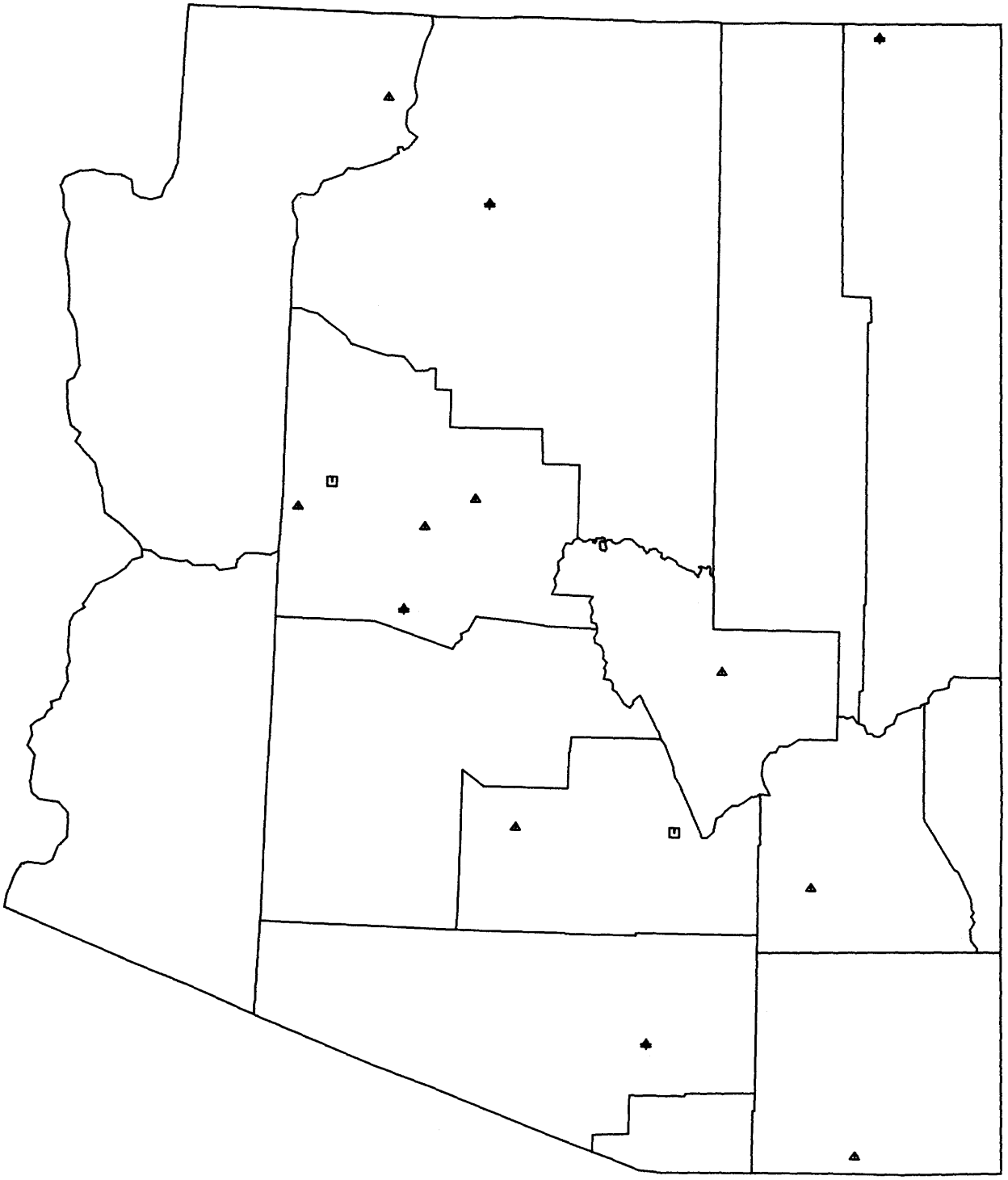

Figure 21.--Deposits and occurrences of chromium (squares), cobalt (triangles), and nickel (crosses) listed in the Arizona MRDS records.

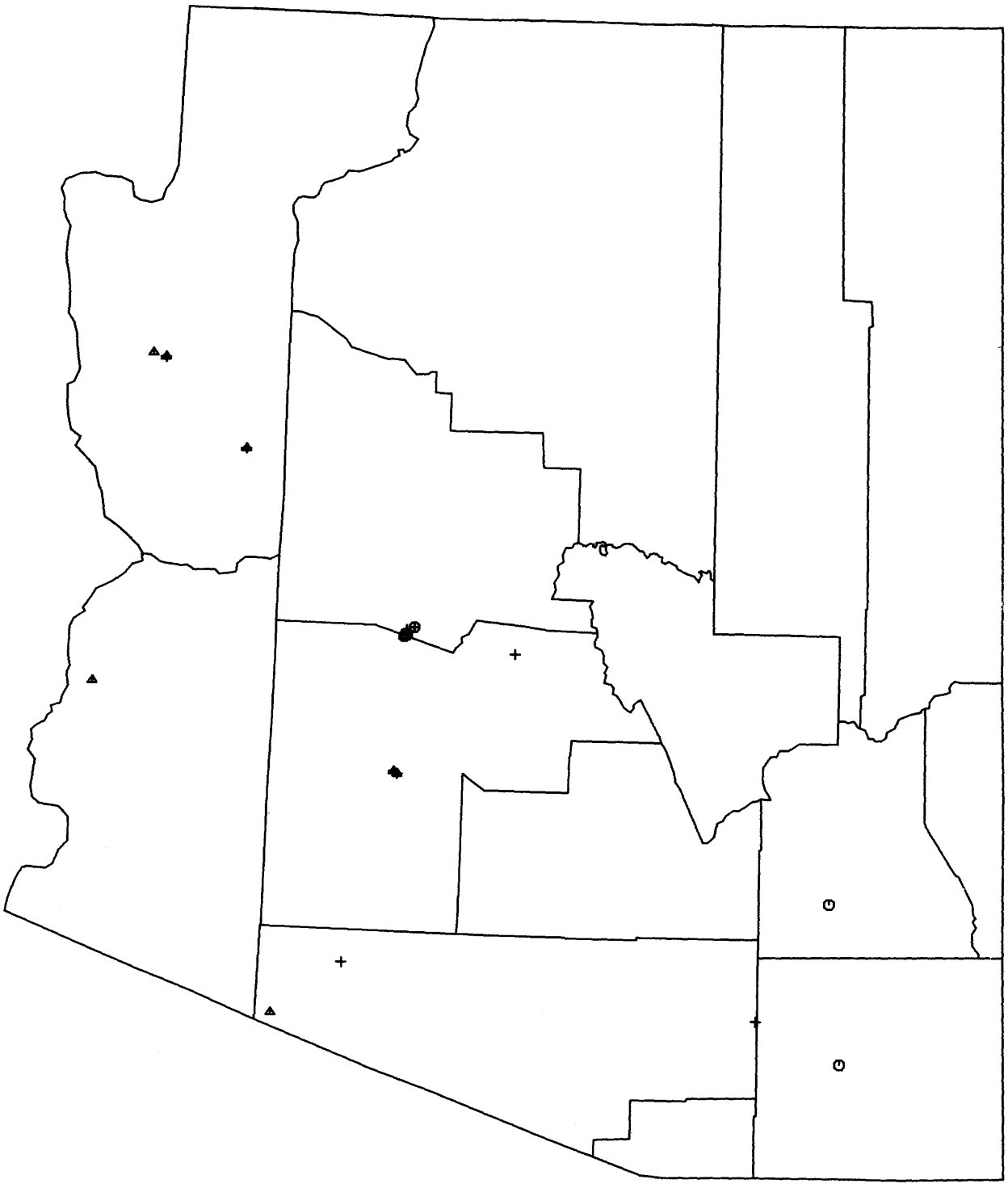

Figure 22.--Deposits and occurrences of lithium (octagons), niobium and tantalum (crosses), and rare-earth elements (triangles) listed in the Arizona MRDS records.

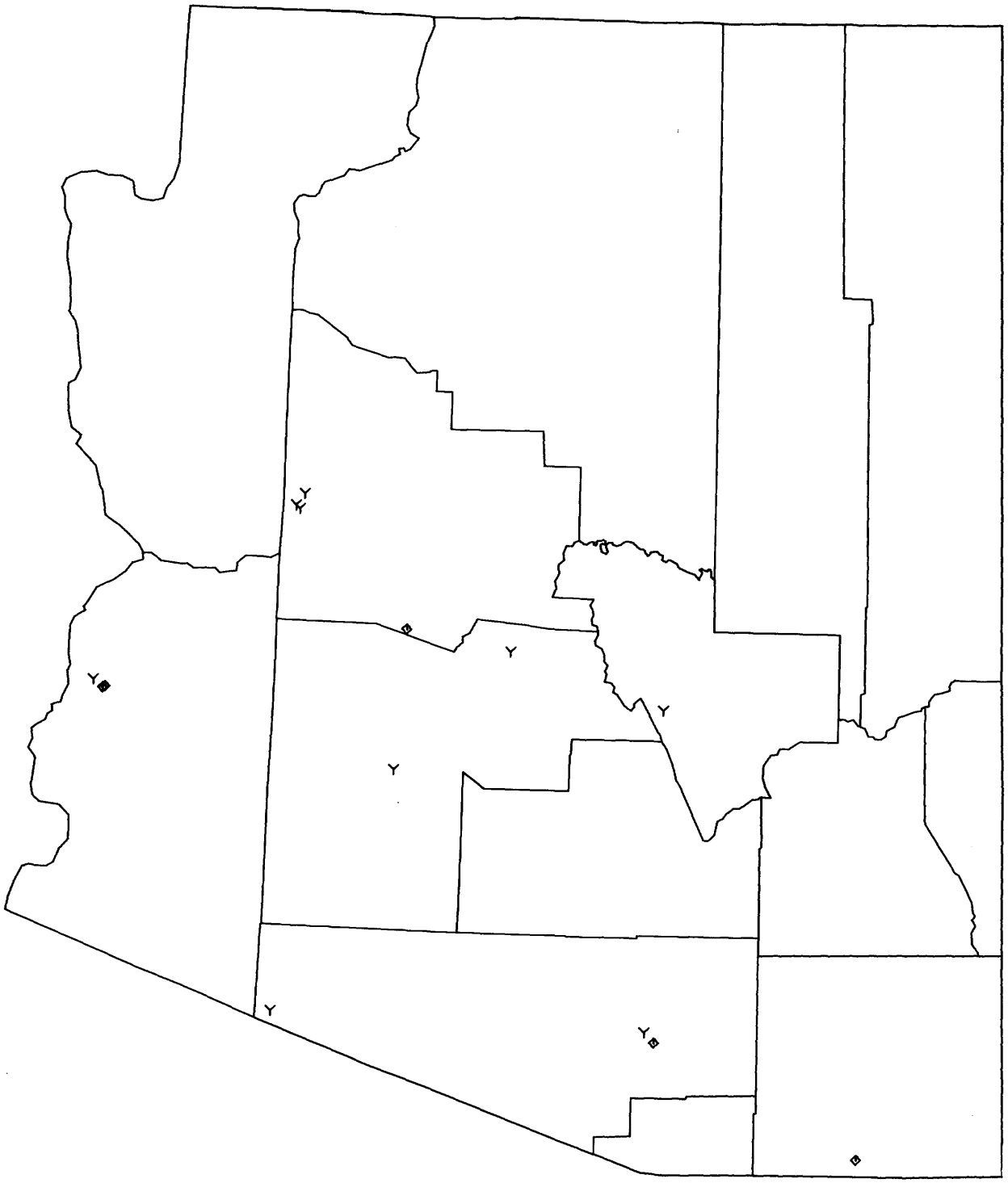

Figure 23.--Deposits and occurrences of thorium (Y's) and tin (diamonds) listed in the Arizona MRDS records.

Table 1.--Two examples of Arizona MRDS records

```
                                                                    RECORD 00001

CRIB MINERAL RESOURCES FILE 12

                                    RECORD IDENTIFICATION
                                      RECORD NO.............  M051111
                                      RECORD TYPE...........  X1M
                                      COUNTRY/ORGANIZATION.  USGS
                                      INFORMATION SOURCE...  3
                                      DEPOSIT NO............  VHNW-007R
                                      MAP CODE NO. OF REC..

                                    REPORTER
                                      NAME..............................  DUCKTER, ROGER D.
                                      AFFILIATION.......................  USGS
                                      DATE..............................  76 04

NAME AND LOCATION
  DEPOSIT NAME.................  UNNAMED PROSPECT VHNW-007R

  MINING DISTRICT/AREA/SUBDIST.  SILVER BELL  DISTRICT

  COUNTRY CODE.................  US
  COUNTRY NAME:  UNITED STATES

  STATE CODE...................  AZ
  STATE NAME:  ARIZONA

  COUNTY.......................  PIMA
  DRAINAGE AREA................  15050305
  PHYSIOGRAPHIC PROV.........  12
  LAND CLASSIFICATION.......  00

  QUAD SCALE          QUAD NO OR NAME
   1: 62500             VACA HILLS

  LATITUDE            LONGITUDE
   32-25-40N            111-37-55W

  UTM NORTHING        UTM EASTING        UTM ZONE NO
   3587838.             440587.            +12

  TWP.......  011S
  RANGE.....  007E
  SECTION...  34
  MERIDIAN.  G & SR

  ACCURACY OF LOCATION
    ACCURATE
COMMODITY INFORMATION
  COMMODITIES PRESENT...........  CU

    OCCURRENCE(S) OR POTENTIAL PRODUCT(S):
            POTENTIAL.........
            OCCURRENCE.......  CU

ORE MATERIALS (MINERALS,ROCKS,ETC.):
  CHRYSOCOLLA, BOXWORK OF CHALCOPYRITE AND PYRITE
EXPLORATION AND DEVELOPMENT
  STATUS OF EXPLOR. OR DEV.  3
DESCRIPTION OF DEPOSIT

  DEPOSIT TYPES:
    DISSEMINATED FRACTURE
  FORM/SHAPE OF DEPOSIT:

  SIZE/DIRECTIONAL DATA
    SIZE OF DEPOSIT.......  SMALL
  COMMENTS(DESCRIPTION OF DEPOSIT):
    ON FAULT RAIN VALLEY FM. AGAINST K SEDIMENT.

DESCRIPTION OF WORKINGS
     UNDERGROUND

  COMMENTS(DESCRIP. OF WORKINGS):
    1 SHAFT


PRODUCTION
      UNDETERMINED

GEOLOGY AND MINERALOGY

  AGE OF HOST ROCKS.............                PALEOZOIC LIMESTONE
  HOST ROCK TYPES..............  LIMESTONE

GENERAL COMMENTS
  COPPER OXIDES FRACTURES IN LIMESTONE, FAULT GOUGE ALSO DISPLAYS OXIDIZED SULFIDES: JAROSITE


GENERAL REFERENCES
  1) BANKS, N. G., 1976 , FIELD EXAM.
```

Table 1.--Two examples of Arizona MRDS records--Continued

```
                                                                                RECORD 00002

CRIR MINERAL RESOURCES FILE 12

                                        RECORD IDENTIFICATION
                                          RECORD NO.............  M003084
                                          RECORD TYPE...........  XIM
                                          INFORMATION SOURCE....  12
                                          FILE LINK ID..........  USBM-004 007 0118; USBM-004 007 0051
                                          MAP CODE NO. OF REC...

                                        REPORTER
                                          NAME..................................  PETERSON, JOCELYN A
                                          AFFILIATION...........................  USGS
                                          DATE..................................  83 05

NAME AND LOCATION
  DEPOSIT NAME.................  MIAMI MINE
  SYNONYM NAME.................  INSPIRATION COPPER CO; INSPIRATION MINE; THORNTON PIT; LIVE OAK PI T; RED HILL PIT
  MINING DISTRICT/AREA/SUBDIST.  MIAMI-INSPIRATION DISTRICT
  COUNTRY CODE.................  US
  STATE CODE...................  AZ
  COUNTY.......................  GILA
  DRAINAGE AREA................  15060103
  PHYSIOGRAPHIC PROV...........  12
  LAND CLASSIFICATION..........  01    1979

  QUAD SCALE          QUAD NO OR NAME
   1: 24000            GLOBE
   1: 24000            INSPIRATION

  LATITUDE            LONGITUDE
   33-24-17N           110-52-18W

  UTM NORTHING        UTM EASTING         UTM ZONE NO
   3695961             511945              +12

  TWP.....  001N; 001N;
  RANGE....  015E; 014E;
  SECTION..  19, 30; 23, 24, 25, 26;
  MERIDIAN.  G&SR
  ALTITUDE..  3500 FT
  ACCURACY OF LOCATION
    ACCURATE A
  POSITION FROM NEAREST PROMINENT LOCALITY:  NORTH OF MIAMI, 6 MI WNW OF GLOBE

COMMODITY INFORMATION
  COMMODITIES PRESENT.....  CU   MO   AU   AG   PB   ZN   RH
     PRODUCER(PAST OR PRESENT):
               MAJOR PRODUCTS..  CU   MO
               MINOR PRODUCTS..  AU   AG
     OCCURRENCE(S) OR POTENTIAL PRODUCT(S):
               POTENTIAL.....
               OCCURRENCE.....  PB   ZN    RH    RH
  ORE MATERIALS (MINERALS,ROCKS,ETC.):
    PYRITE, CHALCOPYRITE, CHALCOCITE, COVELLITE, MOLYBDENITE, BORNITE,  GOLD, SILVER, GALENA, SPHALERITE CHRYSOCOLLA,
    MALACHITE, AZURITE, BRO CHANTITE, CUPRITE

  COMMODITY COMMENTS:
    RHENIUM OCCURS IN MOLYBDENITE

  ANALYTICAL DATA(GENERAL)
    ORE NOW AVERAGES LESS THAN 1% CU, 0.02% MO, TRACE AU, AG, PROTORE  ASSAYS 0.15-0.4% CU

EXPLORATION AND DEVELOPMENT
  STATUS OF EXPLOR. OR DEV.  7
  YEAR OF DISCOVERY.....  A
  YEAR OF FIRST PRODUCTION.  1910
  PRESENT/LAST OWNER.....  CITIES SERVICE CO

  EXPLOR. AND DEVELOP. COMMENTS:
    MIAMI & INSPIRATION ARE PART OF SAME OREBODY, THOUGH OWNED BY DIF FERENT COMPANIES. MIAMI IS TO E OF INSPIRATION.
    FORMER OPERATORS INCLU DE INSPIRATION COPPER CO (1908) ON JOE BUSH, SCORPIO AND BULLDOG SHAFT S AND WOODSON,
    COLUMBIA, TAYLOR CLIPPER, AND BULLDOG ADITS; LIVE OAK D EVELOPMENT CO CONSOLIDATED IN 1912 TO FORM INSPIRATION
    CONSOLIDATED CO PPER CO.; KEYSTONE COPPER CO (1915); MIAMI COPPER CO, AND TENNESSEE
DESCRIPTION OF DEPOSIT

  DEPOSIT TYPES:
    PORPHYRY COPPER, SUPERGENE ENRICHMENT BLANKET
  FORM/SHAPE OF DEPOSIT: IRREGULAR

  SIZE/DIRECTIONAL DATA
    SIZE OF DEPOSIT.....  LARGE
    MAX LENGTH..........  12000      FT
    MAX WIDTH...........  2500       FT
    MAX THICKNESS.......  900        FT
    STRIKE OF OREBODY....  N55E
    DIP OF OREBODY......  N
    PLUNGE OF OREBODY....  SW
  COMMENTS(DESCRIPTION OF DEPOSIT):
    SUPERGENE ENRICHED ZONE AVERAGES 200 FT THICK
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Table 1.--Two examples of Arizona MRDS records--Continued

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DESCRIPTION OF WORKINGS
     SURFACE AND UNDERGROUND)
     DEPTH OF WORKINGS BELOW SURFACE. 1000       FT
     OVERALL LENGTH OF MINED AREA.... 2500       FT
     OVERALL WIDTH OF MINED AREA..... 3000       FT
  COMMENTS(DESCRIP. OF WORKINGS):
    OLD MIAMI UNDERGROUND WORKINGS, OPEN PIT. MIAMI EAST UNDER DEVELOPMENT (1980) WITH PLANNED PRODUCTION OF 2000
    T/DAY
PRODUCTION
      YES
      LARGE PRODUCTION

  ANNUAL PRODUCTION (ORE,COMMOD.,CONC.,OVERBURD.)

    ITEM         ACC  AMOUNT  THOUS.UNITS YEAR  GRADE,REMARKS
   1  CU         EST       50 ST          1972  0.7% CU, MIAMI
   2  CU         EST       43 ST          1973  0.7% CU, MIAMI
   3  MO         EST        1 ST          1973  0.02% MO, MIAMI
   4  CU         EST       50 ST          1971  0.7% CU, INSPIRATION
   5  CU         EST       50 ST          1972  0.7% CU, INSPIRATION
   6  MO         EST        1 ST          1972  0.02% MO, INSPIRATION
   7  CU         EST       43 ST          1973  0.7% CU, INSPIRATION
   8  MO         EST        1 ST          1973  0.02% MO, INSPIRATION

  CUMULATIVE PRODUCTION (ORE,COMMOD.,CONC.,OVERBUR.)

    ITEM         ACC  AMOUNT  THOUS.UNITS YEAR  GRADE,REMARKS
   15 ORE        ACC 00130303 TONS          1920-1978      MIAMI
   16 CU         ACC 02152143 LBS          1920-1978      MIAMI
   17 AG         ACC 1766.478 OZ           1920-1978      MIAMI
   18 AU         ACC 0036.616 OZ           1920-1978      MIAMI
   19 MO         ACC 2177.876 LBS          1949-1959      MIAMI
   20 ORE        ACC 252281.1 TONS         1920-1978      INSPIRATION
   21 CU         ACC 04029795 LBS          1920-1978      INSPIRATION
   22 AG         ACC 0813.787 OZ           1920-1978      INSPIRATION
   23 AU         ACC 0013.523 OZ           1920-1978      INSPIRATION

RESERVES AND POTENTIAL RESOURCES

    ITEM         ACC  AMOUNT  THOUS.UNITS  YEAR GRADE OR USE
   1  ORE        EST   147249 ST          1975  .70% CU, .02% MO
   2  CU         EST     1032 ST          1975
   3  MO         EST       29 ST          1975

GEOLOGY AND MINERALOGY

  AGE OF HOST ROCKS.............  PREC,TERT
  HOST ROCK TYPES...............  SCHIST GRANITE
  AGE OF ASSOC. IGNEOUS ROCKS..  TERT       62 M.Y.
  IGNEOUS ROCK TYPES............  GRANITE
  AGE OF MINERALIZATION.........  TERT       58 M.Y.

  PERTINENT MINERALOGY..........  QUARTZ, PYRITE

  IMPORTANT ORE CONTROL/LOCUS..  SCHISTOSITY (N50E, STEEP SE) CONTROLLED INSTRUSION OF SCHULTZE GRAN ITE &
    HYDROTHERMAL (SOLUTIONS) THAT DEPOSITED PRIMARY SULFIDE MINERALS

  LOCAL GEOLOGY
    NAMES/AGE OF FORMATIONS,UNITS,OR ROCK TYPES
     1) NAME: PINAL SCHIST
        AGE: PREC

    NAMES/AGE OF IGNEOUS UNITS OR IGNEOUS ROCK TYPES
     1) NAME: SCHULTZE GRANITE (PORPHYRITIC QUARTZ MONZONITE)
        AGE: TERT       62 M.Y.

    SIGNIFICANT LOCAL STRUCTURES:
      LOW ANGLE BULLDOG FAULT, MIAMI FAULT- BOTH CUTTING ARE INTO DISTIN CT PIECES

    SIGNIFICANT ALTERATION:
      SILICIFICATION, SERICITIZATION, BIOTIZATION, HYDRATION, ARGILLIZAT ION, ORTHOCLAZATION

    GEOLOGICAL PROCESSES OF CONCENTRATION OR ENRICHMENT:
      SUPERGENE ENRICHMENT, MUCH OF WHICH OCCURRED BEFORE MOST OF FAULTI NG & TILTING IN AREA

 COMMENTS (GEOLOGY AND MINERALOGY):
   HIGHER GRADE MINERALIZATION OCCURS AS BANDS ALONG MIAMI & PINTO FA ULTS BETWEEN JOE BUSH & BULLDOG FAULTS.
   MOLYBDENITE WAS LAST STAGE OF  HYPOGENE MINERALIZATION

GENERAL COMMENTS
  THIS REPORT REPRESENTS A MERGER OF ORIGINAL RECORD M003084 WITH RE CORDS M003085 & W002673 OF JAN WILT IN
  MOLYBDENUM FILE, CONTACT PERSON  T.G. THEODORE, USGS


GENERAL REFERENCES
  1) PETERSON, 1962, USGS PP 342
  2) OLMSTED & JOHNSON, 1966, IN TITLEY & HICKS, UNIV OF AZ PRESS
  3) ABM FILE DATA
  4) FLSING & HEINEMAN, 1936, ABM BULL 140
  5) SIMMONS & REED, 1962, AZ GEOL SOC 13TH FIELD CONF-MOGOLLON RIM
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