University of Wisconsin-Extension

GEOLOGICAL AND NATURAL HISTORY SURVEY
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TIGERTON DELLS MINERAL RESOURCE APPRAISAL

by

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Open-File Report 81-1
20 p.

1981

The attached report was prepared at the request of the Wisconsin Department of Natural Resources in 1981 in support of an Environmental Impact Statement for fisheries development on the North Branch of the Embarrass River, Shawano County.

Tigerton Dells Mineral Resource Appraisal

I. General Statement

This report is an attempt to assess the geological resource (excluding soil and water) potential of the Tigerton Dells area east of the town of Tigerton in Shawano County (Figure 1). By necessity the assessment process is confined to cursory on-site examination and published data. There is no historical record of economic mineral extraction in the area other than for sand and gravel deposits. However, some minor excavations were made in the search for uranium and beryl. In the absence of adequate geological and geophysical data it is not possible to assess the mineral potential of the area with any degree of certainty. This appraisal is therefore based on the general geological setting and known occurrences of economic materials.

II. Geologic Framework

The area of interest is situated entirely within the very large complex of intrusive igneous rocks known as the Wolf River Batholith. The batholith has been best described in the Ph.D. thesis of Anderson (1975) and in the geochemical discussions of Anderson and Cullers (1978) and Meddaugh (1978). Almost all of the constituent rock types have been dated at about 1500 million years (Van Schmus and others, 1975) and range from very silicic granite to nepheline syenite, all very alkaline. There is also a large area of anorthosite north of Tigerton that appears to be an inclusion within the granitic rocks (Weis, 1965).

A major contact between two rock types occurs near Tigerton. The "Wolf River Granite" is exposed to the north and the "Red River Quartz Monzonite Porphyry" to the south. Medaris and others (1973) describe the difference between the two units predominantly as a function of texture with both types containing quartz, two feldspars, biotite and amphibole, the Red River unit being more porphyritic. The exact position of the contact of the two units is unknown and has been interpreted to occur both north of and just south of Tigerton (Figure 2). The same confusion affects the interpreted extent of anorthosite from the north. Weis (1965) shows an isolated outcrop of anorthosite just north of Tigerton. From the aeromagnetic map (Figure 3), it appears that the characteristic magnetic anomaly over the main anorthosite body does extend into the Tigerton area. The anorthosite is a porphyritic rock containing moderately calcic (to 64%) plogioclase and variable amounts of hornblende (often replacing pyroxene) which in large amounts designates the host rock as anorthositic gabbro (Weis, 1965).

In the immediate vicinity of the feasibility study, relatively small pegmatite and aplite (light-colored granitic) dikes cut the country-rock granite. Some shows of uranium-bearing minerals have been found within mafic (biotite) segregations and along joints and fractures in the pegmatites. Beryl crystals have been found and collected from the same type of pegmatite located nearby. More detail on both kinds of mineral occurrence is given below.

III. Known Geological Occurrences of Economic Interest

A. Uranium Mineralization

1. Geology and radiometry

A general discussion of uranium in Wisconsin, including the two minor occurrences in the Tigerton Dells area, is present by Kalliokoski (1976). Similar occurrences are noted by King (1960), Malan and Sterling (1969) and Meddaugh (1978) for Wolf River Batholith granitic rocks in the Big Falls area of Waupaca County. One of the Tigerton Dell's shows is within the study area in section 10 of T. 26 N., R. 12 E. (Figure 1). In each case, the uranium mineralization is evidenced by "high" (several times background) radioactivity measurement. Large scale data which reflects the relatively high radioactivity around the Dells was collected through the National Uranium Resource Evaluation program (NURE) for the U.S. Department of Engery (1978). Various map diagrams showing the NURE analyzed uranium content of natural waters and stream sediments are reproduced from the 1978 report in NURE pages A-9, B-9, B-11 and C-9. In each diagram, an arrow indicates the study area (SA).

Kalliokoski (1976) believes the major radioactive mineral found locally in the study area is uranothorite associated with biotite in primary igneous segregations. Other secondary uranium minerals may be present on iron-stained joint surfaces in pegmatite as well as enclosing granite.

Detailed analysis by Meddaugh (1978) indicates that the Red River Quartz Monzonite, particularly in contact with Wolf River Granite, is the most uranium-enriched phase of the Batholith rocks. A highly mineralized sample collected from the occurrence within the study area, having Red River Quartz Monzonite as country-rock, contained almost .1% U_3O_8 (Kalliokoski, 1976) and Meddaugh (1978) in his Figure 13 shows some unmineralized samples with over 30 parts per million uranium in the area. This value is about ten times that of "normal" granitic rocks.

Ground radiometry surveying by Minerals Recovery Corporation (1976) has helped to delineate more precisely the exact zone(s) of uranium mineralization, and from the combination of all the above data it is possible to give a rough appraisal of the economic uranium potential of the study area.

2. Potential for economic uranium resources

From the available information, the Tigerton Dells area should not be considered a potential source for uranium exploitation in the forseeable future. The very uraniferous samples collected (to .1% U_3O_8) are of economic grade, but they are rare and not characteristic of the mineralized zones in general. Consequently, the volume of ore-grade material that can be interpreted to exist in this particular geological environment is very small. It is true that there are some very profitable low-grade granite/pegmatite uranium deposits worldwide (Nishimori and others, 1977), but they are uranium enriched in much larger zones and over a much greater area than the small shows at Tigerton Dells. If additional exploration in the area uncovers more uranium-rich zones, then the appraisal could change, but this speculation is not considered here.

There is the additional possibility of fluorite, tin, molybdenum or tungsten mineralization which are known to accompany uranium in some alkaline granitic rocks similar to those in the Wolf River Batholith. However, no indication of economic potential for any of these commodities is warranted from available data.

B. Beryl Deposit

Beryl is a mineral with the chemical formula $Be_3Al_2Si_6O_{18}$ and can be valued both as an ore of beryllium and as gemstones (varieties including emerald and aquamarine). The Wisconsin Geoloigcal and Natural History Survey has in its files a letter by G.F. Hanson from 1961 describing a beryl prospect just outside the study area in section 15 of T. 26 N., R. 12 E. (Figure 1). The beryl occurs as green crystals in a narrow pegmatite surrounded by Red River Quartz Monzonite.

The discovery of beryl prompted the landowners to determine if there was any economic potential. From the description in Hanson's note, it appears that the beryl crystals may be of some minor gem quality, but their very limited occurrence, like the uranium, suggests little if any actual economic potential of any kind.

C. Sand and Gravel Pits

Sand and gravel pits are common in the area as in much of Wisconsin. The apparent economic quality and extent of these glacial deposits are not great, due in part to the close proximity of bedrock to the surface throughout much of Shawano and Waupaca Counties. The existing pits have been of very limited exploitation and most are inactive. Tigerton Dells and vicinity should probably not be considered a prime source of sand and gravel resources, although they do exist.

D. Building Stone

Wolf River granite similar to that extensively exposed around Tigerton has been used in the past for polished dimension stone on building fronts, etc. (Buckley, 1898). The present dimension stone market and exact character of the local granite rock would have to be considered prior to any economic assessment.

E. Crushed Stone

Fresh and decayed granitic rocks are exploited in Wisconsin for aggregate use in construction materials and road metal. Like building stone above, the local potential for granite as an economic aggregate could be assessed relative to market and quality, but both are unstudied.

IV. Summary of Economic Mineral/Rock Potential for the Tigerton Dells Area

The present level of available information makes it impossible to assign any monetary "worth" to geological resources with the Tigerton Dells study area. In less specific terms, the economic "potential" of some resources in the area can be estimated by what is known:

(1) Known uranium occurrence do fulfill several criteria of some economic deposits worldwide. However, the estimated volume of uranium ore is very small and indicates only slight economic potential;

(2) The potential for exploitable beryl resources, due to extreme scarcity, is even lower than uranium;

(3) Sand and gravel deposits obviously have some positive economic potential (they exist). Local deposits would probably not be exploitable on any large scale and therefore should not be considered a relatively valuable resource;

(4) The resource potential of dimension stone and crushed stone remain unstudied.

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⊗ - uranium show

Ⓑ - Beryl prospect

Figure 1

TIGERTON QUADRANGLE
WISCONSIN
7 5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 TIGERTON 15 QUADRANGLE

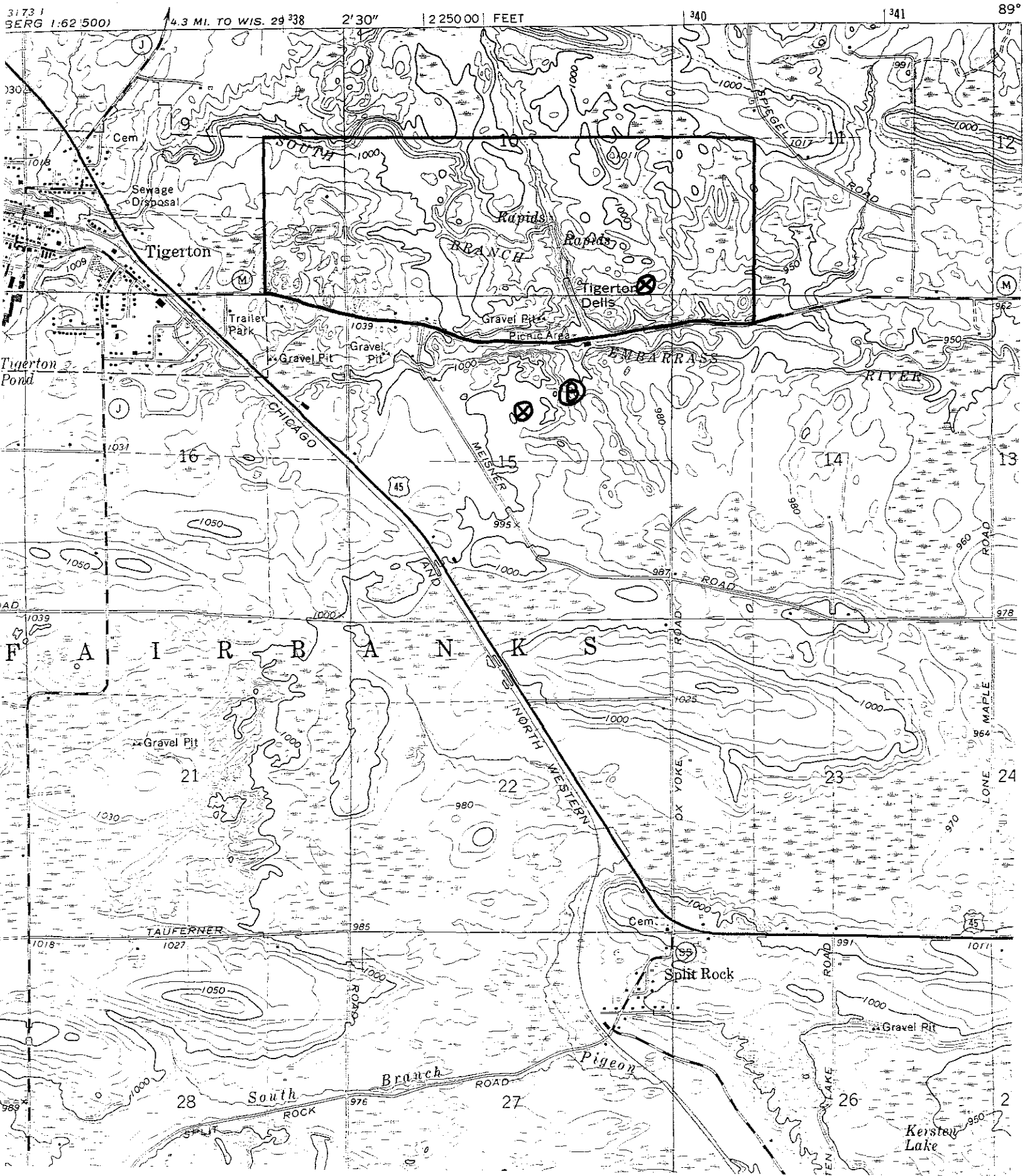
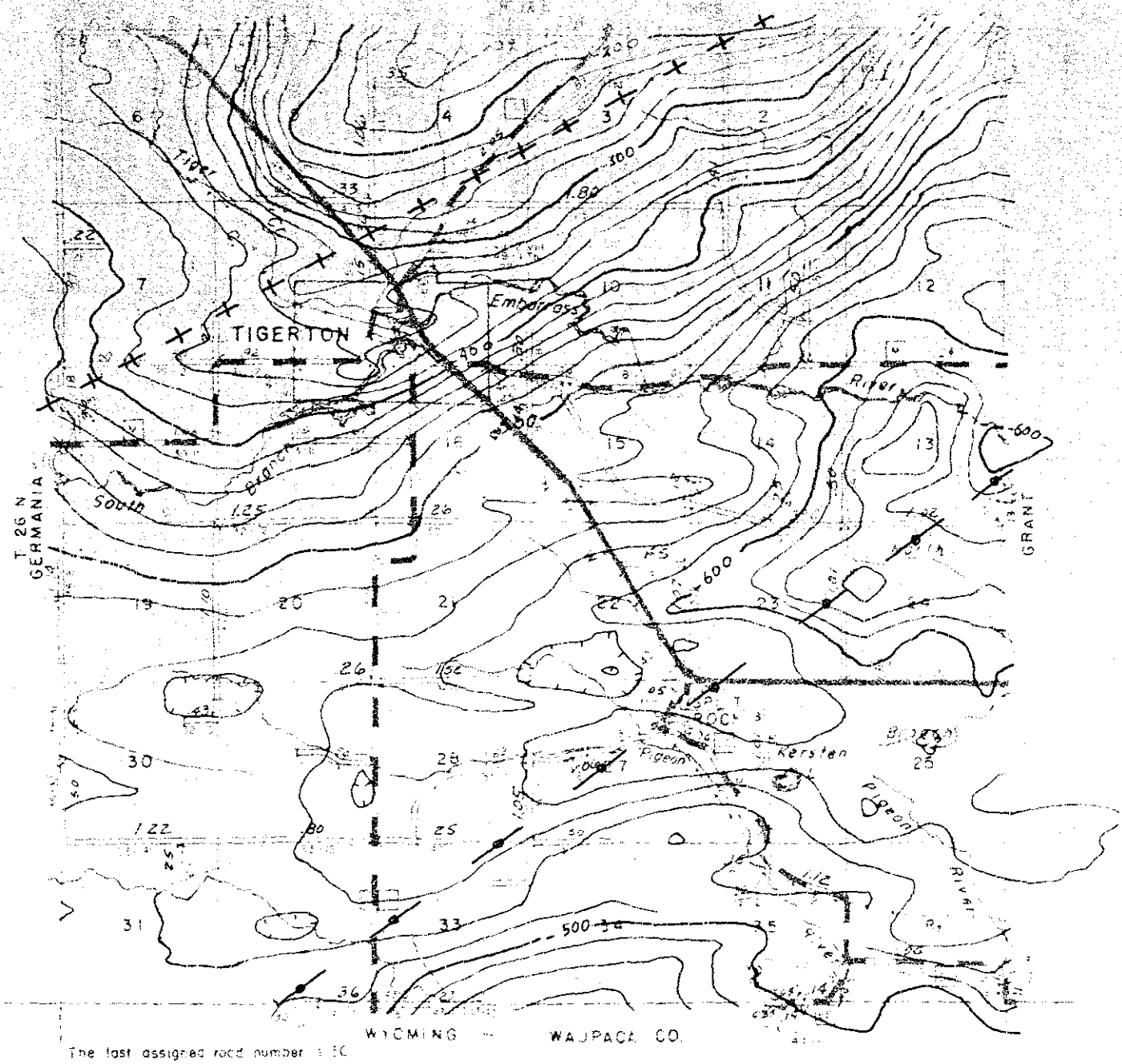


Figure 2

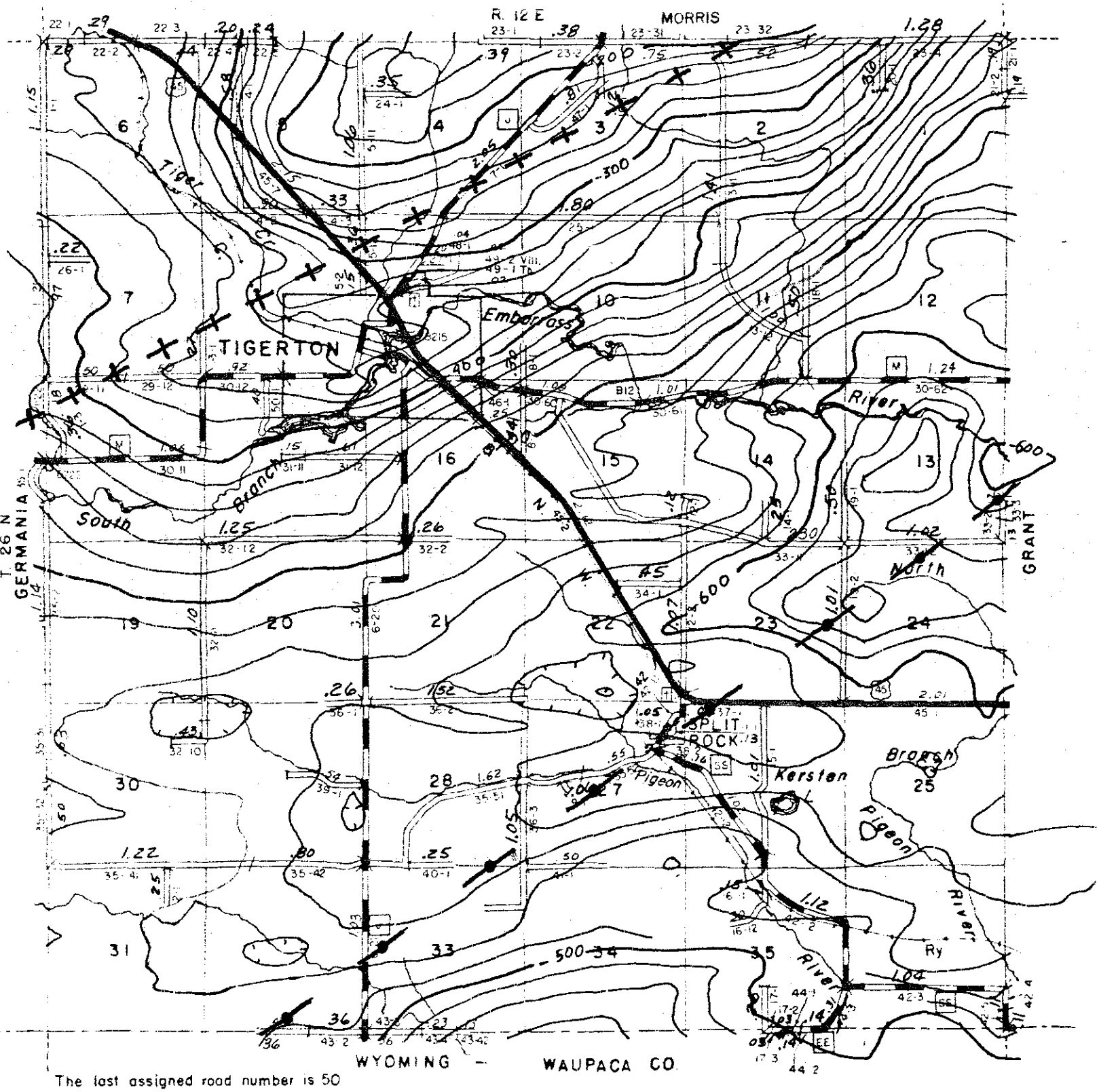


Proposed contacts between the Wolf River Granite (to north) and Red River Quartz Monzonite (to south)

- from Van Schmus and others, 1975

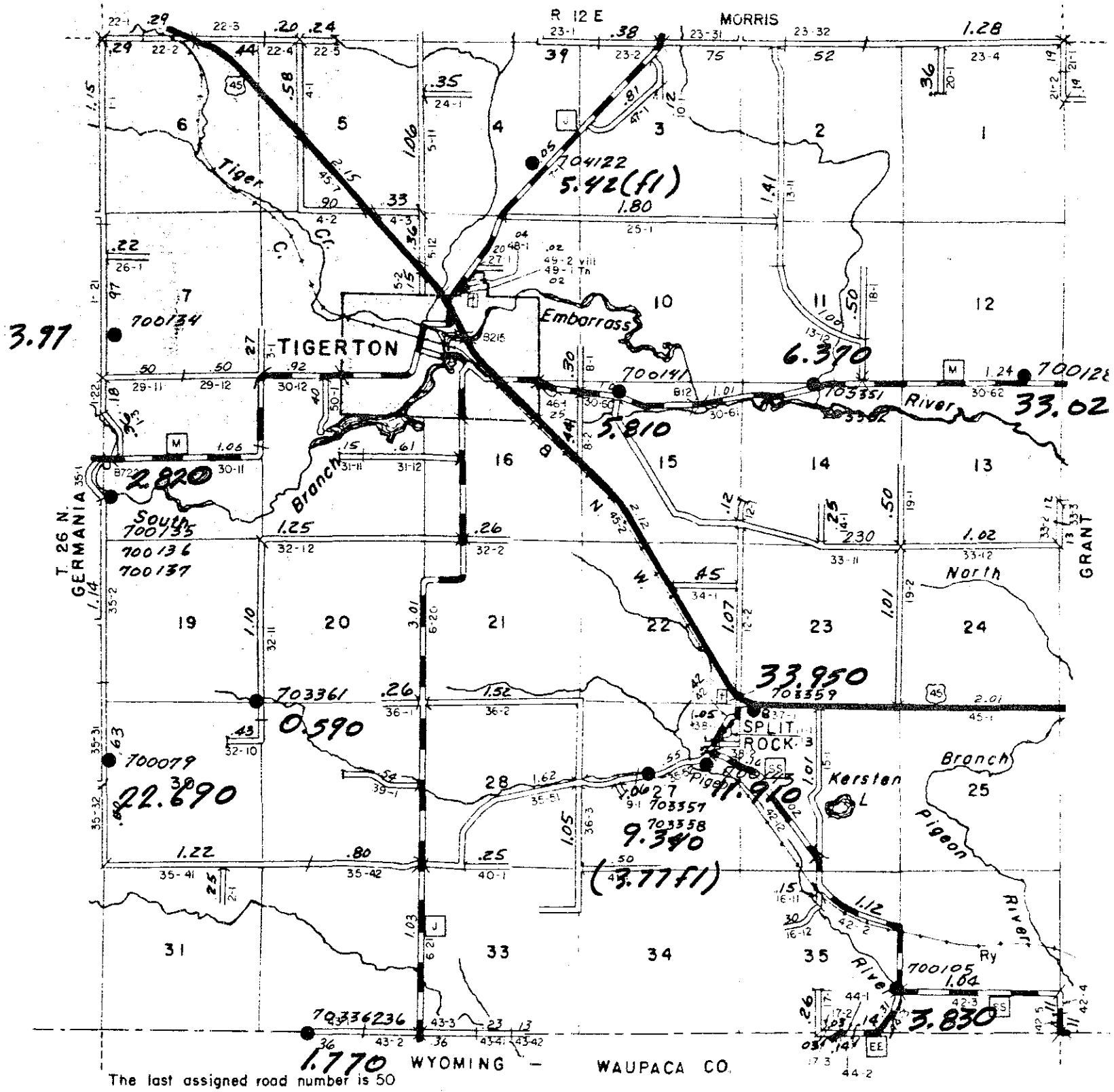
- from Anderson and Cullers, 1978

Figure 3



The last assigned road number is 50

Aeromag IGRF



Uranium in water.

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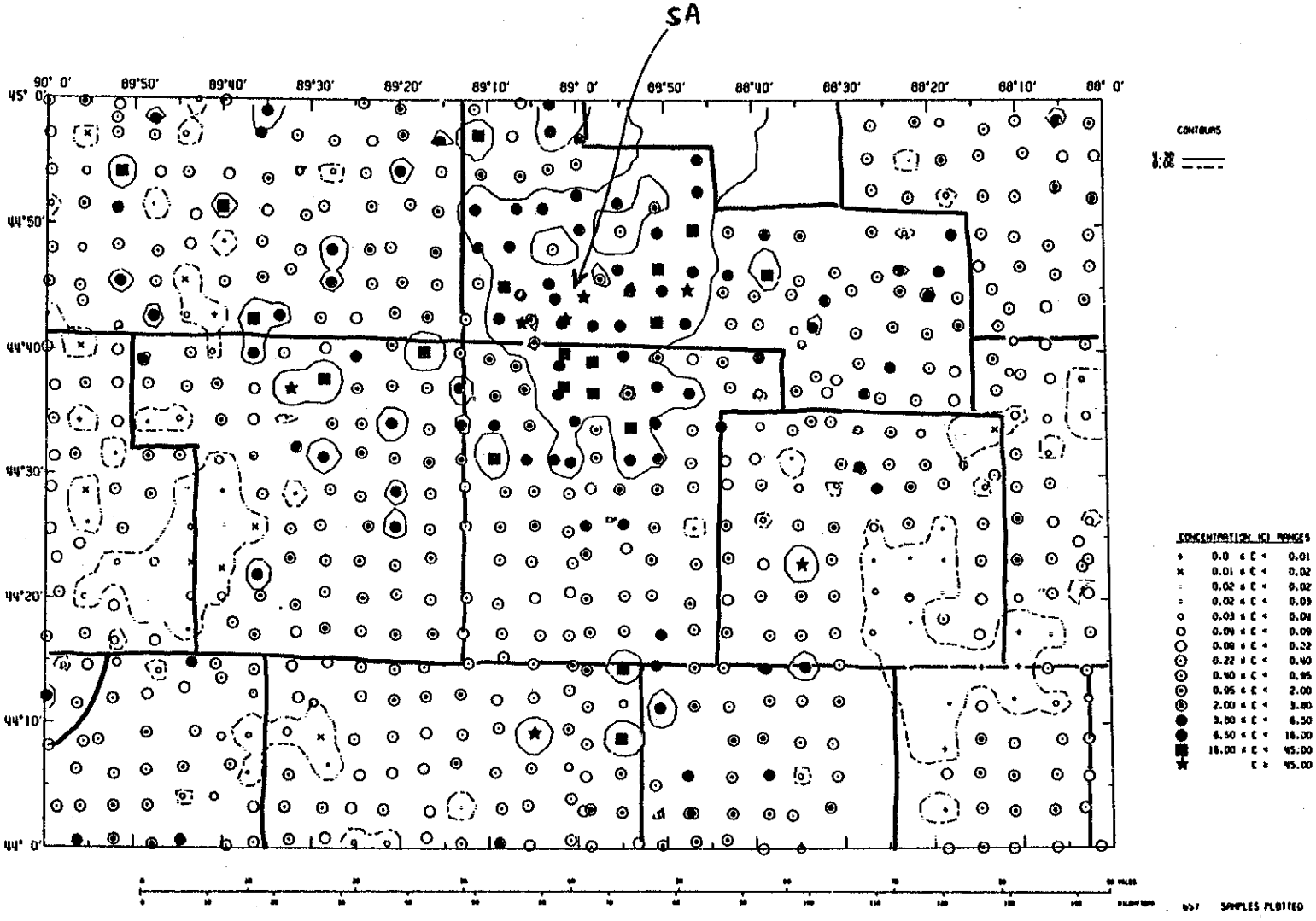


Figure A-1b

GEOCHEMICAL DISTRIBUTION OF URANIUM IN WELL AND SPRING WATERS OF THE GREEN BAY QUADRANGLE

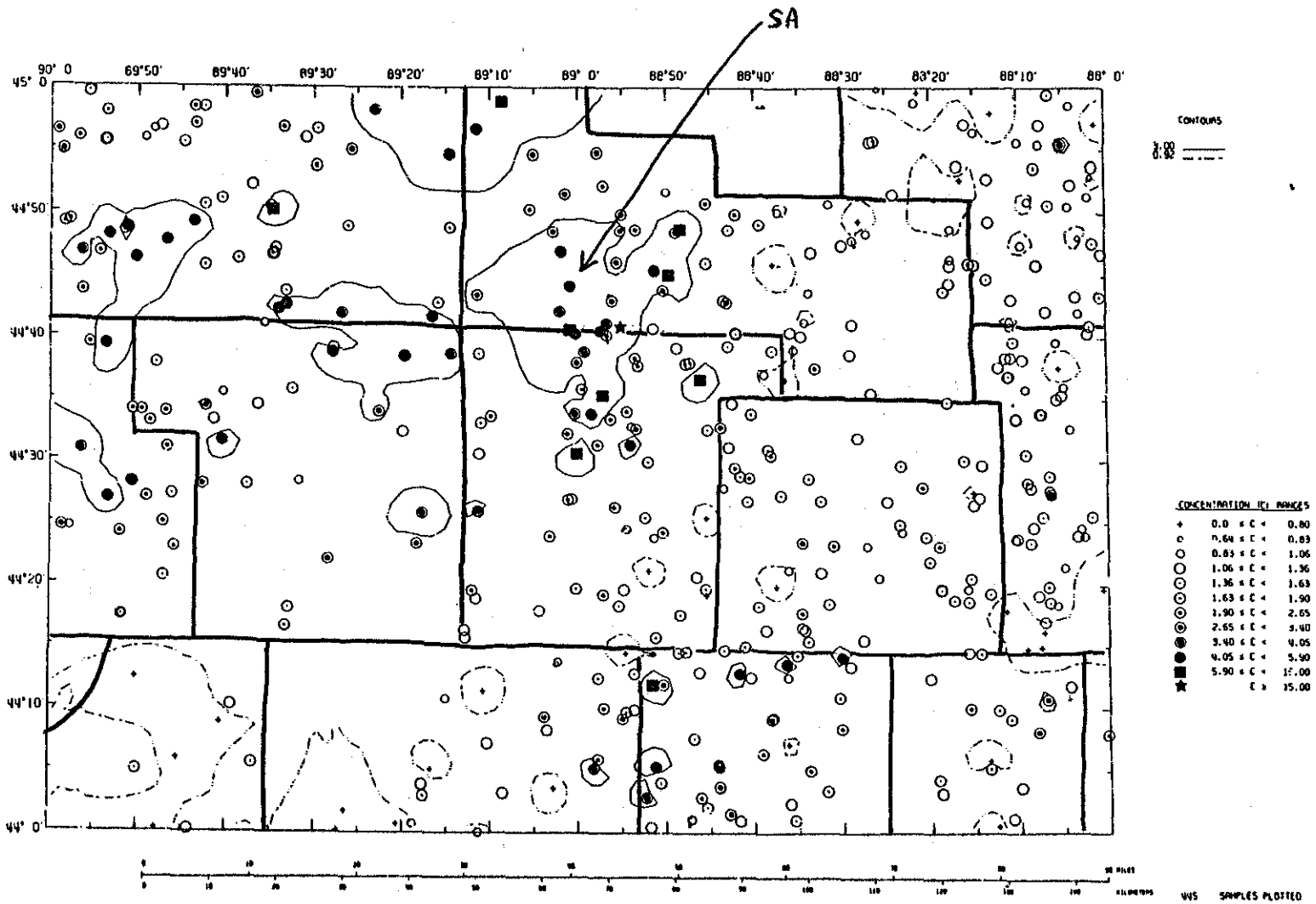


Figure B-1b

GEOCHEMICAL DISTRIBUTION OF URANIUM FLUOROMETRIC
IN STREAM SEDIMENTS OF THE GREEN BAY QUADRANGLE

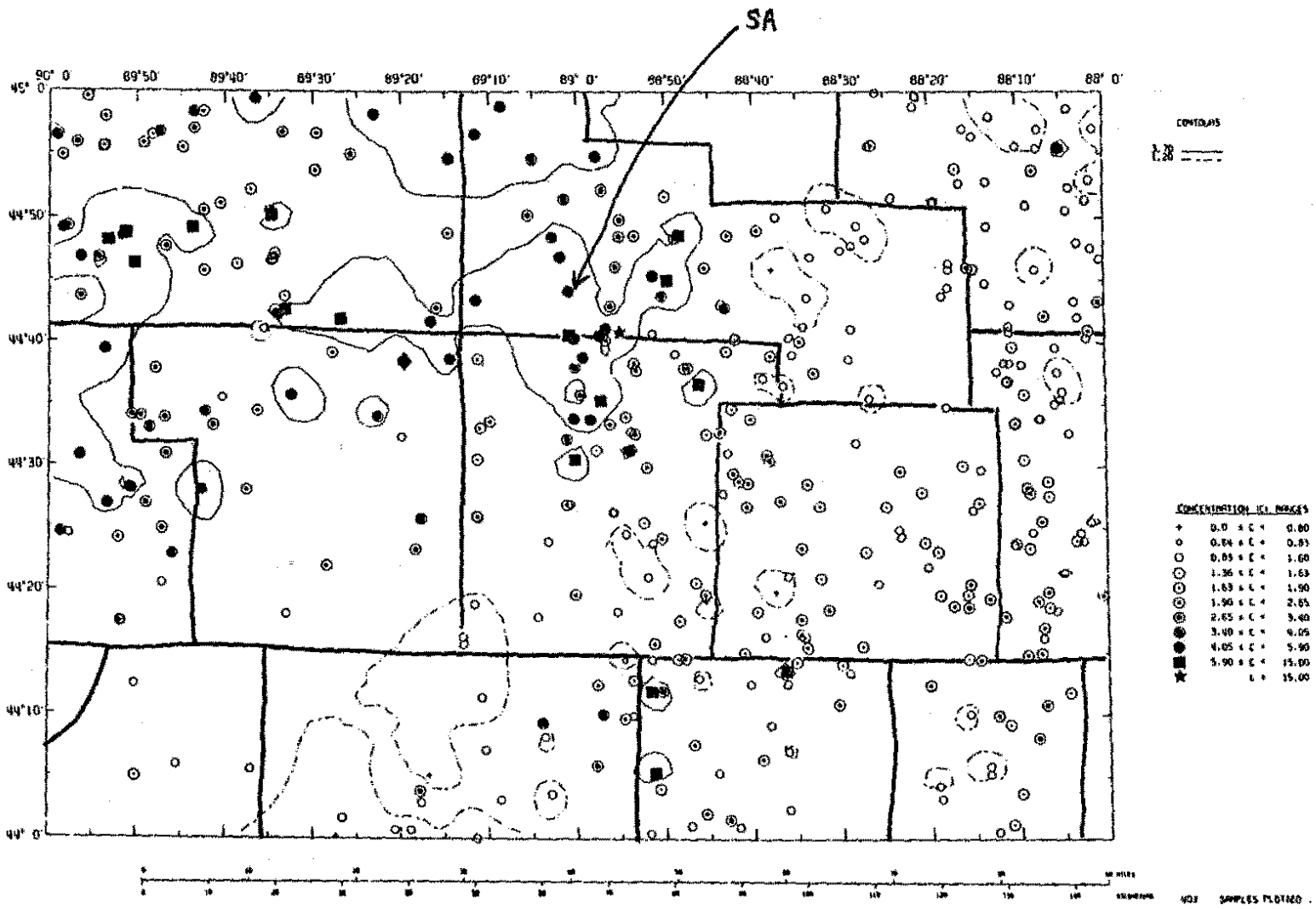


Figure B-2b

GEOCHEMICAL DISTRIBUTION OF URANIUM NEUTRON
ACTIVATION IN STREAM SEDIMENTS OF
THE GREEN BAY QUADRANGLE

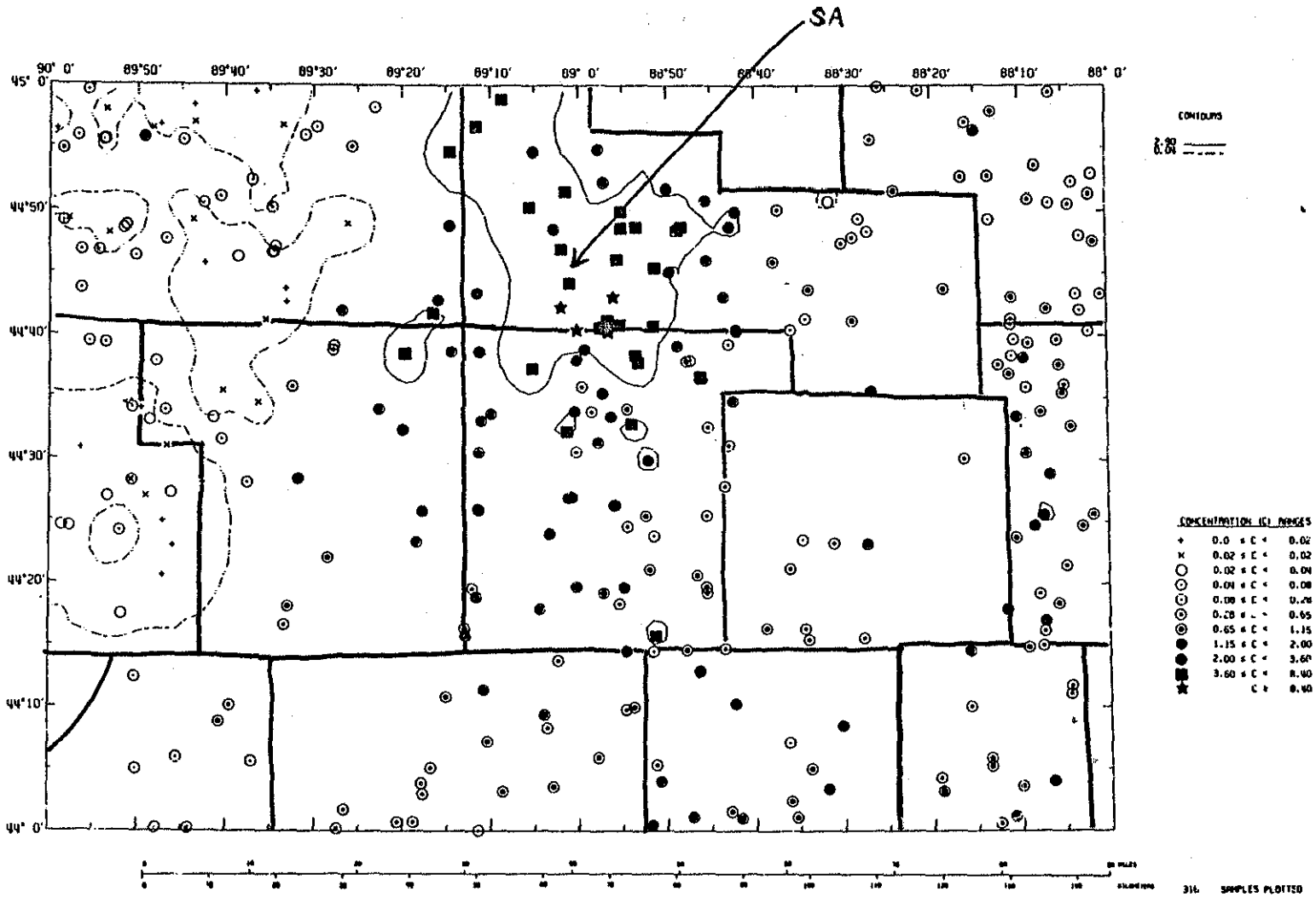
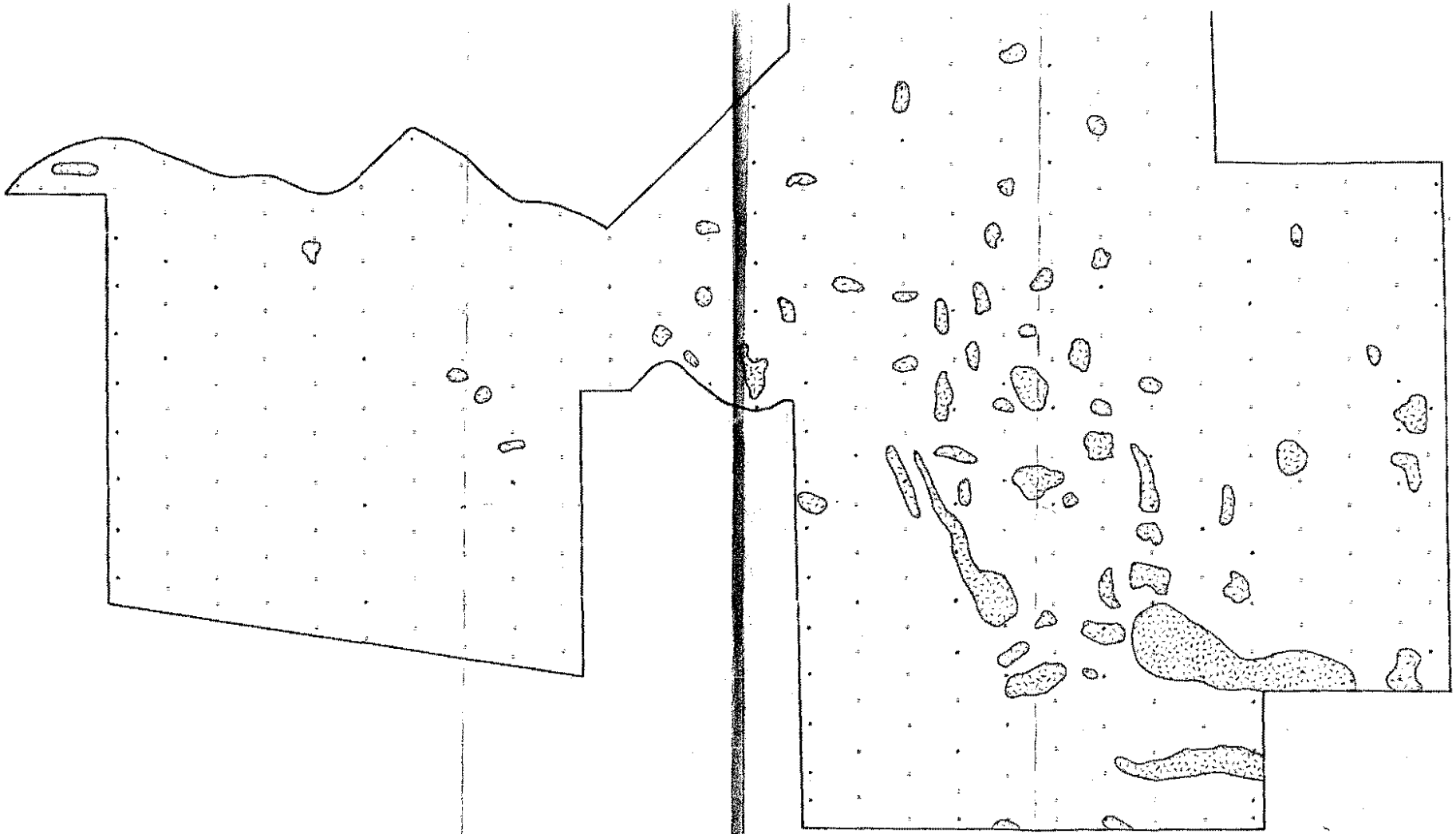


Figure C-1b

GEOCHEMICAL DISTRIBUTION OF URANIUM IN STREAM WATERS OF THE GREEN BAY QUADRANGLE



MINERALS RECOVERY CORP.
LAKEWOOD, COLORADO

ROCK OUTCROP MAP
REDMAN LEASE
Sec. 9, 10, 11, 14, 15 T26N, R12E
SHAWANO COUNTY, WISCONSIN
2-G09 DEC. 1978

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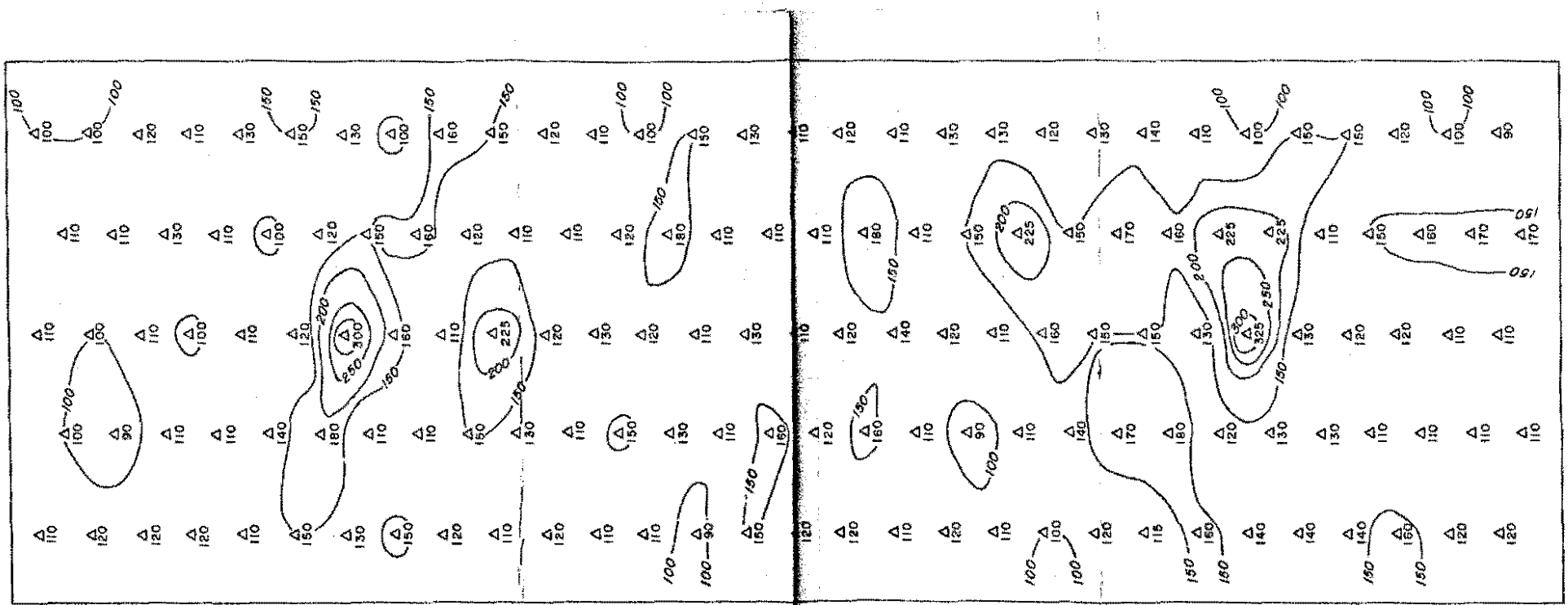

MINERALS RECOVERY CORP.
LAKEWOOD, COLORADO

DETAILED RADIOMETRIC SURVEY
REDMAN LEASE - ZONE 4
Sec. 10, T26N, R12E
SHAWANO COUNTY, WISCONSIN
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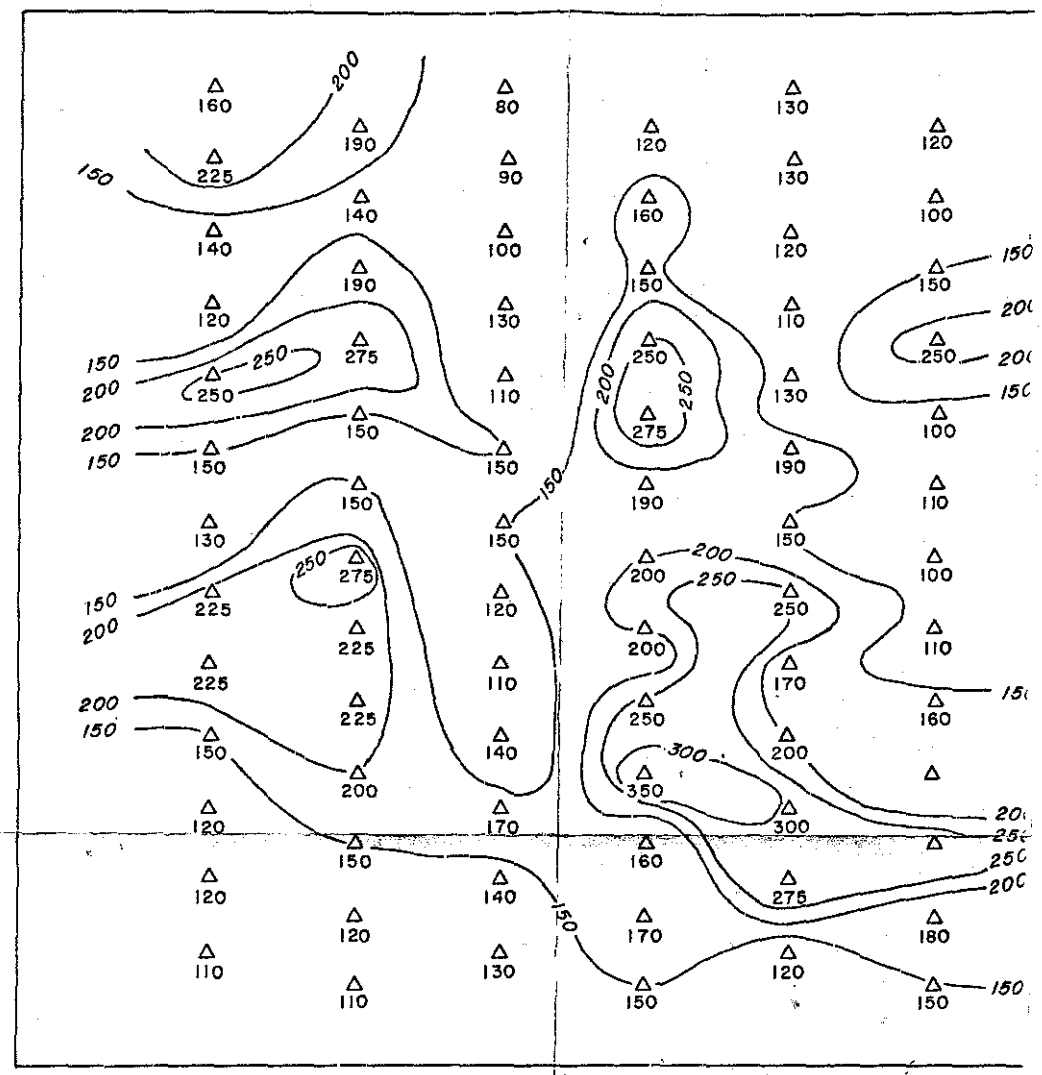

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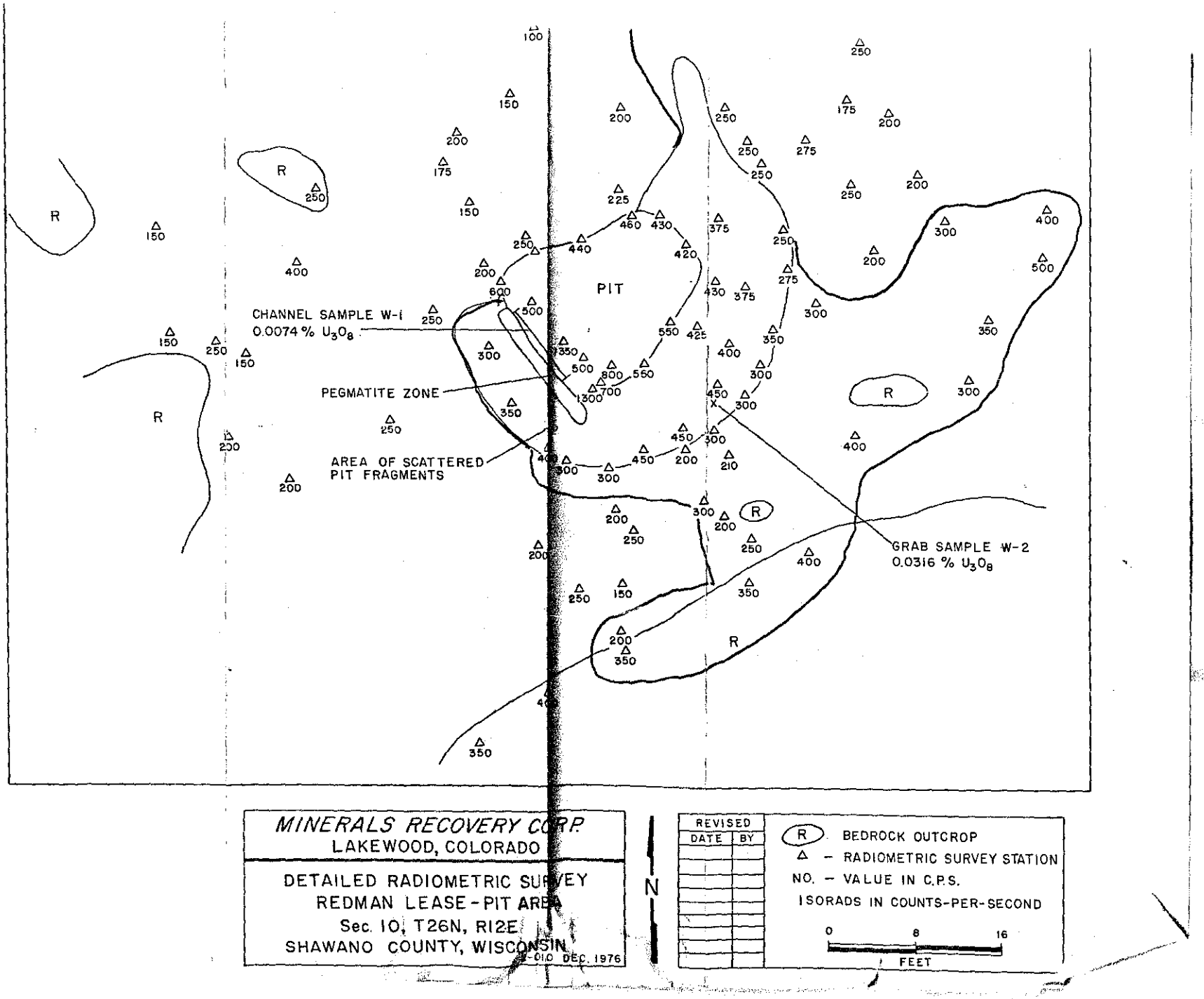
PIT
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MINERALS RECOVERY CORP.
LAKEWOOD, COLORADO
DETAILED RADIOMETRIC SURVEY
REDMAN LEASE - PIT AREA
Sec. 10, T26N, R12E
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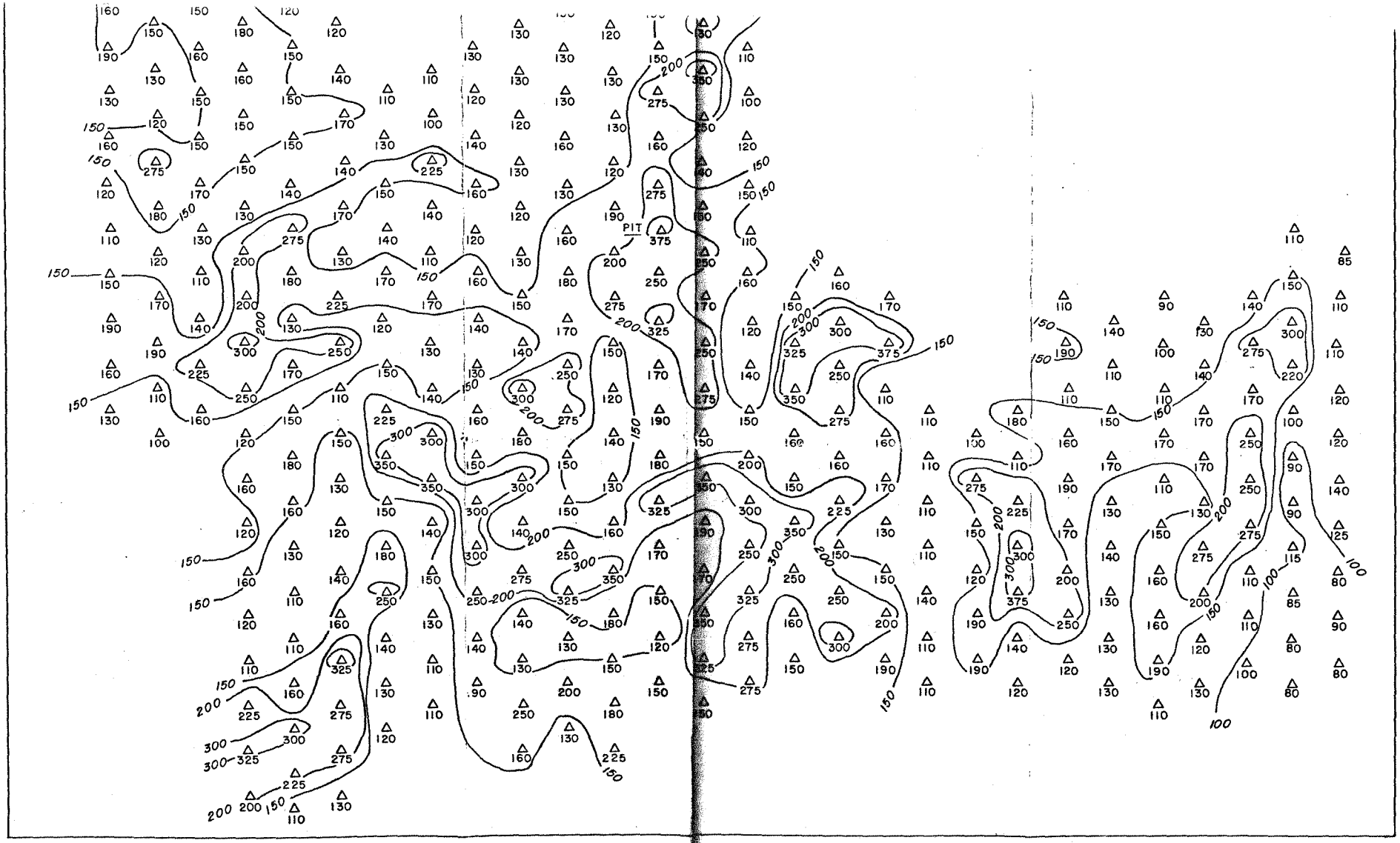

MINERALS RECOVERY CORP.
LAKEWOOD, COLORADO

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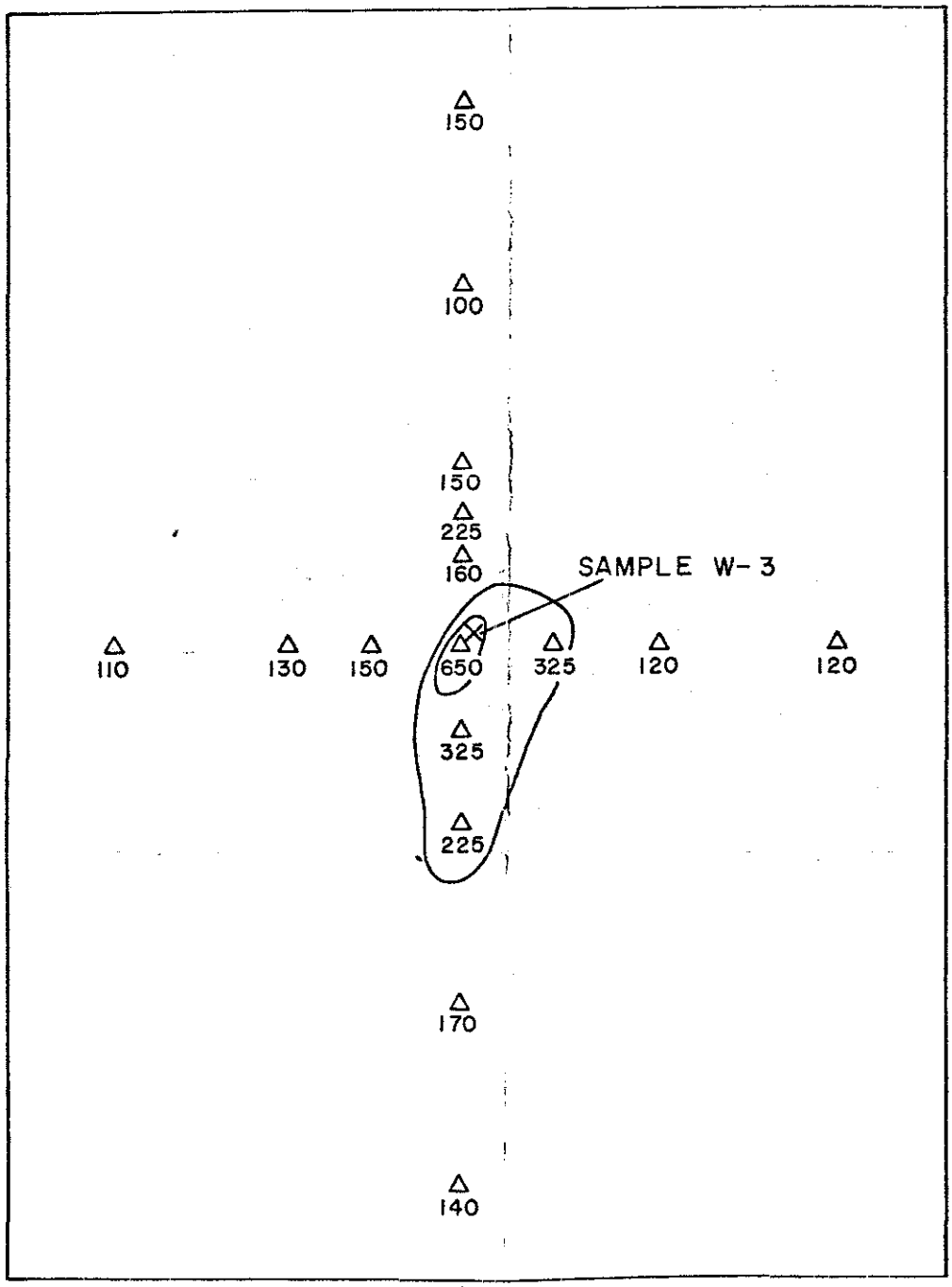

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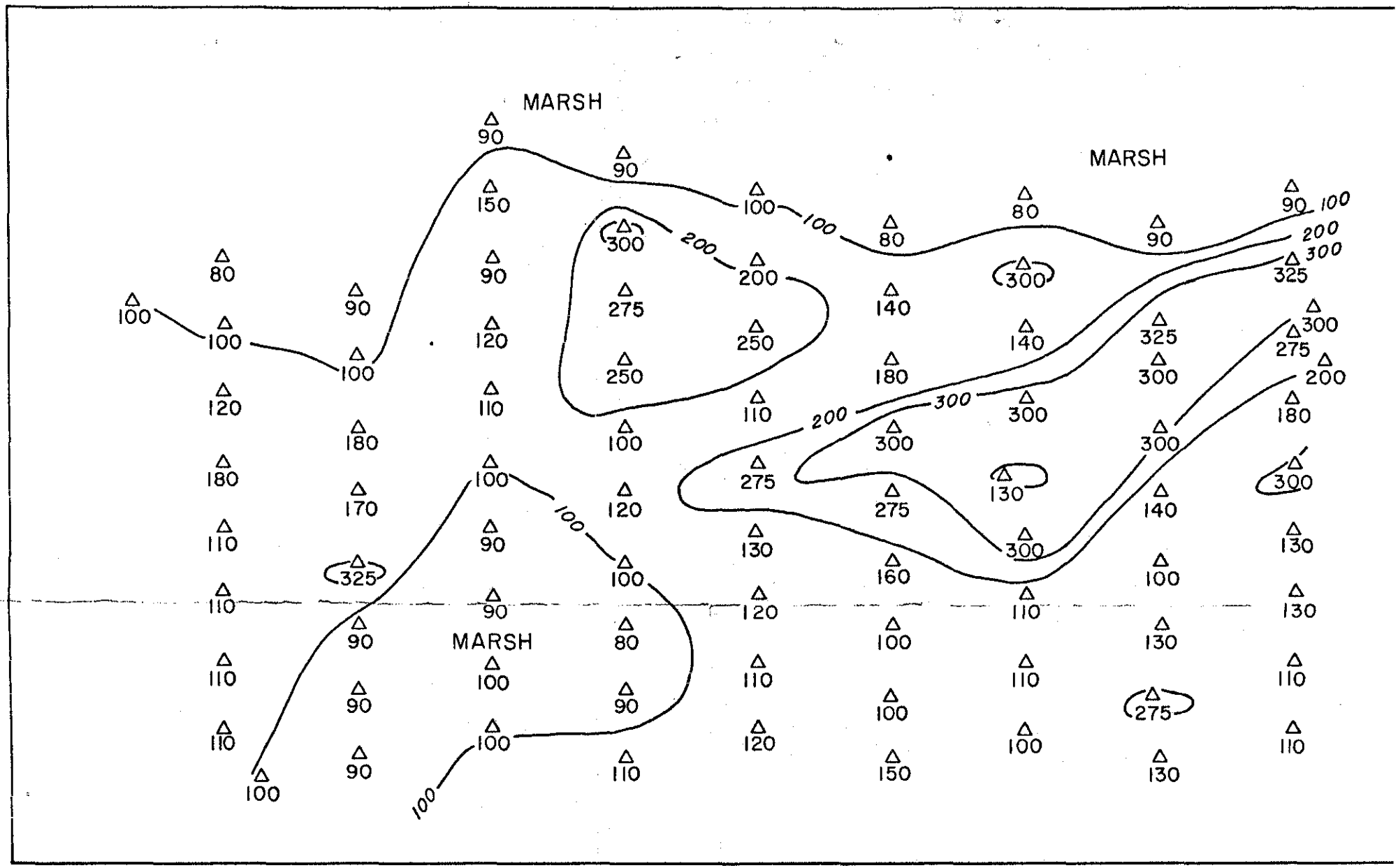

MINERALS RECOVERY CORP.

LAKEWOOD, COLORADO

DETAILED RADIOMETRIC SURVEY
REDMAN LEASE - ZONE 3
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