GEOPHYSICAL STUDIES IN SOUTH CENTRAL WISCONSIN

BY

KENNETH HUBERT KOENEN

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INTRODUCTION

In 1949, on a Tri-State field trip, the writer first visited Glover's Bluff, which is an area of local structural displacement believed to be of cryptovolcanic origin. During the winter and spring of 1955-56 the writer undertook to geophysically study the area to ascertain the possible validity of a cryptovolcanic origin for the structure.

It was found that the regional gravity gradient in Western Adams County is so marked (approximately 10 milligals per mile) that in order to determine if there was any gravity relationship to the Glover's Bluff structure it would first be necessary to make a regional investigation of the area. The area finally considered in the thesis study includes much of South Central Wisconsin.

No published geophysical data are available for the area, but there are data for the vicinity of Fond du Lac, with which the writer assisted in part. These consist of electrical resistivity measurements by the U.S.G.S. and gravity and magnetic measurements carried out by the Geophysics section of the Department of Geology at the University of Wisconsin as part of a groundwater investigation in the Fond du Lac area.

Because of the almost complete lack of outcrops, no regional Pre-Cambrian geology has been done in the area outside of the Fond du Lac area.

The scope of the present study can be summarized as follows:

1. The establishment of a regional gravity bouguer anomaly map with several magnetic traverses.

2. An analysis of the geophysical and geological evidence at Glover's Bluff from the standpoint of a cryptovolcanic origin.

3. A re-examination of data from four other cryptovolcanic structures in the Central United States to establish degrees of postulated similarity with Glover's Bluff.

4. An interpretation of the regional geophysical data in terms of its probable over-all general geologic significance.

Area of Study

The area of regional study covers most of South-central Wisconsin. The limits of the survey covering approximately 2000 square miles in eight counties are outlined on the Geologic Map of Wisconsin. Over 200 miles of linear magnetic profiles cross the gravity survey. An intensive gravity and magnetic survey at Glover's Bluff covers 25 square miles.

Field Program

Regional:

A total of six hundred and sixty gravity stations and one hundred and thirty magnetic stations were used in this study. All the field work was done during the winter of 1955-56 and the spring of 1956 with the exception of the stations in the Fond du Lac area. Work in the Fond du Lac area was done during the summer of 1954. Station locations are shown on Map 1 and principal facts, as determined in the Numerical Analysis Laboratory of the University of Wisconsin, are attached as Appendix A.

Local:

At Glover's Bluff eighty-eight magnetic and fifty-seven gravity stations were established in an area of approximately 25 square miles. Accuracy of the survey was increased in the area relative to the regional work because detailed resolution is required to determine the basement topography effects. This was obtained with the gravity in the following manner:

a. A large scale (1/20,000) map of the area was produced from aerial photographs. Thus the accuracy of theoretical gravity was increased.

b. Frequent base station reoccupations increased

observed gravity accuracy.

c. Barometric elevation surveys were repeated and leap-frogged at night under good atmospheric conditions for good elevation control.

d. Special attempts were made to position the gravimeter observation position to limit the nearby terrain effect.

Accuracy of the magnetic survey was increased in the following manner:

a. Frequent base station reoccupations increased observed magnetic accuracy.

b. Sensitivity of the magnetometers was increased to 22 gammas per scale division and frequently checked in the field.

c. Latitude adjustments were made in the field to eliminate use of magnets.

Previous Work

Geology:

Geological work in the area of investigation has been limited. Weidman[21] made a petrographic description of Pre-Cambrian outcrops in the Red Granite, Berlin and Utley areas. Weidman[22] also described the general geology in Wood, Portage, and Juneau counties. Alden[1] worked the general geology in Southern Adams, Marquette,

Green Lake, and Fond du Lac counties. Thwaites and Ekern[18] detailed the geology of the Glover's Bluff area. Ostrander[12] described the Hamilton Mounds quartzite outcrop in Northern Adams County. Berg[2] has described Cambrian sections at Coolney Hill, Friendship Mound and Horseshoe Bluff in Adams County. Leith[9] made some recent Pre-Cambrian correlations with the Lake Superior section. Thwaites[19] has collected valuable well data throughout the area.

Geophysics:

Previous geophysical work in this portion of the state is almost non-existent. The Coast and Geodetic Survey[5] occupied magnetic stations at Fond du Lac, Green Lake, Montello, Wautoma, and Friendship. Pendulum stations were occupied at Wisconsin Rapids and Oshkosh by the Coast and Geodetic Survey.[6] This work is of a geodetic nature and has no bearing on a regional survey. Sumner[16] conducted a geophysical study of the Waterloo district to the southeast of the area. The U.S.G.S. Groundwater Branch and the Geophysics Section, Department of Geology, University of Wisconsin have made electric resistivity, gravity and magnetic measurements in the Fond du Lac area.

GENERAL GEOGRAPHY OF THE AREA

The general geography provinces according to Martin[10] of the area studied are the Central Plain in the west and Eastern Ridge and Lowland in the east.

The western portion typifies the driftless area, the central portion the glacial features, and the eastern portion glacial features and Paleozoic Cambrian sediments. The driftless area covers most of Juneau and Adams counties, forming vast flood plains of the Wisconsin River with occasional Cambrian sandstone mounds. The Johnstown Terminal Moraine cuts roughly NNE, approximately along the eastern boundary of Adamms County. The terminal and ground moraines of the Wisconsin glaciation forms the major topography immediately to the east of the driftless area. The eastern portion of the surveyed area is crossed by two carbonate escarpments. The Lower Magnesium Escarpment trends northeast in the Ripon region and the Niagarian Escarpment trends north-northeast in the Lake Winnebago area. The intervening area consists of gently undulating glacial topography.

The relief in the area varies from approximately 750 feet at Fond du Lac to slightly over 1200 feet above sea level in Waushara County, while in the Wisconsin

River Valley it is generally between 900-1000 feet above sea level.

The drainage in the area is in three principal patterns. The driftless area in the west drains directly into the Wisconsin River. The Fox River System drains the entire central and eastern areas east of the driftless area into Lake Winnebago. The Rock River drains the southern portion of Fond du Lac County.

GENERAL GEOLOGY OF THE AREA

The area under investigation includes the eastern flank of the Wisconsin Arch, which, just to the north of the area, plunges beneath the onlapping, flat-lying Paleozoic formations. The Pleistocene glacial material, both moraine and outwash, forms a thin veneer over the entire area.

Geologic Column

Pleistocene
Silurian
- Niagara
- Neda

Ordovician
- Richmond
- Decorah
- Platteville
- St. Peter
- Oneota

Cambrian
- Jordan
- Trempealeau
- Mazomanie
- Franconia
- Dresbach
- Eau Claire
- Mt. Simon

Pre-Cambrian
Algonkian
- Keweenawan
- Upper Huronian
- Middle Huronian
- Lower Huronian

Archean
- Laurentian
- Keewatin

Pre-Cambrian Geology

Exposures of Pre-Cambrian rocks are limited in the

area of study. The outcrops have been described in the literature and will be summarized briefly.

The southern areas of Wood and Portage counties have Pre-Cambrian outcrops along the Yellow and Wisconsin rivers, just to the north of the surveyed area. Weidman[22] considers the area in the vicinity of Pittsville and Nekoosa as the Basal Group of the Pre-Cambrian section. This group of foliated gneiss and intrusive schist exhibits extreme metamorphism and similar character to the rock floor in the Lake Superior area to the north. The various rocks of the Basal Group in order of relative age are (1) gneiss, (2) greenstone schist, (3) quartz-syenite schist, (4) biotite gneiss. This belt of gneiss and schist forms an east-west anticline. This anticline is bounded on the north by an intrusive granite and greenstone of a younger age and on the south by the over-lying Cambrian sandstone.

The gneiss and schist of the basal group are cut by numerous dikes and boss-like masses of acidic and basic rocks such as (1) rhyolite, (2) diabase, (3) fine-grained diorite, (4) granite, in the order of their intrusion. These also intrude the younger, lower sedimentary series to the north.

Leith[9] has assumed the age of the basal group

to be Archean, the lower sedimentary series to the north to be Lower Huronian, and the intrusives to be Middle Huronian. This correlation is, of course, questionable.

At Necedah, a massive quartzite mound rises above the glacial alluvium to a level of 1080 feet. Drill holes[19] in the immediate vicinity show the Pre-Cambrian granite and diorite surface lies at about 700 feet. The general slope of the Pre-Cambrian surface is 11 feet a mile rising to the north and 4 feet a mile decreasing to the south.

In Northern Adams County, Huronian quarzite is found at Hamilton Mounds. According to Ostrander,[12] the quartzite has been intensely folded and dynamically metamorphosed with the production of sericite. The axes of the folds strike N75W and probably pitch to the east. A slight amount of overturning has occurred in the southeastern part of the area. Local brecciation and possible intrusion of pegmatitic and aplititic juices occurred with and after the folding producing resistant, well-cemented breccias and hydrothermally-altered, easily-weathered areas. A possible fault occurring after the folding is indicated by the displacement of the two main ranges of hills.

Well data[19] reports quarzite at 678 feet in the city of Adams and granite and gneiss at 655 feet just north of the city of Friendship.

In downtown Montello, Marquette County, Alden[1] describes a red granite cut by several small dense diabase dikes. Some shearing has taken place and joints in a N30-50E with a 50-70NE dip predominate.

Weidman[21] described a series of granite outcrops south of Red Granite, Waushara County. The rocks are essentially a fine-grained dull red granite with numerous fractures and joints. Basic dikes intersect the outcrops, striking approximately N70-80E. Well data in the village of Coloma reports granite at 660 feet.

In Green Lake County, Weidman[21] reports the same red granite as found to the north in Waushara County. It is a coarse phase of granite with basic metamorphosed diorite dike. At Berlin, a rhyolite gneiss monadnock with a sharp local relief of 600 feet within a mile is outlined. The original rock was a rhyolite which has been subjected to orogenic stress and metamorphosed to a gneiss texture. The outcrop contains a complex history of joints and fractures, indicating more than one period of deformation.

At Utley, Weidman describes a rhyolite outcrop, containing intrusive greenstone dikes trending N15E. The texture is massive and uniform of probable similar age as the Baraboo Volcanics.

In Fond du Lac County, Pre-Cambrian rocks are reported only in well data. At Fond du Lac, quartzite and slate are reported at 10 and 320 feet. Quartzite is found in Brandon at 142 feet. Two wells near Waupun show pegmatite at 133 feet and quartzite at 371 feet.

Pre-Cambrian Age relations in this area with other Pre-Cambrian areas are questionable. Weidman calls the basal group probable Archean north of the area and related to the floor rock in the Lake Superior region. The rhyolites and volcanics of the Fox River Valley, probably Upper Huronian, are similar to the Baraboo Volcanics. The granites of the Fox River Valley are congenitally similar to those found at Baraboo, and Weidman places them in the same petrographic province. Weidman also considers the Upper Sedimentary Series, probable Keweenawan, north of the Basal Group in Northcentral Wisconsin, related to the Baraboo Quartzite. Numerous writers have related the Necedah and Hamilton Mounds Quartzites with the Waterloo and Baraboo Quartzites.

Cambrian Geology

The Cambrian sandstones overlie the Pre-Cambrian throughout the area. The sandstones are exposed in erosional outliers in the Wisconsin River Valley. They underlie the Ordovician dolomites in Fond du Lac County. Concealed throughout are the Mt. Simon and Eau Claire formations. The Dresbach is a medium-grained, white, thick-bedded, ripple-marked sandstone. The Franconia is a fine- to very fine-grained, glauconitic sandstone. The Mazomanie is a fine-grained dolomitic sandstone. The Trempealeau is a sandy, thin-bedded dolomite. The Jordan is a medium- to fine-grained sandstone. Well data indicates the thickness of the Cambrian at Fond du Lac is 430 feet.

Ordovician Geology

The Ordovician outcrops in the eastern portion of the area, with the exception of two small ~~inliers~~ outliers of Oneota dolomite at Glover's Bluff. The base of the Ordovician forms a carbonate escarpment in the vicinity of Ripon, Fond du Lac County. To the east of Fond du Lac the Ordovician is buried below the Silurian escarpment. The Oneota is a gray, cherty, dolomite and varies in thickness, depending on the amount of downcutting of the over-lying St. Peter. Well data at Fond du Lac reports a varying thickness of 15-125 feet. The St.

Peter is a well-rounded quartz sandstone with varying amounts of iron oxide coloring. The Platteville, Decorah and Galena are located in well data. They are difficult to distinguish in this area of Wisconsin. The Richmond shale is a thin-bedded, silicified, fossiliferous shale and varies in thickness from 40 to 350 feet, increasing toward the east.

Silurian Geology

The only Silurian formation in the area is the Niagara formation capping the escarpment east of Fond du Lac. The Niagara is a light bluish-gray, crystalline, magnesium limestone, with some reef structures. It averages about 140 feet in thickness increasing toward the east. The Neda formation, which is found to the south, is not present.

Pleistocene Geology

The Pleistocene period has altered the topography throughout the area. The main features are the moraines and glacial lakes of the Wisconsin Glaciation Age. Concentric moraines radiate about Lake Winnebago. Starting form the driftless area, they are the Johnstown, Green Lake, Waupun, Rush Lake, St. Anna, and Outer moraines. The blocking of the Wisconsin River Valley during the last Pleistocene glaciation caused

the formation of glacial Lake Wisconsin over a large part of Juneau and Adams counties. Numerous other glacial lakes have been reported in Waushara and neighboring counties.

Structure

Structure is undoubtedly present in the Pre-Cambrian and Post Pre-Cambrian strata, but due to the lack of outcrops the good correlable horizons, little structure is mapped. Weidman states the rhyolite at Berlin has gone through orogenic stresses. Ostrander suggests faulting and folding at Hamilton Mounds. Thwaites[18] has indicated Post-Ordovician faulting at Glover's Bluff.

GEOPHYSICAL PROCEDURE

Field Procedure

Three methods of field procedure were used, depending on the accuracy desired: (a) base looping, (b) base reoccupation, (c) base line control. All primary base stations were looped in to determine the gravity values as accurately as possible. In general, field stations were tied in as closed series to the nearest primary base station, and most of the work was done on this basis. Distant regional series of stations were tied to the network by reoccupation of stations along a base line. Drift control was determined from the reoccupation values at the base stations. The station density was limited by road conditions, but in general, the regional spacing was one station every 5 square miles and at Glover's Bluff and Fond du Lac stations the density is increased.

Instrumentation

Worden Meters:

Temperature-compensated Worden gravity meters were used for most of the work. The advantage of this instrument over other standard gravity meters lies in its portability, weight, size, temperature compensation, range, and non-magnetic quartz system. In the present

survey two such instruments of the geodetic type were used.

The range of the small dial was sufficient for this particular work and hence the large geodetic dial was removed. This also eliminated a source of error, due to possible accidental movement of the geodetic dial while handling. The sensitivity of Meter 147 was .10466 mgal/Div and Meter 10F was .22740 mgal/Div.

Drift curves for the Worden meters were reliable and only one tare was observed. This tare was immediately located both in the calculations and in the field by reoccupation. Careful cumculative study of drift curves showed direct relationship with outside temperatures.

Frost Meter:

A Frost gravimeter was also used for part of the study. This instrument is a mechanical, astatic instrument of the Galitzen type.[23] The instrument is null reading and barometric-compensated, but must be maintained at a constant temperature. The meter constant used was .08550 mgal/Scale division. During the survey, the instrument was connected to the six volt battery of the truck and never disconnected. Due to

the cold weather, battery trouble halted the survey several times. Readings were taken, as with the Worden meters, both inside the truck on a special tripod or outside the truck on a portable tripod, depending on the vehicle availability. Due to the extreme sensitivity to wind motion, the Frost meter almost requires an inside truck tripod for rapid observation time.

Meter Characteristics

As indicated, several different meters were used during the survey depending upon their availability. Each meter was placed under controlled conditions in order to observe their characteristics. These experimental characteristics were then used to evaluate the drift curves.

During the winter months, when most of the observations were made, the rapidly changing temperature had a definite relation to the drift curves. With increasing temperature the gravimeter would drift positive, and with decreasing temperature the drift would be flatter or negative. This has been generally observed.[7]

The reliability of the meters was tested for this temperature effect (see Fig. 1). The Frost gravimeter

with thermostat control set on the high value of 122 F and the temperature-compensating Worden 147 were tested. The instuments were moved from a laboratory temperature of 80 F to an outside temperature of 40 F. The following graph shows gravimeter reaction to this temperature shock of 40 degrees F. On both occasions each gravimeter would have a definite reaction. The Frost gravimeter was shown to be especially temperature sensitive. Moving from the warm to the cold environment the drift would be negative, but upon regaining the initial warm laboratory temperature the readings would regain their original normal drift position.

The Worden meter appeared to assume a stable drift position after a period of time in the cold environment, while the Frost continued to drift rapidly negative. Field stations where the Frost gravimeter drift was erratic were checked with the Worden gravimeter and results checked within 0.1 mgal suggesting a linear temperature effect. It can be assumed that sufficient accuracy is obtained regardless of temperature effect if the base station is reoccupied every two hours.

Laboratory earth tide observations also verified the necessity of two-hour base station checks. In this

way earth tide corrections would be unnecessary.

Meter constants of the Worden 147 and Frost were compared from field stations occupied by both meters from the same base station. Dial reading differences of eleven stations over a range of 58 milligals were plotted. A linear relationship through all points showed agreement of better than 0.1 milligal.

Drift Control

All gravity observations were corrected for drift. Temperature in the immediate environment of the meter was believed to have the major effect on meter drift. No earth tide corrections were made.

Position Control

Gravity stations were located on county highway maps. Triangulation points (usually fire towers) were incorporated for accurate latitude control. Accuracy of position control is 0.15 minute in latitude, and 0.3 minute in longitude. The maximum error is 0.2 milligals. The relative error between stations is less than 0.1 milligal. At Glover's Bluff a local survey, large scale map was produced from aerial photos making the position error negligible.

Elevation Control

Elevation control presented a difficult problem. Highway profiles from the Wisconsin State Highway Commission and railroad profiles from the U.S.G.S. Groundwater Division were used for elevation control due to lack of topography maps in the area. This network of known elevations along the major highways and railroads increased the accuracy of barometric elevation in the intermediate areas. The overall accuracy of elevation control is within 5 feet, or 0.3 milligals.

Density Determinations

Density determinations were made on samples throughout the area. Buckley[4] made a rather complete study of specific gravities of Wisconsin quarry stone and these are included along with the writer's measurements in the following table.

Formation Name	Lithology	Quarry Location	Specific Gravity
Pleistocene	Drift	4 mi. SW Coloma	2.1
Niagara	Dolomite	Fond du Lac	2.81
		Marble Head	2.85
		Knowles	2.8
Trenton	Limestone	Duck Creek	2.83
Oneota	Dolomite	Glover's Bluff	2.73
Cambrian	Sandstone	Grand Rapids	2.38
		Necedah	2.31
		Coolney Hill	2.44

Formation Name	Lithology	Quarry Location	Specific Gravity
Pre-Cambrian	Quartzite	Adams County	2.64
	Quartzite	Necedah	2.64
	Granite	Montello	2.63
	Granite	Montello	2.65
	Rhyolite	Berlin	2.64
	Rhyolite	Green Lake	2.64

Reduction of Data

The gravity data were reduced in the usual manner with one exception. For the first time at the University of Wisconsin IBM calculation methods were used for gravity reduction computations. Theoretical gravity was obtained from the International Ellipsoid $978.0490(1 + 0.0052884 \sin^2 \phi - 0.0000059 \sin^2 2\phi)$. This formula was then reduced to a simpler form for IBM calculation. For the local survey at Glover's Bluff the relation $K = 1.307 \sin 2\phi$ (mgal/mile) was used as latitude correction. Observed gravity values for the entire survey are relative to the basement floor outside Room 7, Science Hall, Madison, Wisconsin. This value is 980.3690, which is indirectly tied to the world gravity base at Potsdam, Germany.[29]

The station number, latitude, longitude, observed gravity, and elevation are manually puched on IBM cards. The IBM 650 Magnetic Drum Data Processing Machine computes and types the following information for each

station: theoretical gravity, free air anomaly, simple bouguer anomoly for densities 1.77, 2.00, 2.20, 2.40, 2.50, 2.67, 2.80, 2.90. This information is found in Appendix A.

Because of the almost complete lack of topography maps, no terrain corrections were made. The amount of error introduced by terrain is not critical for a regional survey, but is critical in the local Glover's Bluff survey. No isostatic corrections were made but the Coast and Geodetic values at Wisconsin Rapids and Oshkosh are in the following table.[6]

	Obs. Gr.	Free Air	Boug 2.67	Iso.
Wisconsin Rapids	980.441	-.039	-.074	-.042
Oshkosh	.438	-.033	-.059	-.034

Magnetic Survey

The magnetic survey was conducted independent from the gravity survey. Two vertical intensity Schmidt type Askania magnetometers were used. The method of survey is similar to the gravity survey with one exception. Base stations were established with one moving magnetometer, while another stationary magnetometer, the deadman, was read every 10 minutes for diurnal correction. In the work at Glover's Bluff, reoccupation of a single base station every one or two hours determined the diurnal correction.

The sensitivity and temperature corrections of the magnetometers were determined frequently throughout the survey. Two sensitivities were used on both magnetometers: 50.2 and 39.5 gammas per scale division on magnetometer #57641 and 35.3 and 21.3 on the Fest magnetometer. The temperature correction was very small on these temperature-compensating magnetometers. The largest temperature correction was 2 gammas per C^{o} change. Both meters were adjusted for latitude in the field so no magnets were necessary.

The field stations were displaced at least 100 feet from any extraneous magnetic fields. The approximate absolute vertical intensity value can be obtained by adding 56,300 ($\pm$ 100) gammas to the entire survey. The estimate of error for the magnetic survey is 5 gammas between stations.

Magnetic Susceptibility Determinations

All rock gravity samples in the area were examined for their magnetic properties. The granite samples from Montello and Red Granite did indicate magnetic susceptibilities of varying amounts. Attempts to determine their actual amount of susceptibility were unsucessful, but the granite from Red Granite is considered to be rather high in local parts of the sample.

INTERPRETATION OF REGIONAL SURVEY

Method for Regional Determination

A regional gravity correction was applied to the entire Simple Bouguer Anomaly Map. Due to the large station spacing the graphical cross-profile method was used to determine the regional gravity. The regional gravity was determined from seven east-west, eight north-south, and two northwest-southeast profiles, (Plate V a,b,c,d, and h). Two interpretations of the regional gravity were made (Plate II).

Regional A was carefully drawn and readjusted until the E-W and N-S profiles agreed independently. Regional A agreed too closely with the original Simple Bouguer Gravity Map and was assumed to remove too much local geology. Vajk[29] points out this is frequently done. Regional A was not used in the determination of the residual gravity.

Using a method similar to Woollard,[27] Regional B (Plate II) was obtained by broadly smoothing Regional A. Regional B was then transferred on to the profiles used in determining Regional A. Excellent agreement with the broad regional trends was confirmed on the profiles. Regional B was assumed to be accurate and all interpretation was made with this

assumption.

Regional Interpretation

Regional B then showed the broad features of the Wisconsin Arch. Sumner[16] in the Waterloo district to the southeast of the area found the regional to be .66 milligals per mile decreasing N65W. In Fond du Lac County the regional is N35W decreasing .5 milligals per mile. However, in the Ripon area the regional is 1 milligal per mile. Over the major portion of the area the regional is very flat approximately .25 milligal per mile.

The regional "jump" (Plate V-h) in Northwestern Fond ud Lac County could be explained by a rapid thickening of the sialic crustal layer by approximately 1.5 kilometers at the 2.67-2.84 density interface. Slichter[15] point out these variations are possible. The regional control in this area is definitely poor making a regional interpretation difficult.

In the rest of the area to the north the regional is almost non-existent suggesting the Wisconsin Arch apex has been reached.

The comparison of regional A and B also indicates in the major portion of the area the residual inter-

pretation will be of the near surface crustal lithology.

General Discussion of the Residual

The residual anomaly map (Plate III) was obtained by subtracting regional gravity map B (Plate II) from the observed Simple Bouguer Anomaly Map (Plate I). Adjustment of the regional gravity up or down a few milligals will change the magnitude of the large anomalies and obscure or create other small anomalies, but the general interpretation of the large gravity effects however cannot be changed.

As previously stated the general results of the Bouguer Residual Map is near-surface crustal lithology.

All anomalies represent deviations, either structurally or lithologically, from the assumed normal crustal layer of density 2.67.

Positive anomaly areas are of heavy basic composition and negative anomaly areas are of lighter acidic composition. Small anomalies of 3 milligals or less will be disregarded because of possible buried topography effect.

The anomalies are divided into positive and negative catorgies. The anomalies are given geographic names in order to give their discussion a sense of

location. The anomalies can be interpreted by using their shape, gradients, regional orientation, magnetic properties, calculated form, and geological probability.

For calculation purposes a thickness of the sialic crust in this area is assumed to be 2.5-4.0 kilometers, in agreement with Slichter.[15]

Local Effects in Residual Gravity Map

A graticule study was made of various different probable near-surface, buried, topography reliefs likely to occur in the area.

(a) A Pre-Cambrian ridge 500 feet high and 2000 feet at the base covered with sediments and glacial till has a maximum effect of 1.7 milligals.

(b) A sandstone mound 250 feet high and 1000 feet at the base surrounded by glacial till has a .5 milligal effect.

(c) A Pre-Pleistocene river valley, which is filled with glacial material, 250 feet by 2000 feet has a .6 milligal effect.

The gravity anomalies of these features are roughly conformable with the buried topography feature. With gravity stations at a 1-2 mile interval, these topographic effects percentagewise will

occur infrequently. However as previously stated no gravity anomaly of 3 milligals or less will be evaluated, because of a probable surface or buried surface terrain effect.

Negative Anomalies

The characteristics of each anomalous area will be discussed in order to define the lithology and geologic cause. Interpretation will begin with the anomalies with known geology and this interpretation will extend into geologically unknown areas. Numerous interpretations have been evaluated, but only one, which the writer favors, is given.

The Red Granite negative has a circular shape with an east-west trend conformable with a reported basic dike trend. The gradients are steepest toward the Neshkoro positive on the south. Granite outcrops throughout the area. Depth estimate is 4 kilometers with the 1/2 width method. Probably genetically related to the Plainview and Coloma negatives. Downward flexure of the sialic crust could be the geologic cause.

The Berlin negative is not very well outlined. Its trend is toward the northeast *conformable with the rhyolite outcrop joint pattern. The rhyolites*

dip to the northwest and show evidence of having undergone orgenic stress. This evidence conforms with the regional "jump" in the sialic crust and complex orgenic history immediately to the southeast.

The Montello negative is poorly outlined. Granite outcrops suggest a northeast trend, which is also implied on the gravity map. Probably genetically related to the Berlin negative.

The Coloma negative is circular in shape. Granite was found in the Coloma city well. Magnetics indicate nothing. Depth estimation is 8 kilometers. Genetically related to the Plainview negative and probably to the Red Granite and Brooks negatives. Downward flexure of granitic crust is probable geologic cause.

The Plainview negative is similar with Coloma in all respects with exception of its northern trend, which assumes a northeastern direction.

The Necadah negative is not well defined. Probably due to diorite-quartzite density differential at the relatively near surface, because of its sharp gradient.

The Monroe Corner negative has an east-west trend, with a nose pointing at the Hamilton Mound quartzite outcrop. Depth estimation is 2.5 kilometers. Its eastern boundary appears to have a magnetic trend,

conformable with the Adams positive. Probably geologically related to the quartzite outcrops surrounding it, with similar origin.

The Brooks negative is circular in plan, with an east-west trend. Depth estimation is 4.5 kilometers. Using Nettleton's method,[11] a disk with a radius of 2.5 kilometers from a 3.5 to a 6.5 kilometer depth with a density differential of .2 will conform with observed bouguer gravity curve.

Magnetic indications suggest a 200 gamma low conforming with the gravity. Relationship with the Coloma negative is probable. Assumed geologic cause of the anomaly is a downflexure of the crust.

The Lodoga negative has a broad northeast trend, conformable with a magnetic low. The cause is probably a crustal downflexure related to the orgenic belt to the northwest.

Positive Anomalies

The positive anomalies are more difficult to interpret, because of the complete lack of outcrops. Because of the abundand magnetic obeervations some assumptions can be made on a few anomalies to which other positives can be related.

The Adams positive was well outlined with both gravity and magnetics. Gravity gradients are very

steep along the Coloma and Plainview negatives and moderately steep along the Monroe Corner negative. Magnetics indicates a near-surface, oval-shaped anomaly of over 1000 gammas completely within the gravity high (Plates IV and V, e and f). There is a pronounced magnetic low in the center of the high magnetic area. Radio reception in the immediate community is reported extremely poor.

A graticule study of the anomaly indicates an asymetric syncline with a maximum depth of feet of density conforms with the observed bouguer anomaly. Although many different interpretations are possible, a syncline of Pre-Cambrian, iron-rich, meta-sediments is suggested with probable faulting and mineralization along the eastern flank. This iron-rich formation probably stratigraphically overlies the Hamilton Mounds and Necadah quartzite.

The Neshkoro positive appears to be identical to the Adams positive but smaller in size (Plate V-g). Abrupt magnetic highs with a low in the center suggest similar rock sequences. The granite field sample from the Red Granite negative possessing a high magnetic suspectibility is the only objection to this comparison.

The Coddington and Saratoga positives are not too well defined. Gravity trends suggest a relationship with the Adams positive. However lack of the magnetic high trend and the presence of the Hamilton Mounds quartzite does not favor this relationship. Leith[9] indicates the presence of basic intrusives to the north. The geologic cause of the anomalies is probably a basic intrusive similar to the Duluth gabbro.

The Harrisville positive appears to be in the Neshkoro positive trend. However the magnetic and gravity gradients suggest the cause to be related to depth. Probably a slight upway flexure of the crust or basement lithology variation.

The Oxford and Pachwackee positives are not well enough defined for interpretation.

The Ripon positive may be caused by volcanics and basic lava flows as suggested by the geologic outcrops and the regional "jump" Thwaites'[17] map of the Pre-Cambrian shows a topography high of 600 feet on basement through this area.

The Van Dyne positive agrees with a magnetic high in both trend and amplitude. Topography relief of the crystalline basement is the probable cause.

Geologic Correlation

If the foregoing geologic assumptions are correct, there should be some general correlation with surrounding known geologic areas.

The volcanics of the Ripon positive could be related to the Baraboo Volcanics.

The Necedah and Hamilton Mounds quartzite is probably correlated with the Baraboo quartzite. This quartzite probably dips sharply into the deformed and faulted Adams positive syncline. Overlying the quartzite is a heavy sediment, which has a magnetite rich formation, probably correlable with the Freedom formation of Baraboo.

The Coddington and Saratoga positive basic extrusive probably followed deforming the Adams positive syncline from the north. This was followed by the intrusion of a large batholith of the Plainview, Coloma, Red Granite, and probably Brooks negatives. The Adams and Neshkoro positives were then deformed and faulted. Mineralization is probably related to this granite of probable Killarney age.

As previously stated, many alternative interpretations are possible, but the writer has attempted to arrange the lithologies and sequence in such a

manner as best to agree with an overall picture. Re-interpretation of the data is suggested after future geophysical investigations are made in surrounding areas.

GLOVER'S BLUFF DISTURBANCE

Geology

Glover's Bluff consists of a highly disturbed Ordovician outlier. The base of the Oneota formation, the disturbed strata, is approximately 200 feet structurally lower then the normal surrounding, gently southeast dipping Cambrian sandstones. Ekern[8] mapped the base of the Franconian formation two miles east at 1020 feet and six miles west at 1060 feet (Plate VIII). The base of the undisturbed Oneota dolomite is found is found four miles southwest at 1180 feet. The Oneota dolomite in the Glover's Bluff vicinity is found at various levels from 1075 feet to less than 1010 feet. It is obvious that Glover's Bluff is a downfolded or downfaulted element, which extends at least 200 feet below the expected level. Thwaites[18] favors the hypothesis of Post-Ordovician movement on Pre-Cambrian lines of weakness.

Regional

The regional gravity is affected by the Coloma negative to the north and west (Plate VI). However these regional trends are believed to have been eliminated by using the cross-profile and smooth-contour method of regional removal (Plates VII and

IX, i and j). Magnetic data was handled in a similar manner.

Residual

The residual anomaly values are obtained by subtracting the regional from the observed bouguer anomaly map. The gravity and magnetics residual resulted in a large positive anomaly with a small superimposed negative anomaly. The assumed effect of the proposed 200-foot Pre-Cambrian fault was calculated. This accounted very neatly for the superimposed negative, especially with the magnetics. The large magnetic and gravity positive was calculated and both agreed with a basic plug at a depth of 6500 feet.

Interpretation

The gravity residual shows a broad high miles northwest of Glover's Bluff. Magnetic data shows a magnetic sharp low over the gravity high. This magnetic low is flanked by two magnetic highs. The magnetic low cannot be associated comfortably with the gravity high. The magnetic low must be near surface where its resolution in this case is best. The two flanking magnetic highs then merge into one and are directed related to the gravity high. Glover's Bluff is then caused by Post-Ordovician semi-hinge graben

faults in the crystalline basement due to a basic intrusive at depth. Travis and McDowell find this grabenlike faulting to predominate in model studies and saltdomelike structure.

Glover's Bluff has a unique position in regards to probable north-south and east-west regional zones of weakness suggested in the regional interpretation. It is also located at the approximate apex of the Wisconsin Arch.

Cryptovolcanics in other areas

The literature was then surveyed to note geophysical results from other cryptovolcanic structures.

Sappenfield[14] conducted a vertical magnetic survey of Serpent Mound, Adams County, Ohio.

Wilson and Born[25] made a magnetic survey of the Flynn Creek Disturbance, Jackson County, Tennessee.

Wilson and Born[26] conducted a vertical magnetic survey of the Howell Disturbance, Lincoln County, Tennessee.

Pemberton[15] conducted a gravity survey of the Des Plaines Disturbance, Illinois.

The writer has reinterpreted these magnetic surveys by constructing profiles through their survey maps (Plate IX). Assuming the writer has

drawnthe regional properly all of the above profiles are in direct agreement with the Glover's Bluff magnetic results.

The observed bouguer gravity map of Pemberton has also been reevaluated (Plate IX). If the regional gravity is drawn slightly lower and flatter the result will be a large positive anomaly with a superimposed negative anomaly. Pemberton's second derivative maps contain residuals in agreement with the writer's revised regional.

The writer feels, that however the reevaluation of three magnetic and one gravity survey of other cryptovolcanic structures is in agreement with the results found at Glover's Bluff, the solution is not yet unique. A seismic survey in the Glover's Bluff vicinity could possibly solve the origin of crypto-volcanic structures.

SUMMARY AND CONCLUSIONS

A regional network of gravity and magnetic stations have been established over South Central Wisconsin. A Regional Gravity Bouguer Anomaly map has been compiled on the area. Magnetic values have been mapped and profiles drawn for comparison with gravity anomalies. This will make it possible for future surveys over known geologic area to extend their interpretation into this geologically uncertain area.

An attempt was made to interpret the regional geology of the area almost solely from geophysical information. Probable geological correlation and history of the area is suggested.

The Glover's Bluff structure has been surveyed with gravity and magnetics. The writer has evaluated other geophysical surveys on cryptovolcanic structures. With a slight change in the regional geophysical trend all the surveys indicate agreement with results at Glover's Bluff. The probable origin of these disturbances is a basic intrusive at depth on the order of 1 1/2 miles causing graben and hinge faulting at the surface.

ACKNOWLEDGEMENTS

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Approved 

Dr. George P. Woollard

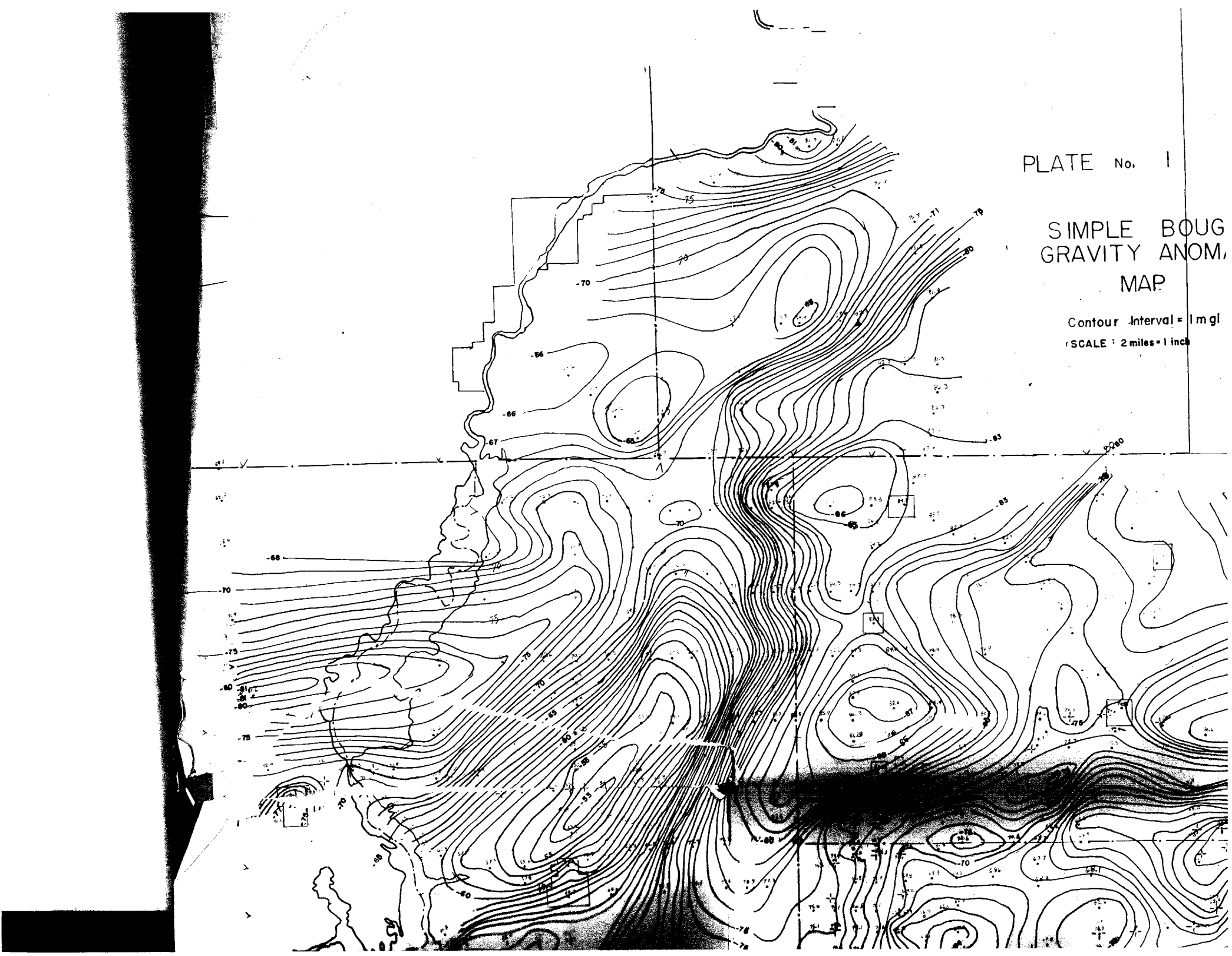
June 9, 1956

PLATE No. 1

SIMPLE BOUG
GRAVITY ANOM
MAP

Contour Interval = 1 mgl

SCALE : 2 miles = 1 inch



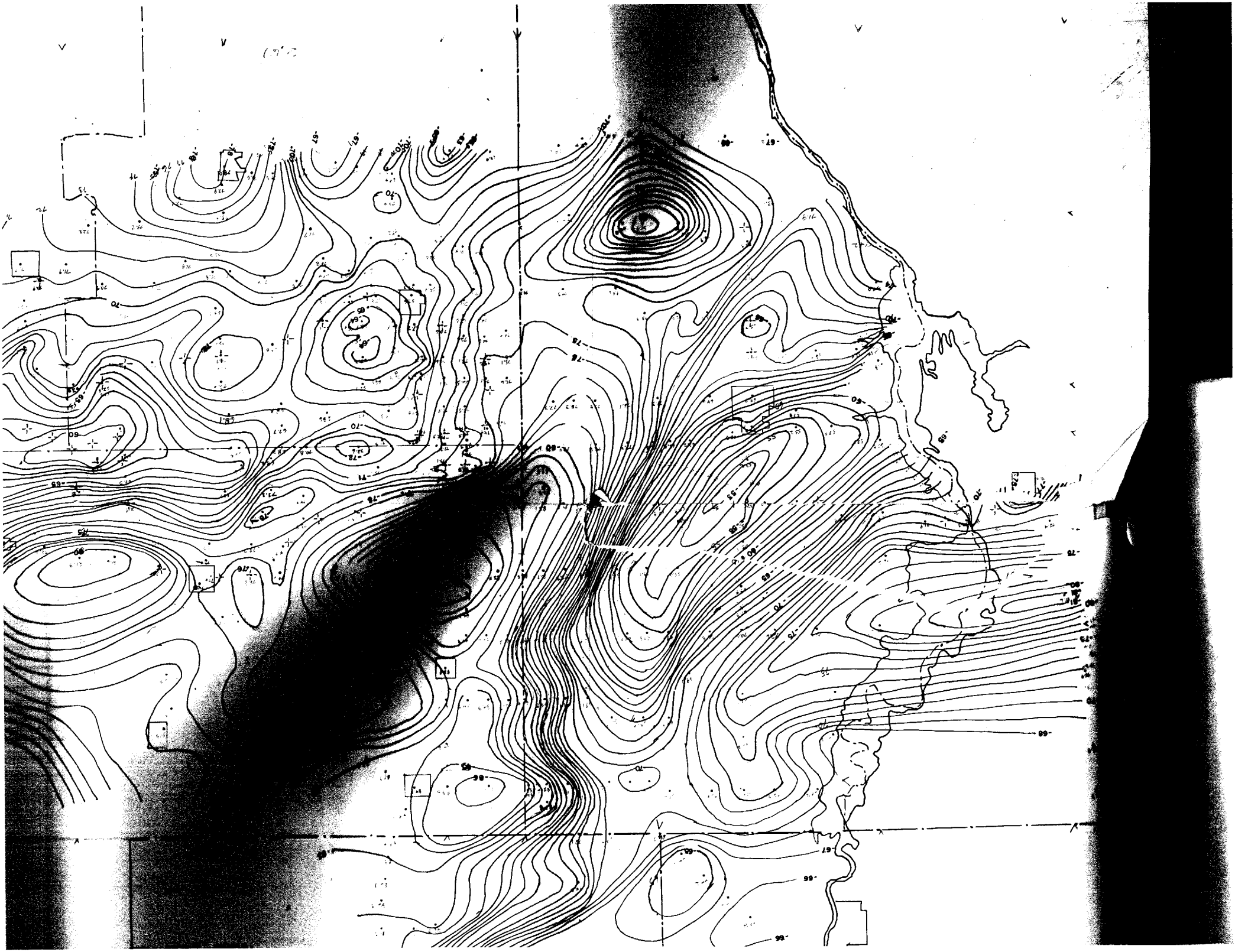
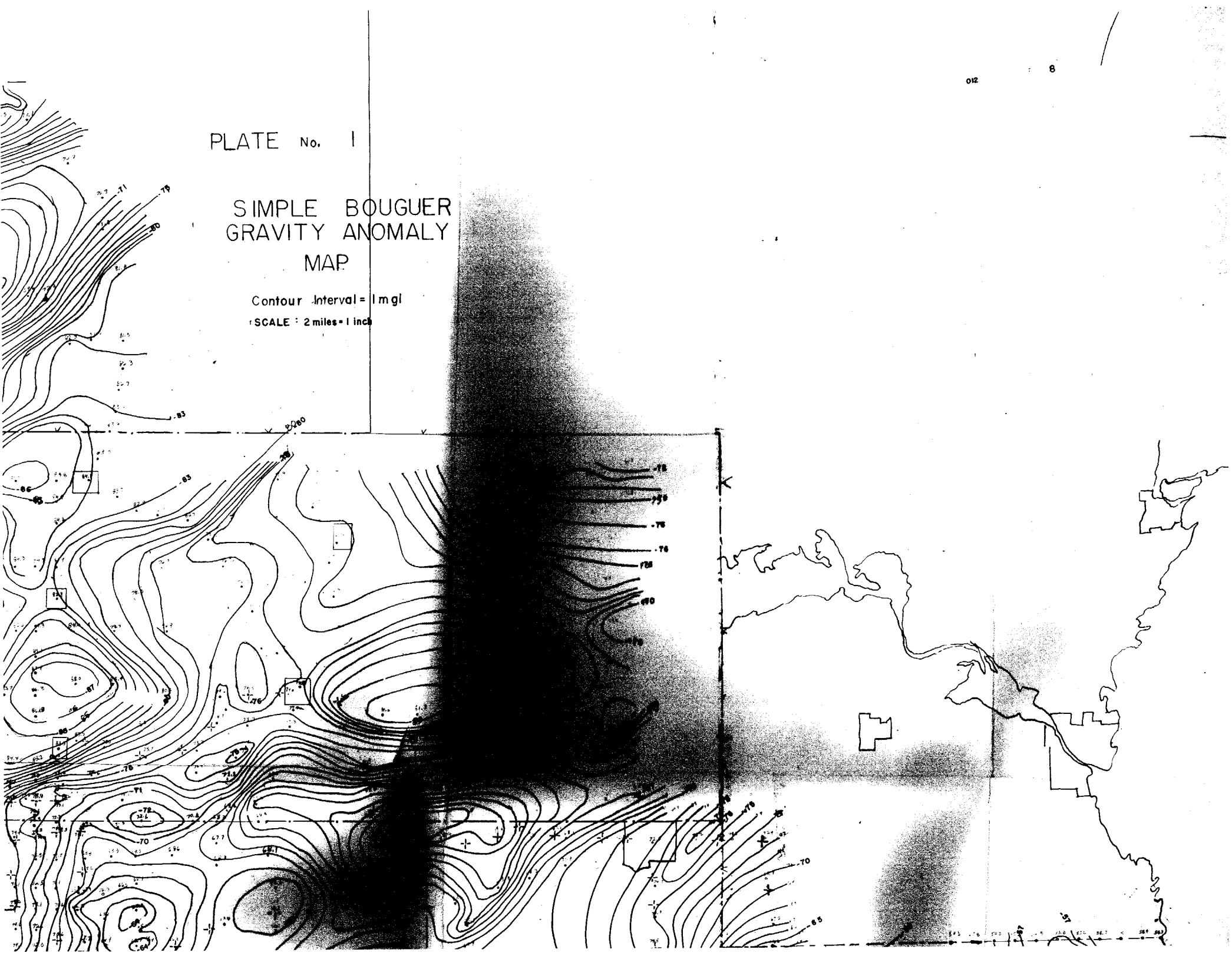


PLATE No. 1

SIMPLE BOUGUER GRAVITY ANOMALY MAP

Contour Interval = 1 mgl

SCALE : 2 miles = 1 inch



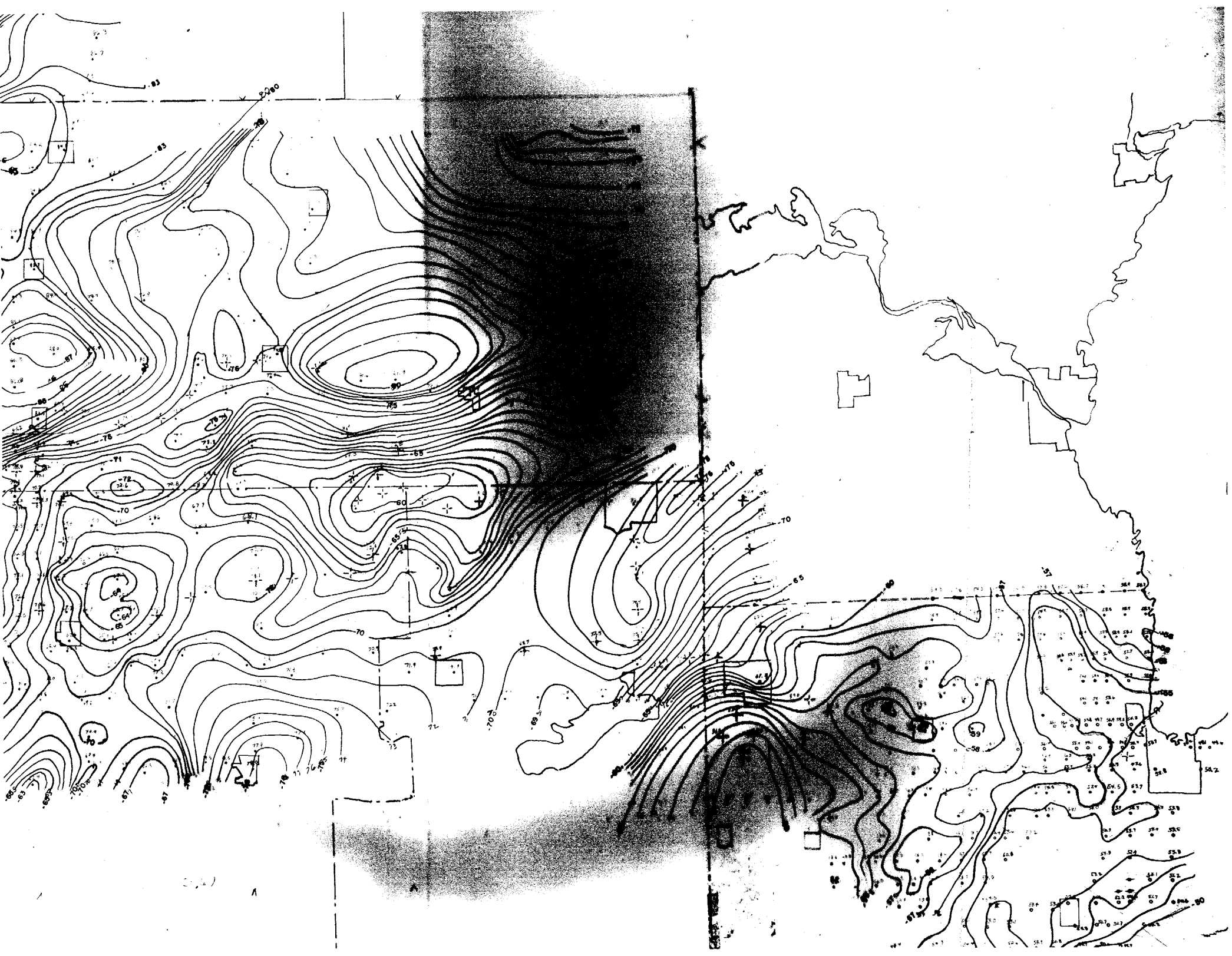


PLATE II

REGIONAL E
GRAVITY COR

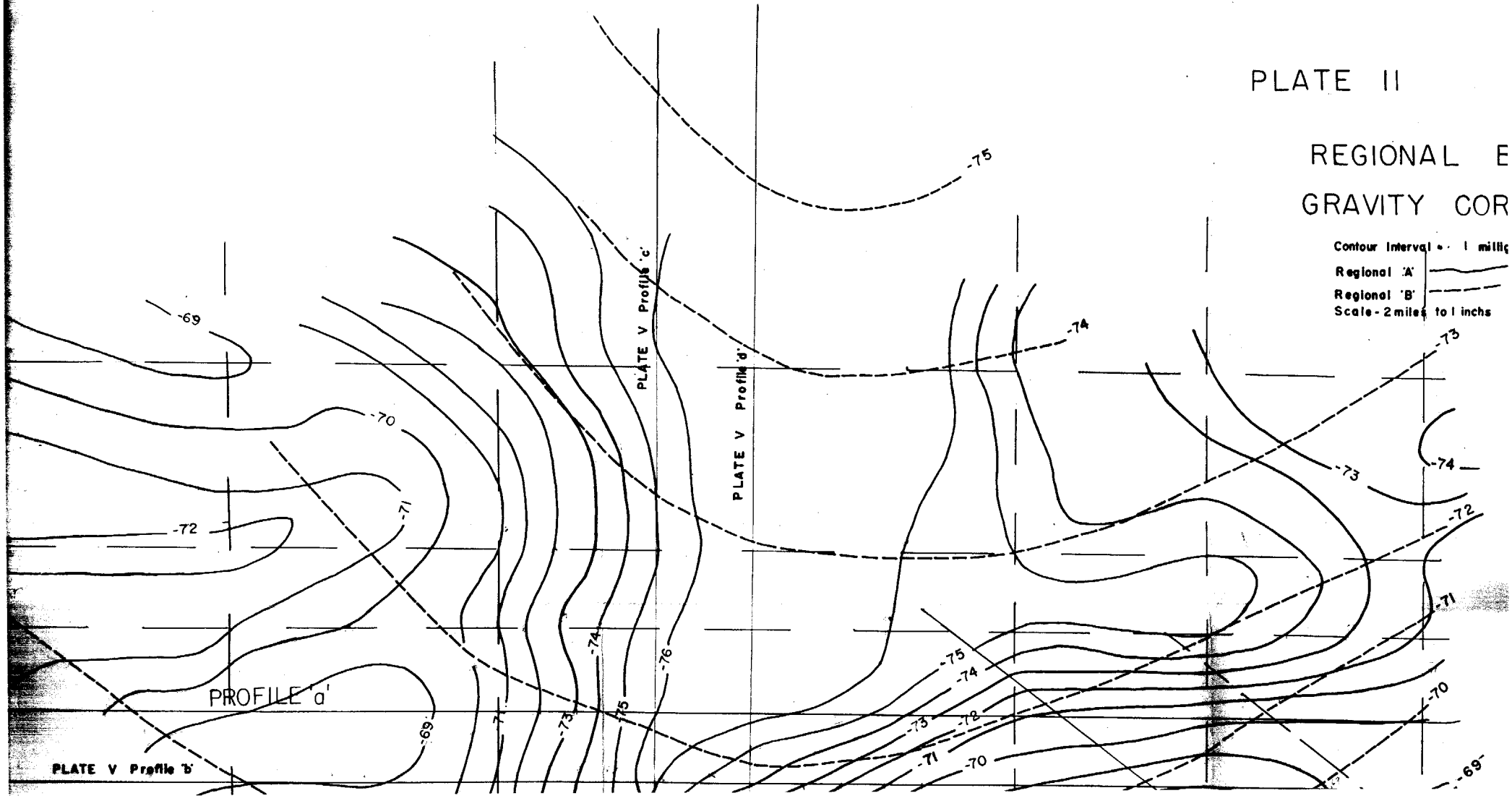


PLATE II

REGIONAL BOUGUE
GRAVITY CORRECTIO

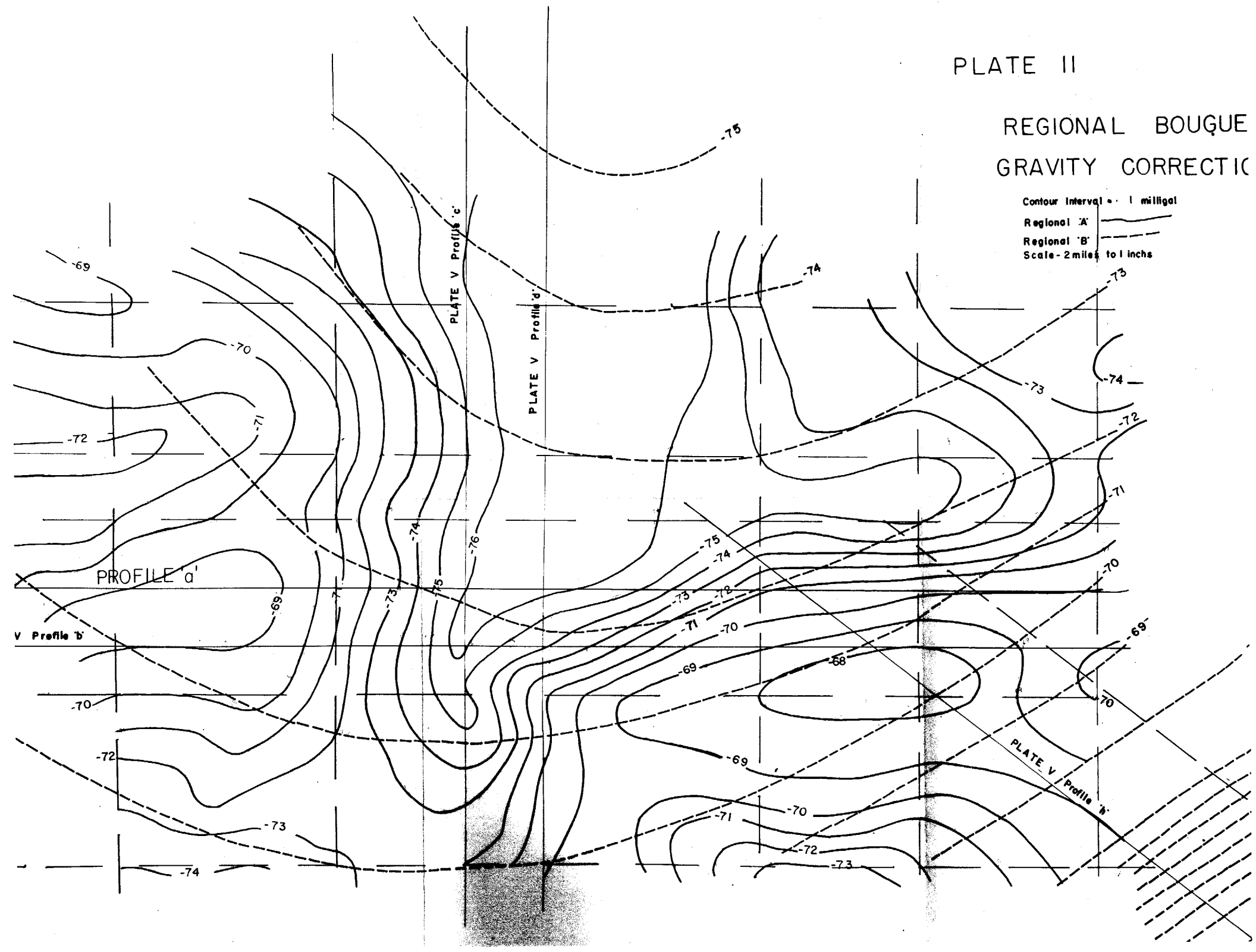
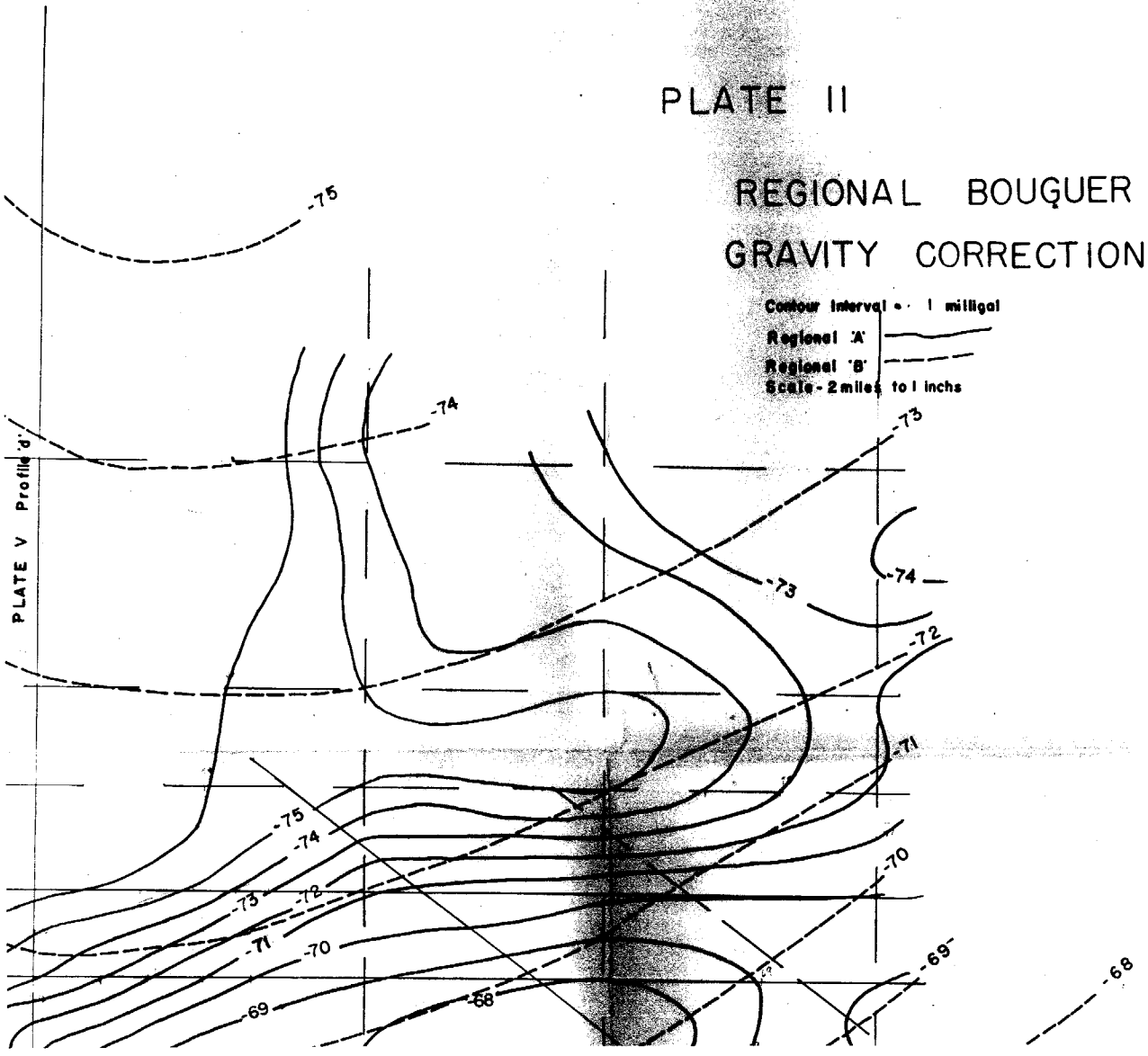


PLATE II

REGIONAL BOUGUER GRAVITY CORRECTION



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REGIONAL BOUGUER GRAVITY CORRECTION

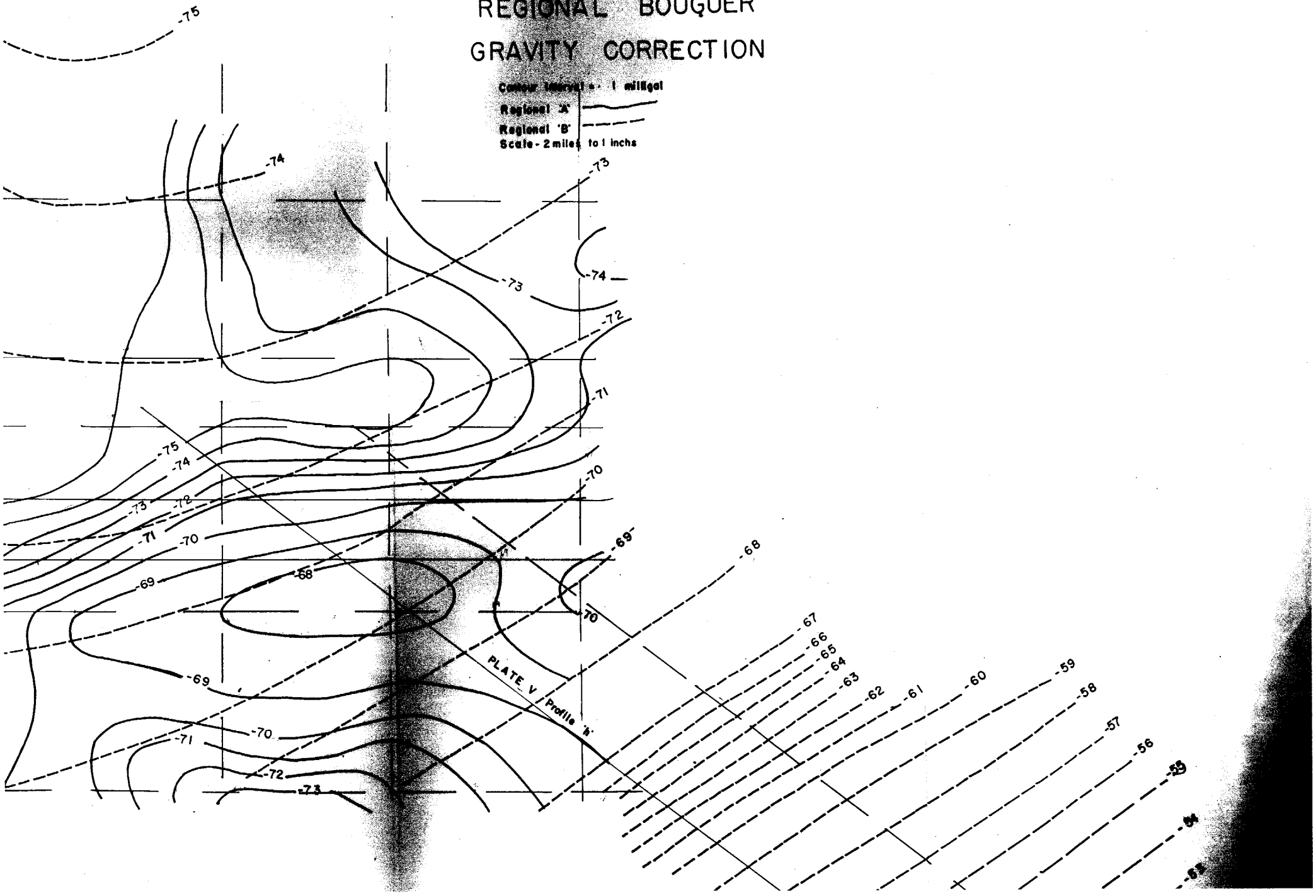
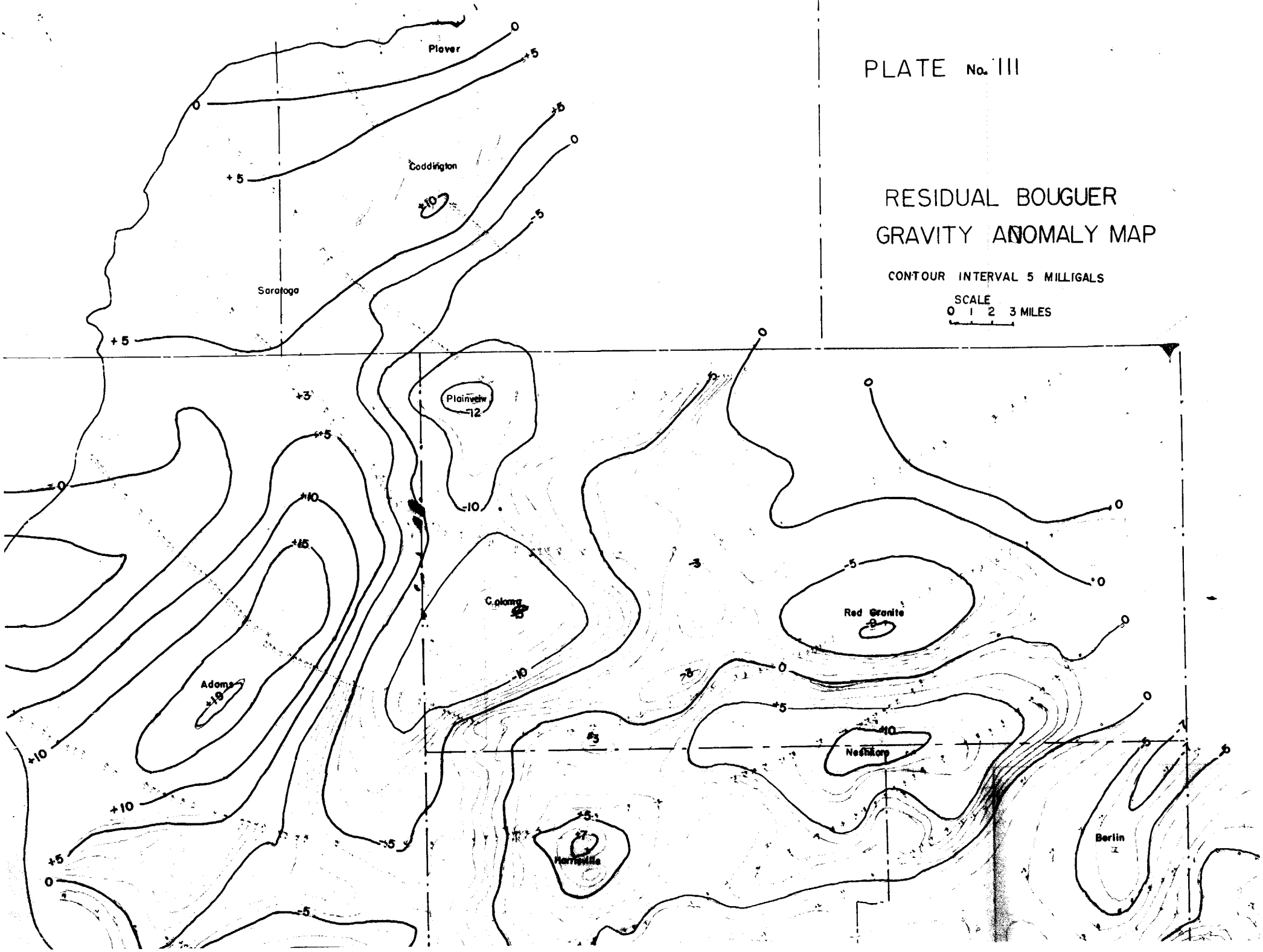


PLATE No. III

RESIDUAL BOUGUER GRAVITY ANOMALY MAP

CONTOUR INTERVAL 5 MILLIGALS

SCALE
0 1 2 3 MILES



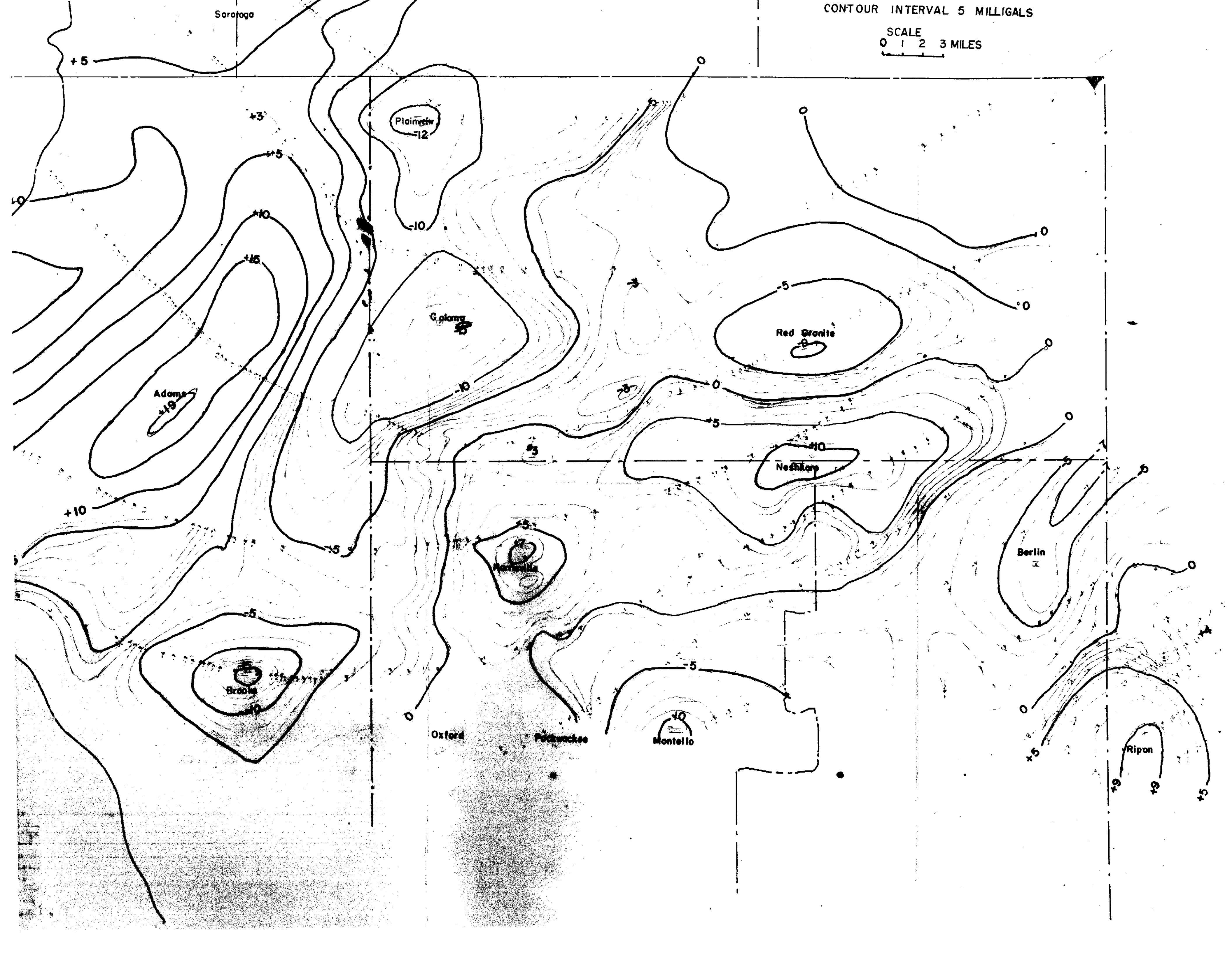
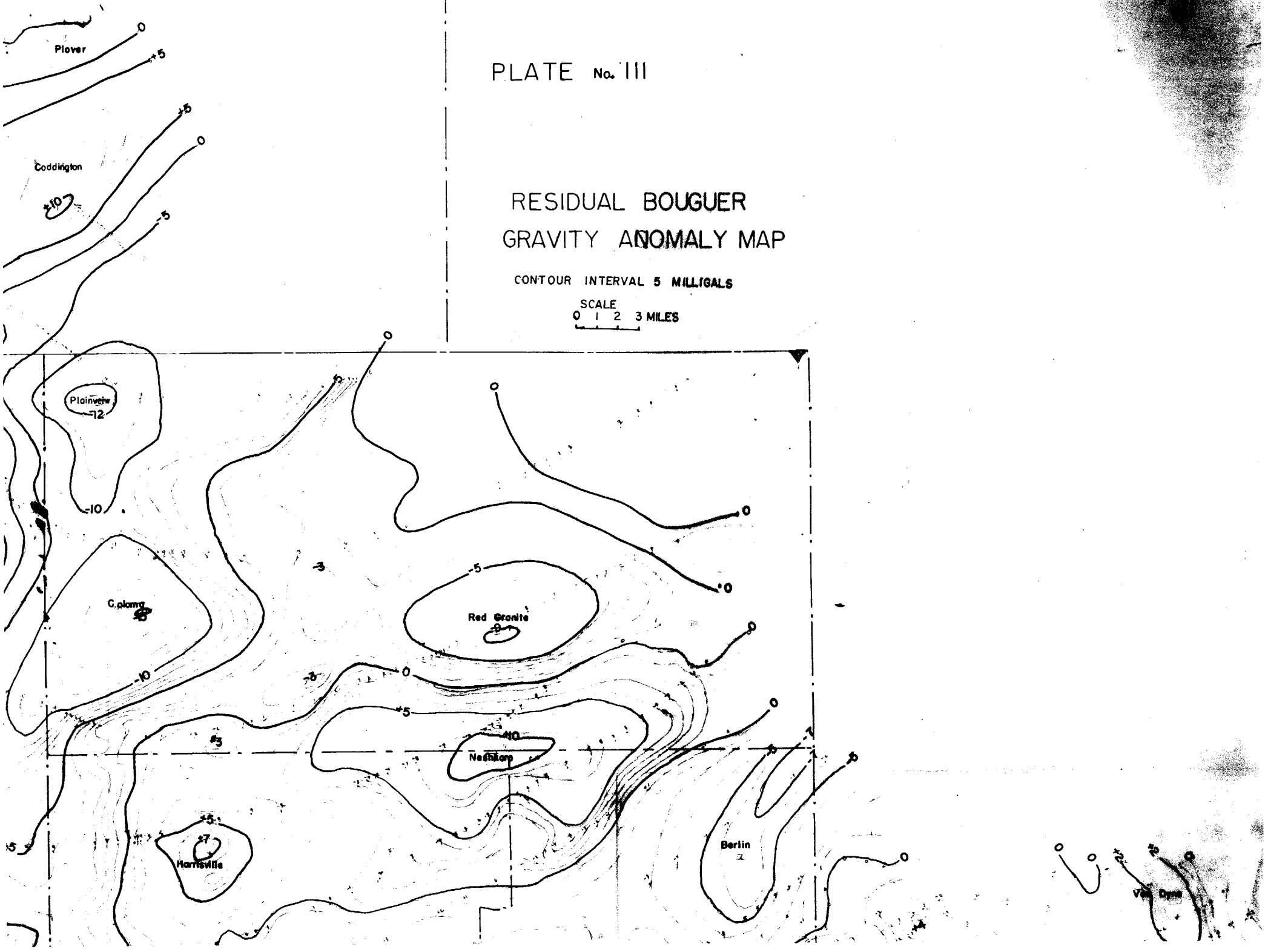

CONTOUR INTERVAL 5 MILLIGALS
SCALE
0 1 2 3 MILES
Saratoga
Plainview
Coloma
Adams
Red Granite
Neshkoro
Berlin
Brooks
Oxford
Montello
Ripon

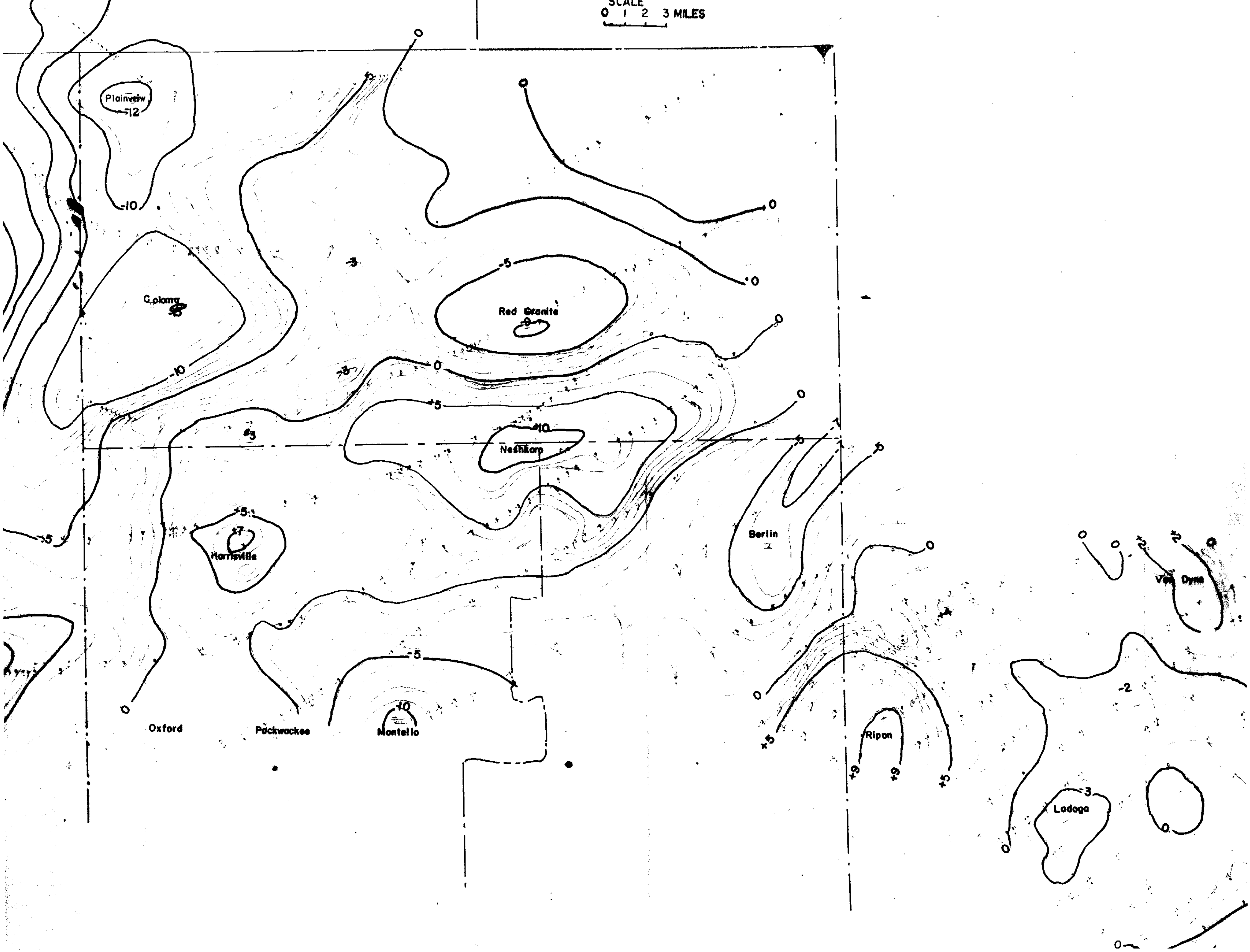
PLATE No. III

RESIDUAL BOUGUER GRAVITY ANOMALY MAP

CONTOUR INTERVAL 5 MILLIGALS

SCALE
0 1 2 3 MILES




SCALE
0 1 2 3 MILES
Plainview
-12
-10
Coloma
-10
Red Granite
-5
-3
0
+5
+10
Neshkoro
+3
+5
+7
Harrisville
Berlin
Oxford
Packwaukee
Montello
-5
+10
Ripon
+9
+5
Ladoga
-3
-2
Van Dyne
+2

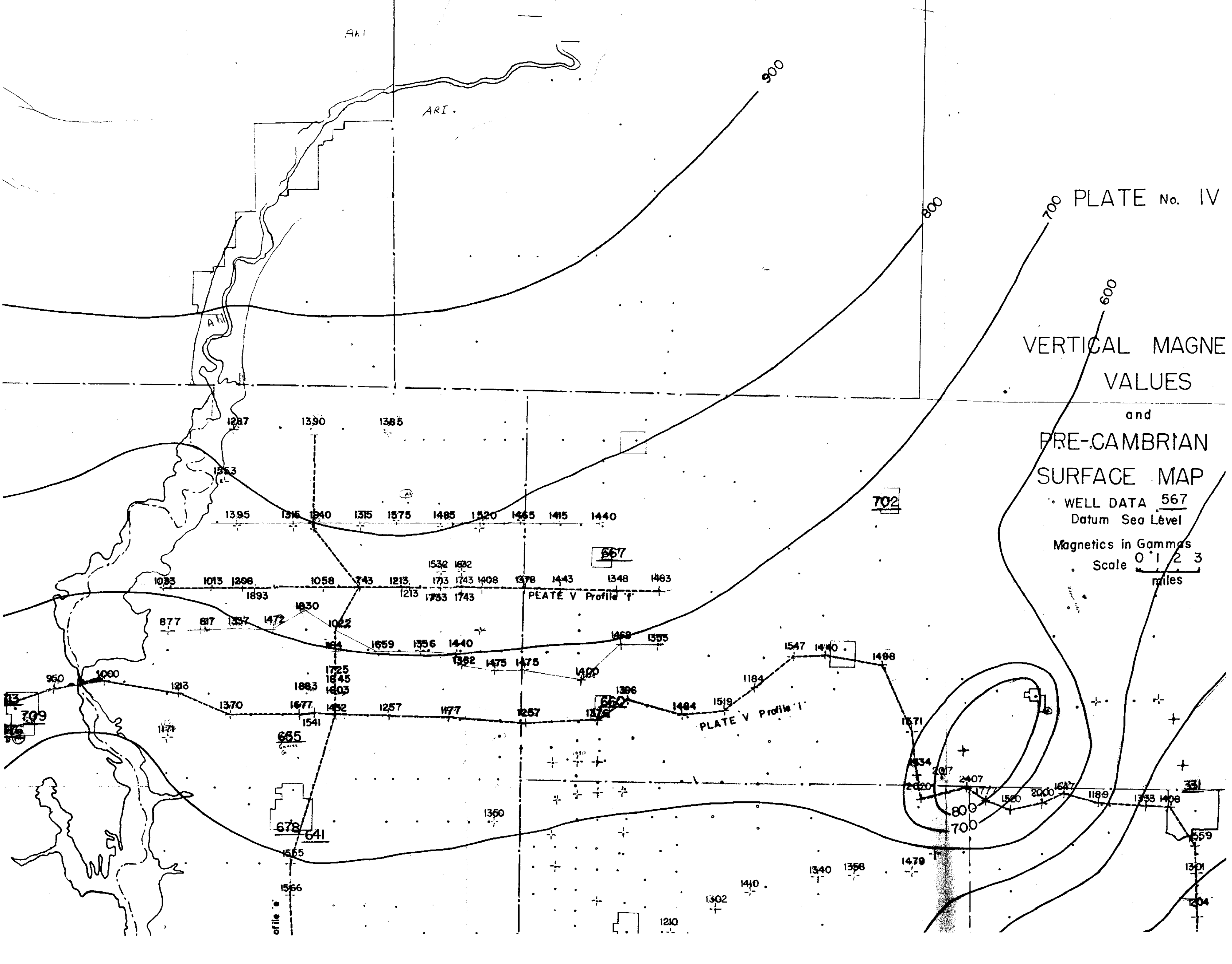
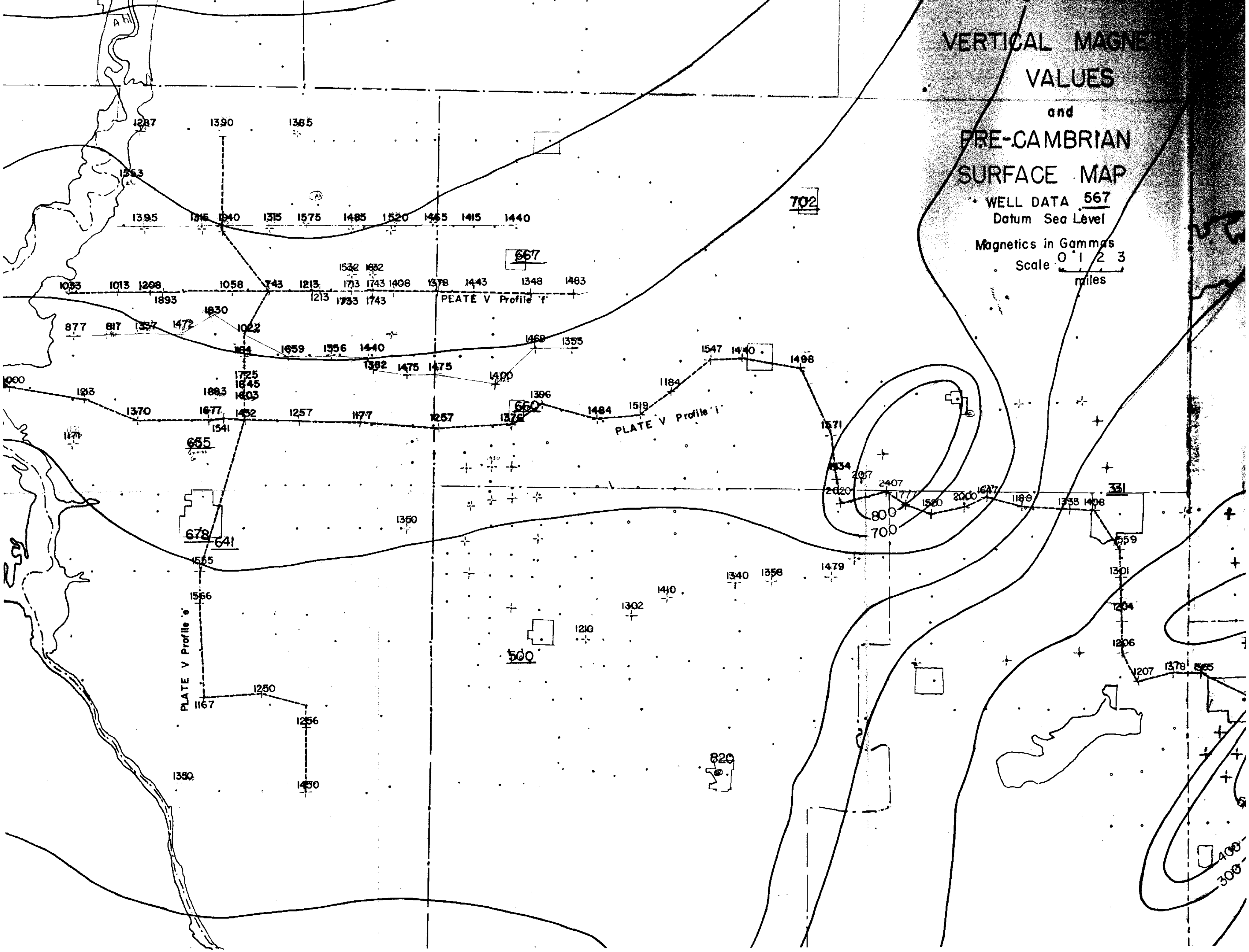


PLATE No. IV
VERTICAL MAGNE
VALUES
and
PRE-CAMBRIAN
SURFACE MAP
WELL DATA 567
Datum Sea Level
Magnetics in Gammas
Scale 0 1 2 3 miles
PLATE V Profile 'f'
PLATE V Profile 'i'
900
800
700
600


VERTICAL MAGNE
VALUES
and
PRE-CAMBRIAN
SURFACE MAP
• WELL DATA 567
Datum Sea Level
Magnetics in Gammas
Scale 0 1 2 3
miles
PLATE V Profile 'f'
PLATE V Profile 'i'
PLATE V Profile 'e'
800
700
400
300

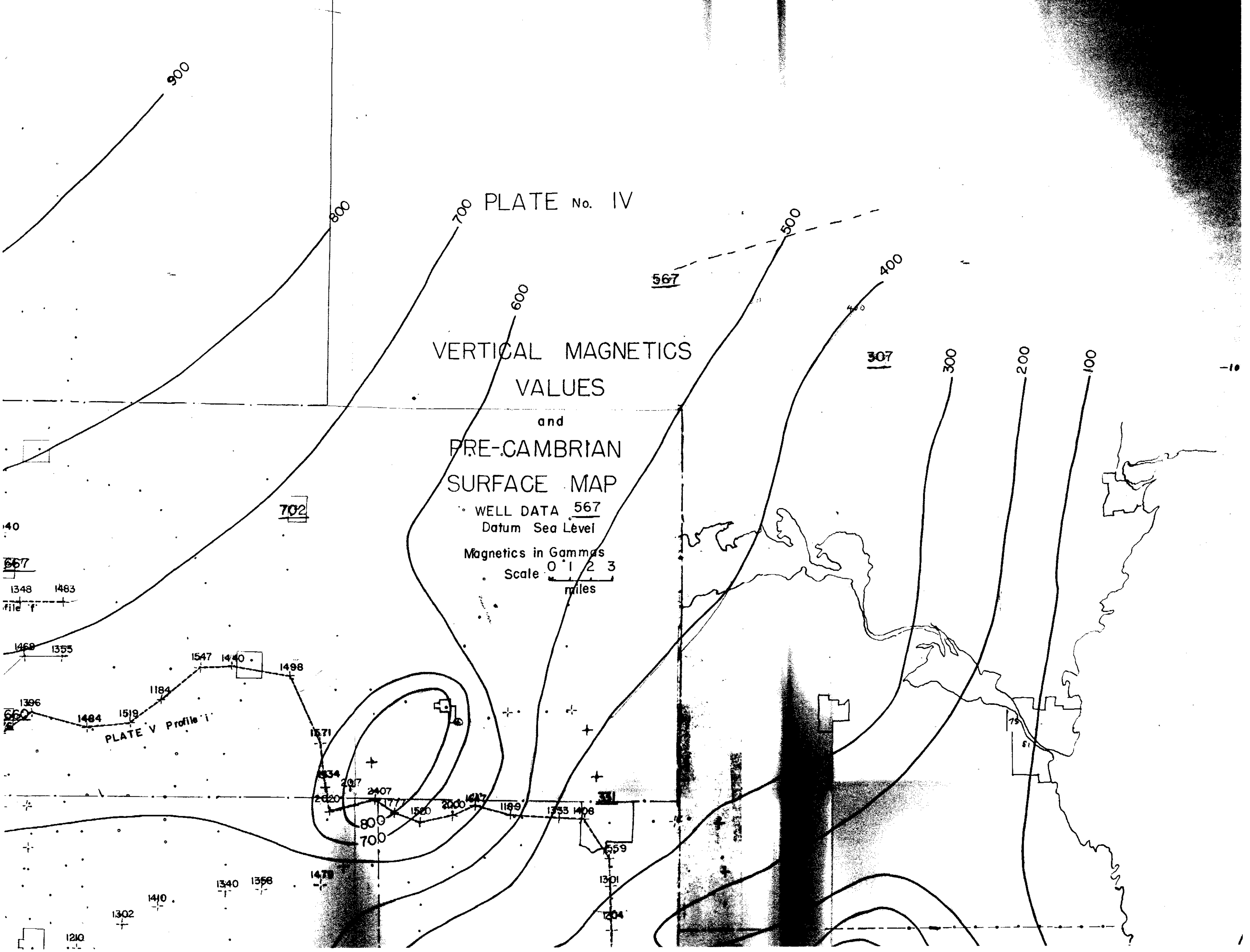
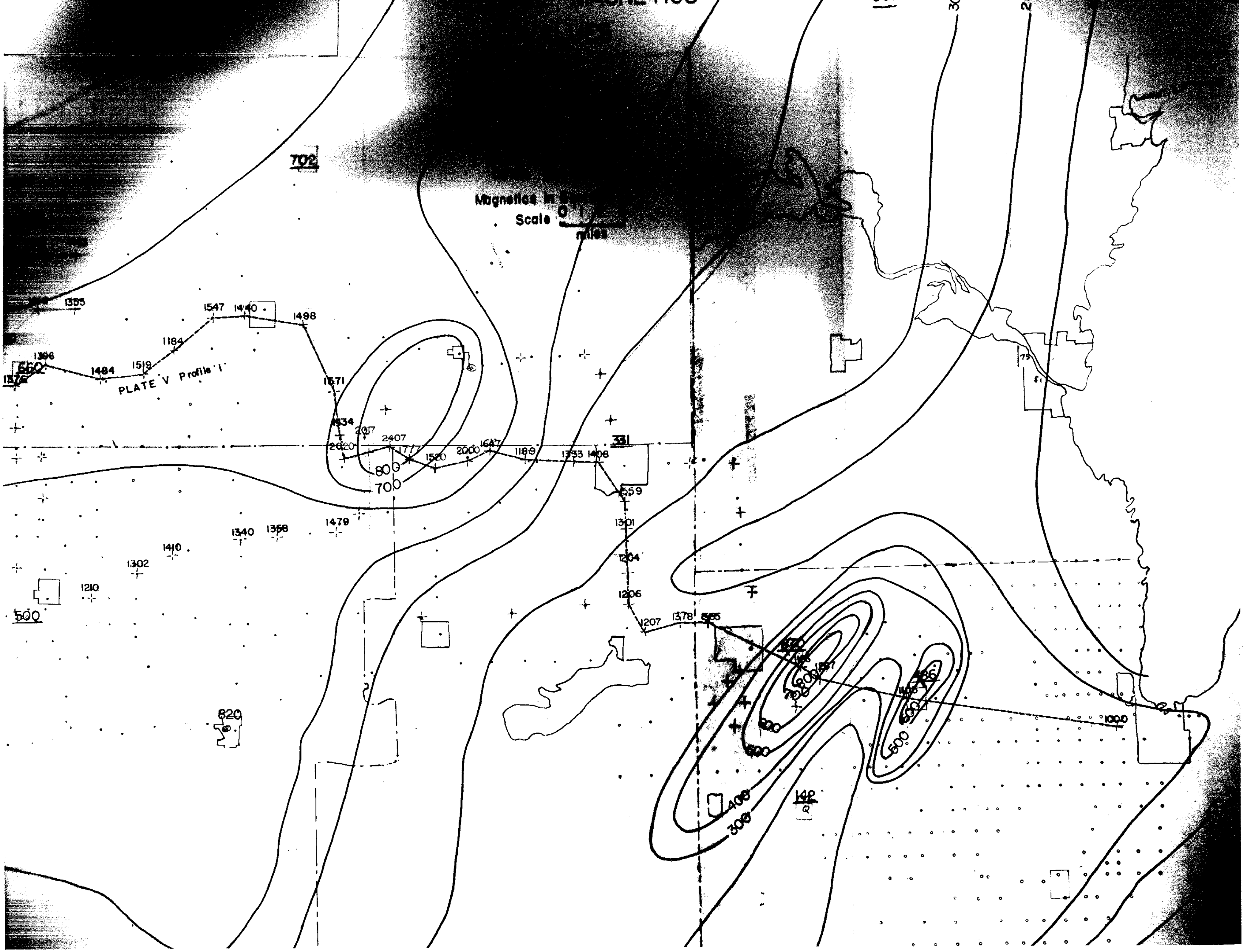


PLATE No. IV
VERTICAL MAGNETICS
VALUES
and
PRE-CAMBRIAN
SURFACE MAP
WELL DATA 567
Datum Sea Level
Magnetics in Gammas
Scale 0 1 2 3
miles
900
800
700
600
500
400
300
200
100
567
307
702
PLATE V Profile I



Magnetics in
Scale 0 1
miles
PLATE V Profile I
702
331
500
820
560
1396
1484
1519
1184
1547
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1498
1571
1434
2017
2020
2407
1777
1520
2000
1647
1189
1333
1408
1559
1301
1204
1206
1207
1378
1355
1479
1340
1368
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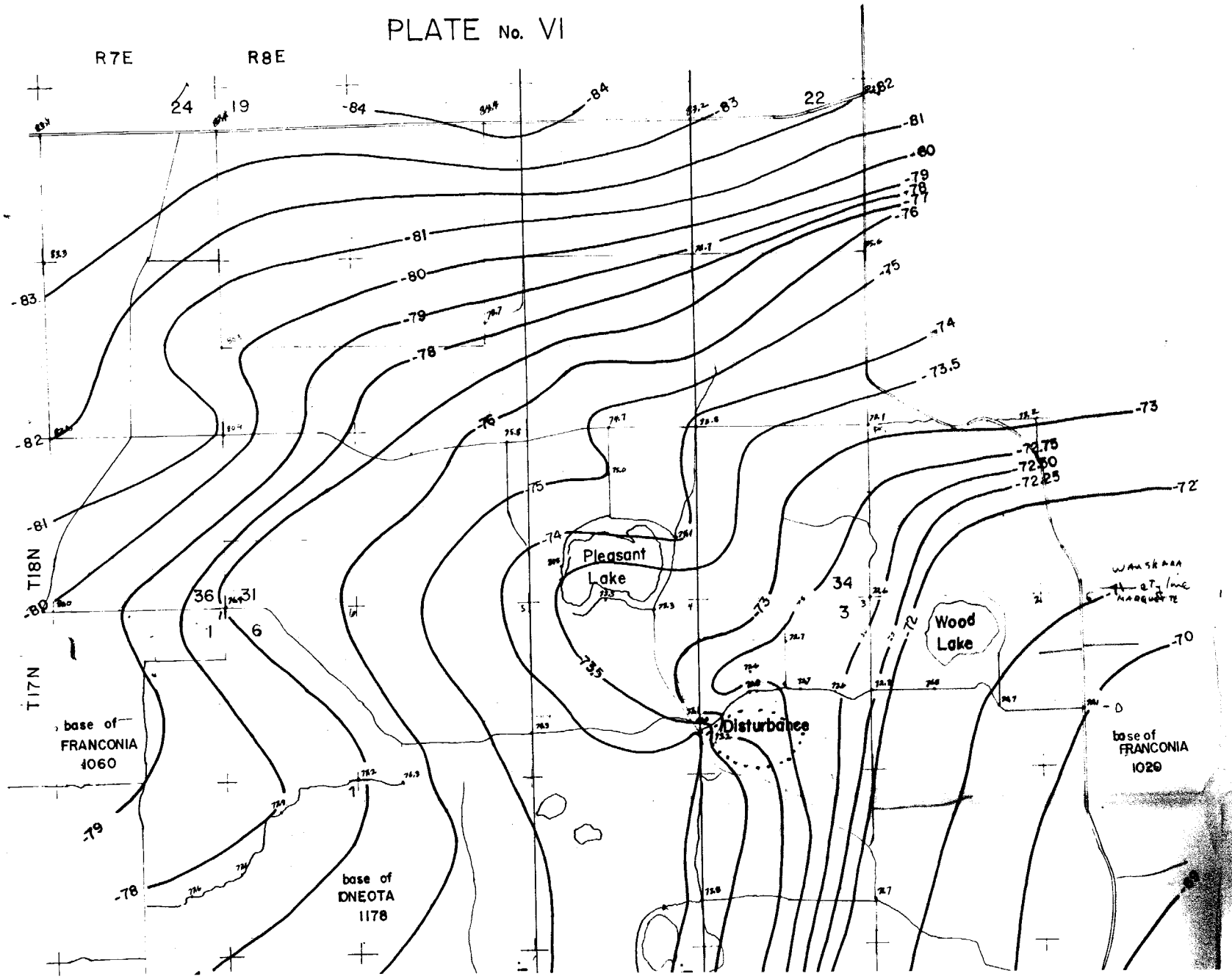
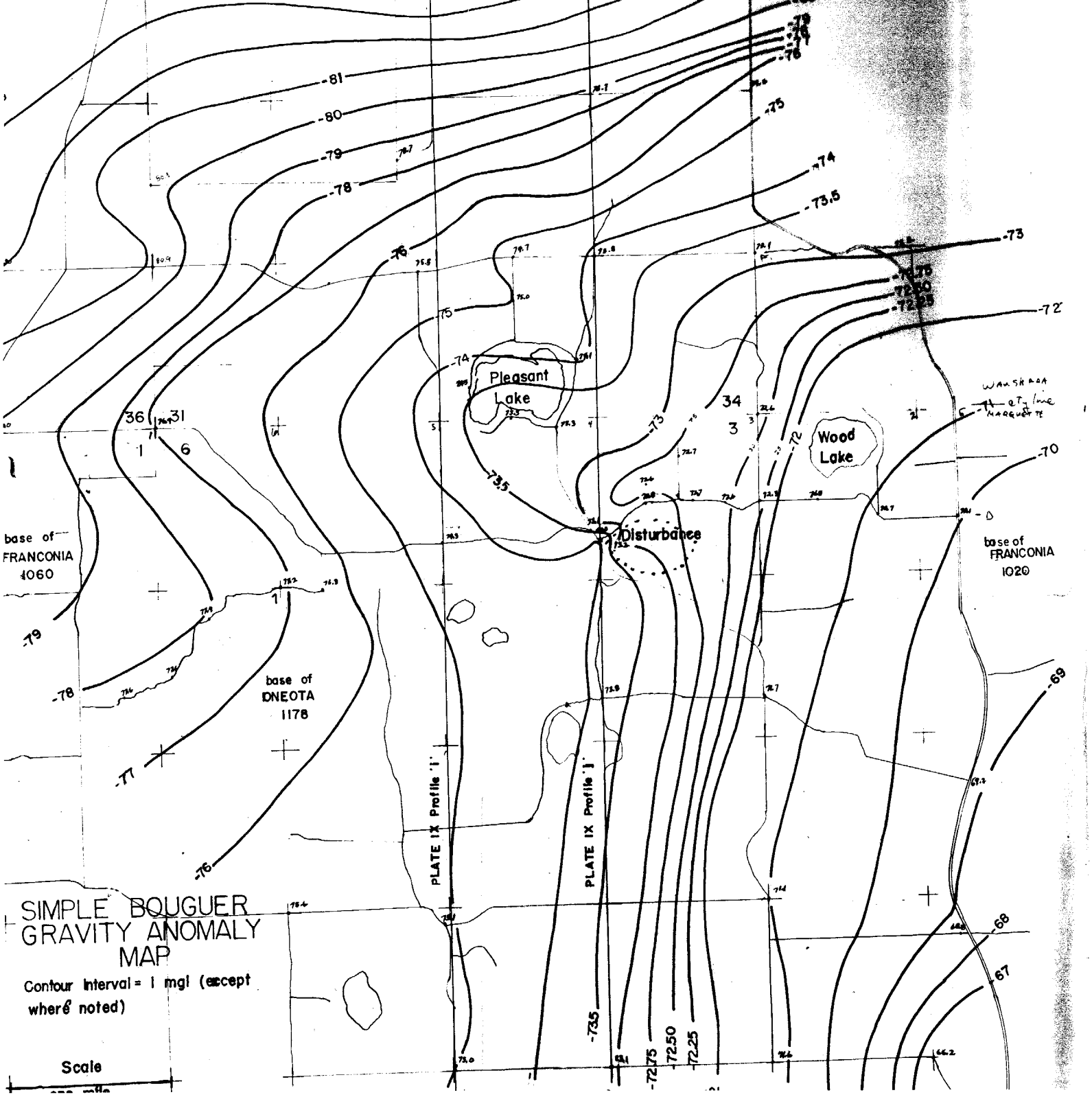
1302
1210
800
700
600
500
400
300
142
1000

PLATE No. VI


R7E
R8E
T18N
T17N
24
19
22
36
31
1
6
34
3
-84
-83
-82
-81
-80
-79
-78
-77
-76
-75
-74
-73.5
-73
-72.75
-72.50
-72.25
-72
-70
Pleasant Lake
Wood Lake
Disturbance
base of FRANCONIA 1060
base of ONEOTA 1178
base of FRANCONIA 1020

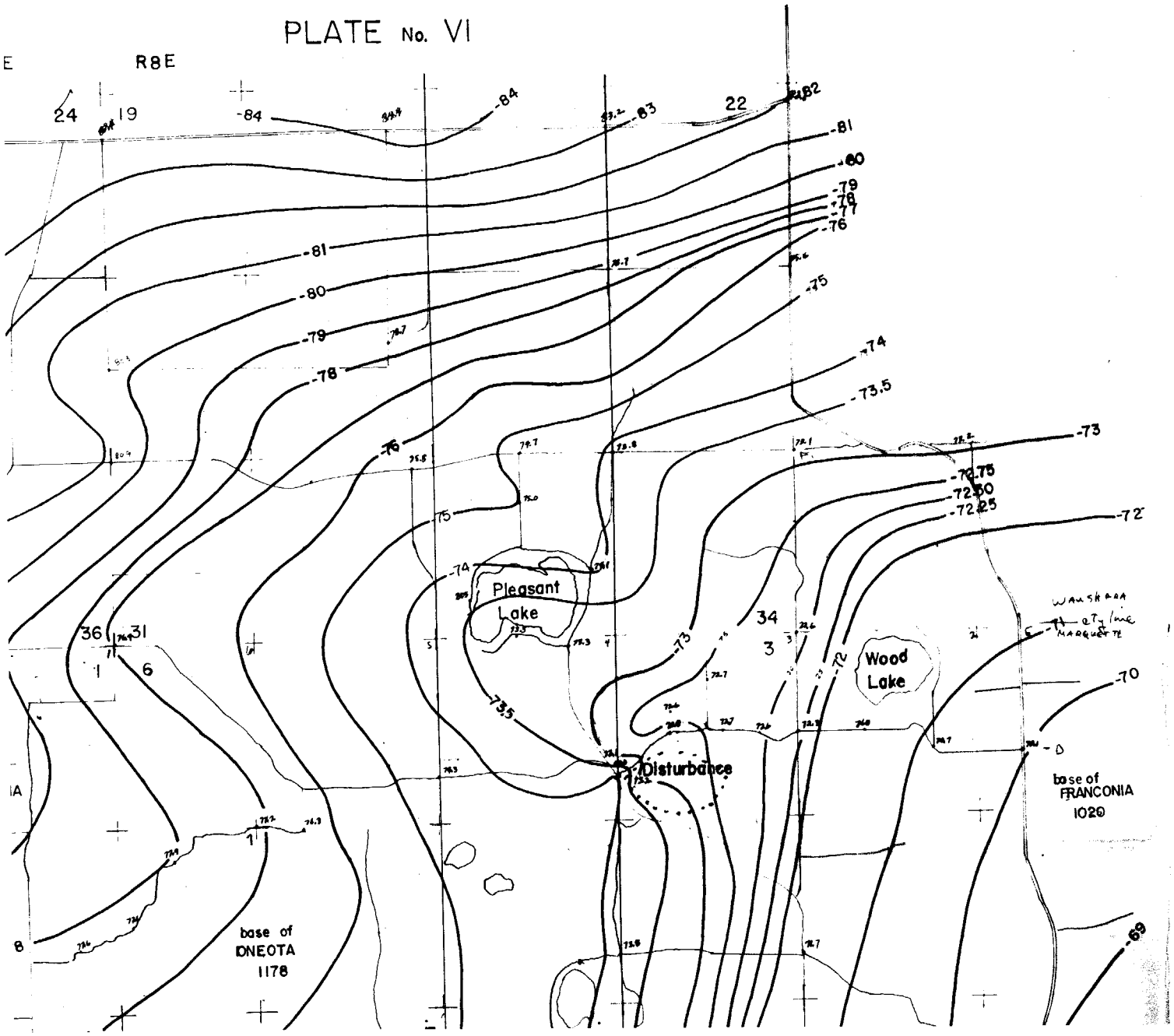


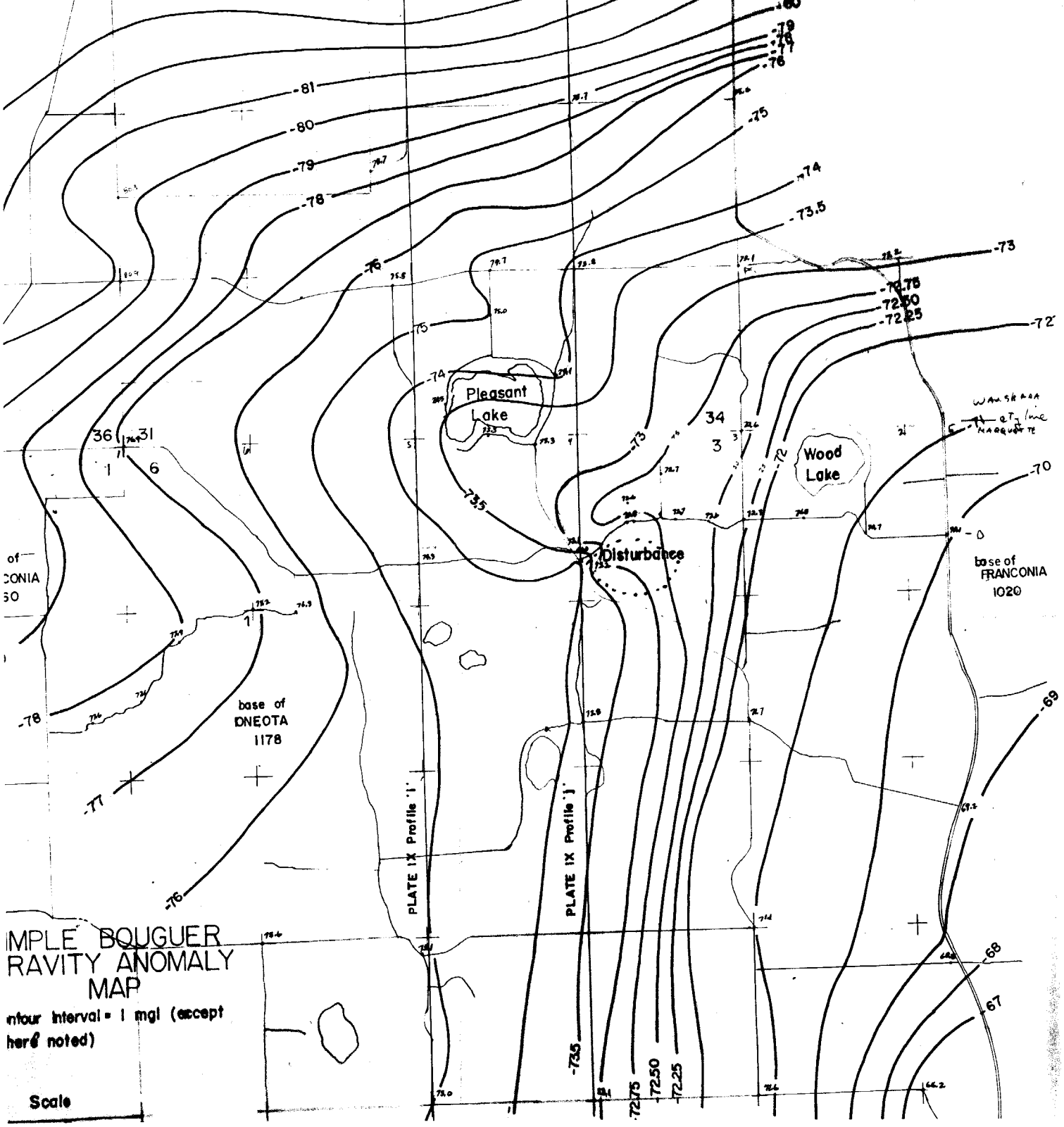
SIMPLE BOUGUER GRAVITY ANOMALY MAP

Contour interval = 1 mgl (except where noted)

Scale

PLATE No. VI

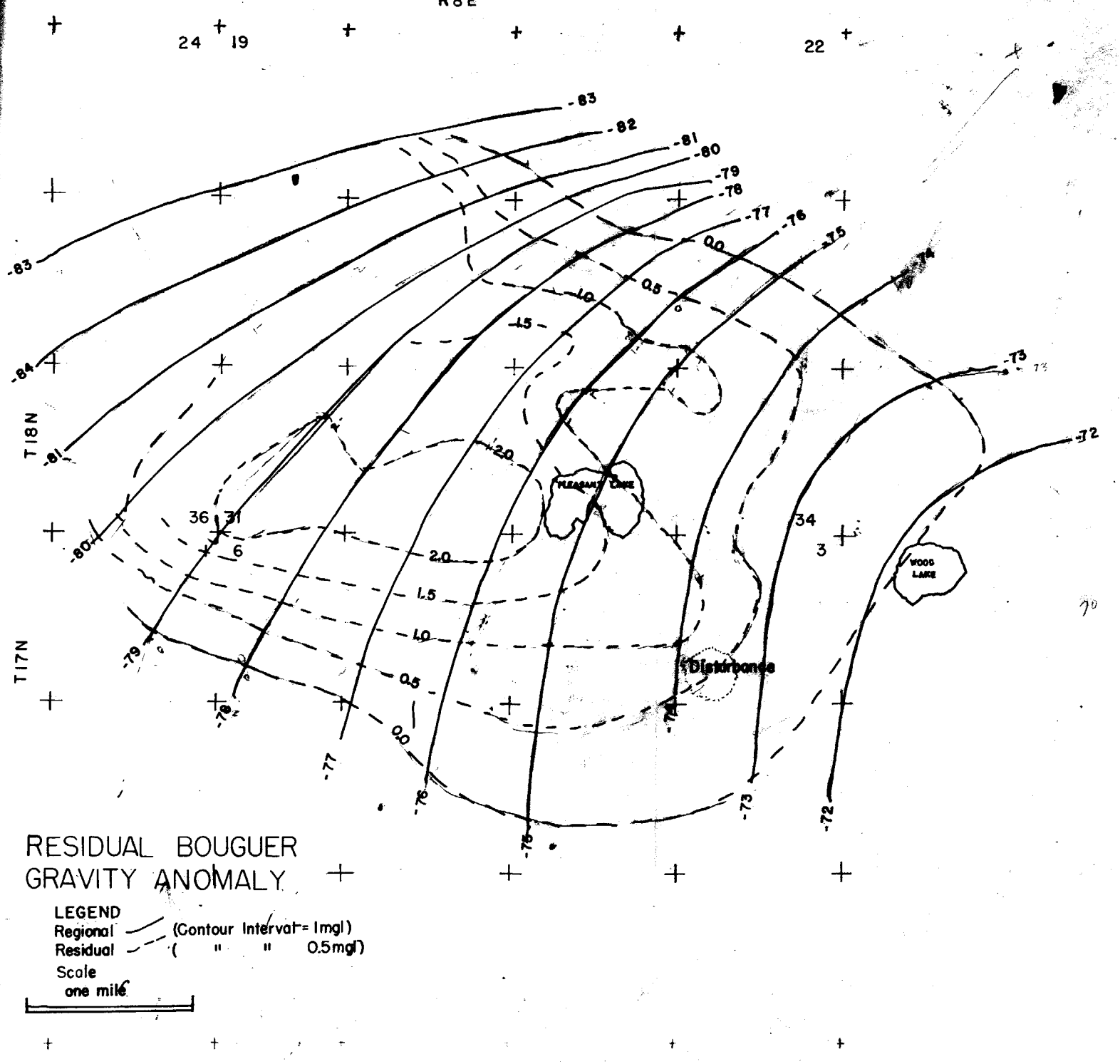

R8E
24
19
22
-84
-83
-82
-81
-80
-79
-78
-77
-76
-75
-74
-73.5
-73
-72.75
-72.50
-72.25
-72
-70
-69
Pleasant Lake
Wood Lake
Disturbance
36
31
1
6
34
3
base of DNEOTA 1178
base of FRANCONIA 1020



IMPLE BOUGUER
RAVITY ANOMALY
MAP

ntour interval = 1 mgl (except
here noted)

Scale


R8E
24
19
22
T18N
T17N
36
31
6
34
3
-83
-82
-81
-80
-79
-78
-77
-76
-75
-74
-73
-72
0.0
0.5
1.0
1.5
2.0
PLEASANT LAKE
WOOD LAKE
Disturbance
RESIDUAL BOUGUER
GRAVITY ANOMALY
LEGEND
Regional (Contour Interval = 1mgl)
Residual (" " 0.5mgl)
Scale
one mile

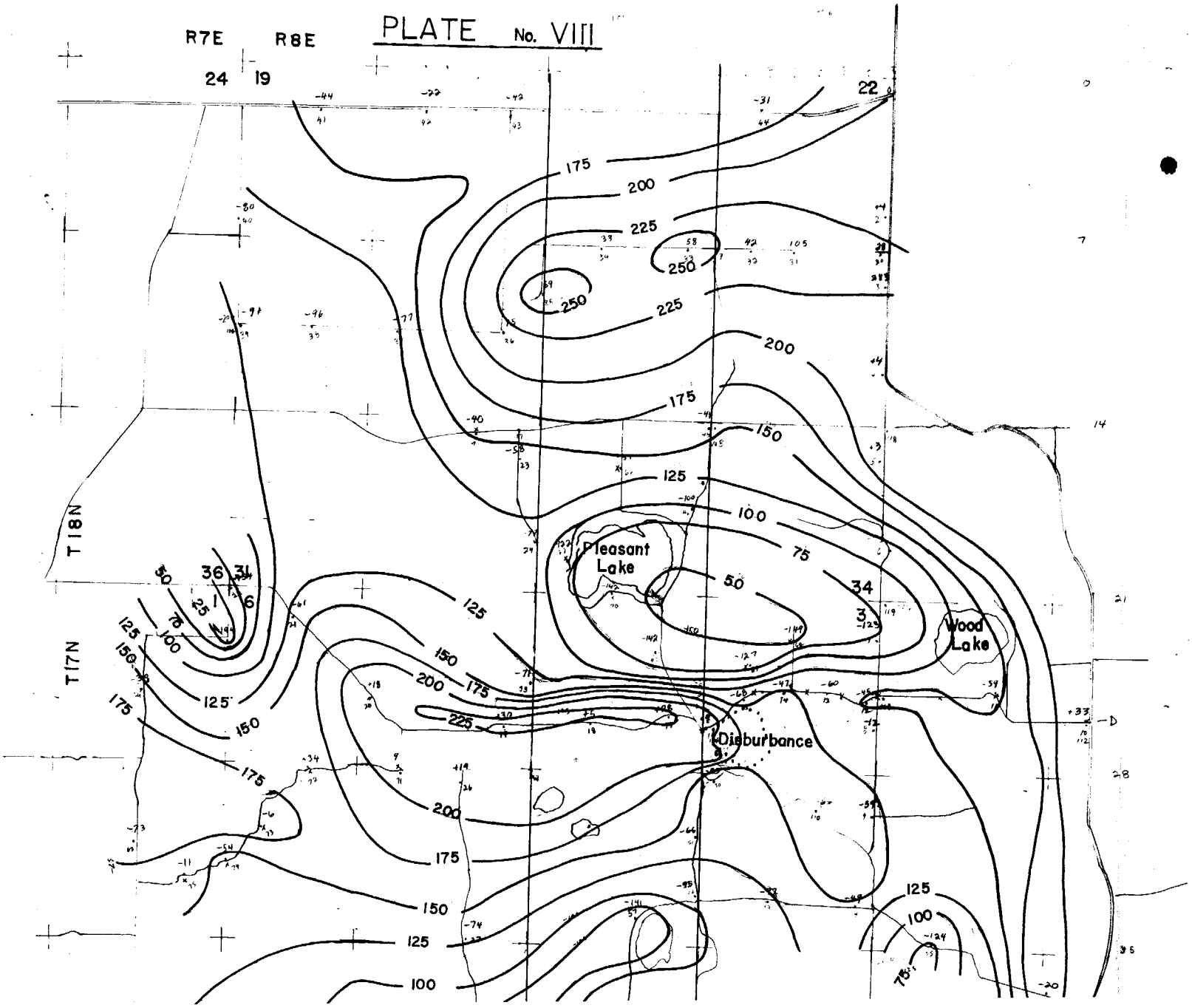
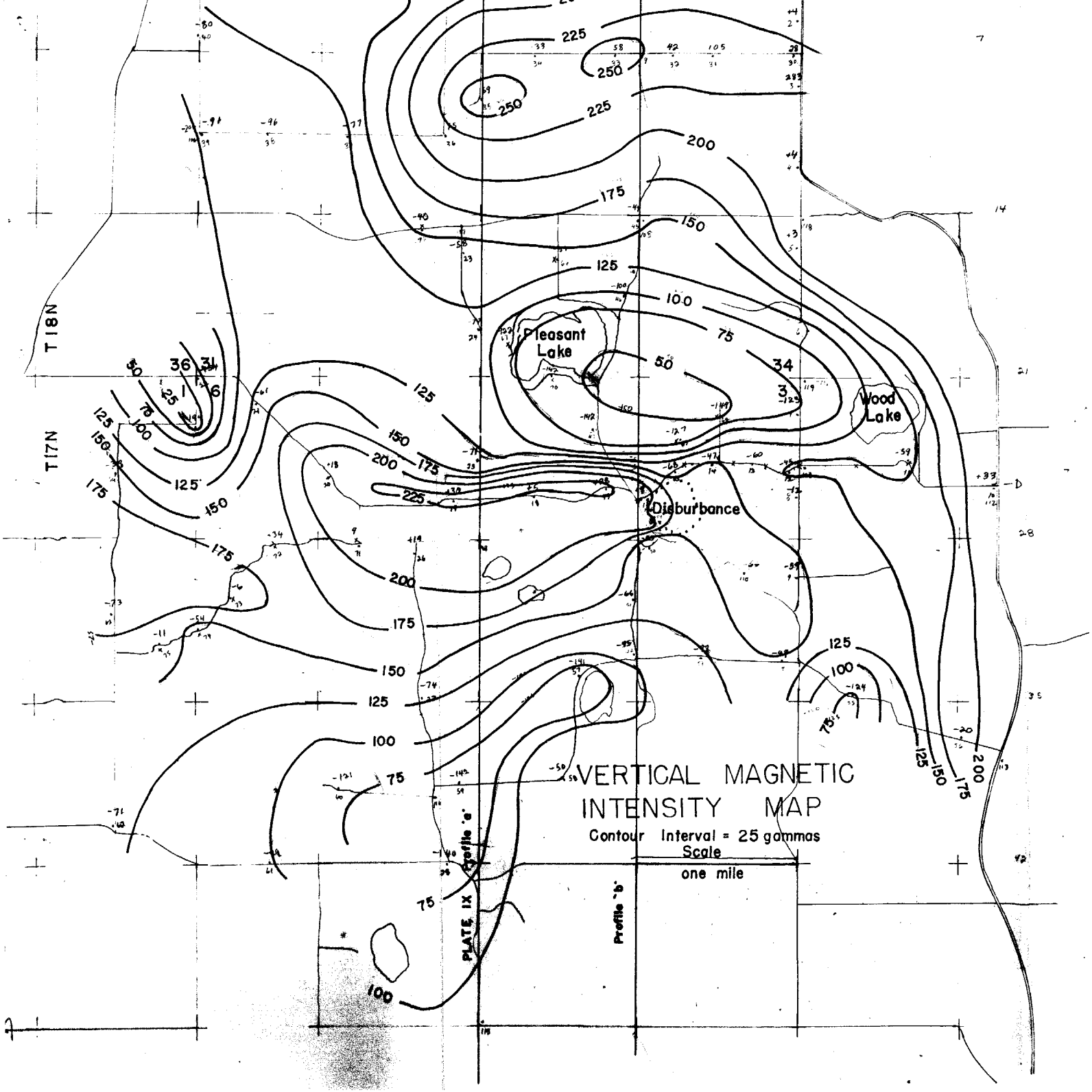


PLATE No. VIII
R7E
R8E
24
19
T18N
T17N
Pleasant Lake
Wood Lake
Disturbance
175
200
225
250
150
125
100
75
50
25


T18N
T17N
Pleasant Lake
Wood Lake
Disburbance
Profile 'a'
Profile 'b'
PLATE IX
VERTICAL MAGNETIC INTENSITY MAP
Contour Interval = 25 gammas
Scale
one mile

6533AR	43569	89550	920	9805375	9804246	264*	472*	499-	522*	546-	557*	577-	593*	604*
7503AR	43584	89534	916	9805367	9804238	266*	473*	500-	524*	547-	559*	579-	594*	606*
7501AB	43584	89514	935	9805367	9804255	233*	444*	472-	495*	519-	531*	552-	567*	579*
7512AR	43578	89514	939	9805358	9804217	258*	470*	498-	522*	546-	558*	578-	593*	605*
5619AH	43465	89502	866	9805188	9803996	377*	573*	598-	620*	642-	653*	672-	686*	697*
5606AH	43491	89502	912	9805228	9803950	420*	626*	653-	676*	699-	711*	731-	746*	757*
5629AH	43509	89490	922	9805255	9803947	441*	649*	676-	700*	723-	735*	755-	770*	782*
6617AH	43522	89490	925	9805274	9804009	395*	604*	631-	655*	678-	690*	710-	725*	737*
7632AH	43541	89490	962	9805303	9804069	329*	546*	575-	599*	624-	636*	657-	673*	685*
7629AH	43554	89490	968	9805322	9804074	337*	556*	584-	609*	633-	646*	667-	683*	695*
7714AH	43571	89376	1039	9805348	9803952	419*	654*	684-	711*	737-	750*	773-	790*	803*
7719AH	43571	89366	1042	9805348	9803940	428*	663*	694-	721*	747-	760*	783-	800*	814*
7716AH	43571	89400	1025	9805348	9803955	429*	660*	691-	717*	743-	756*	778-	795*	808*
7717AH	43571	89418	1015	9805348	9803976	415*	644*	674-	700*	726-	739*	761-	778*	791*
7613AH	43571	89435	1001	9805348	9804034	372*	596*	627-	653*	679-	691*	713-	730*	742*
7615AH	43571	89465	984	9805348	9804111	311*	533*	562-	587*	612-	625*	646-	663*	675*
9620AH	44067	89484	997	9805492	9804194	360*	585*	614-	640*	665-	678*	700-	716*	729*
9629AH	44059	89484	992	9805480	9804212	335*	559*	588-	613*	639-	651*	673-	689*	702*
9632AH	44050	89484	988	9805467	9804231	307*	530*	559-	584*	610-	622*	644-	660*	673*
3606AH	44032	89483	972	9805439	9804273	252*	472*	500-	525*	550-	562*	583-	599*	612*
3617AH	44023	89483	971	9805426	9804294	219*	438*	467-	492*	516-	529*	550-	566*	578*
3620AH	44015	89486	967	9805414	9804262	222*	440*	469-	493*	518-	530*	551-	567*	580*
3632AH	43598	89467	958	9805388	9804261	206*	422*	450-	475*	499-	512*	532-	548*	560*
3622AH	44015	89466	975	9805414	9804301	196*	416*	445-	470*	495-	507*	526-	544*	557*
3623AH	44015	89447	990	9805414	9804242	241*	465*	494-	519*	544-	557*	578-	595*	[illegible]
3624AH	44015	89435	998	9805414	9804212	263*	488*	518-	543*	569-	581*	603-	620*	[illegible]
3622AH	44013	89395	1030	9805411	9803993	449*	682*	712-	738*	764-	778*	800-	817*	[illegible]
3723AH	44013	89382	1040	9805411	9803969	464*	699*	729-	756*	782-	796*	818-	[illegible]	[illegible]
3724AH	44013	89370	1048	9805411	9803951	474*	711*	741-	768*	795-	808*	831-	[illegible]	[illegible]
3619AH	44013	89358	1065	9805411	9803938	471*	712*	743-	770*	797-	811*	[illegible]	[illegible]	[illegible]
3620AH	44013	89339	1178	9805411	9803860	443*	709*	744-	774*	804-	[illegible]	[illegible]	[illegible]	[illegible]

4	8822AH	44013	89327	1082	9805411	9803935	458*	702*	734-	762*	789-	803*	827-	845*	85
4	6706AR	43537	89430	1007	9805297	9803960	390*	617*	647-	673*	696-	711*	733-	750*	76
4	6717AR	43526	89413	1028	9805280	9803927	386*	618*	648-	675*	701-	714*	736-	753*	76
4	6734AR	43496	89387	956	9805235	9803918	418*	634*	662-	686*	711-	723*	744-	760*	77
4	5714AH	43468	89382	925	9805193	9803956	367*	576*	603-	627*	650-	662*	682-	697*	70
4	5621AH	43465	89478	972	9805188	9803924	350*	570*	598-	623*	646-	660*	681-	697*	71
4	5623AH	43469	89453	960	9805188	9803875	391*	612*	641-	666*	691-	704*	725-	741*	75
4	5719AH	43465	89430	1022	9805188	9803828	399*	630*	660-	686*	712-	725*	747-	764*	77
4	5722AH	43465	89395	1000	9805188	9803904	343*	569*	598-	624*	649-	662*	684-	700*	71
4	5009MF	43474	89192	798	9805202	9803943	508*	688*	712-	732*	752-	763*	780-	793*	80
4	2706VH	44251	89433	1050	9805769	9804395	386*	623*	654-	681*	706-	721*	744-	761*	77
4	3734VH	44258	89398	1064	9805779	9804366	412*	652*	684-	711*	736-	751*	774-	792*	80
4	3829VH	44271	89341	1070	9805799	9804343	450*	692*	723-	750*	778-	791*	815-	832*	84
4	2801VH	44254	89302	1090	9805773	9804412	336*	582*	614-	642*	670-	684*	707-	725*	73
4	2907VH	44241	89282	1094	9805754	9804395	330*	577*	609-	637*	665-	679*	703-	721*	73
4	2919VH	44228	89282	1119	9805734	9804329	352*	605*	638-	666*	695-	709*	733-	752*	76
4	2931VH	44210	89274	1131	9805707	9804210	433*	688*	722-	750*	779-	794*	818-	837*	85
4	1907VH	44184	89271	1124	9805668	9804179	432*	686*	719-	748*	776-	791*	815-	834*	84
4	1919VH	44173	89272	1132	9805652	9804150	437*	693*	726-	755*	784-	798*	823-	841*	85
4	1930VH	44164	89275	1123	9805638	9804138	444*	698*	731-	759*	788-	802*	827-	845*	86
4	1931VH	44155	89277	1123	9805624	9804121	447*	701*	734-	762*	791-	805*	830-	848*	86
4	0906VH	44148	89279	1124	9805614	9804104	453*	707*	740-	769*	797-	812*	836-	855*	86
4	0907VH	44137	89287	1111	9805597	9804093	459*	710*	743-	771*	799-	813*	838-	856*	87
4	1617PH	44183	89486	1010	9805667	9804409	308*	536*	566-	592*	617-	630*	652-	669*	68
4	1621PH	44174	89473	1018	9805653	9804378	317*	547*	577-	603*	629-	642*	664-	681*	69
4	1626PH	44165	89459	1031	9805639	9804378	291*	524*	554-	580*	607-	620*	642-	659*	67
4	1636PH	44156	89447	1032	9805626	9804360	295*	528*	558-	585*	611-	624*	647-	664*	67
4	0601PH	44148	89434	1032	9805614	9804308	335*	568*	598-	625*	651-	664*	687-	704*	71
4	0704PH	44148	89407	1045	9805614	9804290	341*	577*	608-	634*	661-	674*	697-	714*	72
4	0703PH	44148	89390	1054	9805614	9804261	362*	600*	631-	658*	685-	698*	721-	739*	75
4	0712PH	44141	89371	1057	9805603	9804141	468*	707*	738-	765*	792-	805*	828-	846*	86

24	0621KO	43502	88393	897	9805244	9804135	265*	468*	494-	517*	540-	551*	571-	585*	59
24	0062KO	43502	88388	890	9805244	9804145	262*	463*	489-	512*	535-	546*	565-	580*	59
24	0061KO	43502	88375	895	9805244	9804132	270*	472*	498-	521*	544-	556*	575-	590*	60
24	0060KO	43502	88369	910	9805244	9804116	272*	476*	504-	527*	551-	562*	582-	597*	60
24	0053KO	43501	88314	811	9805243	9804216	264*	447*	471-	492*	512-	523*	540-	554*	56
24	0054KO	43501	88308	802	9805243	9804222	267*	448*	472-	492*	513-	523*	540-	554*	56
24	0055KO	43501	88302	793	9805243	9804223	274*	453*	476-	497*	517-	527*	544-	557*	56
24	0057KO	43501	88590	777	9805243	9804218	294*	469*	492-	512*	532-	542*	559-	572*	58
24	0058KO	43501	88578	748	9805243	9804235	304*	473*	495-	514*	533-	543*	559-	571*	58
24	0034KO	43497	88336	890	9805237	9804151	249*	450*	476-	499*	522-	533*	552-	567*	57
24	0052KO	43492	88315	805	9805229	9804205	267*	449*	472-	493*	514-	524*	541-	555*	56
24	0051KO	43492	88306	795	9805229	9804211	270*	450*	473-	493*	513-	524*	541-	554*	56
24	0050KO	43492	88302	784	9805229	9804223	269*	446*	469-	489*	509-	519*	536-	549*	55
24	0216KO	43485	88435	971	9805219	9804066	240*	459*	488-	513*	537-	550*	571-	587*	59
24	0032KO	43488	88338	862	9805223	9804162	250*	445*	470-	492*	514-	525*	544-	558*	56
24	0031KO	43488	88327	880	9805223	9804152	243*	442*	468-	490*	512-	524*	543-	557*	56
24	0022KO	43484	88333	857	9805217	9804152	259*	453*	478-	500*	521-	532*	551-	565*	57
24	0023KO	43484	88327	872	9805217	9804140	257*	454*	480-	502*	524-	535*	554-	569*	58
24	0024KO	43484	88320	869	9805217	9804144	256*	452*	478-	500*	522-	533*	552-	566*	57
24	0025KO	43484	88314	818	9805217	9804179	269*	454*	478-	499*	520-	530*	548-	561*	57
24	0026 J	43484	88309	806	9805217	9804187	272*	454*	478-	498*	519-	529*	547-	560*	57
24	0027 J	43484	88301	787	9805217	9804191	286*	464*	487-	507*	527-	537*	554-	567*	57
24	0028 J	43484	88297	781	9805217	9804203	279*	455*	478-	496*	516-	528*	545-	558*	56
24	0029 J	43484	88290	772	9805217	9804211	280*	454*	477-	497*	516-	526*	543-	556*	56
24	0203 J	43275	88399	931	9804903	9804056	29	181*	209-	232*	256-	268*	288-	304*	31
24	0204IM	43275	88387	912	9804903	9804071	26	180*	207-	230*	253-	265*	285-	300*	31
24	0205IM	43275	88380	910	9804903	9804077	30	176*	202-	225*	249-	260*	280-	295*	30
24	0206IM	43275	88368	911	9804903	9804071	25	181*	207-	231*	254-	266*	285-	300*	31
24	0207IM	43475	88304	913	9805203	9804004	340*	546*	573-	596*	620-	631*	651-	666*	67
24	0208IM	43475	88338	852	9805203	9804121	281*	473*	498-	520*	542-	553*	571-	585*	59
24	0016IM	43474	88320	855	9805202	9804125	273*	466*	491-	513*	535-	546*	564-	578*	59

24	7833WB	43555	89339	940	9805324	9803961	459*	671*	699-	723*	747-	759*	779-	795*
24	7834WB	43555	89326	890	9805324	9803999	486*	689*	715-	738*	761-	772*	791-	806*
24	7829WB	43553	89302	920	9805321	9804116	340*	548*	575-	598*	622-	633*	653-	669*
24	7826WB	43553	89315	954	9805321	9804038	386*	601*	629-	654*	678-	690*	711-	727*
24	7827WB	43554	89326	940	9805322	9803998	440*	652*	680-	704*	728-	740*	760-	776*
24	7822WB	43563	89326	970	9805336	9804029	395*	614*	643-	667*	692-	704*	725-	742*
24	7810WB	43574	89326	957	9805352	9804043	409*	625*	653-	678*	702-	714*	735-	751*
24	7811WB	43574	89314	948	9805352	9804059	401*	615*	643-	667*	691-	703*	724-	740*
24	7823WB	43563	89315	933	9805336	9804069	389*	600*	627-	651*	675-	687*	707-	722*
24	7824WB	43560	89301	910	9805331	9804105	370*	576*	602-	625*	649-	660*	680-	695*
24	7919WB	43560	89280	896	9805331	9804130	358*	560*	587-	610*	632-	644*	663-	678*
24	7930WB	43549	89286	885	9805315	9804134	349*	549*	575-	597*	620-	631*	651-	665*
24	7931WB	43538	89287	858	9805298	9804134	357*	551*	576-	598*	620-	631*	649-	664*
24	7933WB	43538	89269	845	9805298	9804154	349*	540*	565-	586*	608-	619*	637-	651*
24	7933WB	43549	89266	853	9805309	9804147	360*	553*	578-	599*	621-	632*	651-	665*
24	7928WB	43553	89269	865	9805321	9804170	337*	532*	558-	580*	602-	613*	632-	646*
24	7918WB	43561	89278	880	9805333	9804145	360*	559*	585-	607*	629-	641*	660-	674*
24	7916WB	43564	89269	852	9805337	9804159	377*	569*	594-	616*	638-	649*	667-	681*
24	7909WB	43575	89269	872	9805354	9804141	393*	590*	616-	638*	660-	671*	690-	705*
24	7907WB	43575	89263	880	9805354	9804143	383*	582*	608-	630*	652-	664*	683-	697*
24	7812WH	43574	89298	917	9805352	9804113	376*	583*	610-	633*	657-	669*	688-	704*
24	8823WH	44019	89311	1022	9805420	9803987	472*	703*	733-	759*	785-	798*	820-	837*
24	8822WH	44018	89324	1082	9805418	9803937	463*	707*	739-	767*	794-	808*	832-	850*
24	8834WB	43598	89324	988	9805388	9803971	488*	711*	740-	765*	791-	803*	825-	841*
24	7803WB	43583	89325	955	9805366	9804040	428*	644*	672-	696*	720-	733*	753-	769*
24	5006MH	43477	89207	791	9805206	9803966	496*	675*	698-	718*	738-	748*	765-	779*
24	5007MH	43477	89219	851	9805206	9803951	455*	647*	672-	694*	716-	726*	745-	759*
24	5911MH	43476	89237	795	9805205	9804049	406*	586*	611-	631*	651-	662*	679-	692*
24	5910MH	43473	89255	799	9805200	9804055	393*	573*	597-	617*	636-	648*	665-	678*
24	5909MH	43474	89267	795	9805202	9804045	409*	589*	612-	632*	652-	663*	680-	693*
24	5907MH	43475	89285	829	9805203	9804002	421*	608*	633-	654*	675-	685*	703-	717*

24	0816PH	44128	89358	1066	9805584	9804094	487*	728*	759-	786*	813-	827*	850-	868*	8
24	0616PH	44128	89335	1082	9805564	9804069	497*	741*	773-	801*	828-	842*	866-	884*	8
24	0814PH	44128	89311	1102	9805564	9804064	483*	732*	764-	792*	820-	835*	856-	877*	8
24	1918PB	44184	89290	1104	9805668	9804196	434*	683*	716-	744*	772-	786*	810-	828*	8
24	1812PB	44183	89302	1091	9805667	9804190	451*	697*	729-	757*	785-	799*	823-	841*	8
24	1803PB	44202	89319	1069	9805695	9804330	359*	600*	632-	659*	686-	700*	723-	741*	7
24	1803PB	44202	89327	1067	9805695	9804359	332*	573*	604-	632*	659-	672*	696-	713*	7
24	1805PB	44202	89350	1063	9805695	9804413	282*	522*	553-	580*	606-	621*	644-	662*	6
24	1806PB	44202	89361	1061	9805695	9804400	297*	537*	568-	595*	622-	635*	658-	676*	6
24	1703PB	44201	89389	1055	9805694	9804390	312*	550*	581-	608*	635-	649*	671-	689*	7
24	1714PB	44193	89386	1053	9805667	9804395	312*	550*	581-	608*	634-	648*	671-	688*	7
24	1723PB	44167	89386	1053	9805642	9804271	381*	619*	650-	677*	703-	717*	740-	757*	7
24	0917PH	44120	89276	1117	9805572	9804065	456*	708*	741-	770*	798-	812*	837-	855*	8
24	0921PH	44115	89265	1129	9805564	9804058	444*	699*	732-	761*	790-	804*	829-	847*	8
24	0922PH	44113	89253	1139	9805561	9804051	439*	696*	730-	759*	788-	802*	827-	846*	8
24	0923PH	44111	89235	1156	9805558	9804056	413*	674*	708-	738*	767-	782*	807-	826*	8
24	0925PH	44103	89225	1193	9805546	9804079	345*	614*	649-	680*	710-	726*	751-	771*	7
24	9006PH	44092	89214	1177	9805530	9804062	361*	627*	661-	691*	721-	736*	762-	782*	7
24	9903PB	44092	89251	1147	9805530	9804079	372*	631*	665-	694*	723-	738*	763-	782*	7
24	9909PB	44079	89266	1141	9805510	9804041	396*	654*	687-	716*	745-	760*	785-	804*	8
24	9822HH	44067	89323	1090	9805492	9803995	472*	718*	750-	778*	806-	820*	843-	861*	8
24	9827HB	44056	89323	1100	9805476	9803965	476*	724*	757-	785*	813-	827*	851-	869*	8
24	9834HH	44050	89323	1110	9805467	9803927	496*	747*	779-	808*	836-	850*	874-	893*	9
24	8803HH	44041	89324	1126	9805453	9803915	479*	733*	766-	795*	824-	838*	863-	881*	8
24	8810HH	44033	89324	1178	9805441	9803866	467*	733*	768-	798*	828-	843*	868-	888*	9
24	8805CB	44041	89343	1075	9805453	9803951	491*	734*	765-	793*	820-	834*	857-	875*	8
24	8806CB	44041	89358	1069	9805453	9803986	461*	702*	734-	761*	788-	802*	825-	843*	8
24	8701CB	44041	89370	1049	9805453	9804016	450*	687*	718-	744*	771-	785*	807-	825*	8
24	8702CB	44041	89382	1044	9805453	9804054	417*	653*	683-	710*	737-	750*	773-	790*	8
24	8703CB	44041	89394	1027	9805453	9804118	369*	601*	631-	657*	684-	697*	719-	736*	7
24	8705CB	44041	89412	1012	9805453	9804280	221*	450*	479-	505*	531-	544*	566-	584*	6

5009MH	43481	89190	842	9805212	9803928	492*	682*	707-	726*	750-	761*	779-	793*	804*
6033MH	43492	89190	837	9805231	9803970	474*	663*	688-	709*	730-	741*	759-	773*	784*
6028MH	43508	89187	836	9805253	9804022	445*	634*	658-	680*	701-	712*	730-	744*	754*
6022MH	43517	89184	861	9805267	9804042	415*	609*	635-	657*	679-	690*	706-	723*	734*
6009MH	43531	89185	840	9805288	9804099	399*	589*	613-	635*	656-	667*	685-	699*	710*
7033MH	43545	89188	820	9805309	9804116	422*	607*	631-	652*	673-	684*	701-	715*	725*
7026MH	43551	89188	823	9805318	9804117	427*	613*	637-	658*	679-	690*	707-	721*	732*
8003UH	44034	89175	862	9805443	9804182	450*	645*	670-	692*	714-	725*	744-	758*	769*
8010UH	44027	89176	858	9805432	9804184	441*	635*	660-	682*	704-	715*	733-	748*	758*
8028UH	44006	89187	853	9805400	9804229	369*	562*	587-	608*	630-	641*	660-	674*	685*
8033UH	43595	89197	853	9805384	9804238	344*	537*	562-	583*	605-	616*	635-	649*	660*
7004UH	43589	89197	845	9805375	9804223	357*	548*	573-	594*	616-	627*	645-	659*	670*
7021UH	43562	89188	829	9805334	9804130	424*	611*	636-	657*	678-	688*	706-	720*	731*
8005UH	44040	89201	855	9805452	9804171	477*	670*	695-	717*	739-	750*	768-	782*	793*
8006UH	44039	89217	930	9805450	9804146	429*	639*	666-	690*	714-	726*	746-	761*	773*
8007UH	44029	89219	899	9805435	9804148	441*	644*	670-	693*	716-	728*	747-	762*	774*
8913UH	44019	89231	863	9805420	9804157	432*	631*	657-	680*	702-	714*	733-	747*	759*
8916UH	44016	89261	934	9805415	9804097	439*	650*	677-	701*	725-	737*	757-	773*	785*
8918UH	44020	89284	994	9805421	9804035	451*	675*	705-	730*	755-	768*	790-	806*	819*
8813UH	44023	89300	1006	9805426	9803968	492*	719*	749-	774*	800-	813*	835-	851*	864*
8003UH	44040	89177	865	9805452	9804187	451*	646*	672-	694*	716-	727*	746-	760*	771*
8826CH	44006	89312	1002	9805400	9804043	415*	641*	671-	696*	722-	735*	756-	773*	786*
8626CH	44000	89311	985	9805391	9804069	396*	618*	647-	673*	698-	710*	732-	748*	760*
7601CH	43587	89299	944	9805372	9804111	373*	586*	614-	638*	662-	674*	695-	710*	722*
7613CH	43568	89299	964	9805343	9804072	364*	582*	610-	635*	659-	672*	692-	706*	721*
7824CH	43560	89299	922	9805331	9804099	365*	573*	600-	624*	647-	659*	679-	694*	706*
6813CH	43524	89299	893	9805277	9804058	379*	581*	607-	630*	652-	664*	683-	698*	709*
6930CH	43504	89291	926	9805247	9803999	377*	586*	613-	637*	661-	672*	692-	708*	720*
5907CH	43478	89287	837	9805208	9804002	419*	608*	633-	654*	675-	686*	704-	718*	729*
5906CH	43469	89287	838	9805225	9804028	409*	598*	623-	644*	666-	676*	694-	708*	719*
8532AR	43591	89361	918	9805378	9804225	290*	497*	524-	548*	571-	583*	603-	618*	630*

Simple Bouguer anomalies for different densities

	Station No.	Latitude	Longitude	Elevation	Observed gravity	Theoretical gravity	Free air anomaly	1.77 = Rock?	2.00	2.20	2.40	2.50	2.67	2.80	2.90
4	6906WB	43528	89277	840	9805283	9804121	372*	562*	586-	608*	629-	640*	658-	672*	683
4	6909WB	43526	89262	850	9805283	9804109	374*	566*	591-	613*	634-	645*	664-	676*	685
4	6910WB	43527	89247	817	9805282	9804112	402*	587*	610-	631*	652-	663*	680-	694*	704
4	6922WB	43517	89248	814	9805267	9804064	417*	601*	625-	646*	666-	677*	694-	708*	718
4	6921WB	43517	89262	933	9805267	9804004	385*	596*	623-	647*	671-	683*	703-	718*	730
4	6920WB	43517	89277	849	9805267	9804081	387*	579*	604-	625*	647-	658*	676-	690*	701
4	6929WB	43504	89275	845	9805247	9804046	406*	597*	622-	643*	665-	676*	694-	708*	719
4	6930WH	43504	89291	926	9805247	9804000	376*	585*	612-	636*	660-	671*	691-	707*	719
4	6824WH	43510	89295	874	9805256	9804047	387*	584*	610-	632*	655-	666*	685-	699*	710
4	6814WB	43524	89308	872	9805277	9804070	387*	584*	610-	632*	654-	665*	684-	699*	710
4	6823WB	43511	89309	930	9805258	9804000	383*	593*	620-	644*	668-	680*	700-	715*	727
4	6826WB	43504	89315	905	9805247	9804009	387*	591*	618-	641*	664-	676*	695-	710*	722
4	6827WB	43509	89327	904	9805255	9803999	406*	610*	637-	660*	683-	694*	714-	729*	741
4	6828WB	43509	89339	925	9805255	9803968	417*	626*	653-	677*	700-	712*	732-	747*	759
4	6821WB	43517	89333	957	9805267	9803973	394*	610*	638-	663*	687-	699*	720-	736*	748
4	6816WB	43526	89333	917	9805280	9804018	399*	606*	633-	656*	680-	692*	711-	727*	738
4	6809WB	43529	89328	892	9805285	9804039	407*	608*	635-	657*	680-	692*	711-	726*	737
4	7836WB	43540	89299	893	9805301	9804101	360*	562*	588-	611*	633-	645*	664-	679*	690
4	7835WB	43540	89315	943	9805301	9804044	370*	583*	611-	635*	659-	671*	691-	707*	719
4	6803WB	43536	89326	950	9805295	9804005	396*	611*	638-	663*	687-	699*	720-	735*	748
4	6804WB	43536	89338	940	9805295	9803990	421*	633*	661-	685*	709-	721*	741-	757*	769
4	7832WB	43543	89350	970	9805306	9803978	416*	635*	664-	688*	713-	725*	746-	763*	775
4	7829WB	43555	89350	1065	9805324	9803934	388*	629*	660-	687*	714-	728*	751-	769*	782
4	7820WB	43563	89350	1049	9805336	9803966	387*	623*	654-	680*	707-	720*	743-	760*	774
4	7821WB	43563	89339	1002	9805336	9803986	406*	632*	662-	687*	713-	726*	747-	764*	777
4	7828WB	43555	89339	990	9805324	9803988	405*	629*	658-	683*	708-	721*	742-	759*	771

8706CB	44041	89430	1002	9805453	9804301	210*	436*	466-	491*	517-	530*	551-	568*	581*
8602CB	44041	89438	993	9805453	9804307	212*	436*	465-	491*	516-	529*	550-	567*	579*
9622CB	44068	89465	1008	9805494	9804224	322*	550*	579-	605*	631-	644*	665-	682*	695*
9624CB	44068	89442	1020	9805494	9804313	222*	452*	482-	508*	534-	547*	570-	586*	599*
9719CB	44068	89430	1021	9805494	9804307	227*	458*	488-	514*	540-	553*	575-	592*	605*
9720CB	44068	89416	1026	9805494	9804300	229*	461*	491-	517*	543-	556*	579-	596*	609*
9722CB	44068	89394	1041	9805494	9804241	274*	509*	540-	566*	593-	606*	629-	646*	659*
9724CB	44068	89370	1059	9805494	9804139	359*	598*	629-	656*	683-	697*	720-	737*	751*
9819CB	44068	89357	1068	9805494	9804083	406*	647*	679-	706*	733-	747*	770-	788*	801*
9820CB	44068	89348	1071	9805494	9804040	447*	689*	720-	748*	775-	789*	812-	830*	843*
9821CB	44068	89335	1077	9805494	9804022	459*	702*	734-	761*	789-	803*	826-	844*	858*
9803HB	44093	89324	1085	9805531	9804038	472*	717*	749-	777*	804-	818*	842-	860*	873*
9804HB	44093	89336	1074	9805531	9804044	477*	720*	751-	778*	806-	820*	843-	861*	874*
9805HB	44093	89348	1071	9805531	9804066	458*	700*	731-	759*	786-	800*	823-	841*	854*
9806HB	44093	89357	1065	9805531	9804088	441*	682*	713-	740*	767-	781*	804-	822*	835*
9701HB	44093	89369	1053	9805531	9804127	414*	652*	683-	710*	736-	750*	773-	790*	804*
9702HB	44093	89382	1043	9805531	9804186	364*	600*	630-	657*	683-	697*	719-	737*	750*
9703HB	44093	89395	1033	9805531	9804240	319*	552*	583-	609*	635-	649*	671-	688*	701*
0732HB	44102	89409	1029	9805545	9804261	316*	548*	579-	605*	631-	644*	667-	684*	697*
0731HB	44102	89427	1031	9805545	9804270	305*	538*	568-	594*	621-	634*	656-	673*	687*
0636HB	44102	89442	1027	9805545	9804250	329*	561*	591-	617*	644-	657*	679-	696*	709*
9611HB	44084	89454	1012	9805518	9804221	345*	574*	603-	629*	655-	668*	690-	707*	719*
9605HH	44093	89484	1007	9805531	9804170	414*	641*	671-	697*	722-	735*	757-	774*	787*
0629HH	44111	89484	1015	9805558	9804217	386*	615*	645-	671*	697-	710*	732-	749*	762*
0608HH	44132	89484	1020	9805590	9804252	379*	609*	639-	665*	691-	704*	727-	743*	756*
0610HB	44132	89466	1035	9805590	9804263	353*	587*	617-	644*	670-	683*	706-	723*	736*
0612HB	44132	89442	1037	9805590	9804276	339*	573*	604-	630*	657-	670*	692-	709*	723*
0716HB	44128	89430	1034	9805584	9804260	351*	585*	615-	641*	668-	681*	703-	720*	734*
0717HB	44128	89416	1032	9805584	9804258	355*	588*	618-	645*	671-	684*	707-	724*	737*
0716HB	44128	89407	1037	9805584	9804270	339*	573*	604-	630*	657-	670*	692-	709*	723*
0714HB	44128	89382	1051	9805584	9804166	429*	666*	697-	724*	751-	764*	787-	805*	818*

0713HB	44128	89370	1058	9805584	9804123	466*	705*	736-	763*	790-	804*	826-	844*	856*
0818HB	44128	89357	1066	9805584	9804093	486*	729*	760-	787*	814-	828*	851-	869*	882*
0823PH	44119	89312	1097	9805570	9804063	475*	723*	755-	783*	811-	825*	849-	867*	881*
0826PH	44110	89312	1096	9805557	9804057	469*	717*	749-	777*	805-	819*	842-	861*	875*
9802PH	44093	89312	1099	9805531	9804052	445*	693*	725-	754*	782-	796*	819-	838*	852*
9920HB	44066	89279	1135	9805491	9804013	410*	666*	700-	729*	758-	772*	797-	816*	830*
9922HB	44066	89248	1130	9805491	9804044	384*	639*	672-	701*	730-	744*	769-	788*	802*
9903HB	44040	89249	1000	9805492	9804050	461*	687*	716-	742*	767-	780*	802-	818*	831*
9106UH	44036	89148	820	9805446	9804163	512*	697*	721-	742*	763-	774*	791-	805*	815*
9109UH	44032	89124	886	9805439	9804101	503*	704*	730-	752*	775-	786*	806-	820*	832*
9110UH	44032	89103	877	9805439	9804100	514*	712*	738-	760*	783-	794*	813-	827*	839*
9112UH	44027	89084	800	9805432	9804167	513*	694*	717-	738*	756-	768*	786-	799*	809*
9208UH	44024	89061	790	9805427	9804226	456*	636*	660-	680*	700-	710*	727-	740*	750*
9215UH	44021	89037	785	9805423	9804268	417*	594*	617-	637*	657-	667*	684-	697*	707*
9214UH	44023	89019	760	9805426	9804258	434*	610*	633-	653*	673-	683*	700-	713*	723*
9318UH	44023	89003	810	9805426	9804245	419*	602*	626-	646*	667-	677*	695-	708*	719*
9317UH	44023	88591	749	9805426	9804249	472*	641*	663-	682*	701-	711*	727-	740*	749*
5732AB	43500	89418	1034	9805241	9803776	492*	726*	756-	782*	809-	822*	844-	861*	875*
5731AB	43500	89429	1045	9805241	9803760	498*	734*	765-	791*	818-	831*	854-	871*	885*
5635AB	43500	89450	952	9805241	9803829	517*	732*	760-	784*	809-	821*	841-	857*	869*
5627AB	43504	89469	925	9805247	9803908	469*	678*	705-	729*	752-	764*	784-	799*	811*
5818AB	43526	89359	987	9805280	9803941	411*	634*	663-	688*	713-	726*	747-	764*	776*
5714AB	43526	89382	1000	9805280	9803937	402*	628*	657-	683*	708-	721*	743-	759*	772*
5602AB	43537	89448	996	9805297	9803979	381*	606*	635-	661*	686-	699*	720-	737*	750*
5603AB	43537	89465	884	9805297	9804034	432*	632*	658-	680*	703-	714*	733-	748*	759*
5529AB	43554	89508	932	9805322	9804062	363*	573*	601-	625*	648-	660*	681-	696*	708*
5526AB	43554	89526	912	9805322	9804111	353*	559*	586-	609*	632-	644*	664-	679*	690*
5528AB	43554	89550	880	9805322	9804130	364*	563*	589-	611*	633-	645*	664-	678*	690*
5520AB	43559	89561	885	9805330	9804162	316*	516*	542-	564*	587-	598*	618-	632*	643*
6619AB	44015	89497	962	9805414	9804270	239*	456*	485-	509*	534-	546*	567-	583*	595*
6524AB	44015	89515	953	9805414	9804260	258*	473*	501-	526*	550-	562*	583-	598*	611*

24	8515AB	44023	89539	957	9805426	9804204	322*	536*	566-	591*	615-	627*	648-	664*	67
24	8517AB	44023	89562	933	9805426	9804158	390*	601*	628-	652*	676-	688*	708-	723*	73
24	8412AB	44028	89586	909	9805433	9804169	409*	614*	641-	664*	687-	699*	719-	734*	74
24	8410AB	44029	90007	895	9805435	9804195	398*	600*	626-	649*	672-	684*	703-	718*	72
24	8419NR	44017	90043	913	9805417	9804096	460*	666*	693-	716*	740-	751*	771-	786*	79
24	7617AF	43571	89491	965	9805348	9804132	306*	526*	554-	579*	604-	616*	637-	653*	66
24	9605AH	44093	89434	1007	9805531	9804172	412*	639*	669-	695*	720-	733*	755-	772*	78
24	0607AB	44132	89502	1005	9805590	9804267	378*	605*	634-	660*	686-	699*	720-	737*	75
24	0511AB	44132	89526	933	9805590	9804338	374*	585*	612-	636*	660-	672*	692-	707*	71
24	0527AB	44111	89535	937	9805558	9804324	353*	565*	592-	616*	640-	652*	672-	688*	70
24	9503AB	44093	89536	977	9805531	9804206	406*	627*	655-	680*	705-	718*	739-	755*	76
24	9520AB	44067	89561	938	9805492	9804138	472*	684*	711-	735*	759-	771*	792-	807*	81
24	8505AB	44041	89561	933	9805493	9804127	446*	659*	686-	710*	734-	746*	766-	781*	79
24	8216AR	44015	90060	915	9805414	9804226	327*	534*	561-	584*	607-	619*	639-	654*	66
24	8318AR	44015	90103	920	9805414	9804172	377*	585*	612-	635*	659-	670*	690-	706*	71
24	8314AR	44015	90067	916	9805414	9804150	402*	609*	636-	659*	683-	694*	714-	729*	74
24	7605AB	43585	89490	962	9805369	9804199	265*	482*	511-	535*	560-	572*	593-	609*	62
24	7604AB	43587	89478	973	9805372	9804205	252*	472*	500-	525*	550-	562*	583-	600*	61
24	7602AB	43590	89454	1000	9805376	9804154	281*	507*	536-	562*	587-	600*	622-	638*	65
24	7602AB	43590	89443	1010	9805376	9804112	314*	542*	572-	598*	623-	636*	658-	675*	68
24	7701AB	43590	89432	1020	9805376	9804052	365*	595*	625-	651*	677-	690*	713-	729*	74
24	7705AB	43590	89418	1010	9805376	9804017	409*	637*	667-	693*	718-	731*	753-	770*	78
24	7704AB	43590	89400	1025	9805376	9803973	439*	670*	701-	727*	753-	766*	788-	805*	81
24	7702AB	43590	89382	1045	9805376	9803951	442*	678*	709-	735*	762-	775*	798-	815*	82
24	7702AB	43590	89371	1065	9805376	9803940	434*	675*	706-	733*	760-	774*	797-	815*	82
24	8831AB	43598	89358	1091	9805388	9803931	431*	677*	709-	737*	765-	779*	803-	821*	83
24	8832AB	43597	89338	1072	9805387	9803996	383*	625*	657-	684*	711-	725*	748-	766*	78
24	8833AB	43598	89330	1044	9805388	9804025	381*	617*	647-	674*	701-	714*	737-	754*	76
24	8834AB	43598	89324	988	9805388	9804056	403*	626*	655-	680*	706-	718*	740-	756*	76
24	7934WB	43538	89246	827	9805298	9804134	386*	573*	597-	618*	639-	650*	668-	681*	69
24	7030WB	43547	89218	855	9805312	9804101	407*	600*	625-	647*	669-	680*	698-	712*	72

7026WH	43552	89186	823	9805319	9804116	429*	615*	639-	660*	681-	692*	709-	723*	734*
7130WB	43554	89149	808	9805322	9804169	393*	575*	599-	620*	640-	651*	668-	682*	692*
7121WB	43562	89120	810	9805334	9804219	353*	536*	560-	580*	601-	611*	629-	642*	653*
7122WB	43562	89103	810	9805334	9804175	397*	580*	604-	624*	645-	655*	673-	686*	697*
7106WR	43560	89130	802	9805361	9804286	321*	502*	526-	546*	567-	577*	594-	608*	618*
5132WR	43590	89134	811	9805376	9804272	341*	524*	548-	569*	589-	600*	617-	631*	641*
5129WR	43599	89130	832	9805390	9804250	357*	545*	569-	591*	612-	622*	640-	654*	665*
5120WB	44010	89032	915	9805406	9804138	407*	614*	641-	664*	687-	699*	719-	734*	746*
9012UR	44079	89149	985	9805510	9804195	389*	611*	640-	666*	691-	703*	725-	741*	753*
9036UR	44094	89150	950	9805533	9804228	411*	626*	653-	678*	702-	714*	735-	750*	763*
9025UR	44101	89149	951	9805543	9804239	409*	624*	652-	676*	700-	712*	733-	749*	761*
9023UR	44116	89163	989	9805566	9804246	390*	613*	642-	668*	693-	705*	727-	743*	756*
9016UR	44127	89162	1056	9805582	9804210	379*	617*	648-	675*	702-	716*	739-	756*	770*
9008UH	44084	89204	1076	9805518	9804110	396*	639*	671-	698*	726-	739*	763-	780*	794*
9017UH	44074	89198	1022	9805503	9804133	409*	640*	670-	696*	722-	735*	757-	774*	787*
9026UB	44056	89185	955	9805476	9804149	429*	645*	673-	697*	721-	734*	754-	770*	782*
9006UB	44028	89201	865	9805433	9804177	442*	637*	663-	685*	707-	718*	737-	751*	762*
9020UB	44015	89208	858	9805414	9804144	466*	659*	684-	706*	728-	739*	757-	771*	782*
9024UB	44008	89232	850	9805403	9804146	457*	649*	674-	696*	717-	728*	747-	761*	772*
9032UB	43998	89275	925	9805388	9804132	386*	595*	622-	646*	669-	681*	701-	716*	728*
9005UB	43988	89277	885	9805373	9804130	411*	611*	637-	659*	682-	693*	713-	727*	738*
8035UH	43998	89307	981	9805388	9804076	389*	611*	639-	664*	689-	702*	723-	739*	752*
8802CB	43585	89314	968	9805369	9804054	404*	623*	651-	676*	700-	713*	734-	750*	762*
8803CB	43583	89326	952	9805366	9804057	414*	629*	657-	681*	706-	718*	738-	754*	766*
8804CB	43583	89335	995	9805366	9804015	415*	640*	669-	694*	720-	732*	754-	770*	783*
8806CB	43589	89358	1085	9805375	9803951	403*	648*	680-	708*	735-	749*	773-	791*	804*
8803CB	43586	89374	1045	9805370	9804012	375*	611*	642-	668*	695-	708*	731-	748*	762*
8817WH	43470	89343	856	9805196	9803999	392*	585*	610-	632*	654-	665*	684-	698*	709*
8815WH	43470	89320	852	9805196	9804061	334*	526*	551-	572*	595-	606*	624-	636*	649*
8812WF	43528	89297	867	9805283	9804087	380*	576*	601-	623*	646-	657*	675-	690*	701*
8822CF	44020	89311	1040	9805421	9803962	481*	716*	746-	773*	799-	813*	835-	853*	866*

9811HF	44060	89311	1090	9805512	9804030	457*	703*	735-	763*	791-	805*		
0813PF	44127	89296	1111	9805582	9804075	462*	713*	746-	774*	802-	816*	841-	859*	873*
9035UF	44043	89170	864	9805456	9804168	455*	650*	675-	698*	720-	731*	749-	764*	775*
3827VF	44271	89325	1075	9805799	9804363	425*	668*	699-	727*	754-	768*	791-	809*	823*

4	9619FB	44067	89503	990	9805492	9804172	389*	613*	642-	667*	692-	705*	726-	743*	755
4	9523FB	44067	89527	983	9805492	9804131	435*	657*	686-	712*	737-	749*	771-	787*	799
4	6922WB	43512	89247	813	9805259	9804063	431*	615*	638-	659*	680-	690*	708-	721*	733
4	6935WB	43500	89241	816	9805241	9804034	439*	623*	647-	668*	689-	699*	717-	731*	741
4	5002WB	43487	89165	810	9805222	9803965	495*	676*	702-	722*	743-	753*	771-	784*	795
4	6131WB	43496	89143	790	9805235	9804023	469*	647*	671-	691*	711-	721*	738-	751*	761
4	6133WM	43498	89114	788	9805238	9804043	454*	632*	655-	675*	695-	705*	722-	736*	746
4	6219WM	43513	89074	776	9805261	9804078	453*	628*	651-	671*	691-	701*	717-	730*	740
4	6207WM	43528	89076	790	9805283	9804108	432*	610*	634-	654*	674-	684*	701-	714*	724
4	6206WM	43536	89076	770	9805295	9804134	437*	611*	634-	653*	673-	683*	699-	712*	722
4	7230WM	43546	89076	803	9805310	9804178	377*	558*	582-	602*	623-	633*	651-	664*	674
4	7124WM	43556	89082	799	9805325	9804169	404*	584*	608-	628*	649-	659*	676-	689*	700
4	7220WM	43562	89058	770	9805334	9804237	373*	547*	570-	589*	609-	619*	635-	648*	658
4	7215WM	43566	89040	765	9805340	9804198	422*	595*	617-	637*	656-	666*	683-	695*	705
4	7214WM	43571	89019	769	9805348	9804176	447*	621*	643-	663*	682-	692*	709-	722*	732
4	7202WM	43582	89019	772	9805364	9804220	418*	592*	615-	635*	654-	664*	681-	694*	704
4	7308WM	43580	88586	779	9805361	9804172	456*	632*	655-	675*	695-	705*	721-	734*	744
4	7303WM	43580	88568	762	9805361	9804179	465*	637*	659-	679*	698-	708*	725-	737*	747
4	7322WM	43563	88568	885	9805336	9804059	445*	645*	671-	693*	716-	727*	747-	761*	772
4	7327WM	43550	88568	895	9805316	9804040	434*	636*	662-	685*	706-	720*	739-	754*	765
4	6303WM	43537	88568	897	9805297	9804011	442*	645*	671-	694*	717-	728*	748-	762*	774
4	6310WM	43524	88568	905	9805277	9803999	427*	631*	658-	681*	704-	716*	735-	750*	762
4	6316WM	43516	88570	805	9805265	9804074	434*	616*	639-	660*	681-	691*	708-	722*	732
4	6331WM	43502	88568	880	9805244	9804022	394*	593*	619-	641*	663-	675*	694-	708*	720
4	6225WM	43502	89009	869	9805244	9804026	382*	583*	609-	632*	654-	666*	685-	700*	711

6226WM	43502	89028	901	9805244	9804013	384*	587*	614-	637*	660-	671*	691-	706*	717*
6228WM	43502	89046	652	9805244	9804034	409*	601*	626-	648*	670-	681*	699-	713*	724*
6229WM	43502	89063	821	9805244	9804042	430*	615*	640-	660*	681-	692*	710-	723*	734*
6123WM	43513	89100	850	9805261	9804032	429*	621*	646-	668*	689-	700*	719-	733*	744*
6116WM	43521	89123	799	9805273	9804091	434*	614*	637-	657*	677-	688*	705-	718*	728*
6063WB	43521	89151	816	9805273	9804072	433*	617*	641-	662*	683-	693*	711-	725*	735*
6023WB	43512	89169	815	9805259	9804052	440*	624*	648-	669*	690-	700*	718-	731*	742*
6017WB	43517	89196	850	9805267	9804046	421*	613*	638-	660*	681-	692*	711-	725*	736*
6018WB	43519	89214	848	9805270	9804042	430*	622*	646-	668*	690-	701*	719-	733*	744*
6913WB	43521	88233	842	9805273	9804053	428*	618*	643-	664*	686-	697*	715-	729*	740*
8835CB	43598	89312	1010	9805388	9804055	383*	611*	641-	667*	692-	705*	727-	744*	757*
8834CB	43598	89325	998	9805388	9804056	393*	616*	648-	673*	699-	711*	733-	750*	762*
6627CB	44007	89325	1073	9805402	9803979	414*	656*	688-	715*	743-	756*	780-	797*	811*
8829CB	44003	89340	1117	9805396	9803932	413*	665*	698-	727*	759-	769*	794-	812*	826*
8830CB	44003	89358	1092	9805396	9803926	443*	690*	722-	750*	777-	791*	815-	833*	847*
8725CB	44007	88370	1061	9805402	9803938	466*	706*	737-	764*	791-	804*	827-	845*	859*
8736CB	43598	89370	1066	9805388	9803935	450*	691*	722-	749*	776-	790*	813-	831*	844*
7802CB	43569	89312	1004	9805375	9804051	380*	607*	636-	662*	687-	700*	722-	739*	752*
7803CB	43563	89326	984	9805366	9804040	400*	622*	651-	676*	701-	714*	735-	752*	764*
7803CB	43567	88326	993	9805372	9804051	387*	611*	640-	666*	691-	704*	725-	742*	754*
8834CB	43591	89326	1023	9805378	9804027	389*	620*	650-	676*	702-	715*	738-	754*	768*
0001FC	43457	88290	790	9805176	9804165	268*	446*	470-	490*	510-	520*	537-	550*	560*
0002FC	43457	88301	823	9805176	9804137	265*	451*	475-	496*	517-	528*	545-	559*	570*
0098FC	43537	88399	890	9805297	9804170	290*	491*	517-	540*	563-	574*	593-	608*	619*
0097FC	43537	88387	880	9805297	9804091	378*	577*	603-	625*	647-	659*	678-	692*	704*
0096FC	43537	88375	885	9805297	9804177	268*	488*	514-	536*	559-	570*	590-	604*	615*
0095FC	43537	88362	876	9805297	9804199	274*	472*	498-	520*	542-	553*	572-	587*	598*
0094FC	43537	88350	925	9805297	9804097	330*	539*	566-	590*	613-	625*	645-	660*	672*
0093FC	43537	88338	865	9805297	9804220	263*	458*	484-	506*	528-	539*	558-	572*	583*
0092FC	43537	88327	838	9805297	9804222	287*	476*	501-	522*	544-	554*	572-	586*	597*
[illegible]	[illegible]	88319	816	9805297	9804220	309*	493*	517-	538*	559-	569*	587-	601*	611*

4	0090FC	43537	88302	886	9805297	9804222	242*	442*	468-	491*	513-	525*	544-	559*	570
4	0089FK	43536	88290	763	9805295	9804248	329*	501*	524-	543*	563-	572*	589-	602*	611
4	0088FK	43536	88280	747	9805295	9804259	333*	502*	524-	543*	562-	571*	587-	600*	609
4	0087FK	43527	88399	913	9805282	9804150	273*	479*	506-	529*	553-	564*	584-	599*	611
4	0086FK	43527	88388	918	9805282	9804149	270*	477*	504-	528*	551-	563*	583-	598*	610
4	0085FK	43527	88375	900	9805282	9804191	264*	487*	514-	537*	560-	571*	591-	606*	617
4	0084FK	43527	88362	878	9805282	9804181	275*	473*	499-	521*	544-	555*	574-	589*	600
4	0083	43527	88350	905	9805282	9804162	269*	479*	500-	523*	546-	558*	577-	592*	604
4	0082	43527	88338	868	9805282	9804217	249*	445*	471-	493*	515-	526*	545-	559*	570
4	0081	43527	88327	835	9805282	9804234	263*	452*	476-	497*	519-	529*	547-	561*	572
4	0080	43527	88315	812	9805282	9804228	290*	473*	497-	518*	539-	549*	567-	580*	590
4	0079	43527	88302	796	9805282	9804219	314*	494*	517-	537*	556-	566*	585-	598*	609
4	0078	43527	88290	770	9805282	9804231	327*	501*	524-	543*	563-	573*	589-	602*	612
4	0077	43527	88279	750	9805282	9804250	327*	496*	518-	538*	557-	566*	583-	595*	605
4	0074	43518	88362	875	9805268	9804187	278*	476*	501-	524*	546-	557*	576-	591*	602
4	0073FC	43518	88279	757	9805268	9804236	320*	491*	513-	533*	552-	561*	578-	590*	600
4	0072FC	43518	88338	868	9805268	9804202	250*	446*	472-	494*	516-	527*	546-	560*	571
4	0070FC	43518	88327	836	9805268	9804234	248*	437*	461-	483*	504-	515*	533-	547*	557
4	0068KU	43518	88315	823	9805268	9804215	279*	465*	489-	510*	531-	542*	559-	573*	584
4	0066KU	43518	88302	803	9805268	9804212	301*	482*	506-	526*	547-	557*	575-	588*	598
4	0065KU	43518	88296	786	9805268	9804208	321*	499*	522-	542*	562-	572*	589-	602*	612
4	0064KU	43518	88290	775	9805268	9804222	317*	492*	515-	535*	554-	564*	581-	594*	604
4	0063KU	43518	88279	757	9805268	9804236	320*	491*	513-	533*	552-	561*	578-	590*	600
4	0045KU	43510	88338	871	9805256	9804184	253*	450*	475-	498*	520-	531*	550-	564*	575
4	0044KU	43510	88327	833	9805256	9804216	256*	444*	469-	490*	511-	522*	540-	554*	564
4	0043KU	43510	88320	846	9805256	9804214	246*	437*	462-	483*	505-	516*	534-	548*	559
4	0042KU	43510	88314	825	9805256	9804214	266*	452*	477-	498*	519-	529*	547-	561*	571
4	0041KU	43510	88308	818	9805256	9804207	280*	465*	489-	510*	531-	541*	559-	572*	583
4	0040KU	43510	88302	815	9805256	9804202	287*	471*	495-	516*	537-	547*	565-	578*	589
4	0039KU	43510	88290	776	9805256	9804213	313*	488*	511-	531*	551-	561*	577-	590*	600
4	0038KU	43510	88279	752	9805256	9804225	324*	494*	516-	535*	554-	564*	580-	593*	602

24	0017	IM	43474	88315	836	9805202	9804147	269*	458*	482-	504*	525-	536*	554-	568*	5
24	0018	IM	43474	88308	909	9805202	9804166	181*	386*	413-	436*	459-	471*	491-	506*	5
24	0019	IM	43474	88302	791	9805202	9804177	281*	460*	483-	503*	523-	533*	550-	564*	5
24	0020	IM	43474	88296	779	9805202	9804193	276*	452*	475-	495*	515-	525*	541-	554*	5
24	0021	IM	43474	88290	782	9805202	9804211	274*	446*	468-	488*	507-	517*	534-	546*	5
24	0183	IM	43466	88432	988	9805190	9804040	221*	444*	473-	498*	524-	536*	556-	574*	5
24	0182	IM	43466	88426	984	9805190	9804044	220*	442*	471-	496*	521-	534*	555-	572*	5
24	0181	IM	43466	88411	983	9805190	9804032	233*	455*	484-	509*	534-	547*	566-	584*	5
24	1811	IM	43464	88411	969	9805187	9804041	235*	454*	482-	507*	532-	544*	565-	581*	5
24	0180	IM	43466	88399	935	9805190	9804049	262*	473*	501-	524*	548-	560*	581-	596*	6
24	0179	IM	43466	88387	931	9805190	9804059	255*	465*	493-	516*	540-	552*	572-	588*	6
24	0178	IM	43466	88374	900	9805190	9804080	263*	466*	493-	516*	539-	550*	570-	585*	5
24	0177	IM	43466	88360	888	9805190	9804088	267*	468*	494-	516*	539-	550*	570-	584*	5
24	0176	IM	43466	88350	909	9805190	9804086	253*	457*	484-	507*	530-	542*	561-	576*	5
24	0015	IM	43470	88338	861	9805196	9804115	271*	465*	491-	513*	535-	546*	564-	579*	5
24	0010	IM	43466	88338	884	9805190	9804099	260*	460*	486-	508*	531-	542*	561-	576*	5
24	0014		43470	88327	848	9805196	9804122	276*	468*	492-	514*	536-	547*	565-	579*	5
24	0009		43466	88327	863	9805190	9804113	265*	460*	485-	507*	529-	540*	559-	573*	5
24	0013		43470	88314	835	9805196	9804133	278*	467*	491-	512*	534-	544*	562-	576*	5
24	0008		43466	88314	862	9805190	9804121	258*	453*	478-	500*	522-	533*	552-	566*	5
24	0007		43466	88311	811	9805190	9804160	267*	450*	474-	495*	515-	526*	543-	557*	5
24	0006		43466	88289	881	9805190	9804185	176*	375*	401-	423*	446-	457*	476-	491*	5
24	0160		43458	88531	988	9805178	9804080	169*	392*	421-	446*	472-	484*	506-	522*	5
24	0161		43458	88518	1008	9805178	9804080	150*	378*	407-	433*	459-	472*	493-	510*	5
24	0162		43458	88506	1025	9805178	9804066	148*	379*	410-	436*	462-	475*	497-	514*	5
24	0163		43458	88494	1035	9805178	9804067	137*	371*	401-	428*	454-	467*	490-	507*	5
24	0164		43458	88482	1045	9805178	9804048	147*	383*	414-	440*	467-	480*	503-	520*	5
24	0165		43458	88470	1030	9805178	9804037	172*	403*	435-	461*	487-	501*	523-	540*	5
24	0166		43458	88459	995	9805178	9804053	169*	414*	443-	468*	494-	506*	528-	544*	5
24	0167		43458	88440	992	9805178	9804043	202*	426*	455-	480*	506-	518*	540-	556*	5
24	0168		43458	88432	983	9805178	9804039	214*	436*	465-	490*	515-	528*	549-	565*	5

0169	43458	88422	972	9805178	9804035	229*	449*	477-	502*	527-	539*	560-	576*	589*
0170	43458	88414	981	9805178	9804020	235*	457*	485-	510*	535-	548*	569-	585*	598*
0171	43458	88405	983	9805178	9804014	239*	461*	490-	515*	540-	553*	574-	590*	603*
0172	43458	88393	952	9805178	9804038	245*	460*	488-	512*	537-	549*	569-	585*	597*
0174	43458	88380	925	9805178	9804054	254*	463*	490-	514*	537-	549*	569-	584*	596*
0175	43457	88344	907	9805176	9804088	235*	440*	466-	490*	513-	524*	544-	559*	571*
0005	43457	88338	907	9805176	9804067	236*	441*	467-	491*	514-	525*	545-	560*	572*
0004	43457	88327	857	9805176	9804116	254*	448*	473-	495*	516-	527*	546-	560*	571*
0003	43457	88314	800	9805176	9804123	301*	482*	505-	526*	546-	556*	574-	587*	597*
0153	43449	88459	988	9805164	9804026	209*	432*	461-	486*	512-	524*	546-	562*	575*
0151	43449	88432	953	9805164	9804032	236*	451*	479-	504*	528-	540*	561-	576*	589*
0150	43449	88417	945	9805164	9804026	249*	462*	490-	514*	538-	550*	571-	587*	599*
0109	43449	88387	928	9805164	9804044	247*	457*	484-	508*	531-	543*	563-	579*	590*
0108	43449	88375	914	9805164	9804043	261*	467*	494-	518*	541-	553*	572-	588*	599*
0107	43449	88359	909	9805164	9804083	226*	431*	458-	481*	504-	516*	536-	551*	562*
0106	43449	88344	889	9805164	9804092	236*	437*	463-	486*	508-	520*	539-	554*	565*
0105	43449	88338	929	9805164	9804072	218*	428*	455-	479*	502-	514*	535-	550*	562*
0104	43449	88327	855	9805164	9804110	250*	443*	468-	490*	512-	523*	541-	555*	566*
0103	43449	88314	837	9805164	9804122	255*	444*	469-	490*	511-	522*	540-	554*	565*
0102	43448	88301	860	9805163	9804108	246*	440*	465-	487*	509-	520*	539-	553*	564*
0101	43448	88294	840	9805163	9804116	257*	447*	471-	493*	514-	525*	543-	557*	568*
0100	43448	88278	810	9805163	9804137	264*	447*	471-	491*	512-	522*	540-	553*	564*
0146	43441	88432	953	9805152	9804027	229*	444*	472-	497*	521-	533*	554-	569*	582*
0148	43441	88405	933	9805152	9804004	270*	481*	508-	532*	556-	568*	586-	603*	615*
0118	43440	88387	933	9805151	9804010	263*	474*	501-	525*	549-	561*	581-	596*	608*
0117	43440	88381	938	9805151	9804002	267*	479*	506-	530*	554-	566*	587-	602*	614*
0116	43440	88368	947	9805151	9804039	221*	435*	463-	487*	511-	523*	544-	559*	571*
0115	43440	88362	899	9805151	9804075	230*	433*	459-	482*	505-	517*	536-	551*	563*
0114	43440	88360	901	9805151	9804079	225*	426*	455-	478*	501-	512*	532-	547*	558*
0112	43440	88307	842	9805151	9804103	256*	446*	471-	492*	514-	525*	543-	557*	568*
0111	43440	88294	837	9805151	9804112	252*	441*	466-	487*	508-	519*	537-	551*	562*

0110		43440	88281	841	9805151	9804113	247*	437*	462-	483*	505-	515*	534-	547*	558*
0133		43432	88459	965	9805139	9804027	204*	422*	450-	475*	500-	512*	533-	549*	561*
0132		43432	88452	962	9805139	9804028	206*	423*	452-	476*	501-	513*	534-	550*	562*
0131		43432	88440	962	9805139	9804003	231*	448*	477-	501*	526-	538*	559-	575*	587*
0130	J	43432	88434	955	9805139	9804002	239*	455*	483-	507*	531-	544*	564-	580*	592*
0129	J	43432	88423	940	9805139	9803993	262*	474*	502-	526*	550-	562*	582-	598*	610*
0128	J	43432	88411	928	9805139	9803994	272*	482*	509-	533*	556-	568*	588-	604*	615*
0127	J	43432	88399	920	9805139	9804002	272*	480*	507-	530*	554-	565*	585-	601*	612*
0126	J	43432	88387	939	9805139	9804005	251*	463*	491-	515*	539-	551*	571-	586*	598*
0125	J	43432	88374	916	9805139	9804052	225*	432*	459-	482*	506-	517*	537-	552*	564*
0124	J	43432	88362	903	9805139	9803990	300*	504*	530-	553*	577-	588*	608-	623*	634*
0121	J	43431	88309	848	9805137	9804095	244*	436*	460-	482*	504-	515*	533-	547*	558*
0120	J	43431	88295	842	9805137	9804103	242*	432*	457-	478*	500-	511*	529-	543*	554*
0305	J	43423	88458	965	9805125	9804025	192*	410*	438-	463*	486-	500*	521-	537*	549*
0306	J	43423	88445	980	9805125	9804000	203*	424*	453-	478*	503-	516*	537-	553*	566*
0307	J	43423	88434	968	9805125	9803979	235*	454*	482-	507*	531-	544*	565-	581*	593*
0308	J	43423	88423	940	9805125	9803996	245*	457*	485-	509*	533-	545*	565-	581*	593*
0309	J	43423	88414	930	9805125	9803984	266*	476*	503-	527*	551-	563*	583-	598*	610*
0310	J	43423	88405	930	9805125	9803998	252*	462*	489-	513*	537-	549*	569-	584*	596*
0311	J	43423	88387	916	9805125	9804018	244*	451*	478-	502*	525-	537*	557-	572*	584*
0312	J	43423	88374	900	9805125	9804045	233*	436*	463-	486*	509-	520*	540-	555*	566*
323	J	43414	88423	950	9805112	9803965	253*	468*	495-	520*	544-	556*	577-	592*	605*
324	J	43414	88411	917	9805112	9803986	263*	470*	497-	520*	544-	556*	575-	591*	602*
327	J	43413	88372	913	9805110	9804032	219*	425*	452-	475*	499-	510*	530-	545*	557*
328	J	43413	88368	860	9805110	9804037	245*	444*	470-	492*	514-	526*	545-	559*	571*
341	J	43405	88387	925	9805098	9804002	226*	435*	462-	486*	509-	521*	541-	556*	568*
342	J	43405	88374	890	9805098	9804034	227*	428*	454-	477*	500-	511*	530-	545*	556*
343	J	43405	88362	870	9805098	9804045	235*	431*	457-	479*	501-	513*	531-	546*	557*
355	J	43396	88429	1060	9805085	9803965	123*	362*	394-	421*	446-	461*	484-	502*	515*
356	J	43396	88404	919	9805085	9803991	230*	438*	465-	488*	511-	523*	543-	558*	570*
359	J	43396	88388	915	9805085	9803992	232*	439*	466-	488*	511-				

4	0360 J	43396	88362	915	9805085	9804010	214*	421*	448-	471*	494-	506*	526-	541*	553
4	0361 J	43396	88348	895	9805085	9804009	234*	436*	462-	485*	508-	520*	539-	554*	565
4	0362 J	43396	88338	1060	9805085	9803921	167*	406*	438-	465*	492-	505*	526-	546*	559
4	0369 J	43388	88411	890	9805073	9803994	242*	443*	469-	492*	515-	526*	545-	560*	571
4	0368 J	43388	88399	885	9805073	9803995	246*	446*	472-	494*	517-	528*	546-	562*	573
4	0367 J	43388	88387	865	9805073	9804008	233*	433*	459-	481*	504-	515*	535-	549*	560
4	0366 J	43388	88378	867	9805073	9804006	233*	433*	459-	482*	505-	516*	535-	550*	561
4	0365 J	43388	88359	906	9805073	9804003	218*	423*	449-	472*	495-	507*	527-	542*	553
1	0364OY	43388	88350	1060	9805073	9803920	156*	395*	427-	454*	481-	494*	517-	535*	548
1	0363OY	43388	88336	1080	9805073	9803915	142*	386*	418-	445*	473-	487*	510-	528*	542
1	0391OY	43380	88411	885	9805061	9803996	233*	433*	459-	481*	504-	515*	535-	549*	560
1	0392OY	43380	88399	890	9805061	9804006	216*	417*	443-	466*	489-	500*	519-	534*	545
1	0393OY	43380	88388	885	9805061	9804015	214*	414*	440-	462*	485-	496*	516-	530*	541
	0394OY	43380	88374	883	9805061	9804029	201*	400*	426-	449*	471-	483*	502-	516*	528
	0395OY	43380	88362	934	9805061	9803989	193*	404*	431-	455*	479-	491*	511-	527*	539
	0396OY	43380	88360	1088	9805061	9803906	132*	378*	410-	437*	465-	479*	503-	521*	535
	0397OY	43380	88339	1097	9805061	9803907	122*	370*	402-	430*	458-	472*	496-	514*	528
	0398OY	43380	88327	1132	9805061	9803906	90*	346*	379-	408*	437-	451*	476-	494*	509
	0399OY	43380	88314	1082	9805061	9803939	104*	348*	380-	408*	435-	449*	473-	491*	504
	3991OY	43380	88301	1031	9805061	9803967	124*	357*	387-	413*	440-	453*	475-	492*	506
	0443FC	43448	88270	800	9805163	9804146	265*	446*	469-	490*	510-	520*	538-	551*	561
	0444FC	43439	88270	840	9805149	9804110	249*	439*	463-	485*	506-	517*	535-	549*	560
	0473FC	43431	88272	832	9805137	9804104	250*	438*	462-	484*	505-	515*	533-	547*	558
	0474FC	43422	88314	855	9805124	9804079	241*	434*	459-	481*	503-	514*	532-	546*	557
	0477FC	43421	88284	855	9805122	9804066	230*	423*	448-	470*	492-	503*	521-	535*	546
	0478FC	43421	88272	965	9805122	9804031	163*	401*	429-	454*	479-	491*	512-	528*	540
	0514FC	43411	88350	850	9805107	9804063	244*	436*	461-	483*	504-	515*	534-	548*	559
	0513FC	43411	88338	860	9805107	9804061	237*	431*	456-	478*	500-	511*	530-	544*	555
	0512FC	43413	88329	950	9805110	9804064	152*	367*	394-	419*	443-	455*	476-	491*	504
	0511FC	43413	88314	934	9805110	9804031	200*	411*	438-	462*	486-	498*	518-	534*	546
	0510FC	43413	88301	899	9805110	9804048	216*	419*	445-	468*	491-	503*	522-	537*	548

4	0509FC	43413	88295	895	9805110	9804129	139*	341*	367-	390*	413-	425*	444-	459*	47(
4	0508FC	43413	88284	904	9805110	9804051	209*	413*	440-	463*	486-	497*	517-	532*	544
4	0507FC	43413	88272	976	9805110	9804019	173*	393*	422-	447*	472-	484*	506-	522*	534
4	0515FC	43404	88327	977	9805097	9803963	215*	436*	464-	489*	514-	527*	546-	564*	577
4	0516FC	43404	88314	943	9805097	9804014	196*	409*	437-	461*	485-	497*	517-	533*	545
4	5161FC	43404	88308	926	9805097	9804024	202*	411*	438-	462*	486-	497*	517-	533*	545
4	0517FC	43404	88288	946	9805097	9804027	160*	394*	421-	446*	470-	482*	502-	518*	530
4	0553FC	43396	88327	1066	9805085	9803927	137*	382*	414-	442*	470-	483*	507-	525*	539
4	0552FC	43396	88314	1034	9805085	9803964	148*	382*	412-	438*	465-	478*	500-	517*	531
4	0551FC	43396	88301	1040	9805085	9803962	145*	380*	410-	437*	463-	477*	499-	517*	530
4	0554FC	43388	88327	1081	9805073	9803936	120*	364*	396-	423*	451-	465*	488-	506*	520
4	0556FC	43388	88301	1069	9805073	9803945	122*	363*	395-	422*	449-	463*	486-	504*	518
4	0400FC	43473	88279	755	9805200	9804240	250*	421*	443-	462*	481-	491*	507-	520*	529
4	0401FC	43473	88266	755	9805200	9804245	245*	416*	438-	457*	476-	486*	502-	515*	524
4	0407FC	43474	88254	755	9805202	9804258	234*	405*	427-	446*	465-	475*	491-	504*	513
4	0408FC	43474	88248	760	9805202	9804250	237*	409*	431-	450*	470-	479*	496-	509*	518
4	0402FC	43465	88278	765	9805188	9804201	267*	440*	462-	482*	501-	511*	528-	540*	550
4	0410FC	43465	88254	768	9805188	9804226	240*	413*	436-	456*	475-	485*	502-	514*	524