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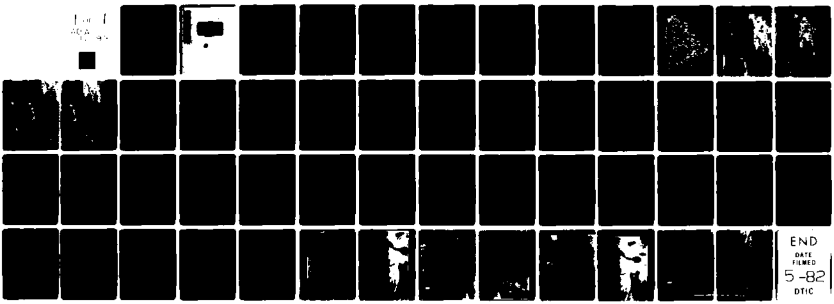

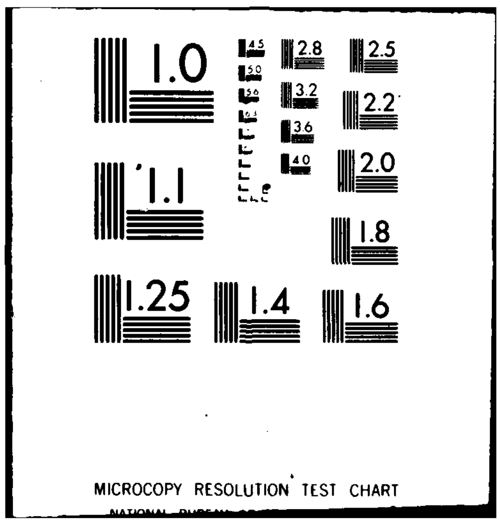
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GRAVITY SURVEY - SPRING VALLEY
NEVADA

Prepared for:

U.S. Department of the Air Force
Ballistic Missile Office (BMO)
Norton Air Force Base, California 92409

Prepared By:

Ertec Western, Inc.
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Long Beach, California 90807

20 May 1981

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Results of a gravity survey of the Spring Valley in East Central Nevada indicates the northern part of the valley is occupied by a subsiding fault block. The block tilts downward toward the Snake Range on the east. This feature is probably the southern end of a major basin. The southern part of the study area is shallow with a maximum depth to bedrock of about 1000 feet.

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FOREWORD

Methodology and Characterization studies during Fiscal Years 1977 and 1978 (FY 77 and 78) included gravity surveys in ten valleys in Arizona (five), Nevada (two), New Mexico (two), and California (one). The gravity data were obtained for the purpose of estimating the gross structure and shape of the basins and the thickness of the valley fill. There was also the possibility of detecting shallow rock in areas between boring locations. Generalized interpretations from these surveys were included in Ertec Western's (formerly Fugro National) Characterization Reports (FN-TR-26a through e).

During the FY 77 surveys, measurements were made to form an approximate 1-mile grid over the study areas, and contour maps showing interpreted depth to bedrock were made. In FY 79, the decision was made to concentrate on verifying and refining suitable area boundaries. This decision resulted in a reduction in the gravity program. Instead of obtaining gravity data on a grid, the reduced program consisted of obtaining gravity measurements along profiles across the valleys where Verification studies were also performed.

The Defense Mapping Agency (DMA), St. Louis, Missouri, was requested to provide gravity data from their library to supplement the gravity profiles. For Big Smoky, Hot Creek, and Big Sand Springs valleys, a sufficient density of library data is available to permit construction of interpreted contour maps instead of just two-dimensional cross sections.

In late summer of FY 79, supplementary funds became available to begin data reduction. At that time, inner zone terrain corrections were begun on the library data and the profiles from Big Smoky Valley, Nevada, and Butler and La Posa valleys, Arizona. The profile data from Whirlwind, Hamlin, Snake East, White River, Garden, and Coal valleys, Nevada, became available from the field in early October 1979.

A continuation of gravity interpretations has been incorporated into the FY 80-81 program, and the results are being summarized in a series of valley reports. Reports covering Nevada-Utah gravity studies are being numbered "E-TR-33-" followed by the abbreviation for the subject valley. In addition, more detailed reports of the results of FY 77 surveys in Dry Lake and Ralston valleys, Nevada, were prepared. Verification studies were continued in FY 80 and 81, and gravity studies were included in the program. DMA continued to obtain the field measurements, and there was a return to the grid pattern. The interpretation of the grid data allows the production of contour maps which are valuable in the deep basin structural analysis needed for computer modeling in the water resources program. The gravity interpretations will also be useful in Nuclear Hardness and Survivability (NH&S) evaluations.

The basic decisions governing the gravity program are made by BMO following consultation with TRW, Inc., Ertec Western, and the DMA. Conduct of the gravity studies is a joint effort between DMA and Ertec Western. The field work, including planning, logistics, surveying, and meter operation is done by the Defense Mapping Agency Hydrographic/Topographic Center (DMAHTC), headquartered in Cheyenne, Wyoming. DMAHTC reduces the data to Simple Bouguer Anomaly (see Section A1.4, Appendix A1.0). The Defense Mapping Agency Aerospace Center (DMAAC), St. Louis, Missouri, calculates outer zone terrain corrections.

Ertec Western provides DMA with schedules showing the valleys with the highest priorities. Ertec Western also recommended locations for the profiles in the FY 79 studies with the provision that they should follow existing roads or trails. Any required inner zone terrain corrections are calculated by Ertec Western prior to making geologic interpretations.

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1.0 INTRODUCTION

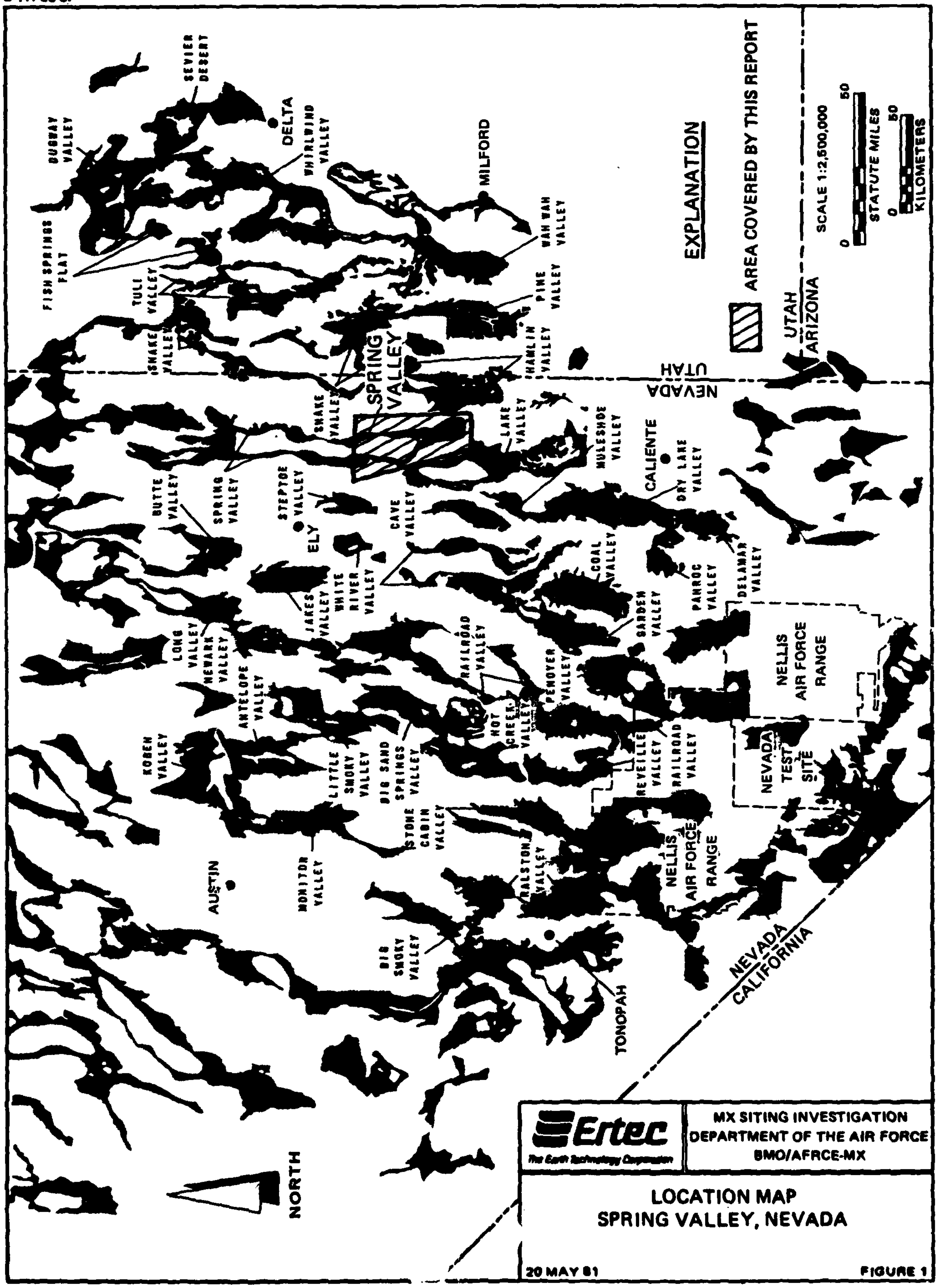
1.1 OBJECTIVE

Gravity data from Spring Valley were studied for the purpose of estimating the overall shape of the structural basin, the thickness of alluvial fill, and the location of concealed faults. The estimates will be useful in modeling the dynamic response of ground motion in the basin and in evaluating groundwater resources.

1.2 LOCATION

Spring Valley is located in eastern Nevada approximately 35 miles (56 km) southeast of the town of Ely (Figure 1).

The topographic feature named Spring Valley is approximately 100 miles (160 km) long (N-S) and 10 miles (16 km) wide (E-W). Field work was restricted to the southern tip of the valley because the central portion is included in the proposed Great Basin National Park. Consequently, this report covers only the southern part of Spring Valley or that part lying between latitudes 38°25' and 39°00' N. and longitudes 114°15' and 114°40' W. (Figure 2). The area is bounded on the east by the Snake Range, on the west by the Schell Creek Range, on the southwest by the Fortification Range, on the south by the Wilson Creek Range, and on the southeast by the Limestone Hills. U.S. Highway 93 passes along the northwest side of the area.



LOCATION MAP
SPRING VALLEY, NEVADA

FIGURE 1

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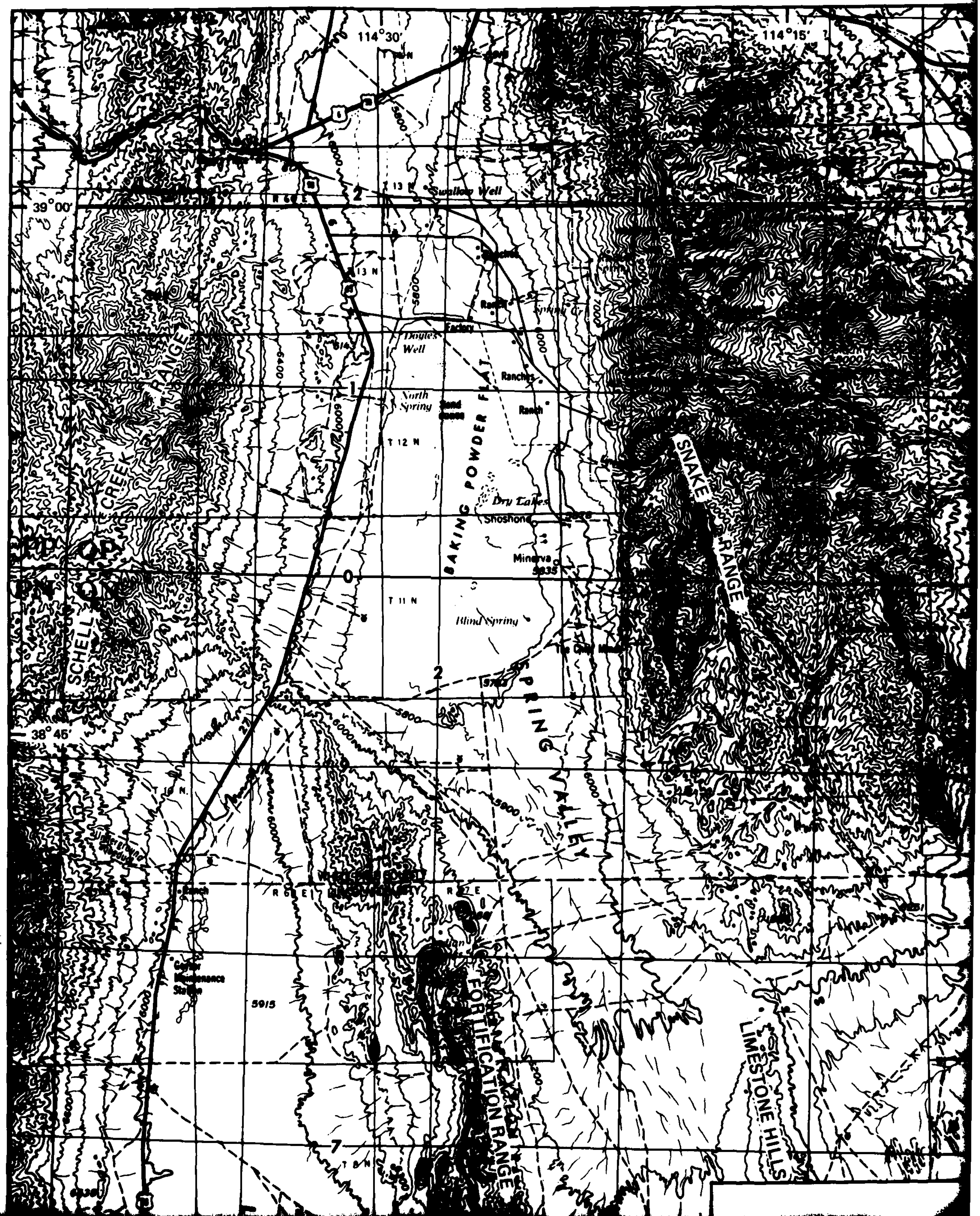
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SCHELL CREEK RANGE
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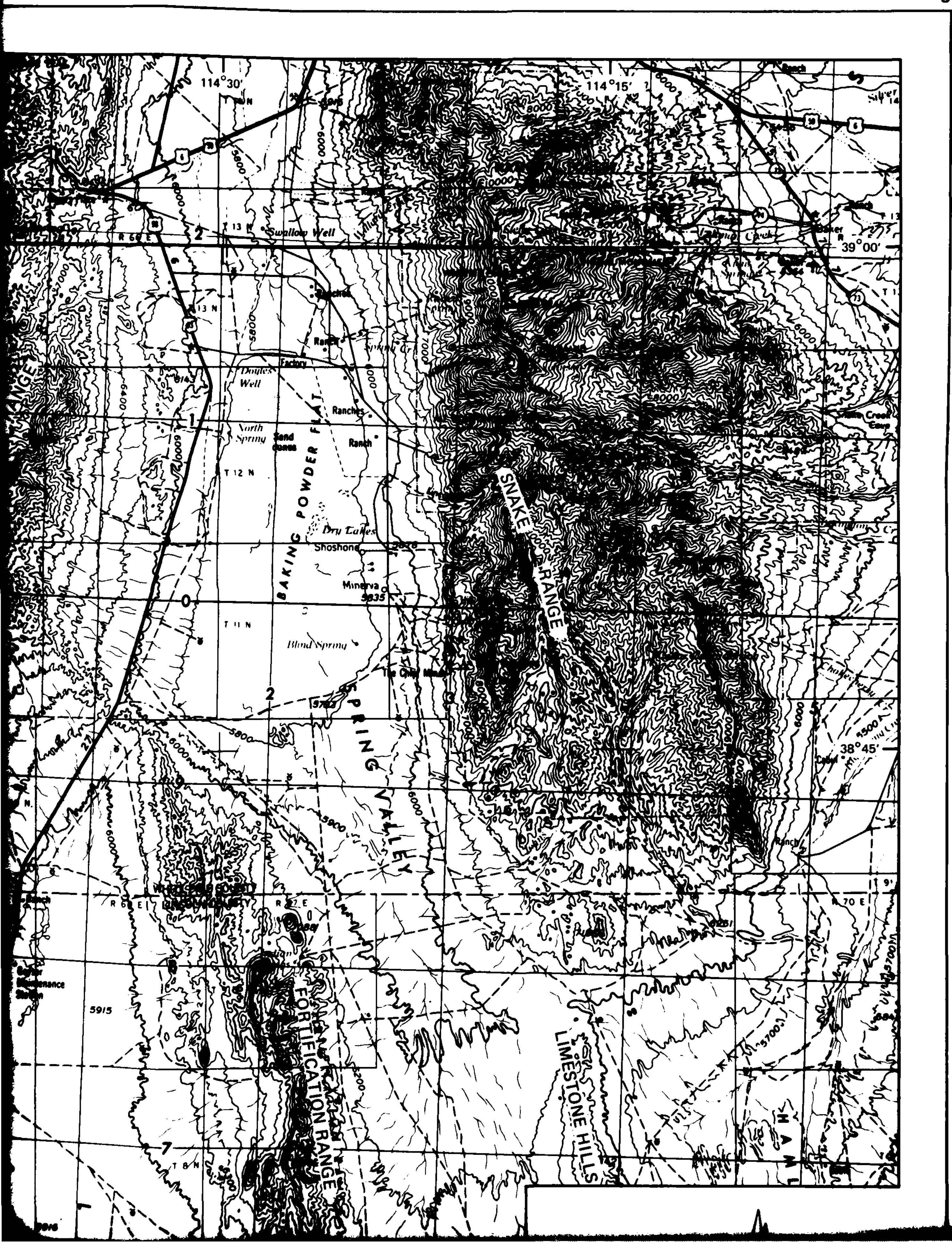
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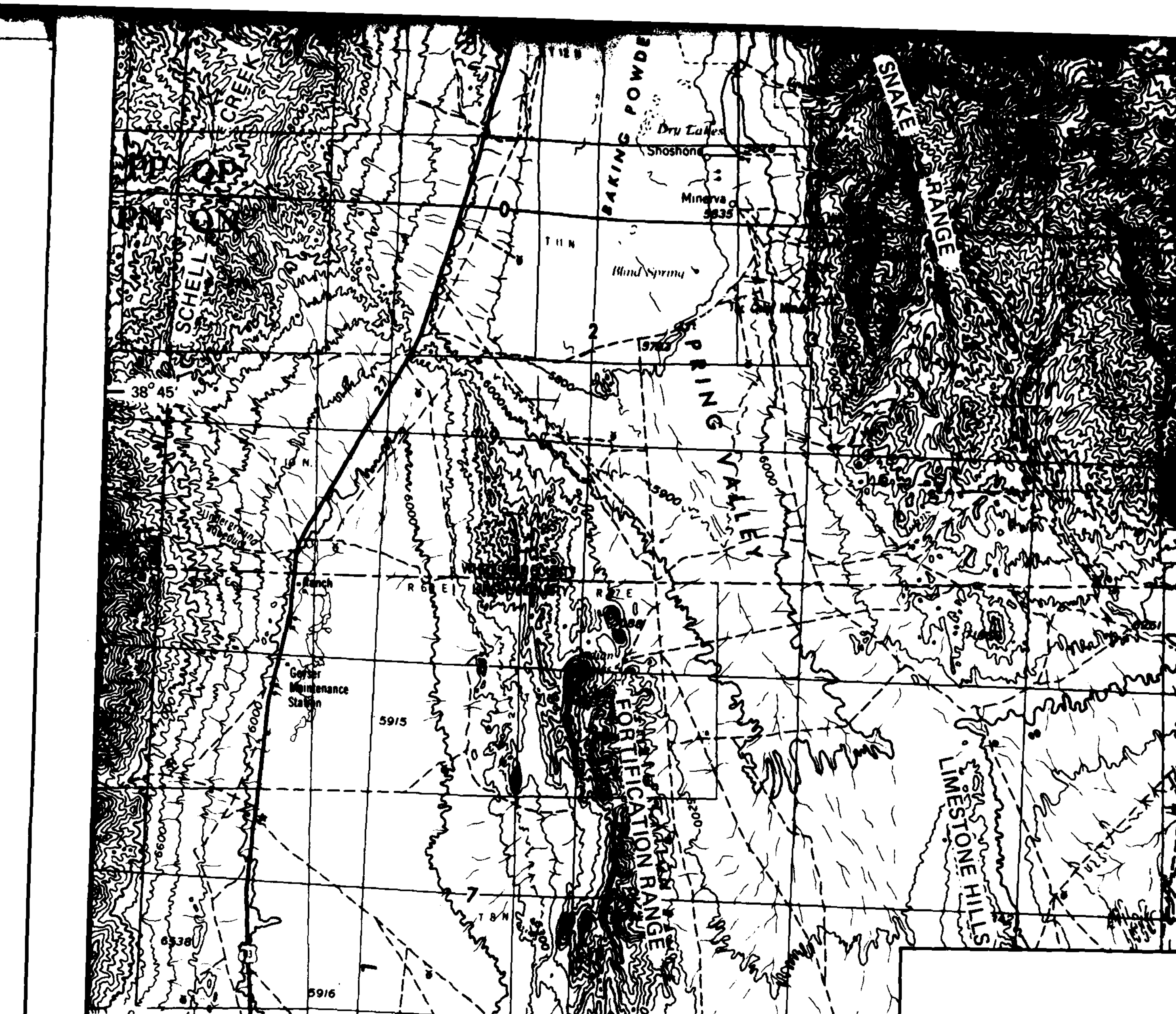
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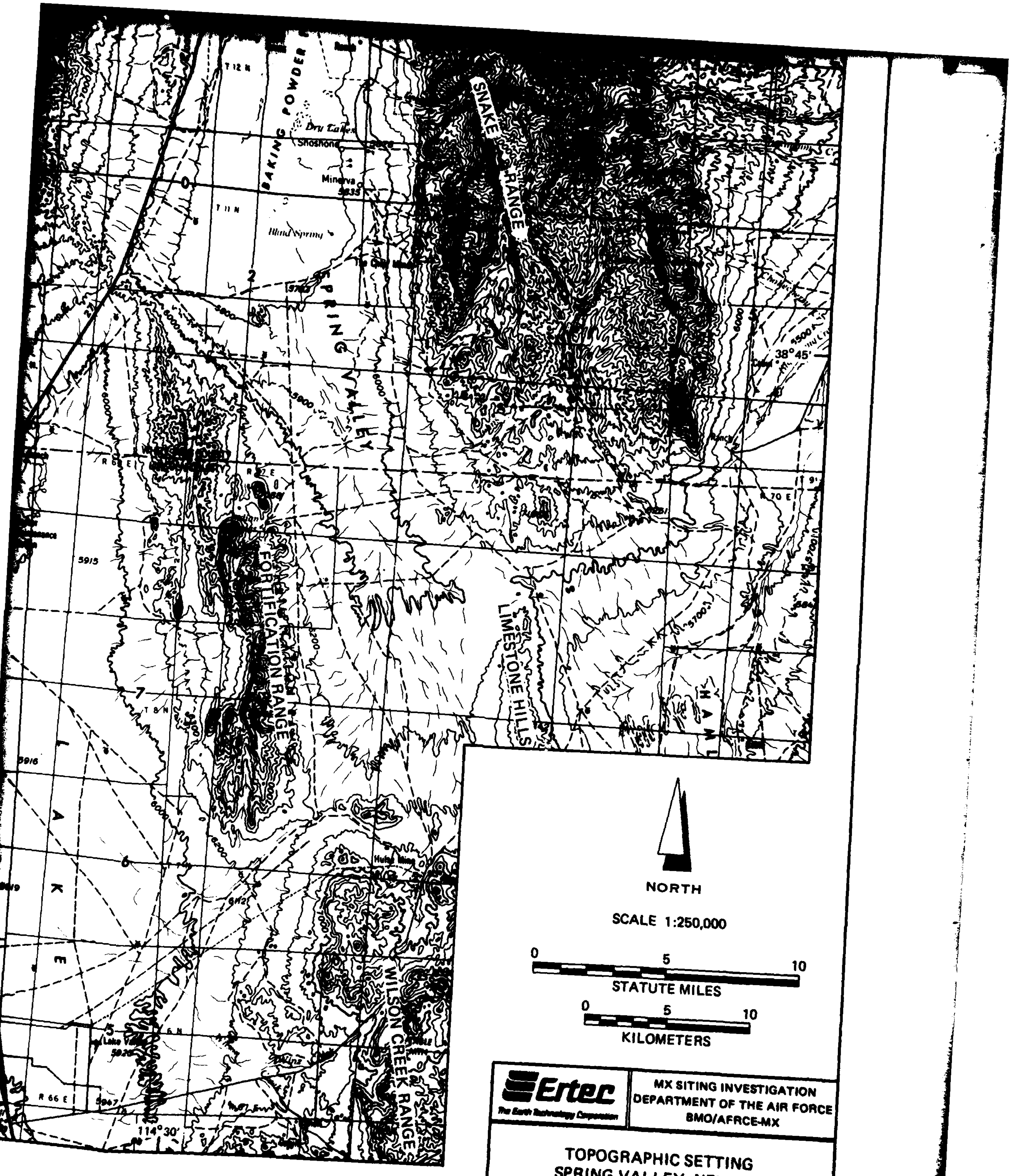

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BMO/AFRCE-MX

TOPOGRAPHIC SETTING
SPRING VALLEY, NEVADA

20 MAY 81

FIGURE 2

1.3 SCOPE OF WORK

Five primary work elements were completed during this study. They are:

1. Computation and merging of terrain corrections;
2. Synthesis of regional and valley-specific geologic data;
3. Evaluation of the regional field and residual separation;
4. Inverse modeling to estimate depth to bedrock; and
5. Interpretation of structural relationships.

The gravitational field within the southern third of Spring Valley was defined by measurements at 321 stations. The principal facts for these stations are listed in Appendix A2.0 and their distribution is shown in Drawing 1. These data were made of 161 new measurements by the Defense Mapping Agency Hydrographic-Topographic Center/Geodetic Survey Squadron (DMAHTC/GSS) and 160 measurements which were obtained from the Defense Mapping Agency Aerospace Center (DMAAC) library.

2.0 GRAVITY DATA REDUCTION

DMAHTC/GSS obtained the basic observations for the new stations and reduced them to Simple Bouguer Anomalies (SBA) as described in Appendix A1.0. Up to three levels of terrain corrections were applied to the new stations to convert the SBA to the Complete Bouguer Anomaly (CBA). Only the first two levels of terrain corrections described below were applied to library stations.

First, the DMAAC, St. Louis, Missouri, used its library of digitized terrain data and a computer program to calculate corrections out to 104 miles (167 km) from each station. When the program could not calculate the terrain effects near a station, a ring template was used to estimate the effect of terrain within approximately 3000 feet (914 m) of the station. The third level of terrain corrections was applied to those stations where 10 feet (3 m) or more of relief were observed within 130 feet (40 m). In these cases, the elevation differences were measured in the field at a distance of 130 feet (40 m) along six directions from the stations. These data were used to calculate the effect of the very near relief.

The CBA values and principal facts for the Spring Valley stations are listed in Appendix A2.0.

3.0 GEOLOGIC SUMMARY

Spring Valley is a north-south trending valley located in the eastern part of the Great Basin region of the Basin and Range Physiographic province.

In general, structures of the Basin and Range province are tilted horsts and grabens which are the result of late Tertiary-Quaternary block faulting. Valleys occupy grabens or the down-tilted portions of the blocks, while mountains are either horsts or the upturned edges of the tilted blocks. Most of the faults bounding the blocks are oriented north-south and are generally near the valley margins. Spring Valley appears to exhibit typical Basin and Range structure.

The floor of Spring Valley is relatively flat with well preserved Pleistocene lake shorelines. Surface drainage is internal forming a playa in Baking Powder Flat.

The basin-fill deposits consist of two units, older alluvium and younger alluvium. The older alluvium is late Tertiary to Quaternary in age and is composed of gravel and sand. These deposits are characteristically unconsolidated or poorly consolidated, poorly sorted, and commonly deformed. The younger alluvium is unconsolidated, undissected, and relatively undisturbed.

The southern end of the valley, covered by this report, is bounded by the Paleozoic limestones and quartzites of the Snake Range on the east and by the Tertiary and Cretaceous lavas and tuffs of the Fortification and Wilson Creek ranges to the southwest and south.

4.0 INTERPRETATION

The basis of interpretation is the Complete Bouguer Anomaly (CBA). Drawing 1 shows the location of the gravity stations and contours of the CBA gravity field. The contours were generated by a computer program Since contouring and other mathematical treatment of irregularly spaced data are inefficient, the station CBA and elevation data were first reduced to sets of values at uniformly spaced points (nodes) in a geographic array, or grid. The value at a node was calculated from the station data within a circular area around the node. The algorithm which calculated the nodal value used a bell-shaped function to weight the station values. In this way, those station values nearest the node had the greatest influence on the calculated value. A node spacing of 1.2 miles (2 km) was chosen to match the average data spacing.

4.1 REGIONAL-RESIDUAL SEPARATION

A fundamental part of the gravity interpretation is the separation of regional effects from the local effects of the valley and its fill. The CBA contains long wavelength components from deep and broad geologic structures extending far beyond the valley. These long wavelength components, called the regional gravity, have been approximated by upward continuation of the gravity field. Upward continuations were made to successively higher elevations until the negative anomaly over the valley was essentially smoothed out. The final continuation was calculated at an elevation of 90,000 feet (27,432 m). This regional field was subtracted from the CBA and the resulting residual gravity anomaly was adjusted by a constant +5.0 milligals so that the zero residual would approximately fit the existing rock outcrops.

4.2 DENSITY SELECTION

The construction of a geologic model from the residual anomaly requires selection of density values representative of the alluvial fill and of the underlying rock. Since only very generalized density information is available, the geologic interpretation of the gravity data can be only a coarse approximation. Information gathered from several borings in alluvial deposits taken during Verification studies indicate an average density of 2.2 g/cm^3. To account for compaction with depth (Woollard, 1962; and Grant and West, 1965), 2.3 g/cm^3 was used in the modeling process.

The underlying basement material is thought to be predominantly Paleozoic carbonate rocks similar to those which crop out in the adjacent Snake Range. Middle Tertiary volcanics probably lie between the alluvial basin deposits and the carbonate basement (Howard, 1978), but too little is known about their thickness and density to evaluate their effect on the interpreted geologic model.

Published values for carbonate rocks typically range between 2.6 and 2.9 g/cm^3. The Paleozoic carbonate rocks in Nevada and Utah are generally reported to be relatively high in density, on the order of 2.8 g/cm^3. This value was selected to represent the density of the basement rock. A density contrast of -0.50 g/cm^3 was used for modeling.

4.3 MODELING

Modeling was done with the aid of a computer program which iteratively calculates a three-dimensional solution of gravity anomaly data (Cordell, 1970). The gravity anomaly is represented by discrete values on a two-dimensional grid. The source of the anomaly (the volume of low-density valley fill) is represented by a set of vertical prism elements. The tops of the prisms lie in a common horizontal plane. The bottoms of the prisms collectively represent the bottom of the valley fill. Each prism has a uniform density and a cross-sectional area equal to one grid square. A grid square of 1.2 miles by 1.2 miles (2 km by 2 km) was selected as representative of the gravity station distribution. Computations were made for three iterations of mutually interactive prism adjustments.

The calculated thickness of the valley fill depends upon the accuracy of the -0.50 g/cm^3 density contrast (i.e., fill density minus rock density) used. Since neither density is perfectly known, nor even uniform, the calculated thickness should be expected to contain a corresponding degree of uncertainty. The calculated thickness of fill, or interpreted depth to rock, is contoured in Drawing 2.

4.4 DISCUSSION OF RESULTS

The depth-to-rock contours (Drawing 2) indicate two depth regimes in the area of Spring Valley under study. At the end of the valley, the gravity data indicate a shallow fill with a maximum thickness of approximately 1000 feet (305 m). There is no indication of major basin-bounding faults even though surface geologic data suggest there may be some small-displacement faults scattered throughout the area. In the other regime to the north, the depth approaches 6000 feet (1829 m) and appears to represent the southern portion of a major basin in the central part of Spring Valley.

The structure in the northern part of the study area is an asymmetrical, eastward tilted block bounded by a major north-south trending fault beneath the alluvium on the east side of the valley. This fault is suggested by the closely spaced CBA contours, by the strongly linear front of the Snake Range, and by the presence of a few limited fault ruptures in older alluvial fans near the base of the range.

There is no evidence in the gravity data of a major structure on the west side of the study area, although to the north, a long fault displacing alluvial fans and late Pleistocene to Holocene shoreline features can be seen in aerial photographs. Apparently this fault is young, but displacement in the basement rocks is small and/or diminishes southward so that in the study area, it is not strongly reflected in the gravity data.

The placement of the interpreted fault shown in Drawing 2 was guided by the location of the zero line of the second vertical derivative of the gravity field. The zero contour line of the second vertical derivative marks the line of inflection in the gravity field which theoretically locates the position of the geologic change which produced the gravity anomaly. This interpretation was aided by regional geologic information from published reports, aerial photographs, and field reconnaissance which indicate the distribution of geologic units and surface faults.

5.0 CONCLUSIONS

Gravity data indicate that the northern part of the Spring Valley study area (Drawing 2) is occupied by a subsided fault block. The block tilts downward toward the Snake Range on the east. This feature is probably the southern end of a major basin. The southern part of the study area is shallow, with a maximum depth to bedrock of about 1000 feet.

The calculated bedrock depths are necessarily approximate because the complex and imperfectly known density distribution has been represented by a simple two-density model. Also, the residual gravity anomaly is necessarily based on an interpreted regional field. An average density contrast of $-0.50\ g/cm^3$ between the alluvium and bedrock was used to calculate the thickness of the valley-fill material. Future studies that acquire better density data or measure actual depths to bedrock in deep parts of the valley can be used to refine the gravity interpretation.

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APPENDIX A1.0

GENERAL PRINCIPLES OF THE GRAVITY EXPLORATION METHOD

A1.0 GENERAL PRINCIPLES OF THE GRAVITY EXPLORATION METHOD

A1.1 GENERAL

A gravity survey involves measurement of differences in the gravitational field between various points on the earth's surface. The gravitational field values being measured are the same as those influencing all objects on the surface of the earth. They are generally associated with the force which causes a 1-gm mass to be accelerated at 980 cm/sec^2. This force is normally referred to as a 1-g force.

Even though in many applications the gravitational field at the earth's surface is assumed to be constant, small but distinguishable differences in gravity occur from point to point. In a gravity survey, the variations are measured in terms of milligals. A milligal is equal to 0.001 cm/sec^2 or 0.00000102 g. The differences in gravity are caused by geometrical effects, such as differences in elevation and latitude, and by lateral variations in density within the earth. The lateral density variations are a result of changes in geologic conditions. For measurements at the surface of the earth, the largest factor influencing the pull of gravity is the density of all materials between the center of the earth and the point of measurement.

To detect changes produced by differing geological conditions, it is necessary to detect differences in the gravitational field as small as a few milligals. To recognize changes due to geological conditions, the measurements are "corrected" to account for changes due to differences in elevation and latitude.

Given this background, the basic concept of the gravitational exploration method, the anomaly, can be introduced. If, instead of being an oblate spheroid characterized by complex density variations, the earth were made up of concentric, homogeneous shells, the gravitational field would be the same at all points on the surface of the earth. The complexities in the earth's shape and material distribution are the reason that the pull of gravity is not the same from place to place. A difference in gravity between two points which is not caused by the effects of known geometrical differences, such as in elevation, latitude, and surrounding terrain, is referred to as an "anomaly."

An anomaly reflects lateral differences in material densities. The gravitational attraction is smaller at a place underlain by relatively low density material than it is at a place underlain by a relatively high density material. The term "negative gravity anomaly" describes a situation in which the pull of gravity within a prescribed area is small compared to the area surrounding it. Low-density alluvial deposits in basins such as those in the Nevada-Utah region produce negative gravity anomalies in relation to the gravity values in the surrounding mountains which are formed by more dense rocks.

The objective of gravity exploration is to deduce the variations in geologic conditions that produce the gravity anomalies identified during a gravity survey.

A1.2 INSTRUMENTS

The sensing element of a Lacoste and Romberg gravimeter is a mass suspended by a zero-length spring. Deflections of the mass from a null position are proportional to changes in gravitational attraction. These instruments are sealed and compensated for atmospheric pressure changes. They are maintained at a constant temperature by an internal heater element and thermostat. The absolute value of gravity is not measured directly by a gravimeter. It measures relative values of gravity between one point and the next. Gravitational differences as small as 0.01 milligal can be measured.

A1.3 FIELD PROCEDURES

The gravimeter readings were calibrated in terms of absolute gravity by taking readings twice daily at nearby USGS gravity base stations. Gravimeter readings fluctuate because of small time-related deviations due to the effect of earth tides and instrument drift. Field readings were corrected to account for these deviations. The magnitude of the tidal correction was calculated using an equation suggested by Goguel (1954):

$$C = P + N\cos\phi\,(\cos\phi + \sin\phi) + S\cos\phi\,(\cos\phi - \sin\phi)$$

where C is the tidal correction factor, P, N, and S are time-related variables, and ϕ is the latitude of the observation point. Tables giving the values of P, N, and S are published annually by the European Association of Exploration Geophysicists.

The meter drift correction was based on readings taken at a designated base station at the start and end of each day. Any difference between these two readings after they were corrected for tidal effects was considered to have been the result of instrumental drift. It was assumed that this drift occurred at a uniform rate between the two readings. Corrections for drift were typically only a few hundredths of a milligal. Readings corrected for tidal effects and instrumental drift represented the observed gravity at each station. The observed gravity values represent the total gravitational pull of the entire earth at the measurement stations.

A1.4 DATA REDUCTION

Several corrections or reductions are made to the observed gravity to isolate the portion of the gravitational pull which is due to the crustal and near-surface materials. The gravity remaining after these reductions is called the "Bouguer Anomaly." Bouguer Anomaly values are the basis for geologic interpretation. To obtain the Bouguer Anomaly, the observed gravity is adjusted to the value it would have had if it had been measured at the geoid, a theoretically defined surface which approximates the surface of mean sea level. The difference between the "adjusted" observed gravity and the gravity at the geoid calculated for a theoretically homogeneous earth is the Bouguer Anomaly.

Four separate reductions, to account for four geometrical effects, are made to the observed gravity at each station to arrive at its Bouguer Anomaly value.

a. Free-Air Effect: Gravitational attraction varies inversely as the square of the distance from the center of the earth. Thus, corrections must be applied for elevation. Observed gravity levels are corrected for elevation using the normal vertical gradient of:

$$FA = -0.09406 \text{ mg/ft } (-0.3086 \text{ milligals/meter})$$

where FA is the free-air effect (the rate of change of gravity with distance from the center of the earth). The free-air correction is positive in sign since the correction is opposite the effect.

b. Bouguer Effect: Like the free-air effect, the Bouguer effect is a function of the elevation of the station, but it considers the influence of a slab of earth materials between the observation point on the surface of the earth and the corresponding point on the geoid (sea·level). Normal practice, which is to assume that the density of the slab is 2.67 grams per cubic centimeter was followed in these studies. The Bouguer correction (B_c), which is opposite in sign to the free-air correction, was defined according to the following formula.

$$B_c = 0.01276 \ (2.67) \ h_f \text{ (milligals per foot)}$$

$$B_c = 0.04185 \ (2.67) \ h_m \text{ (milligals per meter)}$$

where h_f is the height above sea level in feet and h_m is the height in meters.

c. Latitude Effect: Points at different latitudes will have different "gravities" for two reasons. The earth (and the geoid) is spheroidal, or flattened at the poles. Since points at higher latitudes are closer to the center of the earth than points near the equator, the gravity at the higher latitudes is larger. As the earth spins, the centrifugal acceleration causes a slight decrease in gravity. At the higher latitudes where the earth's radii are smaller, the centrifugal acceleration diminishes. The gravity formula for the Geodetic Reference System, 1967, gives the theoretical value of gravity at the geoid as a function of latitude. It is:

$$g = 978.0381\ (1 + 0.0053204 \sin^2 \phi - 0.0000058 \sin^2 2\phi) \text{ gals}$$

where g is the theoretical acceleration of gravity and ϕ is the latitude in degrees. The positive term accounts for the spheroidal shape of the earth. The negative term adjusts for the centrifugal acceleration.

The previous two corrections (free air and Bouguer) have adjusted the observed gravity to the value it would have had at the geoid (sea level). The theoretical value at the geoid for the latitude of the station is then subtracted from the adjusted observed gravity. The remainder is called the Simple Bouguer Anomaly (SBA). Most of this gravity represents the effect of material beneath the station, but part of it may be due to irregularities in terrain (upper part of the Bouguer slab) away from the station.

d. Terrain Effect: Topographic relief around the station has a negative effect on the gravitational force at the station. A nearby hill has upward gravitational pull and a nearby valley contributes less downward attraction than a nearby material would have. Therefore, the corrections are always positive. Corrections are made to the SBA when the terrain effects were 0.1 milligal or larger. Terrain corrected Bouguer values are called the Complete Bouguer Anomaly (CBA). When the CBA is obtained, the reduction of gravity at individual measurement points (stations) is complete.

A1.5 INTERPRETATION

To interpret the gravity data, the portion of the CBA that might be caused by the light-weight, basin-fill material must be separated from that caused by the heavier bedrock material which forms the surrounding mountains and presumably the basin floor. The first step is to create a regional field. A regional field is an estimation of the values the CBA would have had if the light-weight sediments (the anomaly) had not been there. Since the valley-fill sediments are absent at the stations read in the mountains, one approach is to use the CBA values at bedrock stations as the basis for constructing a second order polynomial surface to represent a regional field over the valley.

Where there are insufficient bedrock stations to define a satisfactory regional trend, another approach is to estimate the regional by the process of upward continuation of the CBA field.

In Potential Theory, a field normal to a surface, regardless of its actual source, may be considered as originating in an areal distribution of mass on that surface. If the field strength is known the surface density of mass (grams per square centimeter) can be calculated. The observed gravity field at the surface of the earth approximately fulfills the requirements of this theory: thus the observed (Bouguer anomaly) field can be used to compute a surficial distribution of mass which would reproduce the field, and most importantly, account for the gravity field anywhere above the surface of observation. On this basis, the Bouguer anomaly field is readily "continued" to level surfaces above the ground.

An important property of such "upward *continuation*" is that the resultant field (which can be represented by a contour map), with increasing altitudes of continuation, changes more with respect to shallow sources than it does with respect to deeper sources. The anomalous parts of the field ascribed to shallow density distribution tend to vanish as the continuation is carried upward whereas the field produced by deeper sources changes only slightly, so that upward continuations produce "regional"-type fields.

The difference between the CBA and the regional field is called the "residual" field or residual anomaly. The residual field is the interpreter's estimation of the gravitational effect of the geologic anomaly. The zero value of the residual anomaly is not exactly at the rock outcrop line but at some distance on the "rock" side of the contact. The reason for this is found in the explanation of the terrain effect. There is a component of gravitational attraction from material which is not directly beneath a point.

If the "regional" is well chosen, the magnitude of the residual anomaly is a function of the thickness of the anomalous (fill) material and the density contrast. The density contrast is the difference in density between the alluvial and bedrock material. If this contrast were known, an accurate calculation of the thickness could be made. In most cases, the densities are not well known and they also vary within the study area. In these cases, it is necessary to use typical densities for materials similar to those in the study area.

If the selected average density contrast is smaller than the actual density contrast, the computed depth to bedrock will be greater than the actual depth and vice-versa. The computed depth is inversely proportional to the density contrast. A ten percent error in density contrast produces a ten percent error in computed depth. An iterative computer program is used to calculate a subsurface model which will yield a gravitational field to match (approximately) the residual gravity anomaly.

The second vertical derivative (SVD) of gravitational field is used to aid the interpreter in evaluating the subsurface mass distribution. Once the CBA field has been projected onto a uniform grid system, its SVD at the grid nodes is readily computed.

In accordance with Laplace's Equation in Free Space, the negative of the second vertical derivative is equal to the sums of the second derivatives in the x-direction and in the y-direction. The second vertical derivative is an indication of the curvature of the Bouguer anomaly field. In particular the zero-value of the SVD indicates the inflection in the field as it changes from "concave-upward" (algebraically negative SVD) to "convex-upward" (algebraically positive SVD). In a general way the zero SVD falls on the tightest contours of the field and where contours are nearly parallel its location can be established by eye. However, where contours diverge, converge, or change direction this is not always so readily done. The zero SVD contour line may be an indicator of a line of faulting, the pinchout of a stratum, truncation of a stratum at an unconformity or merely a marked change in shape or in density of a geologic unit.

APPENDIX A2.0

SPRING VALLEY, NEVADA

GRAVITY DATA

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
HV0401	383440	1141564 6132B	8	303427278	73865147553204252	1015	80411
HV0402	383411	1141536 6012B	0	152427281	73905148260204253	595	80240
HV0403	383439	1141508 5935B	0	146427279	73946148531204250	138	80041
HV0404	383438	1141479 5861B	0	135427278	73988148805204248	-283	79862
HV0405	383439	1141457 5825B	0	130427281	74020148940204250	-486	79776
HV0406	383436	1141423 5776B	0	126427277	74070149112204245	-775	79652
HV0603	382602	1141440 6462B	0	156425733	74091143950203021	1749	79865
HV0604	382604	1141414 6416B	0	161425738	74129144276203024	1640	79917
7299	382839	114192565587T	0	176426151	73373143490203369	1800	79626
7294	382858	114280263068T	0	151426150	72097144154203397	70	78731
7301	383114	114205562484T	0	112426654	73169144422203773	-570	78232
7300	383121	114165063944T	0	131426684	73757145246203783	1600	79941
7293	383138	114334559262T	0	97426647	71293145344203808	-2710	77177
7302	383540	114239860978T	0	130427428	72648145901204399	-1130	78200
7017	383698	114322560719T	0	124427669	71440146001204616	-1490	77924
7021	383690	114245061148T	0	134427703	72565146226204619	-870	78414
9237	383737	114198059744T	0	105427810	73245147498204688	-980	78745
7224	383770	114161060538T	0	113427887	73780148416204737	610	80103
7017	383784	114324260719T	0	120427846	71411146006204758	-1630	77780
1573	384060	114377059879T	0	178428336	70632147782205163	-1040	78708
1205	384067	114378559879T	0	188428348	70610147816205174	-1020	78748
7016	384079	114328561867T	0	153428390	71334146914205191	-80	78983
7020	384082	114258060220T	0	121428423	72356147617205196	-920	78661
7025	384135	114182964649T	0	163428552	73442146162205274	1690	79823
7015	384157	114376060266T	0	170428516	70641147391205306	-1210	78400
7022	384174	114212960715T	0	142428612	73005147298205331	-910	78522
1572	384360	114360060449T	0	140428897	70864147652205605	-1080	78450
7026	384413	114145569177T	0	314429083	73969143195205682	2580	79314
7019	384415	114292059117T	0	134429025	71846149053205685	-1010	78964
1204	384470	114355060971T	0	141429103	70931147310205766	-1090	78261
7013	384514	114340060538T	0	140429190	71146147548205831	-1330	78170
7011	384560	114373563117T	0	176429262	70658146116205899	-400	78246
5101	384595	114221659859T	0	330429387	72857148189205950	-1440	78470
4254	384595	114297957900T	0	130429356	71752149015205950	-2470	77920
4253	384611	114286257841T	0	128429390	71920149098205974	-2450	77948
4252	384636	114275657900T	0	132429441	72072149021206011	-2520	77862
4210	384650	114340060518T	0	157429441	71139147737206031	-1360	78157
4251	384653	114264557930T	0	144429477	72232149093206036	-2440	77944
5102	384654	114264257841T	0	145429479	72237149122206037	-2490	77925
1571	384670	114338060531T	0	150429479	71167147732206061	-1380	78120

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN ELEV. +CODE	TER-COR. IN/OUT NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
4250	384675	114254157920T	0 164429522	72382149375206068	-2200	78204
4249	384716	114243257910T	0 213429602	72537149375206128	-2270	78183
7008	384765	114335560007T	0 157429656	71199147887206200	-1860	77837
4248	384789	114235458051T	0 285429740	72647149242206236	-2380	78105
4247	384818	114228558940T	0 364429797	72745148667206278	-2160	78094
4246	384933	114231658570T	0 361430008	72694148772206448	-2580	77811
1203	384960	114329060207T	0 164430019	71283147932206488	-1910	77714
4209	384990	114326560210T	0 161430075	71318147909206532	-1980	77641
4245	385093	114234558780T	0 365430303	72643148434206683	-2950	77365
4276	385121	114298957549T	0 165430329	71710149076206725	-3510	77025
7004	385133	114321259813T	0 172430342	71387148093206742	-2380	77392
8447	385297	114177799999T	04167430704	73454112103206984	14190	78827
4208	385310	114314559239T	0 185430672	71475148556207003	-2720	77265
4244	385324	114234759341T	0 428430730	72628148191207024	-3010	77178
4269	385357	114214167710T	0 938430800	72924143648207072	250	78118
4268	385366	114209670820T	01171430818	72989141734207085	1250	78291
4270	385376	114217665200T	0 816430833	72873145103207100	-660	77916
4267	385332	114206173271T	01107430849	73039140229207109	2030	78167
4271	385394	114223262251T	0 676430864	72791146896207127	-1670	77776
4272	385413	114229060469T	0 559430897	72706147969207155	-2300	77639
1202	385433	114310559081T	0 181430901	71527148751207184	-2850	77181
4273	385437	114234659259T	0 478430939	72624148645207190	-2790	77468
7003	385464	114308559058T	0 177430959	71554148749207230	-2920	77117
8448	385488	114185099999T	04401431054	73338111730207265	14280	78881
4266	385545	114244358691T	0 389431135	72478148855207349	-3280	77089
4206	385625	114305559072T	0 179431258	71590149463207467	-2430	77599
4265	385653	114255757930T	0 289431330	72308149065207508	-3940	76599
4275	385679	114295058330T	0 180431362	71738148916207547	-3750	76530
4264	385731	114256958071T	0 290431474	72286149043207623	-3950	76540
4205	385775	114313560151T	0 173431533	71466148313207688	-2780	76873
SPR081	384433	1141816 7823C	8 876429104	73445137408205712	5333	79535
SPR086	384201	1141689 6950C	31 399428681	73642143063205371	3107	79833
SPR089	384125	114210960971T	0 134428522	73037146913205259	-963	78376
LV0102	382703	1142500 6470S	0 166425876	72544144068203170	1794	79892
SPR095	383958	114225059229T	0 116428207	72841147281205013	-1988	77927
LV0124	382875	1143571 5915Y	0 97426152	70978144475203422	-3278	76645
LV0126	382875	1143153 5930Y	0 99426168	71585145388203422	-22[illegible]3	77650
SPR135	383572	1142743 8268V	872527427473	72146130106204446	34[illegible]7	77903
SPR141	383366	1142685 8268C	322030427094	72241130803204143	4488	78350
SPR148	383175	1142825 7612C	241109426736	72047135275203863	3062	78233

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
SPR164	383076	1142686	7482C	52	831426558	72254136462203717	3170	78534
SPR166	383941	1142696	6941C	5	923428158	72195141108204988	1451	78705
LV0014	384250	1143307	6215S	0	147428705	71294147040205443	91	79041
LV0018	384140	1143375	6024S	0	136428499	71200148027205281	-558	79032
SPR162	385003	1141988	8731C	422234430151		73165130751206551	6388	78885
SPR026	384564	1142073	6815C	36	825429336	73065143348205905	1587	79204
SPR029	385030	1143728	7170S	22	366430224	70643141321206664	2143	78076
SPR036	384878	1143730	7446S	6	473429850	70650139164206367	2883	77966
SPR068	383780	1142972	7102C	12	365428219	71793141462205046	3263	79417
SPR077	383787	1142920	7092C	18	374427864	71878141131204762	3122	79325
SPR091	384014	1141718	6625C	14	180428333	73610145035205096	2295	79893
SPR092	383983	1141543	7141V	33	592428284	73865141557205050	3720	79990
SPR123	383285	1141599	7354V	18	986426990	73823138865204024	4061	79983
SPR152	382965	1142167	7135C	8	460426374	73014138619203554	2222	78355
SPR163	382761	1141832	7420C	5	555426011	73512138002203255	4589	79841
SPR165	383148	1142516	6761C	8	290426698	72497141527203823	1340	78578
SPR027	385185	114321361270T		3	176430438	71383147574206819	-1579	77703
SPR042	384745	1143595	6749S	3	249429610	70852143424206171	775	78008
SPR050	384596	1143353	6162S	7	136429343	71210147157205952	-800	78326
SPR088	384167	1141996	6285S	12	165428605	73198146495205321	327	79068
SPR115	383508	1141649	6563S	3	217427400	73738144901204352	2320	80156
SPR156	382965	1141521	7663C	9	976426401	73954136826203554	5402	80251
LV0013	384230	1143054	6875S	18	273428678	71661142940205413	2235	79078
LV0096	382834	1142356	6712S	5	169426216	72744142682203435	2421	79702
LV0103	382649	1142343	7777S	10	788425782	72775134327203090	4440	78713
LV0012	384413	1143217	6825S	8	406429010	71416142945205682	1501	78637
LV0292	382808	1142760	6462S	1	176426059	72160143257203324	753	78890
SPR001	385094	114234558779T		0	365430305	72643148454206685	-2910	77407
SPR002	385093	1142180	6170B	0	682430310	72882147727206683	-886	78752
SPR003	385028	1142237	6000S	0	510430187	72803148151206588	-1967	78079
SPR004	384943	1142349	5835V	0	326430025	72646148866206462	-2680	77744
SPR005	384941	1142238	5974S	0	492430026	72806148176206460	-2059	78058
SPR007	384854	1142236	6030C	0	445429865	72814147893206331	-1686	78192
SPR008	384773	1142136	6259B	0	756429720	72963146685206212	-619	78790
SPR009	384512	1142201	6004S	0	283429234	72883148352205828	-969	78836
SPR010	384595	114221559878T		0	333429387	72858148165205950	-1429	78481
SPR011	384662	114223360020T		0	345429510	72828148105206049	-1455	78419
SPR012	384738	1142261	5921S	0	362429650	72784148602206161	-1833	78334
SPR013	384790	1142352	5805S	0	287429742	72649149278206237	-2326	78162
SPR014	384690	1142348	5816V	0	253429539	72661149075206075	-2263	78153

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
SPR015	384594	1142348	5831C	0	222429380	72666149031205949	-2040	78294
SPR016	384510	1142475	5819B	0	158429219	72486149421205825	-1638	78673
SPR017	384593	1142505	5800B	0	163429371	72438149592205947	-1769	78612
SPR018	384716	1142443	57910T	0	208429602	72522149399206128	-2228	78229
SPR019	384675	1142543	57920T	0	164429522	72379149394206068	-2163	78246
SPR020	384655	1142646	5793S	0	144429480	72231149111206039	-2407	77979
SPR021	384522	1142633	5809B	0	135429235	72256149399205843	-1773	78550
SPR022	384507	1142782	5803B	0	127429201	72041149476205821	-1730	78604
SPR023	384638	1142756	57900T	0	133429444	72072149041206014	-2481	77904
SPR024	384612	1142862	57841T	0	128429392	71920149110205975	-2429	77971
SPR025	384596	1142979	57900T	0	130429358	71752149032205952	-2427	77955
SPR028	385207	1143354	6197S	0	209430473	71178147111206851	-1416	77657
SPR030	385119	1143466	6359B	0	237430306	71021145955206722	-917	77632
SPR031	385129	1143219	5982Y	0	173430334	71377148076206736	-2360	77410
SPR032	385105	1143014	5762Y	0	159430298	71675149095206701	-3378	77129
SPR033	385011	1143167	5897S	0	155430118	71458148521206563	-2542	77500
SPR034	385030	1143353	6136B	0	181430146	71188147374206591	-1467	77786
SPR035	384944	1143465	6272B	0	189429983	71031146419206464	-1014	77783
SPR037	384919	1143325	6068S	0	162429942	71234147864206427	-1453	78012
SPR038	384831	1143243	5929Y	0	153429875	71355148314206371	-2256	77675
SPR039	384956	1143028	5786S	0	144430022	71662148961206482	-3066	77344
SPR040	384825	1143085	5771Y	0	141429777	71586149380206289	-2595	77863
SPR041	384839	1143495	6229B	0	195429787	70992146672206309	-1012	77938
SPR043	384766	1143357	5995Y	0	159429658	71196147898206202	-1881	77831
SPR044	384738	1143188	5820V	0	142429612	71442149417206161	-1969	78323
SPR045	384717	1143025	5762B	0	133429580	71679149238206130	-2663	77817
SPR046	384605	1143080	57930T	0	134429371	71605149190205965	-2254	78121
SPR047	384607	1143181	58199T	0	158429370	71458149237205968	-1956	78352
SPR048	384646	1143310	59160T	0	165429437	71270148595206025	-1752	78235
SPR049	384652	1143403	60531T	0	1594[illegible]7445	71135147735206034	-1330	78184
SPR051	384507	1143152	5949Y	0	166429186	71505148649205821	-1183	78693
SPR052	384456	1142982	5891S	0	136429099	71754149022205746	-1280	78763
SPR053	384373	1142868	5912S	0	141428950	71924149184205624	-798	79179
SPR054	384382	1142720	5834U	0	131428972	72138149765205637	-966	79267
SPR055	384388	1142619	5827C	0	132428988	72284149559205646	-1246	79011
SPR056	384382	1142467	5839B	0	141428983	72504149178205637	-1505	78720
SPR057	384428	1142354	5888B	0	165429072	72666148970205705	-1319	78763
SPR058	384299	1142340	5880V	0	144428834	72693148725205515	-1450	78639
SPR059	384291	1142547	5868C	0	127428811	72393149284205503	-992	79121
SPR060	384259	1142690	5959S	0	126428746	72187149154205456	-218	79584

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
SPR061	384240	1142865	6424C	0	196428704	7193514600220542 8	1036	79322
SPR062	384177	1142596	5965C	0	120428598	72328148627205335	-568	79207
SPR063	384236	1142437	5868B	0	128428714	72555148769205422	-1427	78687
SPR064	384179	1142280	5930S	0	130428615	72786147804205338	-1724	78181
SPR065	384147	1142376	5878S	0	125428552	7264814820520529:	-1765	78312
SPR066	384130	1142499	5930S	0	118428515	72471148205205266	-1251	78641
SPR067	384060	1142723	6177S	0	135428377	72150147164205163	137	79204
SPR070	384018	1142580	6028C	0	129428305	72359147555205102	-813	78756
SPR071	384035	1142416	5934B	0	115428343	72596147715205127	-1563	78313
SPR072	384060	1142252	5948B	0	118428396	72833147218205163	-1965	77866
SPR073	383941	1142353	59360T	0	116428172	72693147563204988	-1558	78312
SPR074	383923	1142459	59869T	0	121428134	72540147471204962	-1143	78558
SPR075	383904	1142568	60781T	0	148428094	72383147068204934	-662	78756
SPR076	383835	1142685	6226C	0	248428054	72214146306204906	3	79010
SPR078	383801	1142498	6103S	0	146427907	72490146699204782	-644	78686
SPR079	383827	1142350	5986B	0	112427961	72703147111204821	-1372	78324
SPR080	384437	1142193	60951T	0	220429096	72898147821205718	-533	79899
SPR082	384324	1142040	6312S	0	218428893	73126146549205552	405	79095
SPR083	384338	1142185	60889T	0	180428913	72915147688205572	-577	78835
SPR084	384234	1142151	60469T	0	155428722	72970147642205419	-865	78665
SPR085	384232	1141934	6383S	0	199428727	73285146579205416	1239	79667
SPR087	384142	1141821	6476S	0	168428566	73453146146205284	1814	79894
SPR090	384051	1141900	6290B	0	135428394	73344147014205150	1064	79746
SPR093	383997	1142010	61319T	0	123428290	73187147287205071	-71	79138
SPR094	383978	1142129	60131T	0	119428249	73016147089205043	-1361	78249
SPR096	383861	1142222	5927S	0	113428029	72887147252204871	-1836	78061
SPR097	383859	1142041	6025B	0	113428088	73148147529204912	-678	78886
SPR098	383942	1141907	61850T	0	119428192	73340147691204990	913	79937
SPR099	383879	1141816	61430T	0	122428079	73475147316204897	236	79405
SPR100	383781	1141606	60541T	0	117427907	73785148401204753	626	80094
SPR101	383814	1141713	60869T	0	119427964	73628147674204802	162	79520
SPR102	383800	1141920	6042S	0	109427929	73328147640204781	-276	79226
SPR103	383784	1142089	5955B	0	106427892	73084147393204758	-1318	78477
SPR104	383721	1142246	5967B	0	108427769	72860146786204665	-1720	78037
SPR105	383662	1142095	5980B	0	100427666	73082146634204578	-1662	78042
SPR106	383668	1141924	5991B	0	100427685	73330147105204587	-1097	78569
SPR107	383694	1141751	6138S	0	102427740	73579147097204625	241	79408
SPR108	383580	1141670	6231S	0	110427533	73703147100204458	1287	80145
SPR109	383585	1141840	6023B	0	105427535	73456147036204465	-743	78819
SPR110	383549	1142015	6046B	0	96427461	73204146171204412	-1339	78136

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
SPR111	383541	1142221	6009S	0	104427437	72905146014204400	-1832	77777
SPR112	383447	1142106	6050S	0	101427268	73077145662204262	-1659	77807
SPR113	383463	1141906	6070B	0	99427306	73367146145204286	-1012	78384
SPR114	383477	1141749	6182S	0	112427339	73594146403204306	280	79307
SPR116	383350	1141832	6149S	0	104427100	73481146079204120	-168	78964
SPR117	383336	1141981	6112S	0	99427068	73265145584204099	-991	78262
SPR118	383323	114219461010T		0	106427035	72956145417204080	-1242	78055
SPR119	383206	1142104	6202S	0	104426822	73093144930203908	-606	78345
SPR120	383241	1142006	6179B	0	101426891	73234145021203960	-783	78243
SPR121	383260	1141895	6179S	0	101426931	73394145389203988	-443	78583
SPR122	383286	1141736	6311B	0	123426986	73623145574204026	947	79545
SPR124	383199	1141808	6232S	0	108426822	73524145879203898	636	79488
SPR125	383157	1141963	6231B	0	104426738	73301144891203836	-300	78552
SPR126	383166	1142242	6157B	0	117426743	72895145062203849	-839	78278
SPR127	383048	1142196	6265S	0	143426526	72968144572203676	-139	78636
SPR128	383072	114204363241T		0	113426577	73189144244203711	54	78597
SPR129	383083	1141890	6301S	0	110426604	73411144876203728	452	79071
SPR130	383068	1141792	6335S	0	116426580	73554144934203706	853	79362
SPR131	383139	1141621	6422S	0	135426719	73799145226203810	1860	80091
SPR132	383003	1141869	6375S	0	120426457	73446144506203610	897	79273
SPR133	383697	114244161128T		0	130427717	72578146216204630	-879	78401
SPR134	383675	1142570	6369C	0	200427671	72392145041204597	388	78865
SPR137	383616	114239860859T		0	125427569	72644146103204511	-1128	78240
SPR138	383629	1142262	5984B	0	108427598	72841146999204530	-1211	78487
SPR139	383539	114235760649T		0	122427428	72708146002204397	-1314	78122
SPR140	383489	1142526	6372C	0	206427328	72465144114204324	-237	78236
SPR142	383398	1142489	6291C	0	213427143	72524144594204176	-372	78384
SPR145	383304	1142464	6301C	0	172426989	72565144693204052	-55	78626
SPR146	383253	1142334	6151C	0	125426900	72756145314203977	-772	78374
SPR147	383163	1142443	6279B	0	173426729	72603144659203845	-89	78668
SPR150	383075	1142491	6443C	0	221426564	72538143500203716	426	78672
SPR151	383093	1142355	6242C	0	134426603	72734144508203742	-486	78359
SPR153	382980	114200364101T		0	127426409	73252143900203576	655	78919
SPR154	382932	1141824	6514C	0	131426327	73515143538203506	1342	79256
SPR155	382914	1141711	6483B	0	140426299	73680143828203479	1367	79395
SPR157	382894	114195665059T		0	140426251	73325144143203450	1927	79877
SPR158	382813	114207167050T		0	156426097	73162142452203331	2230	79517
SPR159	382832	1141811	66353	0	152426143	73539143128203359	2219	79740
SPR160	382813	1141674	6585C	0	146426114	73739143147203331	1794	79480
LV0004	384668	1143713	6467C	0	188429463	70685144990206058	-201	77930

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM	OBSV GRAV	THEO GRAV	FAA	CBA +1000
LV0005	384590	1143655	6308C	0	160429321	70773146033205943			-540	78105
LV0006	384503	114351160971T		0	136429165	70986147172205815			-1260	78080
LV0007	384596	1143465	6155V	0	146429339	71048147166205952			-856	78297
LV0008	384502	1143417	6050C	0	143429167	71122147545205813			-1328	78180
LV0009	384469	1143699	6173B	0	160429095	70715146548205765			-1118	77988
LV0010	384415	1143548	6032B	0	141429001	70936147800205685			-1114	78453
LV0011	384364	1143399	6037Y	0	136428912	71155147768205610			-1024	78521
LV0015	384255	1143499	5962B	0	136428707	71015148283205450			-1055	78746
LV0016	384317	1143650	6048C	0	145428816	70793147667205541			-952	78565
LV0017	384151	1143607	5955S	0	138428510	70864147943205297			-1308	78519
LV0019	384135	1143221	6475S	0	204428496	71424145580205274			1249	79369
LV0020	384063	1143495	59282	0	132428352	71030148023205168			-1353	78560
LV0021	384039	1143734	5927S	0	173428298	70685147757205132			-1593	78365
LV0022	383965	1143634	5924S	0	142428165	70833147481205024			-1788	78149
LV0023	383932	1143521	5925Y	0	126428109	70999147314204975			-1897	78020
LV0024	383971	1143376	5951B	0	131428186	71207147340205032			-1683	78150
LV0025	383961	1143213	6210S	0	146428174	71444146965205018			395	79360
LV0026	383869	1143238	6104S	0	126428003	71413146342204882			-1092	78215
LV0027	383856	1143464	5925B	0	120427970	71085146906204863			-2194	77718
LV0028	383835	1143634	5921B	0	137428017	70837146973204906			-2207	77735
LV0029	383801	1143607	5922Y	0	127427863	70881146336204782			-2712	77217
LV0030	383761	1143353	5978S	0	113427799	71251146559204724			-1902	77822
LV0032	384361	1143800	6217C	0	169428892	70574146386205606			-707	78257
LV0033	384262	1143792	6135B	0	171428709	70590146820205460			-900	78347
LV0038	384172	1143758	6033C	0	170428544	70644147325205328			-1222	78371
LV0044	383947	1143792	5949C	0	200428126	70605147989204997			-1018	78891
LV0055	383563	114375859199T		0	137427417	70673145627204433			-3089	76856
LV0056	383405	1143752	5918C	0	125427125	70689144654204201			-3848	76092
LV0066	383734	1143738	5928Y	0	148427734	70694146292204684			-2600	77329
LV0067	383562	114363559219T		0	115427420	70851144900204431			-3796	76121
LV0068	383590	114352959340T		0	107427476	71004145241204472			-3383	76485
LV0069	383614	114342159521T		0	106427524	71160145810204508			-2680	77125
LV0070	383634	114331459780T		0	112427565	71314146056204537			-2218	77504
LV0071	383537	1143051	6298S	0	142427396	71701145515204395			396	79057
LV0072	383533	1143205	6085B	0	115427383	71477145850204389			-1269	78092
LV0073	383526	114334159829T		0	103427364	71280145868204378			-2200	77497
LV0074	383448	1143607	5919S	0	108427210	70898144468204264			-4088	75832
LV0075	383418	1143433	5932S	0	103427161	71152145658204220			-2732	77139
LV0076	383414	1143270	6022Y	0	104427160	71389145939204214			-1598	77967
LV0077	383411	1143162	6124S	0	112427159	71546145710204209			-862	78363

SPRING VALLEY GRAVITY DATA

STATION IDENT.	LAT. DEG MIN	LONG. DEG MIN	ELEV. +CODE	TER-COR. IN/OUT	NORTH UTM	EAST UTM OBSV GRAV THEO GRAV	FAA	CBA +1000
LV0078	383293	1143244	5997B	0	103426937	71432145945204036	-1649	78000
LV0079	383322	114337959350T		0	102426986	71235145885204079	-2336	77523
LV0080	383337	1143637	5915Y	0	105427004	70859144090204101	-4341	75590
LV0081	383247	1143737	5819Y	0	148426833	70718144480203968	-4723	75578
LV0082	383270	1143526	5915Y	0	99426884	71024144626204002	-3707	76218
LV0083	383228	114339559229T		0	99426811	71216145361203941	-2835	77062
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LV0085	383197	1143253	5935Y	0	106426759	71424145730203895	-2307	77556
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LV0088	383056	114341859170T		0	94426492	71191144885203688	-3115	76798
LV0089	383098	1143259	5931Y	0	101426576	71420145174203750	-2755	77117
LV0090	383102	1143091	5979B	0	124426590	71664145824203755	-1660	78072
LV0091	383452	1142928	6427C	0	151427244	71883144790204270	1011	79242
LV0092	383329	1142927	6298B	0	192427016	71891144724204089	-89	78622
LV0093	382948	1142985	6082S	0	124426309	71826145258203529	-1029	78351
LV0095	382947	1142418	6382S	0	138426330	72650144106203528	645	79016
LV0097	382825	1142448	6514S	0	147426103	72613143660203349	1621	79550
LV0098	382788	1142582	6288S	0	135426029	72420145061203294	949	79637
LV0099	382829	1142789	6218B	0	130426097	72117144677203355	-155	78768
LV0100	382698	1142895	6037S	0	105425832	71970145412203148	-917	78598
LV0101	382714	1142681	6178S	0	122425889	72280145477203186	437	79487
LV0104	382637	1142621	6296S	0	137425749	72371144960203073	1144	79807
LV0105	382636	1142801	6296S	0	162425739	72109144983203071	1169	79857
LV0120	382779	114236967510T		0	201426022	72730142592203281	2852	80028
LV0121	382967	1143251	5925Y	0	102426334	71438145100203557	-2694	77200
LV0122	382965	1143428	5915U	0	95426323	71181144712203554	-3173	76748
LV0123	382970	1143694	5921Y	0	103426323	70794144749203562	-3087	76821
LV0125	382872	1143426	5917U	0	94426152	71189144494203418	-3235	76678
LV0127	382813	1143297	5926Y	0	96426047	71379144615203331	-2943	76941
LV0128	382782	1143425	5915U	0	94425985	71194144517203286	-3099	76821
LV0129	382727	1143677	5919Y	0	114425874	70831145236203205	-2261	77665
LV0130	382695	1143423	5925U	0	93425824	71202144453203158	-2941	76944
LV0131	382784	1143012	5976Y	0	102426005	71795145624203289	-1420	78299
LV0132	382698	1143117	5955Y	0	95425823	71647144902203148	-2199	77585
LV0135	382608	1143422	5929U	0	92425663	71207144539203030	-2690	77180
LV0136	382618	1143631	5921Y	0	109425674	70903145414203045	-1905	78010
LV0160	382849	1143766	5937Y	0	120426096	70695145896203384	-1611	78259
SPR136	383596	1142536	6283B	0	188427526	72445145002204481	-345	78414
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SPRING VALLEY GRAVITY DATA

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STATION  LAT.    LONG. ELEV. TER-COR. NORTH EAST   OBSV   THEO   FAA    CBA
IDENT. DEG MIN DEG MIN +CODE  IN/OUT   UTM   UTM   GRAV   GRAV          +1000
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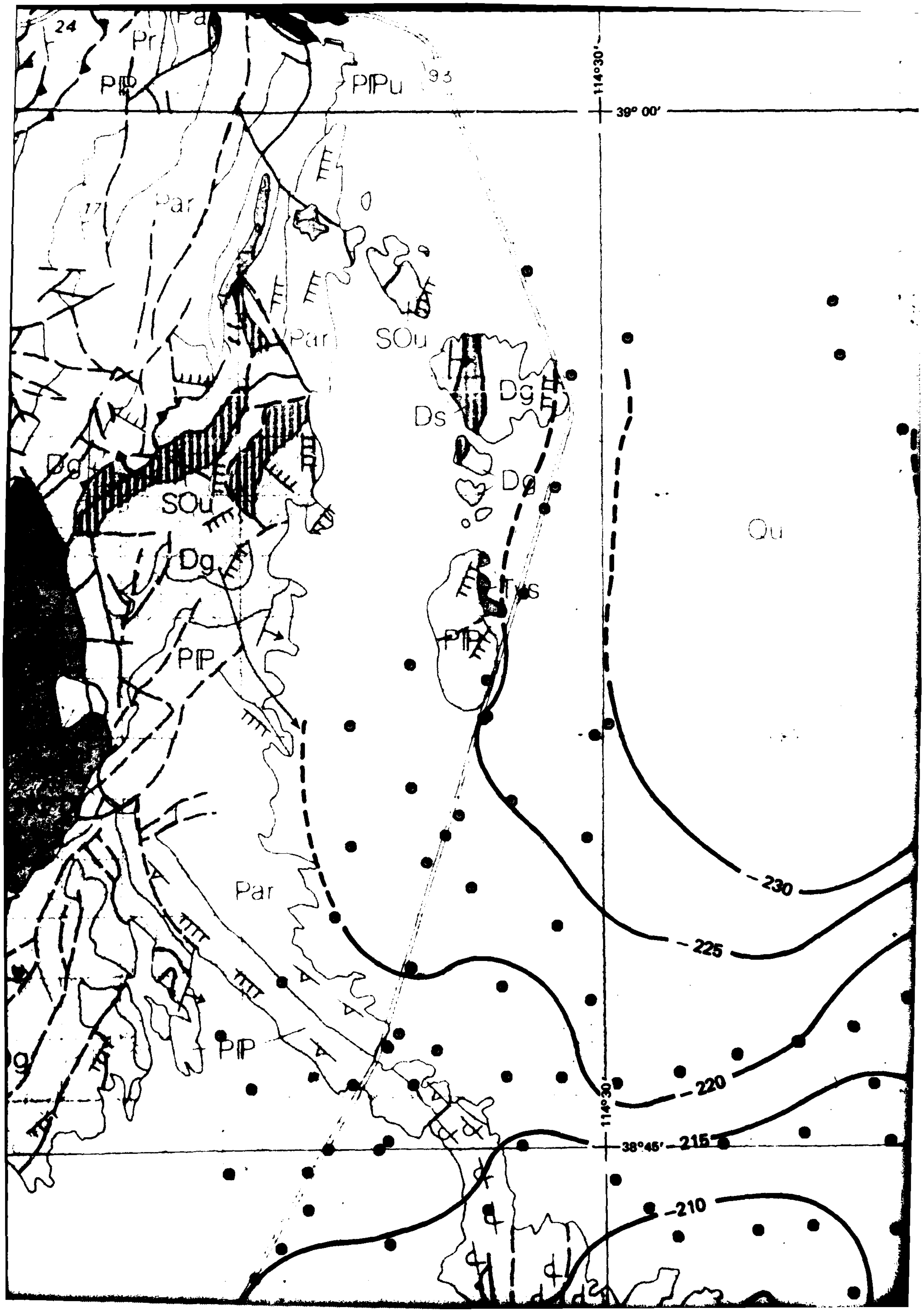
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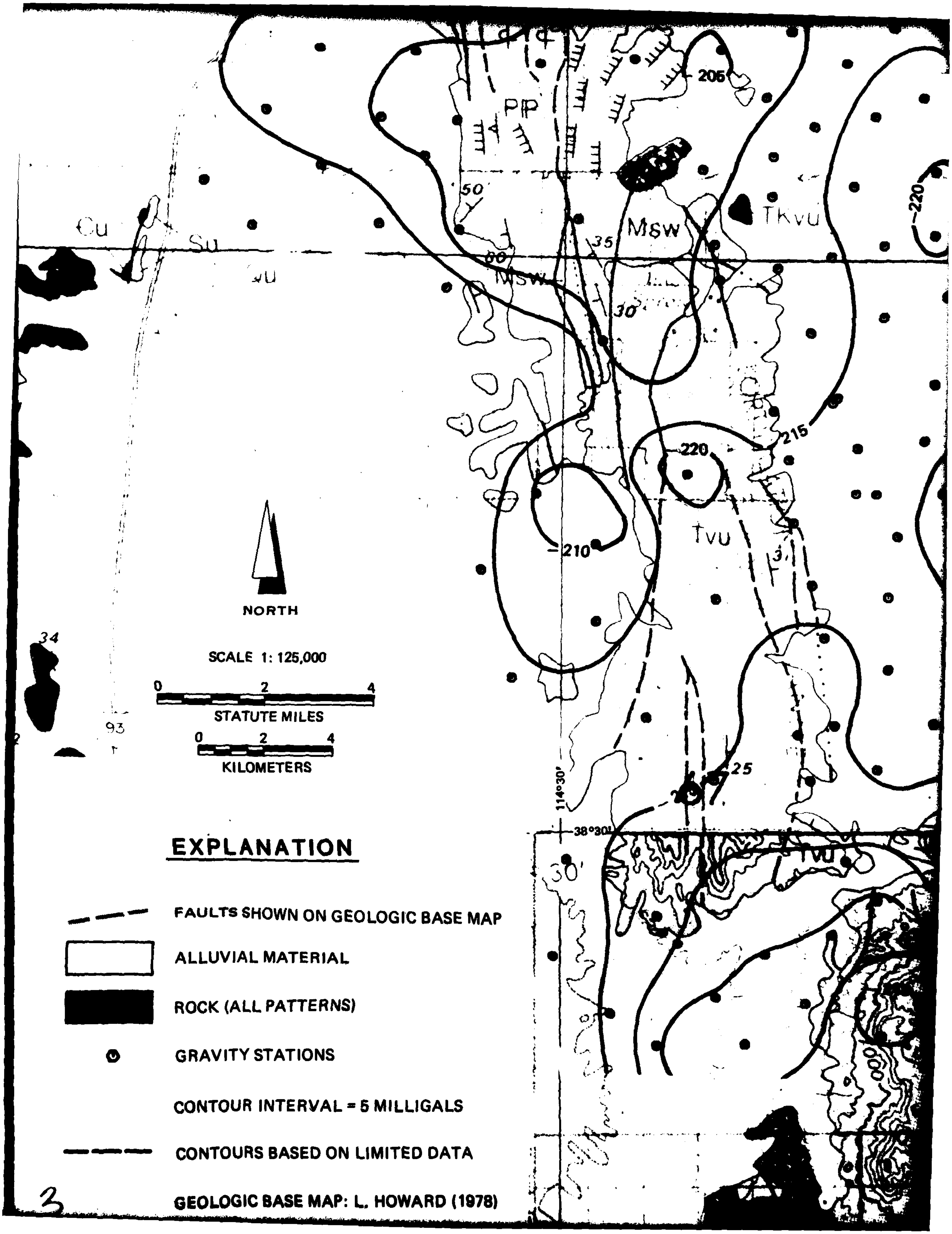
Pr
PIP
PIPu
Par
SOu
Dg
Ds
Tvs
Qu
230
225
220
215
210
38°45'


114°30'
39° 00'
114°15'
Dg
Dg
Tys
230
225
220
215
210
38°45'
114°30'
Op
SOu
Ds
Dg
Pp
To
15
SOu
Ou
MDu
Dg
114°15'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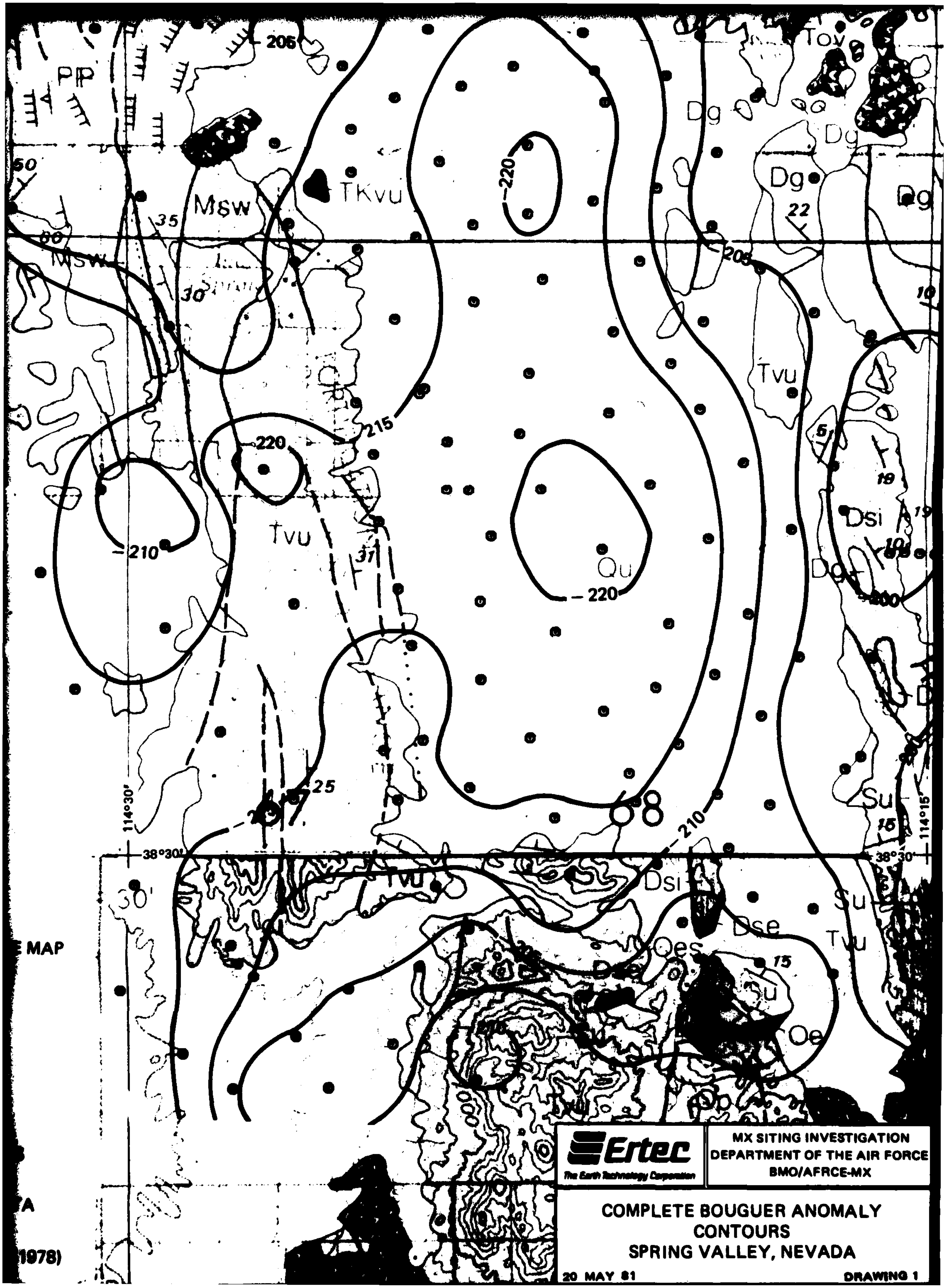
0 2 4
STATUTE MILES
0 2 4
KILOMETERS
EXPLANATION
FAULTS SHOWN ON GEOLOGIC BASE MAP
ALLUVIAL MATERIAL
ROCK (ALL PATTERNS)
GRAVITY STATIONS
CONTOUR INTERVAL = 5 MILLIGALS
CONTOURS BASED ON LIMITED DATA
GEOLOGIC BASE MAP: L. HOWARD (1978)
205
220
215
220
210
PP
Msw
Tkvu
Tvu
Msw
114°30'
38°30'
30'
3



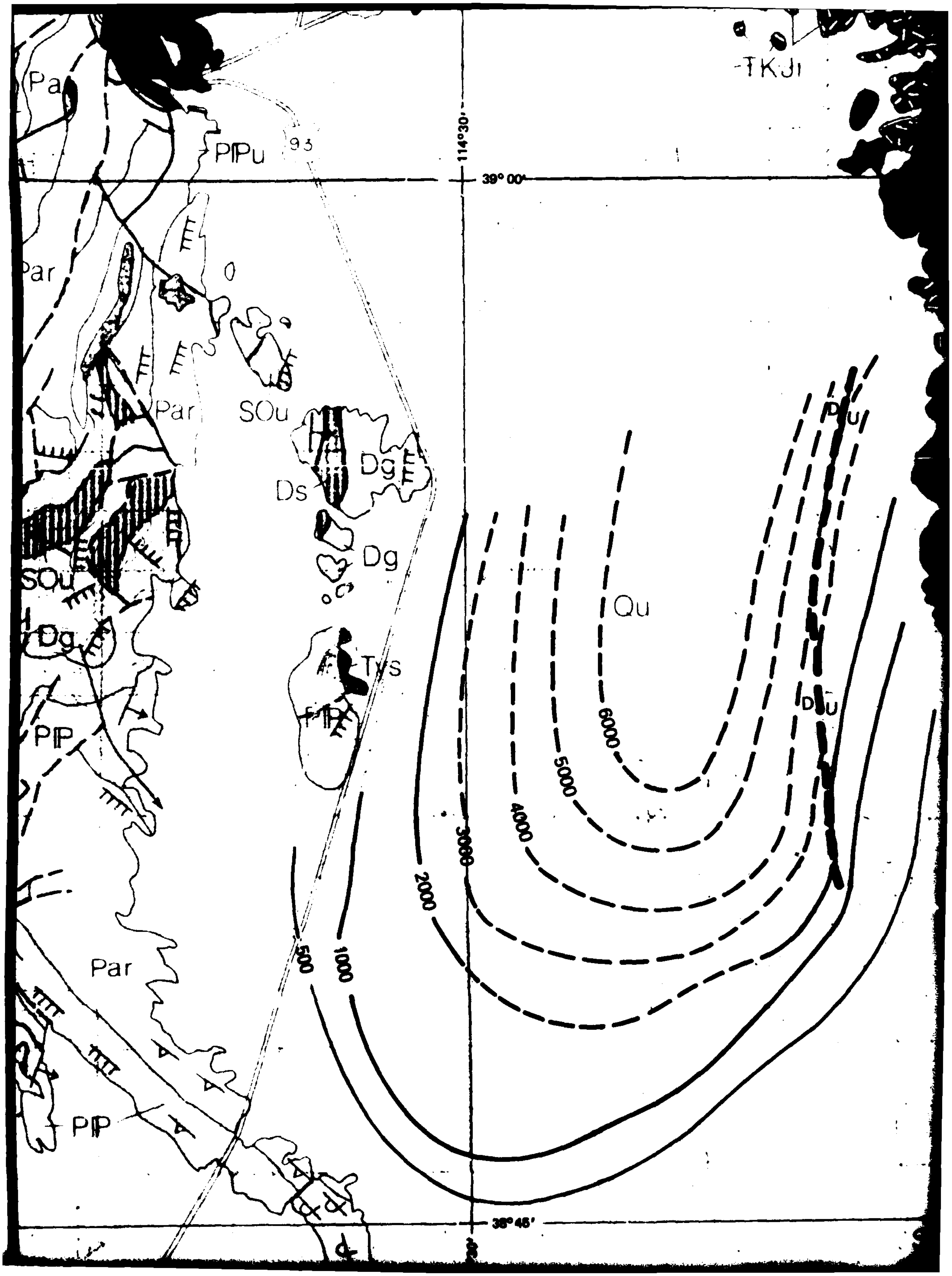
Ertec
The Earth Technology Corporation

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE
BMO/AFRCE-MX

COMPLETE BOUGUER ANOMALY
CONTOURS
SPRING VALLEY, NEVADA

20 MAY 81

DRAWING 1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Pa
PIPu
93
114°30'
39° 00'
Par
Par
SOu
Dg
Ds
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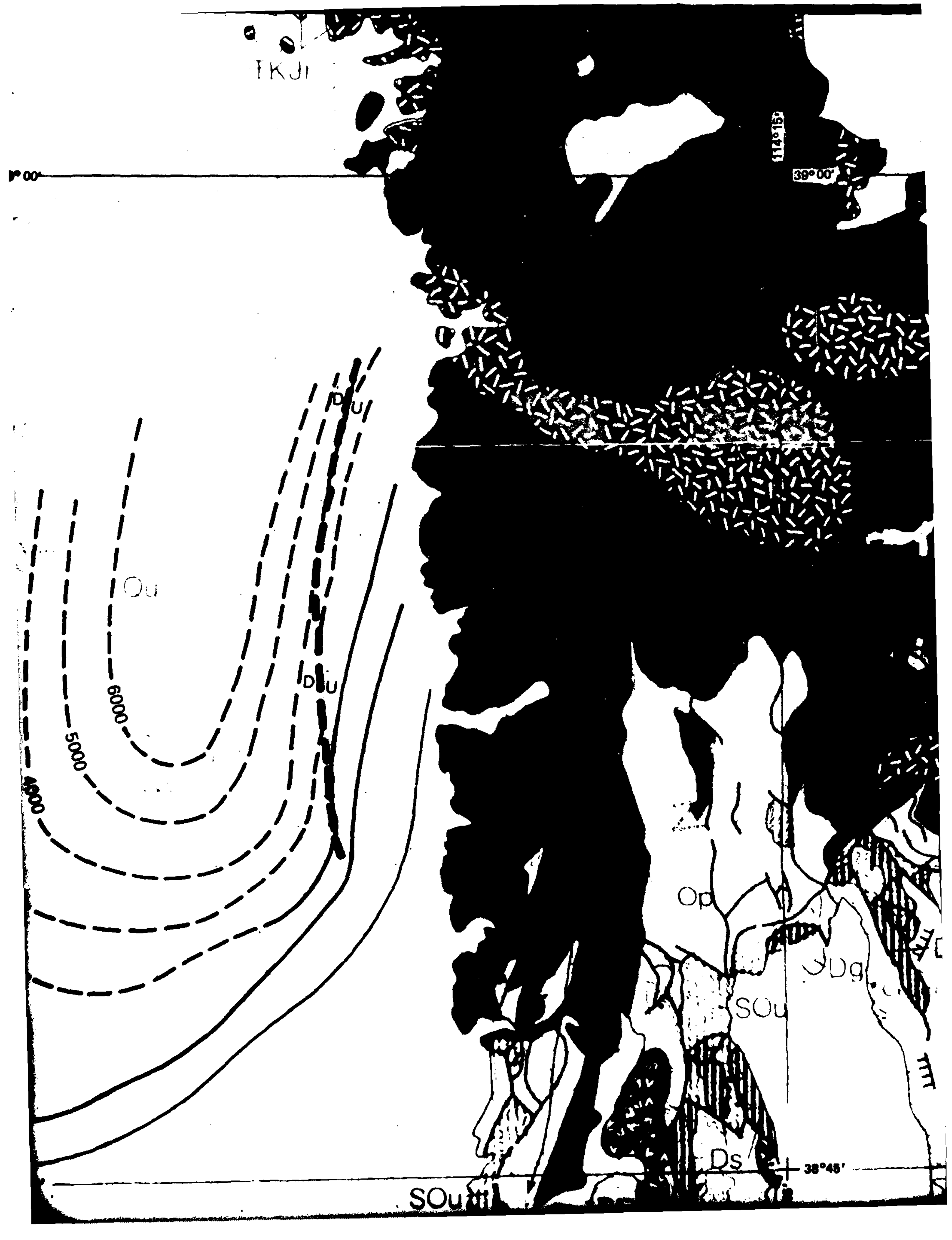
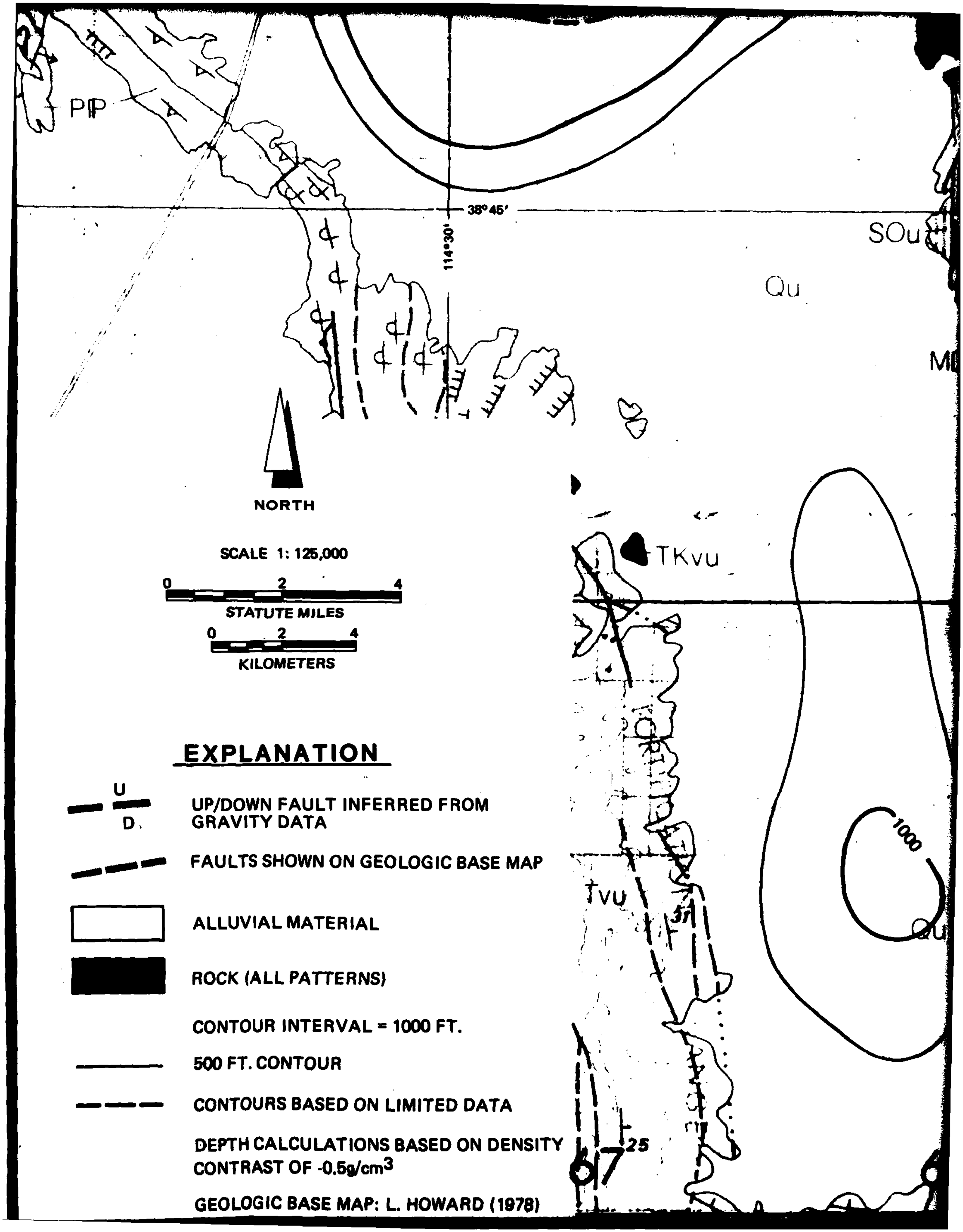
500
Par
PIP
38°45'



TKJi
114°15'
39°00'
D U
D U
Qu
6000
5000
4000
Op
SOu
SOg
Ds
38°45'
SOu


PIP
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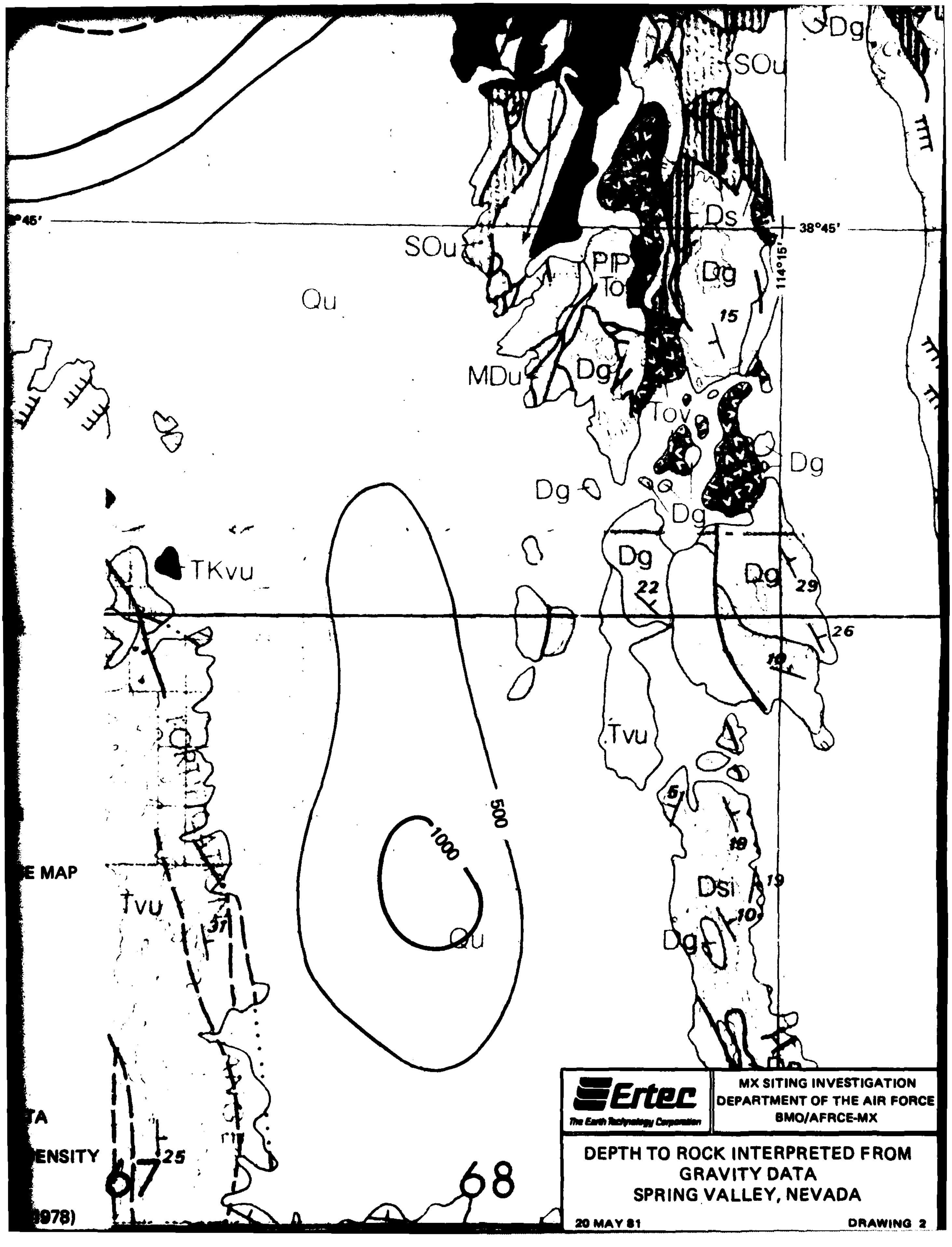
SOu
Qu
NORTH
SCALE 1: 125,000
0 2 4
STATUTE MILES
0 2 4
KILOMETERS
TKvu
EXPLANATION
U
D
UP/DOWN FAULT INFERRED FROM GRAVITY DATA
FAULTS SHOWN ON GEOLOGIC BASE MAP
ALLUVIAL MATERIAL
ROCK (ALL PATTERNS)
CONTOUR INTERVAL = 1000 FT.
500 FT. CONTOUR
CONTOURS BASED ON LIMITED DATA
DEPTH CALCULATIONS BASED ON DENSITY CONTRAST OF -0.5g/cm3
GEOLOGIC BASE MAP: L. HOWARD (1978)
1000
Tvu
25



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DEPTH TO ROCK INTERPRETED FROM GRAVITY DATA SPRING VALLEY, NEVADA

20 MAY 81 DRAWING 2