

UNITED STATES DEPARTMENT OF THE INTERIOR

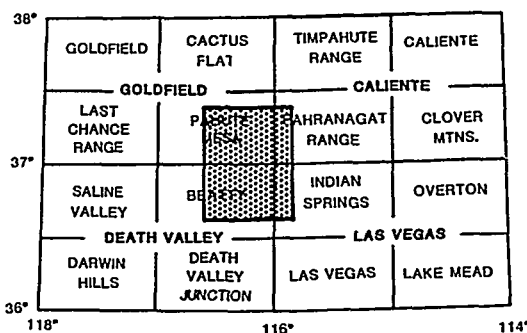
GEOLOGICAL SURVEY

**COMPLETE BOUGUER GRAVITY MAP OF THE
NEVADA TEST SITE AND VICINITY, NEVADA**

By

D. L. Healey, R. N. Harris D. A. Ponce and H. W. Oliver

1987



INDEX MAP SHOWING AREA OF STUDY

Open-File Report 87-506

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Nevada Operations Office
U.S. Department of Energy
(Interagency Agreement DE-AI08-78ET44802)*

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Geological Survey.

Menlo Park, California
1987

MASTER

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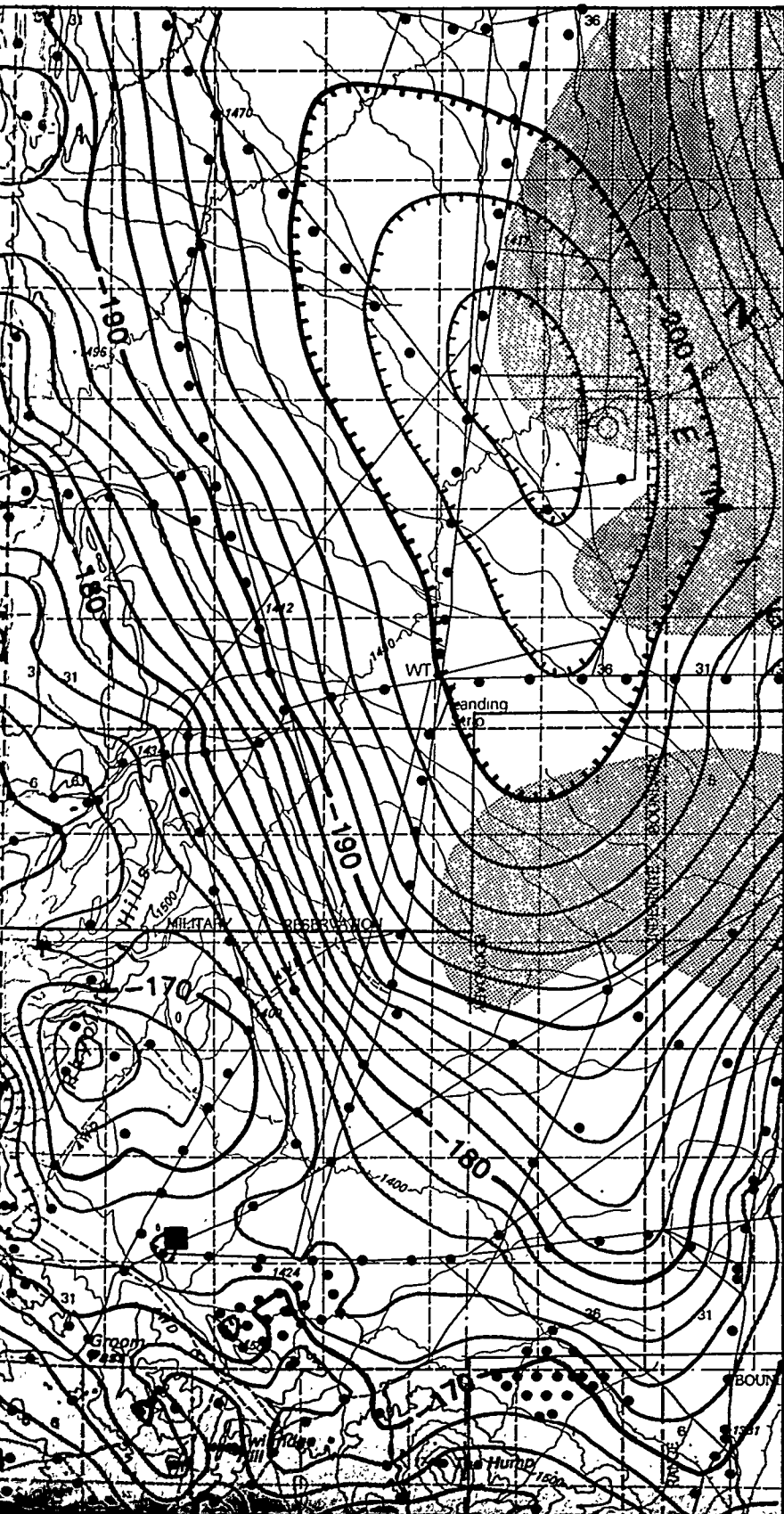
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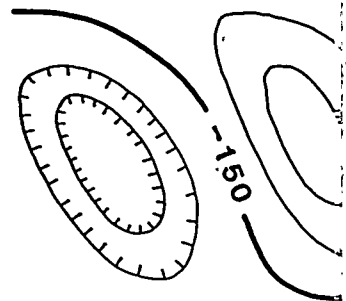
116° 00'

115° 52'30"

37° 22'30"



EXPLANATION



GRAVITY ANOMALY CO
 Contour interval 2 and 10 mGal. Hachur
 Contours were computer generated based on
 interpolated from scattered gravity data. Altho
 edited, caution should be exercised where
 controlled by only a single data point.

●
 GRAVITY STATION

■
 GRAVITY BASE STATION

▲
 HIGH PRECISION GRAVITY STATION

★
 ABSOLUTE GRAVITY STATION



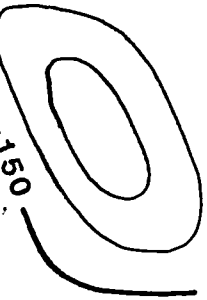
PRELIMINARY AREA OF A POTENTIAL
 WASTE REPOSITORY AT YUCC
 (U.S. Department of Energy, 1973)

15'

USGS-OFR--87-506

TI89 007464

NATION



ANOMALY CONTOURS

1. Hachures indicate gravity low.
 2. Contours based on a 250-meter grid inter-
 vals. Although the data have been
 smoothed when interpreting anomalies
 at a grid point.

GRAVITY STATION

GRAVITY STATION

GRAVITY STATION

GRAVITY STATION

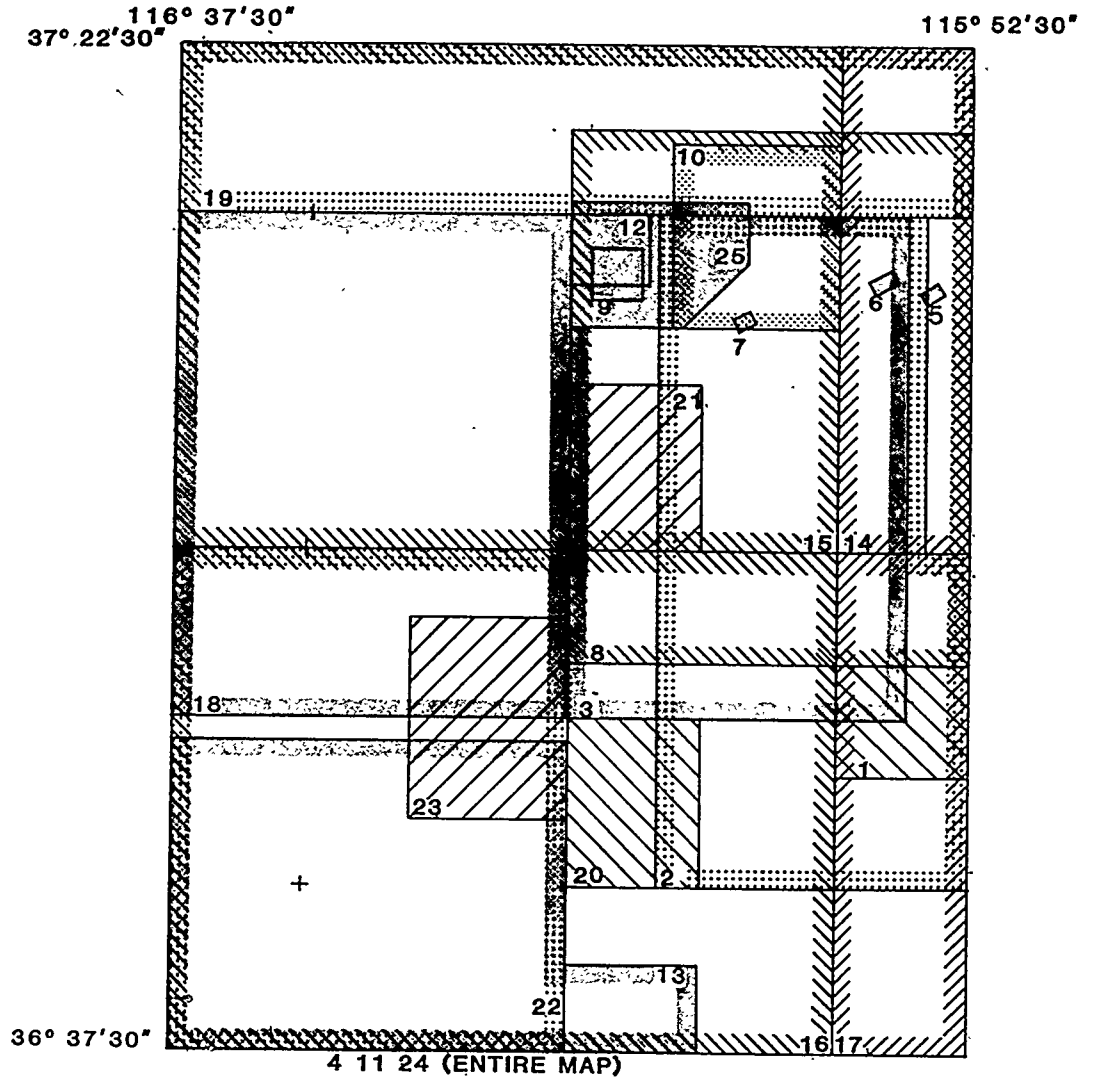


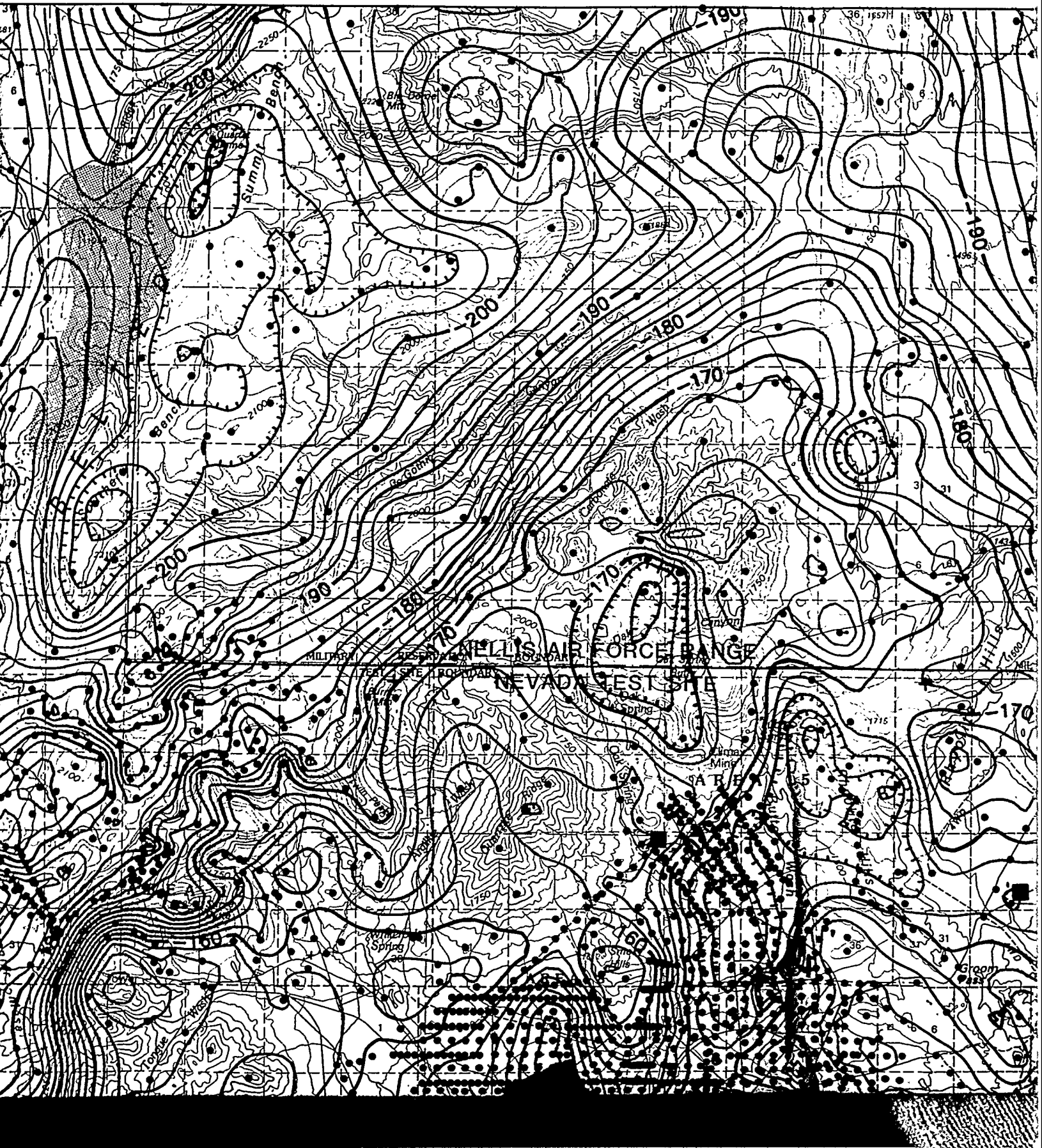
FIGURE 1.-Index of NTS gravity maps (see table 1).

A POTENTIAL HIGH-LEVEL
 AT YUCCA MOUNTAIN
 (Energy, 1984, p. 3-18)

TABLE 1.-List of NTS gravity maps for figure 1

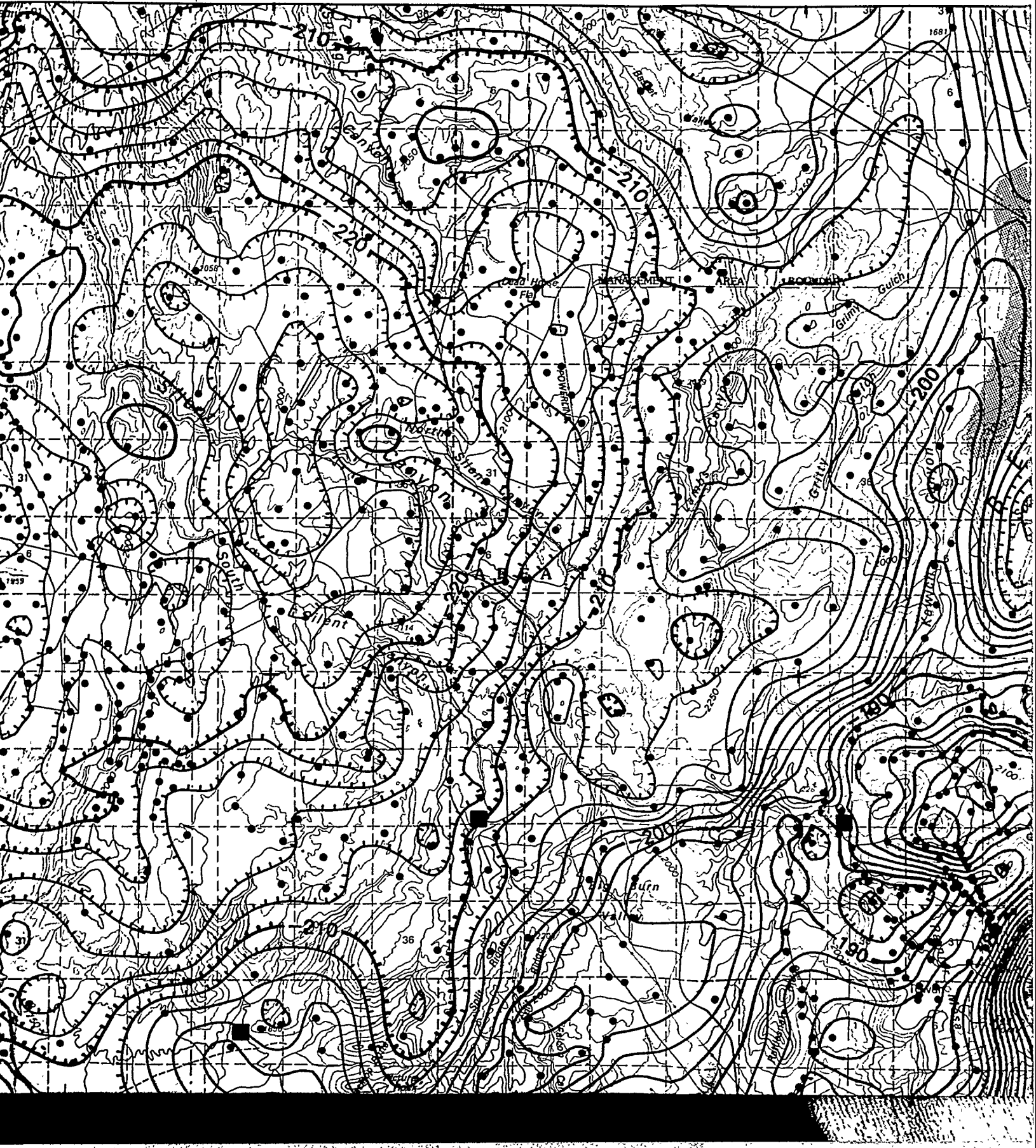
7'30"

116° 00'



22'30"

15'



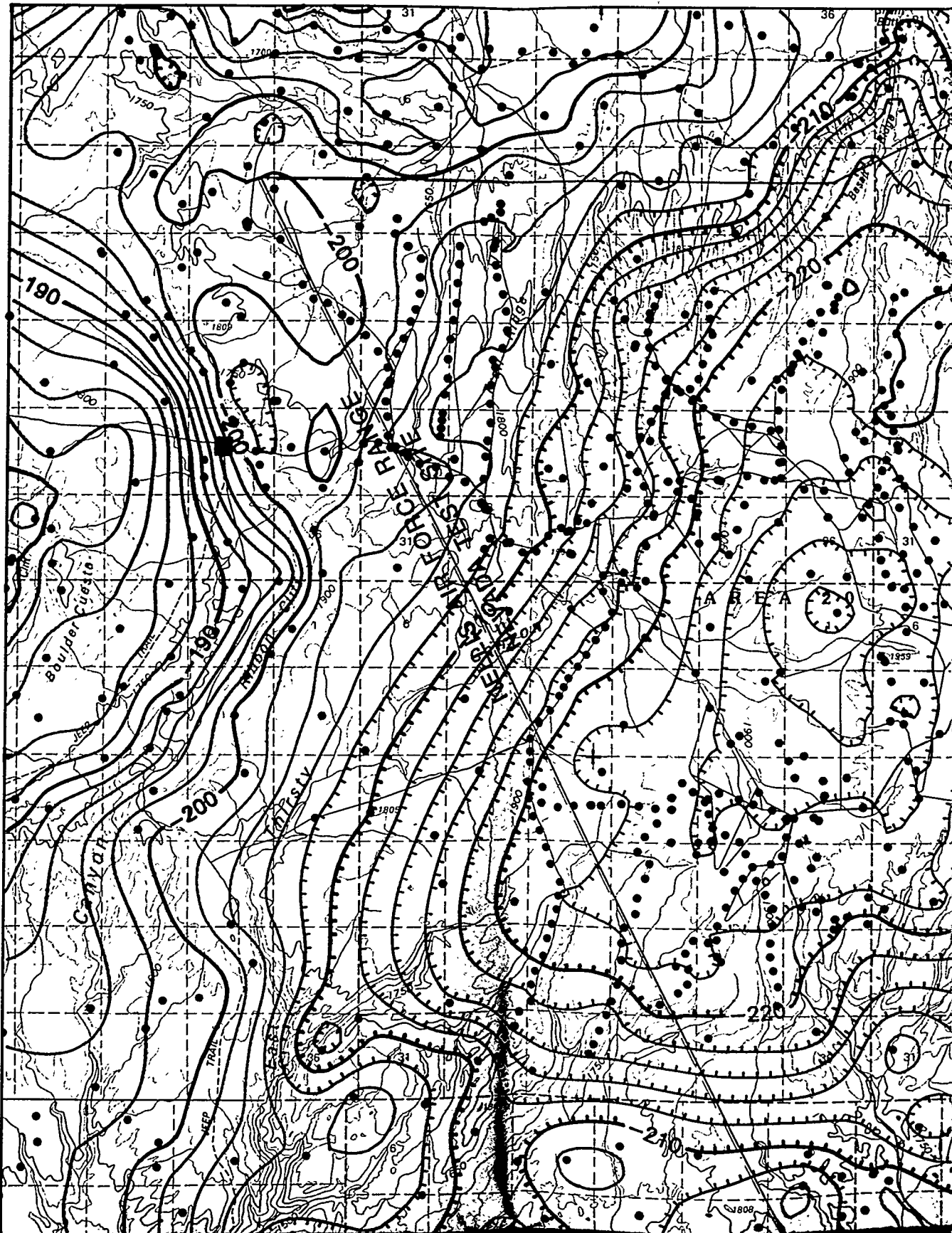
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DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

116° 37' 30"
37° 22' 30"

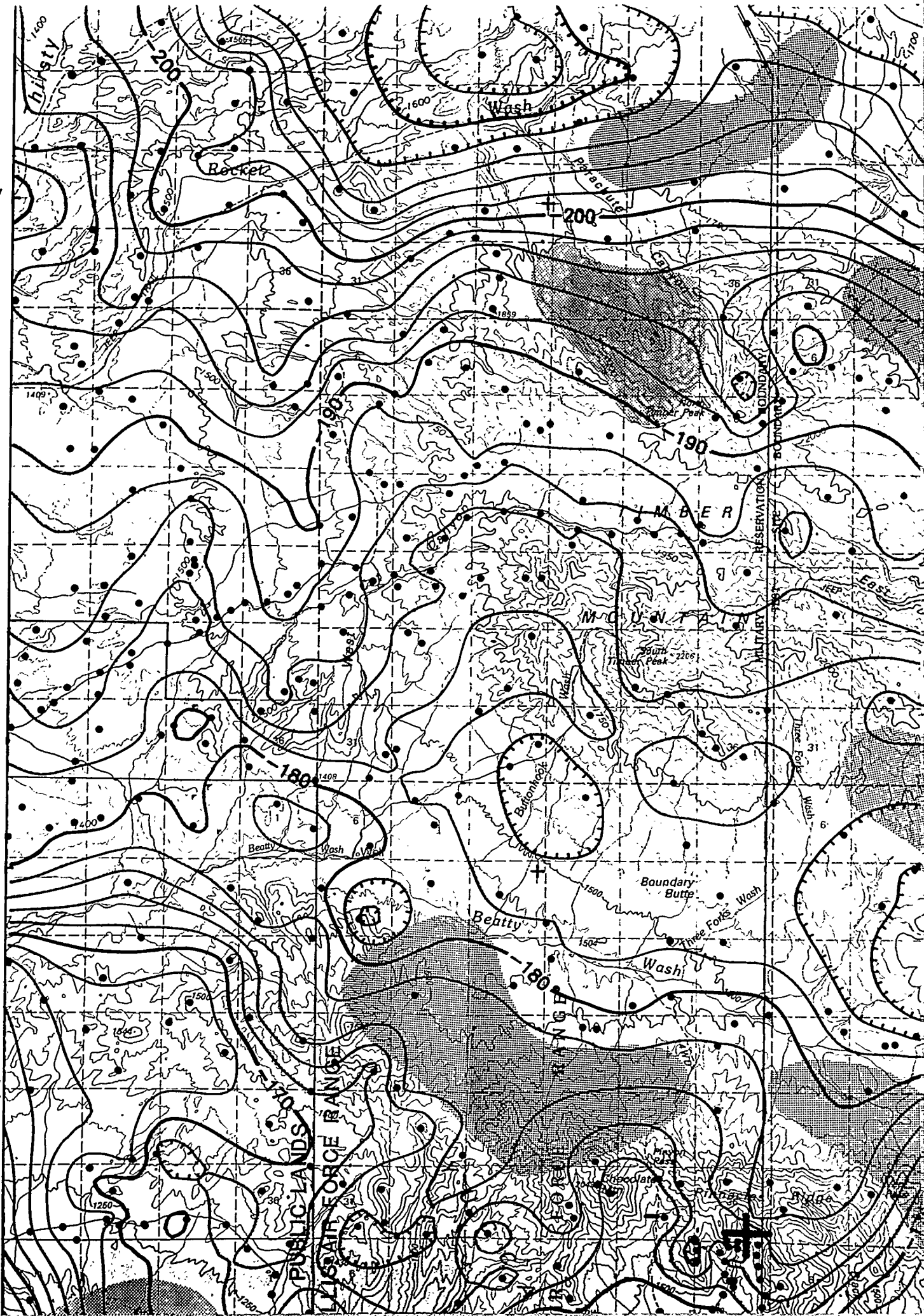
30'

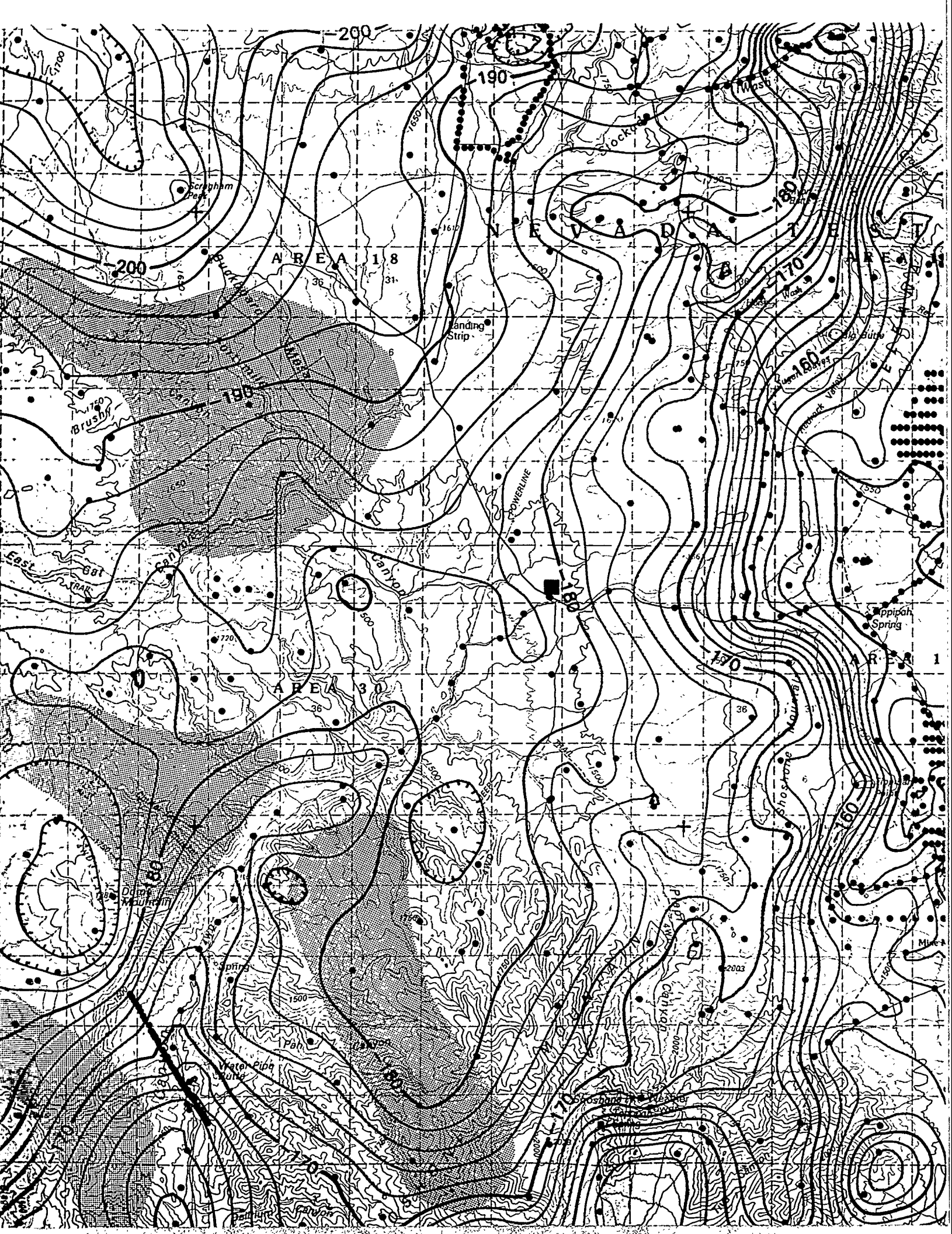
15'



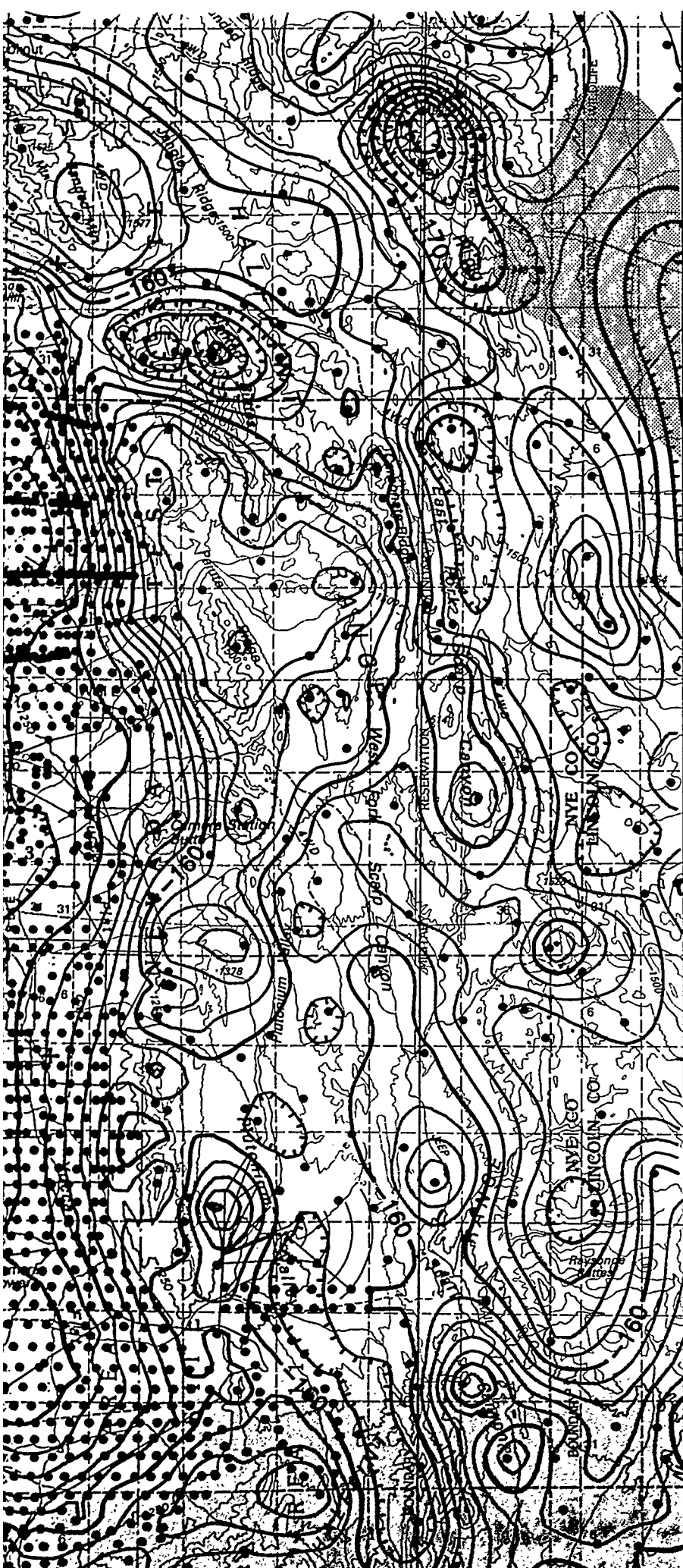
7'30"

37° 00'









7' 30"

37° 00'

AREAS OF POOR GRAVITY STATIONS
 Areas where the station density is generally 2 by 2 km and 2 stations per 3 by 3 km additional control may be needed in areas that are geologically complex.

DISCUSSION

This map is based on about 15,000 Bouguer anomaly stations collected between 1956 and 1986 in conjunction with the Nevada Test Site (NTS). Principal facts described by Harris and others (1989) and descriptions of gravity base stations, the complete Bouguer anomaly values, and the methods used and their calibration factors are referenced to the International Gravity Datum 1971 gravity datum described by Morell. Gravity anomalies were calculated by using the Geodetic Reference System 1967 formula on the ellipsoid (International Association of Geodesy, 1960) and Swick's formula (1942, p. 60) for Bouguer, curvature, and terrain correction. A density of 2.67 g/cm³ were added to determine complete Bouguer anomalies. Corrections were made to a radial distance of 166.7 km from the station elevation model and a computer program was used to include manually estimated inner-zone corrections where available.

Gravity studies at the NTS were undertaken in geologically favorable areas for underground storage geologically characterize potential high-level waste sites. Figure 1 is an index of NTS gravity maps for these maps are listed in table 1. Table 1 is a summary of interpretive gravity reports at the NTS obtained during the 1960's in Yucca and Frenchman Flats to define the depth and configuration of the Yucca Canyon caldera, approximately outlined in the northwest corner of the NTS was Frenchman Mesa in the late 1960's based on gravity studies. Detailed gravity data near Syncline Ridge, Frenchman Flats, and Yucca Mountain in the southwest quadrant were collected to help assess these areas as potential high-level waste storage sites (Ponce and Hanna, 1981; Ponce, 1981; Snyder and Carr, 1984).

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GRAVITY STATION CONTROL

Gravity is generally less than 1 station per 3 by 3 km. Although not shaded, shaded in areas that are geophysically

DISCUSSION

About 15,000 gravity stations collected in conjunction with geologic studies at the Nevada Test Site. The principal facts of the gravity data are discussed (1989) and includes detailed descriptions, the methods used to compute anomalies, and a discussion of gravity measurement factors. Observed gravity values were reduced to the International Gravity Standardization Net 1967 by Morelli (1974). Free-air gravity anomalies were computed by using the theoretical gravity based on the 1967 formula for the normal gravity of the International Association of Geodesy, 1971, p. 2, p. 60) for the free-air correction. Terrain corrections for a standard reduction were added to the free air anomaly to remove anomalies. Terrain corrections were computed at 6.7 km from each station using a digital computer procedure by Plouff (1977) and inner-zone terrain corrections where

Studies were undertaken to help locate geologic and underground nuclear tests and to help identify potential high-level nuclear waste storage areas. Gravity maps and the references are given in Table 1. Table 2 is a geographical summary of the NTS. Detailed data were collected at Yucca and Frenchman Flats to help define the basement. The Silent Valley anomaly outlined by the -210 mGal contour at the NTS was discovered under Pahute Mesa in gravity studies (Healey, 1968). Deeline Ridge, Calico Hills, Wahmonie, and the southwest quadrant of the NTS were identified as potential high-level nuclear waste storage areas (Healey and Hanna, 1982; Snyder and Oliver, 1982; Snyder and Carr, 1982)

1. Carr and others, 1975	14. Healey and others, 1981a
2. Diment and others, 1960	15. Healey and others, 1981b
3. Healey, 1966	16. Healey and others, 1980
4. Healey, 1968	17. Kane and others, 1979; Reidy and others, 1979
5. Healey, 1969	18. Kane and others, 1981
6. Healey, 1970a	19. Miller and others, 1974
7. Healey, 1970b	20. Ponce, 1981
8. Healey, 1976a	21. Ponce and Hanna, 1982
9. Healey, 1979	22. Snyder and Carr, 1982
10. Healey, 1983	23. Snyder and Oliver, 1981
11. Healey and Miller, 1962	24. U.S. Geological Survey, 1968
12. Healey and Miller, 1963	25. Wahl, 1969
13. Healey and Miller, 1971	

TABLE 2.—*Interpretative gravity reports of the Nevada Test Site and vicinity*

Geographic location	Reference
Calico Hills	Snyder and Oliver, 1981
Caliente 1° x 2° sheet	Snyder, 1983
Climax Stock	Healey, 1983
Frenchman Flat	Miller and Healey, 1986
Pahute Mesa	Healey, 1968 Evans and Oliver, 1987
Southern Nevada-Regional	Anderson and others, 1965 Diment and others, 1959
Southwestern Nevada Test Site	Snyder and Carr, 1984
Syncline Ridge	Ponce and Hanna, 1982
Timber Mountain	Healey and Miller, 1979 Kane and others, 1981
Yucca Flat	Healey, 1968; 1969
North End	Healey, 1970a; 1970b; 1976a
Yucca Mountain	Healey and others, 1984
Yucca Mountain and Vicinity	Snyder and Carr, 1982
Wahmonie	Ponce, 1981; 1984

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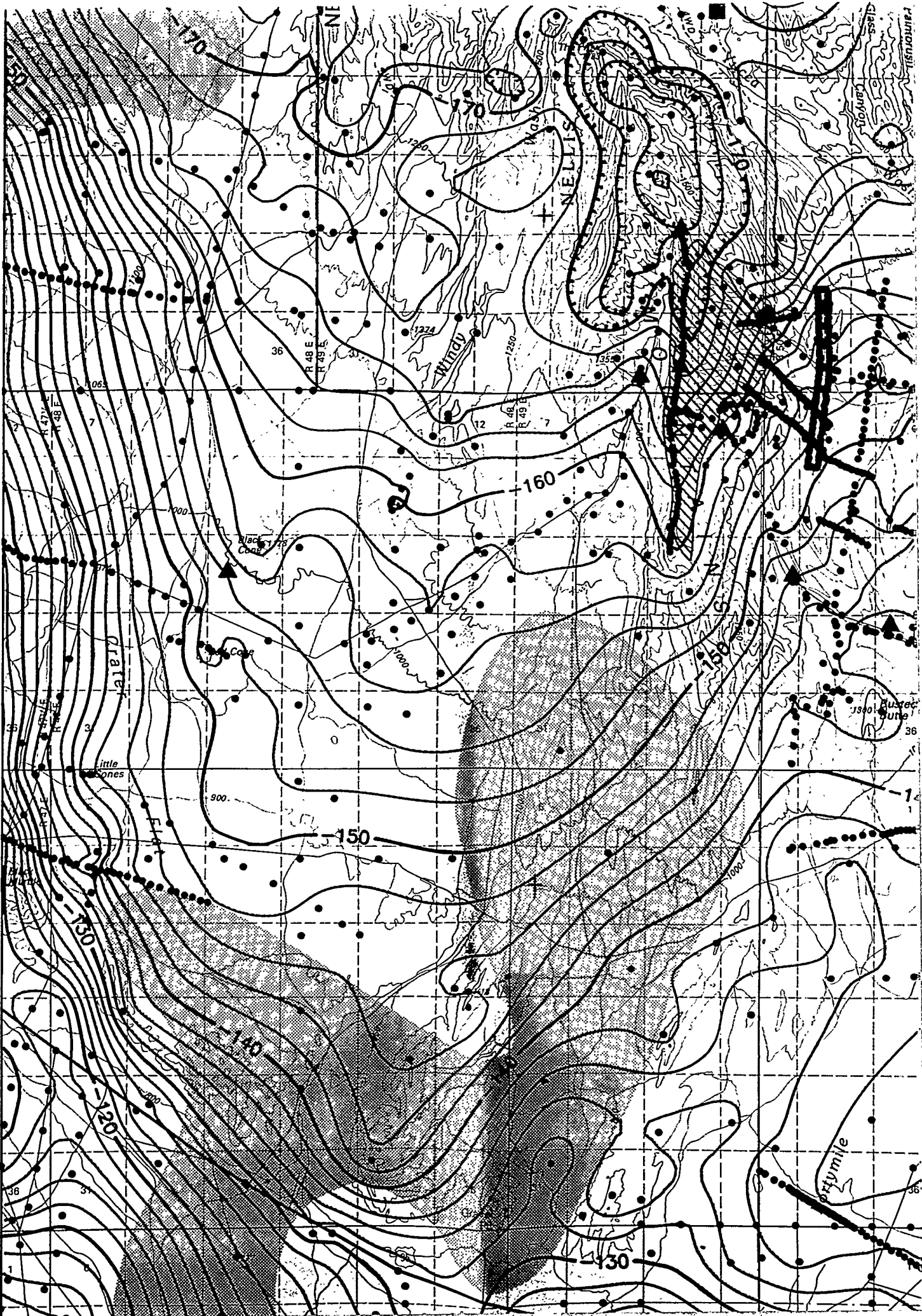
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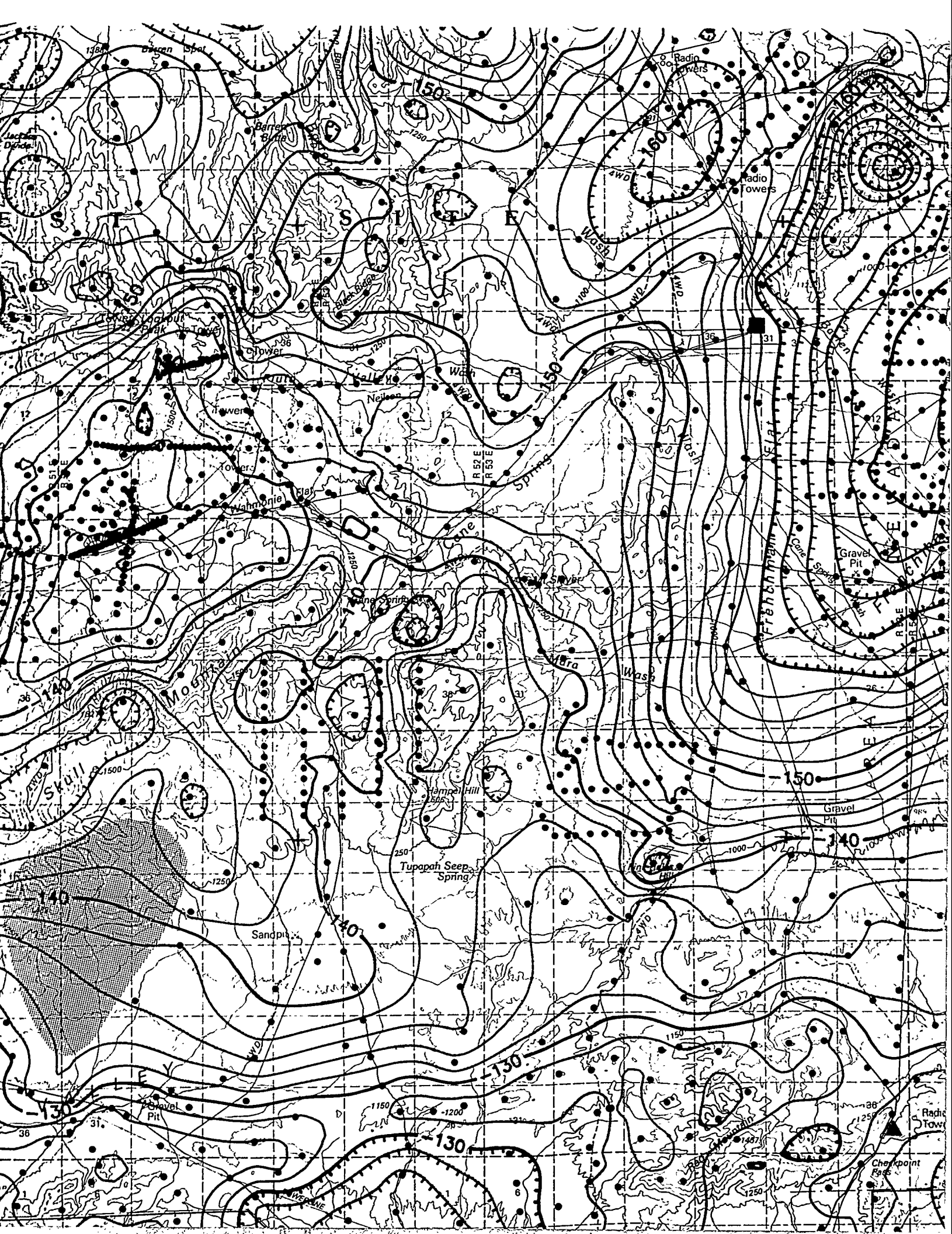
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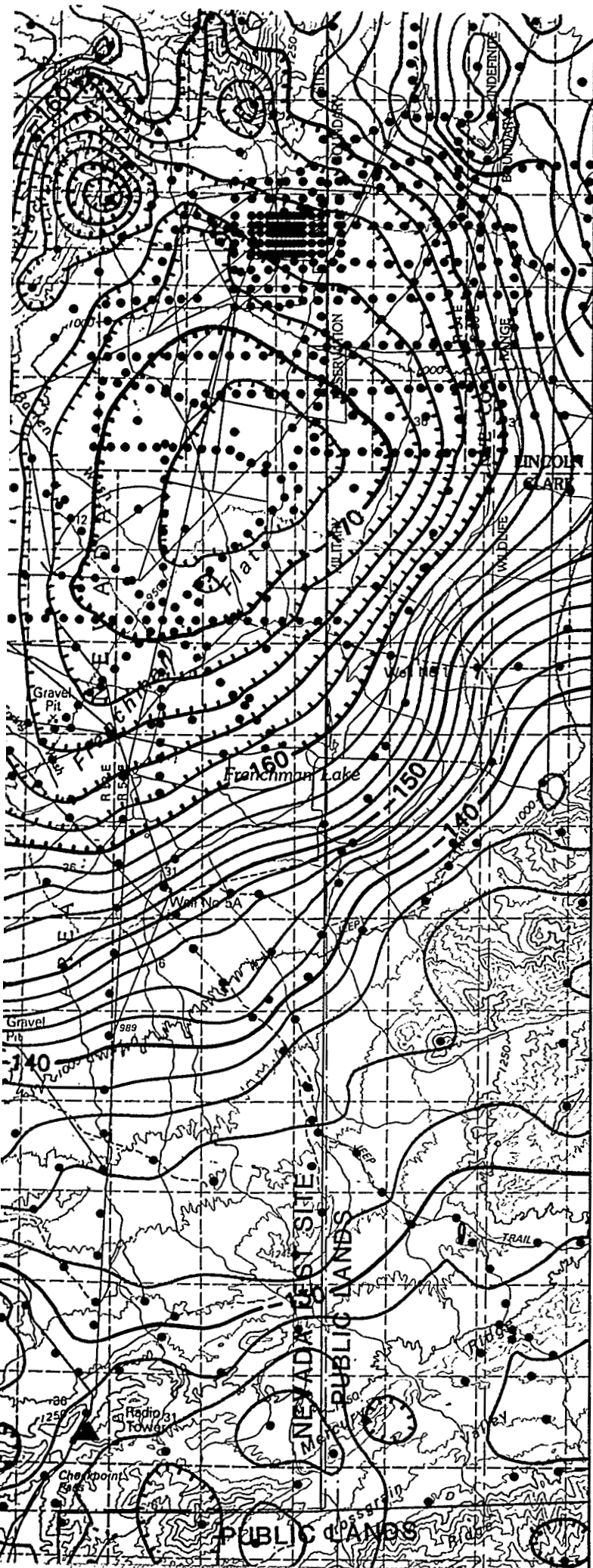
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52'30"

45'







52'30"

45'

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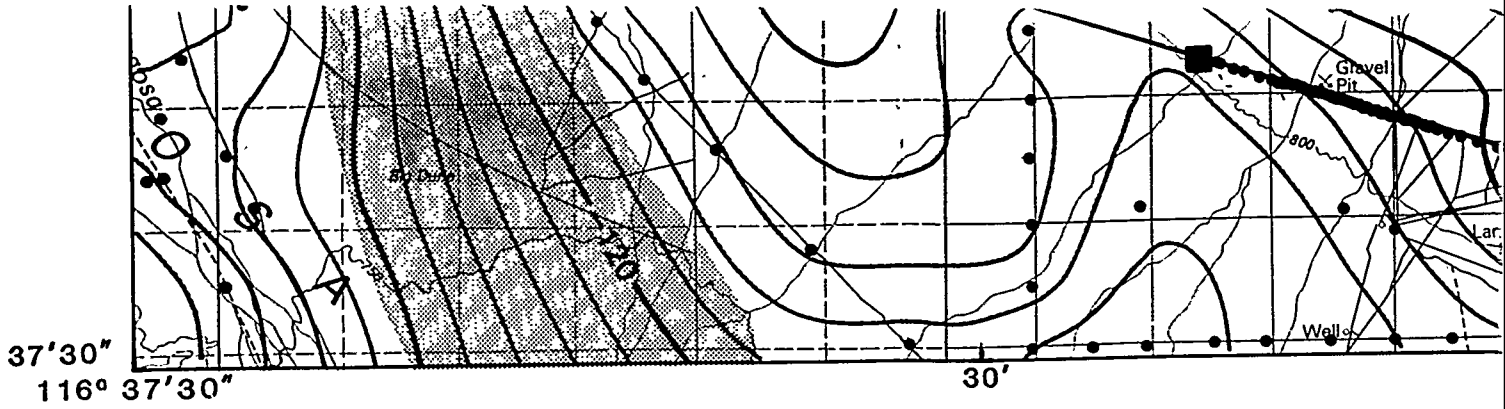
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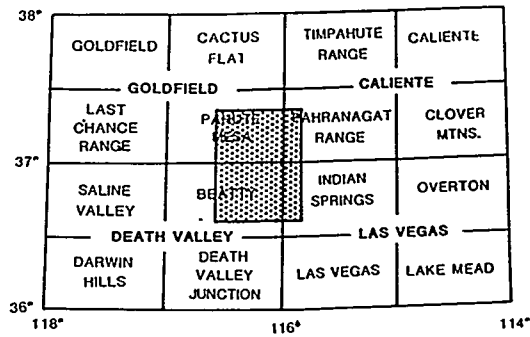
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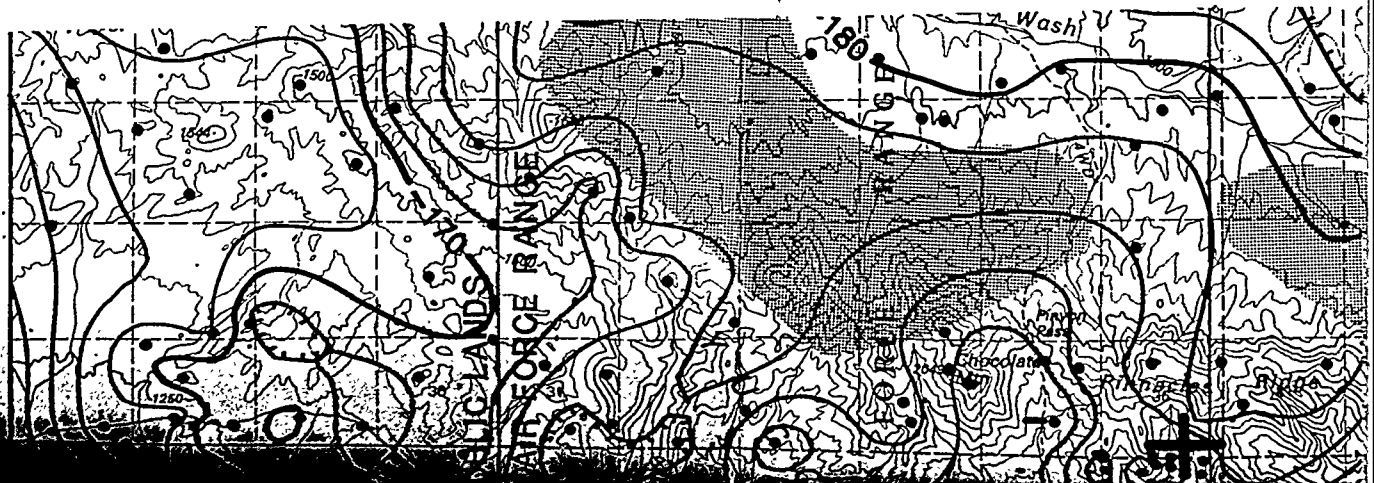
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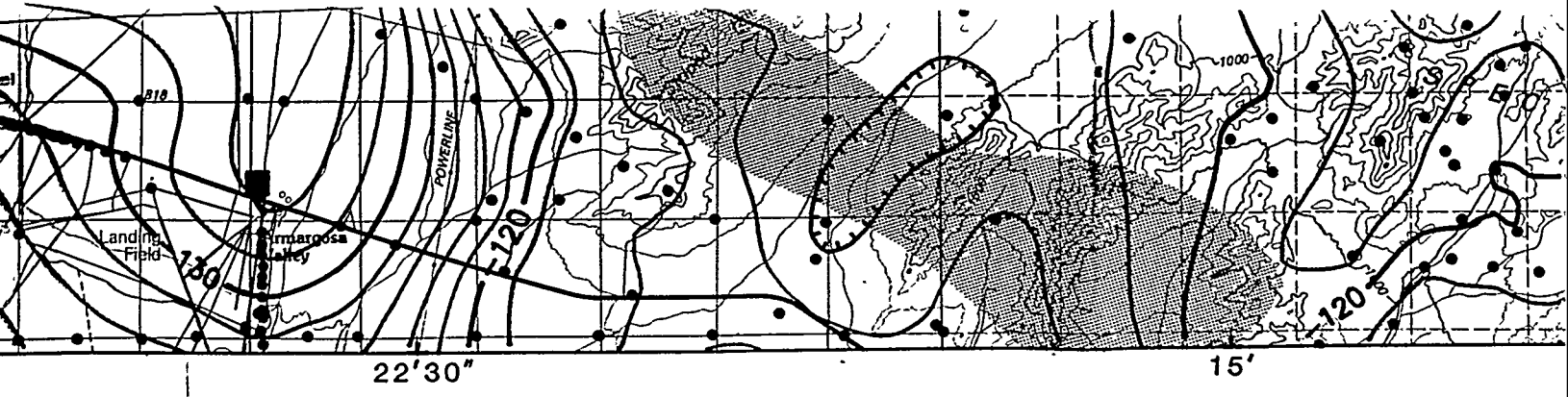


Base from U.S. Geological Survey 1:100,000
 Indian Springs, 1976; Beatty, Pahranaget
 Range, 1978; Pahute Mesa, 1979



INDEX MAP SHOWING AREA OF STUDY





22'30"

15'

SCALE 1:100 000



KILOMETERS



MILES



FEET

ELEVATION CONTOUR INTERVAL 50 METERS

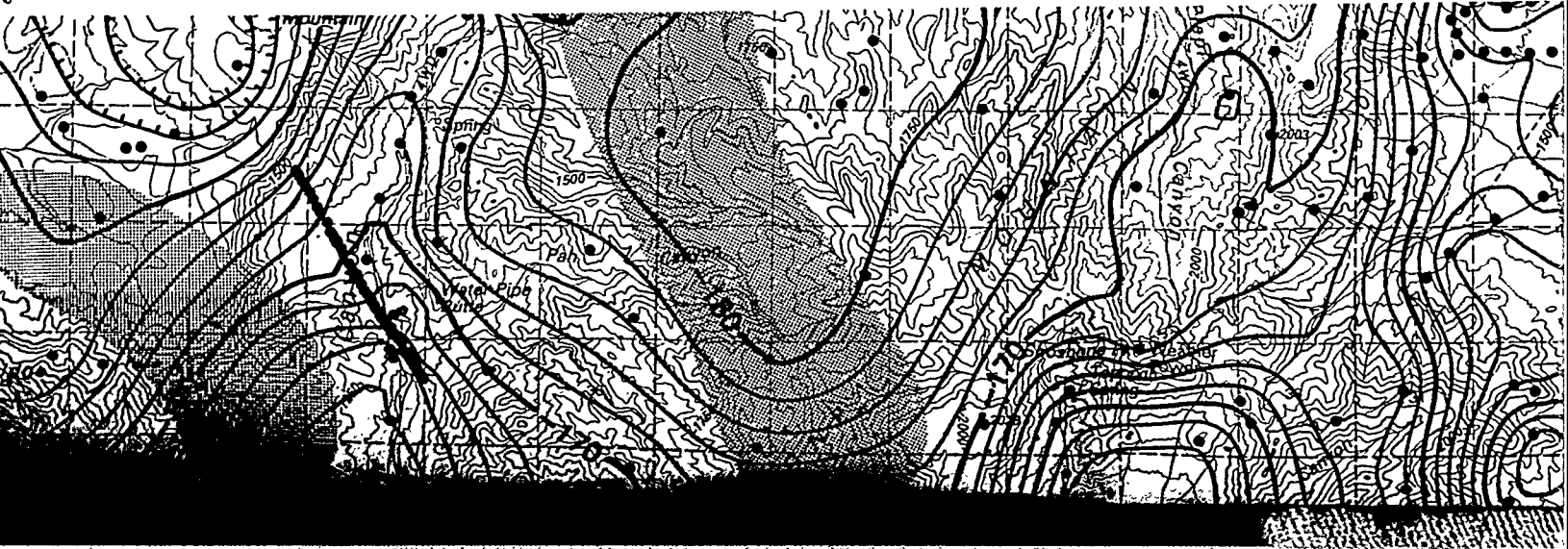
GRAVITY ANOMALY CONTOUR INTERVAL 2

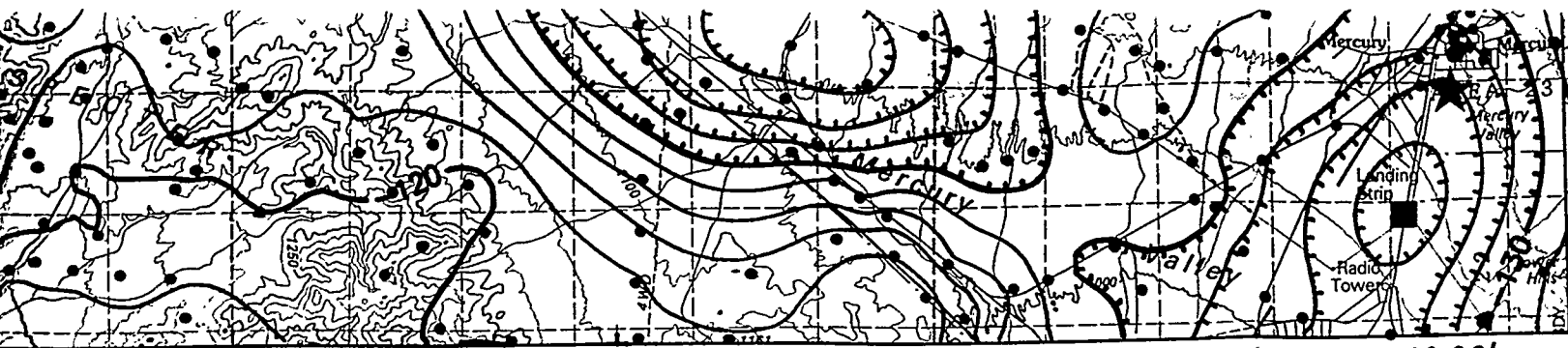
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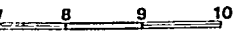
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7' 30"

116° 00'



20000 25000

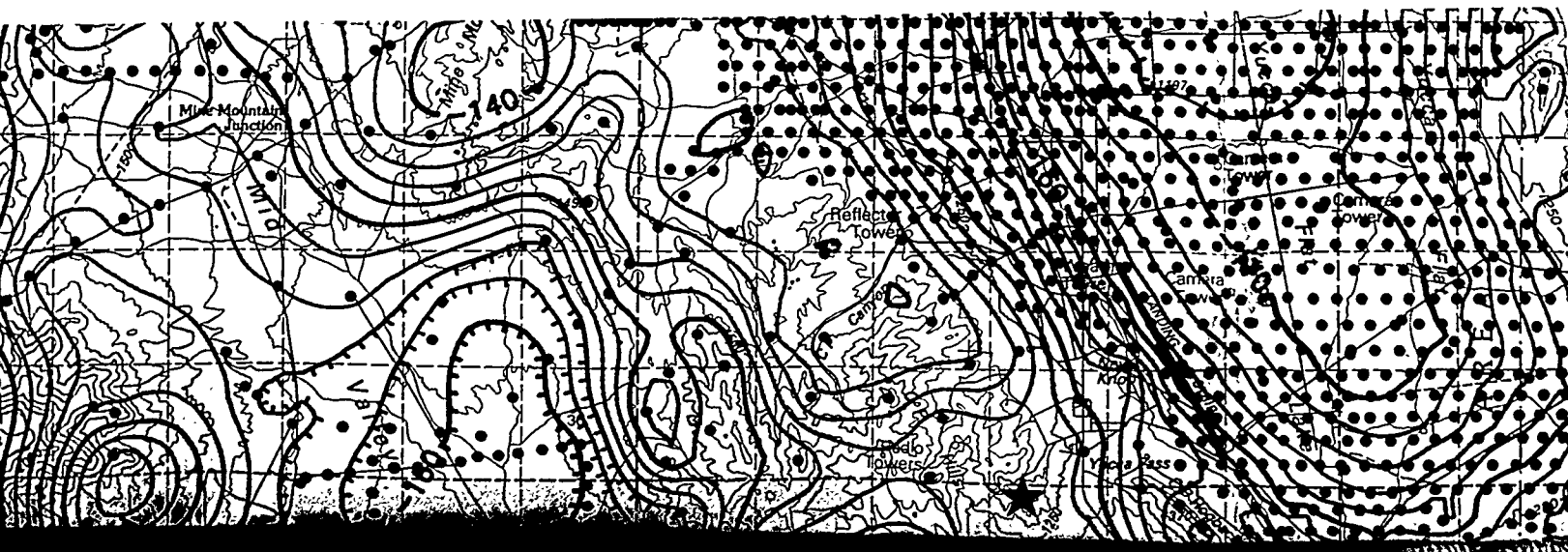
50 METERS

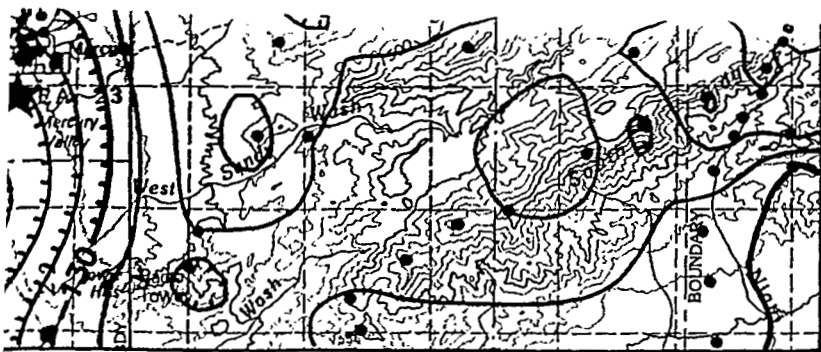
INTERVAL 2 MGAL

DENSITY MAP OF THE CITY, NEVADA

and H. W. Oliver

SOURCE
 Los Alamos National Lab.
 National Geophysical Data
 U.S. Geological Survey:
 Healey (1976b)
 Healey and Curry (1976)
 Healey and others (1977)
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 Jansma and others (1978)
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00' 115° 52' 30"

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- and others (1982)
- (1981)
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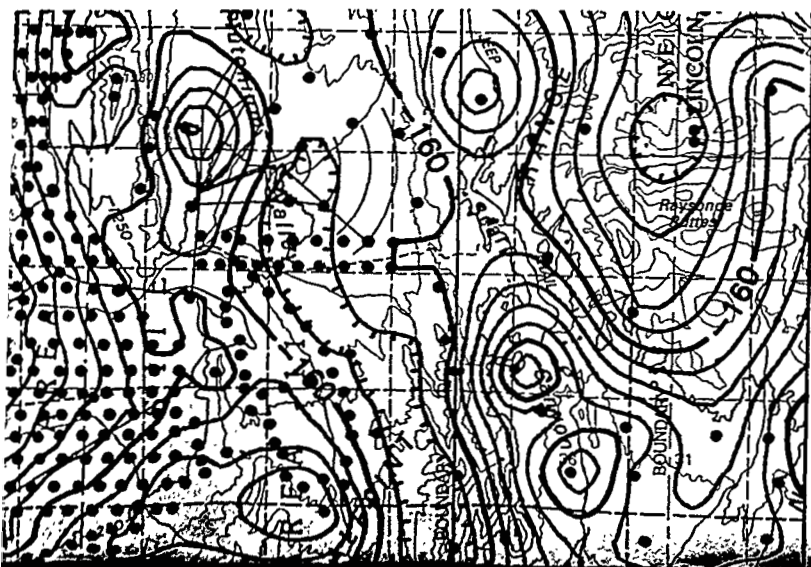
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