RUBY ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E., Barefoot, J.D., Geoterrex-Dighem, and WGM Inc.

Geophysical Report 2019-23

2020
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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RUBY ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.[1], Barefoot, J.D.[1], Geoterrex-Dighem, and WGM Inc.

ABSTRACT

The Ruby electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Ruby mining district, about 360 kilometers west of Fairbanks, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^{V} system from August to September 1997. A total of 3807 line kilometers were collected covering 1405.5 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. The Ruby mining district has a long history of placer gold mining and has seen some placer gold production as recently as 1993. Beaver Creek is a lead and base metal prospect in the northern part of the survey area. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and derivative products of this survey. A table of digital data packages available for download is provided to assist users in data selection. For reference, a catalog of the available maps is presented in reduced resolution. Please consult the metadata, project report, and digital data packages for more information and data.

ACKNOWLEDGMENTS

Funding was provided by the Alaska State Legislature as part of the DGGS Airborne Geophysical/Geological Mineral Inventory (AGGMI) program.

[1] Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor and DGGS	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor and DGGS	Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or the free viewer available from Geosoft
images_registered	DGGS	GeoTiff format images of all gridded data
kmz	DGGS	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	contractor and DGGS	Printable maps in pdf format
maps_prn_format	contractor	Printable maps in HPGL/2 printer file format with extension .prn
profiles_stacked	contractor	Distance-based profiles of the digitally recorded geophysical data are generated and plotted at an appropriate scale. The profiles display electromagnetic anomalies with their respective interpretive symbols. Printable in pdf format.
vector_data	contractor and DGGS	Line path, data contours, and survey boundary in ESRI shapefile (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format
video_flightpath	contractor	Survey flight path downward facing video

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DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of Ruby northwestern B-5 quadrangle: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17D, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1833

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of Ruby southeast B-6 and northeast A-6 quadrangles: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17E, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1834

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of Ruby southwestern C-5 quadrangle: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17B, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1831

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of southeastern C-6 quadrangle: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17A, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1830

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of the Ruby east-central A-6 quadrangle: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17G, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1836

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of the Ruby southwest B-5 and northwest A-5 quadrangles: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17F, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1835

DGGS Staff, Dighem, and WGM, Inc., 1998, Total field magnetics and detailed electromagnetic anomalies of the Ruby area, central Alaska, part of the Ruby west-central A-5 quadrangle: Alaska Division of Geological & Geophysical Surveys Public Data File 98-17H, 1 sheet, scale 1:31,680. http://doi.org/10.14509/1837

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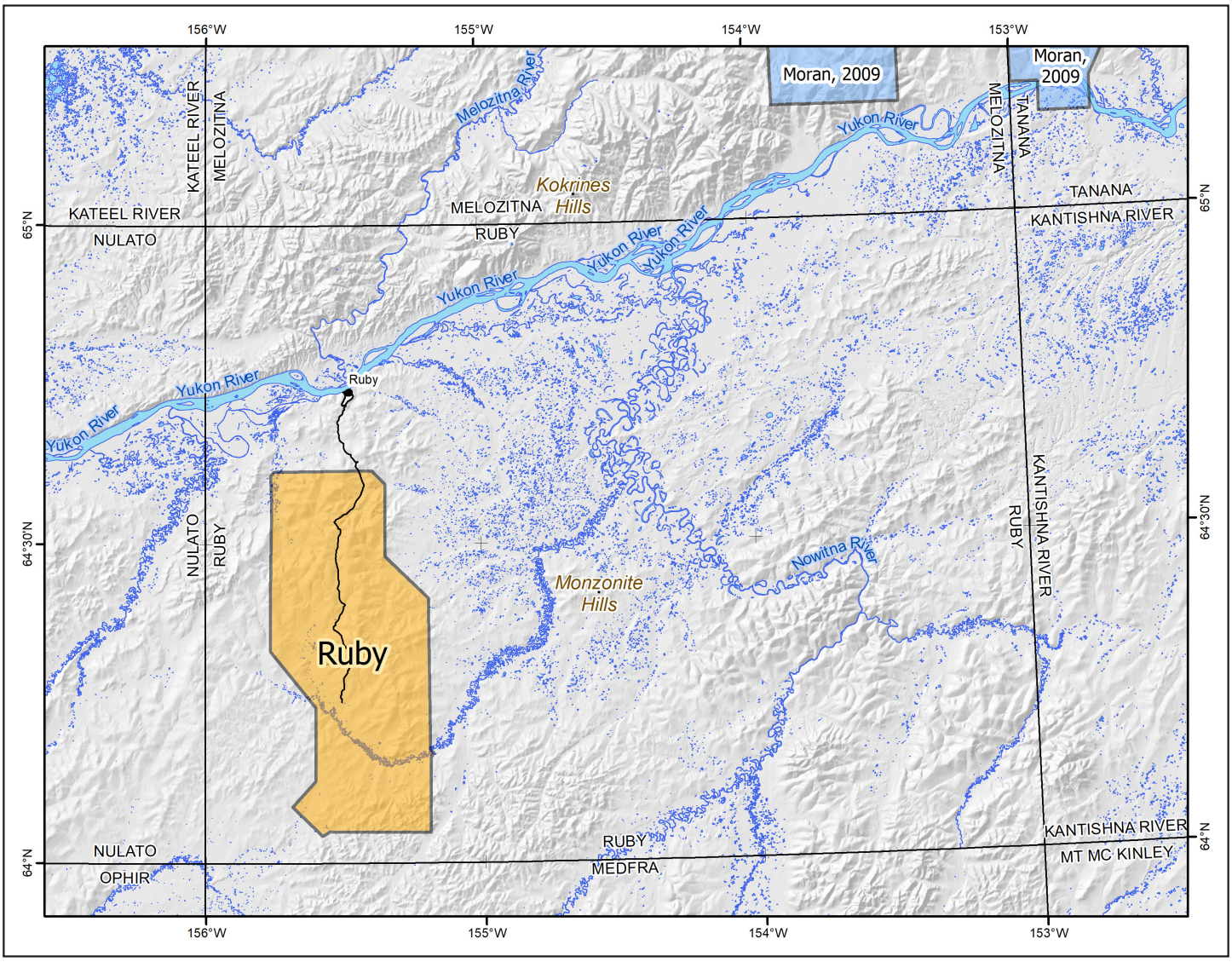


Figure 1. Ruby electromagnetic and magnetic airborne geophysical survey location shown in western Alaska (inset). Ruby survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.

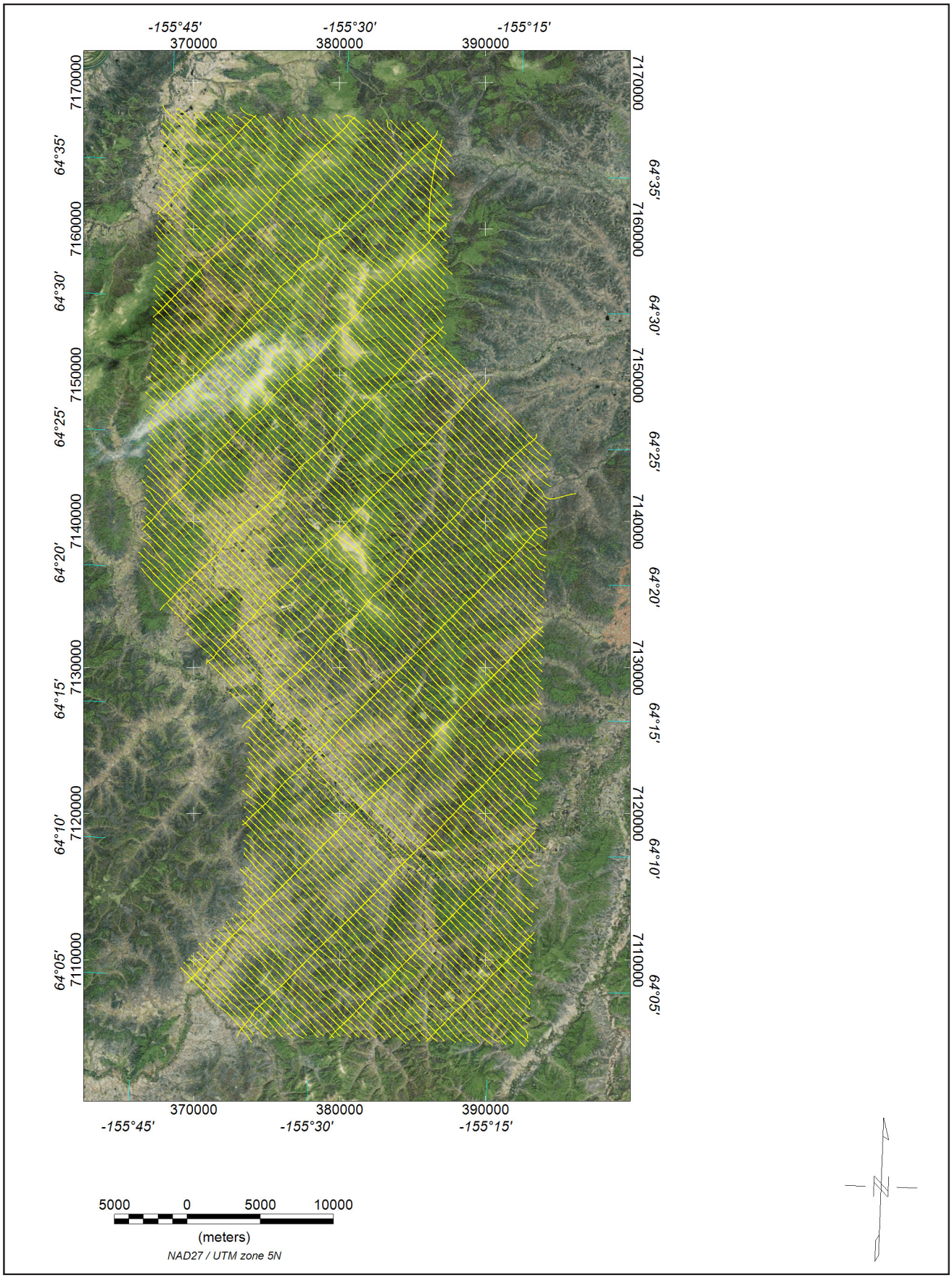


Figure 2. Flight path with orthometric image.

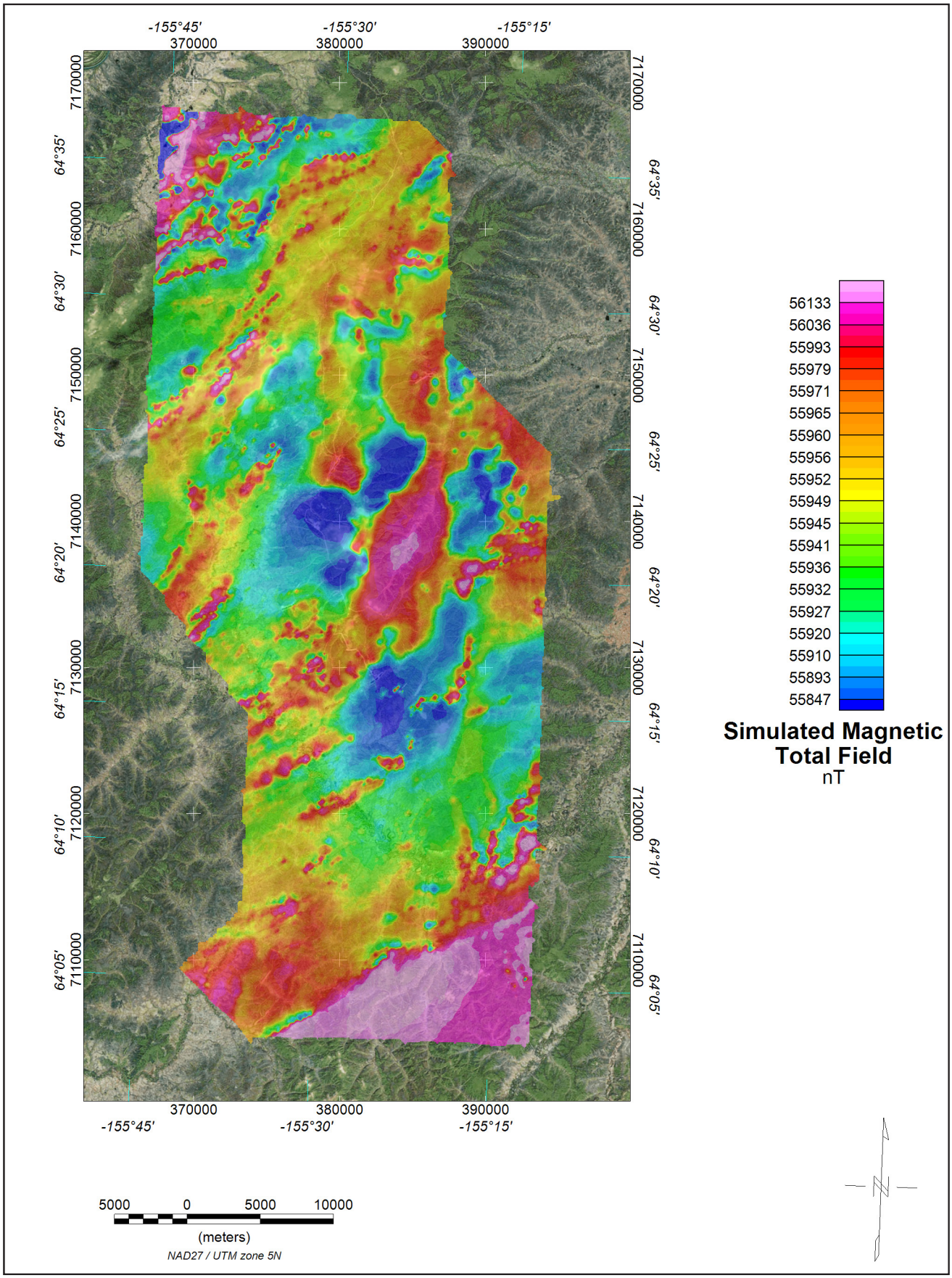


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1995, updated to August 1997), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

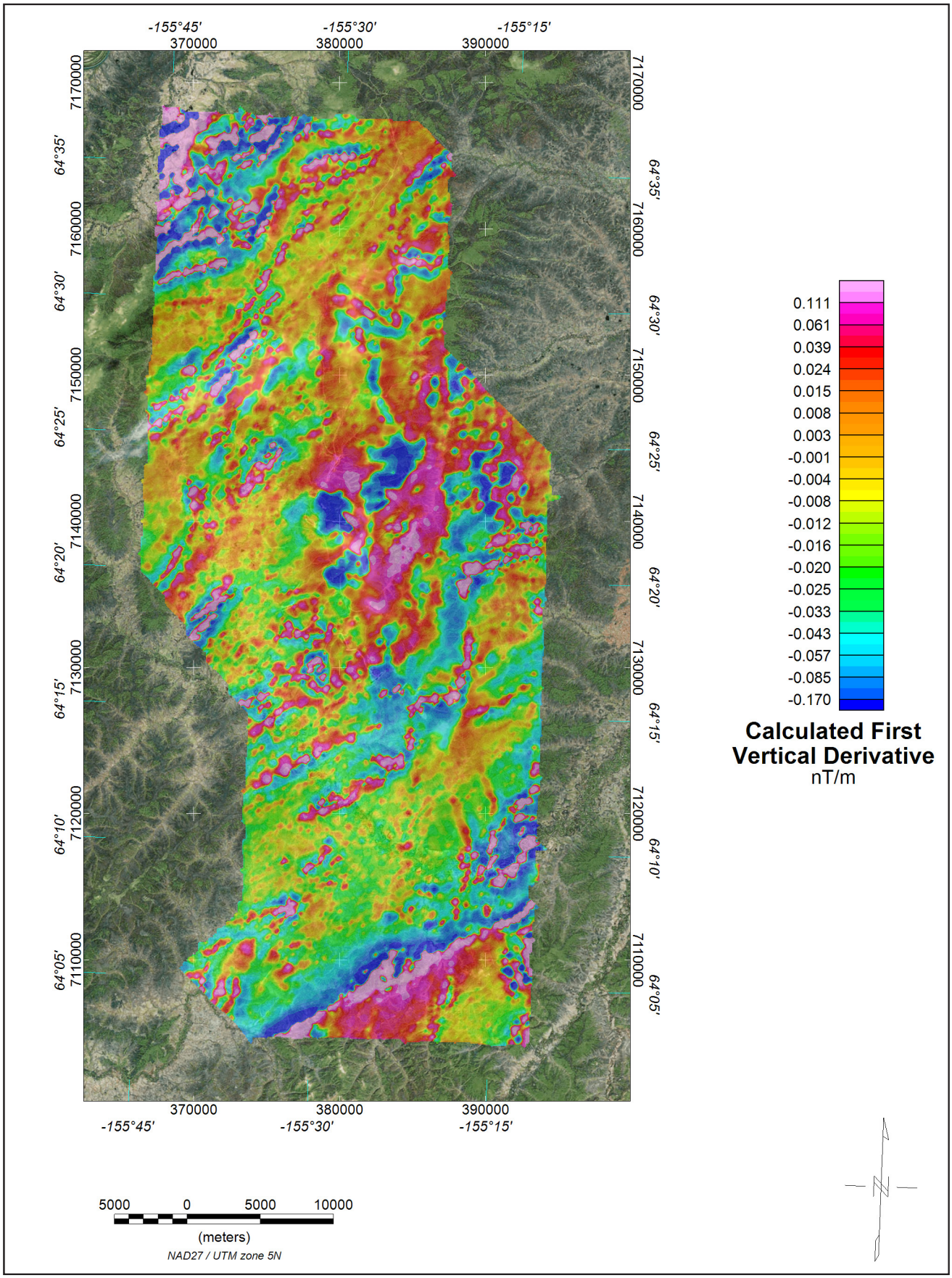


Figure 4. Calculated first vertical derivative grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1995, updated to August 1997), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

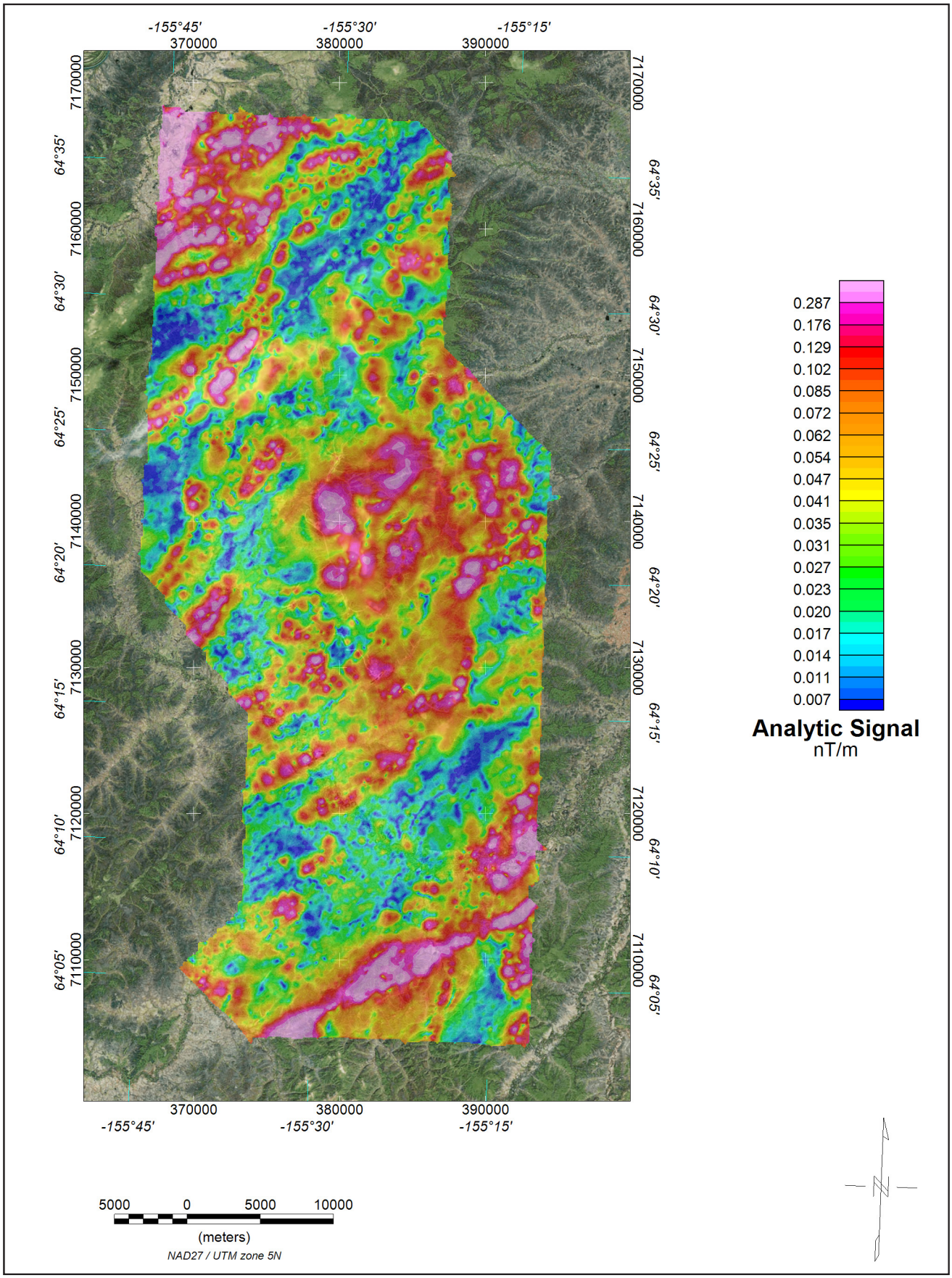


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.

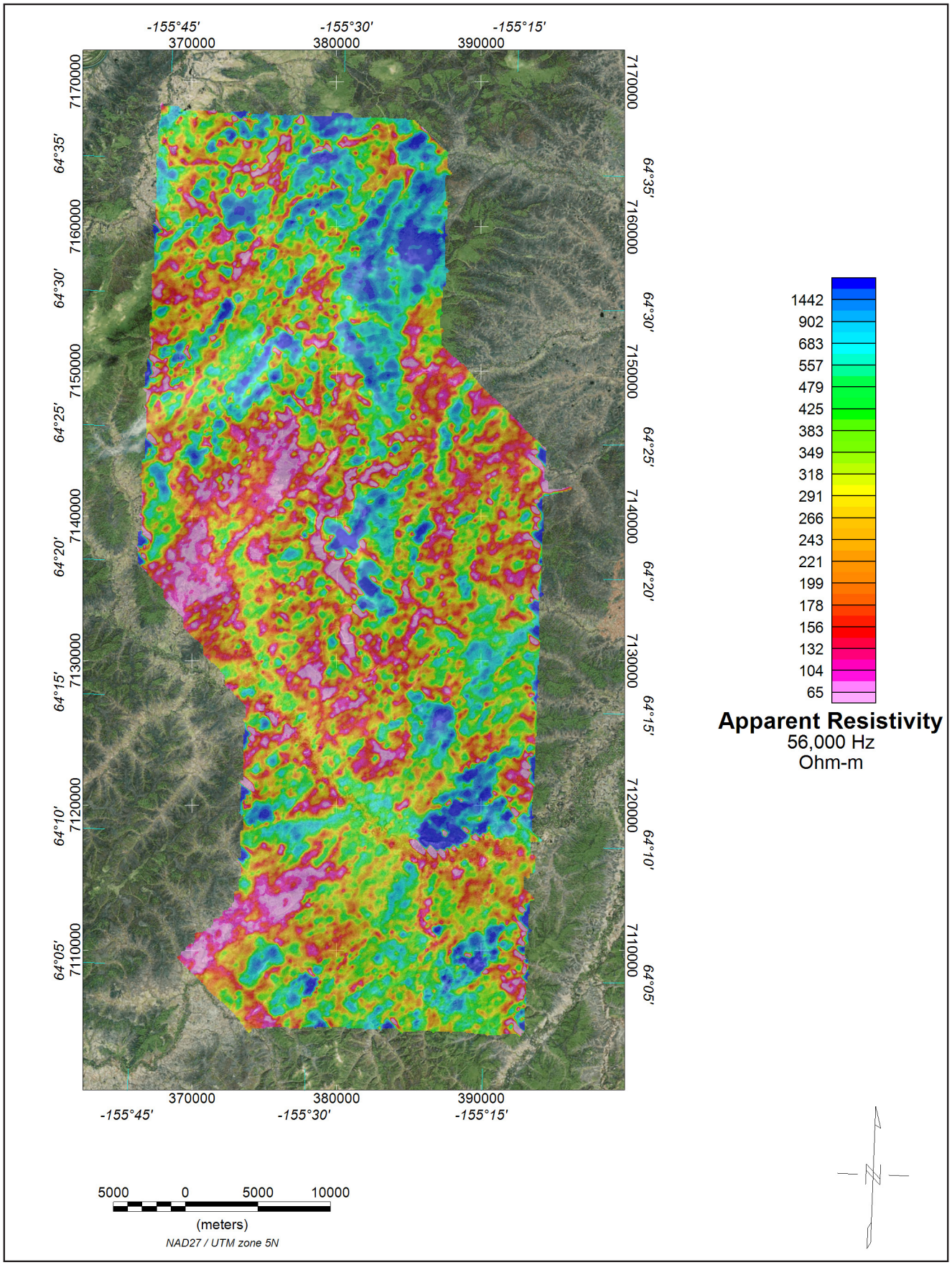


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

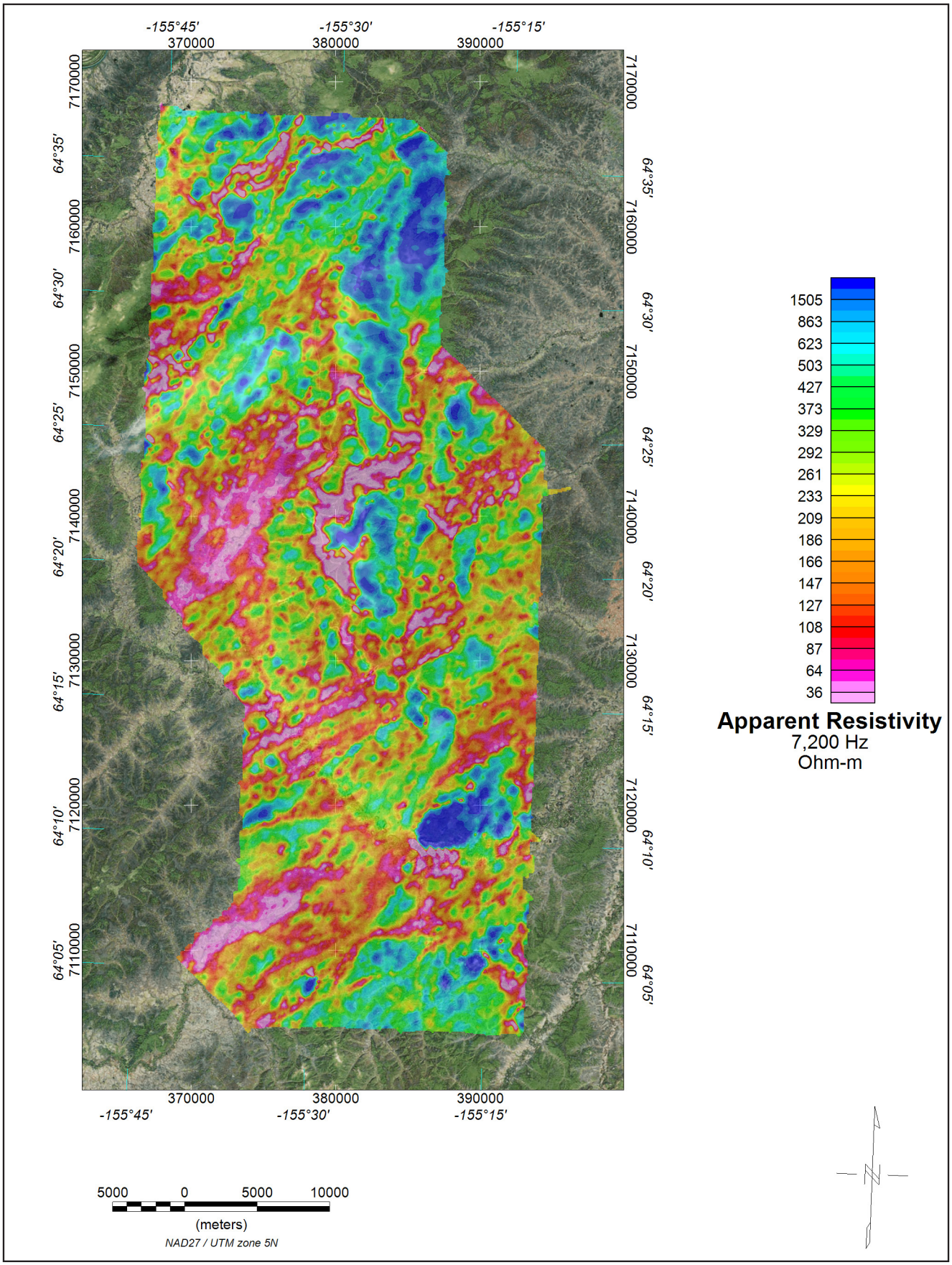


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

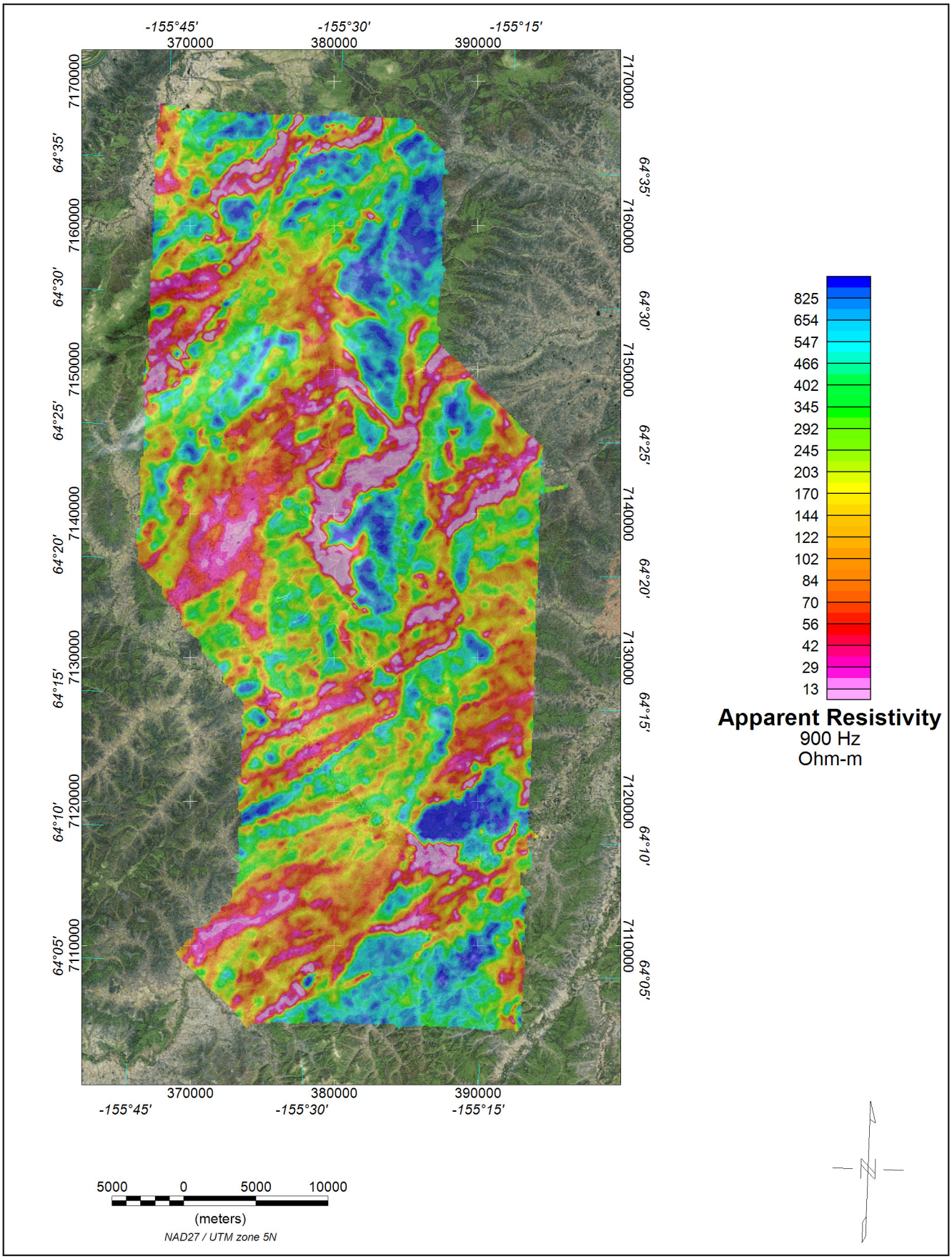


Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30265

Map Title	Description
ruby_flightlines_map_1of2.pdf	flightlines
ruby_flightlines_map_2of2.pdf	flightlines
ruby_res900hz_contours_plss_map_1of2.pdf	coplanar 900 Hz apparent resistivity contours with Public Lands Survey System base layer
ruby_res900hz_contours_plss_map_2of2.pdf	coplanar 900 Hz apparent resistivity contours with Public Lands Survey System base layer
ruby_res900hz_grid_contours_plss_map_1of2.pdf	coplanar 900 Hz apparent resistivity grid and contours with Public Lands Survey System base layer
ruby_res900hz_grid_contours_plss_map_2of2.pdf	coplanar 900 Hz apparent resistivity grid and contours with Public Lands Survey System base layer
ruby_res900hz_topo_map_1of2.pdf	coplanar 900 hz apparent resitivity grid with topographic base map
ruby_res900hz_topo_map_2of2.pdf	coplanar 900 hz apparent resitivity grid with topographic base map
ruby_res7200hz_contours_plss_map_1of2.pdf	coplanar 7200 Hz apparent resistivity contours with Public Lands Survey System base layer
ruby_res7200hz_contours_plss_map_2of2.pdf	coplanar 7200 Hz apparent resistivity contours with Public Lands Survey System base layer
ruby_res7200hz_grid_contours_plss_map_1of2.pdf	coplanar 7200 Hz apparent resistivity grid and contours with Public Lands Survey System base layer
ruby_res7200hz_grid_contours_plss_map_2of2.pdf	coplanar 7200 Hz apparent resistivity grid and contours with Public Lands Survey System base layer
ruby_res7200hz_topo_map_1of2.pdf	coplanar 7200 hz apparent resitivity grid with topographic base map
ruby_res7200hz_topo_map_2of2.pdf	coplanar 7200 hz apparent resitivity grid with topographic base map
ruby_sim_magtf_colorshade_plss_map_1of2.pdf	colorshaded simulated magnetic total field grid with Public Lands Survey System base layer
ruby_sim_magtf_colorshade_plss_map_2of2.pdf	colorshaded simulated magnetic total field grid with Public Lands Survey System base layer

Table 1, continued. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30265

Map Title	Description
ruby_sim_magtf_detailed_emanomalies_map_1of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_2of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_3of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_4of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_5of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_6of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_7of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_detailed_emanomalies_map_8of8.pdf	simulated magnetic total field contours and detailed EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_emanomalies_plss_map_1of2.pdf	simulated magnetic total field contours and EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_emanomalies_plss_map_2of2.pdf	simulated magnetic total field contours and EM anomalies with Public Lands Survey System base layer
ruby_sim_magtf_grid_contours_plss_map_1of2.pdf	simulated magnetic total field grid and contours with Public Lands Survey System base layer
ruby_sim_magtf_grid_contours_plss_map_2of2.pdf	simulated magnetic total field grid and contours with Public Lands Survey System base layer
ruby_sim_magtf_topo_map_1of2.pdf	simulated magnetic field grid with topographic base map
ruby_sim_magtf_topo_map_2of2.pdf	simulated magnetic field grid with topographic base map

155°50' 155°40' 155°30' 155°20' 155°10'
64°40'
64°35'
64°30'
64°25'
64°20'

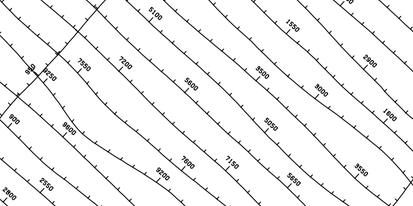
Base from U.S. Geological Survey Ruby B-5, B-6, 1952; C-5, C-6, 1952; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN
DECLINATION, 1952

FLIGHT LINES OF THE RUBY AREA, CENTRAL ALASKA

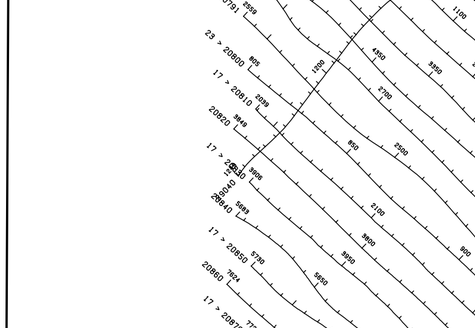
1998

DESCRIPTIVE NOTES

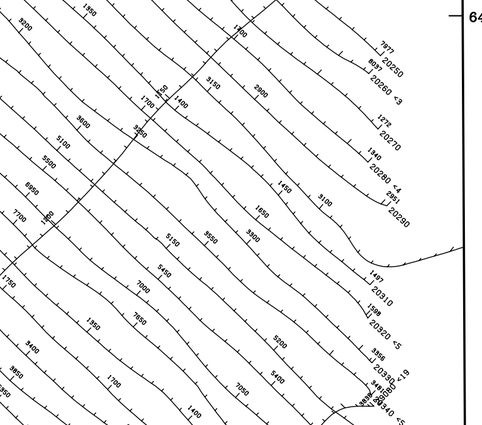
The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, a Scintrex cesium magnetometer, and a Herz VLF system installed in an AS350B-2 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Sercel Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

FLIGHT LINES



LOCATION INDEX



SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and WGM, Mining and Geological Consultants, Inc. Airborne geophysical data for the area were acquired by Geoterrex-Dighem, a division of CGG Canada Ltd., in 1997.

This map and other products from this survey are available by mail order or in person from DGGS, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

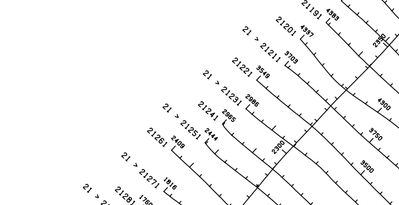
PUBLIC-DATA FILE 98-10

Sheet 2 of 2

155°50' 155°40' 155°30' 155°20' 155°10'

64°20' 64°15' 64°10' 64°05' 64°00'

Base from U.S. Geological Survey Ruby A–5, A–6, 1952; B–5, B–6, 1952; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1952

FLIGHT LINES OF THE RUBY AREA, CENTRAL ALASKA

1998

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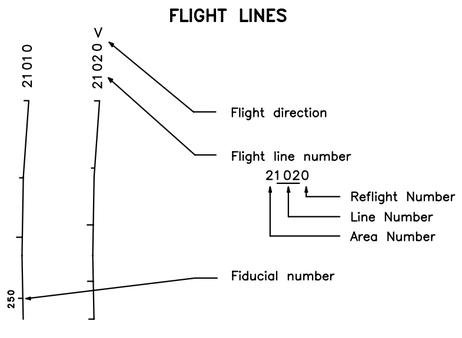
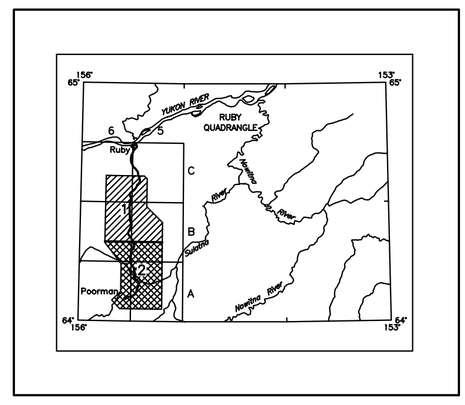


LOCATION INDEX



SURVEY HISTORY

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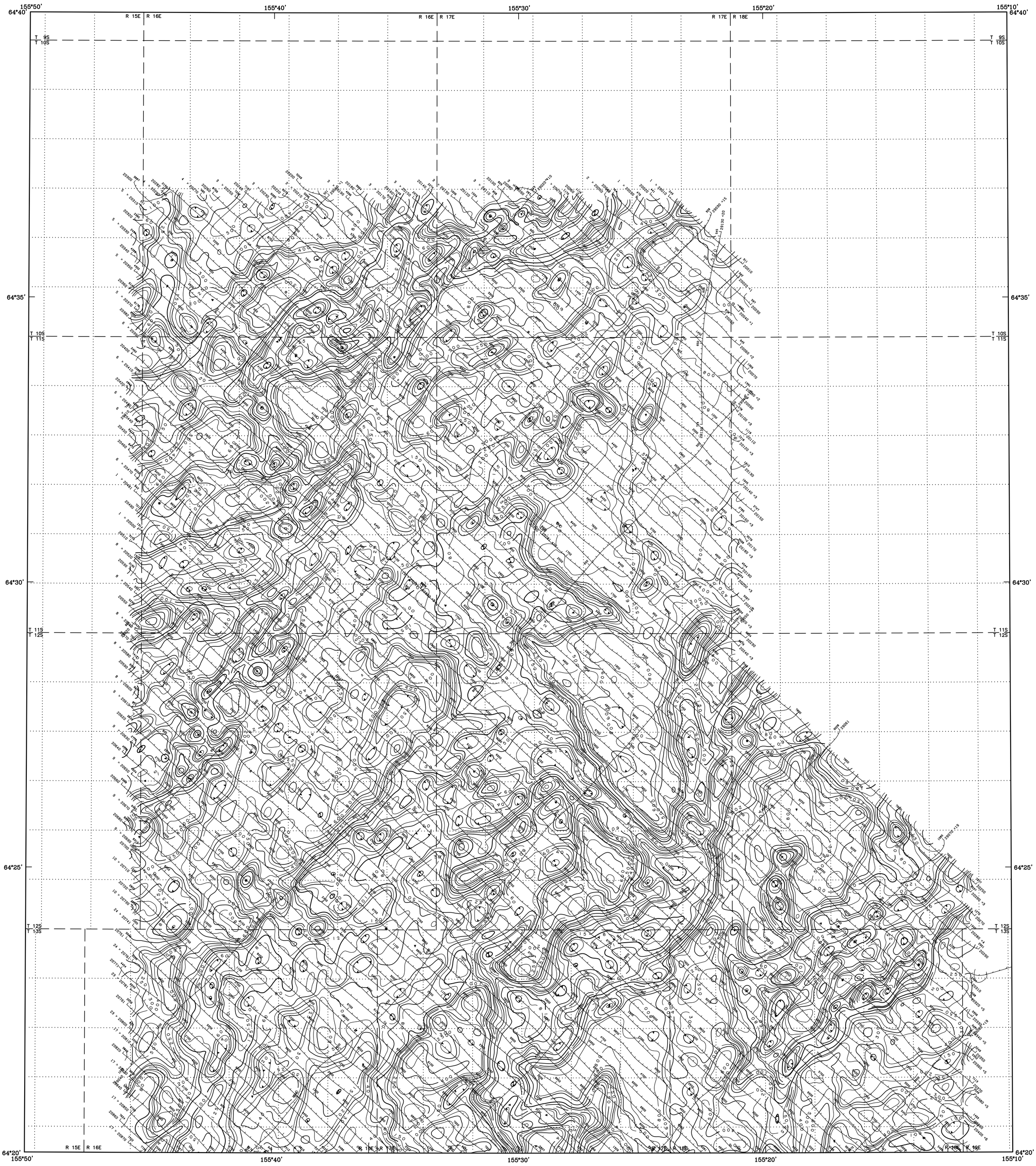
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 98-13

Sheet 1 of 2

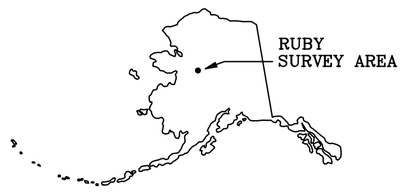


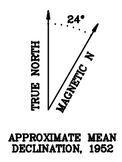
Section outlines from U.S. Geological Survey Ruby B–5, B–6, 1952; C–5, C–6, 1952; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 1952

900 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

1998

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, a Scintrex cesium magnetometer, and a Herz VLF system installed in an AS350B–2 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

RESISTIVITY CONTOURS

1000
800
600
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Contours in ohm–m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX

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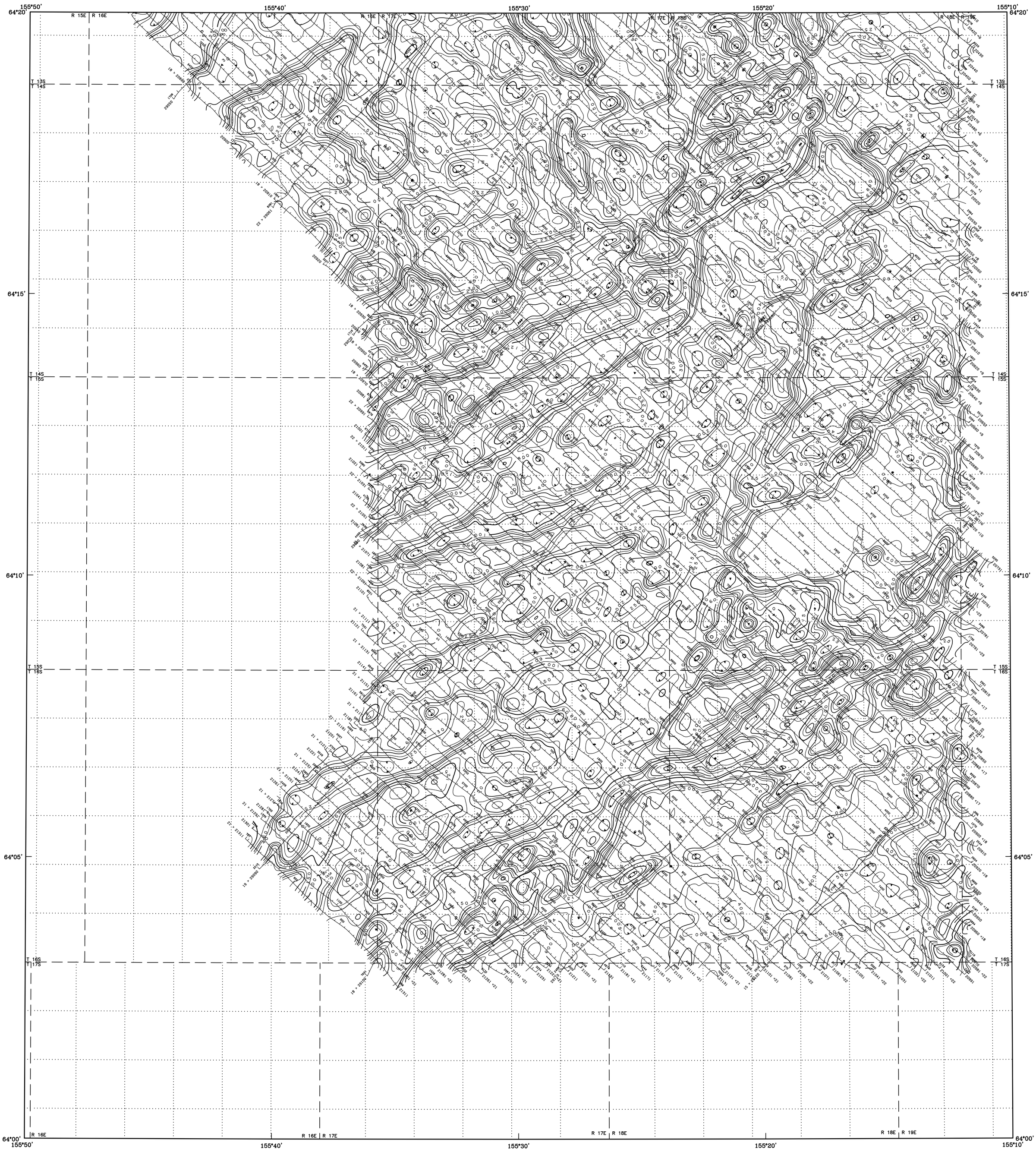

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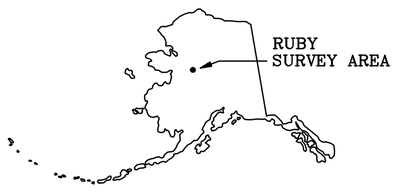

SCALE 1:63,360

1 0 1 2 3 4 MILES

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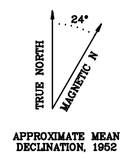

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900 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

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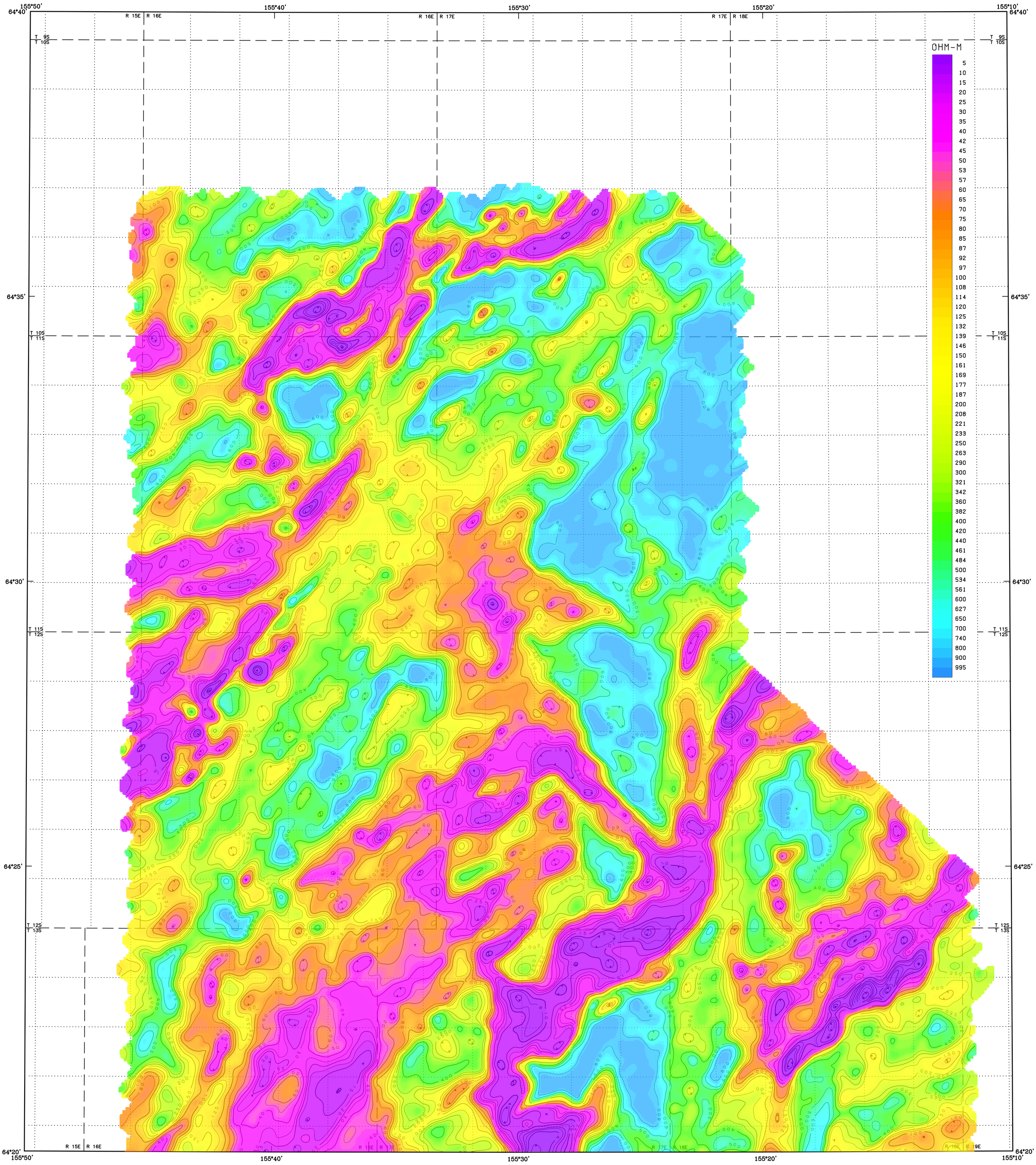

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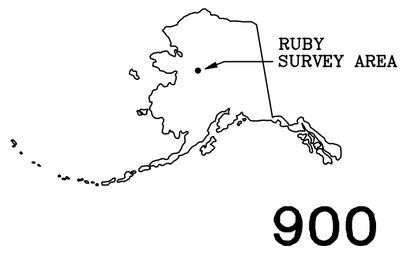
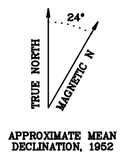
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





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900 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

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Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

OHM-M
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1 0 1 2 3 4 MILES

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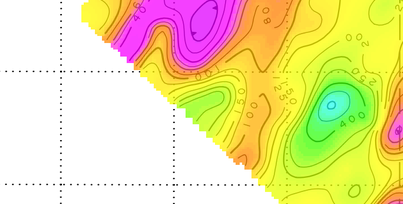

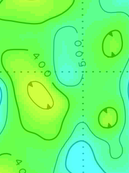

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900 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

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Contours in ohm–m at 10 intervals per decade

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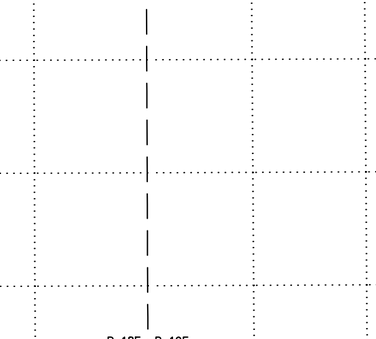
LOCATION INDEX



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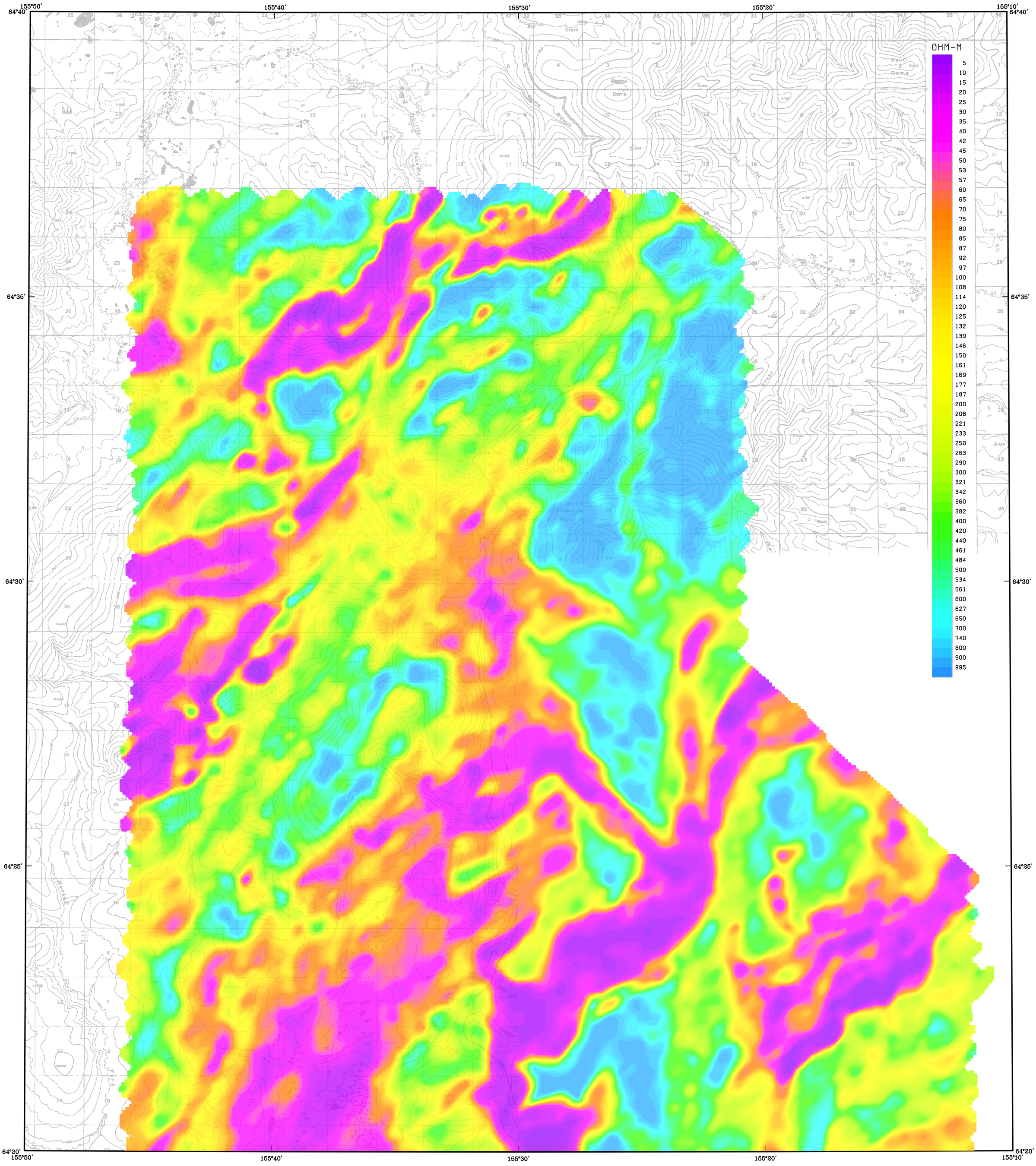

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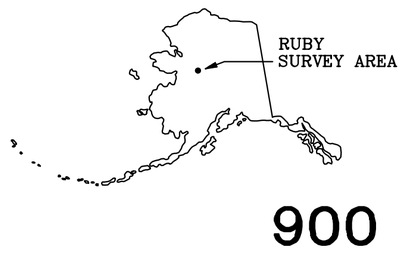
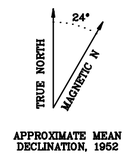


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN DECLINATION, 1952

900 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

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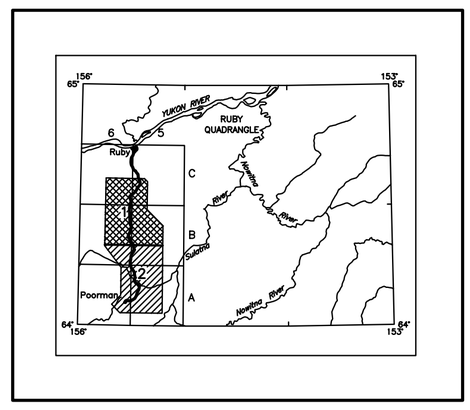

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1 0 1 2 3 4 MILES

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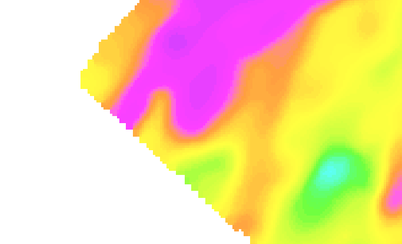

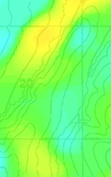

APPROXIMATE MEAN
DECLINATION, 1952

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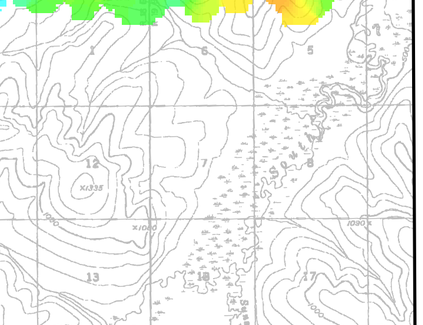

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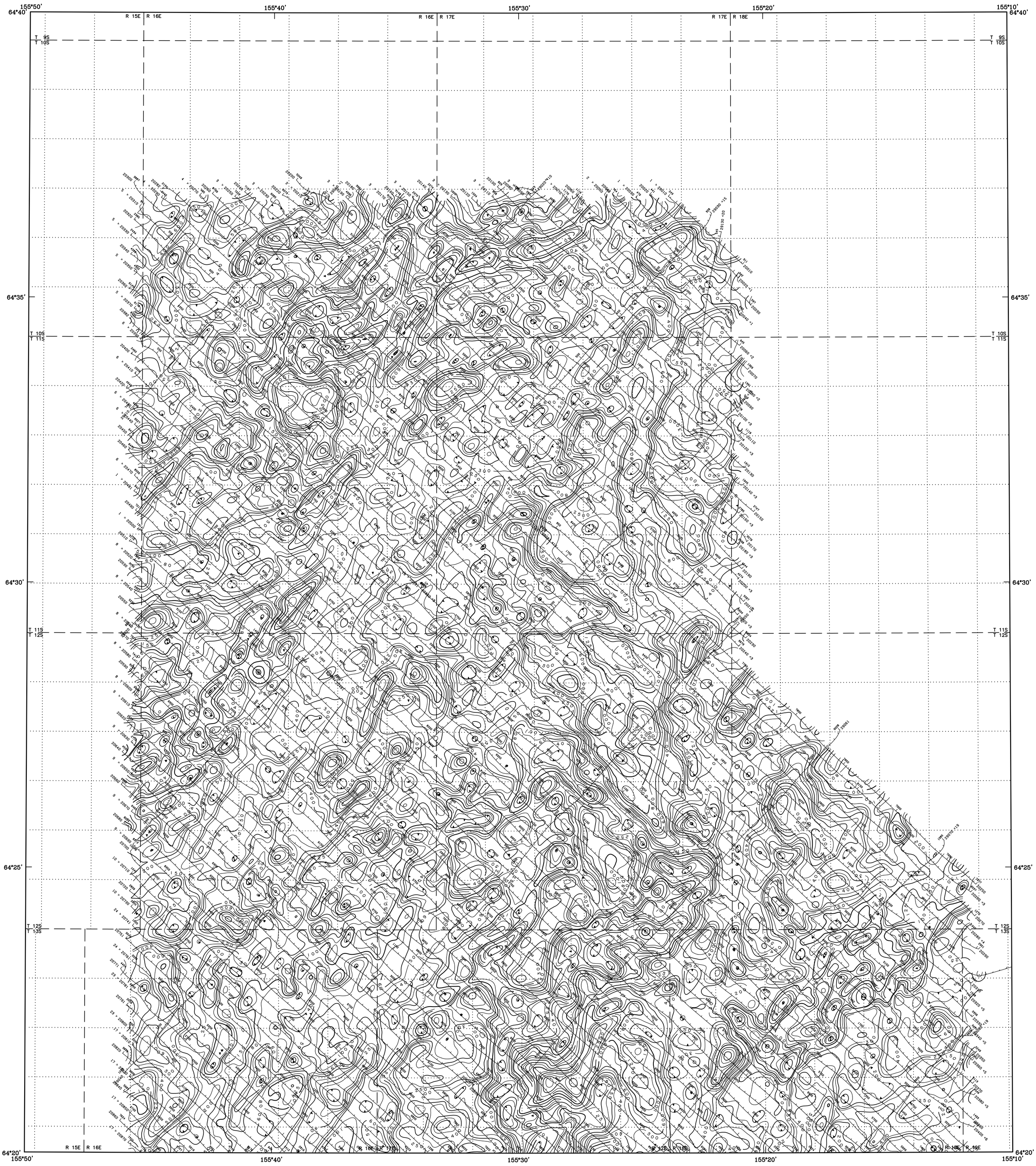

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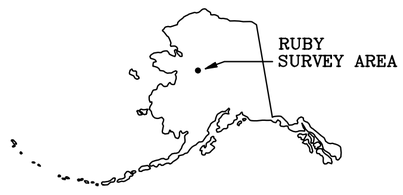

SCALE 1:63,360

1 0 1 2 3 4 MILES

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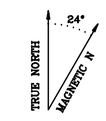

APPROXIMATE MEAN DECLINATION, 1952

7200 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

1998

DESCRIPTIVE NOTES

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Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX

SURVEY HISTORY

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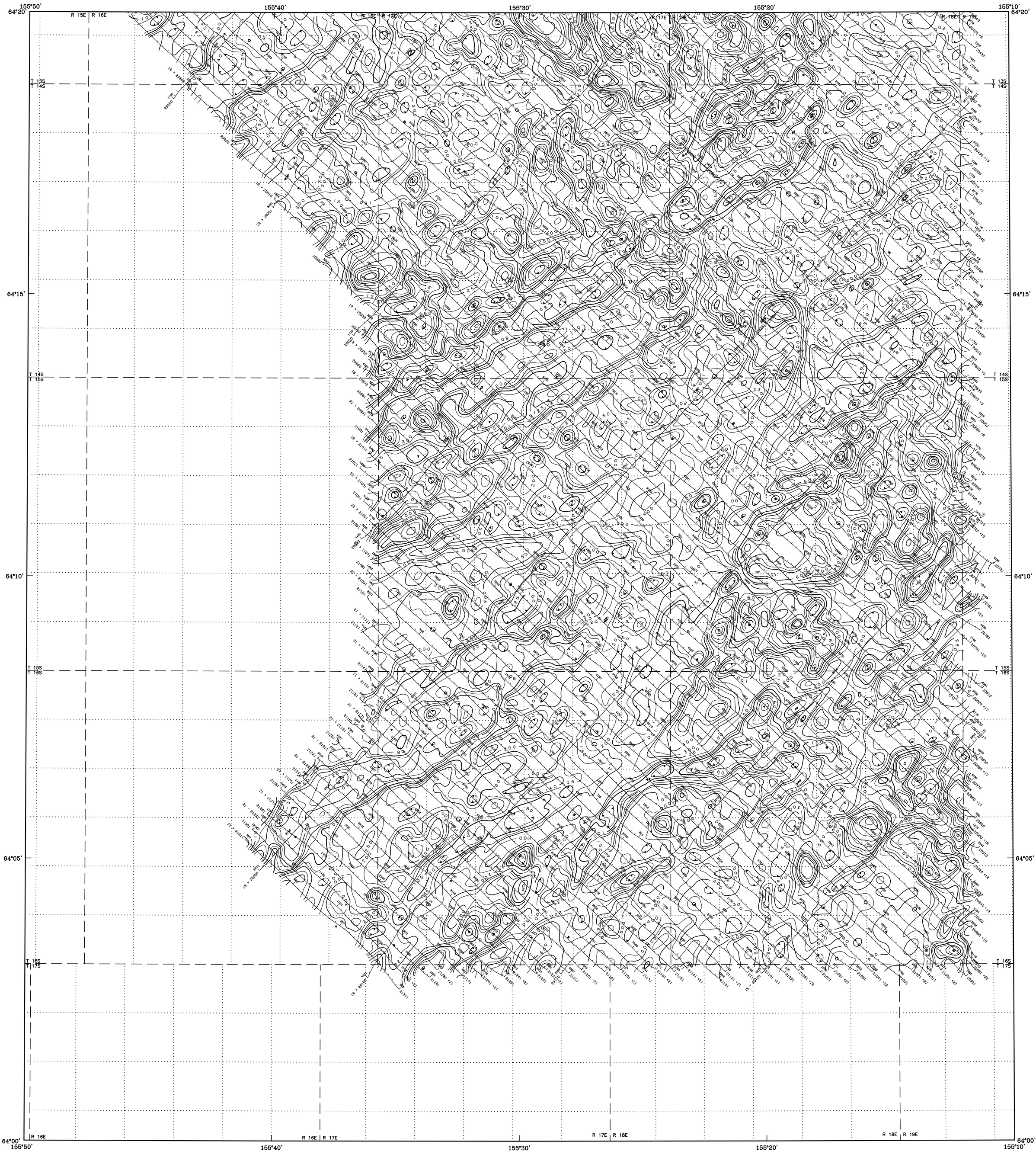
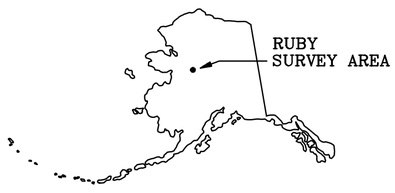


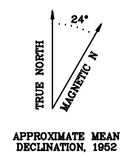
Section outlines from U.S. Geological Survey Ruby A–5, A–6, 1952; B–5, B–6, 1952; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 1952

7200 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

1998

DESCRIPTIVE NOTES

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Contours in ohm–m at 10 intervals per decade

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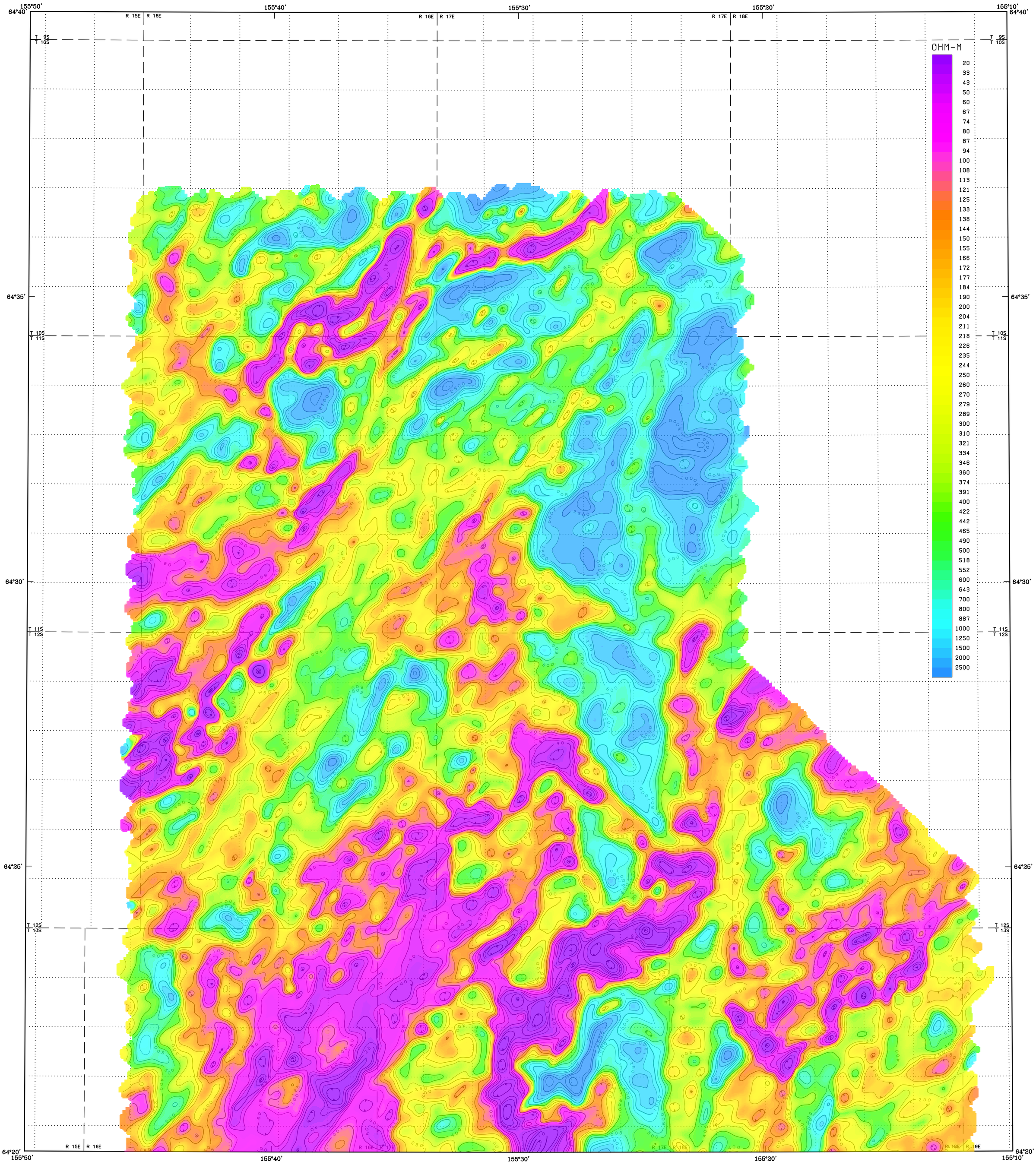
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



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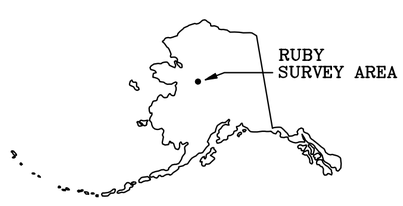
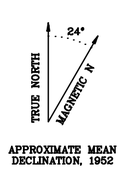
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





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7200 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

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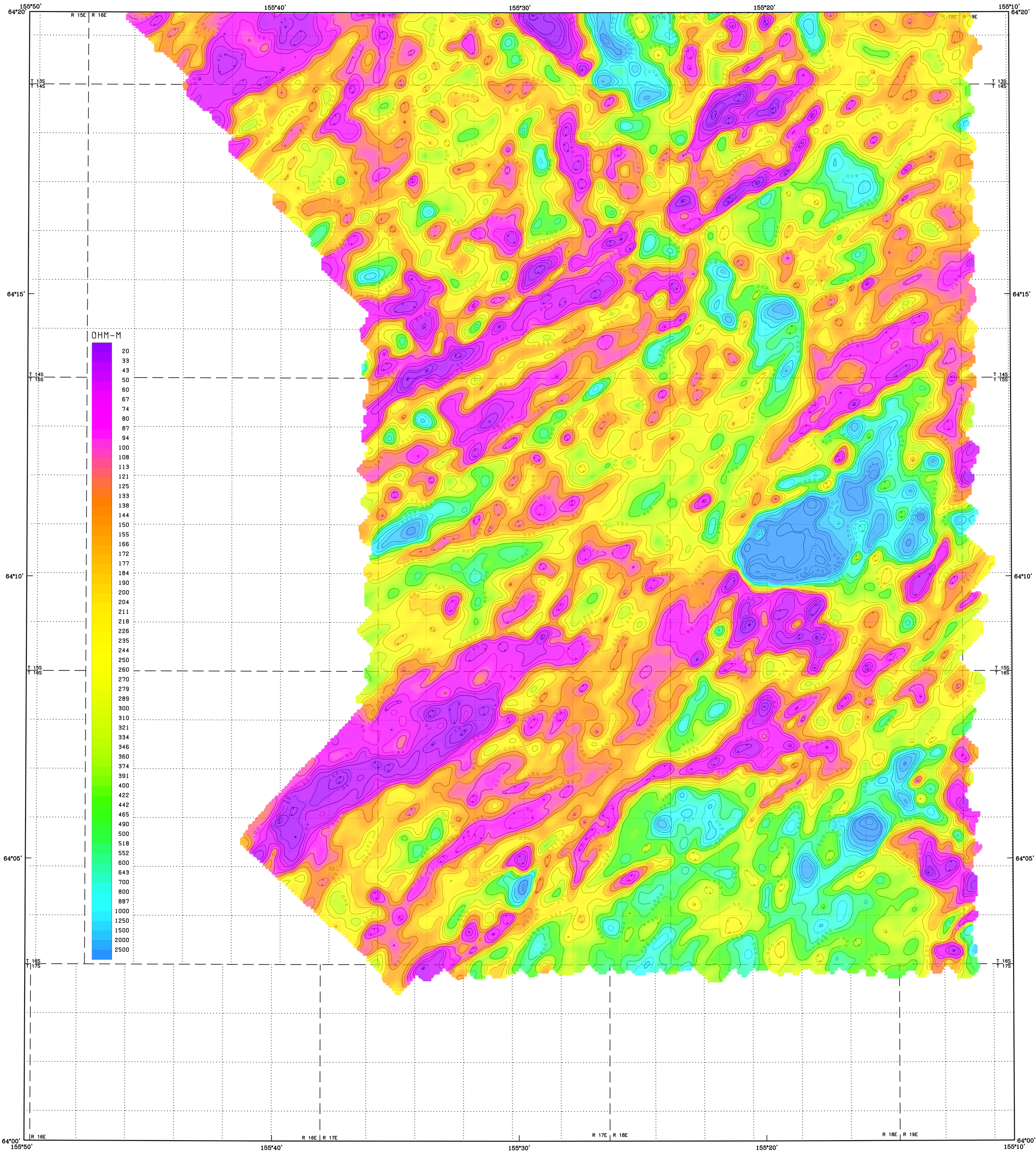

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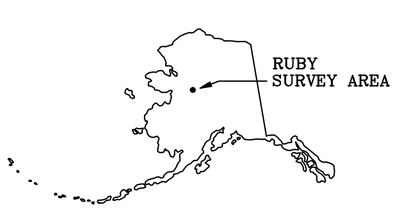
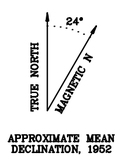


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 1952

7200 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

1998

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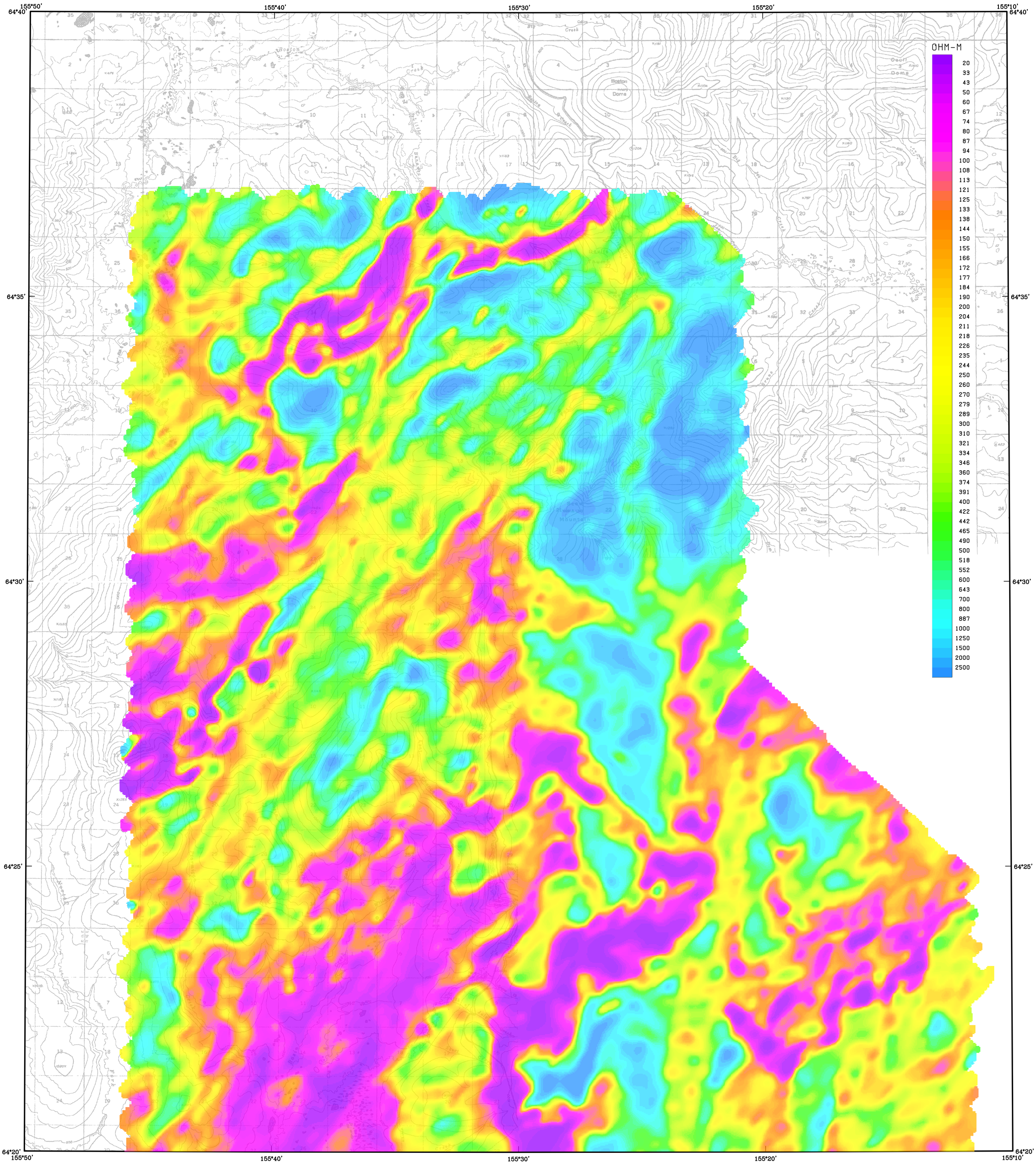
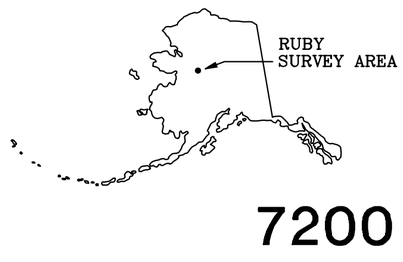


Base from U.S. Geological Survey Ruby B-5, B-6, 1952; C-5, C-6, 1952; Quadrangles, Alaska

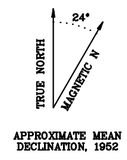


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



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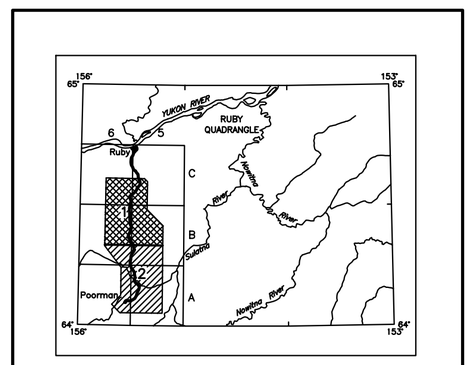
LOCATION INDEX



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OHM-M

20
33
43
50
60
67
74
80
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100
108
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121
125
133
138
144
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177
184
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360
374
391
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422
442
465
490
500
518
552
600
643
700
800
887
1000
1250
1500
2000
2500

Base from U.S. Geological Survey Ruby A–5, A–6, 1952; B–5, B–6, 1952; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

RUBY SURVEY AREA

TRUE NORTH
MAGNETIC N
24°

APPROXIMATE MEAN DECLINATION, 1952

7200 Hz COPLANAR RESISTIVITY OF THE RUBY AREA, CENTRAL ALASKA

1998

DESCRIPTIVE NOTES

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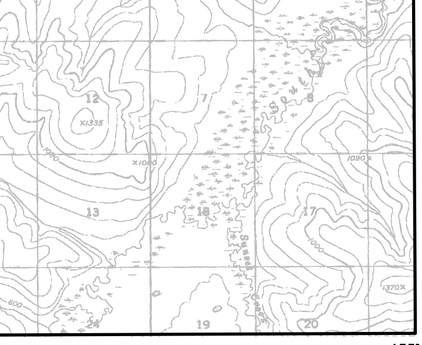

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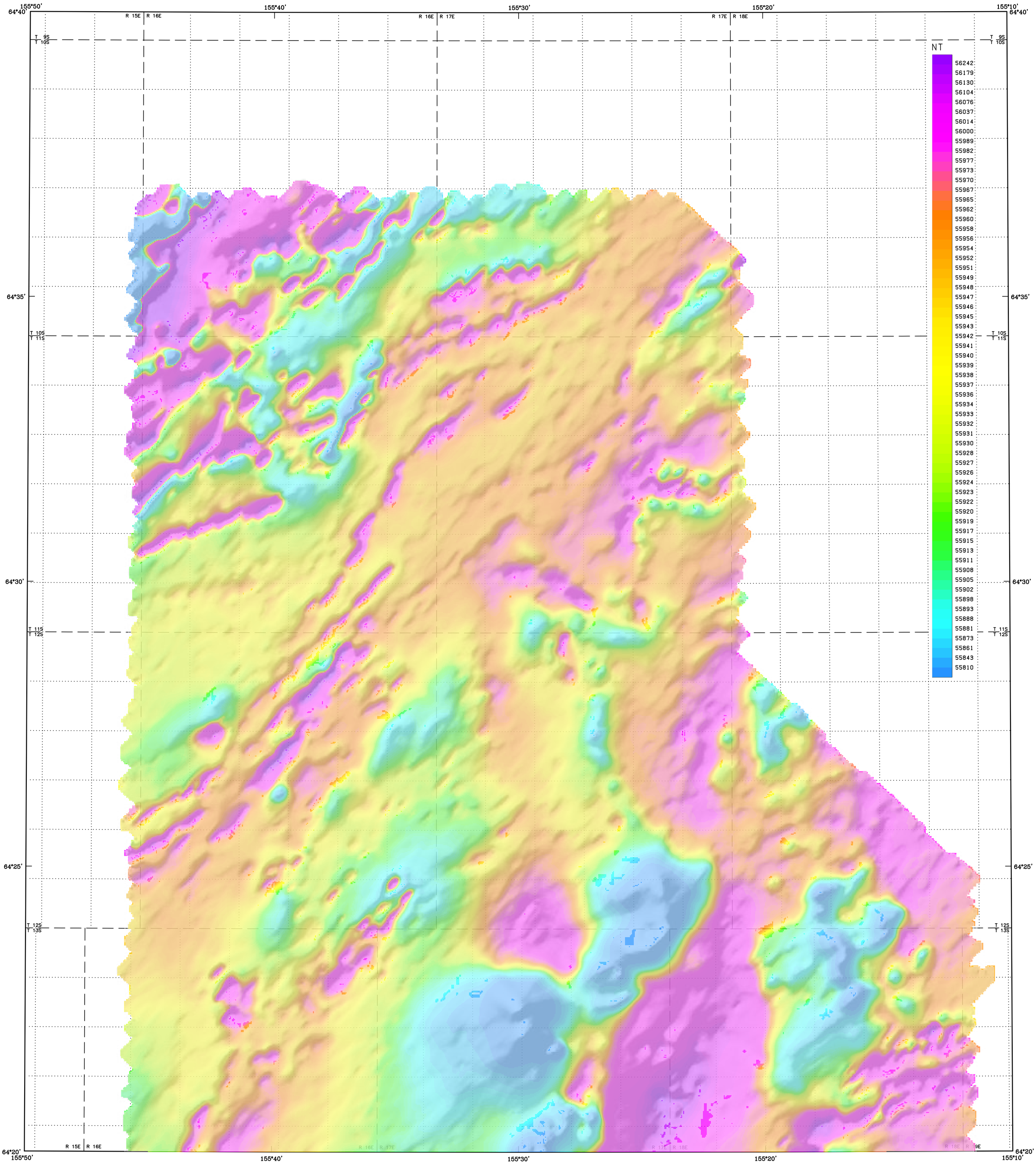

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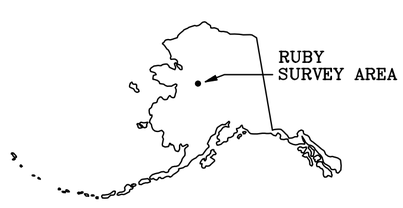
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 1952

COLOR SHADOW TOTAL FIELD MAGNETICS OF THE RUBY AREA, CENTRAL ALASKA

1998

Sun Azimuth: 145 degrees

Inclination: 30 degrees

DESCRIPTIVE NOTES

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TOTAL FIELD MAGNETICS

The total field magnetic data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1995, updated to August 1997) was removed from the leveled magnetic data.

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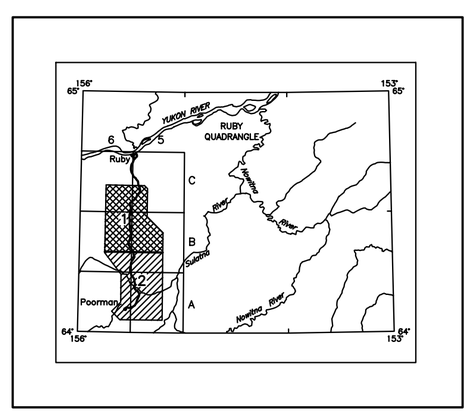

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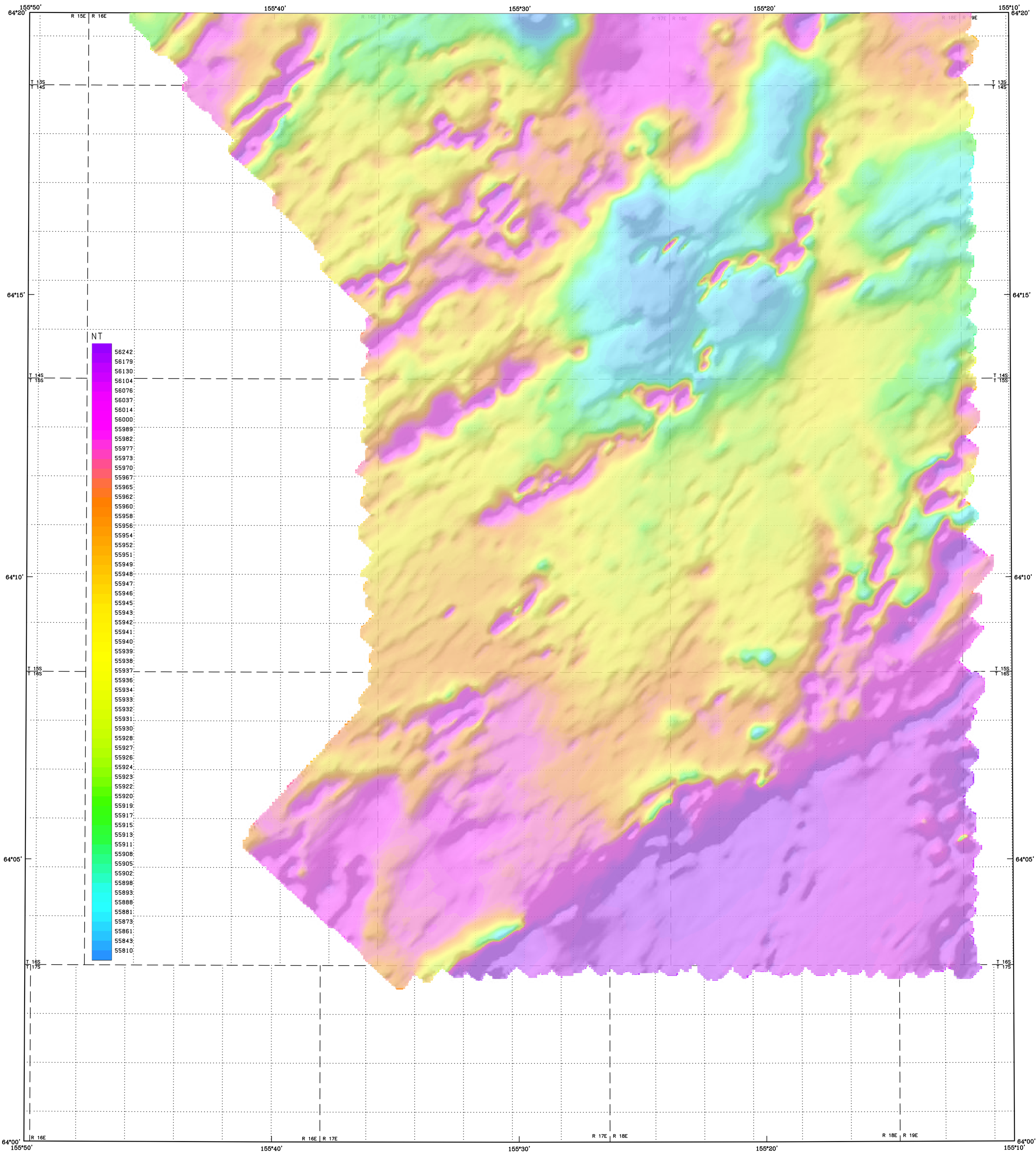

Section outlines from U.S. Geological Survey Ruby A–5, A–6, 1952; B–5, B–6, 1952; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 1952

COLOR SHADOW TOTAL FIELD MAGNETICS OF THE RUBY AREA, CENTRAL ALASKA

1998

Sun Azimuth: 145 degrees

Inclination: 30 degrees

DESCRIPTIVE NOTES

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SURVEY HISTORY

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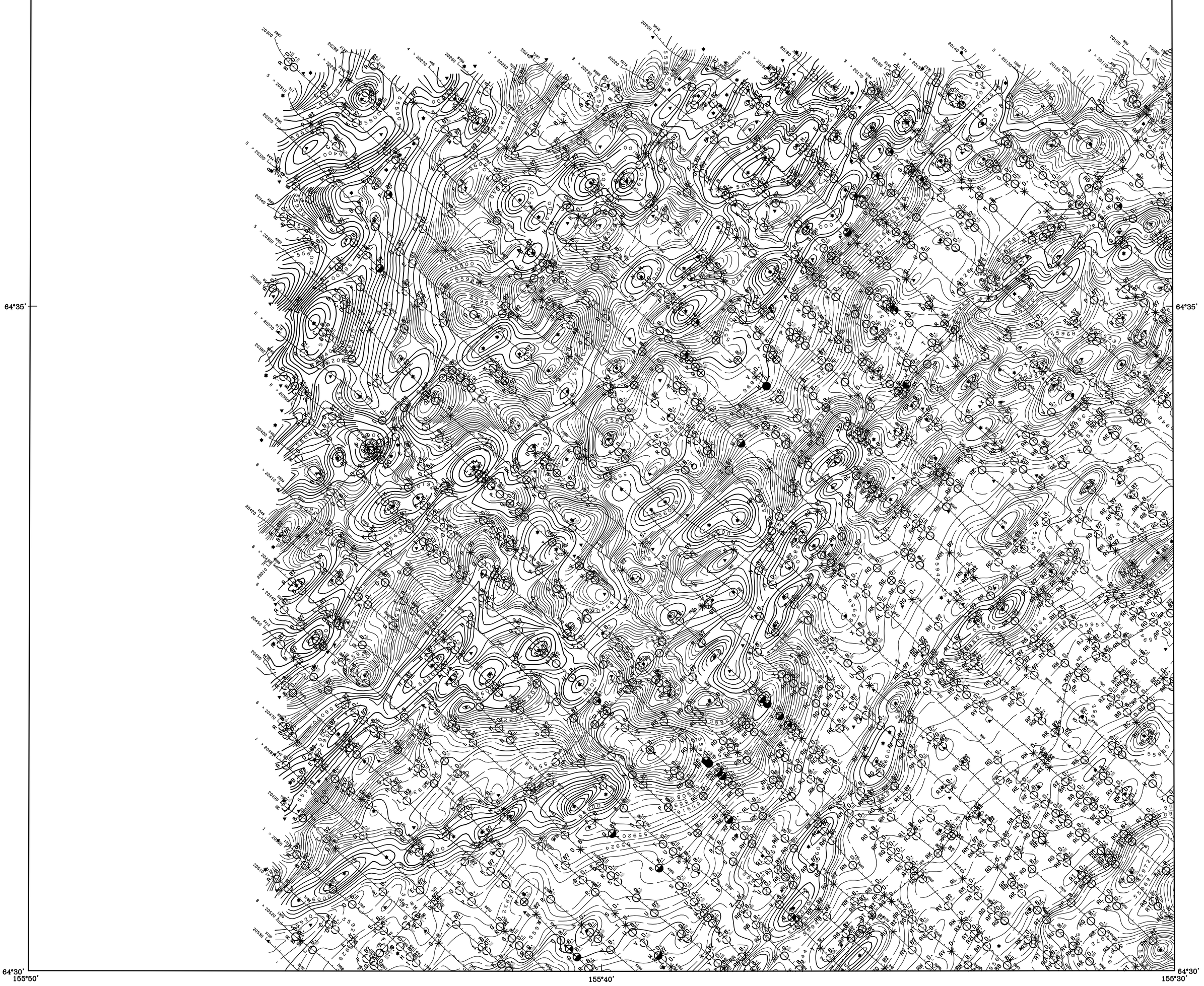
155°50' 155°40' 155°30'

64°40'

64°35'

64°30'



155°50' 155°40' 155°30'

Base from U.S. Geological Survey Ruby C-6, 1952; Quadrangle, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP A

1998

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, a Scintrex cesium magnetometer, and a Herz VLF system installed in an AS350B-2 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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ELECTROMAGNETICS

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ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◑	20–50 siemens
◒	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
$\triangle^M$	EM magnetite response

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

100 nT

20 nT

4 nT

2 nT

▼ magnetic low

✸ magnetic high

LOCATION INDEX FOR SCALE 1:31,680

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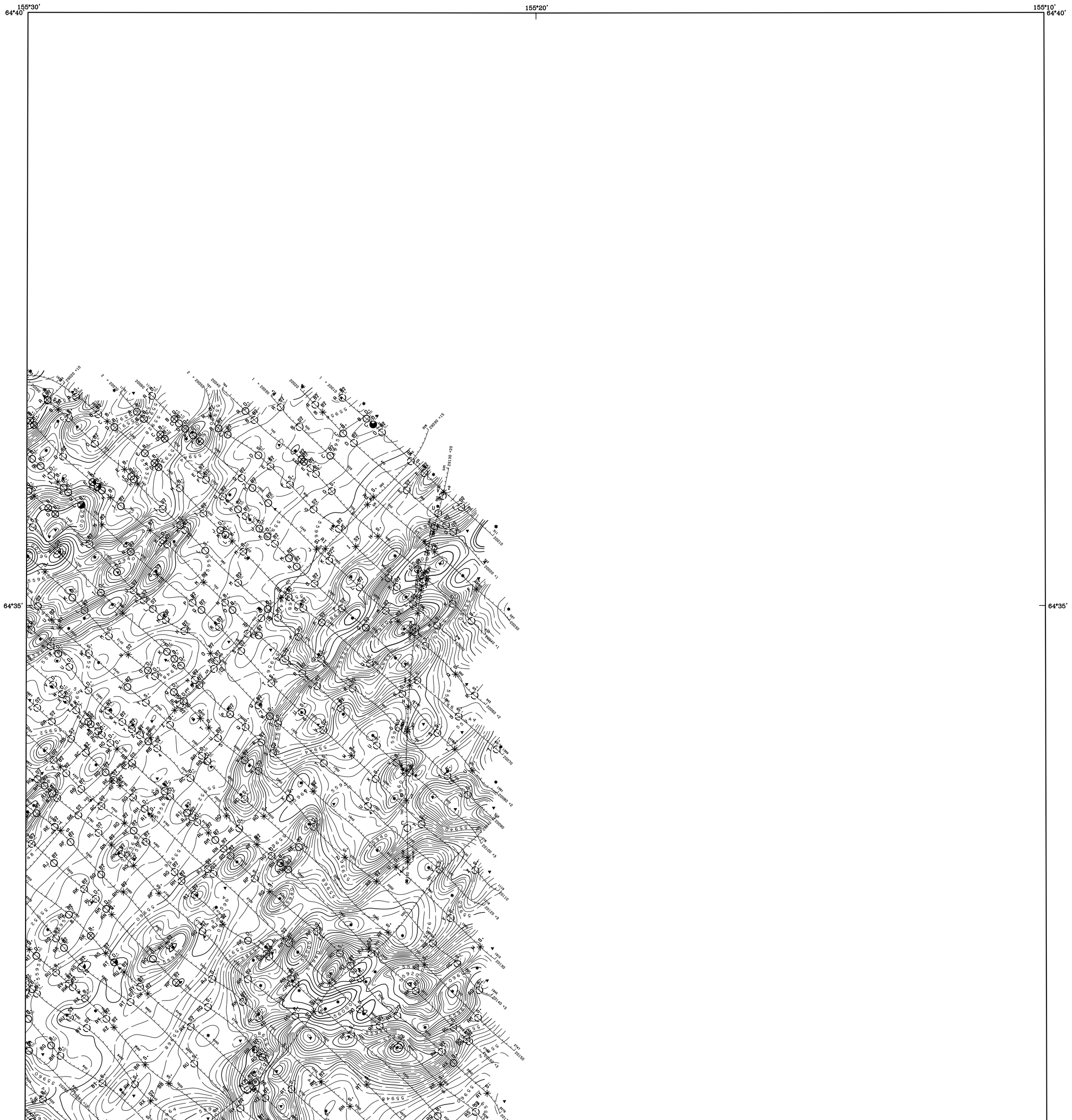

Base from U.S. Geological Survey Ruby C-5, 1952; Quadrangle, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP B

1998

DESCRIPTIVE NOTES

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ELECTROMAGNETICS

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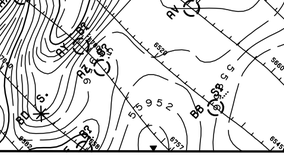
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
●	>100 siemens
◕	50-100 siemens
◑	20-50 siemens
◒	10-20 siemens
⊕	5-10 siemens
○	1-5 siemens
◌	< 1 siemens
✳	Questionable anomaly
$\triangle^M$	EM magnetite response

Interpretive symbol	Conductor ("model")
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L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

- ——————— 100 nT
- ——————— 20 nT
- ——————— 4 nT
- — — — — 2 nT
- ▼ magnetic low
- ✱ magnetic high

LOCATION INDEX FOR SCALE 1:31,680

SURVEY HISTORY

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155°50′ 155°40′ 155°30′
64°30′ 64°25′ 64°20′

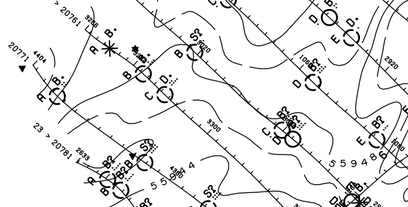
Base from U.S. Geological Survey Ruby B–6, 1952; Quadrangle, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP C

1998

DESCRIPTIVE NOTES

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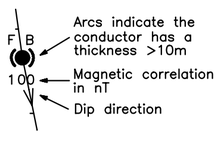
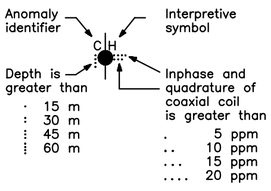
ELECTROMAGNETIC ANOMALIES





Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◑	20–50 siemens
◔	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
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✳	Questionable anomaly
$\triangle^M$	EM magnetite response

Interpretive symbol	Conductor ("model")
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E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

100 nT
20 nT
4 nT
2 nT
magnetic low
magnetic high

LOCATION INDEX FOR SCALE 1:31,680

SURVEY HISTORY

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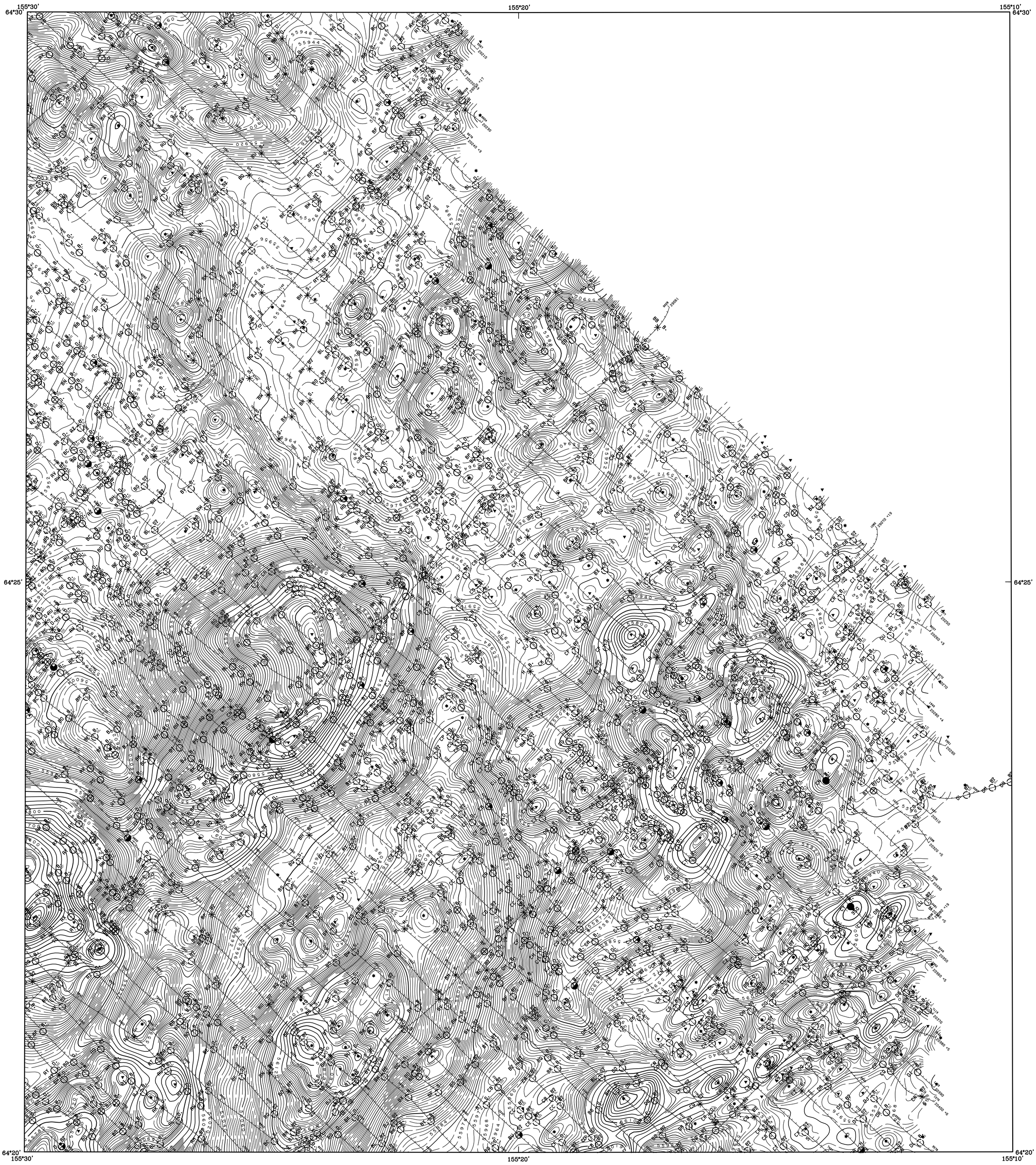


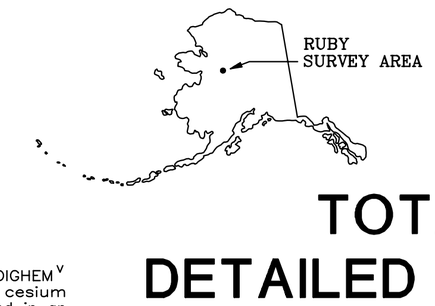
Base from U.S. Geological Survey Ruby B–5, 1952; Quadrangle, Alaska

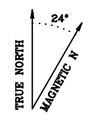
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP D

1998

DESCRIPTIVE NOTES

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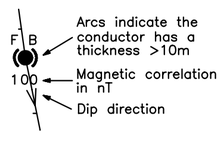
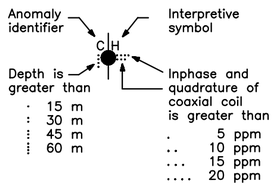
ELECTROMAGNETIC ANOMALIES





Anomaly	Conductance
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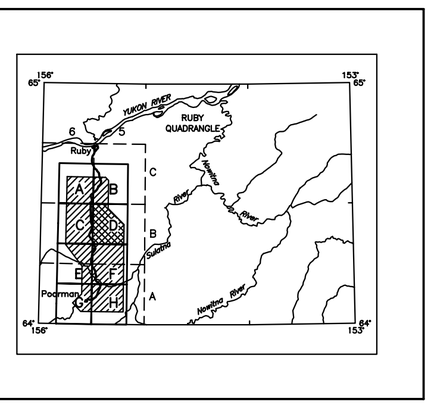
MAGNETIC CONTOUR INTERVAL

- ——————— . . . . . 100 nT
- ——————— . . . . . 20 nT
- ——————— . . . . . 4 nT
- — — — — . . . . . 2 nT
- ▼ . . . . . magnetic low
- ✸ . . . . . magnetic high

LOCATION INDEX FOR SCALE 1:31,680



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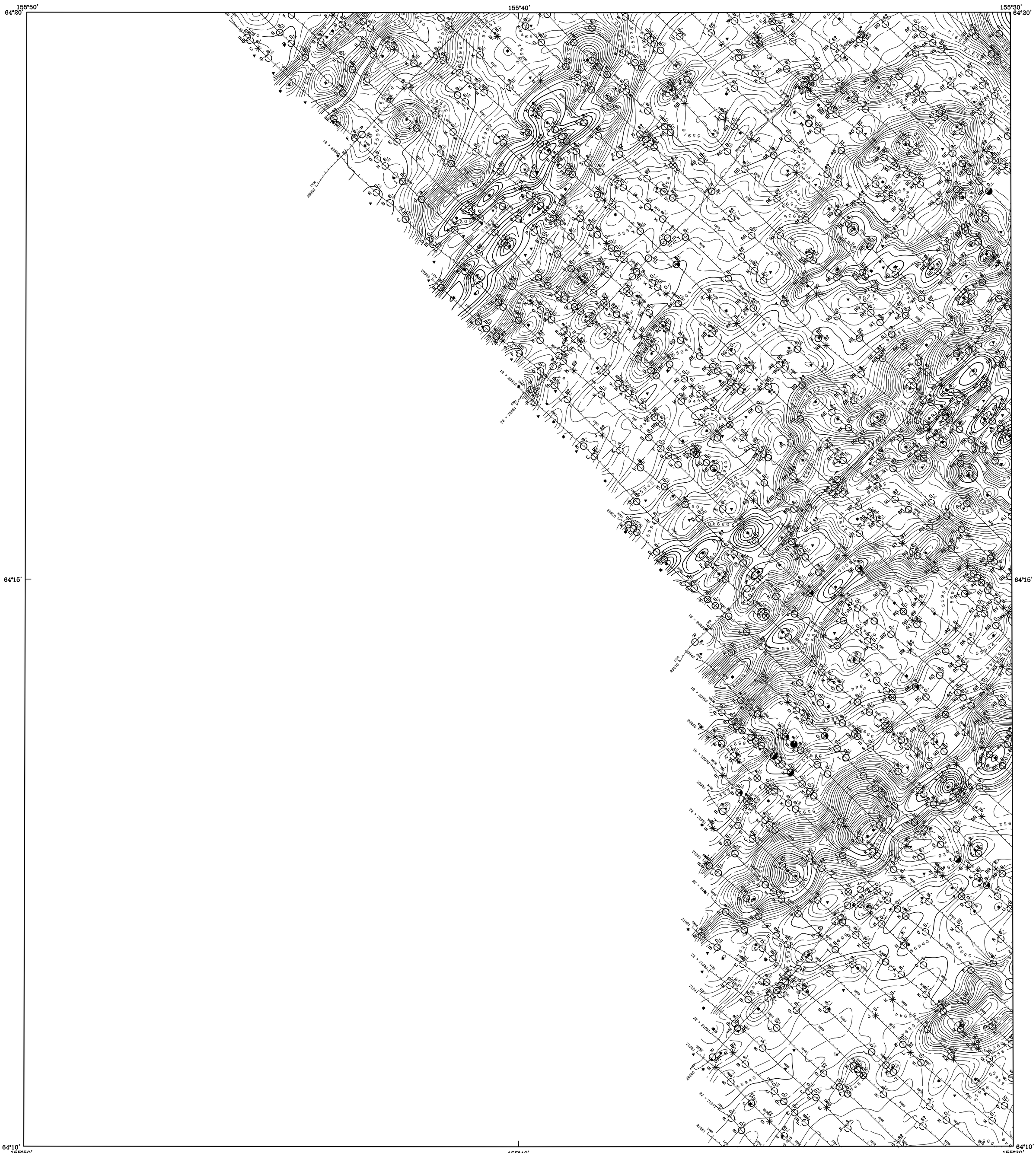

Base from U.S. Geological Survey Ruby A-6; B-6, 1952; Quadrangles, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP E

1998

DESCRIPTIVE NOTES

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MAGNETIC CONTOUR INTERVAL

———	. . . . . 100 nT
———	. . . . . 20 nT
———	. . . . . 4 nT
— — — —	. . . . . 2 nT
▼	. . . . . magnetic low
✱	. . . . . magnetic high

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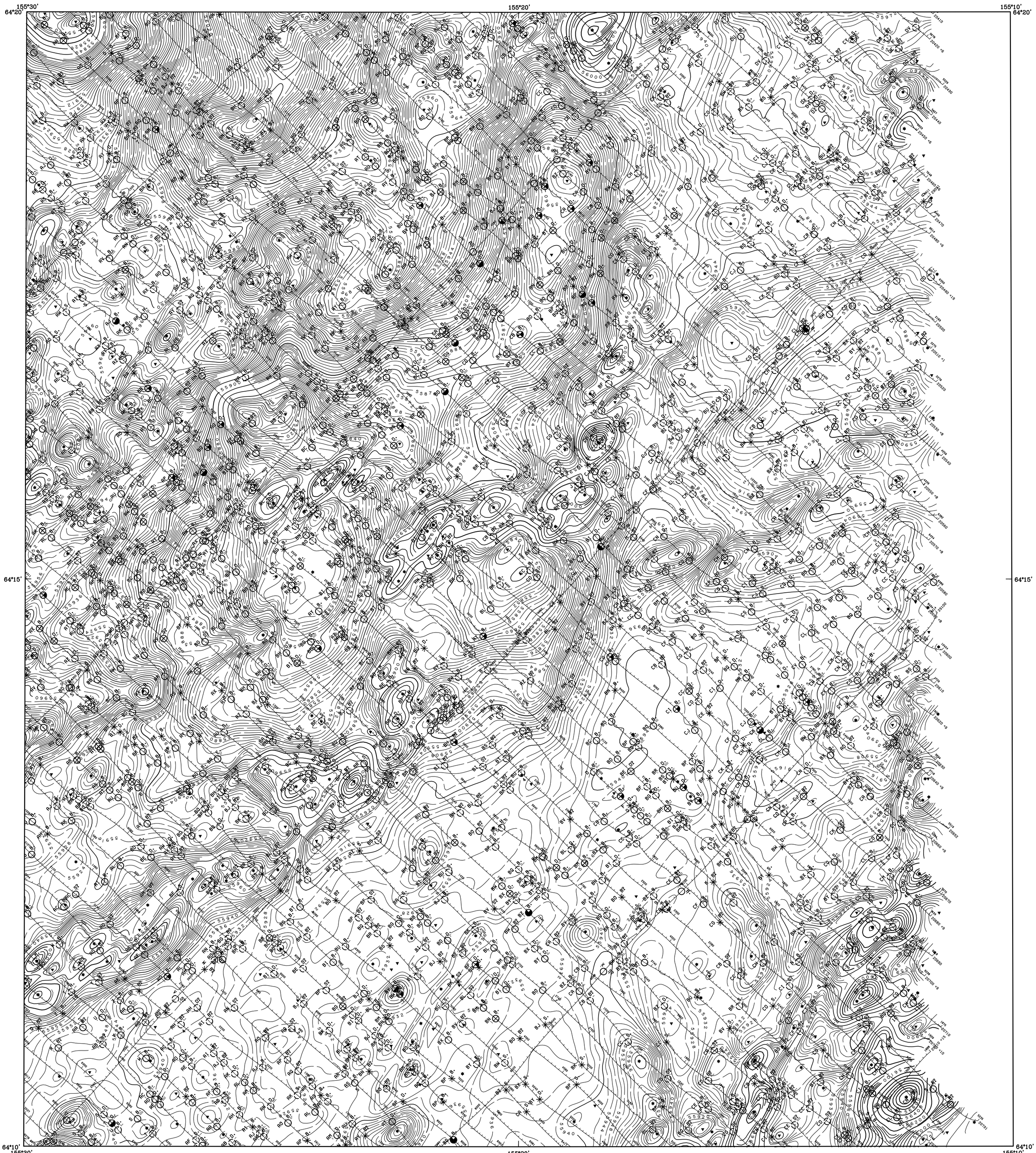

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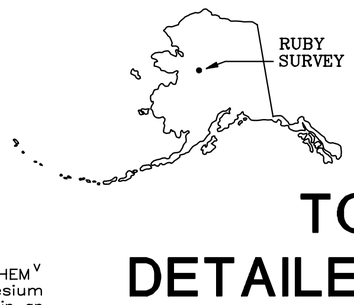
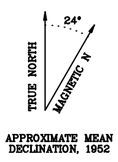
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP F

1998

DESCRIPTIVE NOTES

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ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◑	20–50 siemens
◔	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
△^{M}	EM magnetite response

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

———	. . . . . 100 nT
———	. . . . . 20 nT
———	. . . . . 4 nT
— — — —	. . . . . 2 nT
▼	. . . . . magnetic low
✱	. . . . . magnetic high

LOCATION INDEX FOR SCALE 1:31,680

SURVEY HISTORY

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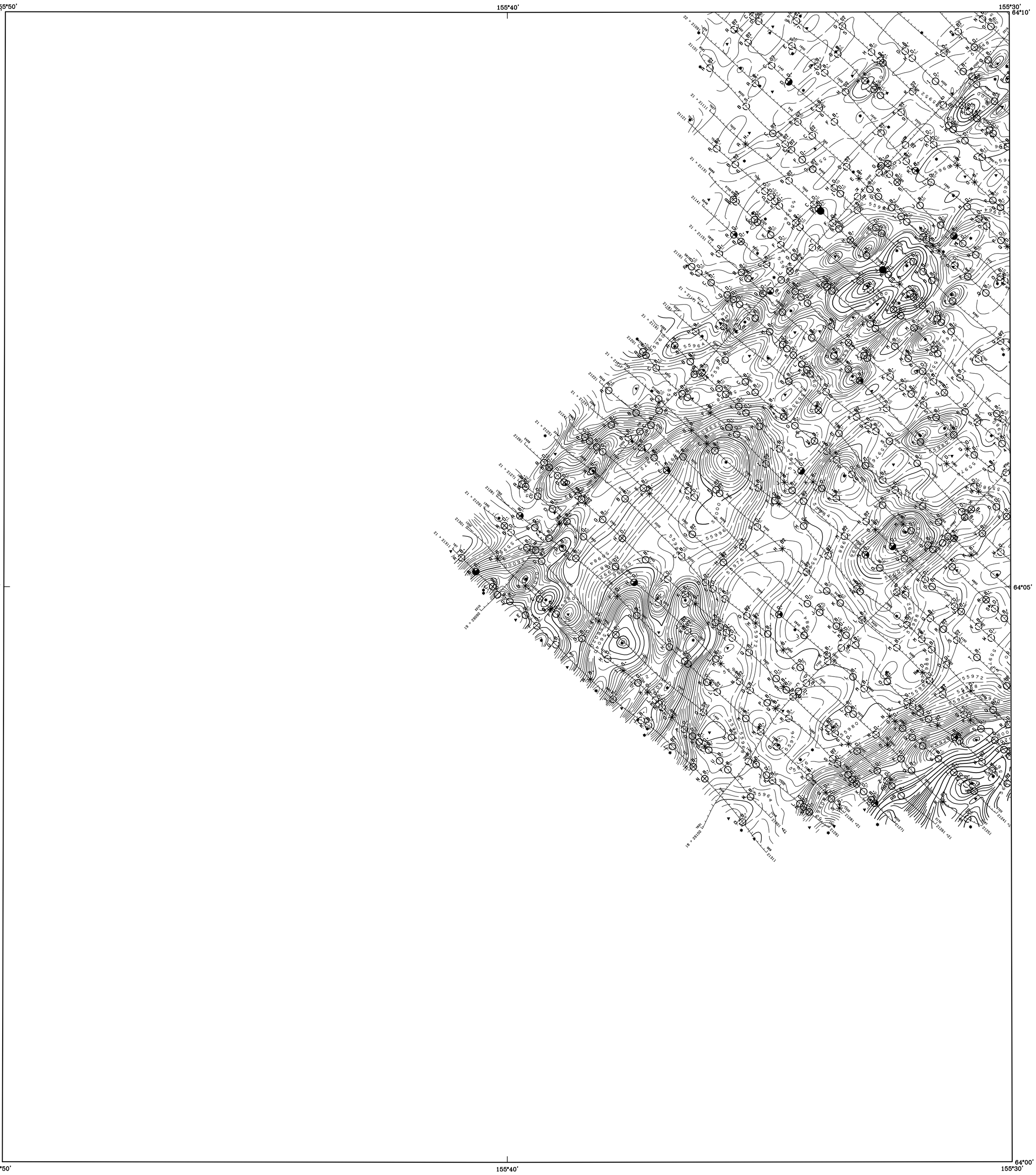
155°50' 155°40' 155°30'

64°10'

64°05'

64°00'



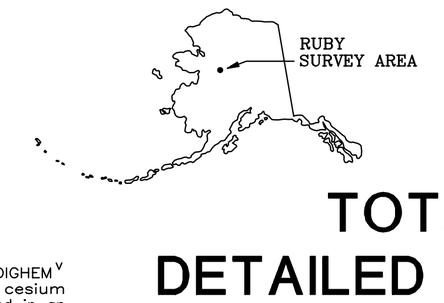
Base from U.S. Geological Survey Ruby A–6, 1952; Quadrangle, Alaska

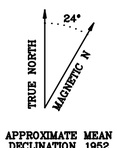
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP G

1998

DESCRIPTIVE NOTES

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ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
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◒	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
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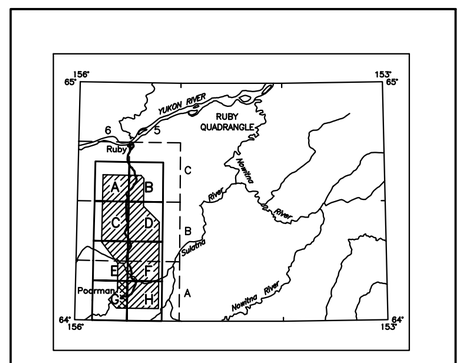
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

———	100 nT
———	20 nT
———	4 nT
— — — —	2 nT
▼	magnetic low
✱	magnetic high

LOCATION INDEX FOR SCALE 1:31,680



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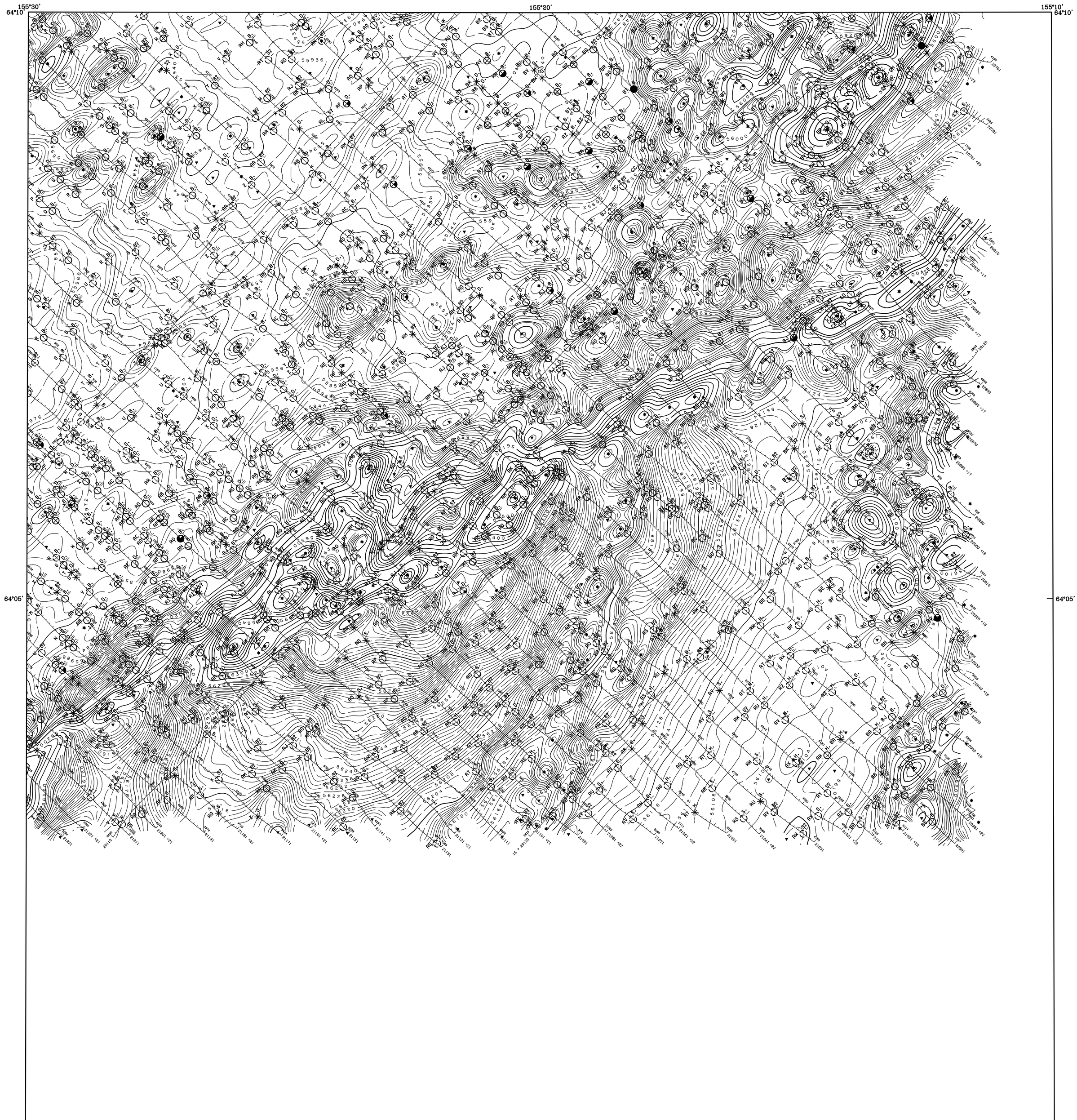


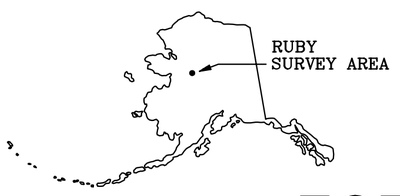
Base from U.S. Geological Survey Ruby A–5, 1952; Quadrangle, Alaska

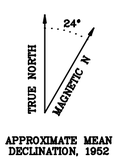
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

MAP H

1998

DESCRIPTIVE NOTES

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Anomaly	Conductance
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⊕	5–10 siemens
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◌	< 1 siemens
✳	Questionable anomaly
△^{M}	EM magnetite response

Interpretive symbol	Conductor ("model")
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E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

———	. . . . . 100 nT
———	. . . . . 20 nT
———	. . . . . 4 nT
— — — —	. . . . . 2 nT
▼	. . . . . magnetic low
✱	. . . . . magnetic high

LOCATION INDEX FOR SCALE 1:31,680

SURVEY HISTORY

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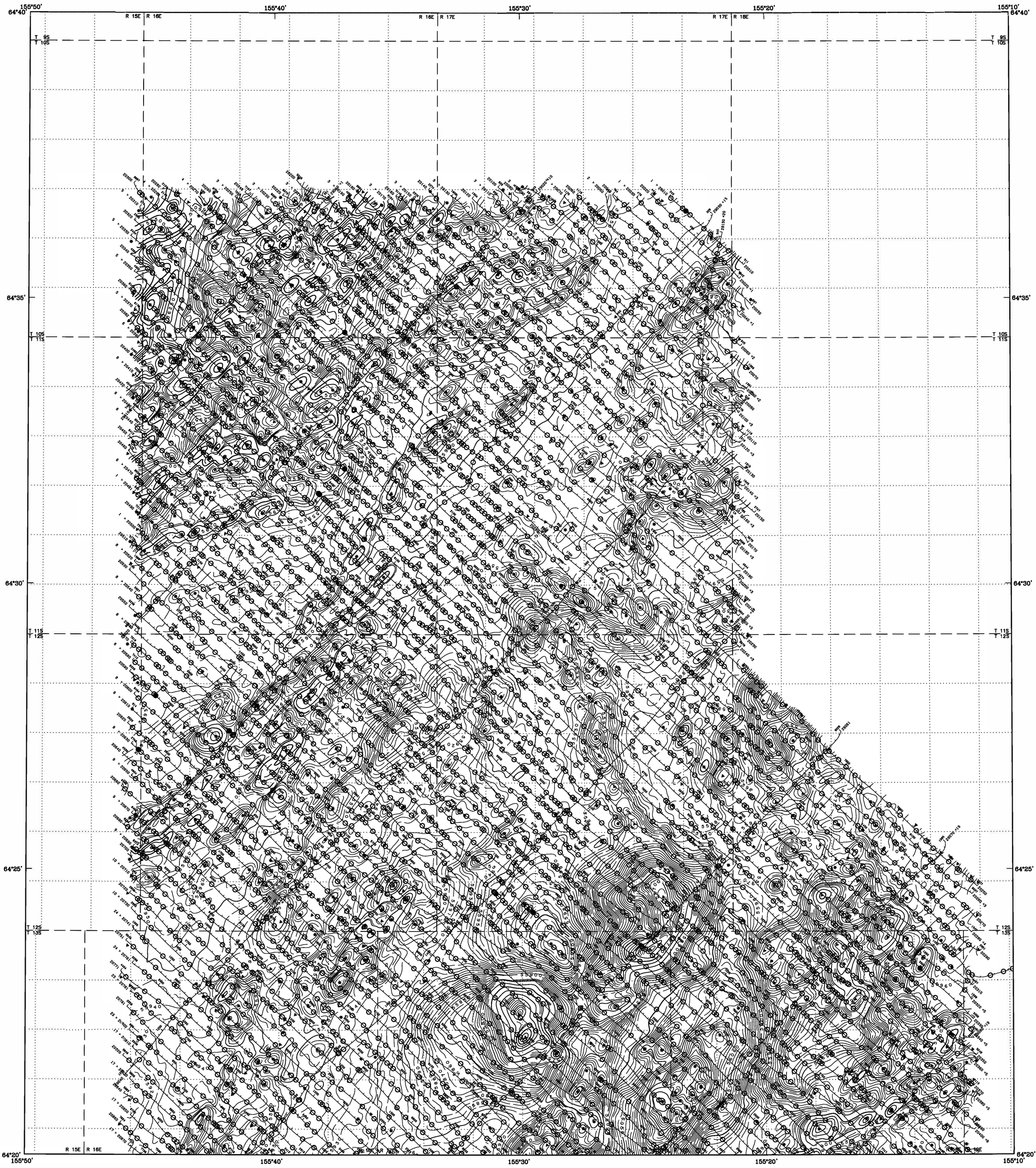
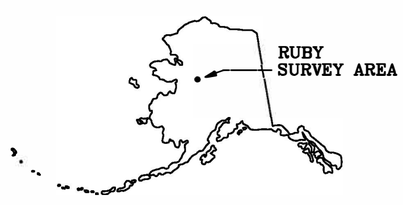


Section outlines from U.S. Geological Survey Ruby B-5, B-6, 1952; C-5, C-6, 1952; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

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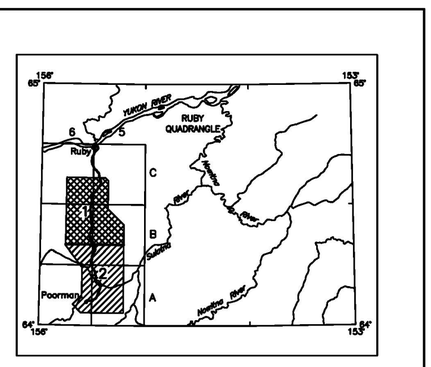
ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>50 siemens
○	<50 siemens
✳	Questionable anomaly
△	Weak conductivity associated with an EM magnetite response

MAGNETIC CONTOUR INTERVAL

- 250 nT
- 50 nT
- 10 nT
- 5 nT
- magnetic low
- magnetic high

LOCATION INDEX



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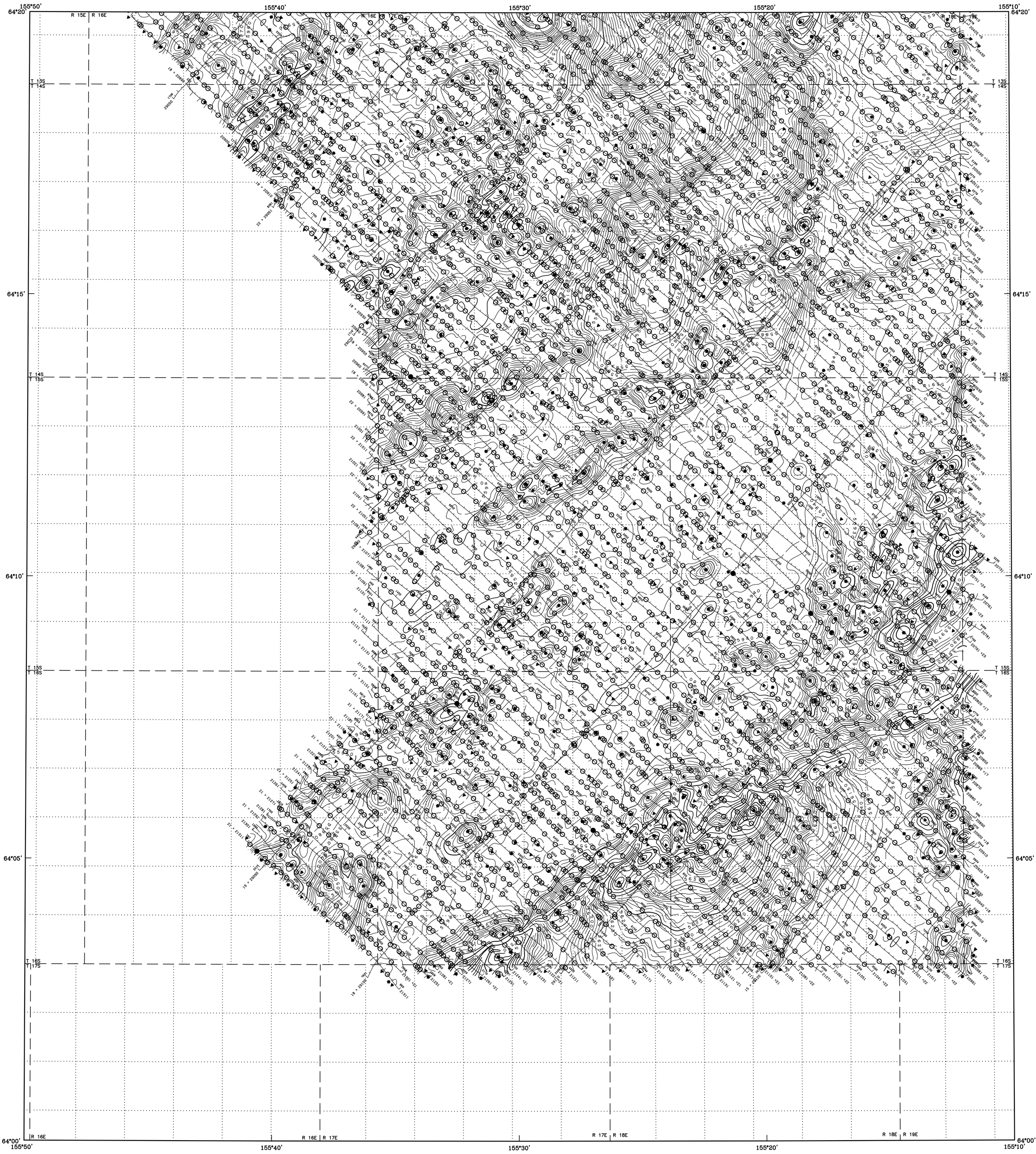
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 98-



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SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS AND ELECTROMAGNETIC ANOMALIES OF THE RUBY AREA, CENTRAL ALASKA

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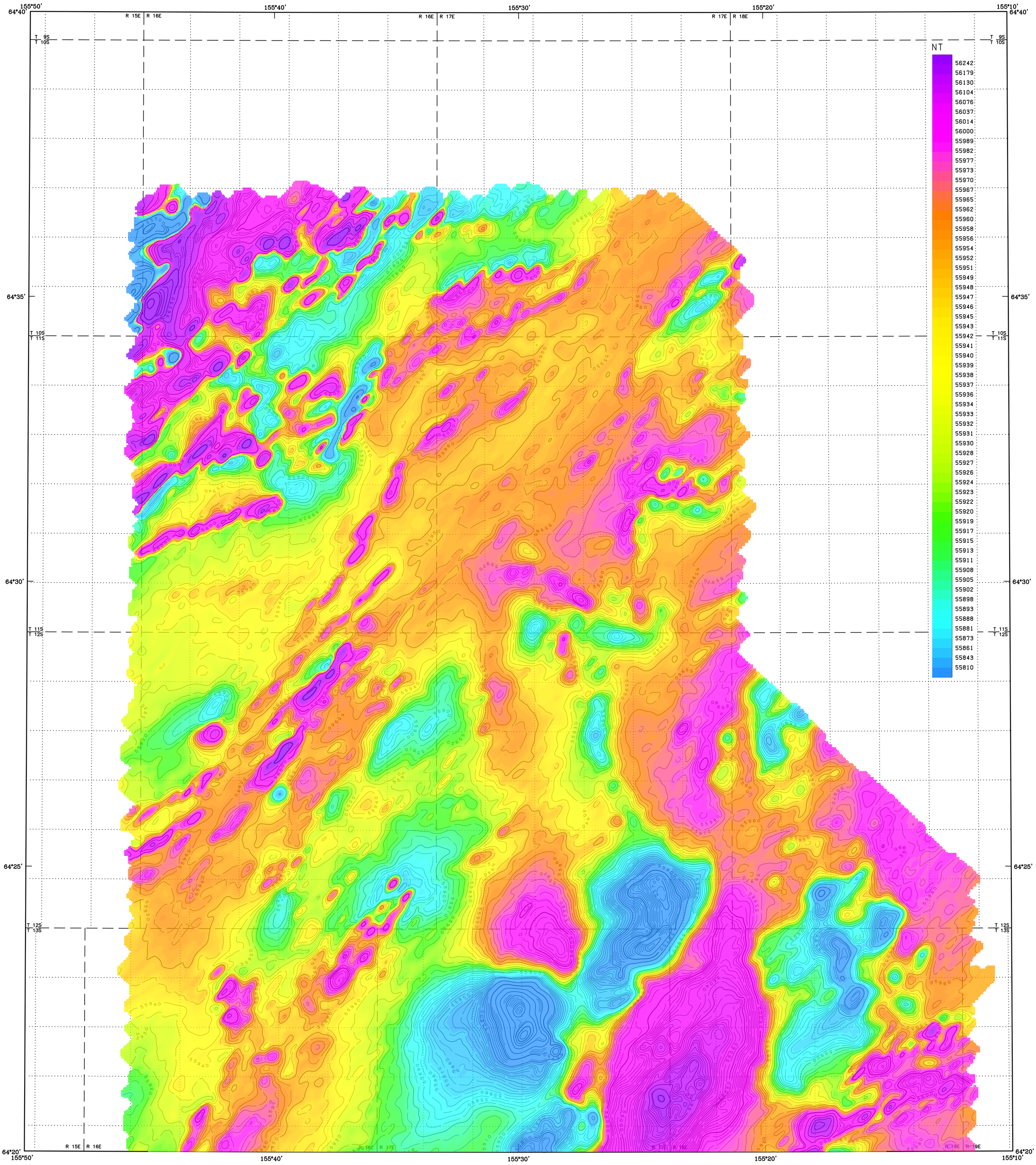
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



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SCALE 1:63,360

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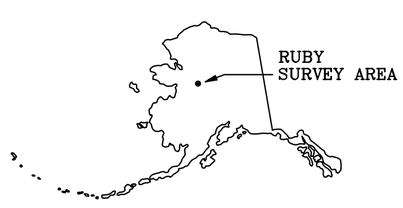

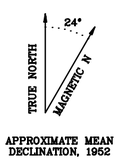

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TOTAL FIELD MAGNETICS OF THE RUBY AREA, CENTRAL ALASKA

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MAGNETIC CONTOUR INTERVAL

250 nT

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10 nT

5 nT

LOCATION INDEX

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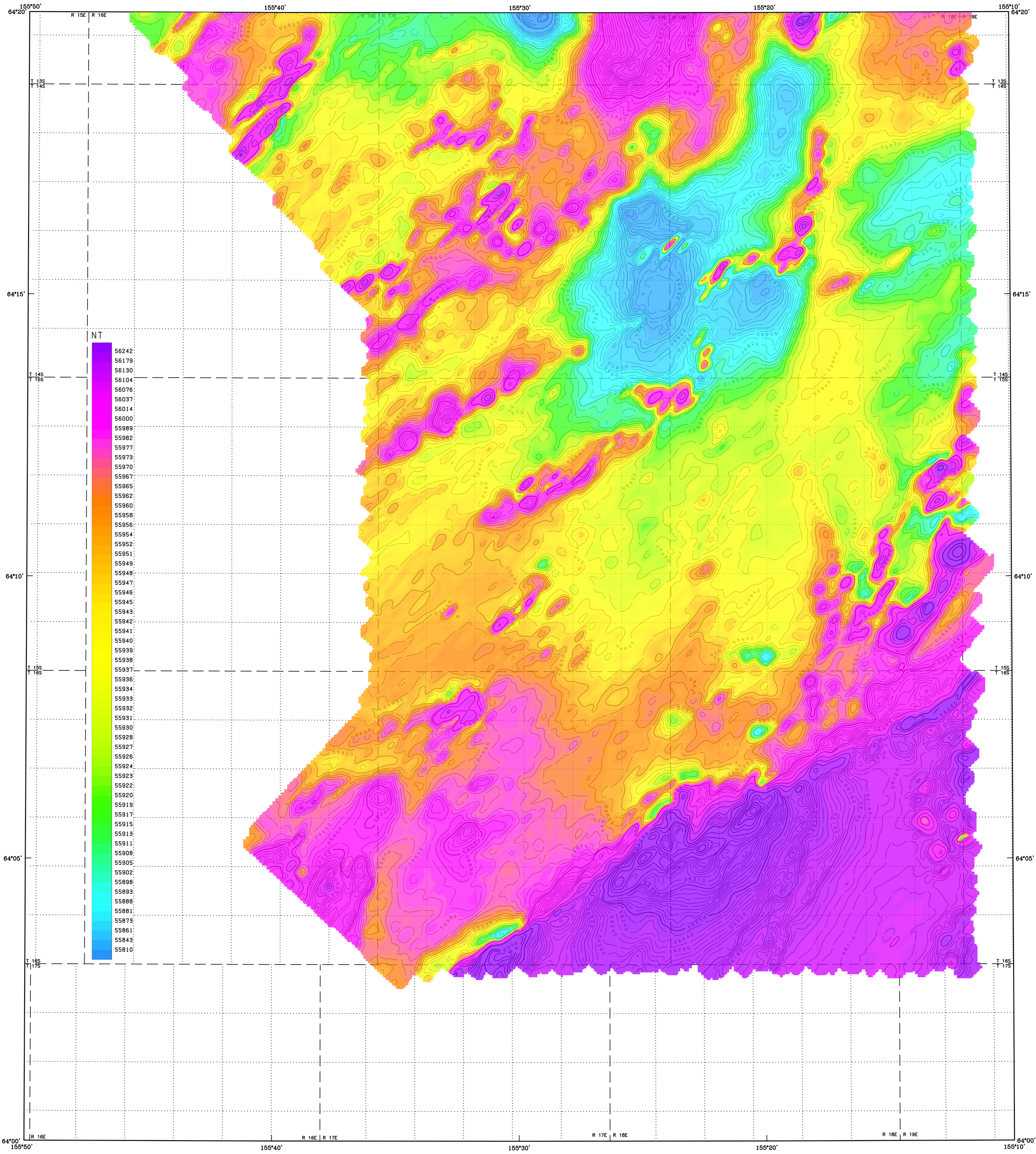
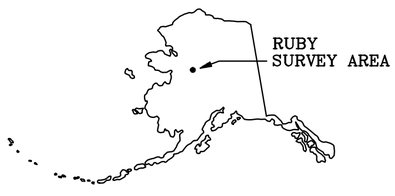
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



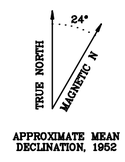
Section outlines from U.S. Geological Survey Ruby A–5, A–6, 1952; B–5, B–6, 1952; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS OF THE RUBY AREA, CENTRAL ALASKA

1998

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, a Scintrex cesium magnetometer, and a Herz VLF system installed in an AS350B–2 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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TOTAL FIELD MAGNETICS

The total field magnetic data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1995, updated to August 1997) was removed from the leveled magnetic data.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

MAGNETIC CONTOUR INTERVAL

250 nT

50 nT

10 nT

5 nT

LOCATION INDEX

SURVEY HISTORY

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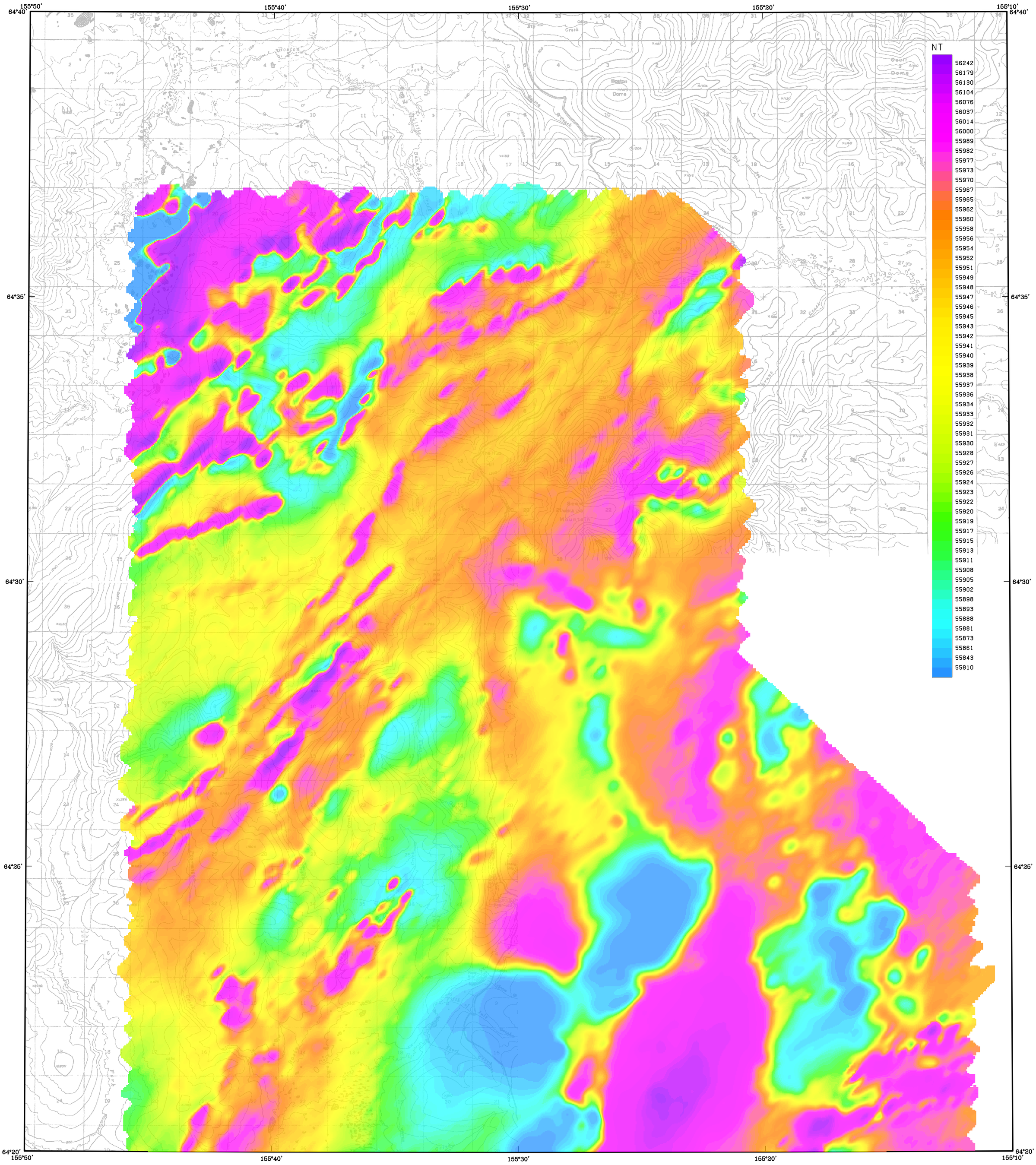
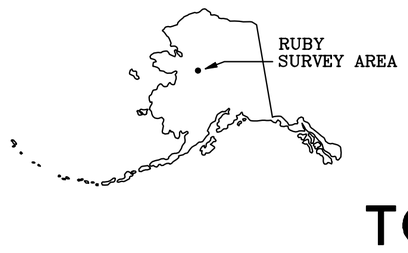


Base from U.S. Geological Survey Ruby B-5, B-6, 1952; C-5, C-6, 1952; Quadrangles, Alaska

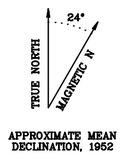


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN DECLINATION, 1952

TOTAL FIELD MAGNETICS OF THE RUBY AREA, CENTRAL ALASKA

1998

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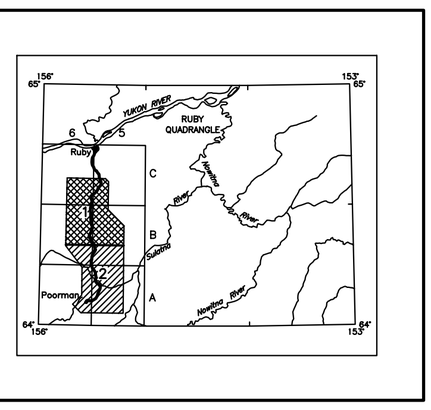
LOCATION INDEX



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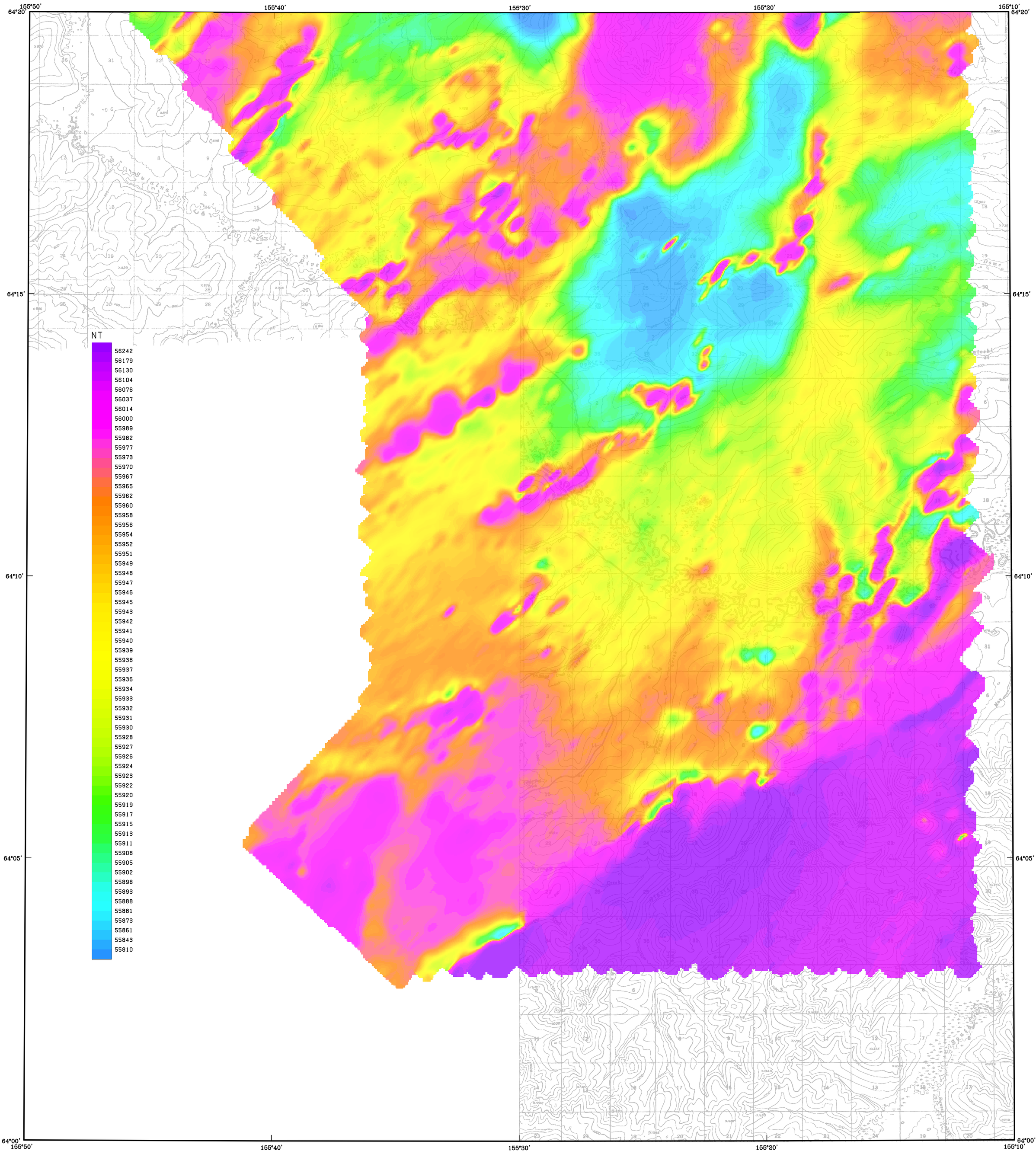

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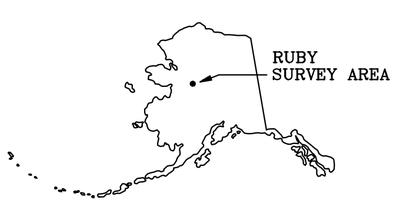

SCALE 1:63,360

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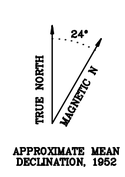
1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN
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