MORAN ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC GEOPHYSICAL SURVEY DATA COMPILATION

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MORAN ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns[1], G.R.C. Graham[1], J.D. Barefoot[1], Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

ABSTRACT

The Moran electromagnetic, magnetic, and radiometric airborne geophysical survey is located in interior Alaska in the Melozitna and Hot Springs mining districts, about 225 kilometers southeast of Fairbanks. Frequency domain electromagnetic, magnetic, and radiometric data were collected with the DIGHEM^{V} system from July to August 2009. A total of 4,685.9 line kilometers were collected covering 1,691.3 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 and provide insight into possible locations of gold-related intrusions, and high-and low-angle fault sets related to mineralizing systems. The Melozitna mining district has a long history of placer gold mining, but there is little to no current production.

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

AVAILABLE DATA

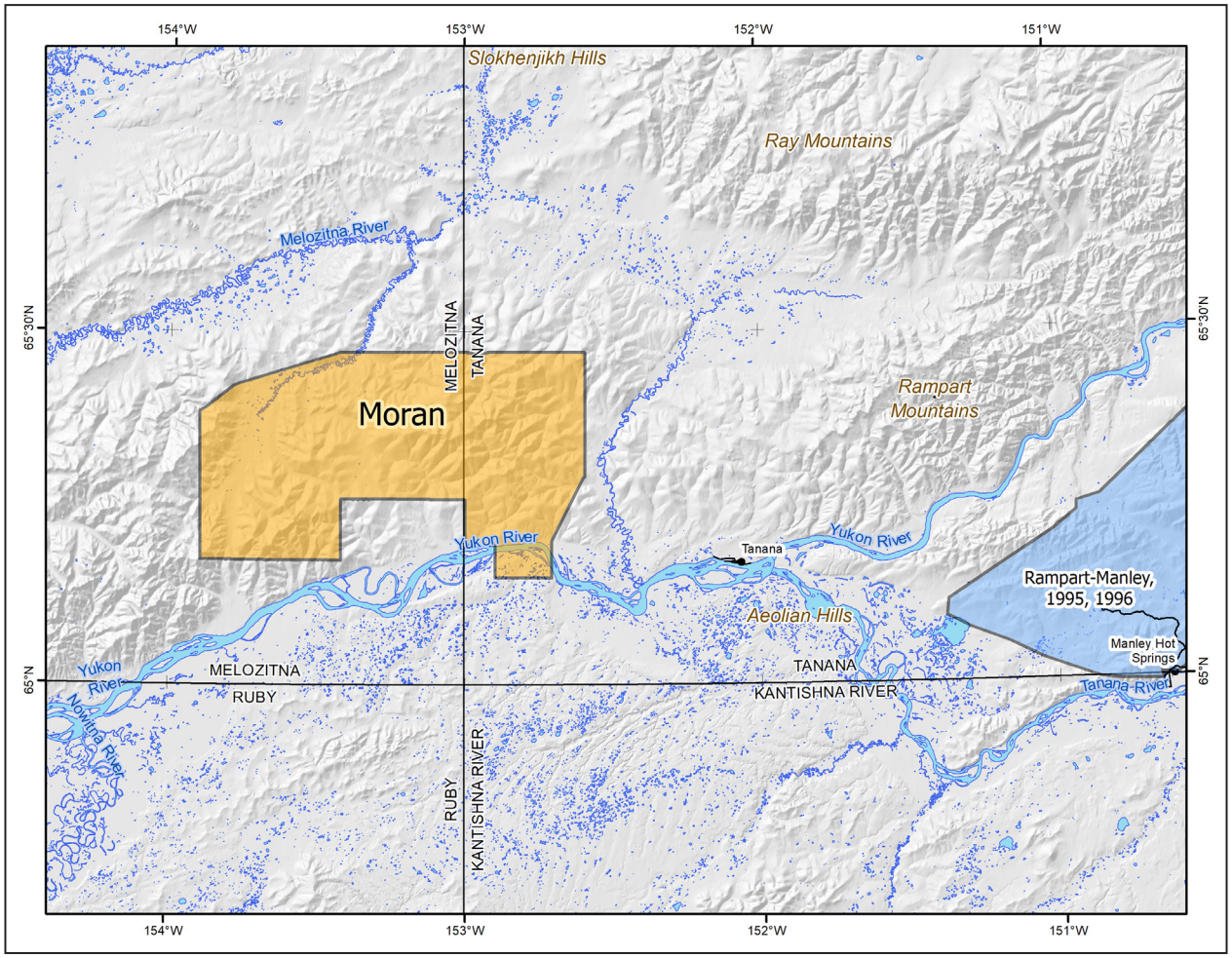
Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor	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	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

REFERENCES

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, n. 4, p. 589–602.

Burns, L.E., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2010, Line, grid, and vector data, and maps for the airborne geophysical survey of the Moran Survey Area, Melozitna and Tanana quadrangles, central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2010-1, 56 sheets, scale 1:63,360, 1 DVD. http://doi.org/10.14509/20561

International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.



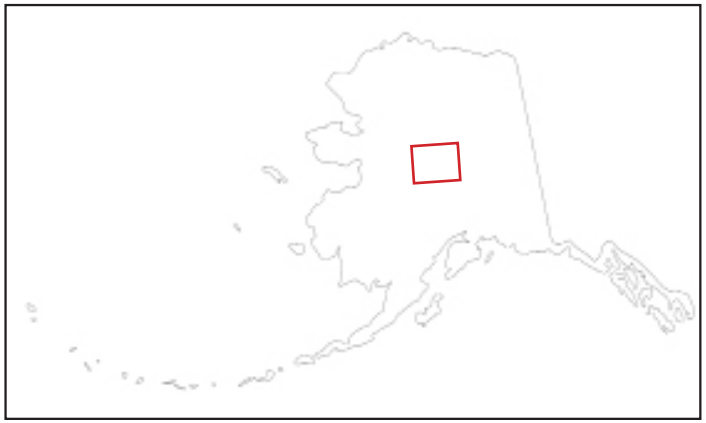


Figure 1. Moran electromagnetic and magnetic airborne geophysical survey location shown in southcentral Alaska (inset). Moran survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.

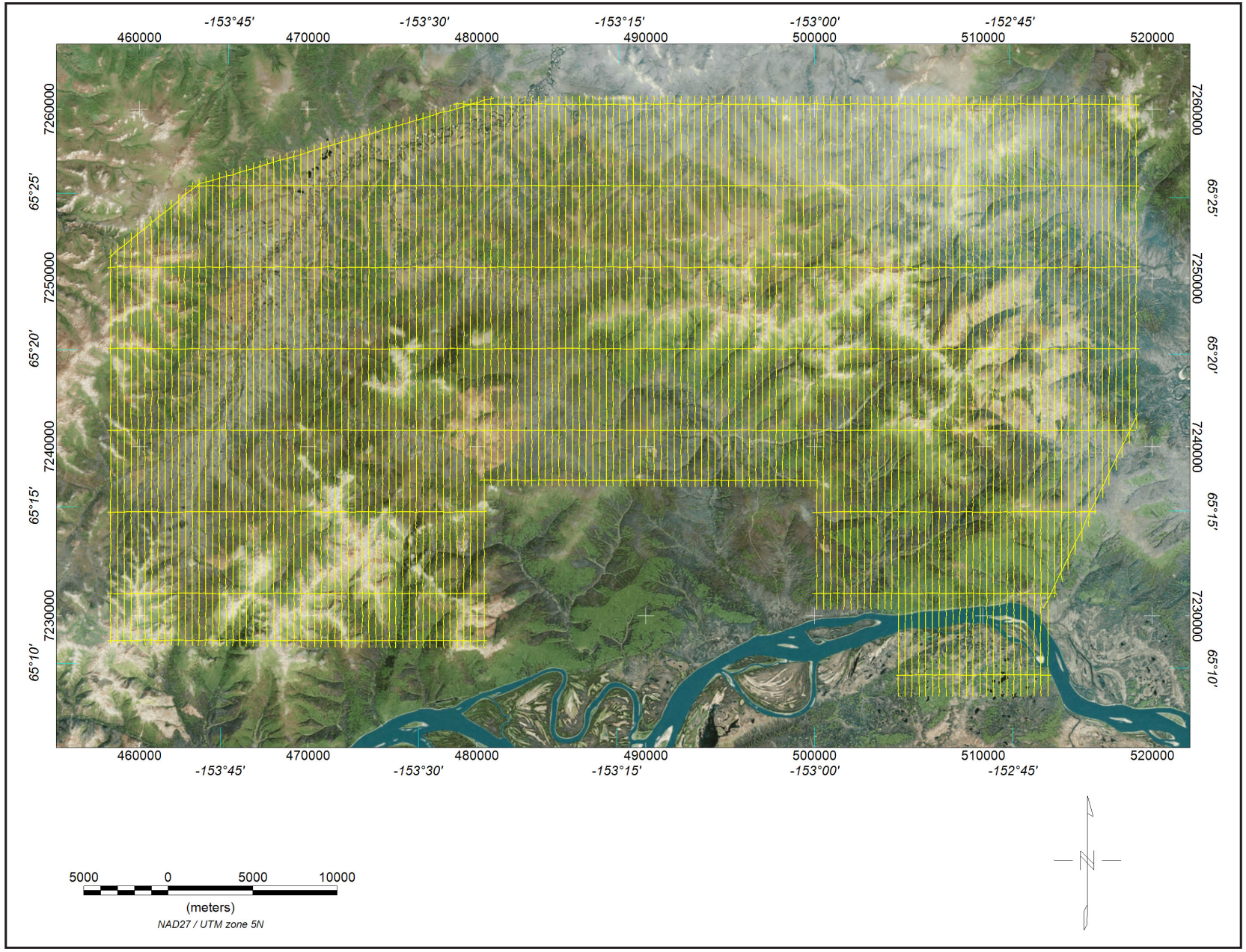


Figure 2. Flight path with orthometric image.

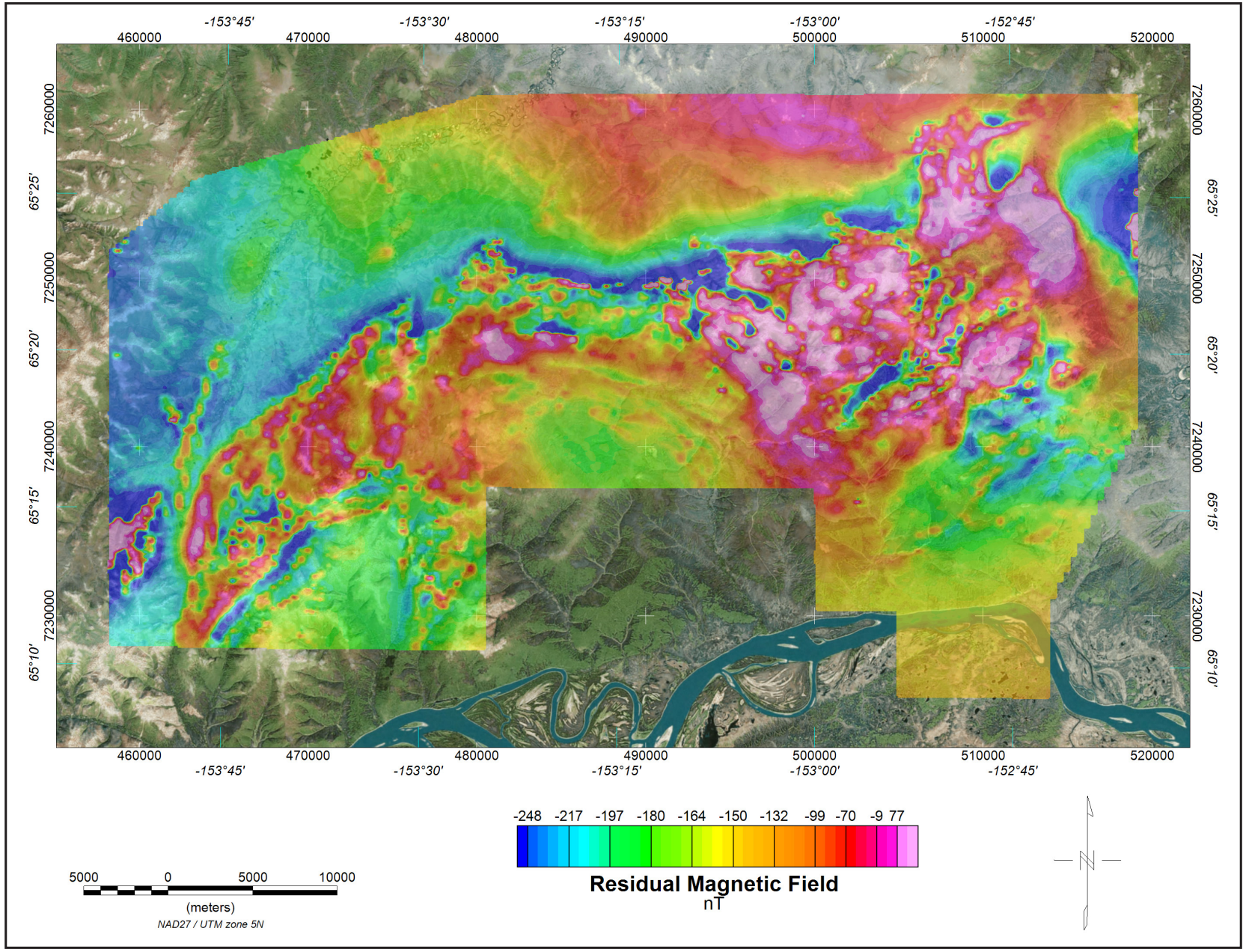


Figure 3. Residual Magnetic Field grid with orthometric image. The magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2005, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

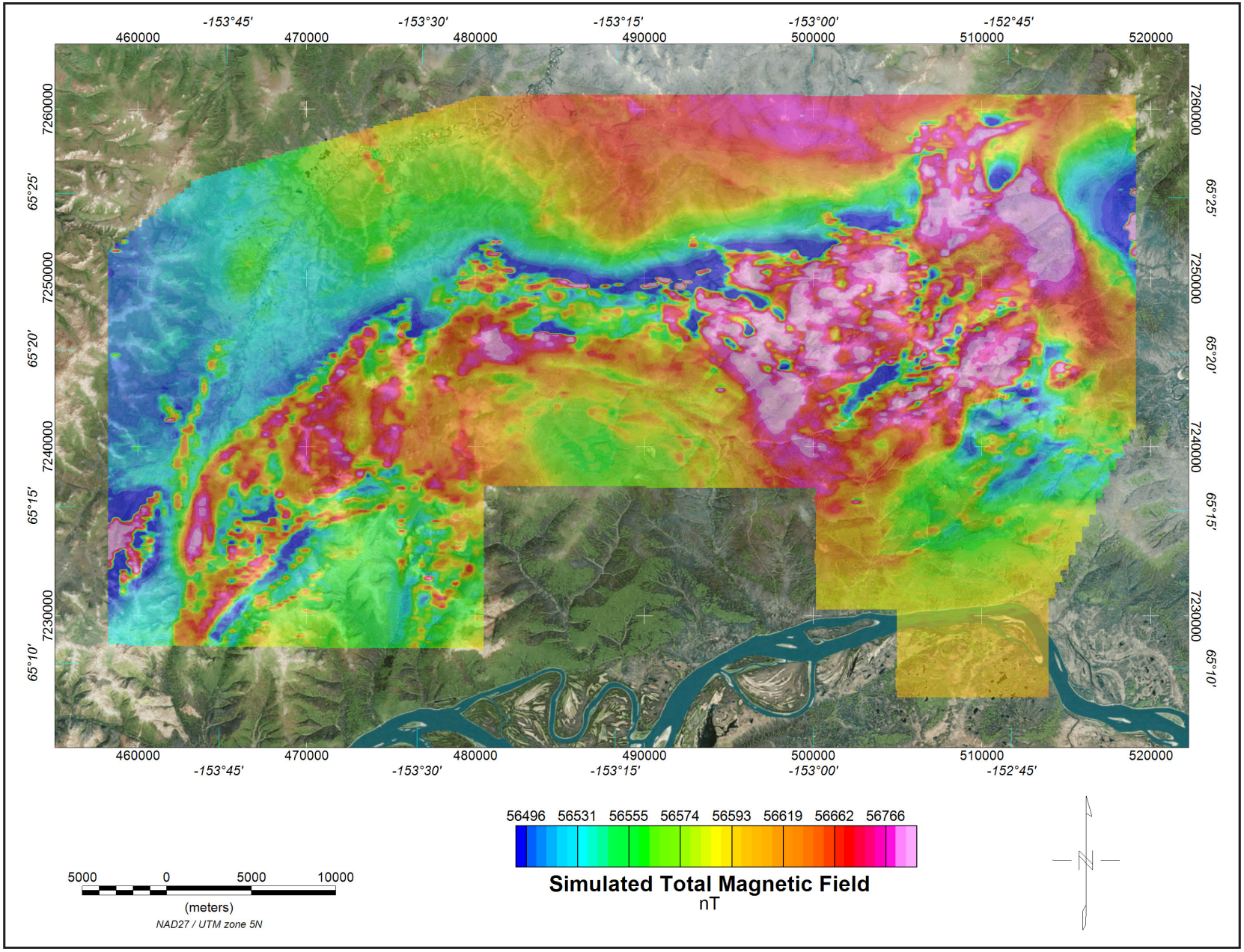


Figure 4. Simulated Magnetic Total Field grid with orthometric image. The simulated magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (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 80 m grid using a modified Akima (1970) technique.

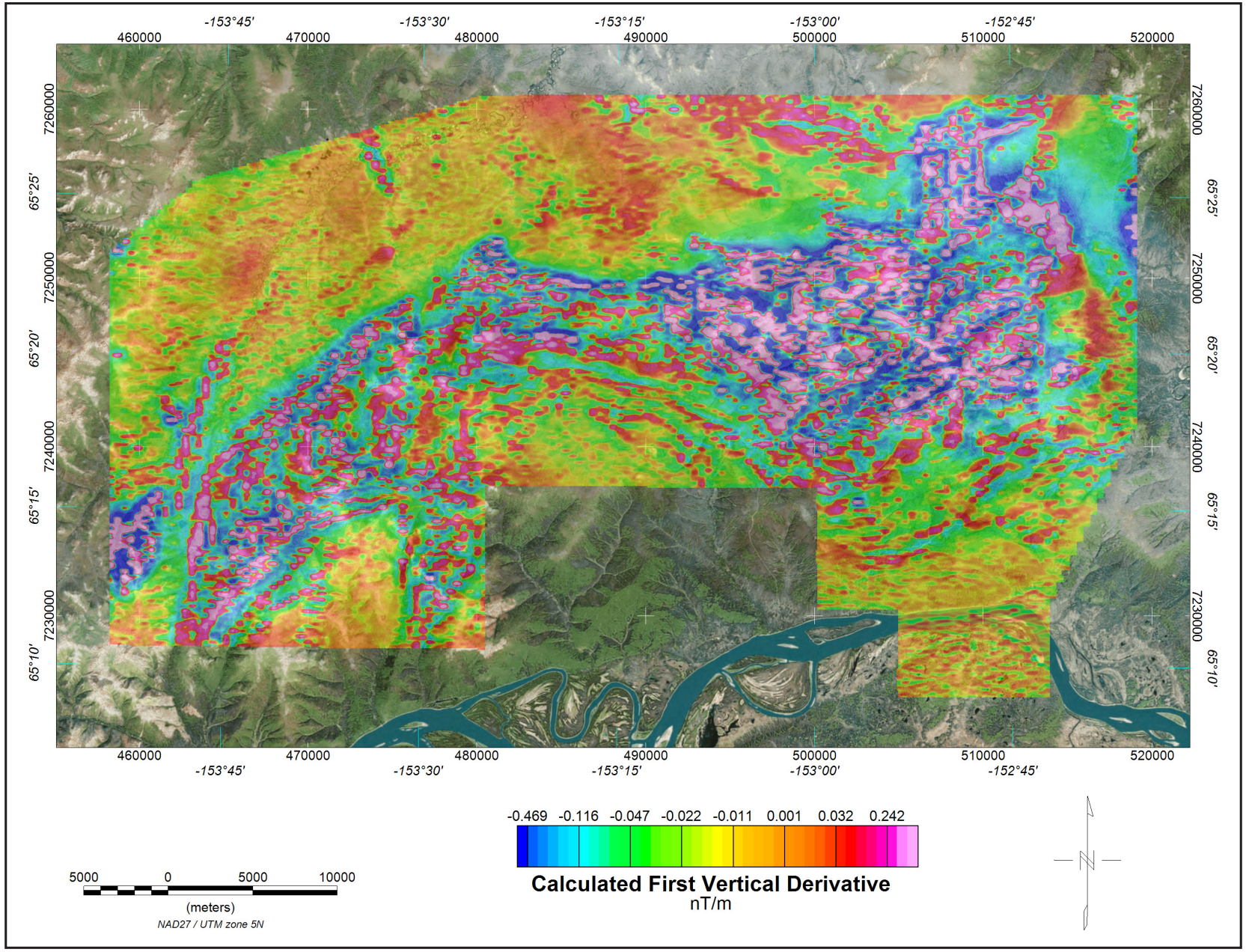


Figure 5. Calculated First Vertical Derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

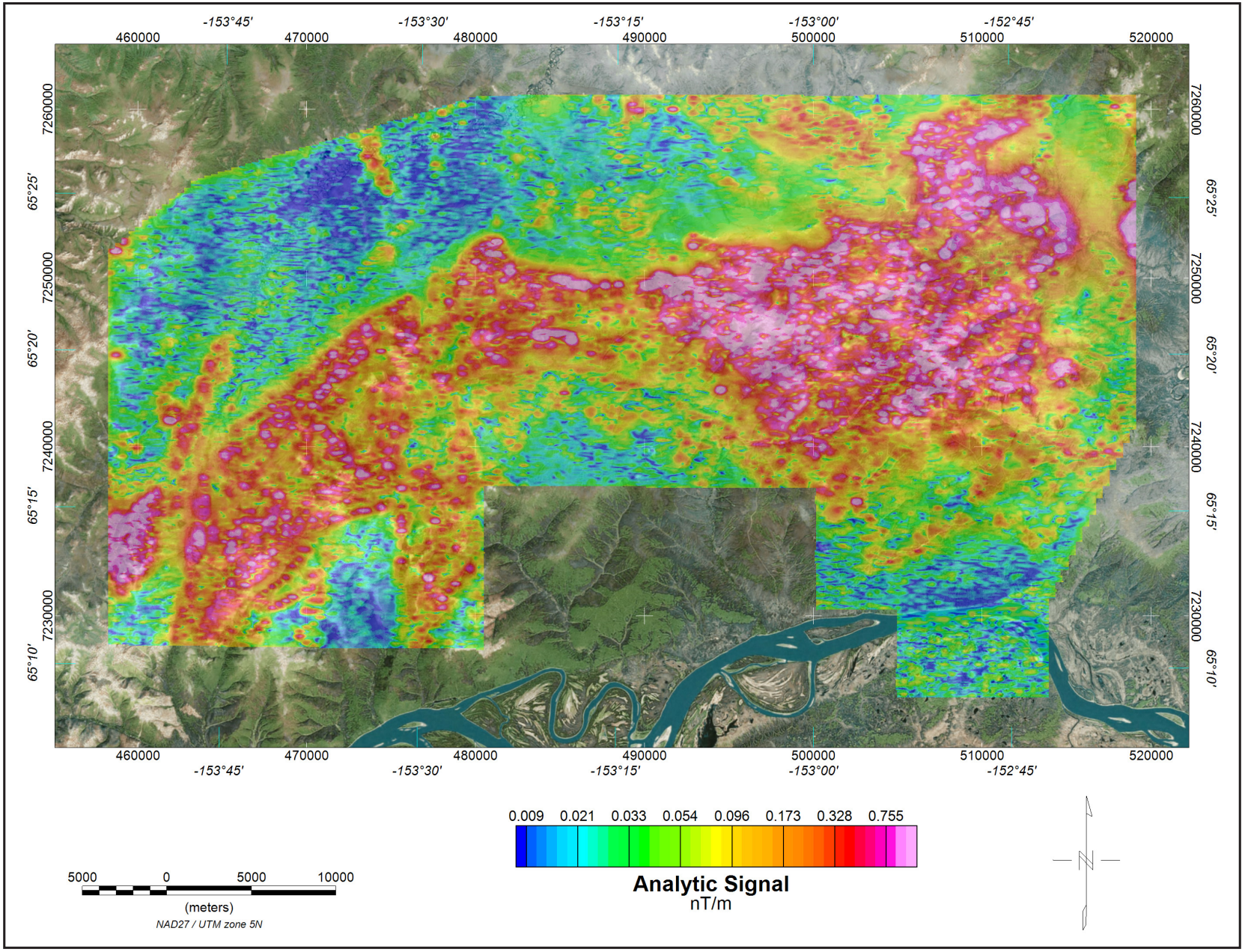


Figure 6. Analytic Signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source 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.

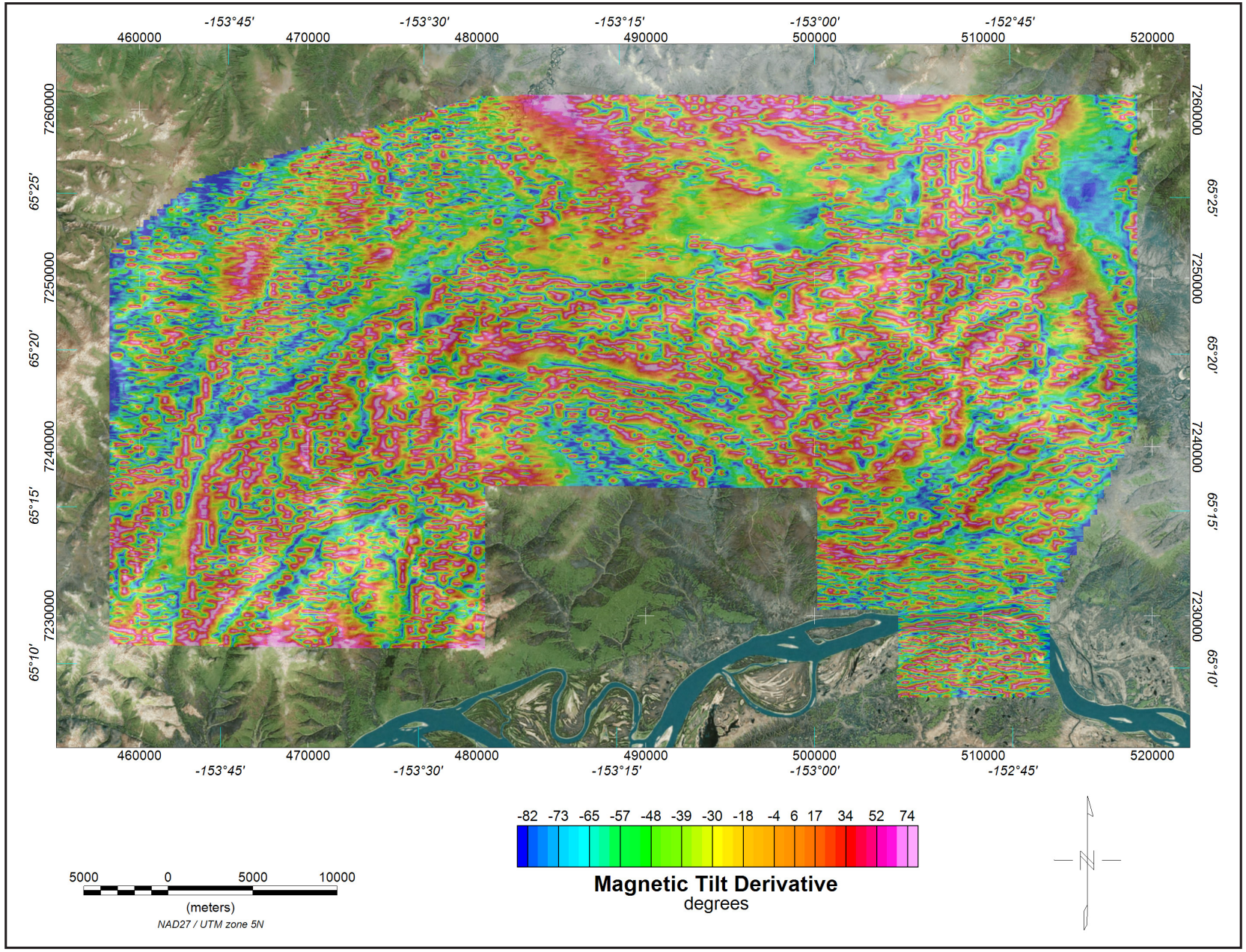


Figure 7. Magnetic Tile Derivative grid with orthometric image. The tilt derivative is the angle between the horizontal gradient and the total gradient, which is useful for identifying the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

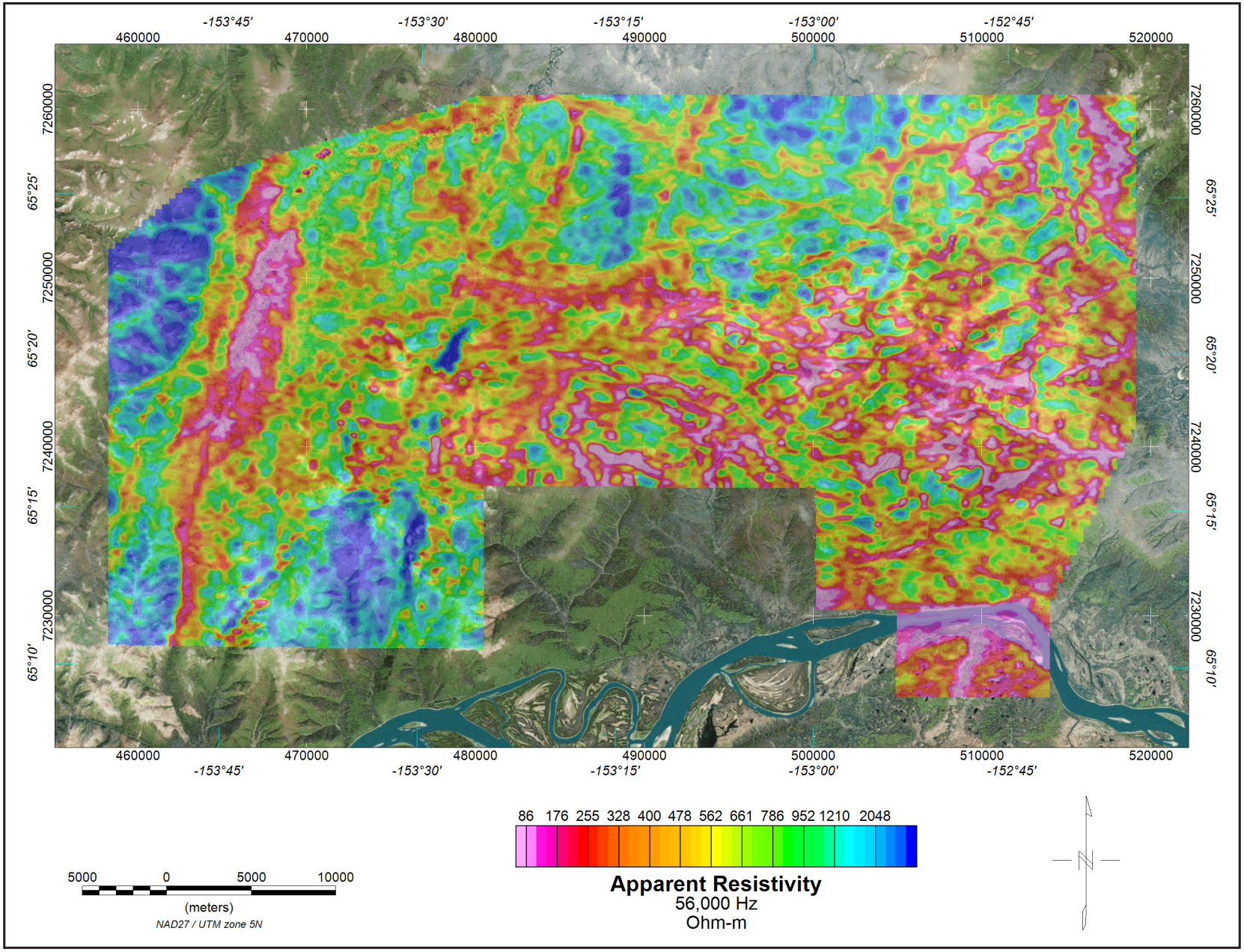


Figure 8. 56,000 Hz coplanar Apparent Resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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 80 m grid using a modified Akima (1970) technique.

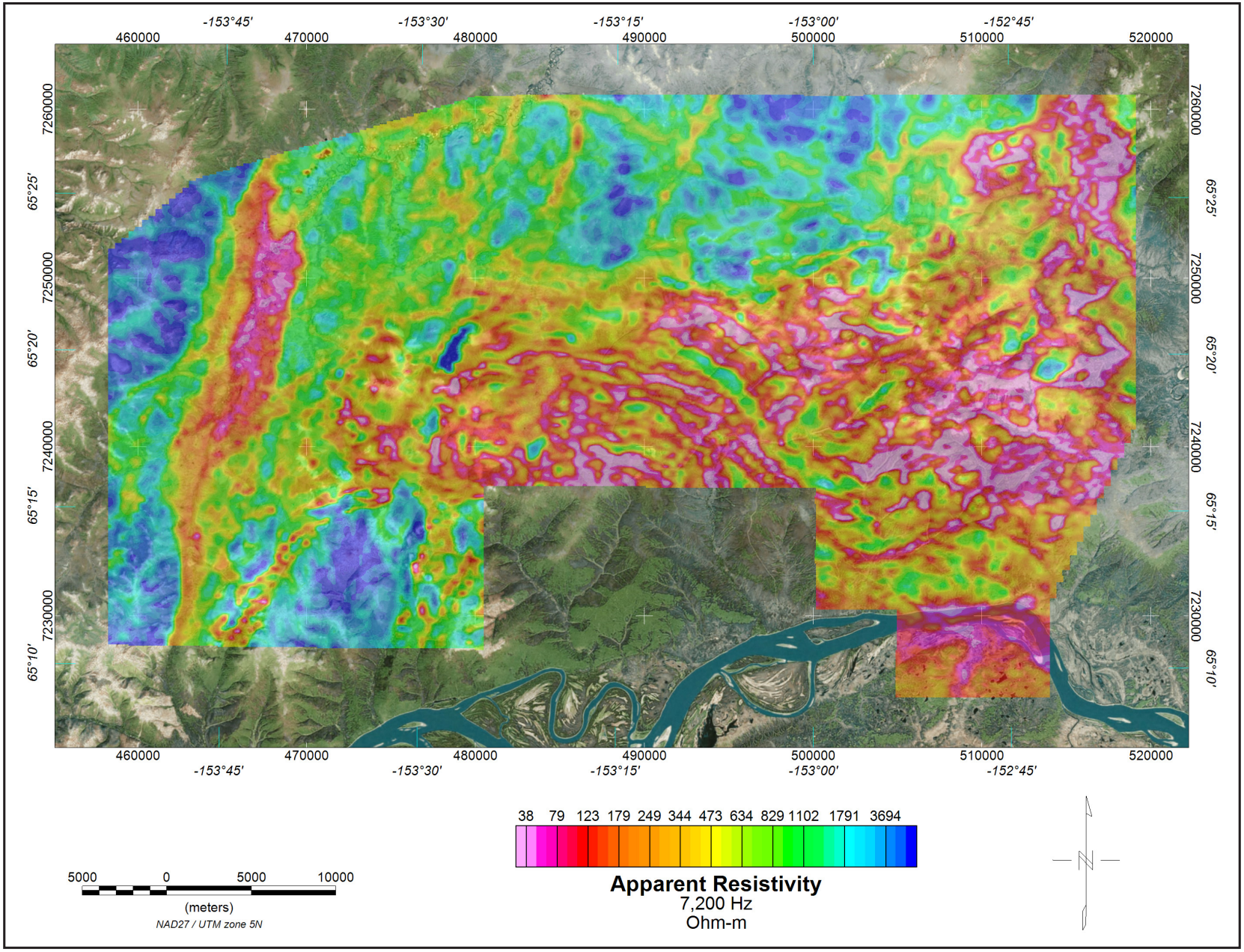


Figure 9. 7,200 Hz coplanar Apparent Resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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 80 m grid using a modified Akima (1970) technique.

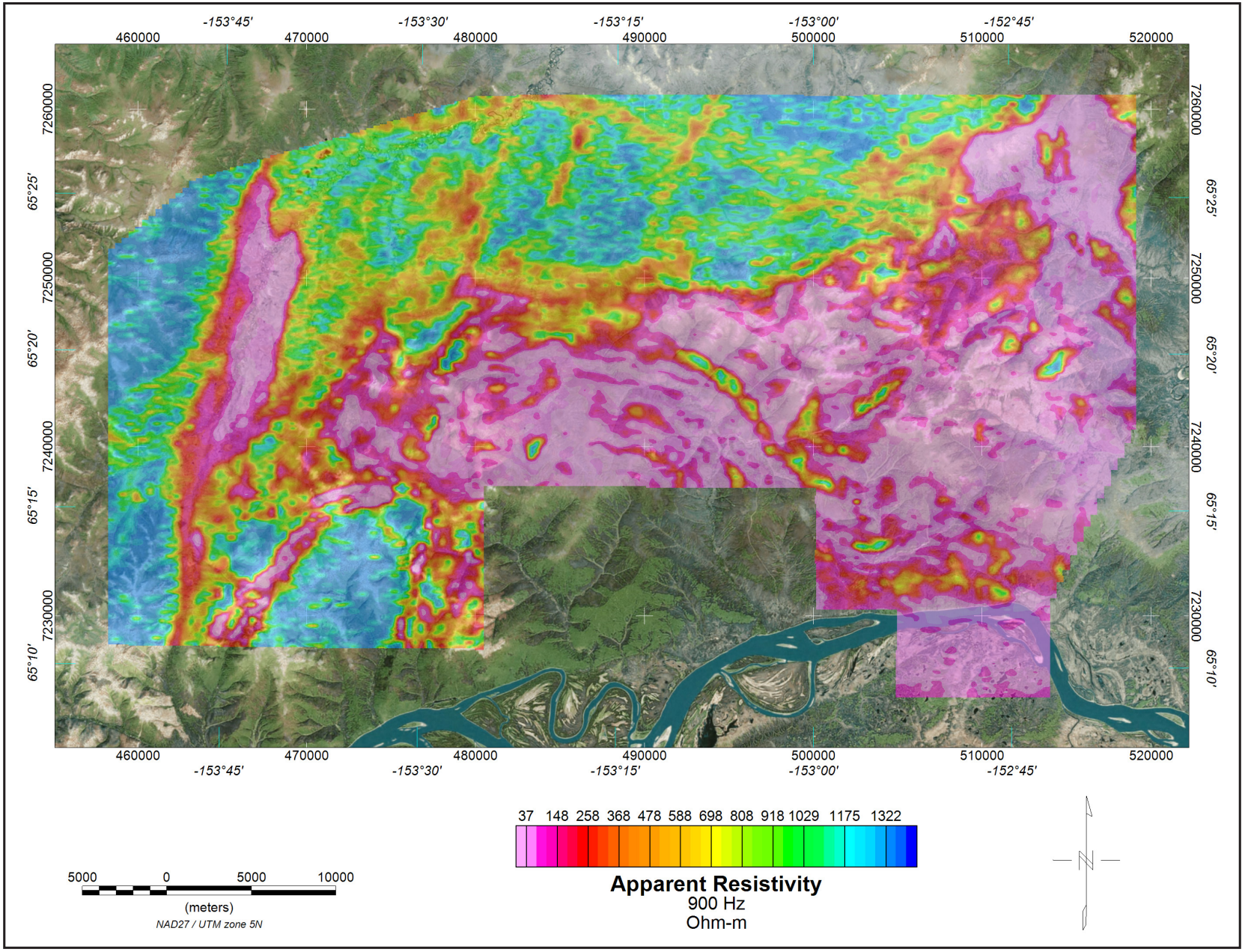


Figure 10. 900 Hz coplanar Apparent Resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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 80 m grid using a modified Akima (1970) technique.

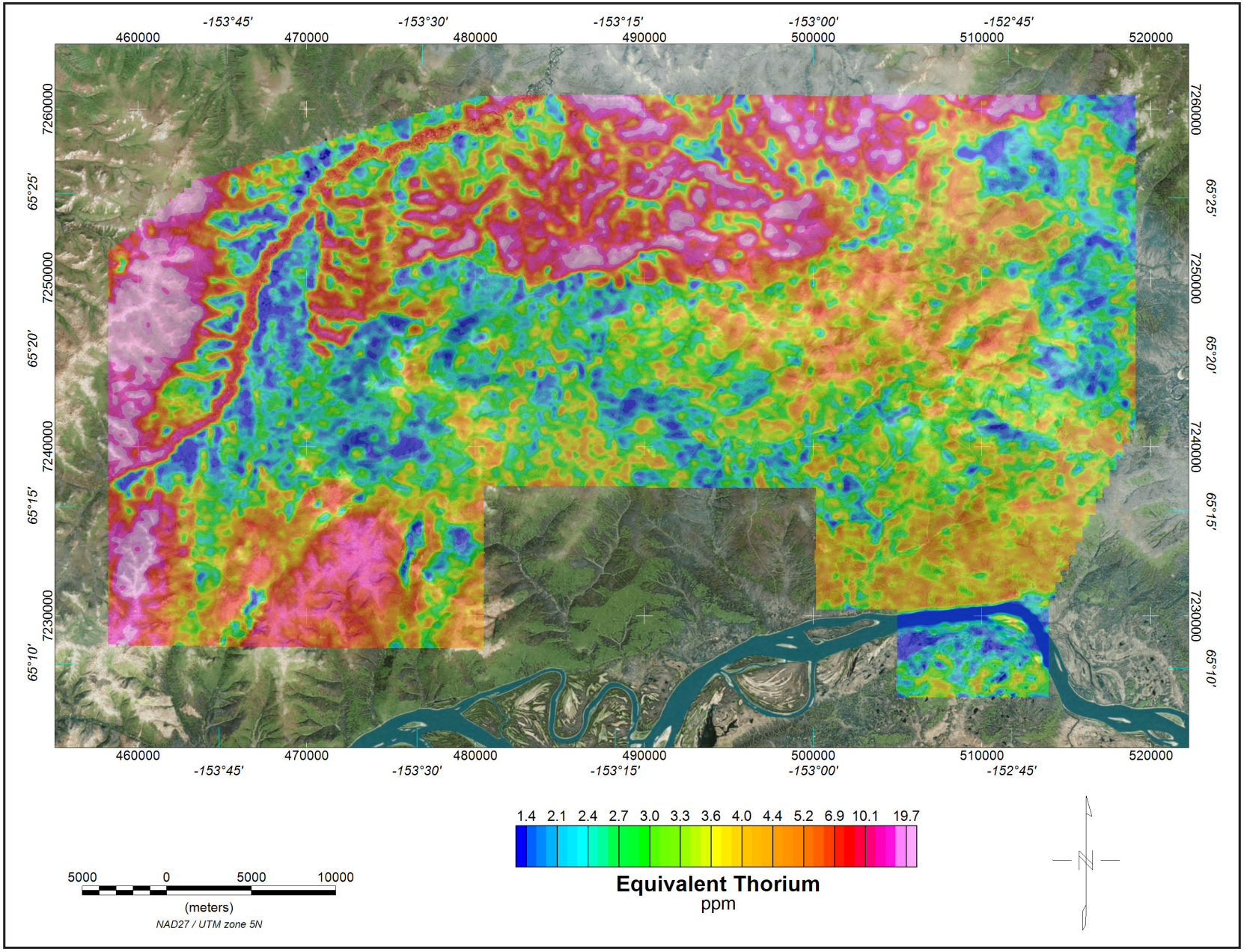


Figure 11. Equivalent Thorium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

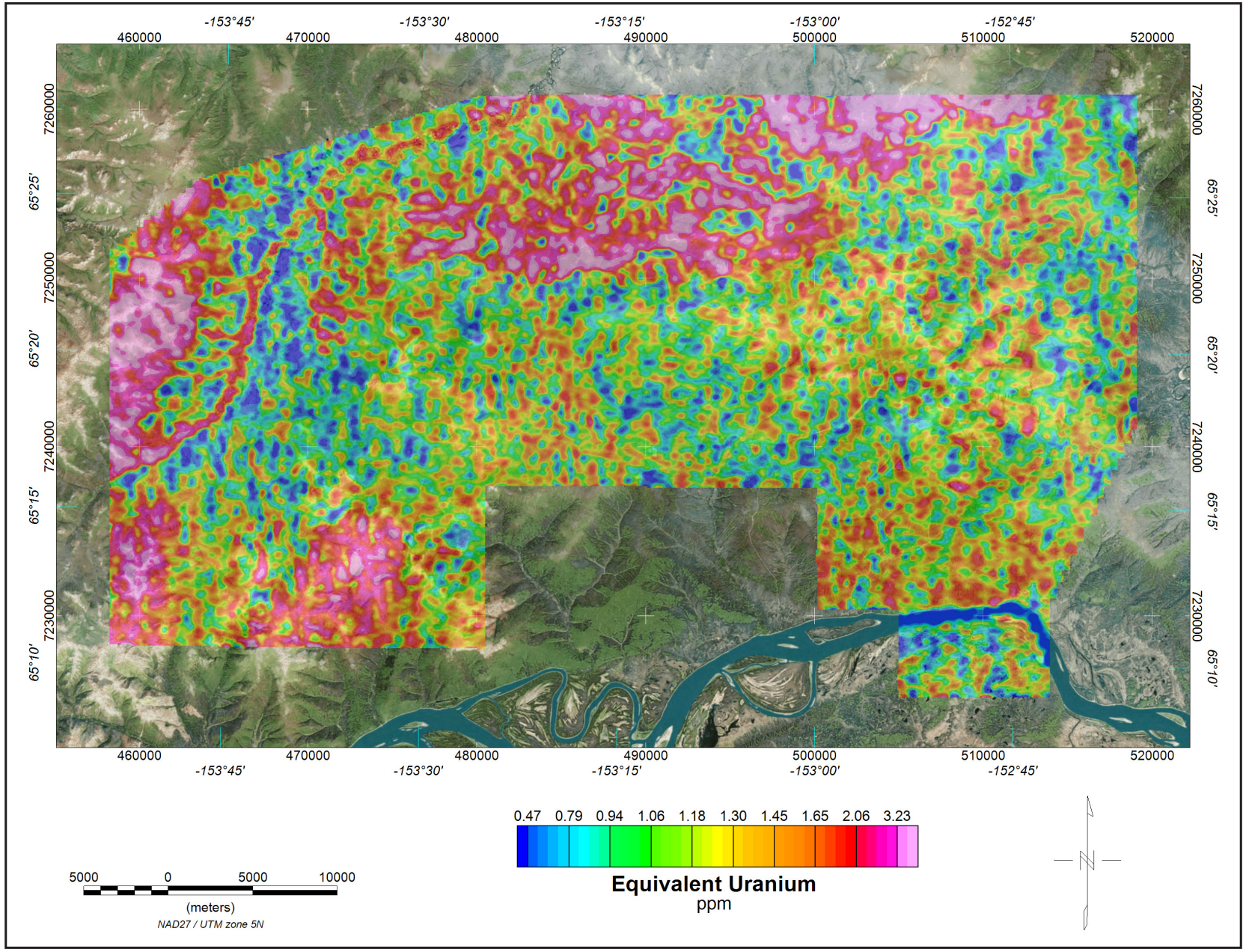


Figure 12. Equivalent Uranium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

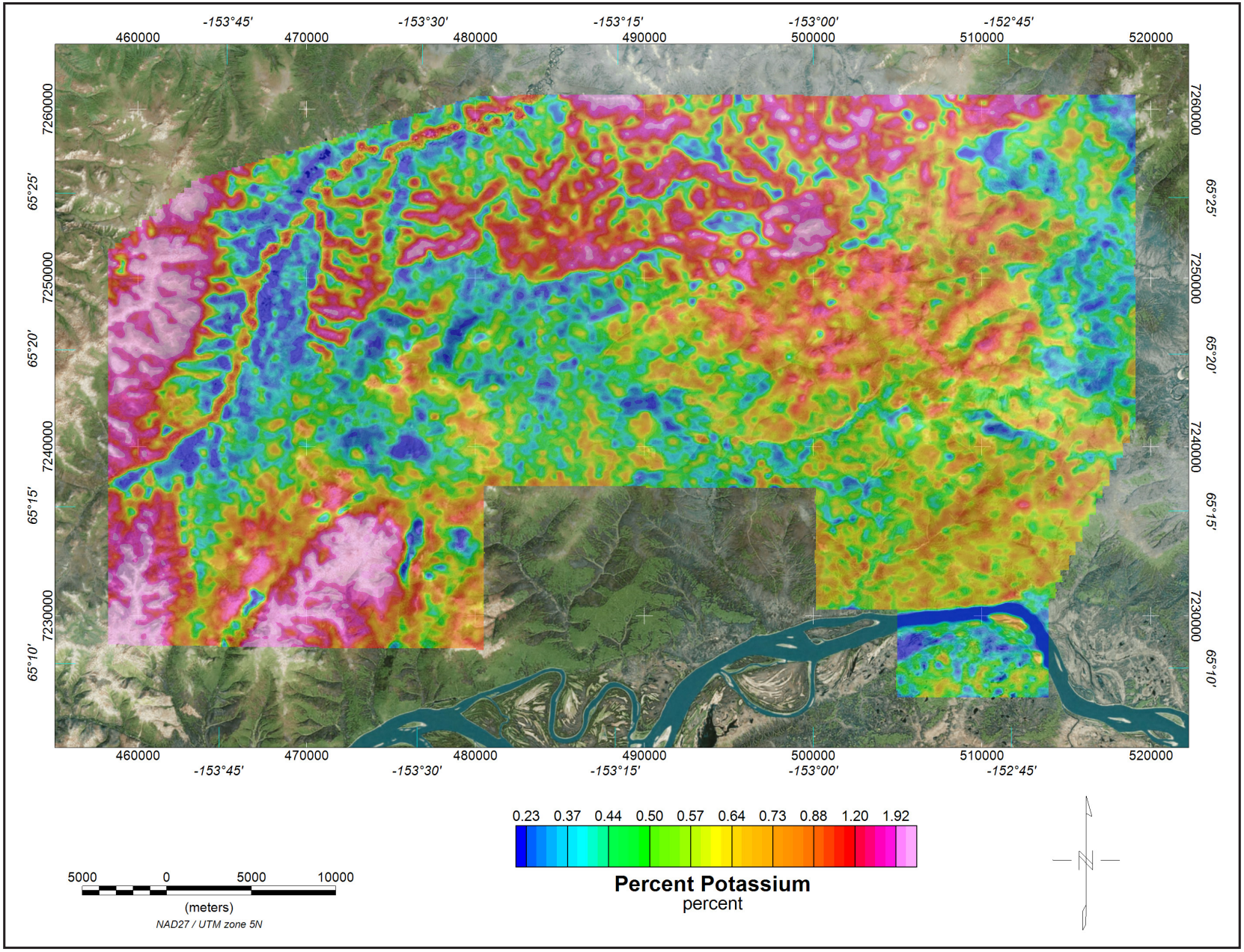


Figure 13. Percent Potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

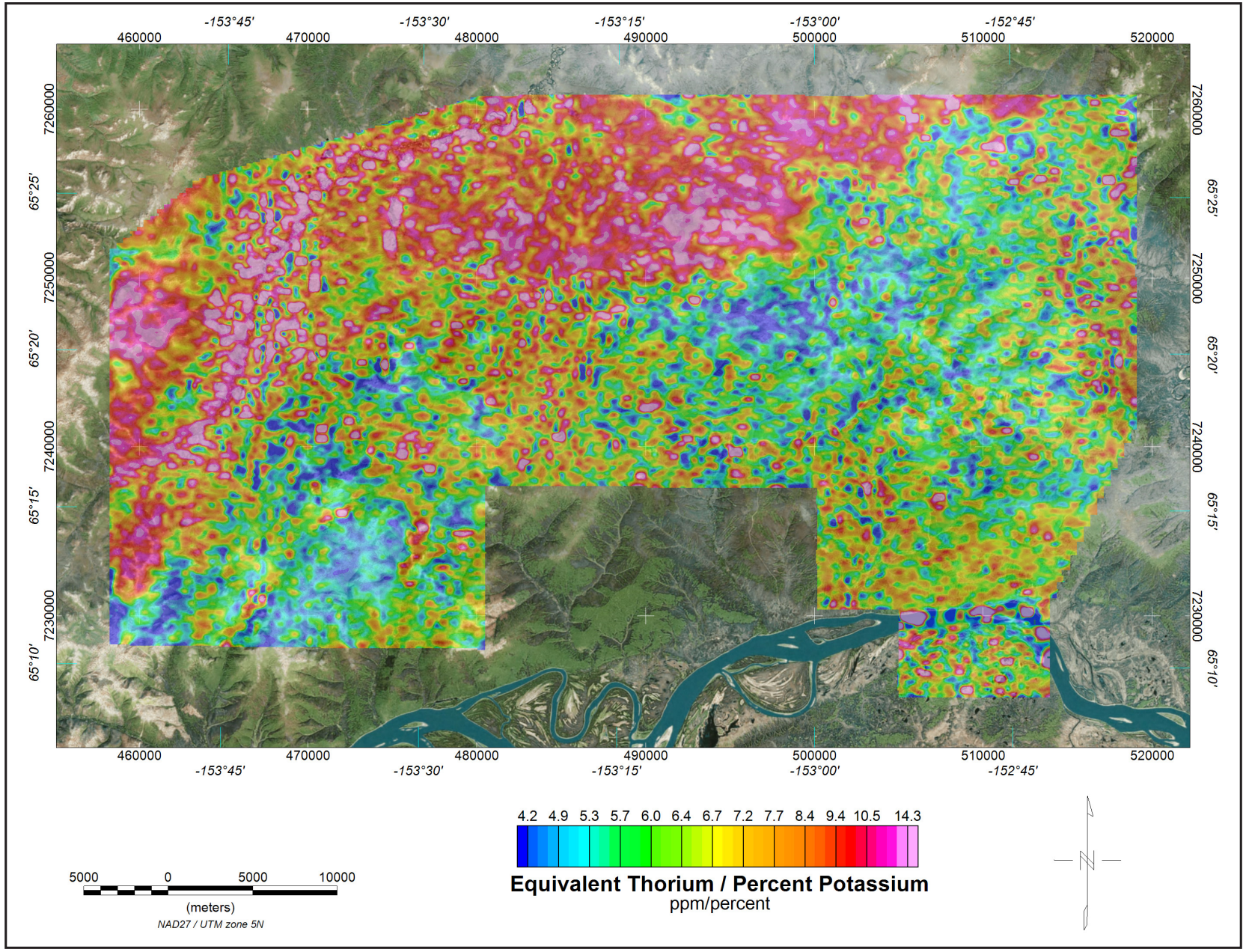


Figure 14. Ratio of Equivalent Thorium to Percent Potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

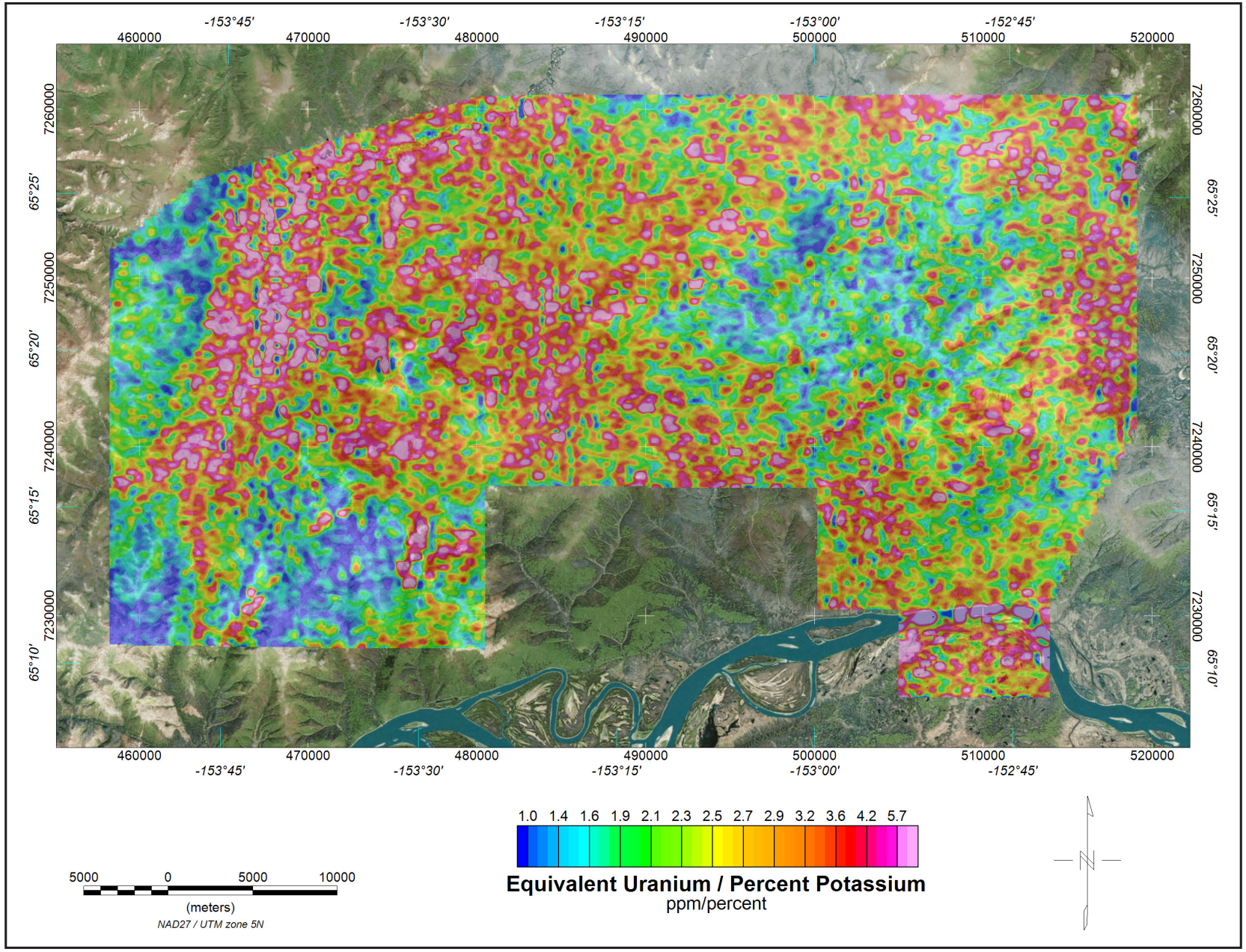


Figure 15. Ratio of Equivalent Uranium to Percent Potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

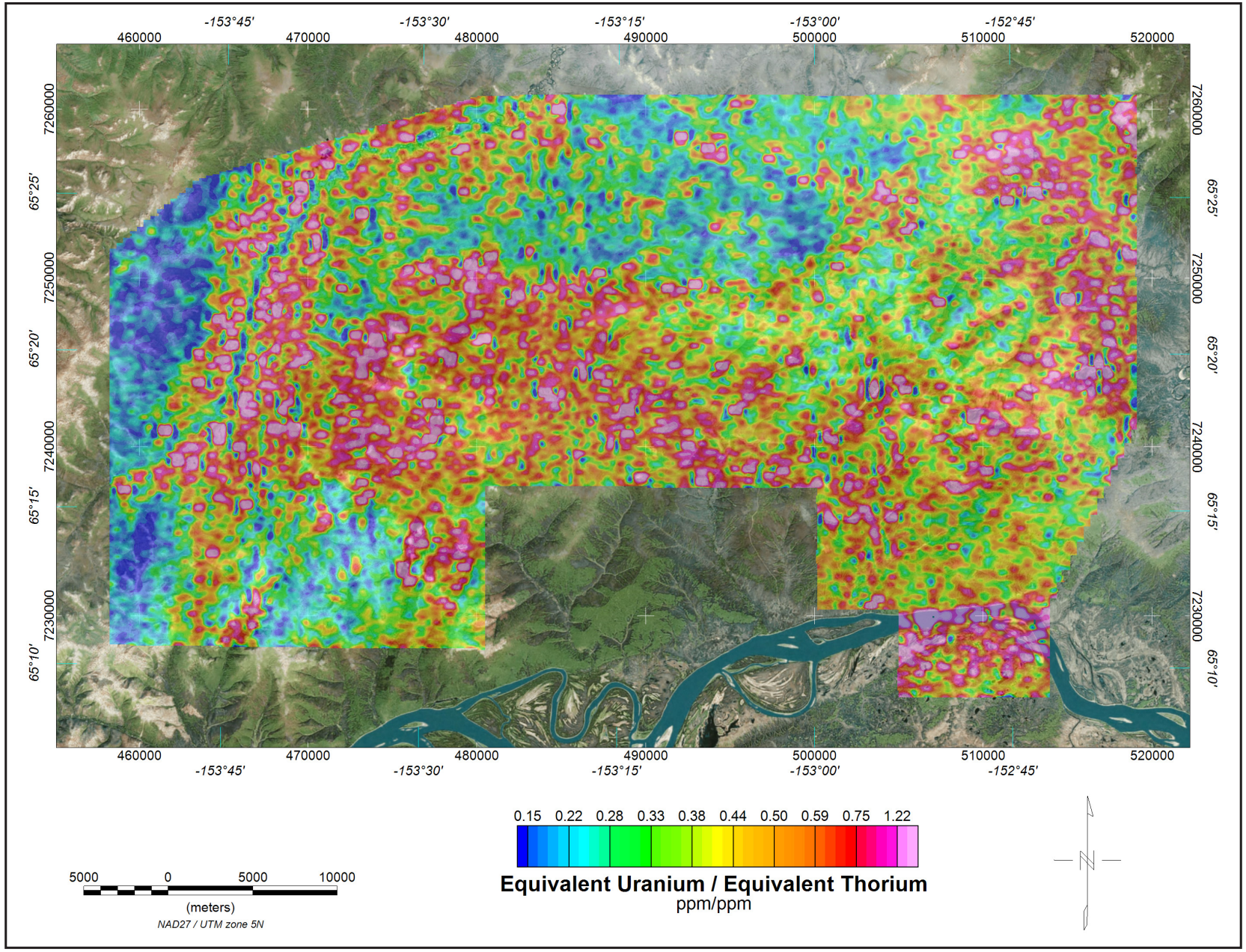


Figure 16. Ratio of Equivalent Uranium to Equivalent Thorium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.

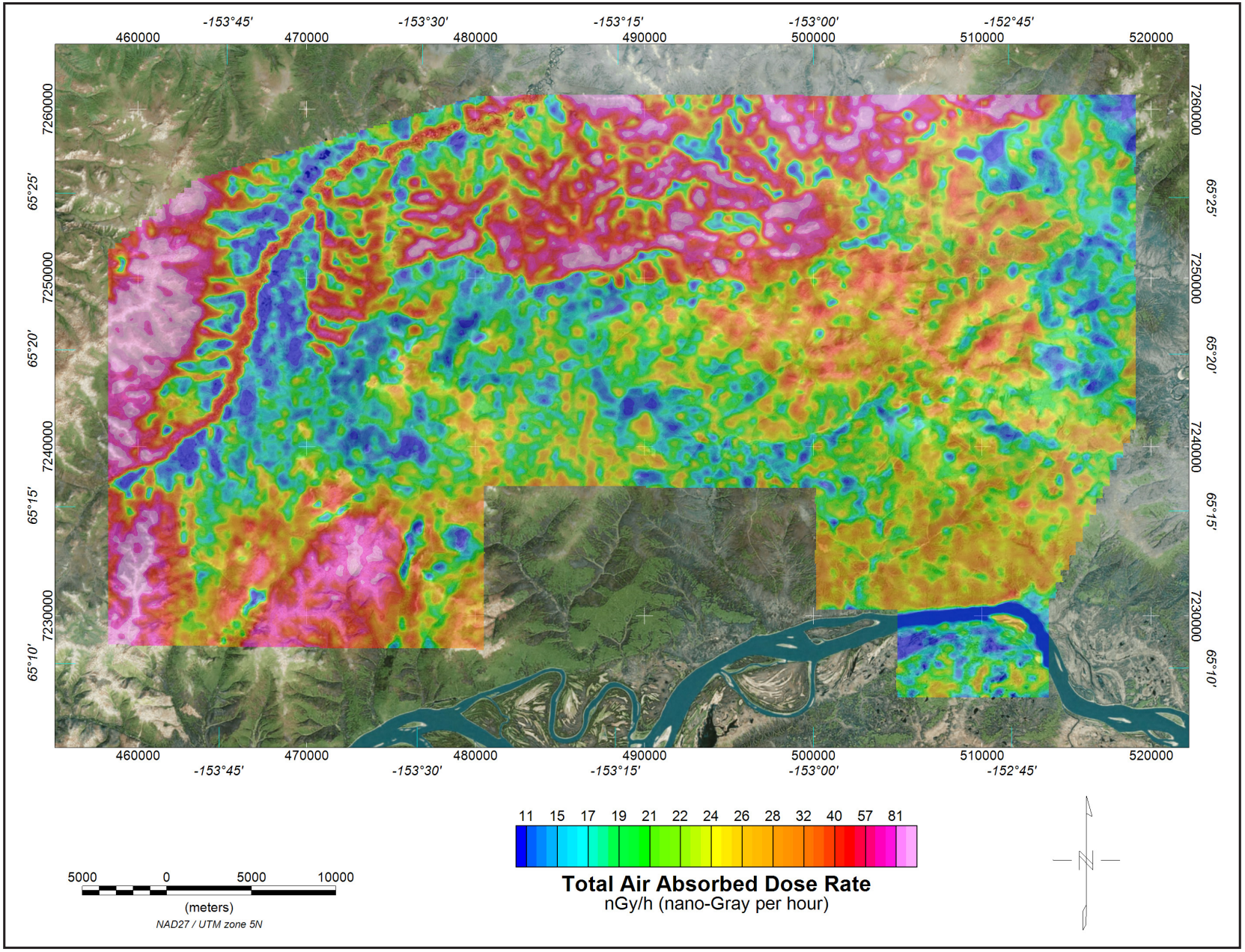


Figure 17. Total Air Absorbed Dose Rate grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using a Radiation Solutions RS-500 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature 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/10.14509/30201.

Map Title	Description
moran_sim_magtf_topo_map_1of2.pdf	simulated total magnetic field grid with topographic base map
moran_sim_magtf_topo_map_2of2.pdf	simulated total magnetic field grid with topographic base map
moran_sim_magtf_contours_plss_map_1of2.pdf	simulated total magnetic field grid with data contours and public land survey system base layer
moran_sim_magtf_contours_plss_map_2of2.pdf	simulated total magnetic field grid with data contours and public land survey system base layer
moran_analyticsignal_topo_map_1of2.pdf	analytic signal grid with topographic base map
moran_analyticsignal_topo_map_2of2.pdf	analytic signal grid with topographic base map
moran_analyticsignal_contours_plss_map_1of2.pdf	analytic signal grid with data contours and public land survey system base layer
moran_analyticsignal_contours_plss_map_2of2.pdf	analytic signal grid with data contours and public land survey system base layer
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moran_calculated1vd_topo_map_2of2.pdf	calculated first vertical derivative grid of the simulated total magnetic field with topographic base map
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moran_tiltderivative_topo_map_2of2.pdf	magnetic tilt derivative grid with topographic base map
moran_tiltderivative_contours_plss_map_1of2.pdf	magnetic tilt derivative grid with data contours and public land survey system base layer
moran_tiltderivative_contours_plss_map_2of2.pdf	magnetic tilt derivative grid with data contours and public land survey system base layer
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moran_res56khz_topo_map_2of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
moran_res56khz_contours_plss_map_1of2.pdf	56,000 Hz apparent resistivity grid with data contours and public land survey system base layer
moran_res56khz_contours_plss_map_2of2.pdf	56,000 Hz apparent resistivity grid with data contours and public land survey system base layer
moran_res7200hz_topo_map_1of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
moran_res7200hz_topo_map_2of2.pdf	7,200 Hz apparent resistivity grid with topographic base map

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/10.14509/30201.

Map Title	Description
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moran_res7200hz_contours_plss_map_2of2.pdf	7,200 Hz apparent resistivity grid with data contours and public land survey system base layer
moran_res900hz_topo_map_1of2.pdf	900 Hz apparent resistivity grid with topographic base map
moran_res900hz_topo_map_2of2.pdf	901 Hz apparent resistivity grid with topographic base map
moran_res900hz_contours_plss_map_1of2.pdf	900 Hz apparent resistivity grid with data contours and public land survey system base layer
moran_res900hz_contours_plss_map_2of2.pdf	901 Hz apparent resistivity grid with data contours and public land survey system base layer
moran_emanomalies_sim_magtf_detailed_topo_map_1of6.pdf	detailed map of EM anomalies with simulated total magnetic field grid and topographic base map
moran_emanomalies_sim_magtf_detailed_topo_map_2of6.pdf	detailed map of EM anomalies with simulated total magnetic field grid and topographic base map
moran_emanomalies_sim_magtf_detailed_topo_map_3of6.pdf	detailed map of EM anomalies with simulated total magnetic field grid and topographic base map
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moran_emanomalies_sim_magtf_detailed_topo_map_5of6.pdf	detailed map of EM anomalies with simulated total magnetic field grid and topographic base map
moran_emanomalies_sim_magtf_detailed_topo_map_6of6.pdf	detailed map of EM anomalies with simulated total magnetic field grid and topographic base map
moran_rad_equiv_th_topo_map_1of2.pdf	equivalent thorium grid with topographic base map
moran_rad_equiv_th_topo_map_2of2.pdf	equivalent thorium grid with topographic base map
moran_rad_equiv_th_contours_plss_map_1of2.pdf	equivalent thorium grid with data contours and public land survey system base layer
moran_rad_equiv_th_contours_plss_map_2of2.pdf	equivalent thorium grid with data contours and public land survey system base layer
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Map Title	Description
moran_rad_pct_k_topo_map_1of2.pdf	percent potassium grid with topographic base map
moran_rad_pct_k_topo_map_2of2.pdf	percent potassium grid with topographic base map
moran_rad_pct_k_contours_plss_map_1of2.pdf	percent potassium grid with data contours and public land survey system base layer
moran_rad_pct_k_contours_plss_map_2of2.pdf	percent potassium grid with data contours and public land survey system base layer
moran_rad_ratio_th_k_topo_map_1of2.pdf	ratio of equivalent thorium to percent potassium grid with topographic base map
moran_rad_ratio_th_k_topo_map_2of2.pdf	ratio of equivalent thorium to percent potassium grid with topographic base map
moran_rad_ratio_th_k_contours_plss_map_1of2.pdf	ratio of equivalent thorium to percent potassium grid with data contours and public land survey system base layer
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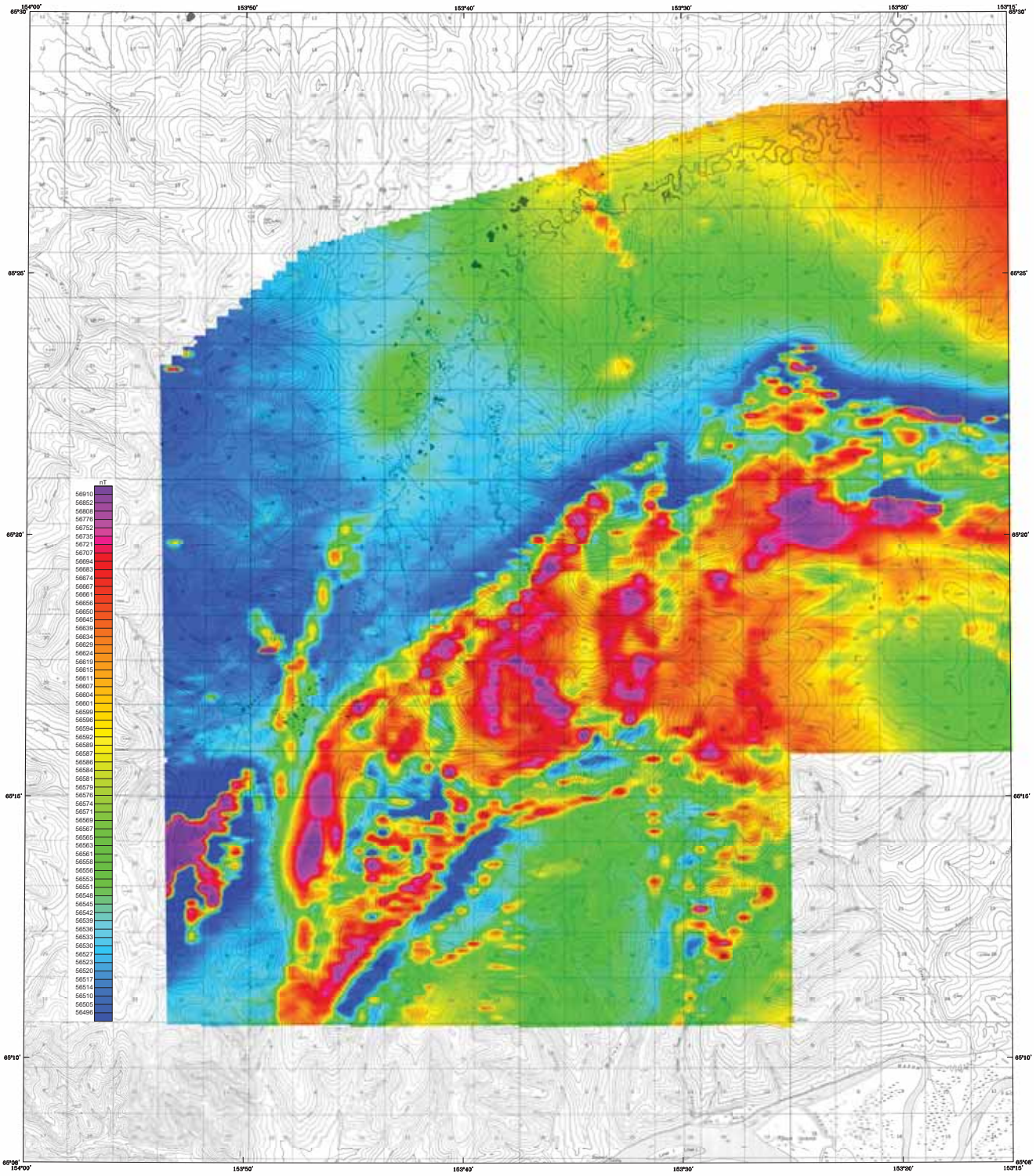
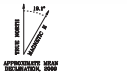
moran_rad_ratio_u_k_contours_plss_map_2of2.pdf	ratio of equivalent uranium to percent potassium grid with data contours and public land survey system base layer
moran_rad_ratio_u_th_topo_map_1of2.pdf	ratio of equivalent uranium to equivalent thorium grid with topographic map
moran_rad_ratio_u_th_topo_map_2of2.pdf	ratio of equivalent uranium to equivalent thorium grid with topographic map
moran_rad_ratio_u_th_contours_plss_map_1of2.pdf	ratio of equivalent uranium to equivalent thorium grid with data contours and public land survey system base layer
moran_rad_ratio_u_th_contours_plss_map_2of2.pdf	ratio of equivalent uranium to equivalent thorium grid with data contours and public land survey system base layer
moran_rad_taadr_topo_map_1of2.pdf	total air absorbed dose rate grid with topographic base map
moran_rad_taadr_topo_map_2of2.pdf	total air absorbed dose rate grid with topographic base map
moran_rad_taadr_contours_plss_map_1of2.pdf	total air absorbed dose rate grid with data contours and public land survey system base layer
moran_rad_taadr_contours_plss_map_2of2.pdf	total air absorbed dose rate grid with data contours and public land survey system base layer
moran_rad_ternary_topo_map_1of2.pdf	radiometric ternary grid with topographic base map
moran_rad_ternary_topo_map_2of2.pdf	radiometric ternary grid with topographic base map



Base from U.S. Geological Survey Moloktlua A-1, 1972; A-2, 1972; B-1, 1972; B-2, 1972; Ganalaska, 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

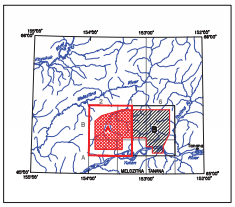
TOTAL MAGNETIC FIELD OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

LOCATION INDEX



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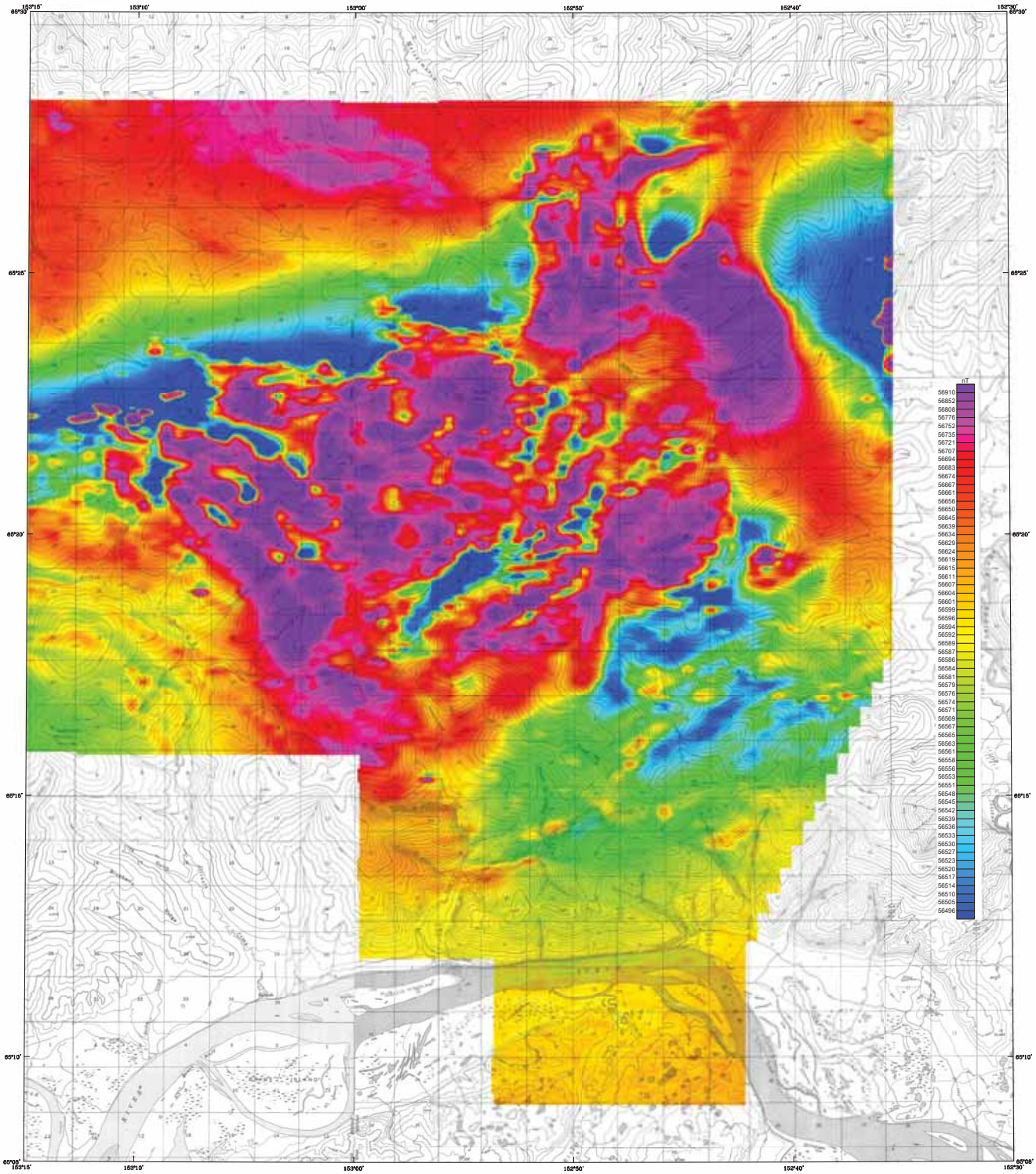

Base from U.S. Geological Survey Moloaina A-1, 1971; B-1, 1978; Tanana A-4, 1969; B-4, 1978; Quadrangles, Alaska

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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2010

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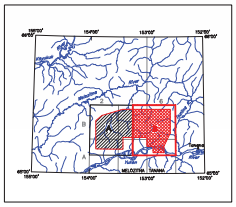

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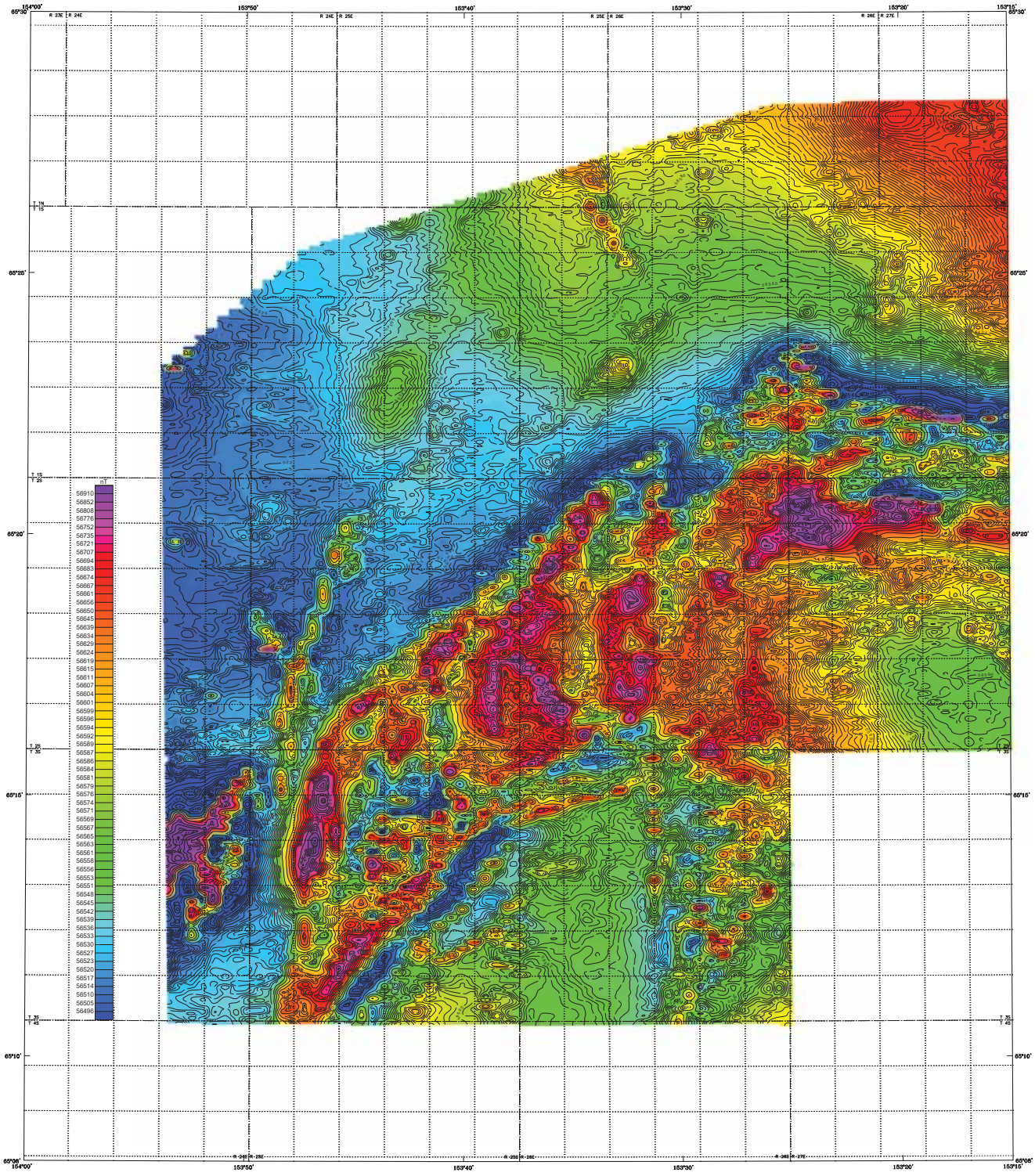

Section outlines from U.S. Geological Survey Metacina A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gandrangida, Alaska

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1 0 1 2 3 4 MILES

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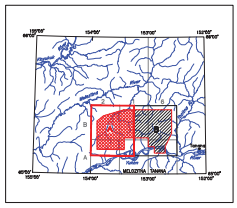

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MAGNETIC CONTOUR INTERVAL

.....	100 nT
.....	20 nT
.....	4 nT
.....	2 nT

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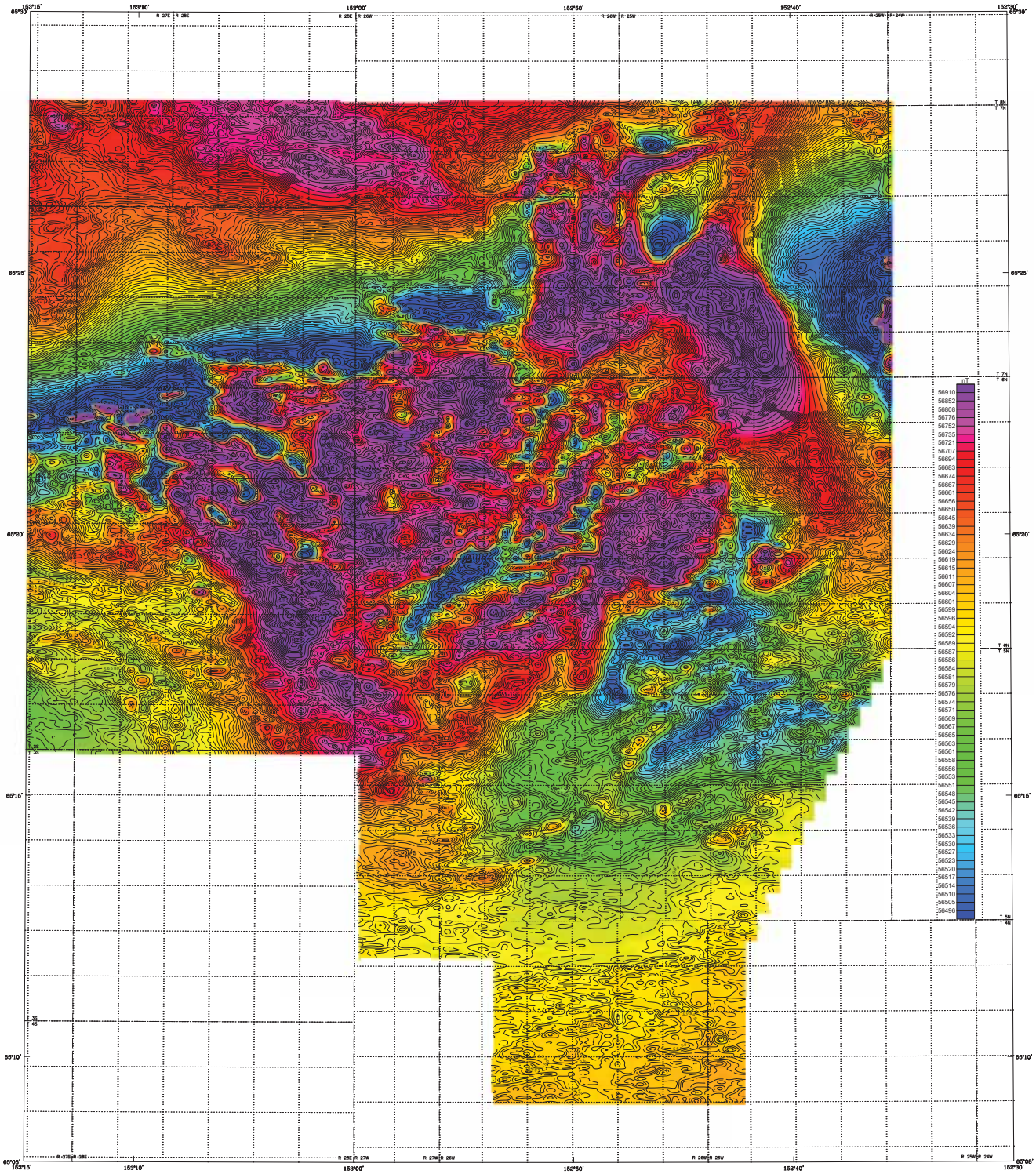

Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-6, 1968; B-6, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 2009

TOTAL MAGNETIC FIELD OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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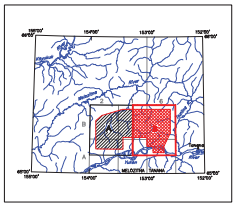

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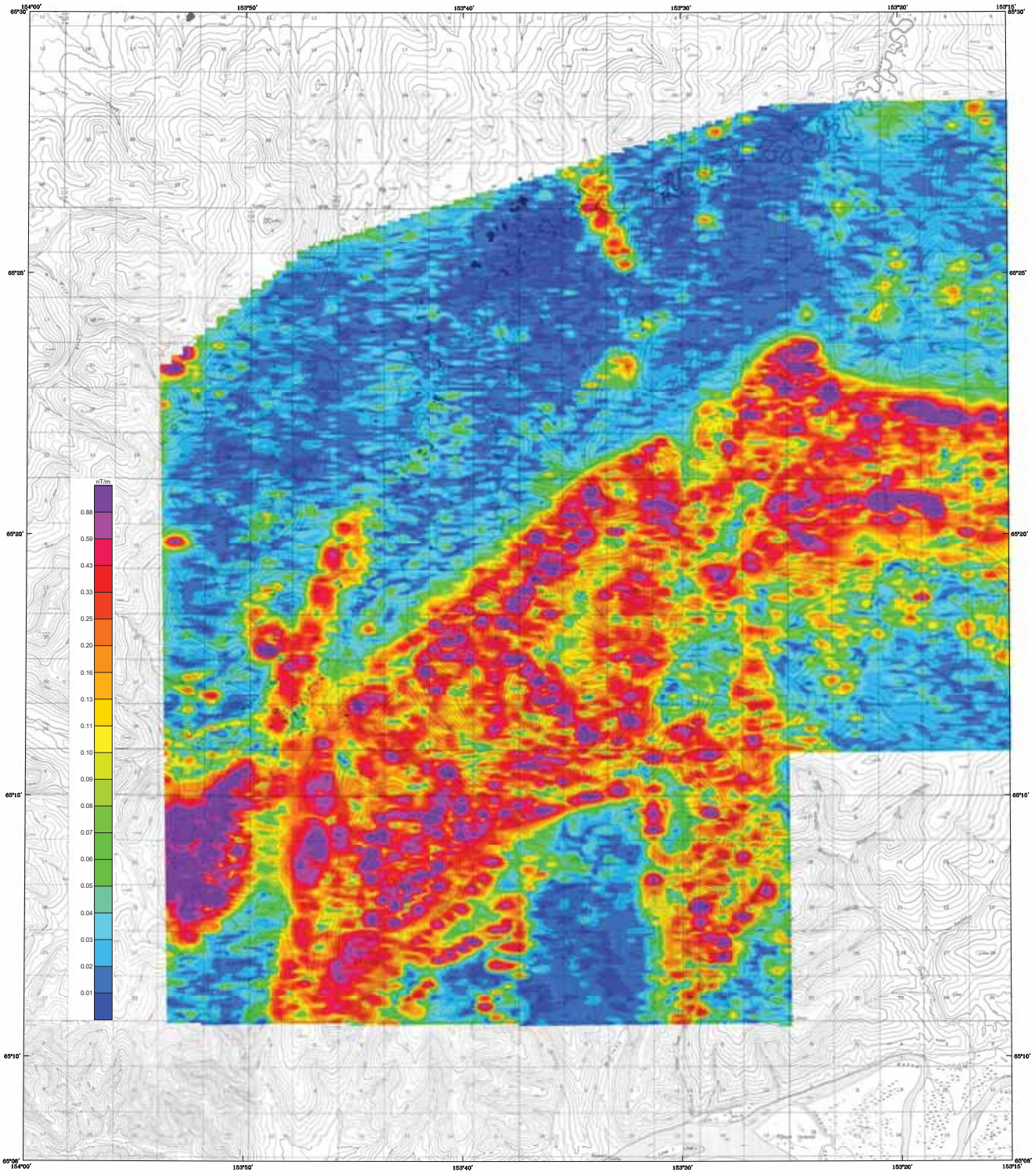

Base from U.S. Geological Survey Meiklejohn A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gennaglaga, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

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CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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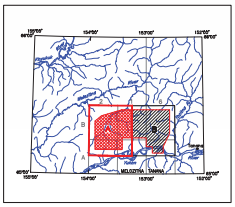

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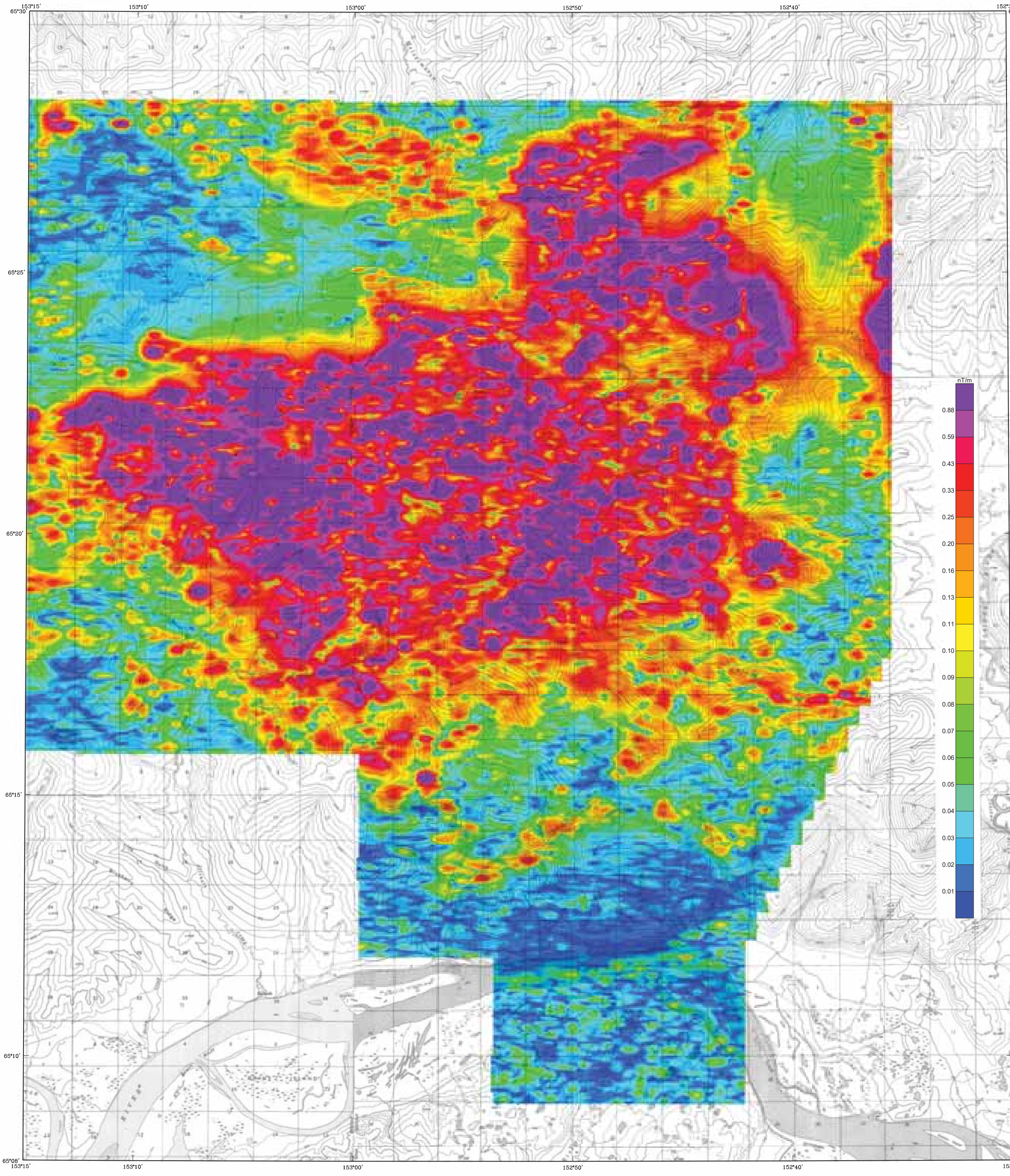

Base from U.S. Geological Survey Melozitna A-1, 1971; B-1, 1978; Tanana A-6, 1969; B-6, 1973; Quadrangles, Alaska

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1 0 1 2 3 4 MILES

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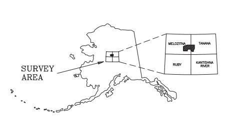
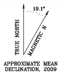
DATUM MEAN SEA LEVEL





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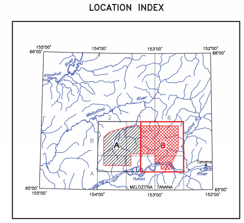

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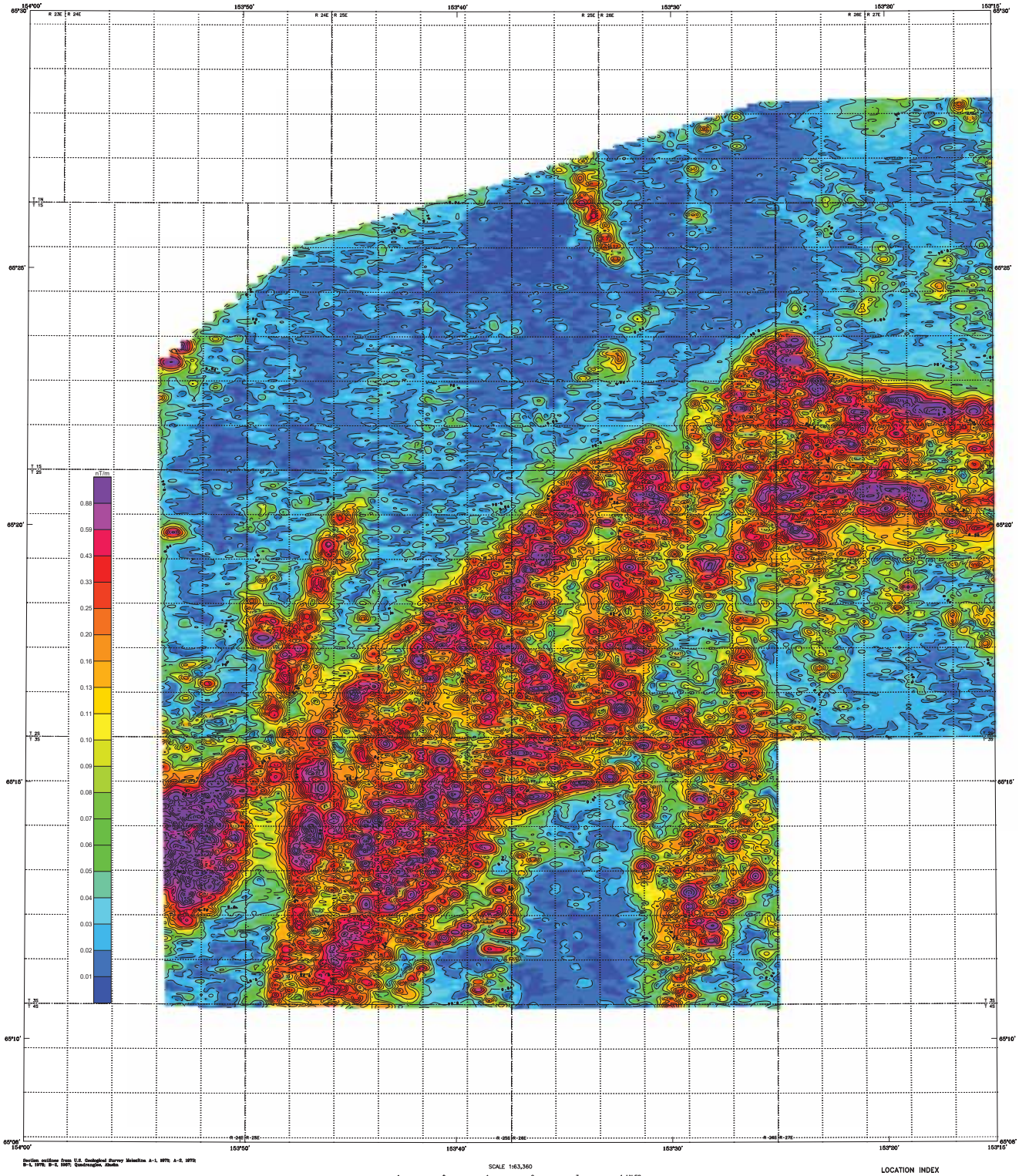

Section outlines from U.S. Geological Survey Meteorites A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gulcana, Alaska

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1 0 1 2 3 4 MILES

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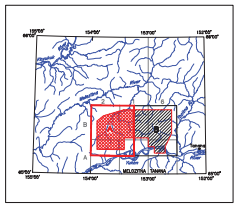

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ANALYTIC SIGNAL

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 (e.g., contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

ANALYTIC SIGNAL CONTOURS

.....	1.00 nT/metre
.....	0.20 nT/metre
.....	0.04 nT/metre
.....	0.02 nT/metre

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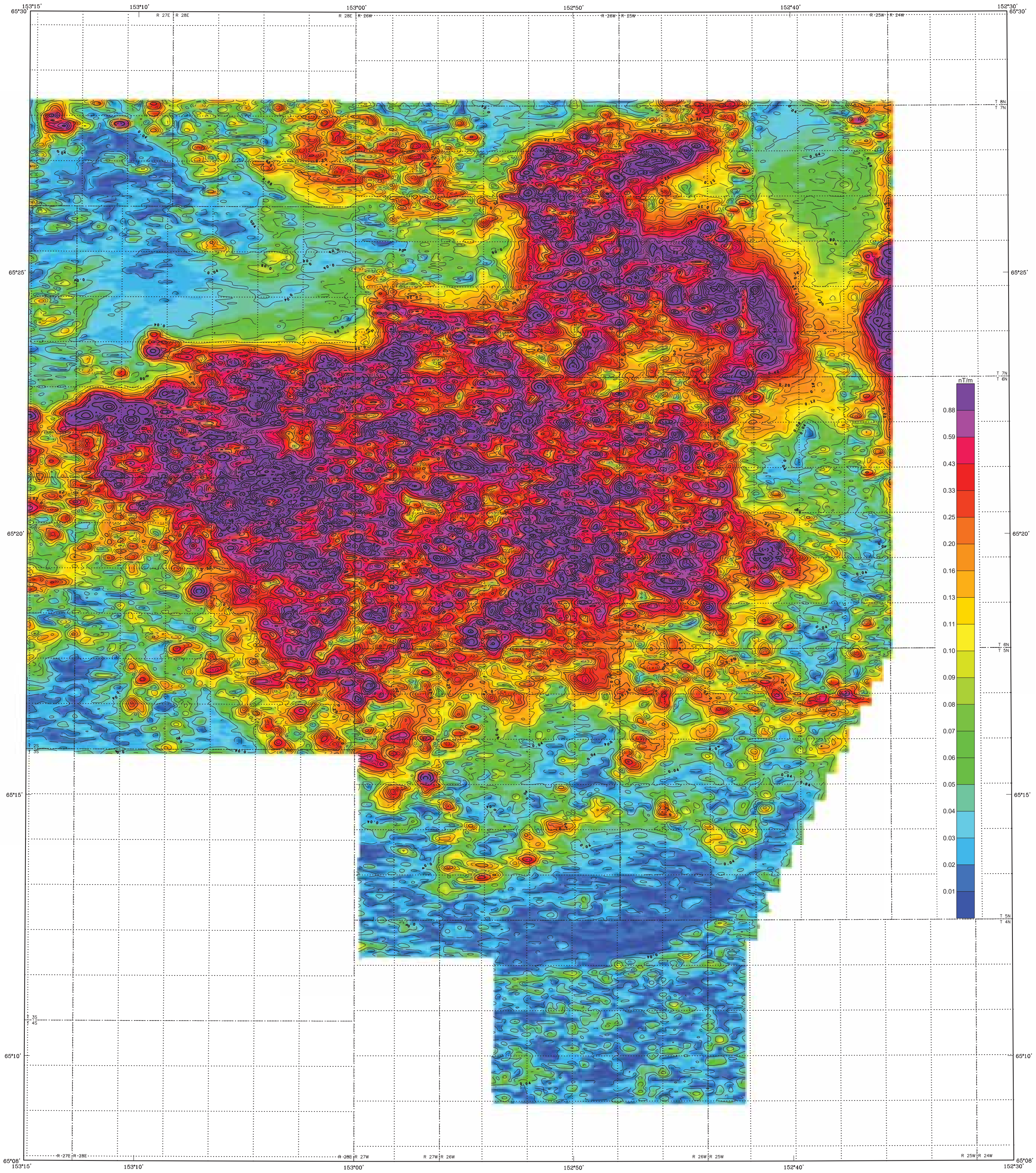
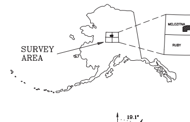


Section outlines from U.S. Geological Survey Melozitna A-1, 1971; B-1, 1978; Tanana A-6, 1969; B-6, 1973; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



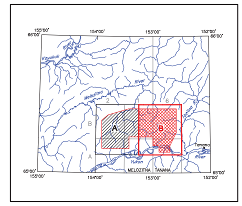
APPROXIMATE MEAN DECLINATION, 2009

ANALYTIC SIGNAL OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

LOCATION INDEX



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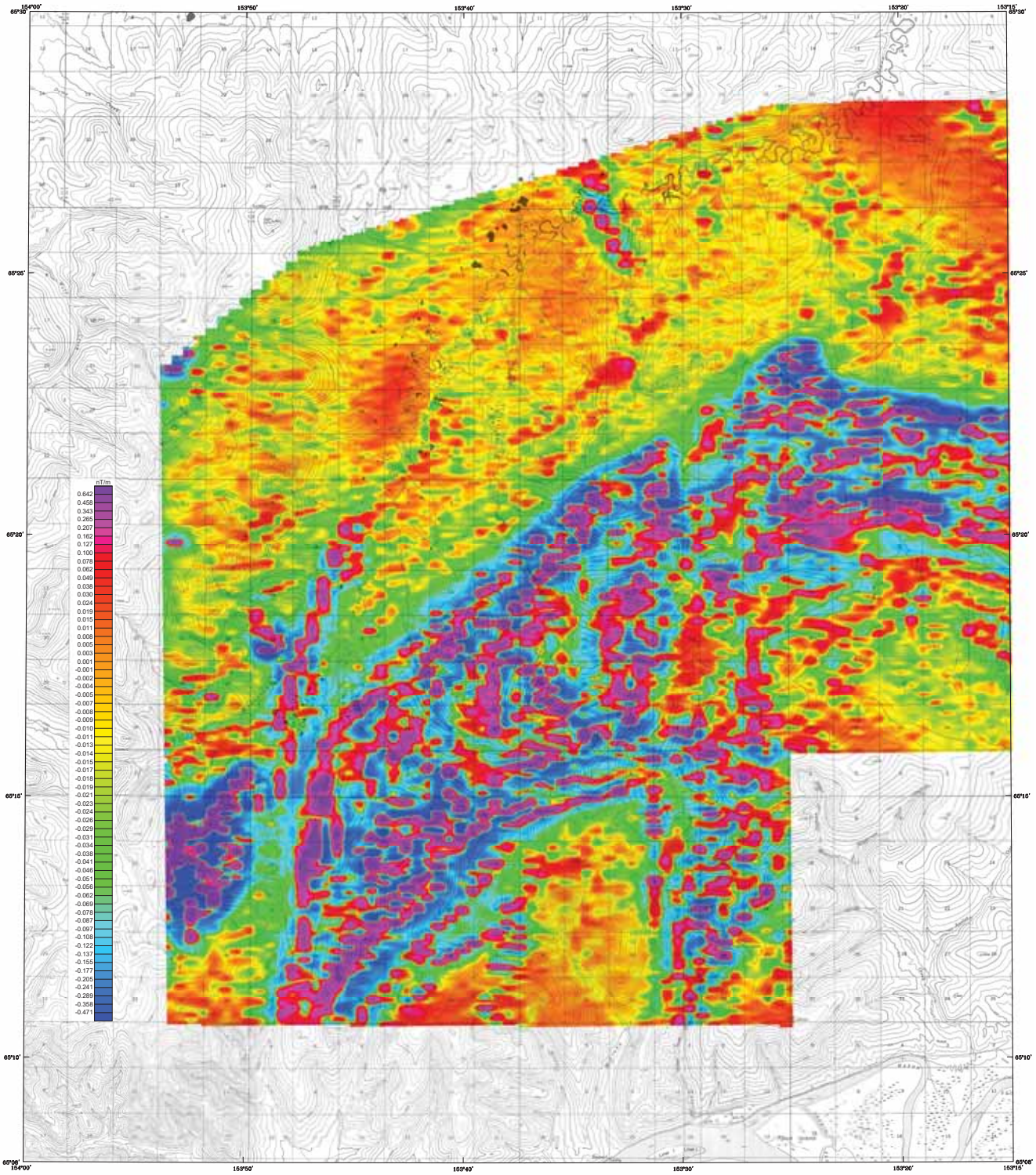

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1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Moran Survey Area dataset lie within the range displayed on the color bar. Data values actually range from -6.597 nT/m (dark blue) to about 11.931 nT/m (magenta).

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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.

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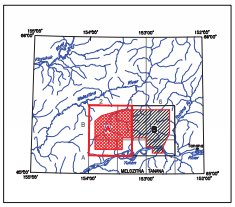

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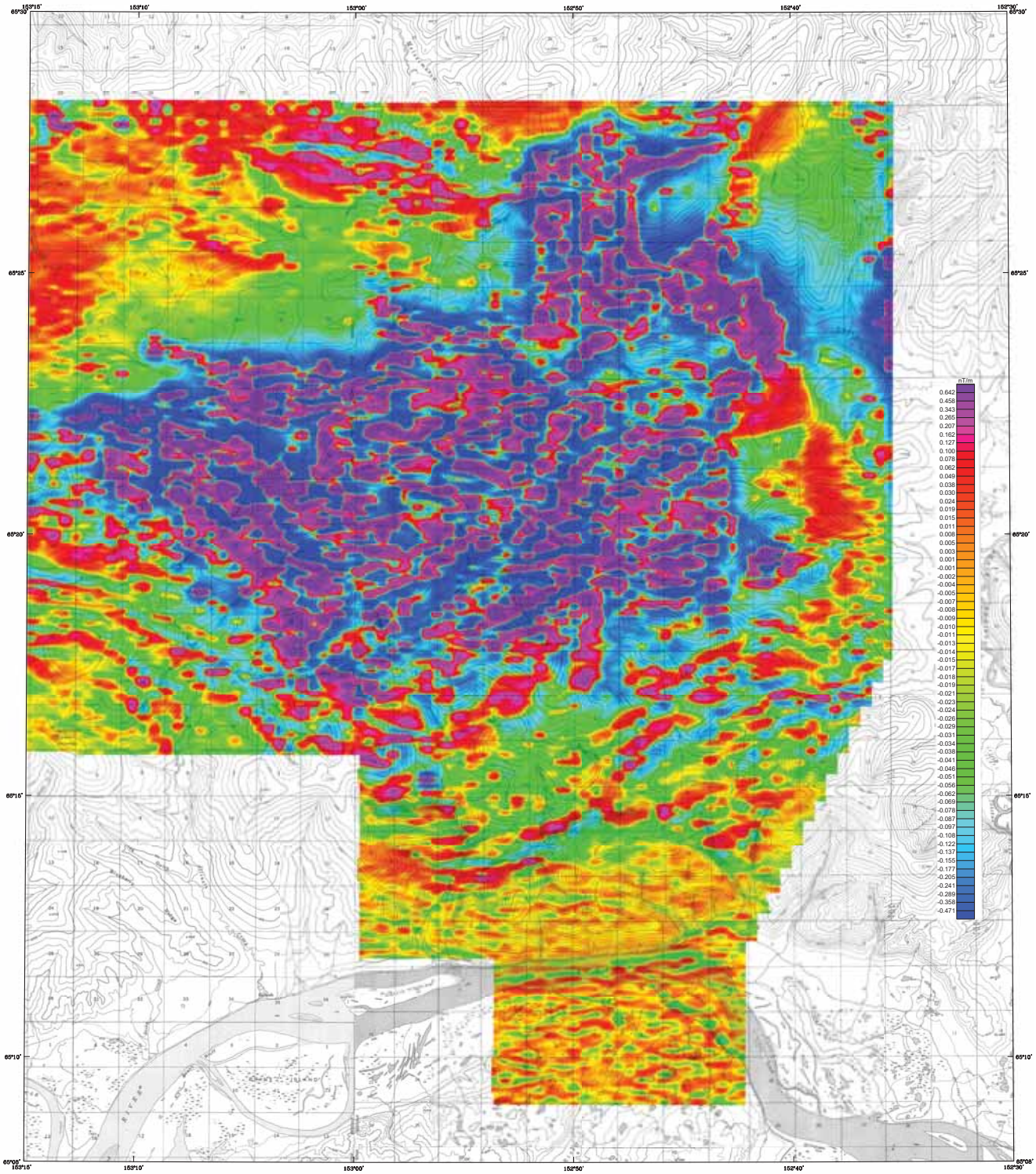

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SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 2009

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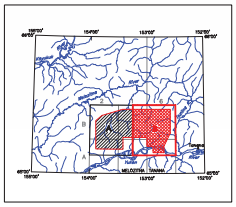

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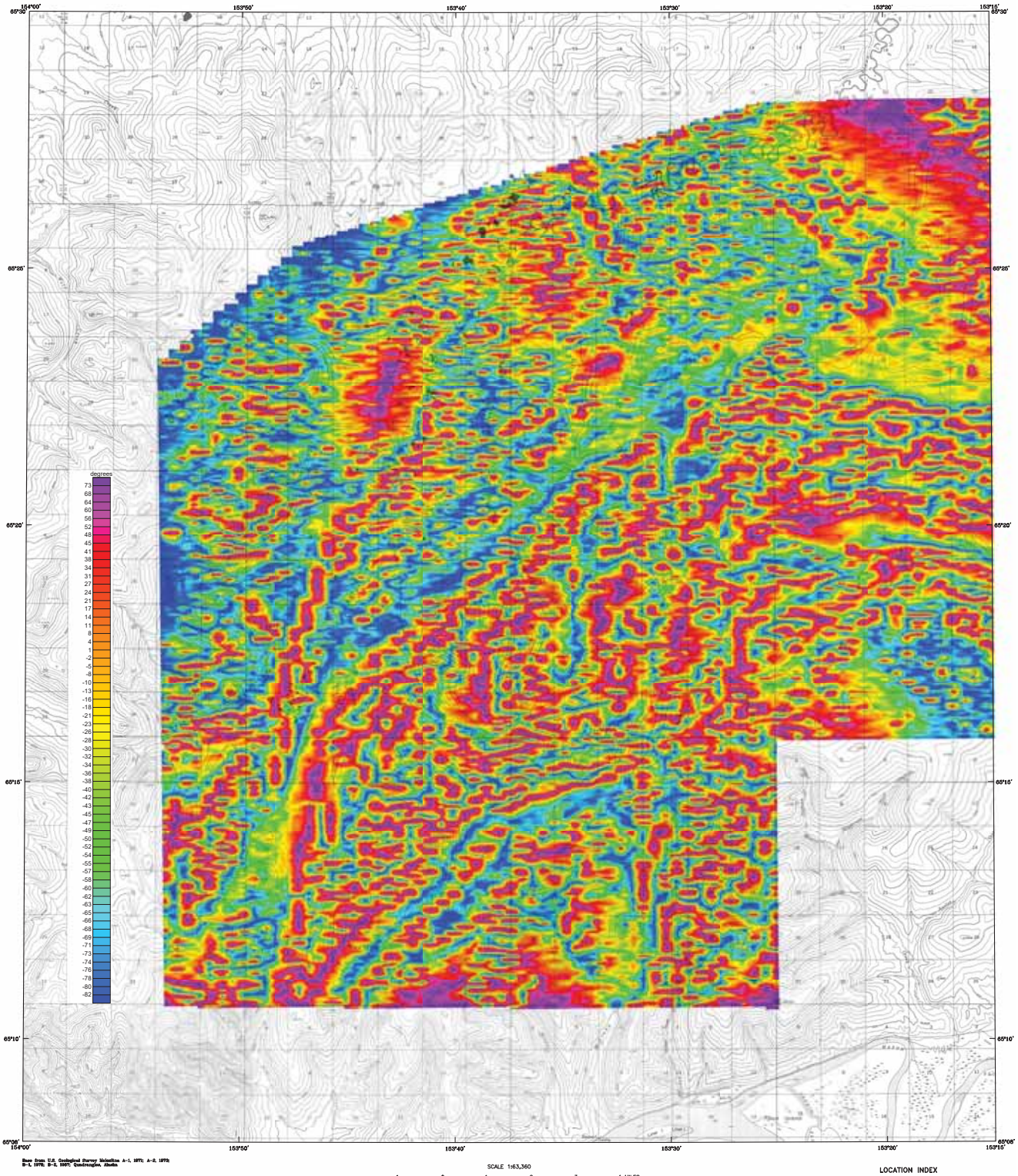

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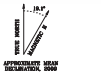

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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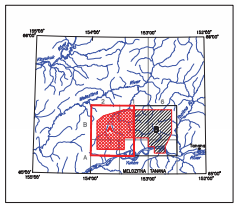

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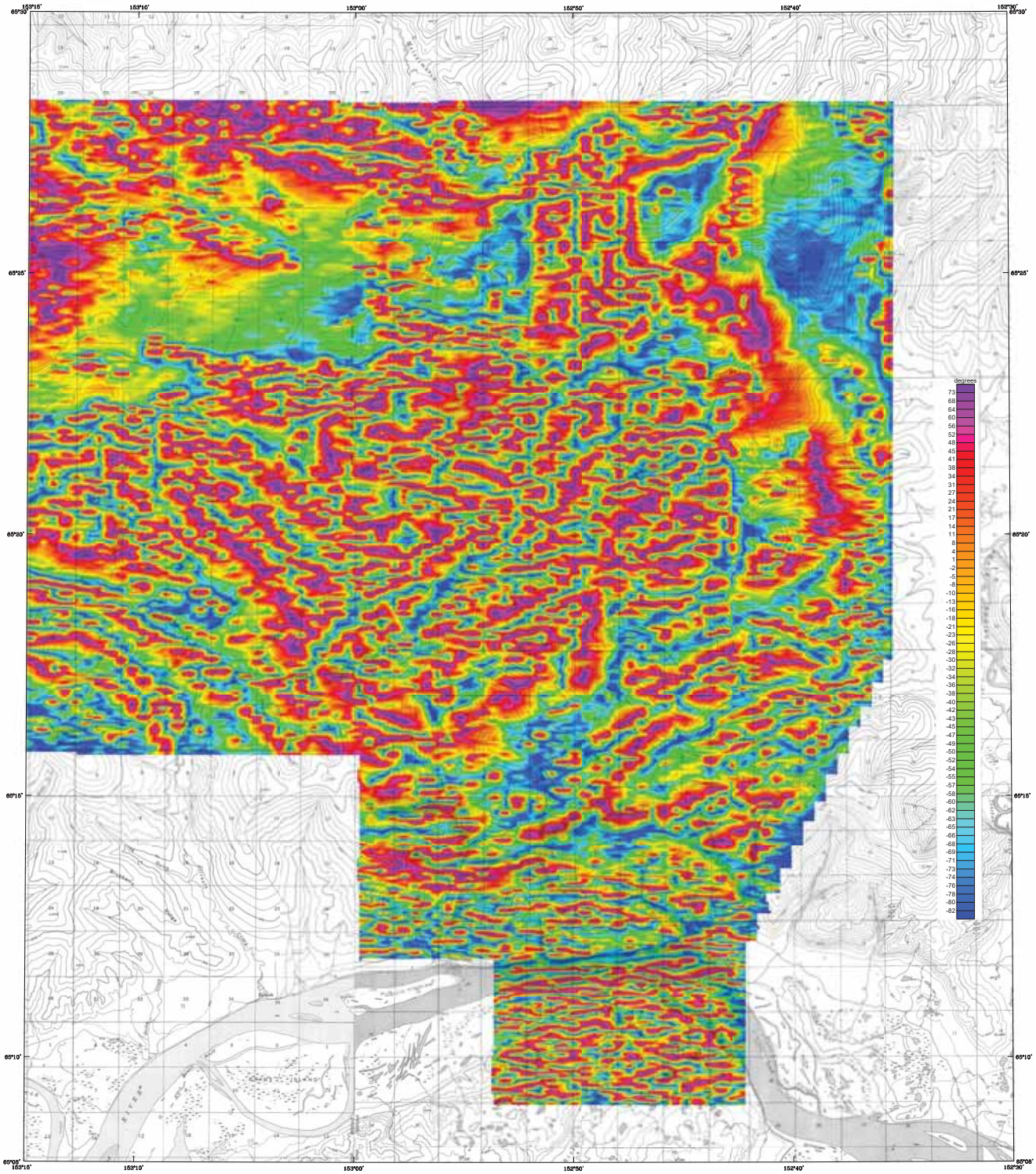

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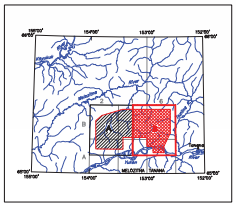

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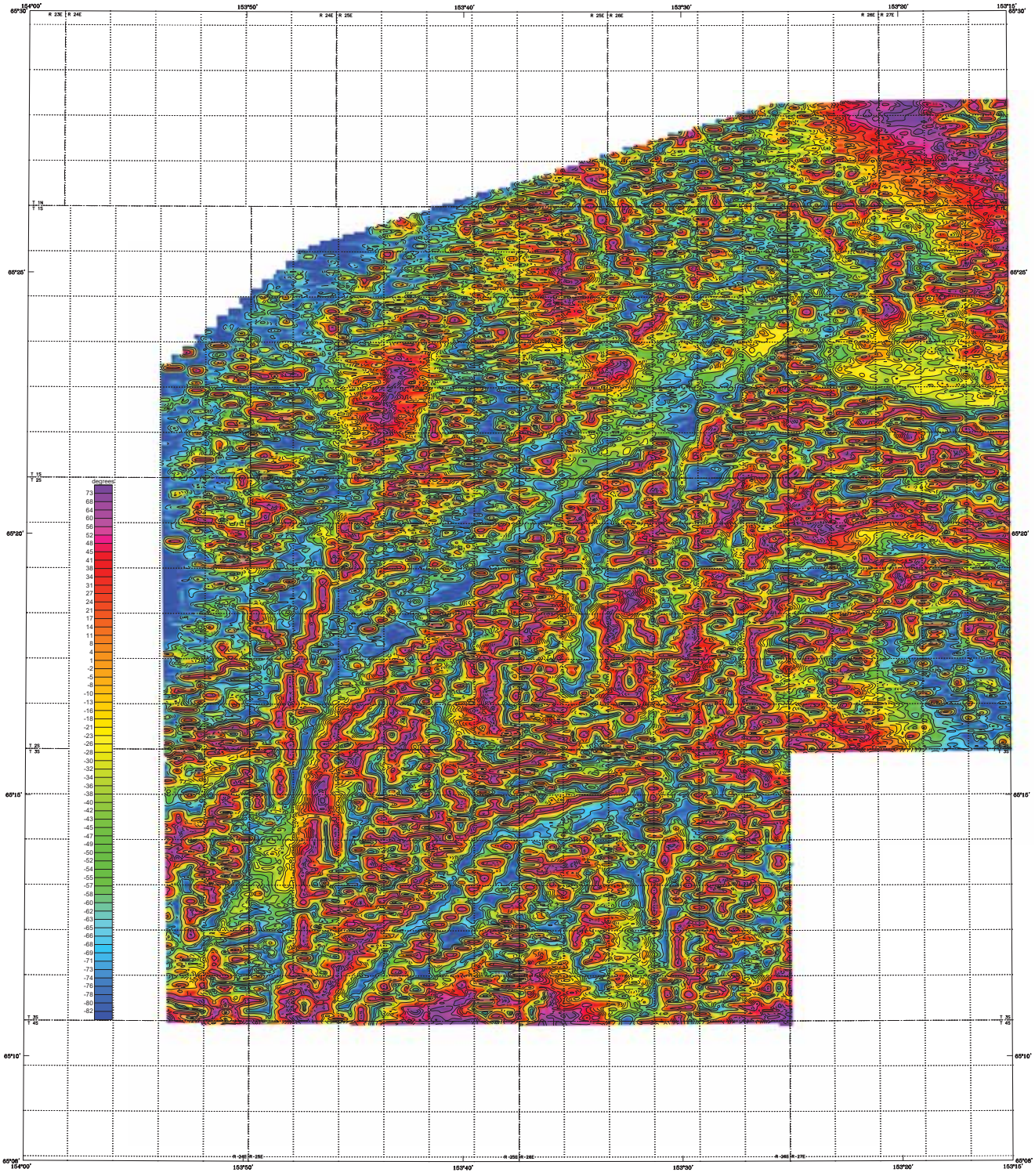

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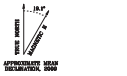

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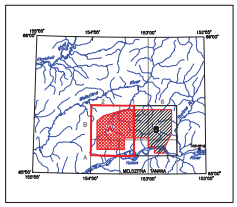
MAGNETIC TILT DERIVATIVE CONTOURS

_____ . . . . . 50 degrees

_____ . . . . . 10 degrees

LOCATION INDEX



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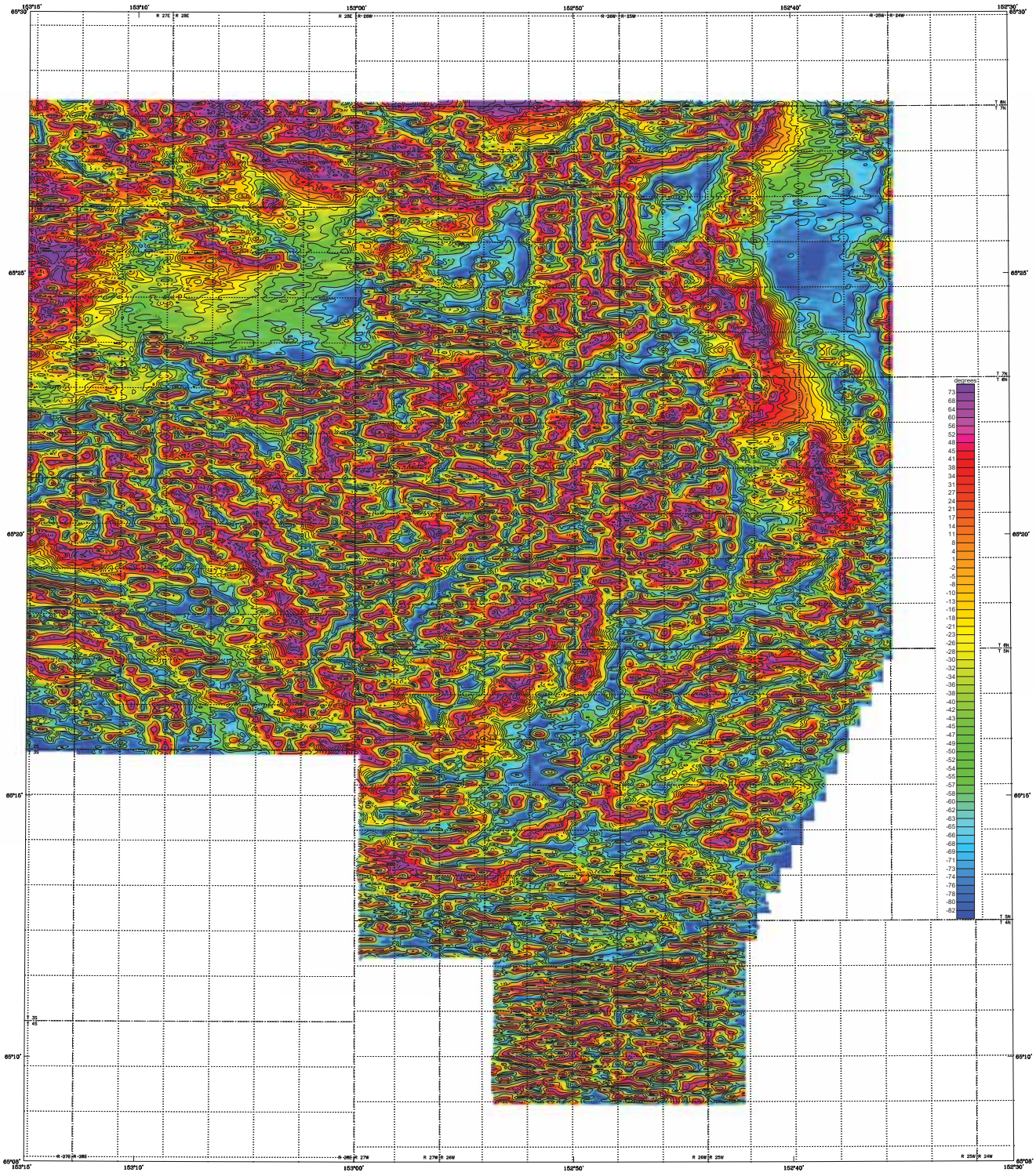


Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-6, 1968; B-6, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

MAGNETIC TILT DERIVATIVE OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

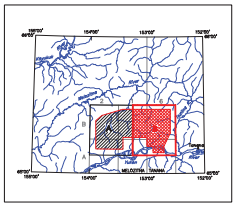
PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

LOCATION INDEX



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The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Radiation Solutions RS-500 gamma-ray spectrometer and a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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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MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

MAGNETIC TILT DERIVATIVE CONTOURS

50 degrees

10 degrees

SURVEY HISTORY

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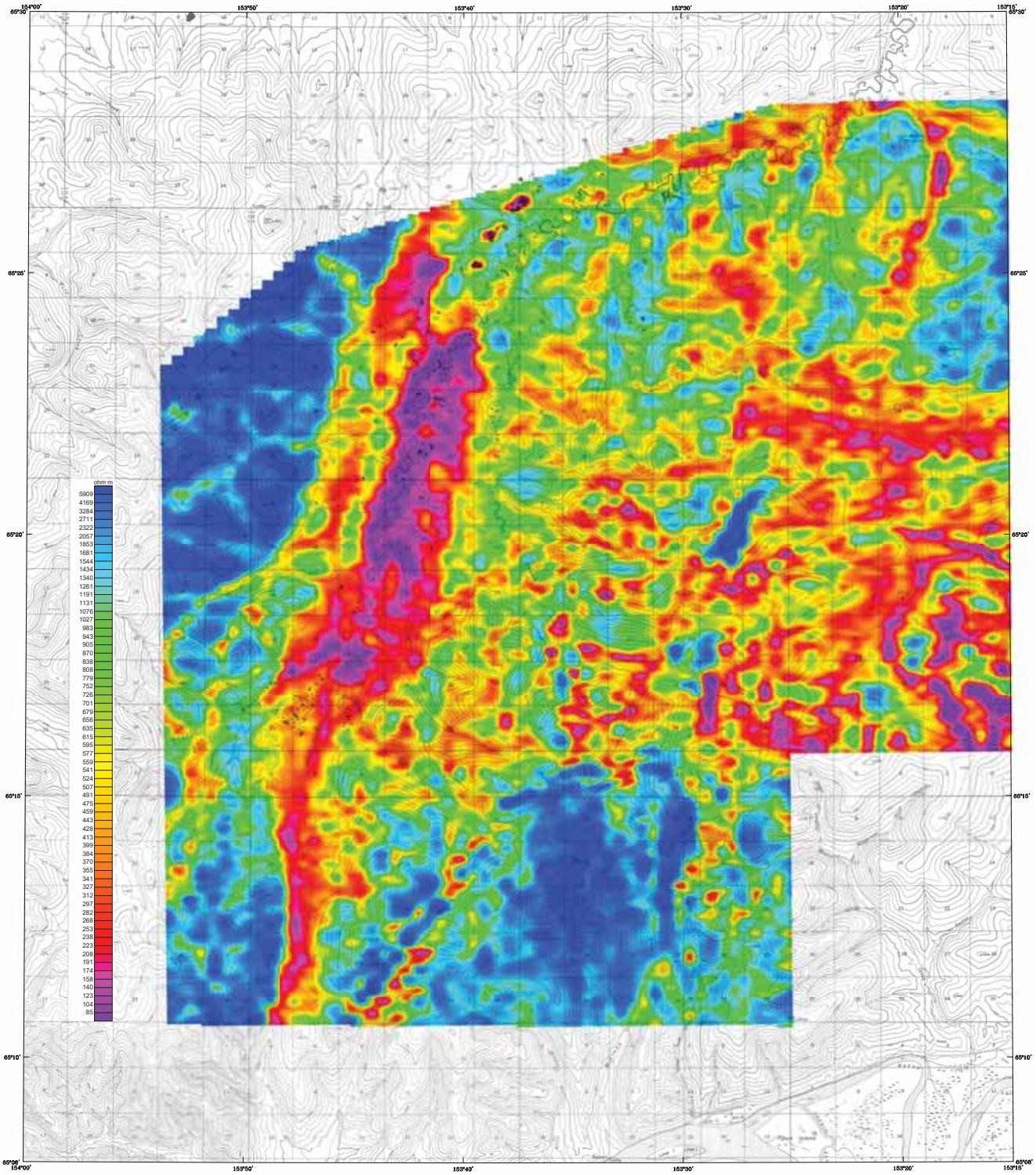

Base from U.S. Geological Survey Medallion A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1972; Gennaglaga, Alaska

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

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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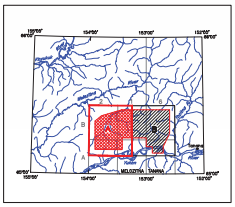

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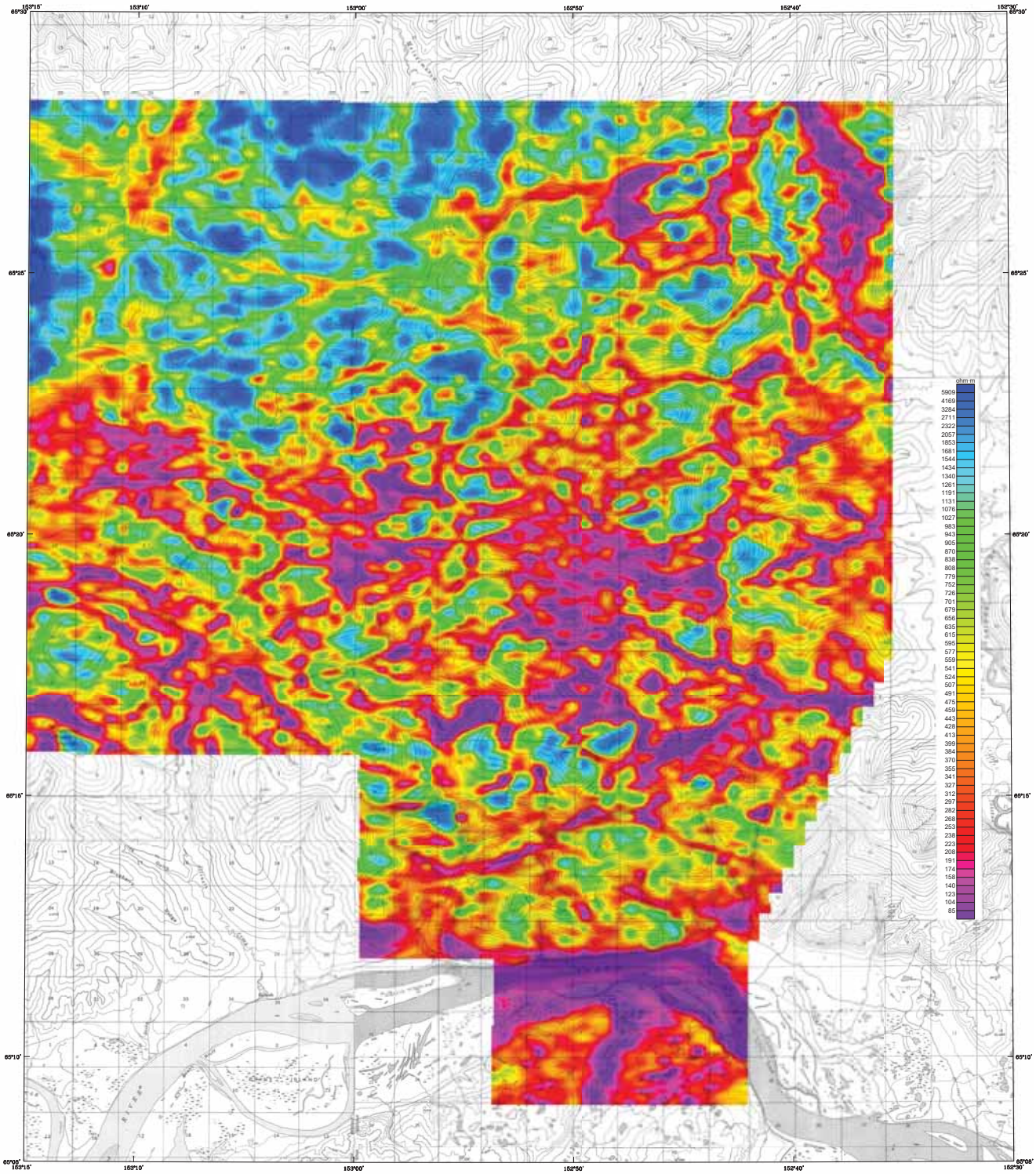

Base from U.S. Geological Survey Moloaina A-1, 1971; B-1, 1978; Tanana A-4, 1968; B-2, 1978; Quadrangles, Alaska

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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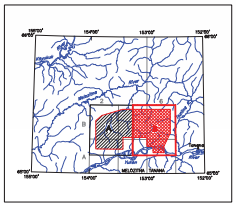

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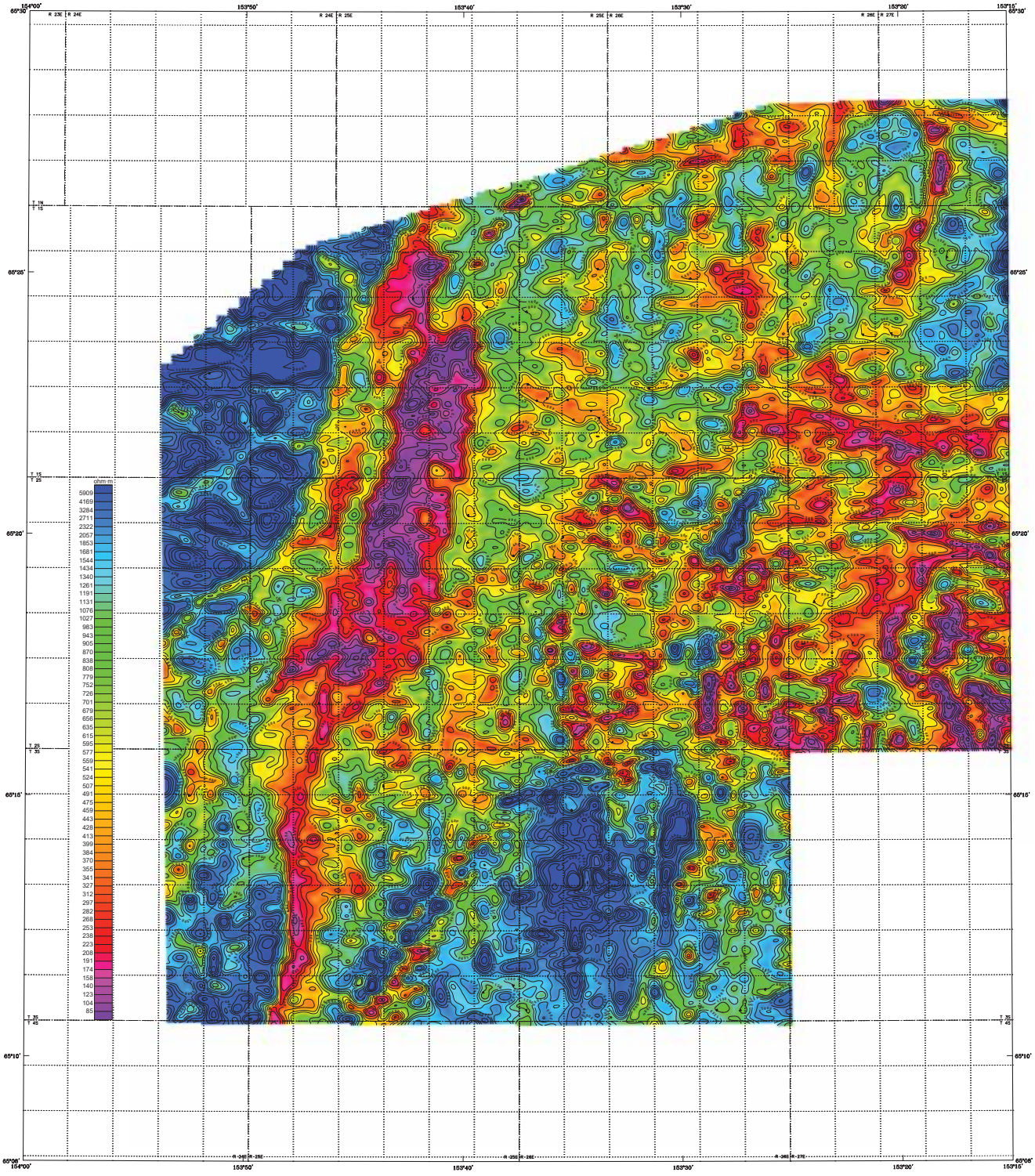

Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gakona, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

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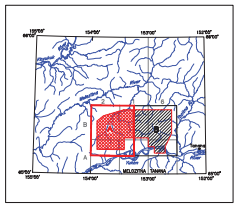

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RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

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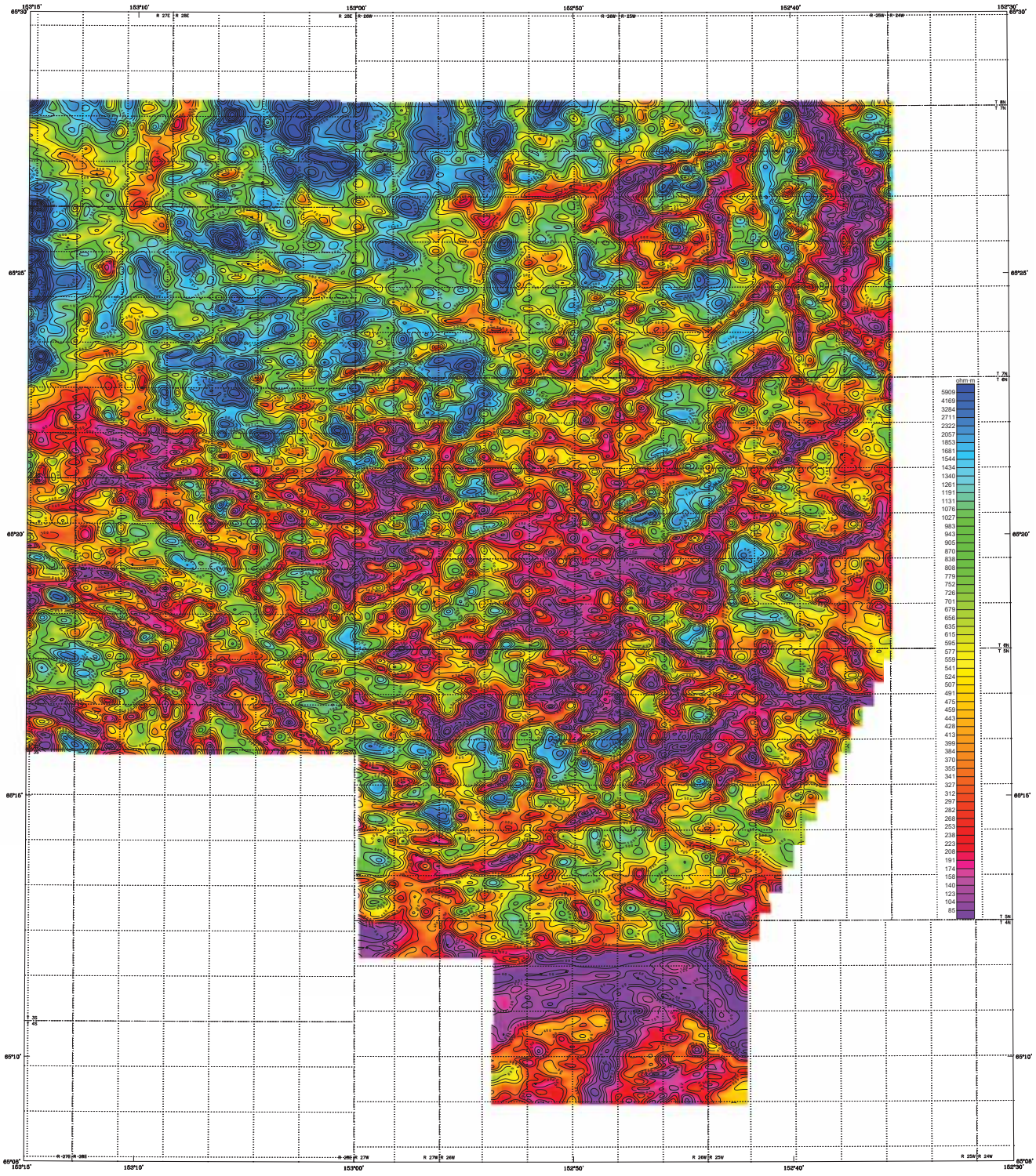

Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-6, 1968; B-6, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 2009

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

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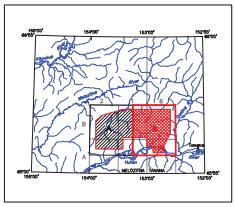
RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX



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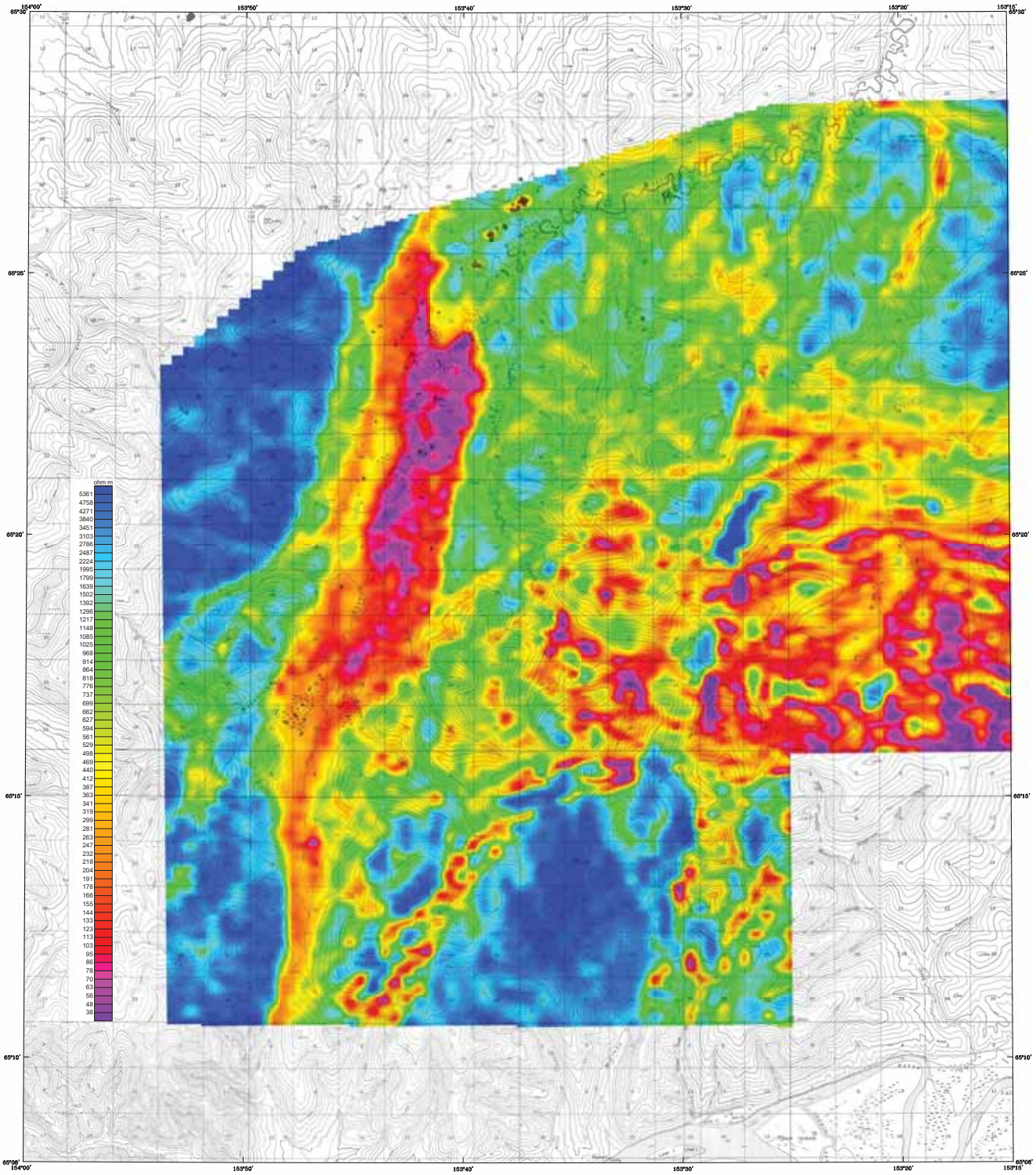

Base from U.S. Geological Survey Meloztina A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1972; Tanacross, Alaska

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

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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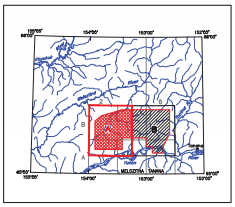

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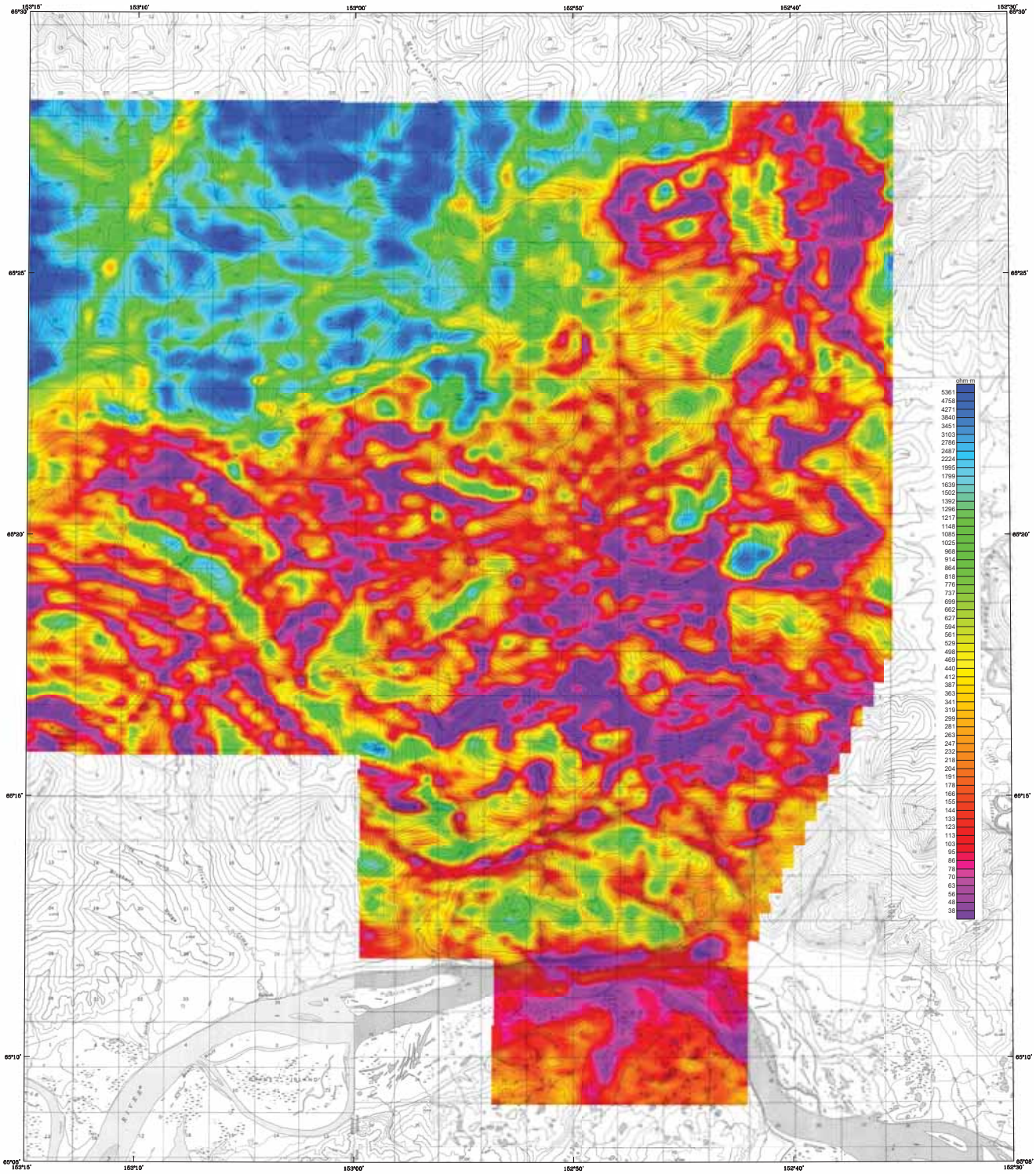

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SCALE 1:63,360

1 0 1 2 3 4 MILES

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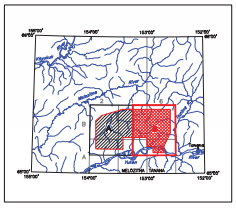

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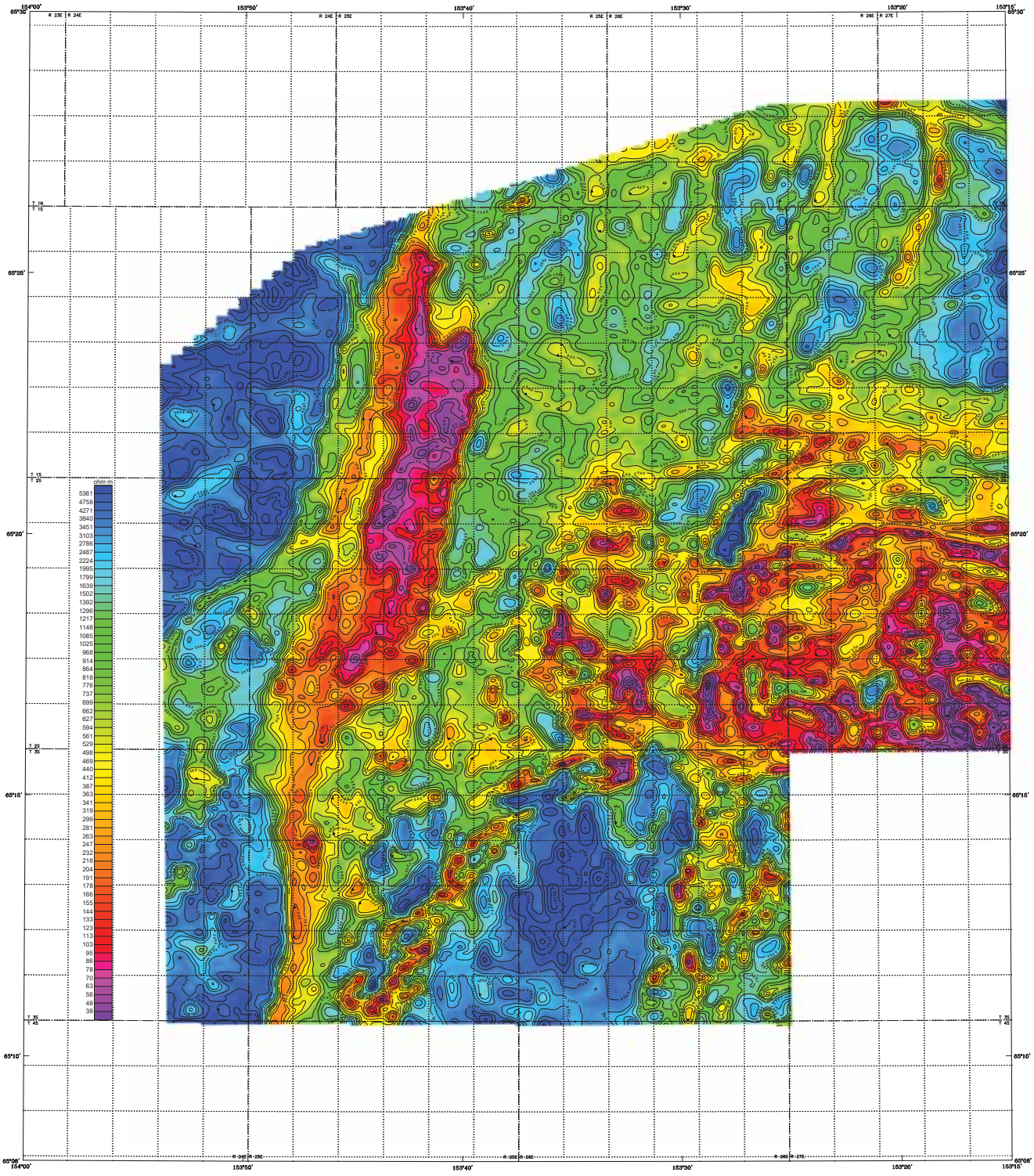

Section outlines from U.S. Geological Survey Metacinta A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gandrangida, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

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1000
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400
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125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

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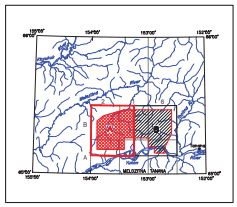

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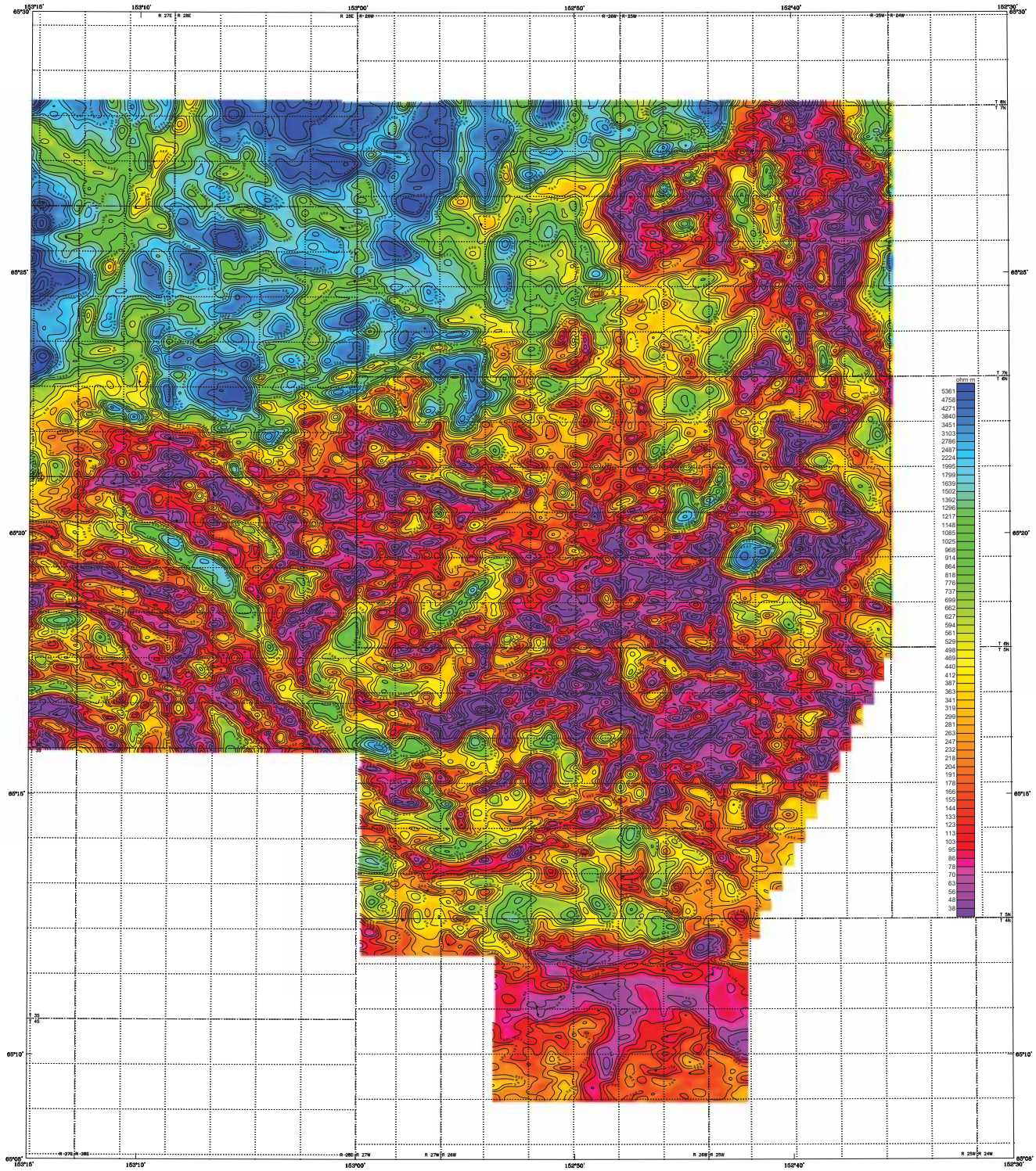

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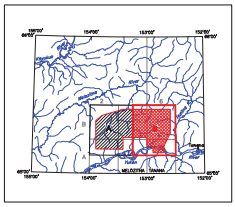

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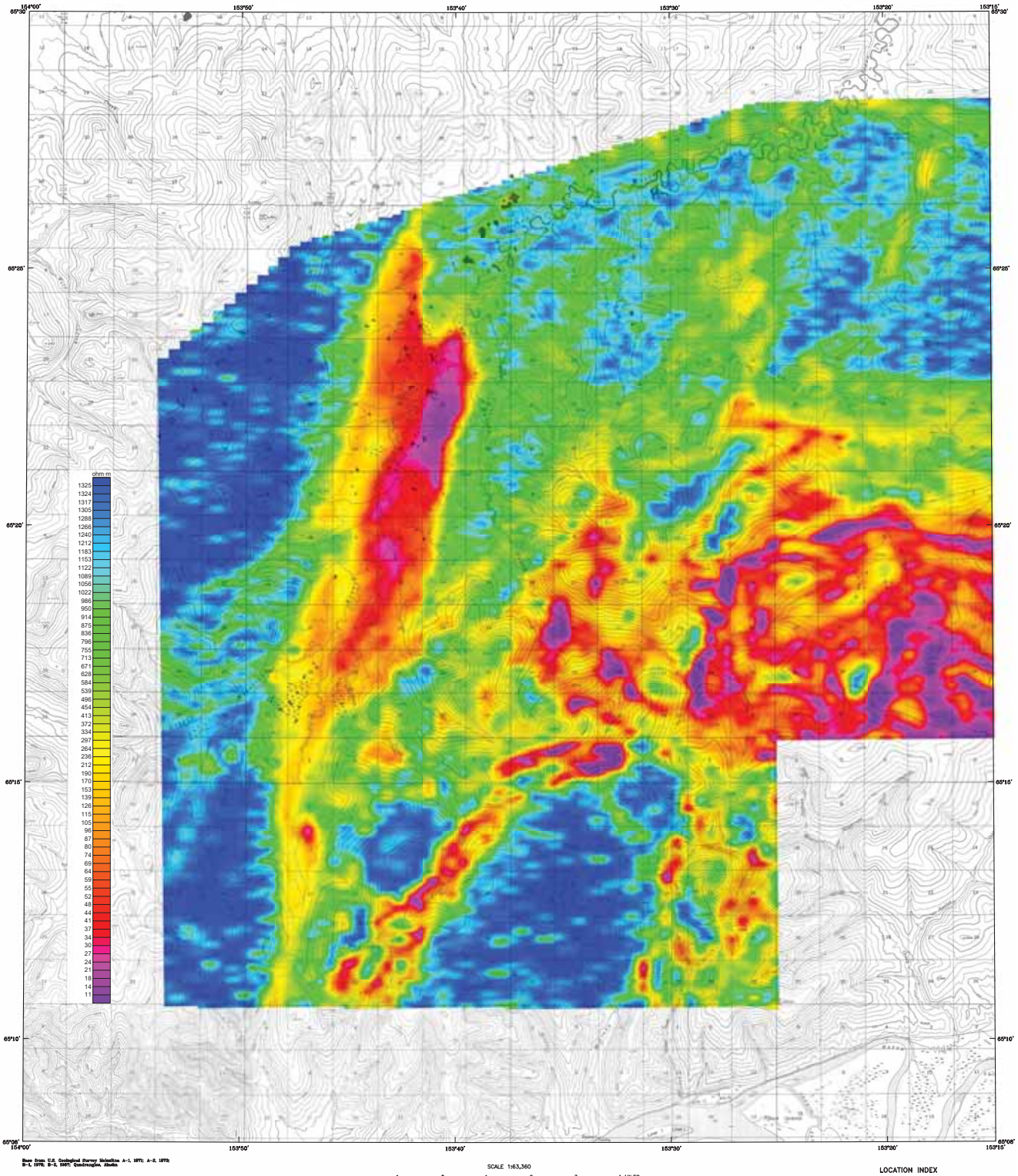

Base from U.S. Geological Survey Medallion A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gennalaska, Alaska

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CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

900 Hz COPLANAR APPARENT RESISTIVITY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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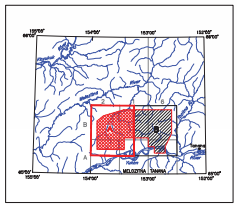

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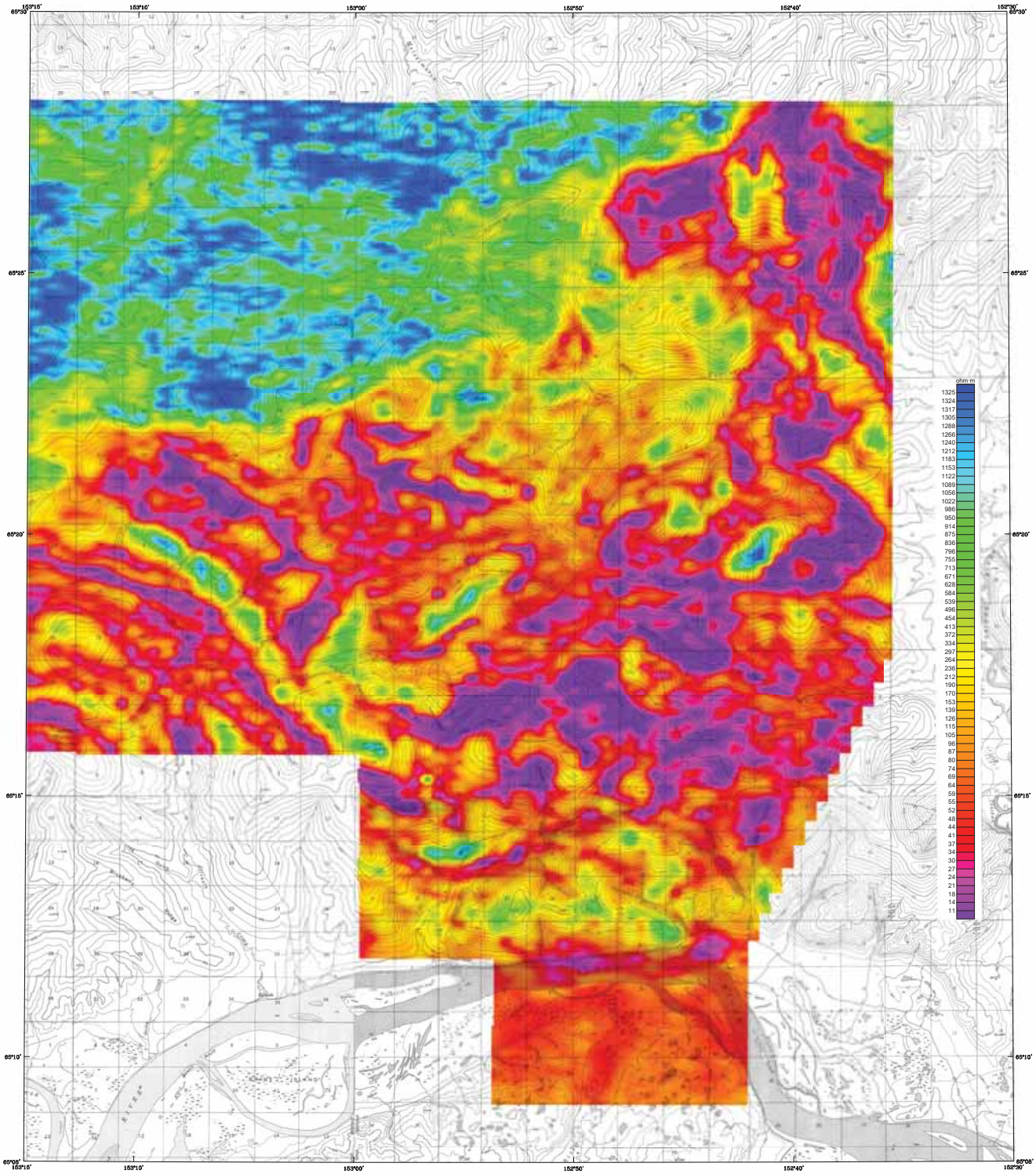

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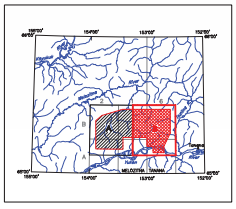

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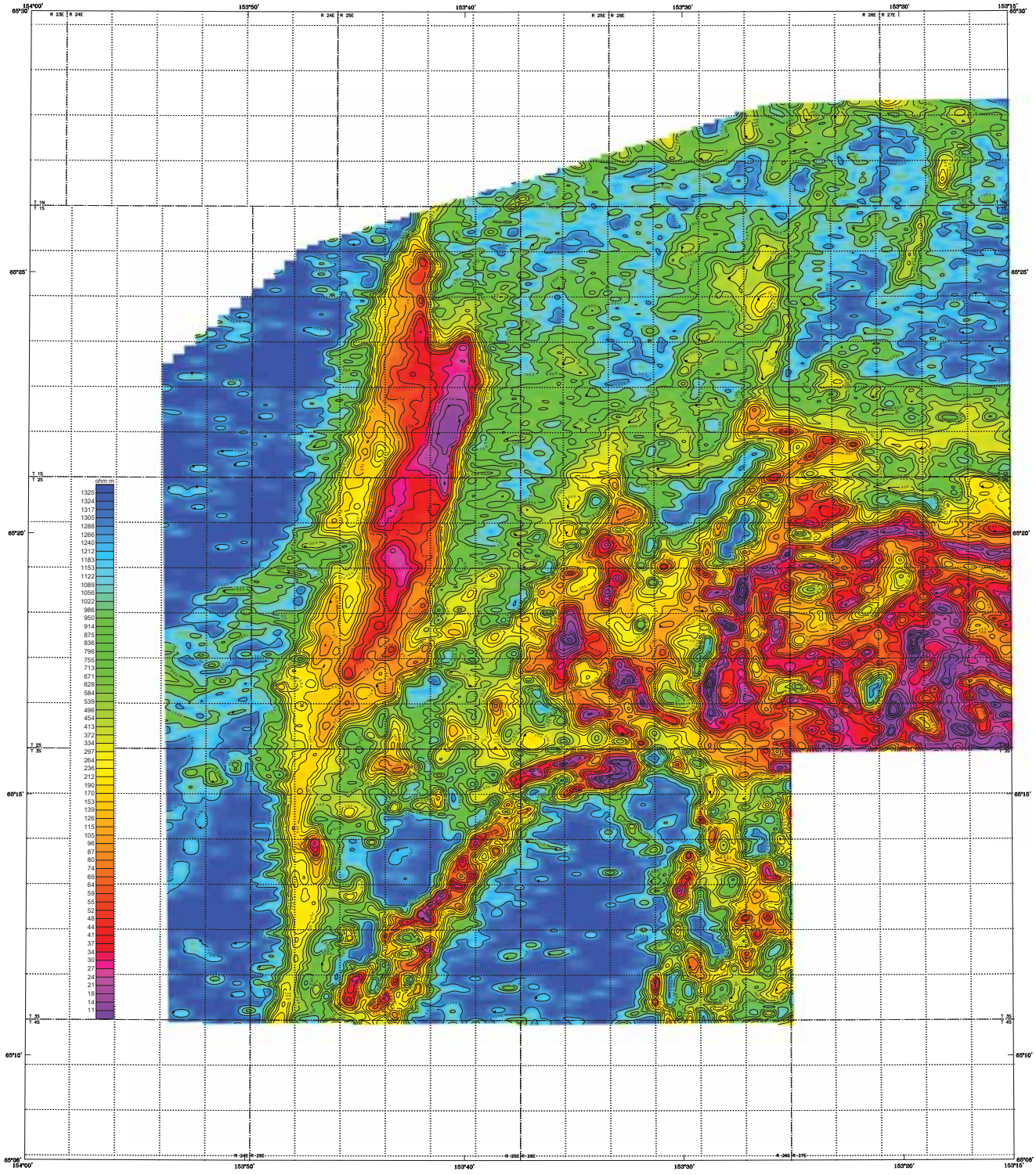

Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gulcana, Alaska

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Contours in ohm-m at 10 intervals per decade

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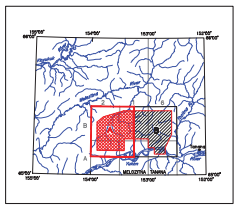

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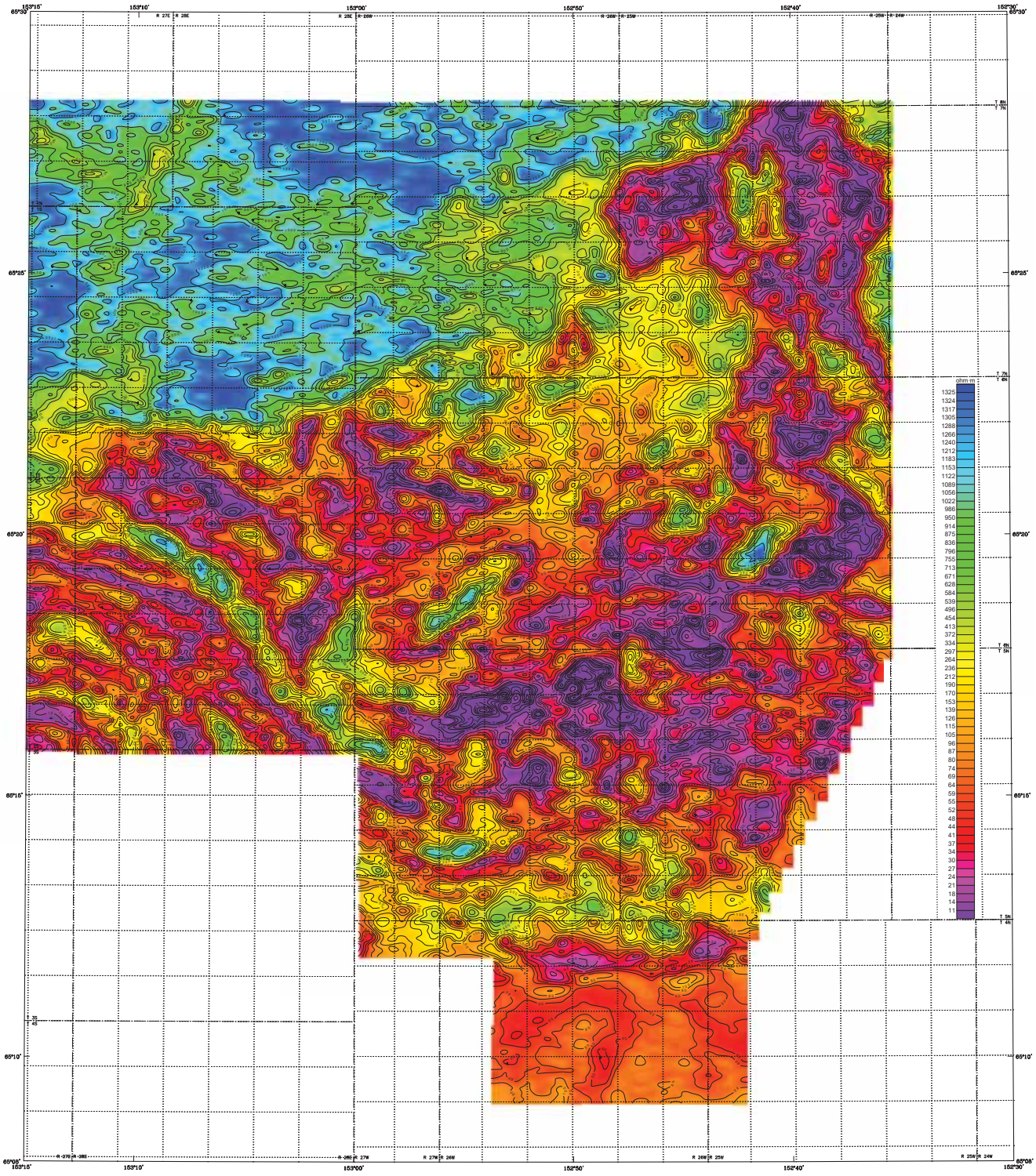

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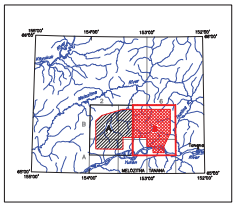

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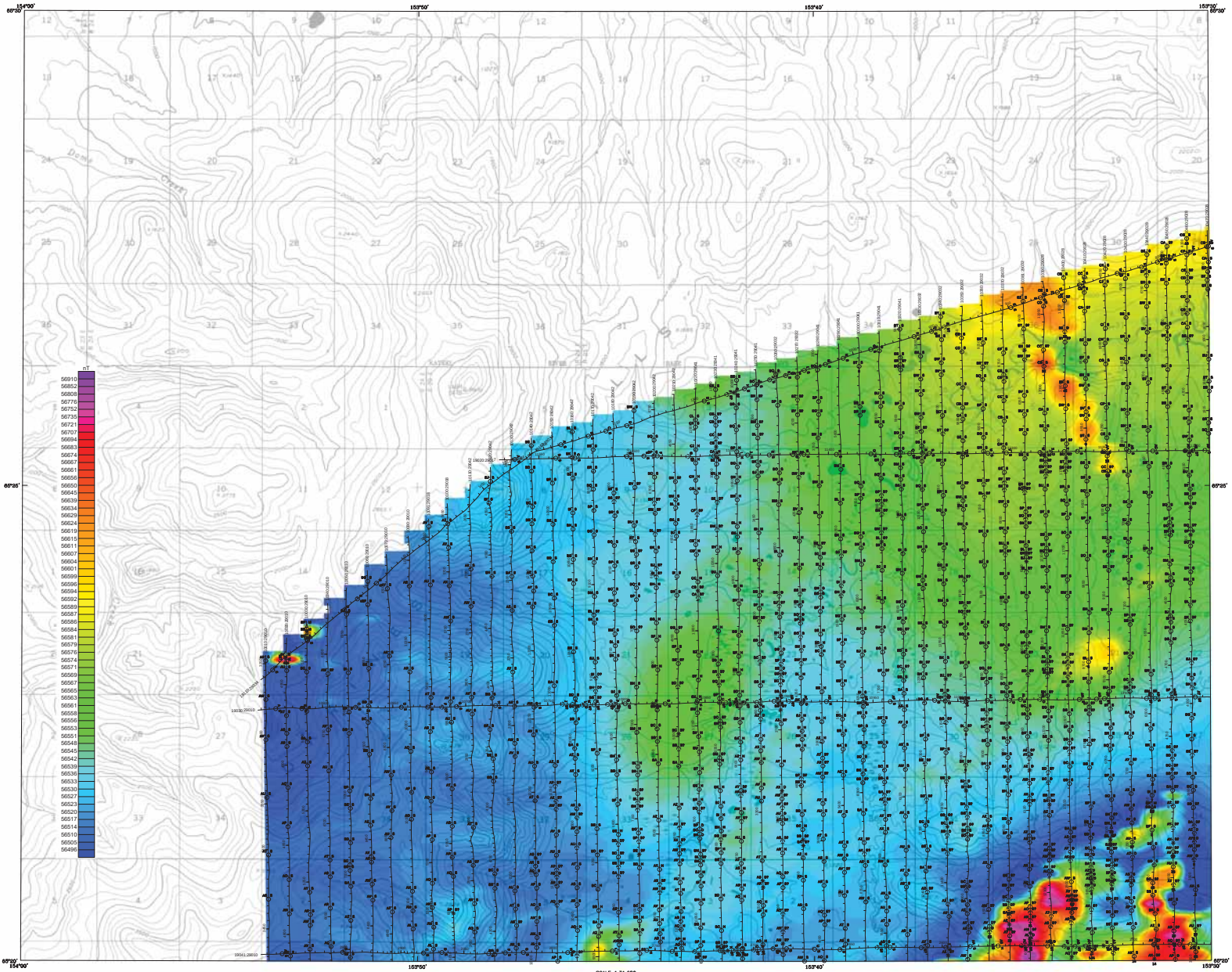

Base from U.S. Geological Survey Melozitna B-2, 1997; Quadrangle, Alaska

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

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PART of MELOZITNA B-2 QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp. and Stevens Exploration Management Corp.
2010

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, Radiation Solutions RS-500 gamma-ray spectrometer and a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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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ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m

Dip direction

Magnetic correlation in nT

Anomaly	Conductance
●	>100 siemens
●	50-100 siemens
●	20-50 siemens
●	10-20 siemens
○	5-10 siemens
○	1-5 siemens
○	< 1 siemens
✳	Indeterminate
△	EM magnetite response
□	Culture

Anomaly identifier

Interpretive symbol

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
M	Magnetite

Indicates some uncertainty as to the most appropriate EM source model, but does not question the validity of the EM anomaly.

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, 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. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

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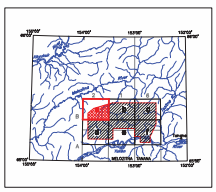
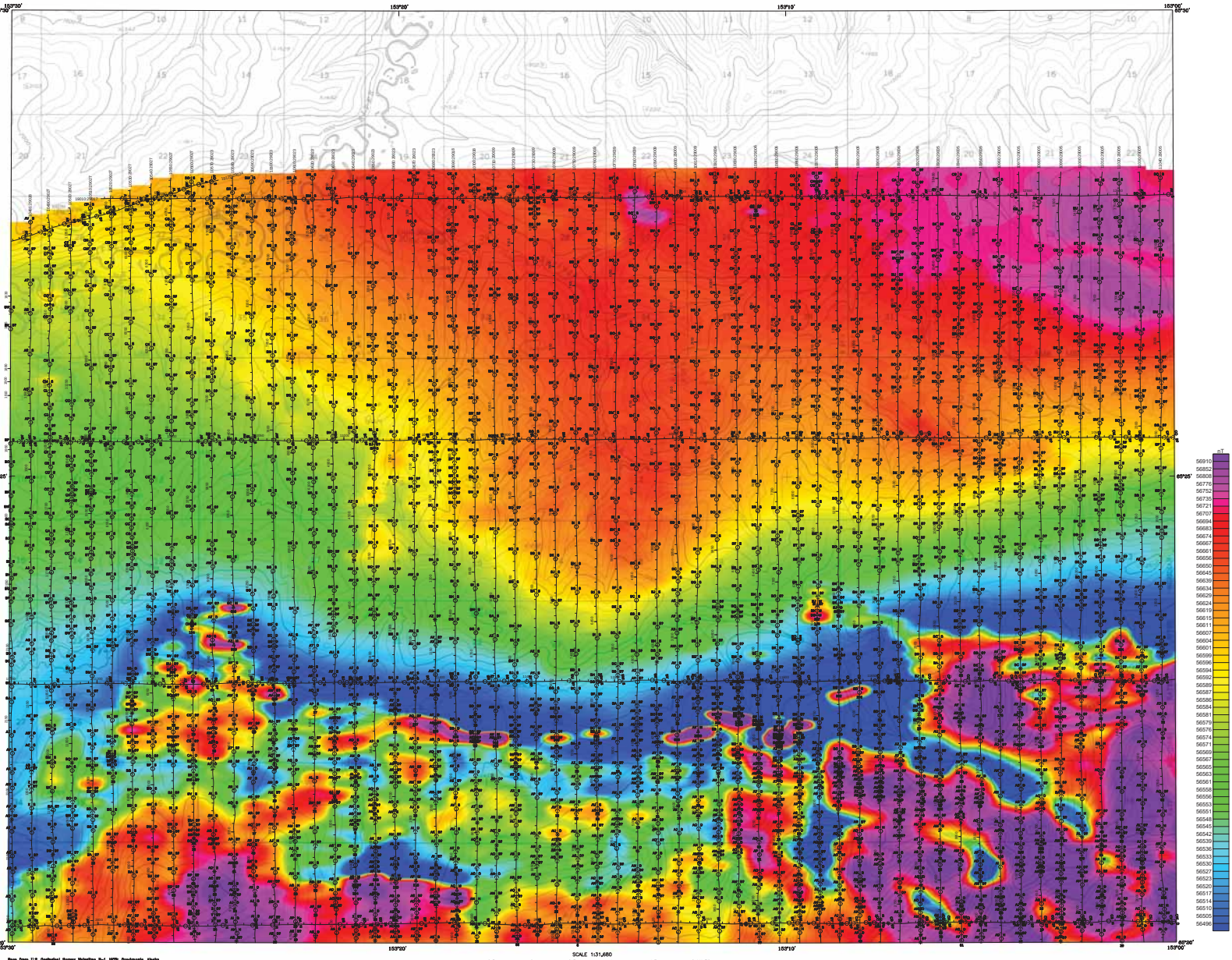
LOCATION INDEX FOR 1:31,680





Base from U.S. Geological Survey Melozitna B-1, 1978 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

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PART of MELOZITNA B-1 QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

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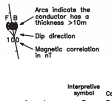

Anomaly	Conductance
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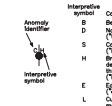

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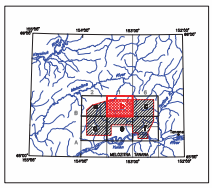

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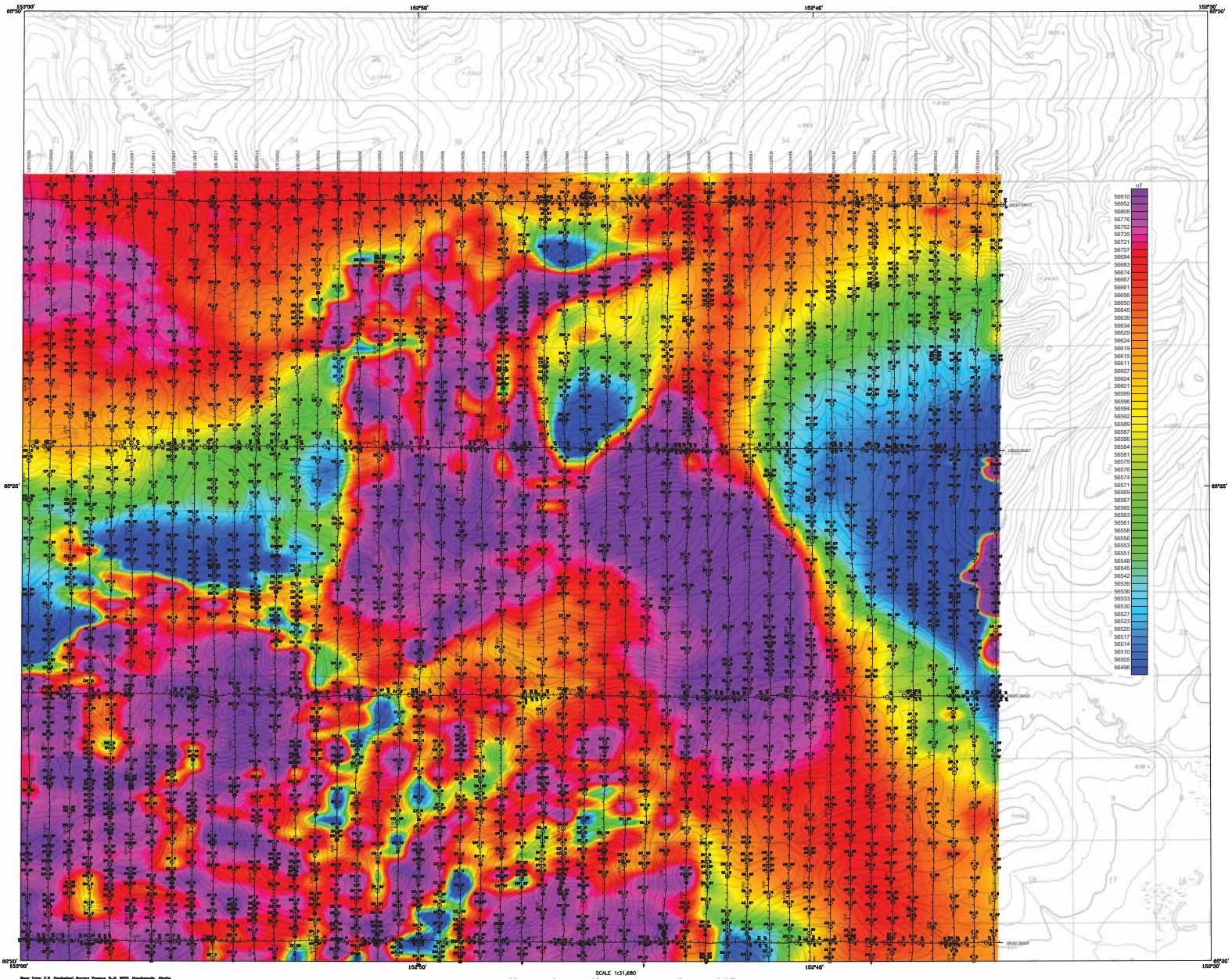

Base from U.S. Geological Survey Tanana B-6, 1970, Quadrangle, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

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CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PART of TANANA B-6 QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

DESCRIPTIVE NOTES

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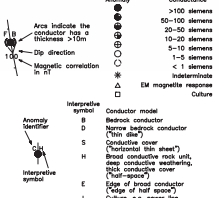

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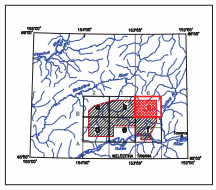

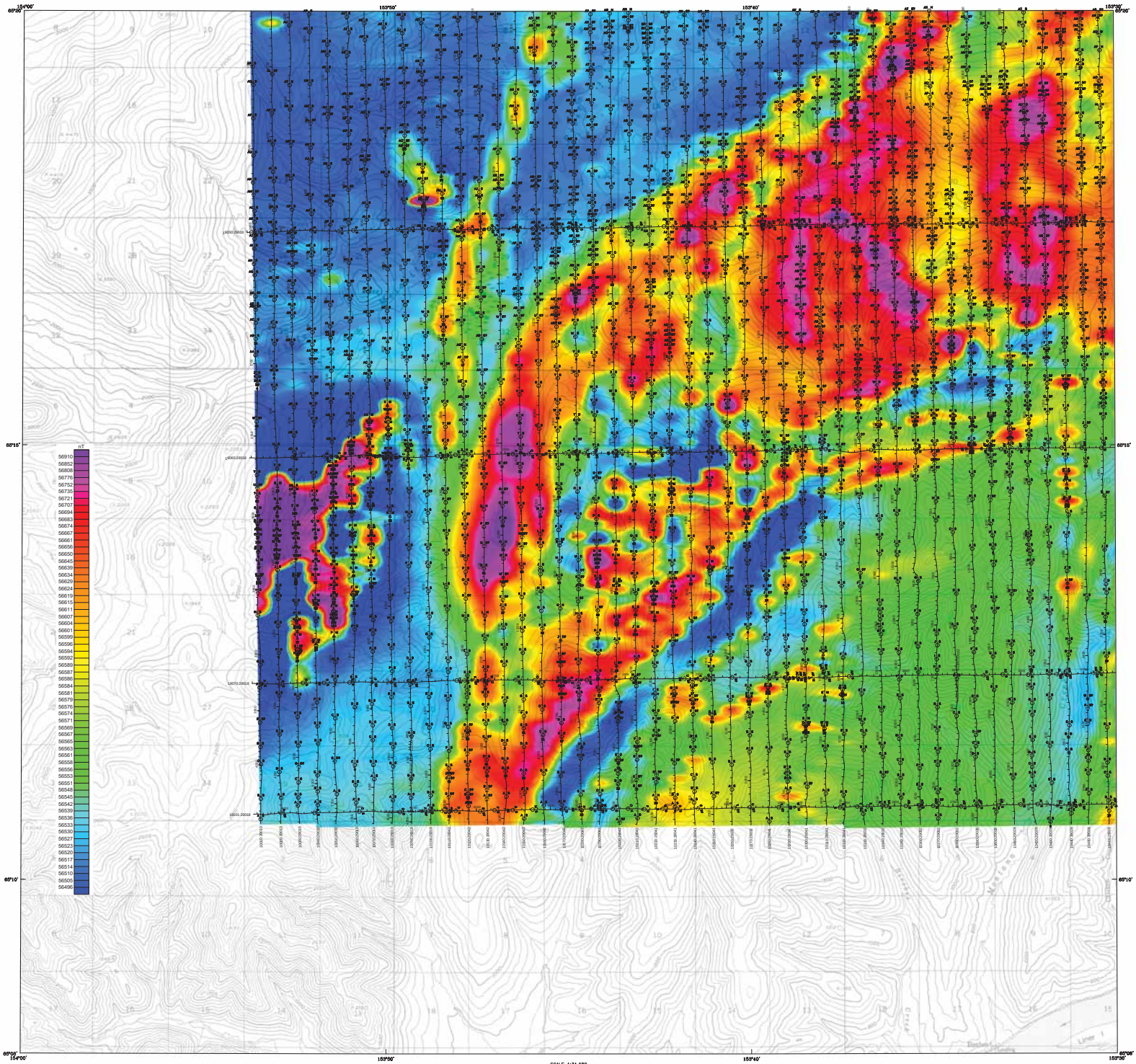

Base from U.S. Geological Survey Melozitna A-2, 1978; B-2, 1987; Quadrangles, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

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CONTOUR INTERVAL 100 FEET
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PARTS of MELOZITNA A-2 and B-2 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

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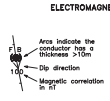

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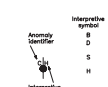

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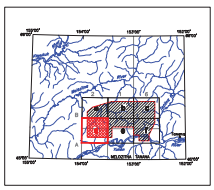

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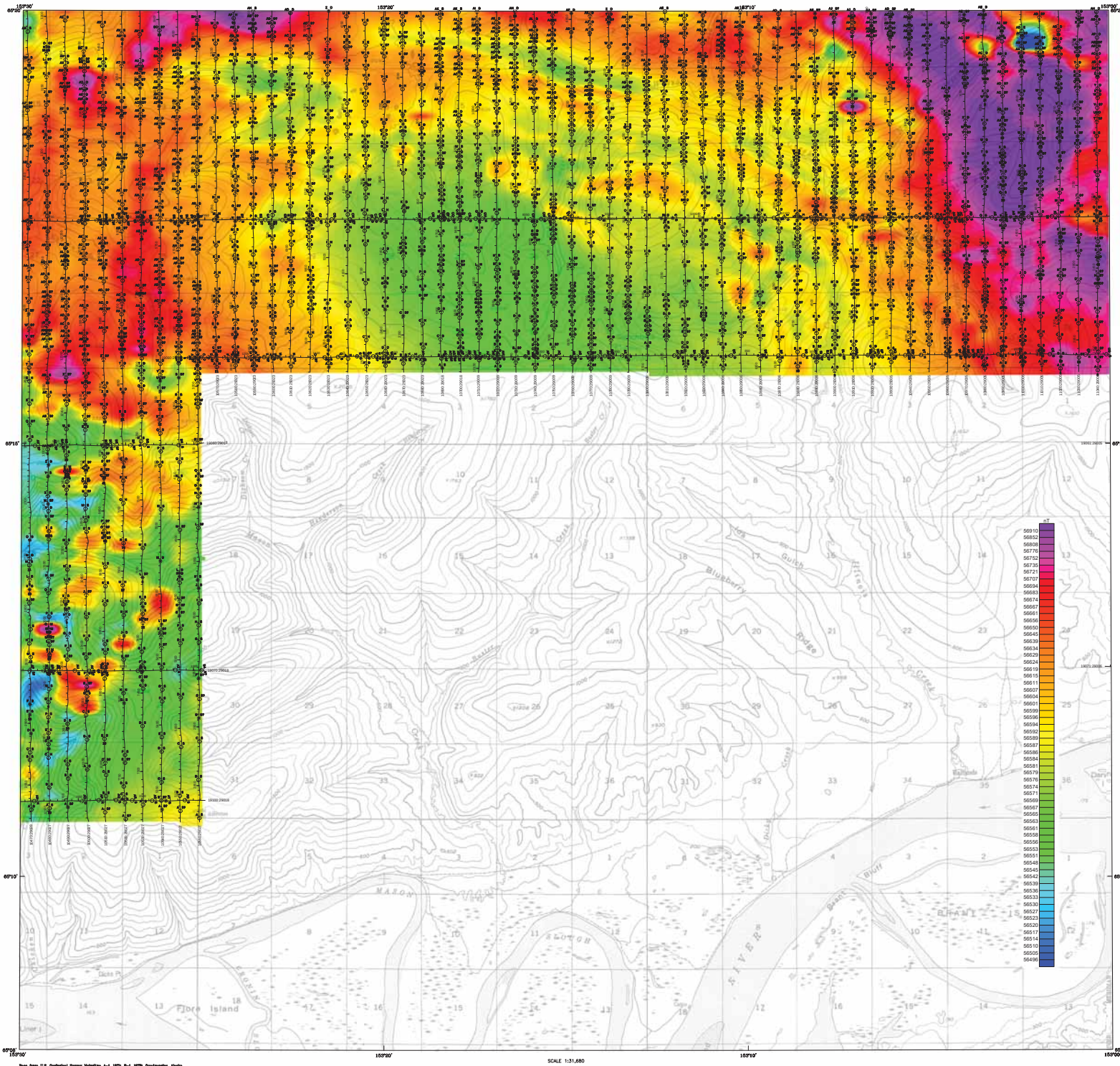

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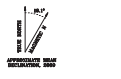

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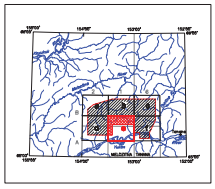
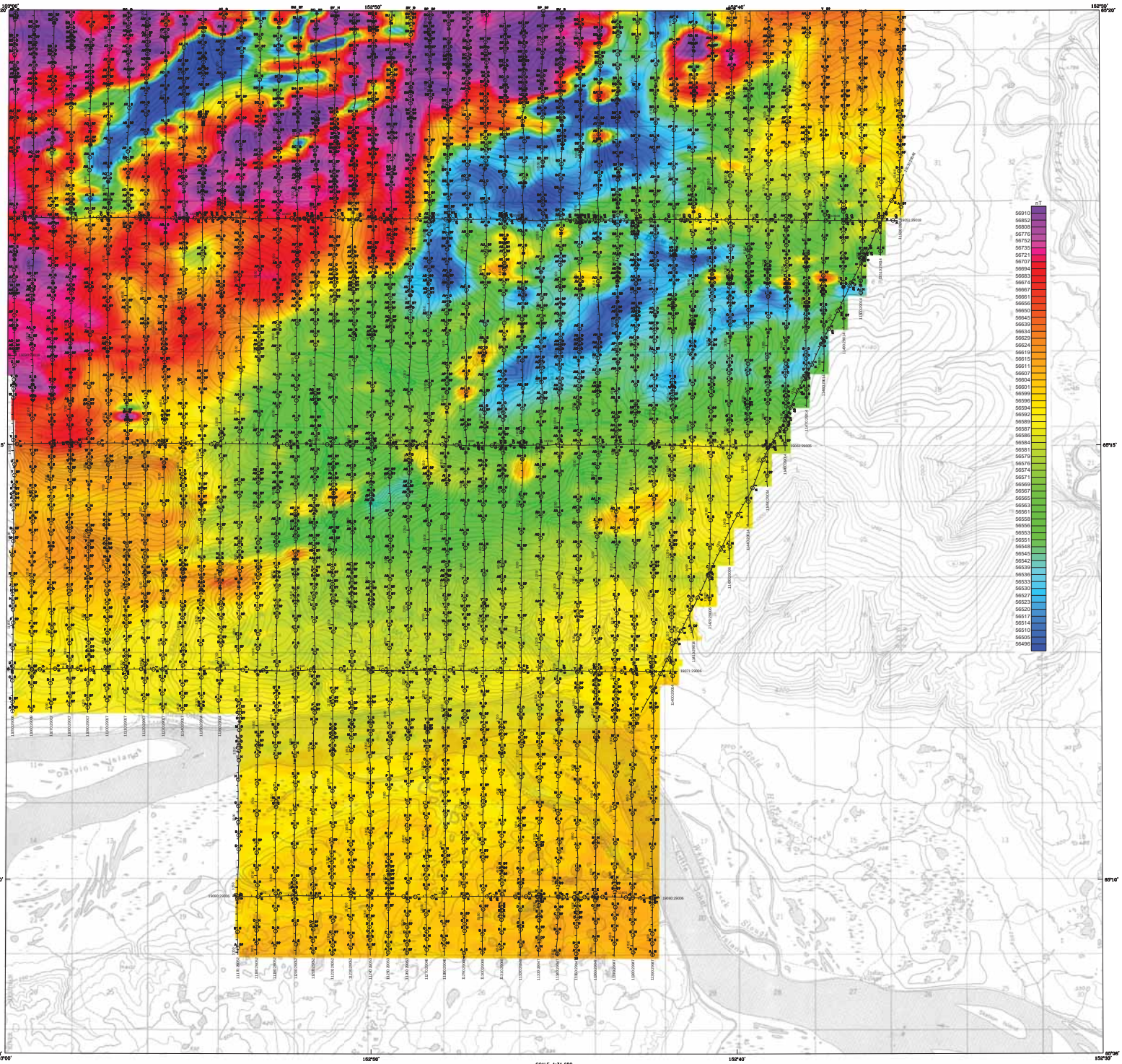
LOCATION INDEX FOR 1:31,680





Base from U.S. Geological Survey Tanana A-6, 1956; B-6, 1957; 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

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS of TANANA A-6 and B-6 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Radiation Solutions RS-500 gamma-ray spectrometer and a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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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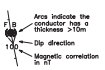
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
●	>100 siemens
●	50–100 siemens
●	20–50 siemens
●	10–20 siemens
●	5–10 siemens
○	1–5 siemens
○	< 1 siemens
✳	Indeterminate
△	EM magnetite response
□	Culture

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
M	Magnetite
"-"	Indicates some uncertainty as to the most appropriate EM source model, but does not question the validity of the EM anomaly.

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, 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. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2005, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.

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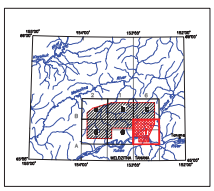

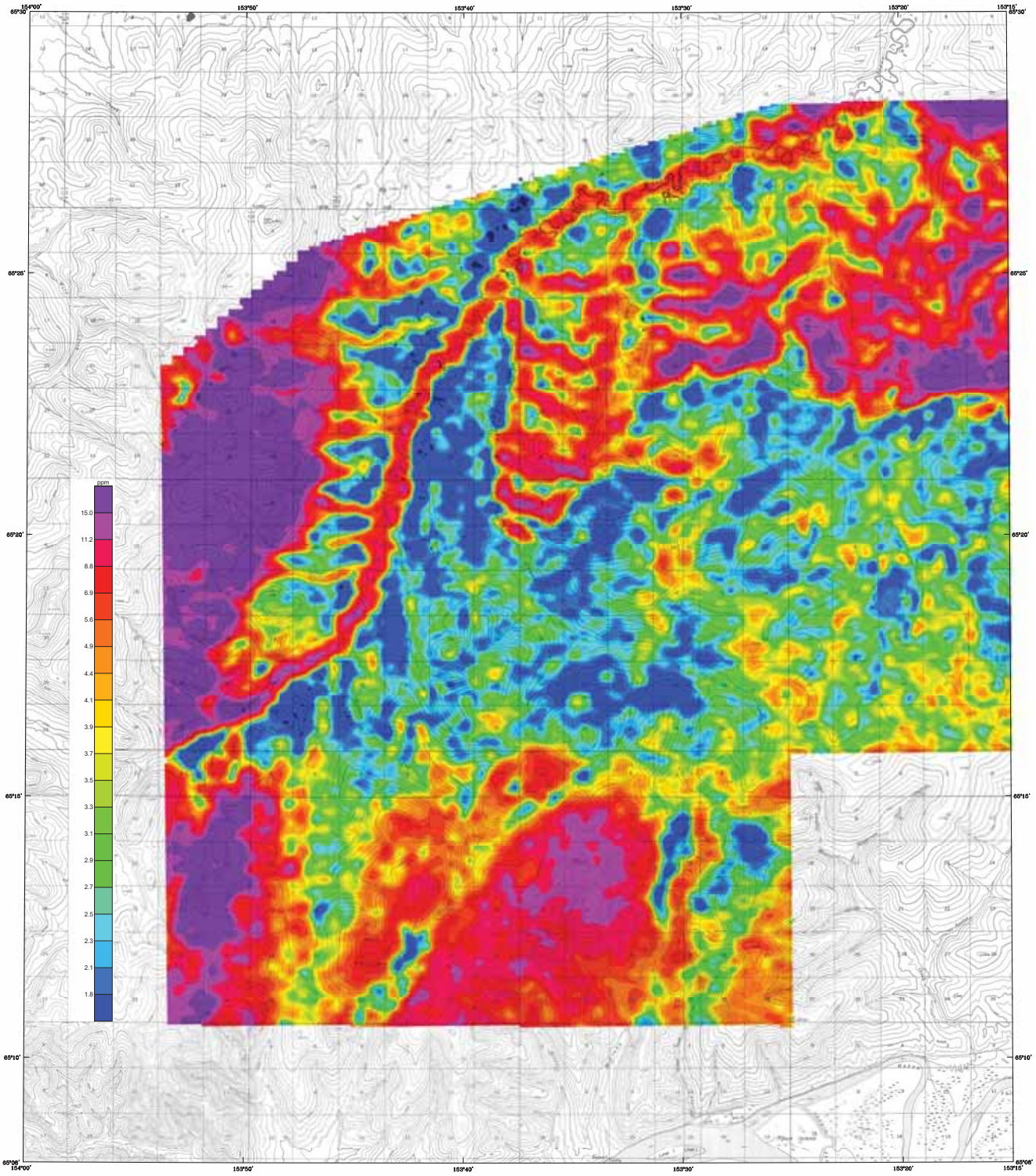

Base from U.S. Geological Survey Meiklitna A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1975; Gulkana, Alaska

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

THORIUM (eTh) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

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2010

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RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-500 gamma-ray spectrometer. It was configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 keV), uranium (1660-1860 keV), potassium (1370-1570 keV), total radioactivity (400-2815 keV) and cosmic radiation (3000->6000 keV). Counts from the radon detector were recorded in the radon window (1660-1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

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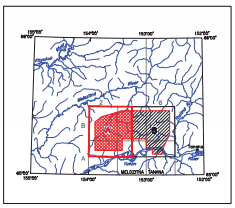

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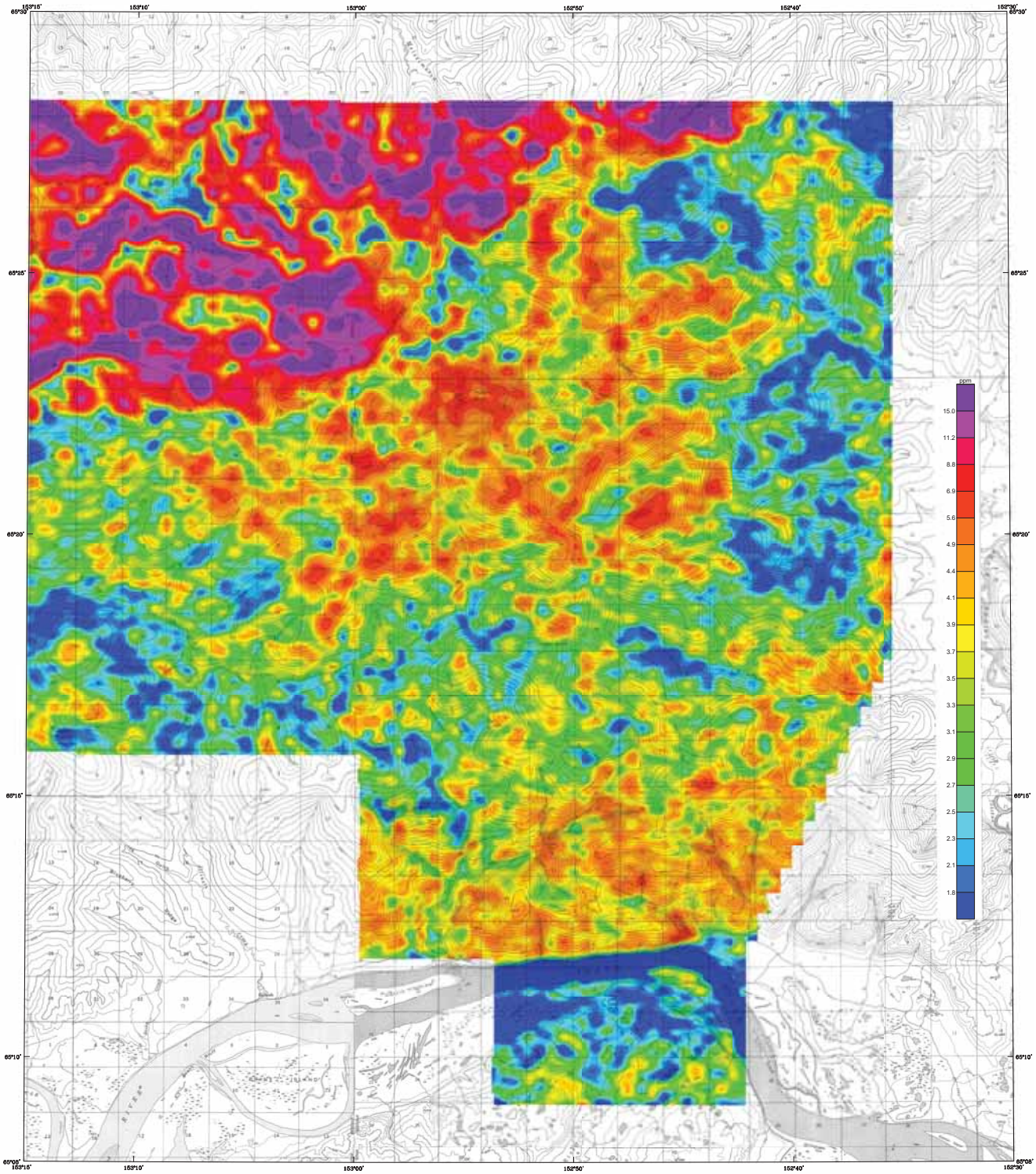

Base from U.S. Geological Survey Nabesna A-1, 1971; B-1, 1978; Tanana A-4, 1950; B-2, 1978; Quadrangles, Alaska

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, 2009

THORIUM (eTh) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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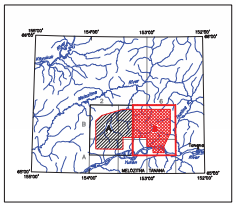

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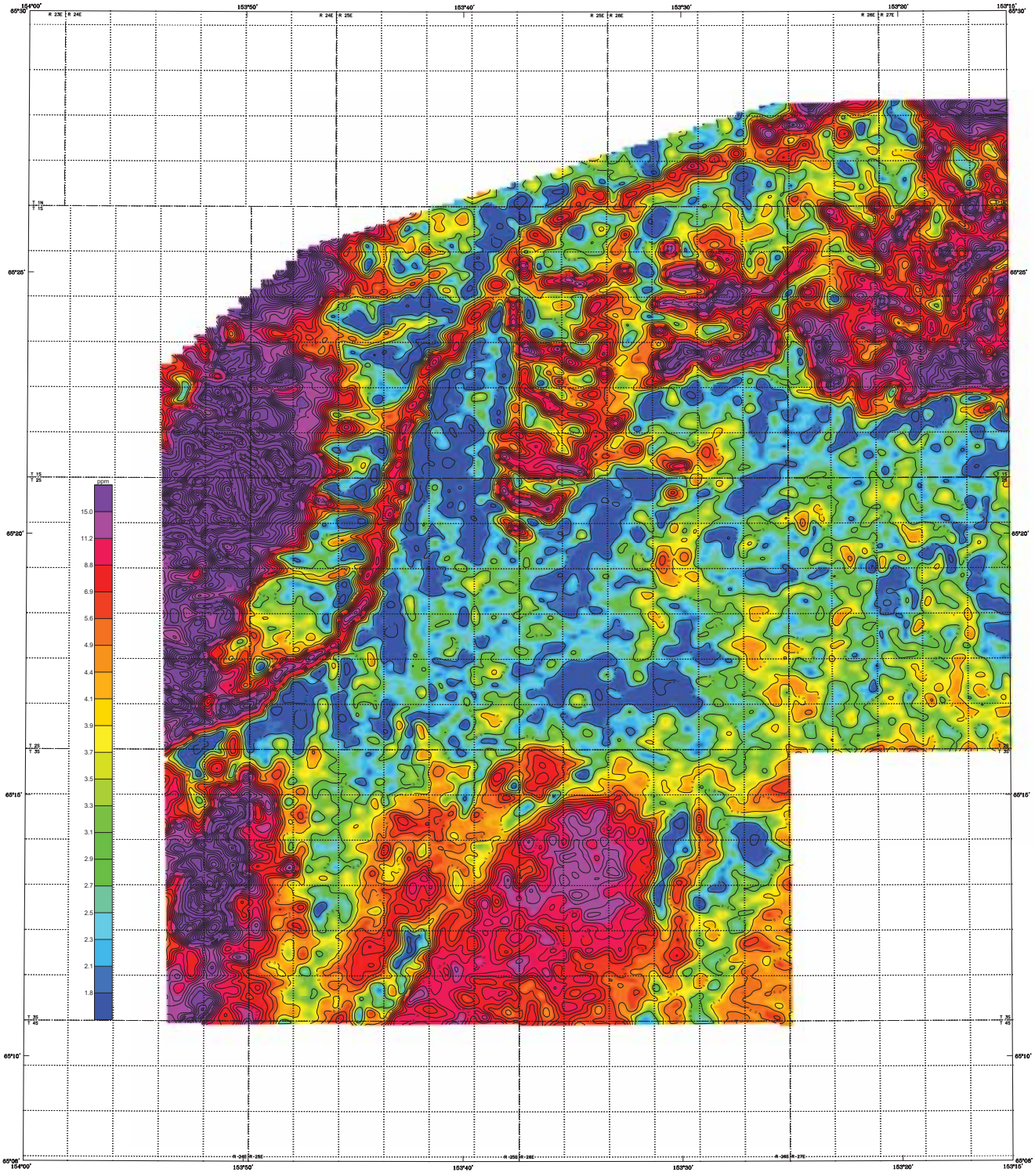
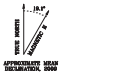


Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1977; Gulochuqlen, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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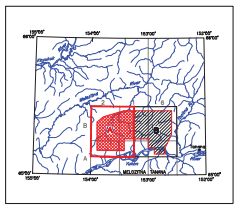
CONTOUR INTERVAL

20.0 ppm

5.0 ppm

1.0 ppm

LOCATION INDEX



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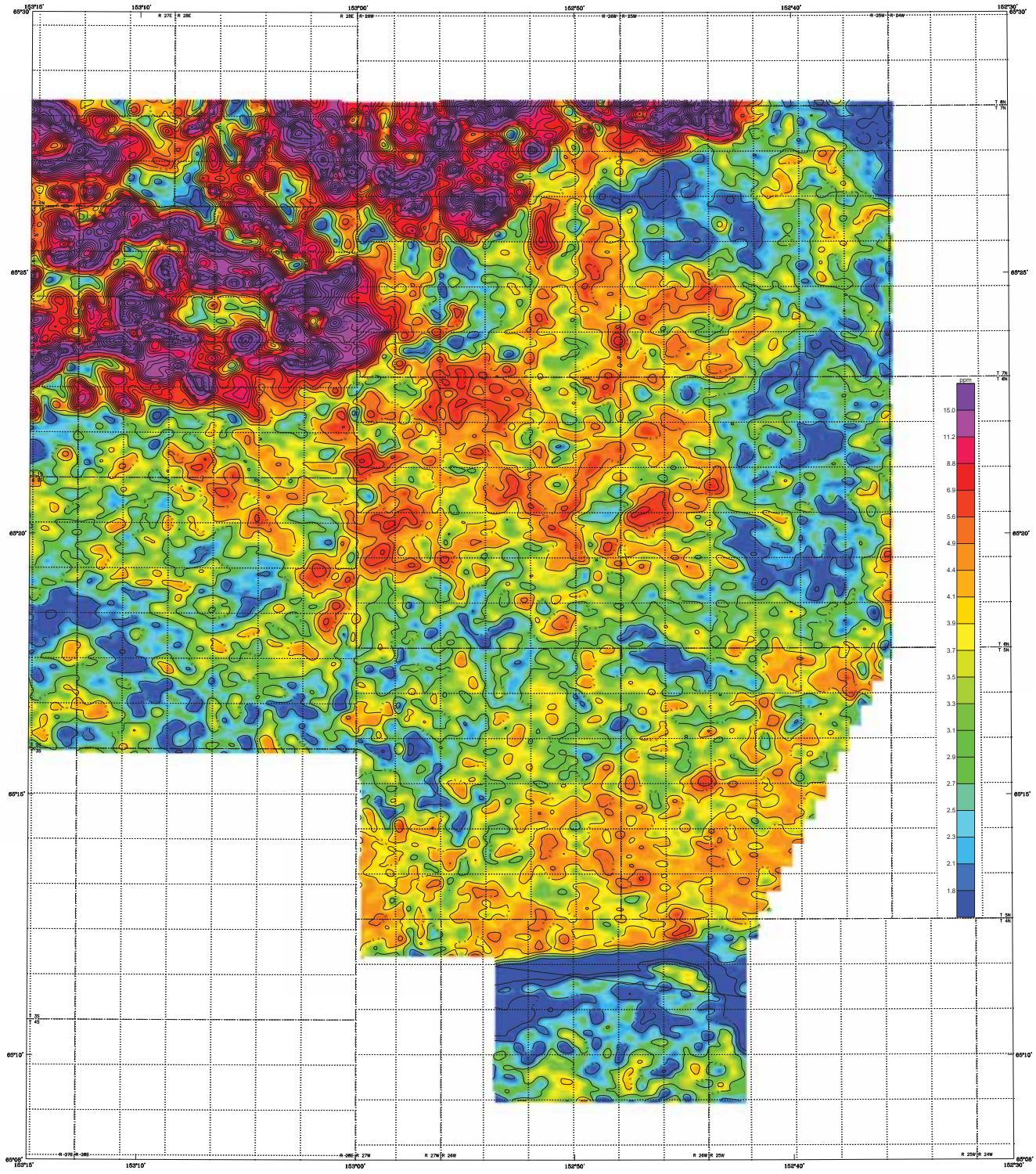

Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-6, 1968; B-6, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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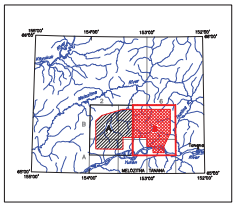

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CONTOUR INTERVAL

.....	20.0 ppm
.....	5.0 ppm
.....	1.0 ppm

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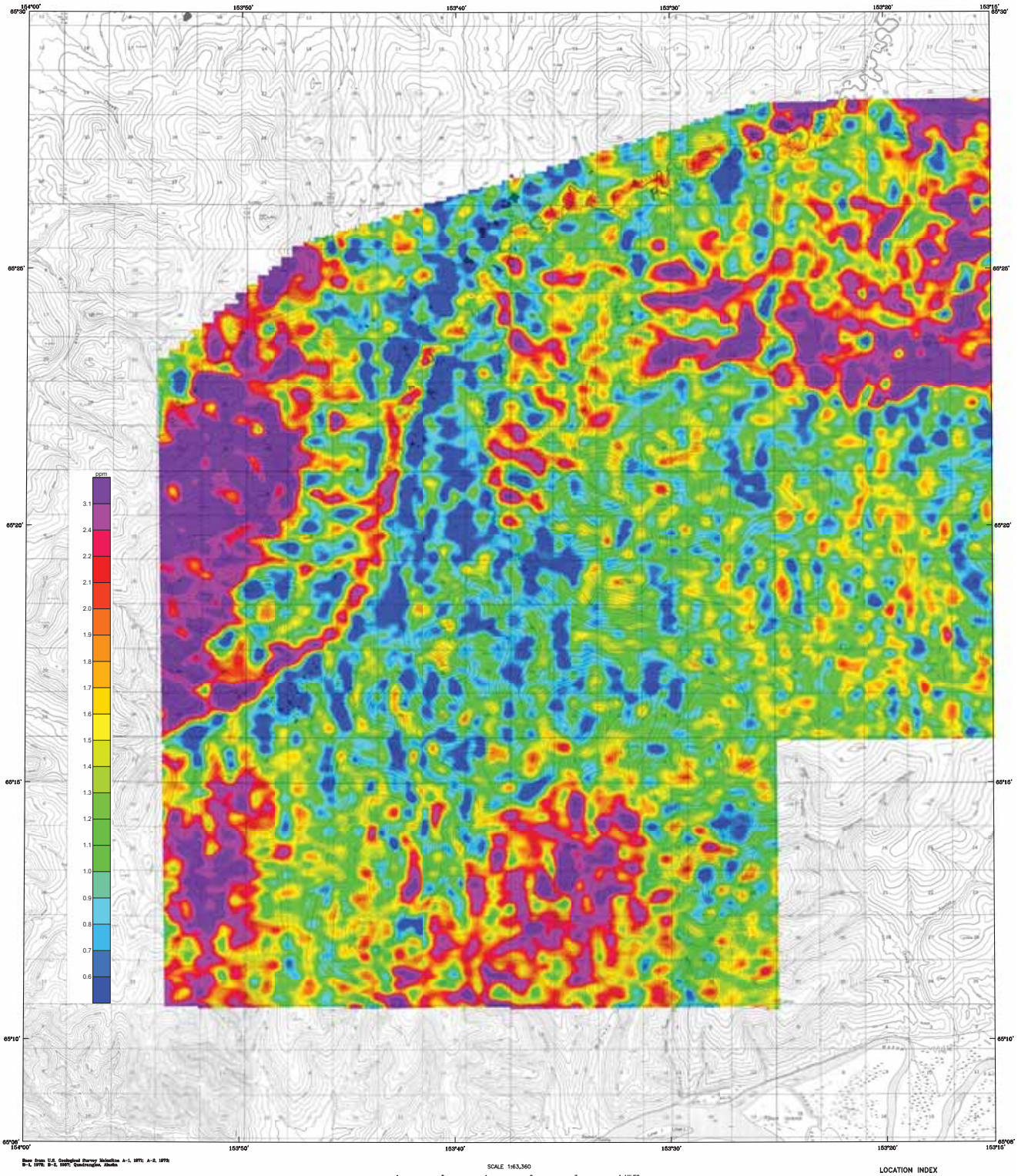

Base from U.S. Geological Survey Meiklejohn A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gardenigiin, Alaska.

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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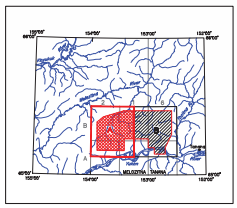

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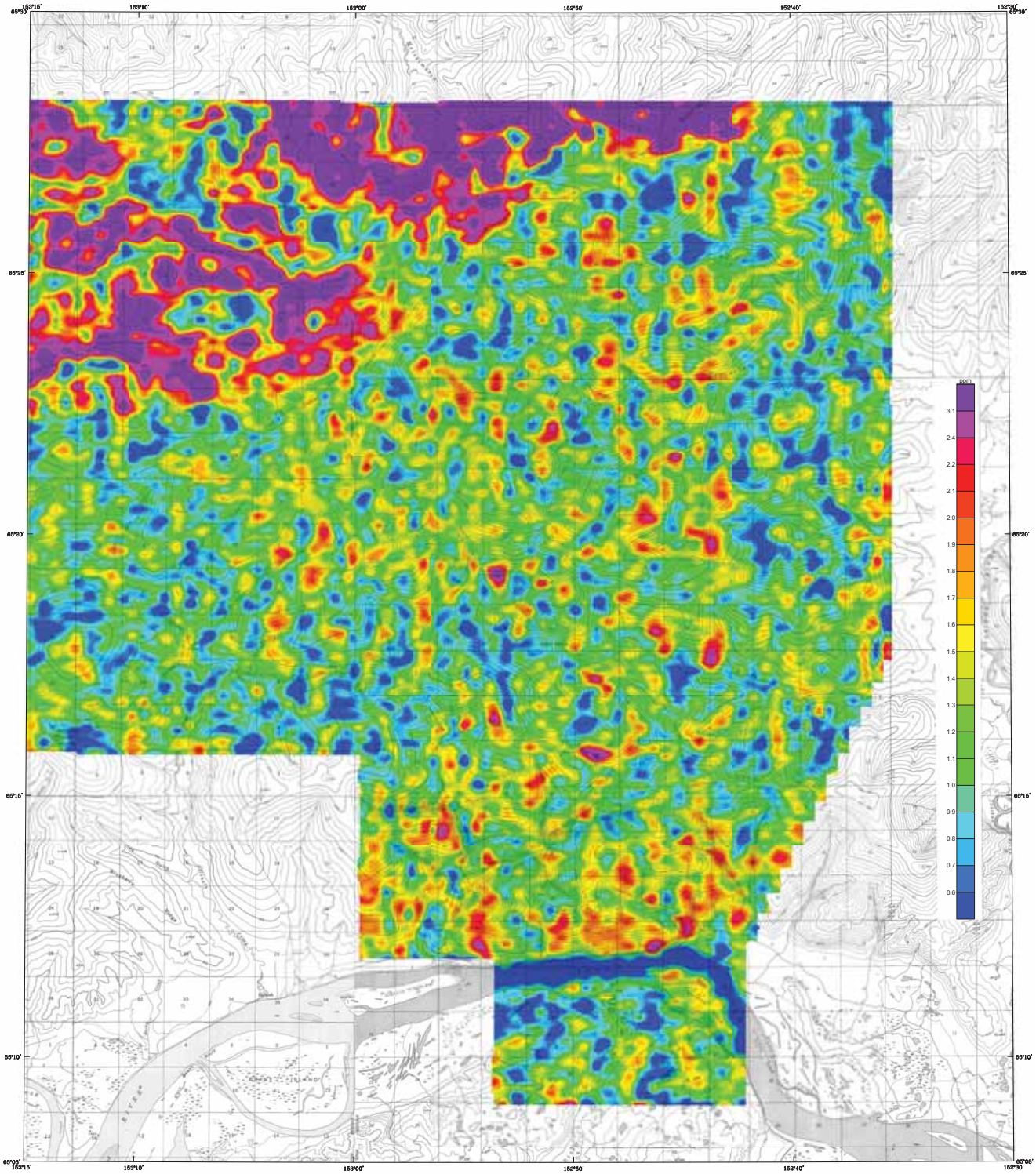

Base from U.S. Geological Survey Nabesna A-1, 1971; B-1, 1978; Tanana A-4, 1969; B-4, 1978; Quadrangles, Alaska

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, 2009

URANIUM (eU) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

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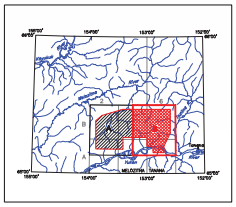

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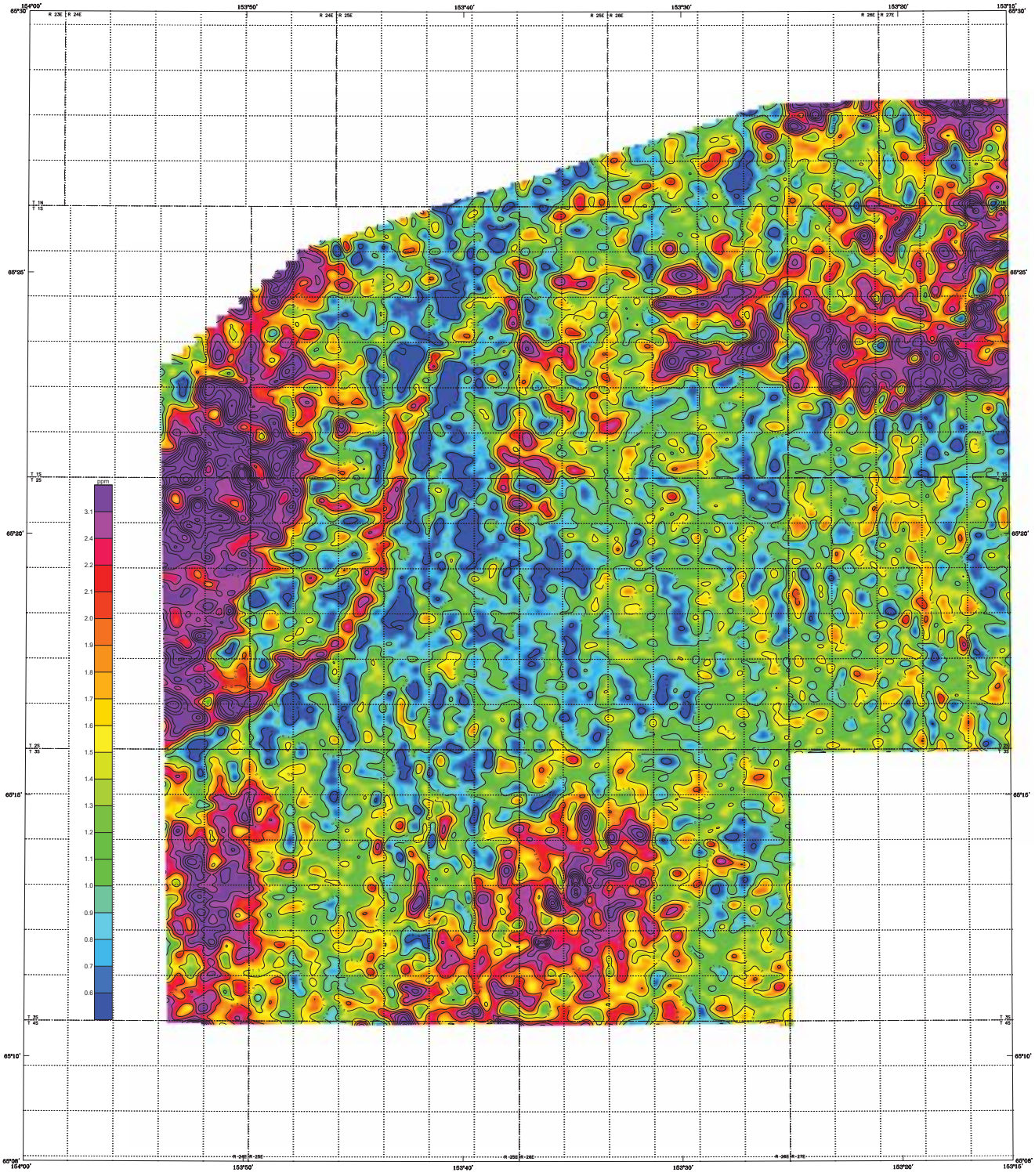

Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gulkana, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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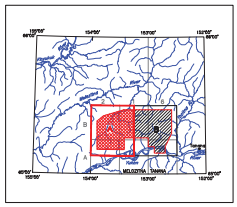
CONTOUR INTERVAL

————	..... 20.0 ppm
————	..... 4.0 ppm
————	..... 0.5 ppm

LOCATION INDEX



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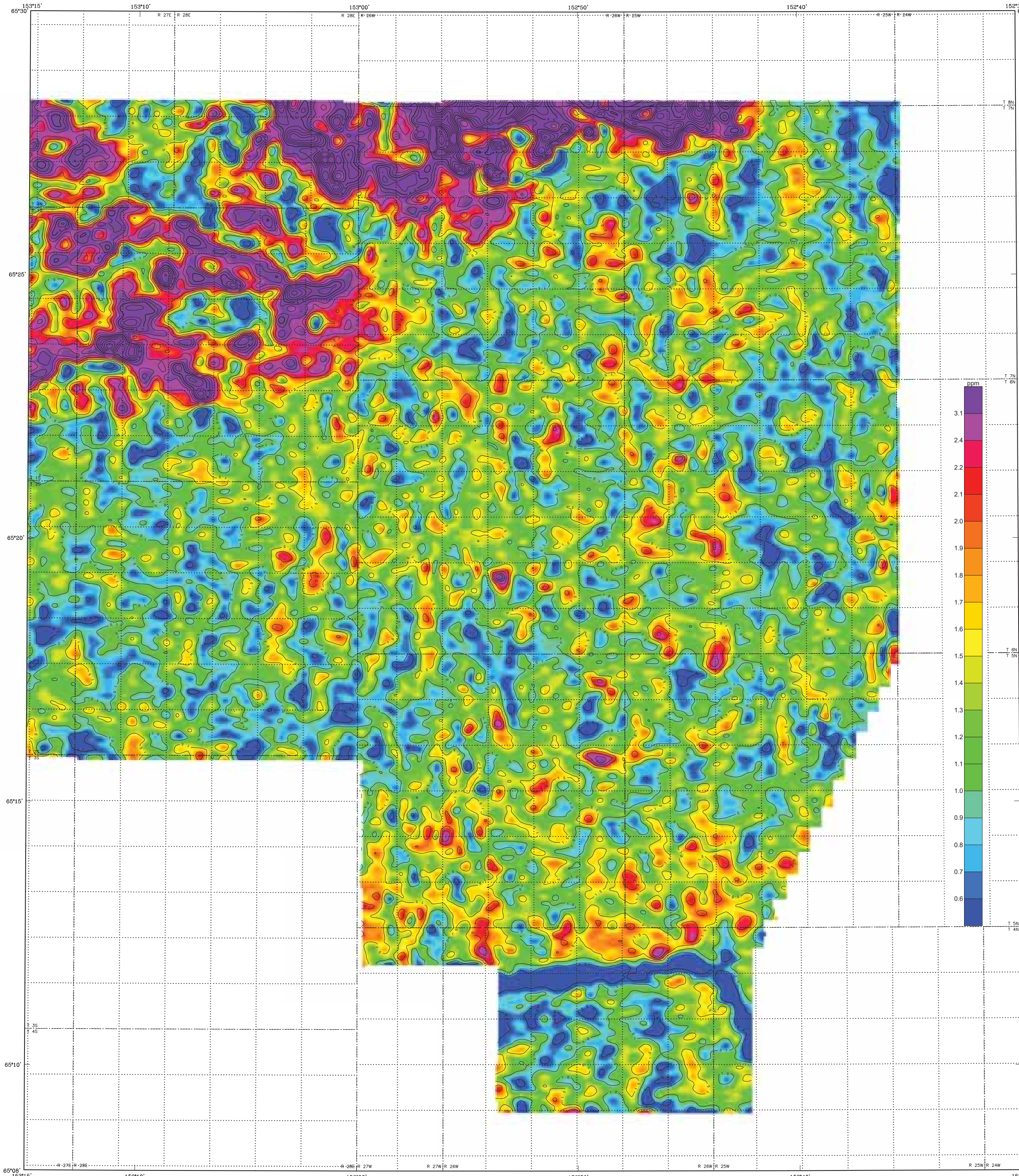

Section outlines from U.S. Geological Survey Melozitna A-1, 1971; B-1, 1978; Tanana A-6, 1969; B-6, 1973; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

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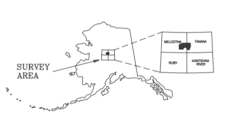

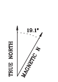

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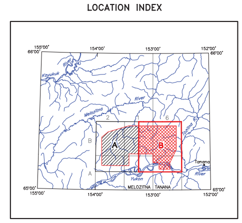

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by
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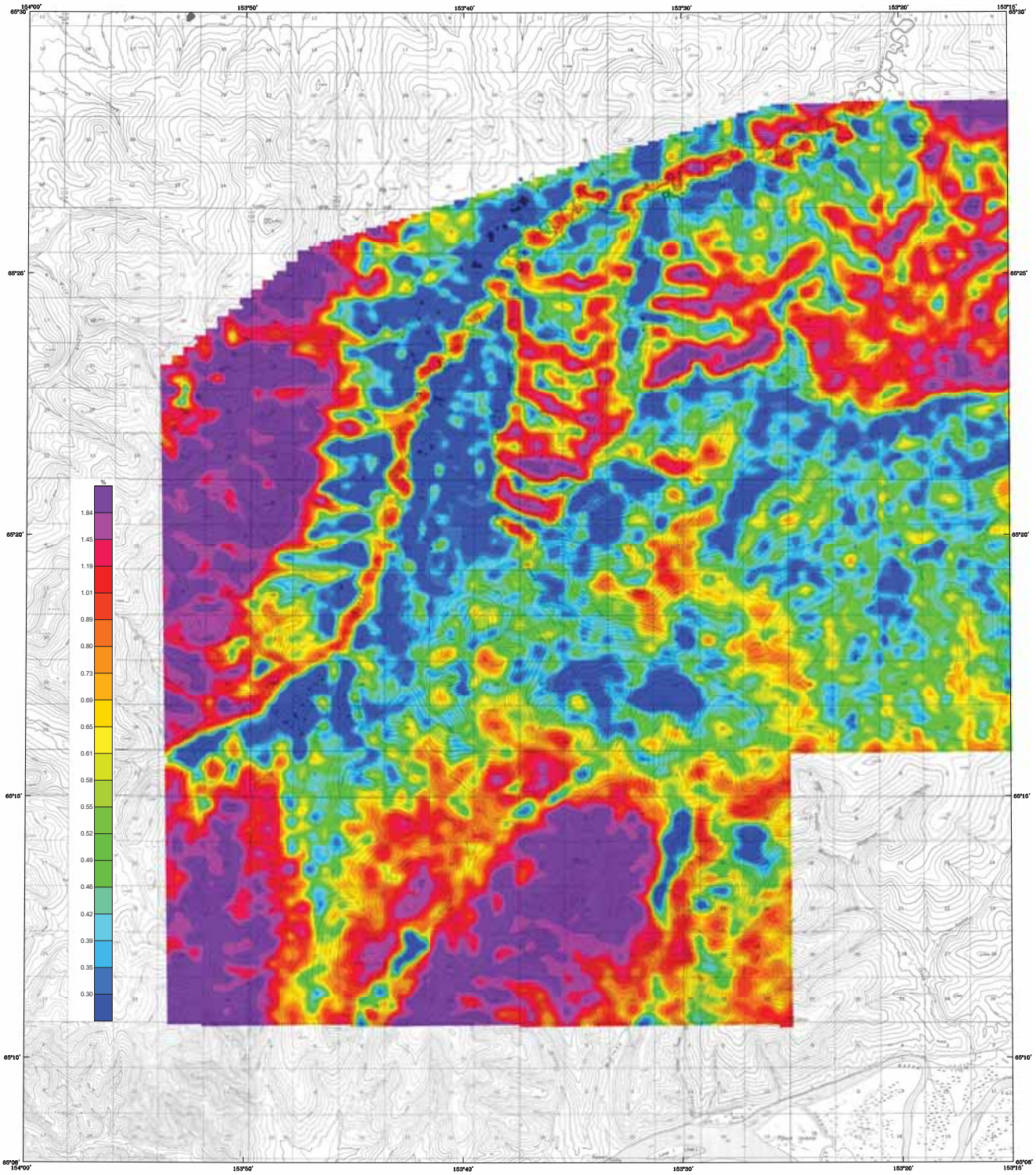

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1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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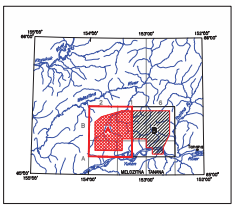

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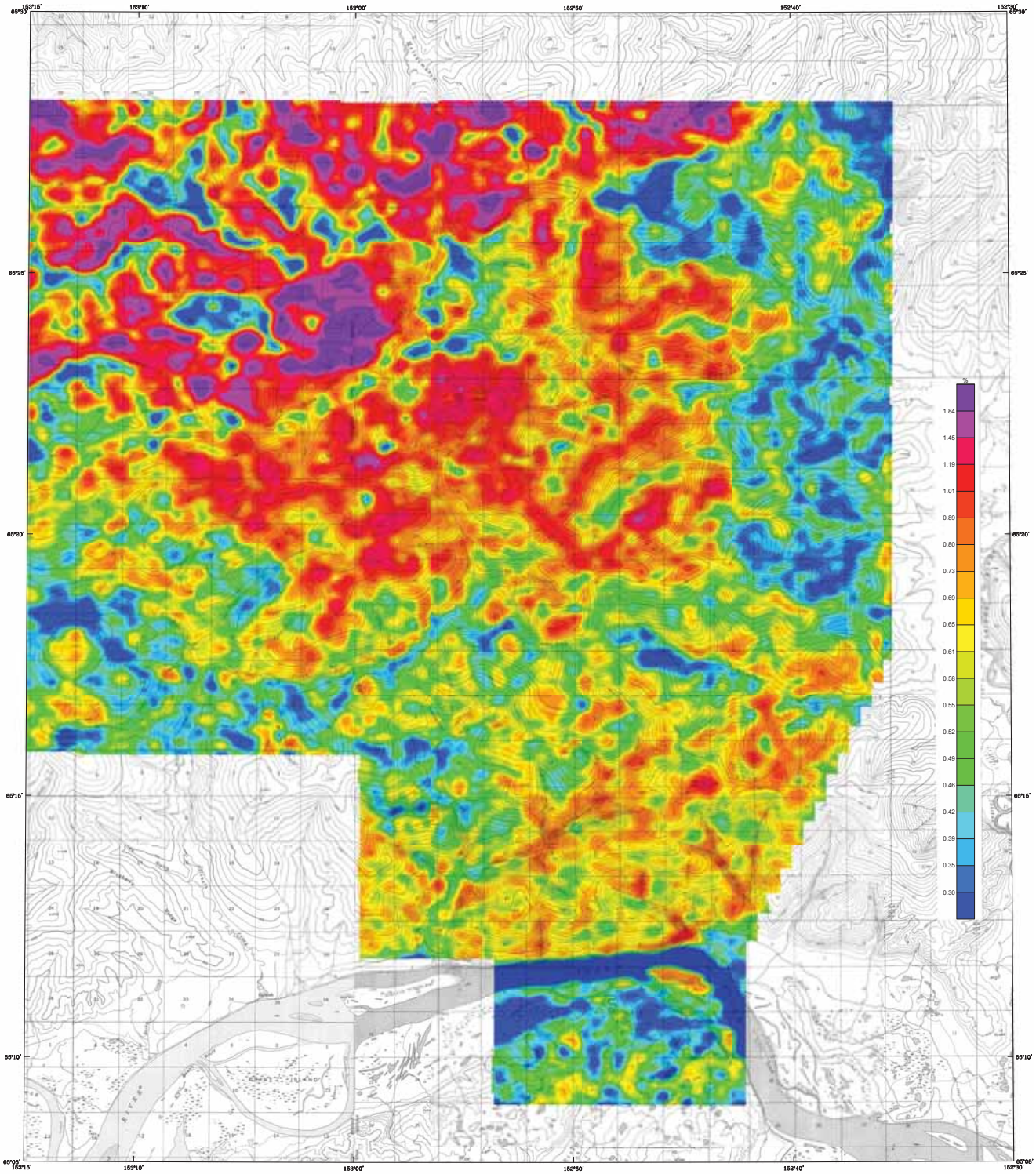

Base from U.S. Geological Survey Nabesna A-1, 1971; B-1, 1978; Tanana A-4, 1950; B-4, 1978; Quadrangles, Alaska

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1 0 1 2 3 4 MILES

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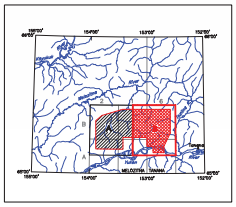

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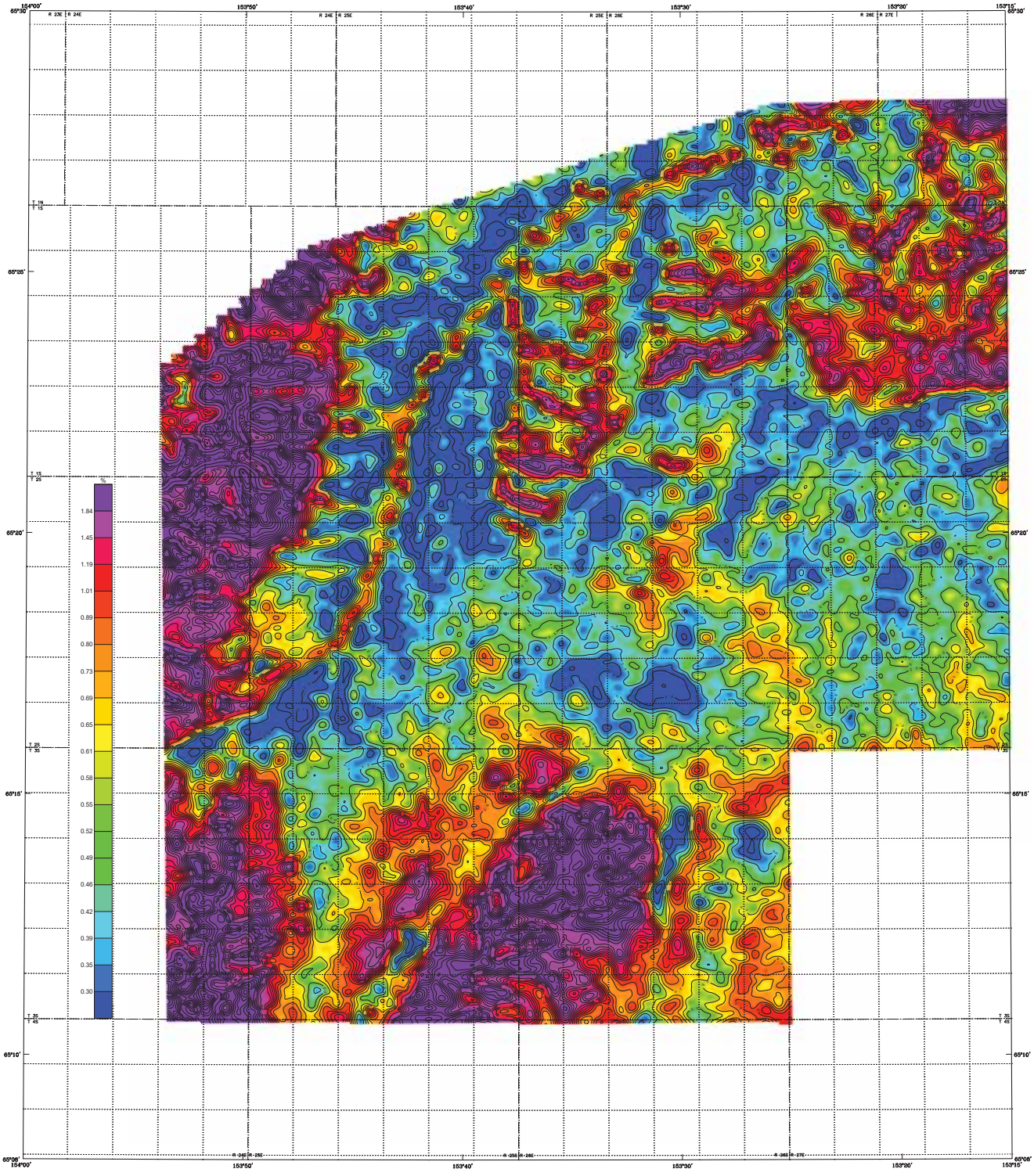

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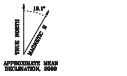

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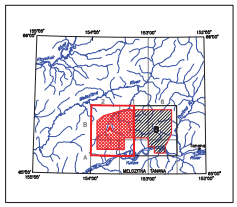
International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

.....	2.50 %
.....	0.50 %
.....	0.10 %

LOCATION INDEX



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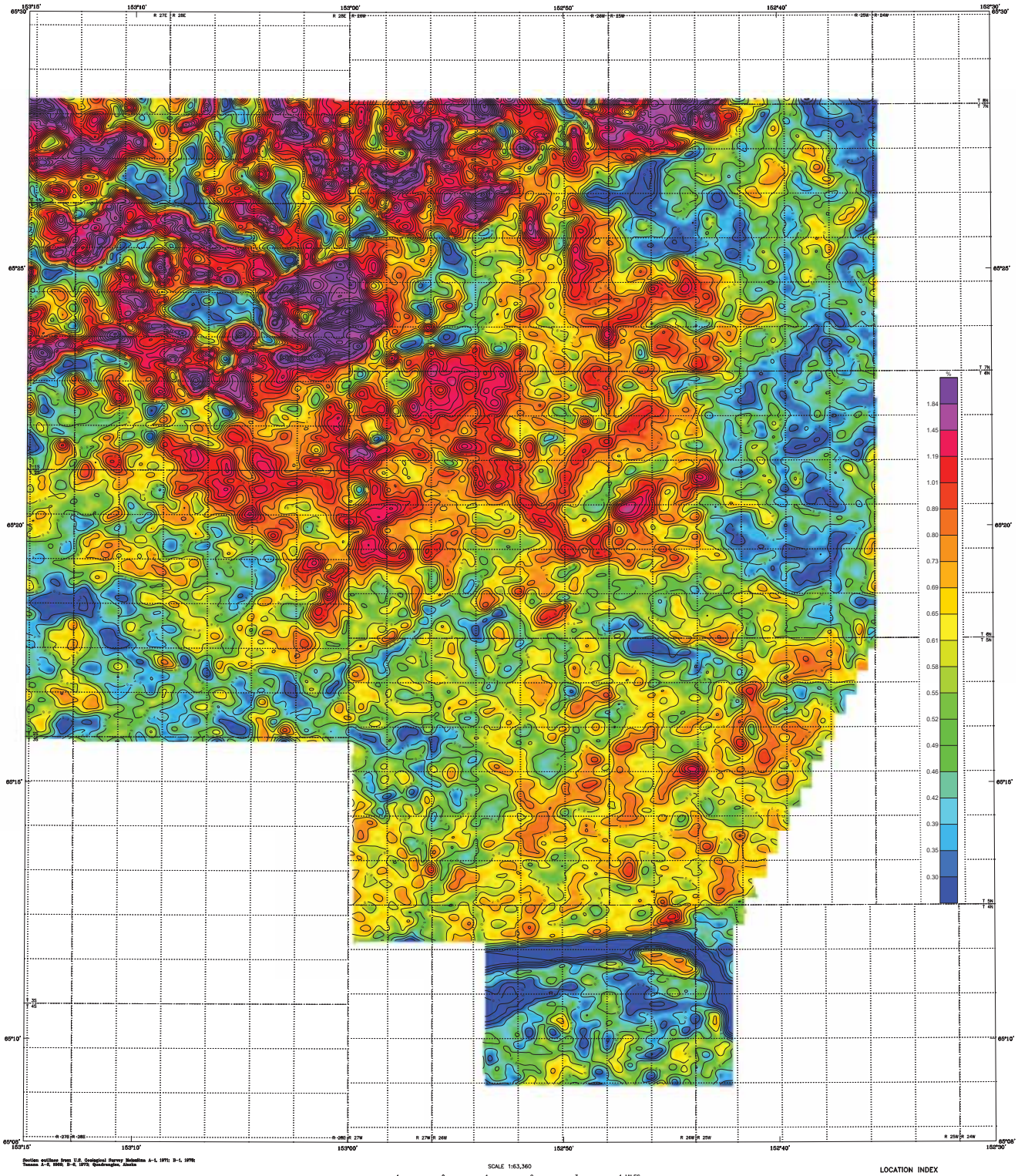


Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-6, 1968; B-6, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 2009

POTASSIUM (K%) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

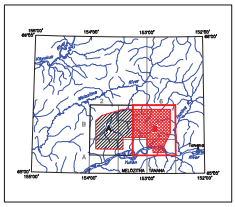
PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

LOCATION INDEX



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.....	0.50 %
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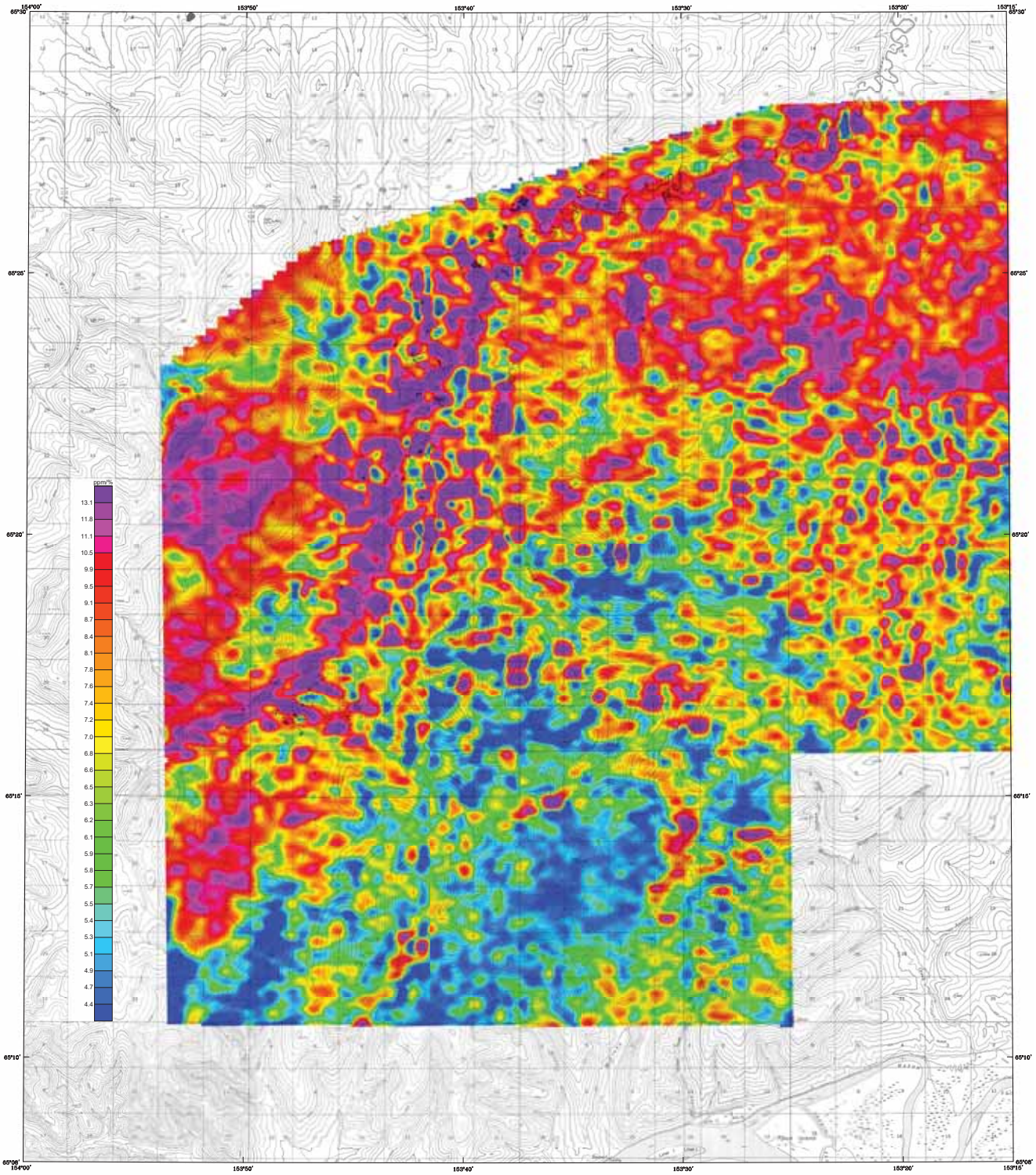

Base from U.S. Geological Survey Maladitas A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1972; Gennaiagiak, Alaska

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

THORIUM / POTASSIUM (eTh/K) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

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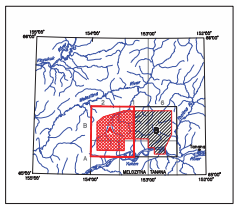

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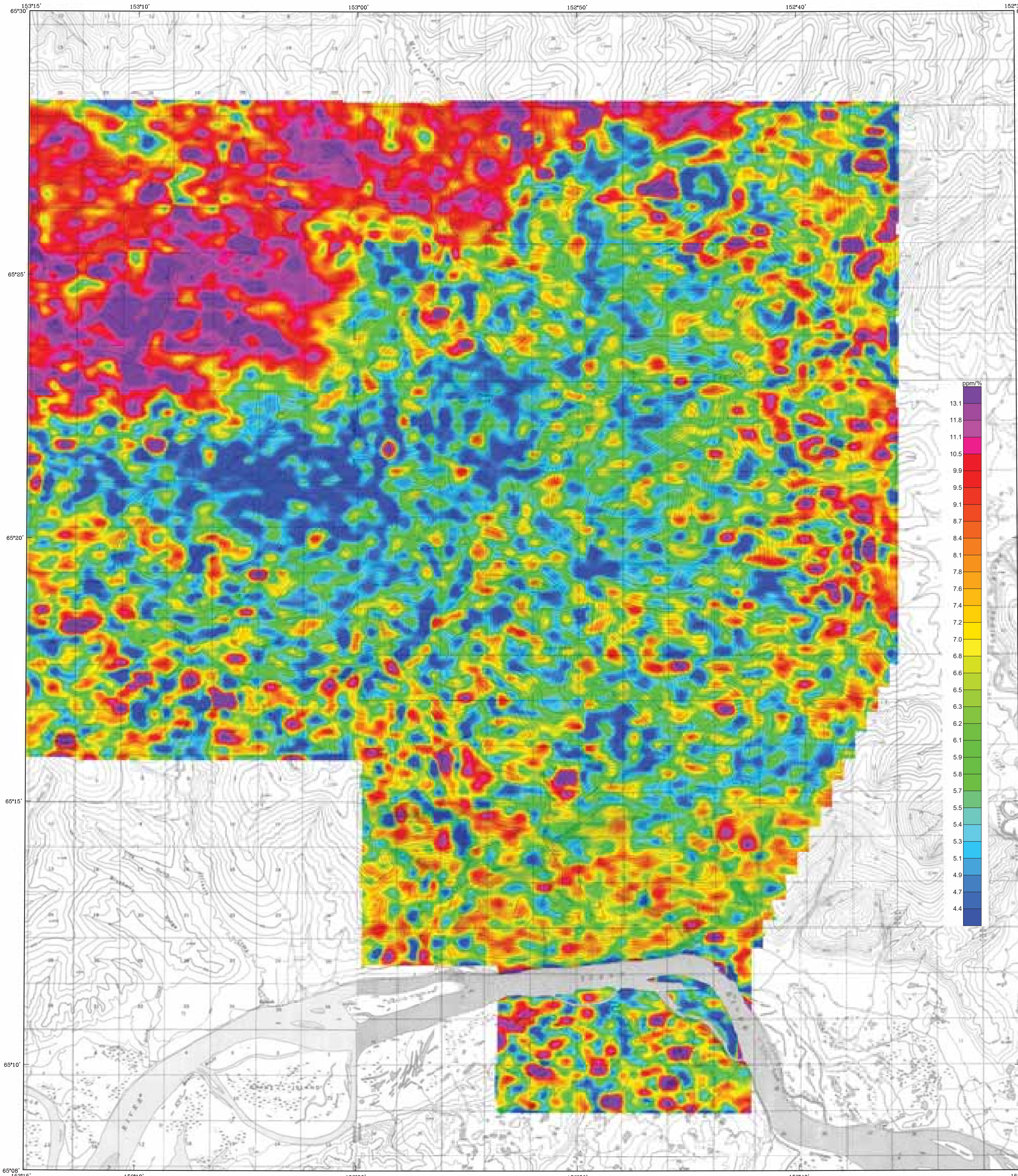
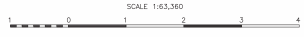
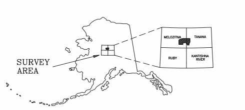


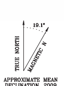
Base from U.S. Geological Survey Melozitna A–1, 1971; B–1, 1978; Tanana A–6, 1969; B–6, 1973; Quadrangles, Alaska

SCALE 1:63,360



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 2009

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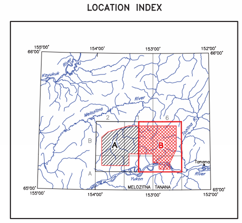
PARTS OF MELOZITNA and TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

LOCATION INDEX



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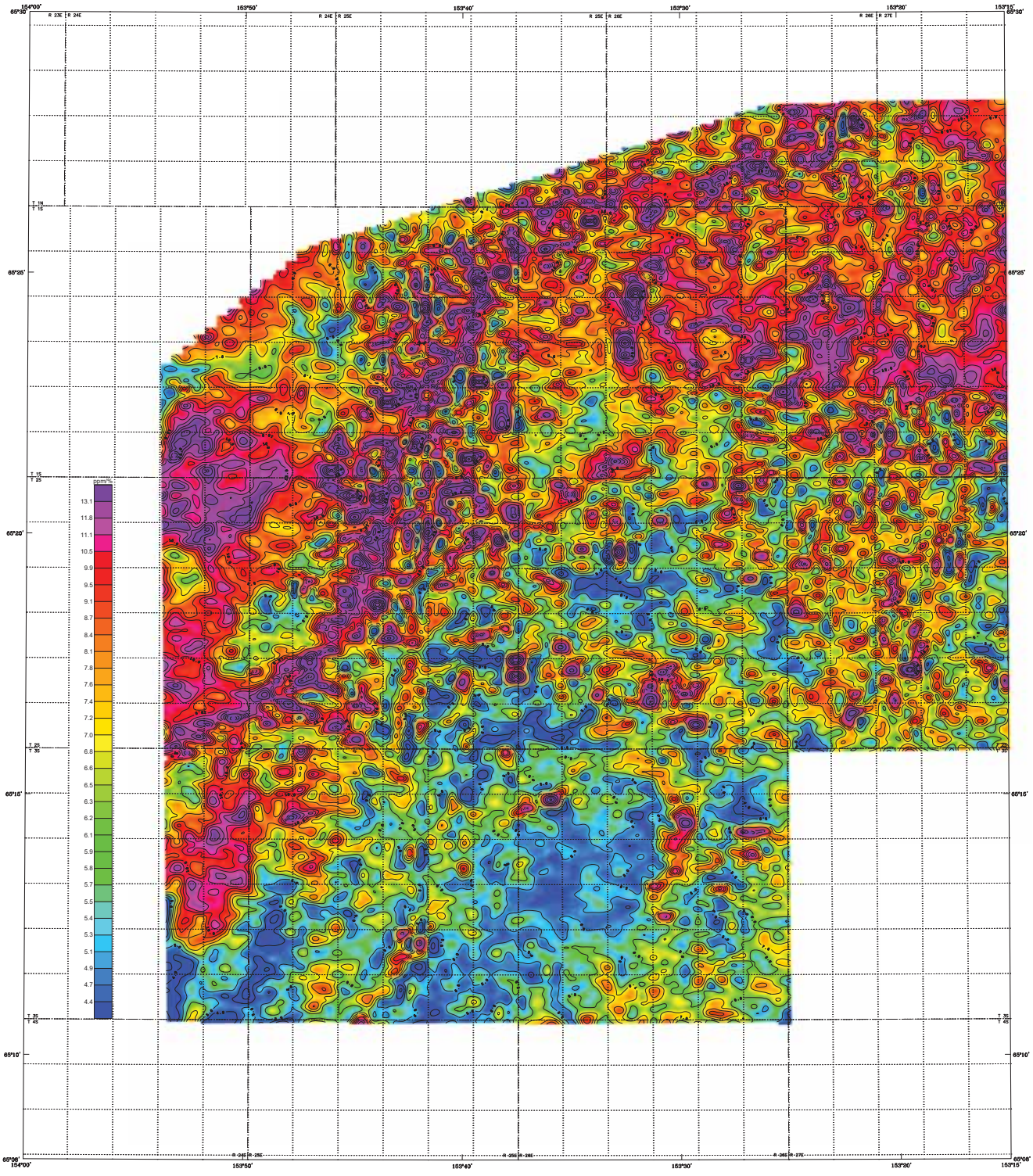

Section outlines from U.S. Geological Survey Meteorites A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gandrangida, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

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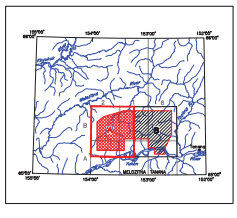
CONTOUR INTERVAL

_____ . . . . . 20.0 ppm/%

_____ . . . . . 5.0 ppm/%

_____ . . . . . 1.0 ppm/%

LOCATION INDEX



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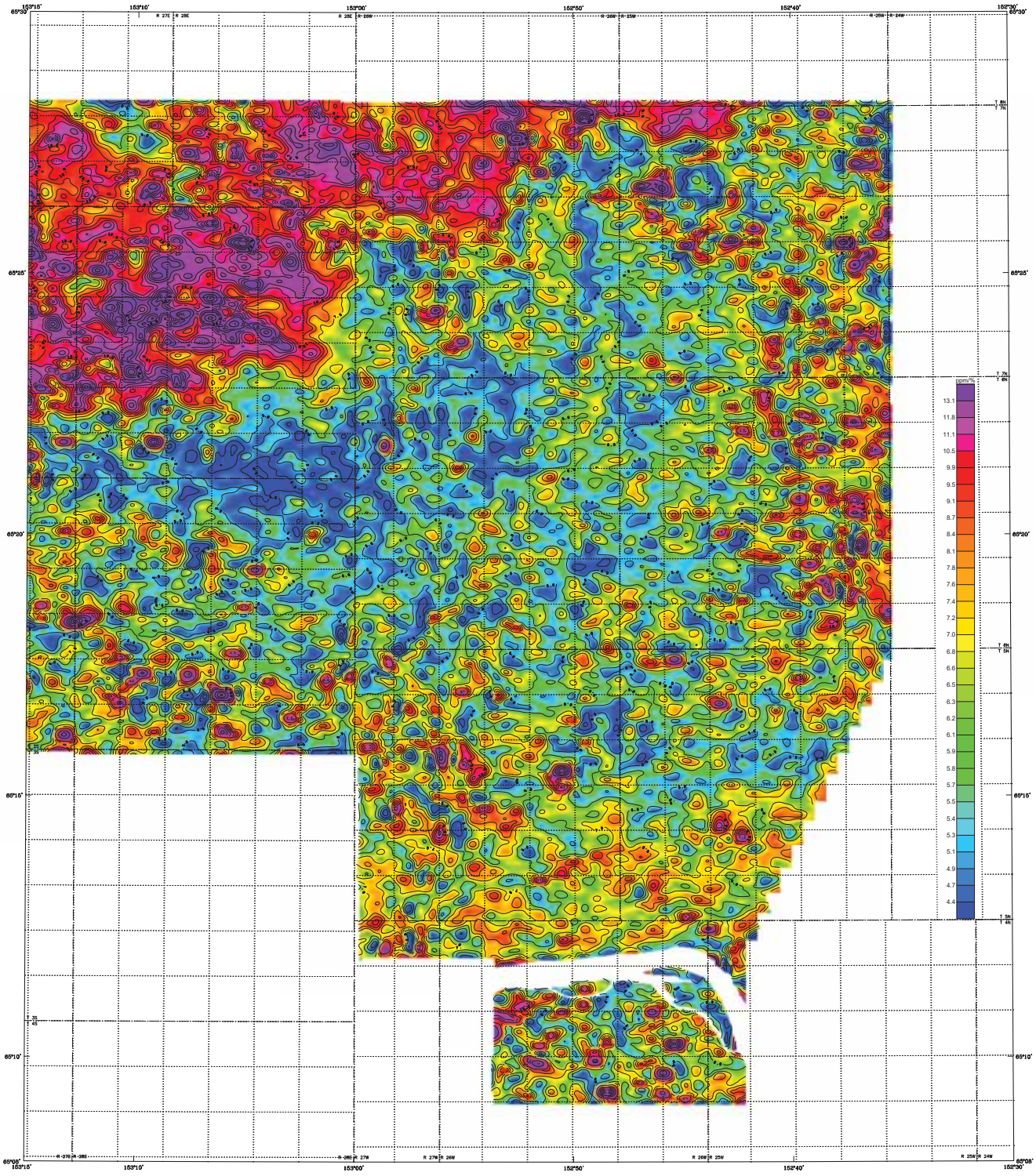

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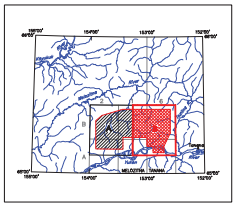

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5.0 ppm/%

1.0 ppm/%

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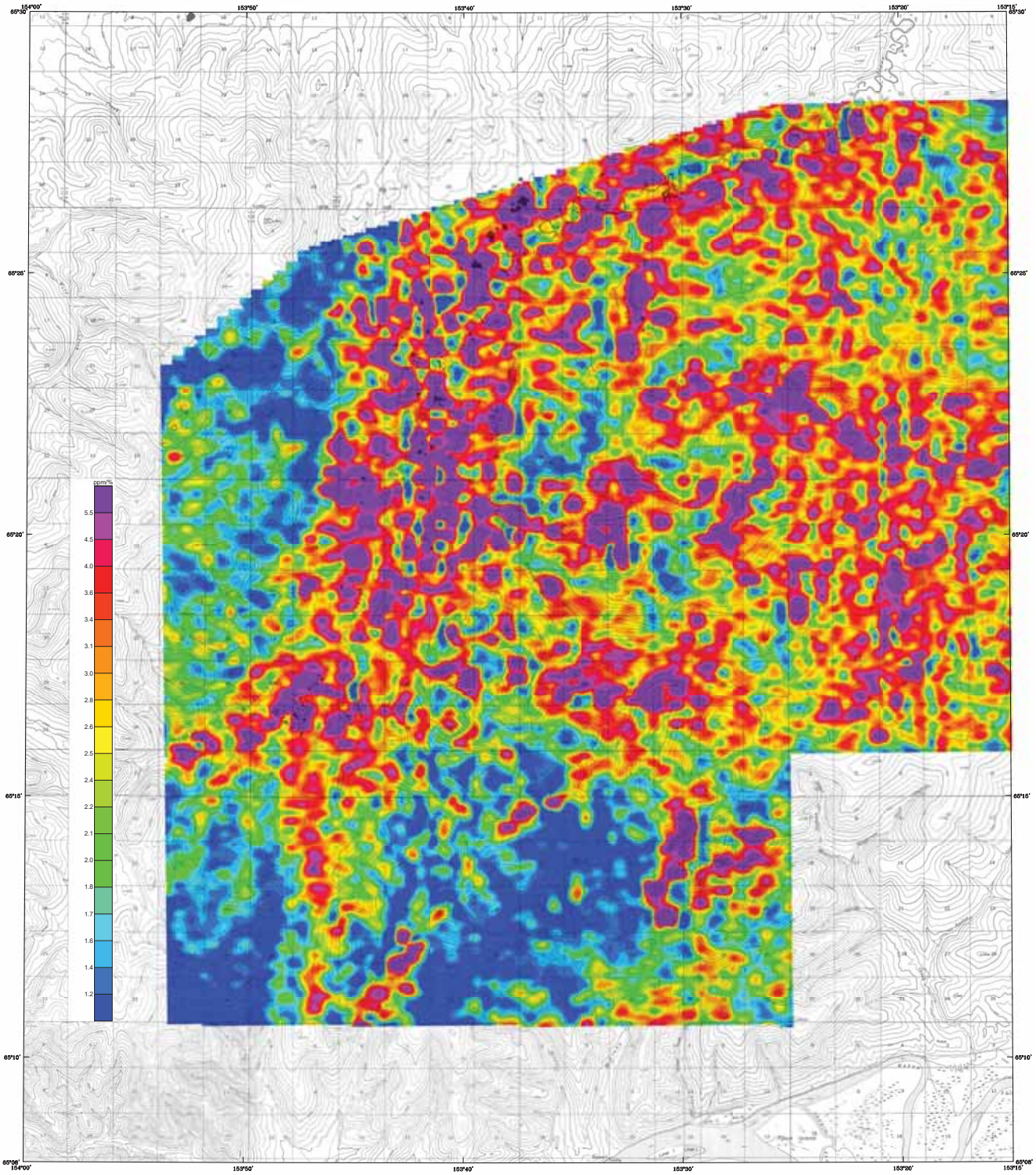

Base from U.S. Geological Survey Moloktlna A-1, 1972; A-2, 1972; B-1, 1975; B-2, 1972; Gakona, Alaska

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

URANIUM / POTASSIUM (eU/K) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2010

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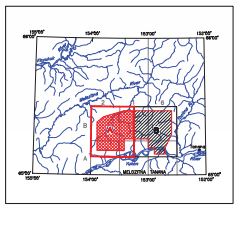

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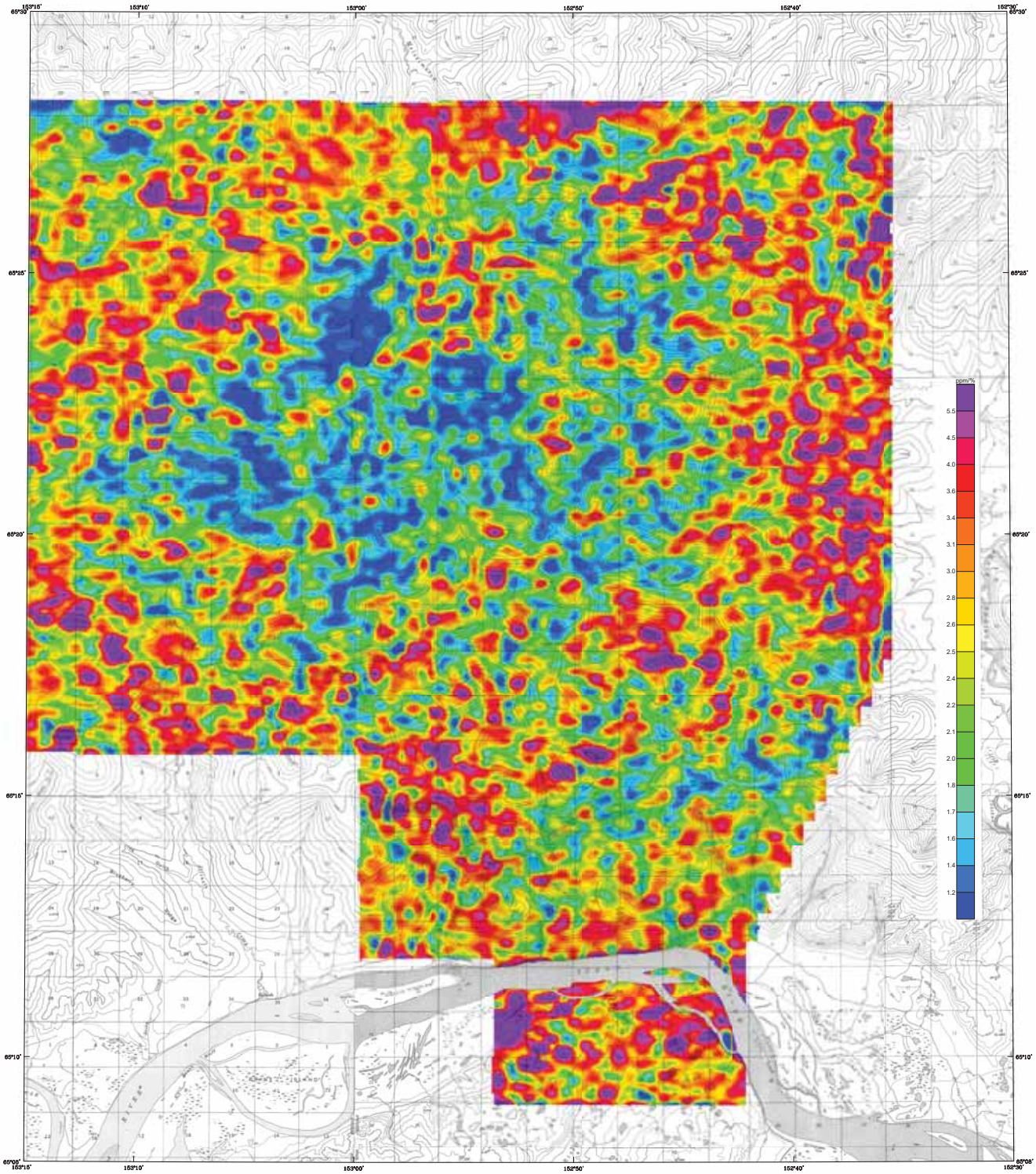

Base from U.S. Geological Survey Nabesna A-1, 1971; B-1, 1978;
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SCALE 1:63,360

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, 2009

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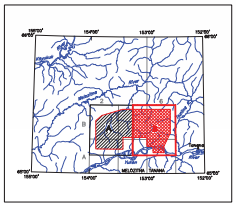

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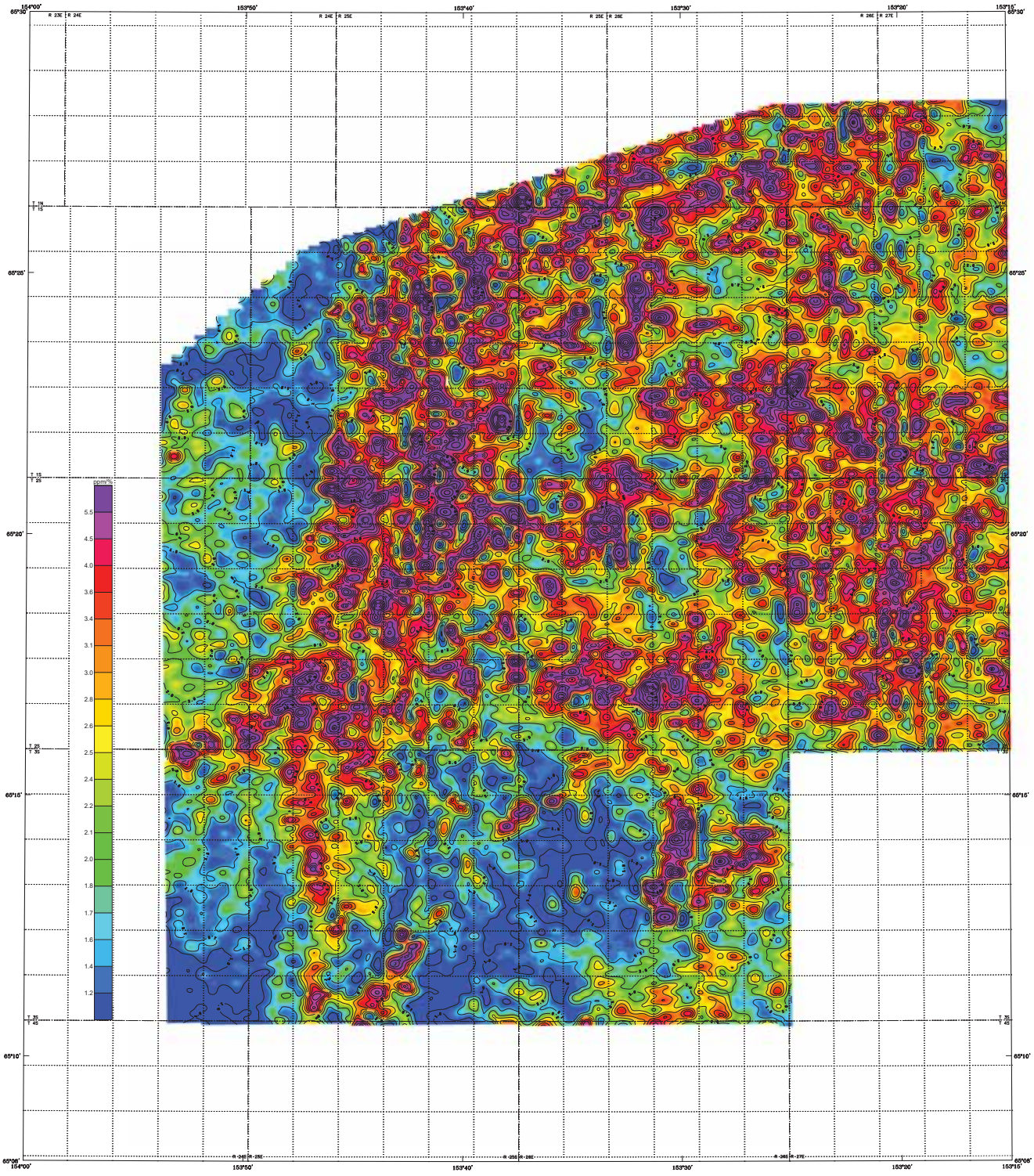

Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1973; Gakona, Alaska

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1 0 1 2 3 4 5 KILOMETERS

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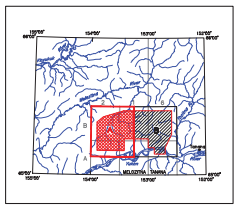
CONTOUR INTERVAL

	10.0 ppm/%
	2.0 ppm/%
	0.5 ppm/%

LOCATION INDEX



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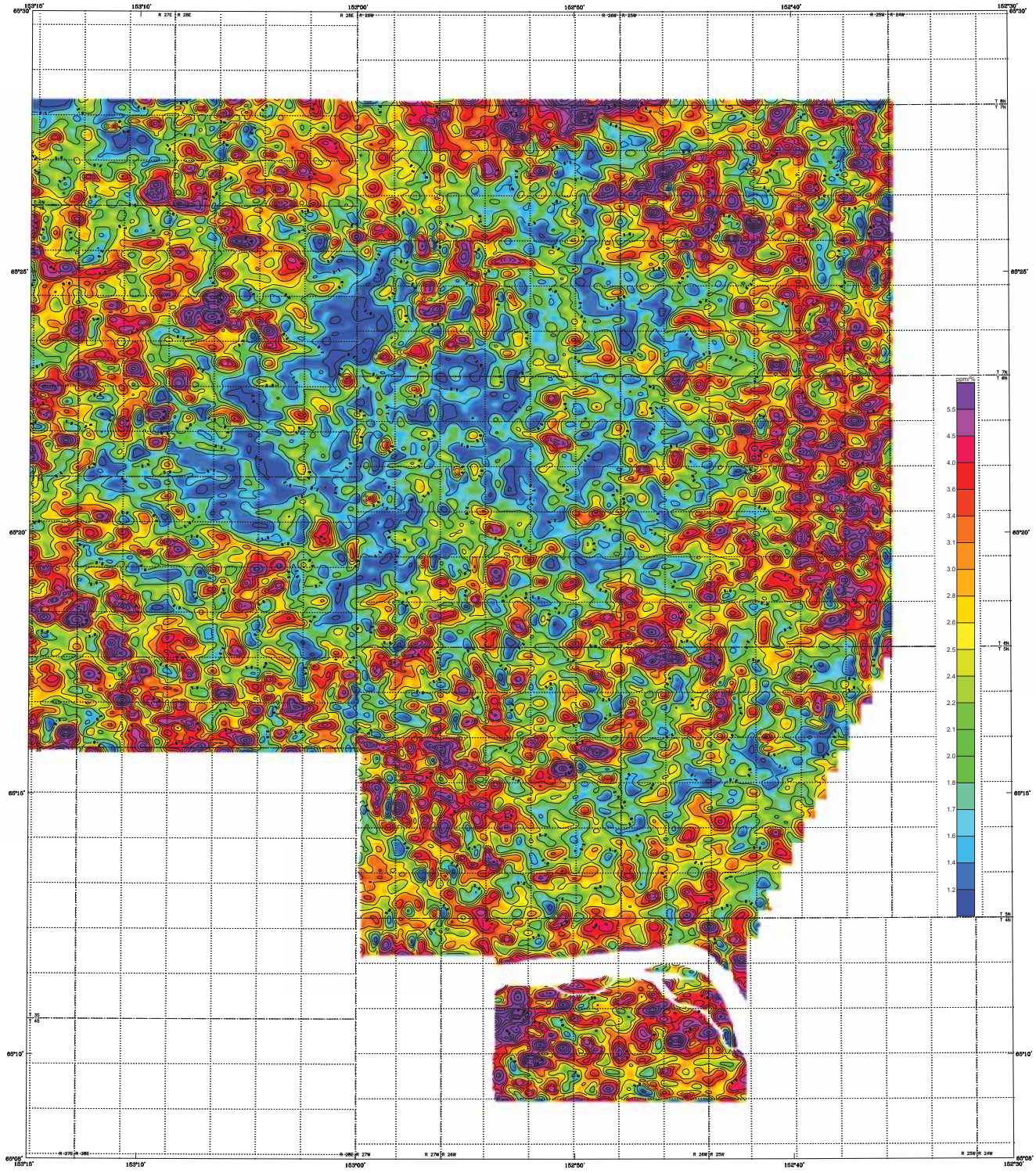

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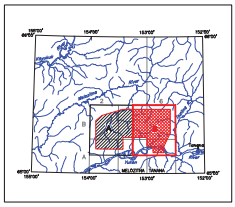

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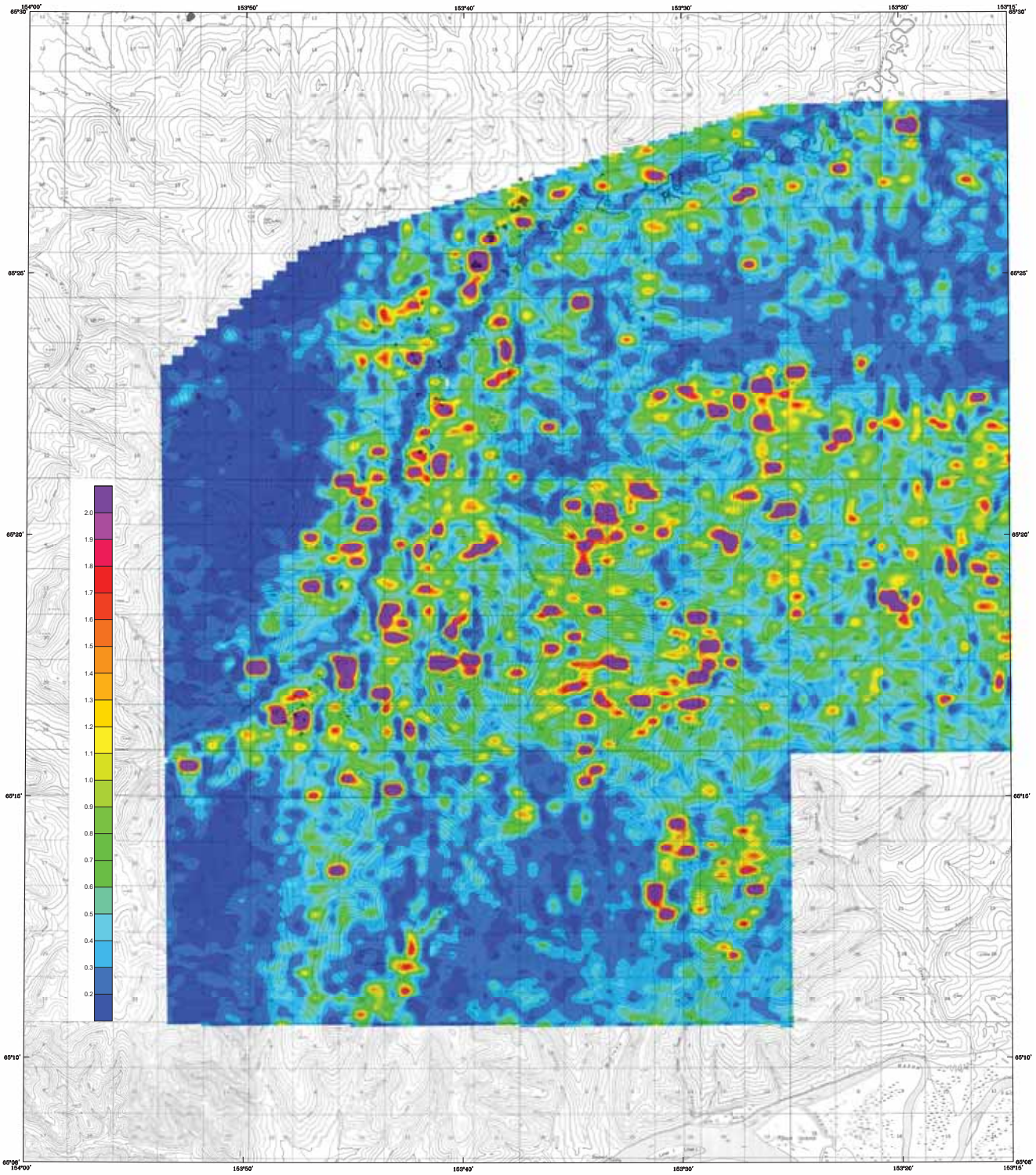

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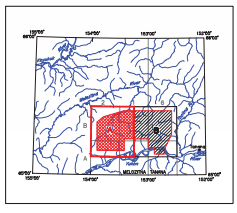

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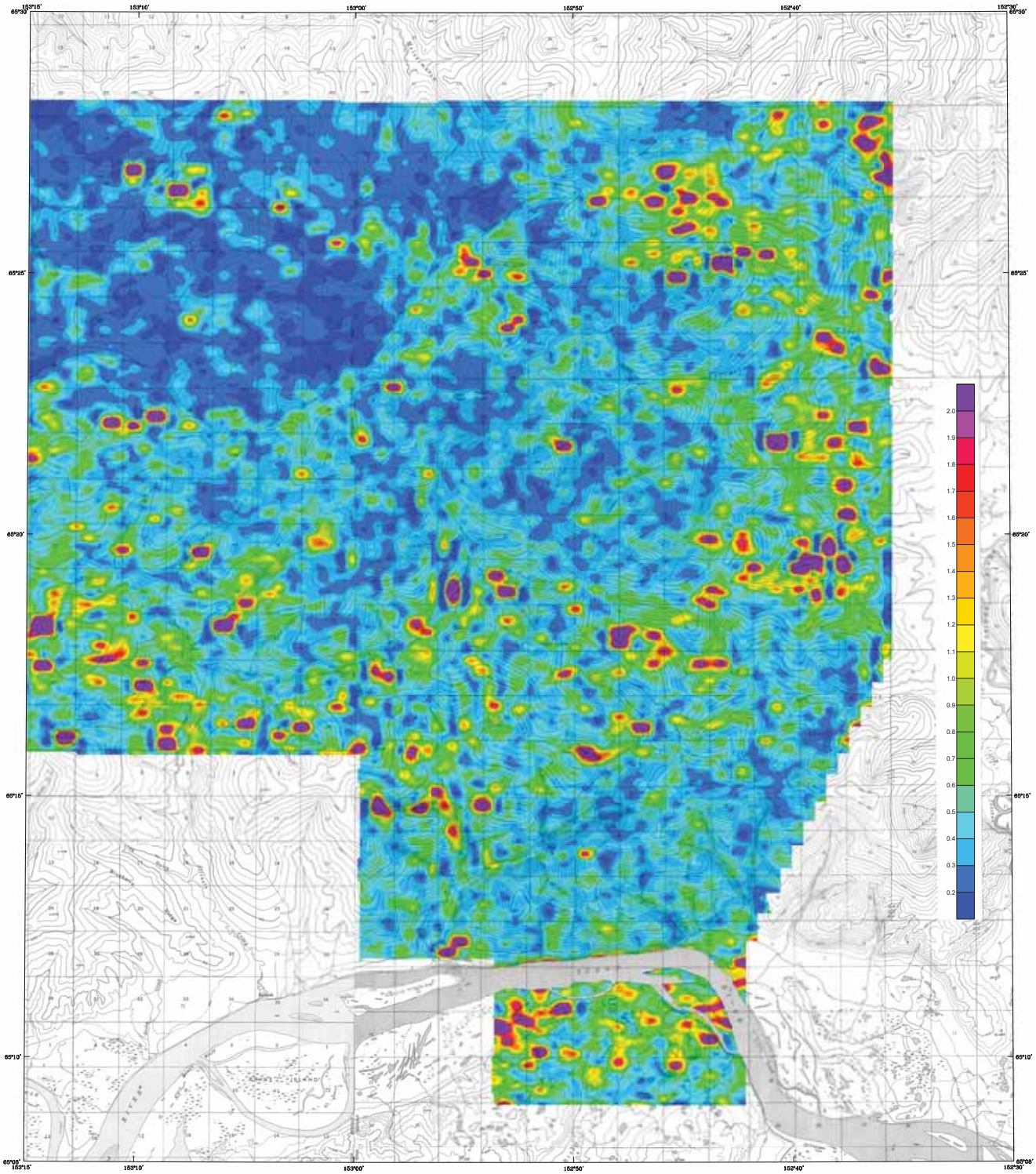

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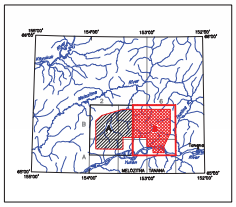

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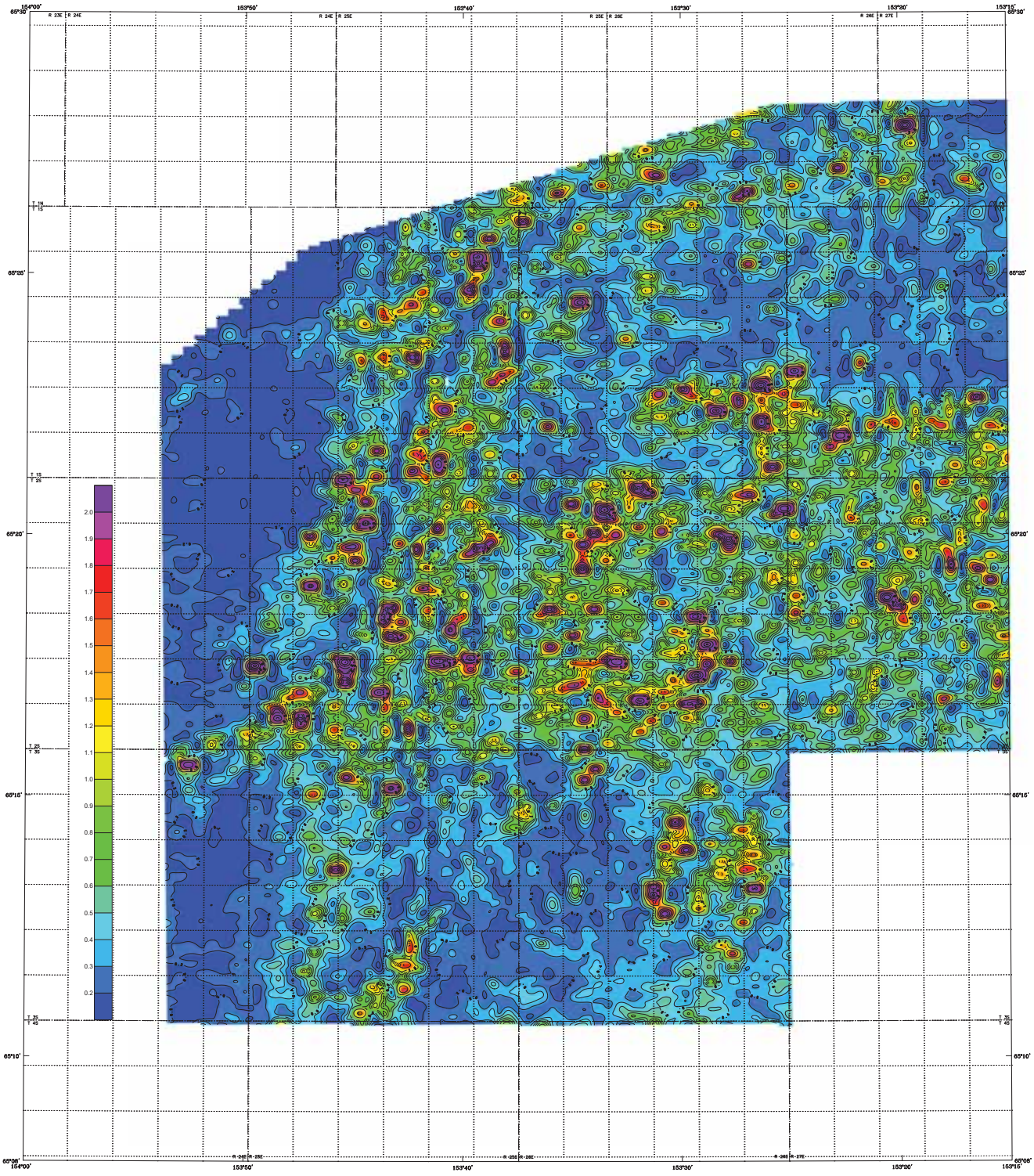
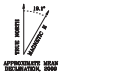


Section outlines from U.S. Geological Survey Meiacline A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gandrangida, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

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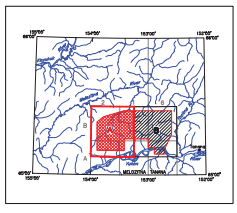
CONTOUR INTERVAL

_____	2.50
_____	0.50
_____	0.10

LOCATION INDEX



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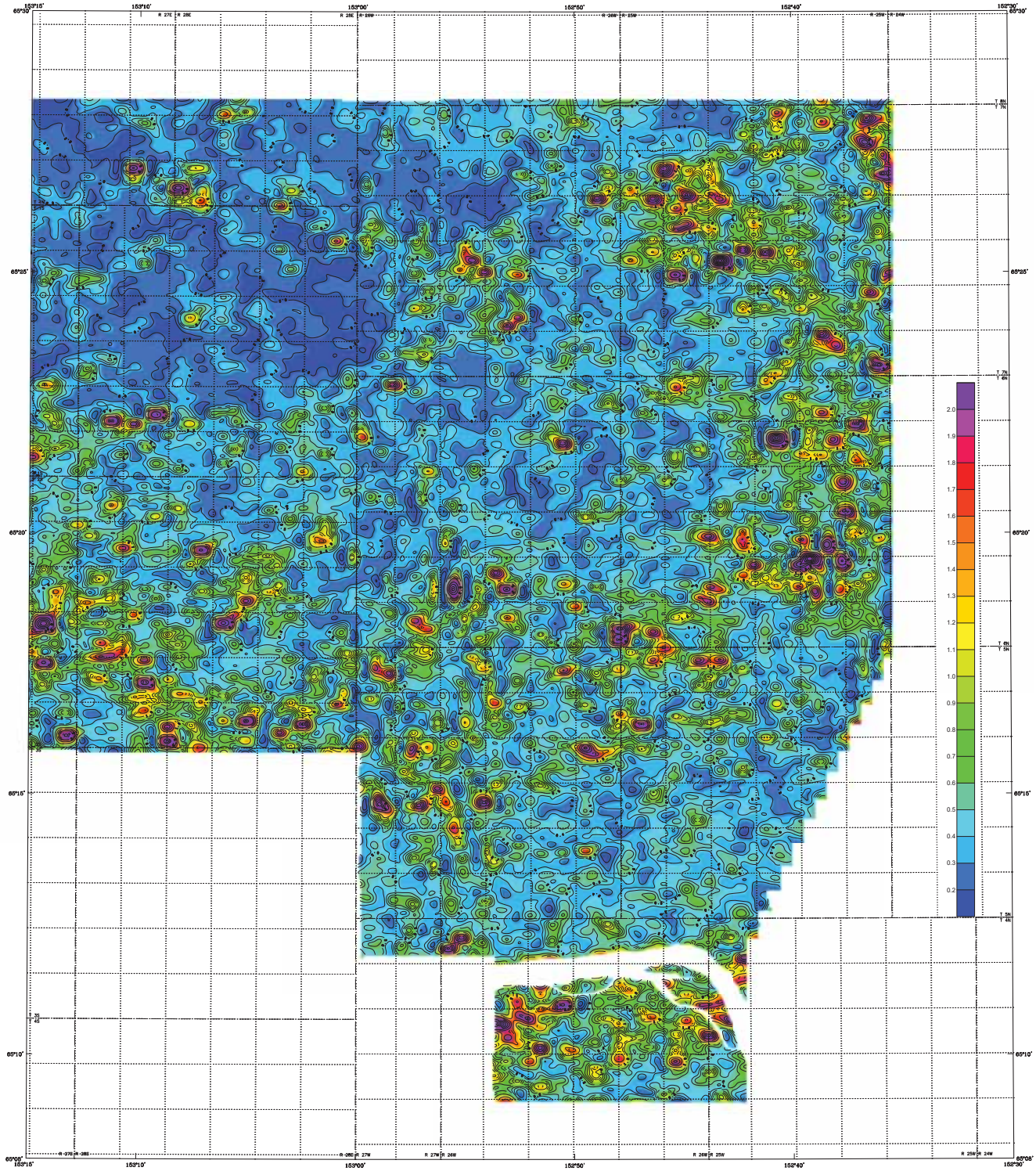

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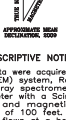

APPROXIMATE MEAN DECLINATION, 2009

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by

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2010

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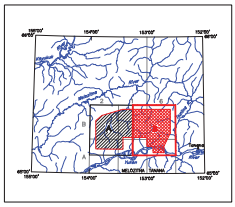

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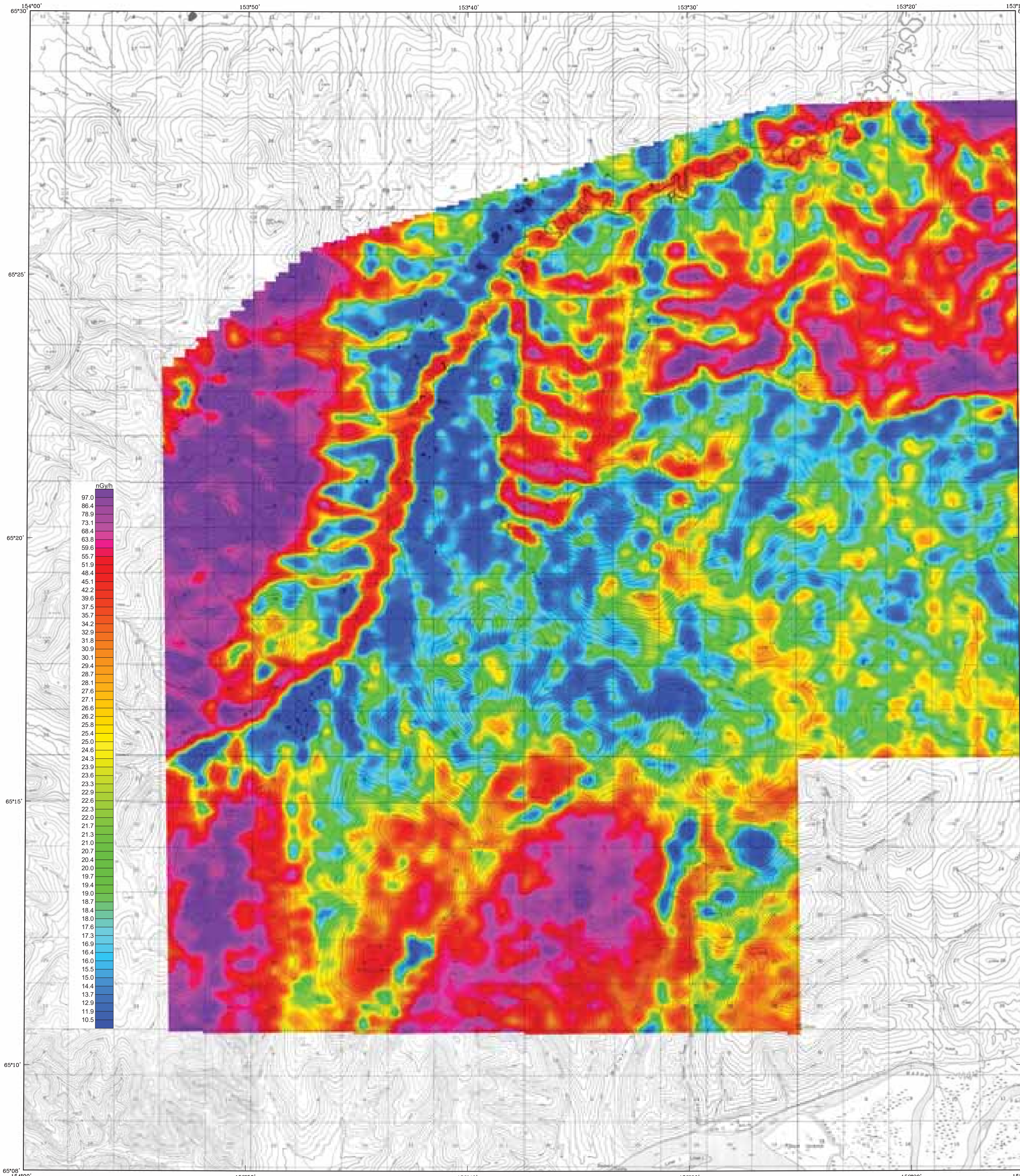


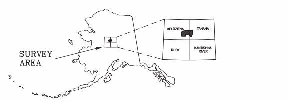
Base from U.S. Geological Survey Melozitna A-1, 1971; A-2, 1973; B-1, 1978; B-2, 1967; Quadrangles, Alaska

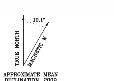
SCALE 1:63,360

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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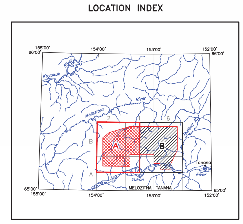

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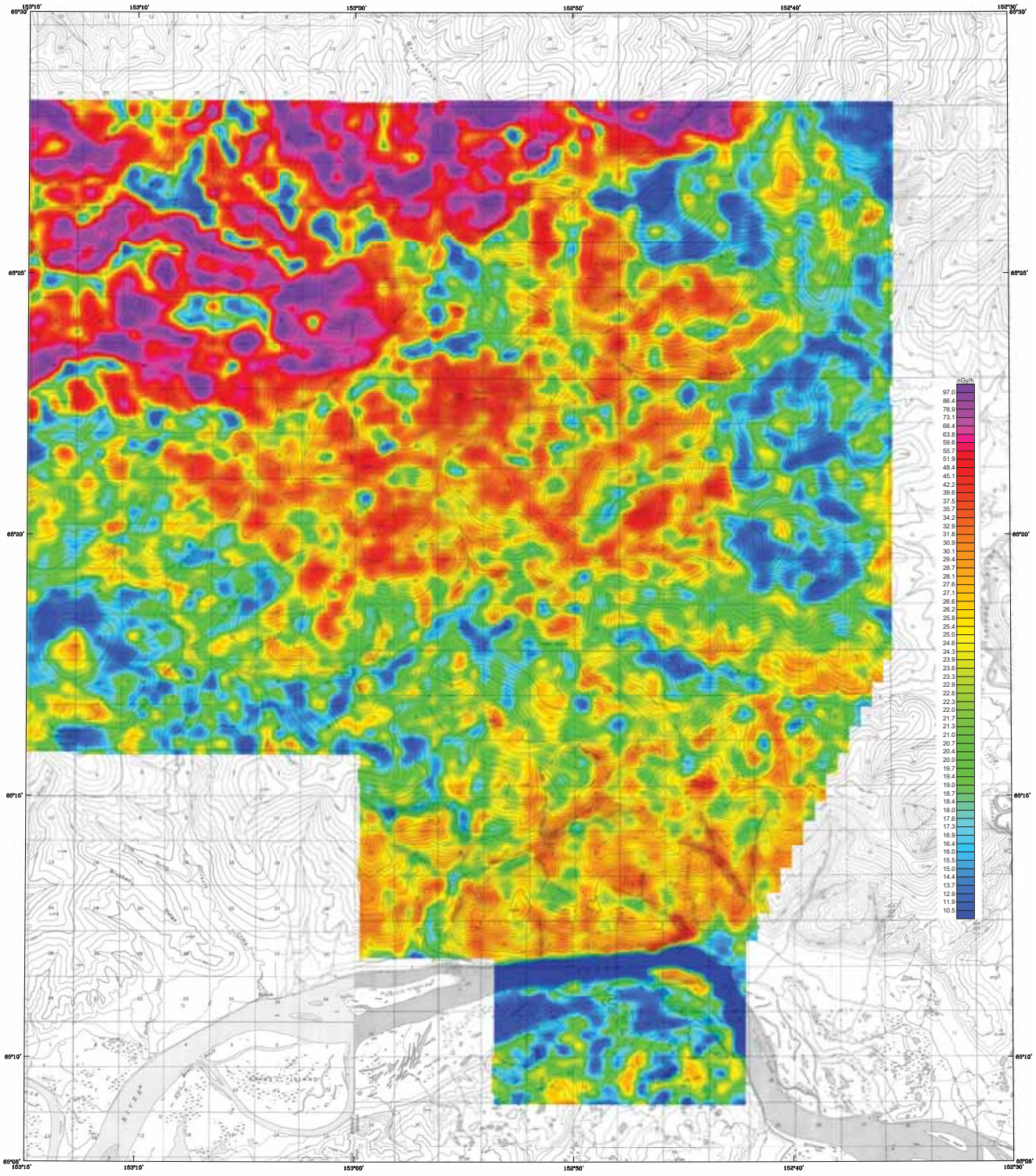

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1 0 1 2 3 4 MILES

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CONTOUR INTERVAL 100 FEET
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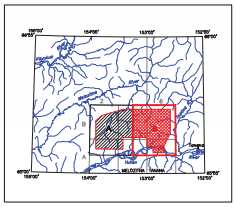

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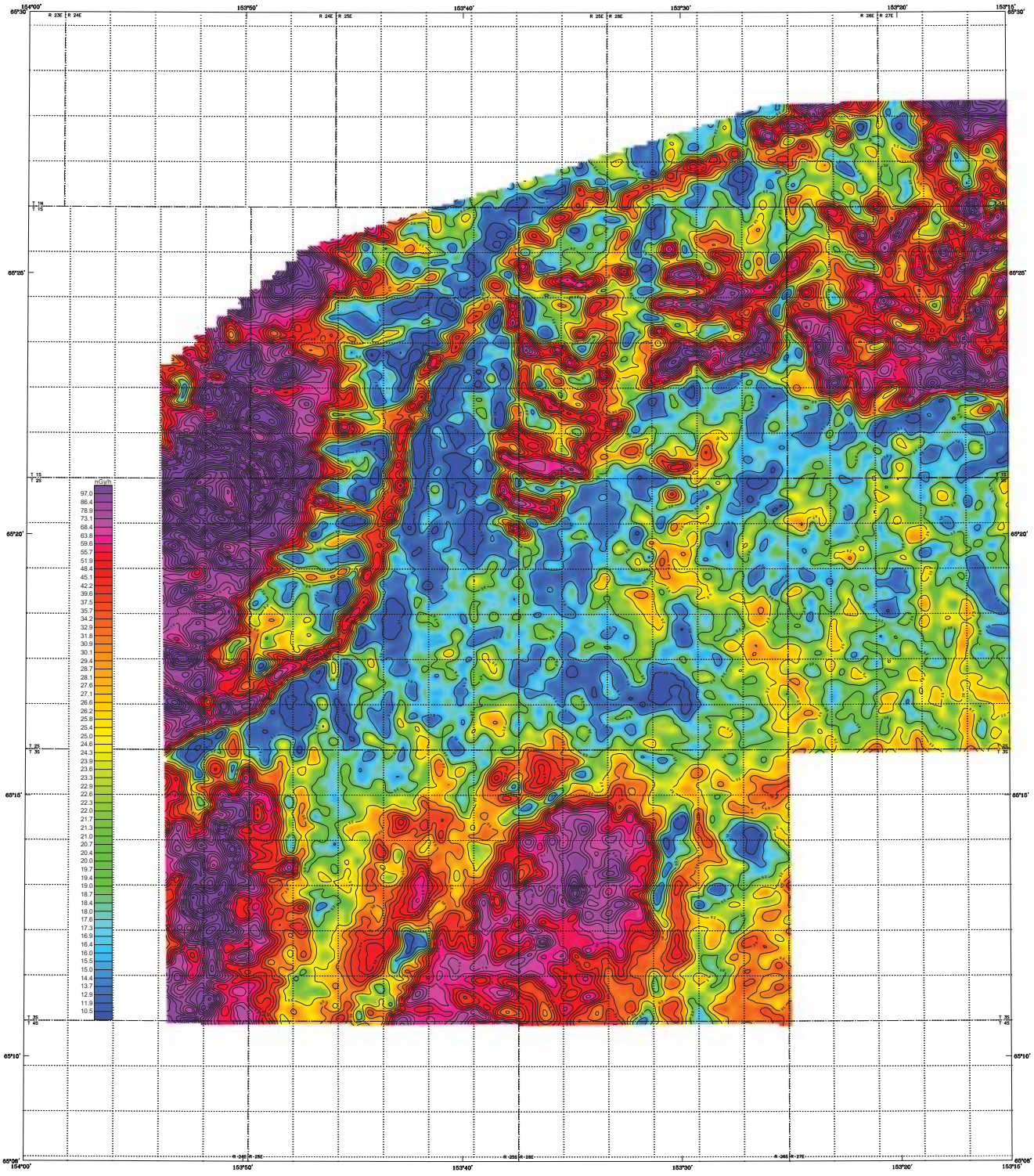

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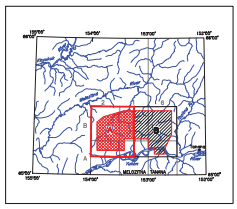

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CONTOUR INTERVAL

_____ . . . . . 50 nGy/h

_____ . . . . . 10 nGy/h

_____ . . . . . 5 nGy/h

SURVEY HISTORY

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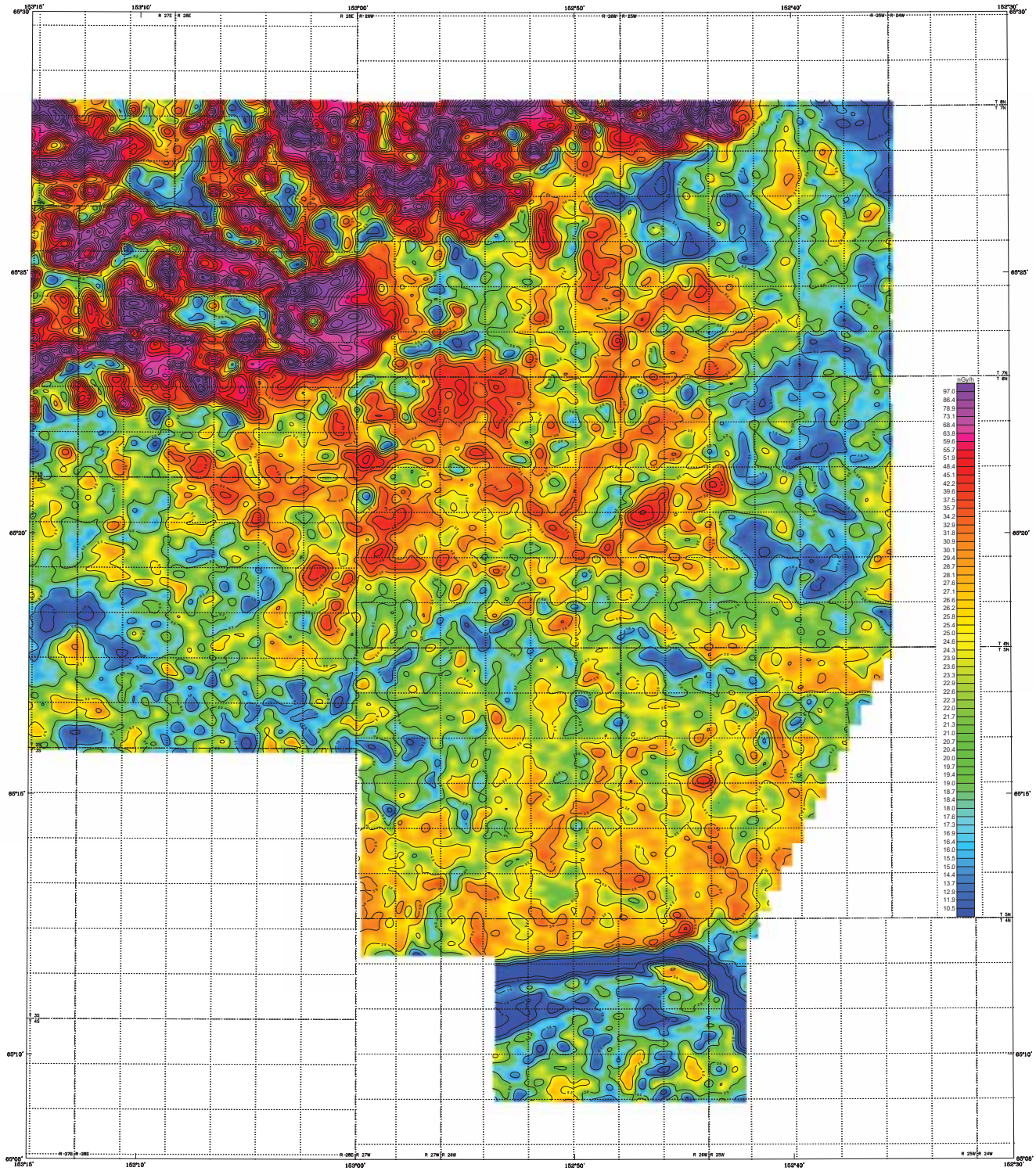


Section outlines from U.S. Geological Survey Bulletins A-1, 1971; B-1, 1972; Tanana A-5, 1955; B-5, 1972; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

APPROXIMATE MEAN DECLINATION, 2009

NATURAL AIR ABSORBED DOSE RATE (nGy/h) OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

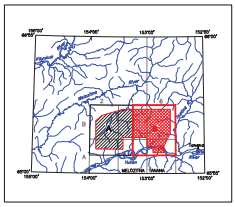
PARTS OF MELOZITNA and TANANA QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2010

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Radiation Solutions RS-500 gamma-ray spectrometer and a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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 Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 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 10m with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-500 gamma-ray spectrometer. It was configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2815 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying. Technical Report 323. International Atomic Energy Agency, Vienna.

NATURAL AIR ABSORBED DOSE RATE

Raw counts have been converted to radioelement concentrations, and combined to produce natural air-absorbed dose rate, so that the results are independent of crystal volume and planned survey height. This facilitates comparisons to other surveys and ground data. Measurements are nanograys per hour (nGy/h).

CONTOUR INTERVAL

50 nGy/h

10 nGy/h

5 nGy/h

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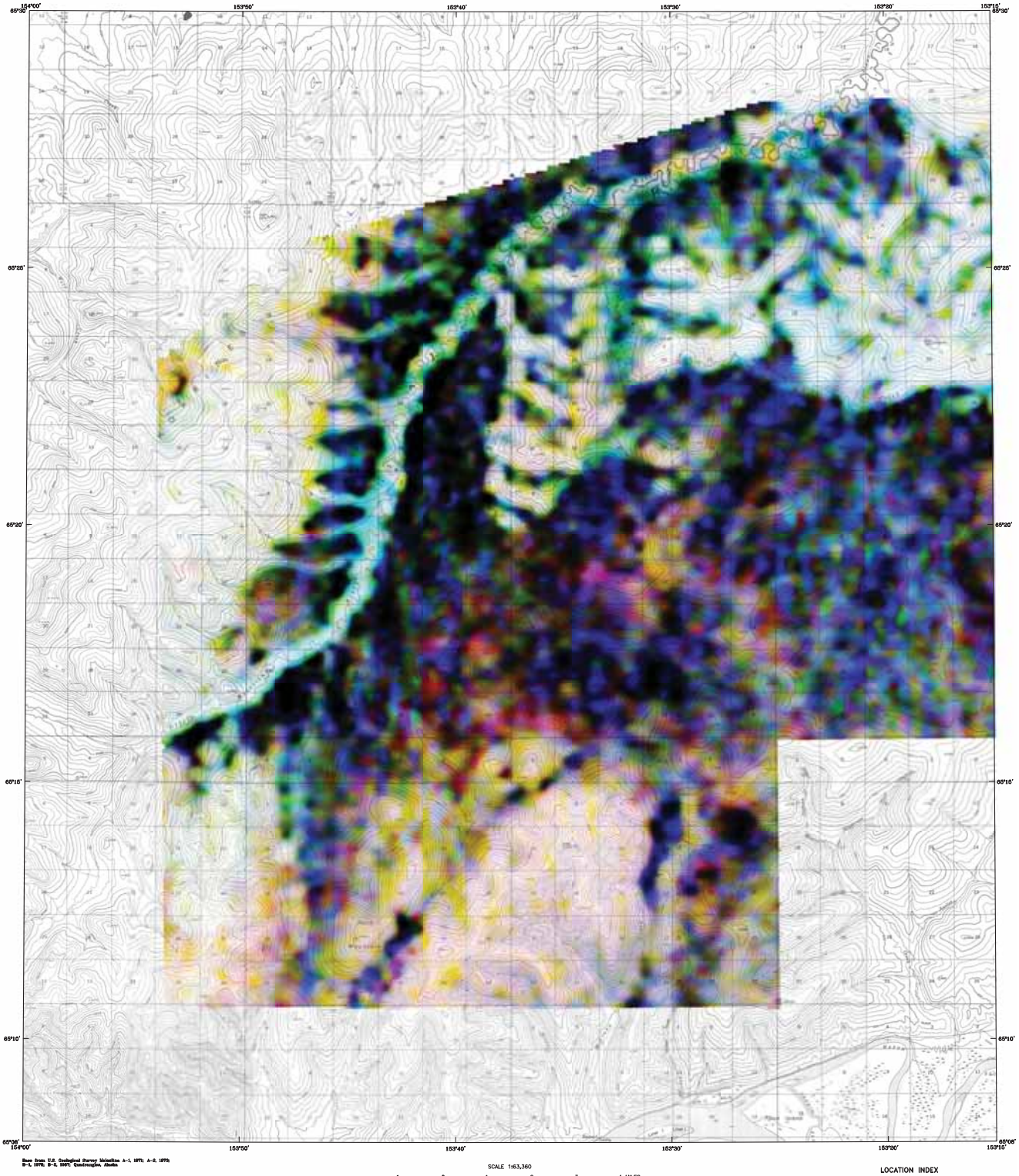

Base from U.S. Geological Survey Meiklejohn A-1, 1972; A-2, 1972; B-1, 1973; B-2, 1972; Gakona, Alaska

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

RADIOELEMENT - TERNARY OF THE MORAN SURVEY AREA, SOUTH-CENTRAL MELOZITNA MINING DISTRICT, CENTRAL ALASKA

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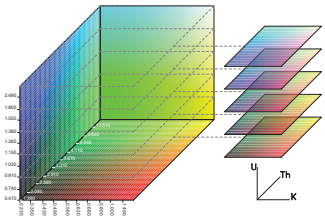

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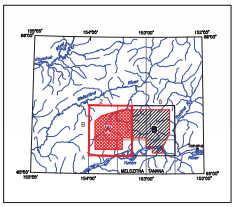

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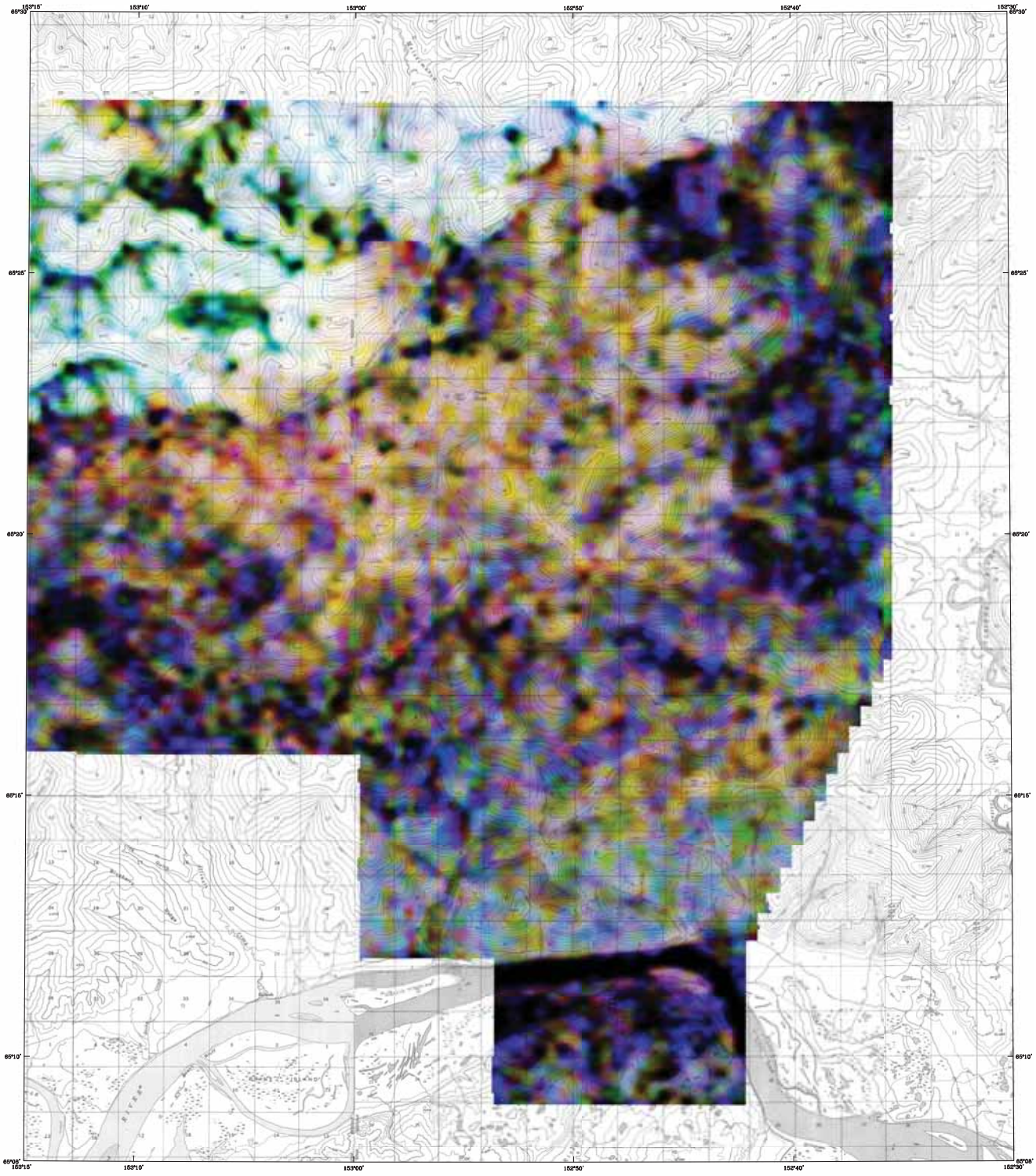

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1 0 1 2 3 4 MILES

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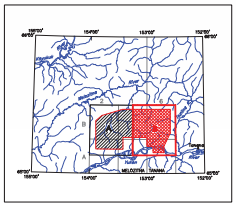

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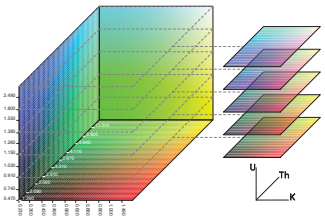

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