GOODPASTER ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E., Barefoot, J.D., Naibert, T.J., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

Geophysical Report 2018-4

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DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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GOODPASTER ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.,[1] Barefoot, J.D.[1], Naibert, T.J.[1], Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

ABSTRACT

This geophysical survey is located in interior Alaska in the Goodpaster mining district, about 125 kilometers southeast of Fairbanks, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEMV system in October 2004. A total of 1589.0 line kilometers were collected covering 537.4 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. The survey area lies 6 kilometers south of the Pogo Mine and includes the Eagle prospect, an early stage intrusion related gold prospect. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

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

ACKNOWLEDGMENTS

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

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

AVAILABLE DATA

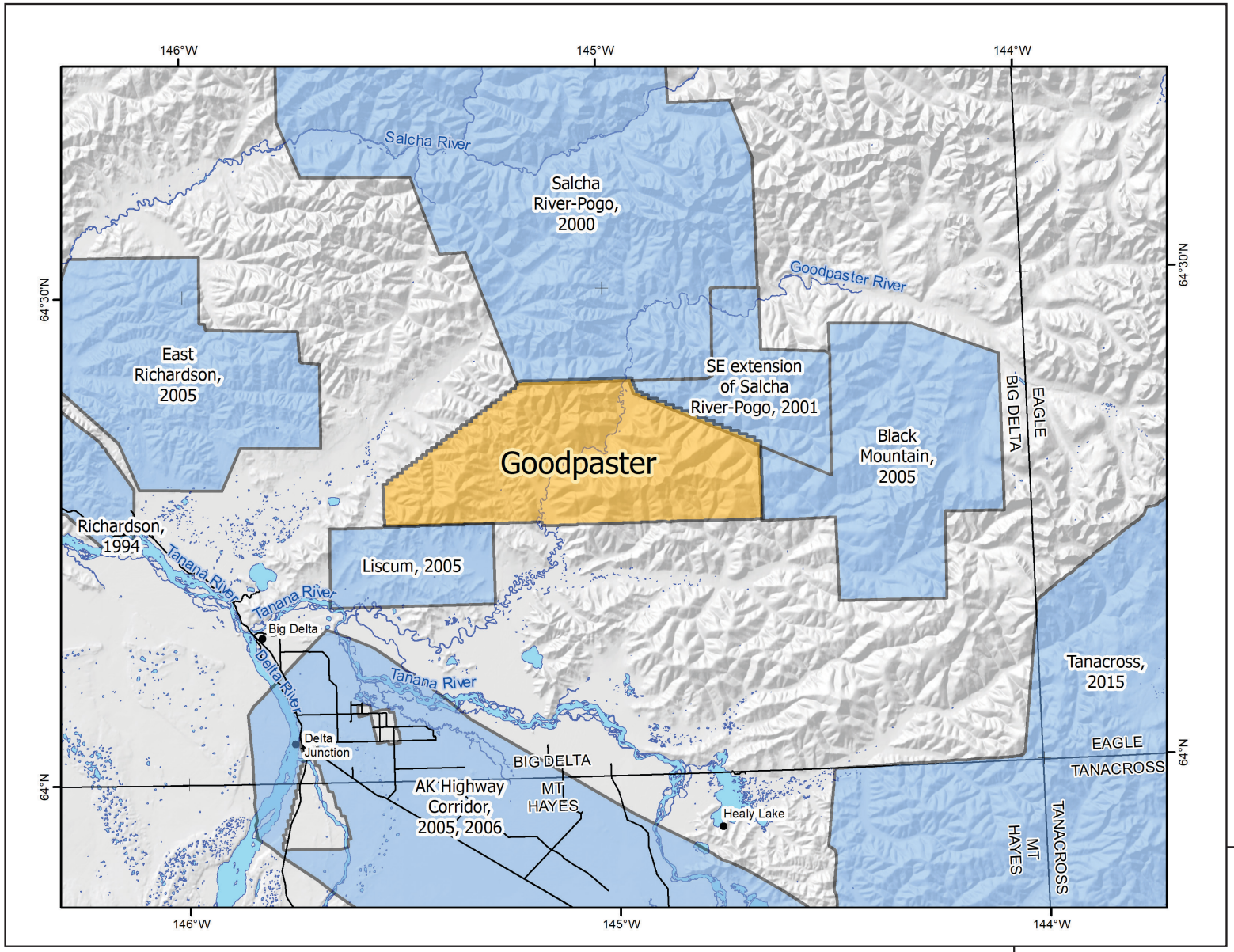
Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor and DGGS	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor and DGGS	Geosoft-format binary grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft, or with a 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/G 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., 2005, Line, grid, and vector data for the airborne geophysical survey data of part of the Goodpaster River area, Goodpaster mining district, interior Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2005-2, 1 DVD. http://doi.org/10.14509/70000

Burns, L.E., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2005, Plot files for the airborne geophysical survey data of part of the Goodpaster River area, Goodpaster mining district, interior Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2005-1, 13 sheets, 1 DVD. http://doi.org/10.14509/69711



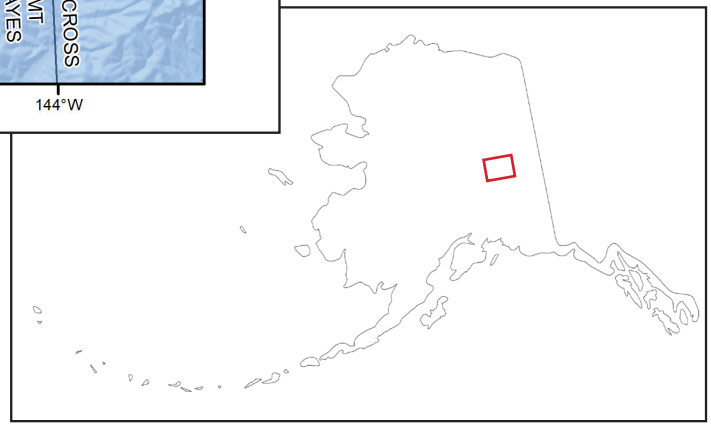


Figure 1. Goodpaster electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Goodpaster survey area is shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation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

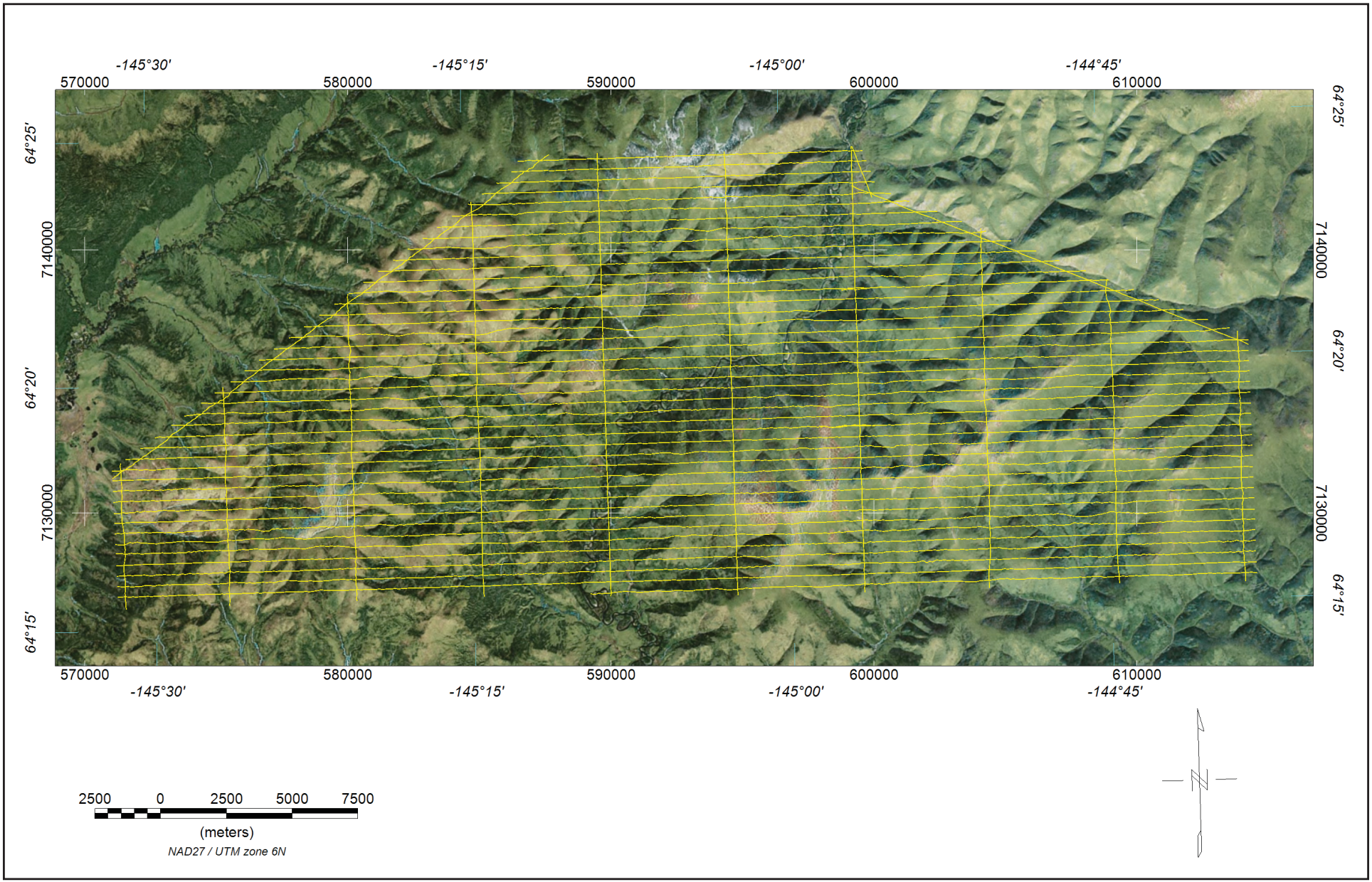


Figure 2. Flight path with orthometric image.

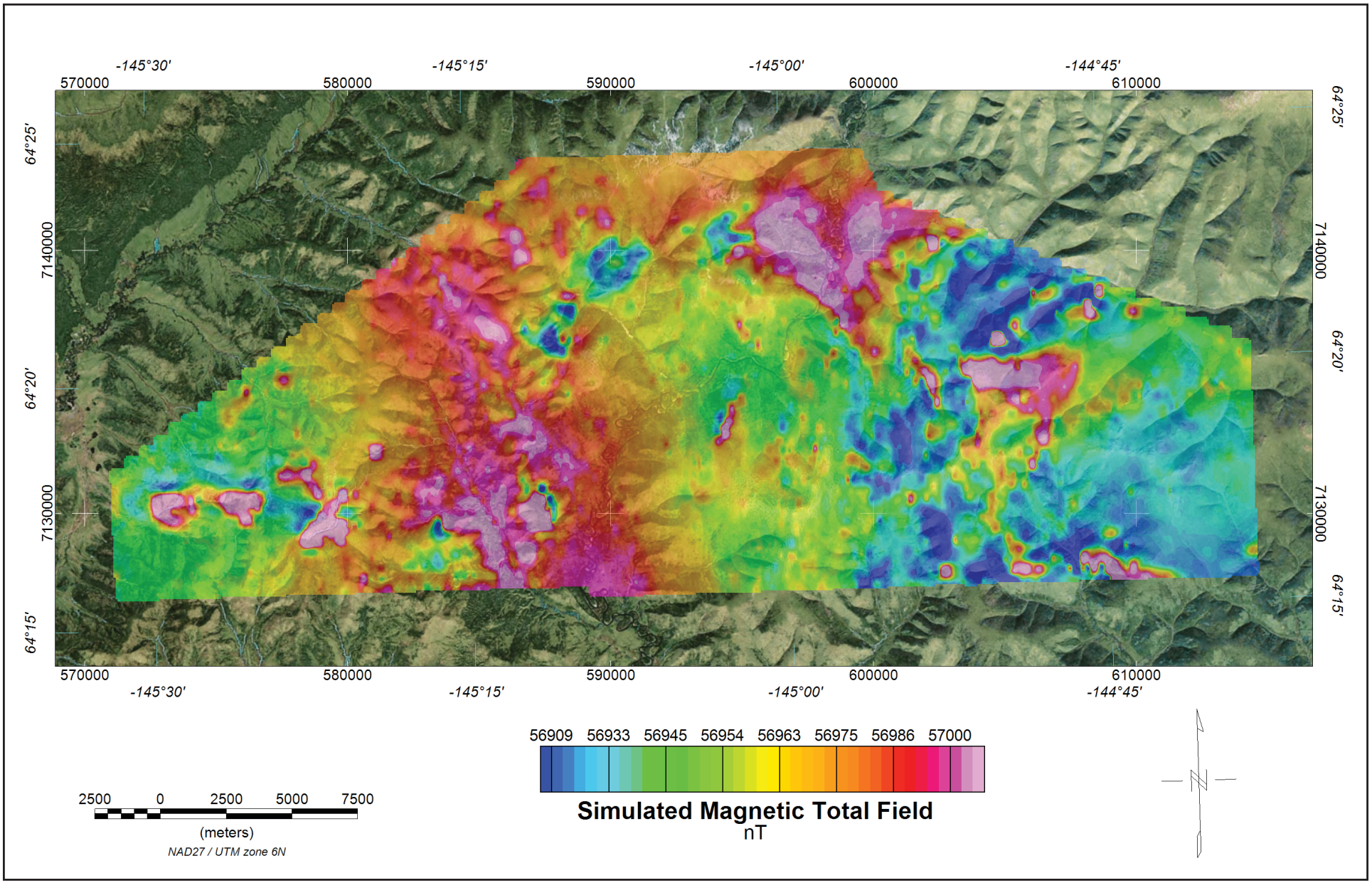


Figure 3. The simulated magnetic total field data were created using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2000, updated October 2004), updated for date of flight and altimeter variations, (3) leveled to the tie line data, (4) a constant value of approximately 57,000 nT was added to all data, and (5) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

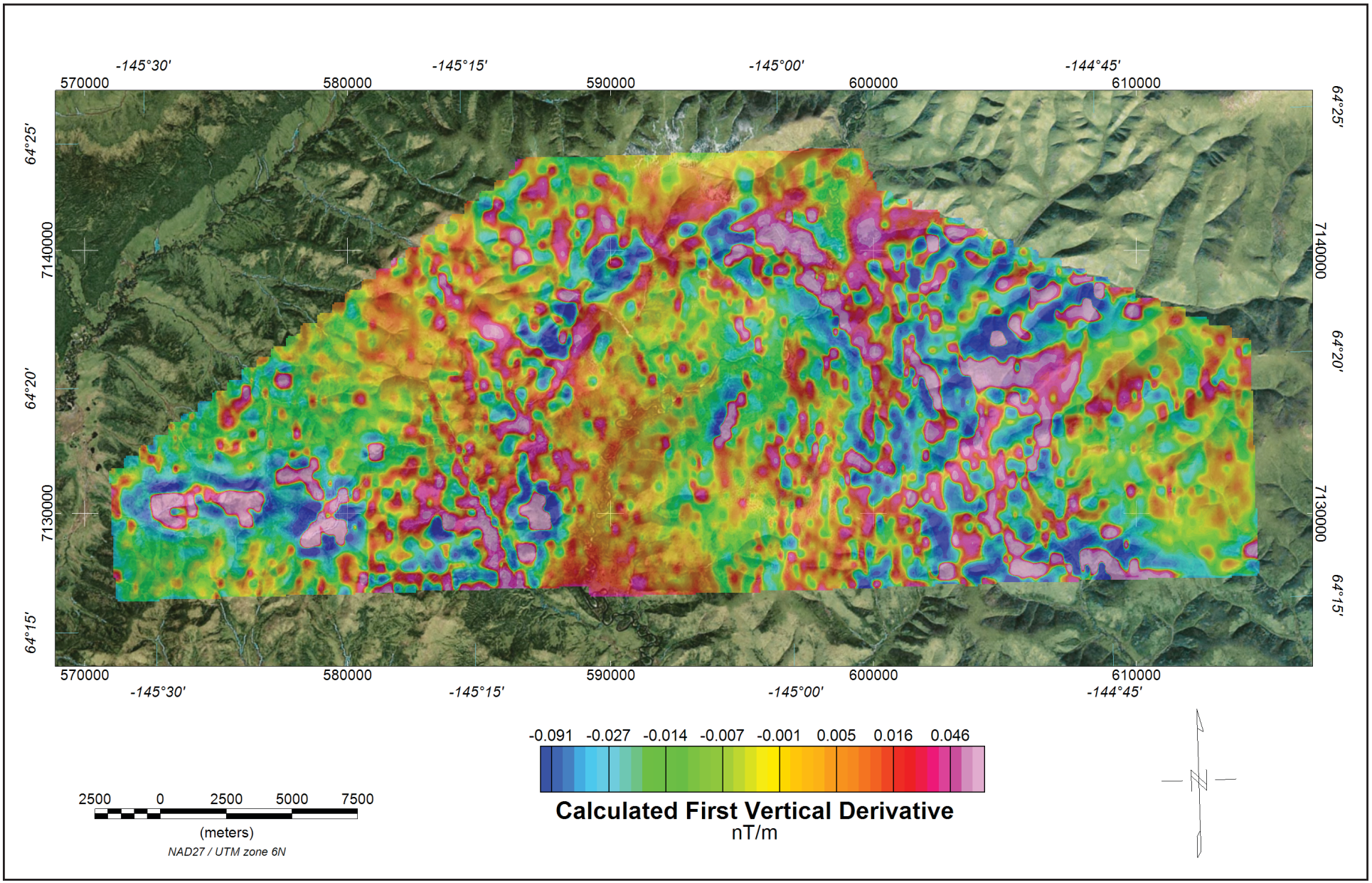


Figure 4. The first vertical derivative grid was calculated from the diurnally-corrected total magnetic field grid using an FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

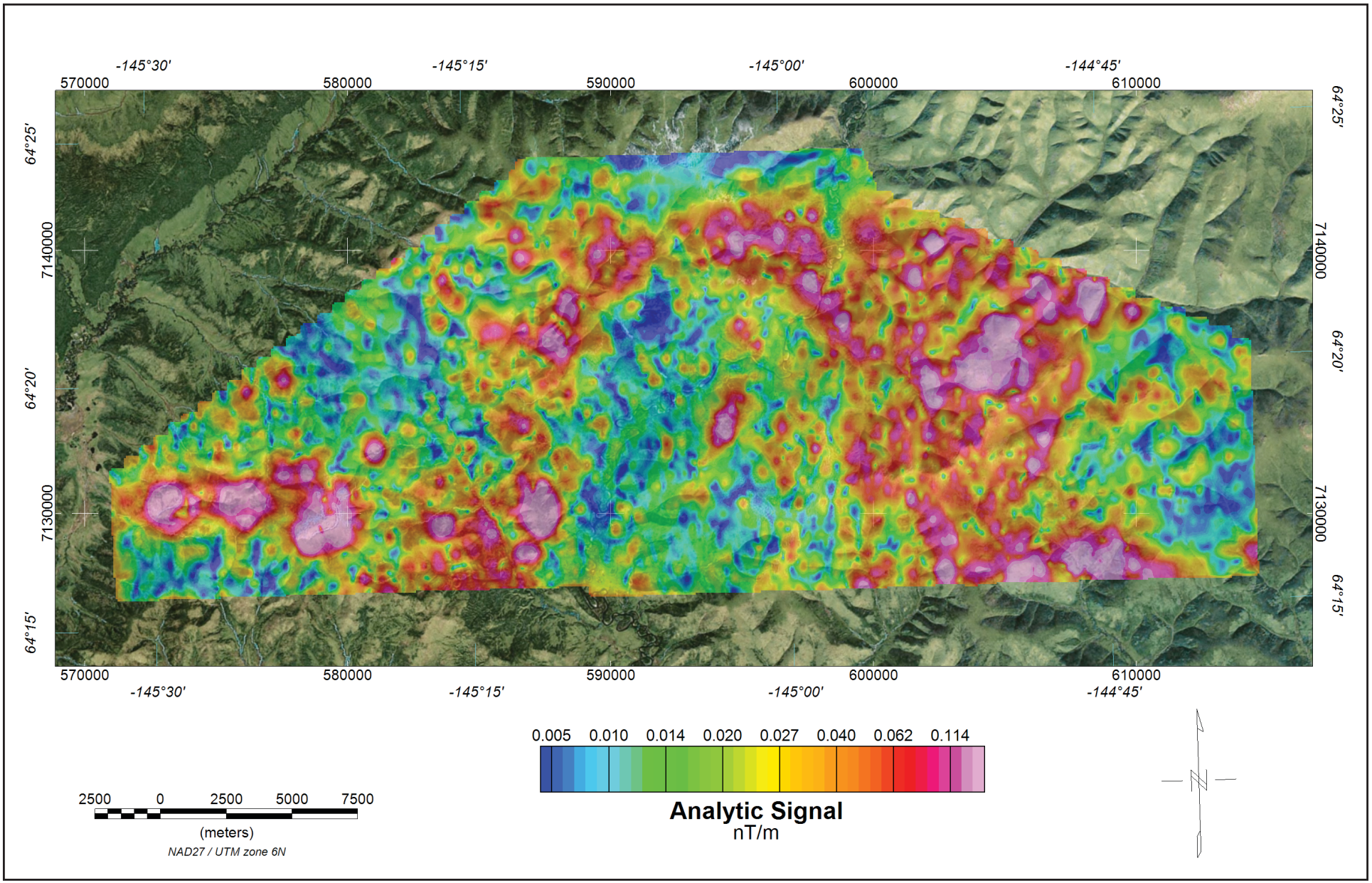


Figure 5. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts,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

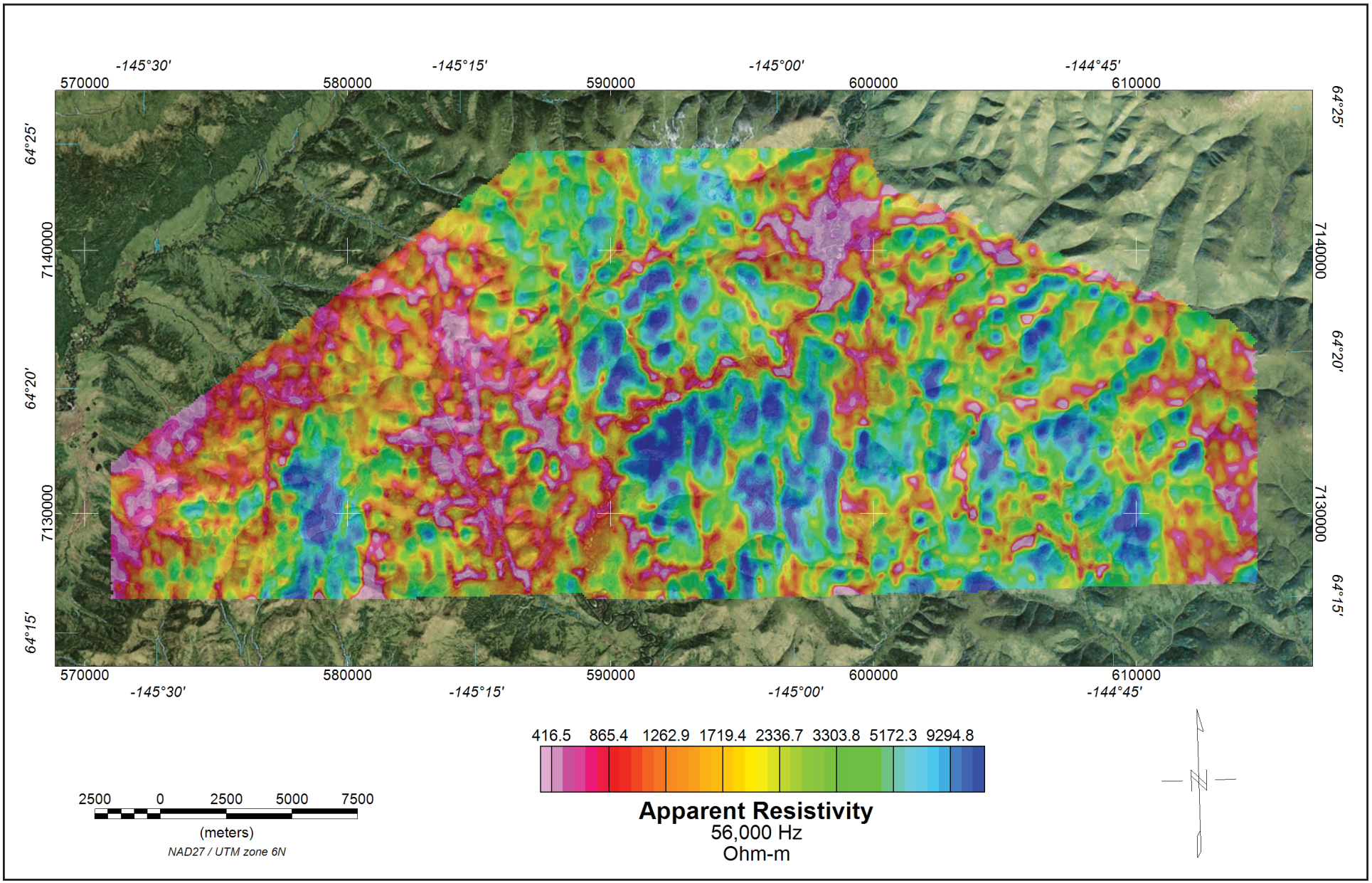


Figure 6. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1-second intervals. The EM system 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.

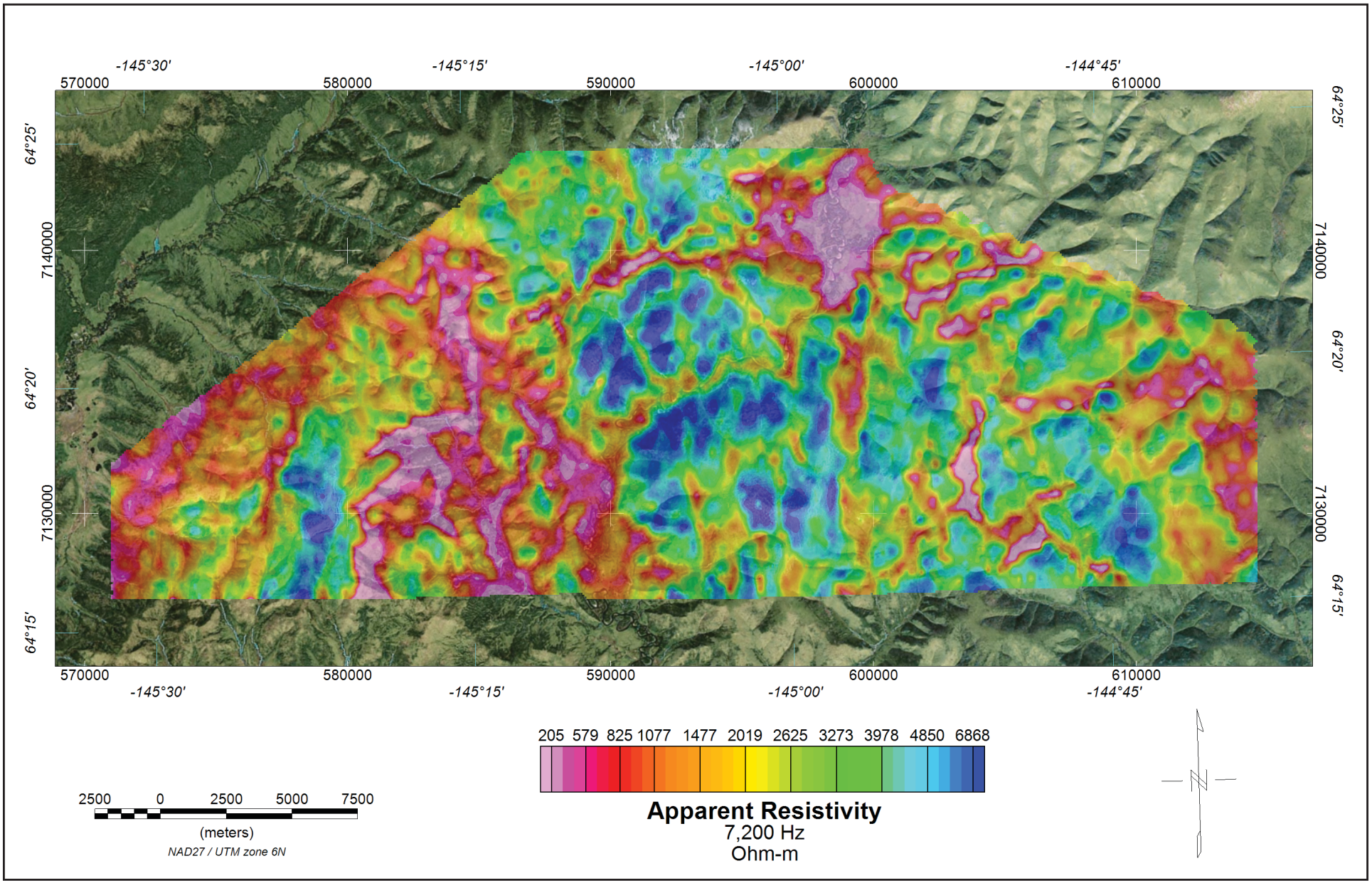


Figure 7. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system 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.

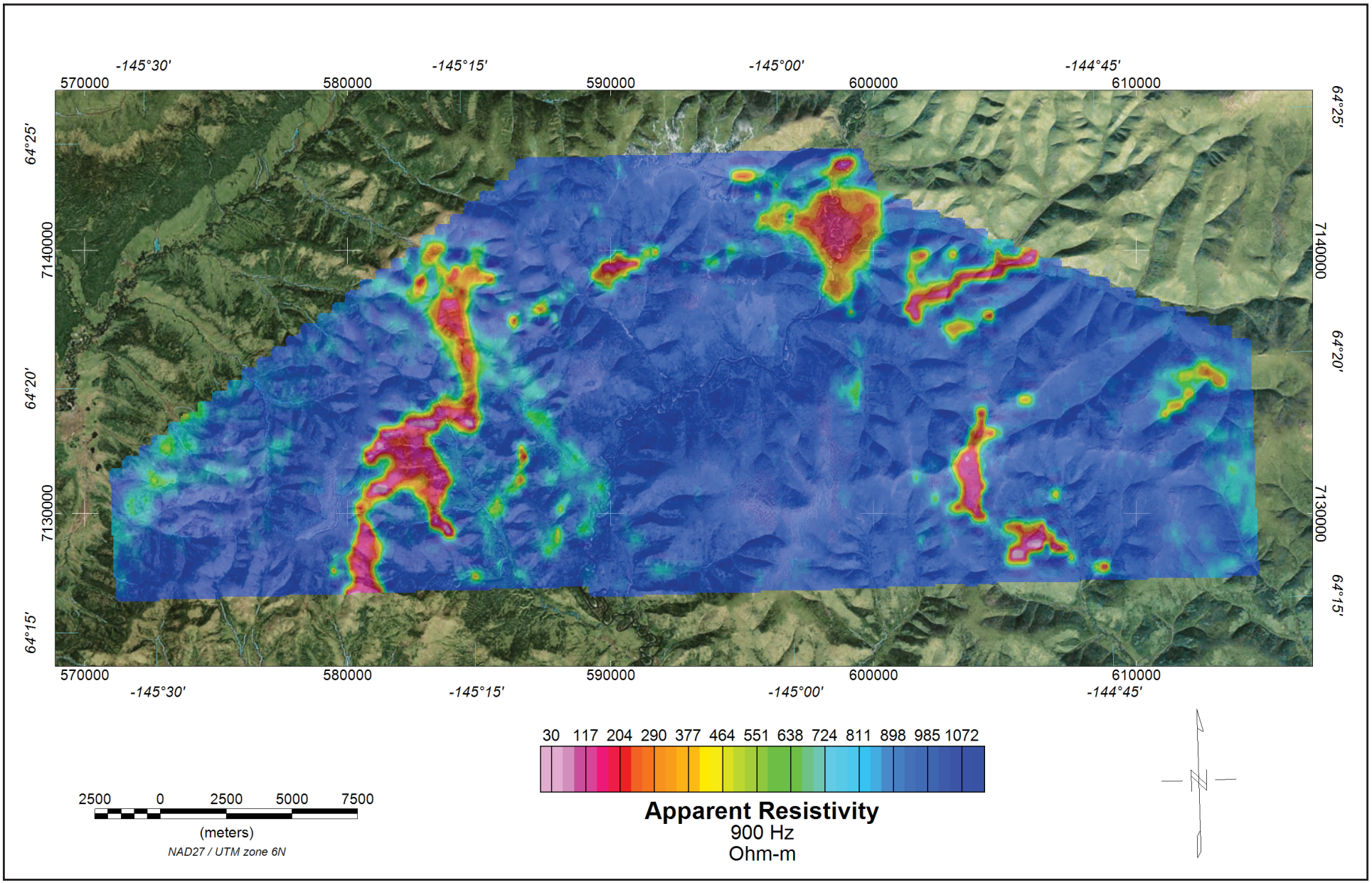


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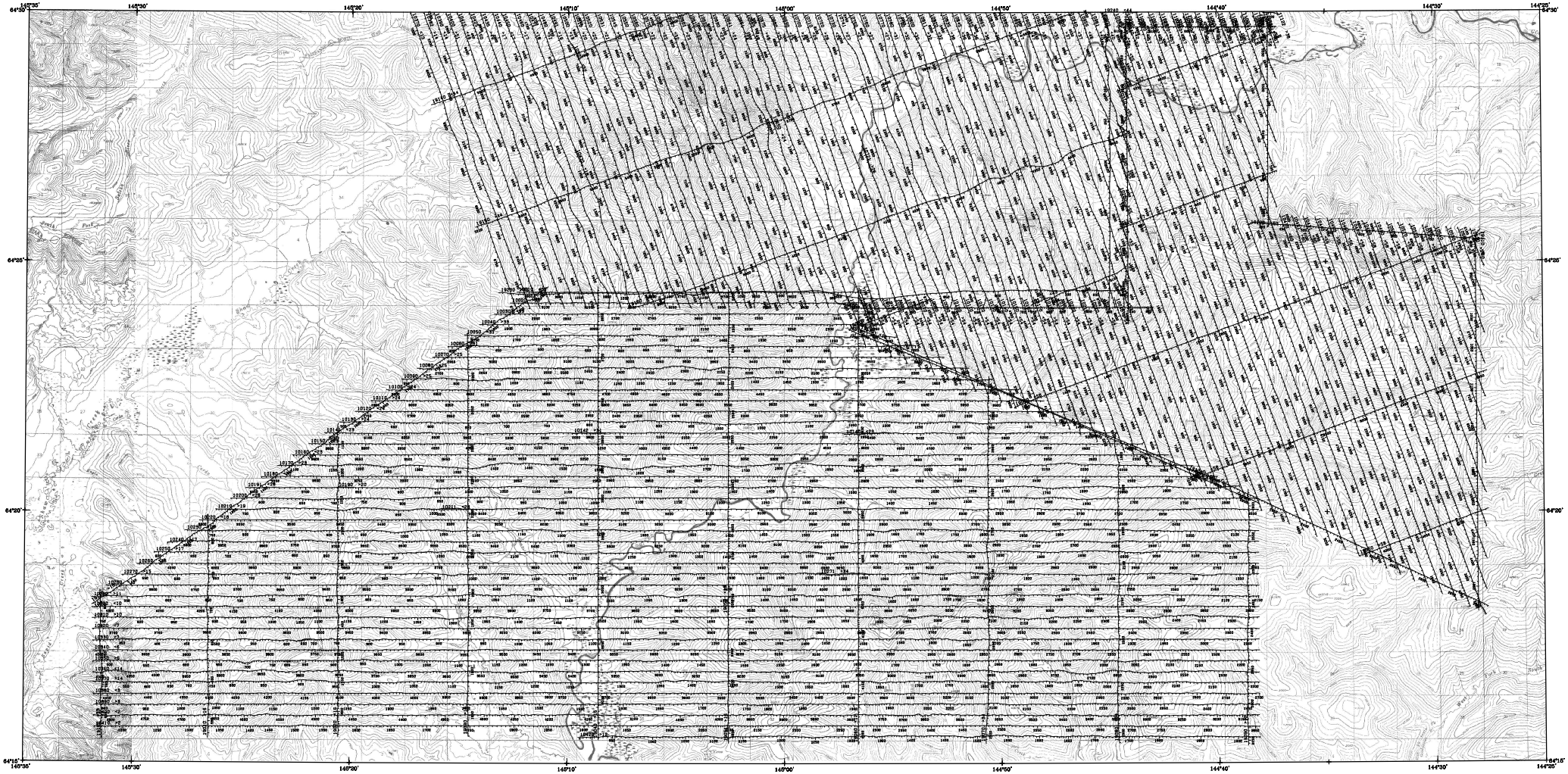
Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/29813.

Map Title	Description
goodpaster_sim_magtf_topo_map.pdf	simulated total magnetic field grid with topographic base map
goodpaster_sim_magtf_contours_plss_map.pdf	simulated total magnetic field grid with contours and public land survey system base layer
goodpaster_sim_magtf_shaded_plss_map.pdf	color shaded simulated total magnetic field grid with public land survey system base layer
goodpaster_emanomalies_sim_magtf_topo_map.pdf	electromagnetic anomalies with simulated total magnetic field grid and topographic base map
goodpaster_res56khz_topo_map.pdf	56,000 Hz coplanar apparent resistivity grid with topographic base map
goodpaster_res56khz_contours_plss_map.pdf	56,000 Hz coplanar apparent resistivity grid with contours and public land survey system base layer
goodpaster_res7200hz_topo_map.pdf	7,200 Hz coplanar apparent resistivity grid with topographic base map
goodpaster_res7200hz_contours_plss_map.pdf	7,200 Hz coplanar apparent resistivity grid with contours and public land survey system base layer
goodpaster_res900hz_topo_map.pdf	900 Hz coplanar apparent resistivity grid with topographic base map
goodpaster_res900hz_contours_plss_map.pdf	900 Hz coplanar apparent resistivity grid with contours and public land survey system base layer
goodpaster_emanomalies_sim_magtf_contours_detailed_plss_map_a.pdf	detailed electromagnetic anomalies with simulated total magnetic field grid contours and public land survey system base map
goodpaster_emanomalies_sim_magtf_contours_detailed_plss_map_b.pdf	detailed electromagnetic anomalies with simulated total magnetic field grid contours and public land survey system base map
goodpaster_flightlines_topo_map.pdf	flight lines with topographic base map
goodpaster_interpretation_plss_map.pdf	interpretation with public land survey system base layer



Base from U.S. Geological Survey 1:63,360 Delta B-1, 1952; B-2, 1952; B-3, 1952; B-4, 1952, Fairbanks, 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

FLIGHT LINES
OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

2005

APPROXIMATE MEAN DECLINATION, 2004

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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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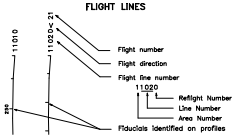
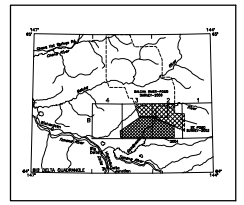
FLIGHT LINES



LOCATION INDEX



SURVEY HISTORY

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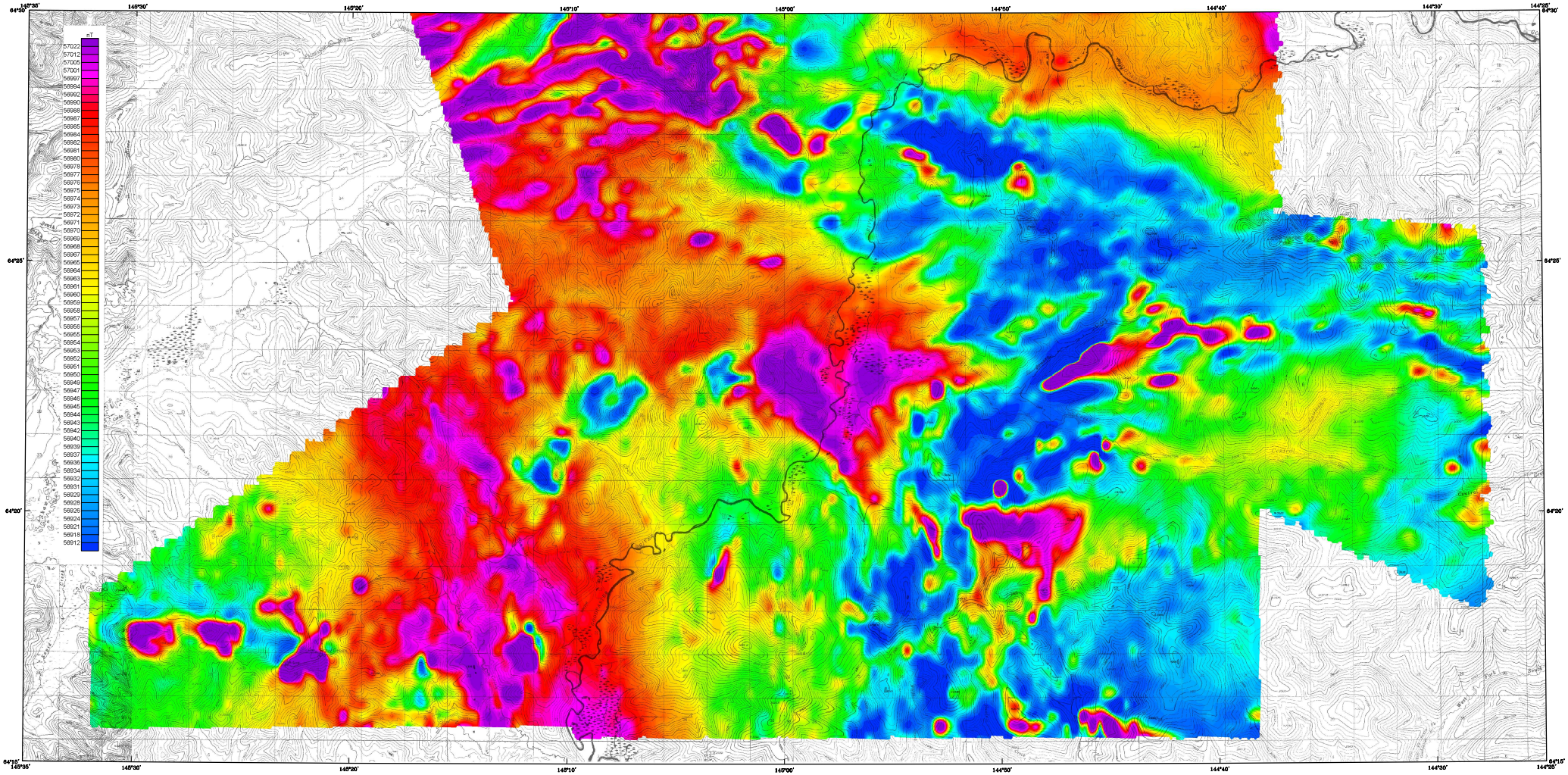

Base from U.S. Geological Survey Big Delta B-1, 1950; B-2, 1952; B-3, 1950; B-4, 1952, Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM: MEAN SEA LEVEL

TOTAL MAGNETIC FIELD OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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2005

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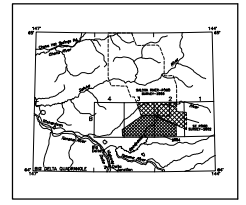

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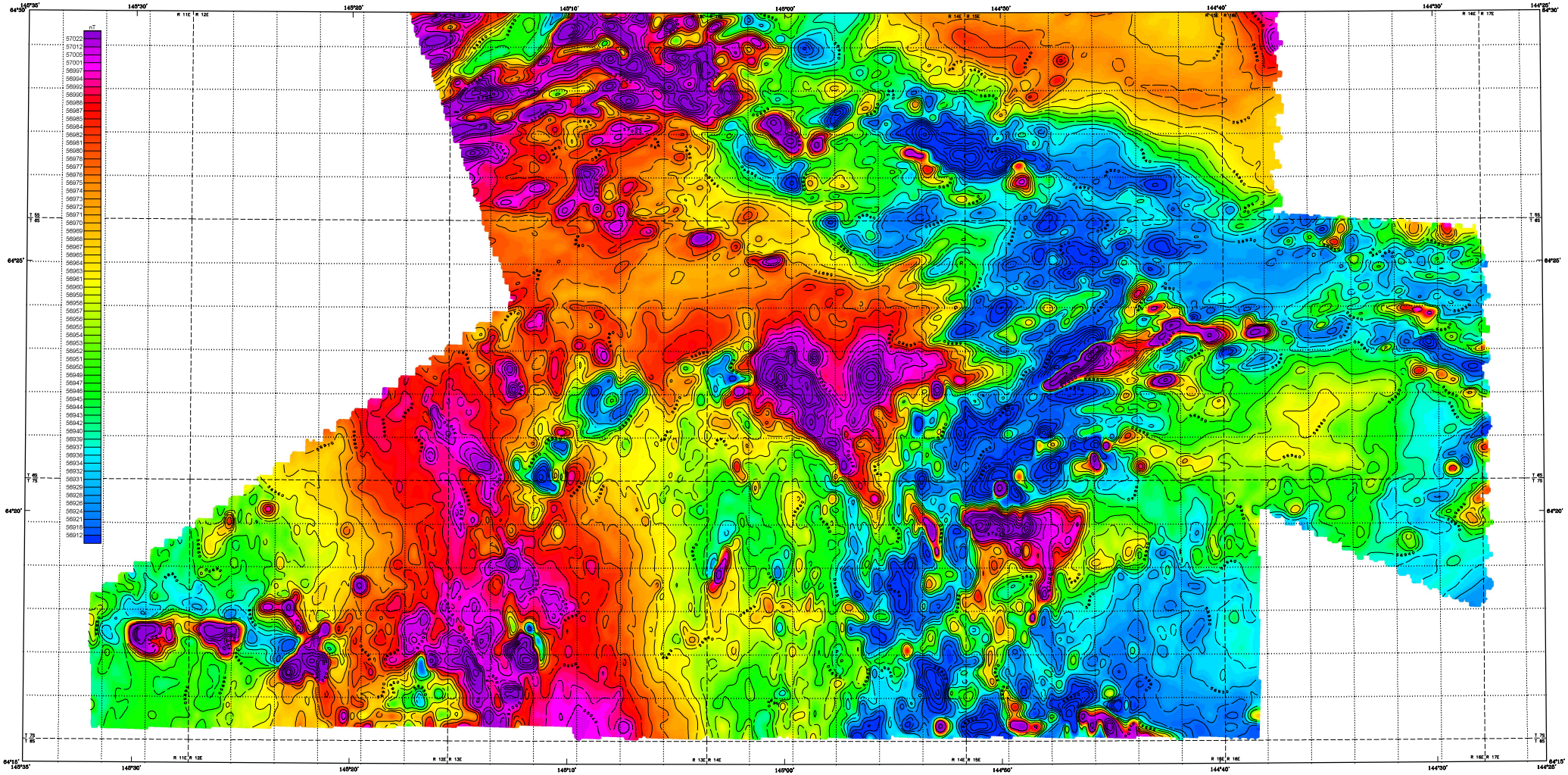

Section outlines from U.S. Geological Survey Big Delta B-1, 1950; B-2, 1952; B-3, 1950; B-4, 1952; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

TOTAL MAGNETIC FIELD OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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MAGNETIC CONTOUR INTERVAL

250 nT

50 nT

10 nT

5 nT

TOTAL MAGNETIC FIELD

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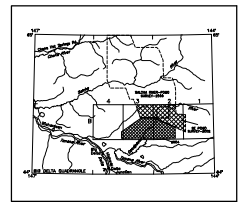

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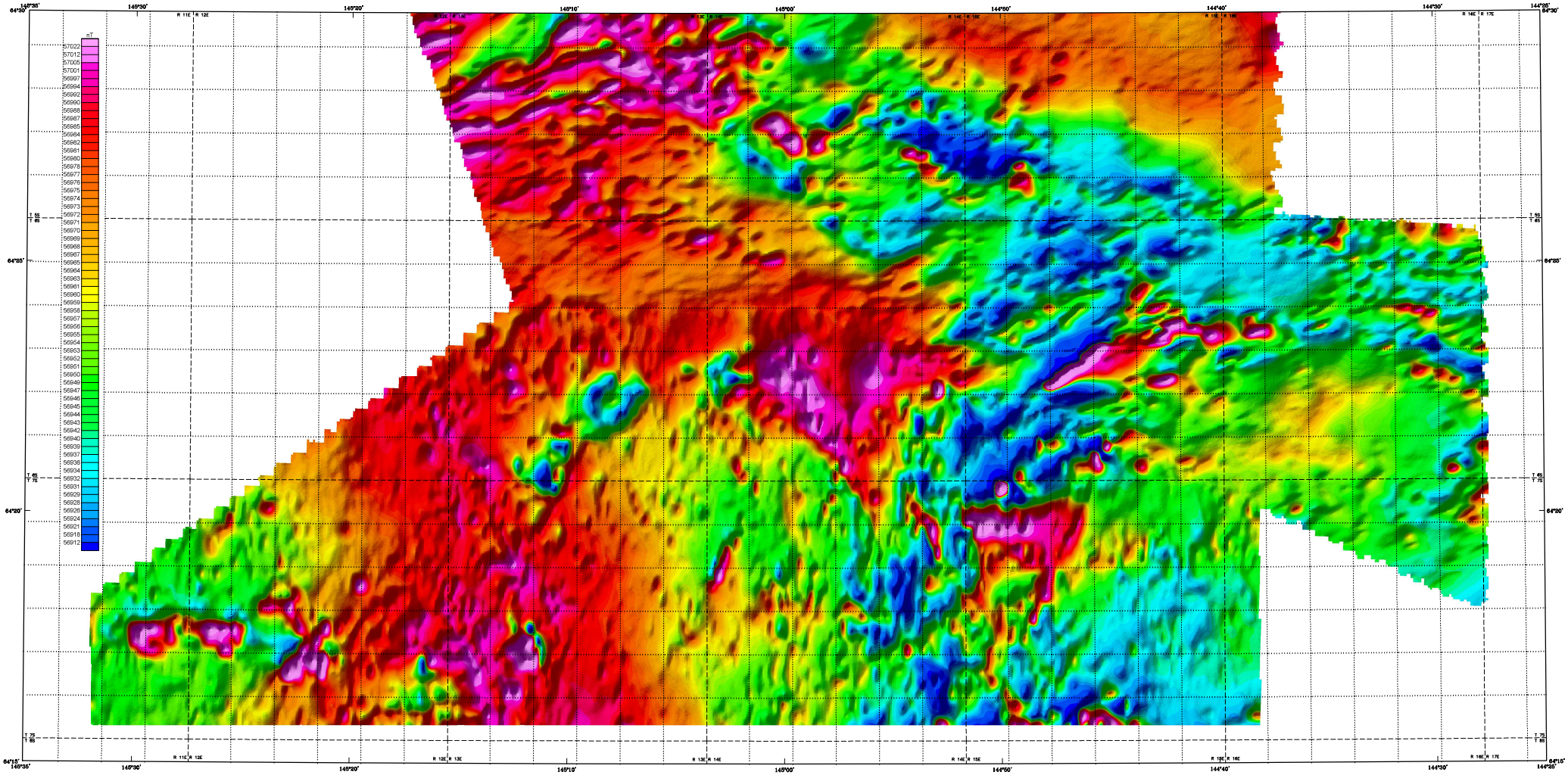
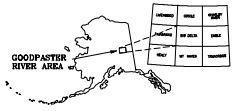


Section outlines from U.S. Geological Survey Big Delta B-1, 1955; B-2, 1955; B-3, 1955; B-4, 1955; Cantwell, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



COLOR SHADOW TOTAL MAGNETIC FIELD OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

Sun Azimuth: 135 degrees, Inclination: 35 degrees

BIG DELTA QUADRANGLE

by

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2005

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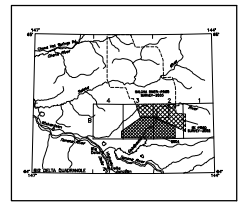

SURVEY HISTORY

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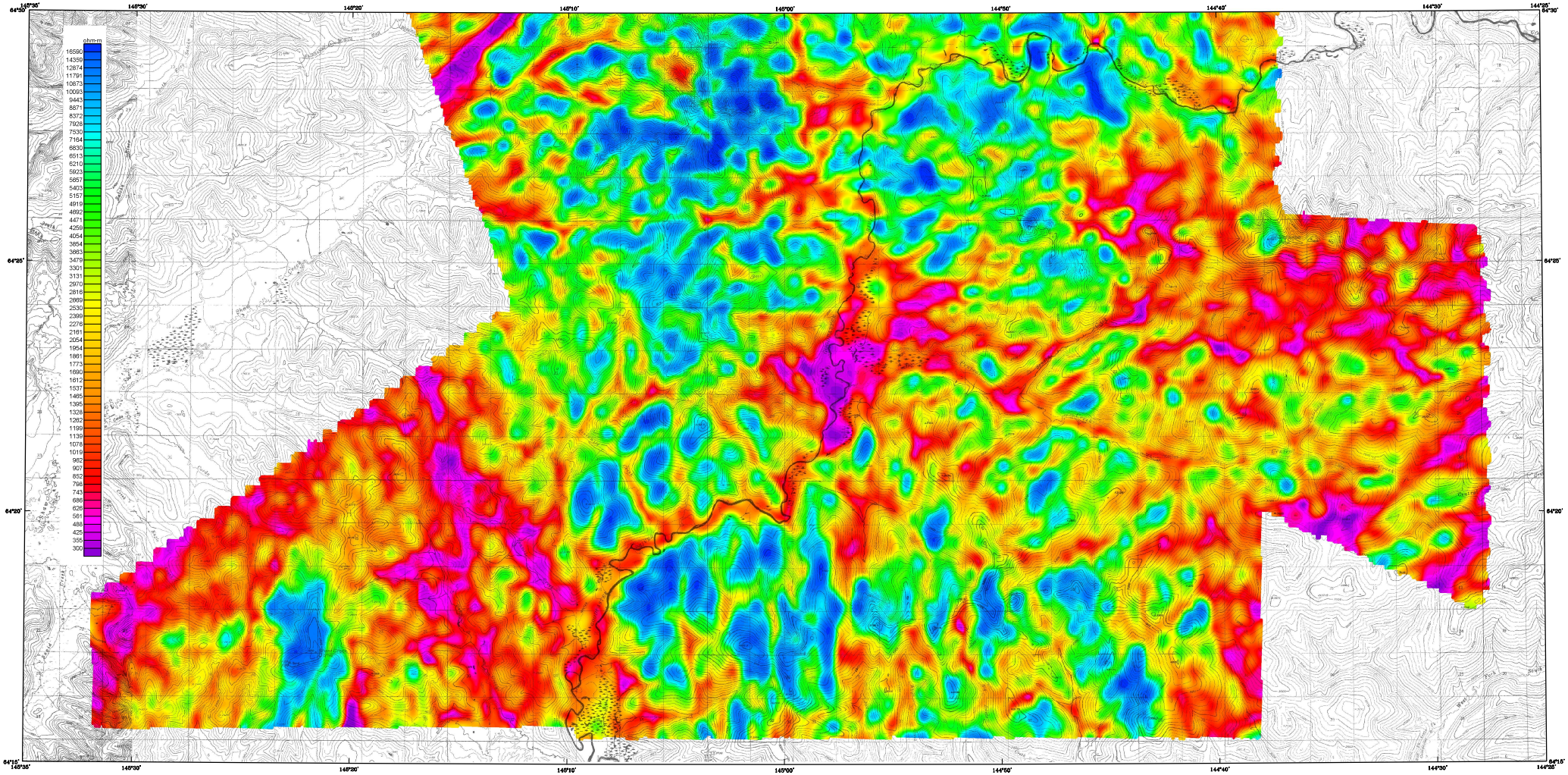


Base from U.S. Geological Survey Big Delta B-1, 1978; B-2, 1952; B-3, 1952; B-4, 1952; Gerstenghe, Alaska

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 PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

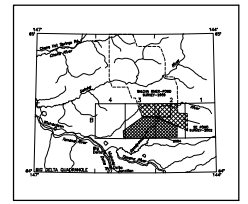
by

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

2005

TRUE NORTH
MAGNETIC N
APPROXIMATE MEAN DECLINATION, 2004

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) at 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. 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.

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SURVEY HISTORY

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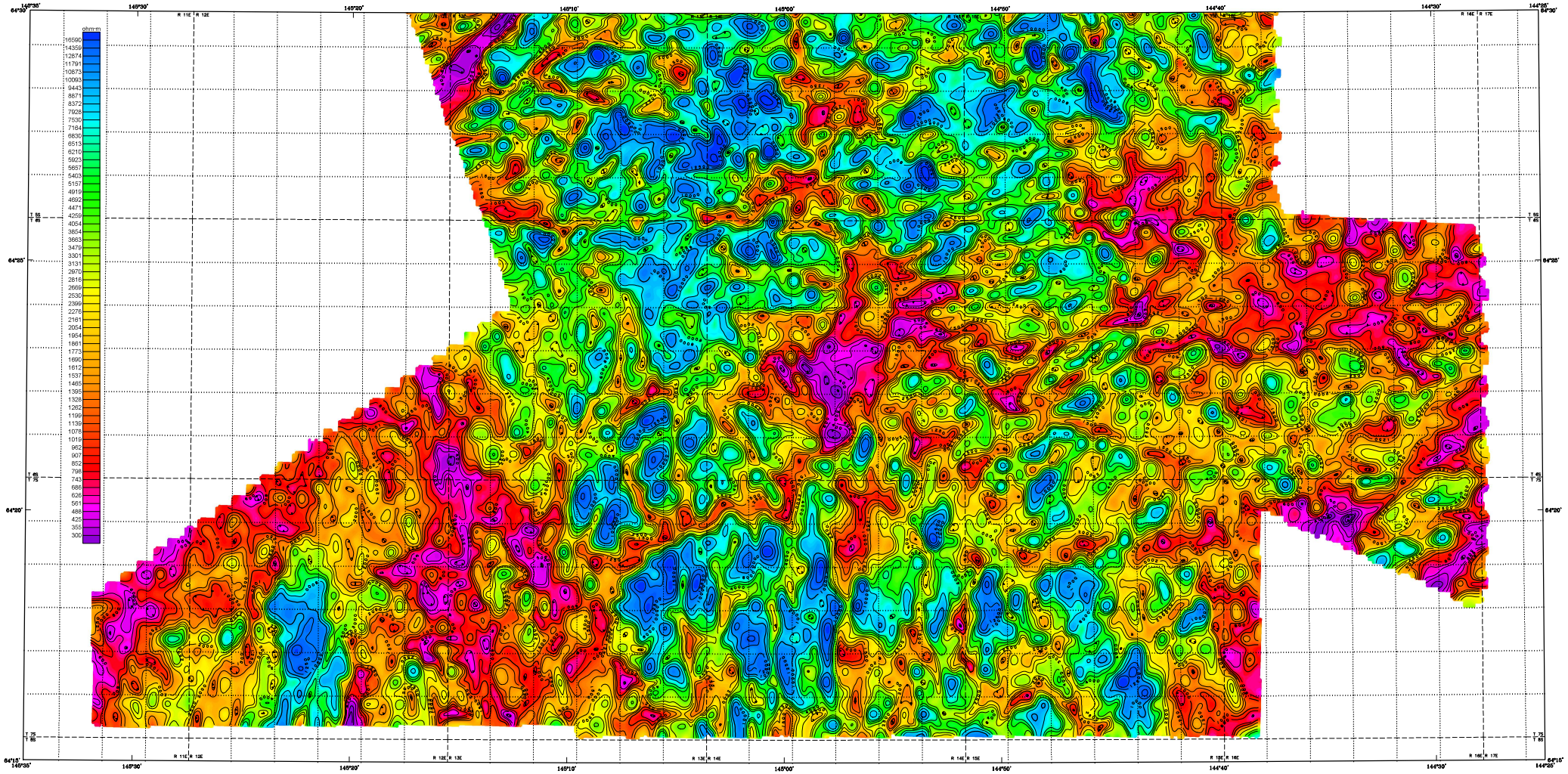
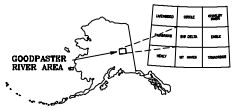


Section outlines from U.S. Geological Survey Big Delta B-1, 1955; B-2, 1955; B-3, 1955; B-4, 1955; Cantwell, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



56,000 Hz COPLANAR APPARENT RESISTIVITY OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

2005

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. 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.

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.

TRUE NORTH

APPROXIMATE MEAN DECLINATION, 2004

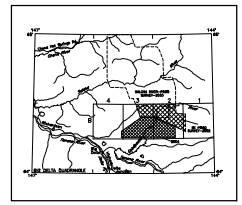
RESISTIVITY CONTOURS

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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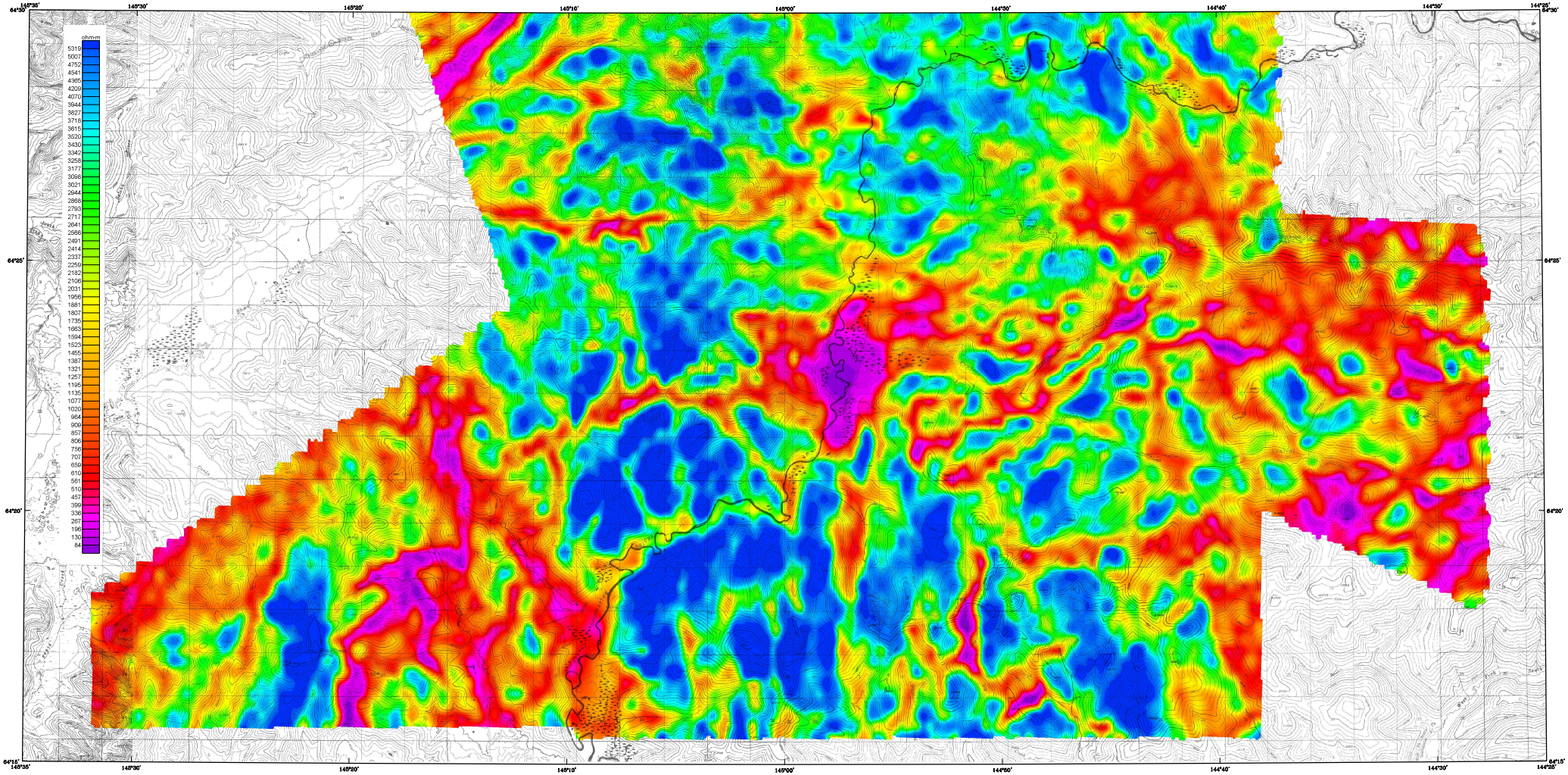


Base from U.S. Geological Survey Big Delta B-1, 1951; B-2, 1952; B-3, 1950; B-4, 1952; Clearwater, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

7200 Hz COPLANAR APPARENT RESISTIVITY OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

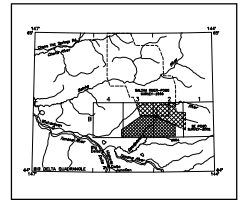
2005

TRUE NORTH

24.9°

APPROXIMATE MEAN DECLINATION, 2004

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of -147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

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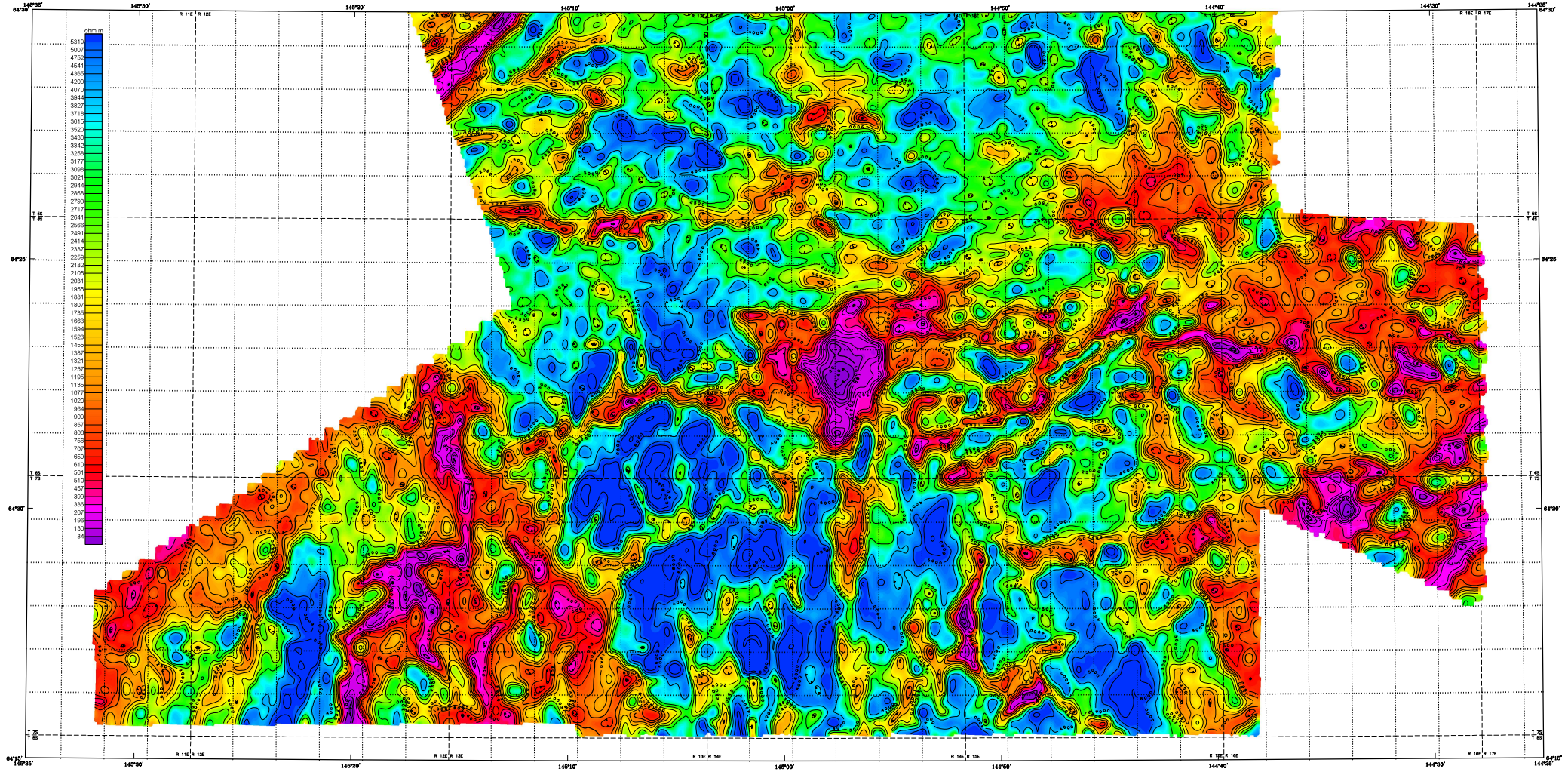


Section outlines from U.S. Geological Survey Big Delta B-1, 1955; B-2, 1955; B-3, 1955; B-4, 1955; Cantwell, Alaska

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 PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

2005

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

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.

TRUE NORTH

APPROXIMATE MEAN DECLINATION, 2004

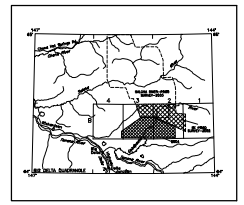
RESISTIVITY CONTOURS

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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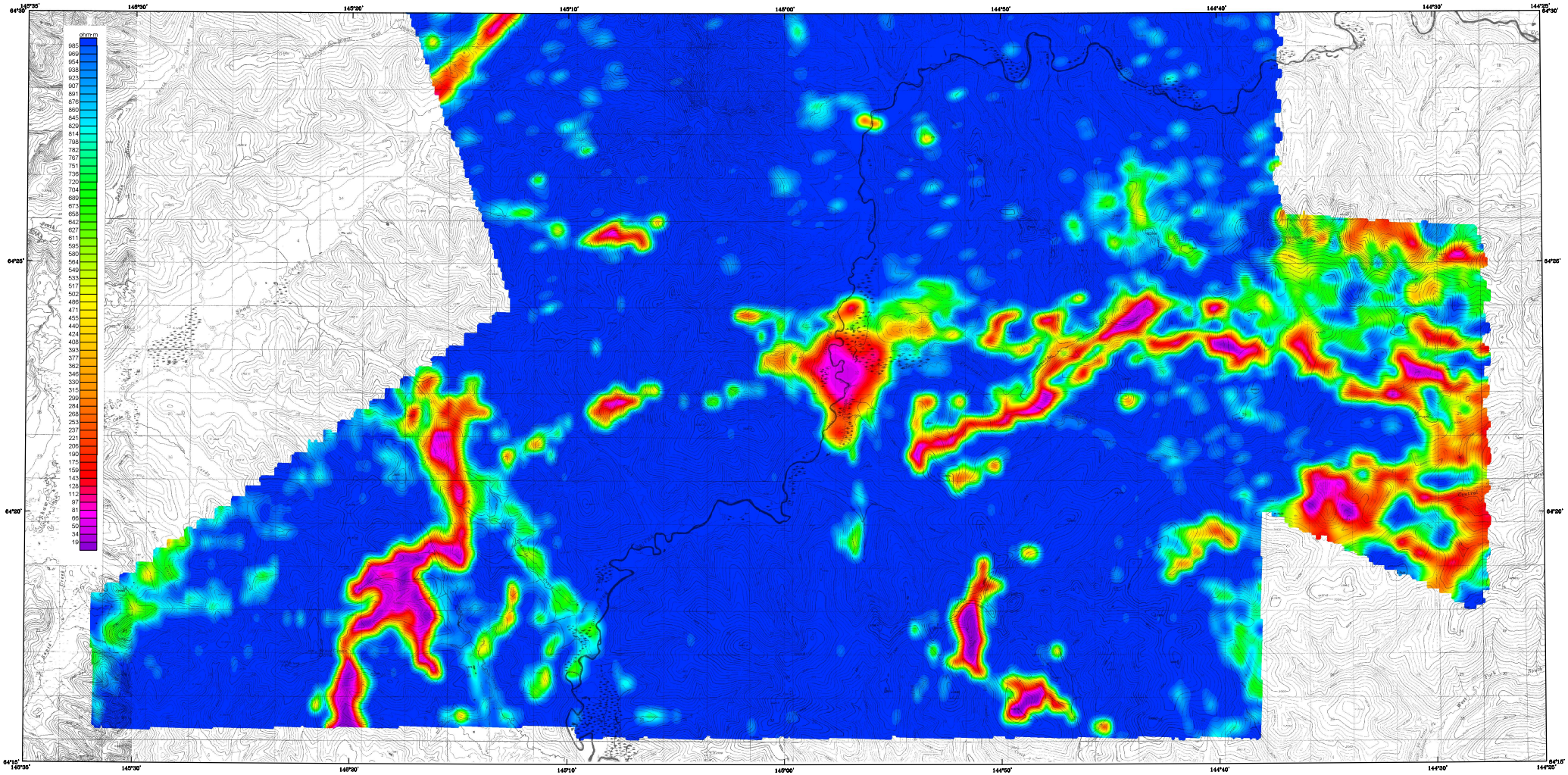


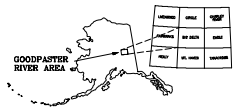
Base from U.S. Geological Survey Big Delta B-1, 1950; B-2, 1950; B-3, 1950; B-4, 1950; Cosmos Hills B-1, 1950

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



900 Hz COPLANAR APPARENT RESISTIVITY OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

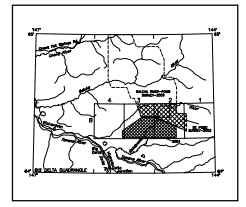
by

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

2005

APPROXIMATE MEAN DECLINATION, 2004

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. 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.

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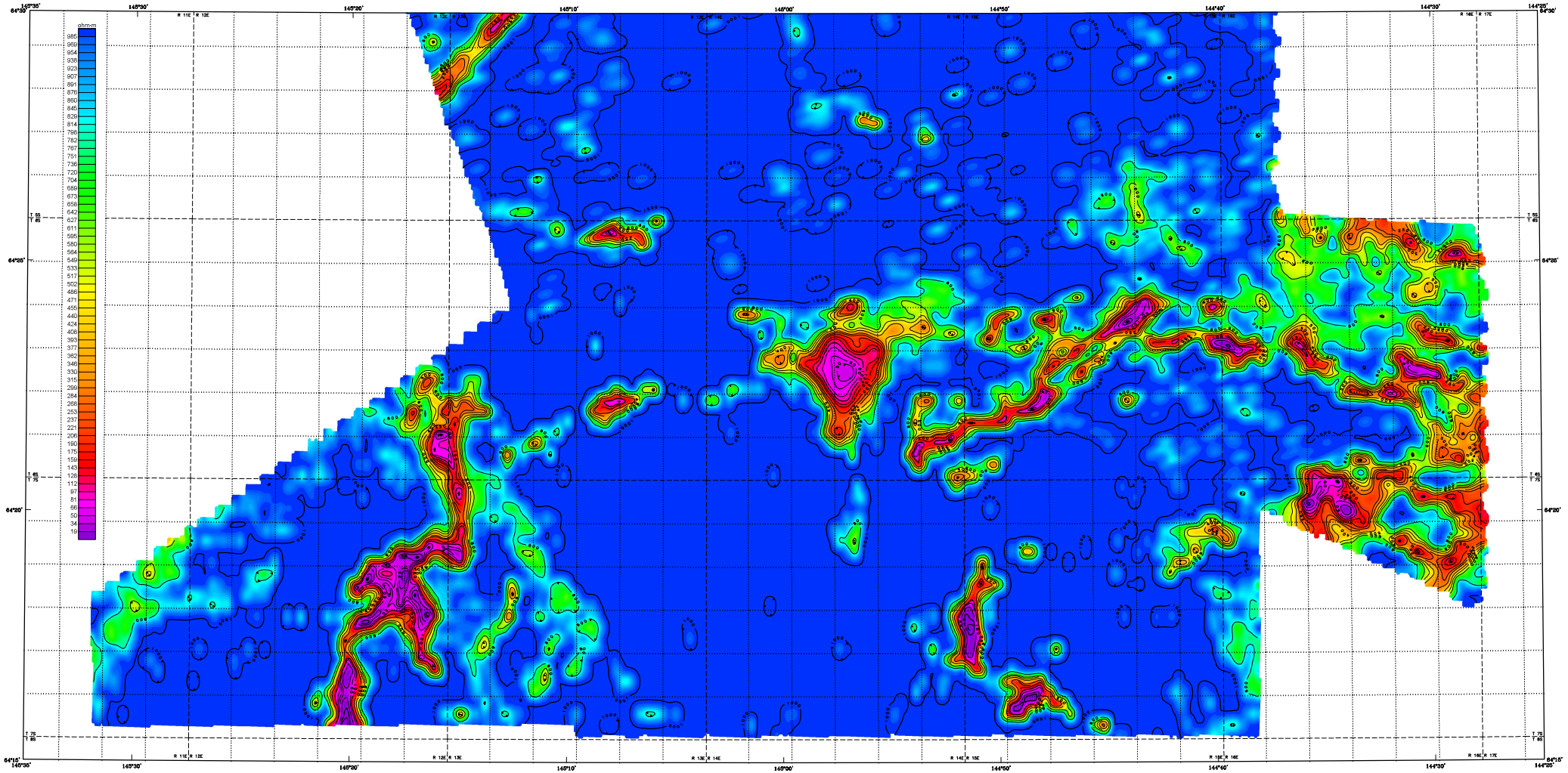
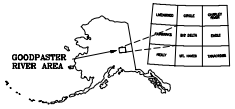


Section outlines from U.S. Geological Survey Big Delta B-1, 1950; B-2, 1952; B-3, 1952; B-4, 1954; Cantwell, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



900 Hz COPLANAR APPARENT RESISTIVITY OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

2005

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 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. 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.

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APPROXIMATE MEAN DECLINATION, 2004

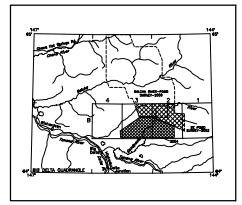
RESISTIVITY CONTOURS

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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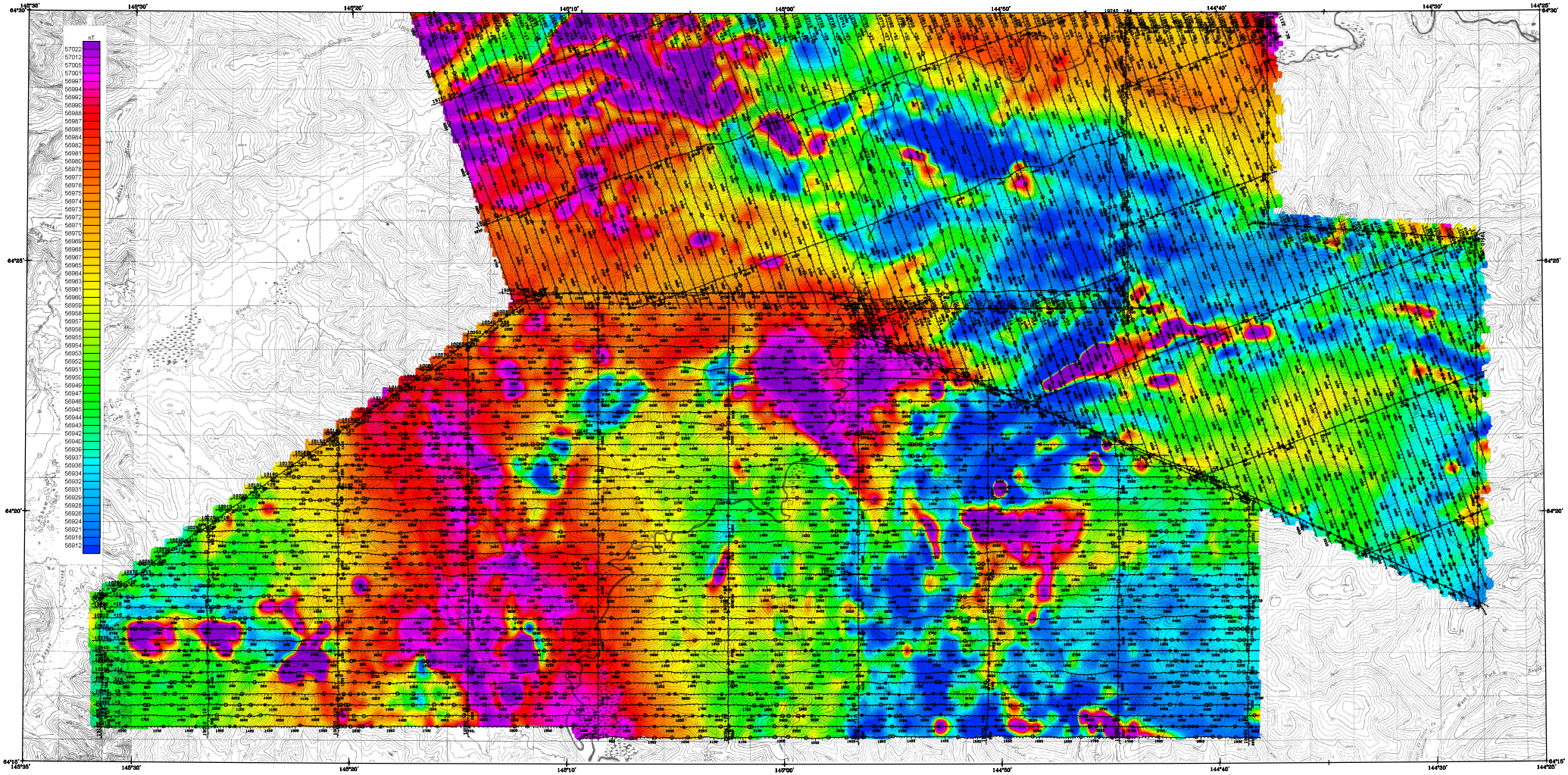


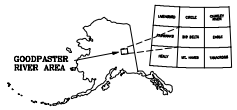
Base from U.S. Geological Survey Big Delta B-1, 1950; B-2, 1953; B-3, 1952; B-4, 1952, Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET DATUM MEAN SEA LEVEL



TOTAL MAGNETIC FIELD AND ELECTROMAGNETIC ANOMALIES OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

BIG DELTA QUADRANGLE

by

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

2005

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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
●	>50 siemens
○	<50 siemens
✱	Questionable anomaly
△	Weak conductivity associated with an EM magnetite response

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 power line monitor and the flight track video were examined to locate cultural sources. The EM anomalies that are indicated are classified by conductance.

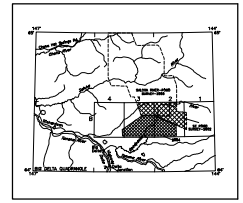
APPROXIMATE MEAN DECLINATION, 2004

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with 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) adjusted for regional variations (or IGRF gradient, 2000, updated to October 2004) using altimeter adjusted IGRF, (3) leveled to the tie line data, and 4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

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.

LOCATION INDEX



SURVEY HISTORY

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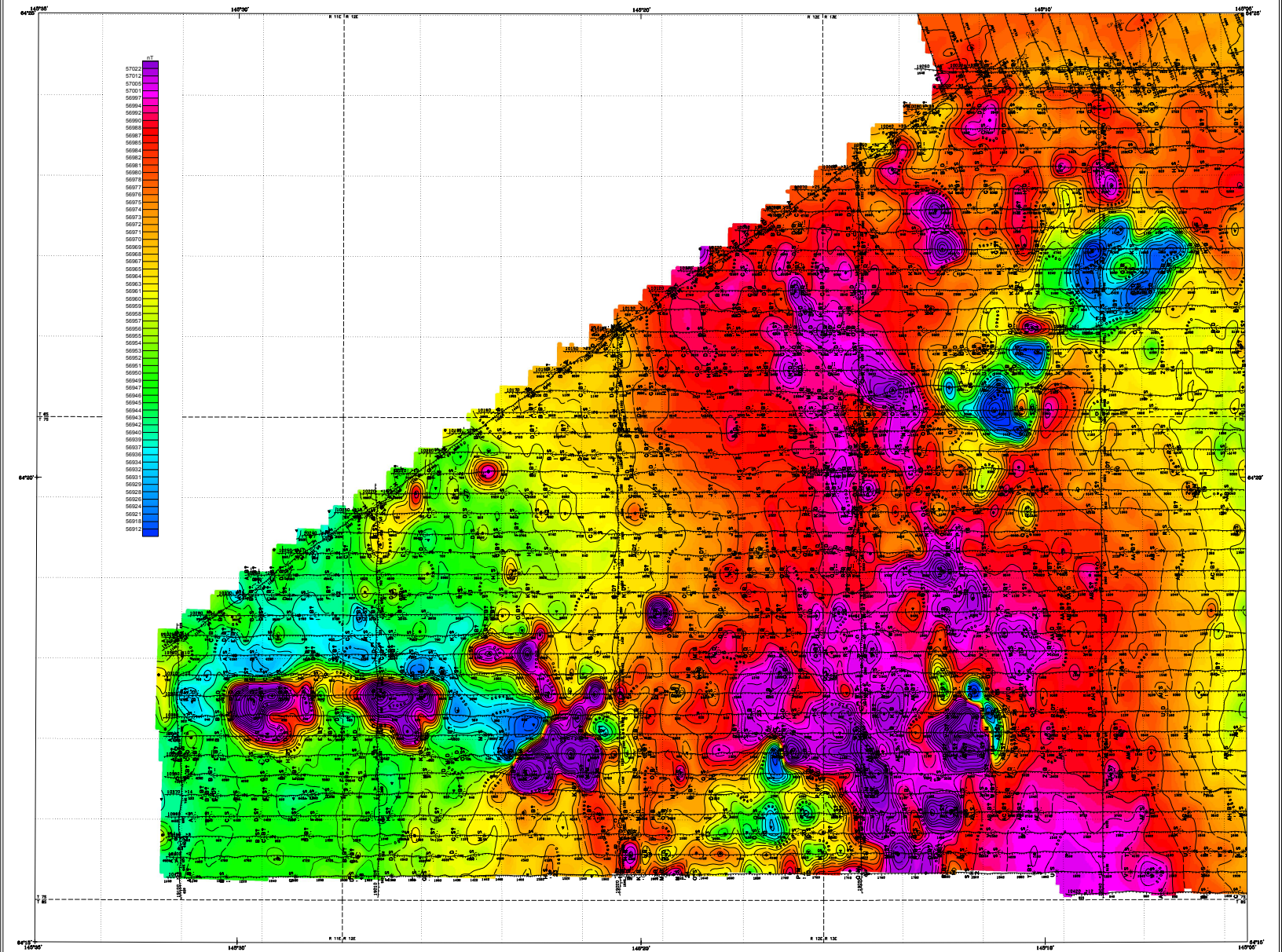
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2005-1-5a
PARTS of BIG DELTA B-3 and B-4 QUADRANGLES



Section outlines from U.S. Geological Survey Big Delta B-3, 1950; B-4, 1950; 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

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PART OF THE GOODPASTER RIVER AREA, GOODPASTER MINING DISTRICT, INTERIOR ALASKA

PARTS of BIG DELTA B-3 and B-4 QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

DESCRIPTIVE NOTES

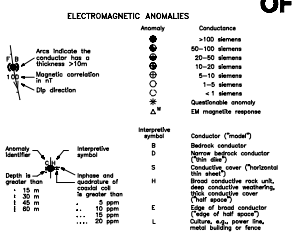
The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along E–W (90°) 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.

An Ashtech GG24 NAVSTAR / GLONASS 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 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

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.

ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
	>100 siemens
	50–100 siemens
	20–50 siemens
	10–20 siemens
	5–10 siemens
	1–5 siemens
	< 1 siemens
	Questionable anomaly
	EM magnetite response

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

MAGNETIC CONTOUR INTERVAL

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

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with 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) adjusted for regional variations (or IGRF gradient, 2000, updated to October 2004) using altimeter adjusted IGRF, (3) leveled to the tie line data, and 4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique.

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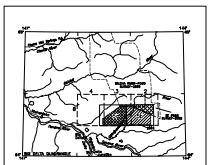
LOCATION INDEX FOR SCALE 1:31,680



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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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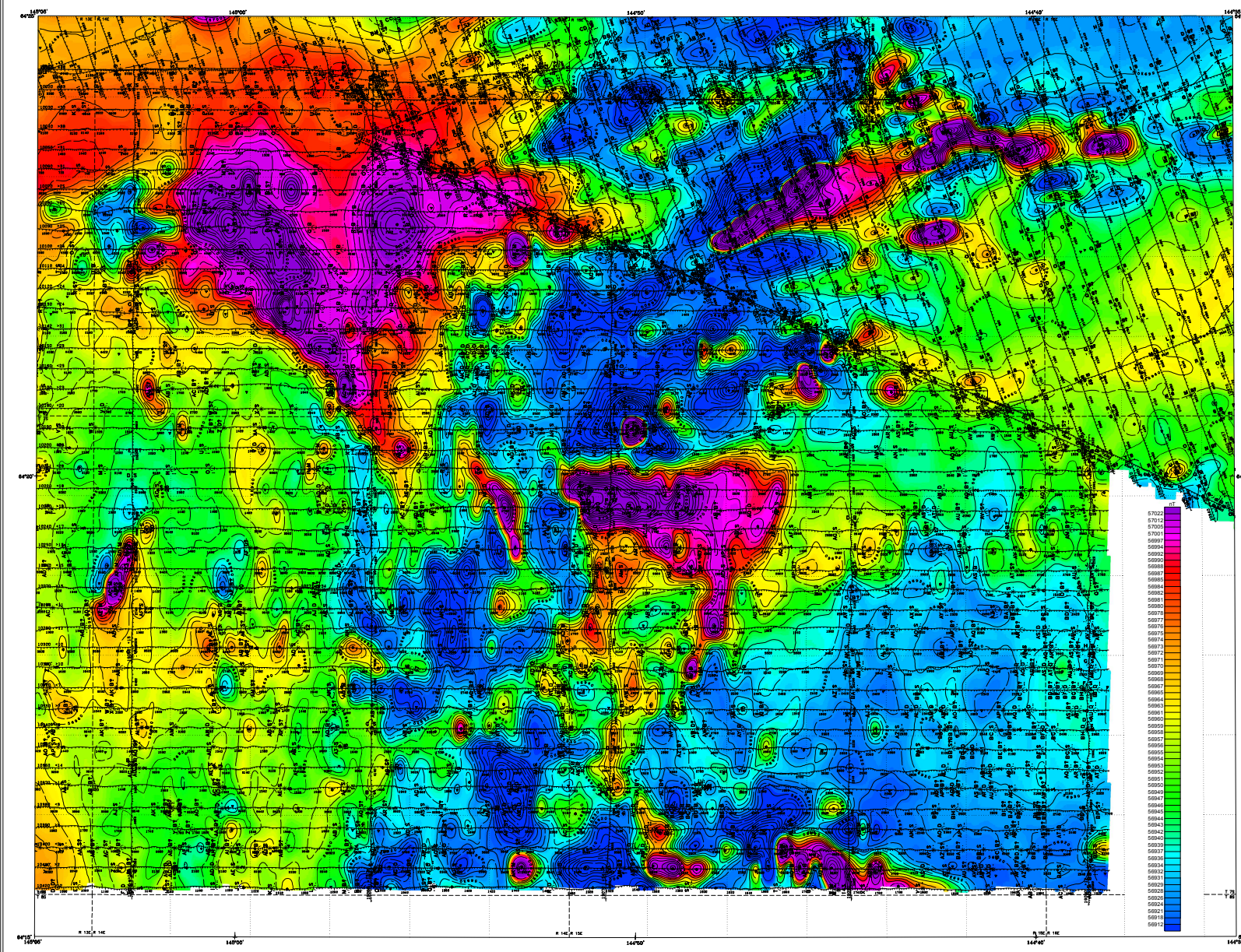

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ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m

Magnetic correlation in nT

Dip direction

Anomaly	Conductance
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	50–100 siemens
	20–50 siemens
	10–20 siemens
	5–10 siemens
	1–5 siemens
	< 1 siemens
	Questionable anomaly
	EM magnetite response

Anomaly identifier

Depth is greater than
- 15 m
- 30 m
- 45 m
- 60 m

Interpretive symbol

Inphase and quadrature of coaxial coil

% greater than
- 5 ppm
- 10 ppm
- 15 ppm
- 20 ppm

Interpretive symbol	
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H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
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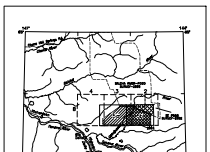
TRUE NORTH

APPROXIMATE MEAN DECLINATION, 2005

LOCATION INDEX FOR SCALE 1:31,680



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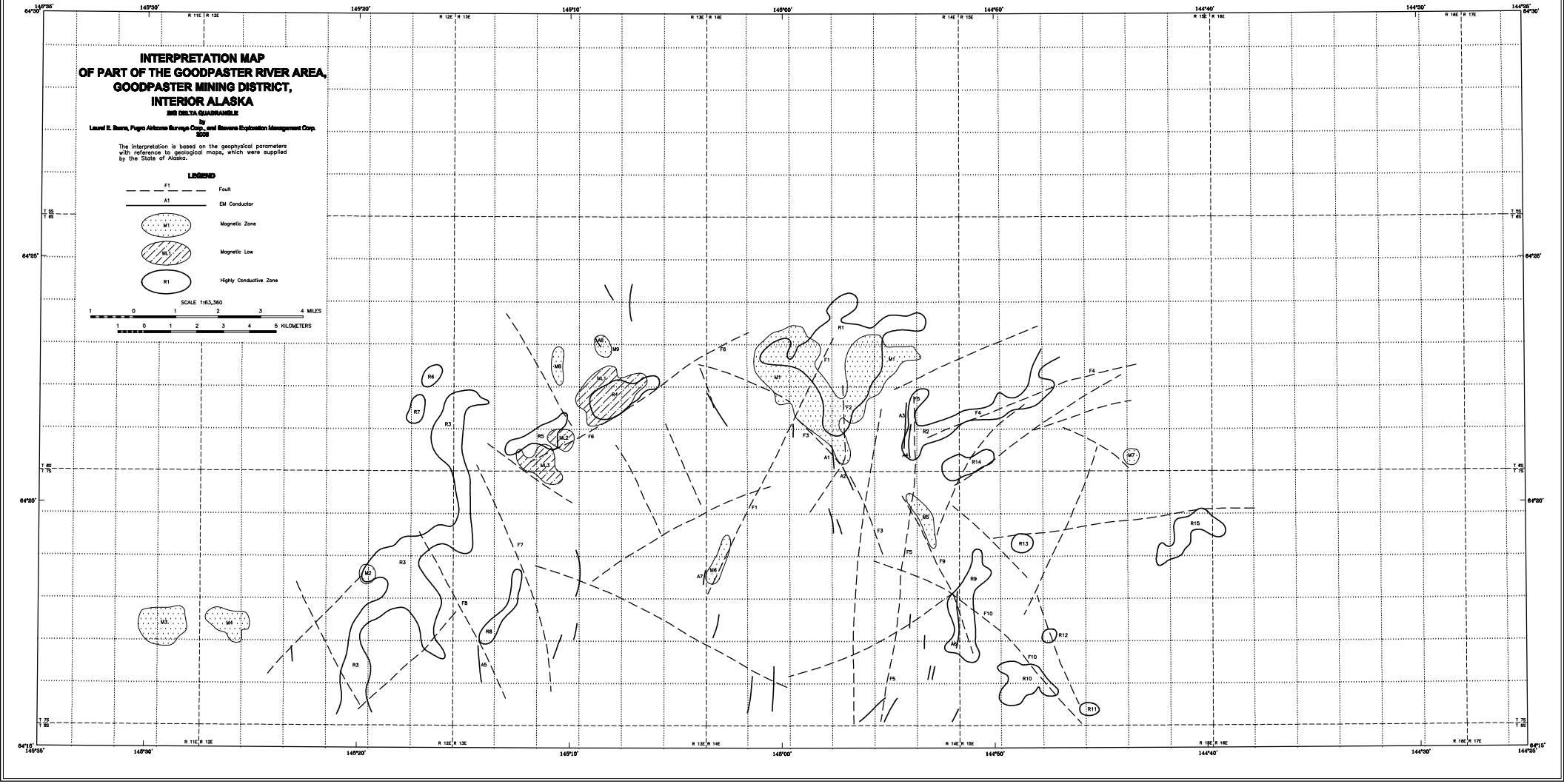
INTERPRETATION MAP
OF PART OF THE GOODPASTER RIVER AREA,
GOODPASTER MINING DISTRICT,
INTERIOR ALASKA
BIG DELTA QUADRANGLE
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2005
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
LEGEND
F1
Fault
A1
EM Conductor
M1
Magnetic Zone
ML1
Magnetic Low
R1
Highly Conductive Zone
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
64°30'
64°25'
64°20'
64°15'
145°35'
145°30'
145°20'
145°10'
145°00'
144°50'
144°40'
144°30'
144°25'
R 11E
R 12E
R 13E
R 14E
R 15E
R 16E
R 17E
T 6S
T 7S
T 8S