NORTHEAST FAIRBANKS ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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

Geophysical Report 2018-11

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DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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NORTHEAST FAIRBANKS ELECTROMAGNETIC AND MAGNETIC AIRBORNE 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 Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Fairbanks and Circle mining districts, about 60 kilometers northeast of Fairbanks, Alaska. The survey is adjacent to the Fairbanks, Headwaters of the Litte Chena, and Circle geophysical survyes. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^V system from September to November 2005. A total of 3259.6 line kilometers were collected covering 1166.1 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 Fairbanks and Circle mining districts have a long history of large-scale placer Au mining. 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.

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

AVAILABLE DATA

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

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., 2006, Project Report and Profile data of the 2005 Geophysical Surveys of the northeast Fairbanks, east Richardson, Liscum, and Black Mountain areas, interior Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2006-4, 1 p. http://doi.org/10.14509/14566

Burns, L.E., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2006, Line, grid, and vector data and plot files for the airborne geophysical survey data of northeast Fairbanks area, Fairbanks and Circle mining districts, interior Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2006-3, 21 sheets, 1 DVD. http://doi.org/10.14509/14522

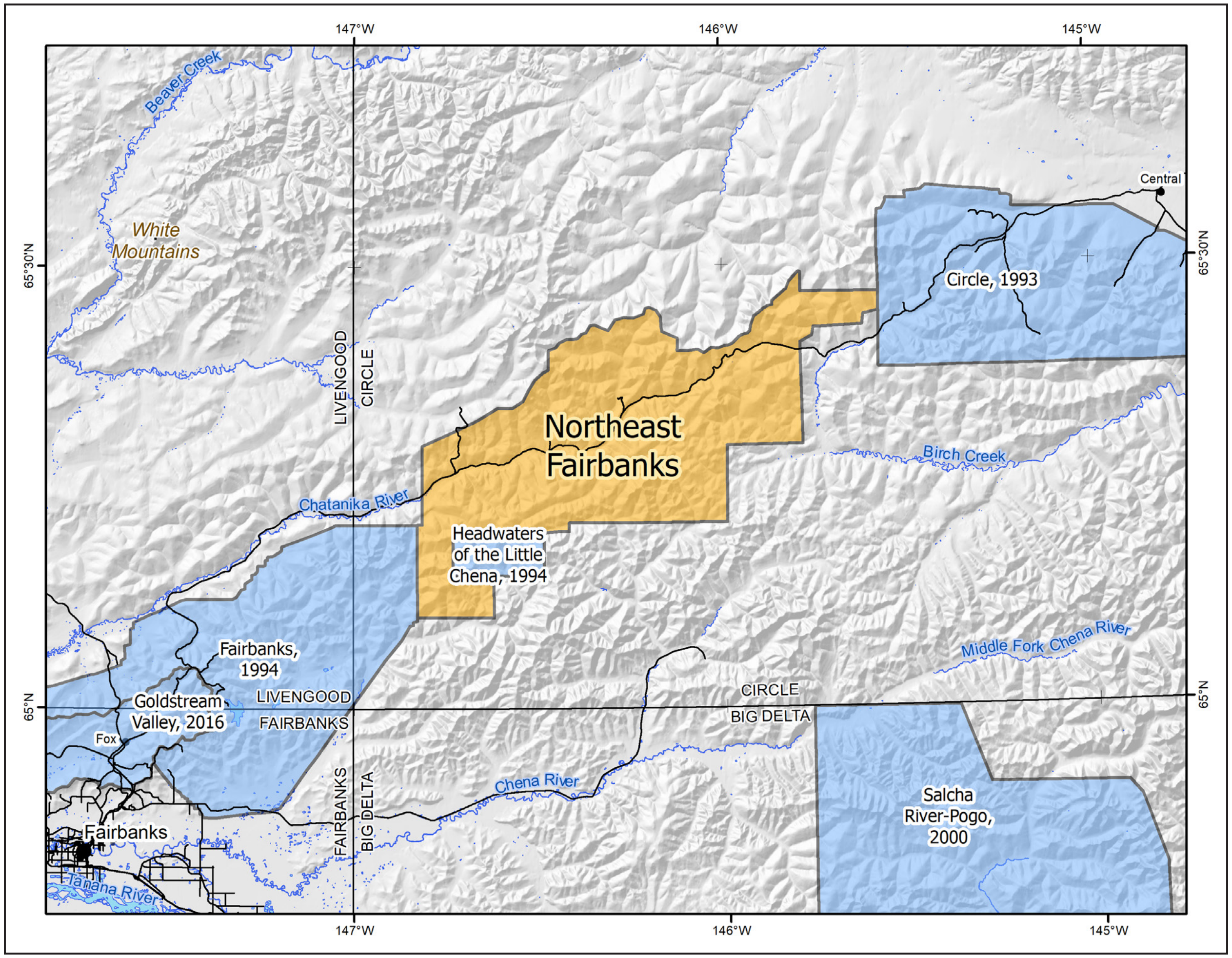
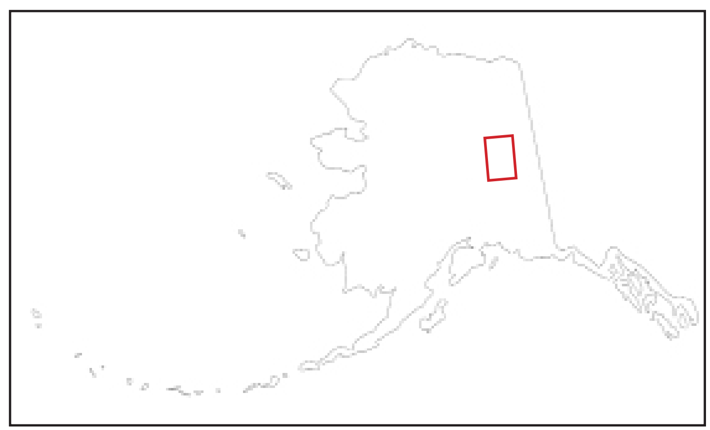


Figure 1. Alaska survey location map. Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Regional survey location map. Northeast Fairbanks survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale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



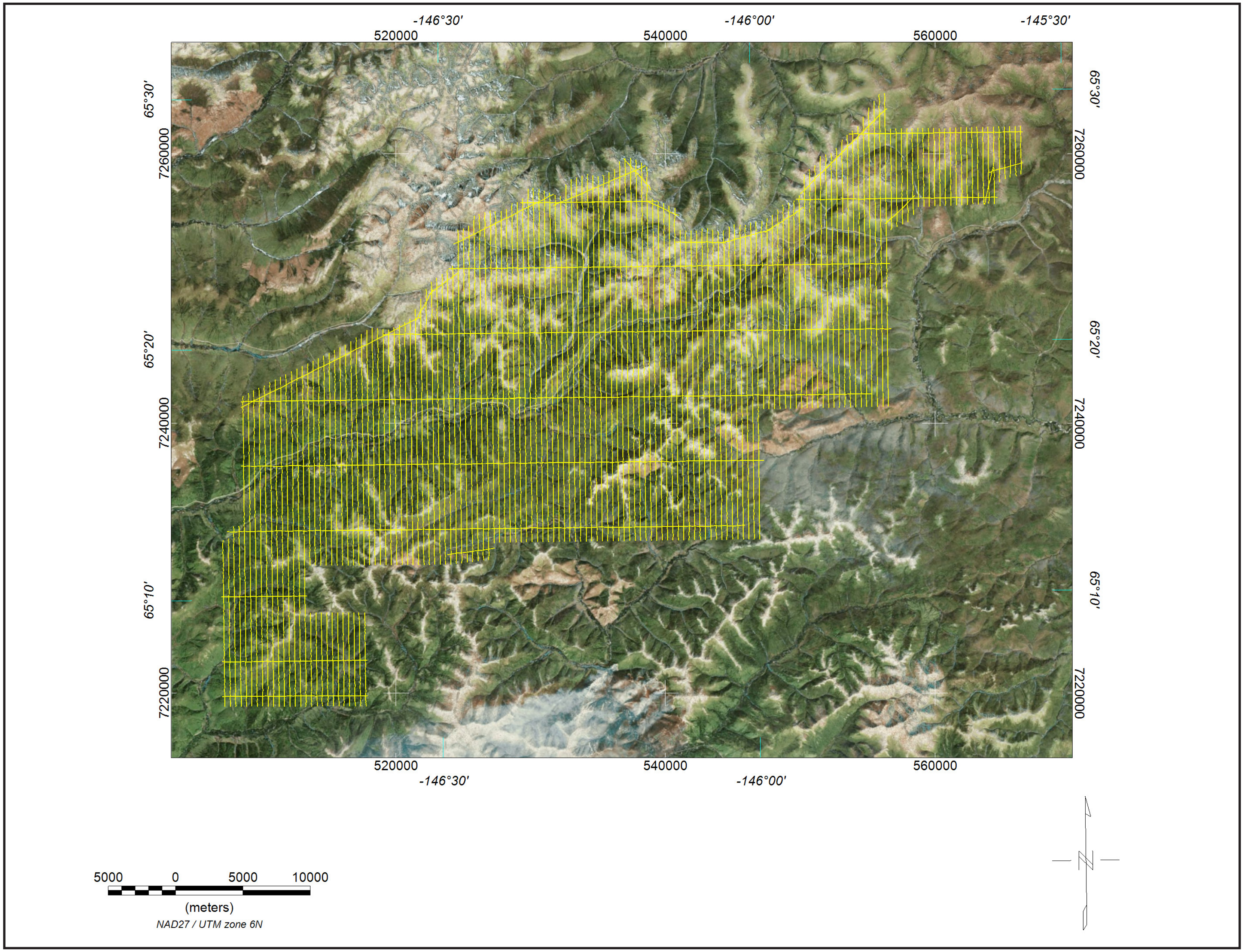


Figure 2. Flight path with orthometric image.

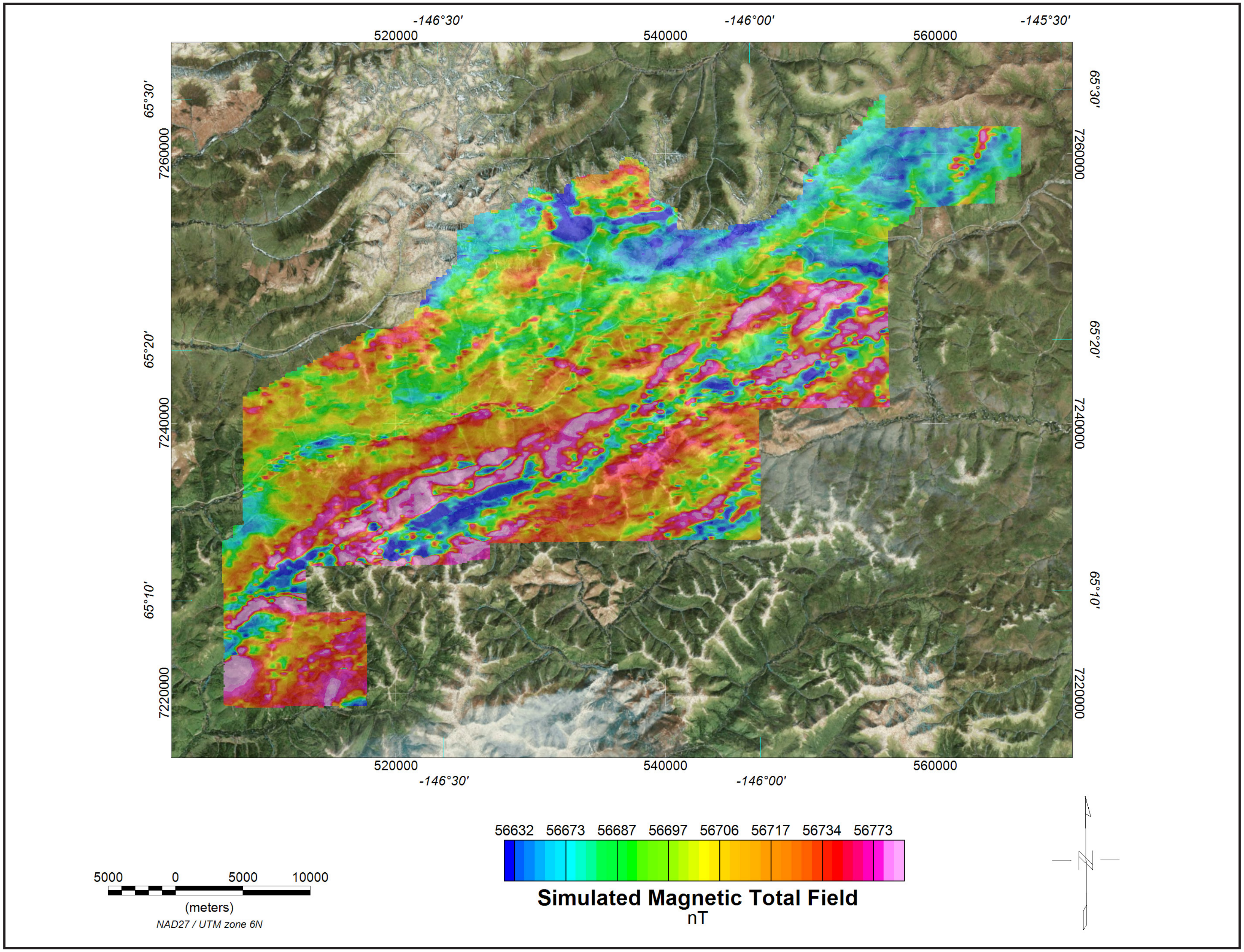


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2005, updated to October, 2005), (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.

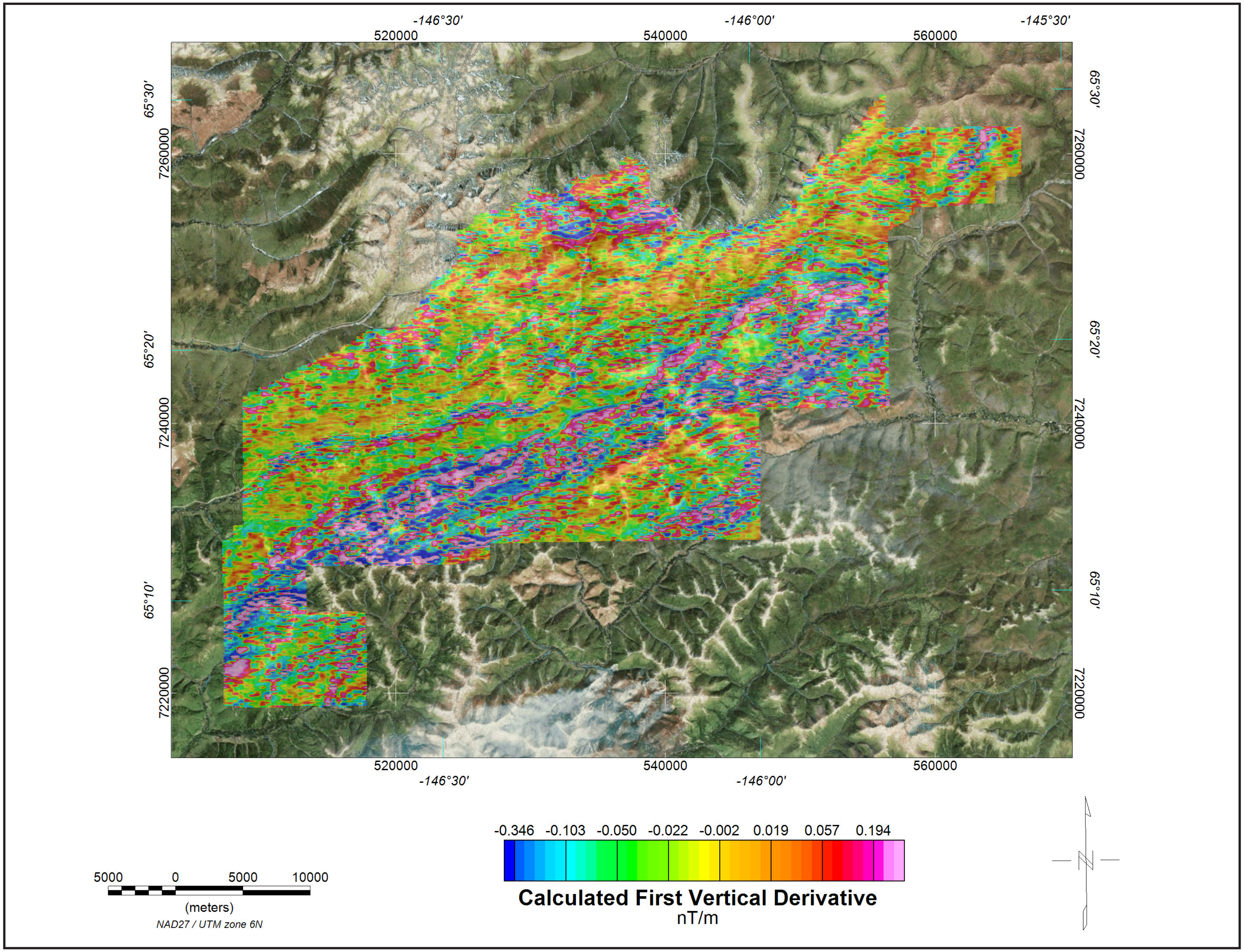


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides 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.

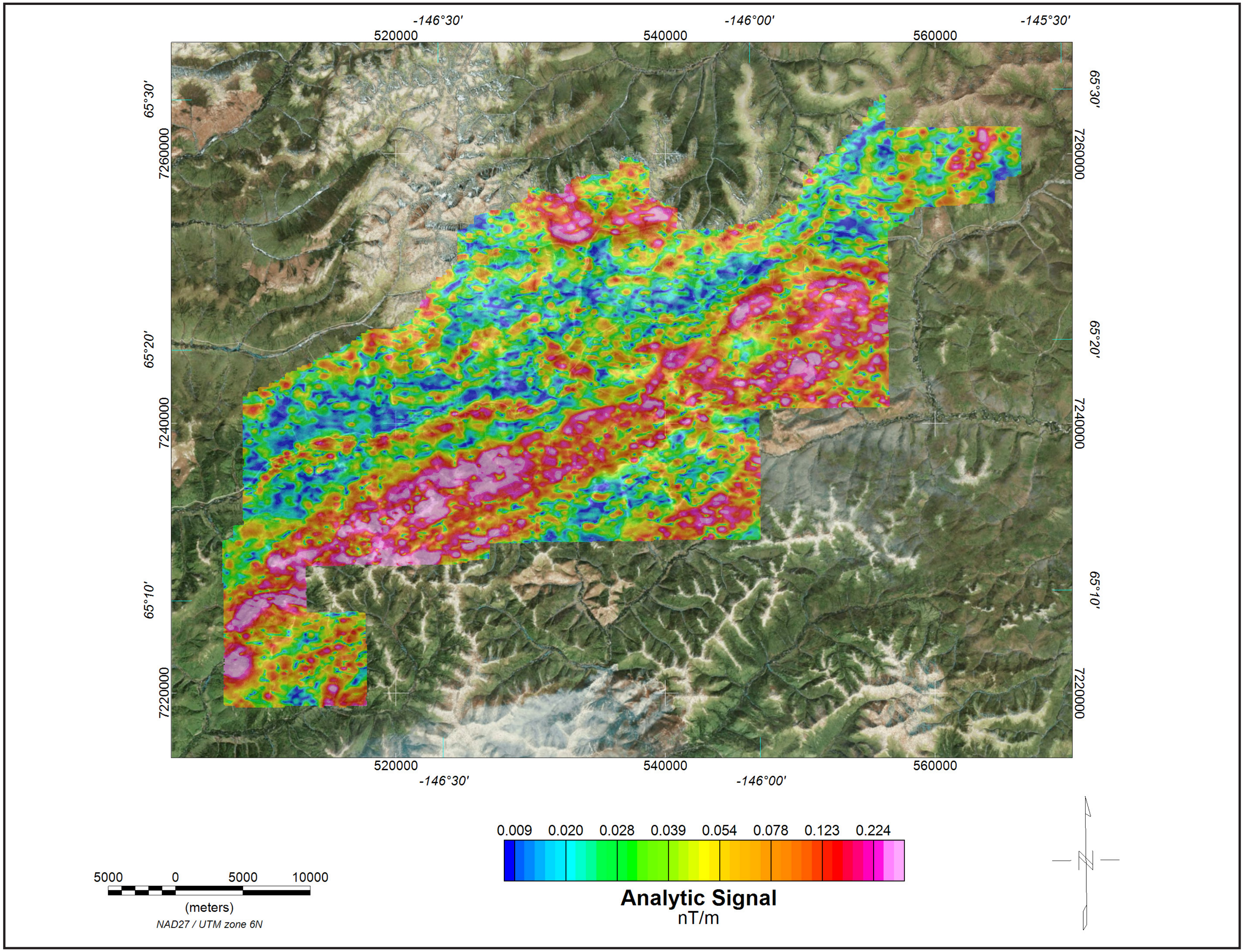


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source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

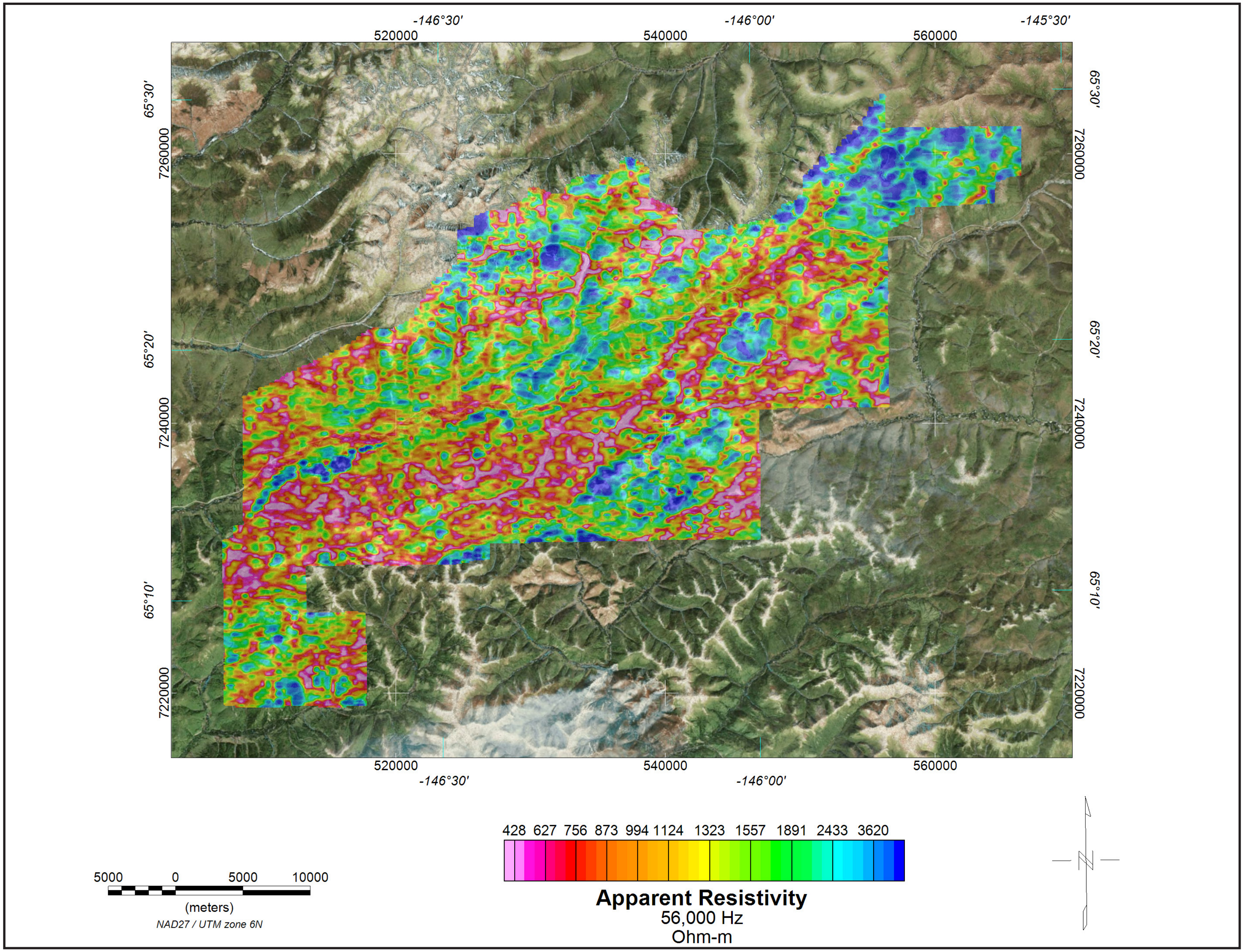


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 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.

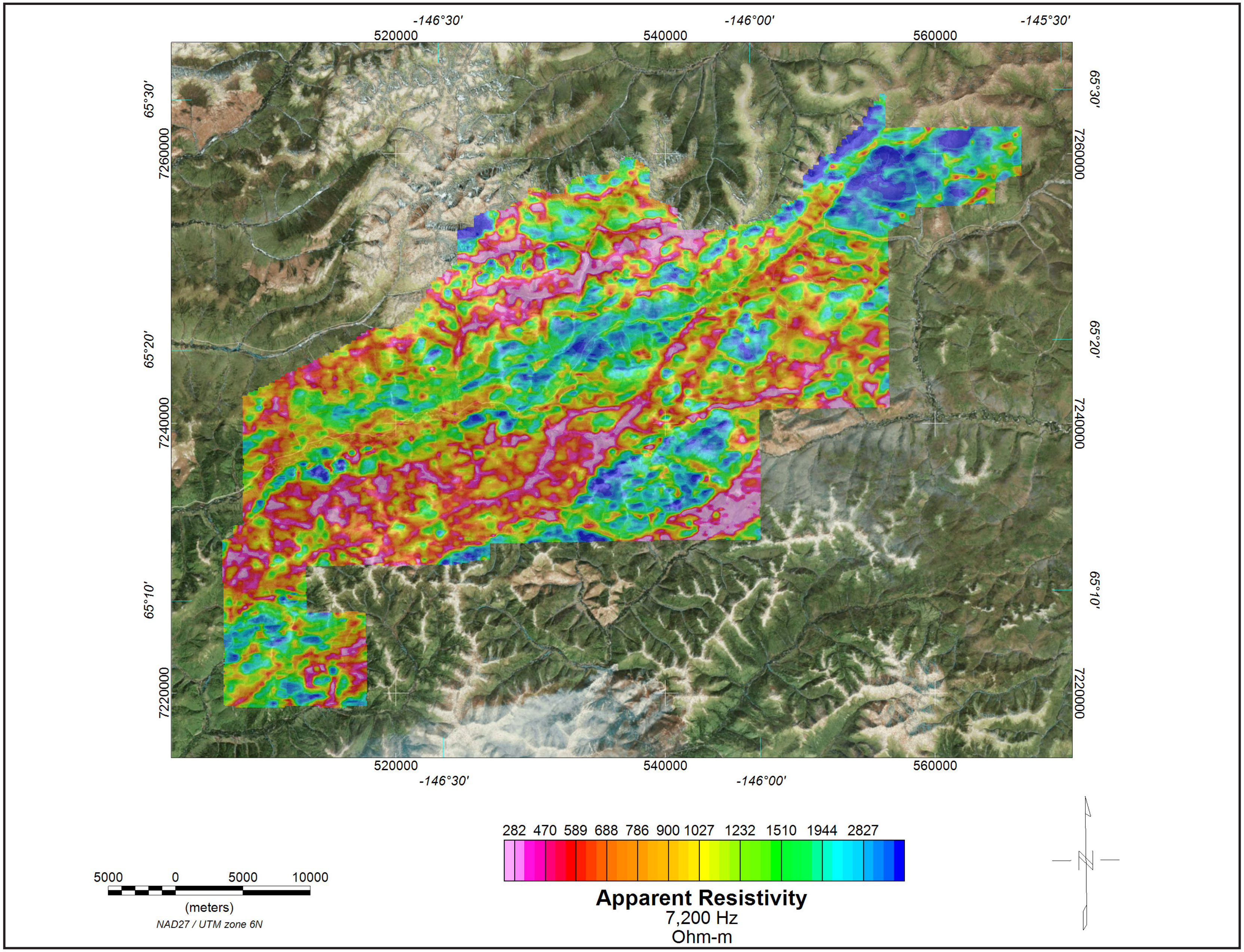


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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.

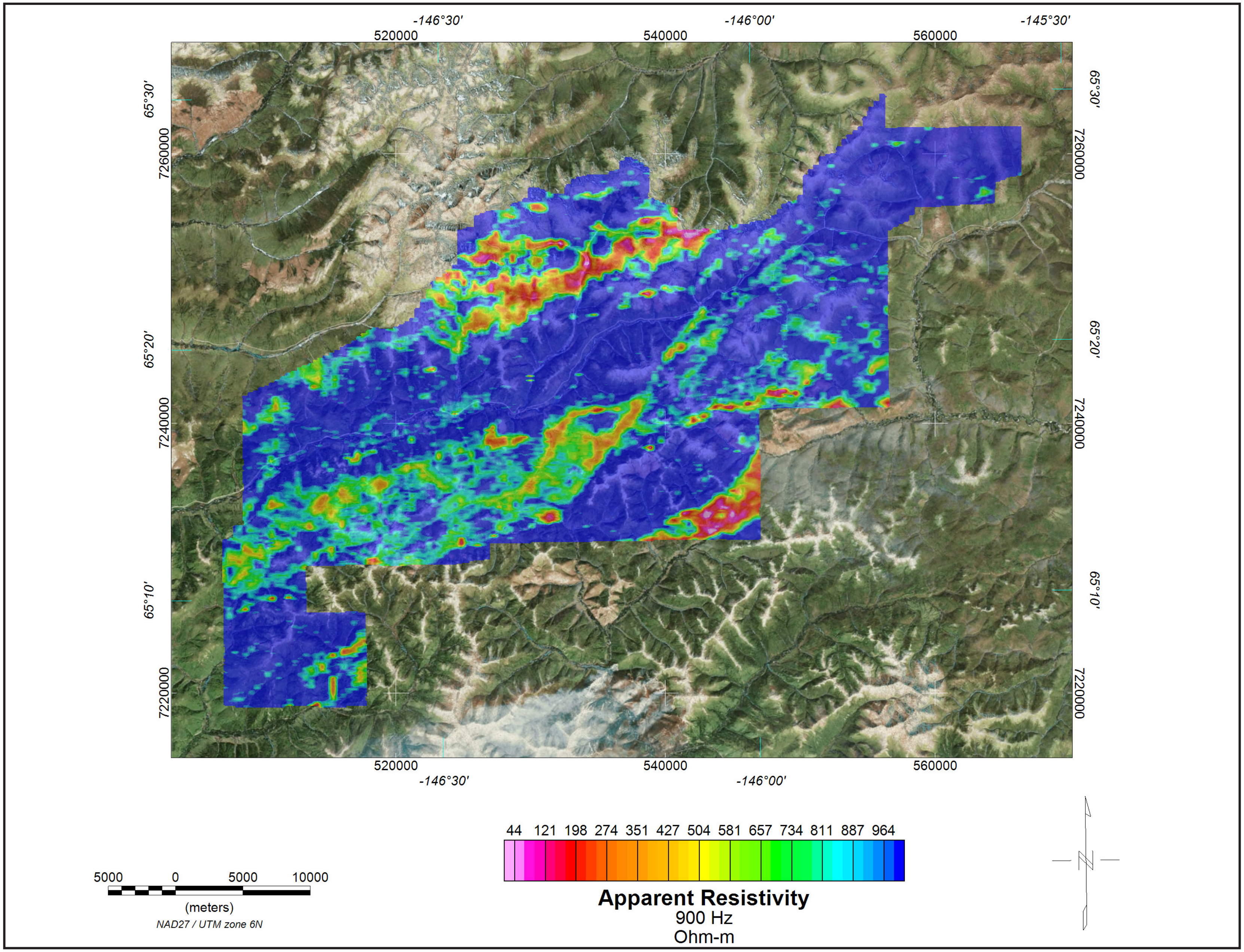
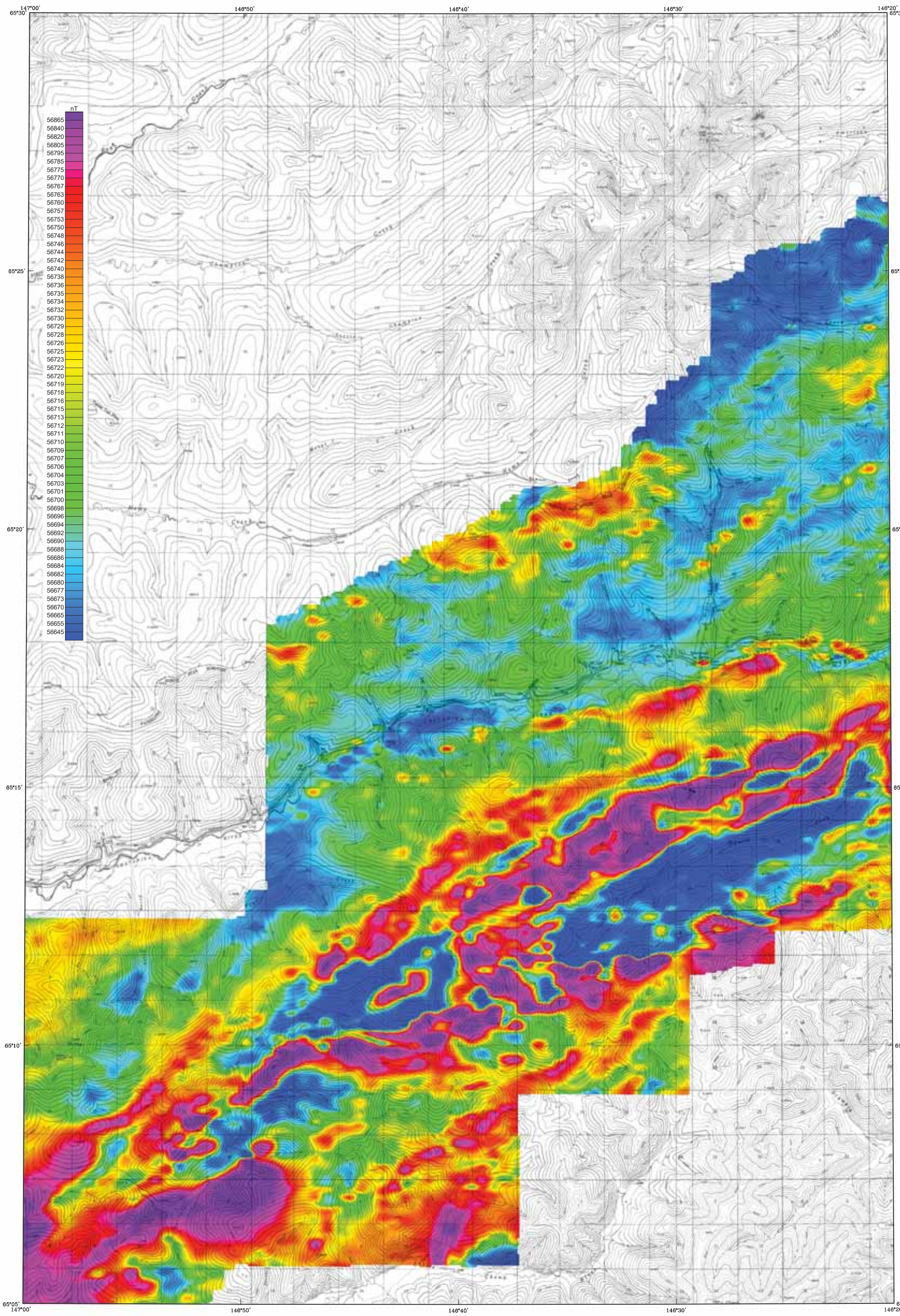


Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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.

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/10.14509/30062.

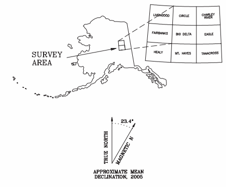
Map Title	Description
northeastfairbanks_sim_magtf_topo_map_1of2.pdf	simulated magnetic total field grid with topographic base map
northeastfairbanks_sim_magtf_topo_map_2of2.pdf	simulated magnetic total field grid with topographic base map
northeastfairbanks_sim_magtf_contours_plss_map_1of2.pdf	simulated magnetic total field grid and contours with public land survey system base layer
northeastfairbanks_sim_magtf_contours_plss_map_2of2.pdf	simulated magnetic total field grid and contours with public land survey system base layer
northeastfairbanks_res56khz_topo_map_1of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res56khz_topo_map_2of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res56khz_contours_plss_map_1of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res56khz_contours_plss_map_2of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res7200hz_topo_map_1of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res7200hz_topo_map_2of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res7200hz_contours_plss_map_1of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res7200hz_contours_plss_map_2of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res900hz_topo_map_1of2.pdf	900 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res900hz_topo_map_2of2.pdf	900 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res900hz_contours_plss_map_1of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res900hz_contours_plss_map_2of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_1of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_2of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_3of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_4of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_5of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_interpretation_plss_map_1of2.pdf	interpretation based on geophysical data with public land survey system base layer
northeastfairbanks_interpretation_plss_map_2of2.pdf	interpretation based on geophysical data with public land survey system base layer

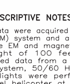


Base from: U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1980; B-6, 1975; Quadrangles, Alaska

SCALE 1:63,360

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



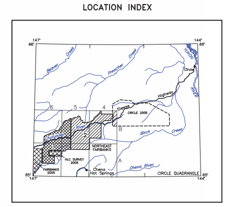


TOTAL MAGNETIC FIELD OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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 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.

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.

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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, 2005, updated to October 2005) 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.

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2005.

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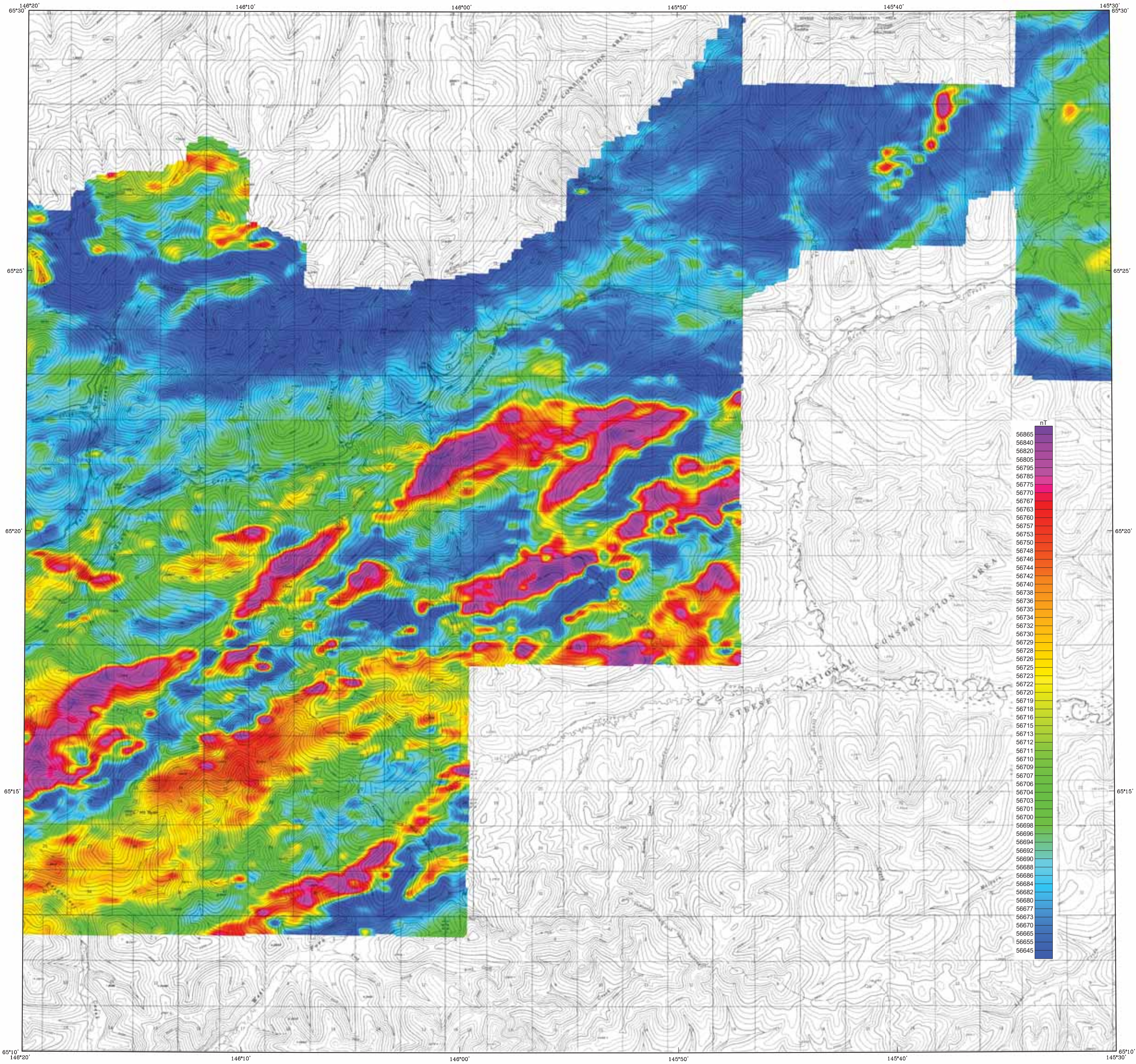
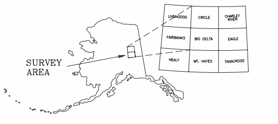
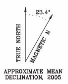


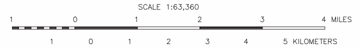
Base from U.S. Geological Survey Circle A-4, 1979; A-5, 1981; B-4, 1984; B-5, 1980; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2005

SCALE 1:63,360



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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PARTS OF CIRCLE QUADRANGLE

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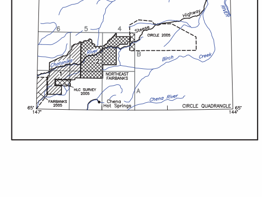

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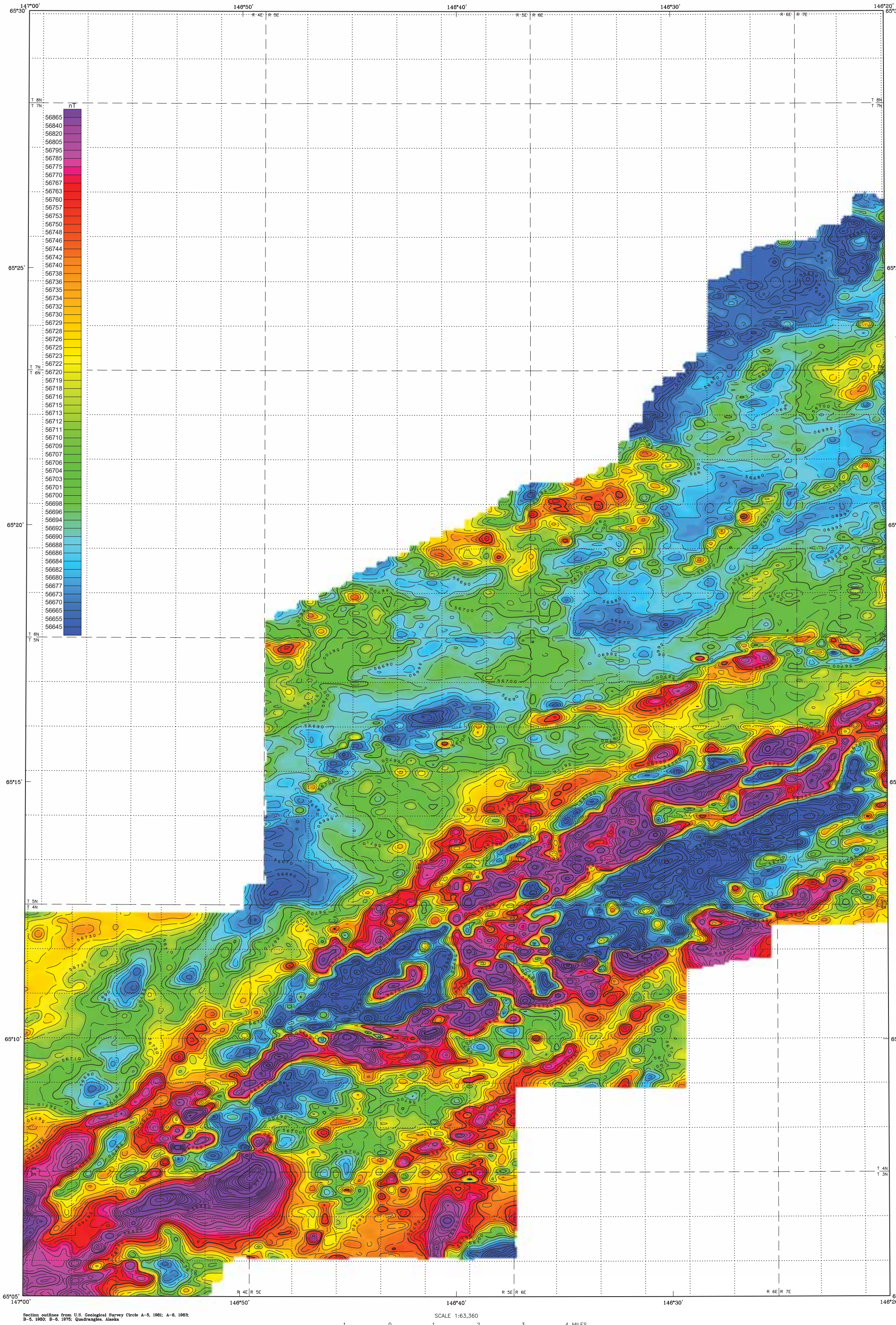
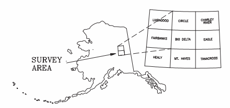


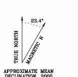
Section outlines from U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1980; B-6, 1975; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





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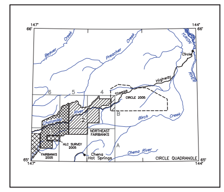

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MAGNETIC CONTOUR INTERVAL

. . . . 250 nT
. . . . 50 nT
. . . . 10 nT
. . . . 5 nT

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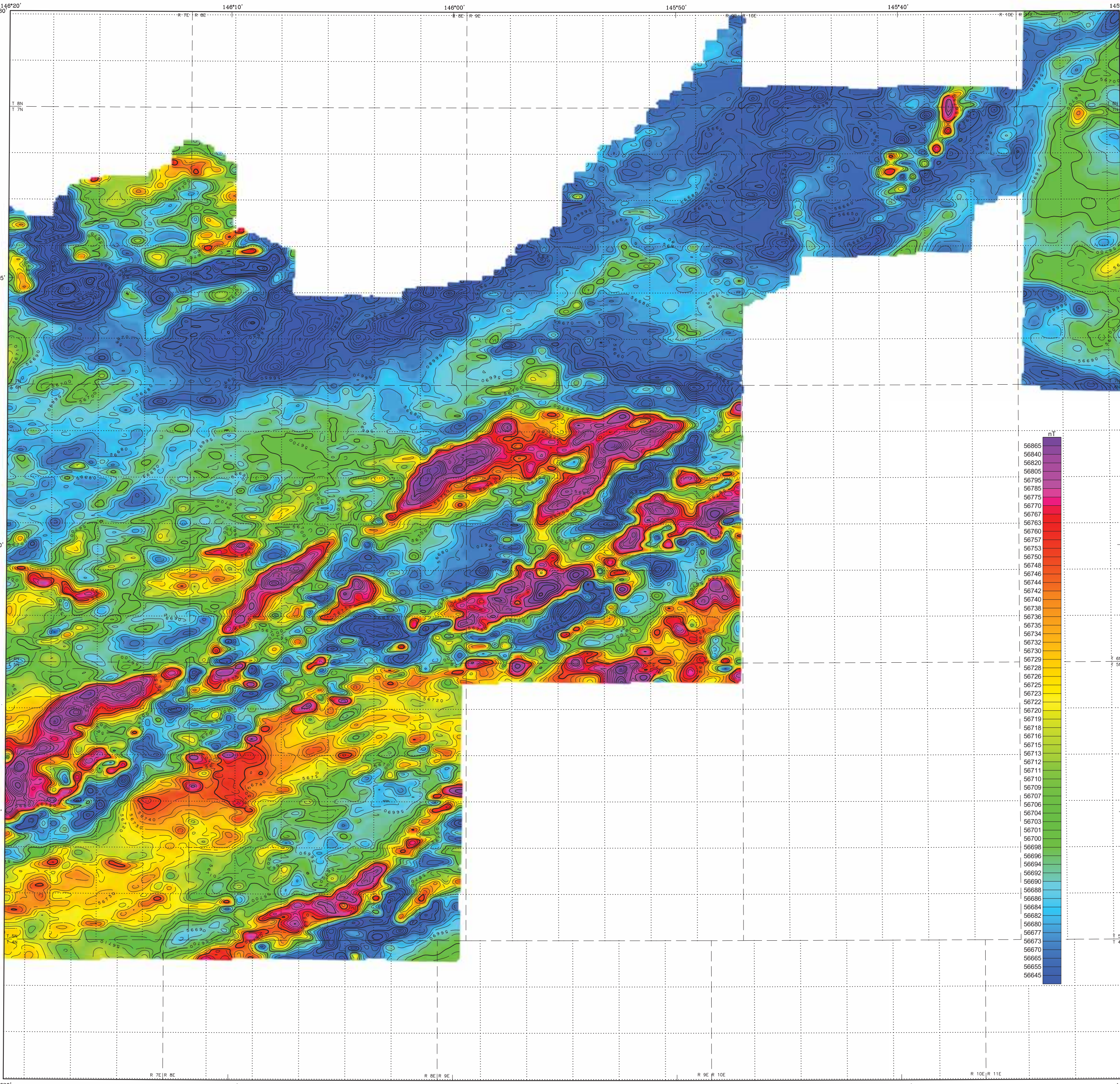
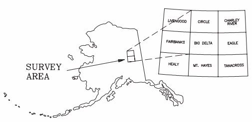


Section outlines from U.S. Geological Survey Circle A–4, 1979; A–5, 1981; B–4, 1984; B–5, 1980; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



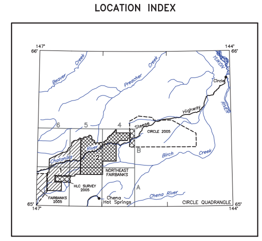
APPROXIMATE MEAN DECLINATION, 2005

TOTAL MAGNETIC FIELD OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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 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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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, 2005, updated to October 2005) 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.

MAGNETIC CONTOUR INTERVAL

————	250 nT
————	50 nT
————	10 nT
— — —	5 nT

SURVEY HISTORY

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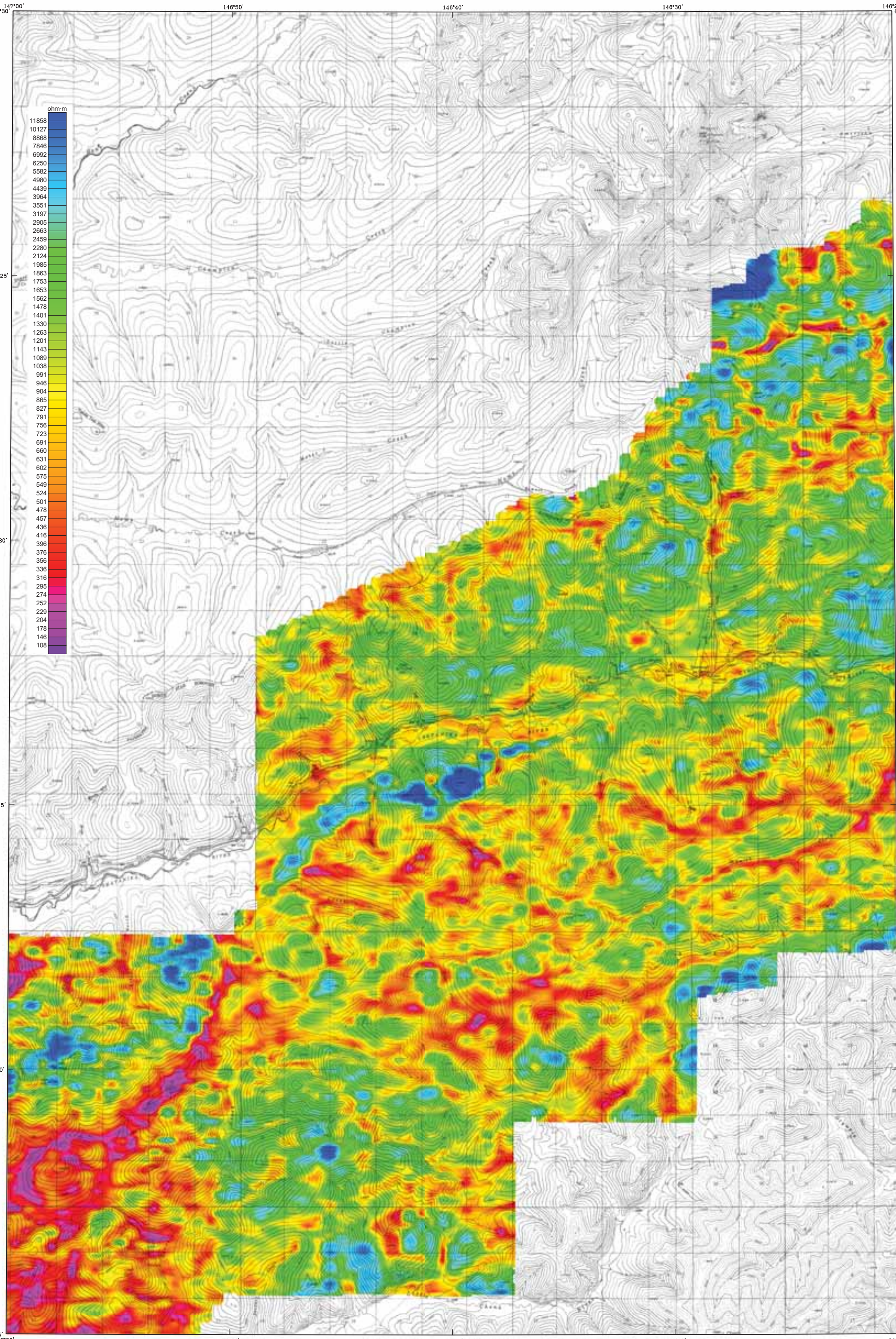


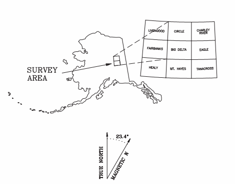
Base from U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1980; B-6, 1975; Quadrangles, Alaska

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



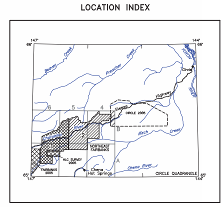
APPROXIMATE MEAN DECLINATION, 2005

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

LOCATION INDEX



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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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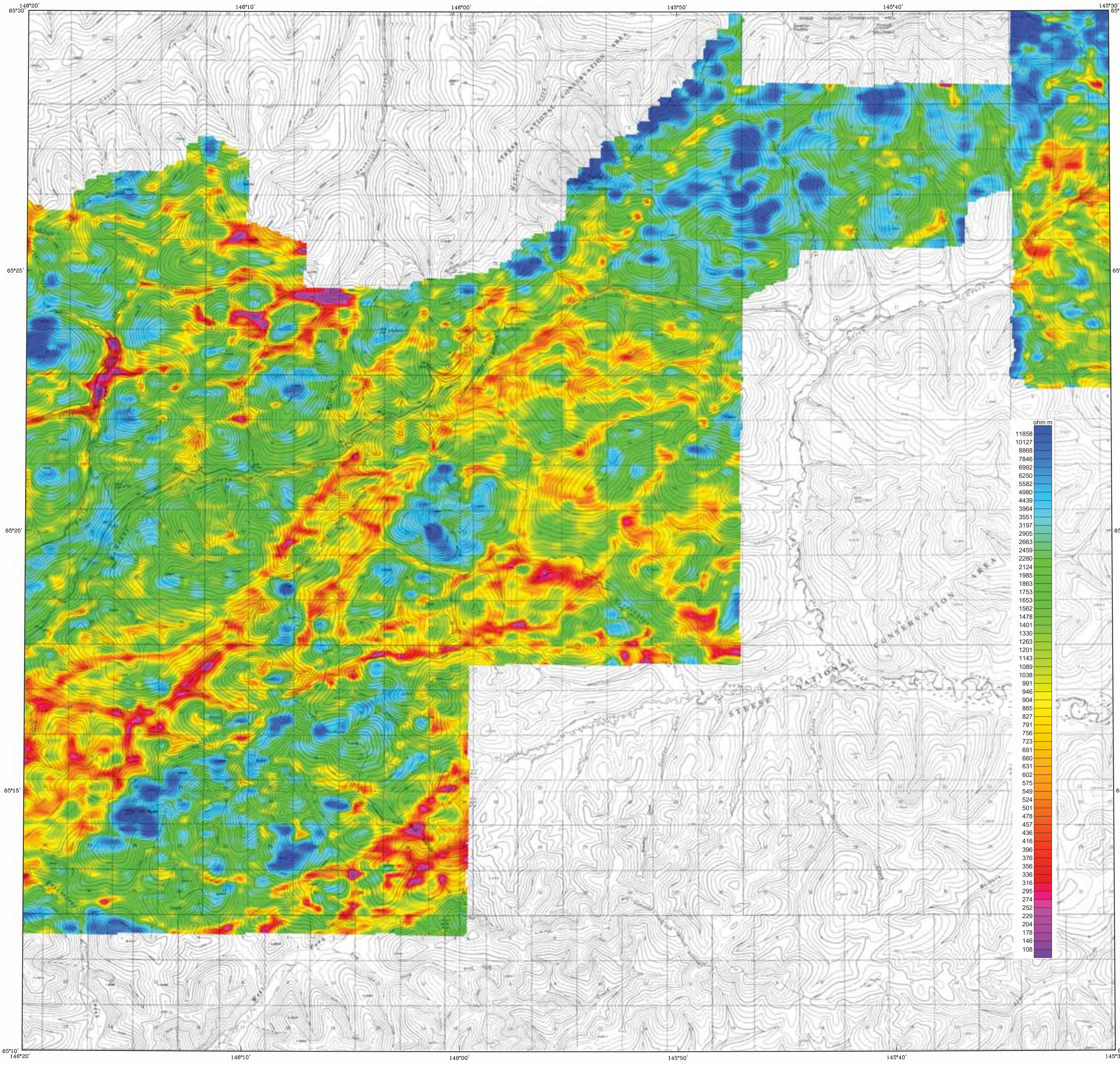


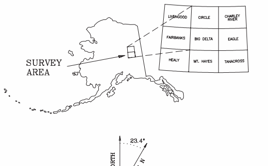
Base from U.S. Geological Survey Circle A-4, 1979; A-5, 1981; B-4, 1984; B-5, 1980; Quadrangles, Alaska

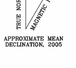
SCALE 1:63,360

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, 2005

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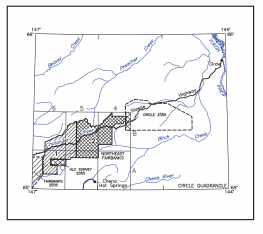
PARTS OF CIRCLE QUADRANGLE

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

LOCATION INDEX



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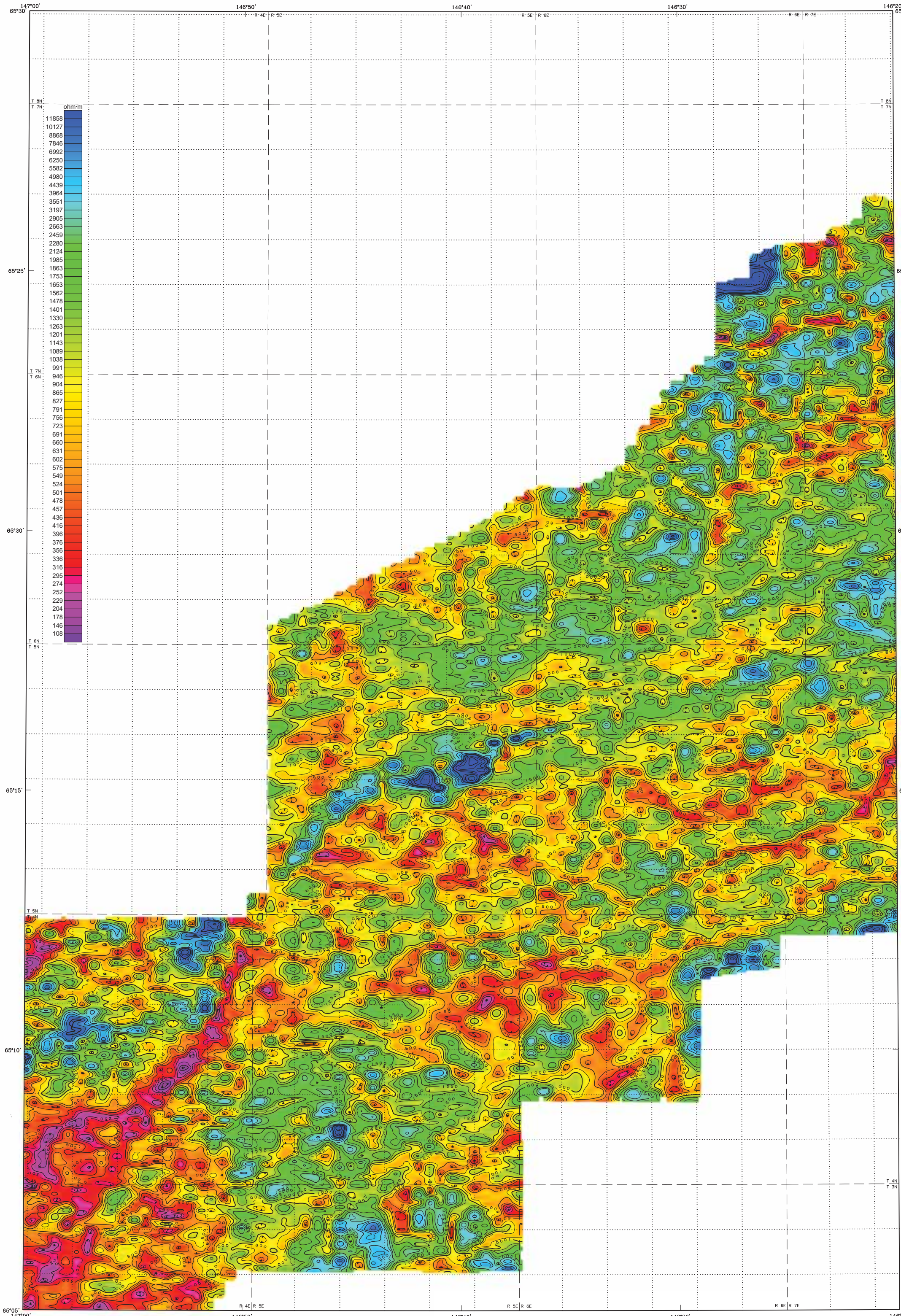

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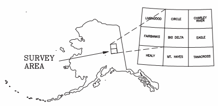

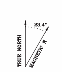

APPROXIMATE MEAN DECLINATION, 2005

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 THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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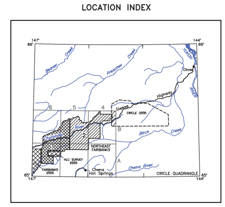

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RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

.... resistivity low

SURVEY HISTORY

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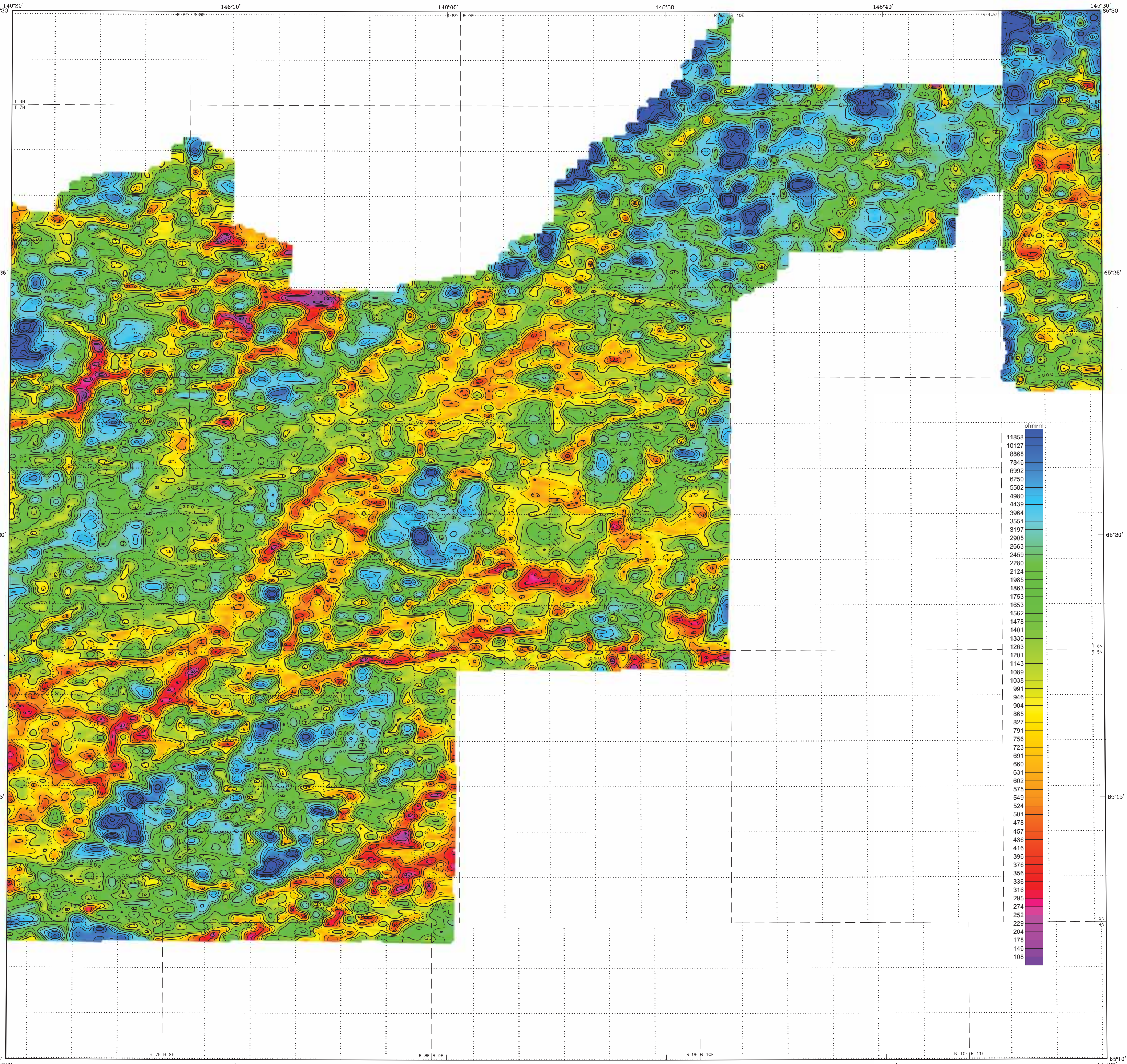

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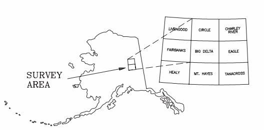

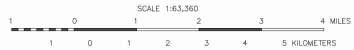

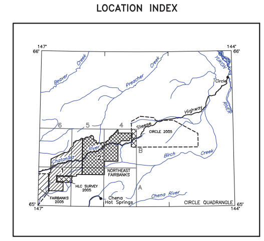

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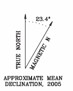
PARTS OF CIRCLE QUADRANGLE

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



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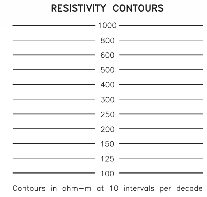
RESISTIVITY CONTOURS



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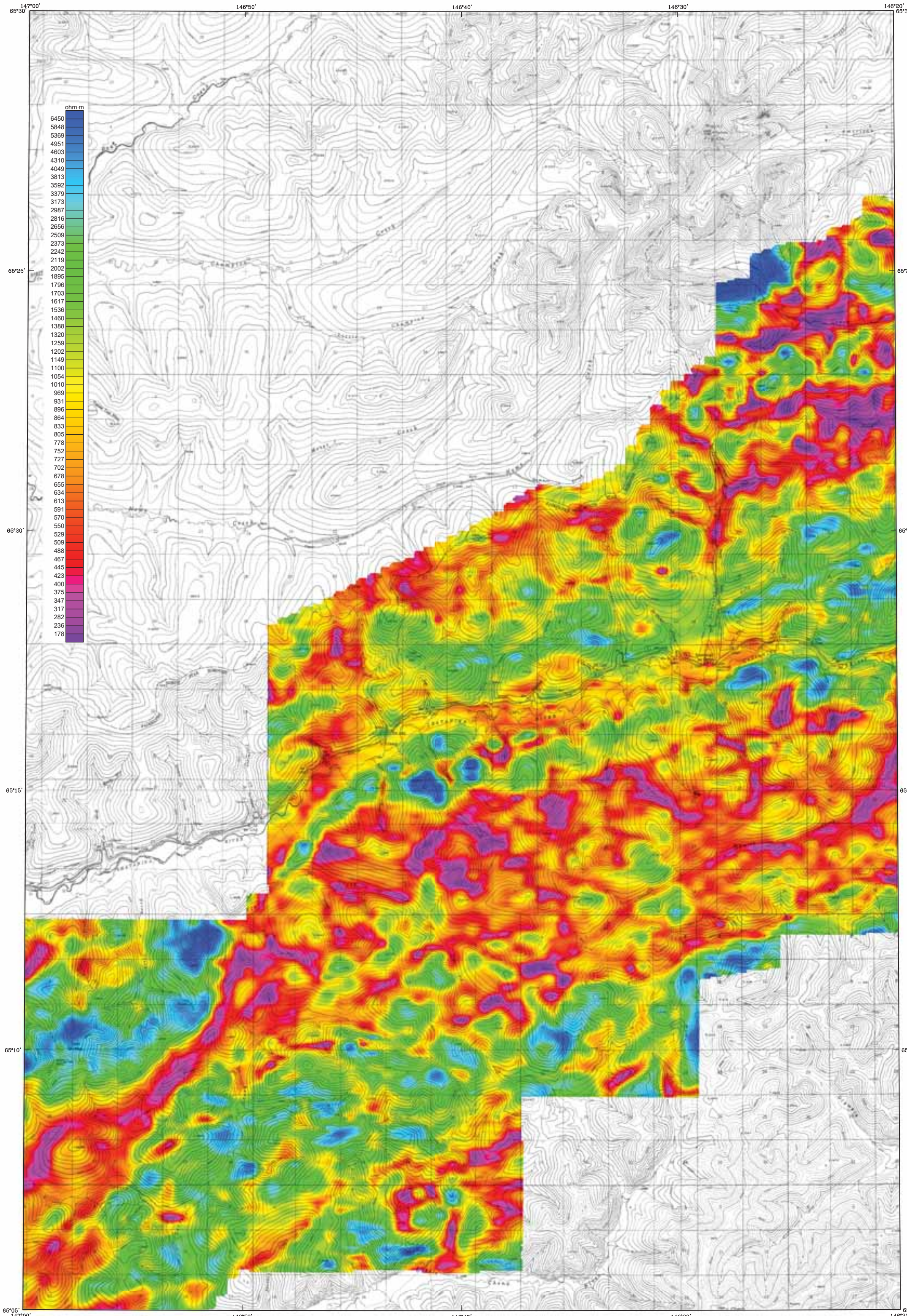


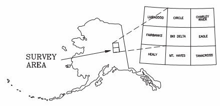
Base from U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1980; B-6, 1975; Quadrangles, Alaska

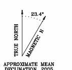
SCALE 1:63,360

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, 2005

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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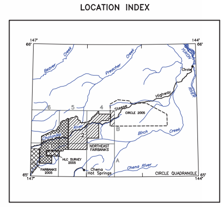

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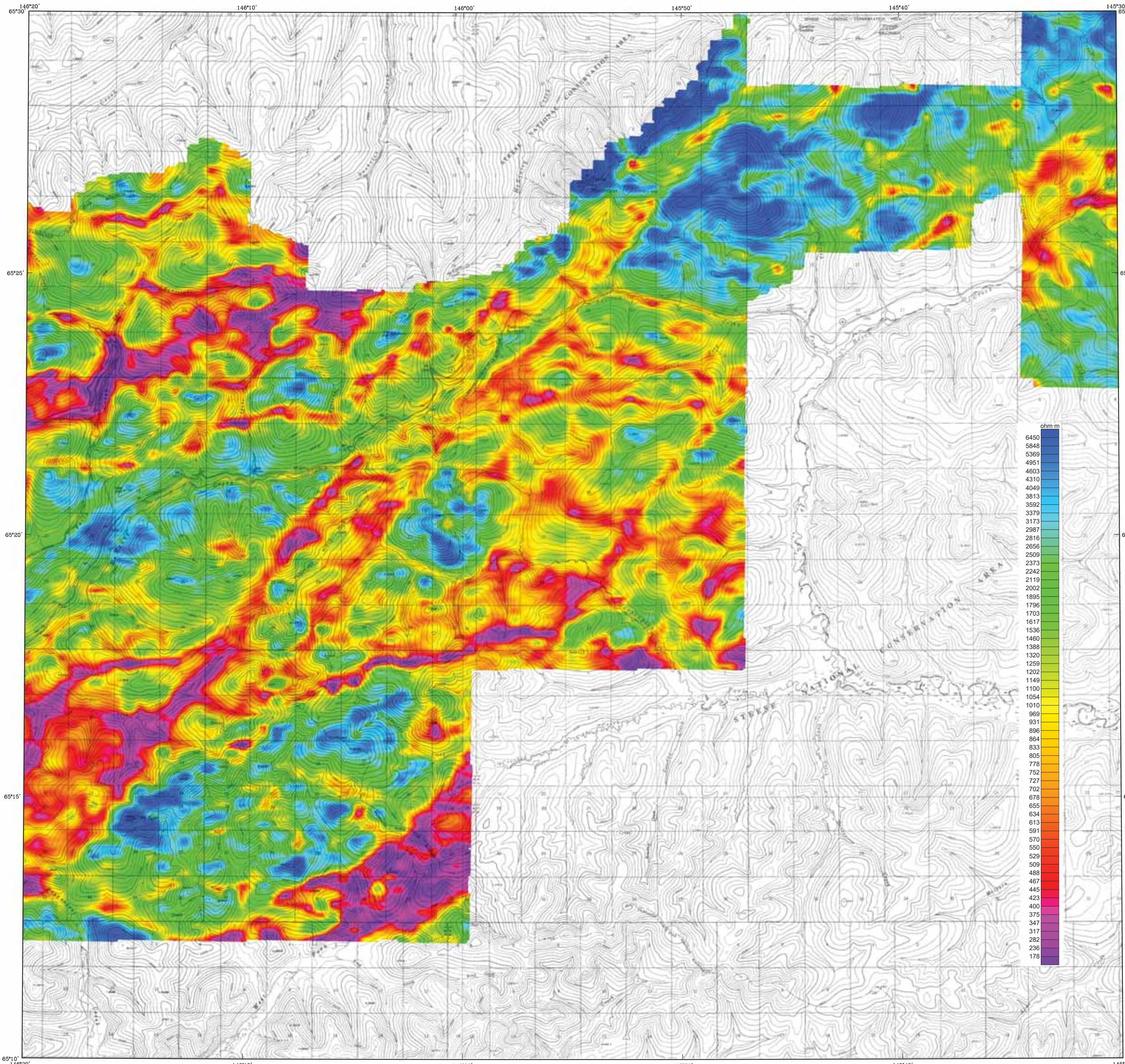

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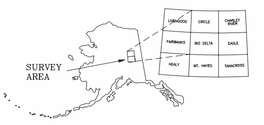

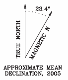

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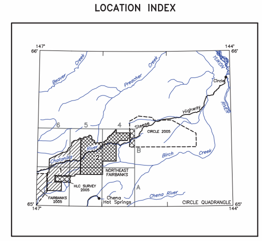

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RESISTIVITY

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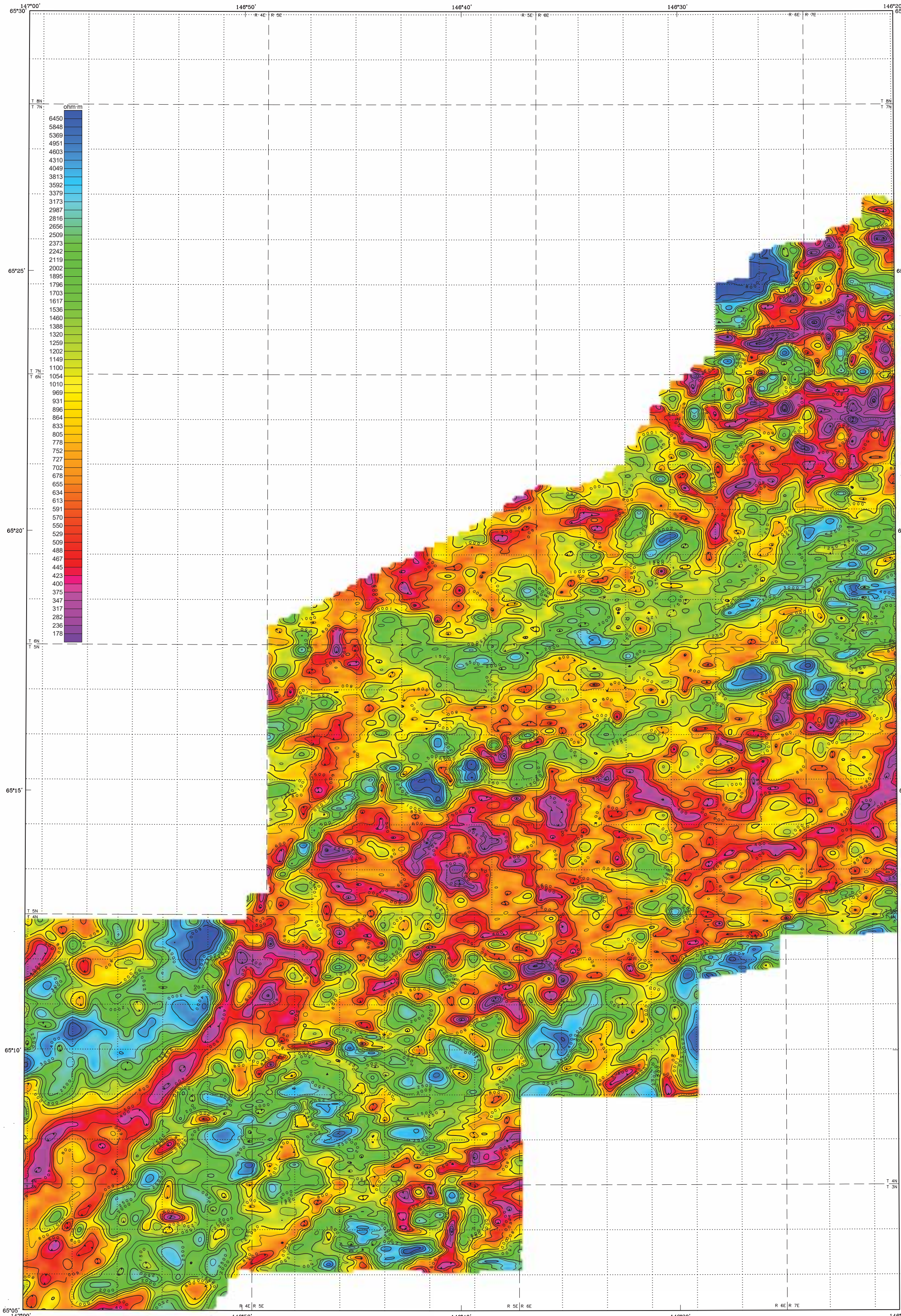
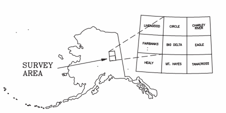


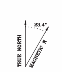
Section outlines from U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1980; B-6, 1975; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





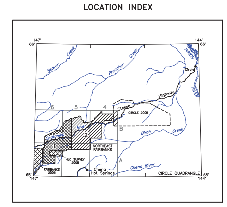
APPROXIMATE MEAN DECLINATION, 2005

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

LOCATION INDEX



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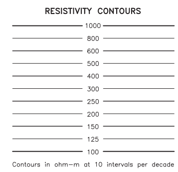
RESISTIVITY CONTOURS



SURVEY HISTORY

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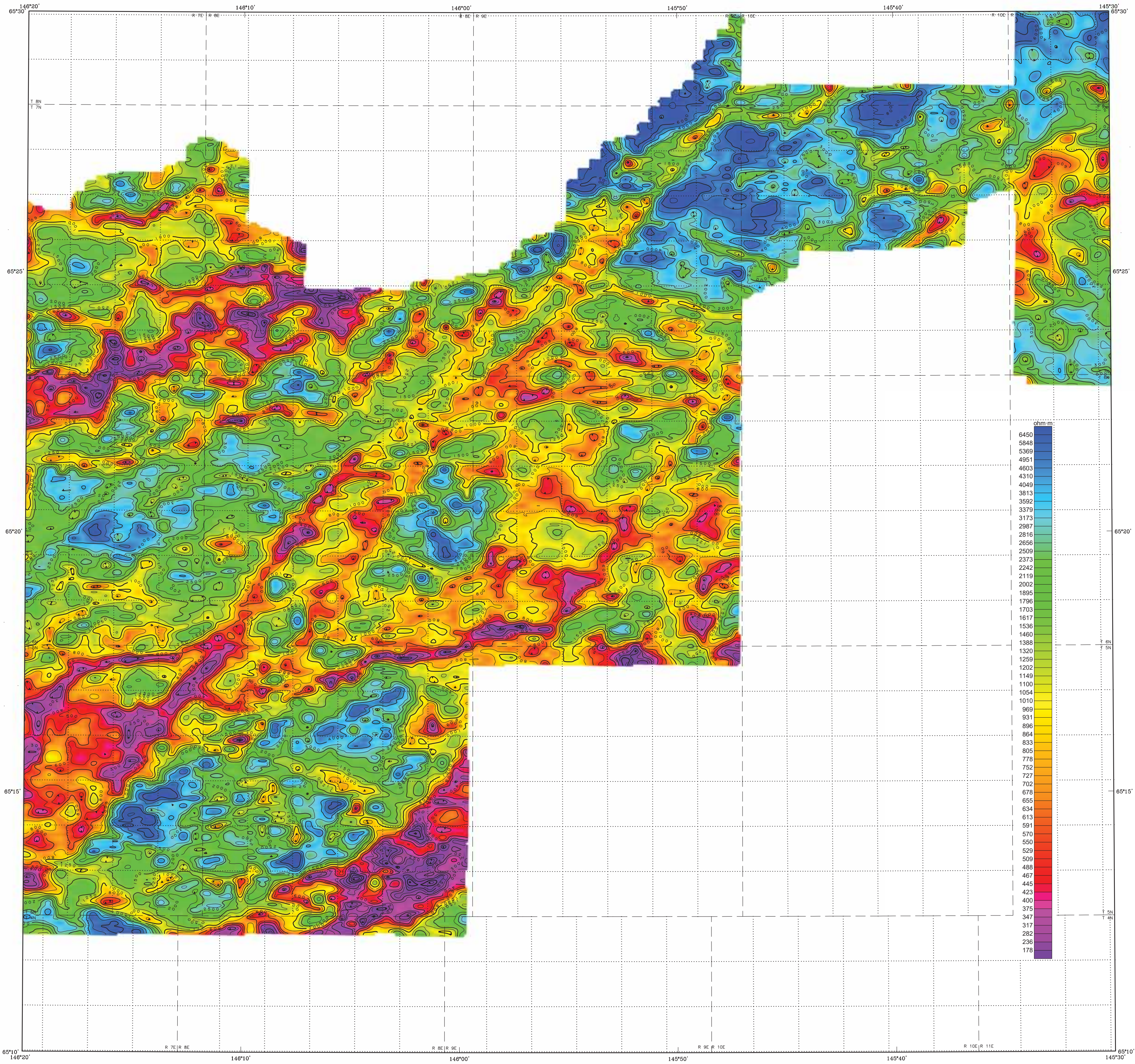
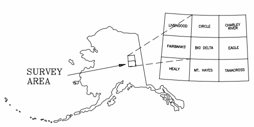
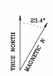


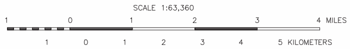
Section outlines from U.S. Geological Survey Circle A-4, 1979; A-5, 1981; B-4, 1984; B-5, 1980; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2005

SCALE 1:63,360



7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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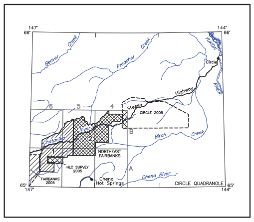

DESCRIPTIVE NOTES

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 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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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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RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

. . . . resistivity low

SURVEY HISTORY

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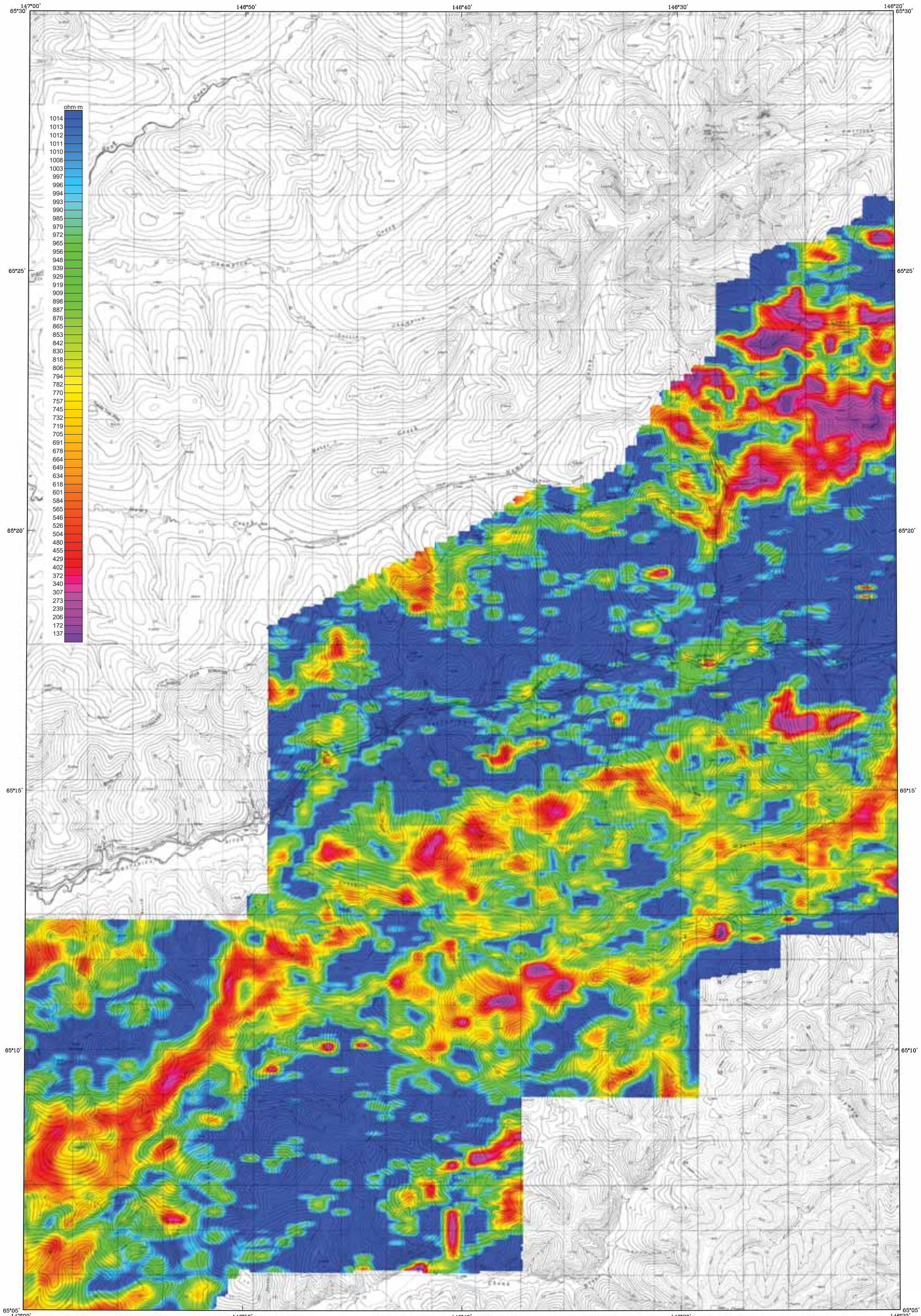
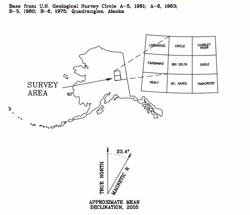
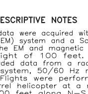


Base from U.S. Geological Survey Circle A-5, 1981; A-6, 1963; B-5, 1960; B-6, 1975; Quadrangles, Alaska

SCALE 1:63,360

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN DECLINATION, 2005

900 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

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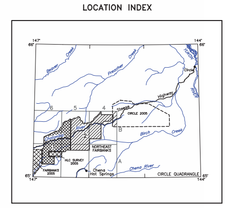

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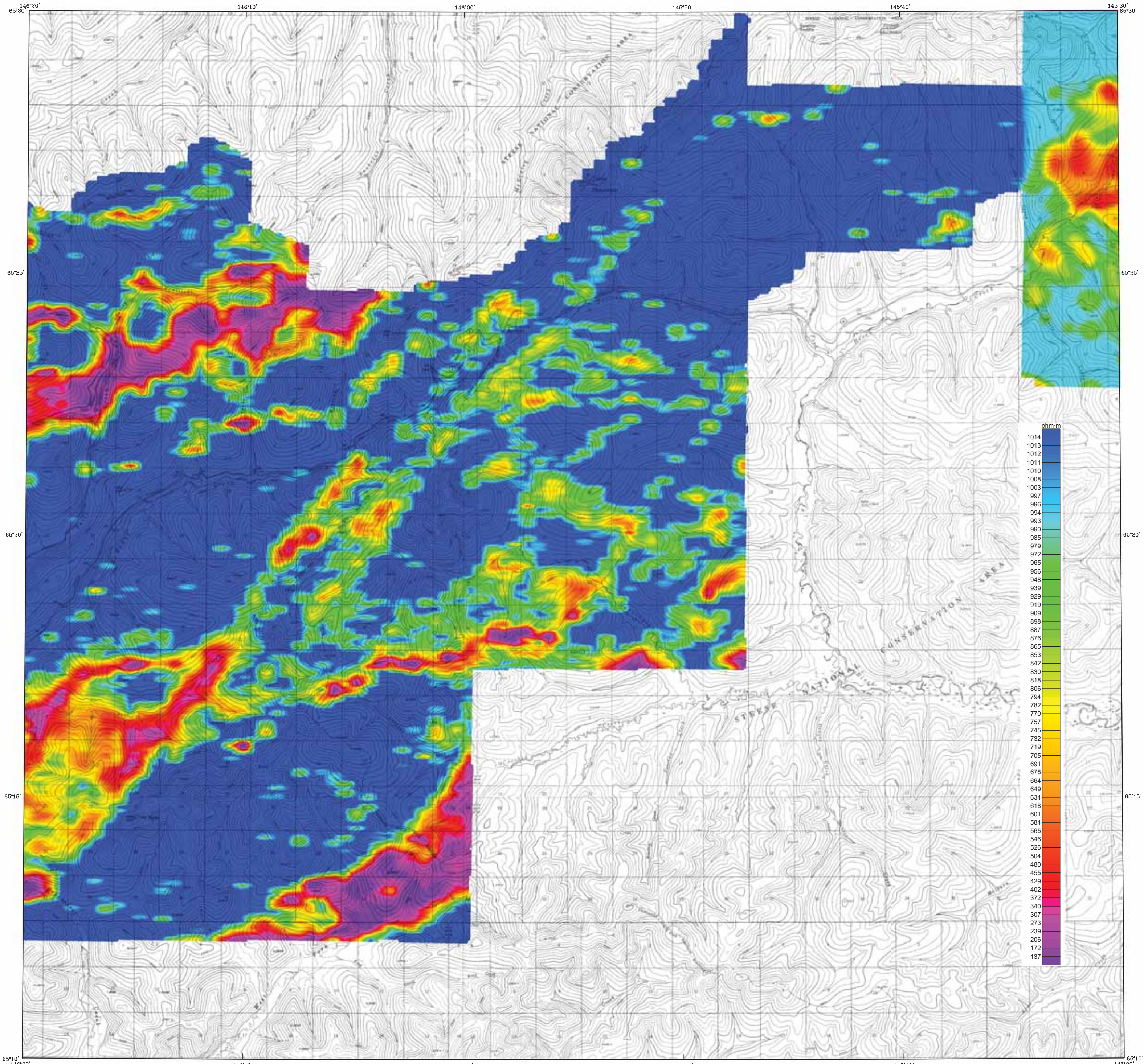

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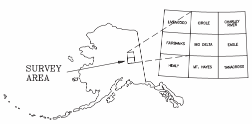
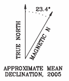
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





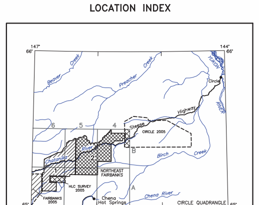
APPROXIMATE MEAN
DECLINATION, 2005

900 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

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

LOCATION INDEX



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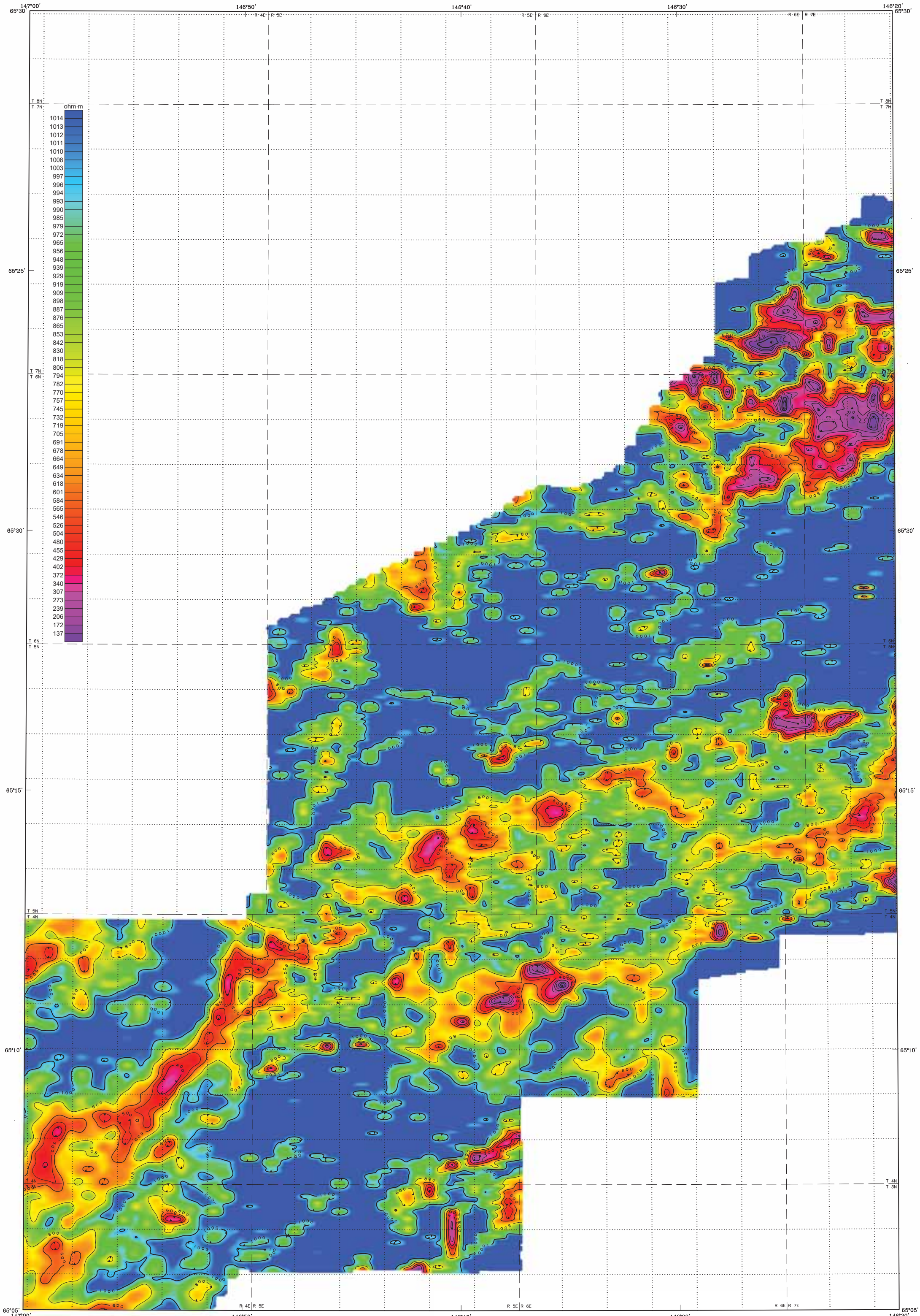

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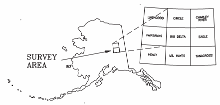
1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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PARTS OF CIRCLE QUADRANGLE

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2006

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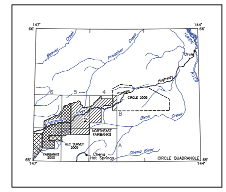

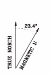

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RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

. . . . resistivity low

SURVEY HISTORY

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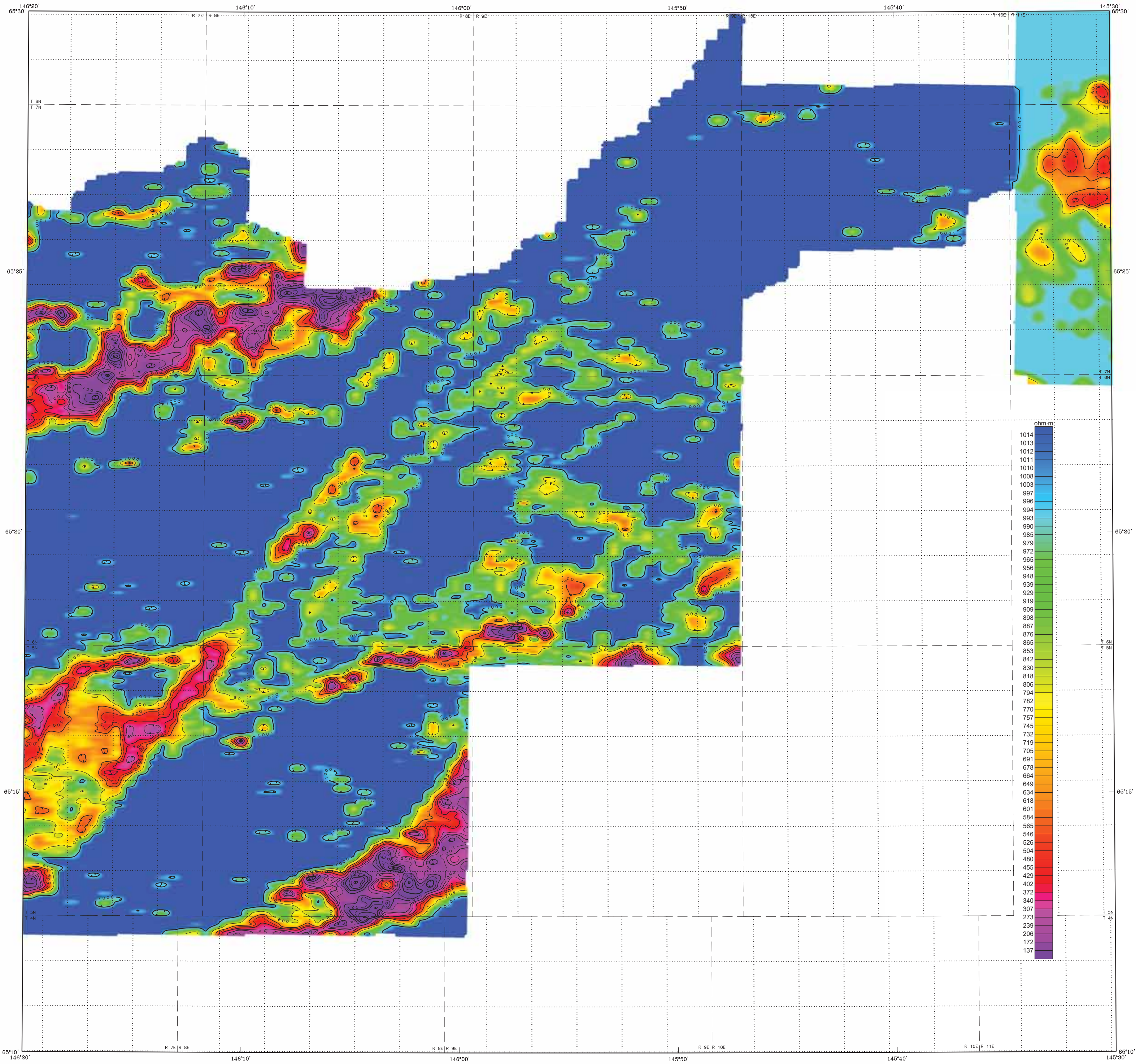

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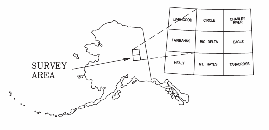

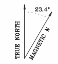

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PARTS OF CIRCLE QUADRANGLE

by
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2006

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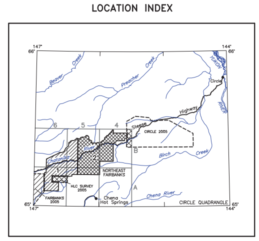

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RESISTIVITY CONTOURS

1000
800
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200
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125
100

Contours in ohm-m at 10 intervals per decade

.... resistivity low

SURVEY HISTORY

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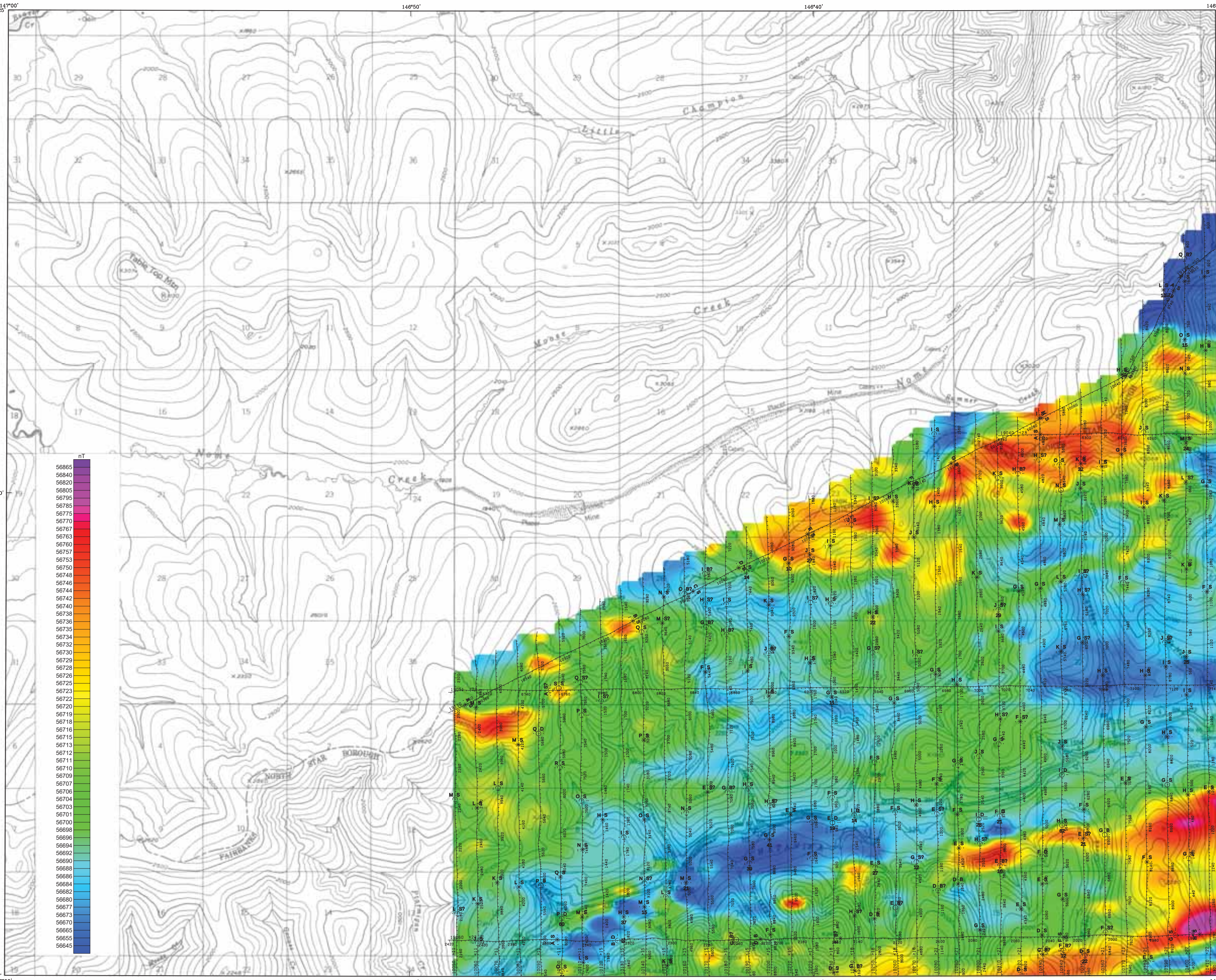


Base from U.S. Geological Survey Circle B-6, 1975; Quadrangle, Alaska

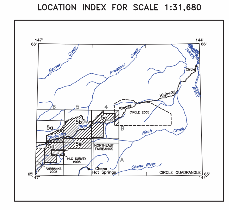
SCALE 1:31,680

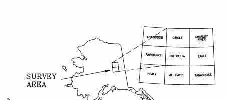
0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

LOCATION INDEX FOR SCALE 1:31,680





TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PART of CIRCLE B-6 QUADRANGLE

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

TRUE NORTH
MAGNETIC N
23.4°
APPROXIMATE MEAN DECLINATION, 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 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

F B — Arcs indicate the conductor has a thickness >10m
100 — Magnetic correlation in nT
Dip direction

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

Anomaly identifier — Interpretive symbol

Depth is greater than: · 15 m; : 30 m; ⋮ 45 m; ⁞ 60 m

Inphase and quadrature of coaxial coil is greater than: . 5 ppm; .. 10 ppm; ... 15 ppm; .... 20 ppm

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

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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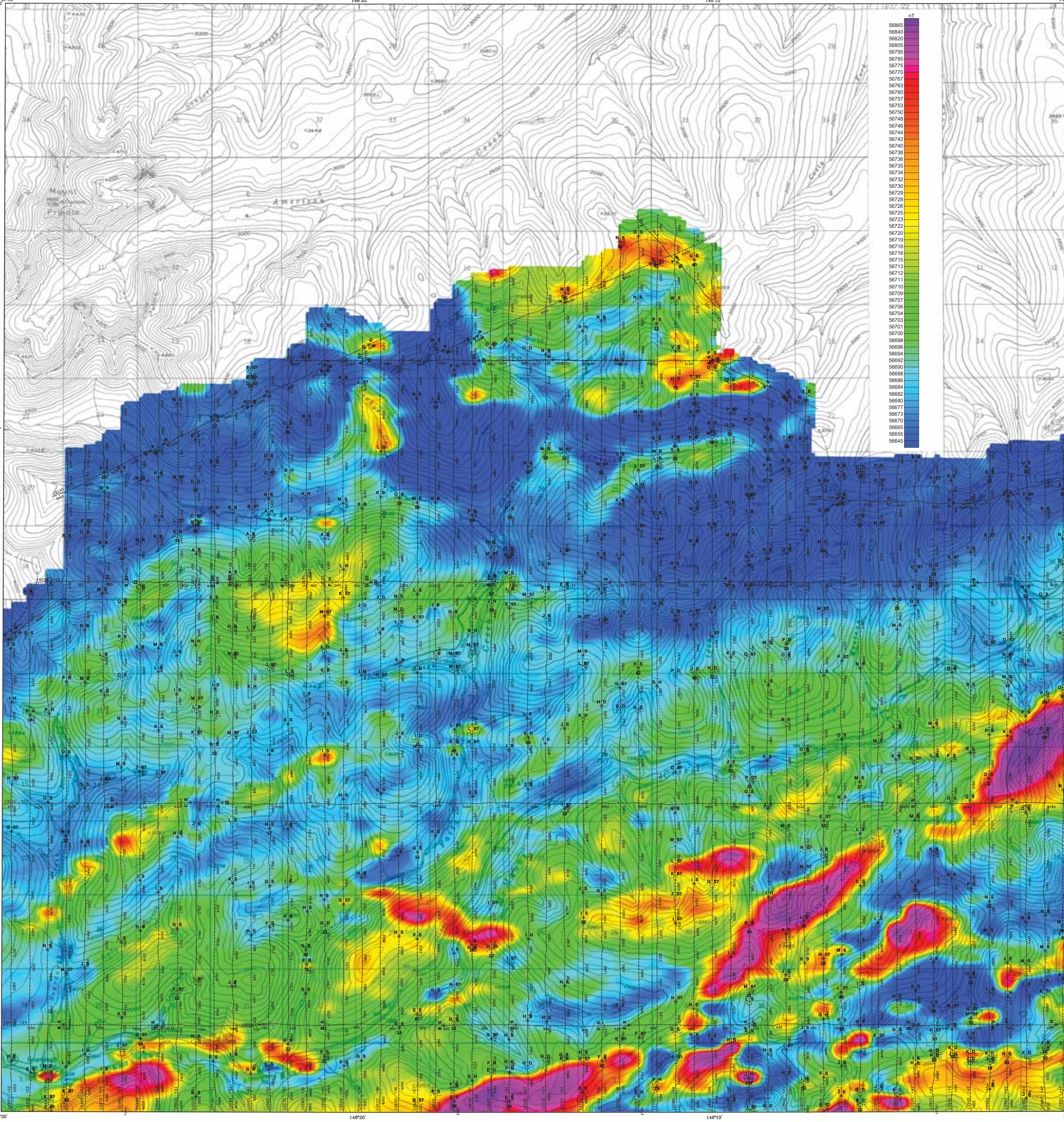


Base from U.S. Geological Survey Circle B-5, 1980. Quadrangle, Alaska

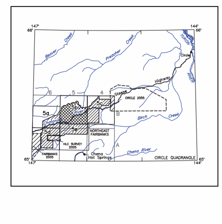
SCALE 1:31,680

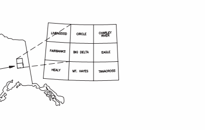
0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

LOCATION INDEX FOR SCALE 1:31,680





TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PART of CIRCLE B-5 QUADRANGLE

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

TRUE NORTH
MAGNETIC N
23.4°
APPROXIMATE MEAN DECLINATION, 2005

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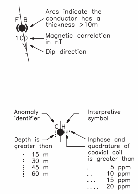
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◒	20–50 siemens
⊕ (partly filled)	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
△ M	EM magnetite response

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

ELECTROMAGNETICS

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SURVEY HISTORY

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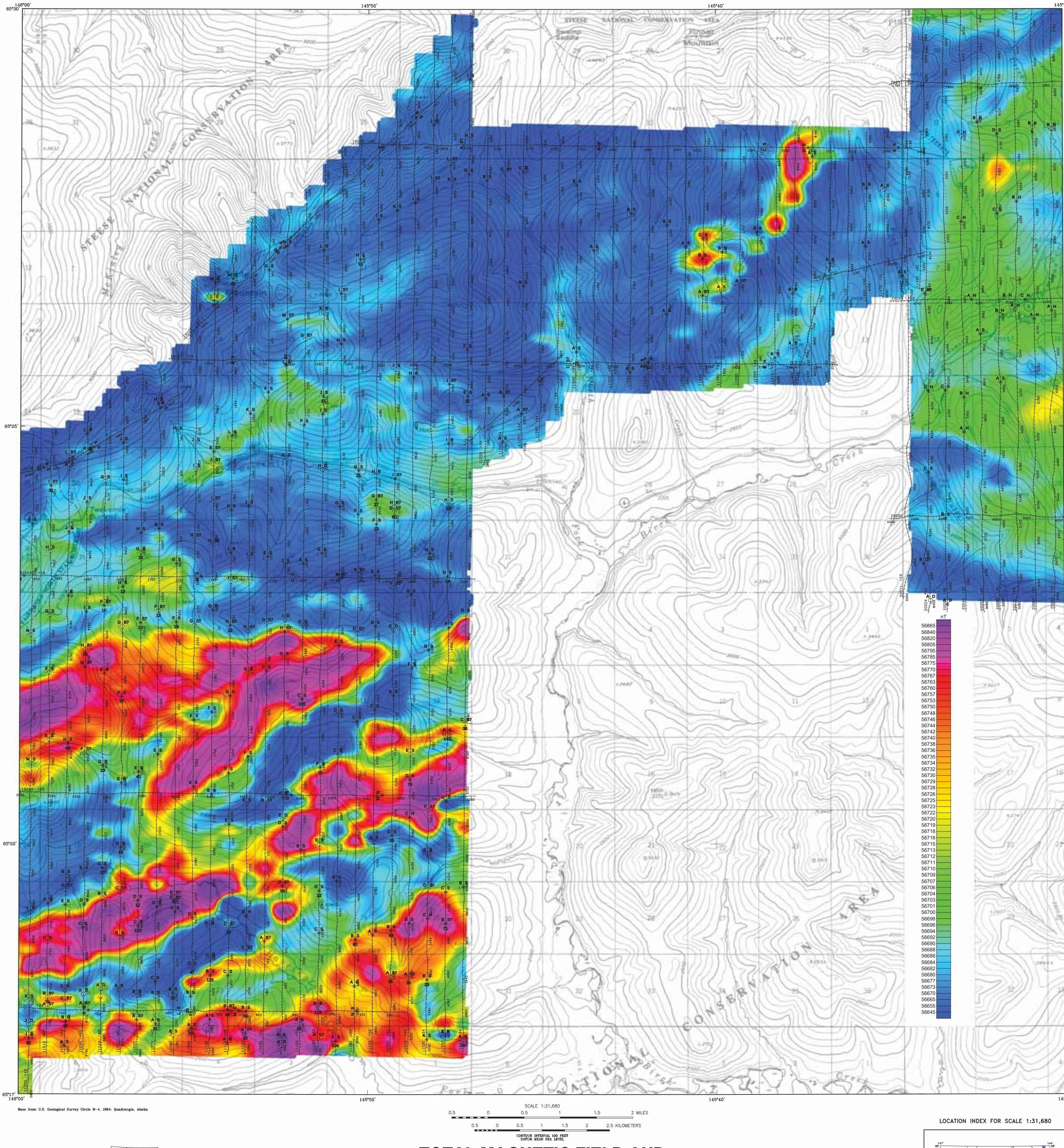
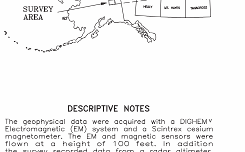


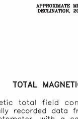
Base from U.S. Geological Survey Circle B-4, 1984; Quadrangle, Alaska



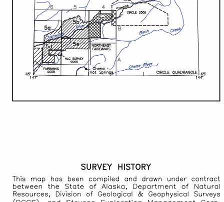
TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PART of CIRCLE B-4 QUADRANGLE

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



LOCATION INDEX FOR SCALE 1:31,680



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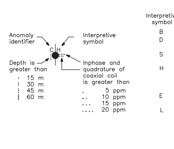
ELECTROMAGNETIC ANOMALIES



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◒	20–50 siemens
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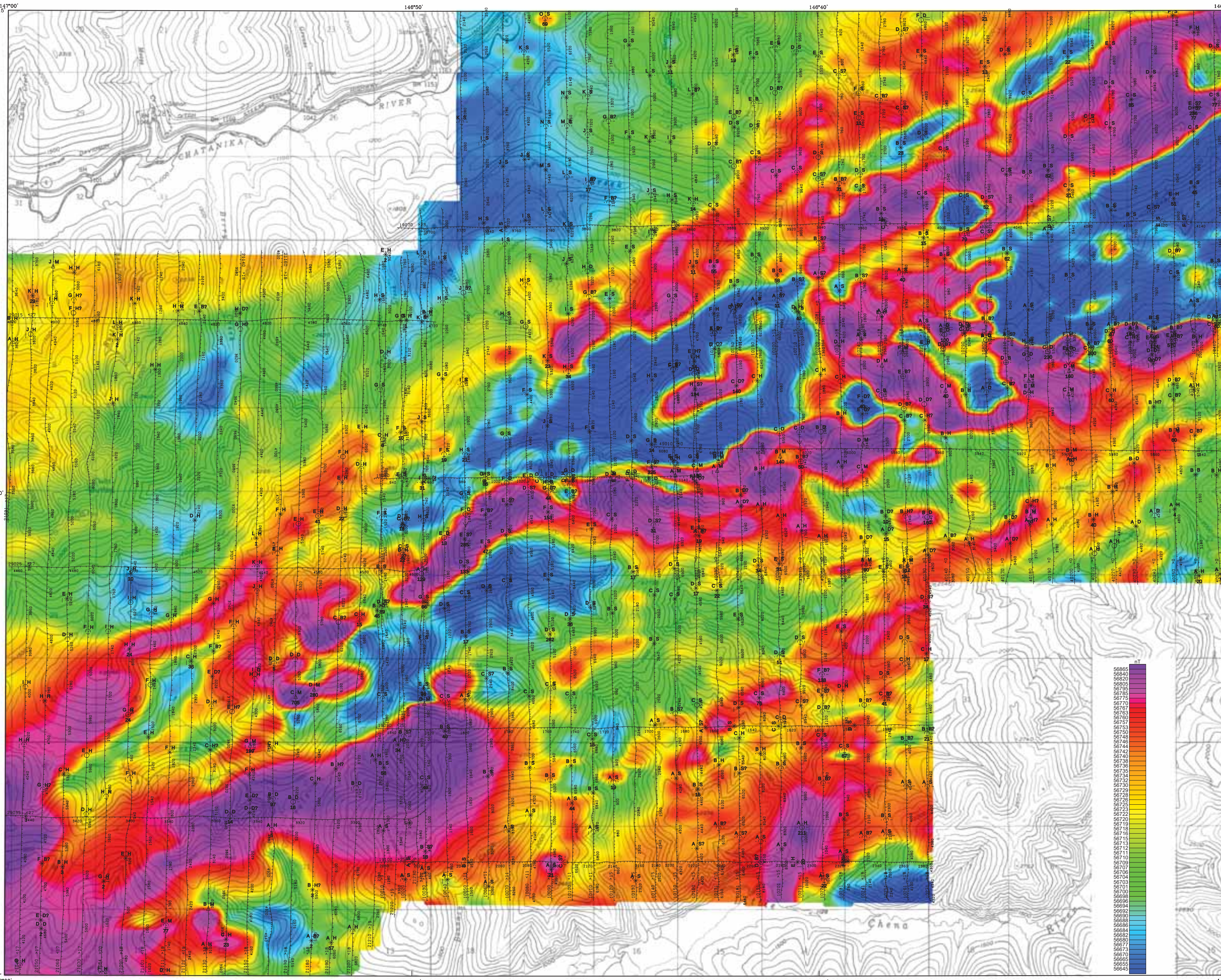


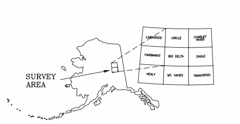
Base from U.S. Geological Survey Circle A-6, 1963, Quadrangle, Alaska

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 CIRCLE A-6 QUADRANGLE

by
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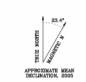
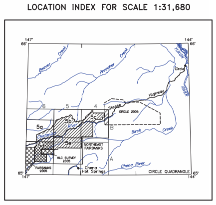
2006



LOCATION INDEX FOR SCALE 1:31,680



ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m
Magnetic correlation in nT
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Anomaly identifier
Interpretive symbol
Depth is greater than
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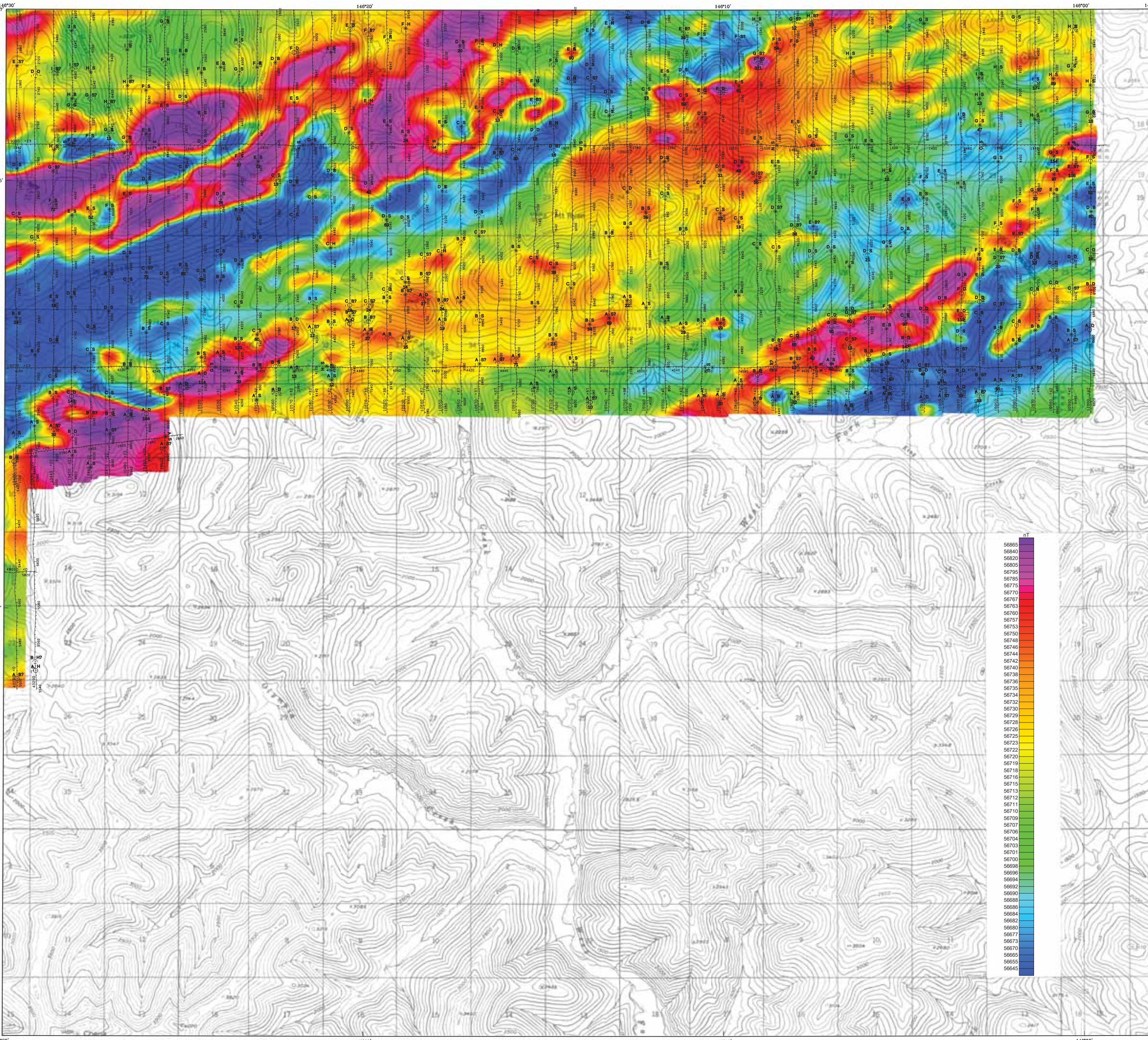

Base from U.S. Geological Survey Circle A-4, 1979; A-5, 1981; B-4, 1984; B-5, 1980; Quadrangles, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

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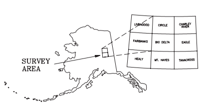
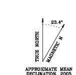
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



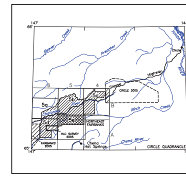
TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS of CIRCLE A-4, A-5, B-4 AND B-5 QUADRANGLES

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



LOCATION INDEX FOR SCALE 1:31,680



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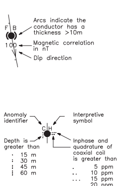

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L	Culture, e.g., power line, metal building or fence

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 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, 2005, updated to October 2005) 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.

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2005.

This map and other products from this survey are available by mail order in person from DGGS, 3354 College Road, Fairbanks, Alaska, 99709–3707. Published maps are also available for viewing or downloading as Adobe Acrobat Files (*.pdf) on our Web site (http://www.dggs.dnr.state.ak.us/pubs/).

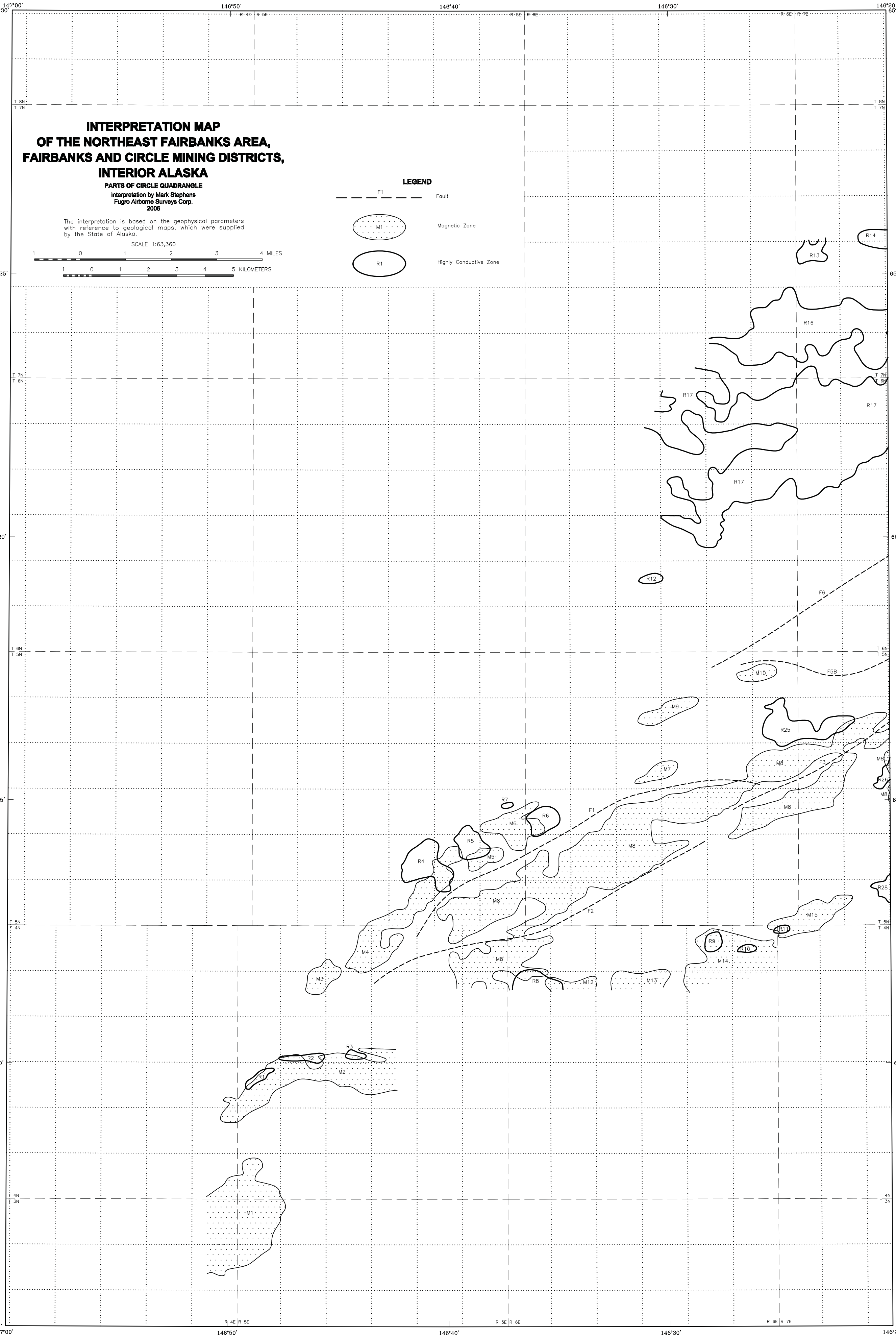
INTERPRETATION MAP OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

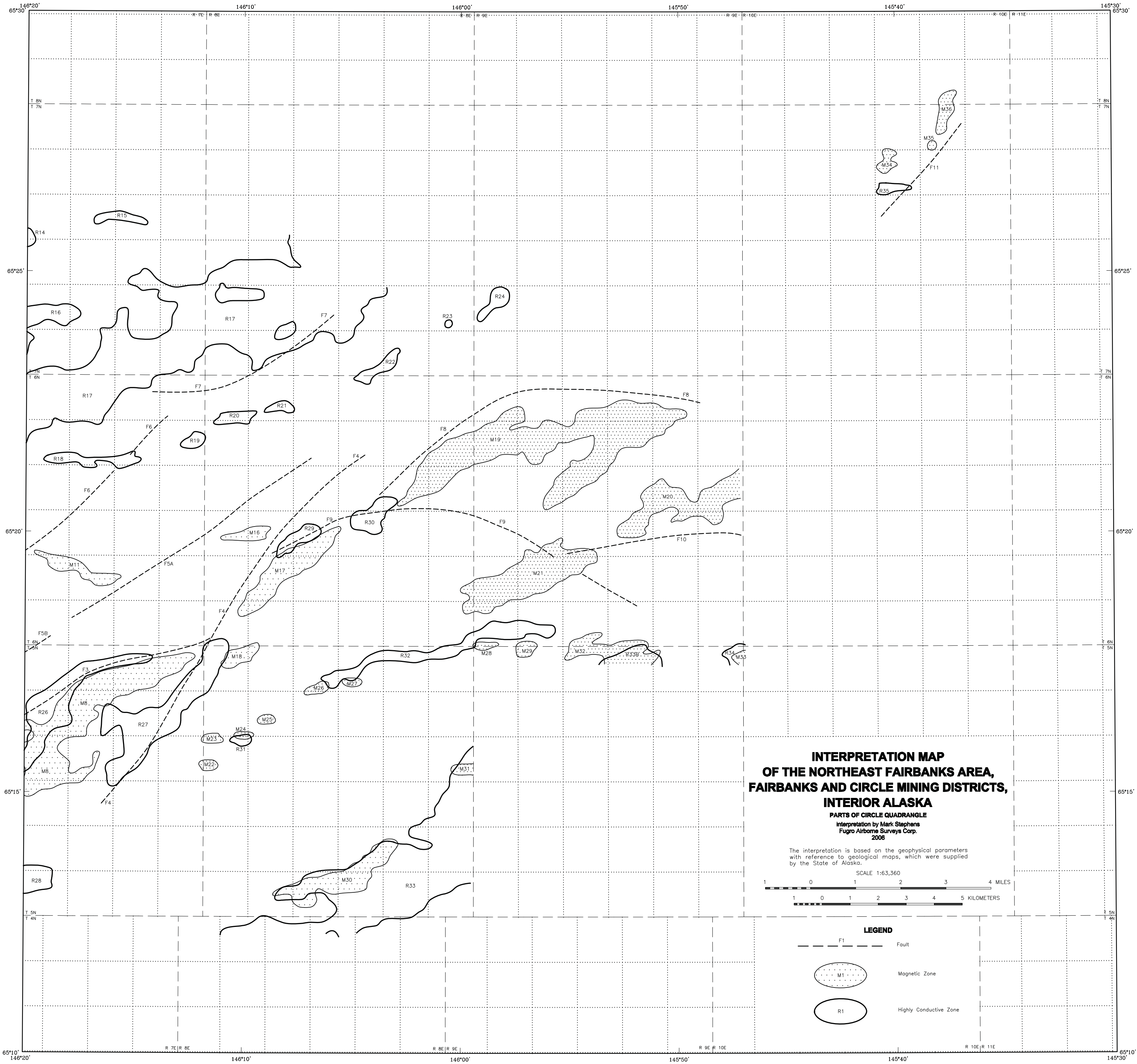
PARTS OF CIRCLE QUADRANGLE

Interpretation by Mark Stephens
Fugro Airborne Surveys Corp.
2006

The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.

SCALE 1:63,360





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SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LEGEND