BONNIFIELD MINING DISTRICT ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns, Fugro Airborne Surveys Corp., Stevens Exploration Management Corp., G.R.C. Graham, and A.M. Emond

Geophysical Report 2016-1

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

STATE OF ALASKA
Mike Dunleavy, Governor

DEPARTMENT OF NATURAL RESOURCES
Corri A. Feige, Commissioner

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
Steve Masterman, State Geologist & Director

Publications produced by the Division of Geological & Geophysical Surveys are available to download from the DGGS website (dggs.alaska.gov). Publications on hard-copy or digital media can be examined or purchased in the Fairbanks office:

Alaska Division of Geological & Geophysical Surveys (DGGS)
3354 College Road | Fairbanks, Alaska 99709-3707
Phone: 907.451.5010 | Fax 907.451.5050
dggspubs@alaska.gov | dggs.alaska.gov

DGGS publications are also available at:

Alaska State Library, Historical
Collections & Talking Book Center
395 Whittier Street
Juneau, Alaska 99801

Alaska Resource Library and
Information Services (ARLIS)
3150 C Street, Suite 100
Anchorage, Alaska 99503

Suggested citation:
Burns, L.E., Fugro Airborne Surveys Corp., Stevens Exploration Management Corp., Graham, G.R.C., and Emond, A.M., 2016, Bonnifield mining district electromagnetic and magnetic airborne geophysical survey data compilation: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2016-1, 2 sheets. https://doi.org/10.14509/29557

BONNIFIELD MINING DISTRICT ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns[1], Fugro Airborne Geophysical Surveys Corp., Stevens Exploration Management Corp., and G.R.C. Graham[1], and A.M. Emond[1]

ABSTRACT

The Bonnifield mining district electromagnetic and magnetic airborne geophysical survey geophysical survey is located approximately 100 kilometers south of Fairbanks, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^{V} system from October 2, 2006 to February 2, 2007. A total of 4,528 line kilometers were collected covering 1,603 square kilometers (km). Line spacing was 400 meters (m). Data were collected an average of 36 m above the ground surface from a helicopter-towed sensor platform ("bird") on a 30 m long line.

PURPOSE

The Bonnifield survey covers part of the Bonnifield mining district. These data were recorded to assist and promote mineral exploration in the region. The data were collected to aid geologic mapping of the region.

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.

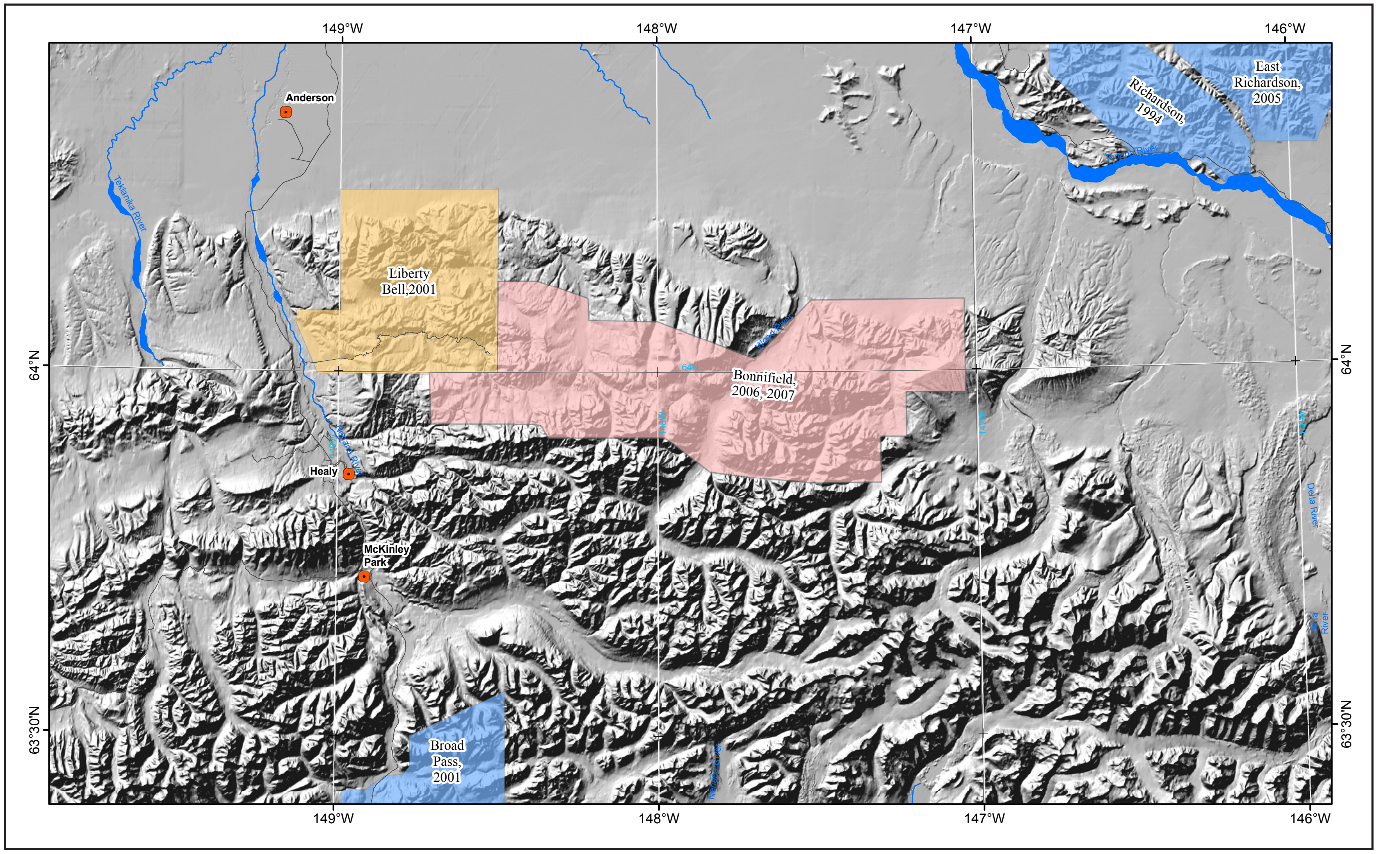
ACKNOWLEDGMENTS

Funding was provided by the Alaska State Legislature.

[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 final and raw data with readme files, ascii format gridded data, Geosoft format import template with extension .iO for final ascii data
databases_geosoft	contractor	Geosoft format database file with extension .gdb
documents	contractor and DGGS	Final report, gridded data explanations, survey background information
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. Additional explanatory information is included with the download files
images_registered	contractor and DGGS	GeoTiff format images of all gridded data. Additional explanatory information is included with the download files
kmz	contractor and DGGS	Google Earth kmz files of all gridded data
maps_pdf_format	contractor	Printable maps in pdf format
maps_prn_format	contractor	Printable maps in HPGL/2 printer file format with extension .prn
profiles_stacked	contractor	Electromagnetic and magnetic data profiles with EM anomalies
vector_data	contractor and DGGS	line path, data contours, em anomalies, interpretation and survey boundary in ESRI shape file (SHP) and Autocad (2000) DXF formats
video_flightpath	contractor	Survey flight path downward facing video. Available in .avi format.



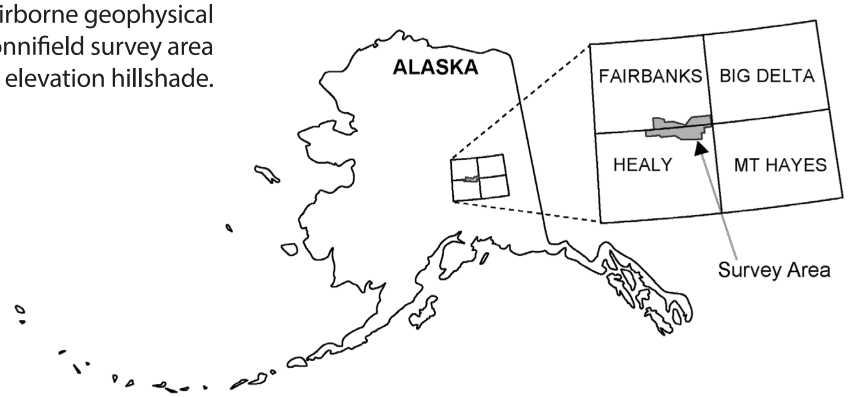


Figure 1. Magnetic and electromagnetic airborne geophysical survey location shown in Alaska (inset). Bonnifield survey area shown with landmarks, rivers, and elevation hillshade.

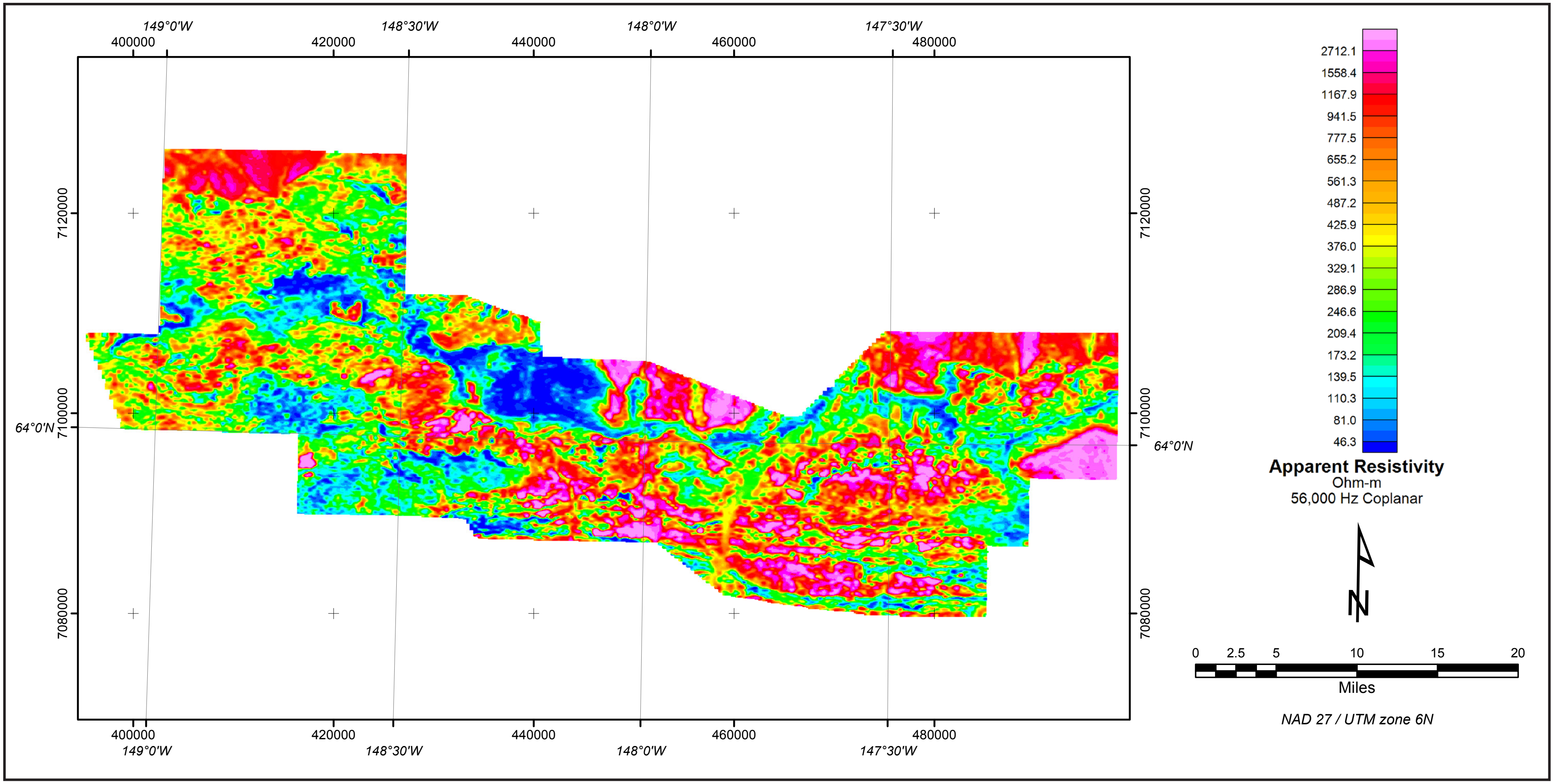


Figure 2. 56,000 Hz apparent resistivity grid.

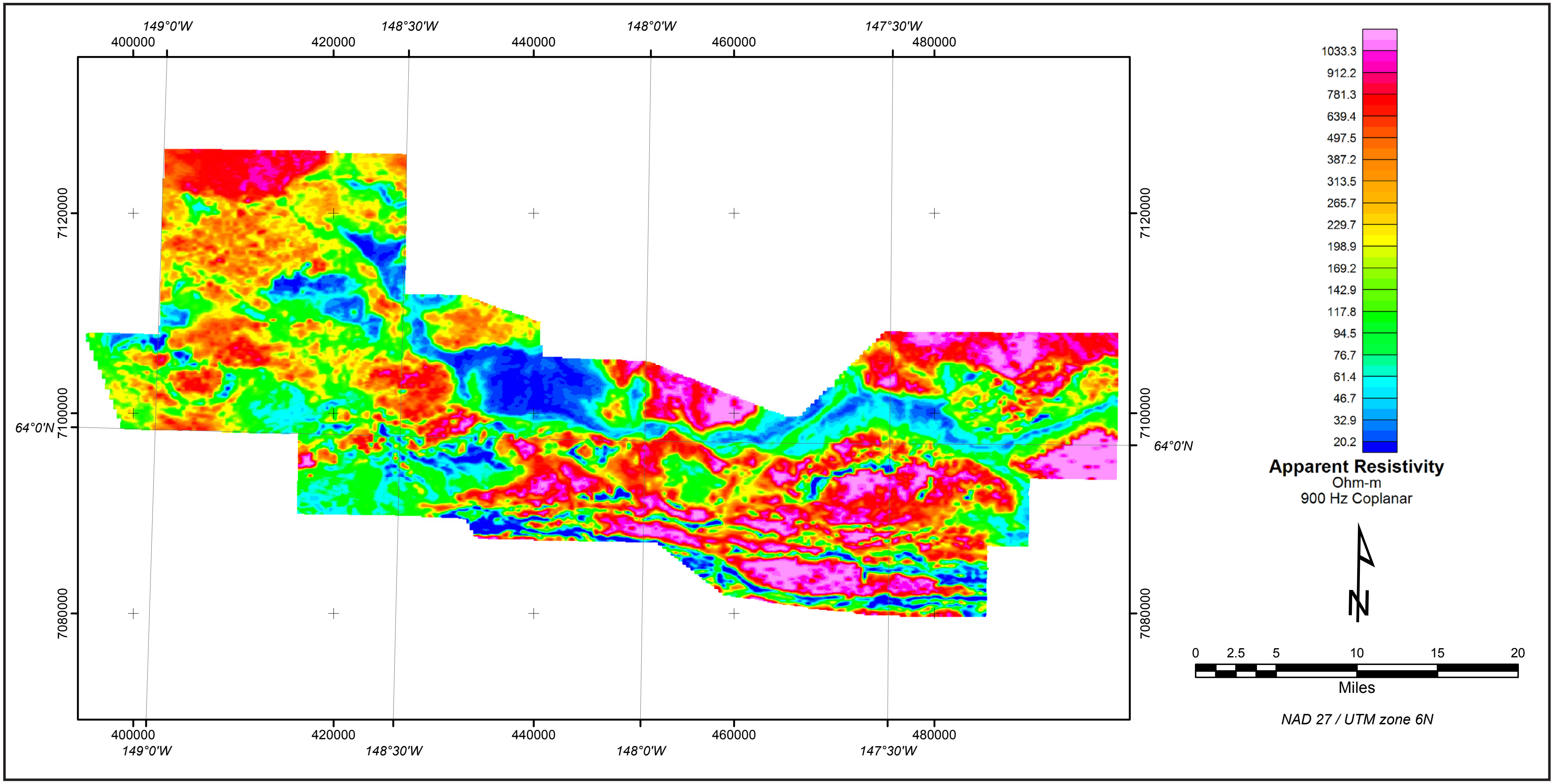


Figure 3. 900 Hz apparent resistivity grid.

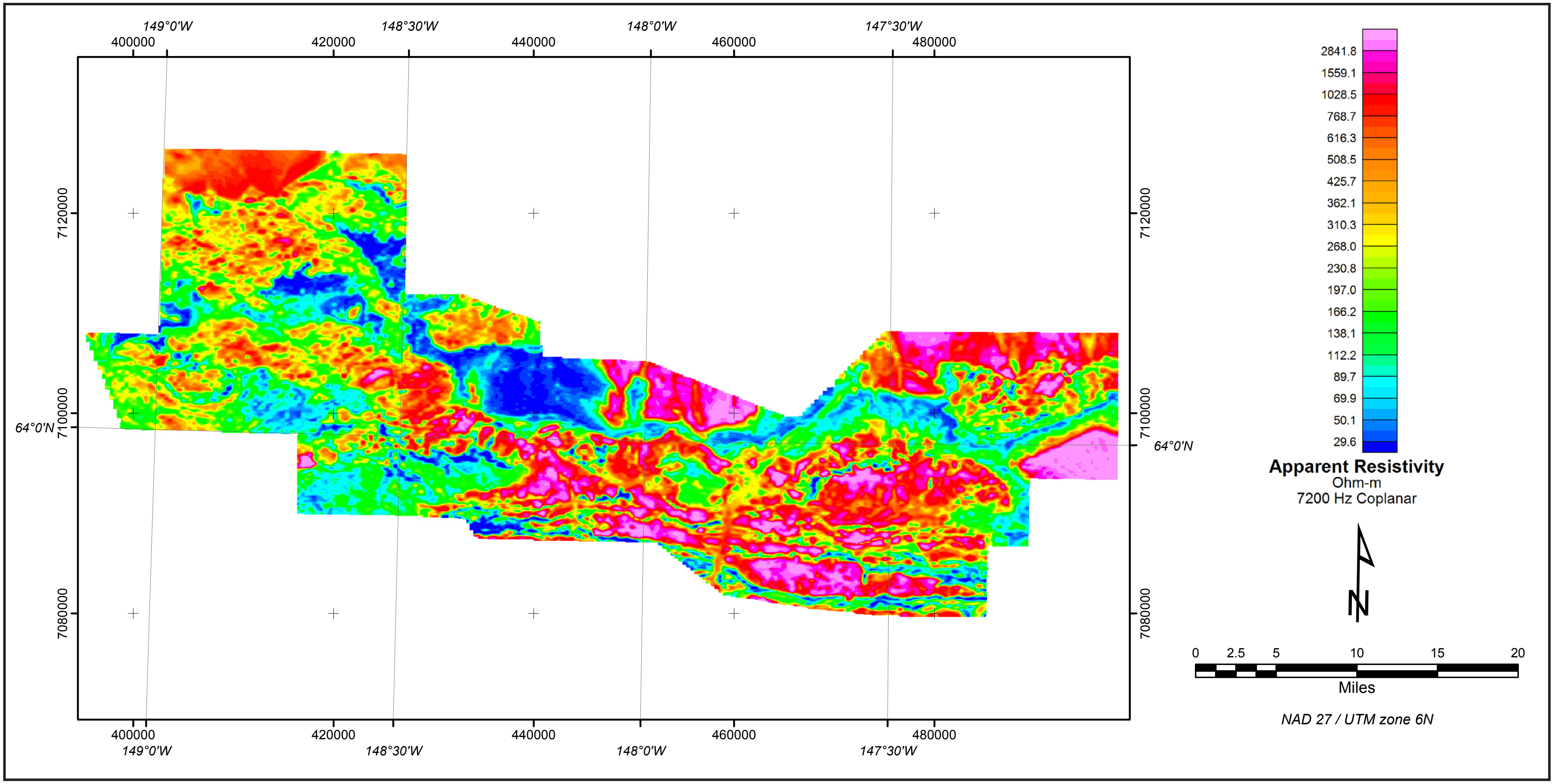


Figure 4. 7,200 Hz apparent resistivity grid.

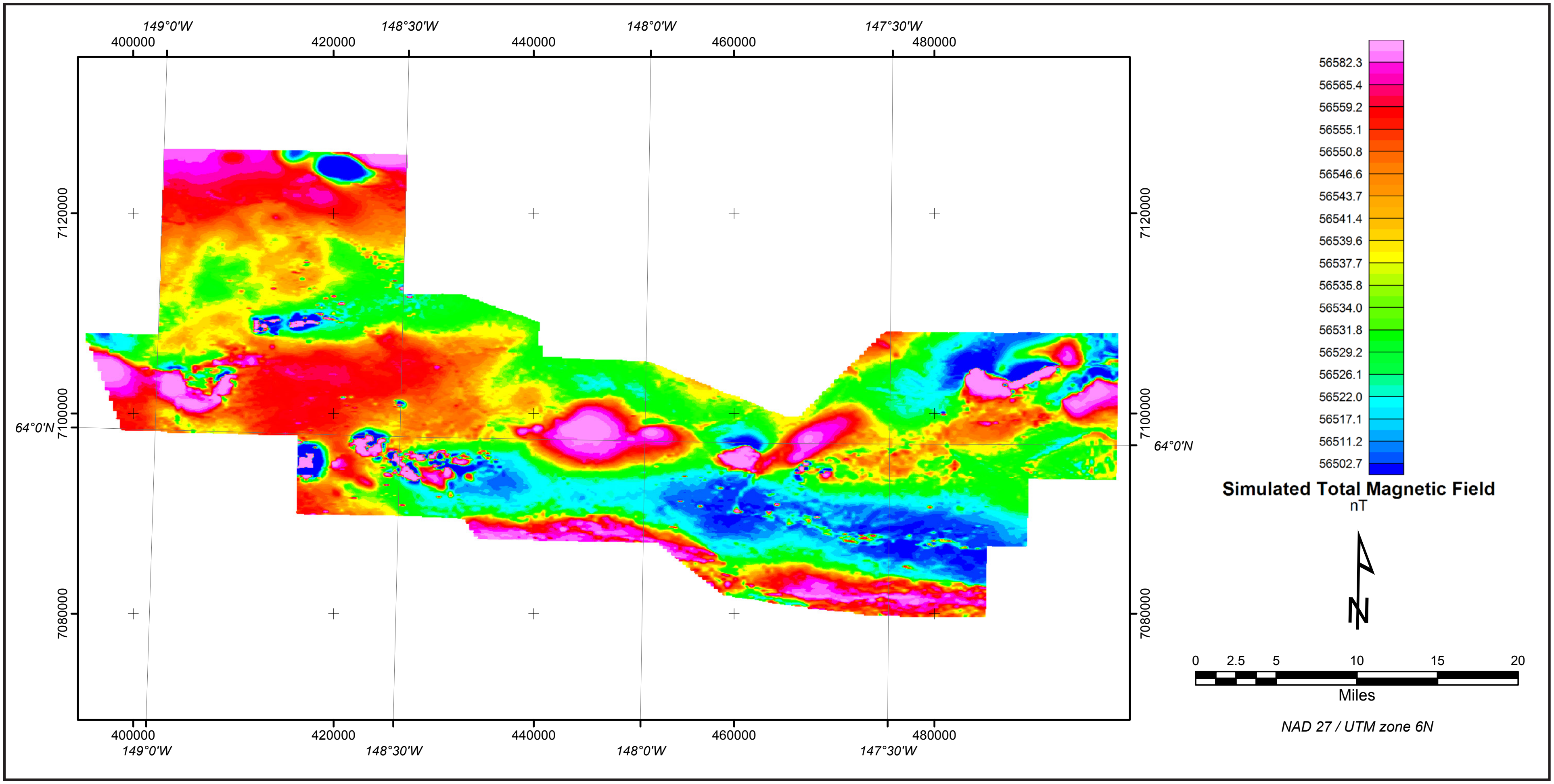


Figure 5. Simulated magnetic total field grid.

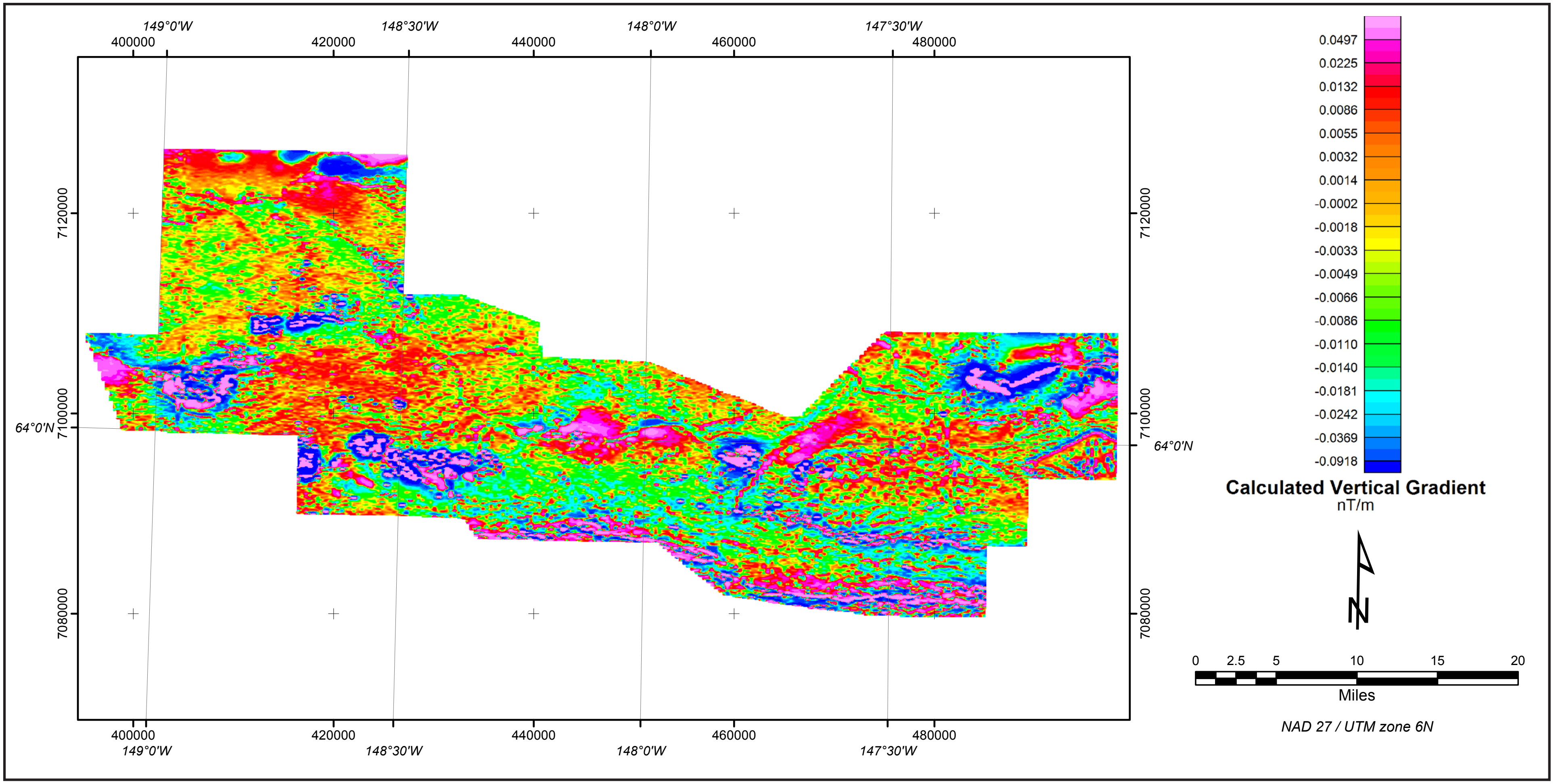
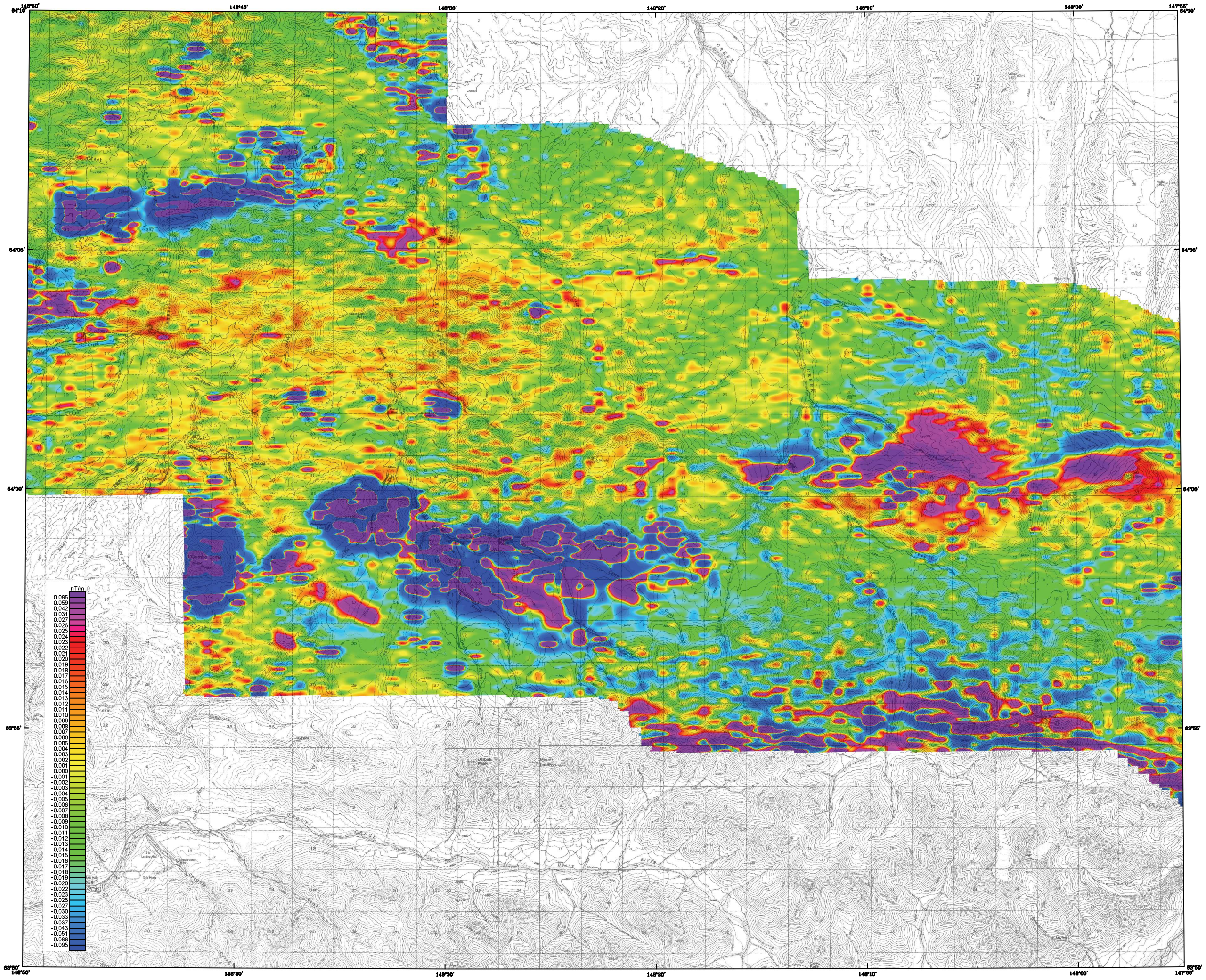


Figure 6. Calculated first vertical derivative grid.

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/10.14509/29557

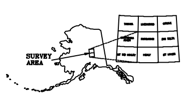
Map Title	Description
bonnifield_calculated1vd_topo_map_1of2.pdf	First vertical derivative of the simulated total magnetic field with topo
bonnifield_calculated1vd_topo_map_2of2.pdf	First vertical derivative of the simulated total magnetic field with topo
bonnifield_interpretation_1of2.pdf	Interpretation with section grid
bonnifield_interpretation_2of2.pdf	Interpretation with section grid
bonnifield_res56khz_contours_trs_map_1of2.pdf	56000 Hz resistivity with section grid and resistivity contours
bonnifield_res56khz_contours_trs_map_2of2.pdf	56000 Hz resistivity with section grid and resistivity contours
bonnifield_res56khz_topo_map_1of2.pdf	56000 Hz resistivity with topo
bonnifield_res56khz_topo_map_2of2.pdf	56000 Hz resistivity with topo
bonnifield_res900hz_contours_trs_map_1of2.pdf	900 Hz resistivity with section grid and resistivity contours
bonnifield_res900hz_contours_trs_map_2of2.pdf	900 Hz resistivity with section grid and resistivity contours
bonnifield_res900hz_topo_map_1of2.pdf	900 Hz resistivity with topo
bonnifield_res900hz_topo_map_2of2.pdf	900 Hz resistivity with topo
bonnifield_res7200hz_contours_trs_map_1of2.pdf	7200 Hz resistivity with section grid and resistivity contours
bonnifield_res7200hz_contours_trs_map_2of2.pdf	7200 Hz resistivity with section grid and resistivity contours
bonnifield_res7200hz_topo_map_1of2.pdf	7200 Hz with topo
bonnifield_res7200hz_topo_map_2of2.pdf	7200 Hz with topo
bonnifield_sim_magtf_contours_trs_map_1of2.pdf	Simulated total magnetic field with section grid and mag contours
bonnifield_sim_magtf_contours_trs_map_2of2.pdf	Simulated total magnetic field with section grid and mag contours
bonnifield_sim_magtf_detail_em_anom_topo_map_1of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_detail_em_anom_topo_map_2of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_detail_em_anom_topo_map_3of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_detail_em_anom_topo_map_4of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_detail_em_anom_topo_map_5of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_detail_em_anom_topo_map_6of6.pdf	Simulated total magnetic field and detailed em anomalies with topo
bonnifield_sim_magtf_topo_map_1of2.pdf	Simulated total magnetic field with topo
bonnifield_sim_magtf_topo_map_2of2.pdf	Simulated total magnetic field with topo



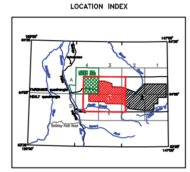
Base from U.S. Geological Survey Fairbanks A-2, 1972; A-3, 1970; A-4, 1972; Healy D-2, 1960; D-3, 1956; D-4, 1970; Quadrangles, Alaska

SCALE 1:63,360

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN
DECLINATION, 2006



LOCATION INDEX

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the entire Bonnifield Mining District dataset lie within the range displayed on the color bar. Data values actually range from −9.532 nT/m (dark blue) to about 19.291 nT/m (magenta). Actual values can be seen in digital publication GPR 2007-1.

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

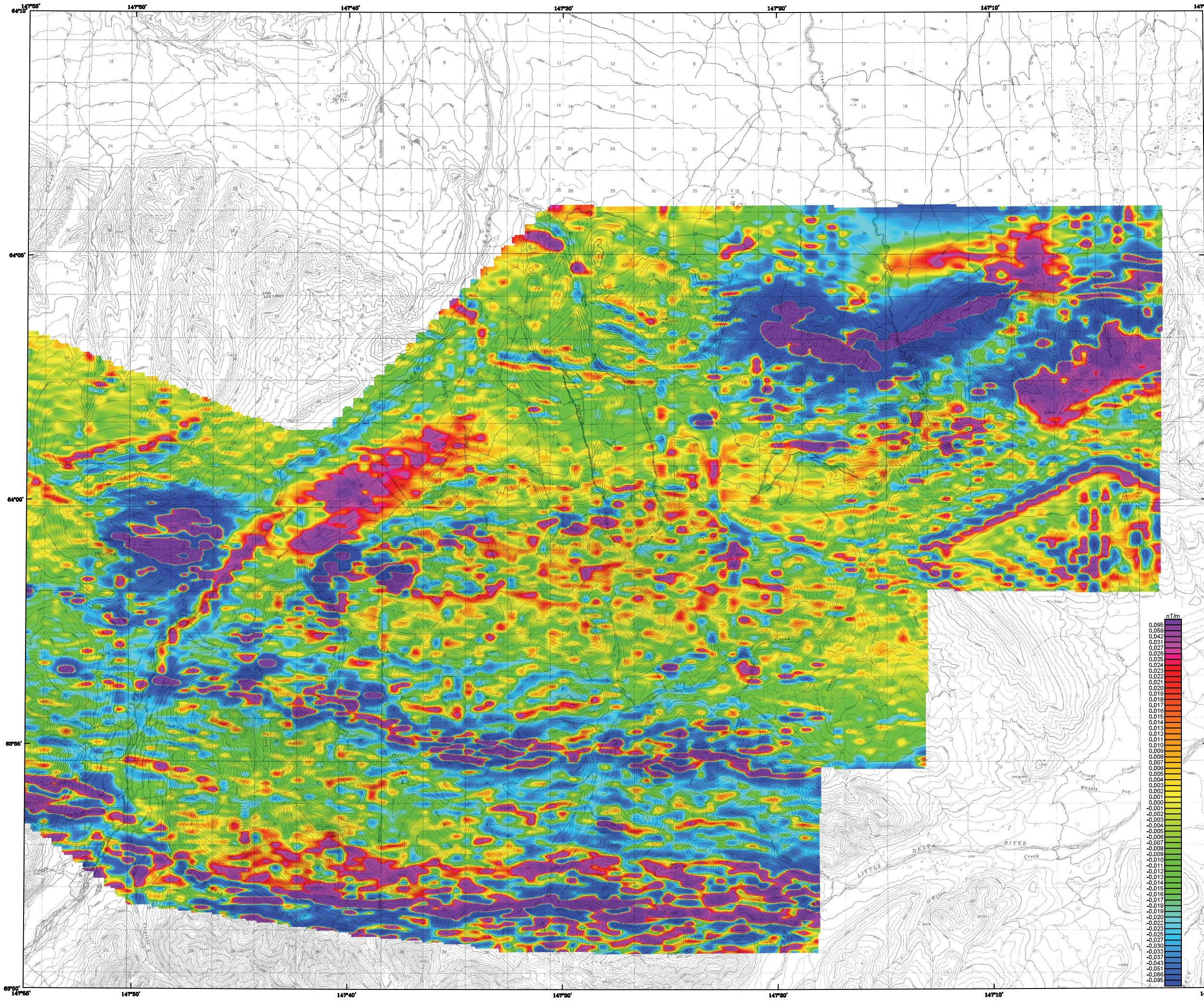
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first veritical 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.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

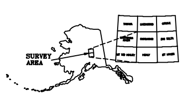


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

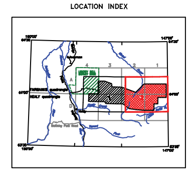


FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the entire Bonnifield Mining District dataset lie within the range displayed on the color bar. Data values actually range from −9.532 nT/m (dark blue) to about 19.291 nT/m (magenta). Actual values can be seen in digital publication GPR 2007−1.

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

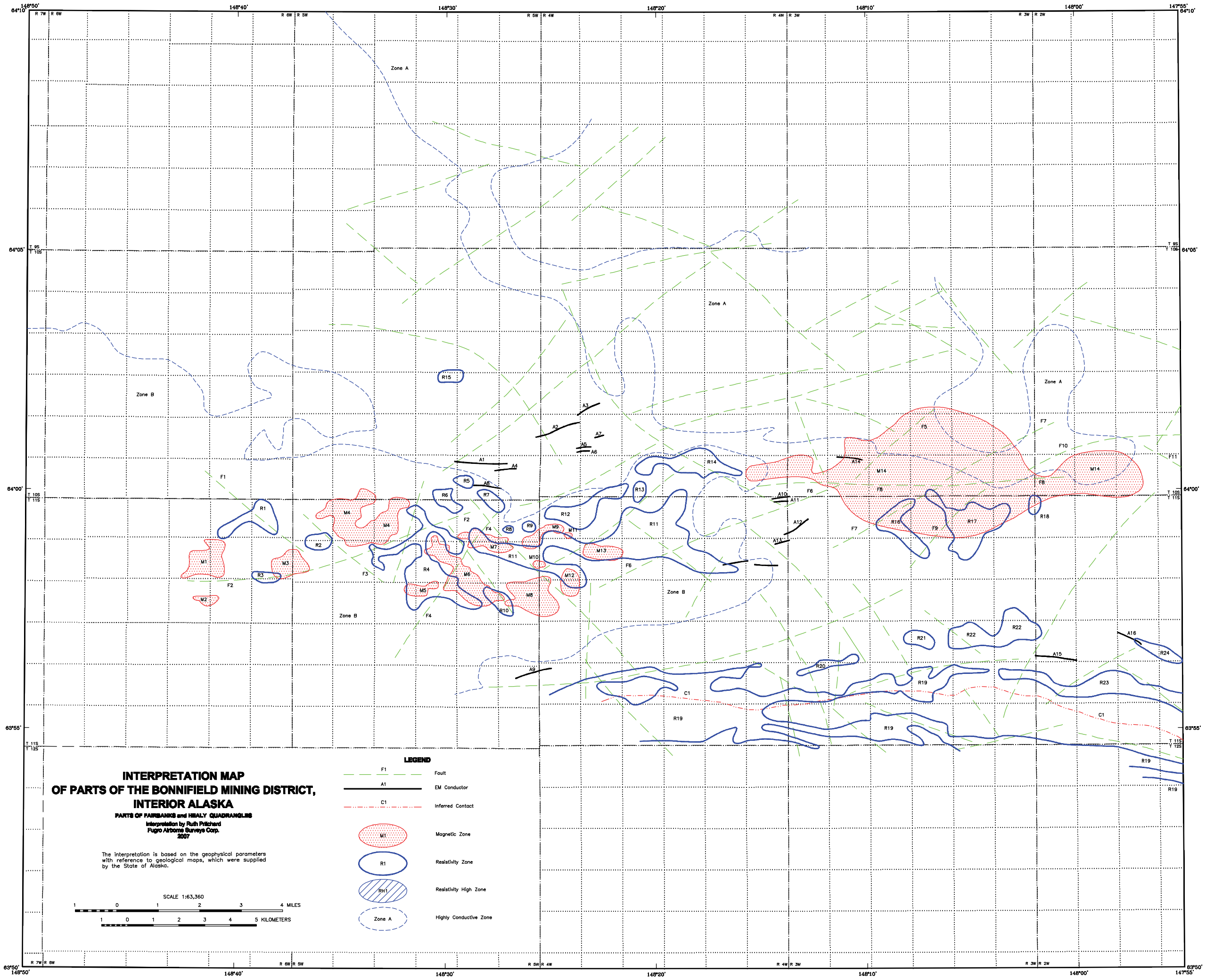
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first veritical 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.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

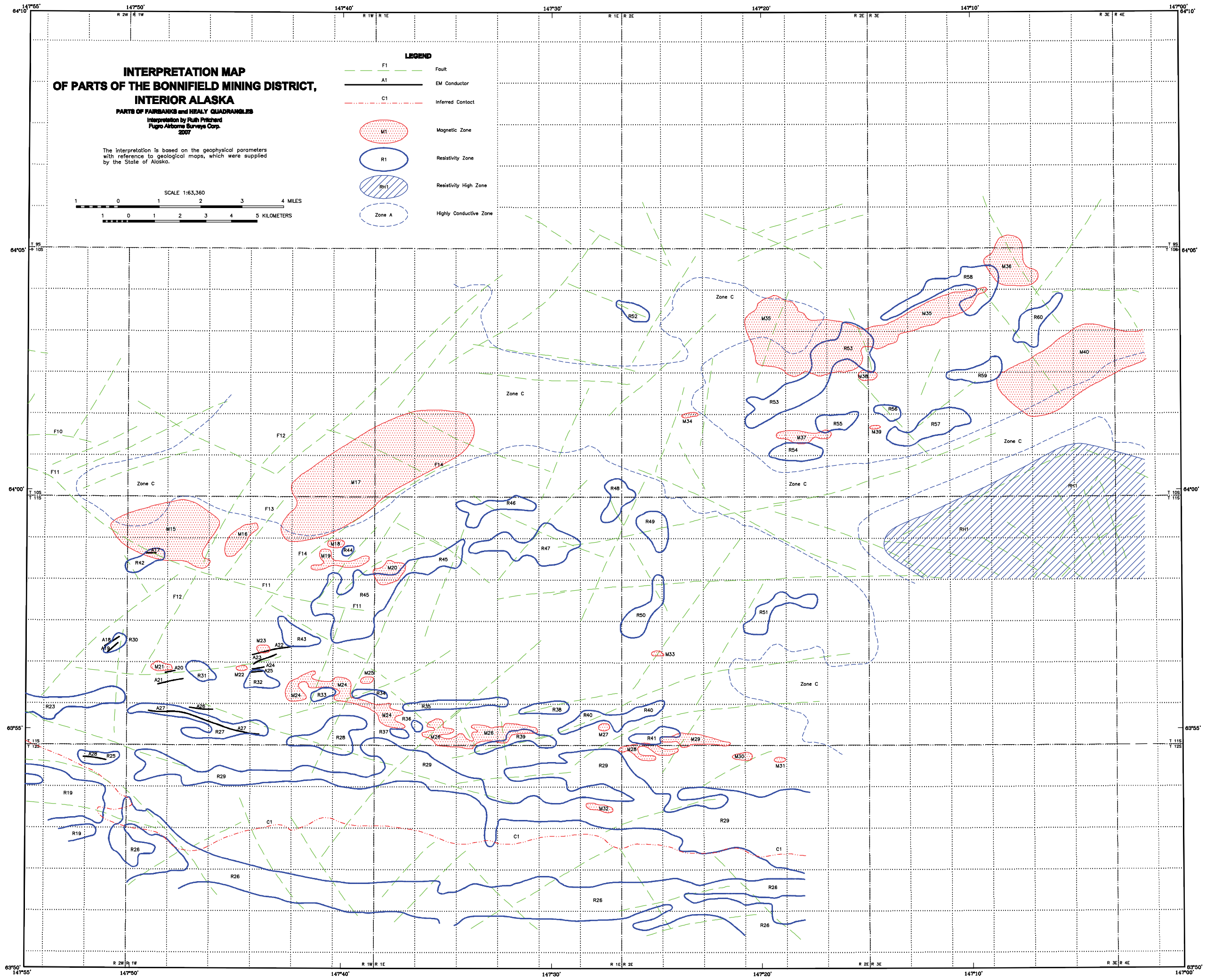

INTERPRETATION MAP
OF PARTS OF THE BONNIFIELD MINING DISTRICT,
INTERIOR ALASKA
PARTS OF FAIRBANKS and HEALY QUADRANGLES
Interpretation by Ruth Pritchard
Fugro Airborne Surveys Corp.
2007
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
F1 Fault
A1 EM Conductor
C1 Inferred Contact
M1 Magnetic Zone
R1 Resistivity Zone
RH1 Resistivity High Zone
Zone A Highly Conductive Zone
Zone A
Zone B
64°10'
64°05'
64°00'
63°55'
63°50'
148°50'
148°40'
148°30'
148°20'
148°10'
148°00'
147°55'

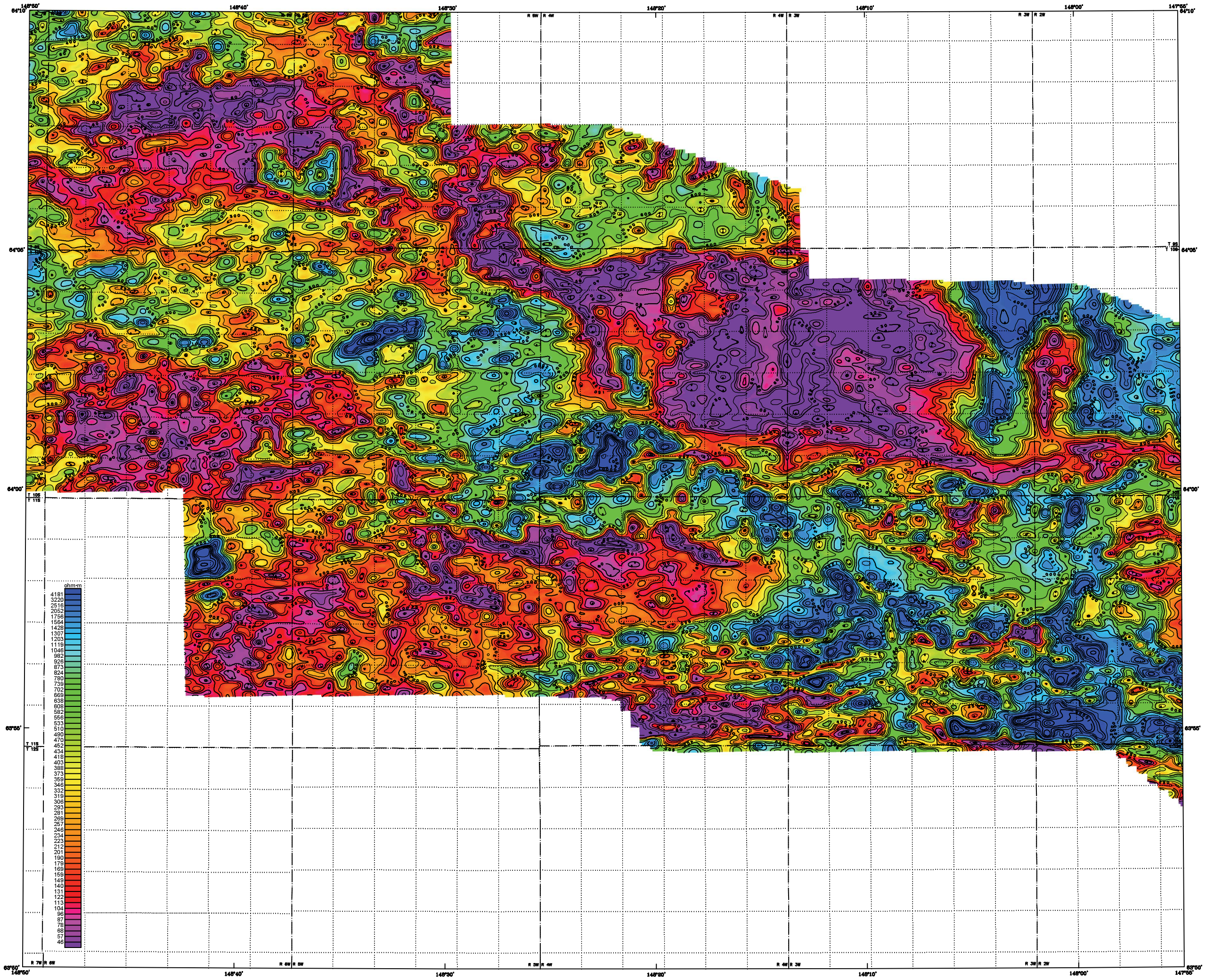
INTERPRETATION MAP OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

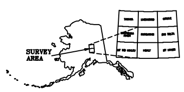
Interpretation by Ruth Pritchard
Fugro Airborne Surveys Corp.
2007

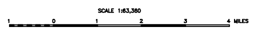
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.

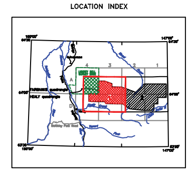




Section outlines from U.S. Geological Survey Fairbanks A-2, 1970; A-3, 1972; A-4, 1972; Healy D-2, 1980; D-3, 1955; D-4, 1970; Quadrangles, Alaska







56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m 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 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. 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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

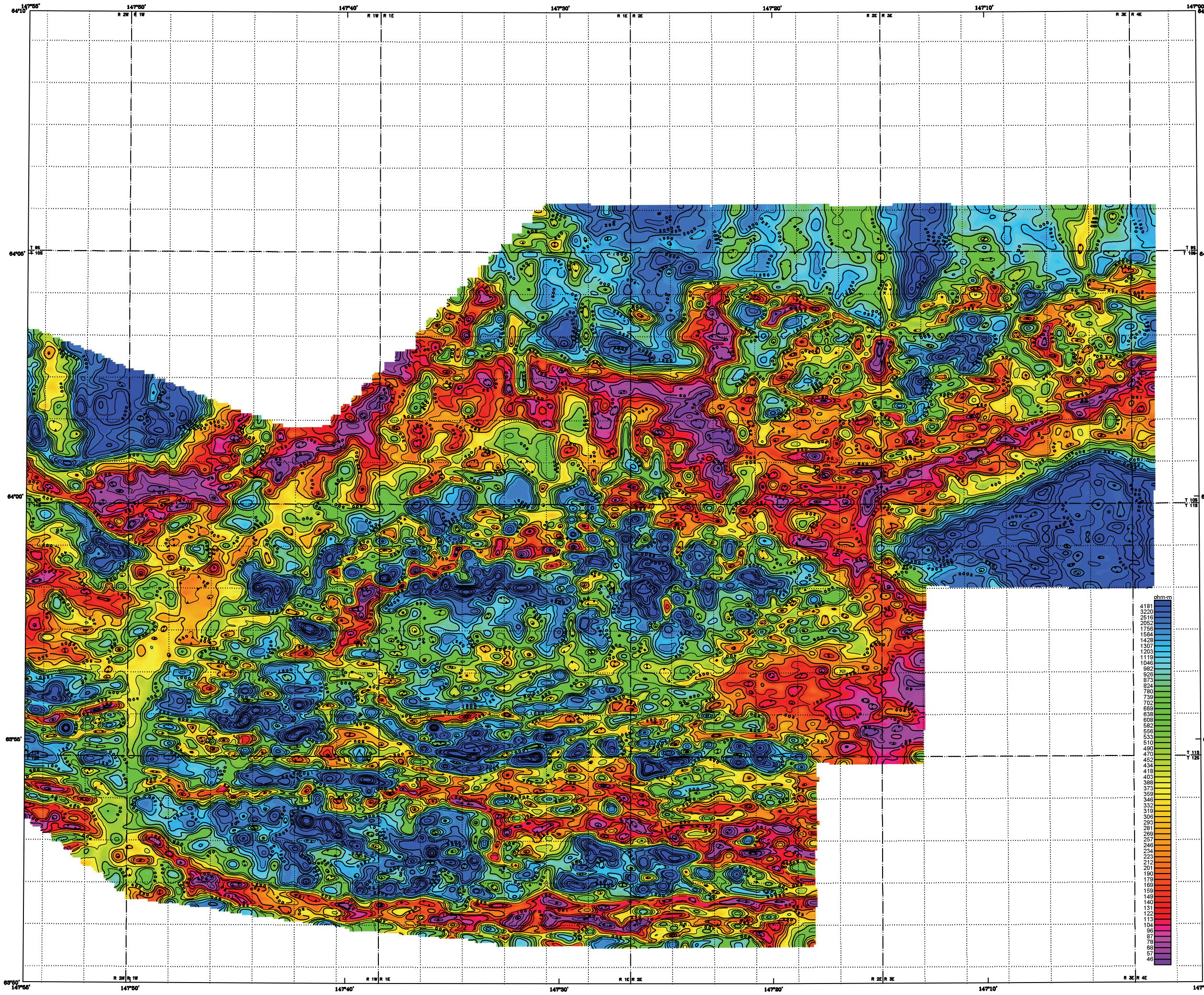
Contours in ohm-m at 10 intervals per decade

.... resistivity low

SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

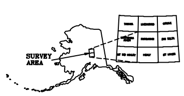
This map and other products from this survey are available by mail order in person from DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707. Published maps are also available for viewing or downloading as Adobe Acrobat Files (*.pdf) on our Web site (http://www.dggs.dnr.state.ak.us/pubs/).



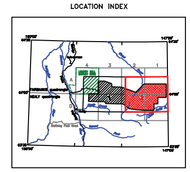
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



LOCATION INDEX



56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by

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

2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEMV 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. 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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

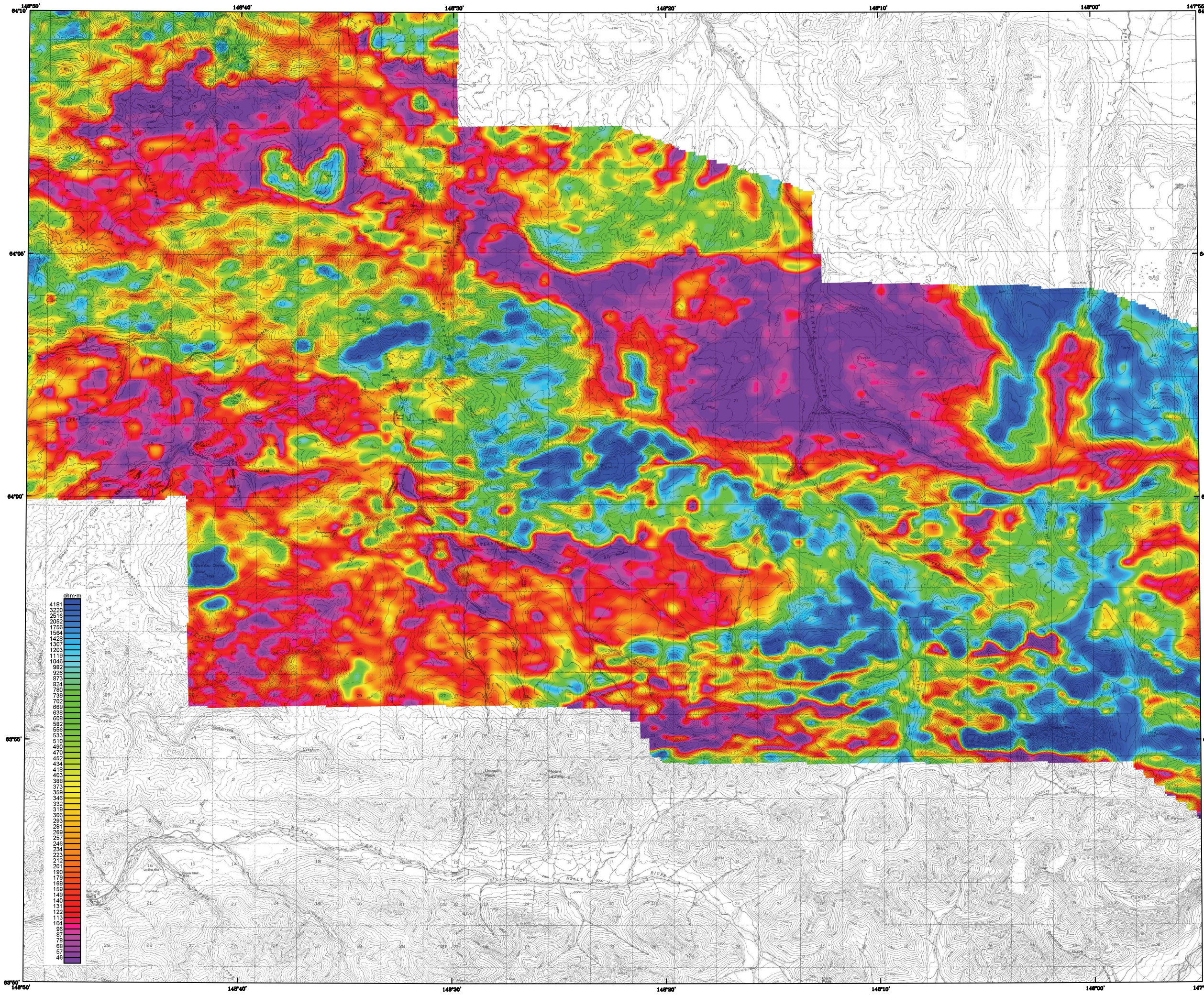
resistivity low

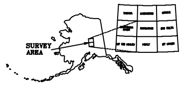
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

GEOPHYSICAL REPORT 2007-1-2a
Sheet 1 of 2





SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

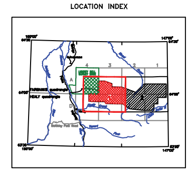
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

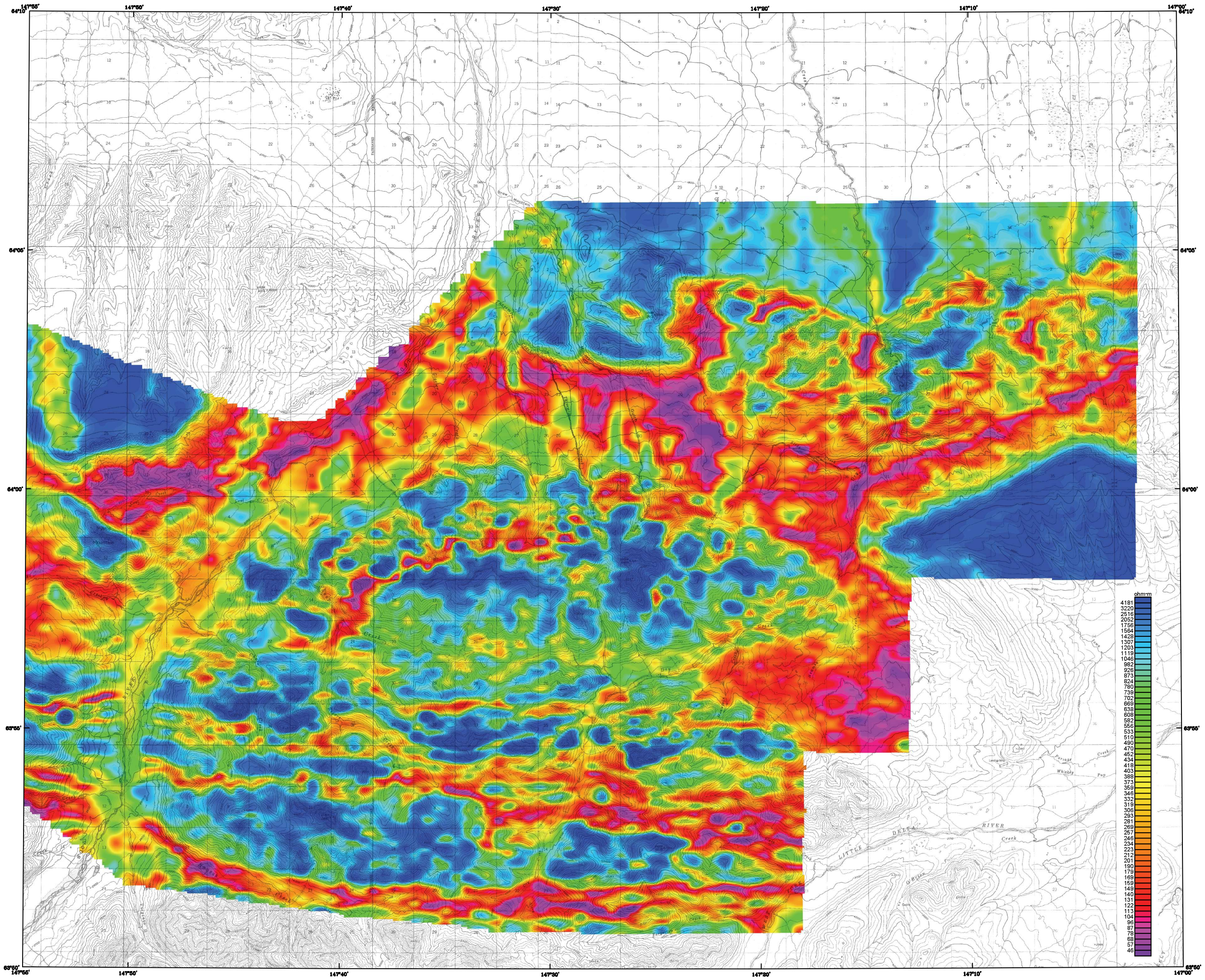
The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. 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.

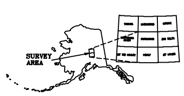
SURVEY HISTORY

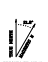
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



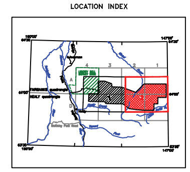
SCALE 1:63,360





APPROXIMATE MEAN DECLINATION, 2006

LOCATION INDEX



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

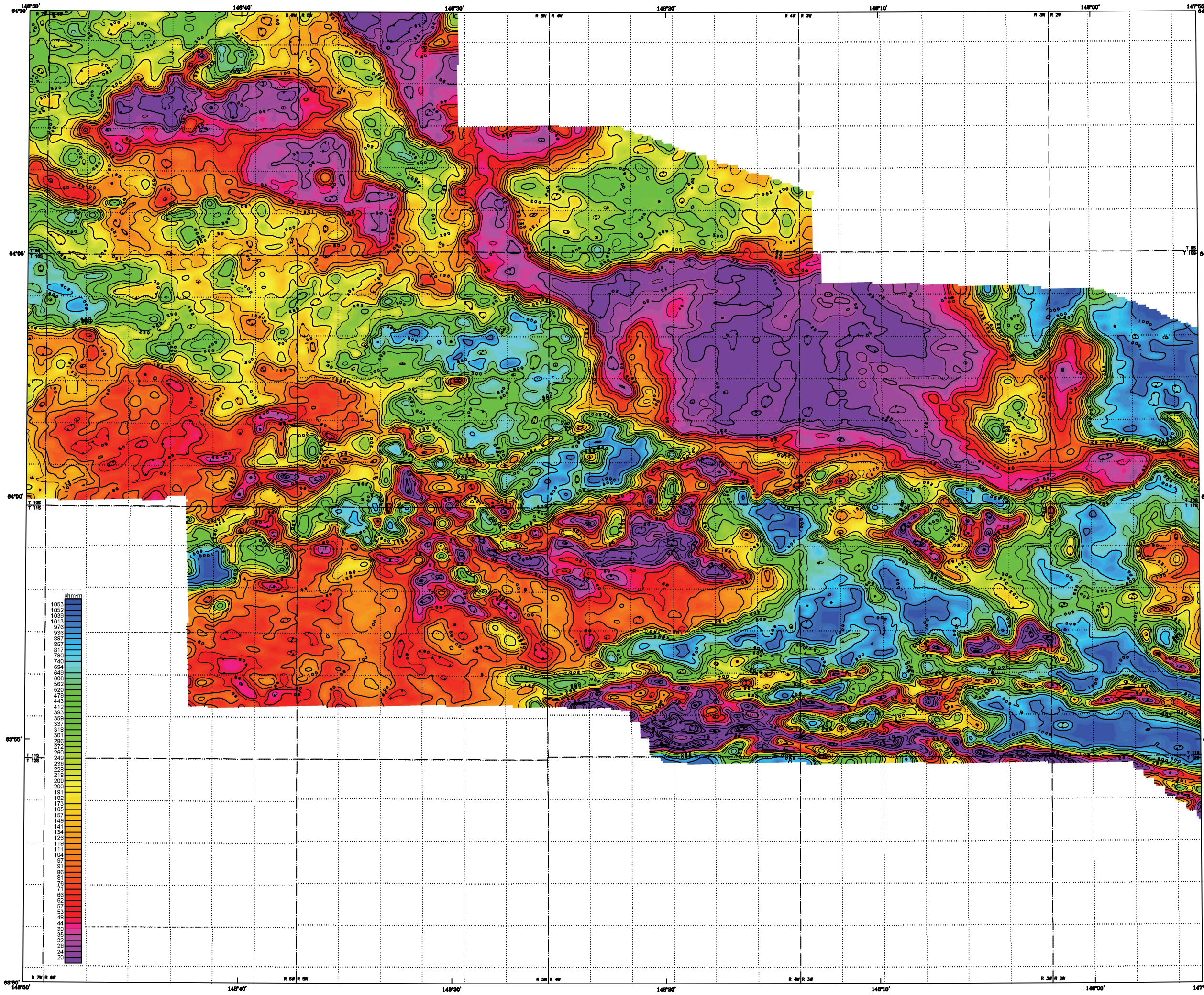
The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. 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.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

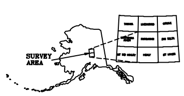


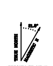
Section outlines from U.S. Geological Survey Fairbanks A-2, 1970; A-3, 1970; A-4, 1970; Healy D-2, 1983; D-3, 1956; D-4, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



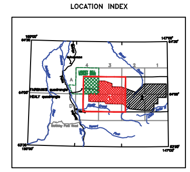


900 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m 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 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. 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.

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

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

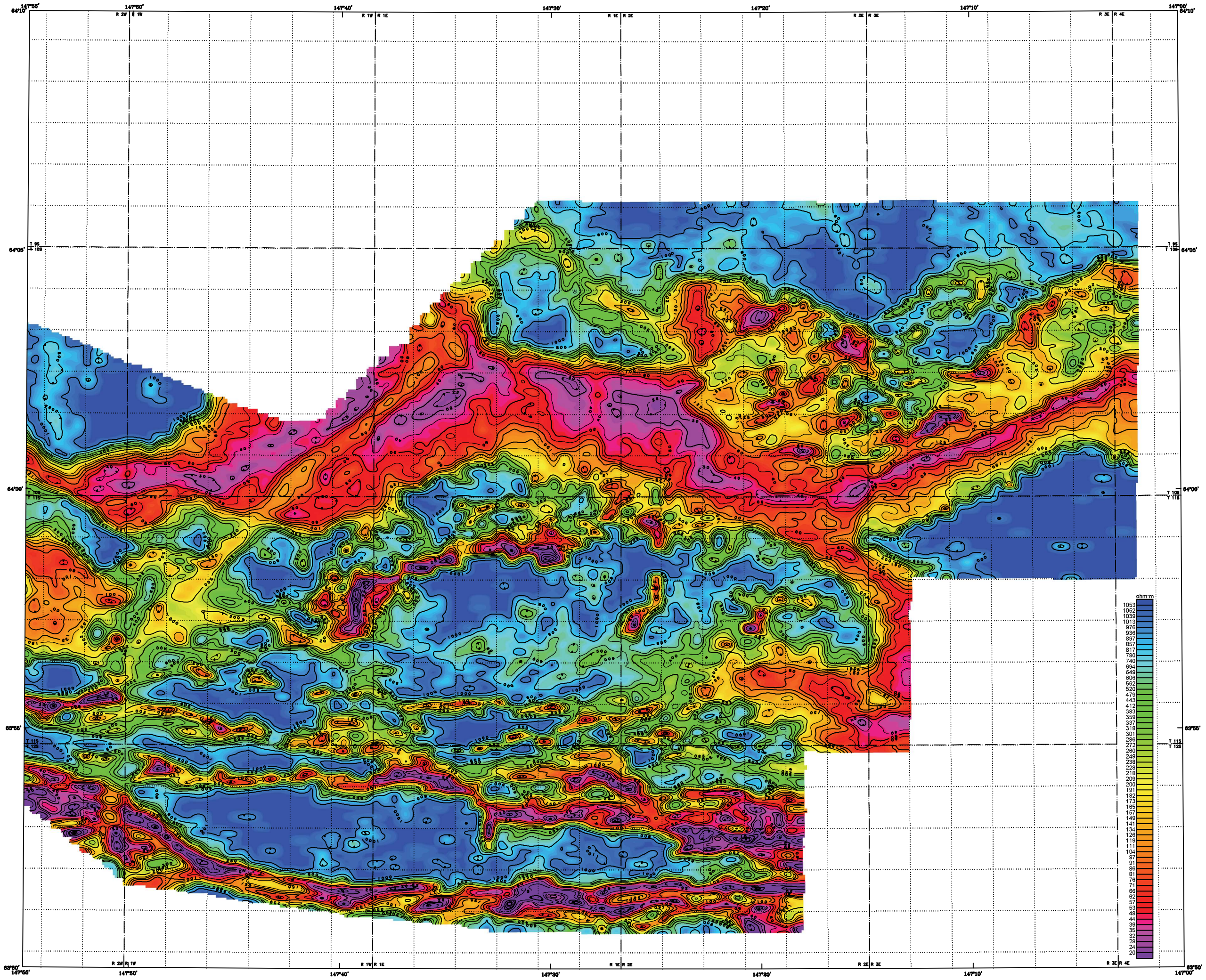
Contours in ohm-m at 10 intervals per decade

. . . . resistivity low

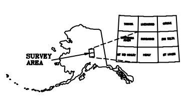
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



SCALE 1:63,360

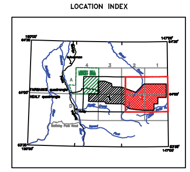


900 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m 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 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. 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.

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

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

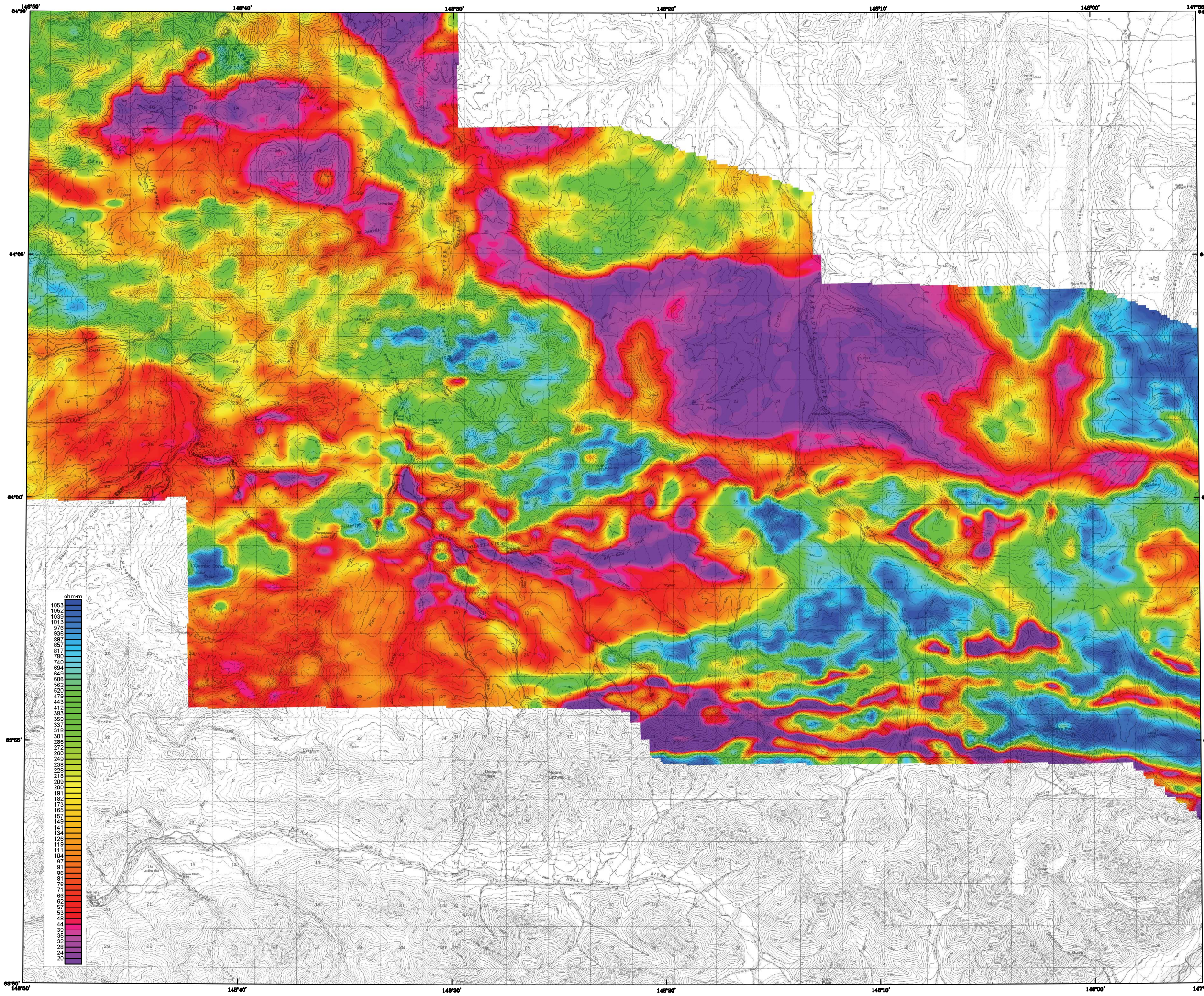
Contours in ohm-m at 10 intervals per decade

resistivity low

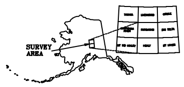
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



Base from U.S. Geological Survey Fairbanks A-2, 1972; A-3, 1972; A-4, 1972; Healy D-2, 1960; D-3, 1955; D-4, 1970; Quadrangles, Alaska



APPROXIMATE MEAN DECLINATION, 2006

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

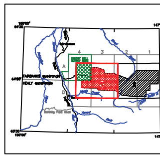
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

900 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

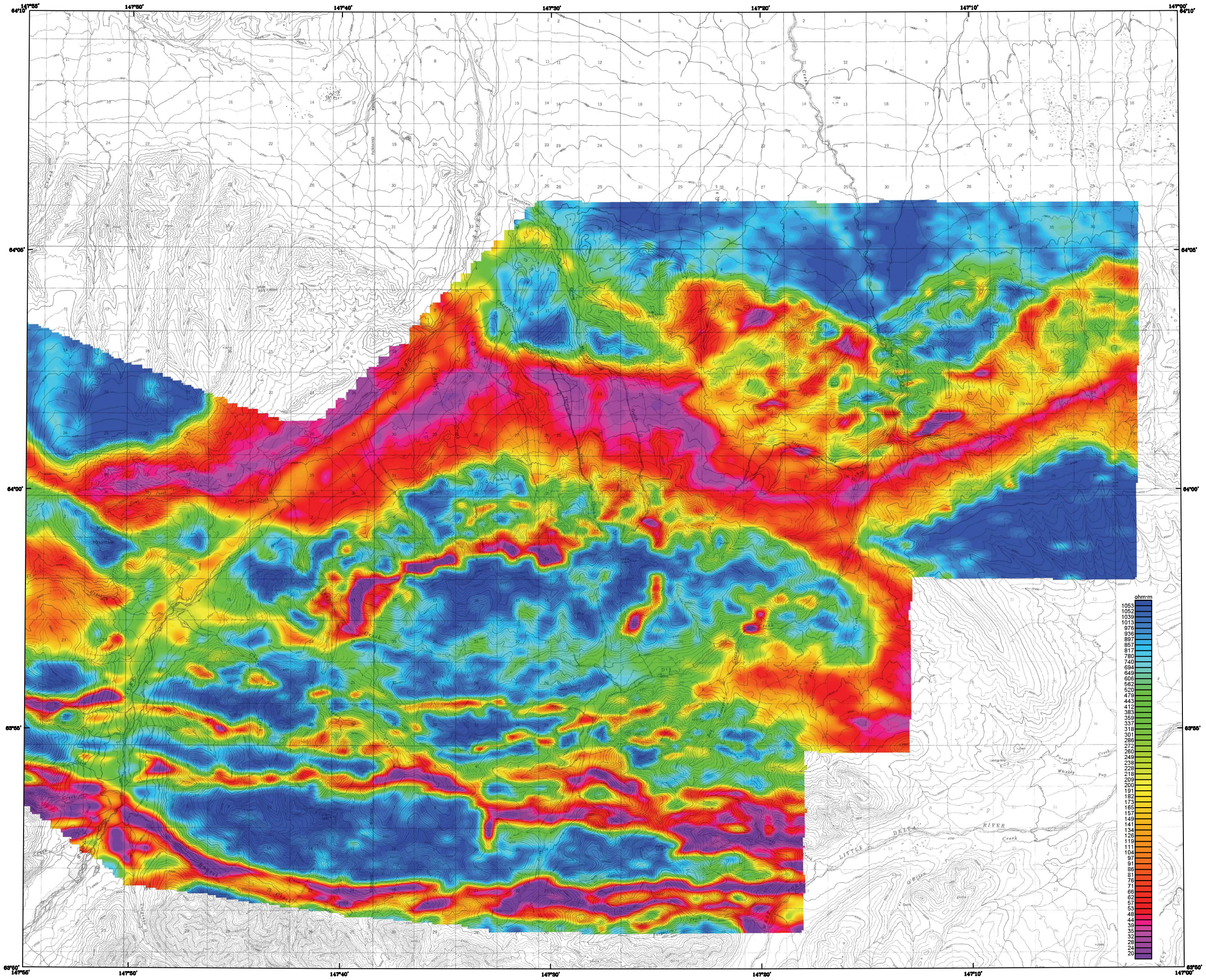
The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. 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.

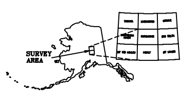
Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

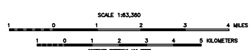
SURVEY HISTORY

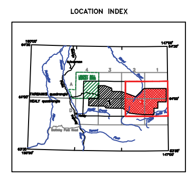
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).









900 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

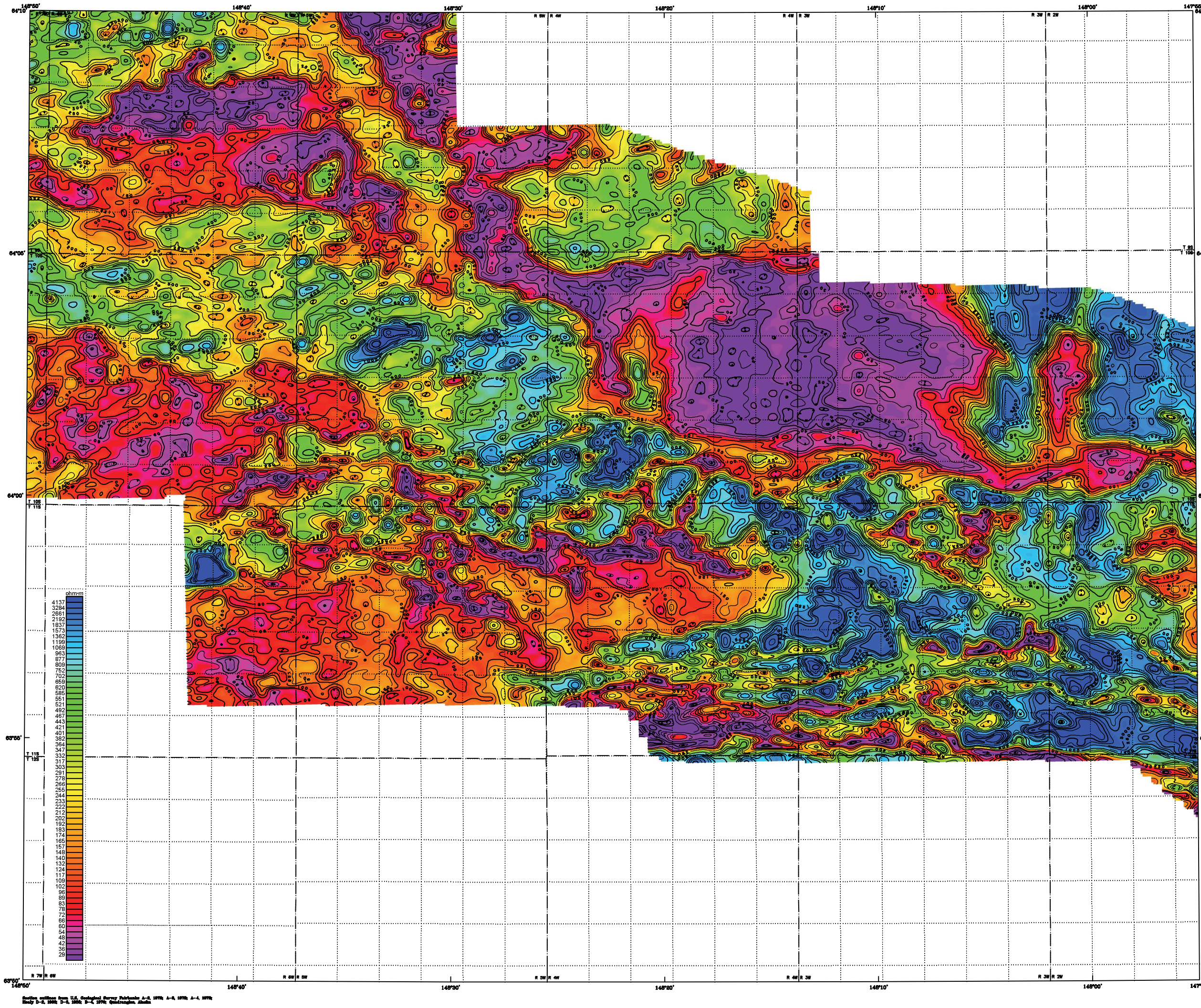
The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. 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.

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.

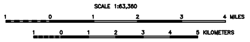
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



SCALE 1:63,360

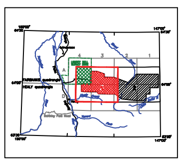


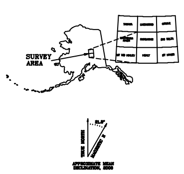
7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX





APPROXIMATE MEAN DECLINATION, 2006

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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–3 Squirrel helicopter at a mean terrain clearance of 200 feet along N–S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m 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 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. 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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

resistivity low

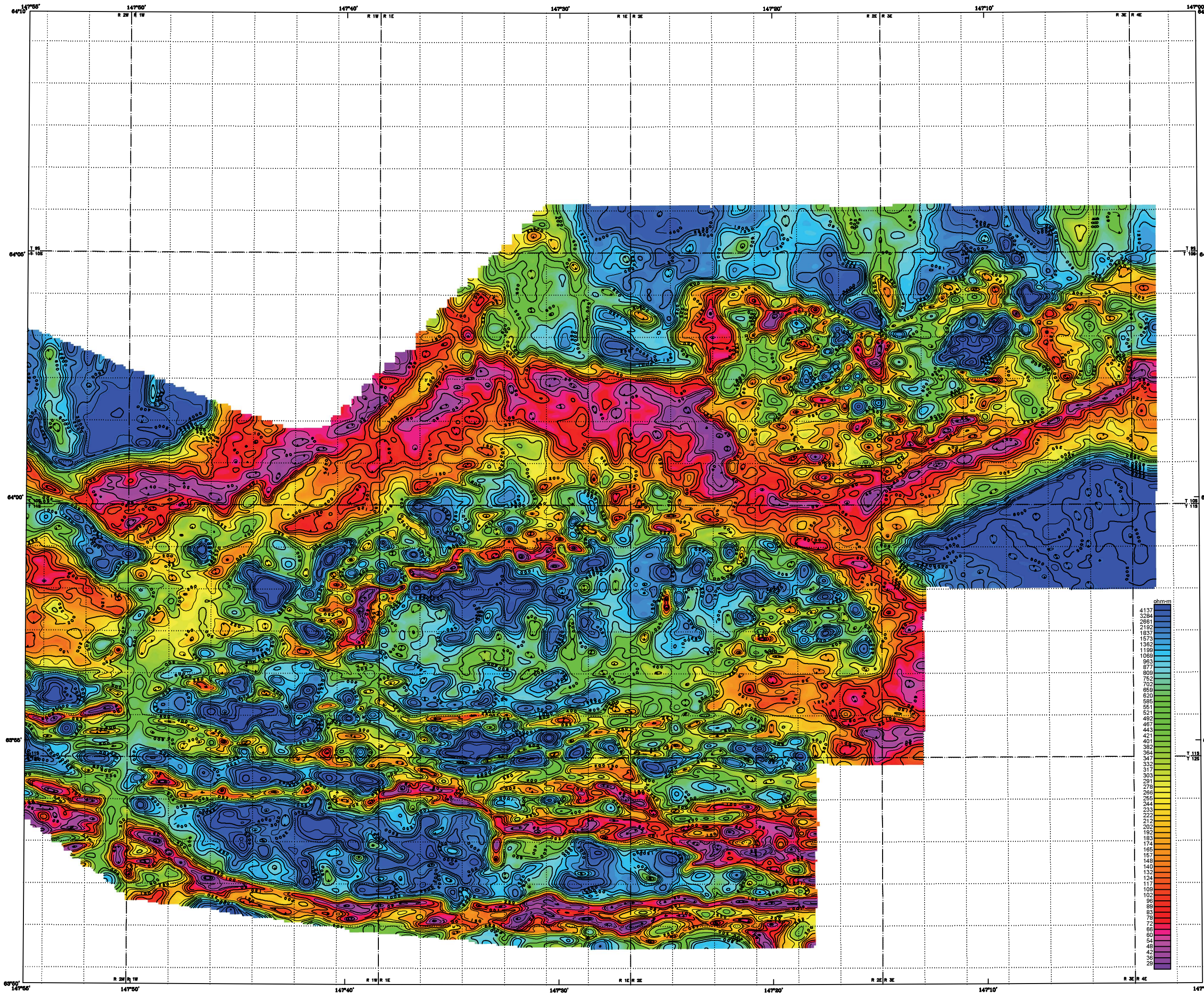
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

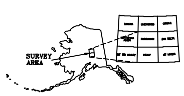
This map and other products from this survey are available by mail order in person from DGGS, 3354 College Road, Fairbanks, Alaska, 99709–3707. Published maps are also available for viewing or downloading as Adobe Acrobat Files (*.pdf) on our Web site (http://www.dggs.dnr.state.ak.us/pubs/).

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2007-1-3b
Sheet 2 of 2



SCALE 1:63,360

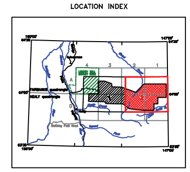


7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEMV 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. 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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

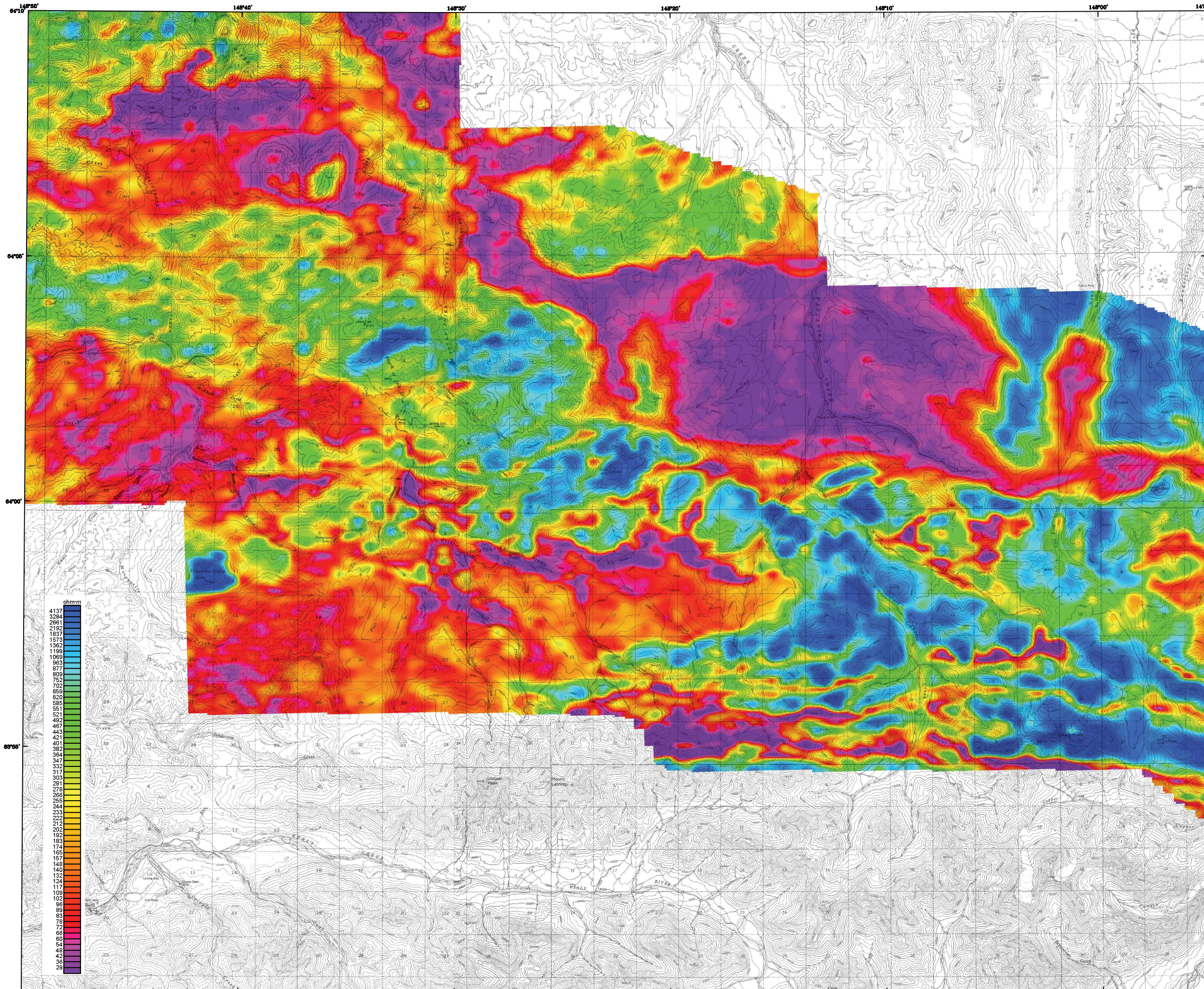
Contours in ohm-m at 10 intervals per decade

. . . . resistivity low

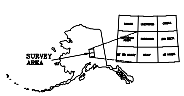
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



Base from U.S. Geological Survey Fairbanks A-2, 1972; A-3, 1970; A-4, 1972; Healy D-2, 1960; D-3, 1955; D-4, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

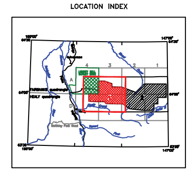
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



APPROXIMATE MEAN
DECLINATION, 2006

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

RESISTIVITY

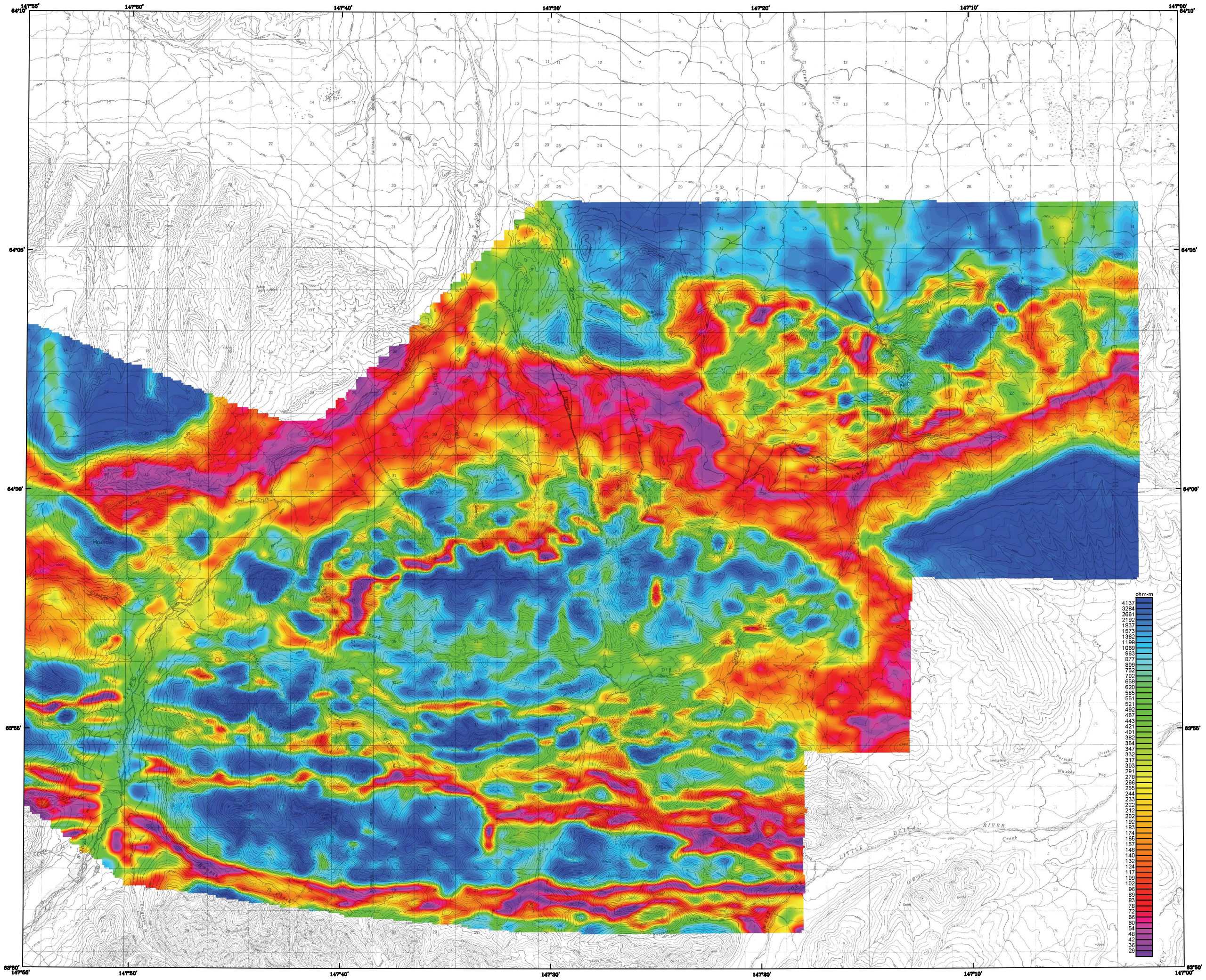
The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. 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.

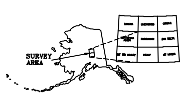
Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).





SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

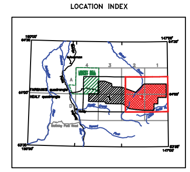
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m 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 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. 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.

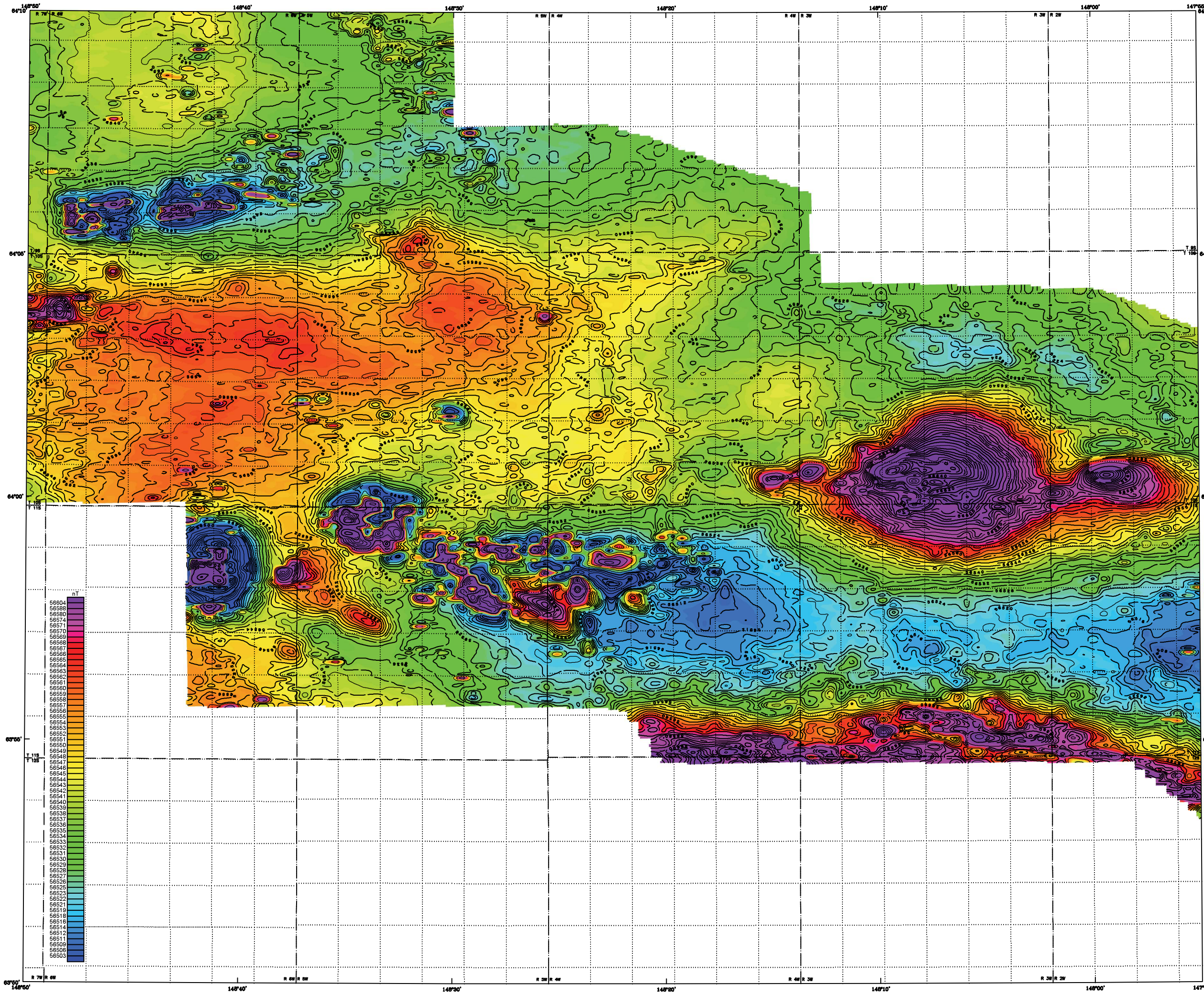
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2007-1-1b
Sheet 1 of 2

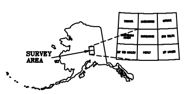


Section outlines from U.S. Geological Survey Fairbanks A-2, 1970; A-3, 1970; A-4, 1970; Healy D-2, 1960; D-3, 1956; D-4, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



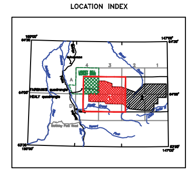
APPROXIMATE MEAN DECLINATION, 2006

TOTAL MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

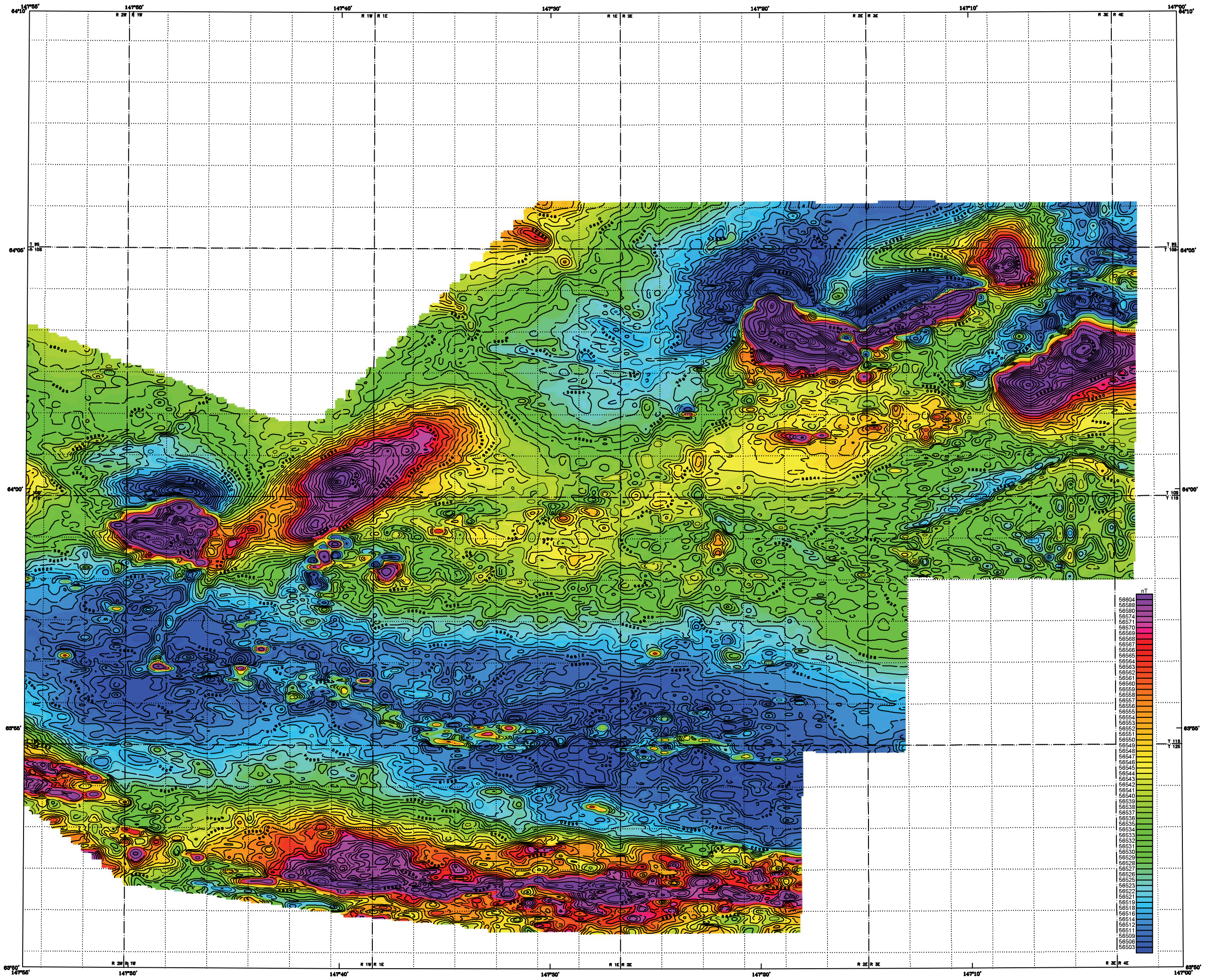
MAGNETIC CONTOUR INTERVAL

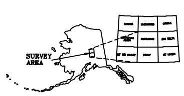
————	............100 nT
————	.... 20 nT
————	.... 4 nT
— — — —	.... 2 nT

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).





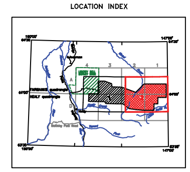
SCALE 1:63,360

TOTAL MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

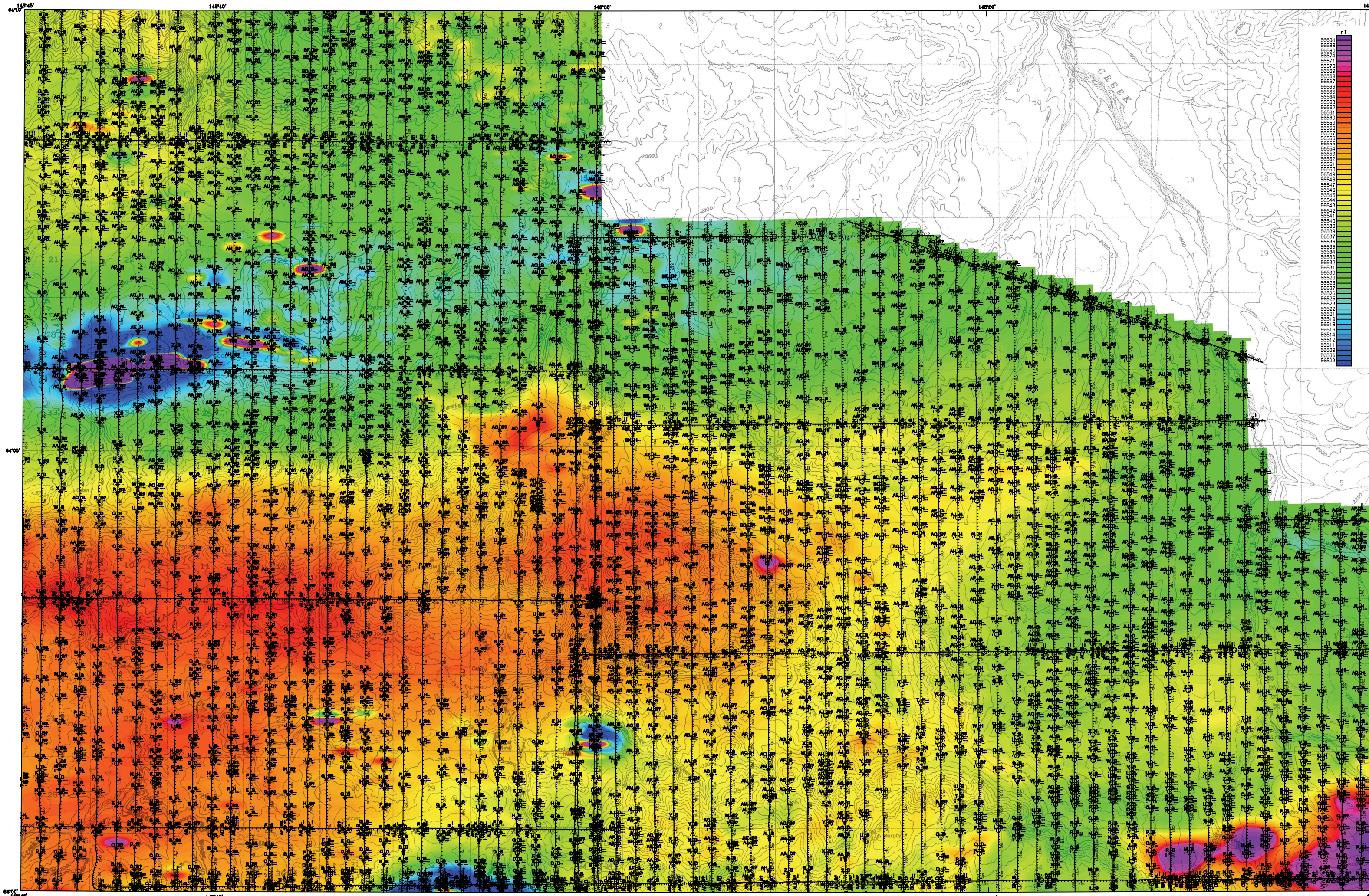
MAGNETIC CONTOUR INTERVAL

100 nT
20 nT
4 nT
2 nT

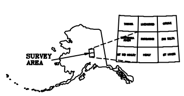
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



Base from U.S. Geological Survey Fairbanks A-3, 1970; A-4, 1970; Quadrangles, Alaska



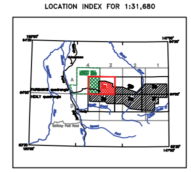
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

LOCATION INDEX FOR 1:31,680



APPROXIMATE MEAN DECLINATION, 2006

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of FAIRBANKS A-3 and A-4 QUADRANGLES

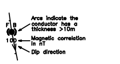
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

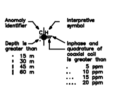
The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

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
Δ^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

To determine the location of EM anomalies or their boundaries, the DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

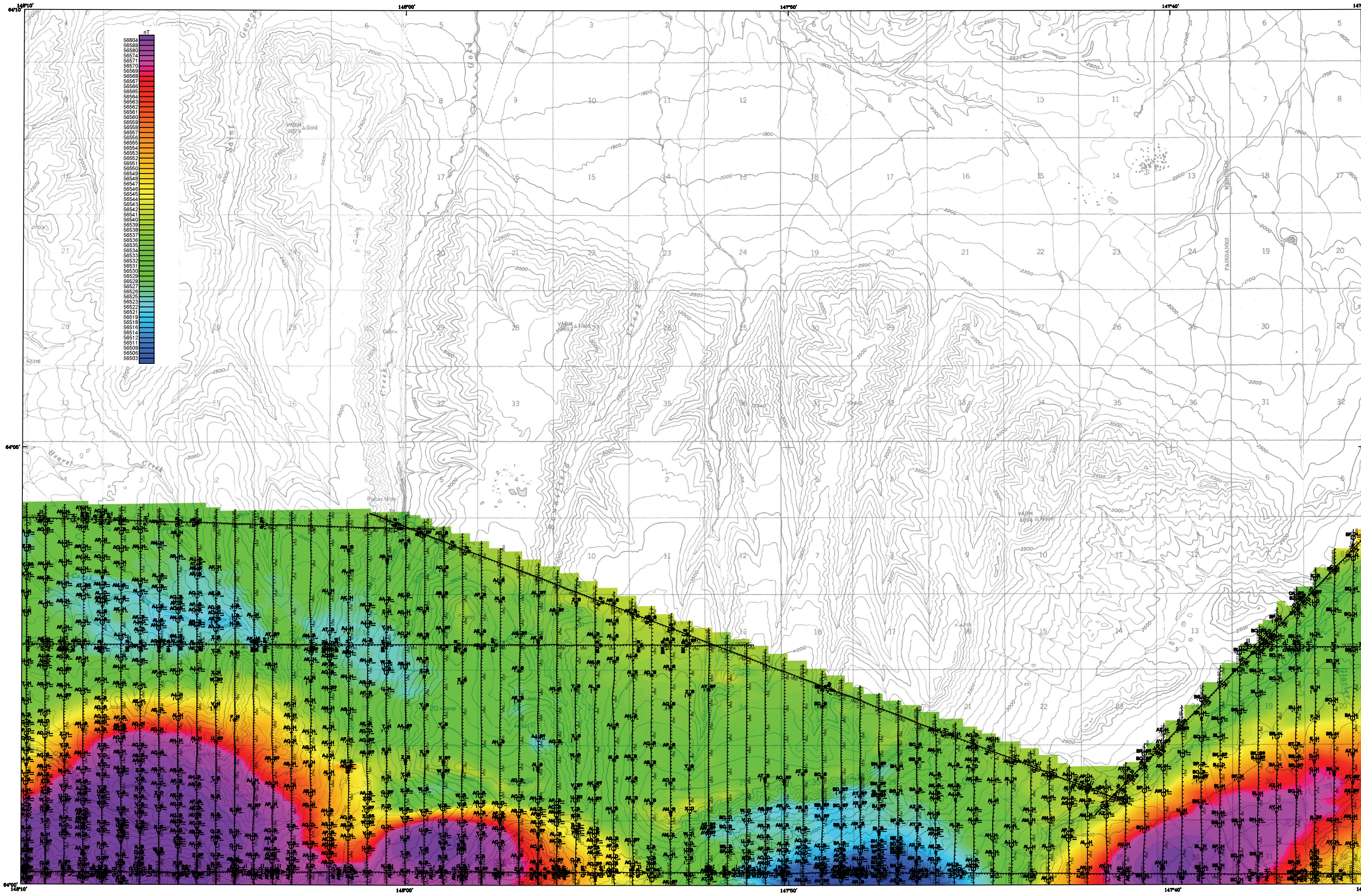
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

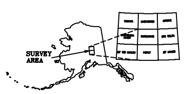
GEOPHYSICAL REPORT 2007-2-2b
PARTS of FAIRBANKS A-2 and A-3 QUADRANGLES



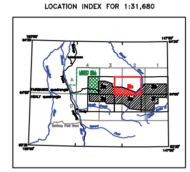
SCALE 1:31,680

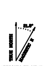
0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS



LOCATION INDEX FOR 1:31,680





TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of FAIRBANKS A-3 and A-4 QUADRANGLES

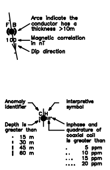
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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–3 Squirrel helicopter at a mean terrain clearance of 200 feet along N–S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES



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

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

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial–coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar–coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial– and coplanar–coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

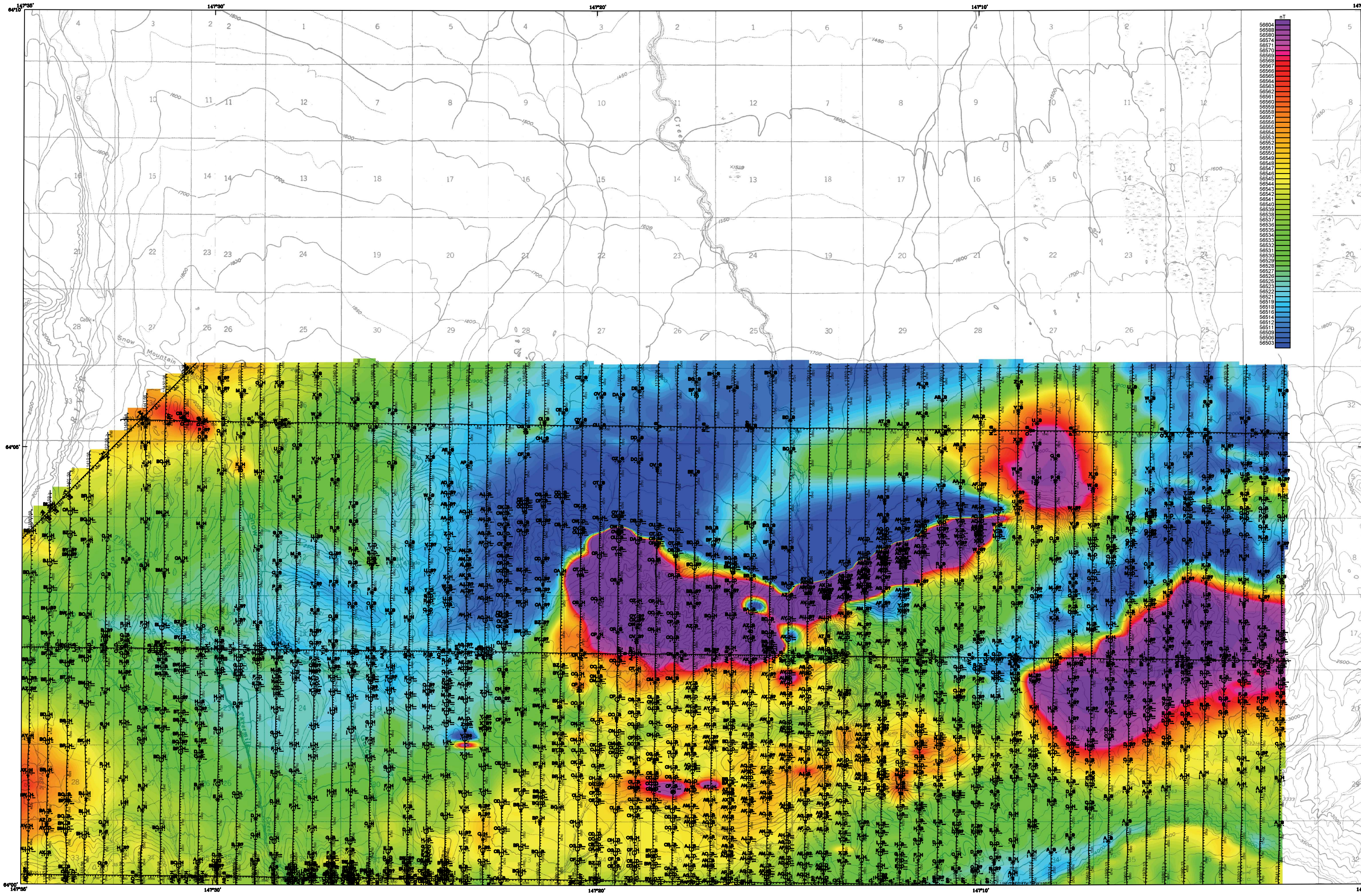
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

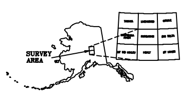
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).





SCALE 1:31,680

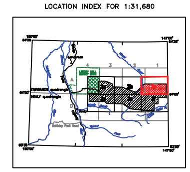
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of FAIRBANKS A-1 and A-2 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX FOR 1:31,680



APPROXIMATE MEAN DECLINATION, 2006

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m
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.

TOTAL MAGNETIC FIELD

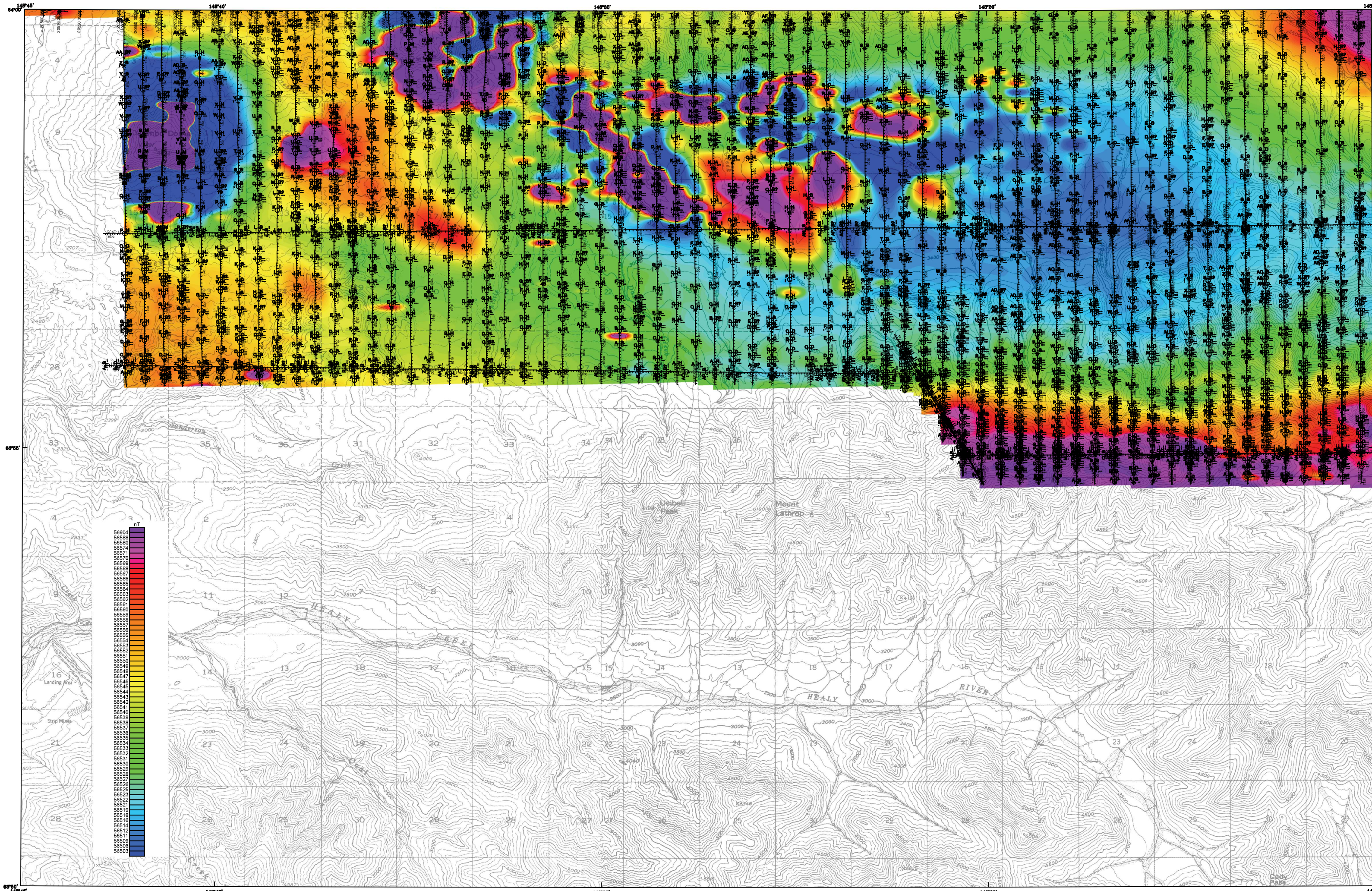
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

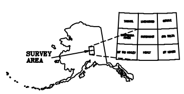
This map and other products from this survey are available by mail order in person from DGGS, 3354 College Road, Fairbanks, Alaska, 99709–3707. Published maps are also available for viewing or downloading as Adobe Acrobat Files (*.pdf) on our Web site (http://www.dggs.dnr.state.ak.us/pubs/).



Base from U.S. Geological Survey Healy D-3, 1950; D-4, 1970; Quadrangles, Alaska.

SCALE 1:31,680

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

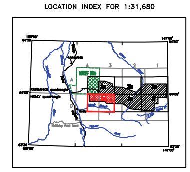


TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of HEALY D-3 and D-4 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

LOCATION INDEX FOR 1:31,680

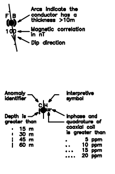


DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES



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

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

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

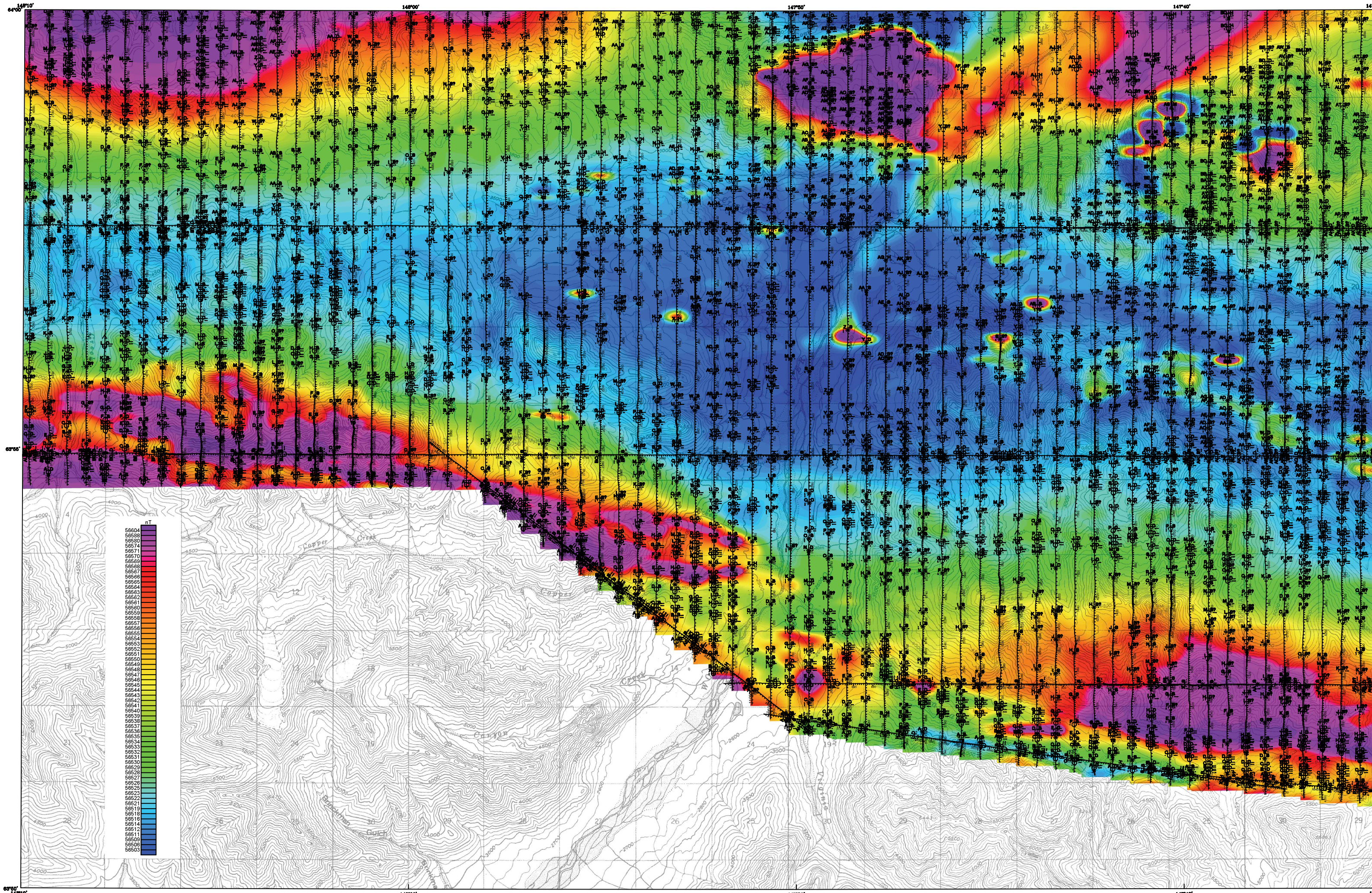
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



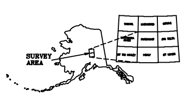
Base from U.S. Geological Survey Healy D-2, 1950; D-3, 1950; Quadrangles, Alaska

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

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of HEALY D-2 and D-3 QUADRANGLES

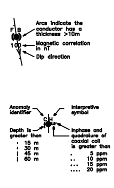
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES



Depth is greater than	Inphase and quadrature of coaxial coil is greater than
15 m	5 ppm
30 m	10 ppm
45 m	15 ppm
60 m	20 ppm

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

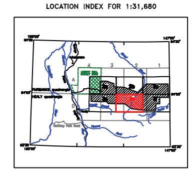
To determine the location of EM anomalies or their boundaries, the DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

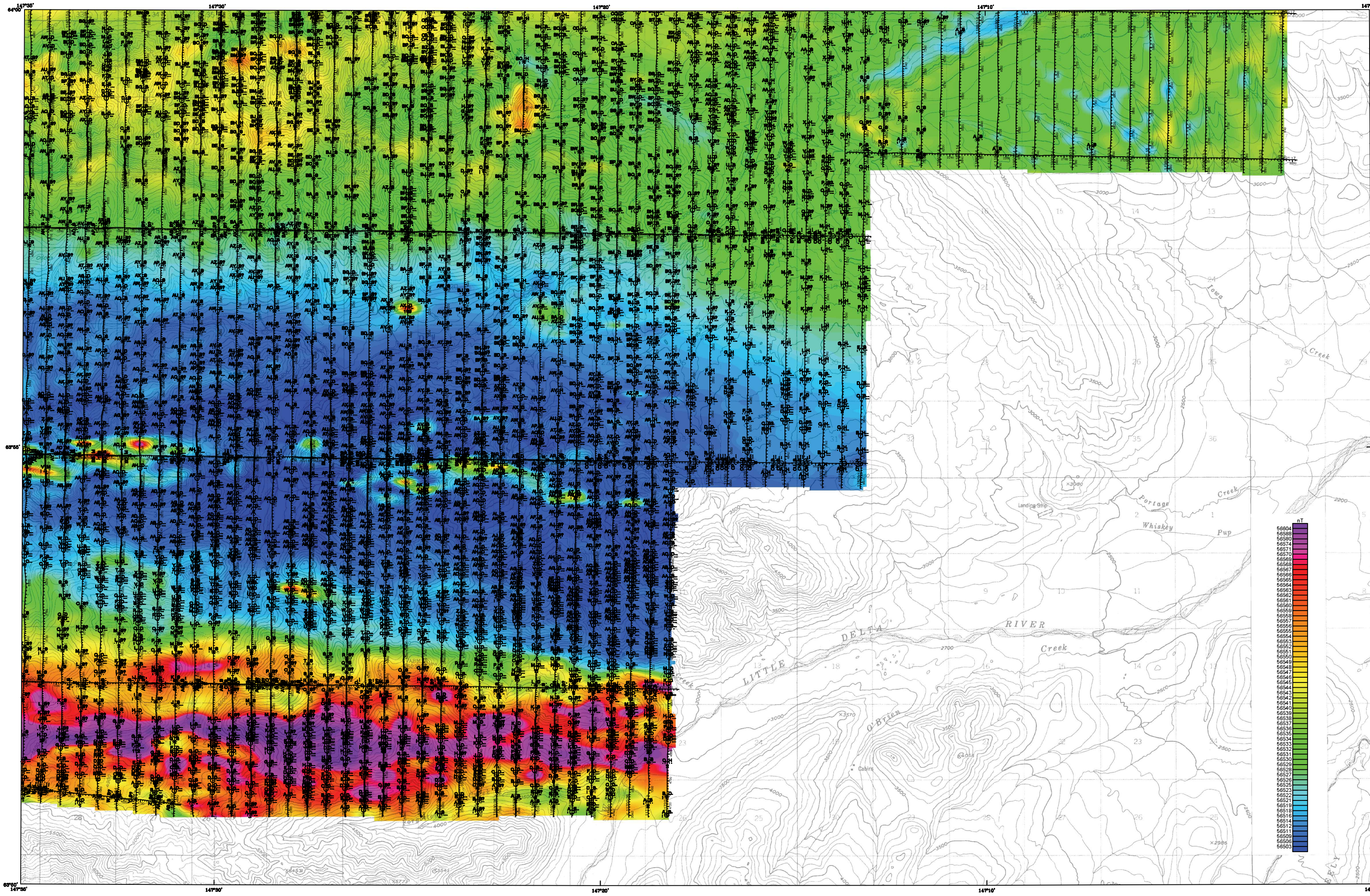
LOCATION INDEX FOR 1:31,680



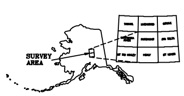
SURVEY HISTORY

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).



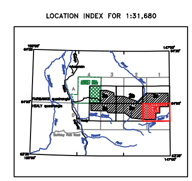
SCALE 1:31,680



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS of HEALY D-1 and D-2 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES

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

Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◓	20–50 siemens
⊕ (heavy)	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

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

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

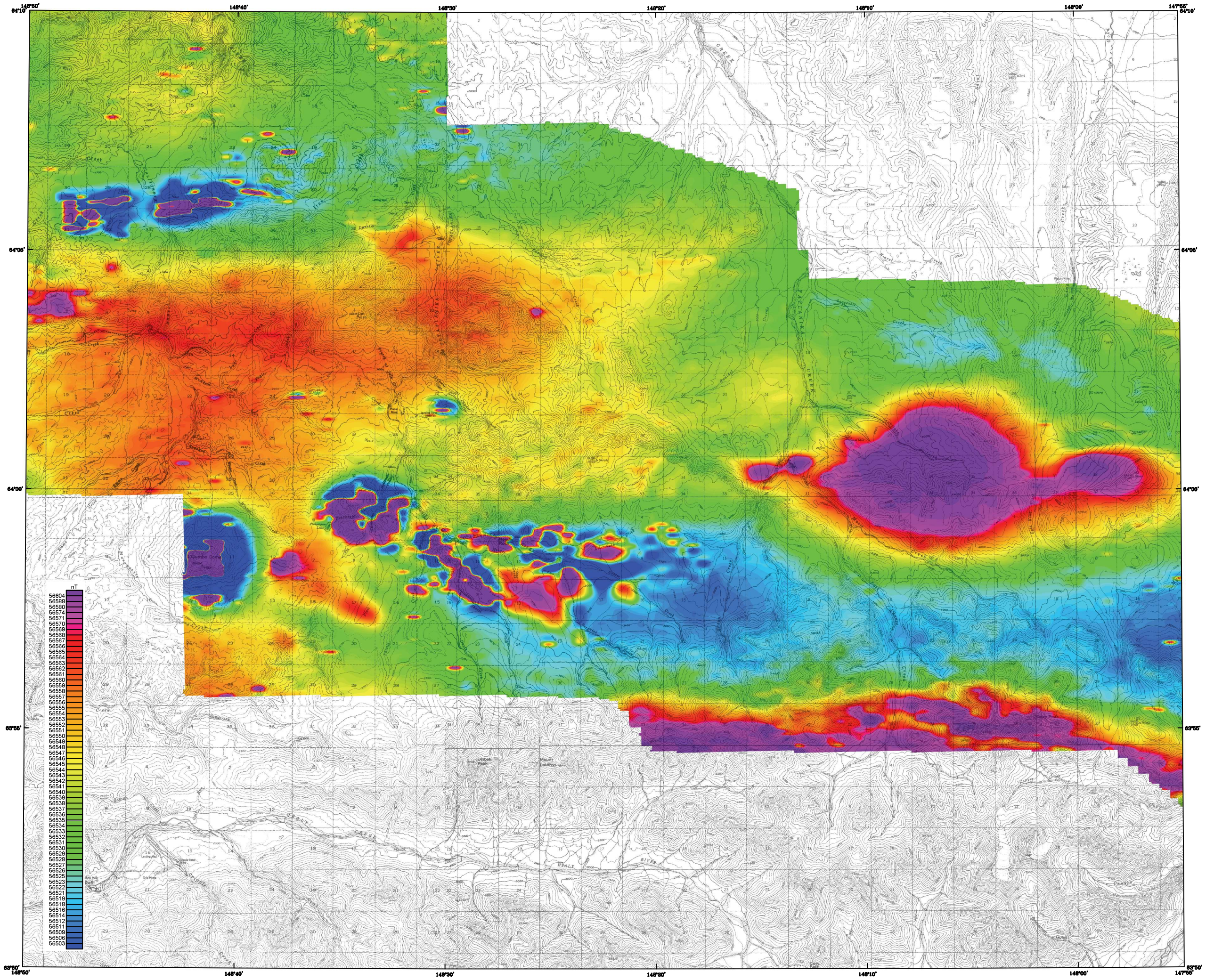
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

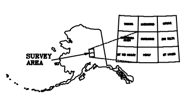
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

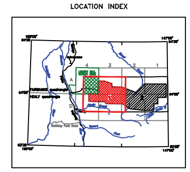




TOTAL MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

PARTS OF FAIRBANKS and HEALY QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2007



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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.

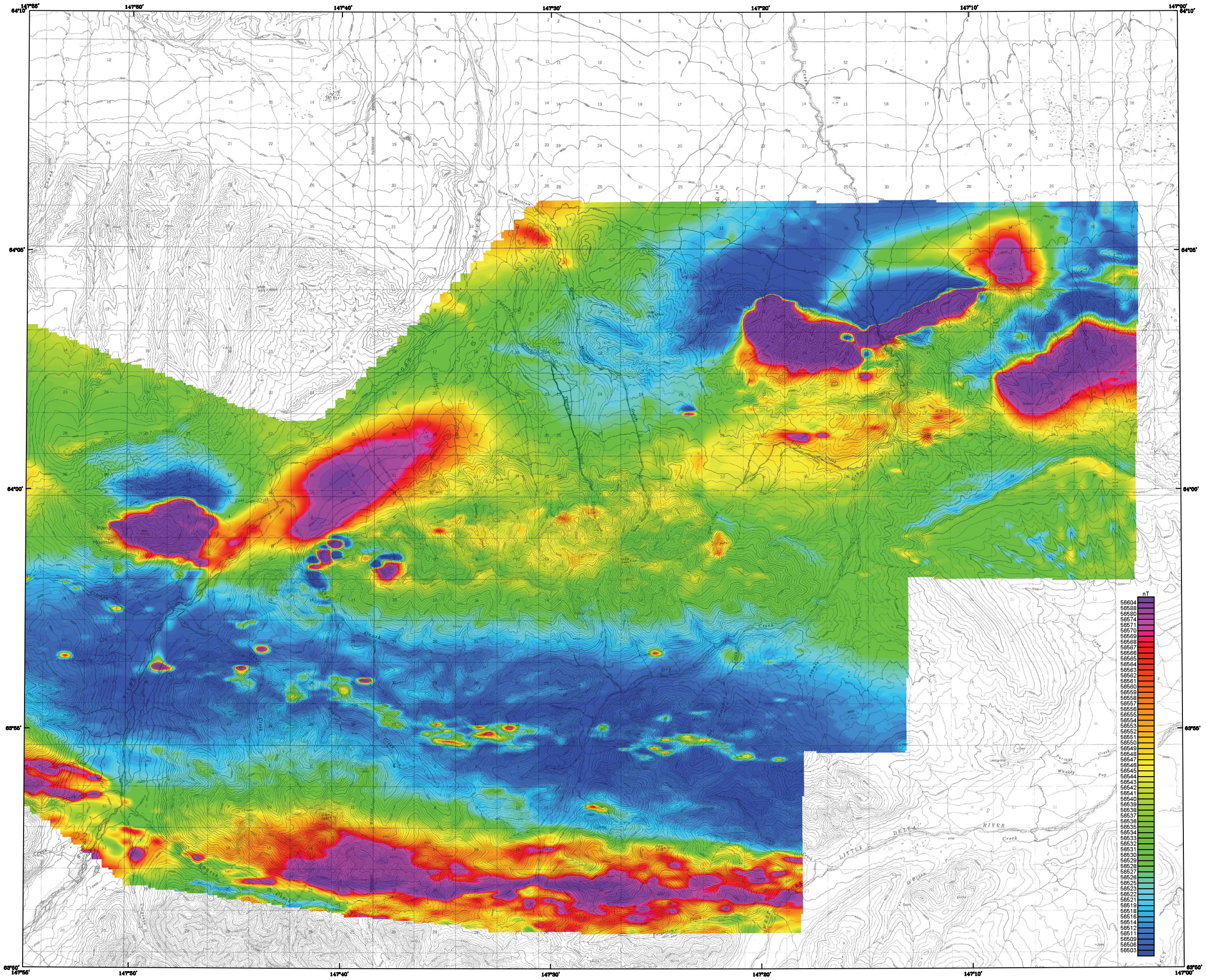
SURVEY HISTORY

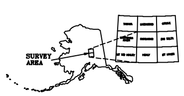
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2007-1-1a
Sheet 2 of 2





SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

TOTAL MAGNETIC FIELD OF PARTS OF THE BONNIFIELD MINING DISTRICT, INTERIOR ALASKA

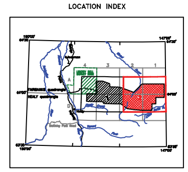
PARTS OF FAIRBANKS and HEALY QUADRANGLES

by

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

2007

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. 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-3 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 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 10m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 cesium magnetometer with a Scintrex CS3 sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to November 2006) 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 area were acquired and processed by Fugro Airborne Surveys Corp. in 2006 and 2007.

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/).