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WGM, Inc., Stevens Exploration Management Corp., and Fugro Airborne Surveys Corp.

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RAMPART–MANLEY ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns¹, G.R.C. Graham¹, J.D. Barefoot¹, Rebecca-Ellen Woods¹, Dighem, R.A. Pritchard², WGM, Inc., Stevens Exploration Management Corp., and Fugro Airborne Surveys Corp.

ABSTRACT

The Rampart-Manley electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Rampart and Hot Springs mining districts, about 110 kilometers northwest of Fairbanks, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^V system from September to October 1995, and from August to September 1996. A total of 7510 line kilometers were collected covering 2679.4 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform (“bird”) on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska’s most promising mineral belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. The Rampart-Manley area hosts many small to medium production placer gold mines, such as Eureka Creek. Lode prospects include Elephant Mountain (gold), as well as the Tofty carbonatite-hosted rare earth element, niobium and yttrium mineralization. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

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

ACKNOWLEDGMENTS

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

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

² Fugro Airborne Surveys Corp.

AVAILABLE DATA

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

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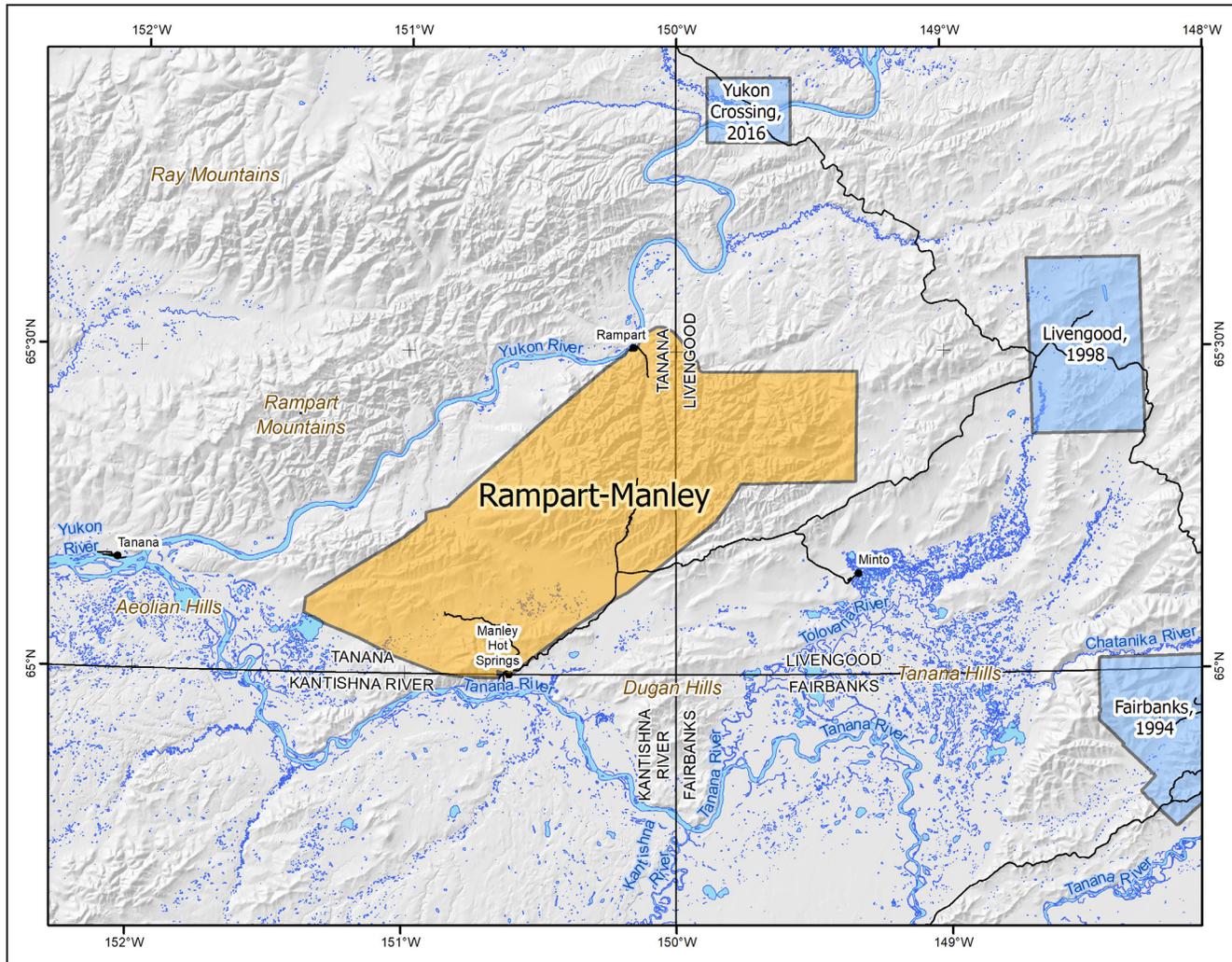


Figure 1. Rampart–Manley electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Rampart–Manley survey area shown with adjacent DGGs geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, and elevation hillshade.



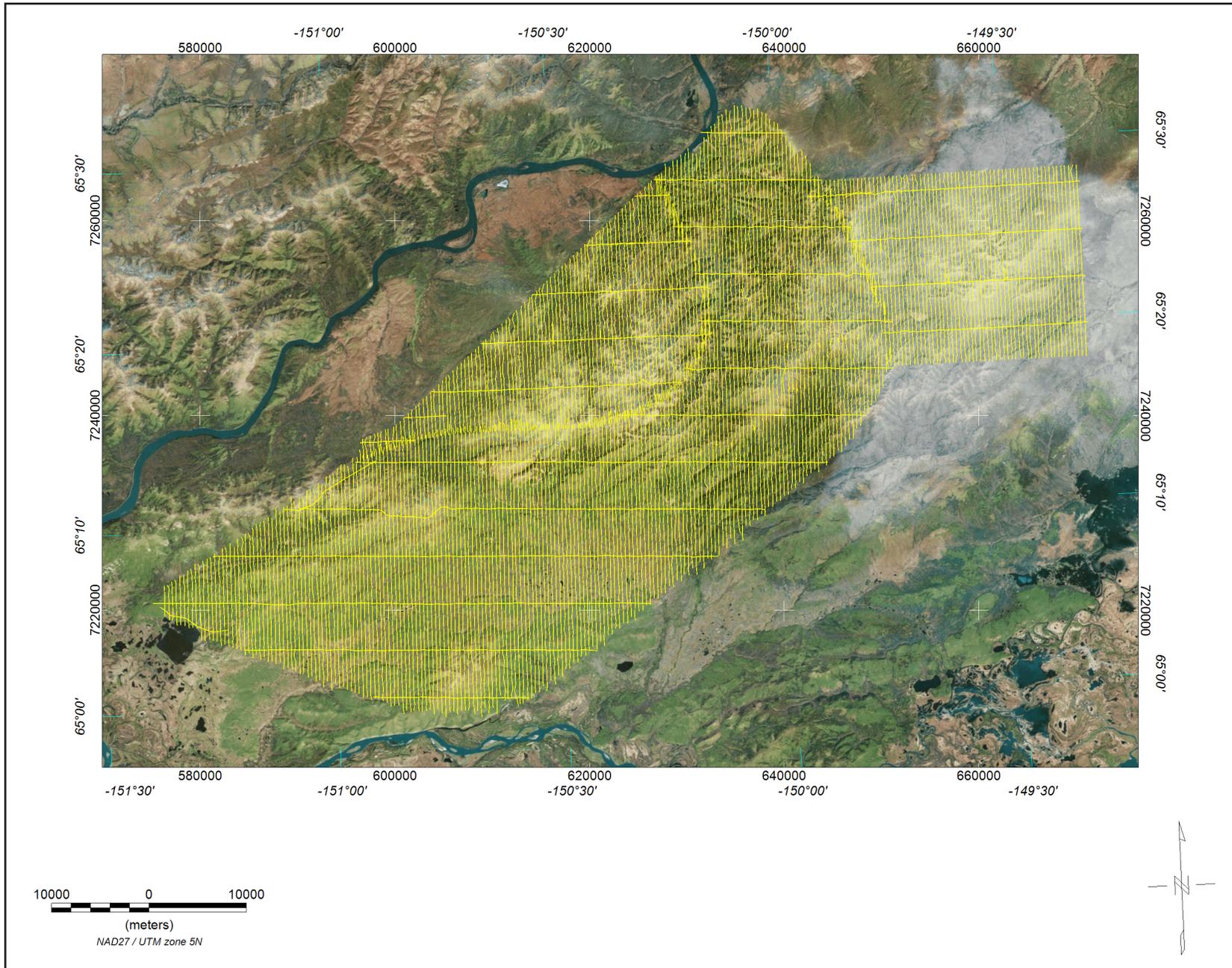


Figure 2. Flight path with orthometric image.

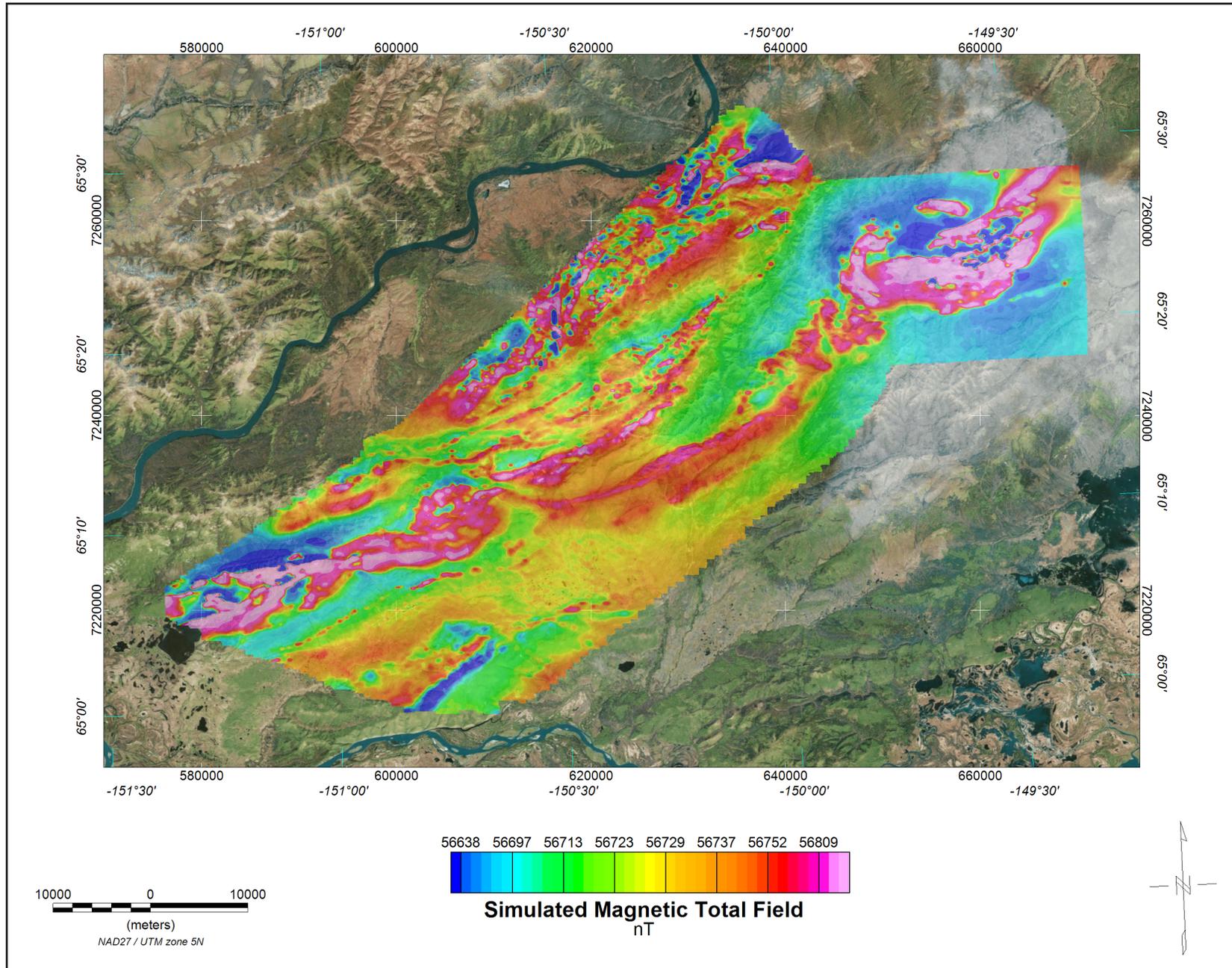


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1985, updated to October, 1996), (3) leveled to the tie line data, (4) a constant value of approximately 57,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique

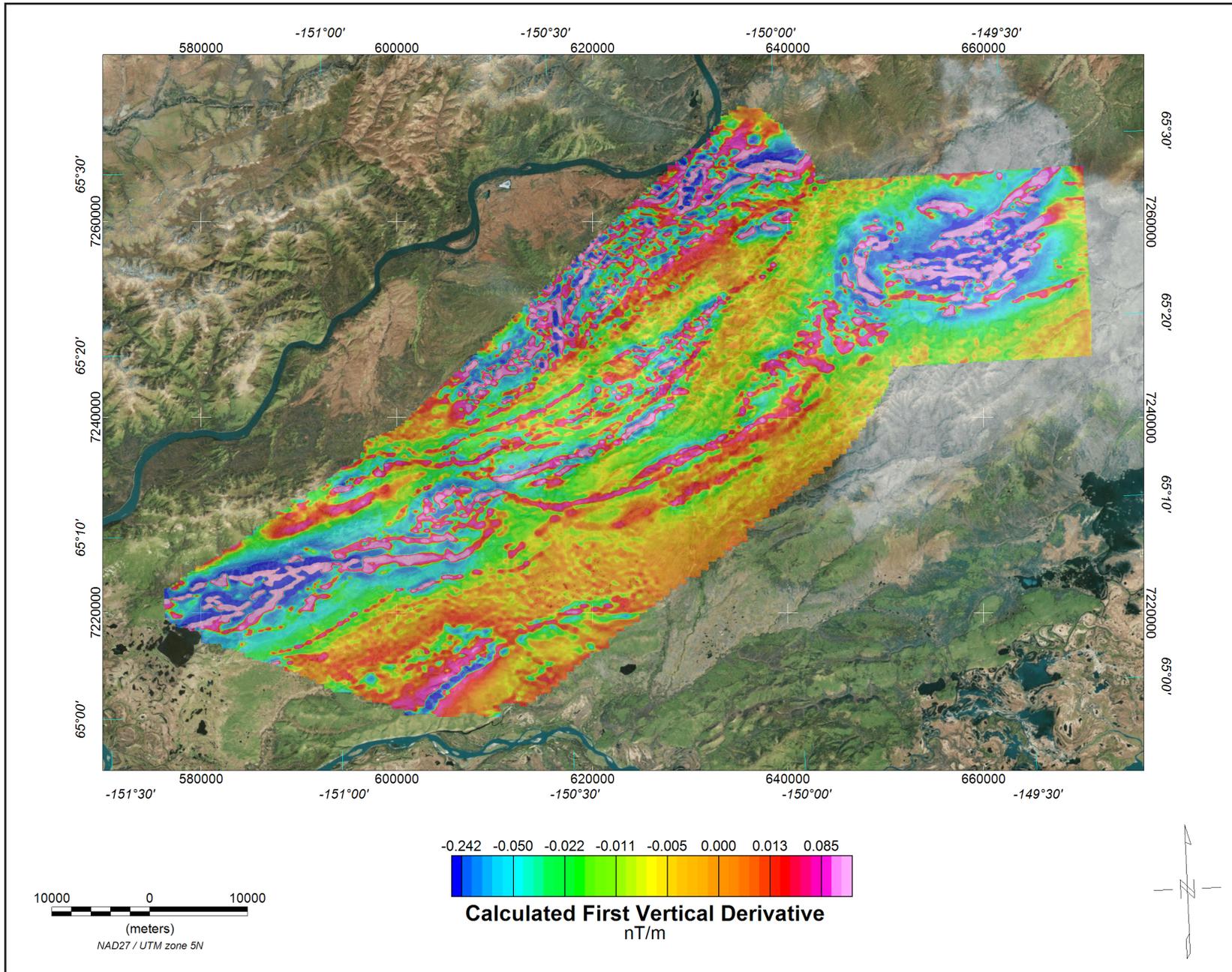


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides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

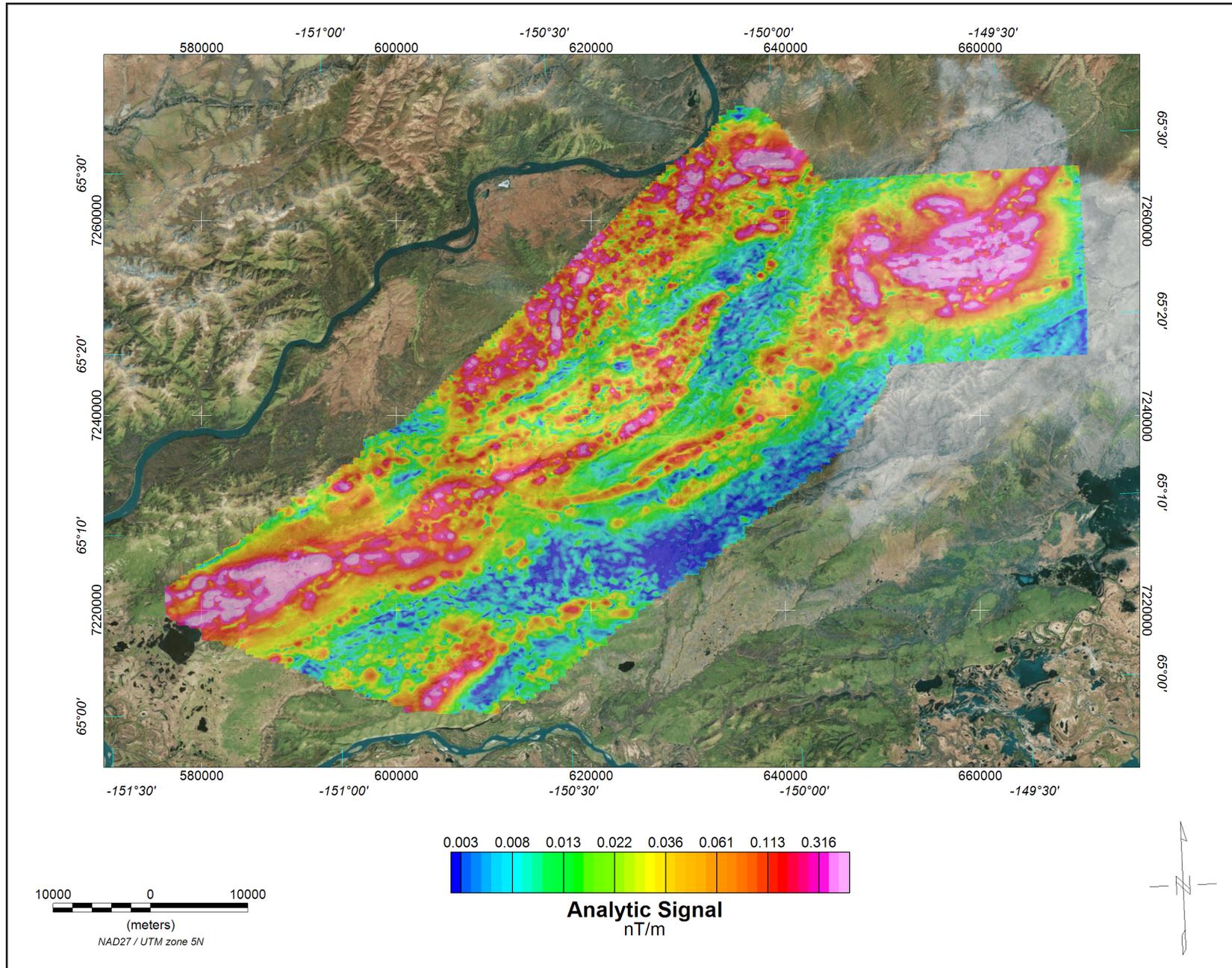


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source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

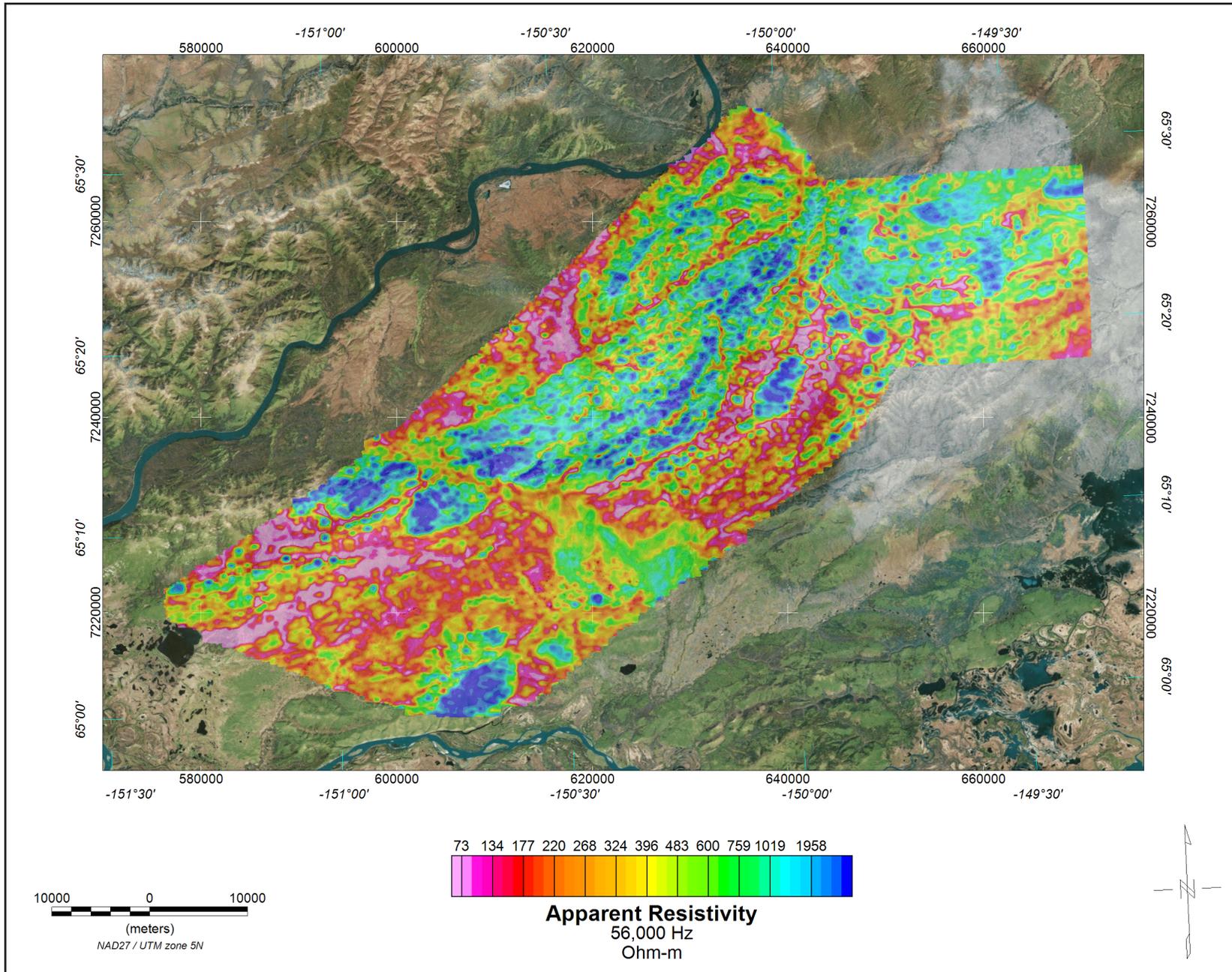


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^Y EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

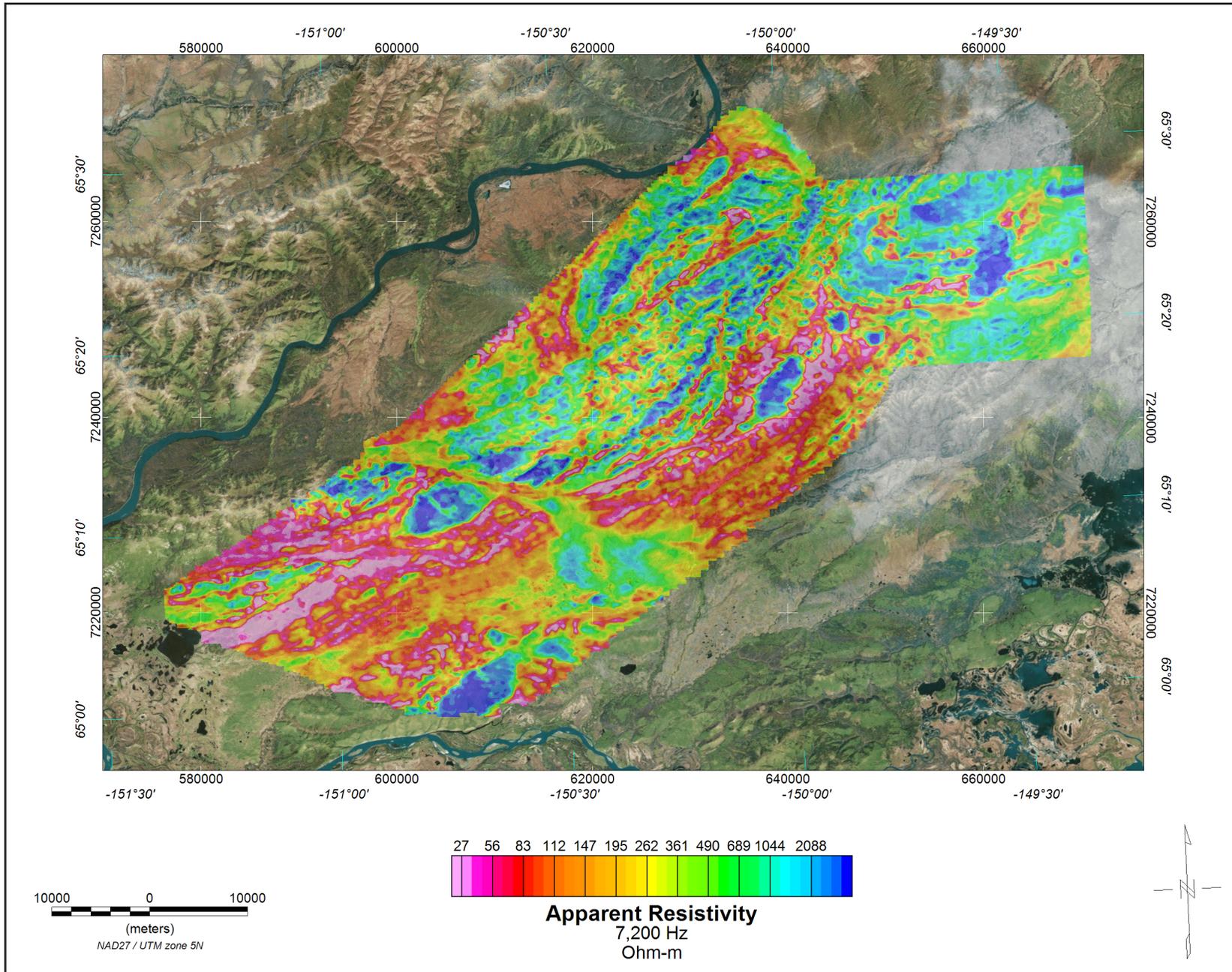


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

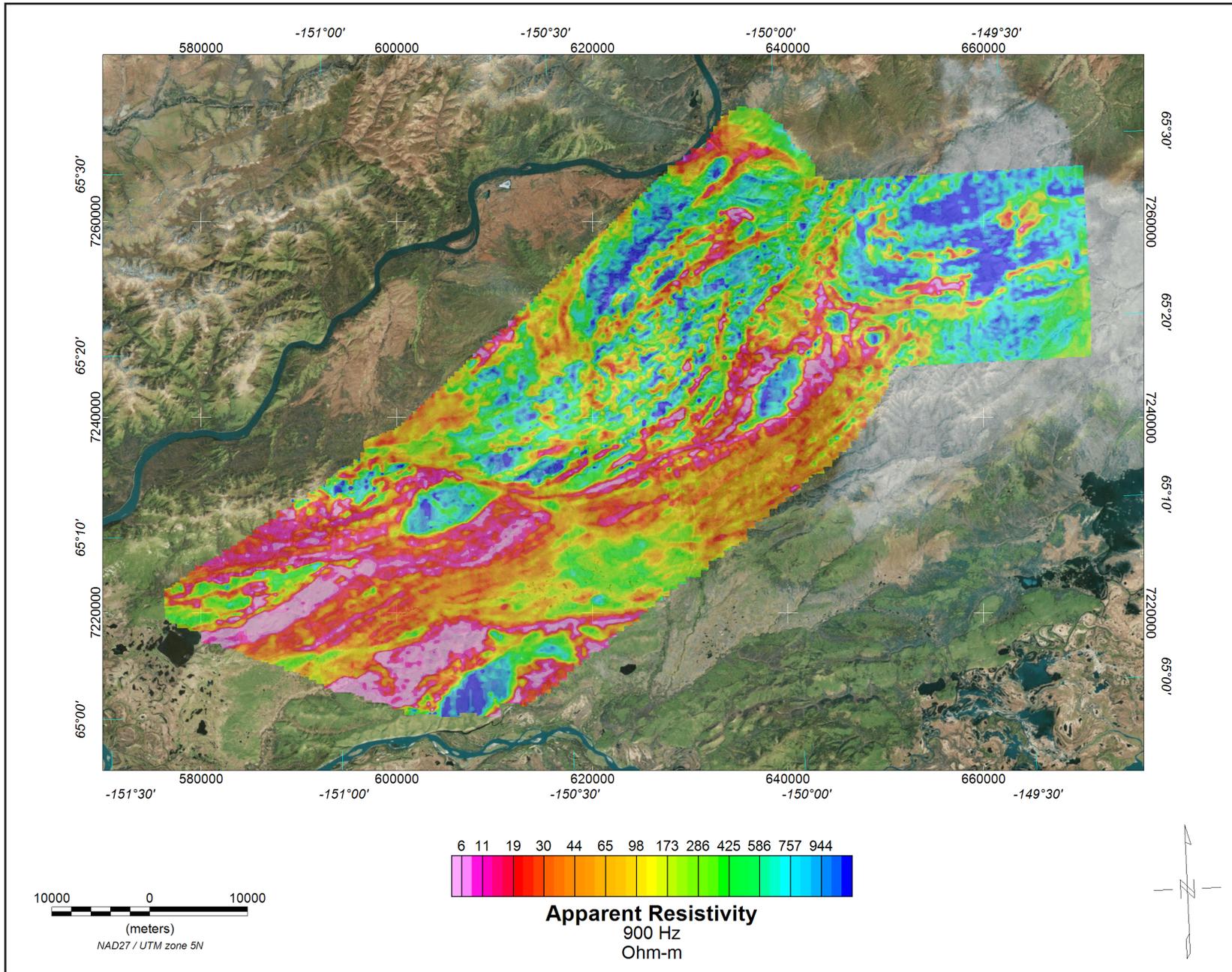
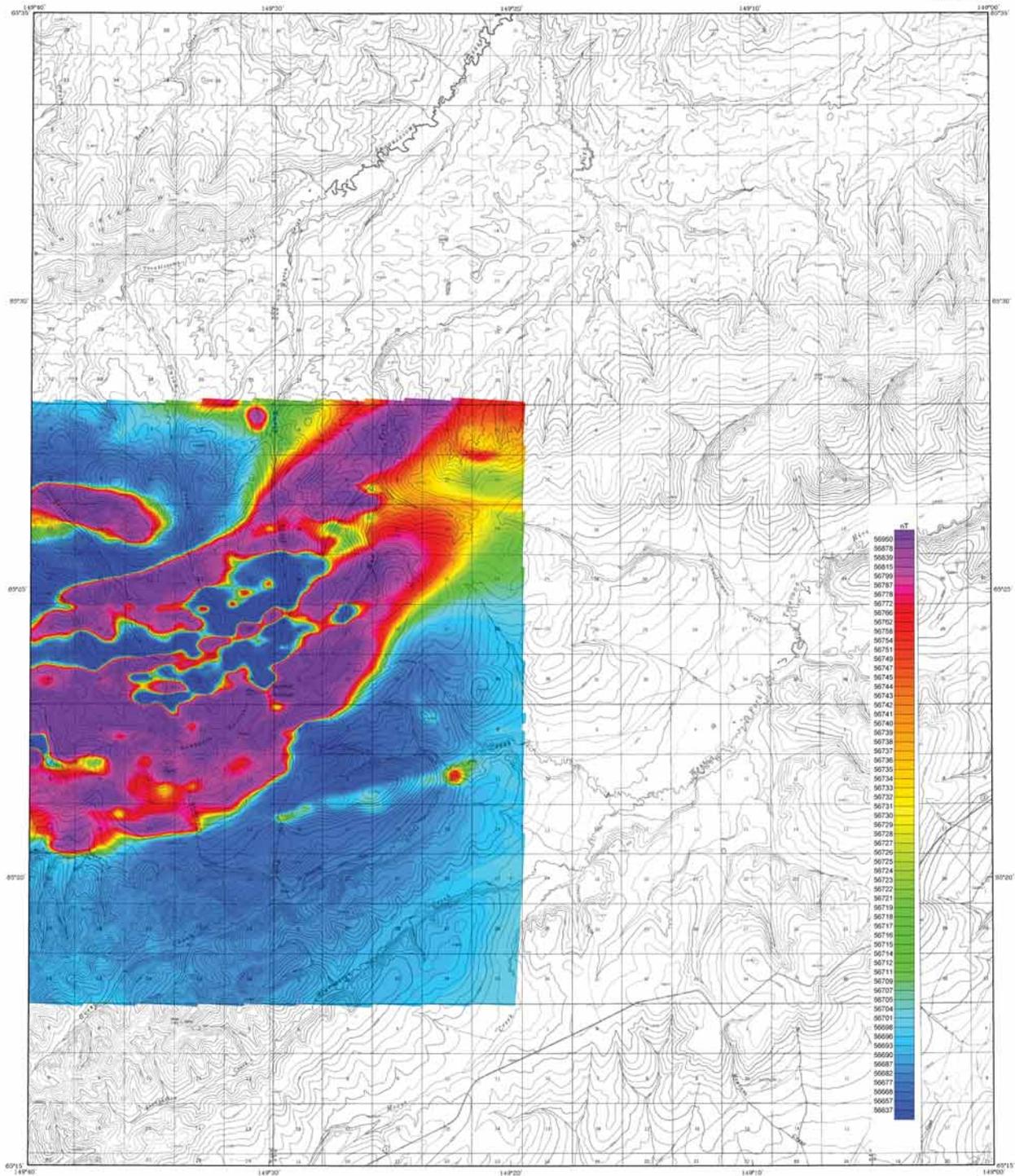


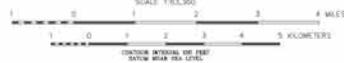
Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30417>

Map Title	Description
rampartmanley_sim_magtf_topo_map_1of3.pdf	simulated magnetic total field grid with topographic base map
rampartmanley_sim_magtf_topo_map_2of3.pdf	simulated magnetic total field grid with topographic base map
rampartmanley_sim_magtf_topo_map_3of3.pdf	simulated magnetic total field grid with topographic base map
rampartmanley_sim_magtf_contours_plss_map_1of3.pdf	simulated magnetic total field grid and contours with public land survey system base layer
rampartmanley_sim_magtf_contours_plss_map_2of3.pdf	simulated magnetic total field grid and contours with public land survey system base layer
rampartmanley_sim_magtf_contours_plss_map_3of3.pdf	simulated magnetic total field grid and contours with public land survey system base layer
rampartmanley_res7200hz_topo_map_1of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
rampartmanley_res7200hz_topo_map_2of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
rampartmanley_res7200hz_topo_map_3of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
rampartmanley_res7200hz_contours_plss_map_1of3.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_res7200hz_contours_plss_map_2of3.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_res7200hz_contours_plss_map_3of3.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_res900hz_topo_map_1of3.pdf	900 Hz apparent resistivity grid with topographic base map
rampartmanley_res900hz_topo_map_2of3.pdf	900 Hz apparent resistivity grid with topographic base map
rampartmanley_res900hz_topo_map_3of3.pdf	900 Hz apparent resistivity grid with topographic base map
rampartmanley_res900hz_contours_plss_map_1of3.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_res900hz_contours_plss_map_2of3.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_res900hz_contours_plss_map_3of3.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
rampartmanley_emanomalies_sim_magtf_contours_topo_map_1of3.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
rampartmanley_emanomalies_sim_magtf_contours_topo_map_2of3.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
rampartmanley_emanomalies_sim_magtf_contours_topo_map_3of3.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
rampartmanley_interpretation_plss_map_1of3.pdf	interpretation based on geophysical data with public land survey system base layer
rampartmanley_interpretation_plss_map_2of3.pdf	interpretation based on geophysical data with public land survey system base layer
rampartmanley_interpretation_plss_map_3of3.pdf	interpretation based on geophysical data with public land survey system base layer



Base Map: U.S. Geological Survey Catalog # 5-1885 3-4, 1986
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TOTAL MAGNETIC FIELD OF THE RAMPART-MANLEY MINING DISTRICT, ALASKA

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVNGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetics (EM) system, a Scintrex caesium Cs132 magnetometer, and a Sierra VLI system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a rotor altimeter, GPS navigation system, 20/20 Hz monitors, and video camera. Flights were performed at a mean terrain clearance of 300 feet along survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Survey Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1860 (UTM) projection, 1987 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 300,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

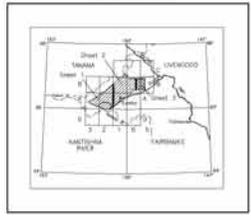
TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex caesium Cs132 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGF gradient, 1985, updated to October, 1996) was removed from the leveled magnetic data.

NOTE: In 1970, a new method of interpolation and smooth curve fitting based on local procedures, as of the Association of Geophysical Geographers, a 10, no. 4, p. 588-603.

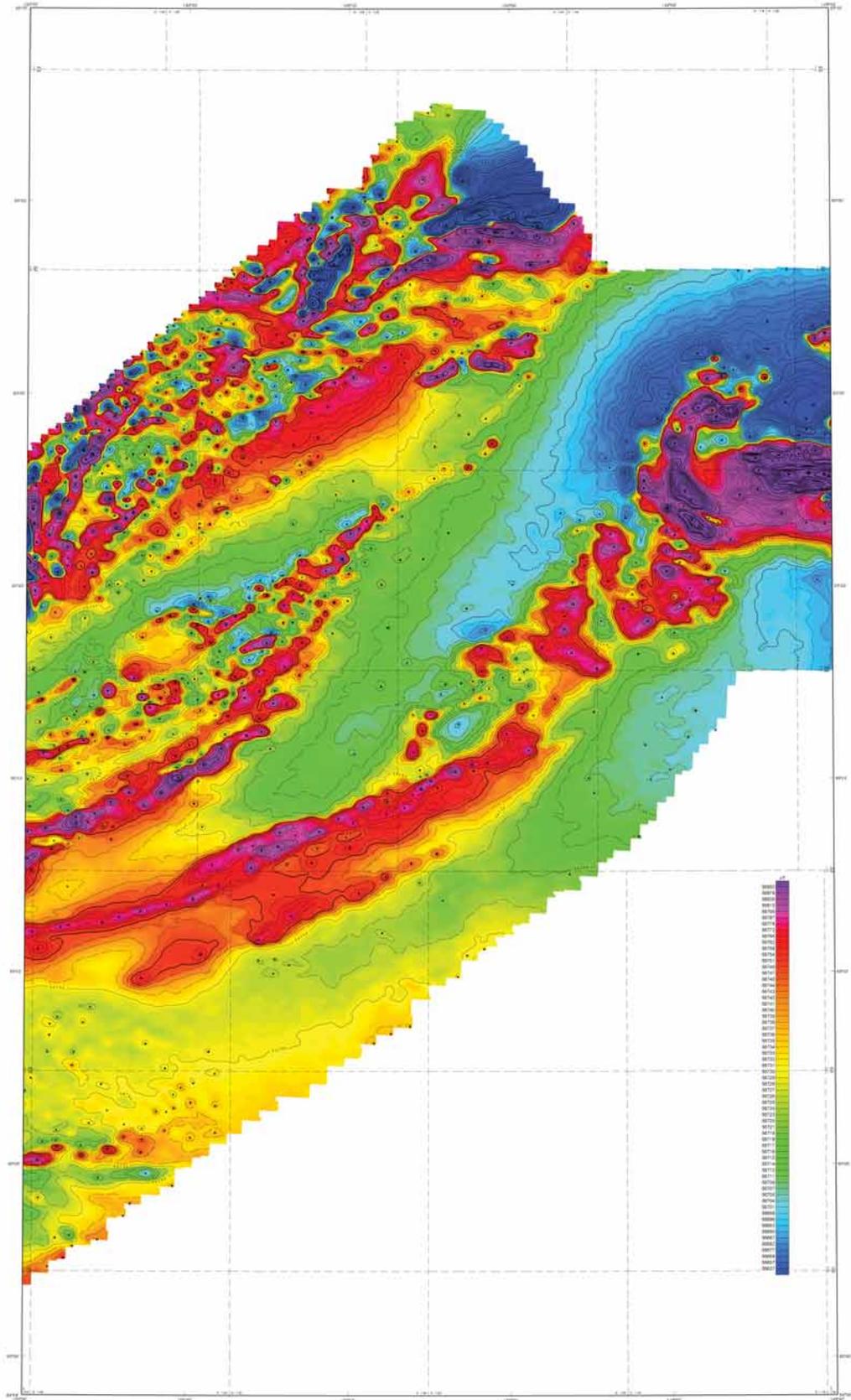


LOCATION INDEX



SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and superseded the earlier full color version released by DGS in 1987. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGS and WDM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DIGHEM, a division of CGO Canada Ltd. Other products from this survey are available from DGS, 3354 Conroy Road, Fairbanks, Alaska, 99708-3707.



114° 30' 00" W 114° 00' 00" W 113° 30' 00" W 113° 00' 00" W 112° 30' 00" W 112° 00' 00" W 111° 30' 00" W 111° 00' 00" W 110° 30' 00" W 110° 00' 00" W



**TOTAL MAGNETIC FIELD
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PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVEGOOD AND TAHANA QUADRANGLES

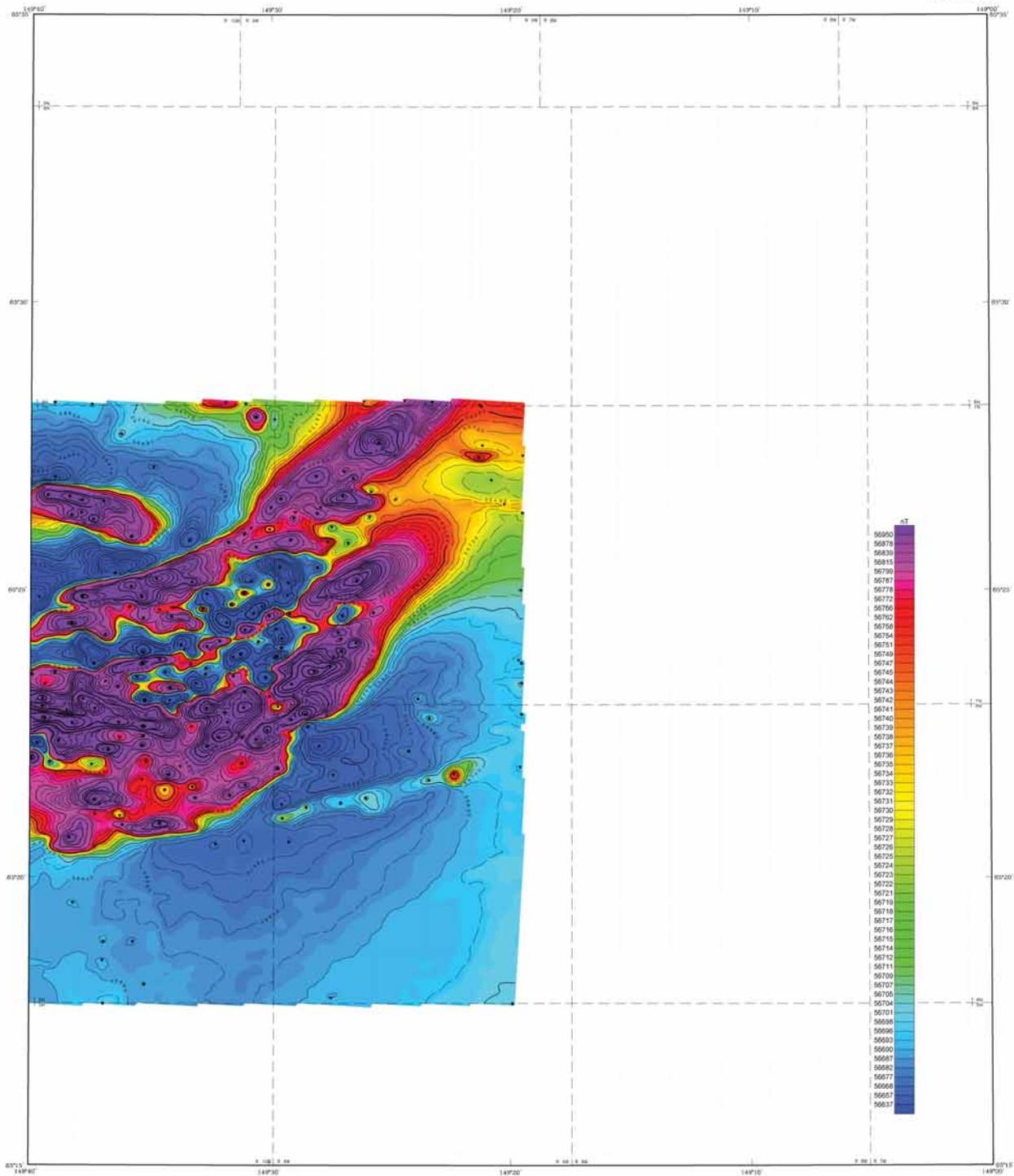
by
Laural E. Burns, Fugro Alaska Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES
This magnetic field map was produced using data collected during the 2004 geophysical survey of the Rampart-Manley Mining District. The data were collected using a magnetometer system consisting of a magnetometer, a GPS, and a data logger. The data were processed using a magnetic field reduction program that corrects for diurnal magnetic variations and other magnetic field anomalies. The resulting magnetic field map shows the total magnetic field in the area of the Rampart-Manley Mining District. The map is presented in a color scale that ranges from blue (low magnetic intensity) to red (high magnetic intensity). The map is overlaid with a grid of latitude and longitude lines. The magnetic field shows complex patterns, with high-intensity areas (red and orange) concentrated in the central and eastern parts of the district, and lower-intensity areas (green and blue) in the western and southern parts.

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Derives outline from U.S. Geological Survey (Langford B-1, 1961; B-4, 1961; Langford C-1, 1961; C-2, 1961; Sutherland, 1961).



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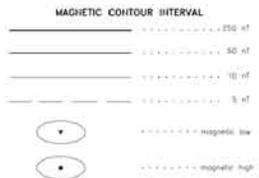
The geophysical data were acquired with a DIGHEW[®] Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a four VLF system installed in an AG-550B-1 Squirrel helicopter. In addition, the survey recorded data from a radio altimeter, GPS navigation system, 50/700 mHz monitors and video camera. Flights were performed at a mean terrain altitude of 200 feet using survey flight lines with a spacing of 0.25 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A General Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.3 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the GDA82 datum (UTM zone 18T) using 1977 North American datum using a central meridian (CM) of 152° 0' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

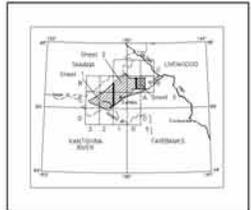
TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Jansa (1970) technique. The regional variation (or IGRF gradient, 1985, updated to October, 1996) was removed from the leveled magnetic data.

Atkins, 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. 549-552.

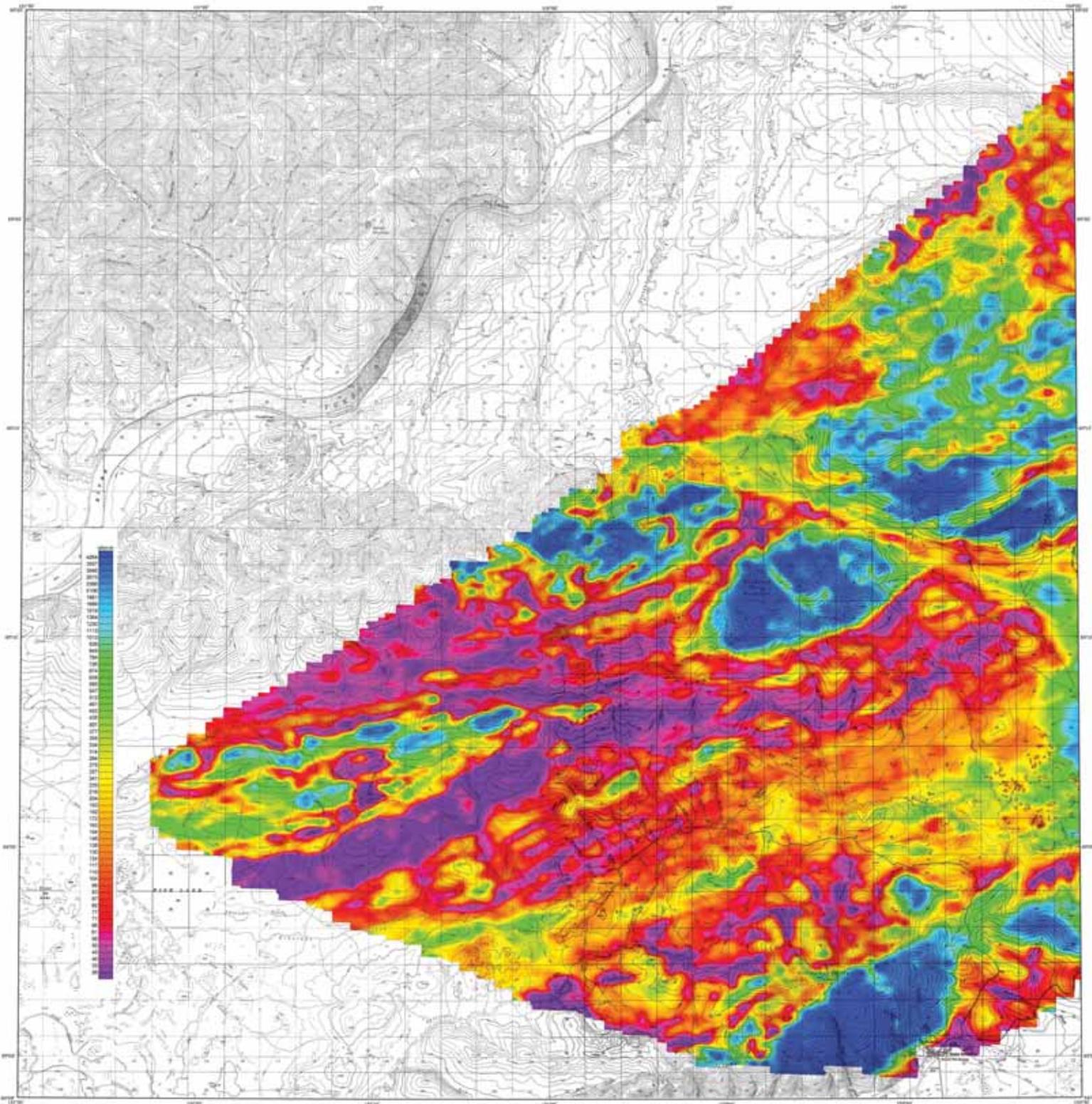


LOCATION INDEX



SURVEY HISTORY

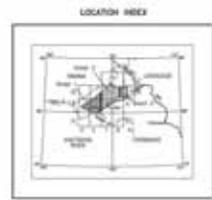
The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supersedes the earlier full color version released by DGGIS in 1987. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGGIS and WGM Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was GDEM, a division of CGG Canada Ltd. Other products from this survey are available from DGGIS, 3354 College Road, Fairbanks, Alaska, 99709-3707.



**7200 Hz COPLANAR APPARENT RESISTIVITY
OF THE RAMPART-MANLEY MINING DISTRICT,
ALASKA**

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVENGOOD AND TANANA QUADRANGLES

by
Lauri E. Runk, Fugro Alaska Surveys Corp., and Stearns Exploration Management Corp.
2004



DESCRIPTIVE NOTES

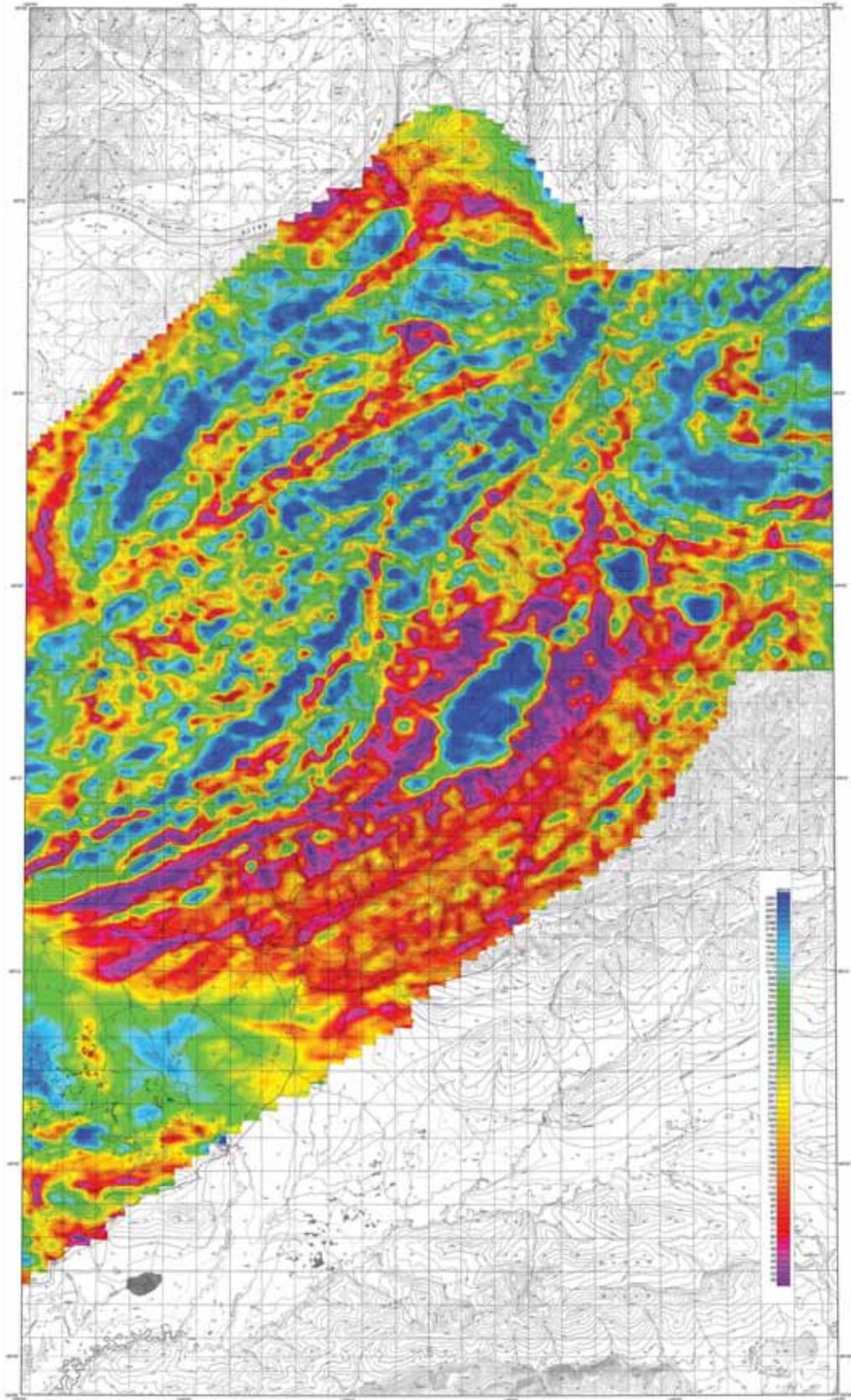
The apparent resistivity data presented on this map were collected with a 7200 Hz coplanar resistivity system using a 100 m electrode spacing and a 100 m electrode spacing. The data were collected on a grid of 100 m by 100 m. The data were collected on a grid of 100 m by 100 m. The data were collected on a grid of 100 m by 100 m.

RESISTIVITY

The resistivity scale is in ohm-meters. The resistivity scale is in ohm-meters. The resistivity scale is in ohm-meters. The resistivity scale is in ohm-meters.

SURVEY HISTORY

The data for this report were collected as part of a larger project. The data for this report were collected as part of a larger project. The data for this report were collected as part of a larger project.



U.S. GEOLOGICAL SURVEY 1:250,000



**7200 Hz COPLANAR APPARENT RESISTIVITY
OF THE RAMPART-MANLEY MINING DISTRICT,
ALASKA**

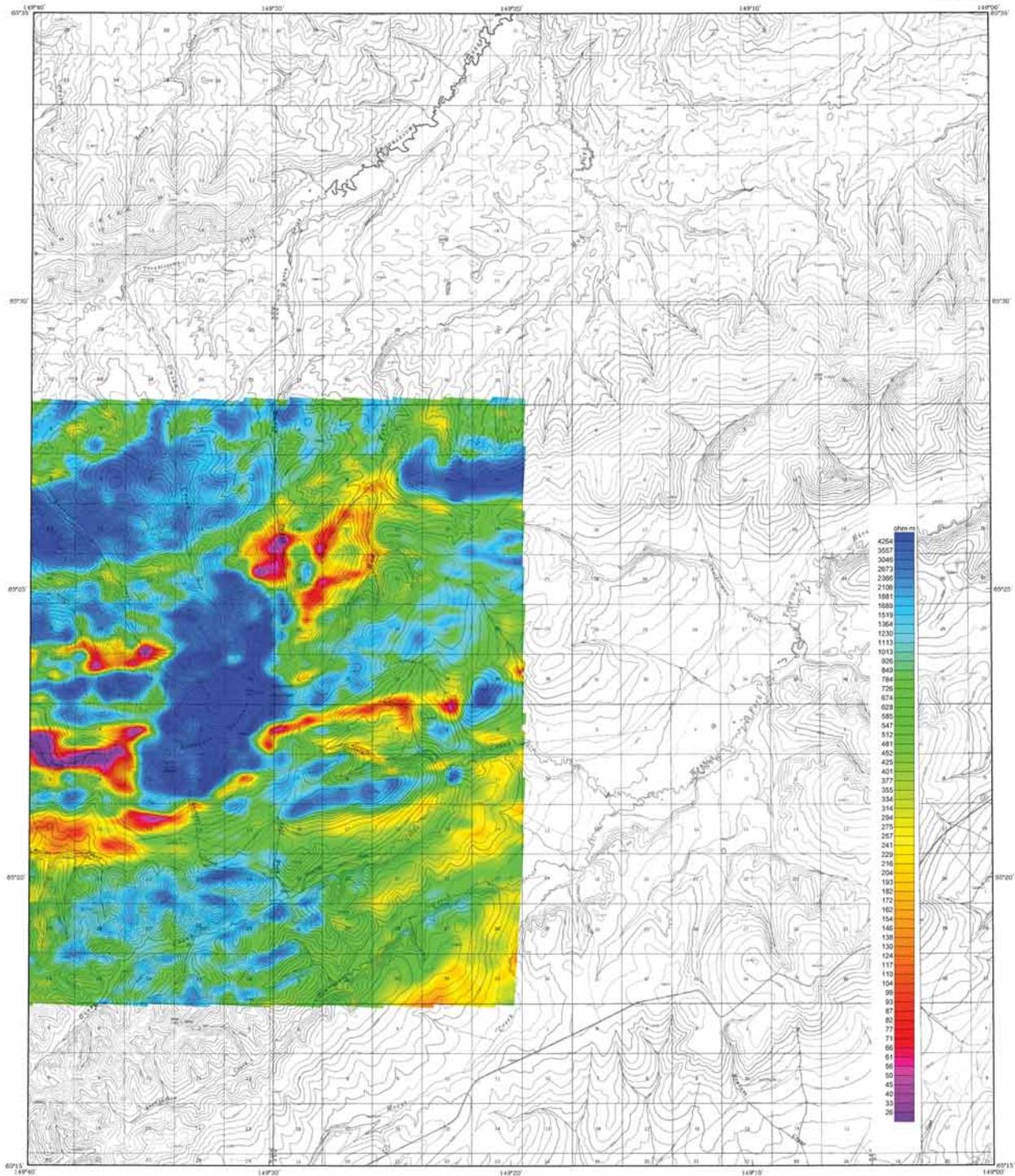
PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVENOOD AND TAKANA QUADRANGLES
by
Laural E. Stone, Fugro Alaska Survey Corp., and Steven E. Heston, Management Corp.
2004



DESCRIPTIVE NOTES
This report is a summary of the geophysical data collected during the 2004 field season. The data were collected using a 7200 Hz coplanar resistivity system. The survey was conducted in the Rampart-Manley Mining District, Alaska. The data were processed and plotted on a grid. The color scale on the right of the map indicates resistivity values in Ohm-meters. The map shows complex resistivity patterns with high resistivity (red/orange) and low resistivity (blue) areas. The data were collected along a profile that follows the general trend of the mining district. The resistivity values are generally higher in the central and eastern parts of the survey area and lower in the western and southern parts. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles.

REMARKS
The data were collected using a 7200 Hz coplanar resistivity system. The survey was conducted in the Rampart-Manley Mining District, Alaska. The data were processed and plotted on a grid. The color scale on the right of the map indicates resistivity values in Ohm-meters. The map shows complex resistivity patterns with high resistivity (red/orange) and low resistivity (blue) areas. The data were collected along a profile that follows the general trend of the mining district. The resistivity values are generally higher in the central and eastern parts of the survey area and lower in the western and southern parts. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles.

SURVEY METHOD
The data were collected using a 7200 Hz coplanar resistivity system. The survey was conducted in the Rampart-Manley Mining District, Alaska. The data were processed and plotted on a grid. The color scale on the right of the map indicates resistivity values in Ohm-meters. The map shows complex resistivity patterns with high resistivity (red/orange) and low resistivity (blue) areas. The data were collected along a profile that follows the general trend of the mining district. The resistivity values are generally higher in the central and eastern parts of the survey area and lower in the western and southern parts. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Rampart and Manley mines and lower in the areas of the Fairbanks and Takana quadrangles. The resistivity values are also higher in the areas of the Kantishna River and Livenood quadrangles and lower in the areas of the Fairbanks and Takana quadrangles.



Base Map: U.S. Geological Survey (Copyright © U.S. GEO. 1984, 1988, 1994, 1998)
Copyright © U.S. GEO. 1984, 1988, 1994, 1998



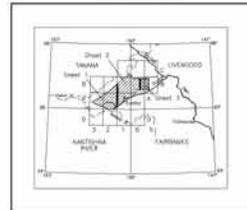
7200 Hz COPLANAR APPARENT RESISTIVITY OF THE RAMPART-MANLEY MINING DISTRICT, ALASKA

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVNGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004



LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHM[®] Electromagnetics (EM) system, a Spintrea caesium Cs2 magnetometer, and a Sierra VLI system installed in an AC308B-1 Squirrel helicopter. In addition, the survey recorded data from a rotor altimeter, GPS navigation system, 20/20 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Garmin Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1860 (UTM) projection, 1987 North American datum using a central meridian (CM) of 153.7, a north constant of 0 and an east constant of 300,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

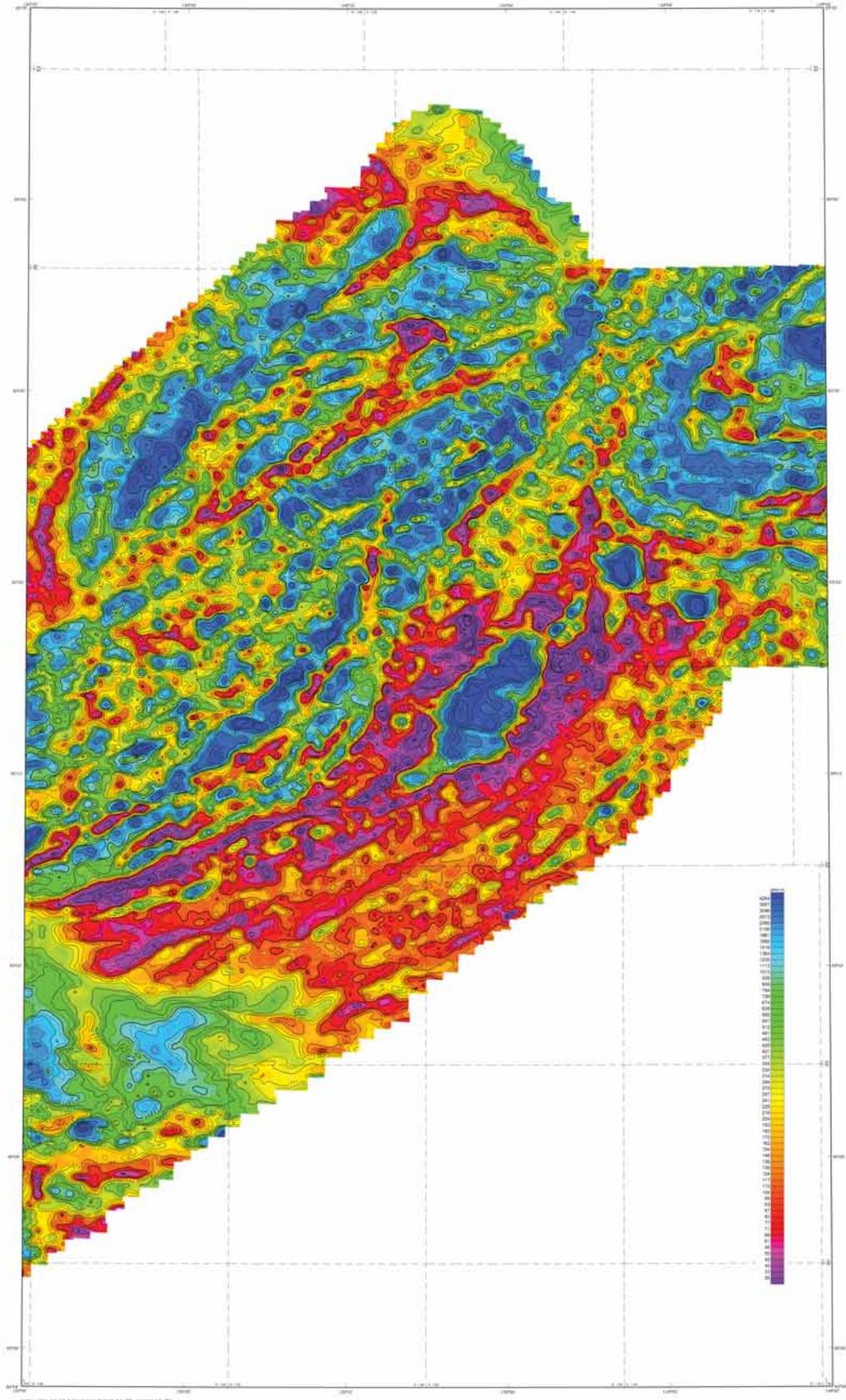
RESISTIVITY

The DIGHM[®] EM system measured in-phase and quadrature components at five frequencies: two vertical coplanar coil-pairs operated at 300 and 3000 Hz while three horizontal coplanar coil-pairs operated at 300, 750 and 30,000 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 in-phase and quadrature component of the 7200 Hz data using the pseudo-layer method. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Sierra, VLI-100, A new method of interpretation and analysis using 1000 points on one structure. Journal of the Association of Geophysical Geophysicists, 10, 1-4, 1987.

SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supervised the earlier full color version released by DGS in 1987. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGS and WDM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DIGHM, a division of CGO Canada Ltd. Other products from this survey are available from DGS, 3354 Conroy Road, Fairbanks, Alaska, 99708-3707.



U.S. GEOLOGICAL SURVEY, RESTON, VA 20192-1199
 1:50,000 SCALE
 1:50,000 SCALE



**7200 Hz COPLANAR APPARENT RESISTIVITY
 OF THE RAMPART-MANLEY MINING DISTRICT,
 ALASKA**

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVENGOOD AND TAHANA QUADRANGLES
 by
 Laurel E. Bunn, Fugro Alaska Surveys Corp., and Stevens Exploration Management Corp.
 2004

DESCRIPTIVE NOTES

The geophysical data were collected using a Schlumberger 7200 Hz coplanar resistivity system. The survey was conducted on a grid with a spacing of 100 m between electrodes. The data were processed using a standard coplanar resistivity inversion algorithm. The resulting resistivity map shows areas of high resistivity (blue) and low resistivity (red). The high resistivity areas are generally located in the northern and eastern parts of the survey area, while the low resistivity areas are more prominent in the southern and western parts.

RESISTIVITY

The resistivity values are in ohm-meters. The color scale ranges from 50 ohm-meters (red) to 600 ohm-meters (blue). The resistivity values are generally higher in the northern and eastern parts of the survey area and lower in the southern and western parts.

RESISTIVITY CONTOURS

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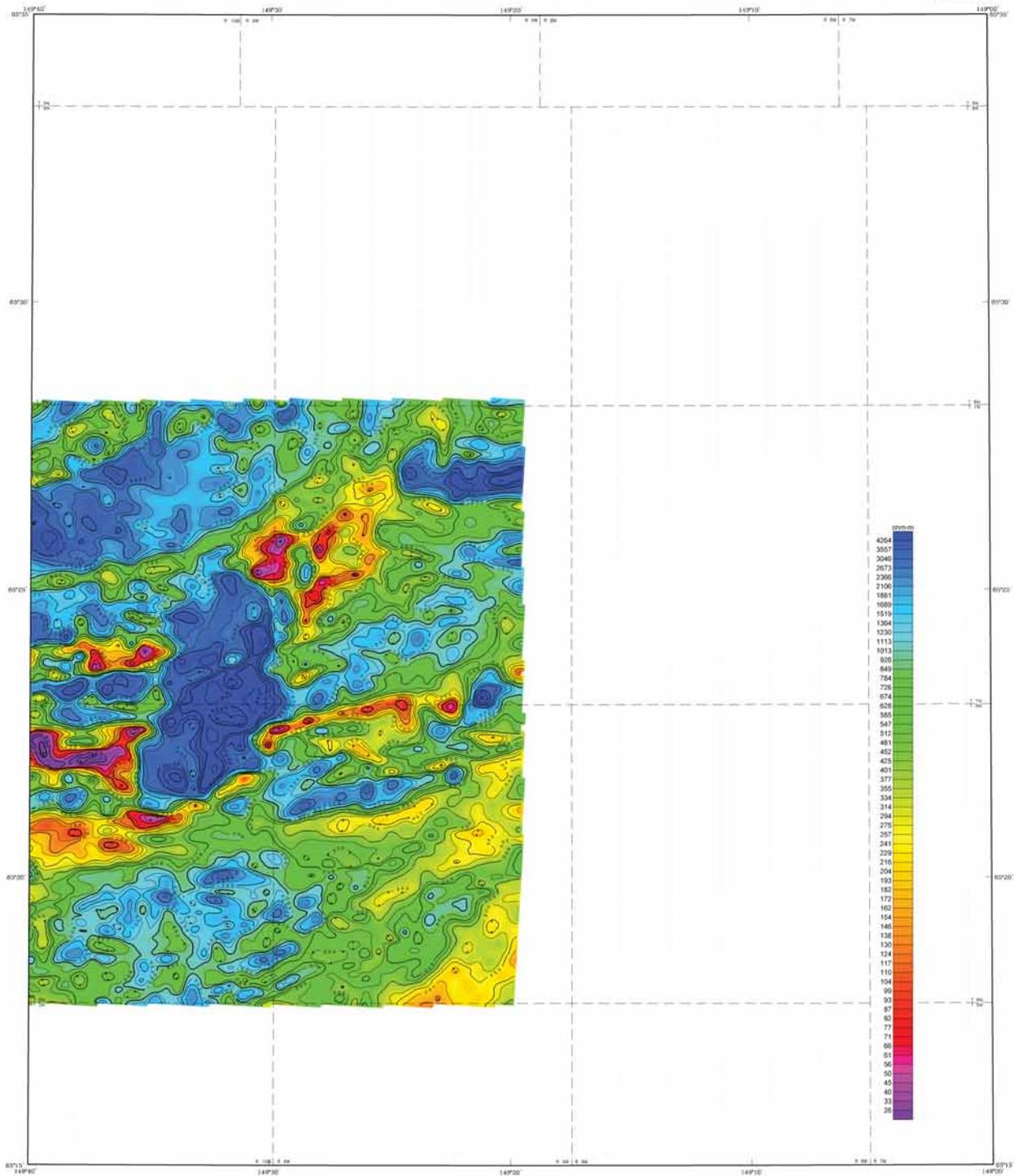


LOCATION INDEX



SURVEY HISTORY

The survey was conducted by Fugro Alaska Surveys Corp. and Stevens Exploration Management Corp. in 2004. The survey was part of a larger geophysical study of the Rampart-Manley Mining District. The data were collected using a Schlumberger 7200 Hz coplanar resistivity system. The survey was conducted on a grid with a spacing of 100 m between electrodes. The data were processed using a standard coplanar resistivity inversion algorithm. The resulting resistivity map shows areas of high resistivity (blue) and low resistivity (red). The high resistivity areas are generally located in the northern and eastern parts of the survey area, while the low resistivity areas are more prominent in the southern and western parts.



Section outline from U.S. Geological Survey (original B-4, 1960; B-4, 1966; 1969; C-1, 1968; C-2, 1968; 1970; 1971)



7200 Hz COPLANAR APPARENT RESISTIVITY OF THE RAMPART-MANLEY MINING DISTRICT, ALASKA

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVNGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES

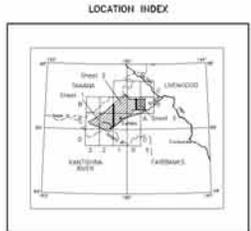
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system, a Sorbus cesium Cs2 magnetometer, and a three VLF system installed in an AG-350B-1 Squirrel helicopter. In addition, the survey recorded data from a radio altimeter, GPS navigation system, 50700 Hz magnetometer, and video camera. Flights were performed at a mean terrain altitude of 200 feet using survey flight lines with a spacing of 0.25 quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A General Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.3 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the GDA83 datum (UTM) system, 1977 North American datum using a central meridian (CM) of 152° W north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

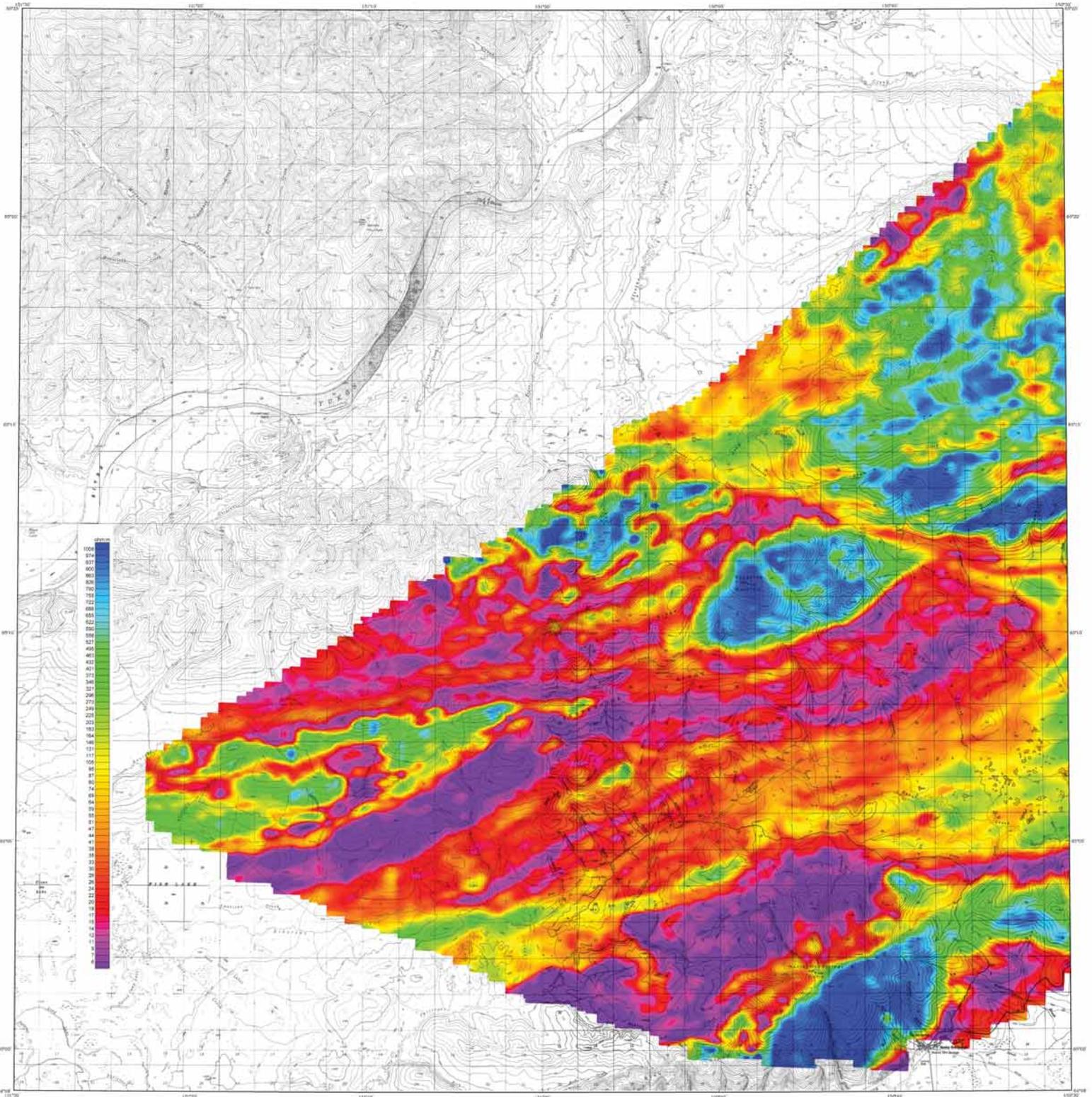
The DIGHEM[®] EM system measured in-phase and quadrature components at five frequencies: two vertical-coil loop-coil pairs separated at 900 and 2000 Hz, while three horizontal-coil loop-coil pairs separated at 800, 2500 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to buried conductive, conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coil pair 7200 Hz using the Wenner-type half-space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Alma, N. 1970. A new method of interpolation and smooth curve fitting using explicit tri-linear splines. *Journal of the American Statistical Association*, 65: 839-845.



SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supersedes the earlier full color version released by DGG in 1987. Airborne geophysical data for the area were acquired and processed in 1995 under contract between DGG and WGM Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DGHM, a division of DGG Canada Ltd. Other products from this survey are available from DGG, 3354 College Road, Fairbanks, Alaska, 99709-3707.



Scale: 1:50,000
North arrow pointing up.



**900 Hz COPLANAR APPARENT RESISTIVITY
OF THE RAMPART-MANLEY MINING DISTRICT,
ALASKA**

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVENGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Altona Surveys Corp. and Stevens Exploration Management Corp.
2004



DESCRIPTIVE NOTES

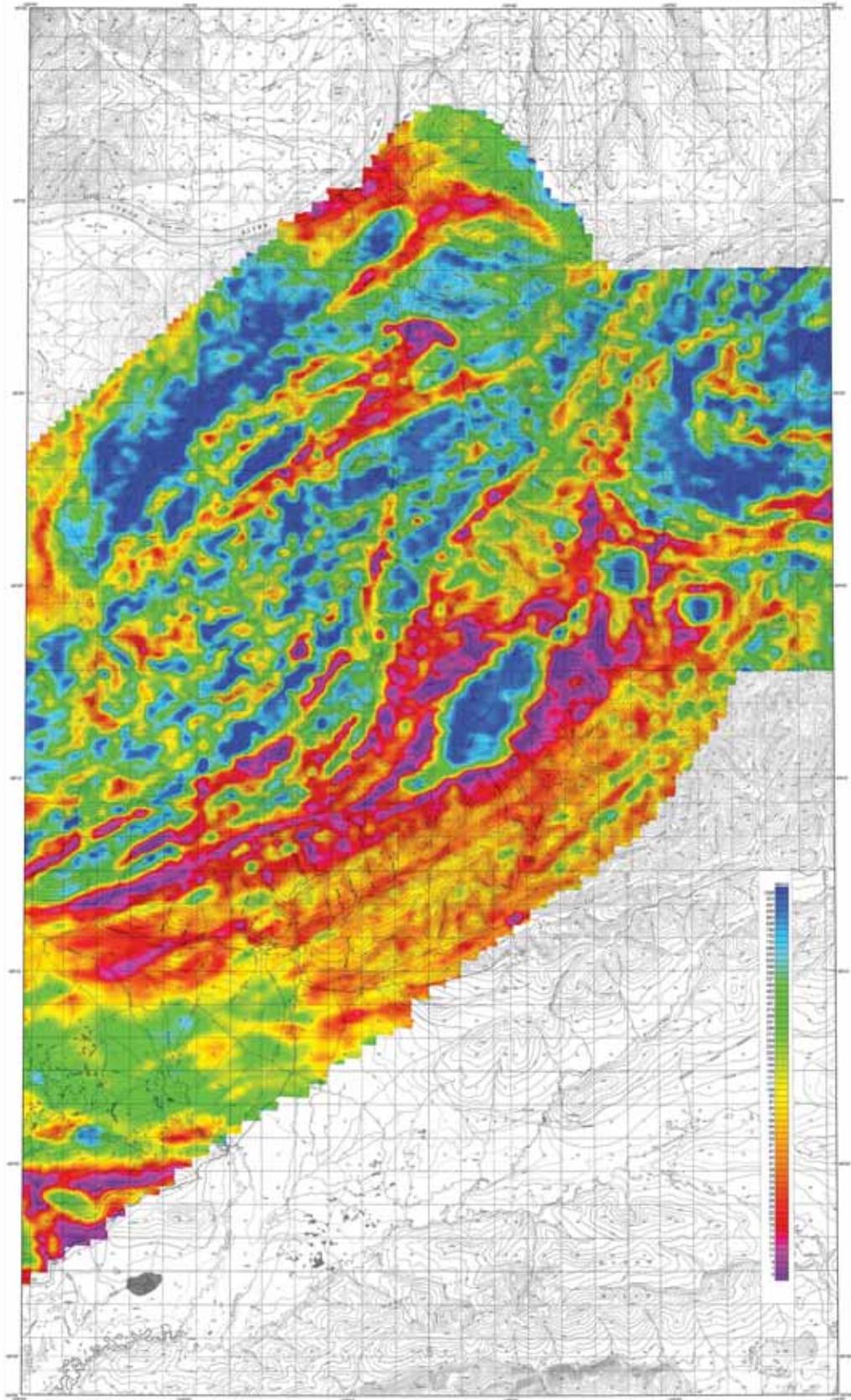
The data were collected with a COPLANAR Electromagnetic (EM) system, a Sennheiser S22 magnetometer, and a 1000 Hz system installed on an MTD-2000 in a Sennheiser S22 magnetometer. The system was used to collect data in the Rampart-Manley Mining District, Alaska. The data were collected in a grid pattern with a spacing of 100 m between lines and a spacing of 100 m between points. The data were collected in a grid pattern with a spacing of 100 m between lines and a spacing of 100 m between points. The data were collected in a grid pattern with a spacing of 100 m between lines and a spacing of 100 m between points.

RESISTIVITY

The COPLANAR EM system measures apparent and quadrature components of the magnetic field. The apparent resistivity is calculated from the ratio of the magnetic field to the electric field. The quadrature component is calculated from the ratio of the magnetic field to the magnetic field. The data were collected in a grid pattern with a spacing of 100 m between lines and a spacing of 100 m between points.

SURVEY HISTORY

The area has been surveyed and other work completed by the State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The work was completed by Fugro Altona Surveys and Stevens Exploration Management Corp. The work was completed by Fugro Altona Surveys and Stevens Exploration Management Corp. The work was completed by Fugro Altona Surveys and Stevens Exploration Management Corp.



U.S. GEOLOGICAL SURVEY 1:250,000



**900 Hz COPLANAR APPARENT RESISTIVITY
OF THE RAMPART-MANLEY MINING DISTRICT,
ALASKA**

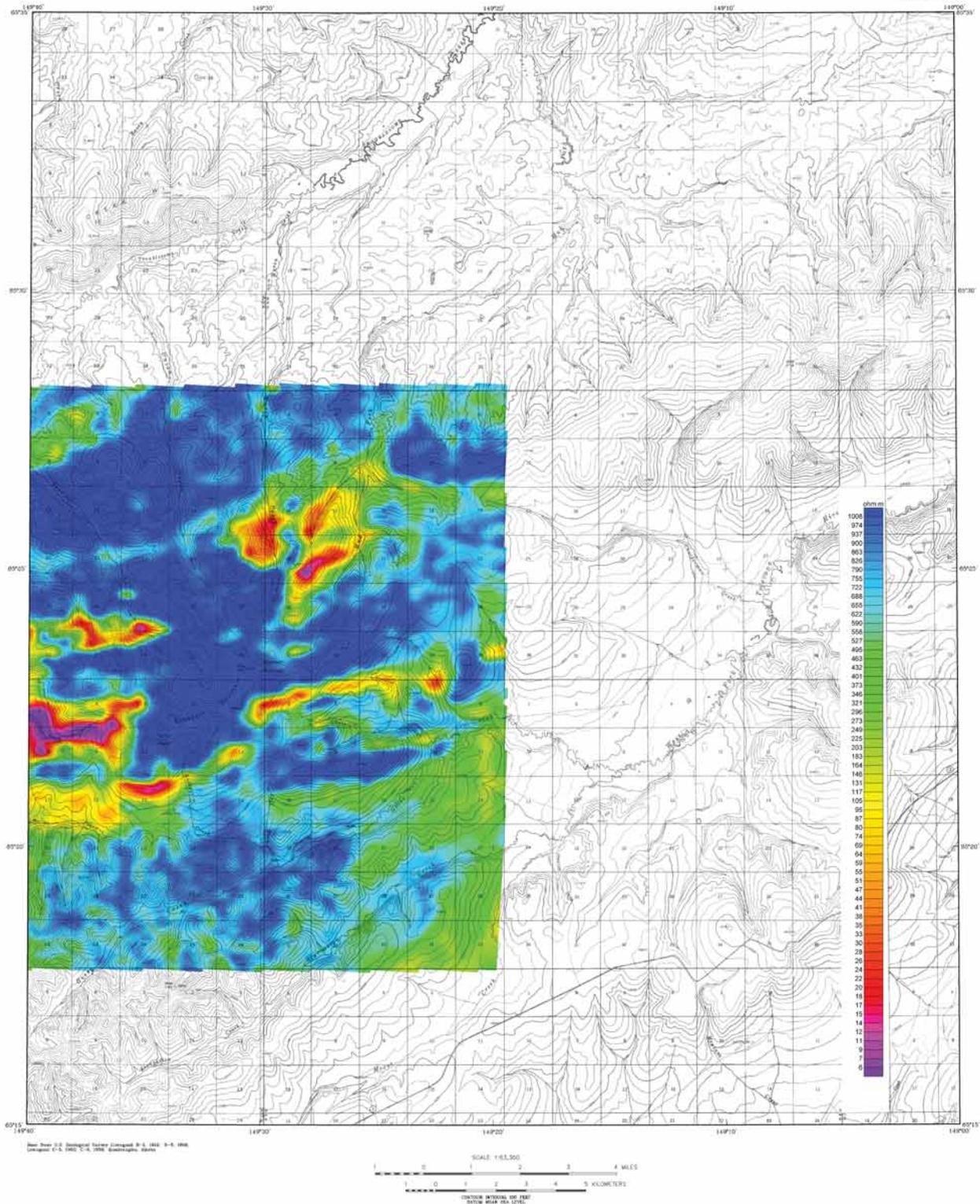
PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVEGOOD AND TAKANA QUADRANGLES
by
Laural E. Stone, Fugro Alaska Survey Corp., and Steven E. Heston, Management Corp.
2004



DESCRIPTIVE NOTES
This report contains the results of a 900 Hz coplanar resistivity survey conducted in the Rampart-Manley Mining District, Alaska. The survey was conducted by Fugro Alaska Survey Corp. and Steven E. Heston, Management Corp. in 2004. The survey area covers parts of the Fairbanks, Kantishna River, Livegood, and Takana quadrangles. The resistivity data were processed using the COPROX software package. The resulting resistivity map is shown on this sheet. The map is overlaid on a topographic contour map. The color scale on the right indicates resistivity values in Ohm-meters. The map shows a complex pattern of resistivity anomalies, with higher resistivity (red/orange) generally trending from the northwest to the southeast, and lower resistivity (blue) in the central and eastern parts of the survey area.

REMARKS
The resistivity data were collected using a 900 Hz coplanar resistivity system. The system consists of a transmitter and a receiver, both of which are connected to a central control unit. The transmitter sends a current into the ground, and the receiver measures the resulting voltage. The resistivity is calculated from the ratio of the voltage to the current. The resistivity data were collected along a series of parallel lines, with a spacing of 100 meters between lines. The resistivity data were then processed using the COPROX software package. The resulting resistivity map is shown on this sheet. The map is overlaid on a topographic contour map. The color scale on the right indicates resistivity values in Ohm-meters. The map shows a complex pattern of resistivity anomalies, with higher resistivity (red/orange) generally trending from the northwest to the southeast, and lower resistivity (blue) in the central and eastern parts of the survey area.

SURVEY METHOD
The resistivity data were collected using a 900 Hz coplanar resistivity system. The system consists of a transmitter and a receiver, both of which are connected to a central control unit. The transmitter sends a current into the ground, and the receiver measures the resulting voltage. The resistivity is calculated from the ratio of the voltage to the current. The resistivity data were collected along a series of parallel lines, with a spacing of 100 meters between lines. The resistivity data were then processed using the COPROX software package. The resulting resistivity map is shown on this sheet. The map is overlaid on a topographic contour map. The color scale on the right indicates resistivity values in Ohm-meters. The map shows a complex pattern of resistivity anomalies, with higher resistivity (red/orange) generally trending from the northwest to the southeast, and lower resistivity (blue) in the central and eastern parts of the survey area.



Base Map: U.S. Geological Survey (unpublished) 1:63,500, 1964. Contouring: G.S. 1982, 5, 4, 1986. Geographical: Alaska.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DICHEM[®] Electromagnetics (EM) system, a Spintrea caesium Cs132 magnetometer, and a Sierra KV system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a rotor altimeter, GPS navigation system, 200 Hz magnetometer, and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Garmin Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1860 (UTM) projection, 1927 North American datum using a central meridian (CM) of 153.7, a north constant of 0 and an east constant of 300,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DICHEM[®] EM system measured in-phase and quadrature components at five frequencies: two vertical coplanar coil-pairs operated at 300 and 5000 Hz while three horizontal coplanar coil-pairs operated at 300, 750 and 50,000 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 in-phase and quadrature component of the coplanar 300 Hz using the pseudo-layer root space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

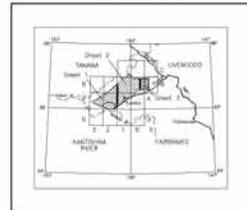
Smith, H., 1970, A new method of interpolation and smoothing using spline functions in data distribution, Journal of the Association of Computing Machinery, 17, 5-16.

900 Hz COPLANAR APPARENT RESISTIVITY OF THE RAMPART-MANLEY MINING DISTRICT, ALASKA
PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVNGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

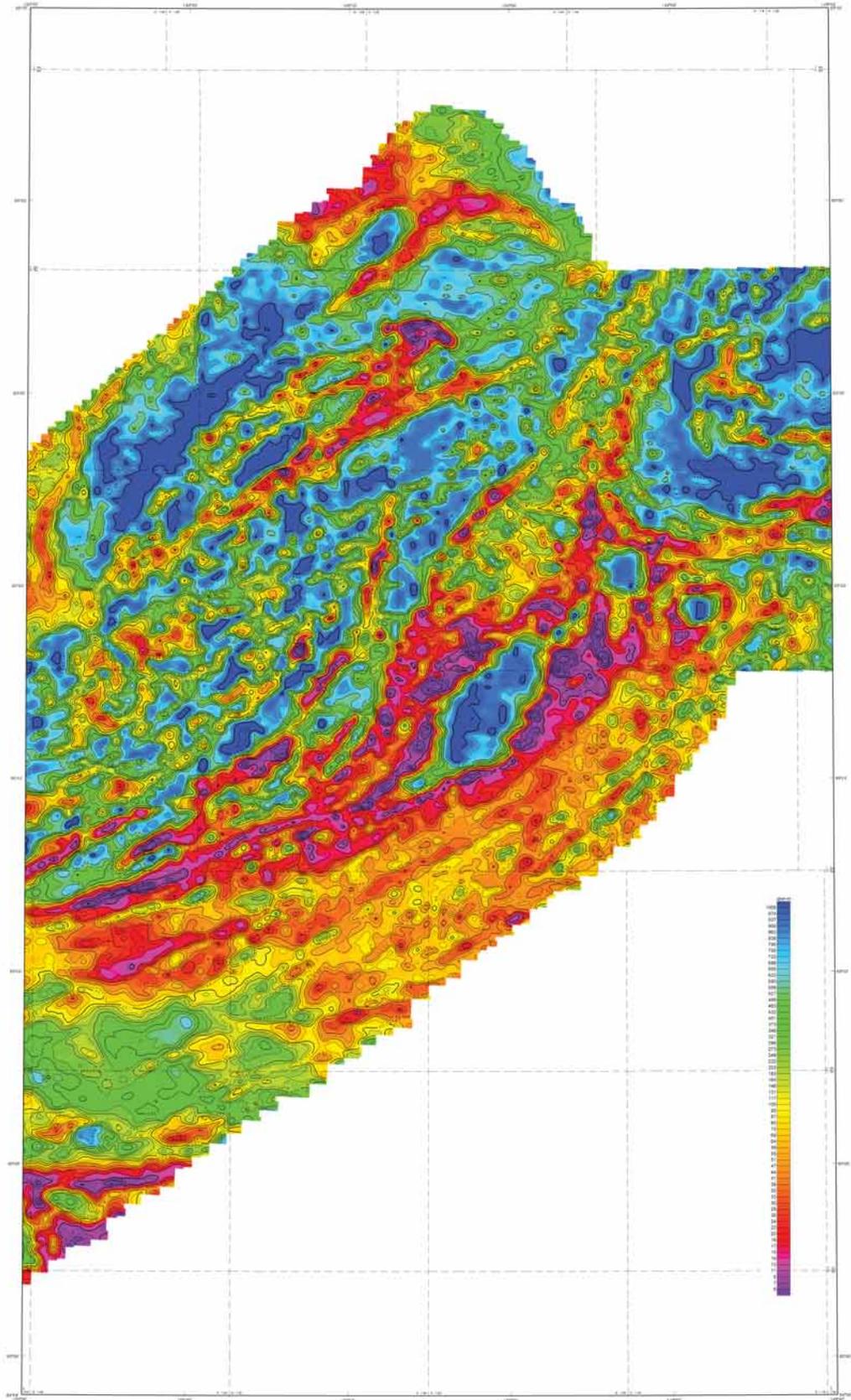


LOCATION INDEX



SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supervised the earlier full color version released by DGS in 1987. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGS and WDM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DICHEM, a division of CGO Canada Ltd. Other products from this survey are available from DGS, 3354 Conroy Road, Fairbanks, Alaska, 99708-3707.



1:50,000 Scale, UTM Projection, Zone 18N, Datum: NAD 83, Contour: 10 Ohm-m



**900 Hz COPLANAR APPARENT RESISTIVITY
OF THE RAMPART-MANLEY MINING DISTRICT,
ALASKA**

PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVENGOOD AND TAHANA QUADRANGLES
by
Laural E. Burns, Fugro Alaska Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES

The apparent resistivity data were collected using a Schlumberger array with a 100 m electrode spacing. The data were processed using a standard resistivity inversion algorithm. The resulting resistivity contours are shown on this map. The map is a color-coded contour plot with a grid overlay. The colors range from dark blue (low resistivity) to dark red (high resistivity). A vertical color scale legend on the right side of the map indicates resistivity values from 0 to 1000. The map shows complex resistivity patterns across the study area.

RESISTIVITY

The resistivity values are in Ohm-meters. The map is a color-coded contour plot with a grid overlay. The colors range from dark blue (low resistivity) to dark red (high resistivity). A vertical color scale legend on the right side of the map indicates resistivity values from 0 to 1000. The map shows complex resistivity patterns across the study area.

RESISTIVITY CONTOURS

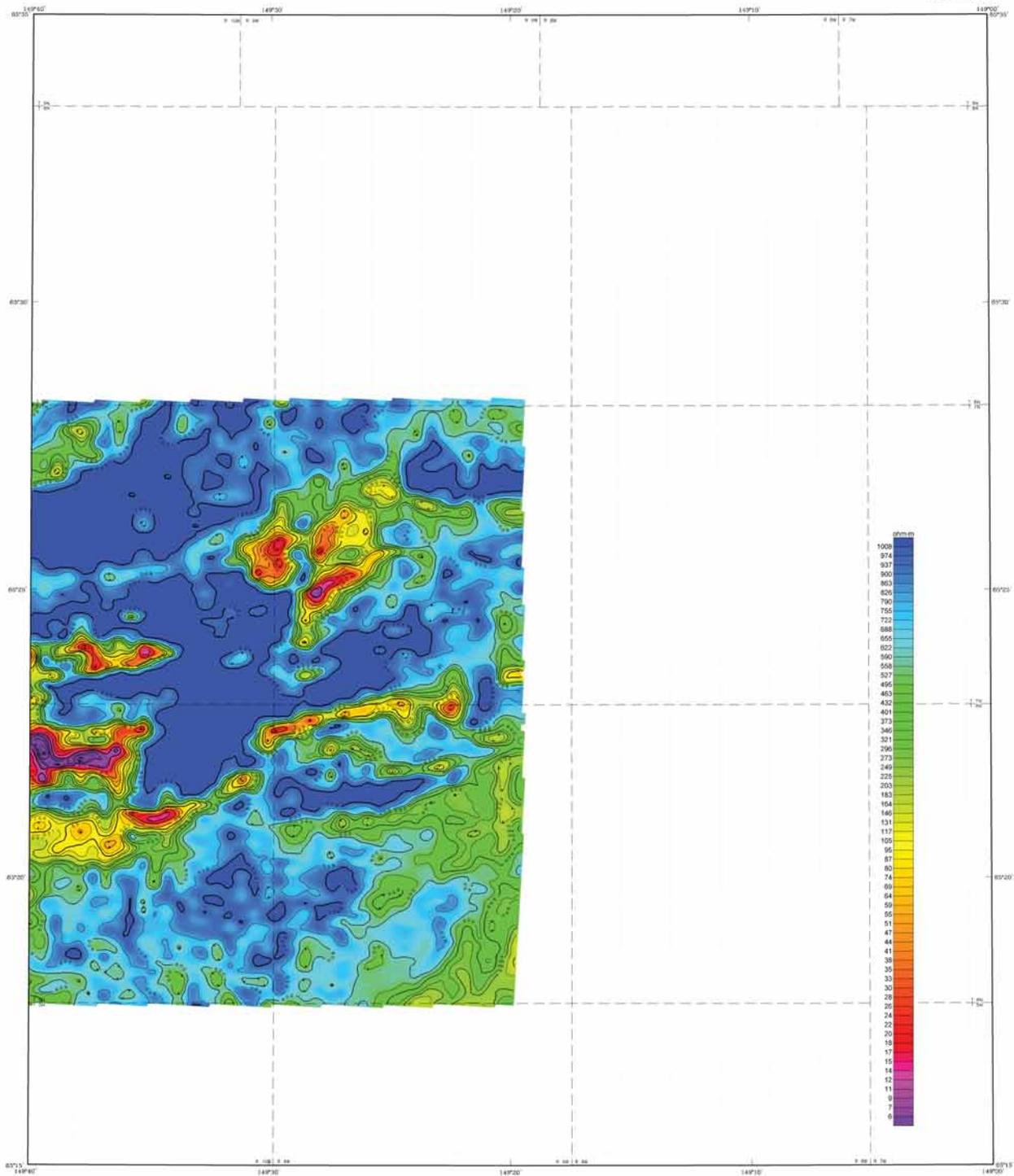
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LOCATION INDEX



SURVEY HISTORY

The survey was conducted by Fugro Alaska Surveys Corp. and Stevens Exploration Management Corp. in 2004. The survey area covers parts of the Fairbanks, Kantishna River, Livengood, and Tahana quadrangles. The resistivity data were collected using a Schlumberger array with a 100 m electrode spacing. The data were processed using a standard resistivity inversion algorithm. The resulting resistivity contours are shown on this map.



Section outline from U.S. Geological Survey (reprinted from G-1, 1960, 9-4, 1960; Geologic C-1, 1960, 9-4, 1960; Geologic maps).



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHW[®] Electromagnetic (EM) system, a Sinterex cesium CS2 magnetometer, and a three VLF system installed in an AG-350B-1 Squirrel helicopter. In addition, the survey recorded data from a radio altimeter, GPS navigation system, 50700 Hz magnetometer and video camera. Flights were performed at a mean terrain altitude of 200 feet using survey flight lines with a spacing of 0.25 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A General Real-Time Differential Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the GDA/1983 (UTM) system, 1977 North American datum using a central meridian (CM) of 152° 30' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

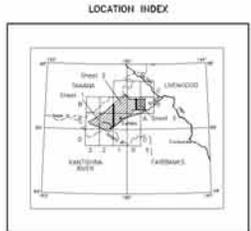
The DIGHW[®] EM system measured in-phase and quadrature components of five frequencies. Two vertical coplanar coil-pairs separated 01 900 and 2000 Hz while three horizontal coplanar coil-pairs operated at 800, 7500 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to subsurface conductive overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the 800 Hz using the Wenner-Schlumberger half-spread mode. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Scale: 1:63,300. A new method of interpolation and smooth curve fitting used in the processing of the data. The accuracy of contouring is approximately ±1% (n=1, p=500,000).

900 Hz COPLANAR APPARENT RESISTIVITY OF THE RAMPART-MANLEY MINING DISTRICT, ALASKA

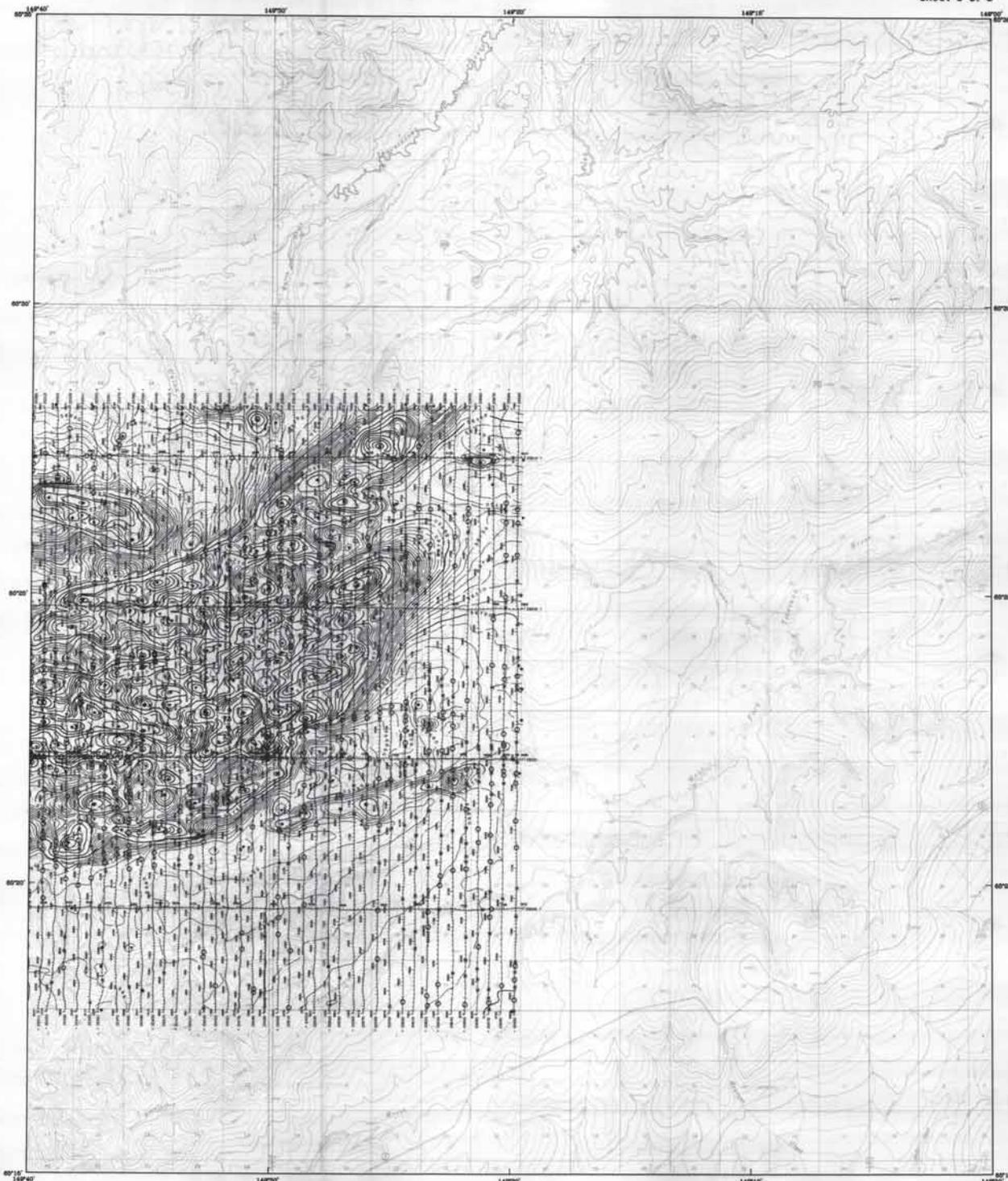
PARTS OF FAIRBANKS, KANTISHNA RIVER, LIVNGOOD AND TANANA QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

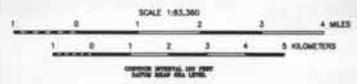


SURVEY HISTORY

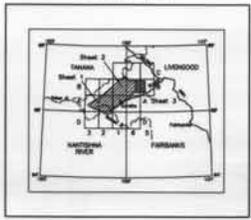
The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supersedes the earlier full color version released by DGG in 1987. Airborne geophysical data for the area were acquired and processed in 1995 under contract between DGG and WGM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DGHM, a division of DGG Canada Ltd. Other products from this survey are available from DGG, 5354 College Road, Fairbanks, Alaska, 99709-3707.



From U.S. Geological Survey (Original G-4, 1966; G-4, 1968; Original G-4, 1966; G-4, 1968; Original G-4, 1966; G-4, 1968)



LOCATION INDEX



EXTENDED COVERAGE OF THE TOTAL FIELD MAGNETICS AND ELECTROMAGNETIC ANOMALIES, RAMPART-MANLEY MINING DISTRICT, ALASKA

1997
IGRF GRADIENT REMOVED

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGEM[®] Electromagnetic (EM) system, a Solinst cesium CS2 magnetometer, and a Hertz VLF system installed in an AS500B-1 Squirrel helicopter. In addition, the survey recorded data from a radio altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Sercon Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1858 (CMA) spheroid, 1927 North American datum using a central meridian (CM) of 152°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

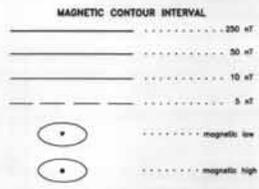
ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGEM EM system measured in-phase and quadrature components of five frequencies. Ten vertical coil-coil pairs operated at 900 and 5000 Hz while three horizontal coil-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to lateral conductive, conductive overburden, and cultural sources. The power the monitor and the flight track video were assumed to locate cultural sources. The EM anomalies that are indicated are classified by conductance.



ELECTROMAGNETIC ANOMALIES

- | | |
|---------|---|
| Anomaly | Conductance |
| ● | >50 Siemens |
| ○ | <50 Siemens |
| ⊗ | Questionable anomaly |
| ⊕ | Weak conductivity associated with an EM magnetic response |



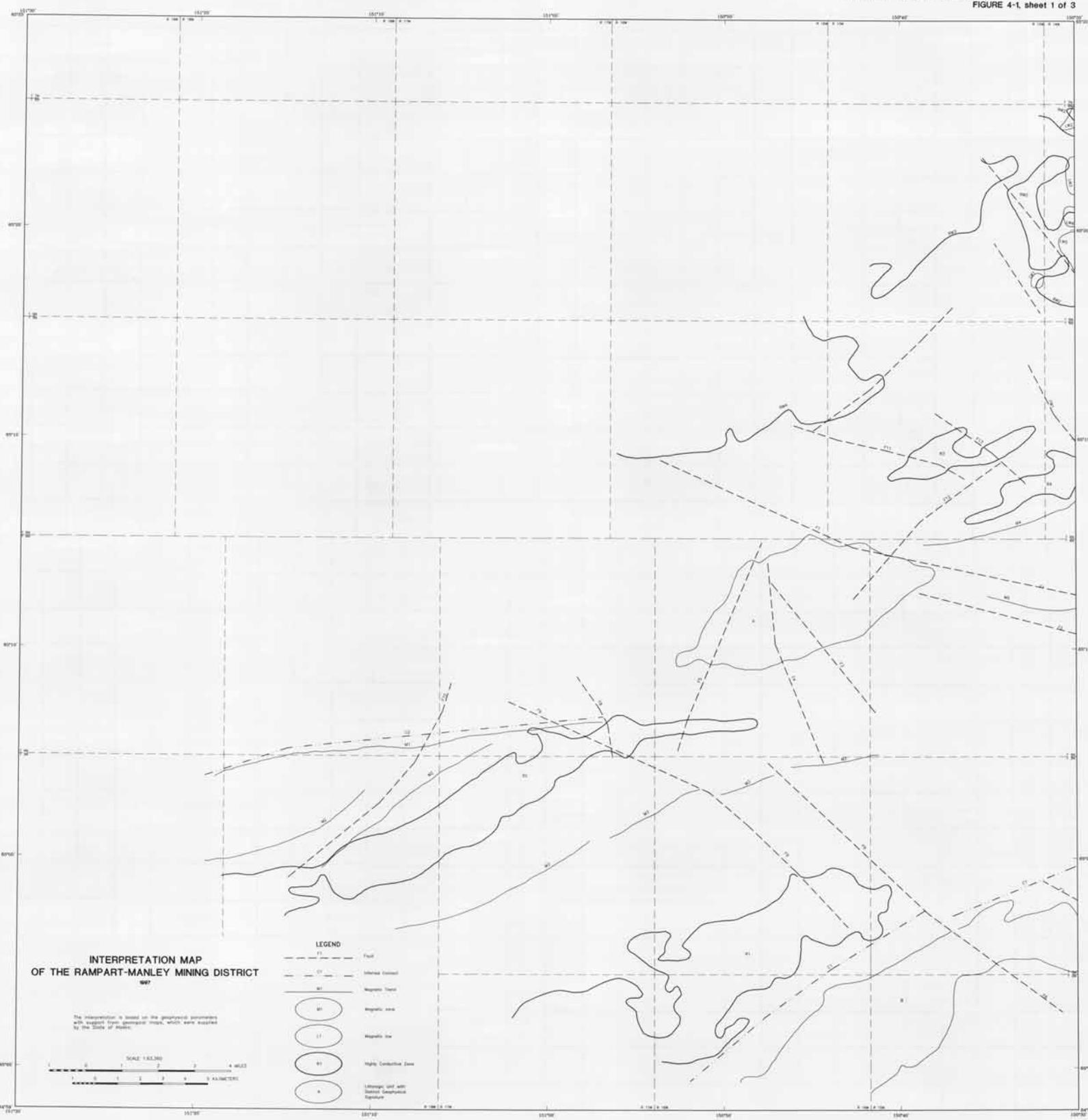
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and RGM Inc., Mining and Geological Consultants, Airborne geophysical data for the area were acquired by DIGEM, a division of CGO Canada Ltd., in 1996. Other products from this survey are available from the Alaska Division of Geological & Geophysical Surveys, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.

TOTAL FIELD MAGNETICS

The total field magnetic data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Alamo (1970) technique. The regional variation (or IGRF gradient, 1985, updated to October 1996) was removed from the leveled magnetic data.

Alamo, 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. 588-592.



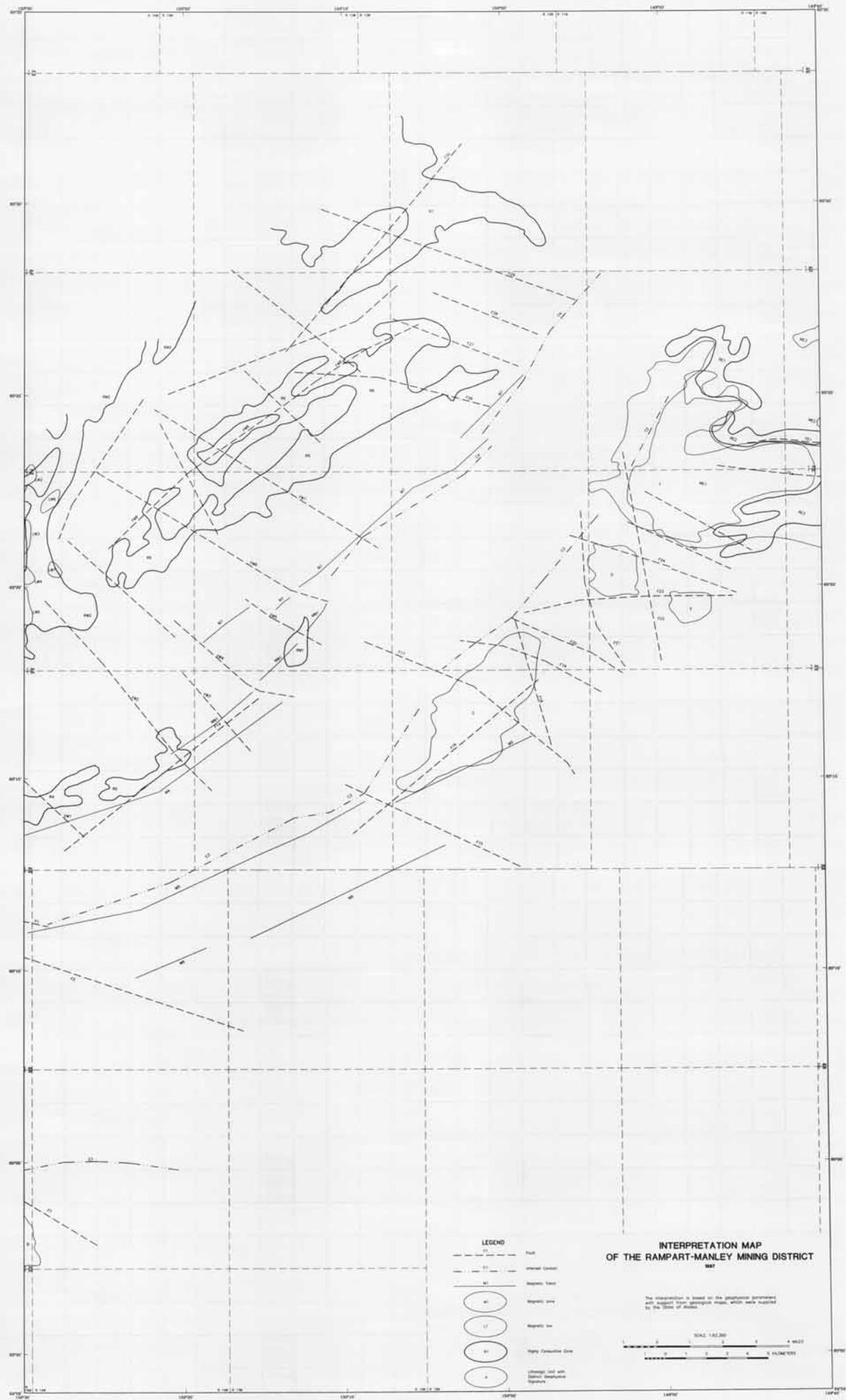
**INTERPRETATION MAP
 OF THE RAMPART-MANLEY MINING DISTRICT**

The interpretation is based on the geophysical parameters with support from geological maps, which were supplied by the State of Idaho.



LEGEND

---	Fault
---	Internal Contact
---	Magnetic Trench
---	Magnetic Area
---	Magnetic Line
---	High Conductive Zone
---	Structure and other features



LEGEND

	Fault
	Mineral Lease
	Magazine Claim
	Magazine Claim
	Magazine Claim
	High Concentration Claim
	Change land with mineral leasehold signatures

**INTERPRETATION MAP
 OF THE RAMPART-MANLEY MINING DISTRICT**

The interpretation is based on the geophysical information with support from geologic maps, which were supplied by the State of Alaska.

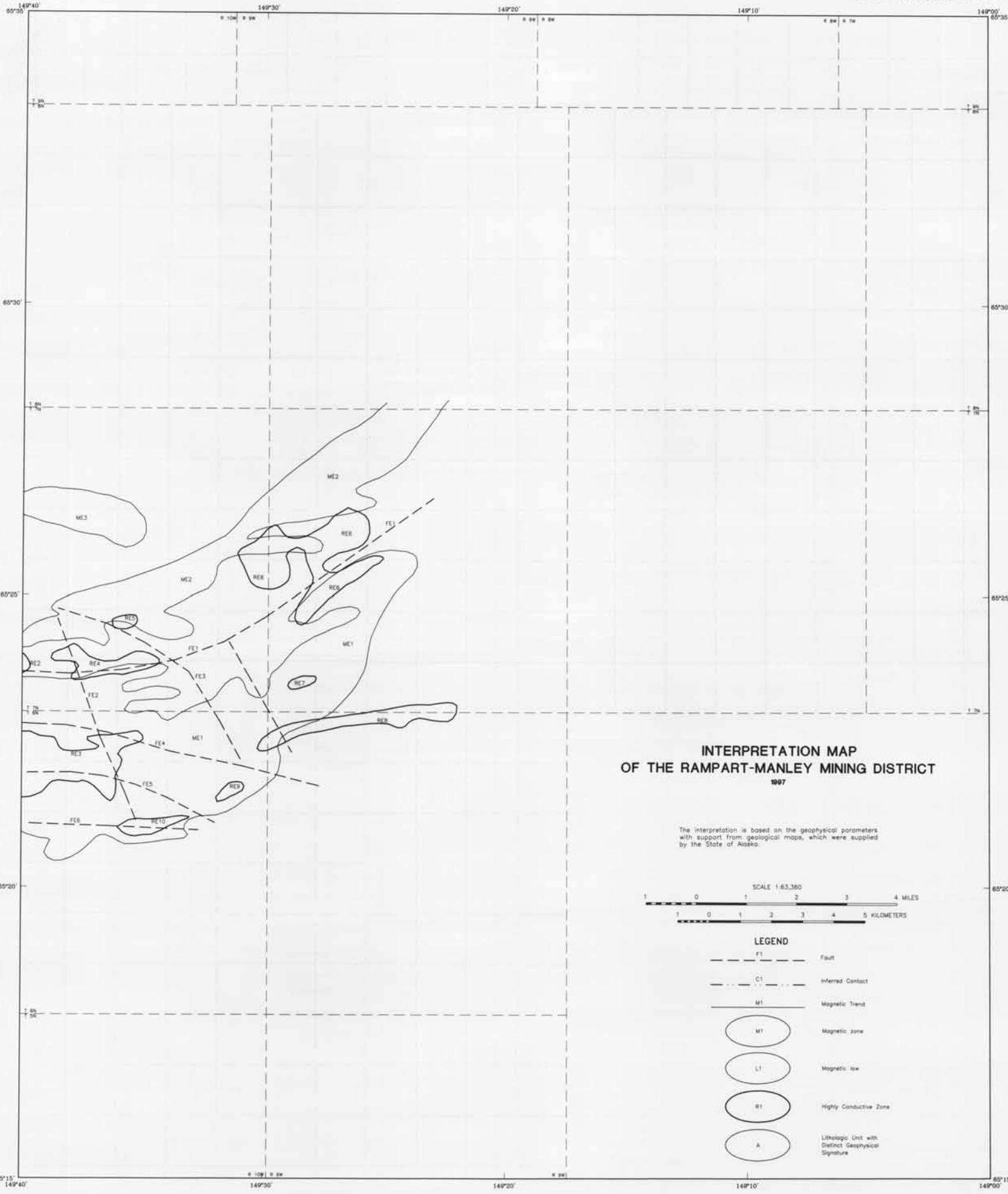
SCALE 1:62,500

0 1 2 3 4 5 6 7 8 9 10

0 1 2 3 4 5 6 7 8 9 10

0 1 2 3 4 5 6 7 8 9 10

0 1 2 3 4 5 6 7 8 9 10



**INTERPRETATION MAP
 OF THE RAMPART-MANLEY MINING DISTRICT**

1997

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



LEGEND

- F1 --- Fault
- - - C1 - - - Inferred Contact
- M1 --- Magnetic Trend
- (M1) Magnetic zone
- (L1) Magnetic low
- (R1) Highly Conductive Zone
- (A) Lithologic Unit with Distinct Geophysical Signature