

# **SOUTHERN NPRA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION**

Laurel E. Burns, Gina R.C. Graham, John D. Barefoot, Fugro Airborne Surveys Corp., and  
Stevens Exploration Management

**Geophysical Report 2020-10**

2020  
STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



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# **SOUTHERN NPRA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION**

Laurel E. Burns<sup>1</sup>, Gina R.C. Graham<sup>1</sup>, John D. Barefoot<sup>1</sup>, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

## **ABSTRACT**

The Southern NPRA electromagnetic and magnetic airborne geophysical survey is located in northwest Alaska in the southern National Petroleum Reserve-Alaska, about 320 kilometers south of the City of Utqiagvik. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM<sup>V</sup> system from July to August 2005. A total of 11,115 line kilometers were collected covering 3,947.9 square kilometers. Line spacing was 400 meters (m) and 200 m over the Drenchwater area. Data were collected with an average ground clearance of 35 m 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. Drenchwater Creek is a Pb-Zn prospect in the western part of the survey area. 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 U.S. Department of the Interior Bureau of Land Management (BLM).

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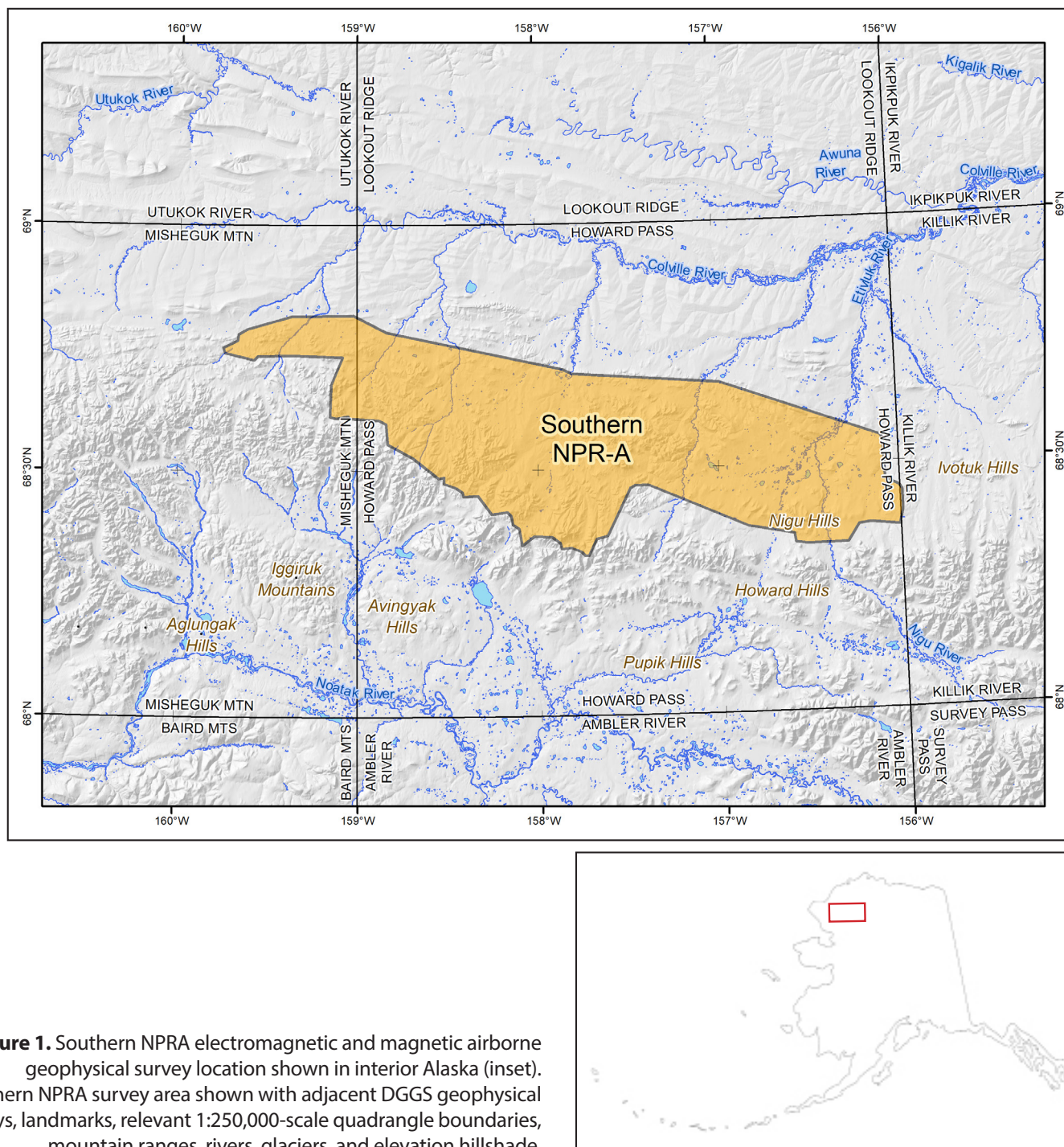
<sup>1</sup> Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

**AVAILABLE DATA**

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

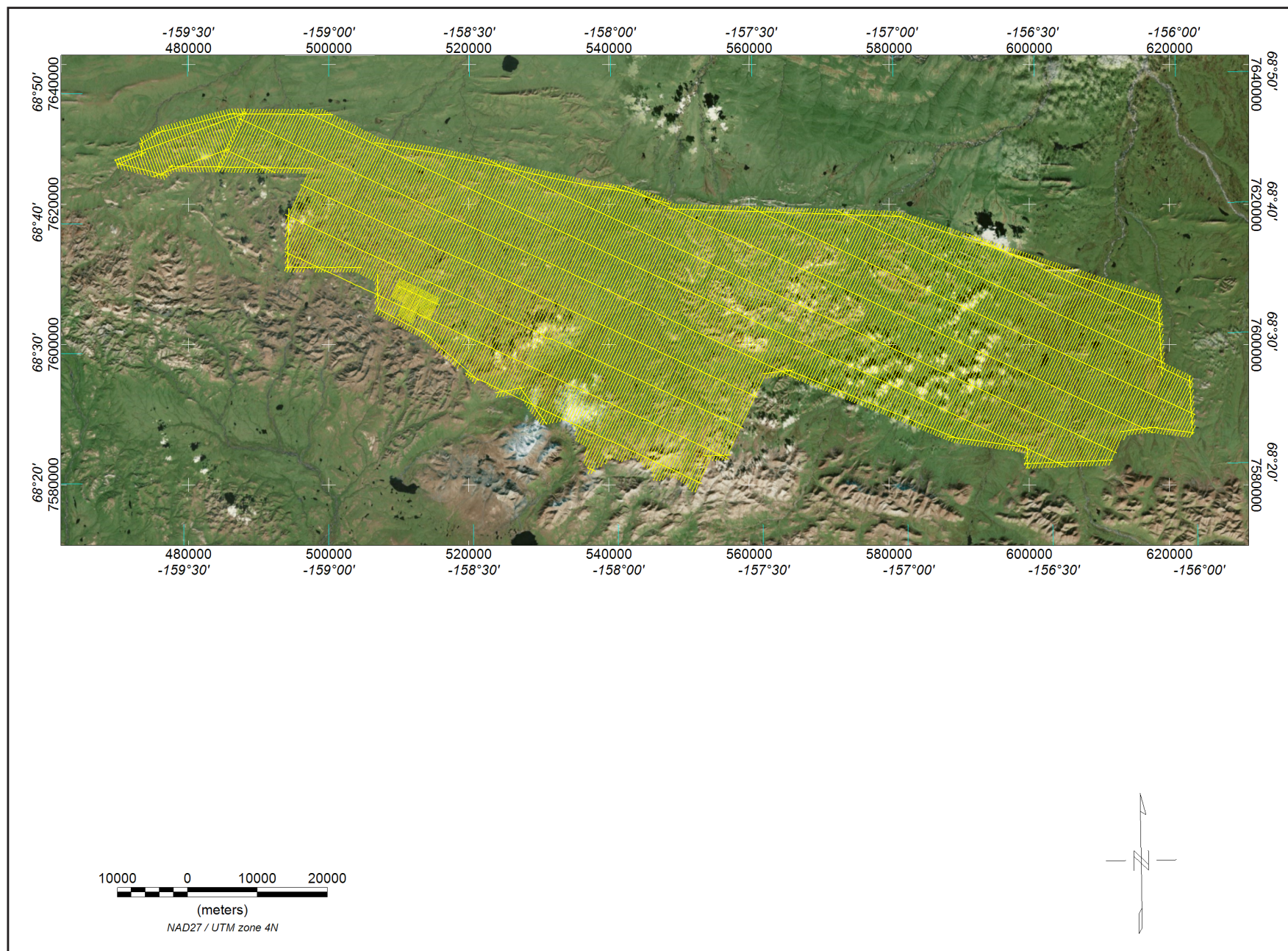
## REFERENCES

- Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, n. 4, p. 589–602.
- Burns, L.E., 2005, Project report and profile data of the southern National Petroleum Reserve-Alaska, northwest Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2006-2. <http://doi.org/10.14509/14510>
- Burns, L.E., U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2006, Line, grid, and vector data and plot files for the airborne geophysical survey data of parts of the southern National Petroleum Reserve-Alaska, northwest Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2006-1, 43 sheets, 1 DVD. <http://doi.org/10.14509/14501>



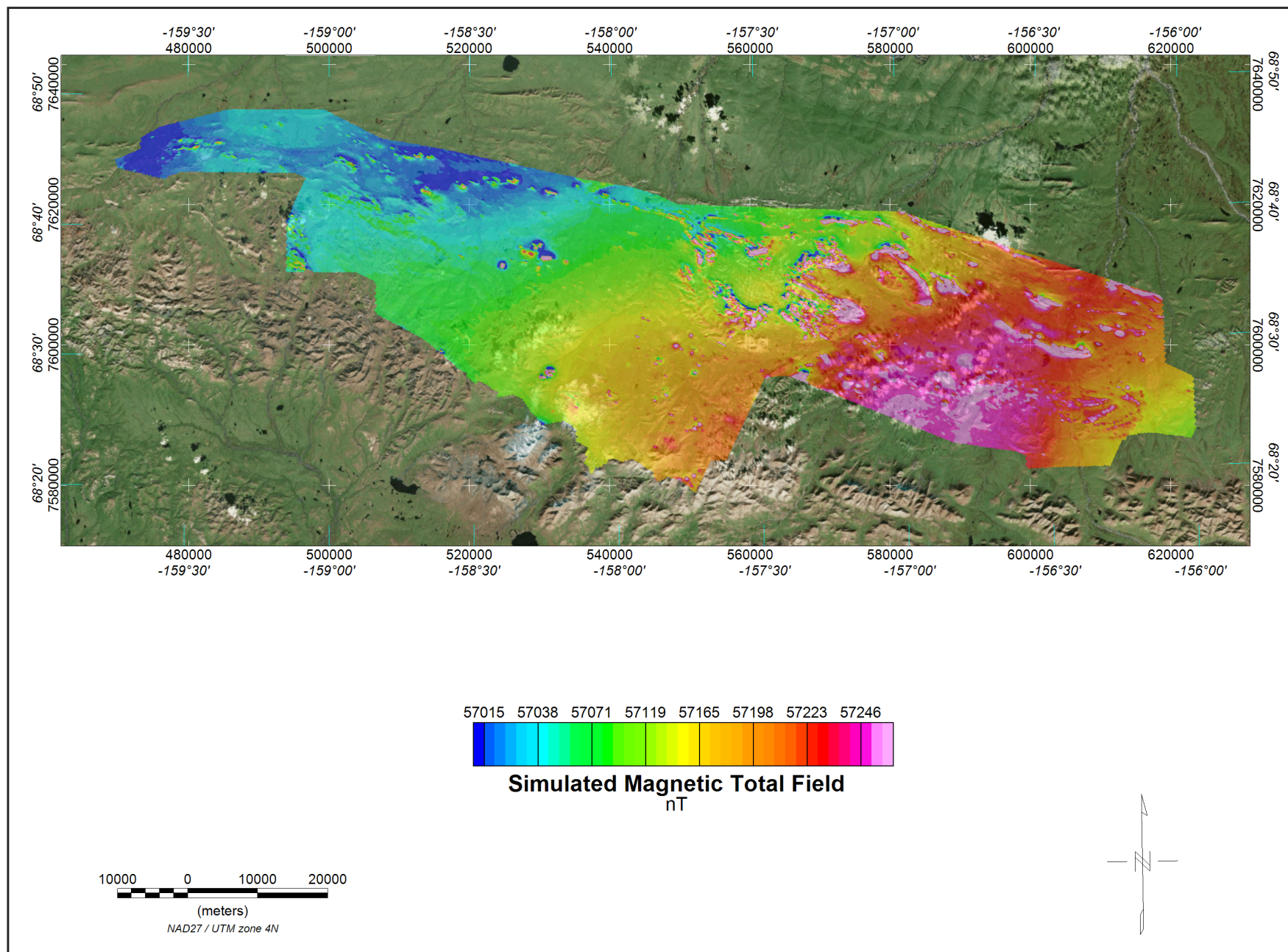
**Figure 1.** Southern NPRA electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Southern NPRA survey area shown with adjacent DGGs geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation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





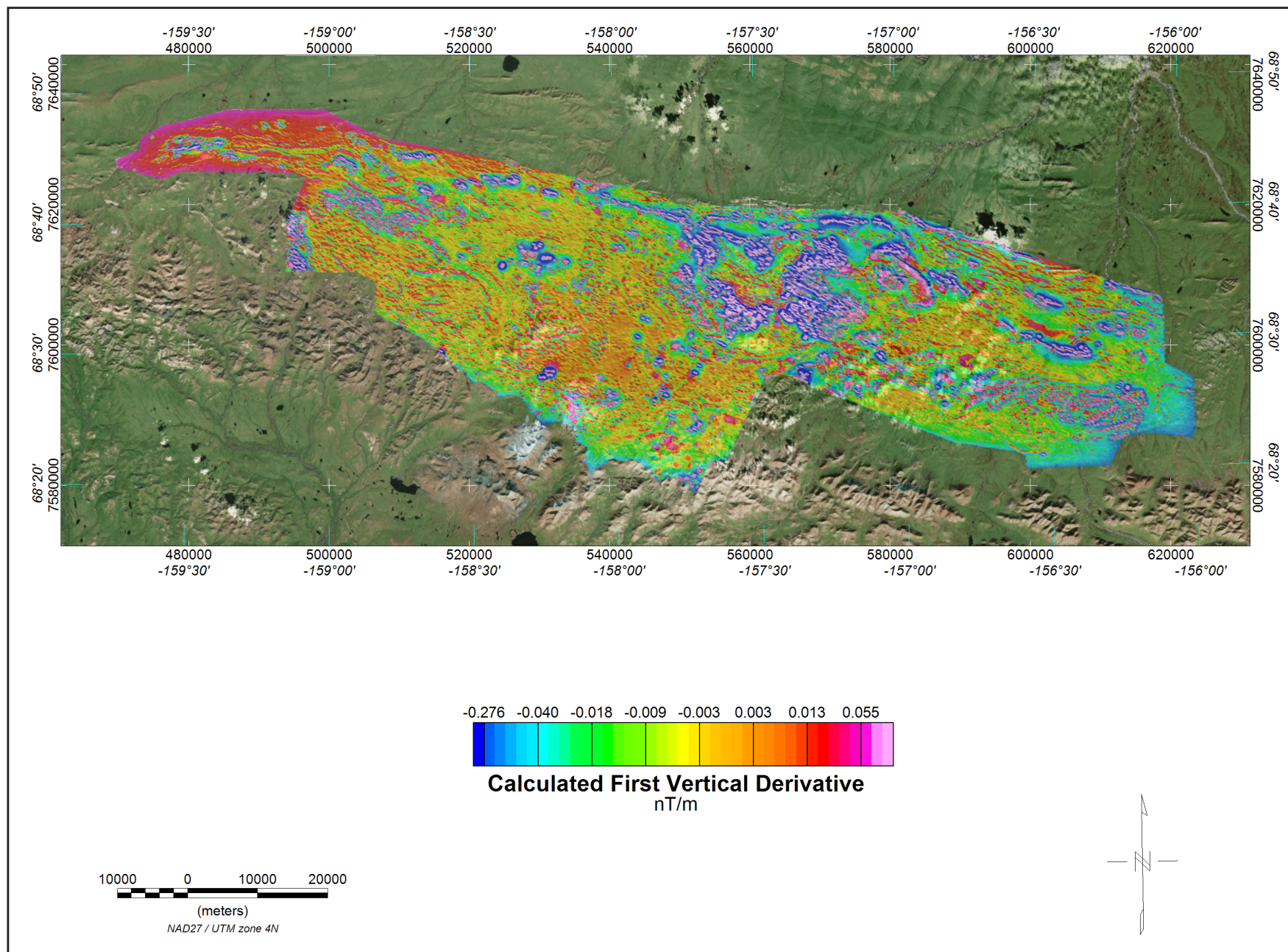
**Figure 2.** Flight path with orthometric image.





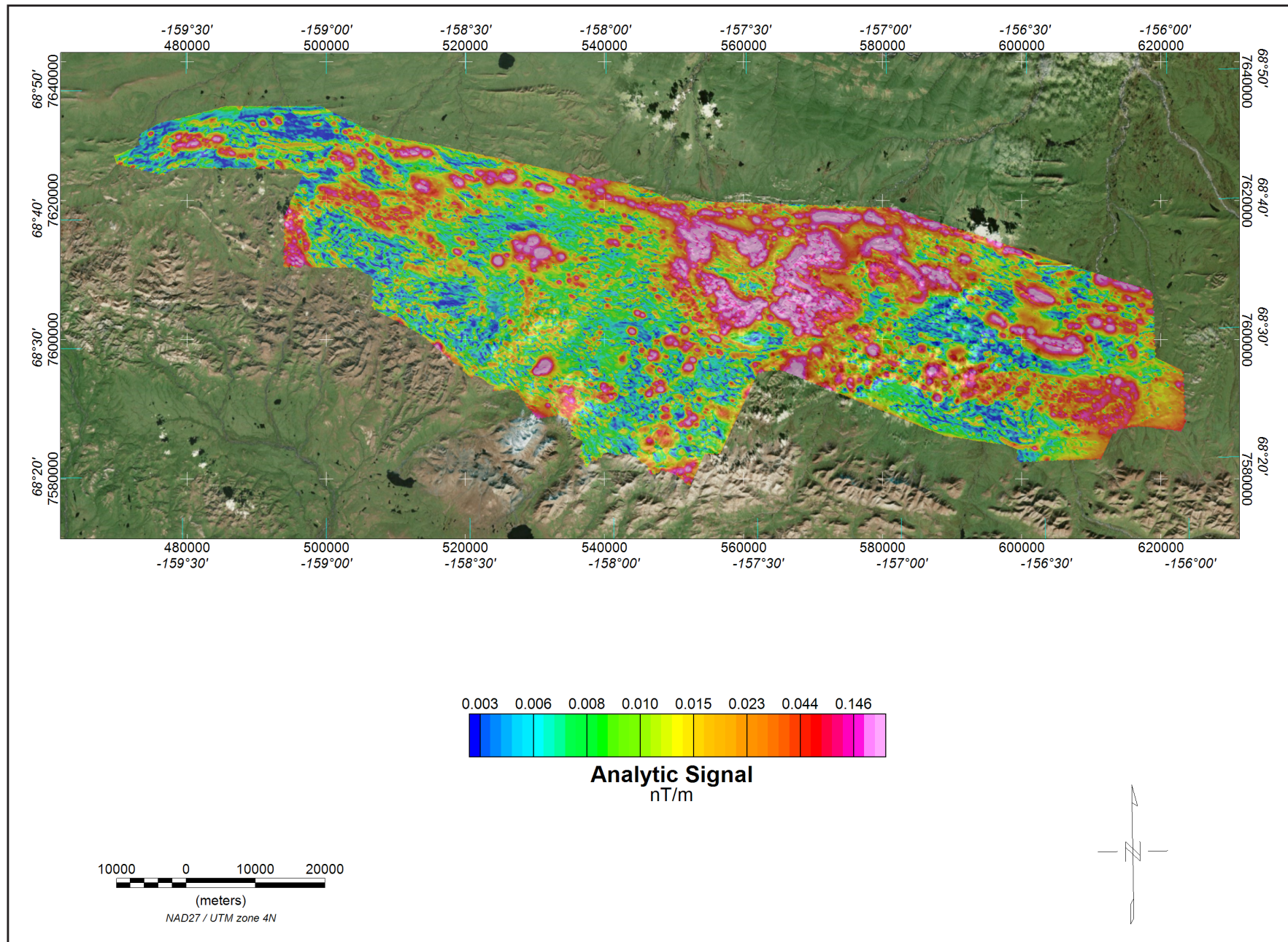
**Figure 3.** Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex CS2 cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2005, updated to August 2005), (3) leveled to the tie line data, (4) a constant value of approximately 57,000 nT was added to all data, and (5) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.





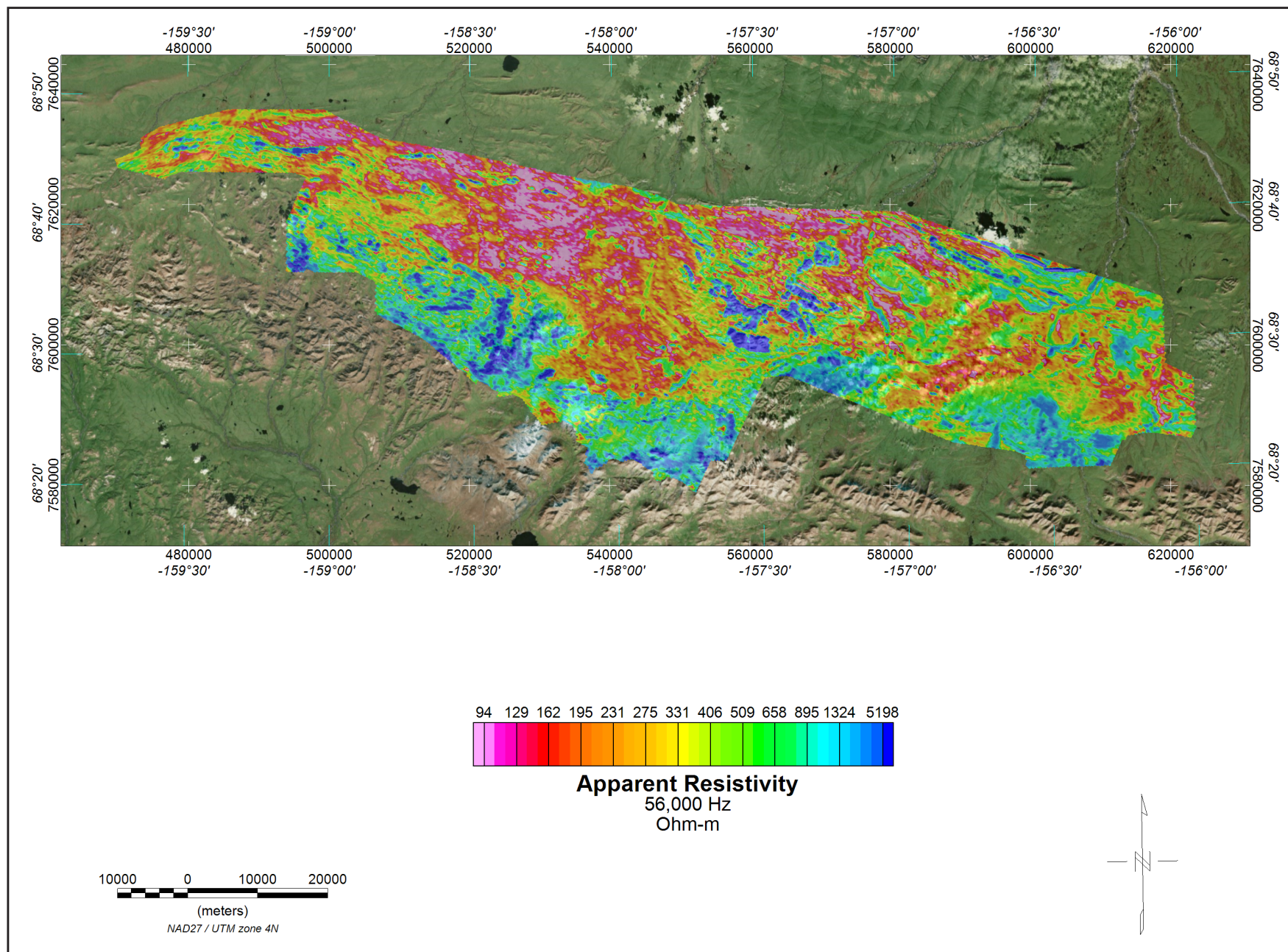
**Figure 4.** Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid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





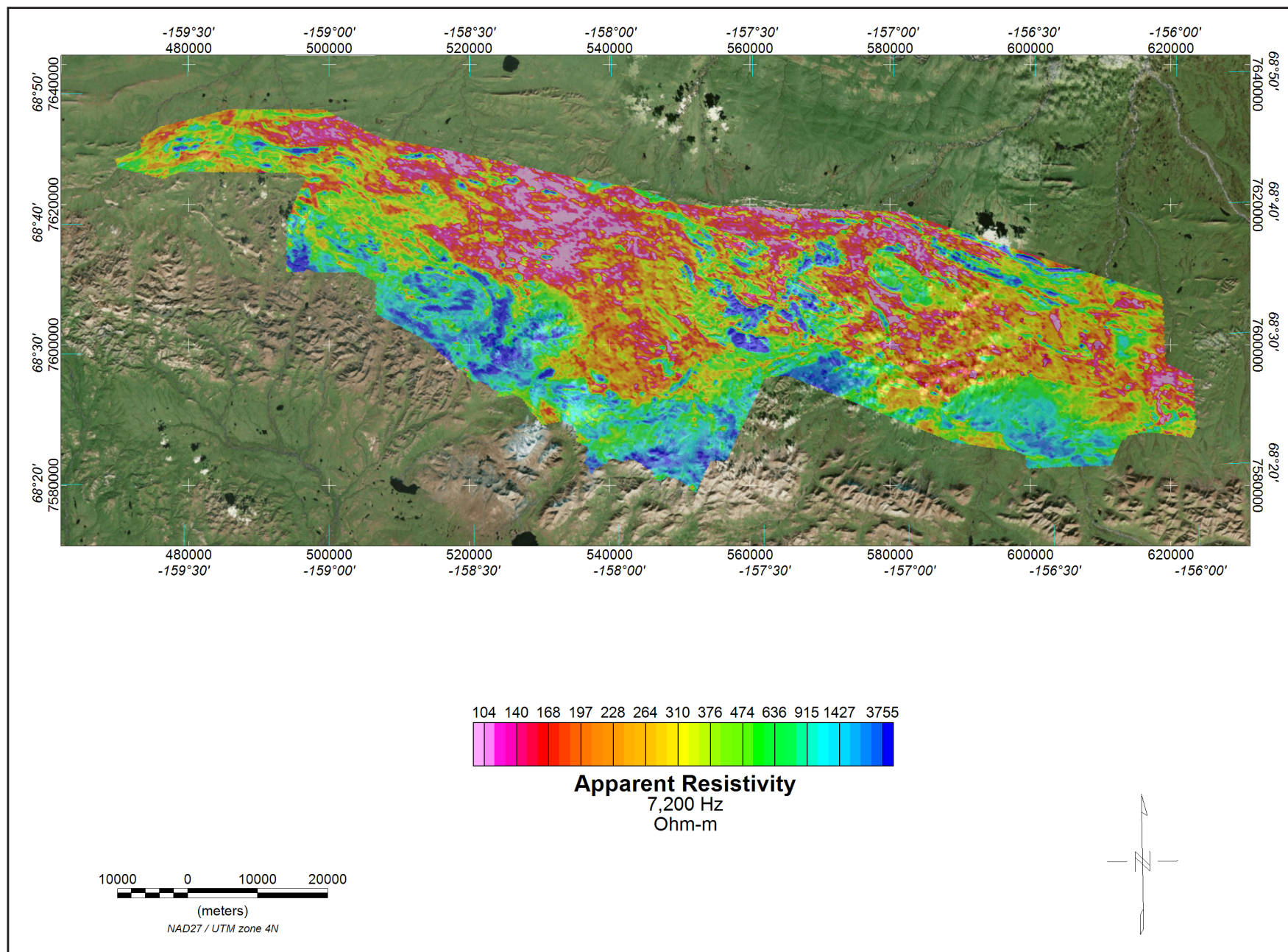
**Figure 5.** Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous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





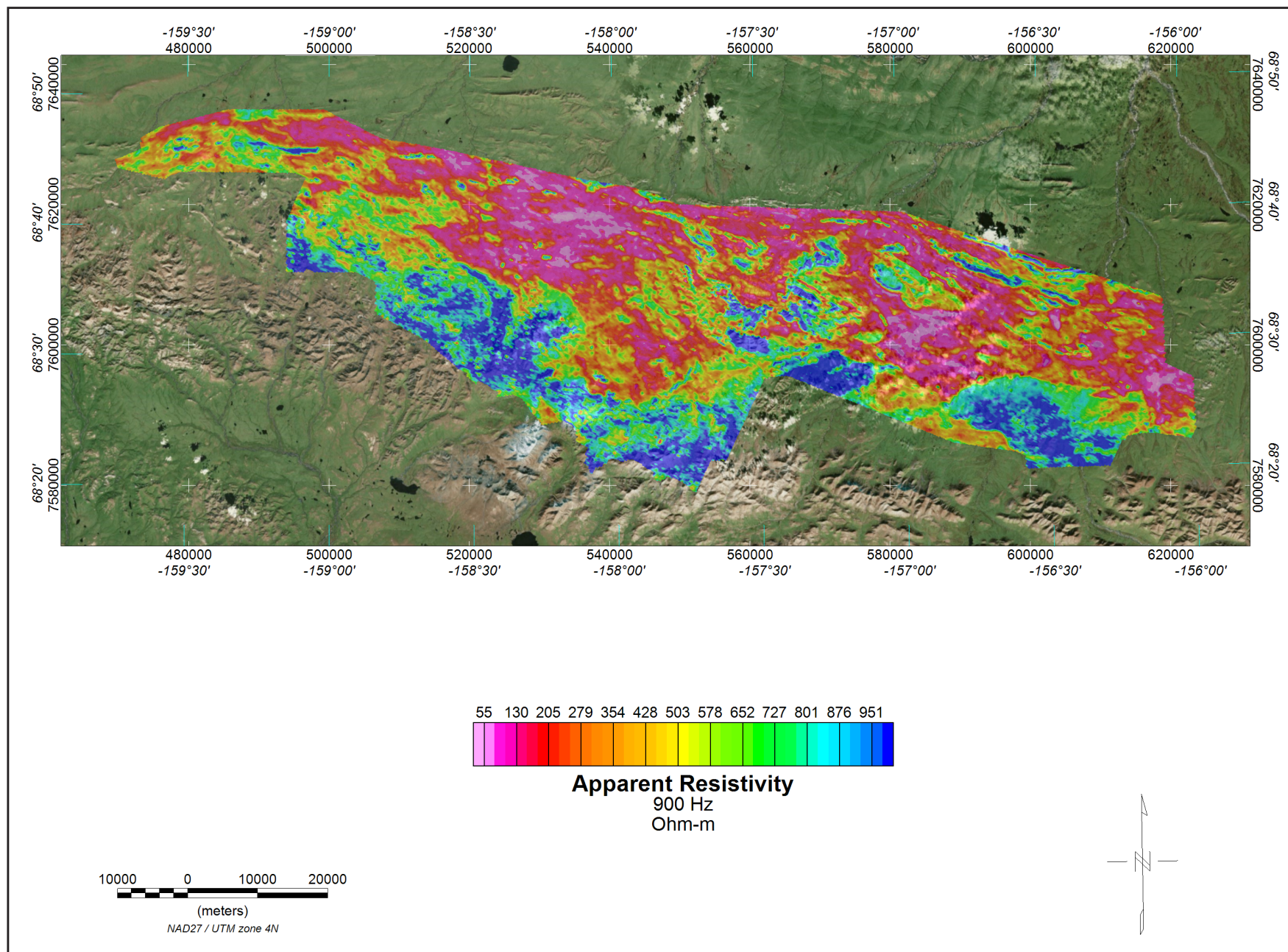
**Figure 6.** 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.





**Figure 7.** 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.





**Figure 8.** 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

**Table 1.** Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30441>

Map Title	Description
southernnpa_sim_magtf_topo_map_1of4.pdf	simulated magnetic total field grid with topographic base map
southernnpa_sim_magtf_topo_map_2of4.pdf	simulated magnetic total field grid with topographic base map
southernnpa_sim_magtf_topo_map_3of4.pdf	simulated magnetic total field grid with topographic base map
southernnpa_sim_magtf_topo_map_4of4.pdf	simulated magnetic total field grid with topographic base map
southernnpa_sim_magtf_contours_plss_map_1of4.pdf	simulated magnetic total field grid and contours with public land survey system base layer
southernnpa_sim_magtf_contours_plss_map_2of4.pdf	simulated magnetic total field grid and contours with public land survey system base layer
southernnpa_sim_magtf_contours_plss_map_3of4.pdf	simulated magnetic total field grid and contours with public land survey system base layer
southernnpa_sim_magtf_contours_plss_map_4of4.pdf	simulated magnetic total field grid and contours with public land survey system base layer
southernnpa_res7200hz_topo_map_1of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
southernnpa_res7200hz_topo_map_2of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
southernnpa_res7200hz_topo_map_3of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
southernnpa_res7200hz_topo_map_4of4.pdf	7,200 Hz apparent resistivity grid with topographic base map
southernnpa_res7200hz_contours_plss_map_1of4.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res7200hz_contours_plss_map_2of4.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res7200hz_contours_plss_map_3of4.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res7200hz_contours_plss_map_4of4.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res900hz_topo_map_1of4.pdf	900 Hz apparent resistivity grid with topographic base map
southernnpa_res900hz_topo_map_2of4.pdf	900 Hz apparent resistivity grid with topographic base map
southernnpa_res900hz_topo_map_3of4.pdf	900 Hz apparent resistivity grid with topographic base map
southernnpa_res900hz_topo_map_4of4.pdf	900 Hz apparent resistivity grid with topographic base map
southernnpa_res900hz_contours_plss_map_1of4.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res900hz_contours_plss_map_2of4.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res900hz_contours_plss_map_3of4.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res900hz_contours_plss_map_4of4.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_01of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_02of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map

**Table 1, continued.** Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30441>

Map Title	Description
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_03of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_04of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_05of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_06of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_07of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_08of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_09of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_10of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_emanomalies_sim_magtf_contours_detailed_topo_map_11of11.pdf	electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
southernnpa_res56khz_topo_map_1of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
southernnpa_res56khz_topo_map_2of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
southernnpa_res56khz_topo_map_3of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
southernnpa_res56khz_topo_map_4of4.pdf	56,000 Hz apparent resistivity grid with topographic base map
southernnpa_res56khz_contours_plss_map_1of4.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res56khz_contours_plss_map_2of4.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res56khz_contours_plss_map_3of4.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_res56khz_contours_plss_map_4of4.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
southernnpa_interpretation_plss_map_1of4.pdf	interpretation based on geophysical data with public land survey system base layer
southernnpa_interpretation_plss_map_2of4.pdf	interpretation based on geophysical data with public land survey system base layer
southernnpa_interpretation_plss_map_3of4.pdf	interpretation based on geophysical data with public land survey system base layer
southernnpa_interpretation_plss_map_4of4.pdf	interpretation based on geophysical data with public land survey system base layer





An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian of 119°, a northward constant of 0 and an east constant of 500,000 m. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.



## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2008

## TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

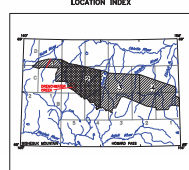
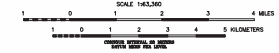
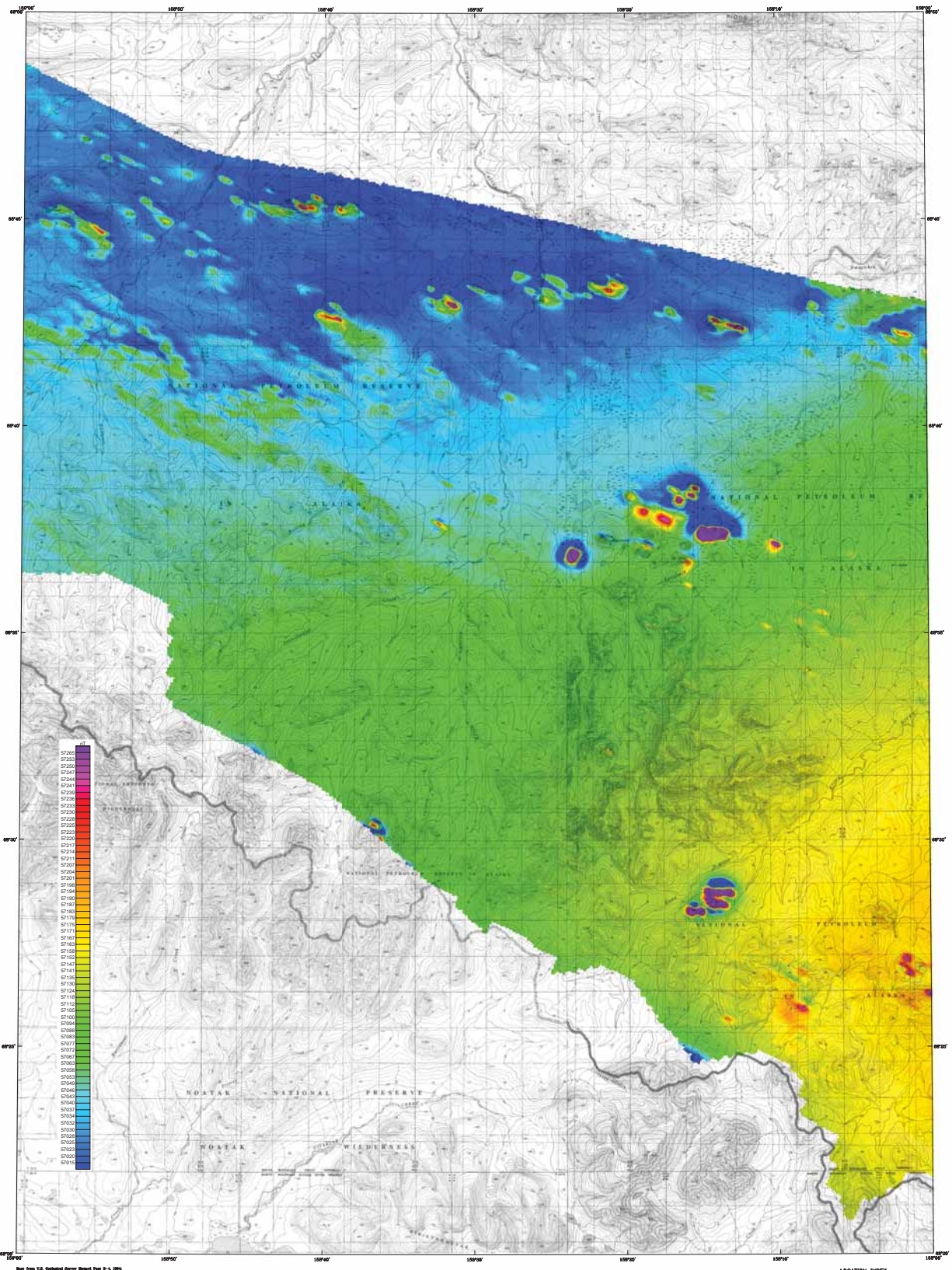
Алмо, Н., 1970, A new method of interpolation and smooth curve fitting based on local procedures, *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-602.

## SURVEY HISTORY

This map has been surveyed and drawn under contract by 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 by Stevens Exploration Management Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in Alaska, per DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707. Published maps are available in hard copy or as a PDF file, or as Adobe Acrobat Files (.pdf) on our Web site (<http://www.dggs.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





# **TOTAL MAGNETIC FIELD OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA**

PARTS OF HOWARD PASS AND MISSEGUQU MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Pease, Alaska Survey Corp., and Stevens Exploration Management Corp.  
2006

**DESCRIPTIVE NOTES**

The geophysical data were collected with a DIGNEX<sup>®</sup> Electromagnetic (EM) system and a Solaire return magnetometer. The EM and magnetic sensors were flown at a height of 100 feet, in addition to the survey recorded data, a video recording of the magnetic field was collected. The magnetic field was collected using a video camera. Flights were performed with an ACSC-2 Solaire helicopter at a mean terrain clearance of 200 feet along NB-SE (340°) survey flight lines west of the red line shown on the location index map. The flight lines were flown east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Drencher Creek area (red area in the location index) where flight lines were spaced one-half mile. Flight lines were flown perpendicular to the flight line intervals of approximately 0.5 miles (except for the Drencher Creek area, where the flight interval was 1.5 miles).

An Aerotech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 10 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 18 projection. The flight path data were then projected onto the 1983 datum using a Clarke 1866 UTM zone 18 projection datum constant of 0 and an east constant of 500,000. Horizontal accuracy of the presented data is better than 10 m, with respect to the UTM grid.

## **TOTAL MAGNETIC FIELD**

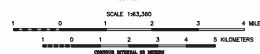
The magnetic total field contours were produced using digitally recorded data from a Solaire return magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations for 1983 profiles, 2004, updated to August 2005, using altimeter adjusted (AA) (3) leveled to the 16-line data, and (4) interpolated onto a regular 80 m grid using a modified Alamo (1970) technique.

Alamo, M. 1970. A new method of interpolation and smoothing of magnetic data. *Journal of Geophysical Research*, v. 75, no. 4, p. 284-292.

**SURVEY HISTORY**

This map and other products from this survey are available for use by other agencies. The map was prepared by the Alaska Division of Geological & Geophysical Surveys (ADGGS) in cooperation with the U.S. Bureau of Land Management (BLM), Alaska Survey Corp., and Stevens Exploration Management Corp. (SEMC). The map was prepared for the BLM Alaska State Office, 222 N. 7th Avenue, Anchorage, AK 99513.





## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter, adjusted IGRF, (3) resampled to the line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1972) technique.

Jidma, 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. 582-602.

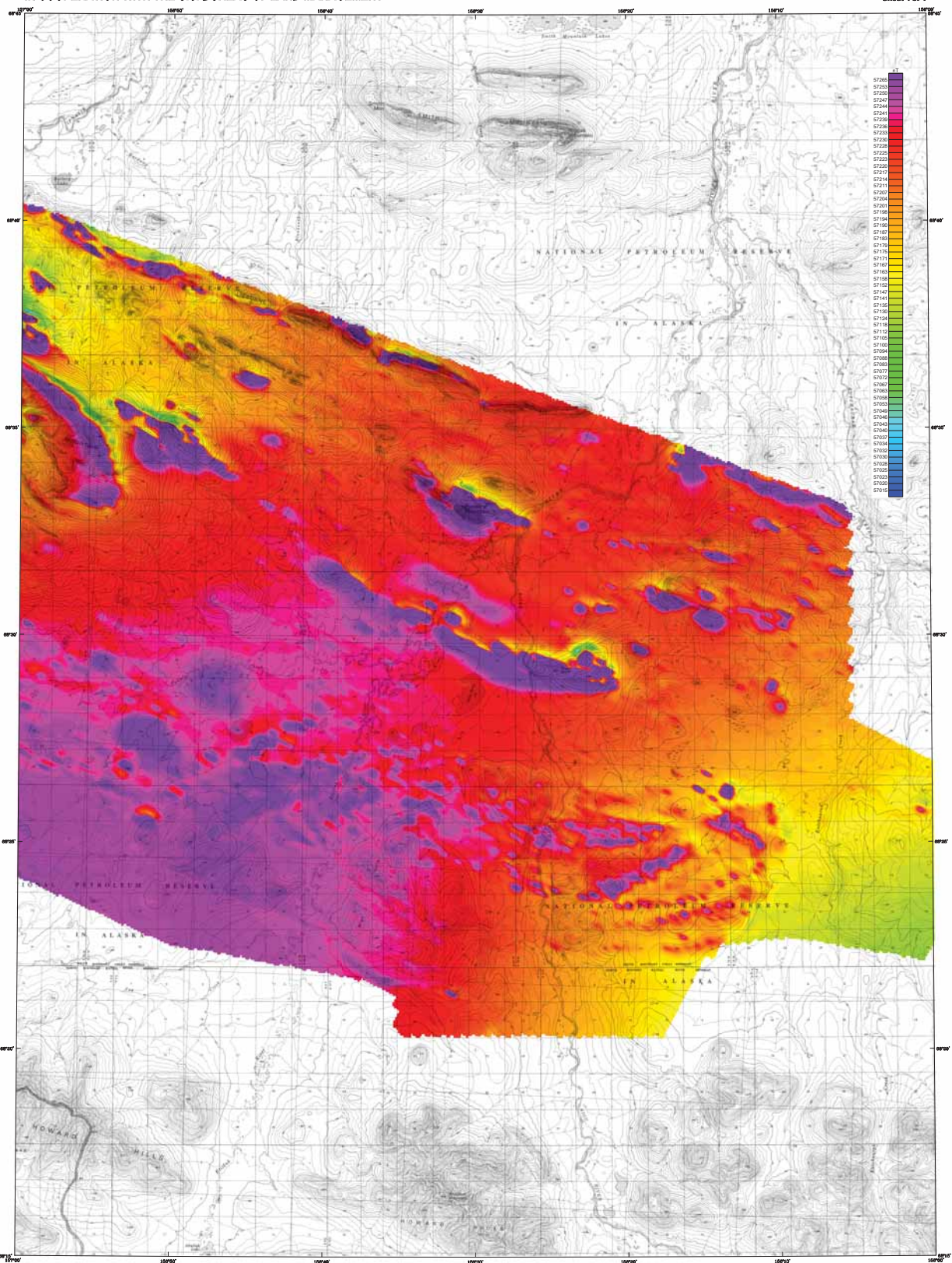


## SURVEY HISTORY

This map has been compiled and drawn under contract by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Environmental Management Corp., Fairbanks geophysical data for the area were acquired and compiled by Stevens Environmental Management Corp. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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 and other products are also available online at the Adobe Acrobat Files (.pdf) on our Web site at (<http://www.dggs.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the BLM Alaska Office, 222 W. 7th Avenue, Anchorage, AK 99513.





#### DESCRIPTIVE NOTES

The geophysical data were collected with a DINGEE® Distingraphic (DM) system and a Sinterex datum magnetometer. The DM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a laser altimeter, grid navigation system, and a real-time kinematic (RTK) system. Flights were performed with an ACSS-2000 Sinterex helicopter at a mean vertical clearance of 300 feet along NW-SE (340°) survey flight lines and at 100 ft (320°) survey flight lines. A portion of the flight lines were spaced one eighth of a mile, the lines were flown perpendicular to the flight line interval of approximately 3 miles except for the Drenthwater Creek area, where the flight interval was 1.5 miles.

An Aerotech 0224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was fixed every 0.5 seconds using post-flight differential positioning to a base station of better than 5 m. The 2005 positions were projected onto the Clarke 1866 UTM zone 4 system. 1982 North American datum using a datum correction (DA) of 120 north-south and an east constant of 500,000. Horizontal accuracy of the recorded data is better than 10 m, with respect to the UTM grid.

## TOTAL MAGNETIC FIELD OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

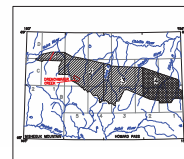
PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laural E. Burns, U.S. Bureau of Land Management, Puget Albion Survey Corp., and Stevens Exploration Management Corp.  
2006

#### TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Sinterex datum magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations by subtracting the 2005 magnetic data from the 2005 magnetic data, (3) adjusted for regional variations by subtracting the 2005 magnetic data from the 2005 magnetic data, (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Alaska, 1970. A new method of interpolation and smooth curve fitting to magnetic data. Report of the Department of Geology, University of Alaska, Fairbanks, 1970, p. 4, 28-30.



#### 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 (DGGGS), and Stevens Exploration Management Corp. (SEMC). The data were collected for the area shown on the map by the U.S. Bureau of Land Management. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGGS, 3354 College Road, Fairbanks, Alaska 99709-3707. Materials are available for viewing and photocopying at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





**TOTAL MAGNETIC FIELD  
OF PARTS OF  
SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA,  
NORTHWEST ALASKA**

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

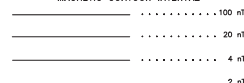
by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2004

TOTAL MAGNETIC FIELD

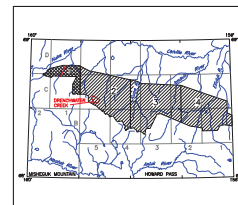
The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005), updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a bivariate Akima (1978) algorithm.

Aidun, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: *Journal of the Association of Canadian Mathematicians*, v. 17, no. 4, p. 589-603.

MAGNETIC CONTOUR INTERVAL



## LOCATION INDEX

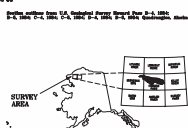
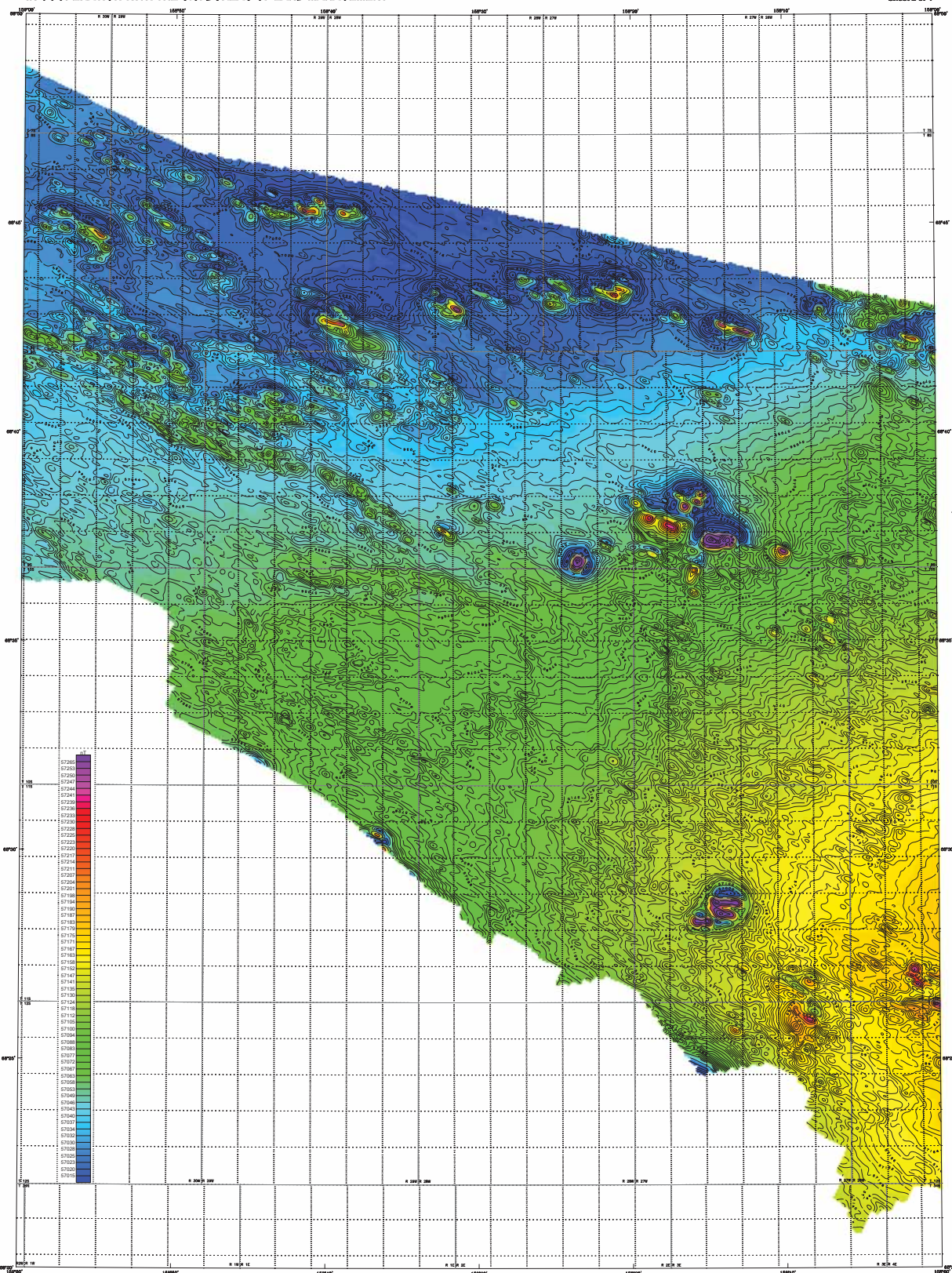


## SURVEY HISTORY

This map has been compiled and drawn under contract from the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corporation (SEMC). The data were collected by DGGS and SEMC and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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**DESCRIPTIVE NOTES**

The geophysical data were collected with a DigiHEM<sup>®</sup> Electromagnetic (EM) system and a Sinterex return magnetometer. The 100 m magnetic sensor was flown at a height of 100 feet. In addition, the survey recorded data from a radio altimeter, GPS, magnetometer, and a video camera. Flights were performed with an AS350B-2 Super helicopter at a mean terrain clearance of 200 feet along NE-S (340°) survey flight lines west of the red line shown on the UTM zone 4J segment. 1977 high resolution terrain data were used to correct the flight lines for the terrain. The flight lines were spaced 1/4 mile apart, with the exception of the Branchwater Creek area (red line) where flight lines were spaced 1/2 mile apart. The flight lines were flown perpendicular to the flight line interval of approximately 3 miles west of the Branchwater Creek area, where the flight interval was 1.5 miles.

An Anatech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The national datum was used for all data. The data were projected onto the Clarke 1866 UTM zone 4J segment. 1977 high resolution terrain data were used to correct the flight lines for the terrain. The flight lines were spaced 1/4 mile apart, with the exception of the Branchwater Creek area, where the flight interval was 1.5 miles.

Altitude, in 1975, is sea surface of interpolation and ground surface. The datum is the 1975 datum of the U.S. Department of the Interior, Bureau of Land Management.

# **TOTAL MAGNETIC FIELD OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA**

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

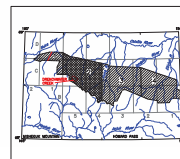
by  
Laurel E. Burns, U.S. Bureau of Land Management, Pogo Alaska Surveys Corp., and Stevens Exploration Management Corp.  
2006

## **TOTAL MAGNETIC FIELD**

The magnetic total field contours were produced using digitally recorded data from a Sinterex return magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data; (2) adjusted for regional variations (or tilt gradient, 2000, updated to August 2000) using altimeter-adjusted (1977, 1975) levelled to the 1975 datum; and (3) interpolated onto a regular 80 m grid using a modified Adams (1970) technique.

## **MAGNETIC CONTOUR INTERVAL**

- 100 nT
- 20 nT
- 4 nT
- 2 nT

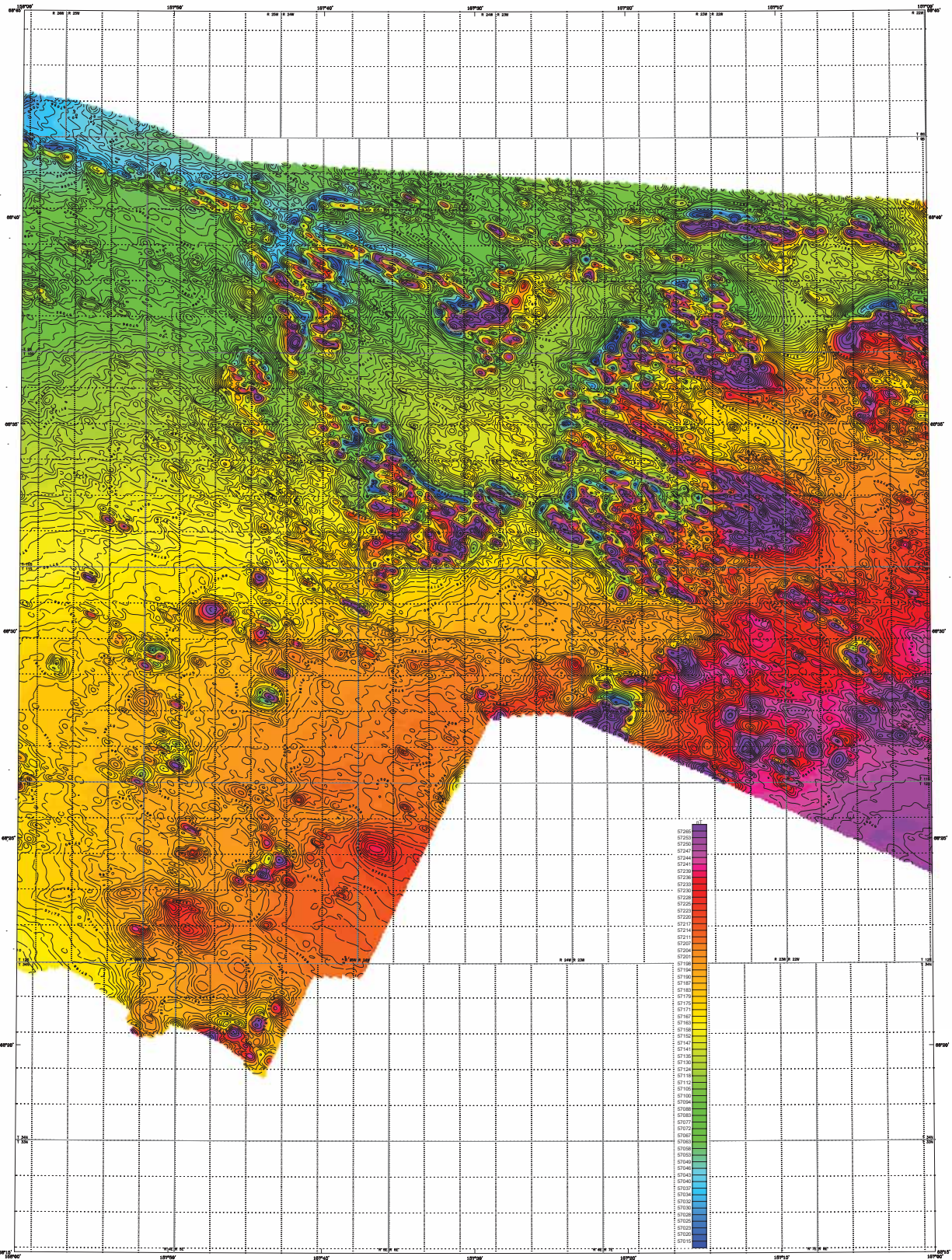


**SURVEY HISTORY**

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. (SEMC). The data were collected for the purpose of mapping the area for the purpose of the project. The project was funded by the U.S. Department of the Interior, Bureau of Land Management (BLM).

The map and other products from this survey are available by mail order to persons from 0001, 3334 College Road, Fairbanks, Alaska, 99709-3377. Published on Adobe Acrobat File (\*.pdf) on our Web site (http://www.dggs.alaska.gov/). The map and other products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DOMEY Electromagnetic (EM) system and a Sintered carbon magnetometer. The EM and magnetometer were flown at a height of 100 feet. In addition, the survey recorded data from a laser altimeter, GPS navigation system, and a real-time kinematic (RTK) GPS system. Flights were performed with an ACSC-2 Survey helicopter at a mean terrain clearance of 200 feet along NE-SE (240°) survey flight lines west of the red line shown on the location index. The flight lines were spaced one mile apart. The flight lines were flown perpendicular to the flight line interval of approximately 3 miles except for the Drenchester Creek area, where the flight interval was 1.5 miles.

An Aerialcam 0224 NAVSTAR / GLONASS digital positioning system was used for navigation. The helicopter system was leveled every 60 seconds using post-flight differential positioning to a station accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 UTM zone 48 system. 1983 North American datum using a vertical datum of 1983. The horizontal datum is of 0 and an east constant of 500,000. Horizontal accuracy of the recorded data is better than 10 m, with respect to the UTM grid.

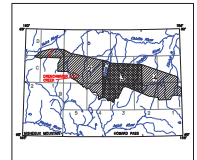
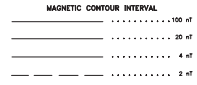
# **TOTAL MAGNETIC FIELD OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA**

**PARTS OF HOWARD PASS AND MISSEGUAK MOUNTAIN QUADRANGLES**  
by  
Laurel E. Burns, U.S. Bureau of Land Management, Pease, Alaska Survey Corp., and Stevens Exploration Management Corp.  
2006

**TOTAL MAGNETIC FIELD**

The magnetic total field contours were produced using digitally recorded data from a Sintered carbon EM magnetometer, with a sampling interval of 0.2 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 IGM gradient), (3) updated to August 2005 using orbitally adjusted IGM, (3) leveled to true line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

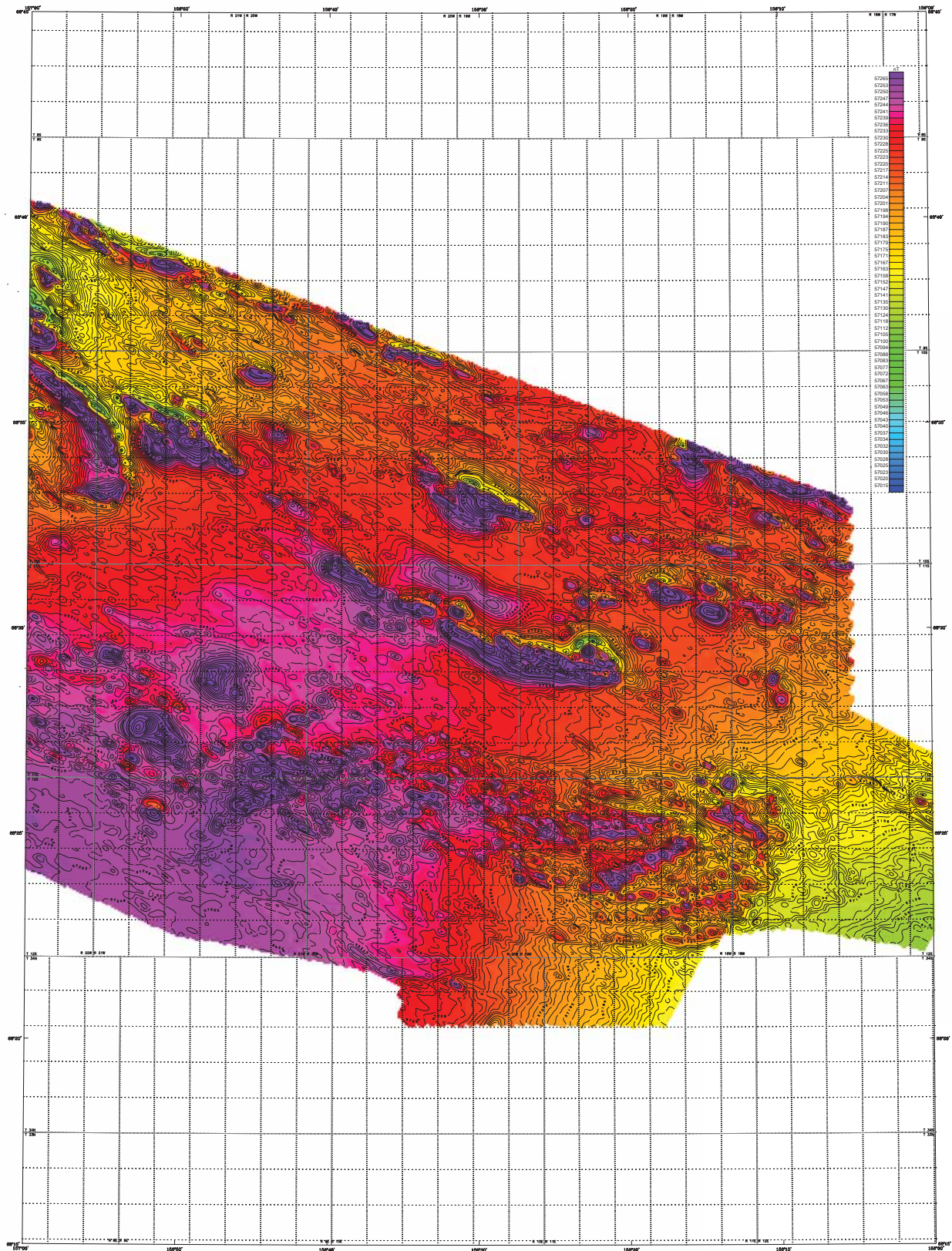
Alaska, N. 1970, A new method of interpolation and smooth curve fitting, *U.S. Geological Survey Bulletin*, 717, no. 4, p. 589-602.



**SURVEY HISTORY**

This map and other products from this survey are available for use under a license from the U.S. Geological Survey, 600 College Road, Foster, Alaska, 99703-2707. Published on Adobe Acrobat File (.pdf) on our Web site (<http://www.digiproc.alaska.edu/arcfile/>). These products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DOMEYR DASH-2000 system and a Sinterex system magnetometer. The DA and Sinterex systems were flown at a height of 100 feet. In addition, the survey recorded data from a radio altimeter, grid navigation system, 100/100 horizontal and vertical cameras. Flights were performed with an ACSS-2000 Sinterex helicopter at a mean vertical clearance of 300 feet along NB-SE (340°) survey flight line west of the red line shown on the location index map. The flight lines were spaced one-quarter of a mile with the exception of the Drenthwater Creek area (red area in the location index) where flight lines were spaced one-half of a mile. The flight lines were flown perpendicular to the right line (line of topographic 1 mile) and the Drenthwater Creek area, where the flight interval was 1.5 miles.

An Aerotech 0224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The real-time system was used every 5 seconds using post-flight differential positioning to a visible accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 4 system, 1983 North American datum using a reference ellipsoid (WGS 84) of 1984. A constant of 0 and an east constant of 500,000. Horizontal accuracy of the ground control is better than 10 m, with respect to the UTM grid.

## TOTAL MAGNETIC FIELD OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laural E. Burns, U.S. Bureau of Land Management, Puget Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2008

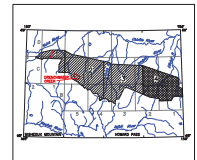
### TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Sinterex system CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or zero gradient, 2005, acquired in August 2005) using ultrametric adjusted (UAT) (3) referred to the 1983 datum, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Alaska, 1983, a new method of interpolation and ground control points, and a new method of interpolation and ground control points of the Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.

### 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 (DGGGS), and the U.S. Bureau of Land Management (BLM). DGGGS and BLM are the lead agencies for the project. The project was funded by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a northward shift of 500,000 m, and a scale factor of 0.999 603 3. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2008

## RESISTIVITY

**RESISTIVITY**

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. The data are 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

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 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management.

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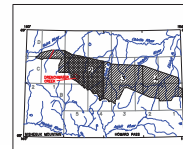
## PARTS OF HOWARD PASS AND MESHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

## RESISTIVITY

**RESISTIVITY**

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity has been generated from the inphase and quadrature components of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m



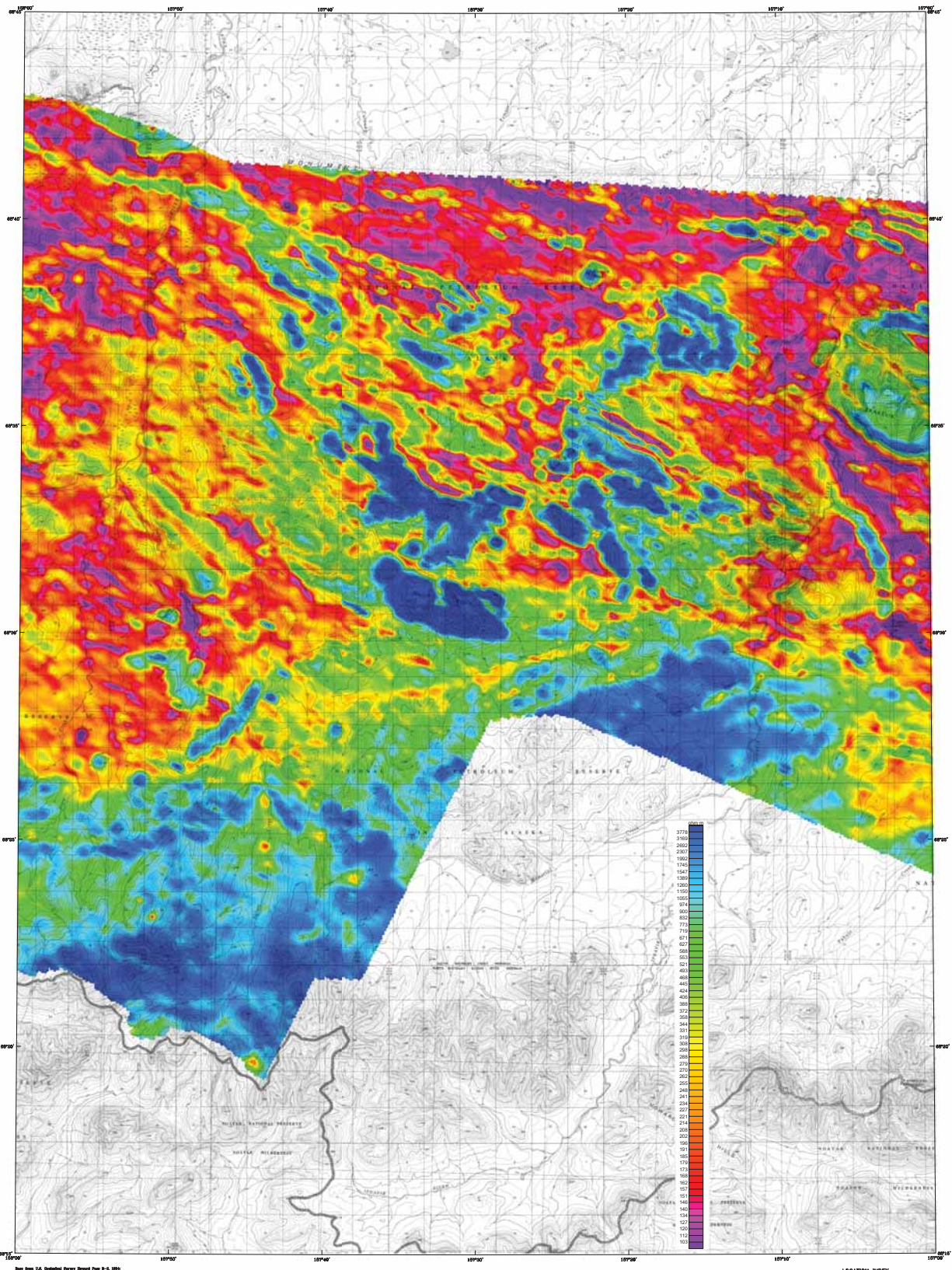
### SURVEY HISTORY

**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geospatial Surveys (DGGS), and Stevens Engineering Management Corp. Airborne geophysical data for the area were acquired in 1975 and 1976 by the U.S. Geological Survey. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIGHEM® Electromagnetic (EM) system and a Sinterex return magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a near-surface, high-resolution, ground-based resistivity system using a resistivity system with a resistivity sensor. Flights were performed with an AS350B-2 Super helicopter at a mean terrain clearance of 200 feet along NE-S (340°) survey flight lines west of the red line shown on the location index. Flights were performed with an AS350B-2 Super helicopter at a mean terrain clearance of 200 feet along NE-S (340°) survey flight lines east of the red line. Flight lines were spaced 1/4 mile apart, with the exception of the Drencheater Creek area (red area in the location index) where flight lines were spaced one eighth of a mile. Flight lines were flown perpendicular to the flight line intervals of approximately 3 miles except for the Drencheater Creek area, where the flight interval was 1.5 miles.

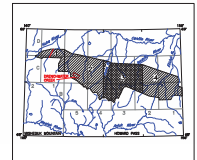
An Ashtech 5022A NAVSTAR®/GLONASS Global Positioning System was used for navigation. The resistivity system was used every 0.1 mile using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 41, UTM 187° North region datum using a datum transformation (UTM) of 10 m. The datum of 0 and an east constant of 500,000. Horizontal accuracy of the recorded data is better than 10 m, with respect to the UTM grid.

## 7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISSEKUK MOUNTAIN QUADRANGLES  
by  
Laural E. Burns, U.S. Bureau of Land Management, Puget Sound Survey Corp., and Stevens Exploration Management Corp.  
2008

**RESISTIVITY**

The DIGHEM® EM system measured in-phase and quadrature components at five frequencies: two vertical-coil coil-coupled systems operated at 1000 and 2000 Hz, and three horizontal-coil systems operated at 7200, 1000, and 2000 Hz. The EM data were a blend of 0.1 second, in-phase, overburden, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature components of the 7200 Hz using the formula:  $\rho_a = \frac{V}{I} \cdot \frac{1}{\omega \mu_0}$ , where  $\rho_a$  is the apparent resistivity,  $V$  is the voltage,  $I$  is the current,  $\omega$  is the angular frequency, and  $\mu_0$  is the permeability of free space. The data were collected using a 9 m coil spaced every 100 m, with a 100 m line spacing.



**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Surveys (DGGGS), and Stevens Exploration Management Corp. (SEMC). The original data were collected by SEMC in 2008. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available to read online at: <http://www.dggs.alaska.gov>. For more information, contact the DGGGS, 222 W. 7th Avenue, Anchorage, AK 99513.



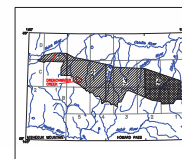


by  
Laurel E. Burns, U.S. Bureau of Land Management, Pagro Alborno Surveys Corp., and Stevens Exploration Management Corp.

**RESISTIVITY**

The DIGHEM<sup>®</sup> EN system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,200 Hz. EN data were interpreted using a computerized EN system responsive to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using a pseudo-half space approximation. The data were interpreted using a separator 80 m gridding using a modified AMBA (1970) technique.

A new method of interpretation and smooth curve fitting based on least procedures journal of the Association of



**SURVEY HISTORY**

This map has been compiled and drawn under contract by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by the Stevens Exploration Management Corp. for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGS, 3335 College Road, Fairbanks, Alaska, 99709-3707. Publications may also be ordered from the Stevens Exploration Management Corp. at Adobe Acrobat files (.pdf) on our Web site (<http://www.dggs.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The horizontal position is derived every 0.1 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a northward constant of 0 and an east constant of 500,000. Positional accuracy of the data is better than 10 m, with respect to the UTM grid.

## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

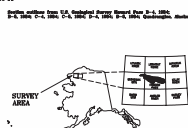
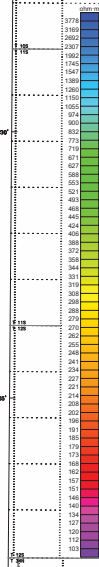
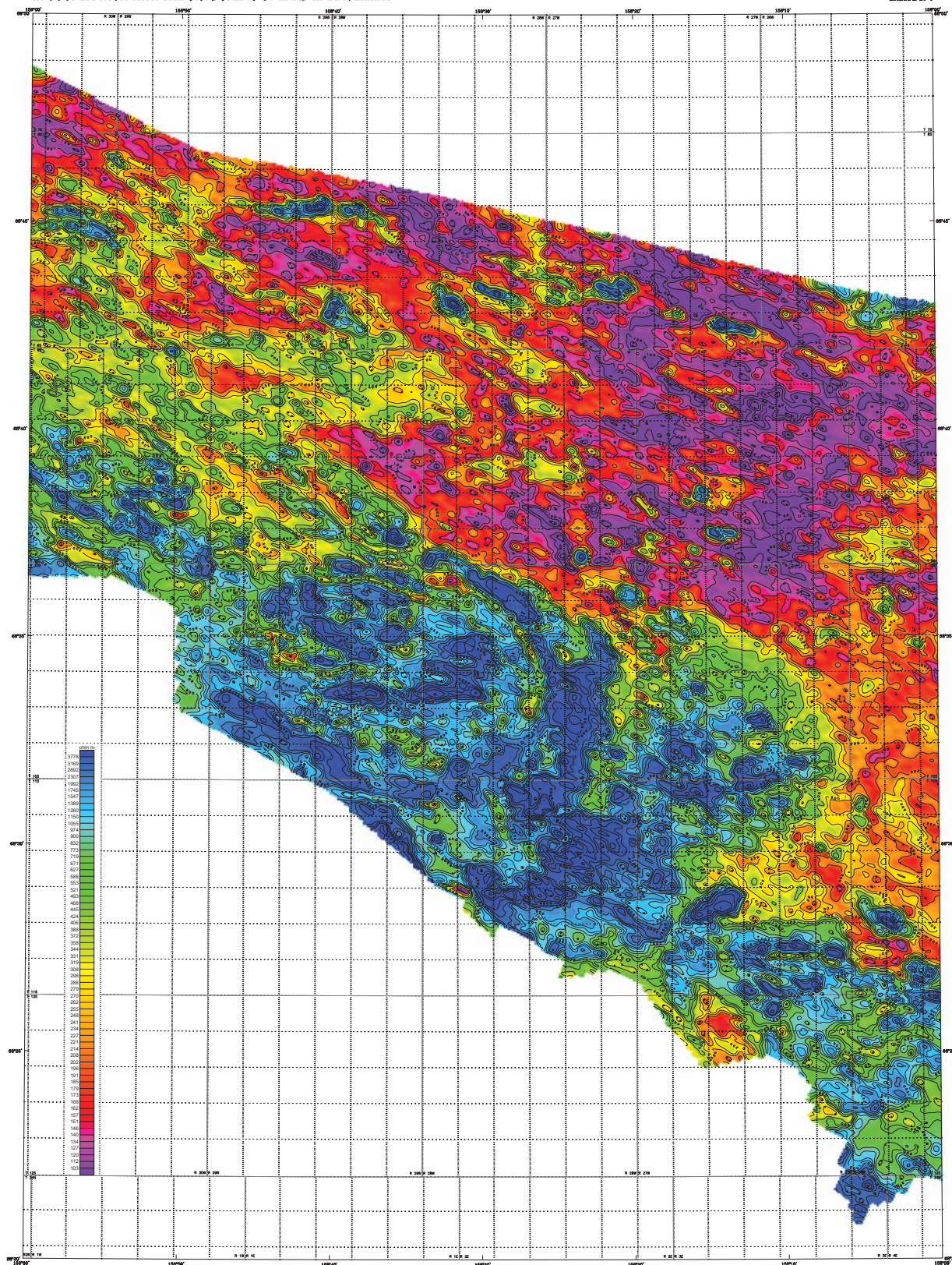
The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial cables, spaced 1.5 m apart, were connected to three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase component of the EM signal. 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.



This map has been surveyed and drawn under contract to 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 by Stevens Exploration Management Corp. in 1985. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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## 7200 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISSEKUK MOUNTAIN QUADRANGLES

by  
Laural E. Burns, U.S. Bureau of Land Management, Puget Sound Survey Corp., and Stevens Exploration Management Corp.  
2006

**DESCRIPTIVE NOTES**

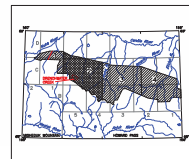
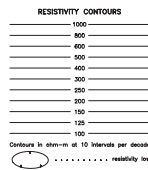
The geophysical data were collected with a Doherty Electromagnetic (EM) system and a Sintered column magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a video altimeter, a GPS navigation system, a 100 MHz radio, and a video camera. Flights were performed with an ACES-2000-2000 helicopter on a terrain clearance of 200 feet along the 340° survey flight lines west of the red line shown on the location index and 100 feet along the flight lines east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Drenth Creek area (red area in the location index), where flight lines were spaced one-half mile. The flight lines were flown perpendicular to the flight line intervals of approximately 3 miles (total) for the Drenth Creek area, where the flight interval was 1.5 miles.

An Aerotech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The resistivity data were collected every 50 meters using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path conditions were projected onto the Clarke 1866 UTM zone 6, projected 1927 North American datum using a reference ellipsoid of 1983. The datum constant is 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 Doherty EM system measured light and quadrature components of five frequencies. Two vertical coil-coupled systems of 100 and 2000 ft with three horizontal resistivity coils were operated at 900, 7200 and 36,000 Hz. EM data were recorded at 0.1 second intervals. The EM system measured apparent resistivity, conductivity, and natural sources. Apparent resistivity is generated from the light and quadrature components of the 7200 Hz data and is reported as a regular 60 m grid. The 60 m grid was then interpolated to a regular 30 m grid using a modified Akima (1975) technique.

AKMA, L. (1975). A new method of interpolation and smoothing using Akima's technique. In: T. H. K. Akima, ed. *Computing Mathematics*, v. 11, 164, 168-170.



**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey, and the U.S. Bureau of Land Management. The Alaska Division of Geological & Geophysical Survey (ADGGGS) was established in 1975. The ADGGGS was merged with the U.S. Bureau of Land Management in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available for sale and are priced from \$200 to \$500. College Road, Fairbanks, Alaska, 99709-3707. Published maps are also available for sale at the BLM Alaska Division of Geological & Geophysical Survey (ADGGGS) or at the Alaska Division of Geological & Geophysical Survey (ADGGGS) website (<http://www.adgggs.state.ak.us>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.

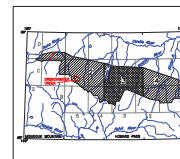
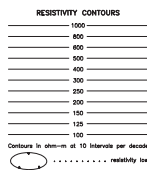




## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

RESISTIVITY CONTOURS

The DIGEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coils operated at 1000 and 500 Hz. The 1000 Hz coils were spaced 100 cm apart, and the 500 Hz coils were spaced 56.0 cm apart. 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 component of the EM signal by 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.



This map has been compiled and drawn under contract by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Environmental Management Corp., Airborne geophysical data for the area were acquired and processed by Stevens Environmental Management Corp. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707. Pdfs and other digital products are available for download as Adobe Acrobat Files (.pdf) on our Web site (<http://www.dggs.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the BLM Alaska Office, 222 W. 7th Avenue, Anchorage, AK 99513.





## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

**RESISTIVITY CONTOURS**

1000  
800  
600  
500  
400  
300  
250  
200  
125  
100

Contours in ohm-m at 10 intervals per decade

reality is

### 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 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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An Ashtech GG24 NAVSTAR / GLOPASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a northward constant of 0 and an east constant of 500,000. Constant of 0 and an east constant of 500,000 is better than 10 m with respect to the UTM grid.



## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2008

## RESISTIVITY

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial cables, spaced 1.5 m apart, were connected to 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 components 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.

### 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 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management.

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/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.





### RESISTIVITY

The DIGHTM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coils separated at 150 cm and 8000 Hz, and two 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 are then regressed to give 80 m grid using a modified Alamo (1970) technique.

Alamo, H., 1970, A new method of interpretation and smooth curve fitting based on least procedures: Journal of the Association of Geophysical Geologists, 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., Alaska geophysical surveying and mapping company. The data were collected by Stevens Exploration Management Corp. and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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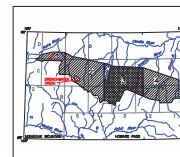




## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

RESISTIVITY

The DIGHEM EM system measured vertical and quadrature components at five frequencies. Two vertical coaxial coils—operated at 100, 200, 400, and 800 Hz—plus 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.



## SURVEY HISTORY

**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Stevens Exploration Management Corp. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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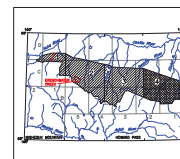
## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

### RESISTIVITY

**RESISTIVITY**

The DIGHEM<sup>®</sup> EM system measured induced and quadrature components at five frequencies. Two vertical coaxial coils operated at 100 and 1500 Hz while a horizontal coil operated at 100, 1500, 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 90° phase quadrature component of the capacitor 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*, 17, 589-590.



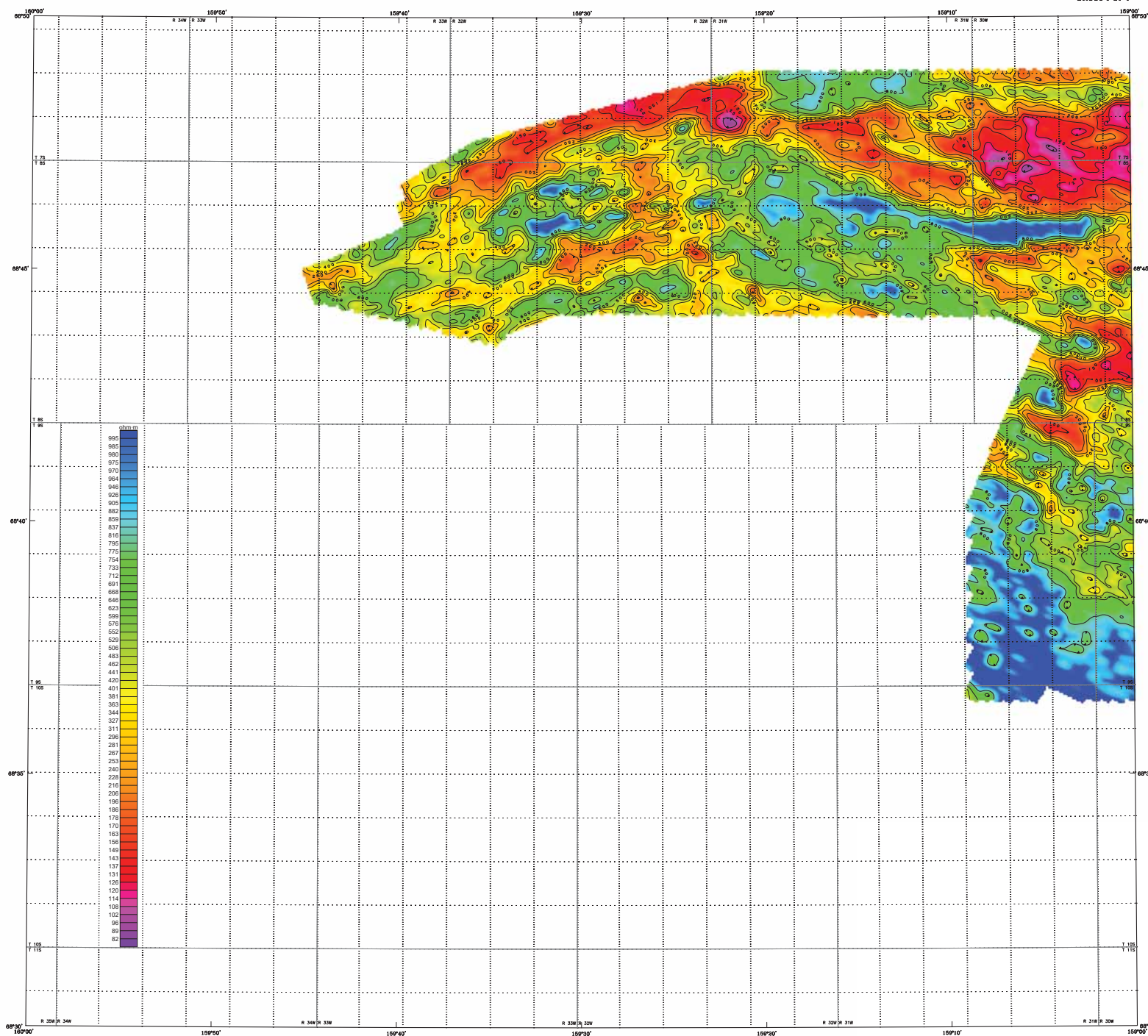
## SURVEY HISTORY

**SURVEY HISTORY**

This map has been compiled and drawn under contract by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Numerous geophysical data for the area were acquired by Stevens Exploration Management Corp. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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# 900 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

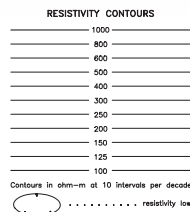
PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2006

## RESISTIVITY

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 300, 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 presumed, Journal of the Association of Computing Machinery, v. 17, no. 4, p.580-602.

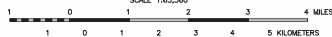


## DESCRIPTIVE NOTES

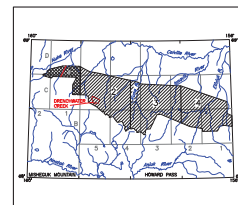
The geophysical data were acquired with a DIGHEM<sup>®</sup> Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/80 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines west of the red line shown on the location index and NE-SW (220°) survey flight lines east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Drenchwater Creek area (red area in the location index), where flight lines were spaced one eighth of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles except for the Drenchwater Creek area, where the flight interval was 1.5 miles.

An Ashtech G224 NAVSTAR / GLOMASS Global Positioning System was used for navigation. The helicopter location was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, 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.

SCALE 1:63,360



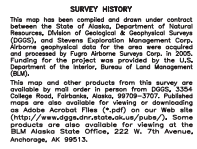
LOCATION INDEX



## 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 (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM). This map and other products from this survey are available by mail order in person from DGGG, 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/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.









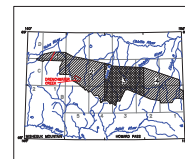
## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

**RESISTIVITY CONTOURS**

1000  
800  
600  
500  
400  
300  
250  
200  
150  
125  
100

Contours in ohm-m at 10 intervals per decade

..... resistivity (ohm-m)



### SURVEY HISTORY

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## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

**RESISTIVITY CONTOURS**

1000  
800  
600  
500  
400  
300  
250  
200  
150  
125  
100

Contours in ohm-m at 10 intervals per decade

 . . . . . resistivity log

### SURVEY HISTORY

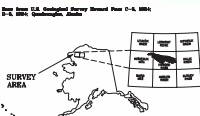
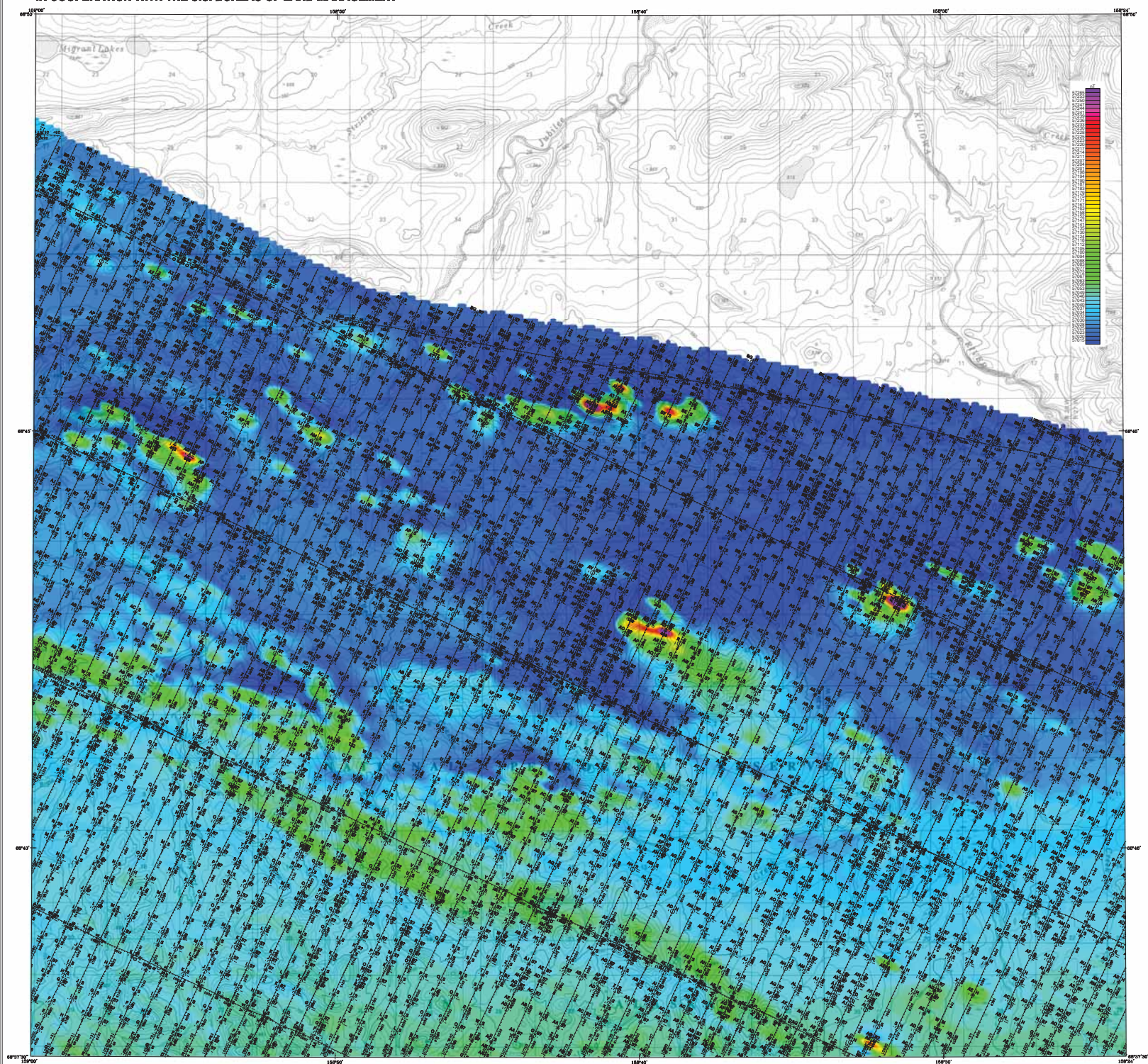
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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#### DESCRIPTIVE NOTES

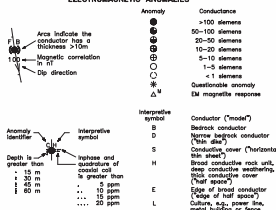
The geophysical data were acquired with a DIGHEM<sup>®</sup> Electromagnetic (EM) system and a Scholtes sodium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 helicopter, at a mean terrain elevation of 1000 feet. The flight lines were spaced 0.1 mile apart, with the exception of the Drachewitz Creek area (red area in the location index), where flight lines were spaced one eighth of a mile. The lines were flown perpendicular to the flight line from the Drachewitz Creek area, where the flight interval was 1.5 miles.

An Ashtech G24 NAVSTAR / GLONASS Global Positioning System (GPS) was used for navigation. The helicopter position was derived every 0.5 seconds and flight lines were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 150° 30' north constant of 0 and an east constant of 500,000. Horizontal accuracy of the presented data is better than 10 m, with respect to the UTM grid.

#### ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM<sup>®</sup> EM system measured inphase and quadrature EM data. The EM system was flown at 1000 and 5000 Hz with three horizontal coplanar coils spaced at 200, 700, 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. 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 patterns, topographic, and geologic information, with conductor and magnetic patterns and topography. The power the monitor and the flight track video were examined to locate cultural sources.

#### ELECTROMAGNETIC ANOMALIES



## TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS C-6 and D-6 QUADRANGLES

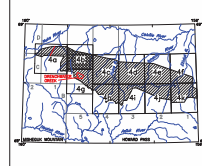
by  
Laural E. Burns, U.S. Bureau of Land Management, Fugro Alaboma Survey Corp.,  
and Stevens Exploration Management Corp.  
2006

#### TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scholtes sodium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the sea line data, and (4) interpolated onto a 50 m grid using a modified Akima (1970) technique.

Alaska, N. 1970. A new method of interpolation and smooth curve fitting based on local properties. *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-601.

#### LOCATION INDEX FOR SCALE 1:51,680



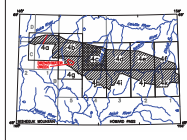
#### SURVEY HISTORY

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 Alaboma Survey Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM). This map and other products from this survey are available by mail order. In person from 2005, 5354 Mile Road, Anchorage, Alaska 99503. For more information, please contact the BLM Alaska State Office at (http://www.dggs.dnr.state.ak.us/pubs/). Some products are also available for viewing or downloading at the Alaska Aerial Photo (AAP) on our Web site (http://www.dggs.dnr.state.ak.us/aap/). The BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.



[illegible]

by  
Laurel E. Burns, U.S. Bureau of Land Management, Pugo Atkins Surveys Corp.  
and Stevens Exploration Management Corp.  
2008



### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Geological and Geophysical Survey (GGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Survey Corp. in 2006. Soundings for the project were provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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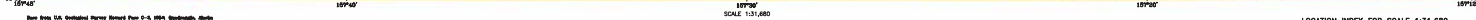
- 1:50,000 Scale Topographic Map, 6°N, 147°E, BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Schlumberger cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Adams, 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.





### ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DICHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coil-coupled pairs operated at 1000 and 5500 Hz while the horizontal coil-coupled pairs operated at 750, 1500, and 56,000 Hz. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated by the response to the three frequencies. Interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coisal- and coisalar-coupled responses, together with conductor size and depth. The EM system also includes a line monitor and the flag track views were examined.

**ELECTROMAGNETIC ANOMALIES**

Area indicates the conductor has a thickness  $>10m$

$\Delta$  magnetic correlation in  $5^\circ$

Dip direction

100

Anomaly	Conductivity
●	$>100$ i.u.
●	50-100 i.u.
●	20-50 i.u.
●	10-20 i.u.
○	5-10 i.u.
○	1-5 i.u.
○	$<1$ i.u.

Depth (meters)	Interpretive symbol	Conductor (m)
$>100$	B	Basaltic intrusion
$>30$	D	Marine basaltic dike
$>10$	S	Sediment
$>5$	C	Conductor in soil
$>1$	H	Brass conductor
$>0.5$		High conductivity
$>0.2$		High conductivity
$>0.1$		High conductivity
$>0.05$		High conductivity
$>0.02$		High conductivity
$>0.01$		High conductivity
$>0.005$		High conductivity
$>0.002$		High conductivity
$>0.001$		High conductivity
$>0.0005$		High conductivity
$>0.0002$		High conductivity
$>0.0001$		High conductivity
$>0.00005$		High conductivity
$>0.00002$		High conductivity
$>0.00001$		High conductivity
$>0.000005$		High conductivity
$>0.000002$		High conductivity
$>0.000001$		High conductivity
$>0.0000005$		High conductivity
$>0.0000002$		High conductivity
$>0.0000001$		High conductivity
$>0.00000005$		High conductivity
$>0.00000002$		High conductivity
$>0.00000001$		High conductivity
$>0.000000005$		High conductivity
$>0.000000002$		High conductivity
$>0.000000001$		High conductivity
$>0.0000000005$		High conductivity
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$>0.00000000005$		High conductivity
$>0.00000000002$		High conductivity
$>0.00000000001$		High conductivity
$>0.000000000005$		High conductivity
$>0.000000000002$		High conductivity
$>0.000000000001$		High conductivity
$>0.0000000000005$		High conductivity
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$>0.00000000000000000002$		High conductivity
$>0.00000000000000000001$		High conductivity
$>0.000000000000000000005$		High conductivity
$>0.000000000000000000002$		High conductivity
$>0.000000000000000000001$		High conductivity
$>0.0000000000000000000005$		High conductivity
$>0.0000000000000000000002$		High conductivity
$>0.0000000000000000000001$		High conductivity
$>0.00000000000000000000005$		High conductivity
$>0.00000000000000000000002$		High conductivity
$>0.00000000000000000000001$		High conductivity
$>0.000000000000000000000005$		High conductivity
$>0.000000000000000000000002$		High conductivity
$>0.000000000000000000000001$		High conductivity
$>0.0000000000000000000000005$		High conductivity
$>0.0000000000000000000000002$		

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Alabama Surveys Corp.  
and Stevens Exploration Management Corp.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 60 m grid using a modified Akima (1970) technique.

Aldin, 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 SCALE 1:31,680



This map was compiled and prepared under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Corporation. The geophysical data were collected, processed and processed by Fugro Airborne Surveys Corp. in 2001. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGS, 330 College Road, Fairbanks, Alaska, 99709-3707. Publications can also be ordered online from the Alaska Division of Adobe Acrobat Director's file (.pdf) on our Web site (<http://www.dggs.dnr.state.ak.us/pub/>). Some products are also available for viewing at the Alaska Division of Office, 222 W. 7th Avenue, Anchorage, AK 99513.



### ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the GDEM-EM system measured five horizontal quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal opsonar-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 conductivity, the conductive overburden, and the 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 opsonar-coil responses, together with the aeromagnetic map. The flight track, the location of the power line monitor and the flight track video were examined to locate cultural sources.

[illegible]

by  
Laurel E. Barnes, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp.  
and Stevens Exploration Management Corp.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Sinterex cesium magnetometer, with a sampling interval of 0.3 s. The contours, 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 August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular grid using a modified Akima (1970) technique.

### SURVEY HISTORY

This map has been compiled and drawn under contract to the State of Alaska by the Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired by Stevens Exploration Management Corp. in 1995. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGS, 3355 College Road, Fairbanks, Alaska, 99709-3707. Publications can also be ordered online from the Alaska Division of Adobe Acrobat Files (.pdf) on our Web site (<http://www.dggs.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the Alaska State Capitol, 222 W. 7th Avenue, Anchorage, AK 99513.





### ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIOEM<sup>®</sup> EM system measured inphase and quadrature components of the magnetic field vector. Three horizontal coil-pairs operated at 1000 and 5500 Hz, 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 lateral conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the following symbols:  $\square$  = anomaly,  $\square$  = conductor. Determination of the type of conductor is based on EM anomaly shapes of the coisal- and coplanar-coil responses, together with the conductor and nonconductor response of the power line monitor and the flight track video was examined.

to locate cultural structures.

### ELECTROMAGNETIC ANOMALIES

**Acronyms**

Conductor  
 >100 sds  
 50-100 sds  
 20-50 sds  
 10-50 sds  
 5-10 sds  
 1-5 sds  
 < 1 sds  
 Questionable  
 EM magnetic

**Interpretive symbols**

B  
 Backscatter  
 S  
 Seismicity  
 "No data"  
 C  
 Conductivity  
 "No data"  
 H  
 Hypocenters and isoseismal circles  
 L  
 Landslides  
 C  
 Cultural, urban, etc.

**Acronyms**

Depth in meters  
 > 15 m  
 10 m  
 5 m  
 0 m  
 < 0 m

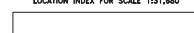
**Interpretive symbols**

Hypocenters and isoseismal circles  
 > 10 ppm  
 10 ppm  
 5 ppm  
 0 ppm  
 < 0 ppm



### PARTS of HOWARD PASS C-1 QUADRANGLE

30



### SURVEY HISTORY

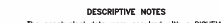
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGG), and Stevens Exploration Management, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Systems Corp. in 2001. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGG, 330 College Street, Fairbanks, Alaska 99701. Additional products are also available for viewing or download as Adobe Acrobat files (\*.pdf) on our Web site (<http://www.dggg.dnr.state.ak.us/pub/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.

**TOTAL MAGNETIC FIELD**

The magnetic total field contours were produced using digitally recorded data from a Sinterex design 352 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005 updated to August 2005) using altimeter adjusted T<sub>eff</sub>, (3) leveled to the datum of the data, and (4) converted to a regular 80 m grid using the modified Akima (1970) technique.





To determine the location of EM anomalies or their boundaries, the DREAM EM system was used to measure quadrature components at five frequencies. Two vertical coil-coil pairs operated at 1000 and 5500 Hz, while three horizontal coplanar-coil pairs operated at 900, 7200, and 5500 Hz. The EM system was set to 100 mT, 10 s 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 legend symbols. The EM system is used to determine the type of conductor is based on EM anomaly shapes of the coastal- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The EM monitor and the flight track video were examined to locate cultural sources.

Anomaly		Conductance
	Area indicate the thickness of the conductor is >10m	>100 siemens
	Magnetic correlation is 50	20-50 siemens
	Magnetic correlation is 10-20	10-20 siemens
	Magnetic correlation is 5-10	5-10 siemens
	Magnetic correlation is 1-5	1-5 siemens
	Magnetic correlation is <1	<1 siemens
	Questionable anomaly	
	EM magnetic response	
	Conductor "mode"	
	Bedrock conductor	
	Narrow bedrock conductor	
	Conductor cover (North)	
	Broad conductive rock with little conductive waste, this conductive cover is 100m	
	E	
	Edge of breast conduct	
	100m of half-sphere	
	Culture, age, power line, metal building or other	

Symbol	Interpretive symbol	Interpretive text
	Anomaly Identifier	
	Depth is greater than	
	15 m	
	30 m	
	5 ppm	
	10 ppm	
	15 ppm	
	20 ppm	
	Bedrock conductor	
	Narrow bedrock conduct	
	Thin disc	
	Conductive cover	
	H	
	Broad conductive rock	
	deep conductive weather	
	thin conductive cover	
	E	
	Edge of broad conduct	
	edge of half cover	
	L	
	Culture, esp. power line metal building or fence	



### PARTS of HOWARD PASS B-5 and C-5 QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Albama Surveys Corp.,  
and Stevens Exploration Management Corp.  
2008



**SURVEY HISTORY**

This map has been compiled and drawn under contract between the U.S. Department of the Interior, Bureau of Natural Resources, Division of Geological & Geophysical Survey (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for this map were collected by Stevens Exploration Management Corp. in 2005. Funding for this project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available by mail order in person from DGGG, 3354 College Road, Fairbanks, Alaska, 99709-3707. Published maps are available in hard copy or as PDF files in Adobe Acrobat files (\*.pdf) on our Web site (<http://www.dggg.dnr.state.ak.us/pubs/>). Some products are also available for viewing at the BLM Alaska State Office, 222 W. 7th Avenue, Anchorage, AK 99513.

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Aizma, 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.



### ELECTROMAGNETICS

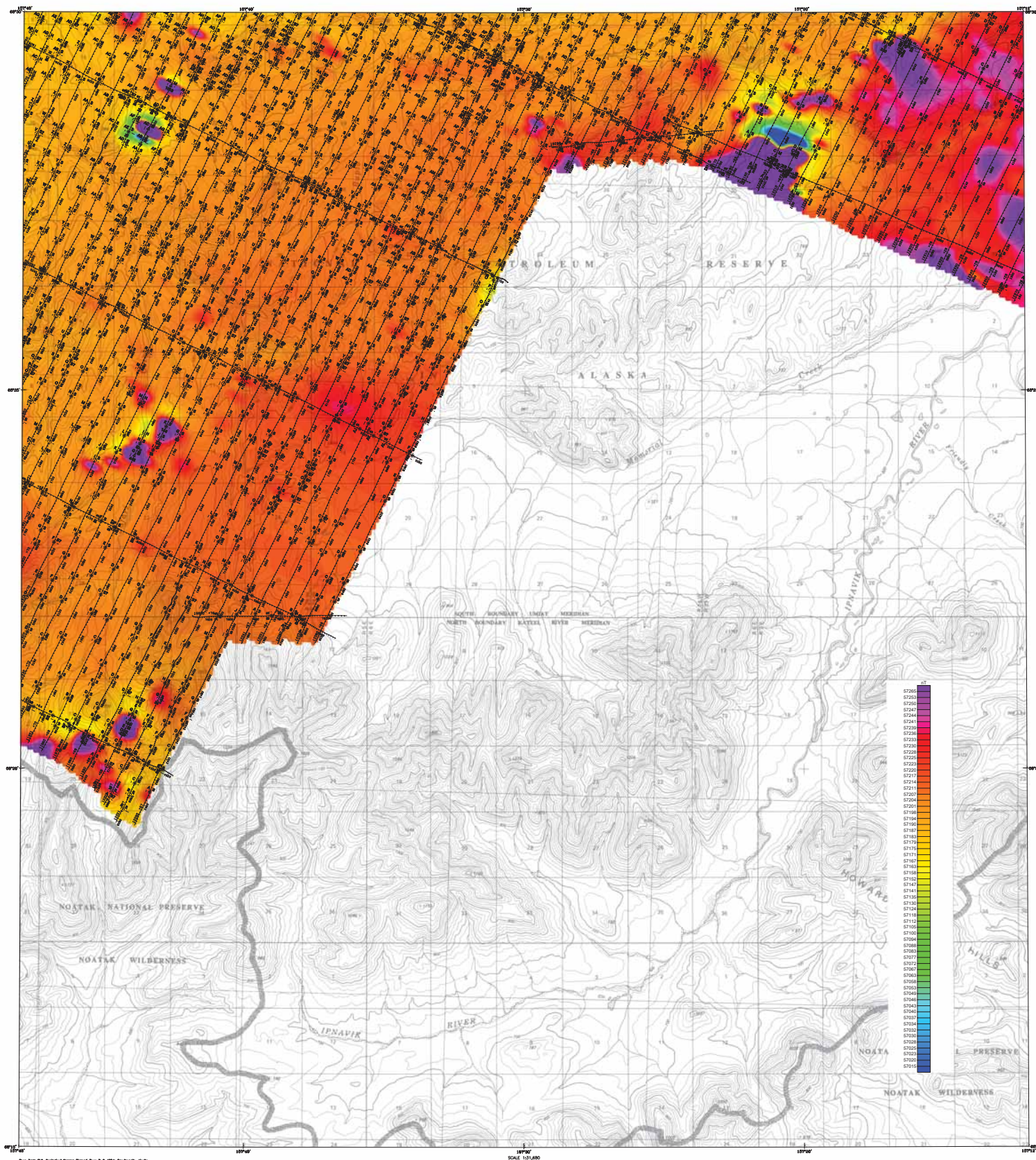
**PARTS of HOWARD PASS B-4 QUADRANGLE**  
by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Aldome Surveys Corp.  
and Stevens Exploration Management Corp.  
2002

The magnetic total field contours were produced using digitally recorded data from a Schöniker vector magnetometer with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGR gradient, 2005 adjusted to August 2005) using estimated adjusted IGR (3) leveled to the line data, and (3) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

This map has been compiled and drawn under contract from the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corporation. The hydrogeological data were collected, compiled, and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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 available in hard copy or as a PDF file, and can be downloaded as Adobe Acrobat files (.pdf) on our Web site (<http://www.dggs.dr.state.ak.us/pub/>). Some products are also available for viewing at the BLM Alaska Office, 222 W. 7th Avenue, Anchorage, AK 99513.





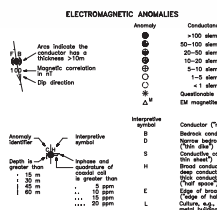
#### DESCRIPTIVE NOTES

The geophysical data were acquired with a DGGM<sup>®</sup> system. The EM system used a direct current magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, DG-60 12 monitors, and video camera. Flights were performed with an AC-130A-2200 helicopter at 2000 feet. The flight lines were flown in a grid pattern with flight lines west of the red line shown on the location index map and 10-20 (20) survey flight lines east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Denali National Park and Preserve area where flight lines were spaced one eighth of a mile. The lines were flown perpendicular to the flight line interval of approximately 3 miles except for the Denali National Park area, where the flight interval was 1.5 miles.

An Aerotech G224 NAVSTAR / GLONASS digital positioning system was used for navigation. The system was set for real-time kinematic (RTK) mode. The system was set for post-flight differential positioning to a nearest accuracy of better than 5 m. Flight path coordinates were projected onto the Clarke 1866 (1983 zone 4) datum, 1983 North American datum, 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 DGGM EM system measured magnetic and geophysical components of the frequency, two vertical conductive coils oriented at 1000 and 2000 Hz with three horizontal dipole-coil sets oriented at 900, 7000, and 10,000 Hz. EM data were recorded 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 magnetic map by the interpretive symbol, oriented to suit the anomaly. When shapes of the conductors and interpretive responses, together with conductive and magnetic patterns and topography, the power line corridor and the flight track video were examined to locate cultural sources.



## TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

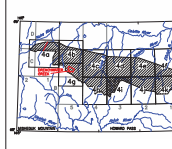
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Alcon Survey Corp.,  
and Stevens Exploration Management Corp.  
2008

#### TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Solaire system C22 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or GMR products, 2005, updated to August 2005) using altimeter adjusted (2005) (3) leveled to the line data, and (4) interpolated onto a regular 80 m grid using a modified Adams (1970) technique.

Adams, W., 1970, A new method of interpolation and smooth curve fitting, in: The geophysical interpretation of magnetic data, p. 17, no. 4, p. 588-592.

#### LOCATION INDEX FOR SCALE 1:31,680

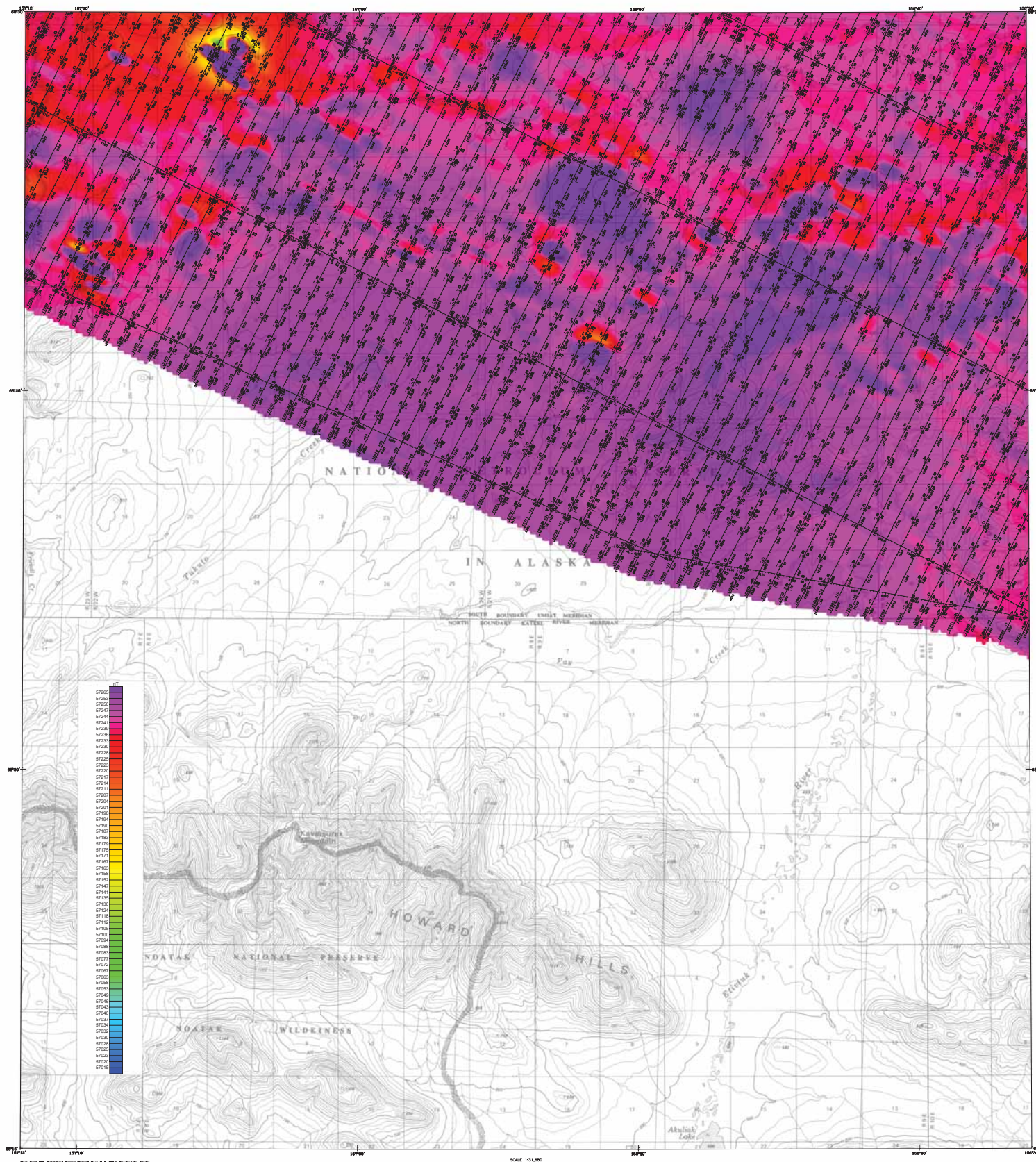


#### SURVEY HISTORY

This map has been compiled and drawn under contract (2008) and Stevens Exploration Management Corp. (2008) and Stevens Exploration Management Corp. (2008). The geophysical data for the area were acquired and processed by Fugro Alcon Survey Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available for use under a license from Stevens Exploration Management Corp. (2008) and Stevens Exploration Management Corp. (2008). The geophysical data for the area were acquired and processed by Fugro Alcon Survey Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).





# **TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA**

PARTS OF HOWARD PASS B-3 QUADRANGLE

Laurel E. Burns, U.S. Bureau of Land Management, Fugro Alaska Survey Corp.,  
and Stevens Exploration Management Corp.,  
2008

## **ELECTROMAGNETICS**

To determine the location of EM anomalies or their boundaries, the DGHM EM system measured depth and quadrature components of the frequency, two vertical three horizontal dipole-dipole pairs oriented at 90°, 70°, and 10,000 Hz. EM data were recorded at 0.1 second intervals. The EM system responds to subsurface conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol, oriented to show its geometry, where shapes of the conductors and apparent resistivity, together with conductive and resistive patterns and topography. The power line location and the flight track data were obtained by local cultural sources.

## **ELECTROMAGNETIC ANOMALIES**



Area includes the location of the EM anomaly. The location of the EM anomaly is indicated by a red line on the map. The location of the EM anomaly is indicated by a red line on the map.

Area includes the location of the EM anomaly. The location of the EM anomaly is indicated by a red line on the map. The location of the EM anomaly is indicated by a red line on the map.

Area includes the location of the EM anomaly. The location of the EM anomaly is indicated by a red line on the map. The location of the EM anomaly is indicated by a red line on the map.

Area includes the location of the EM anomaly. The location of the EM anomaly is indicated by a red line on the map. The location of the EM anomaly is indicated by a red line on the map.

## **TOTAL MAGNETIC FIELD**

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for magnetic variations (or IGRF gradient, 2005, updated to August 2005) using altimeter adjusted (2007) (3) leveled to the line data, and 4) interpolated onto a regular 80 m grid using a modified Adams (1970) technique.

Adams, W., 1970, A new method of interpolation and smoothing of magnetic data, U.S. Geological Survey, Bulletin 1275, p. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

## **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 (DGGG), and Stevens Exploration Management Corp. (SEMC). The aeromagnetic data for the area were acquired and processed by Fugro Alaska Survey Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

This map and other products from this survey are available for use by the public. For more information, contact the Alaska Division of Geological & Geophysical Surveys, 222 W. 7th Avenue, Anchorage, AK 99513.





### ELECTROMAGNETICS

To determine the location of EM anomalies or their absence, the DICHW-EM system measured magnetic quadrature components at five frequencies. Two vertical coisal-coils pairs operated at 1000 and 5500 Hz while two horizontal coplanar coils operated at 7200, 12000, 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 identified by the frequency of the second interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coisal- and coplanar-coil responses, together with the vector and the flight track. The DICHW-EM power line monitor and the flight track video were examined

by  
J. E. Barnes, U.S. Bureau of Land Management, Fugro Albion Surveys Corp.  
and Stevens Exploration Management Corp.  
2000

ELECTROMAGNETIC ANOMALIES

NATION

**NATIONAL PERSPECTIVES  
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**PART 1**  
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**TOTAL**

The magnetic total using digitally recorded CS2 magnetometer, seconds. The magnetodiurnal variations are recorded base station for regional variations updated to August 2, 1976. (3) leveled (4) interpolated onto modified Akima (1968).

Akima, H., 1970, A new method of fitting based on least of Curvature Number

**MAGNETIC FIELD**

field contours were obtained from data from a Scintrex magnetometer with a sampling interval of 1 s. The magnetic data were (1) corrected for the diurnal variation by subtraction of the daily mean magnetic data, (2) corrected for secular variations (or IGRF gradients) using the IGRF 2005 using altimeter data, and (3) projected to the tie line direction. The data were then a regular 80 m grid using the (1D) (1970) technique.

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This map has been prepared by the Alaska Department of Natural Resources, Division of Geology, and Steven J. Bockheim, Airborne geophysicist and processed by Funding for the Department of the Interior (BLM).

This map and other maps are available by mail or by e-mail. For more information, contact the Alaska Department of Natural Resources, Division of Geology, 1000 College Road, Fairbanks, Alaska 99775. Maps are also available on Adobe Acrobat at <http://www.dgnr.state.ak.us>. The products are also available from the BLM Alaska State Office, Anchorage, AK 99501.

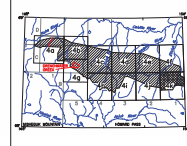
**SURVEY HISTORY**

The map was compiled and drawn under contract by the Alaska Department of Geological & Geophysical Surveys, Exploration Materials Section, from data for the area were obtained from the Airborne Surveys Cooperative Program project was provided by the Alaska Department of Interior, Bureau of Land Management.

For more products from this project contact person from the Alaska Department of Geological & Geophysical Surveys, Exploration Materials Section, 970-078-3700 or visit our website at [www.dnr.state.ak.us/publications/](http://www.dnr.state.ak.us/publications/). Files (\*.pdf) on our website are available for viewing at the Alaska Department of Interior, Office, 222 W. 7th Avenue, Anchorage, Alaska 99568.

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LOCATION INDEX FOR SCALE 1:31.68

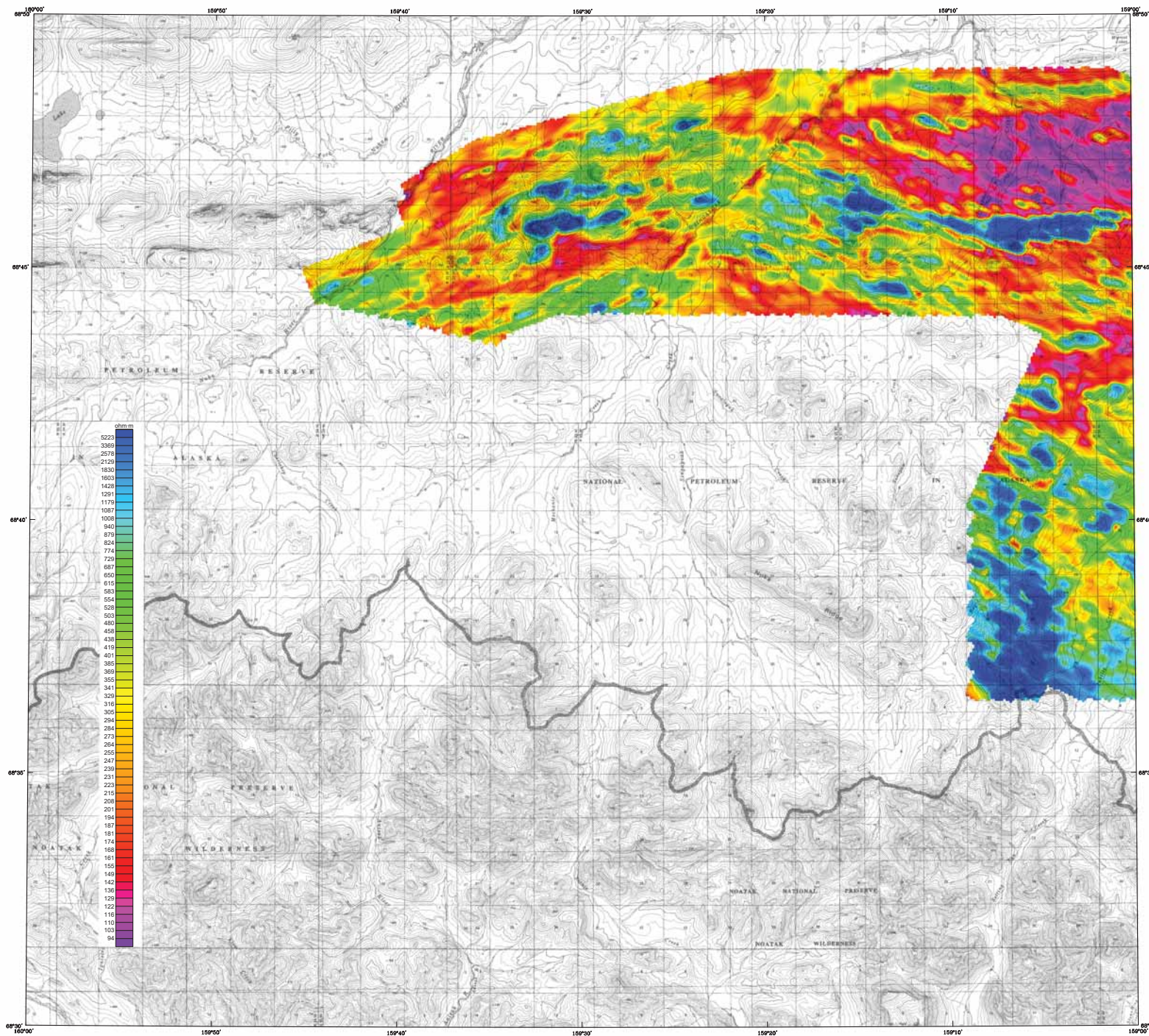


## SUMMARY HISTORY

This map has been compiled and drawn under contract with the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Corporation. Airborne geophysical data were collected by Stevens Exploration Management Corporation in 1995 and 1996, and funded by Fugro Airborne Survey, Inc. in 1995. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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# 56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2006

## DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM<sup>®</sup> Electromagnetic (EM) system and a Schriener cadmium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition to the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (345°) survey flight lines west of the red line shown on the location index and NE-SW (225°) survey flight lines east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Drenchwater Creek area (red area in the location index), where flight lines were spaced one eighth of a mile. Tie lines were flown perpendicular to the flight line intervals of approximately 3 miles except for the Drenchwater Creek area, where the flight interval was 1.5 miles.

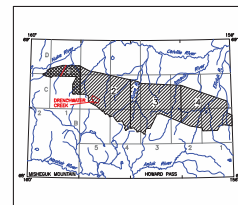
An Ashtech G24 NAVSTAR<sup>®</sup> GLOMASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

## RESISTIVITY

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

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

## LOCATION INDEX



## 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 (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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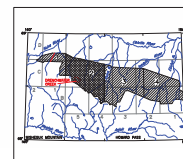
## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

### RESISTIVITY

**RESISTIVITY**

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. Horizontal coil-pairs were spaced 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-half space approximation. The vertical coil-pairs are used to map 80 m grid using a modified Ahlms (1976) technique.

Ahlms, R., 1976, *Geophysical Methods*, 2nd Edition, pp. 11-12. Based on standard procedures of the Association of



## SURVEY HISTORY

**SURVEY HISTORY**

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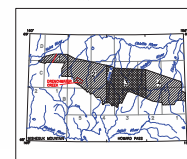


by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Atterbe Surveys Corp., and Stevens Exploration Management Corp.  
2008

**RESISTIVITY**

The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coil-coupled coil-pairs operated at 10000 Hz while three horizontal coil-coupled coil-pairs operated at 500, 1200 and 56000 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 presented from the inphase component of the EM response of the coplanar 56000 Hz using the pseudo-layer 80 m grid model. The data are 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*, 17, 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 and Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired by Stevens Exploration Management Corp. in 1992. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management.

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by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Abt Associates, Inc., and Stevens Exploration Management Corp.

**RESISTIVITY**

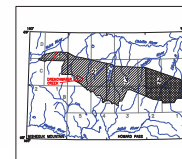
The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

**DESCRIPTIVE NOTES**

The geographical data were acquired with a SIGMA™ Electronic Positioning System (EPOS) Sinterex sensor magnetometer. The EM and magnetic sensors were used to determine the magnetic declination. The survey recorded data from a radar altimeter, a video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain elevation of 1,000 m. The survey was conducted along flight lines west of the red line shown in the map. The flight lines were parallel to the red line and spaced a quarter of a mile with the exception of the flight line in the center of the map (see the location index), where flight lines were spaced 1/2 mile. The flight lines were flown perpendicular to the flight line shown in the map. The flight lines crossed the Drachenreik Creek area, where the flight interval was 1.5 miles.

**DATA ACQUISITION** / **GLONASS GPS**

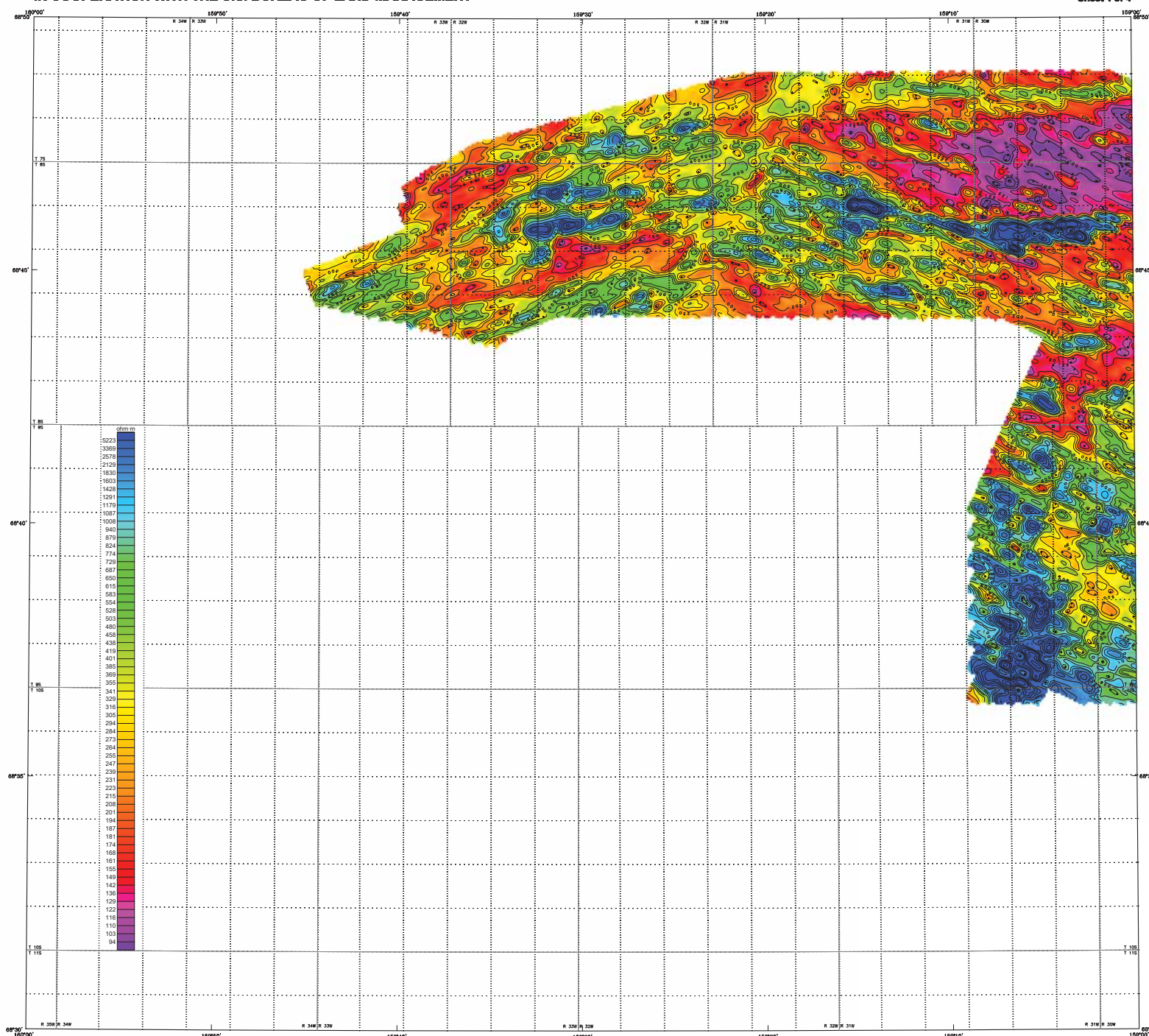
Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds. The accuracy of the position was 10 m. The relative accuracy of the position was 5 m. Flight path was recorded with a video camera. The flight path (UTM zone 4) spherical, 1927 North American datum using a central meridian (C.M.) of 59° 00' 00" W. The flight path was recorded at a mean altitude of 500,000 m. Positional accuracy of the presented data was better than 10 m. The flight lines were flown



This map has been compiled and drawn under contract by the State Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Environmental Management Corp. Aerial geophysical data for the area were acquired and processed by the Stevens Environmental Corp. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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# 56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Laurel E. Burns, U.S. Bureau of Land Management, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.  
2006

## DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM<sup>®</sup> Electromagnetic (EM) system and a Scintrex caesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AC330B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SW (340°) survey flight lines west of the red line shown on the location index and NE-SW (230°) survey flight lines east of the red line. Flight lines were spaced a quarter of a mile with the exception of the Drenchwater Creek area (red area in the location index), where flight lines were spaced one eighth of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles except for the Drenchwater Creek area, where the flight interval was 1.5 miles.

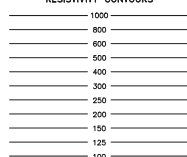
An Aircraft G224 NAVSTAR / GLOMAB Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

## RESISTIVITY

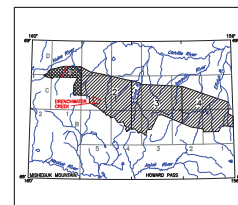
The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 300, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds 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



## LOCATION INDEX



## 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 (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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by  
Laurel E. Burns, U.S. Bureau of Land Management, Pogo Atkins Surveys Corp., and Stevens Exploration Management Corp.

## RESISTIVITY


The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coils of 100 m diameter and 1000 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 system responds to both induced and primary overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coil-pairs. A 56,000 Hz coil-pair is used for the resistivity model. The data were interpolated onto a regular 80 m grid using a modified Adams (1970) technique.

Adams, H. 1970. A new method of interpolation and smooth curve fitting based on local procedures. *Journal of the Association of Computing Machinery*, 17, 1049-1052.

**RESISTIVITY CONTOURS**

1000  
800  
600  
500  
400  
300  
250  
200  
150  
125  
100

Contours in ohm-m at 10 intervals per decade

 . . . . . resistivity log

**SURVEY HISTORY**

This map has been compiled and drawn under contract from the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Company (SEMC). Aerial photographs of the area were obtained and processed by Fugro Airborne Surveys Corp. in 2004. Funding for the project was provided by the Department of the Interior, Bureau of Land Management (BLM).

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## PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

**RESISTIVITY CONTOURS**

1000  
800  
600  
500  
400  
300  
250  
200  
150  
125  
100

Contours in ohm-m at 10 intervals per decade

resistivity

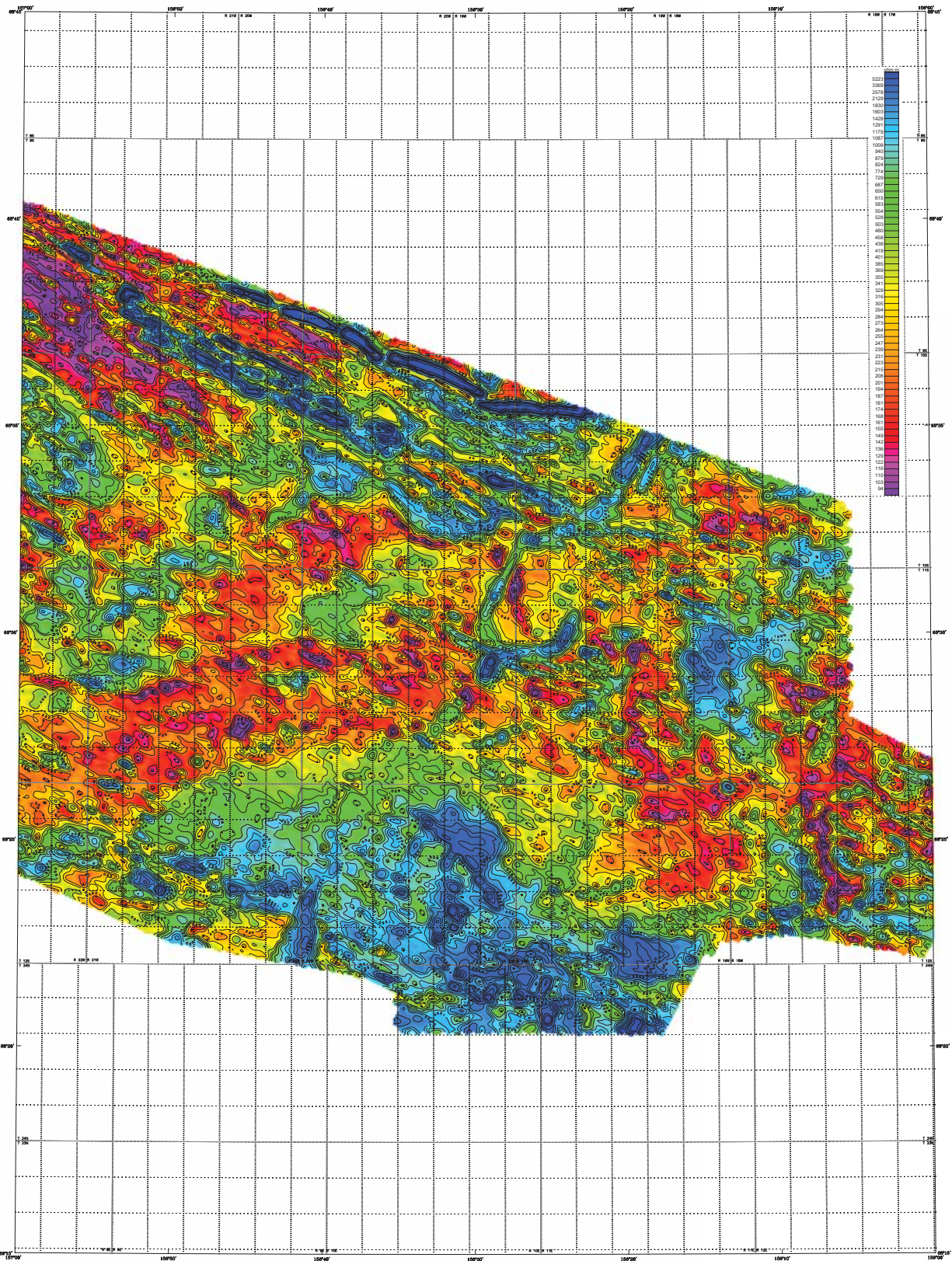
A map of the study area showing the location of the 'Pond' and 'Pond' relative to the 'Pond' and 'Pond'.

### 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), Stevens Extinction Management Corps, and Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2005. Funding for the project was provided by the U.S. Department of the Interior, Bureau of Land Management (BLM).

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Geophysical Data File: 2008-1-5b, Project Name: 2008-1-5b, Date: 2008-1-5b



# 56,000 Hz COPLANAR APPARENT RESISTIVITY OF PARTS OF SOUTHERN NATIONAL PETROLEUM RESERVE - ALASKA, NORTHWEST ALASKA

PARTS OF HOWARD PASS AND MISHEGUK MOUNTAIN QUADRANGLES

by  
Leland E. Burns, U.S. Bureau of Land Management, Puget Sound Survey Corp., and Stevens Exploration Management Corp.  
2008

**DESCRIPTIVE NOTES**

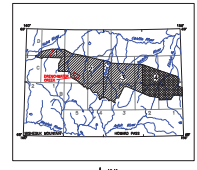
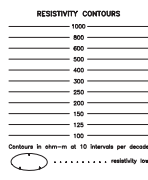
The geophysical data were acquired with a DIGHEM<sup>®</sup> Electromagnetic (EM) system and a Sinterex system magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a real-time video camera. Flights were performed with an AS350B-2 Super helicopter at a mean terrain clearance of 200 feet along NB-S (340°) survey flight line west of the red line shown on the location index. Flights were performed along the flight line east of the red line with the exception of the Drenth Creek area (red area in the location index) where flight lines were spaced a quarter of a mile with the exception of the Drenth Creek area, where the flight lines were spaced 1/2 mile. The flight lines were flown perpendicular to the flight line intervals of approximately 3 miles except for the Drenth Creek area, where the flight interval was 1.5 miles.

An Avian 6224 NAVSTAR<sup>®</sup> GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1886 UTM zone 41 system. 1983 North American datum using a vertical datum of 1988. A mean constant of 0 and an east constant of 500,000. Horizontal accuracy of the presented data is better than 10 m, with respect to the UTM grid.

**RESISTIVITY**

The DIGHEM EM system measured apparent resistivity components at five frequencies. Two vertical coiled self-cable operated at 1000 and 2000 Hz with three horizontal resistivity sensors operated at 500, 700 and 90,000 Hz. EM data were recorded at 0.1 m/sec. The EM system measured apparent resistivity, conductivity, and cultural sources. Apparent resistivity is generated from the apparent resistivity component of the system 56,000 Hz using the geometric half space model. The data are plotted on a log scale 80 m grid using a 100,000 Ohm-m (1000) technique.

ALASKA, U.S. BUREAU OF LAND MANAGEMENT, Puget Sound Survey Corp., and Stevens Exploration Management Corp.  
2008

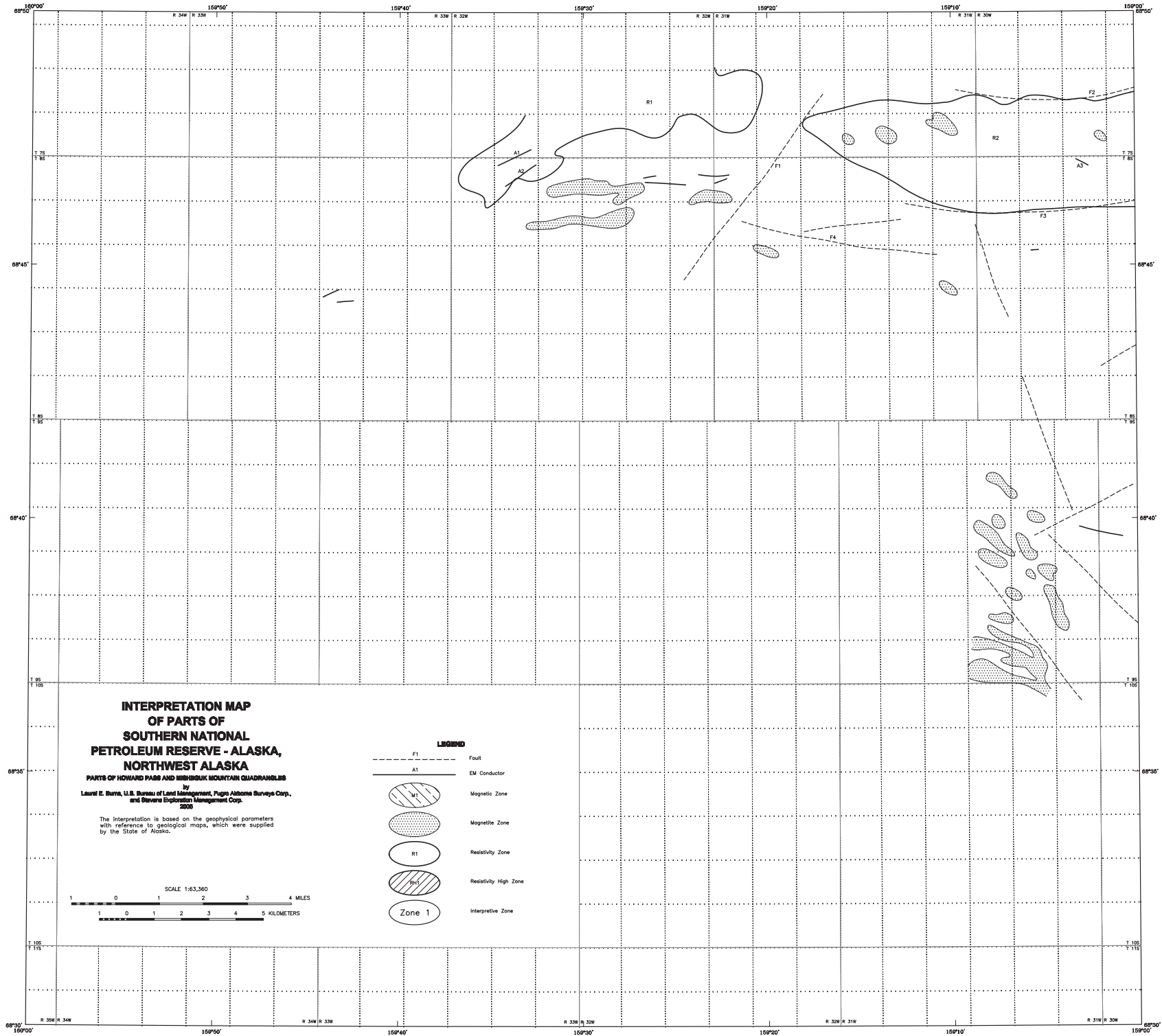


**SURVEY HISTORY**

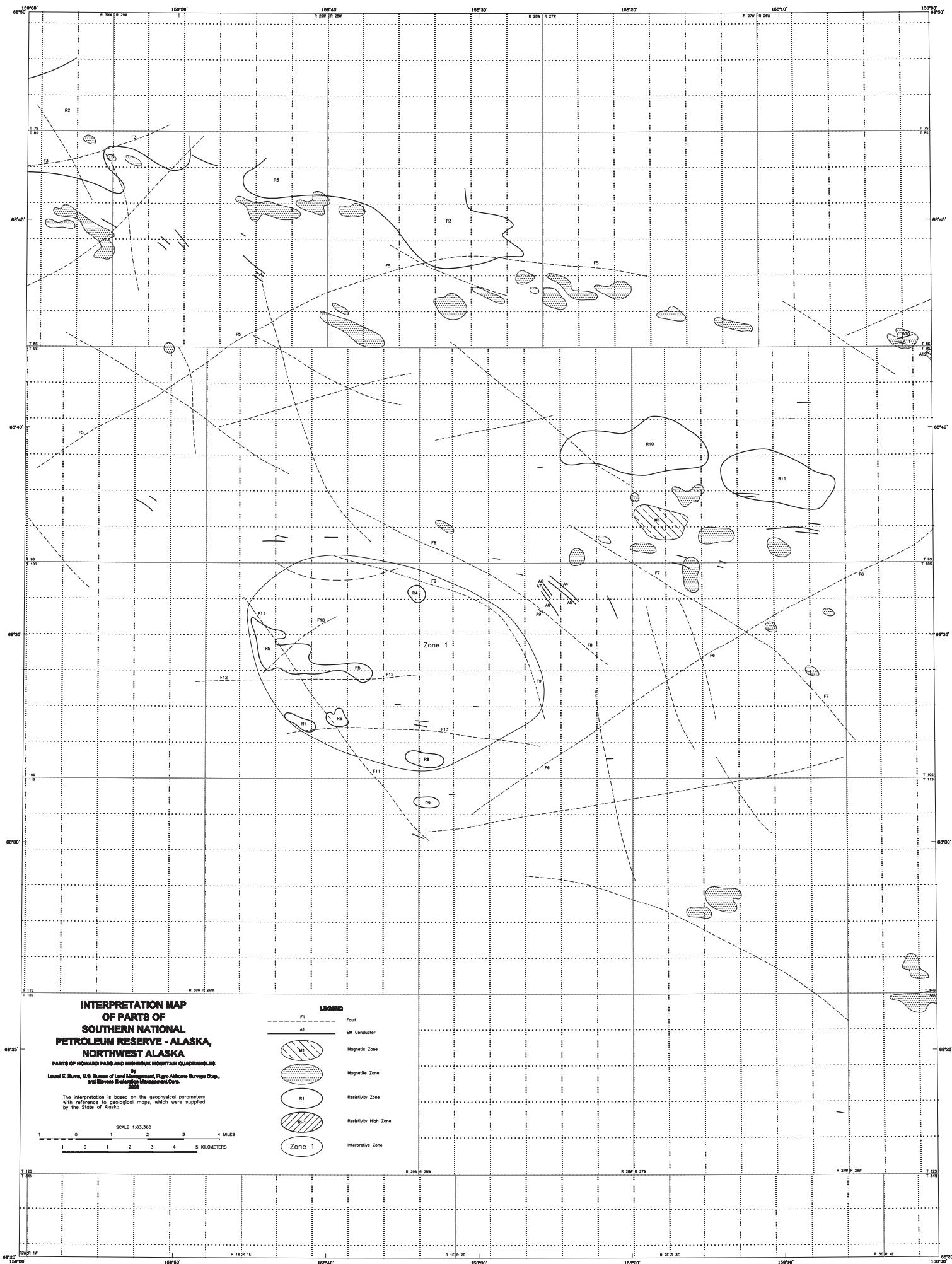
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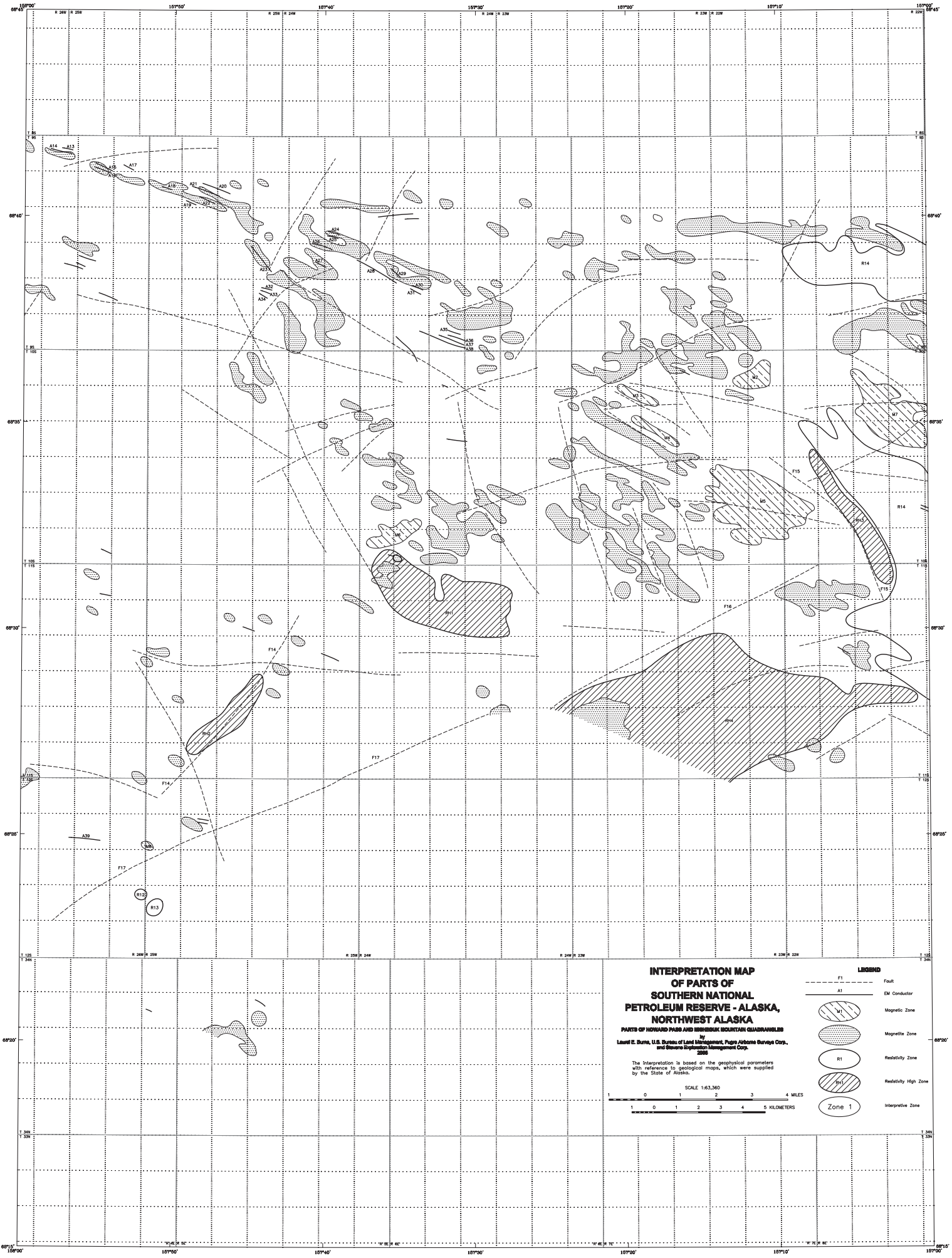








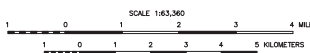




**INTERPRETATION MAP  
OF PARTS OF  
SOUTHERN NATIONAL  
PETROLEUM RESERVE - ALASKA,  
NORTHWEST ALASKA**

**PARTS OF HOWARD PASS AND MIDDLEBURY MOUNTAIN QUADRANGLES**  
by  
Laural E. Dunn, U.S. Bureau of Land Management, Pogo Airborne Survey Corp.,  
and Blount Exploration Management Corp.  
2006

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



- LEGEND**
- F1 Fault
  - A1 DW Conductor
  - M1 Magnetic Zone
  - M2 Magnetic Zone
  - R1 Resistivity Zone
  - RH Resistivity High Zone
  - Zone 1 Interpretive Zone



