

**EAST STYX ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE  
GEOPHYSICAL SURVEY DATA COMPILATION**

L.E. Burns, G.R.C. Graham, A.M. Emond, J.D. Barefoot, CGG, and Fugro GeoServices Inc.

**Geophysical Report 2019-19**

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



## **STATE OF ALASKA**

Mike Dunleavy, Governor

## **DEPARTMENT OF NATURAL RESOURCES**

Corri A. Feige, Commissioner

## **DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS**

Steve Masterman, State Geologist & Director

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

### **Alaska Division of Geological & Geophysical Surveys (DGGS)**

3354 College Road | Fairbanks, Alaska 99709-3707

Phone: 907.451.5010 | Fax 907.451.5050

[dggspubs@alaska.gov](mailto:dggspubs@alaska.gov) | [dggs.alaska.gov](http://dggs.alaska.gov)

### **DGGS publications are also available at:**

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

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

### **Suggested citation:**

Burns, L.E., Graham, G.R.C., Emond, A.M., Barefoot, J.D., CGG, and Fugro GeoServices, Inc., 2020, East Styx electromagnetic, magnetic, and radiometric airborne geophysical survey data compilation: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2019-19. <http://doi.org/10.14509/30412>



# **EAST STYX ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION**

Burns, L.E.<sup>1</sup>, Graham, G.R.C.<sup>1</sup>, Emond, A.M.<sup>1</sup>, Barefoot, J.D.<sup>1</sup>, CGG, and Fugro GeoServices Inc.

## **ABSTRACT**

The East Styx electromagnetic, magnetic, and radiometric airborne geophysical survey is located about 150 kilometers northwest of Anchorage, Alaska in the upper Skwentna River drainage and surrounds the Rainy Pass Airport. The survey is in the Yentna, Redoubt, and McGrath mining districts of south-central Alaska. Frequency domain electromagnetic, magnetic, and radiometric data were collected with the DIGHEM system from June 24th to September 24th, 2013. A total of 7865.6 line kilometers were collected covering 2791.2 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform (“bird”) on a 30 m long line.

## **PURPOSE**

This airborne geophysical survey is part of a program to acquire data on Alaska’s most promising mineral belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery, and ultimate development and production. Mineralization in the survey area includes the Island Mountain porphyry copper-gold deposit and the Oxide intrusion-related gold prospects, as well as other polymetallic vein and epithermal vein-type prospects.

## **SURVEY OVERVIEW DESCRIPTION**

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

## **ACKNOWLEDGMENTS**

Funding was provided by the Alaska State Legislature as part of the DGGs Airborne Geophysical/Geological Mineral Inventory (AGGMI) program and Strategic and Critical Minerals Assessment Capital Improvement (SCMA) program.

---

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

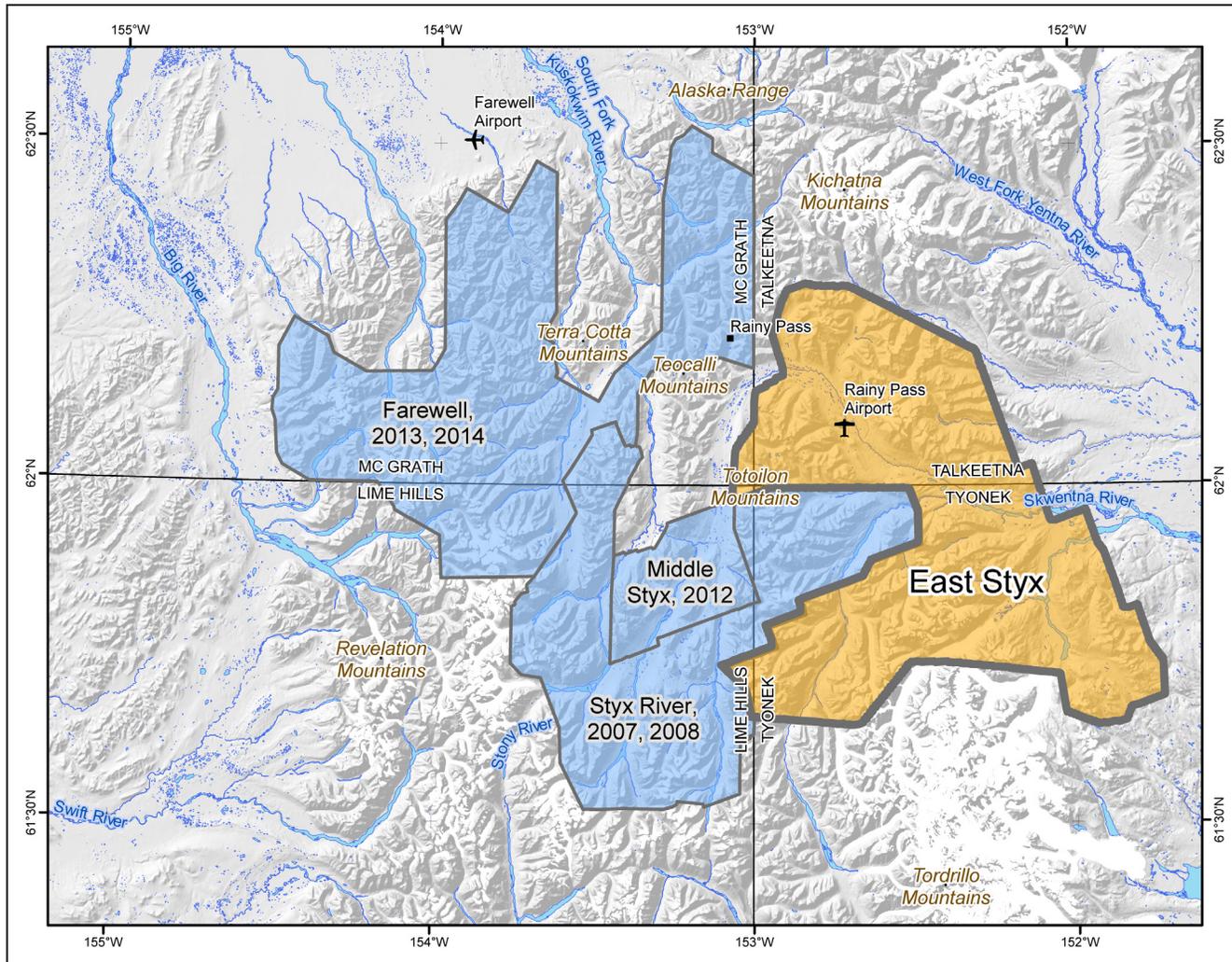
**REFERENCES**

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., CGG, and Fugro GeoServices, Inc., 2014, East Styx survey area: Airborne magnetic, electromagnetic and radiometric data in line (point), grid, vector, and map formats, Talkeetna, Tyonek, McGrath, and Lime Hills quadrangles, south-central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2014-5, scale 1:63,360, 1 DVD.

<http://doi.org/10.14509/29142>



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

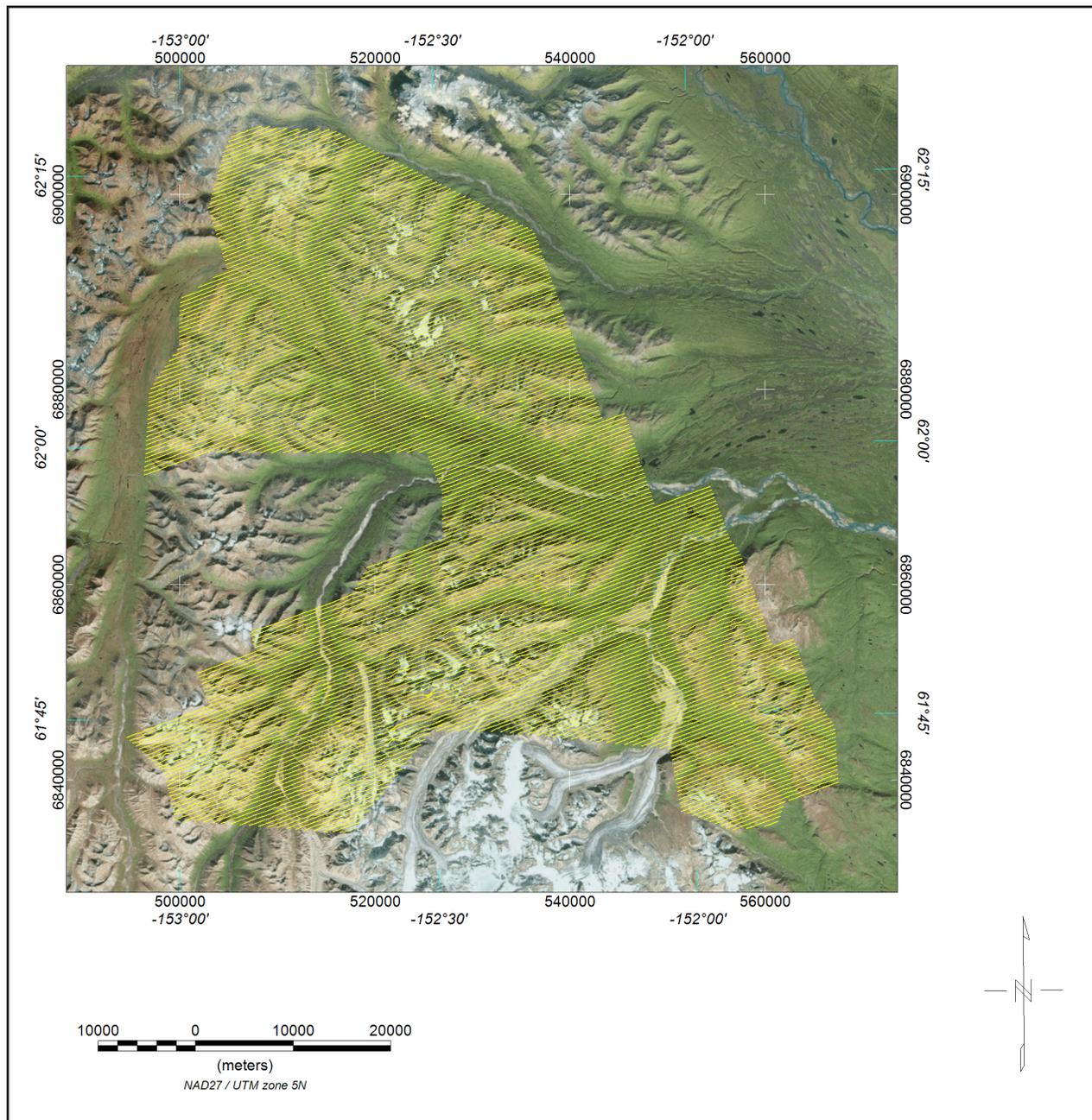
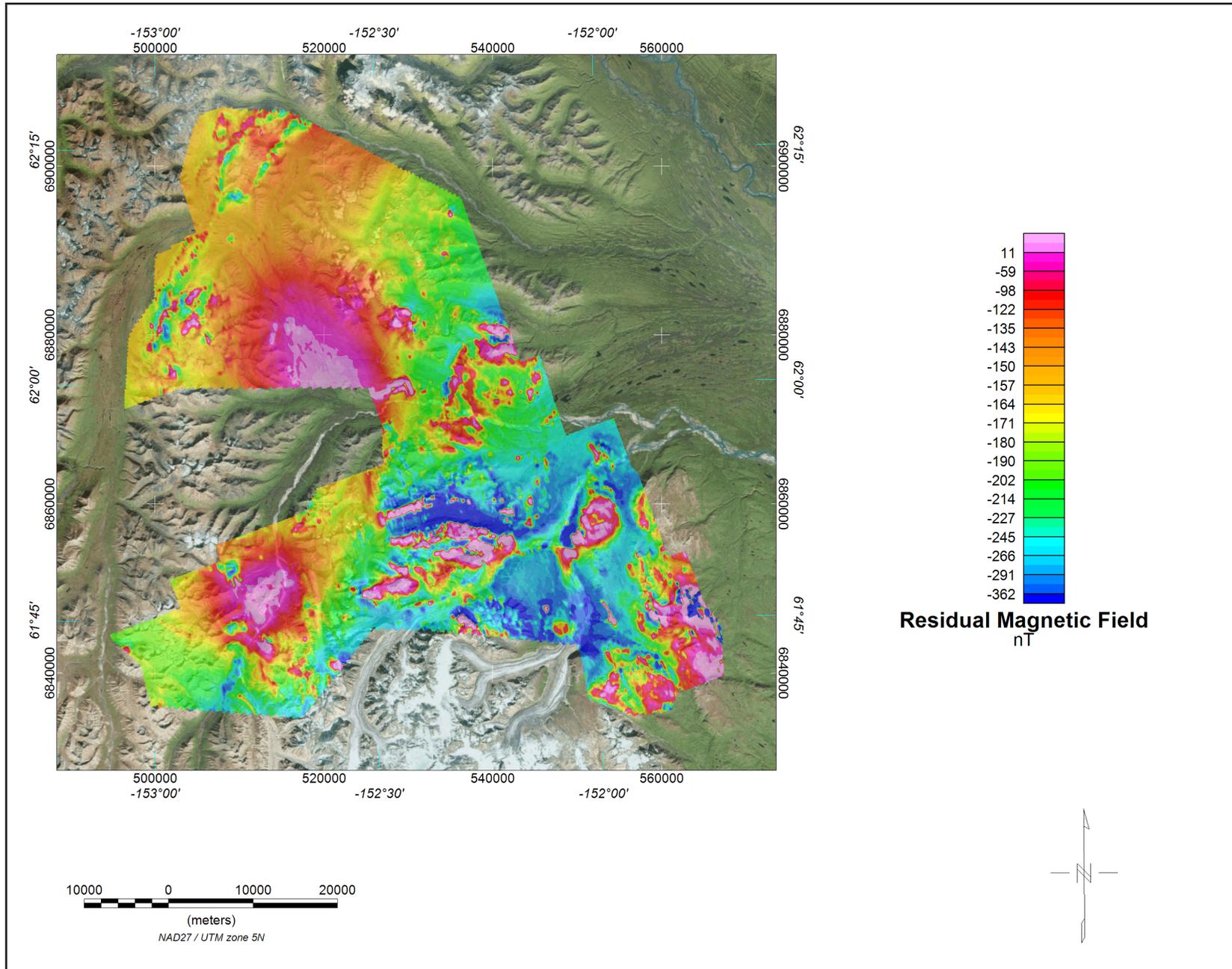
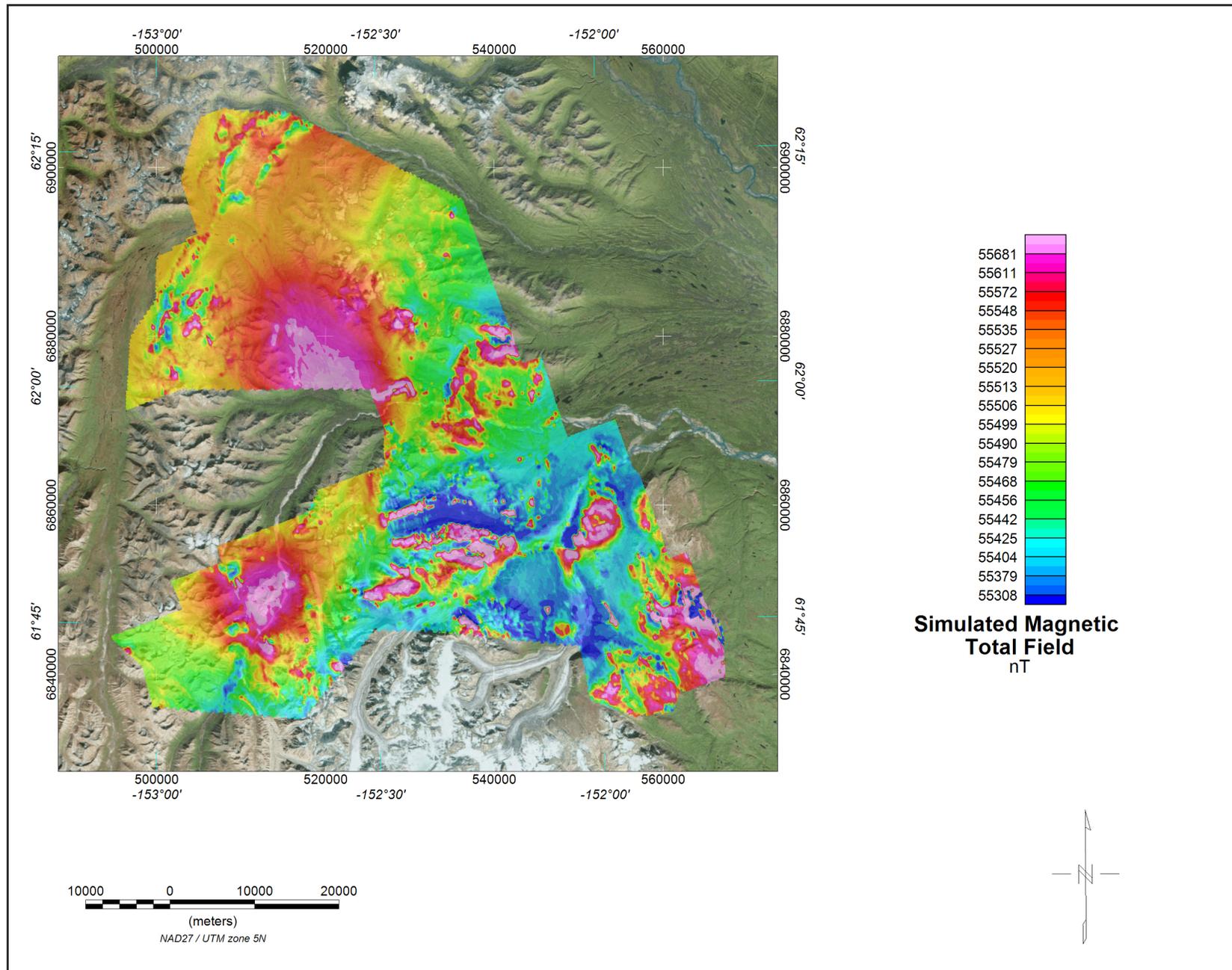


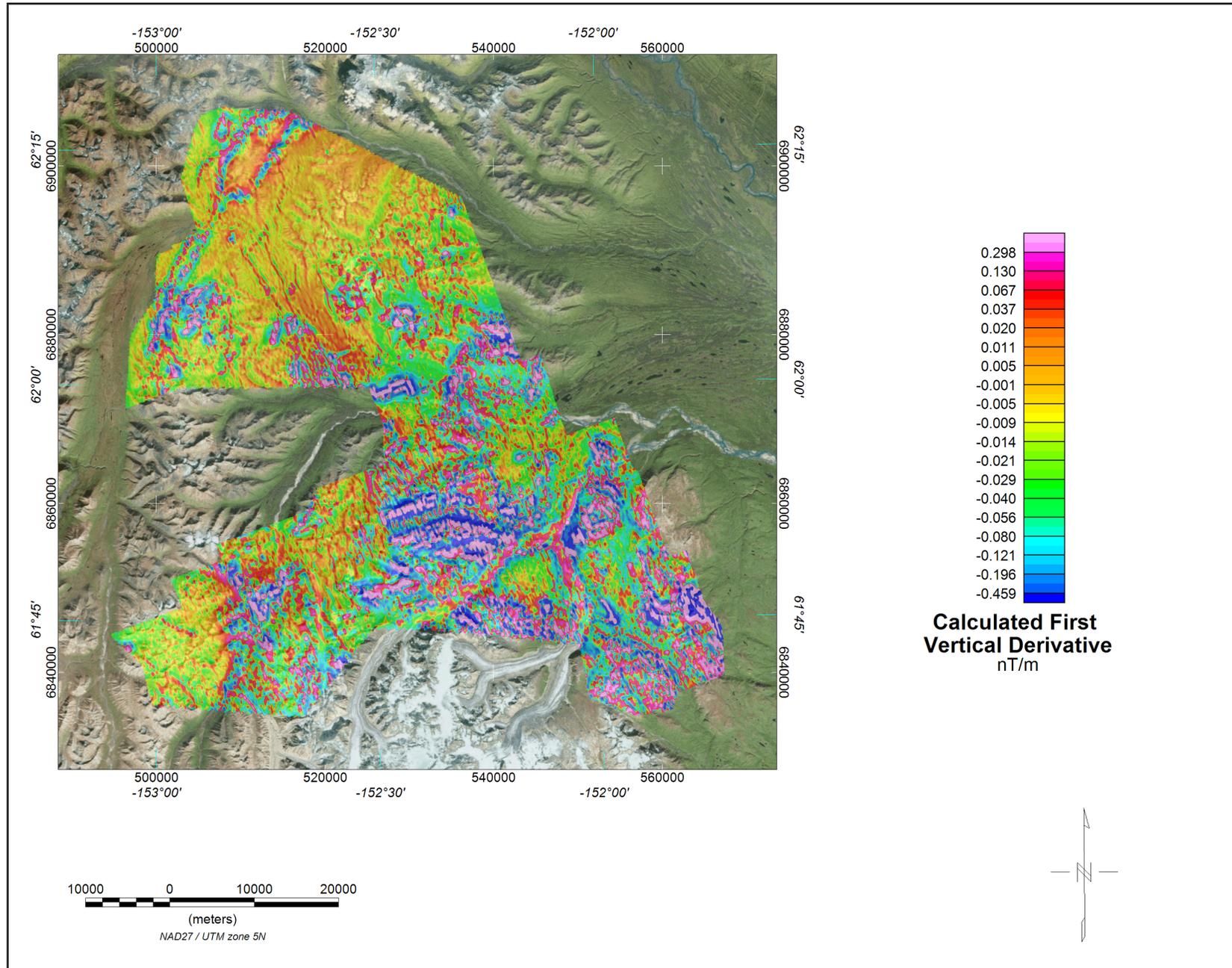
Figure 2. Flight path with orthometric image.



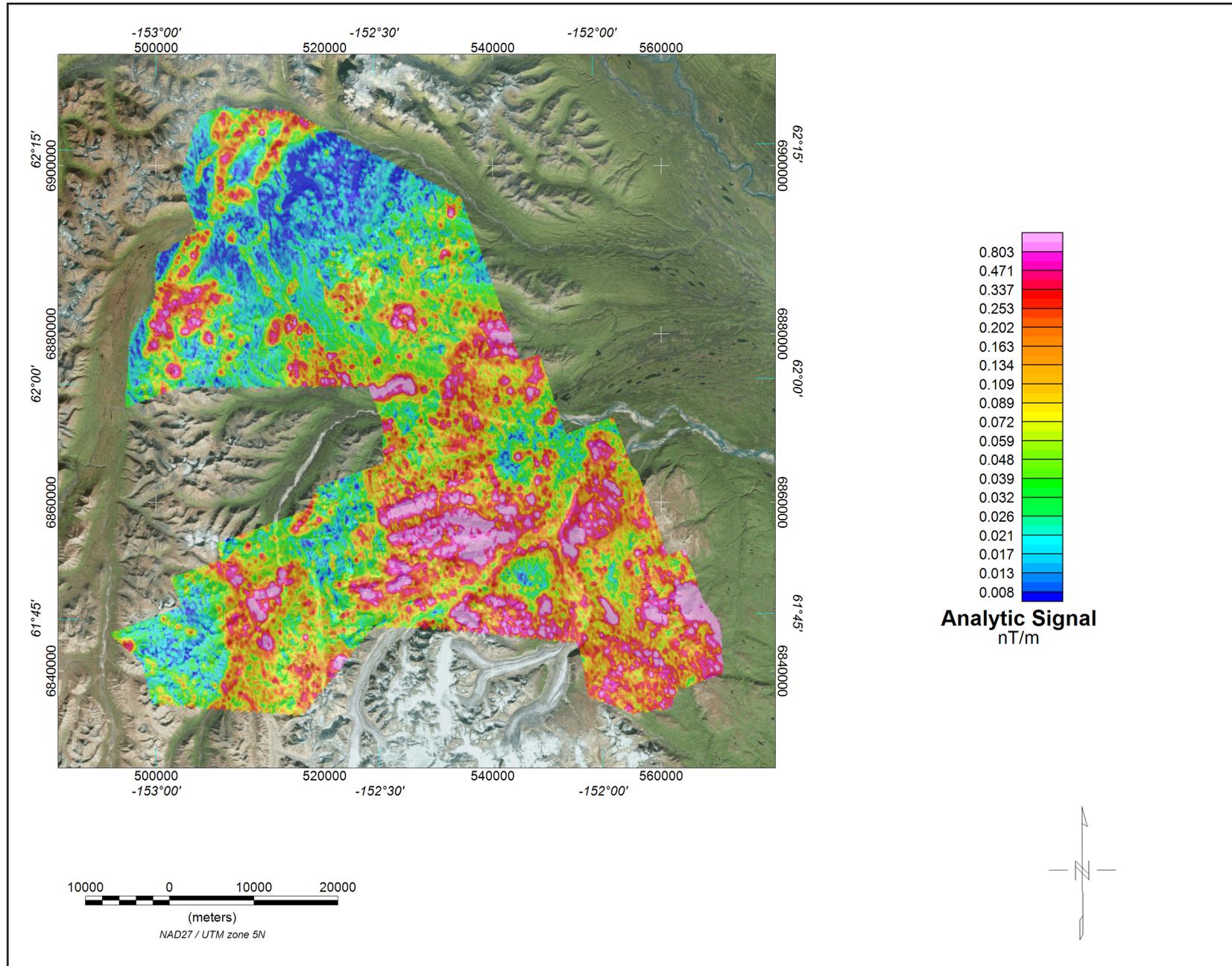
**Figure 3.** Residual magnetic field grid with orthometric image. The magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.



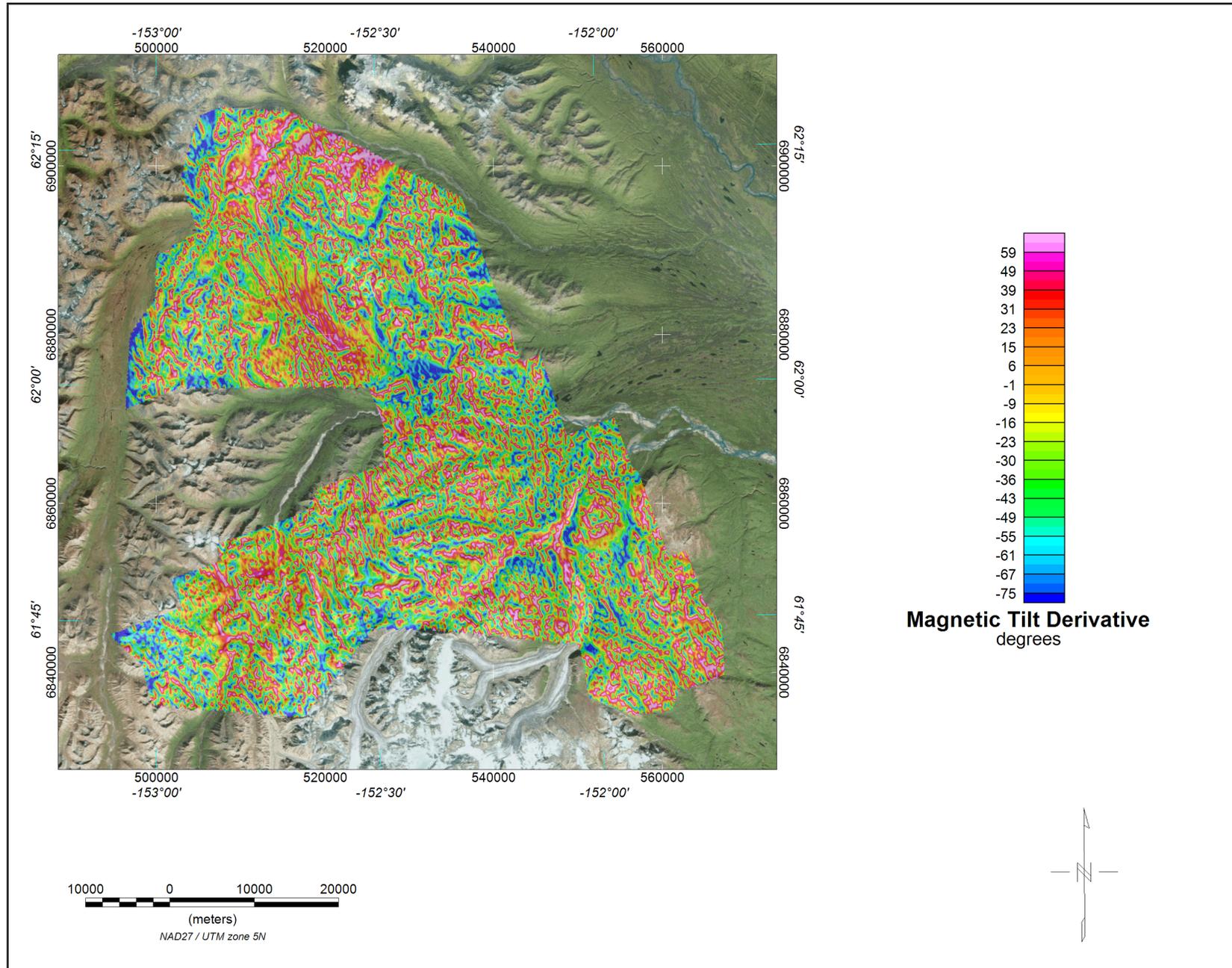
**Figure 4.** Simulated magnetic total field grid with orthometric image. The simulated magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, (4) a constant value of approximately 55,000 nT was added to all data, and (5) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.



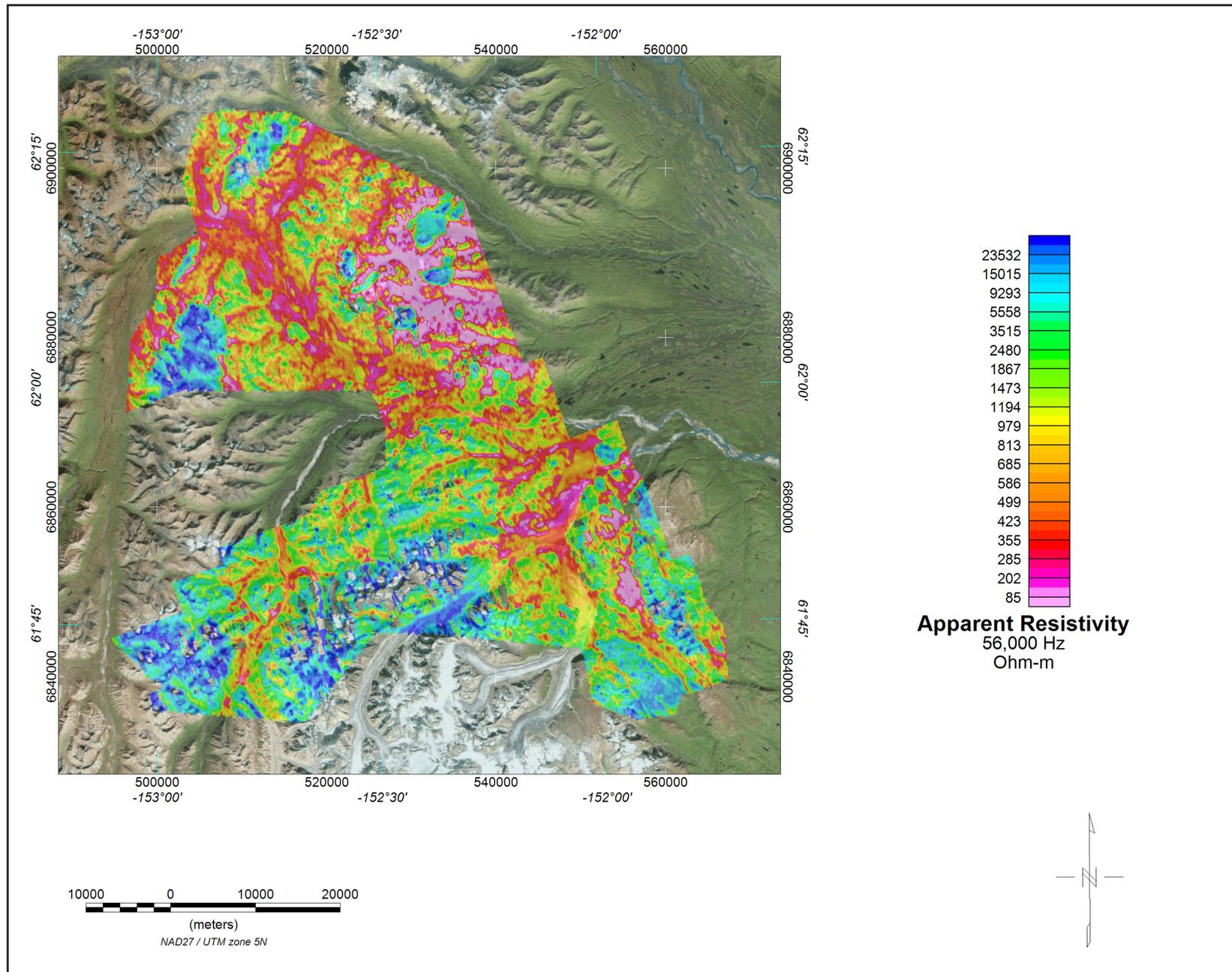
**Figure 5.** Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid 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.



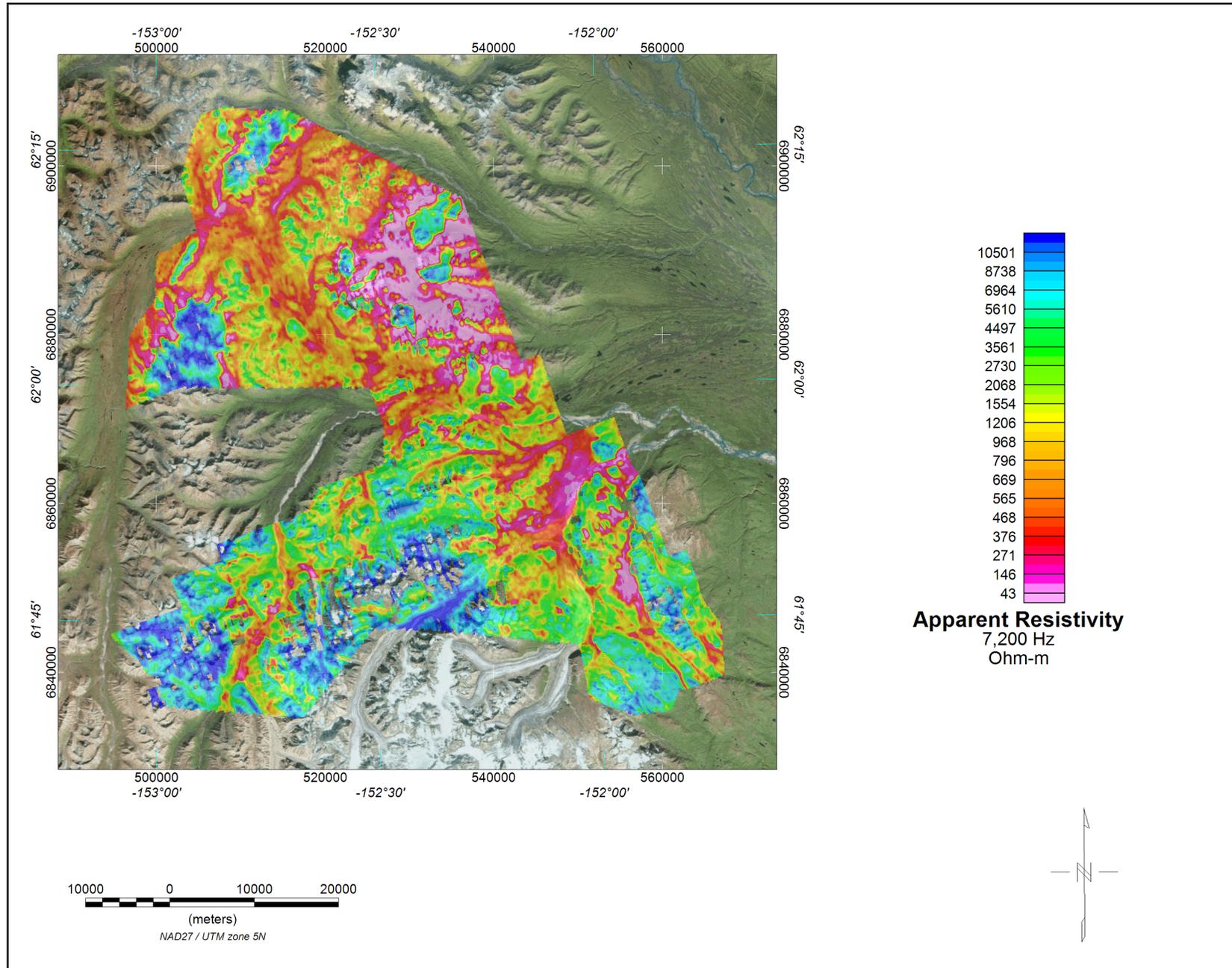
**Figure 6.** Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous 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.



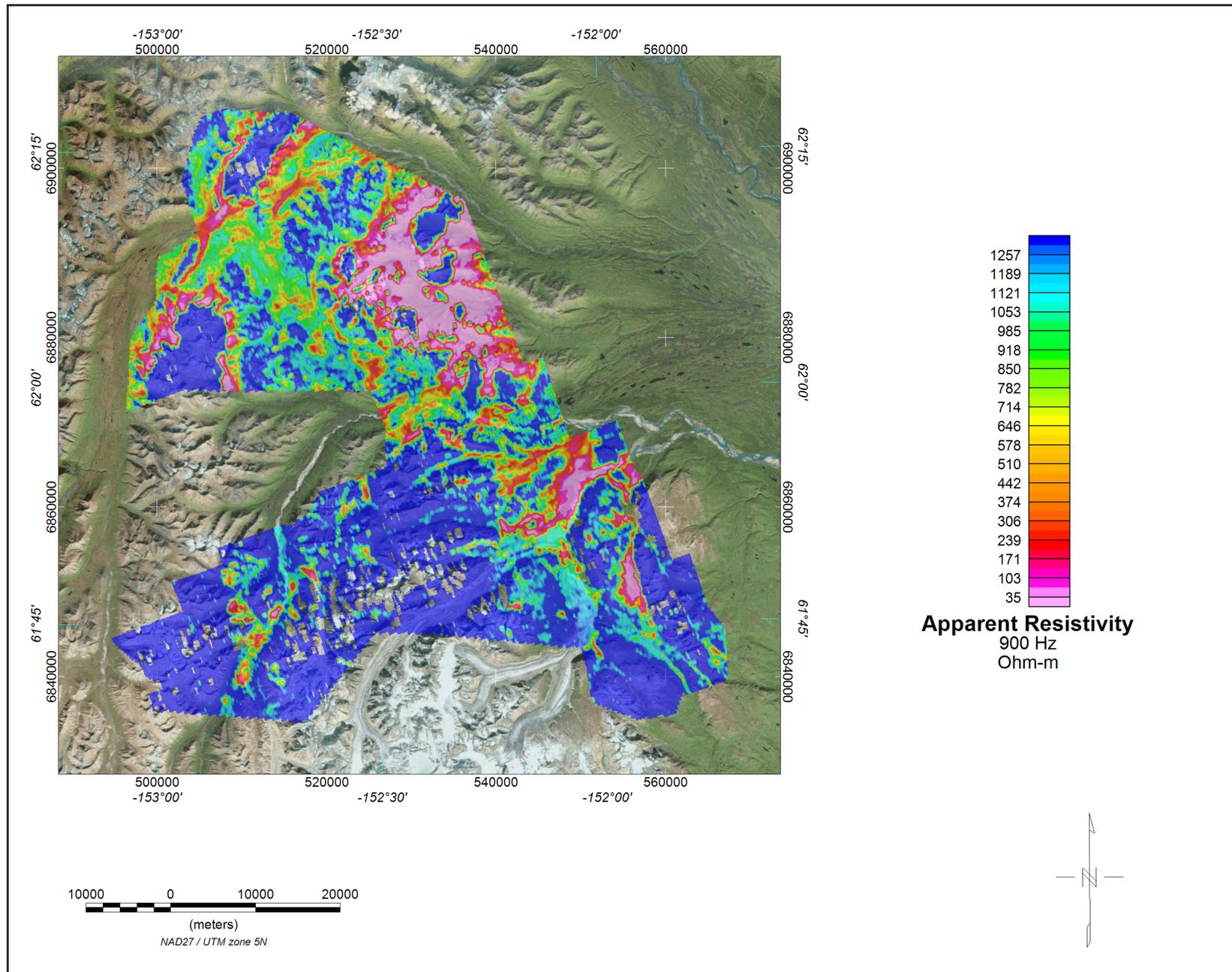
**Figure 7.** Magnetic tilt derivative grid with orthometric image. The tilt derivative is the angle between the horizontal gradient and the total gradient, which is useful for identifying the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.



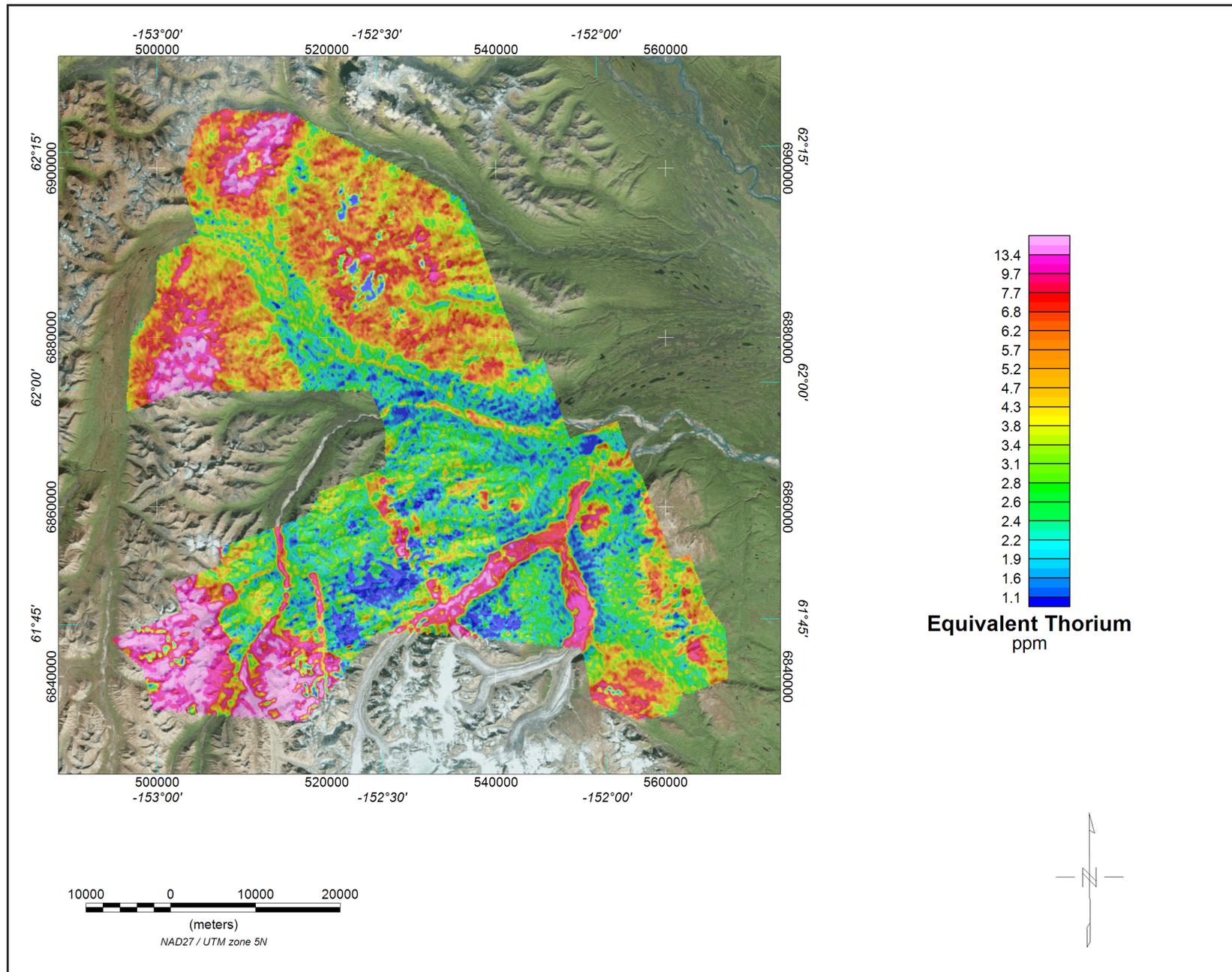
**Figure 8.** 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>V</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.



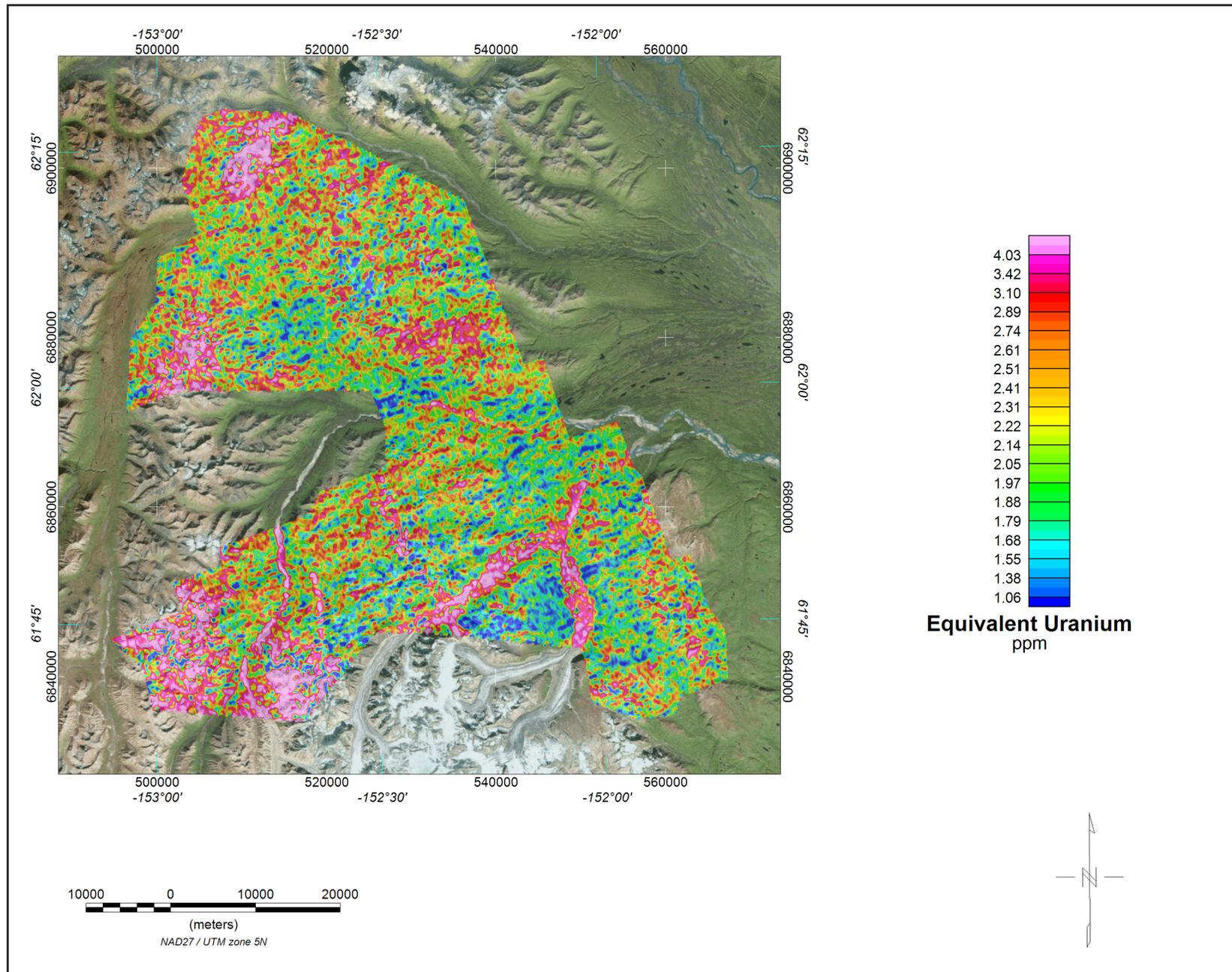
**Figure 9.** 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.



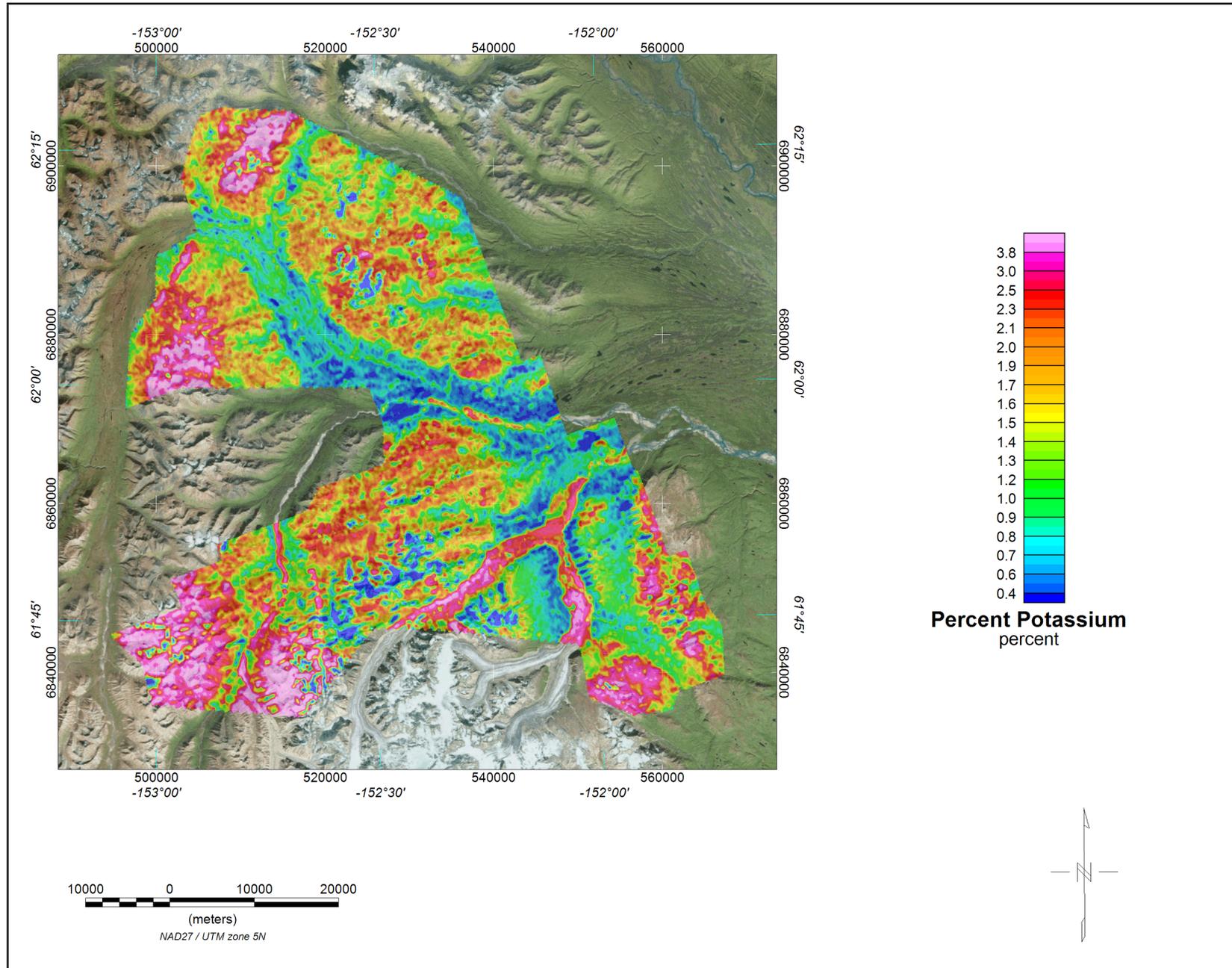
**Figure 10.** 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM<sup>®</sup> EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 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.



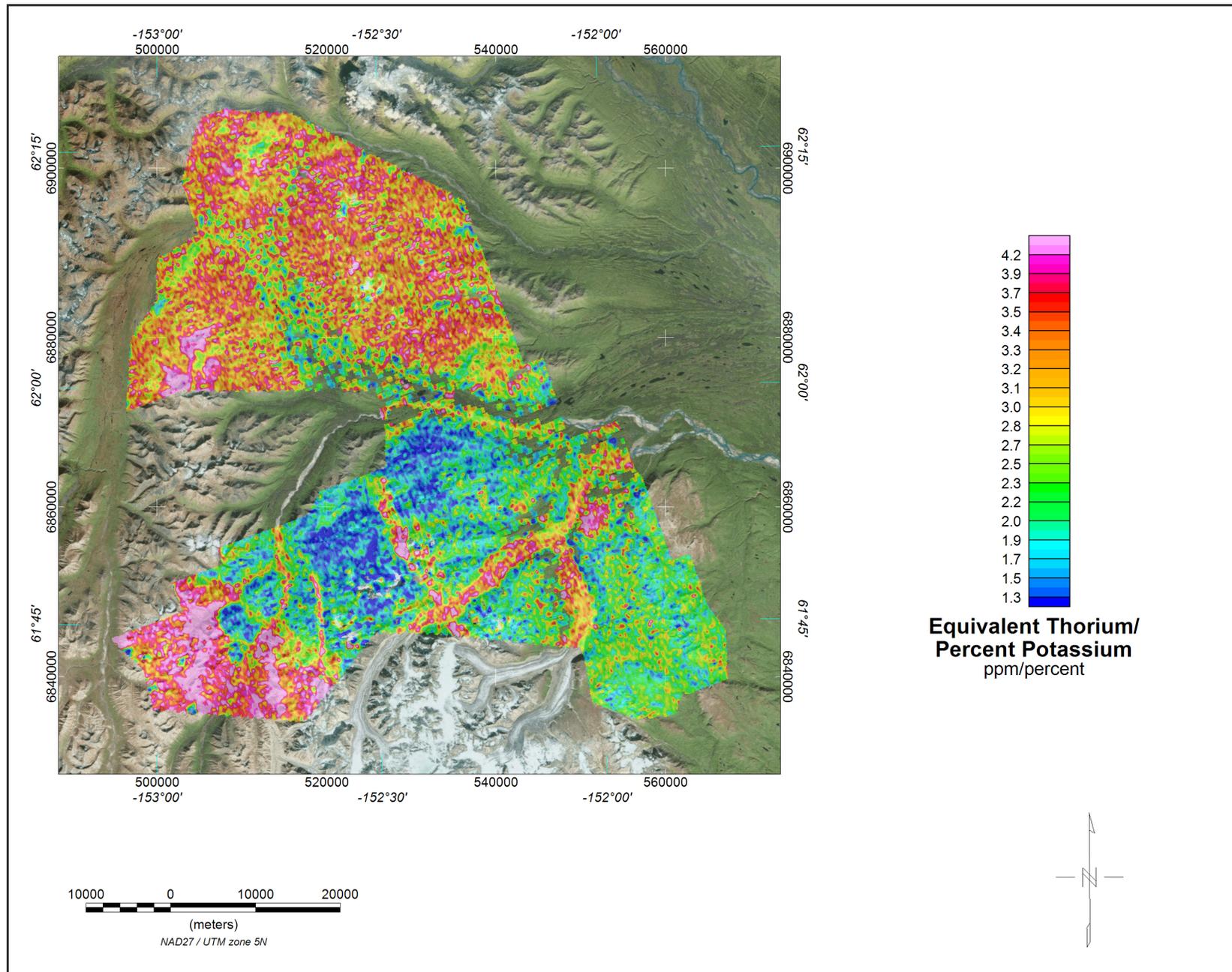
**Figure 11.** Equivalent thorium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



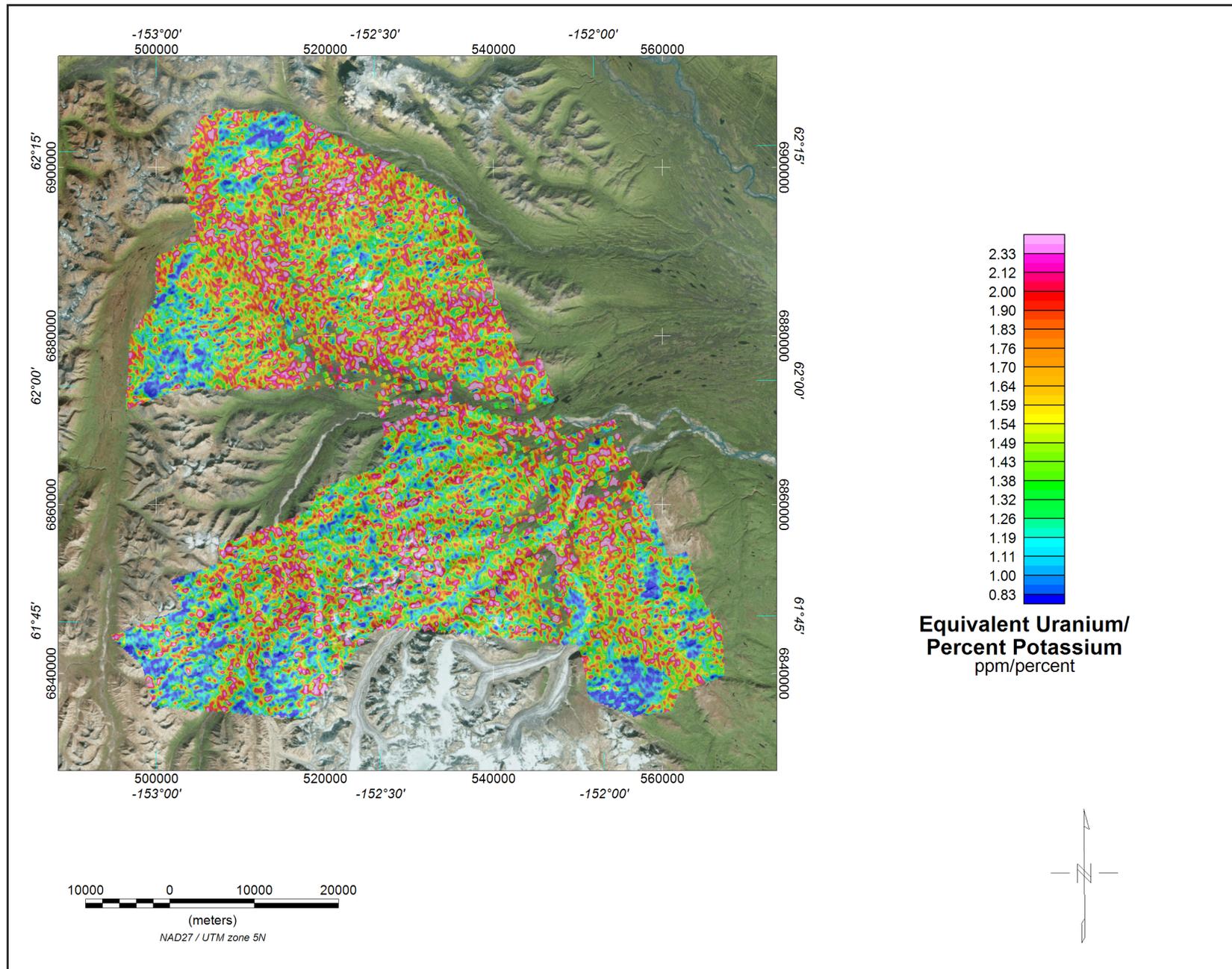
**Figure 12.** Equivalent uranium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



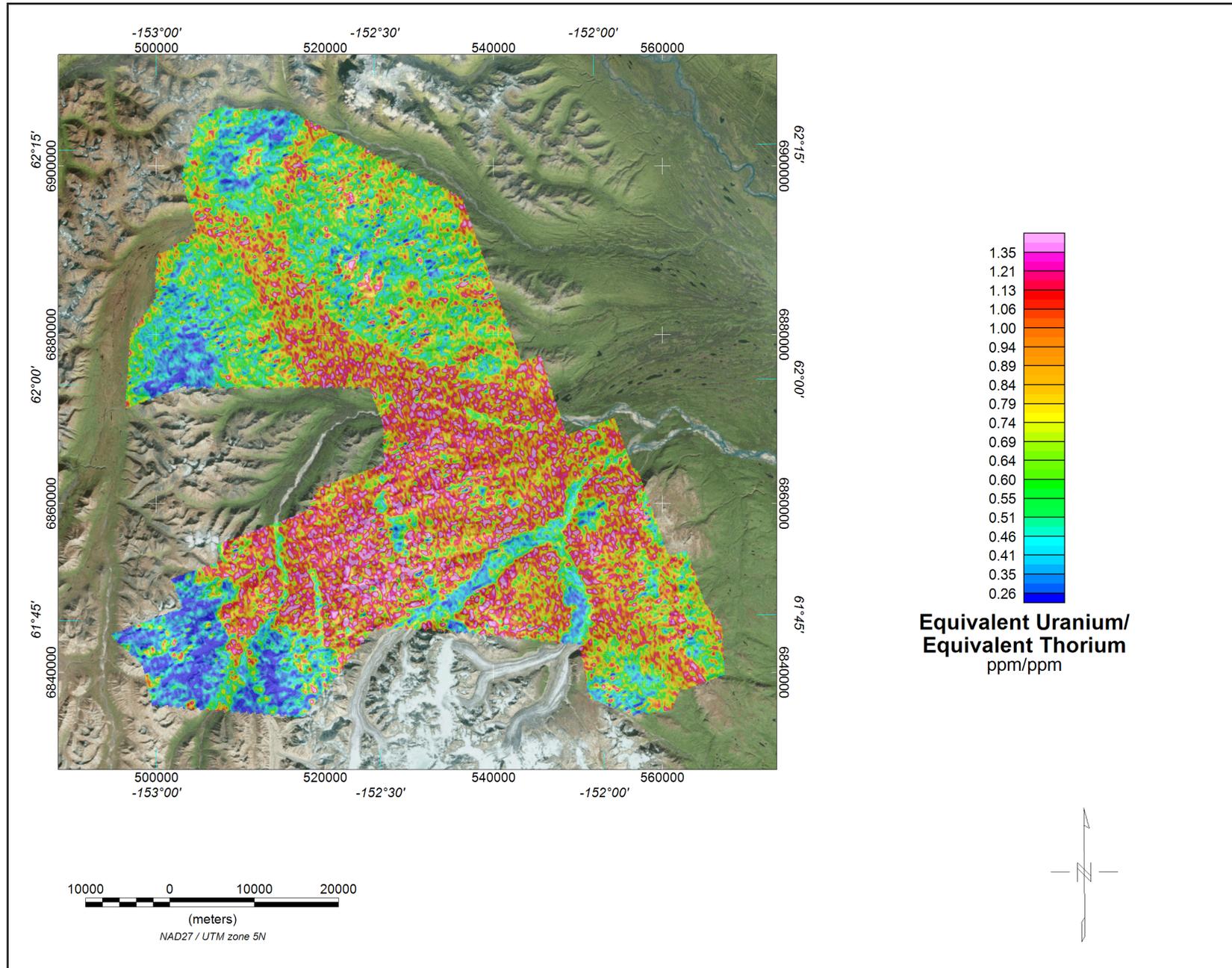
**Figure 13.** Percent potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



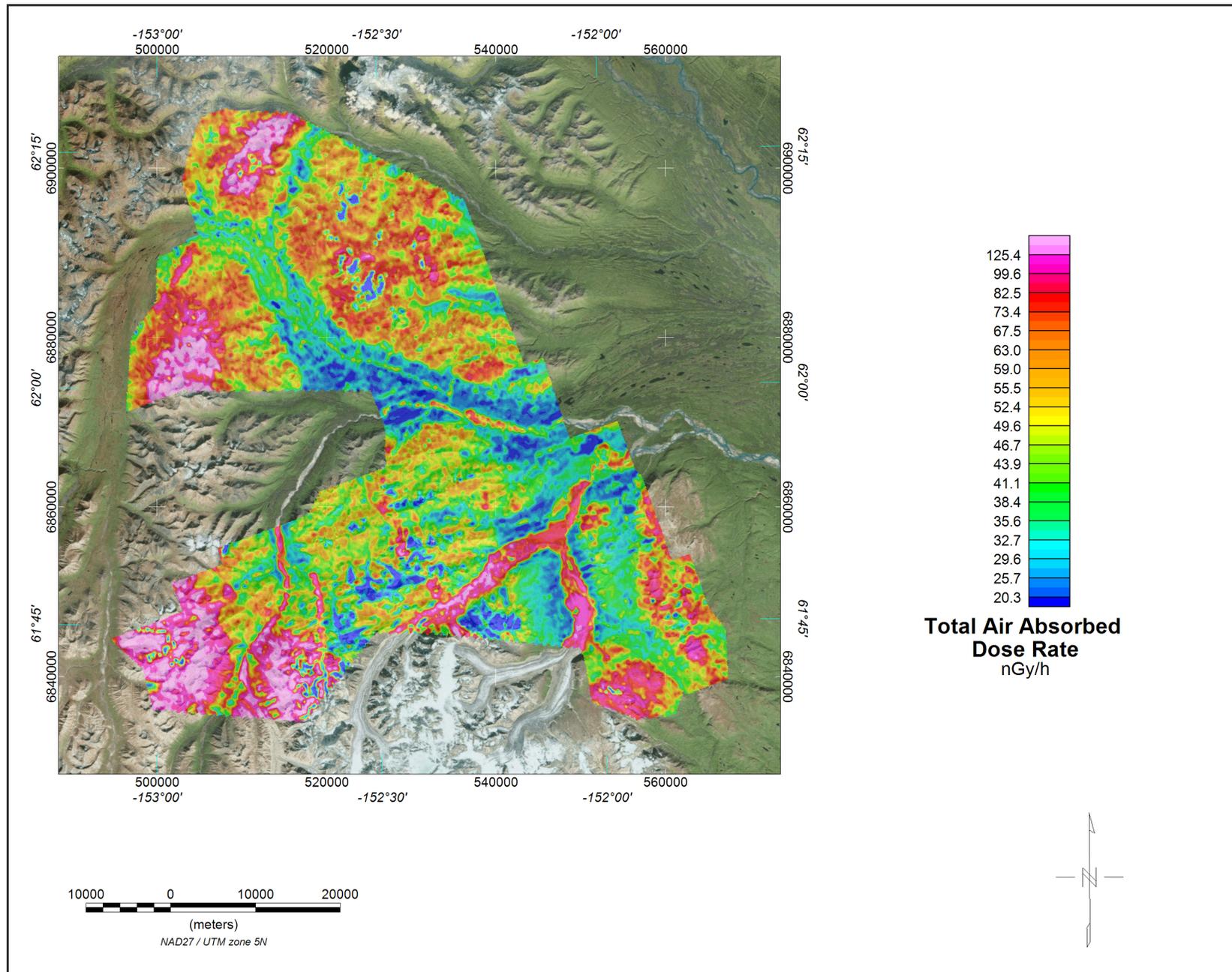
**Figure 14.** Ratio of equivalent thorium to percent potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



**Figure 15.** Ratio of equivalent uranium to percent potassium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



**Figure 16.** Ratio of equivalent uranium to equivalent thorium grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique.



**Figure 17.** Total air absorbed dose rate grid with orthometric image. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature 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/10.14509/30412>

Map Title	Description
eaststyx_flightpath_topo_map_1of3.pdf	flightpath grid with topographic base map
eaststyx_flightpath_topo_map_2of3.pdf	flightpath grid with topographic base map
eaststyx_flightpath_topo_map_3of3.pdf	flightpath grid with topographic base map
eaststyx_residualmag_topo_map_1of3.pdf	residual magnetic intensity grid with topographic base map
eaststyx_residualmag_topo_map_2of3.pdf	residual magnetic intensity grid with topographic base map
eaststyx_residualmag_topo_map_3of3.pdf	residual magnetic intensity grid with topographic base map
eaststyx_residualmag_contours_plss_map_1of3.pdf	residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_residualmag_contours_plss_map_2of3.pdf	residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_residualmag_contours_plss_map_3of3.pdf	residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_analyticssignal_topo_map_1of3.pdf	magnetic analytic signal grid with topographic base map
eaststyx_analyticssignal_topo_map_2of3.pdf	magnetic analytic signal grid with topographic base map
eaststyx_analyticssignal_topo_map_3of3.pdf	magnetic analytic signal grid with topographic base map
eaststyx_analyticssignal_contours_plss_map_1of3.pdf	magnetic analytic signal grid and contours with public land survey system base layer
eaststyx_analyticssignal_contours_plss_map_2of3.pdf	magnetic analytic signal grid and contours with public land survey system base layer
eaststyx_analyticssignal_contours_plss_map_3of3.pdf	magnetic analytic signal grid and contours with public land survey system base layer
eaststyx_calculated1vd_topo_map_1of3.pdf	magnetic calculated first vertical derivative grid with topographic base map
eaststyx_calculated1vd_topo_map_2of3.pdf	magnetic calculated first vertical derivative grid with topographic base map
eaststyx_calculated1vd_topo_map_3of3.pdf	magnetic calculated first vertical derivative grid with topographic base map
eaststyx_tiltderivative_contours_topo_map_1of3.pdf	magnetic tiltderivative grid and contours with topographic base map
eaststyx_tiltderivative_contours_topo_map_2of3.pdf	magnetic tiltderivative grid and contours with topographic base map
eaststyx_tiltderivative_contours_topo_map_3of3.pdf	magnetic tiltderivative grid and contours with topographic base map
eaststyx_residualmag_shaded_tiltderivative_contours_topo_map_1of3.pdf	residual magnetic intensity grid and magnetic tilt derivative with topographic base map
eaststyx_residualmag_shaded_tiltderivative_contours_topo_map_2of3.pdf	residual magnetic intensity grid and magnetic tilt derivative with topographic base map
eaststyx_residualmag_shaded_tiltderivative_contours_topo_map_3of3.pdf	residual magnetic intensity grid and magnetic tilt derivative with 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/10.14509/30412>

Map Title	Description
eaststyx_res56khz_topo_map_1of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
eaststyx_res56khz_topo_map_2of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
eaststyx_res56khz_topo_map_3of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
eaststyx_res56khz_contours_plss_map_1of3.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res56khz_contours_plss_map_2of3.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res56khz_contours_plss_map_3of3.pdf	56,000 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res7200hz_topo_map_1of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
eaststyx_res7200hz_topo_map_2of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
eaststyx_res7200hz_topo_map_3of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
eaststyx_res7200hz_contours_plss_map_1of3.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res7200hz_contours_plss_map_2of3.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res7200hz_contours_plss_map_3of3.pdf	7,200 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res900hz_topo_map_1of3.pdf	900 Hz apparent resistivity grid with topographic base map
eaststyx_res900hz_topo_map_2of3.pdf	900 Hz apparent resistivity grid with topographic base map
eaststyx_res900hz_topo_map_3of3.pdf	900 Hz apparent resistivity grid with topographic base map
eaststyx_res900hz_contours_plss_map_1of3.pdf	900 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res900hz_contours_plss_map_2of3.pdf	900 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_res900hz_contours_plss_map_3of3.pdf	900 Hz apparent resistivity grid and contours with public land survey system base layer
eaststyx_emanomalies_residualmag_detailed_topo_map_1of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_2of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_3of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_4of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_5of11.pdf	em anomalies and residual magnetic intensity grid with 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/10.14509/30412>

Map Title	Description
eaststyx_emanomalies_residualmag_detailed_topo_map_6of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_7of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_8of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_9of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_10of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_emanomalies_residualmag_detailed_topo_map_11of11.pdf	em anomalies and residual magnetic intensity grid with topographic base map
eaststyx_interpretation_plss_map_1of3.pdf	interpretation grid and contours with public land survey system base layer
eaststyx_interpretation_plss_map_2of3.pdf	interpretation grid and contours with public land survey system base layer
eaststyx_interpretation_plss_map_3of3.pdf	interpretation grid and contours with public land survey system base layer
eaststyx_interpretation_residualmag_plss_map_1of3.pdf	interpretation and residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_interpretation_residualmag_plss_map_2of3.pdf	interpretation and residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_interpretation_residualmag_plss_map_3of3.pdf	interpretation and residual magnetic intensity grid and contours with public land survey system base layer
eaststyx_rad_equiv_th_topo_map_1of3.pdf	equivalent thorium grid with topographic base map
eaststyx_rad_equiv_th_topo_map_2of3.pdf	equivalent thorium grid with topographic base map
eaststyx_rad_equiv_th_topo_map_3of3.pdf	equivalent thorium grid with topographic base map
eaststyx_rad_equiv_th_contours_plss_map_1of3.pdf	equivalent thorium grid and contours with public land survey system base layer
eaststyx_rad_equiv_th_contours_plss_map_2of3.pdf	equivalent thorium grid and contours with public land survey system base layer
eaststyx_rad_equiv_th_contours_plss_map_3of3.pdf	equivalent thorium grid and contours with public land survey system base layer
eaststyx_rad_equiv_u_topo_map_1of3.pdf	equivalent uranium grid with topographic base map
eaststyx_rad_equiv_u_topo_map_2of3.pdf	equivalent uranium grid with topographic base map
eaststyx_rad_equiv_u_topo_map_3of3.pdf	equivalent uranium grid with topographic base map

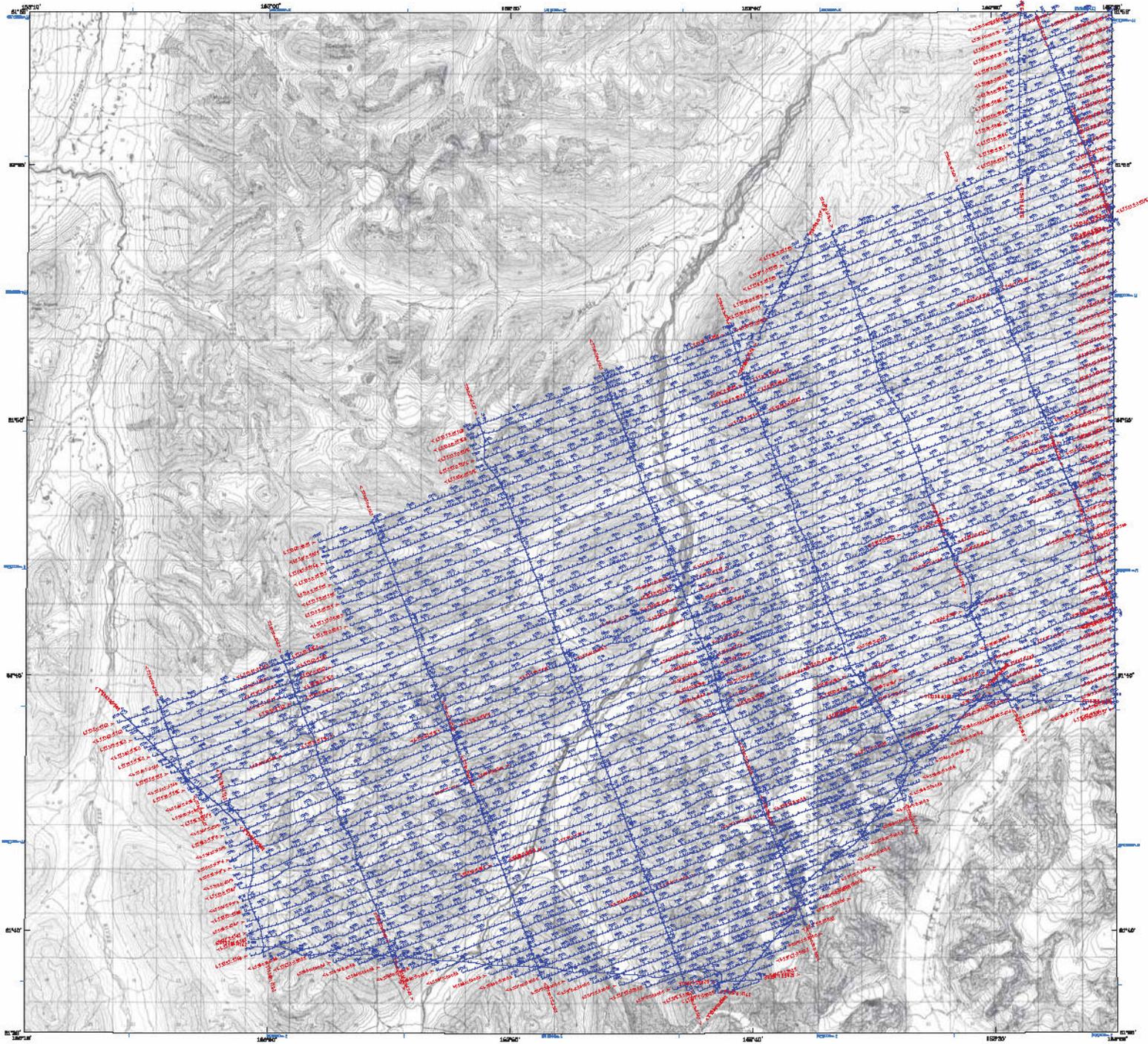
**Table 1, continued.** Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30412>

Map Title	Description
eaststyx_rad_equiv_u_contours_plss_map_1of3.pdf	equivalent uranium grid and contours with public land survey system base layer
eaststyx_rad_equiv_u_contours_plss_map_2of3.pdf	equivalent uranium grid and contours with public land survey system base layer
eaststyx_rad_equiv_u_contours_plss_map_3of3.pdf	equivalent uranium grid and contours with public land survey system base layer
eaststyx_rad_pct_k_topo_map_1of3.pdf	percent potassium grid with topographic base map
eaststyx_rad_pct_k_topo_map_2of3.pdf	percent potassium grid with topographic base map
eaststyx_rad_pct_k_topo_map_3of3.pdf	percent potassium grid with topographic base map
eaststyx_rad_pct_k_contours_plss_map_1of3.pdf	percent potassium grid and contours with public land survey system base layer
eaststyx_rad_pct_k_contours_plss_map_2of3.pdf	percent potassium grid and contours with public land survey system base layer
eaststyx_rad_pct_k_contours_plss_map_3of3.pdf	percent potassium grid and contours with public land survey system base layer
eaststyx_rad_ratio_th_k_topo_map_1of3.pdf	equivalent thorium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_th_k_topo_map_2of3.pdf	equivalent thorium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_th_k_topo_map_3of3.pdf	equivalent thorium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_th_k_contours_plss_map_1of3.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_th_k_contours_plss_map_2of3.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_th_k_contours_plss_map_3of3.pdf	equivalent thorium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_k_topo_map_1of3.pdf	equivalent uranium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_u_k_topo_map_2of3.pdf	equivalent uranium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_u_k_topo_map_3of3.pdf	equivalent uranium percent potassium ratio grid with topographic base map
eaststyx_rad_ratio_u_k_contours_plss_map_1of3.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_k_contours_plss_map_2of3.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_k_contours_plss_map_3of3.pdf	equivalent uranium percent potassium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_th_topo_map_1of3.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
eaststyx_rad_ratio_u_th_topo_map_2of3.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map
eaststyx_rad_ratio_u_th_topo_map_3of3.pdf	equivalent uranium equivalent thorium ratio grid with topographic base map

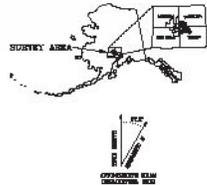
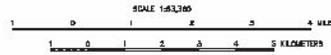
**Table 1, continued.** Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30412>

Map Title	Description
eaststyx_rad_ratio_u_th_contours_plss_map_1of3.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_th_contours_plss_map_2of3.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
eaststyx_rad_ratio_u_th_contours_plss_map_3of3.pdf	equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer
eaststyx_rad_tadr_topo_map_1of3.pdf	total air absorbed dose rate grid with topographic base map
eaststyx_rad_tadr_topo_map_2of3.pdf	total air absorbed dose rate grid with topographic base map
eaststyx_rad_tadr_topo_map_3of3.pdf	total air absorbed dose rate grid with topographic base map
eaststyx_rad_tadr_contours_plss_map_1of3.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
eaststyx_rad_tadr_contours_plss_map_2of3.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
eaststyx_rad_tadr_contours_plss_map_3of3.pdf	total air absorbed dose rate grid and contours with public land survey system base layer
eaststyx_rad_ternary_topo_map_1of3.pdf	radioelement ternary grid with topographic base map
eaststyx_rad_ternary_topo_map_2of3.pdf	radioelement ternary grid with topographic base map
eaststyx_rad_ternary_topo_map_3of3.pdf	radioelement ternary grid with topographic base map

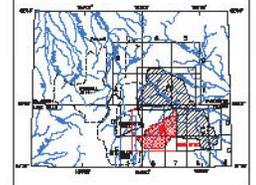




Date: June 13, 2014; Survey Name: 2014-5-29B; Date: 2014-06-13; Scale: 1:63,360; Data: 2014-06-13; UTM Zone: 18N



LOCATION INDEX OF 1:63,360-SCALE MAPS



# FLIGHT PATH WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

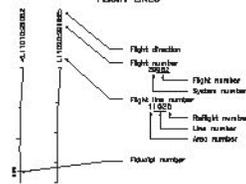
PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

**DESCRIPTIVE NOTES**

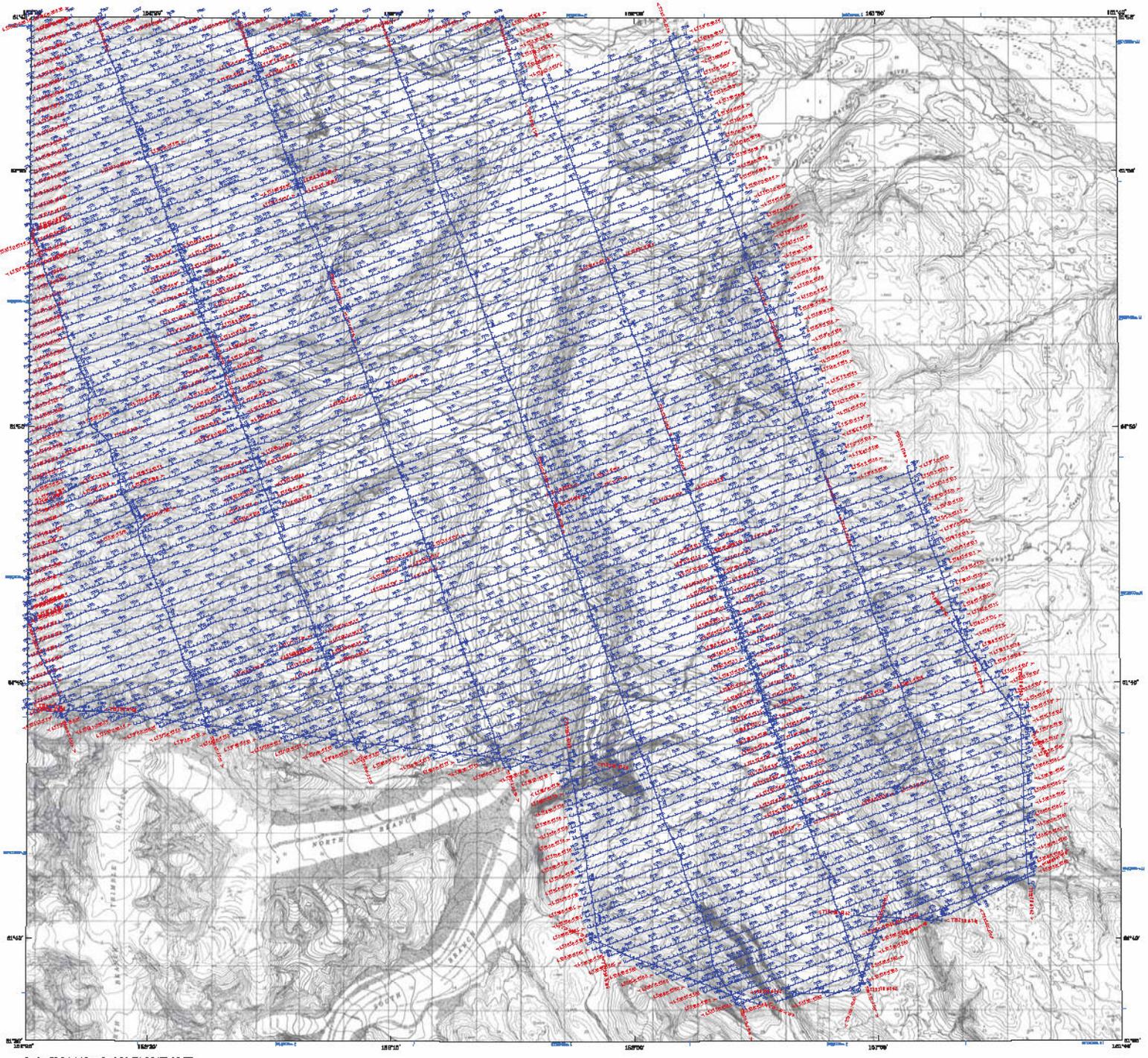
The geophysical data were acquired with a DHEWY Electromagnetic (EM) system, a GSI D1344 caesium magnetometer with a Bohring C13 caesium sensor, and a Radiation Systems RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, DGPS RTK motion and video camera. Flights were performed with an AS-330-B3 Super Puma helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles. A Novatel OEM4-62L 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 2 m. Flight path positions were projected onto the UTM 18N (UTM zone 18) datum, 1987 North American datum using a central meridian (CM) of 153° a north constant of 0 and an east constant of 500000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**FLIGHT LINES**

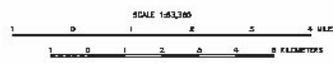
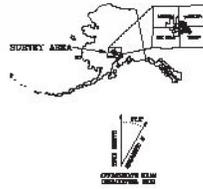


**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through POGO, 3304 College Road, Fairbanks, Alaska, 99709-2707, and an administrative fee from the DGGPS website ([www.dggs.alaska.gov/pogo](http://www.dggs.alaska.gov/pogo)). Maps are also available on paper through the DGGPS office, on site, or via email at the website in Adobe Acrobat PDF file format.



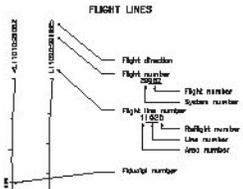
Date: June 13, 2014; Project Name: 2014-5-29C; Scale: 1:63,560; UTM Zone: 18Q; Datum: NAD83; Projection: UTM; Units: Meters



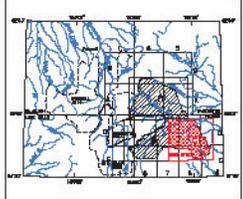
## FLIGHT PATH WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pargo Geoservices, Inc.  
2014



LOCATION INDEX OF 1:63,560-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIXIEVEI Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Schmidt C10 caesium sensor, and a Radiation Systems RS-300 counter-coy spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The counter-coy spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 207/80 Hz magnetic and video camera. Flights were performed with an AS-350-B3 Super Puma helicopter at a mean level in clearance of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-62L 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 2 m. Flight path positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 163° a north coordinate of 0 and an east coordinate of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

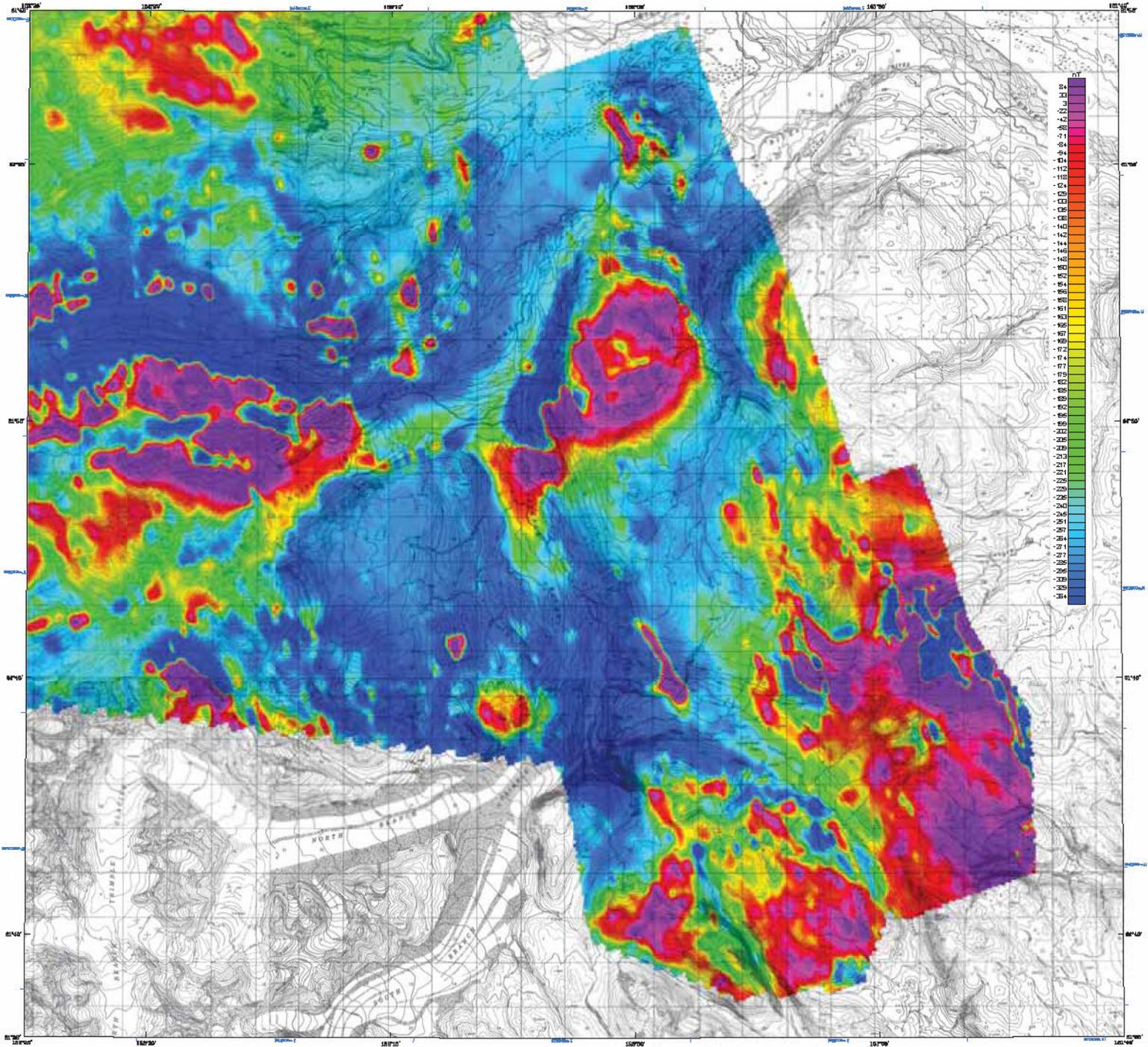
**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Pargo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through PARGO, 3304 College Road, Fairbanks, Alaska, 99709-2707, and are downloadable for free from the DGGS website ([www.dggs.alaska.gov/pubs/](http://www.dggs.alaska.gov/pubs/)). Maps are also available on paper through the DGGS office, on a variable order of the website in Adobe Acrobat PDF file format.

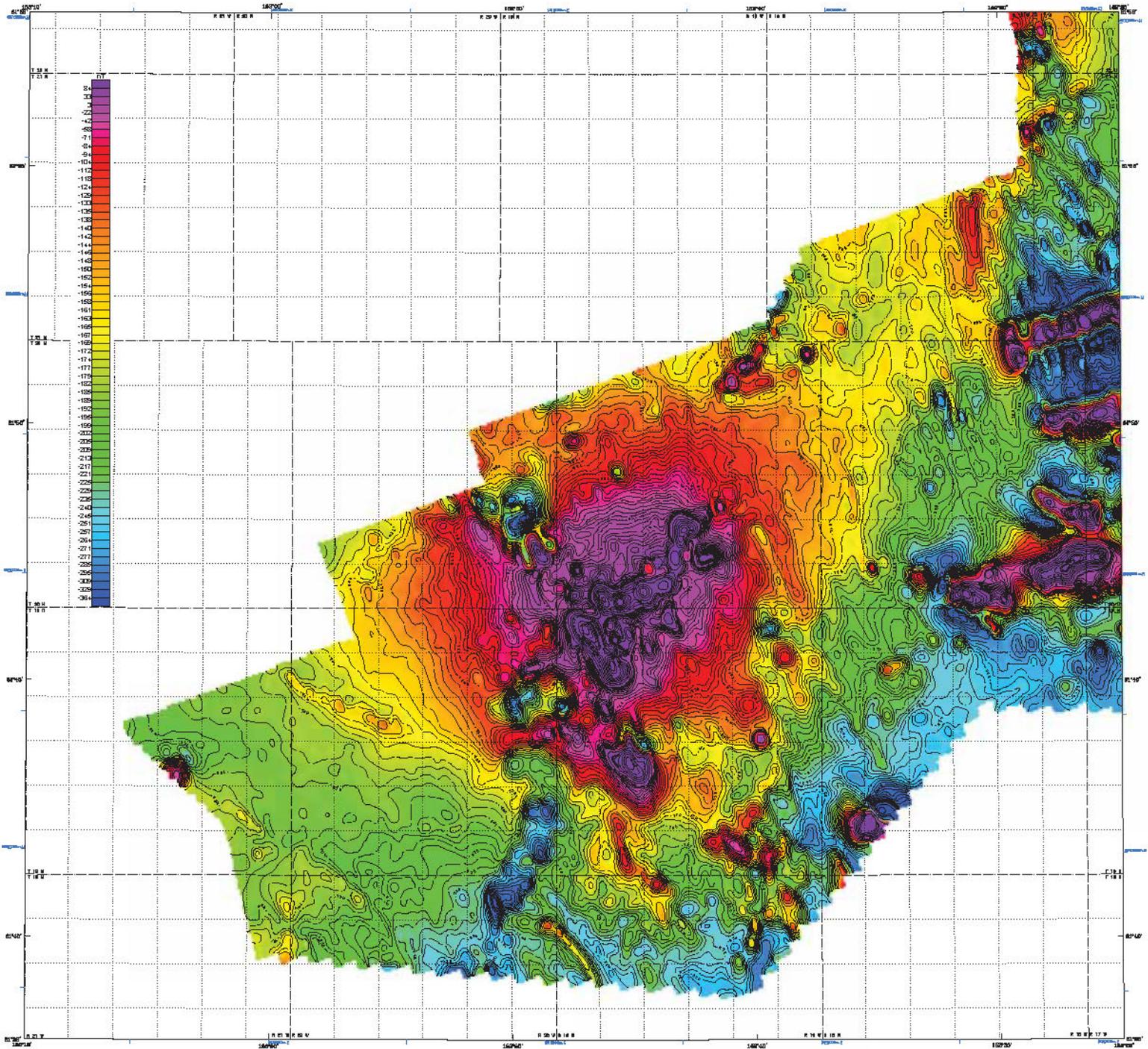




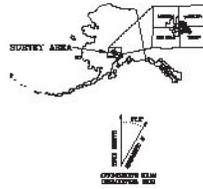
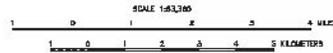


Base Data U.S. Geological Survey 7.5, 2.5, 1:250,000, 1:50,000, 1:25,000, 1:12,500, 1:6,250, 1:3,125, 1:1,562.5, 1:781.25, 1:390.625, 1:195.3125, 1:97.65625, 1:48.828125, 1:24.4140625, 1:12.20703125, 1:6.103515625, 1:3.0517578125, 1:1.52587890625, 1:0.762939453125, 1:0.3814697265625, 1:0.19073486328125, 1:0.095367431640625, 1:0.0476837158203125, 1:0.02384185791015625, 1:0.011920928955078125, 1:0.0059604644775390625, 1:0.00298023223876953125, 1:0.001490116119384765625, 1:0.0007450580596923828125, 1:0.00037252902984619140625, 1:0.000186264514923095703125, 1:0.0000931322574615478515625, 1:0.00004656612873077392578125, 1:0.000023283064365386962890625, 1:0.00001164153218269348442578125, 1:0.000005820766091346742212890625, 1:0.0000029103830456733711064453125, 1:0.00000145519152283668555322265625, 1:0.000000727595761418342776611328125, 1:0.0000003637978807091713883056640625, 1:0.00000018189894035458569415283203125, 1:0.000000090949470177292847076416015625, 1:0.0000000454747350886464235382080078125, 1:0.00000002273736754432321176910400390625, 1:0.000000011368683772161605884552001953125, 1:0.0000000056843418860808029422760009765625, 1:0.00000000284217094304040147113800048828125, 1:0.000000001421085471520200735569000244140625, 1:0.0000000007105427357601003677845001220703125, 1:0.00000000035527136788005018389225006103515625, 1:0.000000000177635683940025091949462530517578125, 1:0.000000000088817841970012545959731265257890625, 1:0.0000000000444089209850062729798656326289453125, 1:0.00000000002220446049250313648993281631447265625, 1:0.000000000011102230246251574494946408157136328125, 1:0.000000000005551115123125787222474704078681631447265625, 1:0.00000000000277555756156287112373735203934081631447265625, 1:0.000000000001387778780781435561868676019671704081631447265625, 1:0.0000000000006938893903907177784343380098353604081631447265625, 1:0.000000000000346944695195358888919419004917680204081631447265625, 1:0.00000000000017347234759767944449709500245840104081631447265625, 1:0.0000000000000867361737988397222485475001220703125, 1:0.00000000000004336808689941961112377375006103515625, 1:0.000000000000021684043449709500245840104081631447265625, 1:0.00000000000001084202172485475001220703125, 1:0.000000000000005421010862377375006103515625, 1:0.00000000000000271050543118868838250030517578125, 1:0.00000000000000135525271559444419004917680204081631447265625, 1:0.00000000000000067762635779722209500245840104081631447265625, 1:0.000000000000000338813178898611237375006103515625, 1:0.000000000000000169406589449305568838250030517578125, 1:0.000000000000000084703294724652794419004917680204081631447265625, 1:0.000000000000000042351647362326397209500245840104081631447265625, 1:0.00000000000000002117582368116319860475001220703125, 1:0.000000000000000010587911840581595302375006103515625, 1:0.00000000000000000529395592029079765118750030517578125, 1:0.0000000000000000026469779601453988257500152587890625, 1:0.00000000000000000132348898007269941287500762939653125, 1:0.000000000000000000661744490036349706437500381469265625, 1:0.00000000000000000033087224501817485321875001907346328125, 1:0.00000000000000000016543612250908742660937500953671631447265625, 1:0.0000000000000000000827180612545437133046875004768356628125, 1:0.000000000000000000041359030627271856623437500238417831447265625, 1:0.000000000000000000020679515313635928311718750011920917265625, 1:0.00000000000000000001033975765681796415588875005960458125, 1:0.000000000000000000005169878828408982279443750029802290625, 1:0.00000000000000000000258493941420449113972187500149011453125, 1:0.000000000000000000001292469707102245569860937500745057265625, 1:0.000000000000000000000646234853551123243441875003725286328125, 1:0.0000000000000000000003231174267755616162193750018626431447265625, 1:0.000000000000000000000161558713387778080810937500931321631447265625, 1:0.00000000000000000000008077935669388404040468750046566081631447265625, 1:0.000000000000000000000040389678346942020227375002328304081631447265625, 1:0.00000000000000000000002019483917347101113687500116415204081631447265625, 1:0.00000000000000000000001009741958673550556843750058207104081631447265625, 1:0.0000000000000000000000050487097933677777818218750029103515625, 1:0.000000000000000000000002524354896683888890912500145517578125, 1:0.0000000000000000000000012621774483419444454562500727687890625, 1:0.000000000000000000000000631088724170972222728125003638439653125, 1:0.00000000000000000000000031554436208548611136406250018192198265625, 1:0.0000000000000000000000001577721810427430556820312500909608125, 1:0.0000000000000000000000000788860905213715278410625004548040625, 1:0.000000000000000000000000039443045260685763920531250022740203125, 1:0.00000000000000000000000001972152263034288196026562500113701015625, 1:0.0000000000000000000000000098607613151714400132812500568505078125, 1:0.000000000000000000000000004930380657585720006640625002842525390625, 1:0.00000000000000000000000000246519032879285000332031250014212628125, 1:0.000000000000000000000000001232595164396425000166015625000710631447265625, 1:0.0000000000000000000000000006162975821982125000083007812500035531631447265625, 1:0.00000000000000000000000000030814879109910625000041503906250001776581631447265625, 1:0.00000000000000000000000000015407439554955312500002075195312500008882908125, 1:0.0000000000000000000000000000770371977747765625000010375976562500004441453125, 1:0.00000000000000000000000000003851859888738881562500005187987890625000022207265625, 1:0.0000000000000000000000000000192592994436944078125000025939939653125000011103631447265625, 1:0.00000000000000000000000000000962964972184720390625000012969969826562500000555181631447265625, 1:0.00000000000000000000000000000481482486092360195312500006484984939653125000002775908125, 1:0.0000000000000000000000000000024074124304618009765625000032424924698265625000013879540625, 1:0.00000000000000000000000000000120370621523090048828125000016212462349396531250000069397703125, 1:0.00000000000000000000000000000060185310761500244140625000081062311969826562500000346988515625, 1:0.00000000000000000000000000000030092655380750012207031250000405311598493965312500001734942578125, 1:0.000000000000000000000000000000150463276903750061035156250000202655799246982656250000086747128125, 1:0.0000000000000000000000000000000752316384518750030517578125000010132789962346982656250000043373563125, 1:0.0000000000000000000000000000000376158192259375001525878906250000506639499623469826562500000216867815625, 1:0.000000000000000000000000000000018807909612968750076293965312500002533197499623469826562500001084339078125, 1:0.000000000000000000000000000000009403954806484375003814692656250000126659874996234698265625000005421695390625, 1:0.0000000000000000000000000000000047019774032421875001907346328125000063329937499623469826562500000271084769265625, 1:0.000000000000000000000000000000002350988701621093750095367163144726562500003166496874996234698265625000013554238463125, 1:0.0000000000000000000000000000000011754943508104687500476835662812500001583248437499623469826562500000677711923125, 1:0.00000000000000000000000000000000058774717540523437500238417831447265625000079162421874996234698265625000003388559615625, 1:0.000000000000000000000000000000000293873587702617187500119209172656250000395812109374996234698265625000016942798078125, 1:0.000000000000000000000000000000000146936793851308812500596045812500001979060493749962346982656250000084713990390625, 1:0.000000000000000000000000000000000073468396925664406250029802290625000098953024698265625000004235699519265625, 1:0.0000000000000000000000000000000000367341984628322031250014901145312500004947651234698265625000002117849763125, 1:0.00000000000000000000000000000000001836709923141610625007450572656250000247382561734698265625000010589248815625, 1:0.00000000000000000000000000000000000918354961570805312500372528632812500012369128087346982656250000052946244078125, 1:0.0000000000000000000000000000000000045917748078540265625001862643144726562500061845640437346982656250000264731220390625, 1:0.00000000000000000000000000000000000229588740392720132812500931321631447265625007171402021873469826562500013236561019265625, 1:0.00000000000000000000000000000000000114794370196360066406250045517578125001434280043734698265625000661828050963125, 1:0.000000000000000000000000000000000000573971850981800332031250022768789062500717140202187346982656250033091400463125, 1:0.00000000000000000000000000000000000028698592549090016601562500113701015625007171402021873469826562501654570023125, 1:0.000000000000000000000000000000000000143492962745450083007812500568505078125007171402021873469826562508272850115625, 1:0.000000000000000000000000000000000000071746481372725004150390625002842525390625007171402021873469826562541364250578125, 1:0.000000000000000000000000000000000000035873240686362500207519531250014212628125007171402021873469826562520682127890625, 1:0.0000000000000000000000000000000000000179366203431812500103759765625007171402021873469826562510341064463125, 1:0.00000000000000000000000000000000000000896831017156250051879878906250071714020218734698265625517053223125, 1:0.0000000000000000000000000000000000000044841550857812500259399623469826562500717140202187346982656252585266115625, 1:0.00000000000000000000000000000000000000224207754289062500129699623469826562500717140202187346982656251292633078125, 1:0.000000000000000000000000000000000000001121038771445312500648498493965312500717140202187346982656256463165390625, 1:0.0000000000000000000000000000000000000005605193857265625003242492469826562500717140202187346982656253231576953125, 1:0.0000000000000000000000000000000000000002802596928632812500162124623469826562500717140202187346982656251615788463125, 1:0.000000000000000000000000000000000000000140129846431631447265625007171402021873469826562580789423125, 1:0.007006492321566314472656250071714020218734698265625403947115625, 1:0.00350324616078314472656250071714020218734698265625201973578125, 1:0.00175162308039163144726562500717140202187346982656251009867890625, 1:0.0008758115401958163144726562500717140202187346982656255049339463125, 1:0.0004379057700979163144726562500717140202187346982656252524669763125, 1:0.000218952885048958163144726562500717140202187346982656251262334939653125, 1:0.000109476442524479163144726562500717140202187346982656256311674939653125, 1:0.005473822126224791631447265625007171402021873469826562531558374939653125, 1:0.0027369110631147916314472656250071714020218734698265625157791874939653125, 1:0.0013684555315597916314472656250071714020218734698265625788959374939653125, 1:0.000684227765779163144726562500717140202187346982656253944796874939653125, 1:0.000342113882889581631447265625007171402021873469826562519723984374939653125, 1:0.000171056941444791631447265625007171402021873469826562598619921874939653125, 1:0.008552847072239581631447265625007171402021873469826562549309609374939653125, 1:0.0042764235361197916314472656250071714020218734698265625246548046874939653125, 1:0.0021382117680598958163144726562500717140202187346982656251232740234939653125, 1:0.0010691058840299479163144726562500717140202187346982656256163701174939653125, 1:0.00053455294201499791631447265625007171402021873469826562530818505874939653125, 1:0.000267276471007499791631447265625007171402021873469826562515409254374939653125, 1:0.0001336382355037





Scale: 1:63,360. UTM Zone 18N. Datum: NAD 83. Contour Interval: 5 nT. Contour Labels: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360.



# RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

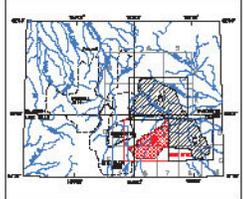
### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digital recorded data from a CGG D1344 magnetometer with a Scintec C31 caesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the diurnally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and observer location), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1978) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alaska, 1976. A new method of interpolation and exact curve fitting based on local procedures. Journal of the Association of Geographers, Vol. 17, no. 4, p. 680-690.

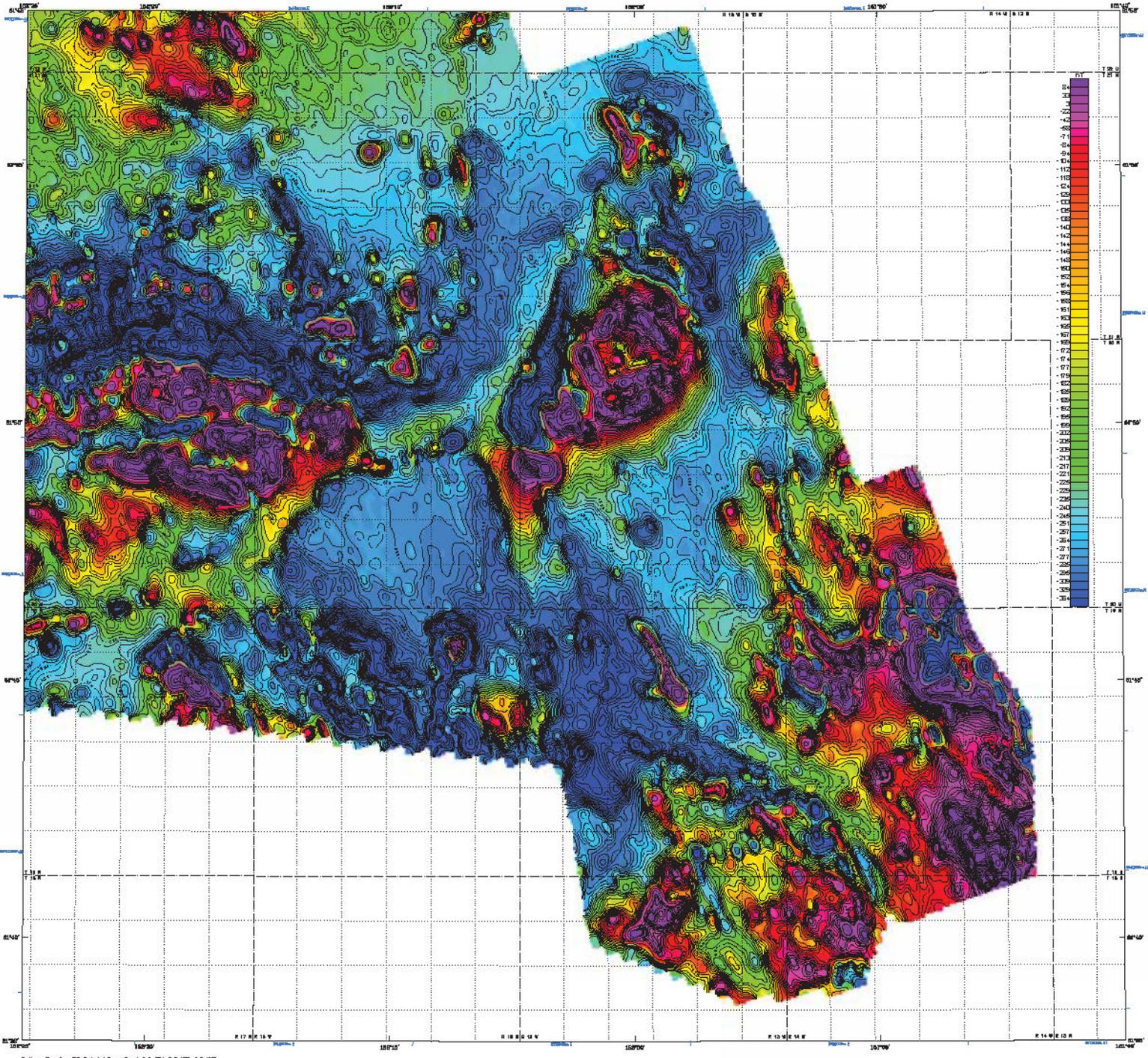
**DESCRIPTIVE NOTES**  
The geophysical data were acquired with a DITHREX<sup>®</sup> electromagnetic (EM) system, a CGG D1344 caesium magnetometer with a Scintec C31 caesium sensor, and a Radiation Systems RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 600/80 Hz magnetometer and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The flight lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.  
A Novatel OEM4-82L 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 15 mm (flight path) and 10 mm (tie line) perpendicular to the flight lines (UTM zone 18N). The datum is the North American datum using a central meridian (CM) of 163° W, a north coordinate of 0 and an east constant of 500,000. Potential accuracy of the processed data is better than 10 m with respect to the UTM grid.

### LOCATION INDEX OF 1:63,360-SCALE MAPS

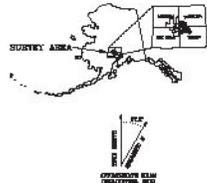
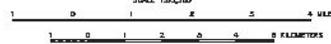


MAGNETIC CONTOURS	Color
250 nT	Red
50 nT	Orange
10 nT	Yellow
5 nT	Green

**SURVEY HISTORY**  
This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGGS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical (ASGGG) Inventory Program.  
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and are downloadable for free from the DGGGS website ([www.dggg.alaska.gov/pubs](http://www.dggg.alaska.gov/pubs)). Maps are also available in paper through the DGGGS office, and are available online in the Alaska Aerial JEP file format.



Scale 1:63,560. U.S. Geological Survey, 1984. 1:63,560, 6-1, 1984. P-4, 1984. 3-1, 2004. P-1, 1978. Residual Magnetic Field.



## RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

### RESIDUAL MAGNETIC FIELD

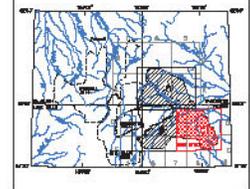
The magnetic total field data were processed using digital recorded data from a CGS D1344 magnetometer with a Scintrex C31 cesium sensor, and a Rodden Spitzer RC-300 cesium-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The cesium-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, DGPS RTK motion and video camera. Flights were performed with an AS-300-B3 Spirit helicopter at a mean level of 600 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight data were projected onto the Clarke 1886 (LTM zone 5) datum, 1827 North American datum using a central meridian (CM) of 125° 3' north-south of 0 and an east constant of 500,000. Potential accuracy of the presented data is better than 10 m with respect to the UTM grid.

Alaska, 1976. A new method of interpolation and smooth curve fitting based on local procedures. Journal of the Association of Surveying, Vol. 17, no. 4, p. 580-590.

MAGNETIC CONTOURS	Value
.....	20 nT
.....	50 nT
.....	10 nT
.....	5 nT

### LOCATION INDEX OF 1:63,560-SCALE MAPS



### 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 (DGGS), and Pigo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by DGGS in 2013 and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of collection. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

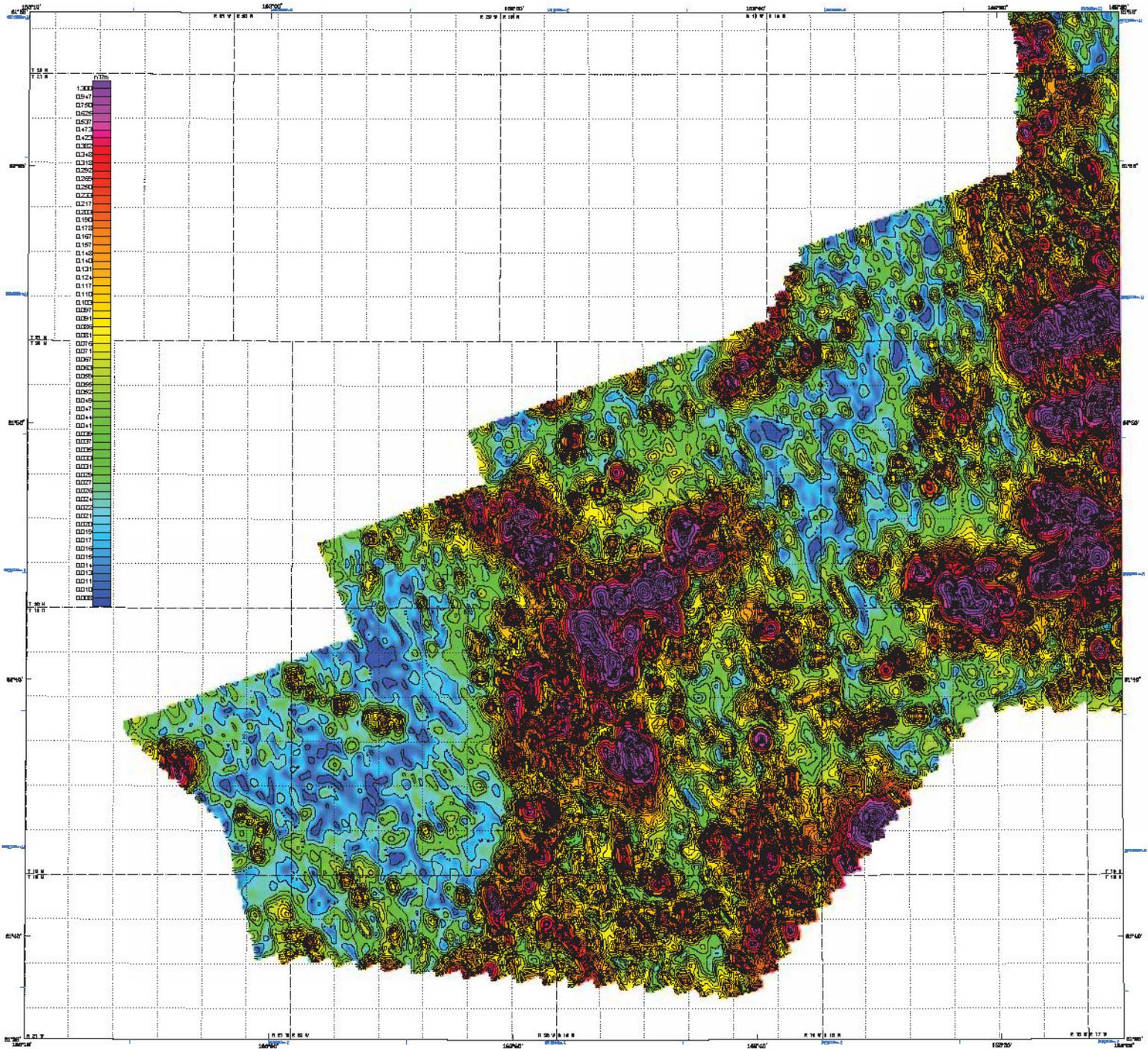
All data and maps produced to date from the survey are available in digital format on DVD for a nominal fee through 998E, 3304 College Road, Fairbanks, Alaska, 99708-2377, and an arrangement for free from the DGGS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available on paper through the DGGS office, and are available online at the website in Adobe Acrobat PDF file format.



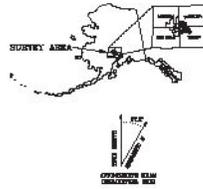
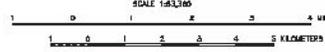








Scale: 1:63,360. UTM Zone 18N. Datum: NAD 83. Contour Interval: 0.1 nT. Contour Interval: 0.1 nT. Contour Interval: 0.1 nT.

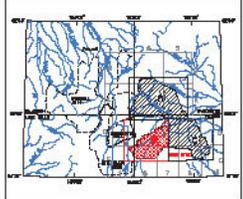


# ANALYTIC SIGNAL WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,360-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEWY Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Bohring C10 caesium sensor, and a Radiation Systems RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 600/80 Hz magnetometers and video camera. Flights were performed with an AS-330-B3 Spirit Helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L 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 15 mm (flight path) and 10 mm (vertical) using the CORS 1486 (UTM zone 5) network, 1827 North American datum (along a central meridian (CM) of 163° a north coordinate of 0 and an east coordinate of 500000). Potential accuracy of the presented data is better than 10 m with respect to the UTM grid.

**ANALYTIC SIGNAL**

Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Negative highs in the calculated analytic signal of magnetic gradient locate the anomalous source body edges and corners (e.g., anticline, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and anticlines, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

**ANALYTIC SIGNAL CONTOURS**

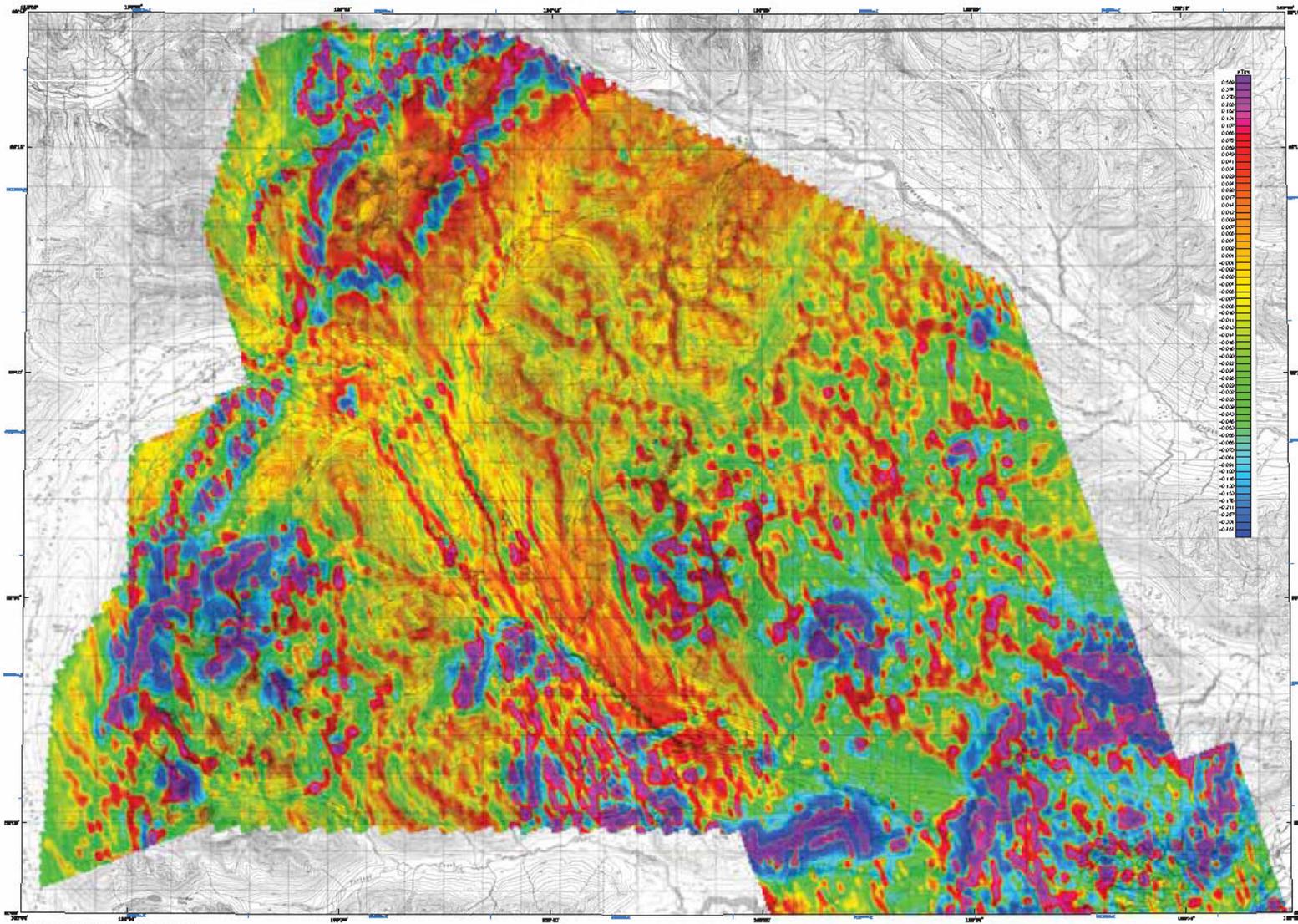
.....	0.20 nT/mtes
.....	0.10 nT/mtes
.....	0.02 nT/mtes
.....	0.01 nT/mtes

**SURVEY HISTORY**

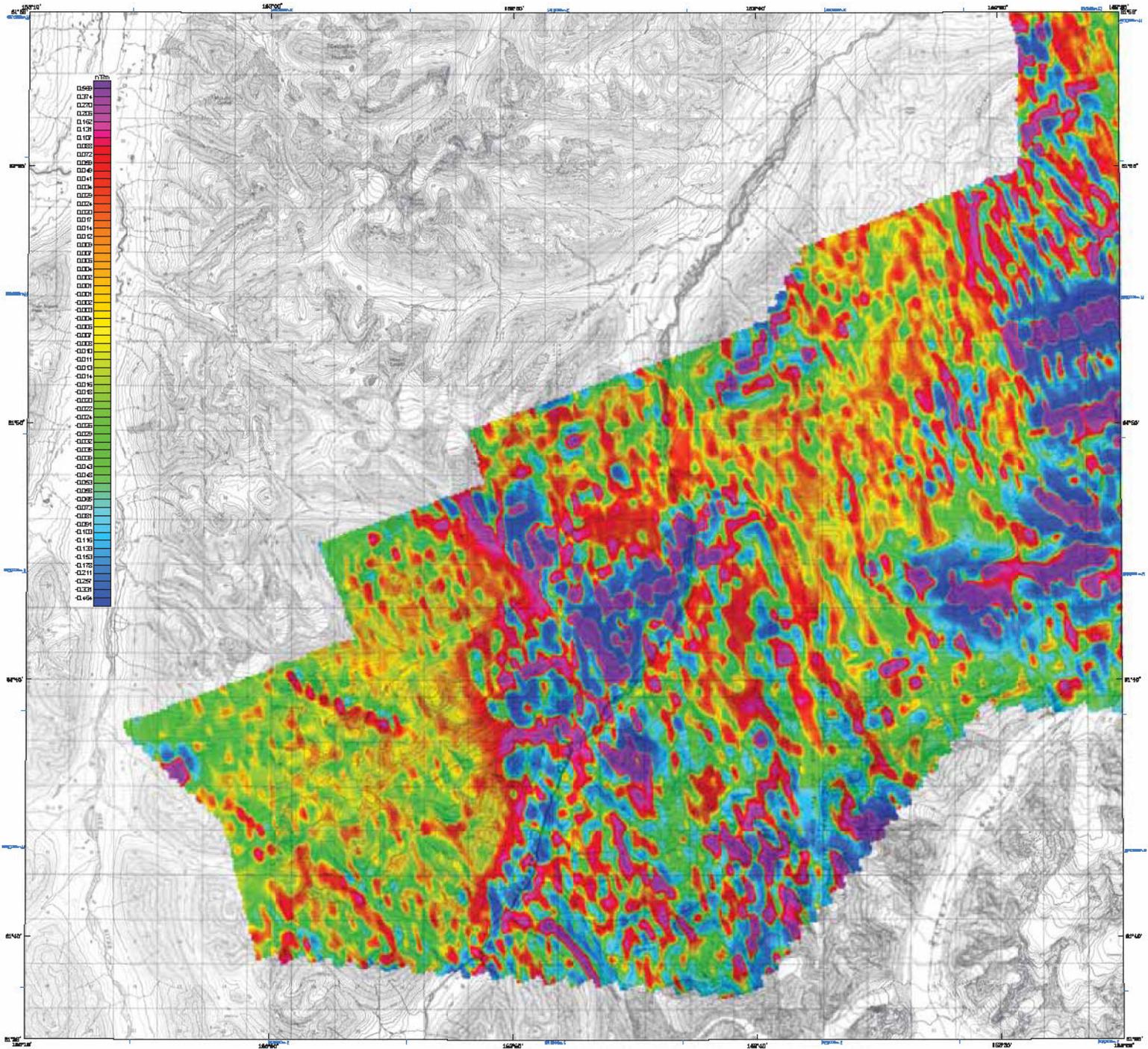
This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by DGG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geophysical and Geological Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 9965, 3304 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable for free from the DGG website ([www.dgg.alaska.gov/pubs](http://www.dgg.alaska.gov/pubs)). Maps are also available in paper through the DGG office, and are available online at the website in Adobe Acrobat PDF file format.

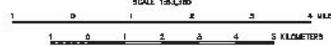




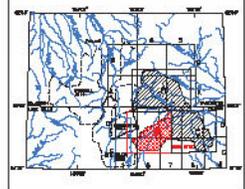
1:50,000  
 1:100,000  
 1:200,000  
 1:400,000  
 1:800,000  
 1:1,600,000  
 1:3,200,000  
 1:6,400,000  
 1:12,800,000  
 1:25,600,000  
 1:51,200,000  
 1:102,400,000  
 1:204,800,000  
 1:409,600,000  
 1:819,200,000  
 1:1,638,400,000  
 1:3,276,800,000  
 1:6,553,600,000  
 1:13,107,200,000  
 1:26,214,400,000  
 1:52,428,800,000  
 1:104,857,600,000  
 1:209,715,200,000  
 1:419,430,400,000  
 1:838,860,800,000  
 1:1,677,721,600,000  
 1:3,355,443,200,000  
 1:6,710,886,400,000  
 1:13,421,772,800,000  
 1:26,843,545,600,000  
 1:53,687,091,200,000  
 1:107,374,182,400,000  
 1:214,748,364,800,000  
 1:429,496,729,600,000  
 1:858,993,459,200,000  
 1:1,717,986,918,400,000  
 1:3,435,973,836,800,000  
 1:6,871,947,673,600,000  
 1:13,743,895,347,200,000  
 1:27,487,786,744,000,000  
 1:54,975,573,488,000,000  
 1:109,951,146,976,000,000  
 1:219,902,293,952,000,000  
 1:439,804,587,904,000,000  
 1:879,609,175,808,000,000  
 1:1,759,218,351,616,000,000  
 1:3,518,436,703,232,000,000  
 1:7,036,873,406,464,000,000  
 1:14,073,746,812,928,000,000  
 1:28,147,493,625,856,000,000  
 1:56,294,987,251,712,000,000  
 1:112,589,974,503,424,000,000  
 1:225,179,949,006,848,000,000  
 1:450,359,898,013,696,000,000  
 1:900,719,796,027,392,000,000  
 1:1,801,439,592,054,784,000,000  
 1:3,602,879,184,109,568,000,000  
 1:7,205,758,368,219,136,000,000  
 1:14,411,516,736,438,272,000,000  
 1:28,823,033,472,876,544,000,000  
 1:57,646,066,945,753,088,000,000  
 1:115,292,133,891,506,176,000,000  
 1:230,584,267,783,012,352,000,000  
 1:461,168,535,566,024,704,000,000  
 1:922,337,071,132,049,408,000,000  
 1:1,844,674,142,264,098,816,000,000  
 1:3,689,348,284,528,197,632,000,000  
 1:7,378,696,569,056,395,264,000,000  
 1:14,757,393,138,112,790,528,000,000  
 1:29,514,786,276,225,581,056,000,000  
 1:59,029,572,552,451,162,112,000,000  
 1:118,059,145,104,902,324,224,000,000  
 1:236,118,290,209,804,648,448,000,000  
 1:472,236,580,419,609,296,896,000,000  
 1:944,473,160,839,218,593,792,000,000  
 1:1,888,946,321,678,437,187,584,000,000  
 1:3,777,892,643,356,874,375,168,000,000  
 1:7,555,785,286,713,748,750,336,000,000  
 1:15,111,570,573,427,497,500,672,000,000  
 1:30,223,141,146,854,995,001,344,000,000  
 1:60,446,282,293,709,990,002,688,000,000  
 1:120,892,564,587,419,980,005,376,000,000  
 1:241,785,129,174,839,960,010,752,000,000  
 1:483,570,258,349,679,920,021,504,000,000  
 1:967,140,516,699,359,840,043,008,000,000  
 1:1,934,281,033,398,719,680,086,016,000,000  
 1:3,868,562,066,797,439,360,172,032,000,000  
 1:7,737,124,133,594,878,720,344,064,000,000  
 1:15,474,248,267,189,757,448,688,096,000,000  
 1:30,948,496,534,379,514,897,377,152,000,000  
 1:61,896,993,068,759,029,794,754,304,000,000  
 1:123,793,986,137,518,059,589,508,608,000,000  
 1:247,587,972,275,036,119,179,017,217,152,000,000  
 1:495,175,944,550,072,238,358,034,434,304,000,000  
 1:990,351,889,100,144,476,716,068,868,868,000,000  
 1:1,980,703,778,200,288,953,433,137,737,737,152,000,000  
 1:3,961,407,556,400,577,906,866,275,475,474,304,000,000  
 1:7,922,815,112,801,155,813,732,550,950,948,608,000,000  
 1:15,845,622,225,602,311,627,465,101,191,189,137,152,000,000  
 1:31,691,244,451,204,623,254,930,202,382,378,274,304,000,000  
 1:63,382,488,902,409,246,509,860,404,764,756,548,608,000,000  
 1:126,764,977,804,818,493,019,720,809,529,513,117,152,000,000  
 1:253,529,955,609,636,986,038,441,619,059,026,234,304,000,000  
 1:507,059,911,219,273,972,076,883,238,118,052,468,608,000,000  
 1:1,014,119,822,438,547,944,153,766,476,236,036,137,152,000,000  
 1:2,028,239,644,877,095,888,307,532,952,472,072,274,304,000,000  
 1:4,056,479,289,754,171,776,615,065,904,944,148,548,608,000,000  
 1:8,112,958,579,508,343,553,231,131,189,097,097,152,000,000  
 1:16,225,917,159,016,687,106,462,262,378,194,194,304,000,000  
 1:32,451,834,318,033,374,212,924,524,746,388,388,608,000,000  
 1:64,903,668,636,066,748,425,849,049,492,776,776,152,000,000  
 1:129,807,337,272,133,496,851,698,998,995,553,552,304,000,000  
 1:259,614,674,544,266,993,703,397,997,107,110,707,608,000,000  
 1:519,229,349,088,533,987,407,795,994,214,221,415,217,152,000,000  
 1:1,038,458,698,167,067,974,815,591,988,428,442,830,434,304,000,000  
 1:2,076,917,396,334,134,949,631,183,976,856,884,860,868,608,000,000  
 1:4,153,834,792,668,269,899,262,367,953,713,769,721,637,152,000,000  
 1:8,307,669,585,336,539,798,524,735,907,427,539,443,274,304,000,000  
 1:16,615,339,170,673,079,597,049,471,814,854,877,886,548,608,000,000  
 1:33,230,678,341,346,159,194,098,943,629,755,773,093,152,000,000  
 1:66,461,356,682,692,318,388,197,897,859,511,546,146,304,000,000  
 1:132,922,713,365,384,636,776,795,719,023,092,292,608,000,000  
 1:265,845,426,730,769,273,553,591,438,046,185,185,152,000,000  
 1:531,690,853,461,538,547,107,183,876,092,370,370,304,000,000  
 1:1,063,381,706,923,077,094,214,367,752,140,740,740,608,000,000  
 1:2,126,763,413,846,154,388,428,734,504,281,481,481,152,000,000  
 1:4,253,526,827,692,308,776,857,469,008,962,962,962,304,000,000  
 1:8,507,053,655,384,617,553,714,937,925,925,925,608,000,000  
 1:17,014,107,310,769,235,110,743,875,851,851,851,152,000,000  
 1:34,028,214,621,538,470,221,487,703,703,703,304,000,000  
 1:68,056,429,243,076,940,442,974,407,407,407,608,000,000  
 1:136,112,858,486,152,384,884,949,814,814,814,152,000,000  
 1:272,225,712,972,764,769,769,629,629,629,304,000,000  
 1:544,451,425,945,529,539,539,259,259,259,608,000,000  
 1:1,088,902,851,091,059,079,079,129,129,129,152,000,000  
 1:2,177,805,702,182,118,158,158,64,64,64,304,000,000  
 1:4,355,611,404,364,236,316,316,32,32,32,608,000,000  
 1:8,711,222,808,728,472,632,632,16,16,16,152,000,000  
 1:17,422,445,617,456,944,128,128,8,8,8,304,000,000  
 1:34,844,891,234,913,888,256,256,4,4,4,608,000,000  
 1:69,689,782,469,827,776,512,512,2,2,2,152,000,000  
 1:139,379,564,939,655,552,1024,1024,1,1,1,304,000,000  
 1:278,759,129,879,311,104,2048,2048,1,1,1,608,000,000  
 1:557,518,259,758,622,208,4096,4096,1,1,1,152,000,000  
 1:1,115,036,519,517,245,417,8192,8192,1,1,1,304,000,000  
 1:2,230,073,039,034,490,834,16384,16384,1,1,1,608,000,000  
 1:4,460,146,078,068,981,668,32768,32768,1,1,1,152,000,000  
 1:8,920,292,156,137,963,335,65536,65536,1,1,1,304,000,000  
 1:17,840,584,312,275,926,671,311,040,131,040,608,000,000  
 1:35,681,168,624,551,852,134,262,080,262,080,152,000,000  
 1:71,362,337,249,102,370,268,524,104,524,104,304,000,000  
 1:142,724,674,498,204,740,536,104,262,104,262,608,000,000  
 1:285,449,348,996,409,480,536,104,131,104,131,152,000,000  
 1:570,898,697,992,818,960,536,104,65,104,65,304,000,000  
 1:1,141,797,395,985,637,920,536,104,32,104,32,608,000,000  
 1:2,283,594,791,971,275,840,536,104,16,104,16,152,000,000  
 1:4,567,189,583,942,551,680,536,104,8,104,8,304,000,000  
 1:9,134,379,167,884,102,368,536,104,4,104,4,608,000,000  
 1:18,268,756,335,768,204,184,536,104,2,104,2,152,000,000  
 1:36,537,512,671,536,368,536,104,1,104,1,304,000,000  
 1:73,075,025,343,072,716,536,104,1,104,1,608,000,000  
 1:146,150,050,686,144,143,536,104,1,104,1,152,000,000  
 1:292,300,101,372,288,286,536,104,1,104,1,304,000,000  
 1:584,600,202,744,572,572,536,104,1,104,1,608,000,000  
 1:1,169,200,405,488,1145,1144,536,104,1,104,1,152,000,000  
 1:2,338,400,810,976,2288,2288,536,104,1,104,1,304,000,000  
 1:4,676,801,621,952,4576,4576,536,104,1,104,1,608,000,000  
 1:9,353,603,243,904,9152,9152,536,104,1,104,1,152,000,000  
 1:18,707,206,487,808,18304,18304,536,104,1,104,1,304,000,000  
 1:37,414,412,975,616,36608,36608,536,104,1,104,1,608,000,000  
 1:74,828,825,951,232,73216,73216,536,104,1,104,1,152,000,000  
 1:149,657,651,902,464,146432,146432,536,104,1,104,1,304,000,000  
 1:299,315,303,804,928,292864,292864,536,104,1,104,1,608,000,000  
 1:598,630,607,609,856,585728,585728,536,104,1,104,1,152,000,000  
 1:1,197,261,215,219,711,1171456,1171456,536,104,1,104,1,304,000,000  
 1:2,394,522,430,438,422,2342912,2342912,536,104,1,104,1,608,000,000  
 1:4,789,044,860,876,844,4685824,4685824,536,104,1,104,1,152,000,000  
 1:9,578,089,721,753,688,9371648,9371648,536,104,1,104,1,304,000,000  
 1:19,156,175,443,507,377,18743296,18743296,536,104,1,104,1,608,000,000  
 1:38,312,350,887,014,754,37486592,37486592,536,104,1,104,1,152,000,000  
 1:76,624,701,774,029,508,74973184,74973184,536,104,1,104,1,304,000,000  
 1:153,249,403,548,058,017,49946368,49946368,536,104,1,104,1,608,000,000  
 1:306,498,807,096,116,034,99892736,99892736,536,104,1,104,1,152,000,000  
 1:612,997,614,192,232,068,199785472,199785472,536,104,1,104,1,304,000,000  
 1:1,225,995,228,384,464,399,599,579,959,716,716,608,000,000  
 1:2,451,990,456,768,928,799,199,199,367,846,846,152,000,000  
 1:4,903,980,913,537,856,158,799,799,183,423,423,304,000,000  
 1:9,807,961,827,075,712,317,599,599,91,211,211,608,000,000  
 1:19,615,923,654,151,424,635,199,199,45,105,105,152,000,000  
 1:39,231,847,308,302,848,127,399,399,22,52,52,304,000,000  
 1:78,463,694,616,605,696,63,799,799,11,26,26,608,000,000  
 1:156,927,389,233,211,392,31,799,799,5,13,13,152,000,000  
 1:313,854,778,466,422,784,15,799,799,2,6,6,304,000,000  
 1:627,709,556,932,845,568,7,799,799,1,3,3,608,000,000  
 1:1,255,419,113,865,691,14,1595,1595,1,1,1,152,000,000  
 1:2,510,838,227,731,382,29,3190,3190,1,1,1,304,000,000  
 1:5,021,676,455,462,764,58,6380,6380,1,1,1,608,000,000  
 1:10,043,352,910,925,528,116,12760,12760,1,1,1,152,000,000  
 1:20,086,705,821,851,056,232,25520,25520,1,1,1,304,000,000  
 1:40,173,411,643,702,1112,51040,51040,1,1,1,608,000,000  
 1:80,346,823,287,404,2224,102080,102080,1,1,1,152,000,000  
 1:160,693,646,574,808,4448,204160,204160,1,1,1,304,000,000  
 1:321,387,293,149,616,8896,408320,408320,1,1,1,608,000,000  
 1:642,774,586,299,232,1778,816640,816640,1,1,1,152,000,000  
 1:1,285,548,118,598,464,3556,1633280,1633280,1,1,1,304,000,000  
 1:2,571,096,357,197,928,7112,3266560,3266560,1,1,1,608,000,000  
 1:5,142,192,714,395,856,14224,6533120,6533120,1,1,1,152,000,000  
 1:10,284,385,428,791,712,28448,13066240,13066240,1,1,1,304,000,000  
 1:20,568,770,857,583,424,56896,26132480,26132480,1,1,1,608,000,000  
 1:41,137,541,715,166,848,113792,52264960,52264960,1,1,1,152,000,000  
 1:82,275,083,430,333,696,227584,104529920,104529920,1,1,1,304,000,000  
 1:164,550,166,860,667,392,455168,209059840,209059840,1,1,1,608,000,000  
 1:329,100,333,721,334,784,910336,418119680,418119680,1,1,1,152,000,000  
 1:658,200,667,442,668,1580,736,236239360,236239360,1,1,1,304,000,000  
 1:1,316,401,334,885,336,3160,1472,472,472,472,608,000,000  
 1:2,632,802,669,770,672,6320,2944,944,944,944,152,000,000  
 1:5,265,605,338,540,1344,11888,5888,5888,5888,304,000,000  
 1:10,531,210,677,080,2688,23776,11776,11776,11776,608,000,000  
 1:21,062,421,354,1360,4755,23552,23552,23552,23552,152,000,000  
 1:42,124,842,708,2720,9510,47104,47104,47104,47104,304,000,000  
 1:84,249,685,416,5440,19020,94208,94208,94208,94208,608,000,000  
 1:168,499,370,832,10880,38040,188416,188416,188416,188416,152,000,000  
 1:336,998,741,664,21760,76080,376832,376832,376832,376832,304,000,000  
 1:673,997,483,328,43520,152160,753664,753664,753664,753664,608,000,000  
 1:1,347,994,966,656,87040,304320,1507328,1507328,1507328,1507328,152,000,000  
 1:2,695,989,933,312,174080,608640,3014656,3014656,3014656,3014656,304,000,000  
 1:5,391,979,866,624,348160,1217280,6029312,6029312,6029312,6029312,608,000,000  
 1:10,783,959,733,248,696320,2434560,12058624,12058624,12058624,12058624,152,000,000  
 1:21,567,919,466,496,1392640,4869120,24117248,24117248,24117248,24117248,304,000,000  
 1:43,135,838,932,992,2785280,9738240,48234496,48234496,48234496,48234496,608,000,000  
 1:86,271,677,865,984,5570560,19476480,96468992,96468992,96468992,96468992,152,000,000  
 1:172,543,355,731,968,11141120,38952960,481835904,481835904,481835904,481835904,304,000,000  
 1:345,086,711,463,



Date: June 13, 2014; Survey Dates: 6-1, 2014, 6-4, 10-1, 6-7, 2014, 3-4, 2014  
 Date: May 14, 2014; Survey Dates: 5-1, 10-1, 10-2, 2014



LOCATION INDEX OF 1:63,560-SCALE MAPS



# FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

### FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Geos 01344 magnetometer with a Sintered CoS calcium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter correction), (3) leveled to true tie data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the main and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT low 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.

Alm, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, Journal of the Association of Geophysical Geographers, v. 17, no. 4, p. 581-82.

### 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 (DGGGS), and Pogo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by DGGGS in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and are downloadable for free from the DGGGS website ([www.dgggs.alaska.gov/pubs/](http://www.dgggs.alaska.gov/pubs/)). Maps are also available in paper through the DGGGS office, or are available online in the website in Adobe Acrobat PDF file format.

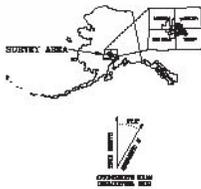
### COLOR BAR HISTOGRAM

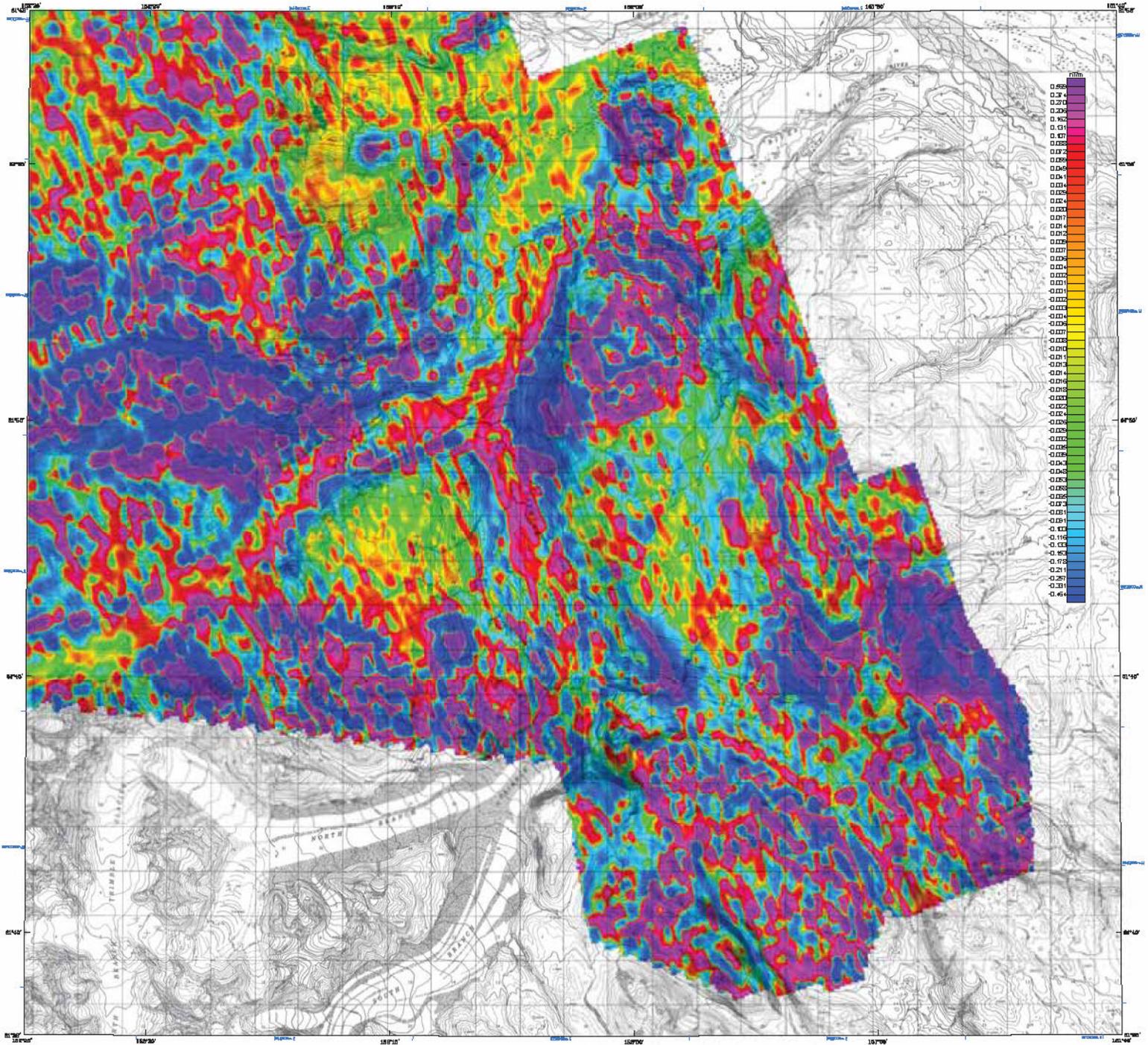
Approximately 85% of the first vertical derivative of the magnetic field for the East Styx Survey Area plotted fit within the range displayed on the color bar. Data values actually range from -12.804 nT/m (dark blue) to about 12.110 nT/m (magenta).

### DESCRIPTIVE NOTES

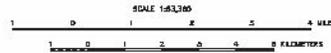
The geophysical data were acquired with a DITHEM Electromagnetic (EM) system, a Geos 01344 caesium magnetometer with a Sintered CoS calcium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/80 Hz motion and video camera. Flights were performed with an AS-300-B3 Super Helicopter at a mean terrain clearance of 500 feet along NE-SW (70°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-82L 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 0.5 m. Flight path positions were projected onto the Clarke 1882 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° 30' north coordinate of 0 and an east constant of 500,000. Positional accuracy of the processed data is better than 10 m with respect to the UTM grid.

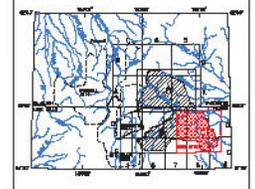




Date: June 13, 2014; Project: Survey 2014-3-3C; Scale: 1:63,360; UTM Zone: 18N; Datum: NAD 83; Projection: UTM; Units: Meters



LOCATION INDEX OF 1:63,360-SCALE MAPS



# FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

### FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a GDS 01344 magnetometer with a Sintered CoS calcium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variation by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010), updated for date of flight and altitude variations, (3) leveled to true tie data, and (4) interpolated into a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the main and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT low 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.

ALMA, H. 1976. A new method of interpolation and smooth curve fitting based on least-squares solution of the Association of Geophysical Geodesy, v. 17, no. 4, p. 588-602.

### COLOR BAR HISTOGRAM

Approximately 85% of the first vertical derivative of the magnetic field for the East Styx Survey Area plotted in which the range displayed on the color bar. Data values actually range from -12.804 nT/m (dark blue) to about 12.110 nT/m (magenta).

### DESCRIPTIVE NOTES

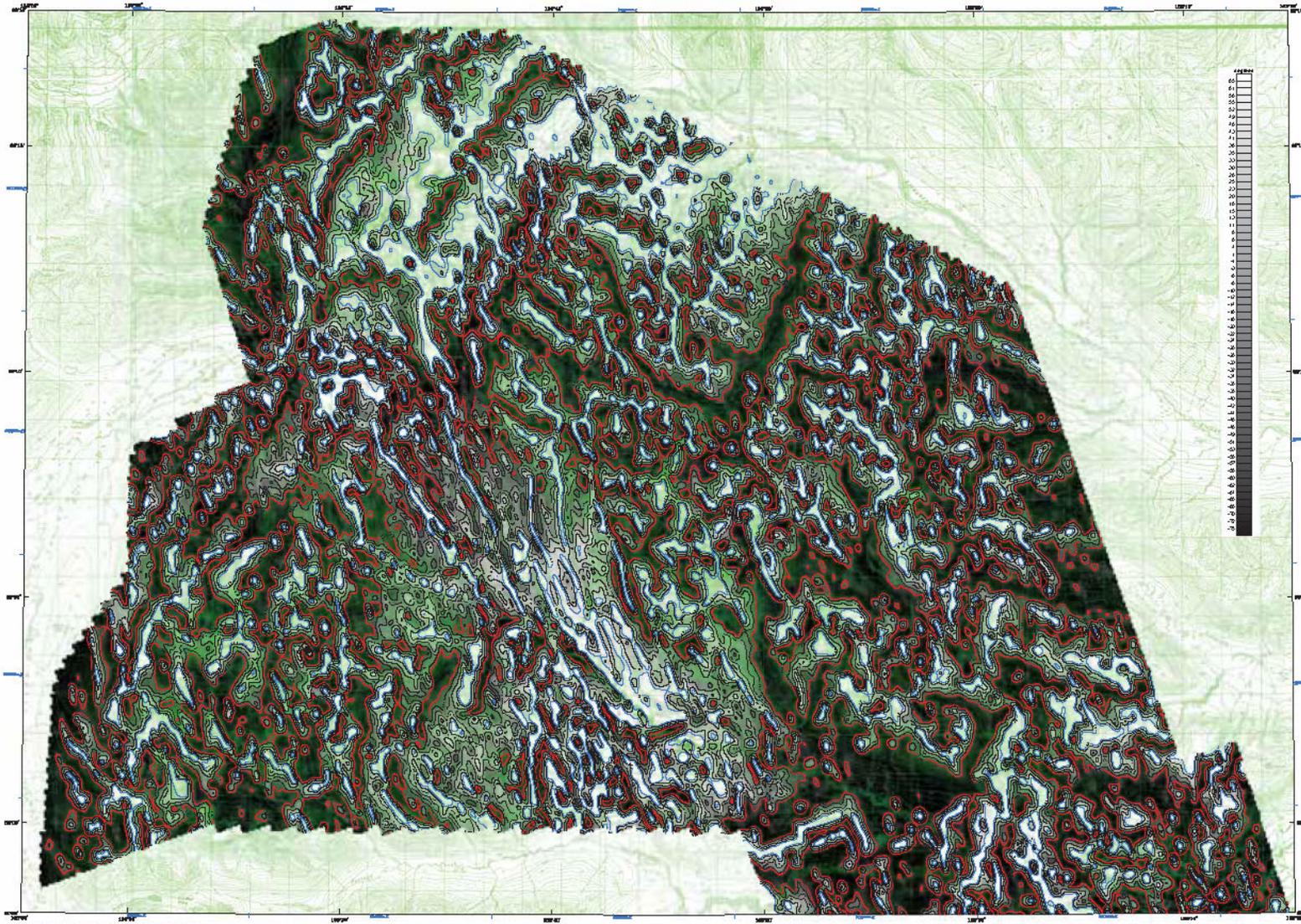
The geophysical data were acquired with a DICEHY Electromagnetic (EM) system, a GDS 01344 calcium magnetometer with a Sintered CoS calcium sensor, and a Radiation Solutions RS-300 camera-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The camera-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/80 Hz motion and video camera. Flights were performed with an AS-300-B3 Squirrel Helicopter at a mean level of 500 feet above ground level (AGL) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-82L 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 2 m. Flight path positions were projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° 30' north coordinate of 0 and an east coordinate of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

### 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 (DGGS), and Pigo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by GDS in 2013 and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Mineral Inventory Program.

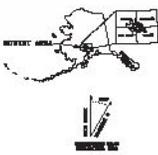
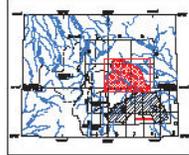
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 9085, 3304 College Road, Fairbanks, Alaska, 99709-2197, and can also be accessed for free from the DGGS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available on paper through the DGGS office, and are available online at the website in Adobe Acrobat PDF file format.



1:50,000 Scale



LOCATION MAP OF 1:50,000-SCALE MAPS



### MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, MEGORATH AND LIME HILLS QUADRANGLES

by  
Laural E. Burns, DGL, and Fagan Claiborne, Inc.  
2014

**DESCRIPTIVE NOTES**

The geophysical data were acquired with a GEOTECH Geometrics GEM 3000 system of DCI Global system magnetometer, a Scripps DCI system survey and a Realtime Solutions RT-500 geomatics magnetometer. The DCI magnetic sensor were based on a stack of DCI magnetic sensor were approximately 10 cm thick and made of 2000 turns of copper wire. The sensor were mounted on a rugged aluminum, GPS navigation system, 300 kg to rugged metal frame. Rigids were performed with an AG-201-01 Shogun Helicopter Co. magnetometer system of 100 feet, along a track of a distance of 10 miles. The data were then processed with the DCI software of the system of approximately 20 miles.

A standard 6000-001 Geotech Positioning System was used for navigation. The helicopter position was derived from DCI magnetic sensor. The DCI differential positioning on a relative accuracy of better than 2 m. Digital data collection were performed using the RT-500 geomatics magnetometer. The data were collected on a track of 10 miles and a distance of 10 miles. The data were then processed with the DCI software of the system of approximately 20 miles.

**MAGNETIC TILT DERIVATIVE**

The tilt derivative is the angle between the horizontal gradient of the total gradient, which is useful for detecting the main magnetic anomaly. The tilt derivative is the angle between the horizontal gradient of the total gradient, which is useful for detecting the main magnetic anomaly. The tilt derivative is the angle between the horizontal gradient of the total gradient, which is useful for detecting the main magnetic anomaly.

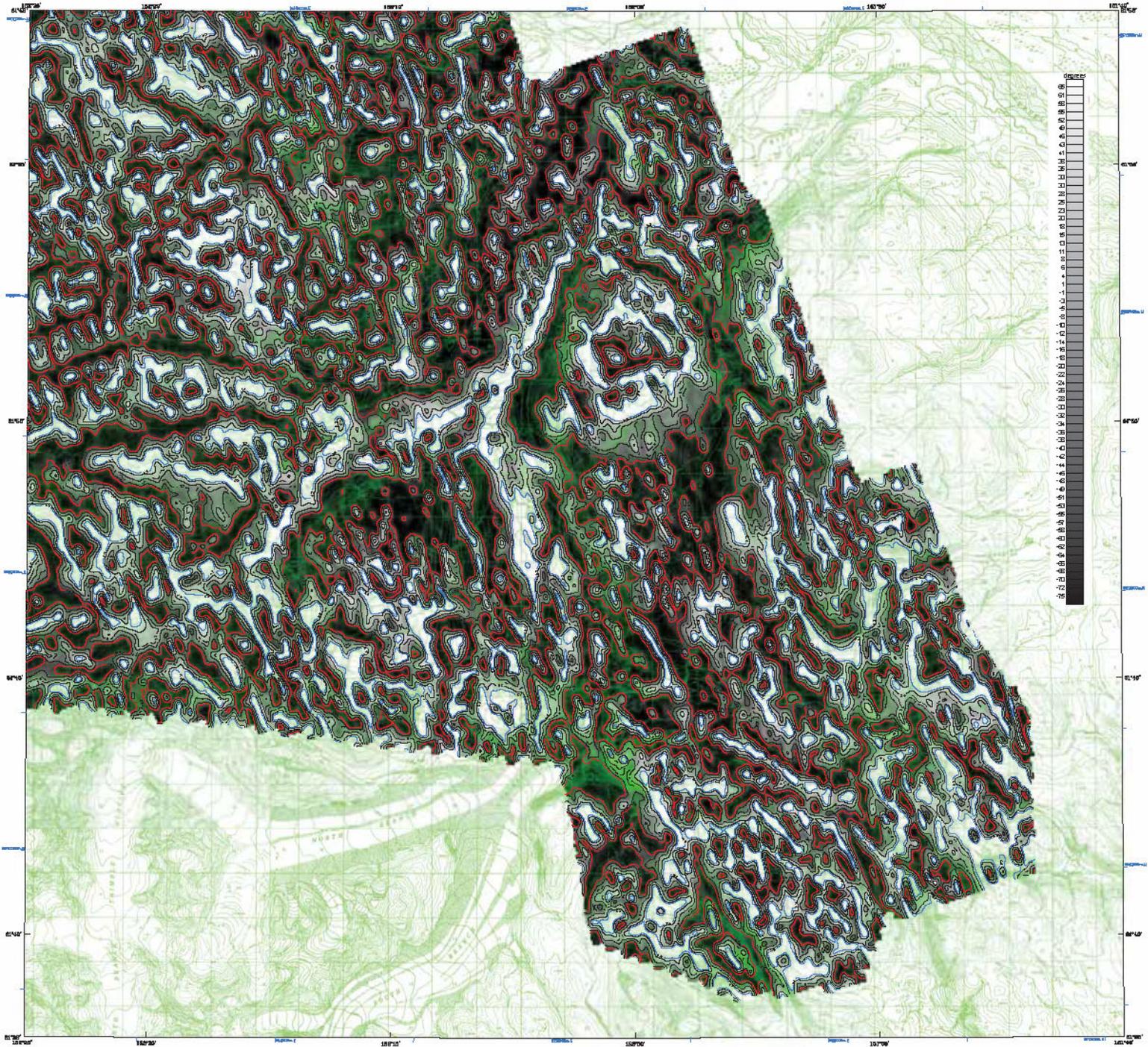
**MAGNETIC TILT DERIVATIVE CONTOURS**

.....	+44 degree
.....	+40 degree
.....	+36 degree
.....	+32 degree
.....	+28 degree
.....	+24 degree
.....	+20 degree
.....	+16 degree
.....	+12 degree
.....	+8 degree
.....	+4 degree
.....	0 degree
.....	-4 degree
.....	-8 degree
.....	-12 degree
.....	-16 degree
.....	-20 degree
.....	-24 degree
.....	-28 degree
.....	-32 degree
.....	-36 degree
.....	-40 degree
.....	-44 degree

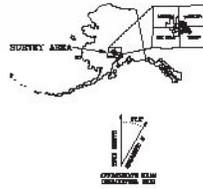
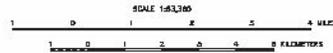
**QUALITY HISTORY**

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys, and Fagan Claiborne, Inc. All data were collected on a track of 10 miles and a distance of 10 miles. The data were then processed with the DCI software of the system of approximately 20 miles.





Date: June 13, 2014; Project Name: 2014-8-8C; UTM Zone: 18N; UTM Easting: 186750 - 187750; UTM Northing: 614250 - 615250

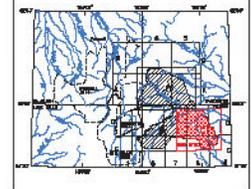


## MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Fugo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,360-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEW Electromagnetic (EM) system, a GEOTECH 01344 caesium magnetometer with a Schminke C10 caesium sensor, and a Radiation Systems RS-300 continuous-wave spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The continuous-wave spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz magnetic and video camera. Flights were performed with an AS-330-B3 Spirit helicopter at a mean terrain clearance of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L 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 2 m. Flight path navigation was projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 128° 5' north coordinate 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.

**MAGNETIC TILT DERIVATIVE**

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at or near the edge of a vertical sided source, and is negative within the source region. It has the added advantage of responding equally well to shallow and deep sources and is not as sensitive to noise that may be masked by larger responses from uncoupled sources.

**MAGNETIC TILT DERIVATIVE CONTOURS**

- ..... +10 degree
- ..... +10 degree
- ..... +10 degree
- ..... +10 degree
- ..... 0 degree
- ..... -15 degree
- ..... -30 degree
- ..... -15 degree

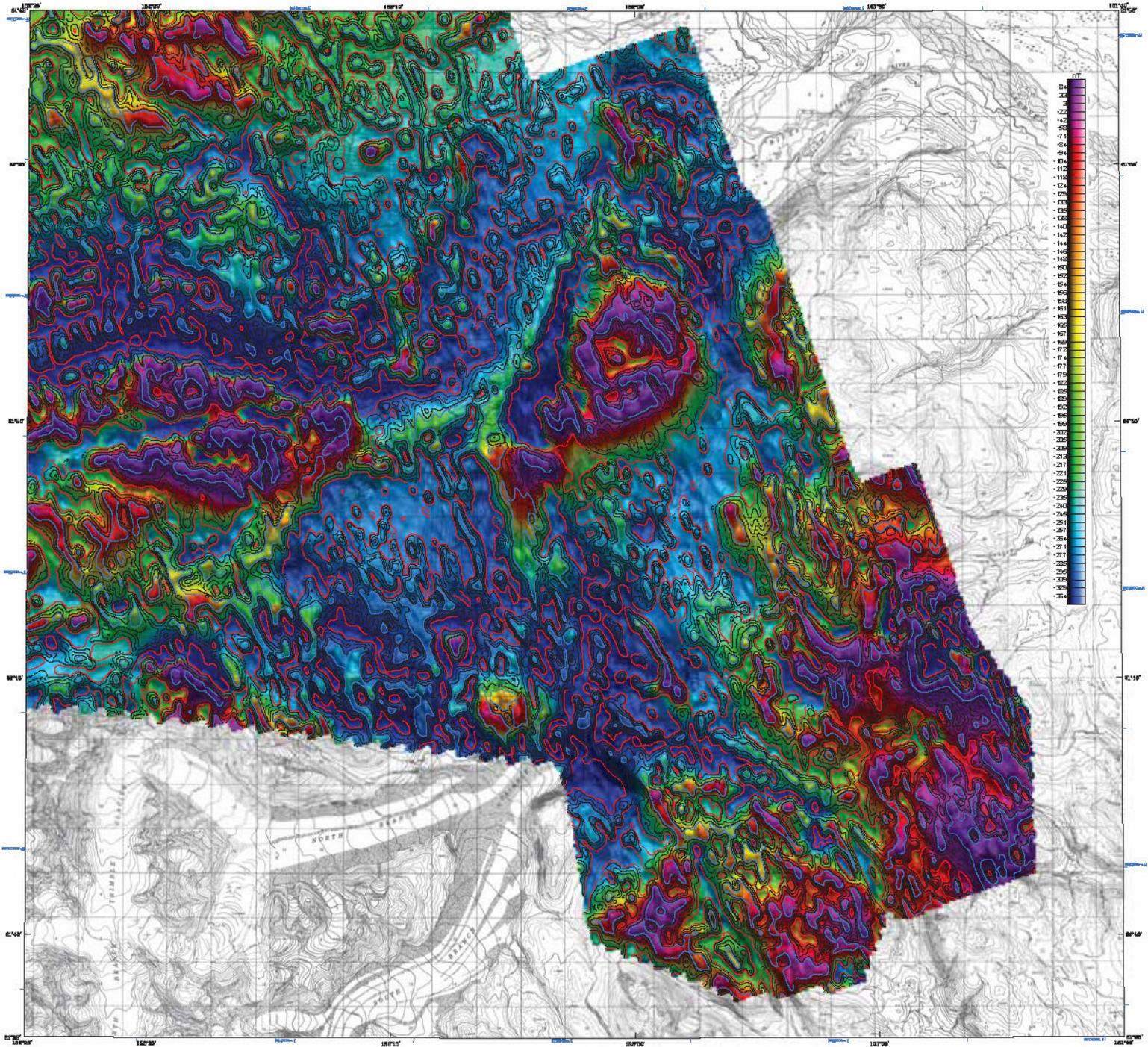
**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGPS), and Fugo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geophysical and Geological Mineral Inventory Program.

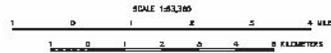
All data and maps produced to date from this survey are available in digital format on DVD for a period fee through 2016, 3304 College Road, Fairbanks, Alaska, 99708-2707, and can also be accessed for free from the DGGPS website ([www.dggps.alaska.gov/pub/](http://www.dggps.alaska.gov/pub/)). Maps are also available on paper through the DGGPS office, and are available online at the website in Adobe Acrobat PDF file format.



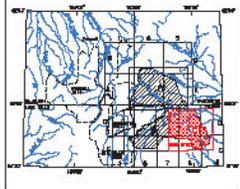




Date: June 13, 2014; Revised Survey Track #4, 2014; 0-4, 100, 4-1, 2014; 0-4, 100, 3-1, 2014; 0-4, 100, 4-1, 2014



LOCATION INDEX OF 1:63,560-SCALE MAPS



## COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

Sun Azimuth: 0 degrees; Sun Inclination: 45 degrees

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG D134 magnetometer with a Schminke C50 column sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variation by subtraction of the digitally recorded base station magnetic data, (2) NSF corrected (NSF model 2210, updated for dip of flight and gimbal rotation), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1979) technique. All grids were then reprojected from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Metz, H., 1979. 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. 586-592.

### MAGNETIC TILT DERIVATIVE

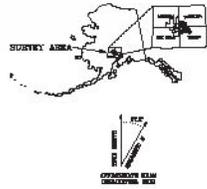
The tilt derivative is the angle between the horizontal gradient & the local vertical, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, increases through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to handle deeper sources that may be masked by larger responses from shallower sources.

### MAGNETIC TILT DERIVATIVE CONTOURS



### SURVEY HISTORY

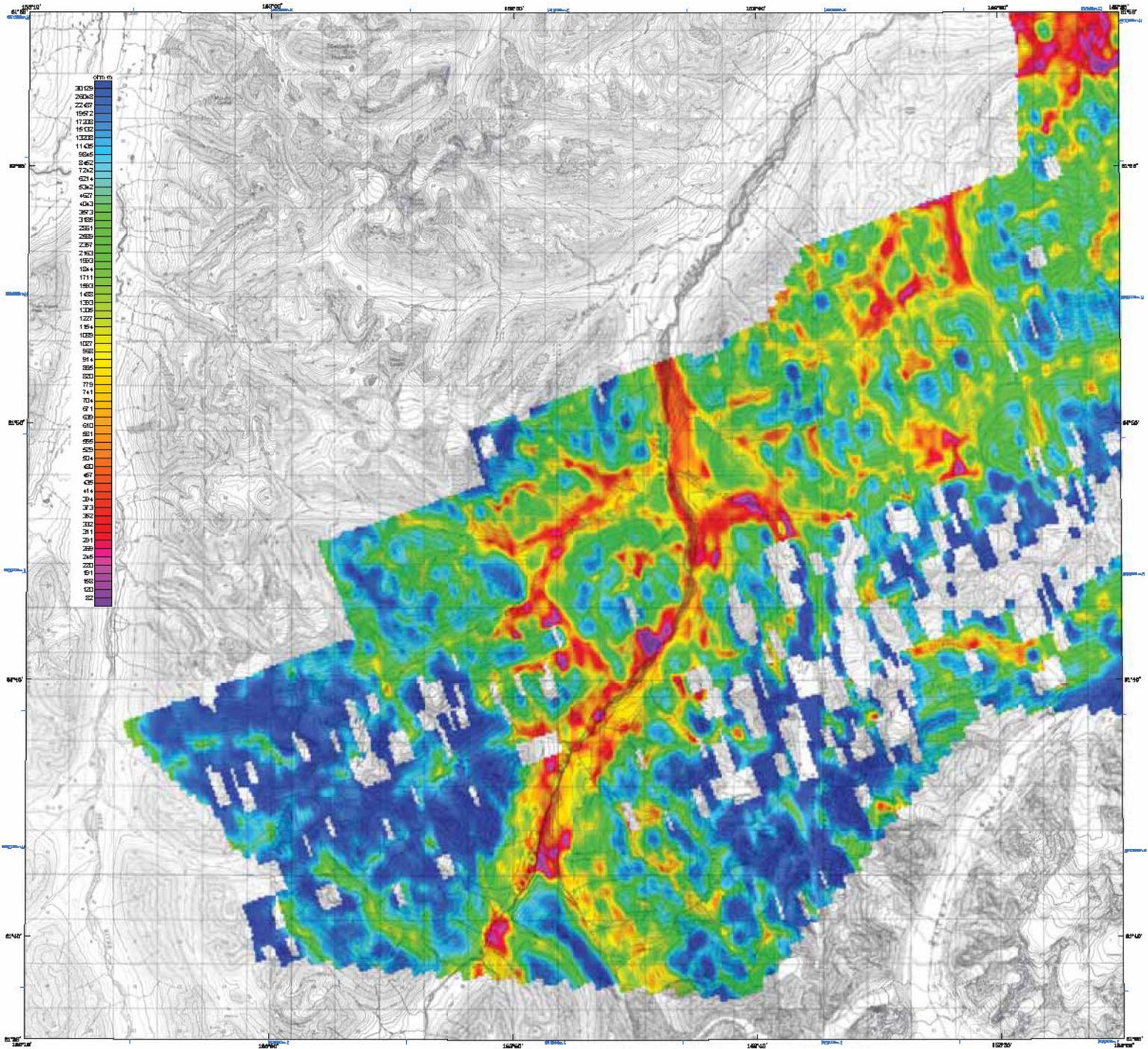
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by CGG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and an internet-based file from the DGG&G website ([www.dggs.alaska.gov/](http://www.dggs.alaska.gov/)). Maps are also available on paper through the DGG&G office, and are available online at the website in Adobe Acrobat PDF file format.



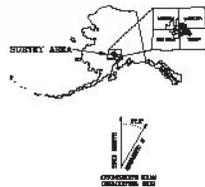
### DESCRIPTIVE NOTES

The geophysical data were acquired with a DICEHY Electromagnetic (EM) system, a CGG D1344 column magnetometer with a Schminke C50 column sensor, and a Rockwell Systems HC-300 control-roty magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The geometry was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 600/80 Hz magnetometers and video camera. Flights were performed with an AS-300-B3 Squirrel Helicopter at a mean terrain clearance of 500 feet along HC-300 survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles. A Novatel OEM4-82L 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 2 m. Flight path waypoints were projected onto the Clarke 1886 (UTM zone 5) projection, 1827 North American datum using a central meridian (CM) of 163° 30' north coordinate of 0 and an east coordinate of 500,000. Potential accuracy of the presented data is better than 10 m with respect to the UTM grid.



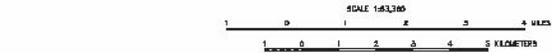


Date: June 13, 2014; Survey Dates: 6-1-13, 6-11, 6-17, 6-18, 6-19, 6-24, 6-25, 6-26, 6-27, 6-28, 6-29, 6-30, 2014  
 Date: 2014-07-17, 1:00 PM (Topographic Data)



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIGHENY Electromagnetic (EM) system, a GSI D1344 caesium magnetometer with a Bohinen G13 caesium sensor, and a Radiation Systems RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/30 Hz motion and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain elevation of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles. A Novatel OEM4-82L 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 3 m. Flight path coordinates were projected onto the Clarke 1886 (LTM zone 5) spheroid, 4827 North American datum using a central meridian (CM) of 123° a north constant of 0 and an east constant of 500000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.



**56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

**RESISTIVITY**

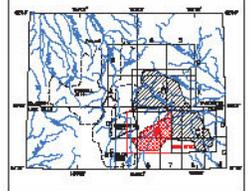
The DIGHENY EM system measured in-phase and quadrature components of the frequency. The vertical coil-collinear system operated at 1000 and 5000 Hz with three horizontal coplanar coil-pairs operated at 800, 1000 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive overburden, and cultural structures apparent resistivity is generated from the in-phase and quadrature component of the coplanar 56,000 Hz with the pseudo-layer half-wave mode. The data were reprojected onto a regular 60 m grid using a modified along (187°) technique. All grids were then reprojected from the 60 m cell size down to a 30 m cell size to produce the maps and grid grids contained in this publication.

ALASKA, 1:50,000, A new edition of interpretation and ground cover maps based on local procedures, Journal of the Association of Geophysical Technicians, v. 17, no. 4, p. 581-592.

**RESISTIVITY ALTITUDE LIMITS**

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids misinterpreting resistivity variations due to small objects where the helicopter was higher to avoid cultural objects or for safety reasons. Some areas in the grid were checked where zones of high flying corrected over more than one survey line.

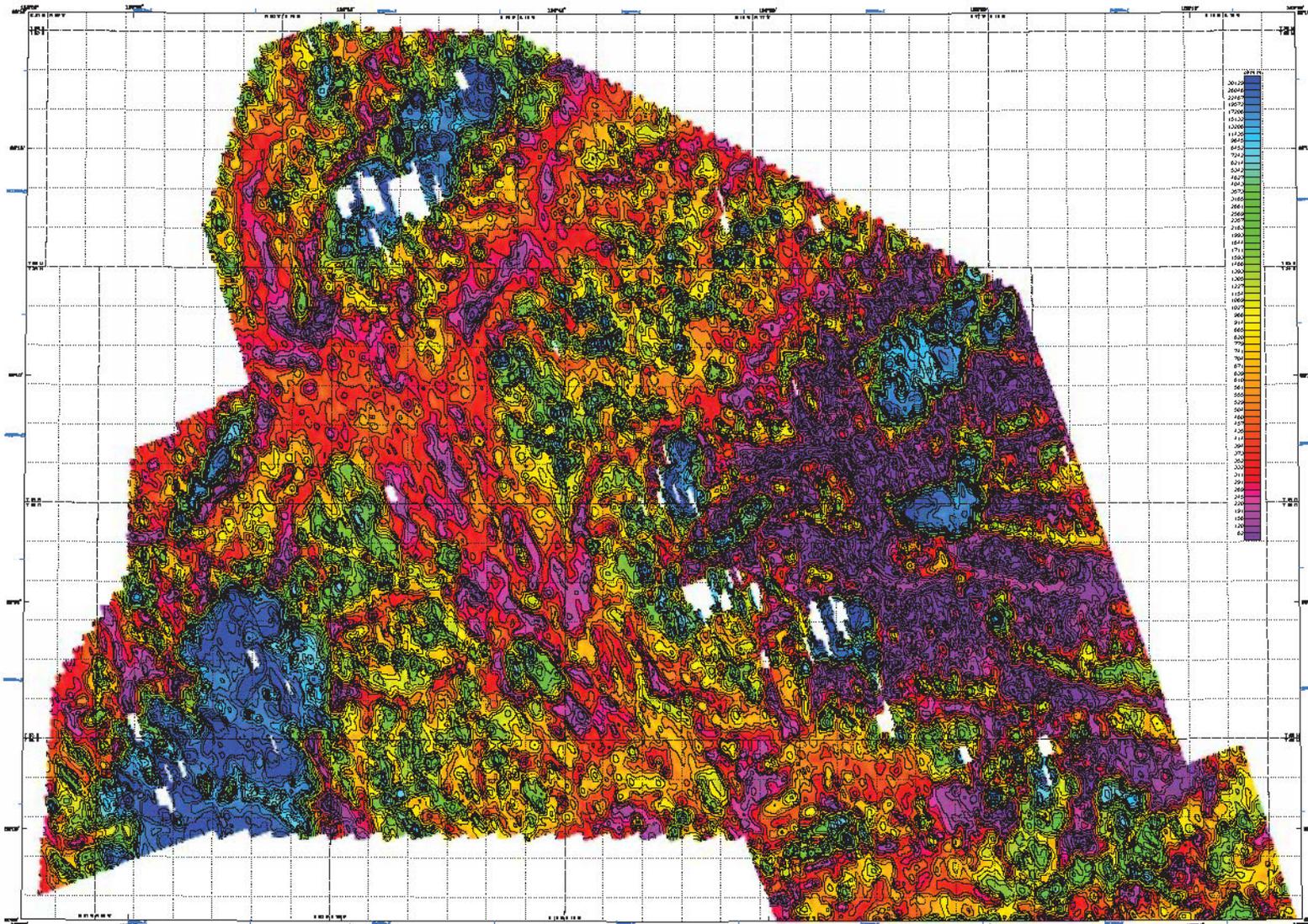
**LOCATION INDEX OF 1:63,360-SCALE MAPS**



**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 (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical (ASGGG) Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 906.633.3344 College Road, Fairbanks, Alaska, 99709-2377, and an internet access to the data from the DGGPS website ([www.dggs.alaska.gov/pogo](http://www.dggs.alaska.gov/pogo)). Maps are also available on paper through the DGGPS office, and are available online at the website in Adobe Acrobat PDF file format.





**DESCRIPTIVE NOTES**

The geophysical data were acquired with a SIRION Geosystems Ltd. system of DCI Global system magnetometer and a Sirion DCI system survey and a Sirion Solutions 900-500 geo-mag system. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second.

**RESISTIVITY**

The SIRION DCI system magnetometer and Sirion Solutions 900-500 geo-mag system were used to acquire data at a rate of 100 samples per second. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second.

**56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKIETNA, TYONEK, MCGRATH AND LIME HILLS QUADRANGLES

by  
Laural E. Burns, DORL and Fagan Geophysics, Inc.  
2014

**RESISTIVITY ALTITUDE LIMITS**

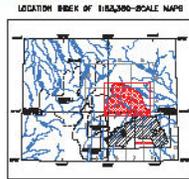
In areas where the DCI line height exceeded 100 m, the DCI data were not included. The resistivity contours were calculated using the DCI data and the resistivity contours were calculated using the DCI data.

**RESISTIVITY CONTOURS**

100
200
300
400
500
600
700
800
900
1000
1200
1500
2000
2500
3000
4000
5000
6000
7000
8000
10000
12000
15000
20000

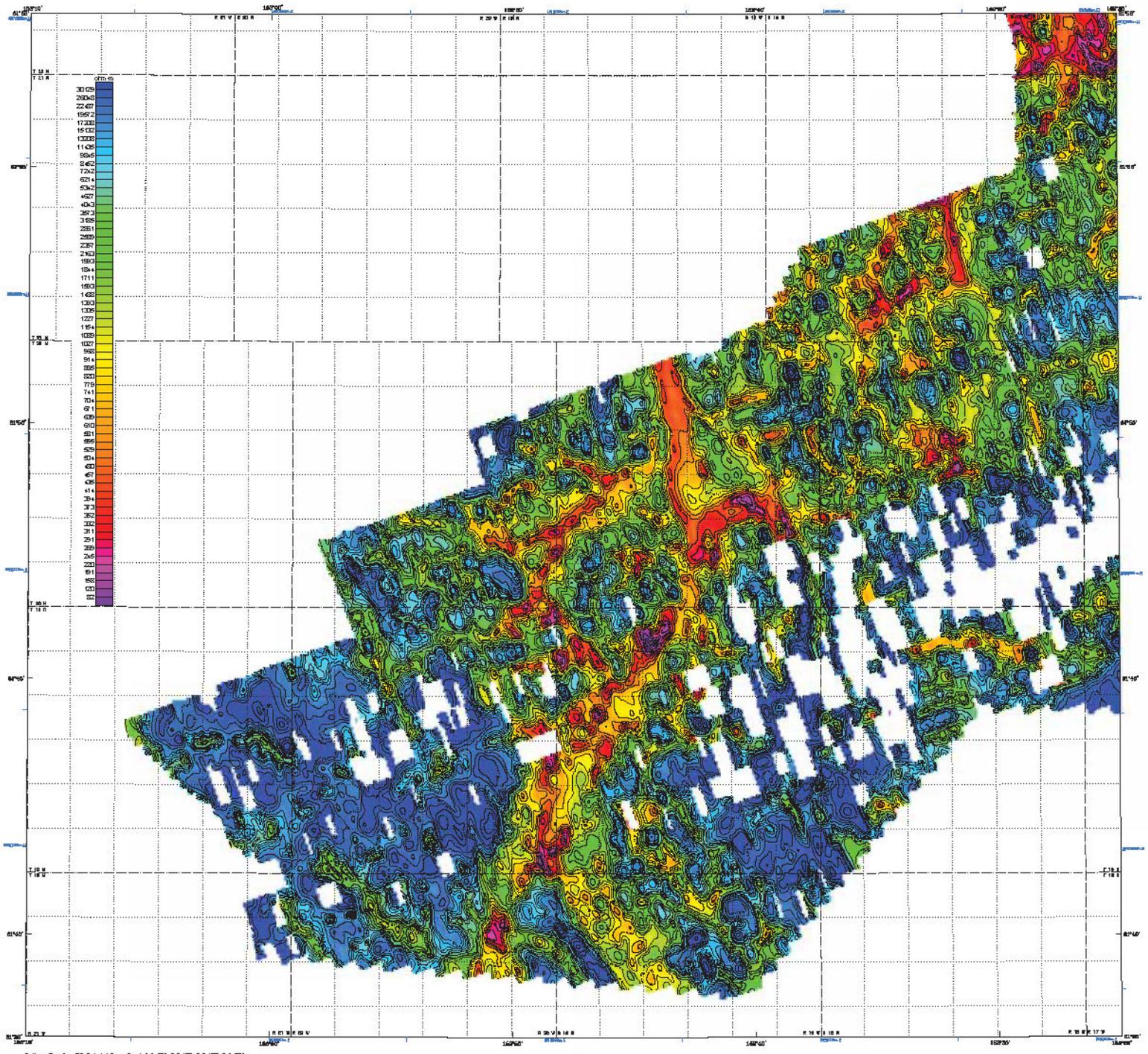
Contours in increments of 10 ohms per decade

○ ..... resistivity less



**QUALITY HISTORY**

The data were collected and processed using SIRION DCI system magnetometer and Sirion Solutions 900-500 geo-mag system. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second. The DCI system magnetometer was used to acquire data at a rate of 100 samples per second.

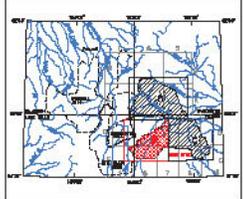


# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,360-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIXEM<sup>®</sup> Electromagnetic (EM) system, a GCS D1344 caesium magnetometer with a Bohmtec C13 caesium sensor, and a Radiation Systems RS-300 control-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz motion and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean level of 5000 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L 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 15 cm (flight path) and better than 5 cm (vertical), using the CORS 1488 (LTM zone 5) system, 1827 North American datum using a central meridian (CM) of 163° 30' north coordinate of 0 and an east coordinate of 500,000. Positional accuracy of the processed data is better than 10 m with respect to the UTM grid.

**RESISTIVITY**

The DIXEM<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. Two vertical coil-pairs separated at 1000 and 2500 Hz with three horizontal coplanar coil-pairs oriented at 90°, 70° and 50,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive structures, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpreted onto a regular 80 m grid using a modified along (187°) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

Also, H. 1270, a new method of interpretation and error correction, based on local procedures, Journal of the Association of Geophysical Surveyors, v. 17, no. 4, p. 68-81.

**RESISTIVITY ALTITUDE LIMITS**

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. The crude north-south resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying contacts are more than one survey line.

**RESISTIVITY CONTOURS**

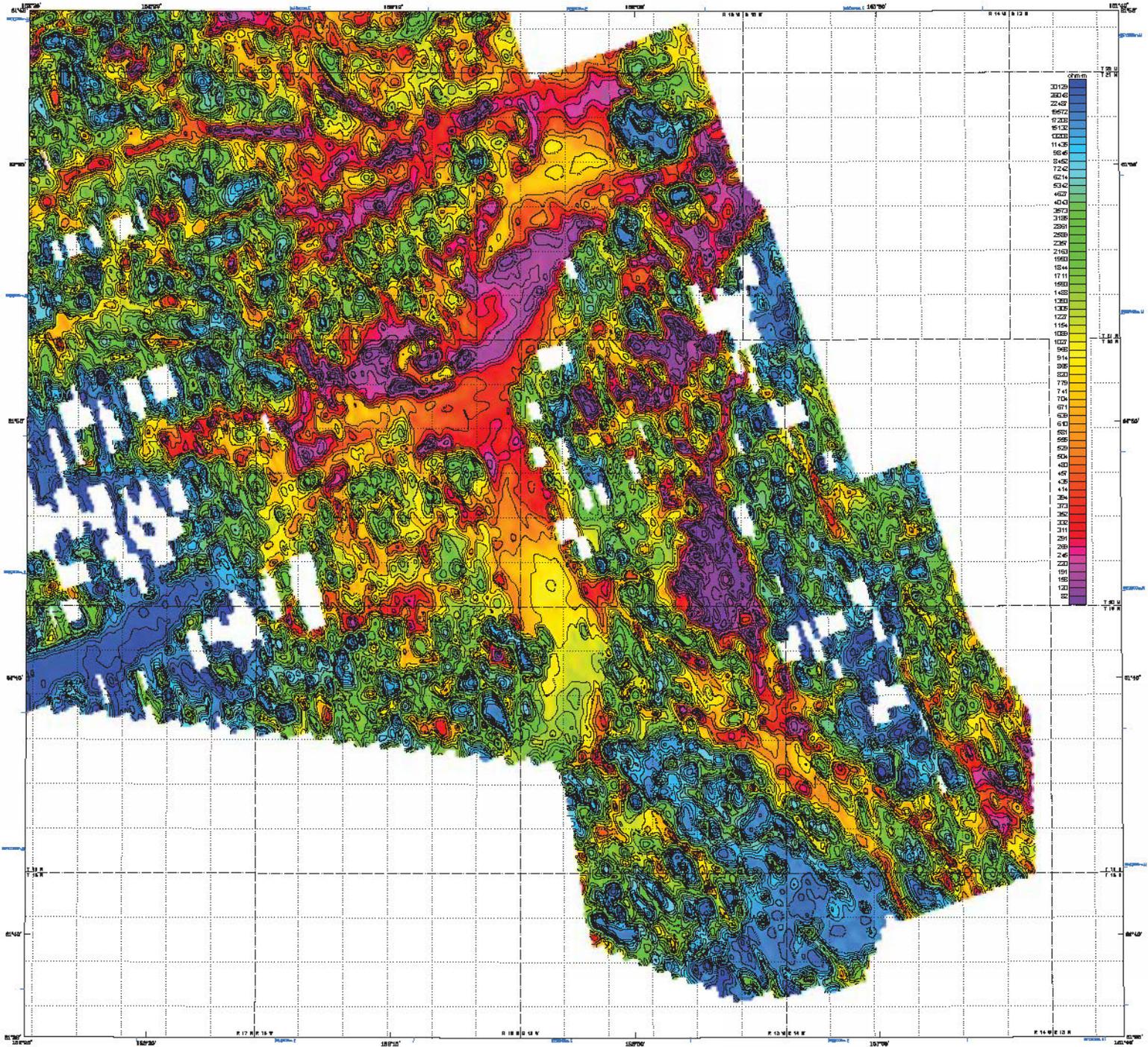
- 1000
- 800
- 600
- 400
- 200
- 100
- 50
- 20
- 10

Contours in ohm-m of 10 intervals per decade  
..... RESISTIVITY IN

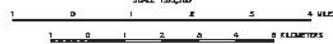
**SURVEY HISTORY**

This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geophysical and Geological (ASGG) Inventory Program.

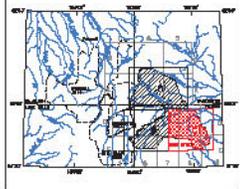
All data and maps produced to date from this survey are available in digital format on DVD for a period fee through POGS, 3304 College Road, Fairbanks, Alaska, 99709-2707, and on CD-ROMs for fee from the DGG&G website ([www.dggg.alaska.gov/pubs](http://www.dggg.alaska.gov/pubs)). Maps are also available on paper through the DGG&G office, and are available online at the website in Adobe Acrobat PDF file format.



Scale: 1:63,560. UTM Zone 18N, Datum: NAD 83, Contour Interval: 100 m. Contour Interval: 100 m. Contour Interval: 100 m.



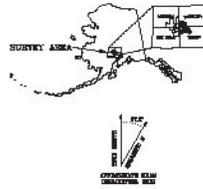
LOCATION INDEX OF 1:63,560-SCALE MAPS



# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIXIE™ Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Schminke C10 caesium sensor, and a Radiation Systems RS-300 continuous-wave spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The continuous-wave spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz real-time and video camera. Flights were performed with an AS-330-B3 Spirit Helicopter at a mean level of 5000 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The three meter flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using GPS sensors using post-flight differential positioning to a relative accuracy of better than 5 m. Flight paths and positions were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° 3' north coordinate of 0 and an east constant of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

**RESISTIVITY**

The DIXIE™ EM system measured in-phase and quadrature components of the frequency. Two vertical coil-coupled loops sampled at 1000 and 5000 Hz with three horizontal coplanar coil-pairs oriented at 90°, 70° and 50,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock geodesics, conductive structures, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpreted onto a regular 80 m grid using a modified along (180°) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

Also, in 1976, a new method of interpretation and cross-correlation, based on local geodesics, Journal of the Association of Geophysical Geophysicists, v. 17, no. 4, p. 680-615.

**RESISTIVITY ALTITUDE LIMITS**

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. The altitude normalizing resistivity calculations due to areas where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying contacts are more than one survey line.

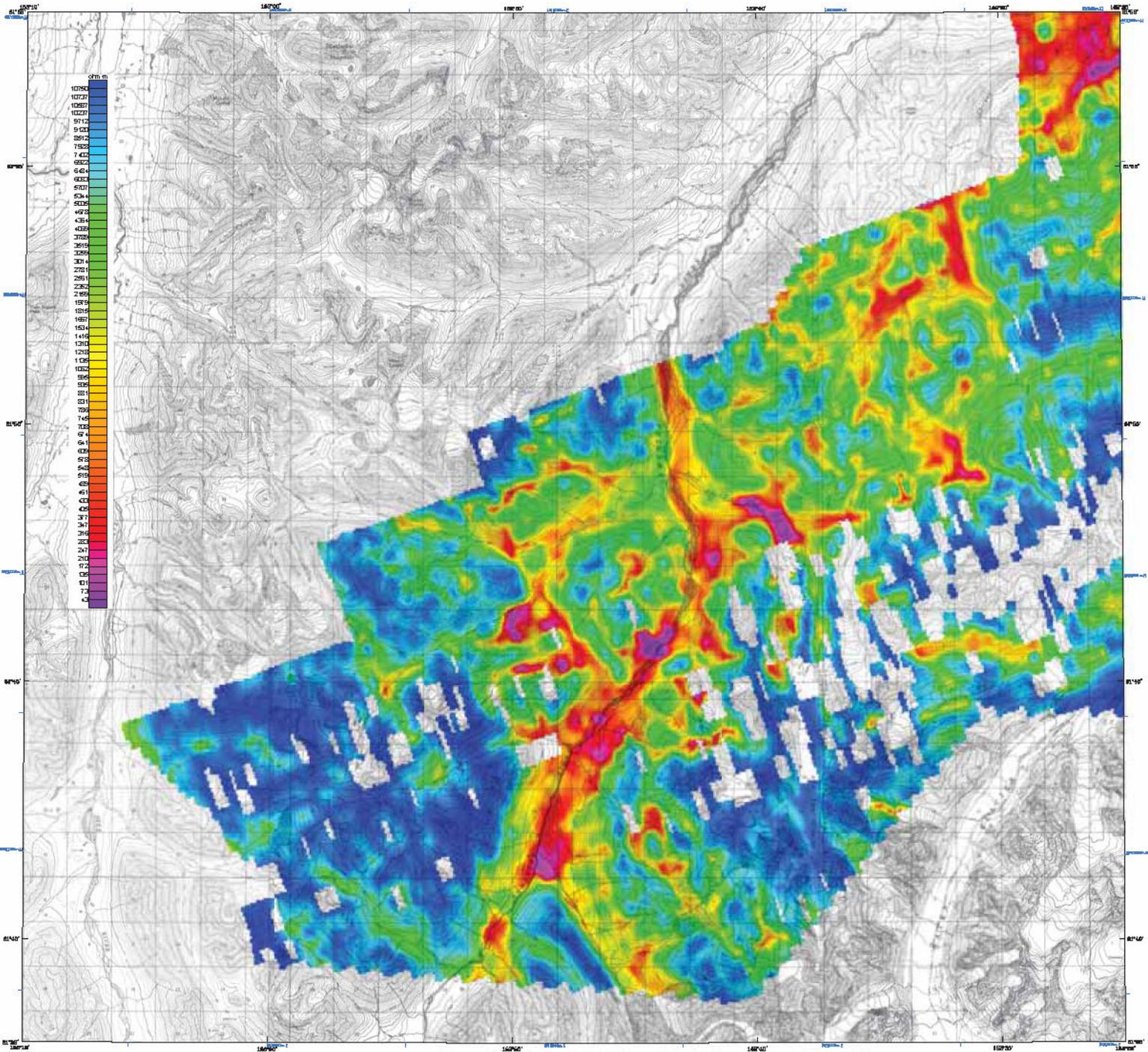


**SURVEY HISTORY**

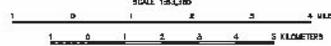
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by DGG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Lands as part of the Hope-Ustun Geological and Geological Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2015, 3304 College Road, Fairbanks, Alaska, 99708-2707, and are downloadable for free from the DGG&G website ([www.dgg.alaska.gov/pogo](http://www.dgg.alaska.gov/pogo)). Maps are also available on paper through the DGG&G and are available online at the website in Adobe Acrobat PDF file format.





Date: June 13, 2014; Survey Dates: 6-1, 2014, 6-4, 10, 6-7, 8, 9, 2014  
 Date: 2014-05-10; 1:50,000; UTM; North-pole datum

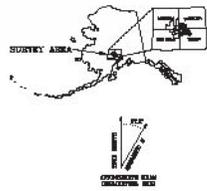
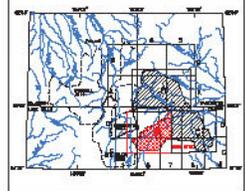


## 7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

LOCATION INDEX OF 1:63,560—SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIGHEV<sup>®</sup> Electromagnetic (EM) system, a GEI D1344 caesium magnetometer with a Bohrium C13 caesium sensor, and a Radiation Systems RS-300 control-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The control-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/80 Hz motion and video camera, flight logs performed with an AS-350-B3 Spirit Helicopter at a mean level of 500 feet along the NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-82L 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 3 m. Flight path coordinates were projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 163° a north constant of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**RESISTIVITY**

The DIGHEV<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. The vertical coplanar coil-pole operated at 1000 and 5000 Hz with three horizontal coplanar coil-pole operated at 800, 1000 and 64,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive overburden, and cultural features apparent resistivity is generated from the in-phase and quadrature component of the coplanar EM data. The data were sampled with a regular 80 m grid using a modified along (187°) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and grid grids contained in this publication.

ALASKA, 1:50,000, A new edition of interpretation and ground cover maps based on local procedures, edited by the Association of Geophysical Technicians, v. 17, no. 4, p. 581-592.

**RESISTIVITY ALTITUDE LIMITS**

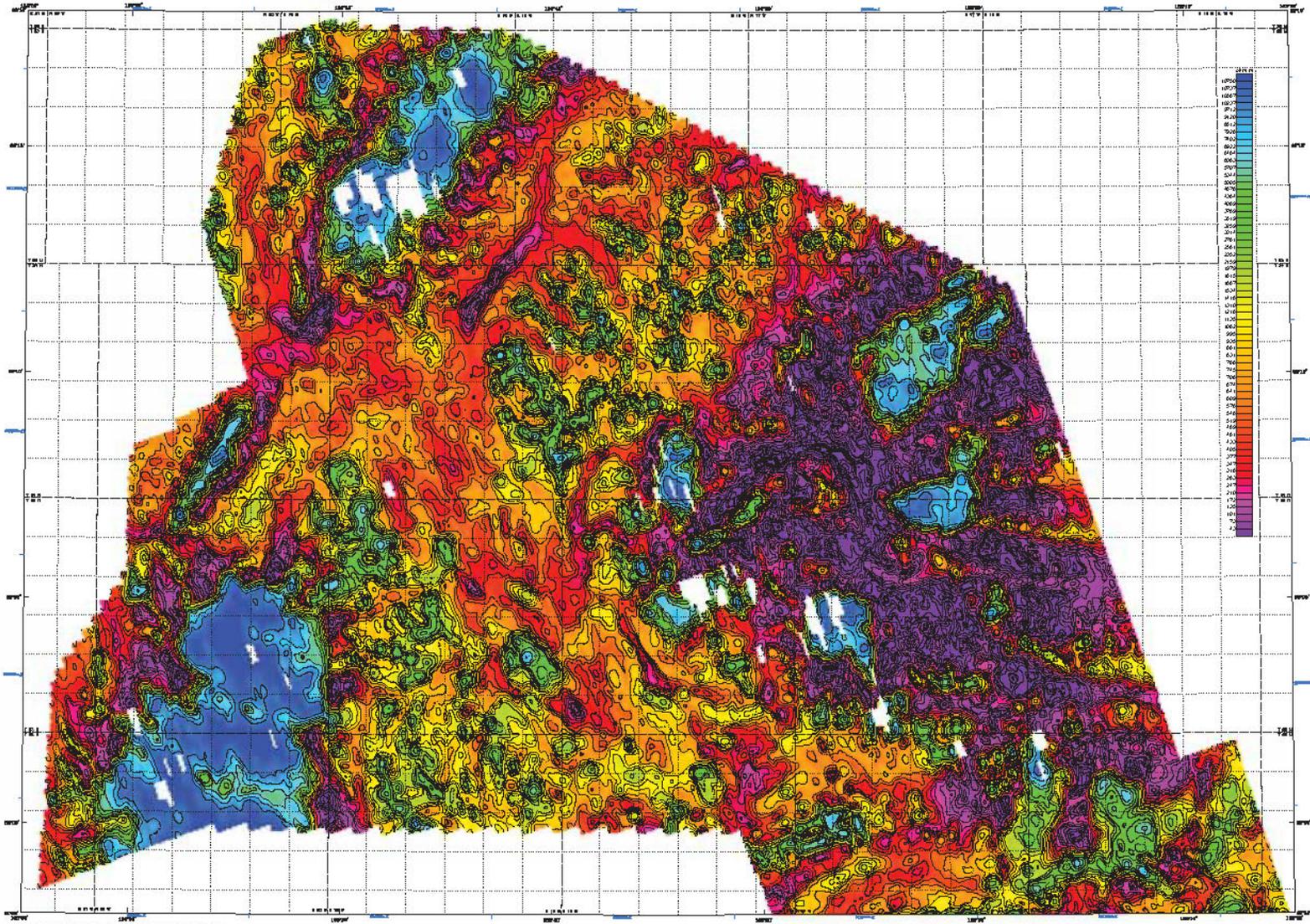
In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids misinterpreting resistivity variations due to small altitude where the helicopter was higher to avoid cultural objects or for safety reasons. Some areas in the grid were checked where zones of high flying corrected over more than one survey line.

**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 (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 9085, 3354 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable free from the DGG&G website ([www.dggg.alaska.gov/pogo](http://www.dggg.alaska.gov/pogo)). Maps are also available on paper through the DGG&G office, on a variable scale of the scale in Adobe Acrobat PDF file format.





**DESCRIPTIVE NOTES**

The geophysical data were acquired with a GEOTECH Developmental (GD) version of the GDS 3200 system and a Resonance Technology RT-300 geophone array. The GDS 3200 system was operated in a mode of 1000 Hz and 1000 samples per second. The RT-300 geophone array was operated in a mode of 1000 Hz and 1000 samples per second. The data were collected in a 1000 Hz mode and were processed with the GDS 3200 system. The data were processed with the GDS 3200 system and were plotted on a resistivity map. The map shows resistivity contours and data points. The map is color-coded by resistivity values, with a legend on the right side ranging from 20 to 10500. The map includes a grid of latitude and longitude coordinates and a scale bar at the bottom center.

**RESISTIVITY**

The GDS 3200 system measured resistivity and resistivity components of the impedance. The vertical axis is resistivity in ohm-meters. The horizontal axis is resistivity in ohm-meters. The data were collected in a 1000 Hz mode and were processed with the GDS 3200 system. The data were processed with the GDS 3200 system and were plotted on a resistivity map. The map shows resistivity contours and data points. The map is color-coded by resistivity values, with a legend on the right side ranging from 20 to 10500. The map includes a grid of latitude and longitude coordinates and a scale bar at the bottom center.

**7200 Hz COPLANAR APPARENT RESISTIVITY  
WITH DATA CONTOURS,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKIETNA, TYONEK, MCGRATH AND LIME HILLS QUADRANGLES

by  
Laural E. Burns, DOG, and Fagan Christensen, Inc.  
2014

**RESISTIVITY ALTITUDE LIMITS**

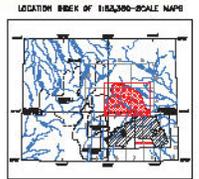
In areas where the GDS 3200 system was not used, resistivity contours are shown in gray. The resistivity contours are shown in gray in areas where the GDS 3200 system was not used. The resistivity contours are shown in gray in areas where the GDS 3200 system was not used. The resistivity contours are shown in gray in areas where the GDS 3200 system was not used.

**RESISTIVITY CONTOURS**

100
200
300
400
500
600
700
800
900
1000
1200
1500
2000
3000
4000
5000
6000
7000
8000
9000
10000
10500

Contours in meters at 10 intervals per decade

..... resistivity less

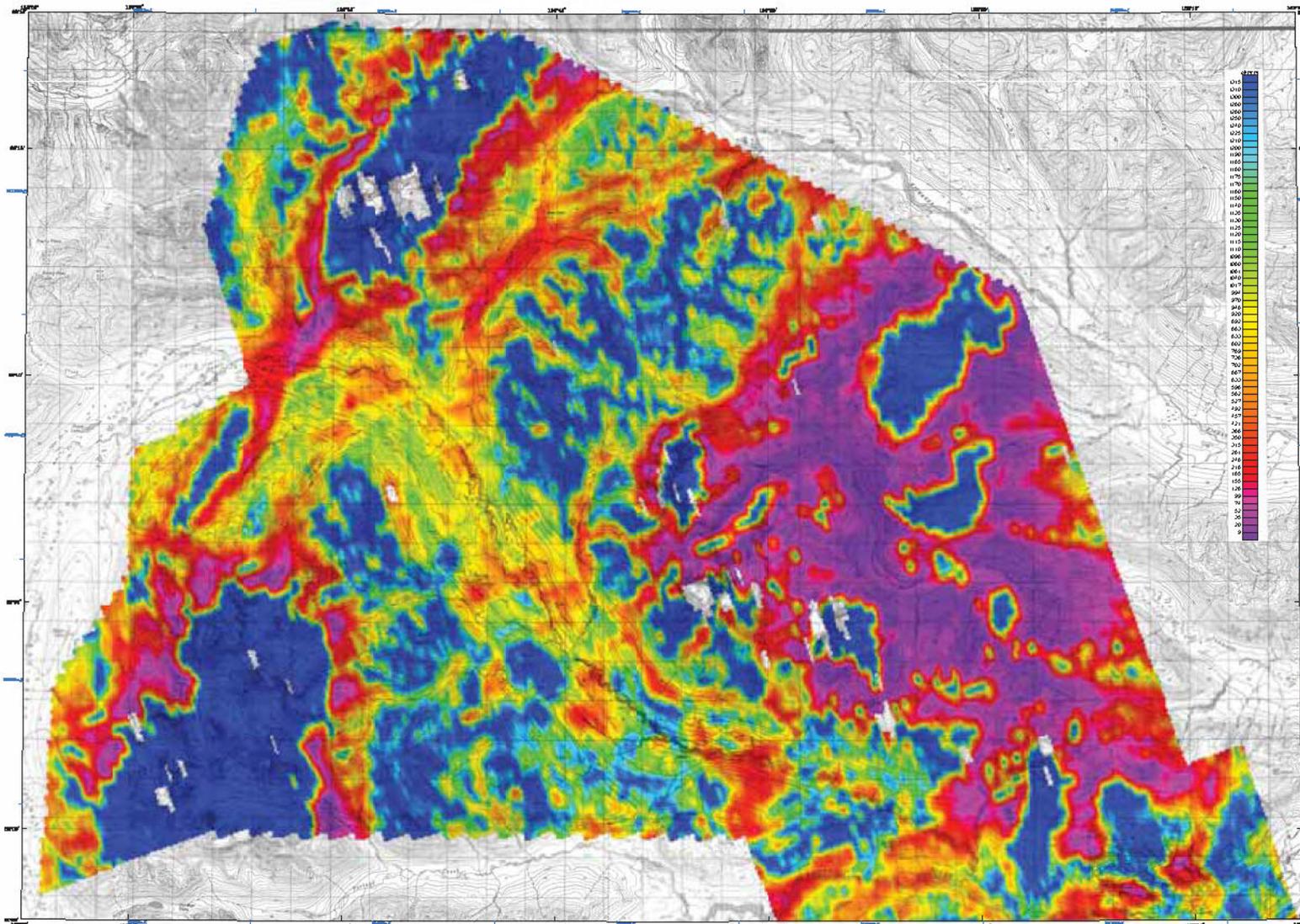


**SURVEY HISTORY**

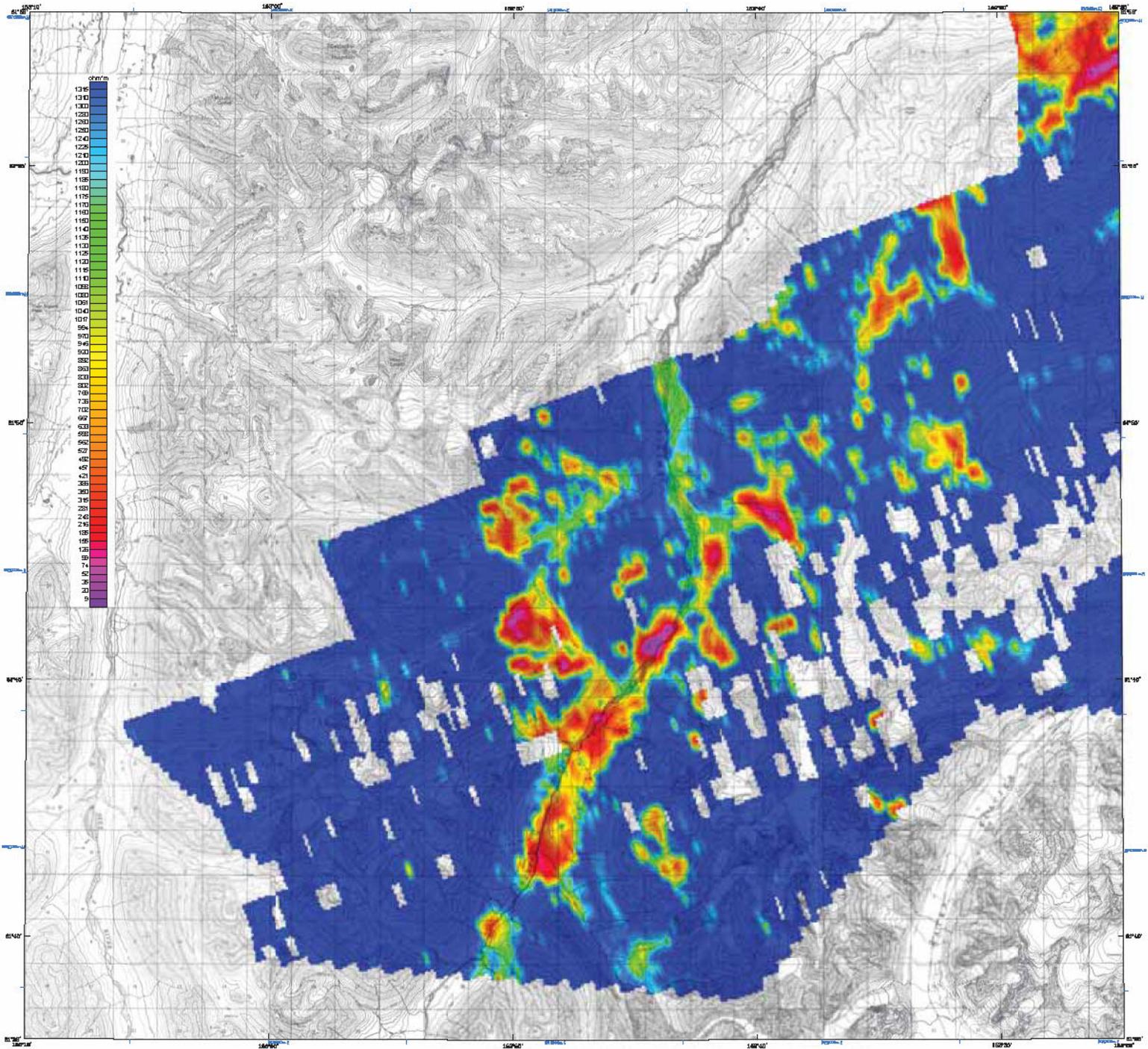
The area has been mapped and shown as a contact between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), and Fagan Christensen, Inc. All rights are reserved to the State of Alaska. The data were collected in a 1000 Hz mode and were processed with the GDS 3200 system. The data were processed with the GDS 3200 system and were plotted on a resistivity map. The map shows resistivity contours and data points. The map is color-coded by resistivity values, with a legend on the right side ranging from 20 to 10500. The map includes a grid of latitude and longitude coordinates and a scale bar at the bottom center.







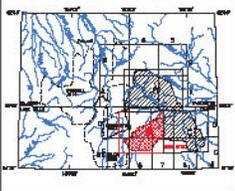
1:250,000  
 1:500,000  
 1:1,000,000  
 1:2,000,000  
 1:4,000,000  
 1:8,000,000  
 1:16,000,000  
 1:32,000,000  
 1:64,000,000  
 1:128,000,000  
 1:256,000,000  
 1:512,000,000  
 1:1,024,000,000  
 1:2,048,000,000  
 1:4,096,000,000  
 1:8,192,000,000  
 1:16,384,000,000  
 1:32,768,000,000  
 1:65,536,000,000  
 1:131,072,000,000  
 1:262,144,000,000  
 1:524,288,000,000  
 1:1,048,576,000,000  
 1:2,097,152,000,000  
 1:4,194,304,000,000  
 1:8,388,608,000,000  
 1:16,777,216,000,000  
 1:33,554,432,000,000  
 1:67,108,864,000,000  
 1:134,217,728,000,000  
 1:268,435,456,000,000  
 1:536,870,912,000,000  
 1:1,073,741,824,000,000  
 1:2,147,483,648,000,000  
 1:4,294,967,296,000,000  
 1:8,589,934,592,000,000  
 1:17,179,869,184,000,000  
 1:34,359,738,368,000,000  
 1:68,719,476,736,000,000  
 1:137,438,953,472,000,000  
 1:274,877,906,944,000,000  
 1:549,755,813,888,000,000  
 1:1,099,511,627,776,000,000  
 1:2,199,023,255,552,000,000  
 1:4,398,046,511,104,000,000  
 1:8,796,093,022,208,000,000  
 1:17,592,186,444,416,000,000  
 1:35,184,372,888,832,000,000  
 1:70,368,745,777,664,000,000  
 1:140,737,491,555,328,000,000  
 1:281,474,983,110,656,000,000  
 1:562,949,966,221,312,000,000  
 1:1,125,899,932,442,624,000,000  
 1:2,251,799,864,885,248,000,000  
 1:4,503,599,729,770,496,000,000  
 1:9,007,199,459,540,992,000,000  
 1:18,014,398,919,081,984,000,000  
 1:36,028,797,838,163,968,000,000  
 1:72,057,595,676,327,936,000,000  
 1:144,115,191,352,655,872,000,000  
 1:288,230,382,705,311,744,000,000  
 1:576,460,765,410,623,488,000,000  
 1:1,152,921,530,821,246,976,000,000  
 1:2,305,843,061,642,493,952,000,000  
 1:4,611,686,123,284,987,904,000,000  
 1:9,223,372,246,569,975,808,000,000  
 1:18,446,744,493,139,951,616,000,000  
 1:36,893,488,986,279,903,232,000,000  
 1:73,786,977,972,559,806,464,000,000  
 1:147,573,955,951,119,612,928,000,000  
 1:295,147,911,902,239,225,856,000,000  
 1:590,295,823,804,478,451,712,000,000  
 1:1,180,591,647,608,956,903,424,000,000  
 1:2,361,183,295,217,913,806,848,000,000  
 1:4,722,366,590,435,827,613,696,000,000  
 1:9,444,733,180,871,655,227,392,000,000  
 1:18,889,466,361,743,310,454,784,000,000  
 1:37,778,932,723,486,620,909,568,000,000  
 1:75,557,865,446,973,241,819,136,000,000  
 1:151,115,730,893,946,483,638,272,000,000  
 1:302,231,461,787,892,967,276,544,000,000  
 1:604,462,923,575,785,934,553,088,000,000  
 1:1,208,925,847,151,571,869,106,116,000,000  
 1:2,417,851,694,303,143,738,212,232,000,000  
 1:4,835,703,388,606,287,476,424,464,000,000  
 1:9,671,406,777,212,574,952,848,928,000,000  
 1:19,342,813,554,425,149,957,697,856,000,000  
 1:38,685,627,108,850,299,915,395,712,000,000  
 1:77,371,254,217,701,799,830,791,424,000,000  
 1:154,742,508,435,403,599,661,582,848,000,000  
 1:309,485,016,870,807,199,323,165,696,000,000  
 1:618,970,033,741,614,398,646,331,392,000,000  
 1:1,237,940,067,483,228,797,292,662,784,000,000  
 1:2,475,880,134,966,457,594,585,325,568,000,000  
 1:4,951,760,269,932,915,189,170,651,136,000,000  
 1:9,903,520,539,865,830,378,340,302,272,000,000  
 1:19,807,041,079,731,660,756,680,604,544,000,000  
 1:39,614,082,159,463,321,513,361,209,088,000,000  
 1:79,228,164,318,926,643,026,722,418,176,000,000  
 1:158,456,328,637,853,286,053,444,836,352,000,000  
 1:316,912,657,275,706,572,106,888,872,704,000,000  
 1:633,825,314,551,413,144,213,737,745,408,000,000  
 1:1,267,650,629,102,826,288,427,467,490,816,000,000  
 1:2,535,301,258,205,652,576,854,934,981,632,000,000  
 1:5,070,602,516,411,305,153,709,869,963,264,000,000  
 1:10,141,205,032,822,610,307,419,739,926,528,000,000  
 1:20,282,410,065,645,220,614,838,879,853,056,000,000  
 1:40,564,820,131,290,441,229,677,759,716,112,000,000  
 1:81,129,640,262,580,882,459,355,519,432,224,000,000  
 1:162,259,284,525,161,764,918,711,038,864,448,000,000  
 1:324,518,569,050,323,529,837,422,077,696,896,000,000  
 1:649,037,138,100,647,059,674,844,155,393,792,000,000  
 1:1,298,074,276,201,294,119,349,368,688,787,587,584,000,000  
 1:2,596,148,552,402,588,238,698,737,377,375,175,168,000,000  
 1:5,192,297,104,805,176,477,397,474,754,750,350,336,000,000  
 1:10,384,594,209,611,352,954,794,949,509,500,670,672,000,000  
 1:20,769,188,419,222,705,909,589,899,019,001,341,344,000,000  
 1:41,538,376,838,445,411,819,179,798,038,002,682,688,000,000  
 1:83,076,753,676,890,823,638,359,597,076,005,365,376,000,000  
 1:166,153,507,353,781,647,276,719,194,152,010,730,752,000,000  
 1:332,307,014,707,563,294,553,438,388,304,021,461,504,000,000  
 1:664,614,029,415,126,589,106,876,776,608,922,922,000,000  
 1:1,329,228,058,830,253,178,213,737,553,217,845,844,000,000  
 1:2,658,456,117,660,506,356,426,467,106,435,691,688,000,000  
 1:5,316,912,235,321,012,712,852,934,212,871,377,376,000,000  
 1:10,633,824,470,642,025,425,705,765,425,754,752,000,000  
 1:21,267,648,941,284,050,851,411,531,151,150,350,400,000,000  
 1:42,535,297,882,568,101,702,282,262,302,300,700,800,000,000  
 1:85,070,595,765,136,203,404,564,604,604,600,140,160,000,000  
 1:170,141,191,530,272,406,809,109,120,919,200,280,320,000,000  
 1:340,282,383,060,544,813,618,218,218,200,560,560,640,000,000  
 1:680,564,766,120,108,837,236,436,436,400,112,112,128,000,000  
 1:1,361,129,532,240,217,674,472,872,872,800,224,224,256,000,000  
 1:2,722,259,064,480,435,348,945,745,745,600,448,448,512,000,000  
 1:5,444,518,128,960,870,697,891,491,491,200,896,896,1,024,000,000  
 1:10,889,036,257,921,741,383,782,982,982,400,1,792,1,792,2,048,000,000  
 1:21,778,072,515,843,482,767,565,965,965,800,3,584,3,584,4,096,000,000  
 1:43,556,145,031,686,965,531,131,931,931,600,7,168,7,168,8,192,000,000  
 1:87,112,290,063,373,931,062,263,863,863,200,14,336,14,336,16,384,000,000  
 1:174,224,580,126,747,862,126,527,727,727,400,28,672,28,672,32,768,000,000  
 1:348,449,163,493,495,734,254,254,254,800,57,344,57,344,65,536,000,000  
 1:696,898,326,986,991,468,508,508,508,1600,114,688,114,688,171,072,000,000  
 1:1,393,796,653,973,983,936,1016,1016,1016,3200,229,376,229,376,342,144,000,000  
 1:2,787,593,307,947,967,872,2032,2032,2032,6400,458,752,458,752,684,288,000,000  
 1:5,575,186,615,895,935,744,4064,4064,4064,12800,917,504,917,504,1368,576,000,000  
 1:11,150,373,231,791,871,488,8128,8128,8128,25600,1835,1008,1835,1008,2737,1536,000,000  
 1:22,300,746,463,583,743,976,16256,16256,16256,51200,3670,2016,3670,2016,5474,3072,000,000  
 1:44,601,492,927,166,747,952,32512,32512,32512,102400,7340,4032,7340,4032,10948,6144,000,000  
 1:89,202,985,854,333,495,904,65024,65024,65024,204800,14680,8064,14680,8064,21896,12288,000,000  
 1:178,405,971,708,666,991,800,130048,130048,130048,409600,29360,16128,29360,16128,43792,24576,000,000  
 1:356,811,943,417,333,983,600,260096,260096,260096,819200,58720,32256,58720,32256,87584,49152,000,000  
 1:713,623,886,834,666,967,200,520192,520192,520192,1638400,117440,64512,117440,64512,175168,98304,000,000  
 1:1,427,247,773,669,333,934,400,1,040,384,1,040,384,3,276,800,234,880,129,024,258,168,000,000  
 1:2,854,495,547,338,666,868,800,2,080,768,2,080,768,6,553,600,469,760,258,168,516,336,000,000  
 1:5,708,991,094,677,333,737,600,4,161,536,4,161,536,13,107,200,939,520,516,336,1,032,672,000,000  
 1:11,417,982,189,354,666,475,200,8,323,072,8,323,072,26,214,400,1,879,040,1,032,672,2,065,344,000,000  
 1:22,835,964,378,709,333,237,600,16,646,144,16,646,144,52,428,800,3,758,080,1,032,672,4,130,688,000,000  
 1:45,671,928,757,418,666,118,800,33,292,288,33,292,288,104,857,600,7,516,160,1,032,672,8,261,376,000,000  
 1:91,343,857,514,837,333,59,400,66,584,571,66,584,571,209,715,200,15,032,320,1,032,672,16,522,752,000,000  
 1:182,687,715,029,674,666,29,700,133,168,1143,133,168,1143,419,430,400,30,064,640,1,032,672,33,045,504,000,000  
 1:365,375,430,059,349,333,14,850,266,327,228,133,168,1143,838,860,800,60,128,1280,1,032,672,66,091,008,000,000  
 1:730,750,860,118,698,666,7,425,133,654,456,133,168,1143,1,677,720,1600,120,256,2560,1,032,672,132,182,016,000,000  
 1:1,461,501,720,237,397,333,3,712,133,1308,912,133,168,1143,3,355,440,3200,240,512,5120,1,032,672,264,364,032,000,000  
 1:2,923,003,440,474,794,666,1,856,133,661,824,133,168,1143,6,710,880,6400,480,1024,10240,1,032,672,528,728,064,000,000  
 1:5,846,006,880,949,589,333,928,133,1323,648,133,168,1143,13,421,760,12800,960,2048,20480,1,032,672,1,056,145,612,000,000  
 1:11,692,013,761,899,178,666,464,133,661,824,133,168,1143,26,843,520,25600,1,920,4096,40960,1,032,672,2,112,291,224,000,000  
 1:23,384,027,523,798,357,333,232,133,1323,648,133,168,1143,53,687,040,51200,3,840,8192,81920,1,032,672,4,224,582,448,000,000  
 1:46,768,055,047,597,714,666,116,133,661,824,133,168,1143,107,374,080,102400,7,680,16384,163840,1,032,672,8,448,1164,896,000,000  
 1:93,536,110,095,195,439,333,58,133,1323,648,133,168,1143,214,748,160,204800,15,360,32768,327680,1,032,672,16,896,2329,792,000,000  
 1:187,072,220,390,390,878,678,666,29,133,661,824,133,168,1143,429,496,320,409600,30,720,65536,655360,1,032,672,33,792,4659,584,000,000  
 1:374,144,440,780,781,757,357,133,1323,648,133,168,1143,858,992,640,819200,61,440,131072,1310720,1,032,672,67,584,9319,168,000,000  
 1:748,288,881,561,563,514,714,666,429,133,661,824,133,168,1143,1,717,984,1280,1,638,400,2,621,440,33,177,336,000,000  
 1:1,496,577,763,122,326,029,439,333,214,133,1323,648,133,168,1143,3,435,968,2560,2,476,800,5,242,880,66,354,672,000,000  
 1:2,993,155,526,244,652,058,878,666,107,133,661,824,133,168,1143,6,871,936,5120,4,953,600,10,485,760,132,709,344,000,000  
 1:5,986,311,052,489,304,175,714,666,54,133,1323,648,133,168,1143,13,743,872,10240,9,907,200,20,971,520,265,418,688,000,000  
 1:11,972,622,104,978,608,351,439,333,27,133,661,824,133,168,1143,27,487,744,20480,19,814,400,41,943,040,530,837,376,000,000  
 1:23,945,244,209,957,215,878,666,13,666,133,1323,648,133,168,1143,54,975,488,40960,39,628,800,83,886,080,1,061,674,752,000,000  
 1:47,890,488,419,914,431,757,357,666,6,666,133,1323,648,133,168,1143,109,950,976,81920,79,256,167,772,1,123,349,504,000,000  
 1:95,780,976,839,828,863,514,714,666,3,333,133,661,824,133,168,1143,219,901,952,163840,158,512,335,544,2,246,699,008,000,000  
 1:191,561,953,679,657,727,029,439,333,1,666,133,1323,648,133,168,1143,439,803,904,327680,317,024,671,088,4,493,398,016,000,000  
 1:383,123,907,359,315,454,058,878,666,833,133,661,824,133,168,1143,879,607,808,655360,634,048,1,342,176,8,986,796,032,000,000  
 1:766,247,814,718,630,908,175,714,666,416,133,1323,648,133,168,1143,1,759,215,611,311,1,342,176,17,973,592,064,000,000  
 1:1,532,495,629,437,261,816,351,439,333,208,133,661,824,133,168,1143,3,518,430,1,222,622,2,684,784,35,947,184,000,000  
 1:3,064,991,258,874,523,632,878,666,104,133,1323,648,133,168,1143,7,036,860,2,445,244,5,369,568,71,894,368,000,000  
 1:6,129,982,517,749,046,125,714,666,52,133,661,824,133,168,1143,14,073,720,4,890,488,10,739,136,143,789,736,000,000  
 1:12,259,965,035,498,092,251,439,333,26,133,1323,648,133,168,1143,28,147,440,9,781,976,21,478,272,287,579,472,000,000  
 1:24,519,930,070,996,182,514,714,666,13,133,661,824,133,168,1143,56,294,880,19,563,952,42,956,544,575,158,944,000,000  
 1:49,039,860,141,992,365,029,439,666,6,666,133,1323,648,133,168,1143,112,589,760,39,127,904,85,913,088,1,150,317,888,000,000  
 1:98,079,720,283,984,730,058,878,133,333,133,661,824,133,168,1143,225,179,520,78,255,808,171,827,177,600,000,000  
 1:196,159,440,567,968,461,017,714,666,66,666,133,1323,648,133,168,1143,450,359,040,156,511,616,343,655,408,000,000  
 1:392,318,880,1135,936,922,034,439,333,33,333,133,661,824,133,168,1143,900,718,080,313,023,232,687,316,816,000,000  
 1:784,637,760,2271,873,844,068,878,666,166,666,133,1323,648,133,168,1143,1,801,436,162,646,426,1,374,633,684,633,600,000,000  
 1:1,569,275,520,4543,747,688,171,714,666,83,333,133,661,824,133,168,1143,3,602,872,325,292,852,2,749,266,1,374,63



Date: June 13, 2014; Survey Dates: 6-1, 2014, 6-4, 10-1, 6-7, 2014, 6-8, 2014, 6-9, 2014, 6-10, 2014, 6-11, 2014, 6-12, 2014, 6-13, 2014, 6-14, 2014, 6-15, 2014, 6-16, 2014, 6-17, 2014, 6-18, 2014, 6-19, 2014, 6-20, 2014, 6-21, 2014, 6-22, 2014, 6-23, 2014, 6-24, 2014, 6-25, 2014, 6-26, 2014, 6-27, 2014, 6-28, 2014, 6-29, 2014, 6-30, 2014, 7-1, 2014, 7-2, 2014, 7-3, 2014, 7-4, 2014, 7-5, 2014, 7-6, 2014, 7-7, 2014, 7-8, 2014, 7-9, 2014, 7-10, 2014, 7-11, 2014, 7-12, 2014, 7-13, 2014, 7-14, 2014, 7-15, 2014, 7-16, 2014, 7-17, 2014, 7-18, 2014, 7-19, 2014, 7-20, 2014, 7-21, 2014, 7-22, 2014, 7-23, 2014, 7-24, 2014, 7-25, 2014, 7-26, 2014, 7-27, 2014, 7-28, 2014, 7-29, 2014, 7-30, 2014, 7-31, 2014, 8-1, 2014, 8-2, 2014, 8-3, 2014, 8-4, 2014, 8-5, 2014, 8-6, 2014, 8-7, 2014, 8-8, 2014, 8-9, 2014, 8-10, 2014, 8-11, 2014, 8-12, 2014, 8-13, 2014, 8-14, 2014, 8-15, 2014, 8-16, 2014, 8-17, 2014, 8-18, 2014, 8-19, 2014, 8-20, 2014, 8-21, 2014, 8-22, 2014, 8-23, 2014, 8-24, 2014, 8-25, 2014, 8-26, 2014, 8-27, 2014, 8-28, 2014, 8-29, 2014, 8-30, 2014, 8-31, 2014, 9-1, 2014, 9-2, 2014, 9-3, 2014, 9-4, 2014, 9-5, 2014, 9-6, 2014, 9-7, 2014, 9-8, 2014, 9-9, 2014, 9-10, 2014, 9-11, 2014, 9-12, 2014, 9-13, 2014, 9-14, 2014, 9-15, 2014, 9-16, 2014, 9-17, 2014, 9-18, 2014, 9-19, 2014, 9-20, 2014, 9-21, 2014, 9-22, 2014, 9-23, 2014, 9-24, 2014, 9-25, 2014, 9-26, 2014, 9-27, 2014, 9-28, 2014, 9-29, 2014, 9-30, 2014, 10-1, 2014, 10-2, 2014, 10-3, 2014, 10-4, 2014, 10-5, 2014, 10-6, 2014, 10-7, 2014, 10-8, 2014, 10-9, 2014, 10-10, 2014, 10-11, 2014, 10-12, 2014, 10-13, 2014, 10-14, 2014, 10-15, 2014, 10-16, 2014, 10-17, 2014, 10-18, 2014, 10-19, 2014, 10-20, 2014, 10-21, 2014, 10-22, 2014, 10-23, 2014, 10-24, 2014, 10-25, 2014, 10-26, 2014, 10-27, 2014, 10-28, 2014, 10-29, 2014, 10-30, 2014, 10-31, 2014, 11-1, 2014, 11-2, 2014, 11-3, 2014, 11-4, 2014, 11-5, 2014, 11-6, 2014, 11-7, 2014, 11-8, 2014, 11-9, 2014, 11-10, 2014, 11-11, 2014, 11-12, 2014, 11-13, 2014, 11-14, 2014, 11-15, 2014, 11-16, 2014, 11-17, 2014, 11-18, 2014, 11-19, 2014, 11-20, 2014, 11-21, 2014, 11-22, 2014, 11-23, 2014, 11-24, 2014, 11-25, 2014, 11-26, 2014, 11-27, 2014, 11-28, 2014, 11-29, 2014, 11-30, 2014, 12-1, 2014, 12-2, 2014, 12-3, 2014, 12-4, 2014, 12-5, 2014, 12-6, 2014, 12-7, 2014, 12-8, 2014, 12-9, 2014, 12-10, 2014, 12-11, 2014, 12-12, 2014, 12-13, 2014, 12-14, 2014, 12-15, 2014, 12-16, 2014, 12-17, 2014, 12-18, 2014, 12-19, 2014, 12-20, 2014, 12-21, 2014, 12-22, 2014, 12-23, 2014, 12-24, 2014, 12-25, 2014, 12-26, 2014, 12-27, 2014, 12-28, 2014, 12-29, 2014, 12-30, 2014, 12-31, 2014.

SCALE 1:63,360  
0 1 2 3 4 5 MILES  
0 1 2 3 4 5 KILOMETERS

LOCATION INDEX OF 1:63,360-SCALE MAPS



# 900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

### RESISTIVITY

The DIGHEV<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. The vertical coplanar coil-pair operated at 9000 and 5000 Hz with three horizontal coplanar coil-pair operated at 900, 7000 and 64000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive overburden, and cultural sources apparent resistivity is generated from the in-phase and quadrature component of the coplanar 5000 Hz with the pseudo-layer half space model. The data were interpreted with a regular 60 m grid using a modified along (180°) technique. All grids were then reprojected from the 60 m cell size down to a 20 m cell size to produce the maps and grid grids contained in this publication.

ALASKA, 1:125,000, A new edition of interpretation and ground cover maps based on local procedures, Journal of the Association of Geophysical Technicians, v. 17, no. 4, p. 581-592.

### RESISTIVITY ALTITUDE LIMITS

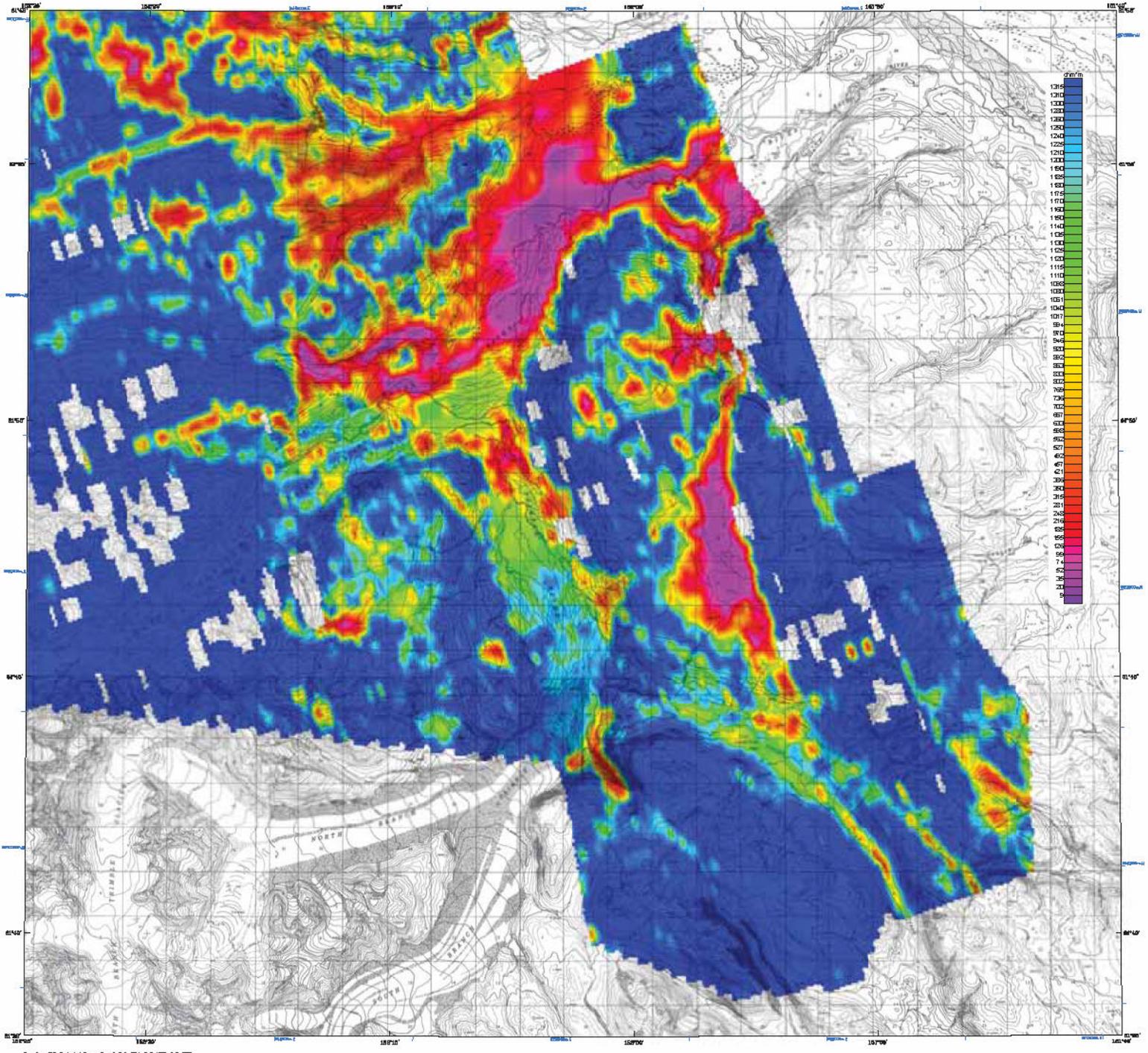
In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids misinterpreting resistivity variations due to small objects where the helicopter was higher to avoid cultural objects or for safety reasons. Some areas in the grid were checked where zones of high flying corrected over more than one survey line.

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEV<sup>®</sup> Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Bohemia GSI caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 200/80 Hz motion and video camera, flight logs performed with an AS-350-B3 Squirrel helicopter at a mean level of 500 feet along the NE-SW (71°) survey flight lines with a spacing of 0.5 quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles. A Novatel OEM4-82L 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 3 m. Flight path positions were projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° a north coordinate of 0 and an east coordinate of 500000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

### 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 (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2377, and an internet access fee from the DGGPS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available on paper through the DGGPS office, on one variable width of the media in Adobe Acrobat PDF file format.

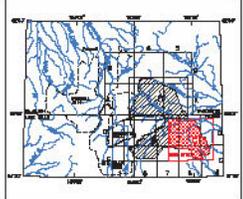


**900 Hz COPLANAR APPARENT RESISTIVITY  
WITH TOPOGRAPHY,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,360—SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIGHEV<sup>®</sup> Electromagnetic (EM) system consisting of a GEOTECH<sup>®</sup> magnetometer with a Schriber C10 cesium sensor, and a Radiation Solutions RS-300 continuous-wave spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The spectrometer spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz real-time and video camera, flight logs performed with an AS-350-B3 Spirit Helicopter at a mean level of 500 feet along the NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was defined every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 2 m. Flight path waypoints were projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 125°3' north-south of 0 and an east constant of 500,000. Potential accuracy of the presented data is better than 10 m with respect to the UTM grid.

**RESISTIVITY**

The DIGHEV<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. The vertical coplanar coil-pole oriented at 1000 and 5000 Hz with three horizontal coplanar coil-pole oriented at 900, 7000 and 50,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive overburden, and cultural sources; apparent resistivity is generated from the in-phase and quadrature component of the system. SA000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 60 m grid using a modified along (1870) technique. All grids were then reprojected from the 80 m cell size down to a 20 m cell size to produce the maps and grid grids contained in this publication.

ALASKA, 1:125,000, A new edition of interpretation and a new cover being based on local procedures, edited by the Association of Geophysical Technicians, v. 17, n. 4, p. 580-590.

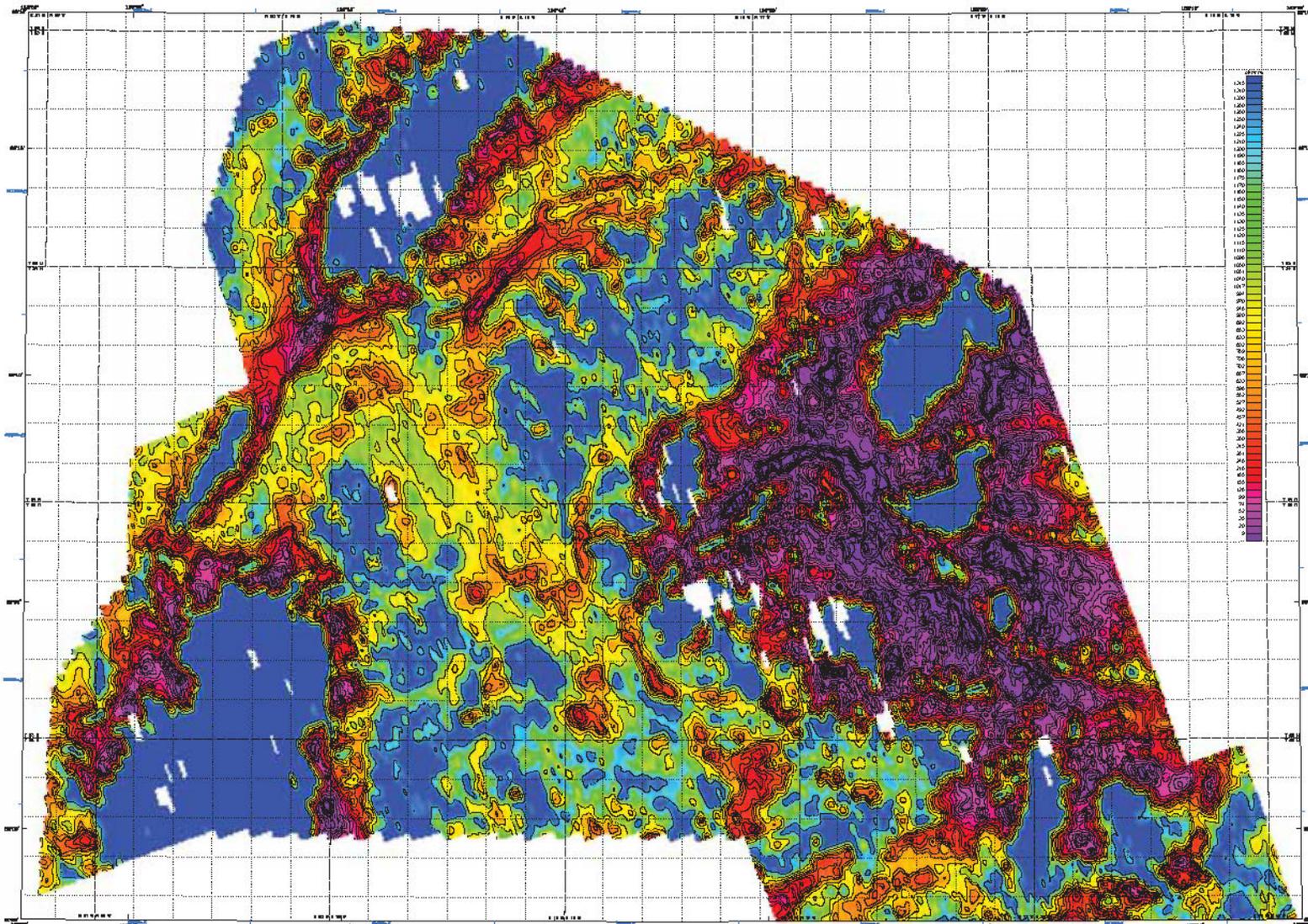
**RESISTIVITY ALTITUDE LIMITS**

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids meaningless resistivity extrapolations due to small slopes where the helicopter flew higher to avoid cultural objects or for safety reasons. Some areas in the grid were checked where zones of high flying corrected over more than one survey line.

**SURVEY HISTORY**

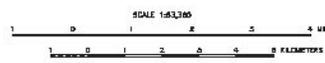
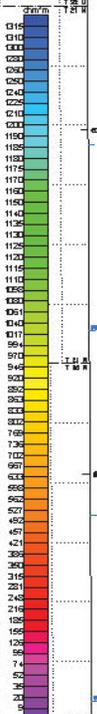
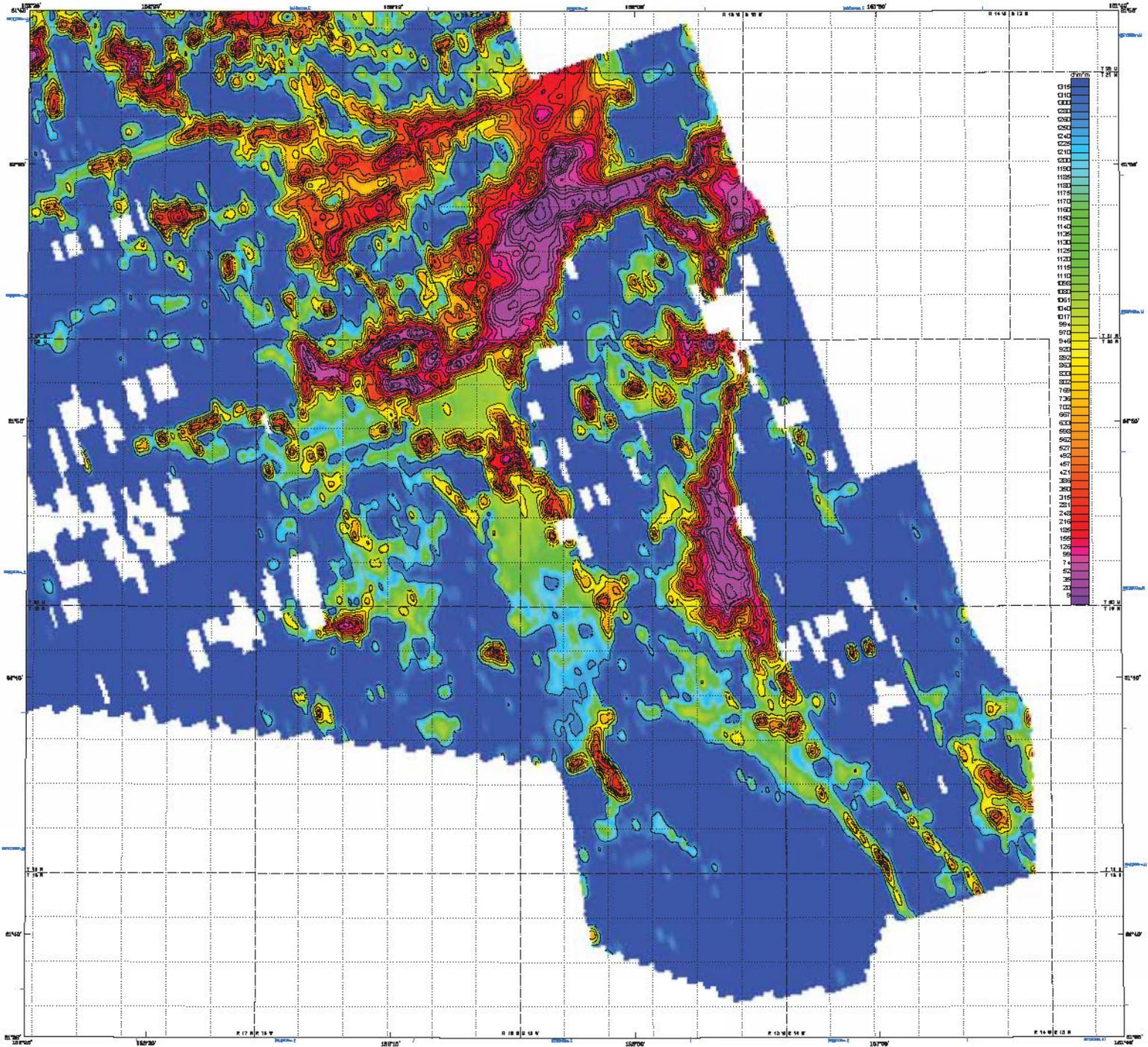
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGPS), and Pigo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Statewide Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through PIGS, 3304 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable for free from the DGGPS website ([www.dggs.alaska.gov/gis/](http://www.dggs.alaska.gov/gis/)). Maps are also available on paper through the DGGPS office, on one variable print of the website in Adobe Acrobat PDF file format.



1:50,000  
1:100,000  
1:200,000  
1:400,000  
1:800,000  
1:1,600,000  
1:3,200,000  
1:6,400,000  
1:12,800,000  
1:25,600,000  
1:51,200,000  
1:102,400,000  
1:204,800,000  
1:409,600,000  
1:819,200,000  
1:1,638,400,000  
1:3,276,800,000  
1:6,553,600,000  
1:13,107,200,000  
1:26,214,400,000  
1:52,428,800,000  
1:104,857,600,000  
1:209,715,200,000  
1:419,430,400,000  
1:838,860,800,000  
1:1,677,721,600,000  
1:3,355,443,200,000  
1:6,710,886,400,000  
1:13,421,772,800,000  
1:26,843,545,600,000  
1:53,687,091,200,000  
1:107,374,182,400,000  
1:214,748,364,800,000  
1:429,496,729,600,000  
1:858,993,459,200,000  
1:1,717,986,918,400,000  
1:3,435,973,836,800,000  
1:6,871,947,673,600,000  
1:13,743,895,347,200,000  
1:27,487,786,694,400,000  
1:54,975,573,388,800,000  
1:109,951,146,777,600,000  
1:219,902,293,555,200,000  
1:439,804,587,110,400,000  
1:879,609,174,220,800,000  
1:1,759,218,348,441,600,000  
1:3,518,436,696,883,200,000  
1:7,036,873,393,766,400,000  
1:14,073,746,787,532,800,000  
1:28,147,493,575,065,600,000  
1:56,294,987,150,131,200,000  
1:112,589,974,300,262,400,000  
1:225,179,948,600,524,800,000  
1:450,359,897,201,049,600,000  
1:900,719,794,402,099,200,000  
1:1,801,439,588,804,198,400,000  
1:3,602,879,177,608,396,800,000  
1:7,205,758,355,216,793,600,000  
1:14,411,516,710,433,587,200,000  
1:28,823,033,420,867,174,400,000  
1:57,646,066,841,734,348,800,000  
1:115,292,133,683,468,697,600,000  
1:230,584,267,366,937,395,200,000  
1:461,168,534,733,874,790,400,000  
1:922,337,069,467,749,580,800,000  
1:1,844,674,138,935,499,161,600,000  
1:3,689,348,277,870,998,323,200,000  
1:7,378,696,555,741,996,646,400,000  
1:14,757,393,111,483,993,292,800,000  
1:29,514,786,222,967,986,585,600,000  
1:59,029,572,445,935,973,171,200,000  
1:118,059,144,891,871,946,342,400,000  
1:236,118,289,783,743,892,692,800,000  
1:472,236,579,567,487,785,385,600,000  
1:944,473,159,134,975,570,771,200,000  
1:1,888,946,318,269,951,141,542,400,000  
1:3,777,892,636,539,902,283,084,800,000  
1:7,555,785,273,079,804,566,169,600,000  
1:15,111,570,546,159,609,132,339,200,000  
1:30,223,141,092,319,218,264,678,400,000  
1:60,446,282,184,638,436,528,356,800,000  
1:120,892,564,373,276,873,052,713,600,000  
1:241,785,128,746,553,746,105,427,200,000  
1:483,570,257,493,107,492,210,854,400,000  
1:967,140,514,986,214,984,421,708,800,000  
1:1,934,281,029,972,429,968,843,417,600,000  
1:3,868,562,059,944,859,937,686,835,200,000  
1:7,737,124,119,889,719,875,373,671,400,000  
1:15,474,248,359,779,439,751,747,342,800,000  
1:30,948,496,719,558,879,503,494,685,600,000  
1:61,896,993,439,117,759,007,009,371,200,000  
1:123,793,986,878,235,518,014,018,742,400,000  
1:247,587,973,756,471,036,028,037,484,800,000  
1:495,175,947,512,942,072,056,074,969,600,000  
1:990,351,895,025,884,144,112,138,939,939,200,000  
1:1,980,703,790,051,768,288,228,277,879,878,400,000  
1:3,961,407,580,103,536,576,456,555,759,756,800,000  
1:7,922,815,160,207,073,153,113,111,511,513,600,000  
1:15,845,630,320,414,146,306,226,223,023,027,200,000  
1:31,691,260,640,828,292,612,452,446,046,054,400,000  
1:63,382,521,281,656,585,224,904,892,092,108,800,000  
1:126,765,042,563,313,170,449,809,784,184,217,600,000  
1:253,530,085,126,626,340,899,619,569,368,438,400,000  
1:507,060,170,253,252,681,799,239,138,736,876,800,000  
1:1,014,120,340,506,505,363,598,478,277,473,753,600,000  
1:2,028,240,681,013,010,727,197,096,954,947,507,200,000  
1:4,056,481,362,026,021,454,394,193,909,904,414,400,000  
1:8,112,962,724,052,042,908,788,387,819,818,828,800,000  
1:16,225,925,448,104,085,817,576,775,639,637,657,600,000  
1:32,451,850,896,208,171,735,155,155,271,275,315,200,000  
1:64,903,701,792,416,343,470,310,310,542,542,630,400,000  
1:129,807,403,584,832,686,940,620,621,085,085,260,800,000  
1:259,614,807,169,665,373,881,241,242,170,170,521,600,000  
1:519,229,614,339,330,747,762,482,484,340,340,104,300,000  
1:1,038,459,238,678,661,495,524,964,968,680,680,208,600,000  
1:2,076,918,477,357,322,991,049,049,937,360,360,417,200,000  
1:4,153,836,954,714,645,982,098,198,874,720,720,834,400,000  
1:8,307,673,909,429,291,964,196,397,744,144,166,868,800,000  
1:16,615,347,818,858,583,932,392,792,288,288,333,737,600,000  
1:33,230,695,637,717,167,864,784,584,576,576,667,475,200,000  
1:66,461,391,275,434,334,736,168,116,116,133,494,450,400,000  
1:132,922,782,550,868,669,472,336,232,232,266,988,900,800,000  
1:265,845,565,101,737,337,944,464,464,533,977,801,600,000  
1:531,691,130,203,474,675,888,928,928,106,795,603,200,000  
1:1,063,382,260,406,949,351,776,185,185,213,591,206,400,000  
1:2,126,764,520,813,898,703,552,370,370,427,182,400,000  
1:4,253,529,041,627,797,407,104,740,740,854,364,800,000  
1:8,507,058,083,255,594,814,208,148,148,170,729,600,000  
1:17,014,116,166,511,189,638,416,296,296,341,459,200,000  
1:34,028,232,333,022,377,276,832,592,592,682,918,400,000  
1:68,056,464,666,044,754,553,664,118,118,136,473,600,000  
1:136,112,929,332,131,509,110,736,236,236,272,947,200,000  
1:272,225,864,664,263,018,221,472,472,544,494,400,000  
1:544,451,729,328,526,036,442,944,944,108,988,800,000  
1:1,088,903,458,657,052,072,884,888,197,977,600,000  
1:2,177,806,917,314,104,145,769,776,776,915,944,000,000  
1:4,355,613,834,628,208,291,539,552,552,631,888,000,000  
1:8,711,227,669,256,416,583,078,104,104,126,376,000,000  
1:17,422,453,338,512,833,166,216,216,252,752,000,000  
1:34,844,906,677,025,666,332,432,432,505,504,000,000  
1:69,689,813,354,051,332,664,864,864,101,008,000,000  
1:139,379,626,708,102,664,128,172,172,202,016,000,000  
1:278,759,253,416,205,328,344,344,404,404,484,032,000,000  
1:557,518,506,832,410,656,688,688,808,808,968,064,000,000  
1:1,115,037,013,664,821,312,137,637,637,776,128,000,000  
1:2,230,074,027,329,642,624,275,275,336,256,000,000  
1:4,460,148,054,659,285,248,550,550,672,512,000,000  
1:8,920,296,109,318,570,496,110,110,134,512,000,000  
1:17,840,592,218,637,140,992,220,220,269,024,000,000  
1:35,681,184,437,274,281,984,440,440,538,048,000,000  
1:71,362,368,874,548,563,968,880,880,107,609,600,000,000  
1:142,724,737,749,097,127,936,176,176,215,219,200,000,000  
1:285,449,475,498,194,255,872,352,352,430,438,400,000,000  
1:570,898,950,996,388,511,704,704,704,860,876,800,000,000  
1:1,141,797,901,992,777,023,408,140,140,172,175,600,000,000  
1:2,283,595,803,985,554,046,816,280,280,344,351,200,000,000  
1:4,567,191,607,971,108,109,560,560,560,688,702,400,000,000  
1:9,134,383,215,942,216,219,120,120,147,150,800,000,000  
1:18,268,766,431,884,432,238,240,240,294,301,600,000,000  
1:36,537,532,863,768,864,476,480,480,588,603,200,000,000  
1:73,075,065,727,537,728,952,960,960,1176,1206,400,000,000  
1:146,150,131,455,075,456,192,192,235,241,200,000,000  
1:292,300,262,910,150,912,384,384,470,482,400,000,000  
1:584,600,525,820,301,824,768,768,940,964,800,000,000  
1:1,169,201,051,640,603,648,153,632,153,188,192,800,000,000  
1:2,338,402,103,281,207,296,307,264,307,376,384,800,000,000  
1:4,676,804,206,562,414,592,614,528,614,752,768,800,000,000  
1:9,353,608,413,124,828,118,896,105,625,625,768,800,000,000  
1:18,707,216,826,249,656,237,792,211,251,251,536,800,000,000  
1:37,414,433,652,499,312,475,584,422,502,502,1072,800,000,000  
1:74,828,867,304,998,624,951,168,844,804,804,2144,800,000,000  
1:149,657,734,609,997,248,190,336,168,168,328,328,4288,800,000,000  
1:299,315,469,219,994,496,380,672,336,336,656,656,8576,800,000,000  
1:598,630,938,439,989,992,761,344,672,672,1312,1312,17152,800,000,000  
1:1,197,261,876,879,979,984,152,268,134,134,263,263,34304,800,000,000  
1:2,394,523,753,759,959,968,304,536,268,268,526,526,68608,800,000,000  
1:4,789,047,507,519,919,936,608,1072,536,536,1052,1052,137216,800,000,000  
1:9,578,095,015,039,839,872,1216,2144,1072,1072,2104,2104,274432,800,000,000  
1:19,156,190,030,079,679,744,2432,4288,2144,2144,4208,4208,548864,800,000,000  
1:38,312,380,060,159,359,488,4864,8576,4288,4288,8416,8416,1097728,800,000,000  
1:76,624,760,120,318,718,976,9728,17152,8576,8576,16832,16832,2195456,800,000,000  
1:153,249,520,240,637,437,952,19456,34304,17152,17152,33664,33664,4390912,800,000,000  
1:306,499,040,481,274,875,904,38912,68608,17152,17152,67328,67328,8781824,800,000,000  
1:612,998,080,962,549,751,808,77824,137216,34304,34304,134656,134656,17563648,800,000,000  
1:1,225,996,161,925,099,503,616,155648,274432,68608,68608,269312,269312,35127296,800,000,000  
1:2,451,992,323,850,199,007,232,311296,548864,137216,137216,538624,538624,70254592,800,000,000  
1:4,903,984,647,700,398,014,464,622592,1077152,274432,274432,1077152,1077152,140509184,800,000,000  
1:9,807,969,295,400,796,028,928,1245184,2154304,548864,548864,2154304,2154304,281018368,800,000,000  
1:19,615,938,590,801,592,056,1890368,4308608,1077152,1077152,4308608,4308608,562036736,800,000,000  
1:39,231,877,181,603,184,378,3781736,8617216,2154304,2154304,8617216,8617216,1124073472,800,000,000  
1:78,463,754,363,206,368,756,7563472,17234432,4308608,4308608,17234432,17234432,2248146944,800,000,000  
1:156,927,508,726,412,736,151,512,694,6946944,34468864,8617216,8617216,34468864,34468864,4496293888,800,000,000  
1:313,855,017,452,825,472,303,024,138,938,938688,68937728,17234432,17234432,68937728,68937728,9092587776,800,000,000  
1:627,710,034,905,650,944,606,048,277,877,877376,137875456,34468864,34468864,137875456,137875456,18185175552,800,000,000  
1:1,255,420,069,811,301,888,1212,1152,555,755,755672,275750912,68937728,68937728,275750912,275750912,36370351104,800,000,000  
1:2,510,840,139,622,603,776,242,424,1111,511,5111344,551501824,137875456,137875456,551501824,551501824,72740702208,800,000,000  
1:5,021,680,279,245,207,552,484,848,222,222,111,1112688,1111503648,275750912,275750912,1111503648,1111503648,145481404416,800,000,000  
1:10,043,360,558,490,415,104,968,488,488,244,244,122,1225376,1221507296,551503648,551503648,1221507296,1221507296,160962808832,800,000,000  
1:20,086,721,116,980,830,208,193,696,976,976,488,488,244,2441072,10721507296,1221507296,1221507296,244301417664,800,000,000  
1:40,173,442,233,961,660,396,387,392,195,195,97,97512,5121507296,244301417664,244301417664,488602835328,800,000,000  
1:80,346,884,467,923,323,774,784,391,391,195,195,97,971024,10241507296,488602835328,488602835328,977205670656,800,000,000  
1:160,693,768,935,846,646,148,156,782,782,391,391,195,195,97,972048,20481507296,977205670656,977205670656,1954411341312,800,000,000  
1:321,387,537,871,693,292,296,312,156,156,782,782,391,391,195,195,97,974096,40961507296,1954411341312,1954411341312,3908822682624,800,000,000  
1:642,775,075,743,386,584,592,624,312,312,156,156,782,782,391,391,195,195,97,978192,81921507296,3908822682624,3908822682624,7817645365248,800,000,000  
1:1,285,550,151,487,173,168,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,9716384,163841507296,7817645365248,7817645365248,15635290730496,800,000,000  
1:2,571,100,302,974,346,336,2496,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,9732768,327681507296,15635290730496,15635290730496,31270581460992,800,000,000  
1:5,142,200,605,948,692,672,4992,2496,2496,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,9765536,655361507296,31270581460992,31270581460992,62541162921984,800,000,000  
1:10,284,401,211,897,384,1344,9984,4992,4992,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,97131072,1310721507296,62541162921984,62541162921984,125082325843968,800,000,000  
1:20,568,802,423,794,768,2688,19968,9984,9984,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,97262144,2621441507296,125082325843968,125082325843968,250164651687936,800,000,000  
1:41,137,604,847,589,536,5376,39936,19968,19968,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,97524288,5242881507296,250164651687936,250164651687936,500329303375872,800,000,000  
1:82,275,209,695,179,072,11952,79872,39936,39936,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,971048576,10485761507296,500329303375872,500329303375872,1000658606751744,800,000,000  
1:164,550,419,390,358,148,23964,15974,79872,79872,1248,1248,624,624,312,312,156,156,782,782,391,391,195,195,97,972097152,20971521507296,1000658606751744,1000658606751744,2001317213503488,800,000,000  
1:329,100,838,780,716,296,47928,31948,15974,15974,1248,1248



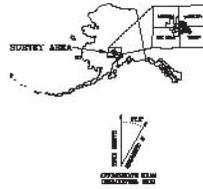
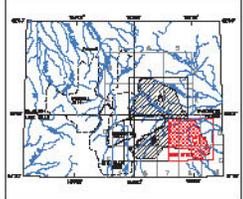


**900 Hz COPLANAR APPARENT RESISTIVITY  
WITH DATA CONTOURS,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,560-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were collected with a DIXEEM<sup>®</sup> Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Schminke C10 caesium sensor, and a Rodent Systems RS-300 control-roty magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The control-roty magnetometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz motion and video camera, flight logs performed with an AS-300-B3 Spirit Helicopter at a mean level of 5000 feet along NE-SW (70°) survey flight lines with a spacing of a quarter of a mile. The three meter flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight path coordinates were projected onto the Clarke 1886 (LTM zone 5) Spheroid, 1827 North American datum using a central meridian (CM) of 163° 5 north coordinate of 0 and an east constant of 500,000. Potential accuracy of the presented data is better than 10 m with respect to the UTM grid.

**RESISTIVITY**

The DIXEEM<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. Two vertical soundi coil-pairs sampled at 1000 and 5000 Hz with three horizontal coplanar coil-pairs oriented at 90°, 70° and 50.000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock geology, conductive structures, and cultural sources. Apparent resistivity is generated from the in-phase and quadrature component of the capacitor 5000 Hz using the pseudo-layer half space model. The data were interpreted onto a regular 80 m grid using a modified along (1000) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

Also, H. 1270, a new method of interpretation and error correction, based on local geology, derived at the direction of Geophysical Society, v. 17, no. 4, p. 68-81.

**RESISTIVITY ALTITUDE LIMITS**

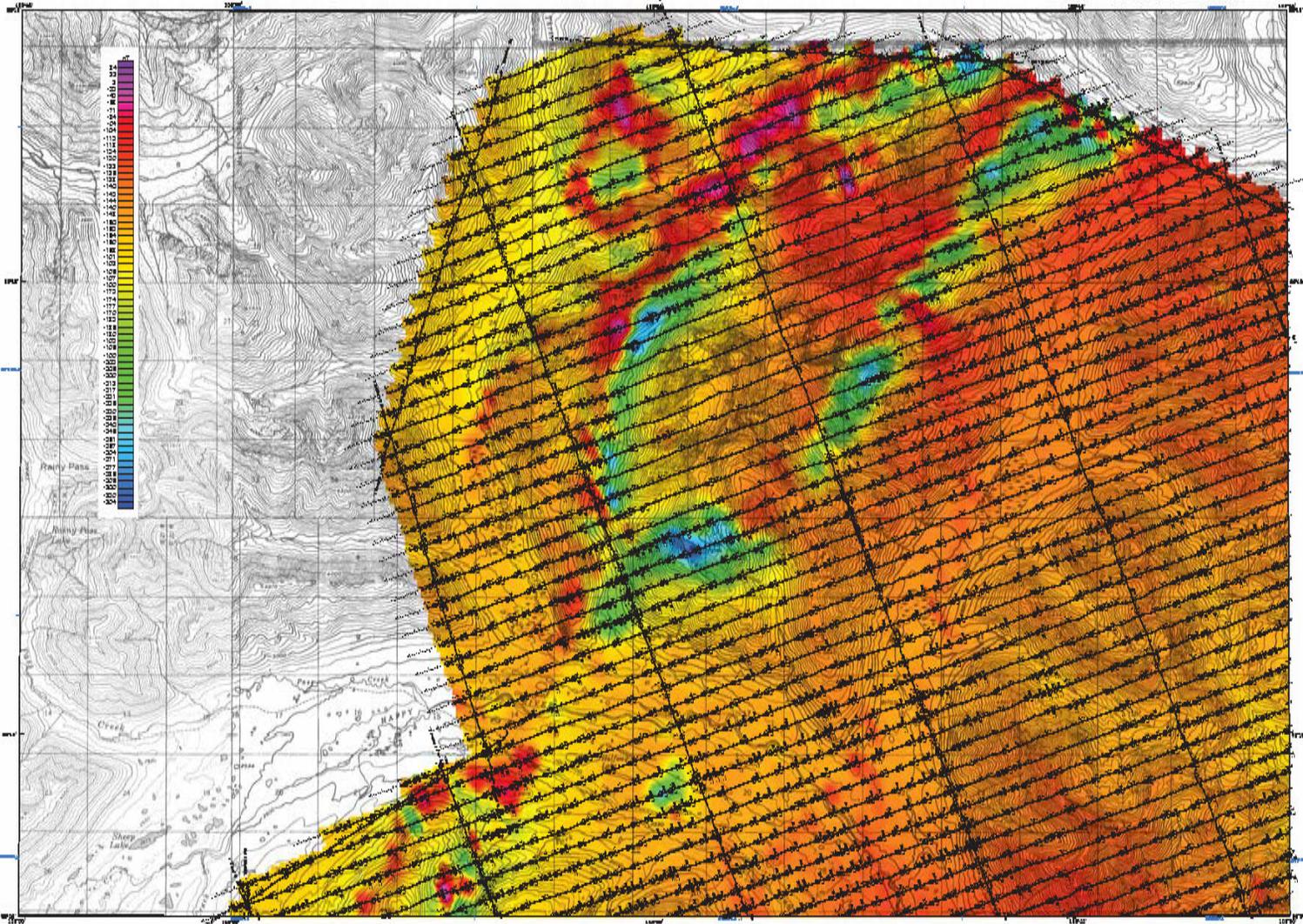
In areas where the EM lift height exceeded 120 m, resistivity was not calculated. The crude north-south resistivity anomalies due to several airports where the helicopter flew higher to avoid cultural objects or existing roads. Blank space in the grids were created where zones of high flying contacts are more than one survey line.



**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 (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Lands as part of the Hope 3000 Geologic and Geological Mineral Inventory Program.

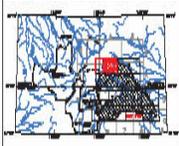
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2015, 3304 College Road, Fairbanks, Alaska, 99708-3707, and are downloadable for free from the DGGPS website ([www.dggs.alaska.gov/gis/](http://www.dggs.alaska.gov/gis/)). Maps are also available on paper through the DGGPS and are available online at the website in Adobe Acrobat PDF file format.



ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



LOCATION INDEX OF 1:50,000-SCALE MAPS



### RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF TALKIETNA A-6, B-4, and  
McGRATH A-1, B-1 QUADRANGLES

by  
Leland E. Brown, CGM, and Roger Goodwin, Inc.  
2015



**ABBREVIATIVE NOTES**  
THIS DOCUMENT WAS PREPARED FOR A PRIVATE CONTRACTOR AND IS NOT A PRODUCT OF THE ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS. THE SURVEY AREA IS SHOWN IN RED ON THE LOCATION INDEX MAP. THE SURVEY AREA IS SHOWN IN RED ON THE LOCATION INDEX MAP. THE SURVEY AREA IS SHOWN IN RED ON THE LOCATION INDEX MAP.

**ELECTROMAGNETIC ANOMALIES**

Symbol	Description
+	100 nanotesla
0	50 nanotesla
-	0 nanotesla
-	-50 nanotesla
-	-100 nanotesla
-	-150 nanotesla
-	-200 nanotesla
-	-250 nanotesla
-	-300 nanotesla
-	-350 nanotesla
-	-400 nanotesla
-	-450 nanotesla
-	-500 nanotesla
-	-550 nanotesla
-	-600 nanotesla
-	-650 nanotesla
-	-700 nanotesla
-	-750 nanotesla
-	-800 nanotesla
-	-850 nanotesla
-	-900 nanotesla
-	-950 nanotesla
-	-1000 nanotesla

**ELECTROMAGNETIC**  
The magnetic field of the earth is the result of the earth's internal magnetic field and the magnetic field of the earth's crust. The magnetic field of the earth's crust is the result of the earth's internal magnetic field and the magnetic field of the earth's crust.

**RESIDUAL MAGNETIC FIELD**  
The residual magnetic field is the difference between the total magnetic field and the magnetic field of the earth's crust. The residual magnetic field is the difference between the total magnetic field and the magnetic field of the earth's crust.

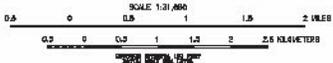
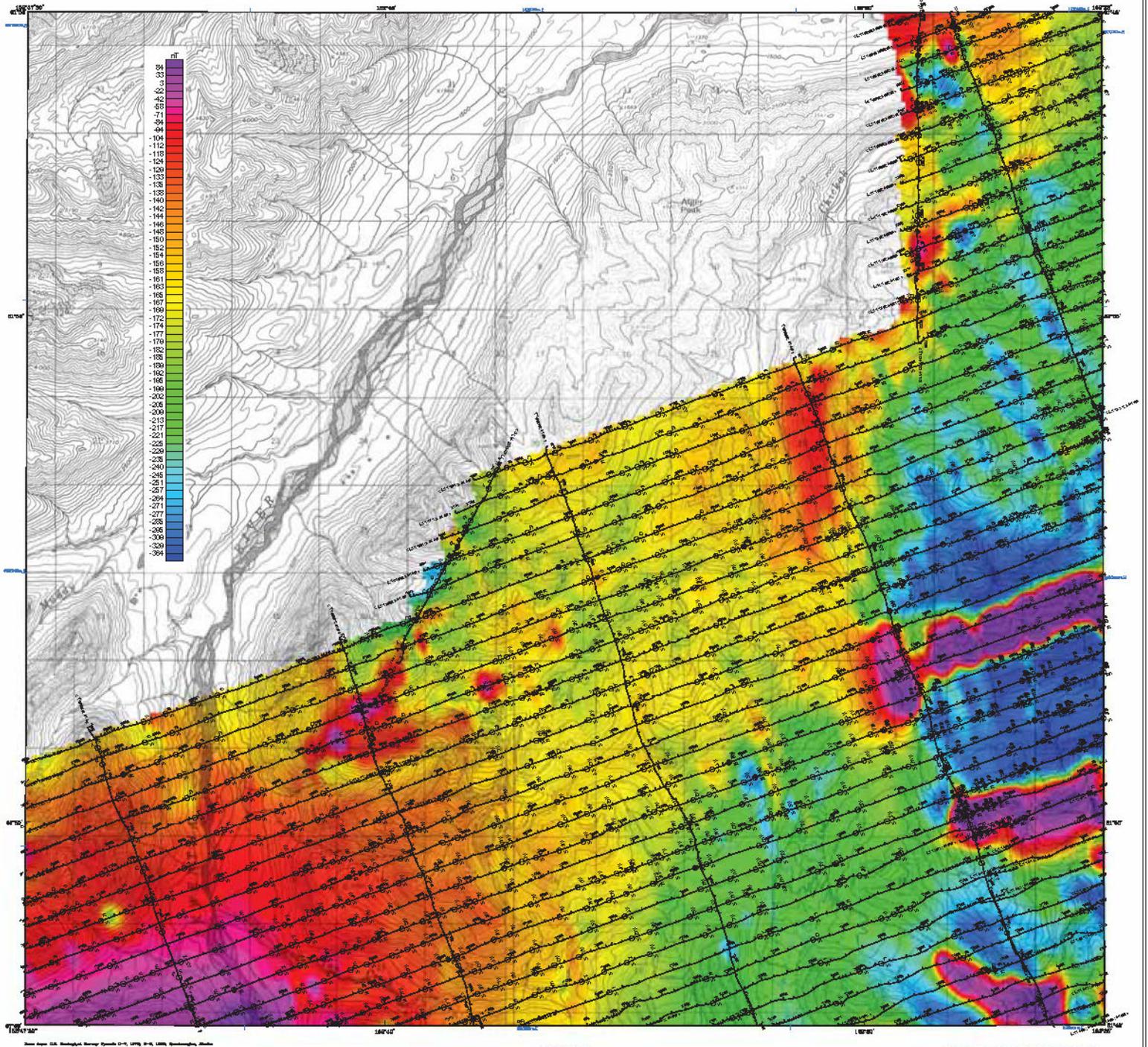
**SURVEY HISTORY**  
The survey area was surveyed by the Alaska Division of Geological & Geophysical Surveys in 1960. The survey area was surveyed by the Alaska Division of Geological & Geophysical Surveys in 1960.









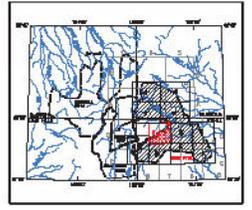


# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF TYONEK D-7 and D-8 QUADRANGLES

by  
Leland B. Burns, CGS, and Pagan Gledhill, Inc.  
2015

LOCATION INDEX OF 1:50,000-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DIGHEV electromagnetic (EM) system, a Geotek 024 calcium magnetometer with a Schlumberger CS3 calcium sensor, and a Radiator Solutions RS-303 galvanic current spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The galvanic current spectrometer was flown at a height of 500 feet. In addition the survey recorded data from radio and laser altimeters, GPS navigation system, DG/DO Hz markers and video camera. Flights were performed with an AS-350-B3 Bellini helicopter at a mean terrain clearance of 3300 feet along NE-SW (70°) survey flight lines with a spacing of 0.25 miles. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.2 seconds via post-flight differential positioning to a relative accuracy of better than 3 feet. Post-flight positions were projected onto the Clarke 1886 (UTM zone 53) horizontal, 1927 North American datum using a central meridian (CM) of 153.3 a north-south of 0 and an east-west offset of 500,000. Post-flight accuracy of the projected data is better than 10 m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES	
Intensity	Contour
●	>100 nT
○	50-100 nT
○	0-50 nT
○	10-50 nT
○	0-10 nT
○	1-6 nT
○	< 1 nT
○	Quadrangle gravity
○	EM magnetic intensity
○	Contours

INTERPRETATION	
○	Conductor model
○	Subsidiary conductor
○	Major bedrock conductor (EM 2015)
○	Conductive zone sheet (Topographic sheet)
○	Sheet conductive zone with deep conductive structure (EM 2015)
○	Base of broad conductor (Edge of bed mass?)
○	Column, 200 meters EM model height of mass
○	Magrith
○	Indicates where uncertainty on the model is greater than 50% (the model fit does not qualify the validity of the EM survey)

**ELECTROMAGNETICS**

To determine the location of EM anomalies or their boundaries, the DIGHEV EM system measured phase and conductive components of the frequency. Two vertical search-coil pipes separated at 1000 and 5000 Hz with three horizontal magnetometer pipes oriented at 000, 225, and 04500 Hz. EM data were sampled at 0.1 second intervals. The EM system requires 10 meters separation, conductive overburden, and cultural sources. The type of conductor is indicated on the interpretive map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on the relative slopes of the conductive and resistive responses, together with conductive and magnetic patterns and topography. The color the map and the flight track lines were selected to locate cultural sources.

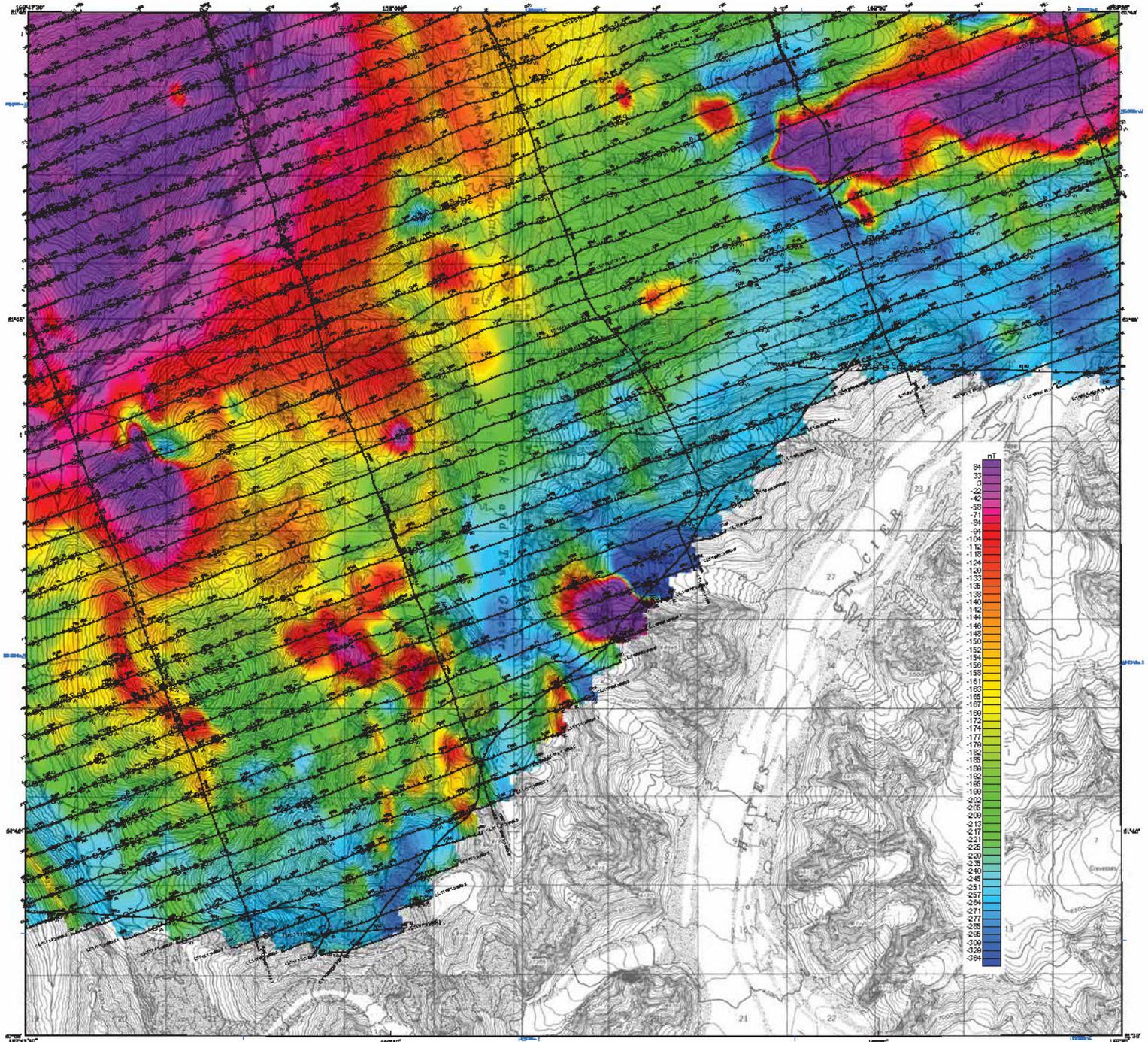
**RESIDUAL MAGNETIC FIELD**

The magnetic total field data were processed using digitally recorded data from a Geotek 024 calcium magnetometer with a Schlumberger CS3 calcium sensor. Data were collected at a magnetic 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) GRF corrected (GRF model 2010, updated for date of flight and arbitrary variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All data were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Wells, H., 1970. A new method of interpolation and search curve fitting based on least squares approximation of the interpolation of Geophysical Research, v. 75, no. 4, p. 800-802.

**SURVEY HISTORY**

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Pagan Gledhill, Inc. Airborne geophysical data for this area were obtained and processed by GGP in 2013 and 2014. Previously from DGGS surveys conducted to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geophysical and Geological Mineral Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3334 College Road, Fairbanks, Alaska, 99709-2747 and are downloadable for free from the DGGS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available on paper through the DGGS office, and are available online at the website in Adobe Acrobat PDF file format.



# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF TYONEK C-7, C-8, D-7,  
and D-8 QUADRANGLES

by  
Loren E. Burns, CDG, and Fugro Geoservices, Inc.  
2015

### ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DCHEM<sup>®</sup> EM system measured in-phase and quadrature components of the frequency. The vertical coil-coupled pairs operated at 1000 and 5500 Hz with three horizontal coil-coupled pairs operated at 500, 2000, and 55000 Hz. EM data were sampled at 0.1 second intervals. The EM system records in-ground conductive overburden, and cultural sources. The type of conductor is indicated on the interpretive map by the interpretive symbol indicated in each EM anomaly. Determination of the type of conductor is based on EM anomaly maps of the conductive and resistive responses, together with conductor and magnetic patterns and topography. The power line, roadway and the light pole sites were identified to local cultural sources.

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CDG C1 dual magnetometer with a Schriber G33 cesium beam sensor. Data were collected at a recording 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) IIRF corrected (IGF model 2010), updated for date of flight, and otherwise corrected, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akers (1970) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in the publication.

AKERS, H. 1970. A new method of interpolation and smooth curve fitting based on local properties digital of the observation of geomagnetic intensity. p. 13, 14, 15. AGU-TERRESTRIAL

### 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 Fugro Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by CDG in 2013 and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical and Geospatial (AAG) Program. All data and maps produced to date from this survey are available in digital format on DVD or a network file through DGGS, 3554 College Road, Fairbanks, Alaska, 99709-2707, and are downloadable for free from the DGGS website ([www.dggs.state.ak.us/pubs/](http://www.dggs.state.ak.us/pubs/)). Maps are also available on paper through the DGGS office, and geospatial data of the entire AAG dataset are available on request.



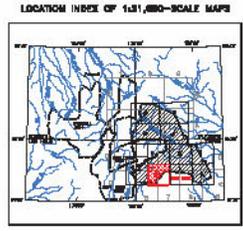
### DESCRIPTIVE NOTES

The geophysical data were acquired with a DCHEM<sup>®</sup> Electromagnetics (EM) system, a CDG C1 dual magnetometer with a Schriber G33 cesium beam sensor, and a Radiation Solutions RS-3010 corner-coupled spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The corner-coupled spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 60/60 Hz markers and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain elevation of 2000 feet along NE-SW (70°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

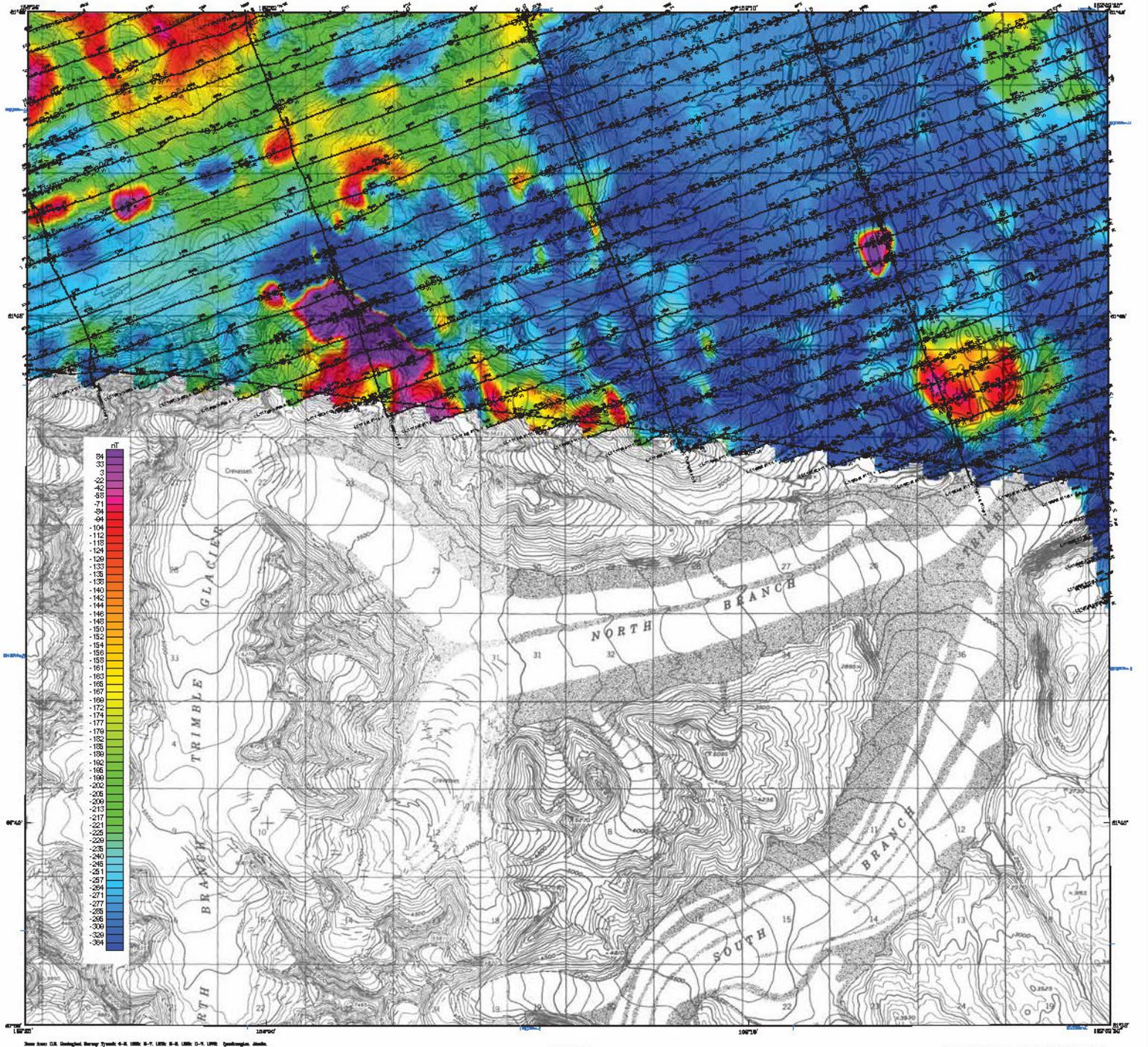
A Novatel OEM4-021 Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path coordinates were projected onto the Alaskan NAD83 (UTM zone 00) datum, 1827 North American datum using a central meridian (CM) of 123° a north constant of 0 and an east constant of 500,000. Horizontal accuracy of the corrected data is better than 10 m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES		Conductance
+	Area indicates the conductor has a thickness >10m	>100 Siemens
○	Area indicates the conductor has a thickness <10m	10-100 Siemens
○	Area indicates the conductor has a thickness <10m	10-50 Siemens
○	Area indicates the conductor has a thickness <10m	5-10 Siemens
○	Area indicates the conductor has a thickness <10m	1-5 Siemens
○	Area indicates the conductor has a thickness <10m	<1 Siemens
○	Area indicates the conductor has a thickness <10m	Quaternary anomaly
○	Area indicates the conductor has a thickness <10m	EM magnetic response
○	Area indicates the conductor has a thickness <10m	Culture

INTERPRETIVE SYMBOLS		Description
○	Conductor model	Conductor model
○	Basaltic conductor	Basaltic conductor
○	Granite conductive	Granite conductive
○	Basaltic rock	Basaltic rock
○	Granite rock	Granite rock
○	Basaltic rock with deep conductive overburden	Basaltic rock with deep conductive overburden
○	Basaltic rock with shallow conductive overburden	Basaltic rock with shallow conductive overburden
○	Basaltic rock with conductive overburden	Basaltic rock with conductive overburden
○	Basaltic rock with non-conductive overburden	Basaltic rock with non-conductive overburden
○	Basaltic rock with resistive overburden	Basaltic rock with resistive overburden
○	Basaltic rock with conductive overburden and resistive overburden	Basaltic rock with conductive overburden and resistive overburden
○	Basaltic rock with conductive overburden and resistive overburden	Basaltic rock with conductive overburden and resistive overburden



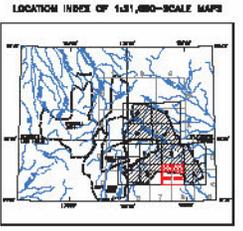




# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF TYONEK C-4, C-7, D-4, and D-7 QUADRANGLES

by  
Loren E. Burns, CGS, and Pledge Geophysical, Inc.  
2015



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a GEM-500 Electromagnetics (EM) system, a 2000 D1344 cadmium magnetometer with a Schimadzu Q3 cadmium sensor, and a Radiation Solutions RS-5010 core-coil gradiometer. The EM and magnetic sensors were flown at a height of 100 feet. The core-coil gradiometer was flown at a height of 200 feet. In addition, the magnetic data were recorded and laser altimetry, GPS positioning system, 60/60 Hz markers and video camera. Flights were performed with an AS-350-B3 Super Helicopter at a mean terrain elevation of 2000 feet along NE-SW (70°) survey flight lines with a spacing of 0.25 miles. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-C2 Global Positioning System was used for navigation. The helicopter position was derived every 0.25 seconds using post-flight differential positioning to a relative accuracy of better than 0.1 meters. Flight path positions were projected onto the digital 1:50,000 (UTM zone 02) topographic (1983) North American datum using a central meridian (CM) of 153° 30' north-south of 0 and on west-southwest (WSW) bearing. The accuracy of the projected data is better than 10 m with respect to the UTM grid.

- ELECTROMAGNETIC ANOMALIES**
- 100 meters
  - 50-100 meters
  - 10-50 meters
  - 5-10 meters
  - 1-5 meters
  - < 1 meters
  - Quantitative anomaly
  - EM magnetic response
  - Culture
- INTERPRETIVE SYMBOLS**
- A Conductive model
  - B Baseline conductor
  - C Narrow conductive conductor
  - D "Thin sheet"
  - E Broad conductive rock unit, deep conductive structure, thick conductive zone
  - F "Thin-layered"
  - G Edge of broad conductor
  - H "Wide of hole aspect"
  - I Culture, city, town, etc.
  - J "Interpretive symbol"
  - K "Interpretive symbol"
  - L "Interpretive symbol"
  - M "Interpretive symbol"
  - N "Interpretive symbol"
  - O "Interpretive symbol"
  - P "Interpretive symbol"
  - Q "Interpretive symbol"
  - R "Interpretive symbol"
  - S "Interpretive symbol"
  - T "Interpretive symbol"
  - U "Interpretive symbol"
  - V "Interpretive symbol"
  - W "Interpretive symbol"
  - X "Interpretive symbol"
  - Y "Interpretive symbol"
  - Z "Interpretive symbol"

**ELECTROMAGNETICS**

To determine the location of EM anomalies or their boundaries, the GEM-500 EM system measured line and vertical components of the frequency. The vertical component was measured at 1000 and 5500 Hz with three horizontal conductor-pole pairs oriented at 0°, 225°, and 55,000 Hz. EM data were sampled at 0.1 second intervals. The EM system records in indirect coordinates, conductive overburden, and cultural sources. The type of conductor is indicated on the interpretive map by the interpretation of the type of conductor based on EM anomaly. The EM system records in indirect coordinates, together with conductor and magnetic patterns and topography. The power line location and the flight track data were corrected to local cultural sources.

**RESIDUAL MAGNETIC FIELD**

The magnetic total field data were processed using digitally recorded data from a GEM-500 D1344 magnetometer with a Schimadzu Q3 cadmium sensor. Data were collected at a recording 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) IIRP corrected (IGRF model 2010), updated for date of flight, and outlier-rejection, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akers (1970) technique. All data were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in the publication.

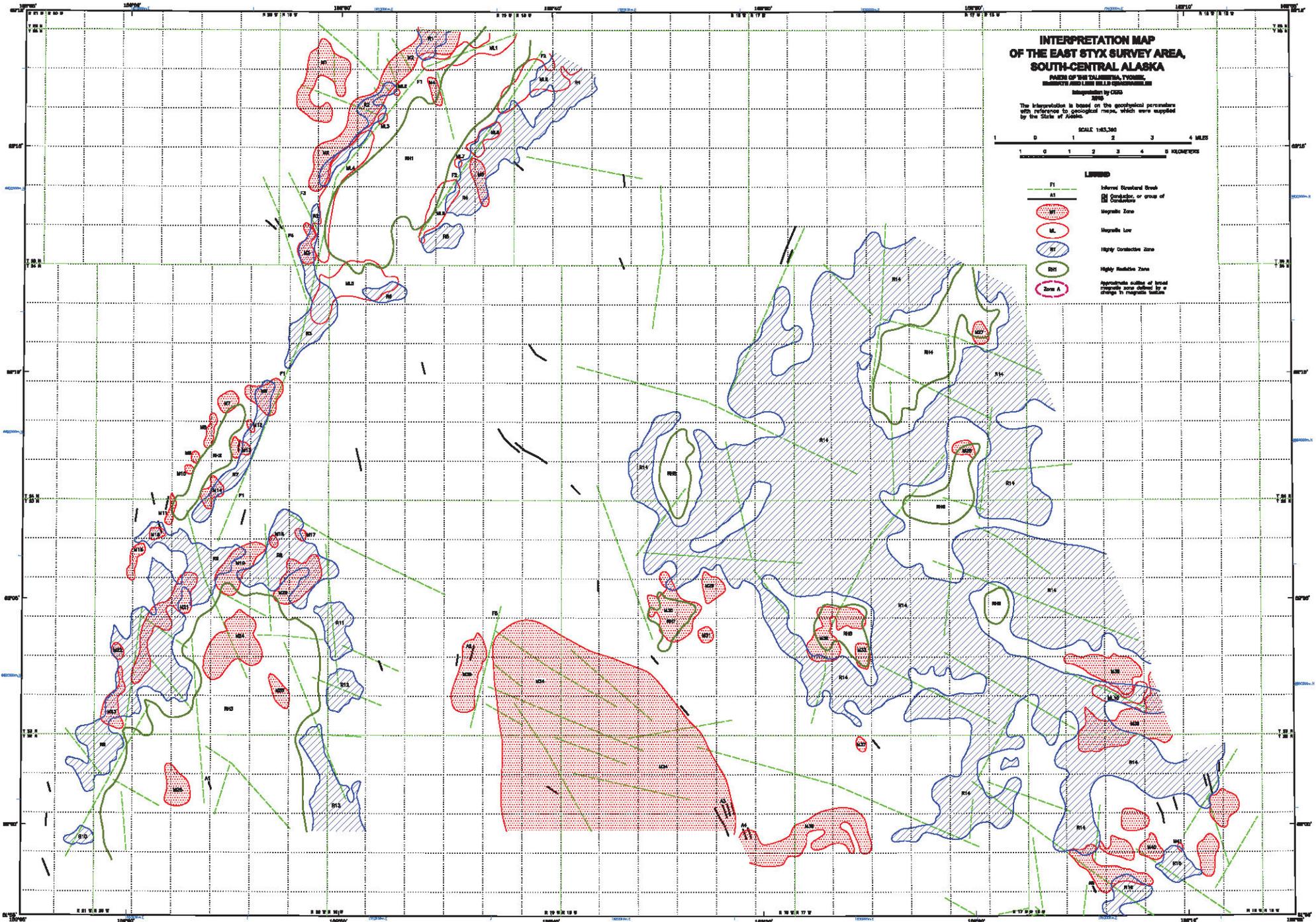
AKERS, H. 1970. A new method of interpolation and smooth curve fitting based on local properties. *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 586-591.

**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 Pledge Geophysical, Inc. Airborne geophysical data for this area were obtained and processed by DGGGS in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Geophysical and Geological Interpretive Program. All data and maps produced to date from this survey are available in digital format on DVD or a network through DGGGS, 3554 College Road, Fairbanks, Alaska, 99707-3707, and are downloadable for free from the DGGGS website ([www.dgggs.state.ak.us/pub/](http://www.dgggs.state.ak.us/pub/)). Maps are also available on paper through the local office, and geospatial data of the entire Alaska dataset are available on paper through the local office, and geospatial data of the entire Alaska dataset are available on paper through the local office, and geospatial data of the entire Alaska dataset are available on paper through the local office.







**INTERPRETATION MAP  
OF THE EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PAGES OF THE PALMER, TONGUE,  
MELVILLE AND LITTLEFIELD QUADRANGLES

Interpretation by GSD

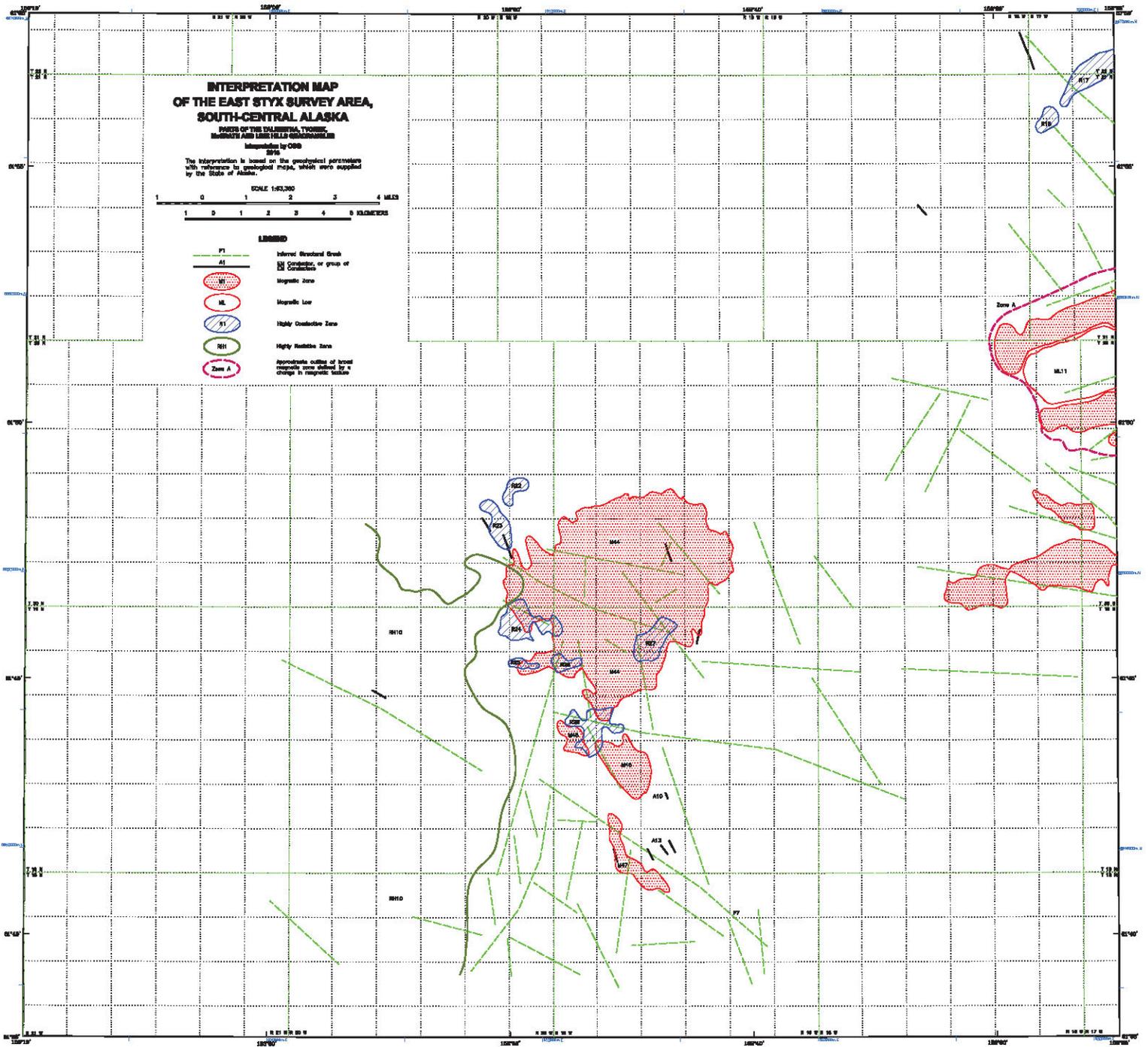
2014

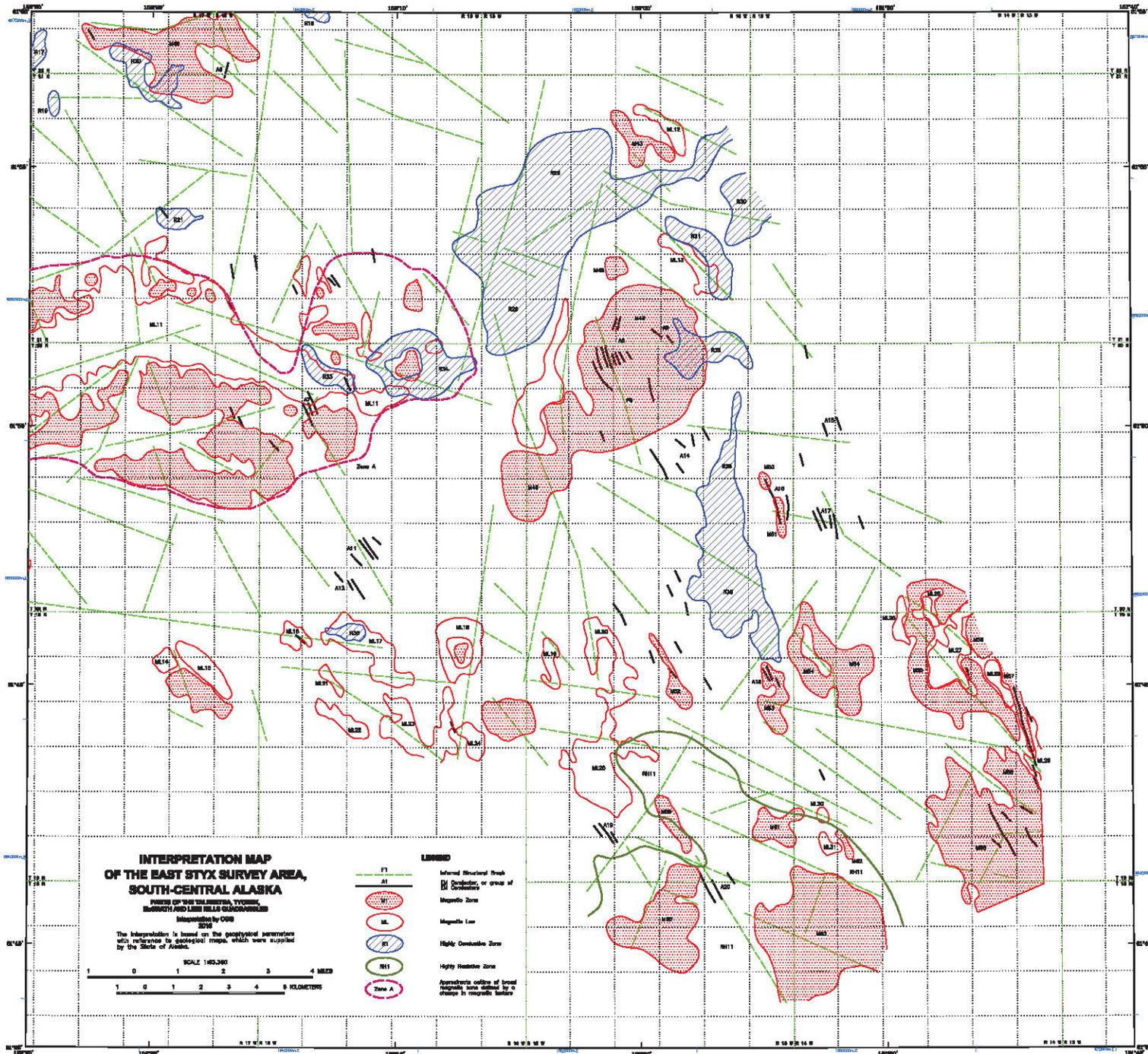
The interpretation is based on the geophysical parameters  
with reference to geological maps, which were supplied  
by the State of Alaska.

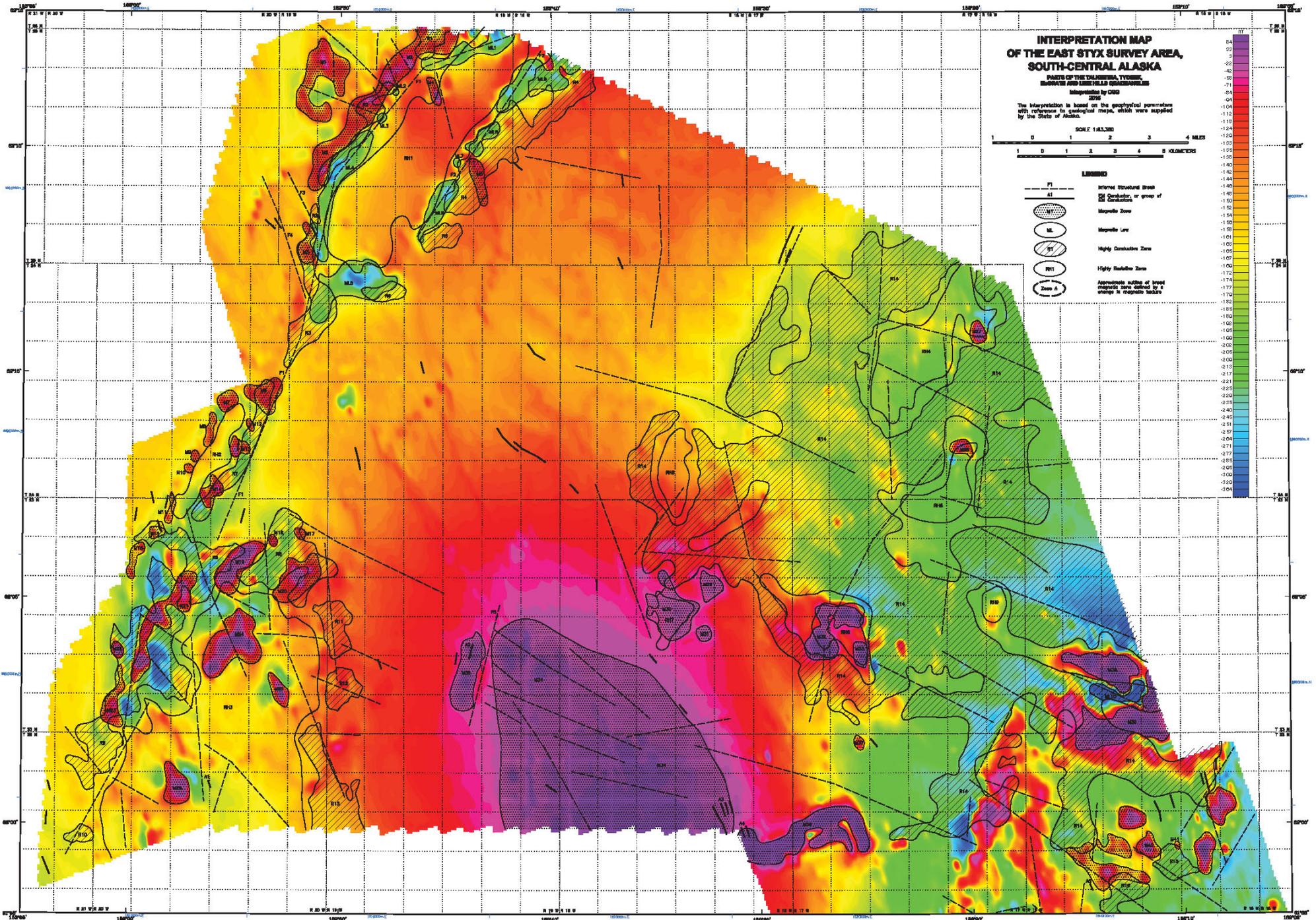


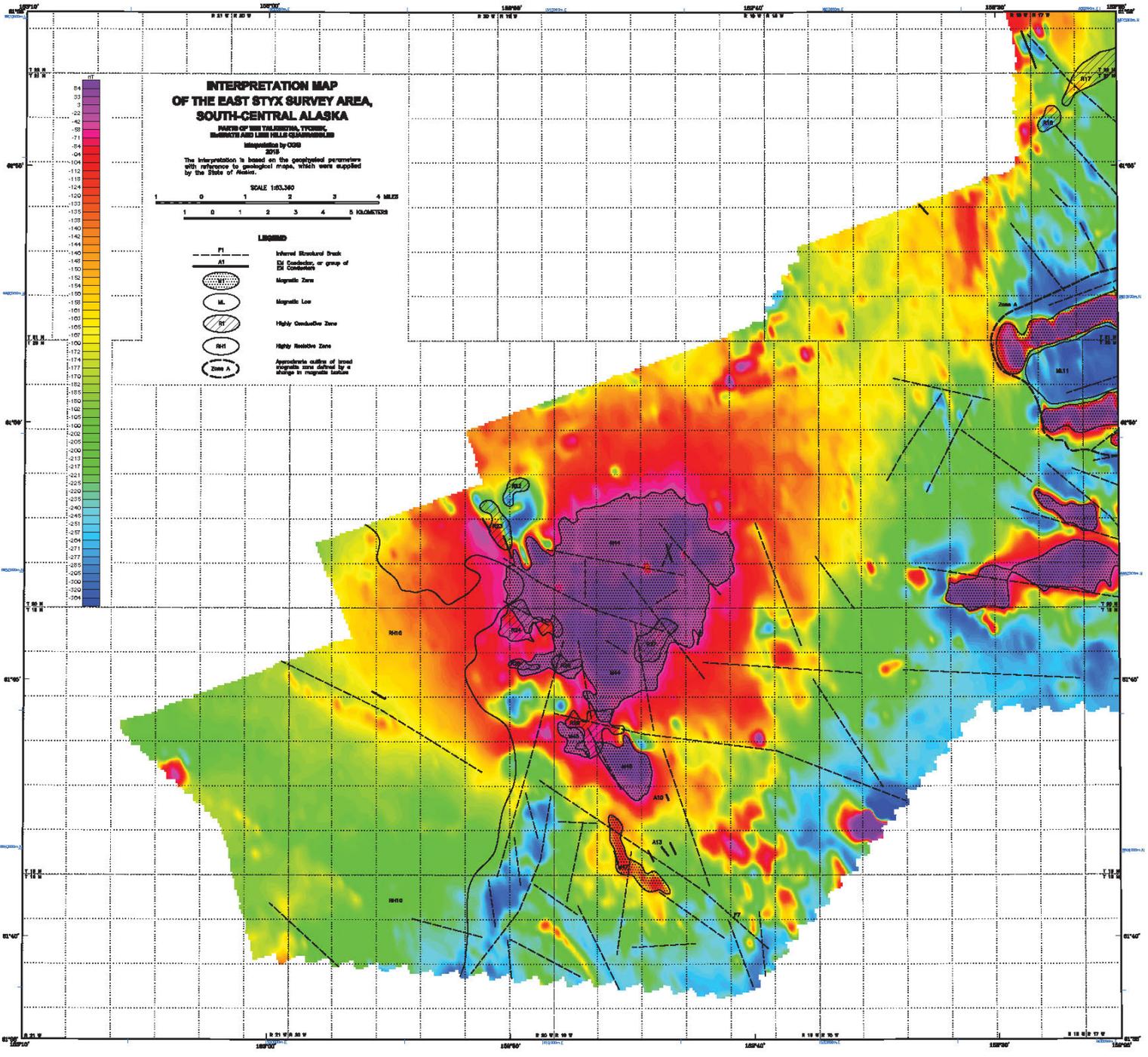
**LEGEND**

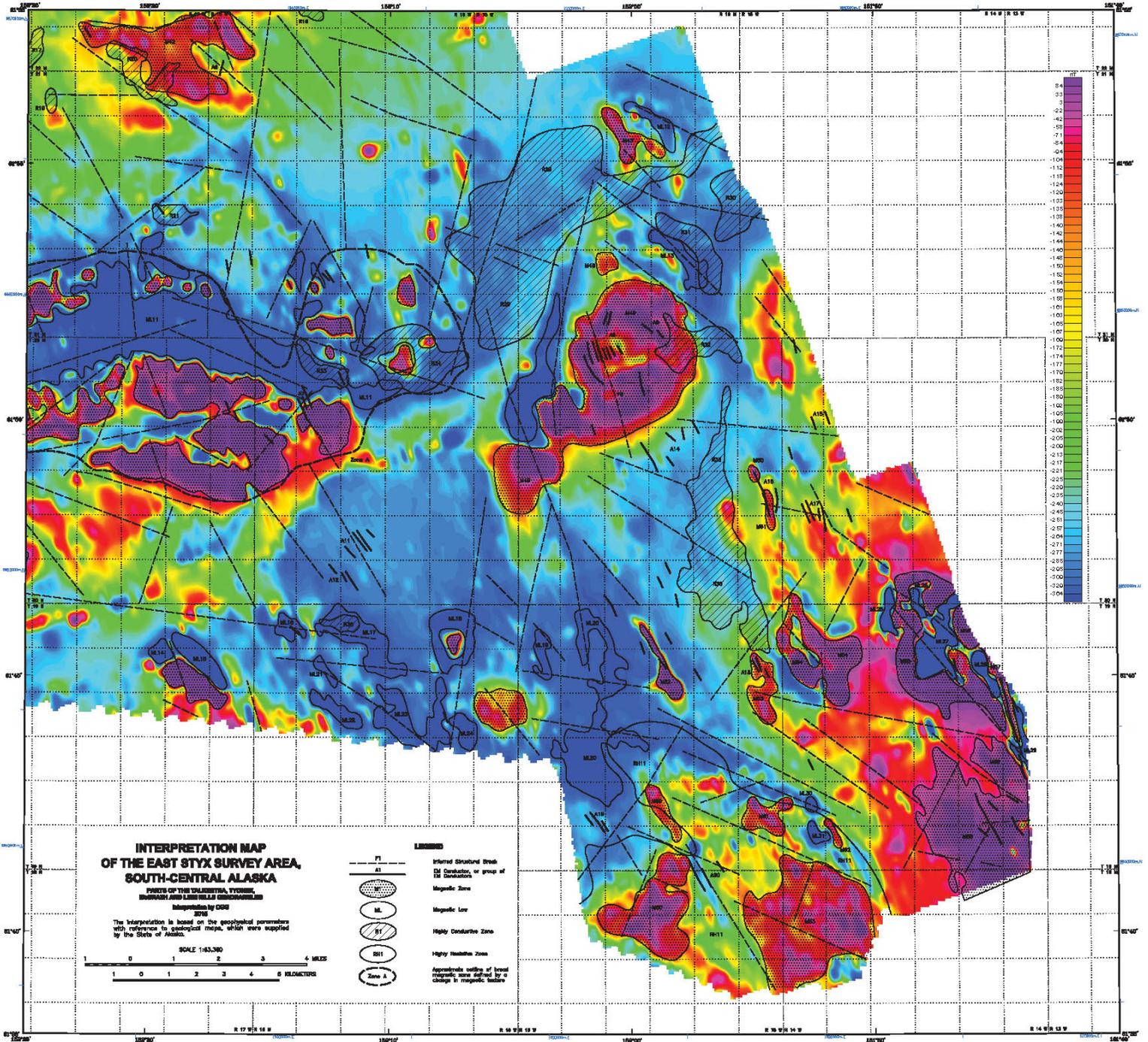
- PT Inland Standard Creek
- AI Contour, or group of Contours
- MI Magnetic Zone
- ML Magnetic Low
- HI Highly Conductive Zone
- RI Highly Resistive Zone
- Zone A Approximate outline of broad magnetic zone defined by a change in magnetic declination



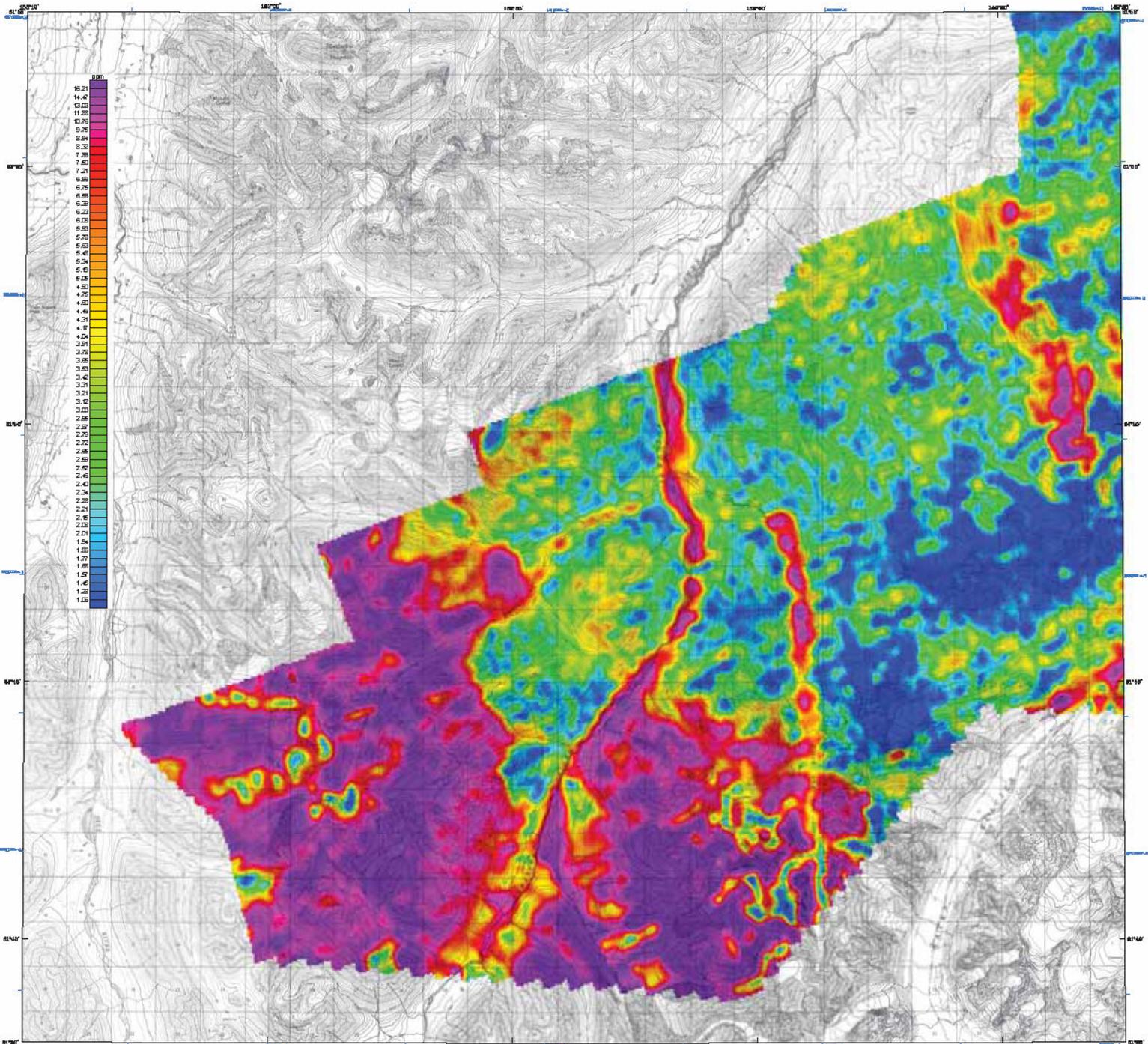




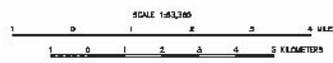
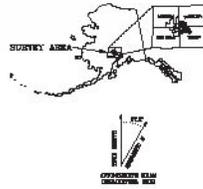








Date: June 13, 2014; Survey Name: 2014-G-228; 0-4, 100, 0-1, 000, 0-4, 000  
 Date: 2014-06-13; 2014-06-13; 2014-06-13; 2014-06-13



**THORIUM (eTh)  
 WITH TOPOGRAPHY,  
 EAST STYX SURVEY AREA,  
 SOUTH-CENTRAL ALASKA**  
 PARTS OF THE TALKEEITNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

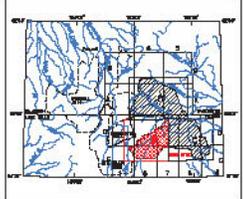
by  
 Laurel E. Burns, CGG, and Fugro Geosciences, Inc.  
 2014

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-3000 gamma-ray spectrometer. It was configured with 18.8L (1034 cubic inches) of NaI (Cs) crystal detector, and 4.3L (265 cubic inches) of NaI (Cs) crystal detector. After acquisition of data, Adjusted Single Peak Decomposition to the spectra counts from the main detector were recorded in the software corresponding to thorium (2410-2810 keV), uranium (1860-1960 keV), potassium (1320-1370 keV), total radioactivity (1000-2810 keV) and coarse spectra (2000-2800 keV). Counts from the main detector were recorded in the radio window (1860-1960 keV). The radio detection system was calibrated using the methods outlined in AGS Report 2008. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All data were then reprojected from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Interpreted Alaska: Energy Agency, 1981, Airborne Gamma Ray Spectrometry, Technical Report AGS, Interpreted Alaska: Energy Agency, Alaska.

**LOCATION INDEX OF 1:63,360-SCALE MAPS**

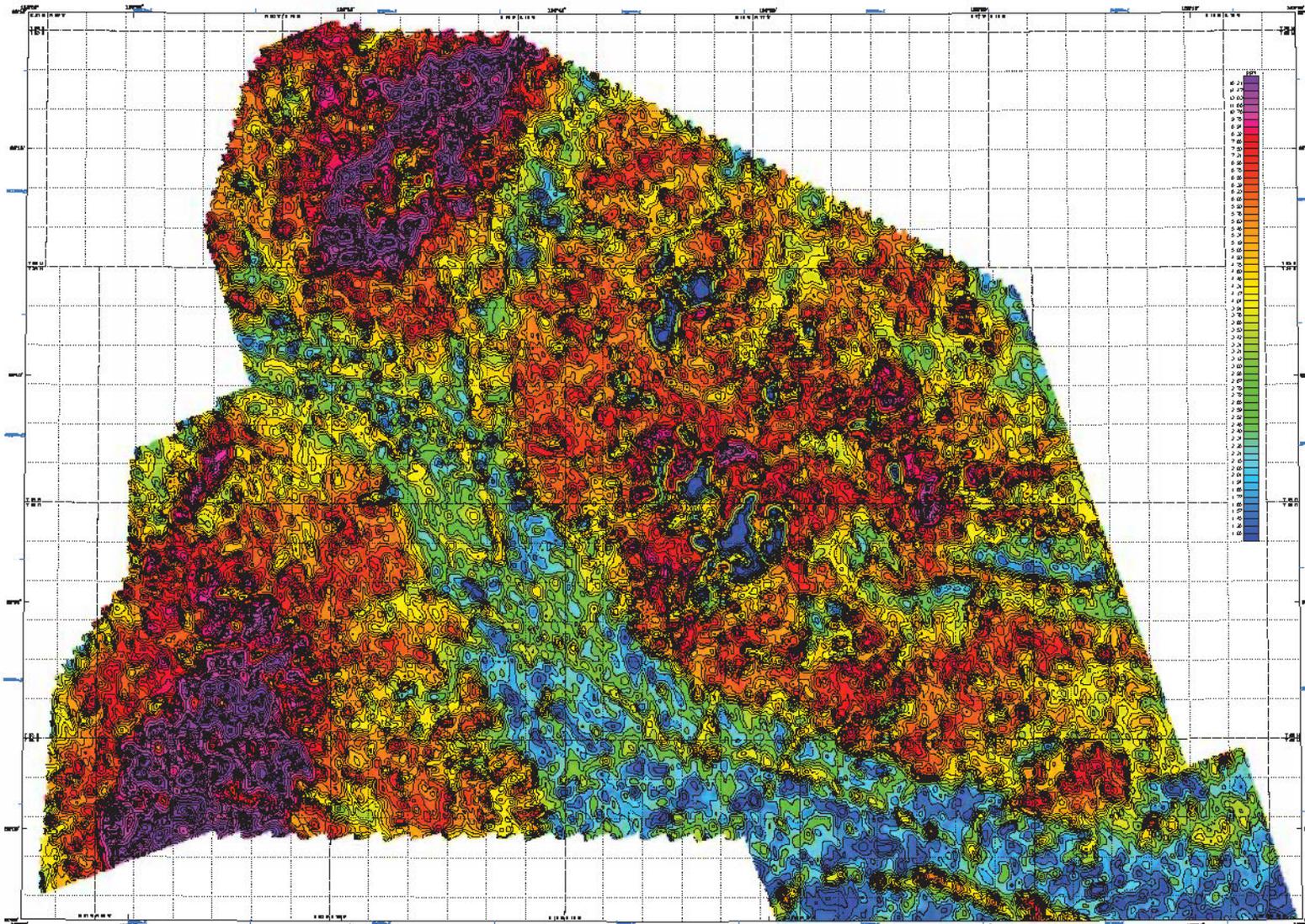


**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Fugro Geosciences, Inc. Airborne geophysical data for this area were acquired and processed by CGG in 2013 and 2014. Previously from DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 1995, 3304 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable for free from the DGGS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available on paper through the DGGS office, or are available online at the website in Adobe Acrobat PDF file format.

**DESCRIPTIVE NOTES**  
 The geophysical data were acquired with a DHEW Electromagnetic (EM) system, a GEI 01344 caesium magnetometer with a Bohrium 013 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/80 Hz motion and video camera, flight logs were performed with an AS-300-00 Spirit helicopter at a mean level of 200 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.  
 A Novatel OEM4-82L 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 (LTM zone 5) Spheroid, 1827 North American datum using a central meridian (CM) of 153° 30' north constant of 0 and an east constant of 300,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.





1000' 2000' 3000' 4000' 5000' 6000' 7000' 8000' 9000' 10000'



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a GEOPHYSICS Developmental (GD) version of the GEOPHYSICS system and a Resolution Software (RS) 200 geophysical workstation. The RS 200 workstation was used for data processing and map production. The RS 200 workstation was used for data processing and map production. The RS 200 workstation was used for data processing and map production.

**GEOMETRICS**

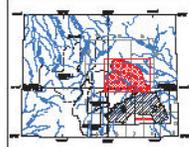
The geophysical data were acquired at a 1.0 second sample rate using a Resolution Software (RS) 200 geophysical workstation. The RS 200 workstation was used for data processing and map production. The RS 200 workstation was used for data processing and map production.

**THORIUM (eTh)  
WITH DATA CONTOURS,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKIETNA, TYONEK, MEGORATH AND LIME HILLS QUADRANGLES

by  
Laural E. Bawn, DOR, and Fagan Claiborne, Inc.

LOCATION MAP OF 1:62,500-SCALE MAPS



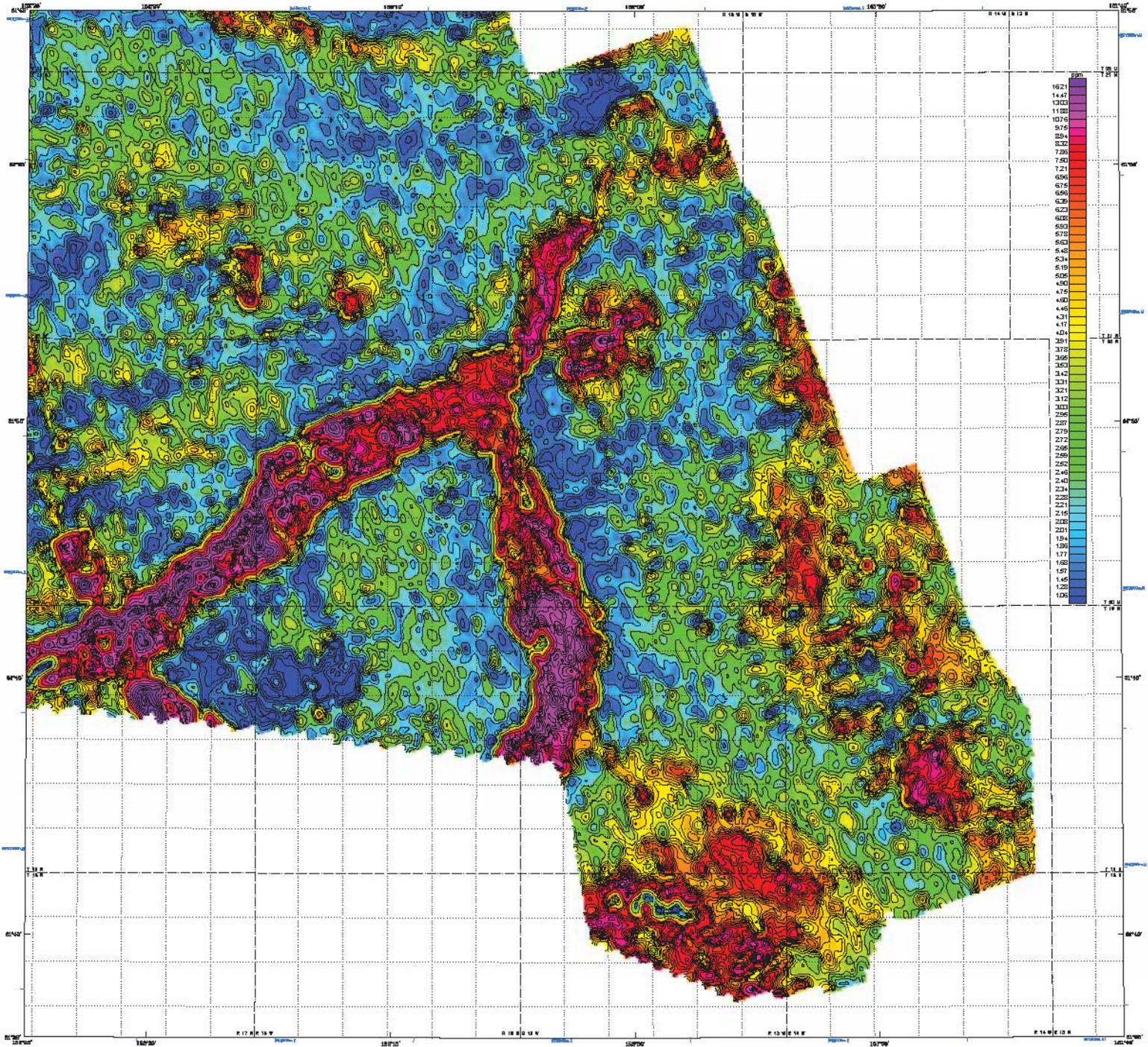
**SURVEY HISTORY**

The area has been surveyed and shown under contract between the State of Alaska, Department of Natural Resources, Division of Geology, and Fagan Claiborne, Inc. (FCI), and Fagan Claiborne, Inc. (FCI), and Fagan Claiborne, Inc. (FCI).

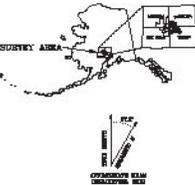
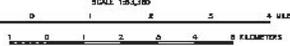
**CONTOUR INTERVAL**

.....	0.20 ppm
.....	0.40 ppm
.....	0.60 ppm
.....	0.80 ppm
.....	1.00 ppm
.....	1.20 ppm
.....	1.40 ppm
.....	1.60 ppm
.....	1.80 ppm
.....	2.00 ppm
.....	2.20 ppm
.....	2.40 ppm
.....	2.60 ppm
.....	2.80 ppm
.....	3.00 ppm
.....	3.20 ppm
.....	3.40 ppm
.....	3.60 ppm
.....	3.80 ppm
.....	4.00 ppm
.....	4.20 ppm
.....	4.40 ppm
.....	4.60 ppm
.....	4.80 ppm
.....	5.00 ppm
.....	5.20 ppm
.....	5.40 ppm
.....	5.60 ppm
.....	5.80 ppm
.....	6.00 ppm
.....	6.21 ppm





Scale: 1:63,560. UTM Zone 18N, UTM Datum: WGS 84, UTM Spheroid: GRS 80, UTM Projection: UTM, UTM Units: Meter, UTM False Easting: 500,000, UTM False Northing: 10,000,000.

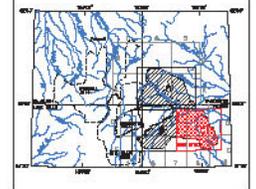


# THORIUM (eTh) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Fugo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,560-SCALE MAPS



**DESCRIPTIVE NOTES**  
The geophysical data were acquired with a DHEWY Electromagnetic (EM) system, a GE 01344 cesium magnetometer with a Schminke Cs-137 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz magnetometer and video camera. Flight logs were performed with an AS-300-B3 Spirit Helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.  
A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using post-flight differential positioning to a relative accuracy of better than 0.1 m. Flight logs were processed using the Corbin 1888 (UTM zone 5) projection, 1927 North American datum, taking a central meridian (CM) of 153° a north constant of 0 and an east constant of 500,000. Potential accuracy of the processed data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**  
The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.8L (1024 cells, inches) of NaI (best) 143 crystal detector, and 4.2L (288 cells, inches) of NaI (best) 143 crystal detector. After acquisition of NaI adjusted singular value decomposition to the spectra, counts from thorium (241Pb-232Th), uranium (235U-238U), potassium (40K) (1320-1270 keV), total radioactivity (100-2815 keV) and cosmic radiation (3000-24000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detector system was oriented relative to the survey line. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and separation from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid files contained in the publication.  
Interpretation Agency: Energy Agency, 1991, Alaska Division for Spectrometer Surveying Technical Paper 333, International Atomic Energy Agency, Vienna.

**CONTOUR INTERVAL**

.....	1000 ppm
.....	2500 ppm
.....	0.40 ppm

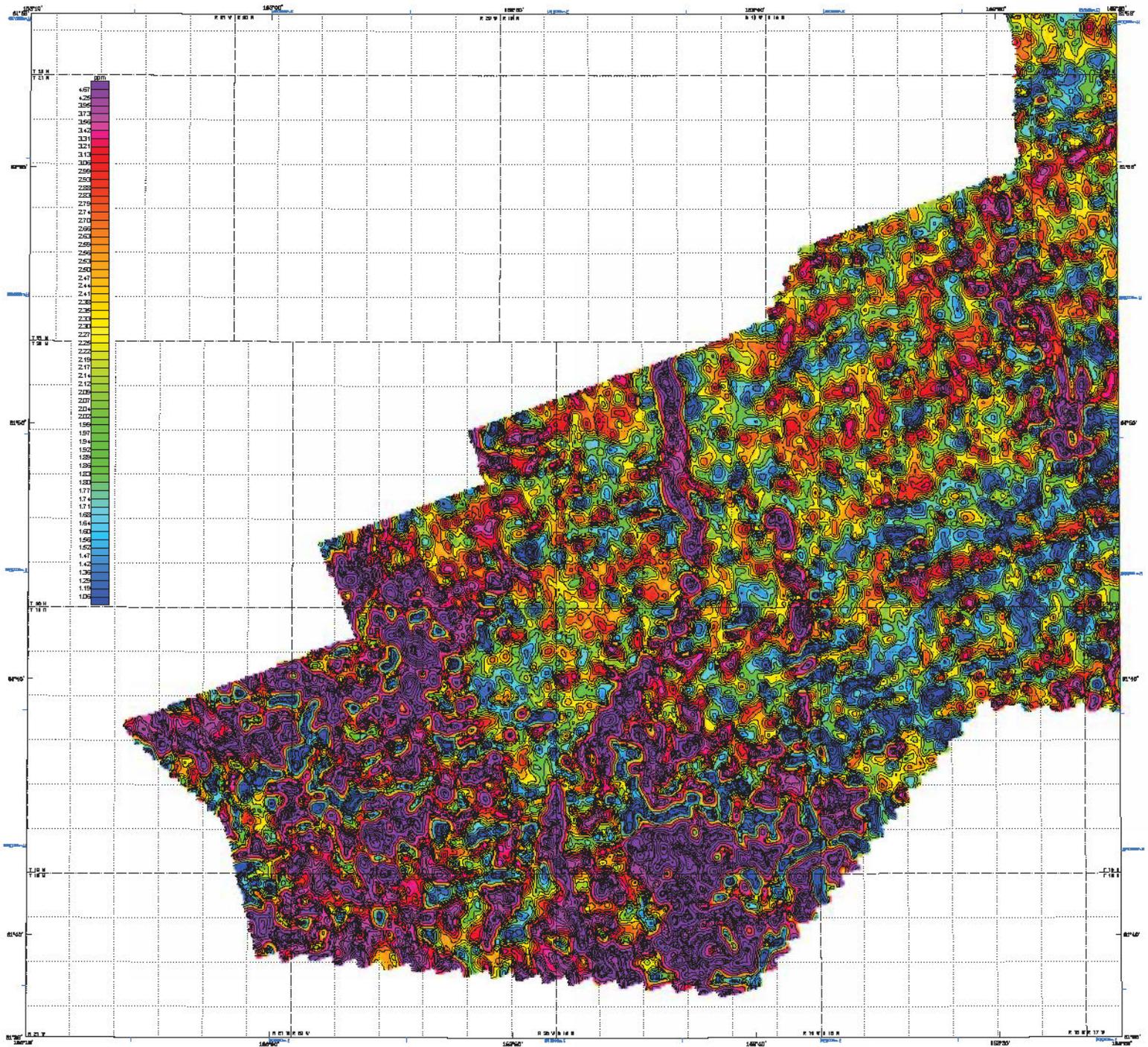
**SURVEY HISTORY**  
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGPS), and Fugo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey lines, and data of the location. The project was funded by the Alaska State Lands as part of the Hope 3 Uranium Geological and Geological Mineral Inventory Program.  
All data and maps produced to date from this survey are available in digital format on CD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2707, and an arrangement for fees from the DGGPS website ([www.dggs.alaska.gov/pubs/](http://www.dggs.alaska.gov/pubs/)). Maps are also available on paper through the DGGPS and are available online at the website in Adobe Acrobat PDF file format.



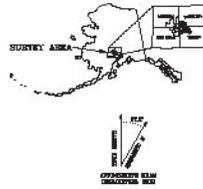








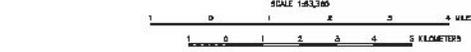
Scale: 1:63,360. UTM Zone 18N. Datum: NAD 83. Contour Interval: 0.50 ppm. Contour Labels: 0.50, 1.00, 1.50, 2.00, 2.50, 3.00, 3.50, 4.00, 4.50.



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEWEM Electromagnetic (EM) system, a GDS 01344 caesium magnetometer with a Bohmco C13 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, DGPS RTK motion and video camera, flight logs performed with an AS-300-B3 Squirrel helicopter at a mean level of 500 feet along NE-SW 717 survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived every 2.5 seconds using post-flight differential positioning to a relative accuracy of better than 2.5 cm. Flight logs were projected onto the Clarke 1886 (UTM zone 5) projection, 1827 North American datum using a central meridian (CM) of 123° a north coordinate of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.



# URANIUM (eU) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

**RADIOMETRICS**

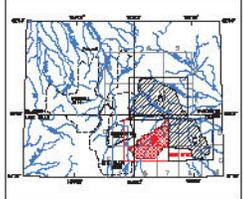
The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.8L (1024 cells, 10 inch) of NaI (Searles) NaI crystal detector, and ACS (206 cells) of NaI (Searles) NaI crystal detector. After operation of NaI (Searles) NaI crystal detector, the detector counts from the main detector were recorded in five windows corresponding to Thorium (241D-261D keV), Uranium (188D-188B keV), Potassium (132D-137B keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-28000 keV). Counts from the radar detector were recorded in the radar window (1800-1850 keV). The radar detector system was operated following methods outlined in EGSR Report 302. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and separation from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in this publication.

International Atomic Energy Agency, 1994. *Alphabetic System For Spectrometer Surveying Technical Paper 333*, International Atomic Energy Agency, Vienna.

**CONTOUR INTERVAL**

.....	0.50 ppm
.....	1.00 ppm
.....	0.20 ppm

LOCATION INDEX OF 1:63,360-SCALE MAPS



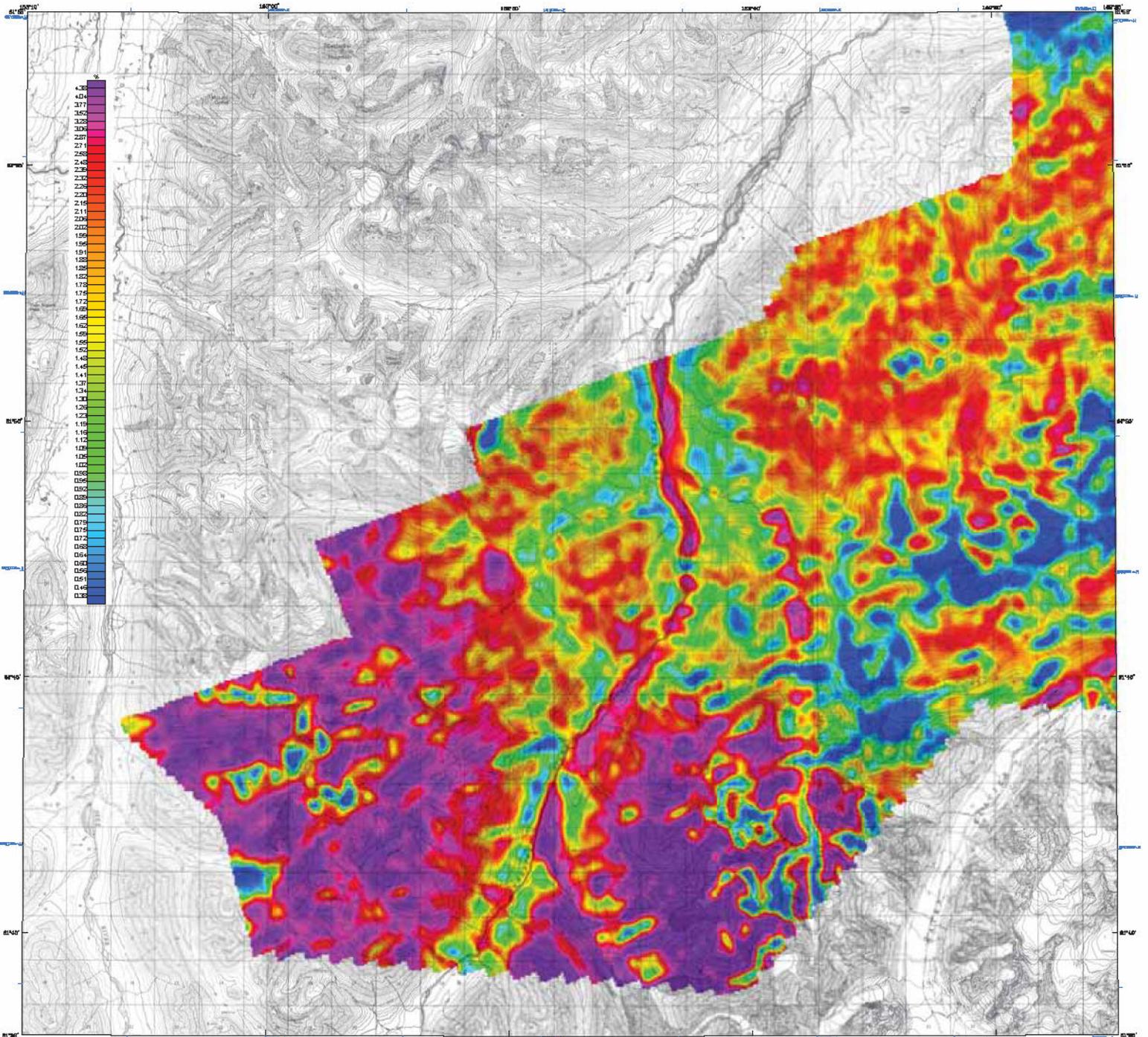
**SURVEY HISTORY**

This map has been compiled and drawn under contract to the Alaska Division of Geological & Geophysical Surveys (DGGGS), Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

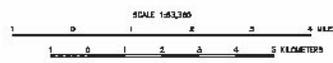
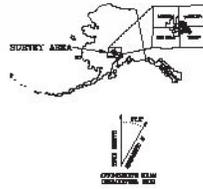
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3304 College Road, Fairbanks, Alaska, 99709-2177, and are downloadable for free from the DGGGS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available in paper format. The DGGGS office and its various units are located in Alaska Aerialist 337 file format.







Date: June 13, 2014; Survey Dates: 6-1, 2014, 6-4, 10-1, 6-7, 2014, 6-8, 2014  
 Date: July 1, 2014; Survey Dates: 7-1, 10-1, 2014



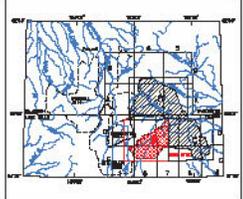
**POTASSIUM (%K)  
 WITH TOPOGRAPHY,  
 EAST STYX SURVEY AREA,  
 SOUTH-CENTRAL ALASKA**  
 PARTS OF THE TALKIEKTA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, CGG, and Fugro Geosciences, Inc.  
 2014

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Detection RS-3000 gamma-ray spectrometer. It was configured with 18.8L (1034 cubic inches) of NaI (Cs) crystal detector, and 432, (208 cubic inches) of NaI (Cs) crystal detector. After acquisition of 1000 Adjusted Single Pulse Discrimination to the spectra, counts from the main detector were recorded in the ratios corresponding to thorium (2410-2810 keV), uranium (1860-1960 keV), potassium (1320-1370 keV), total radioactivity (1000-2810 keV) and coarse spectra (2000-2800 keV). Counts from the main detector were recorded in the ratio window (1860-1960 keV). The ratio detection system was calibrated using methods outlined in AGS Report 200. After removal of the background, the data were corrected for spectral interferences, obtained by temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then corrected to standard conditions and were interpolated to a 100 m grid using a minimum curvature technique. All data were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

**LOCATION INDEX OF 1:63,360-SCALE MAPS**



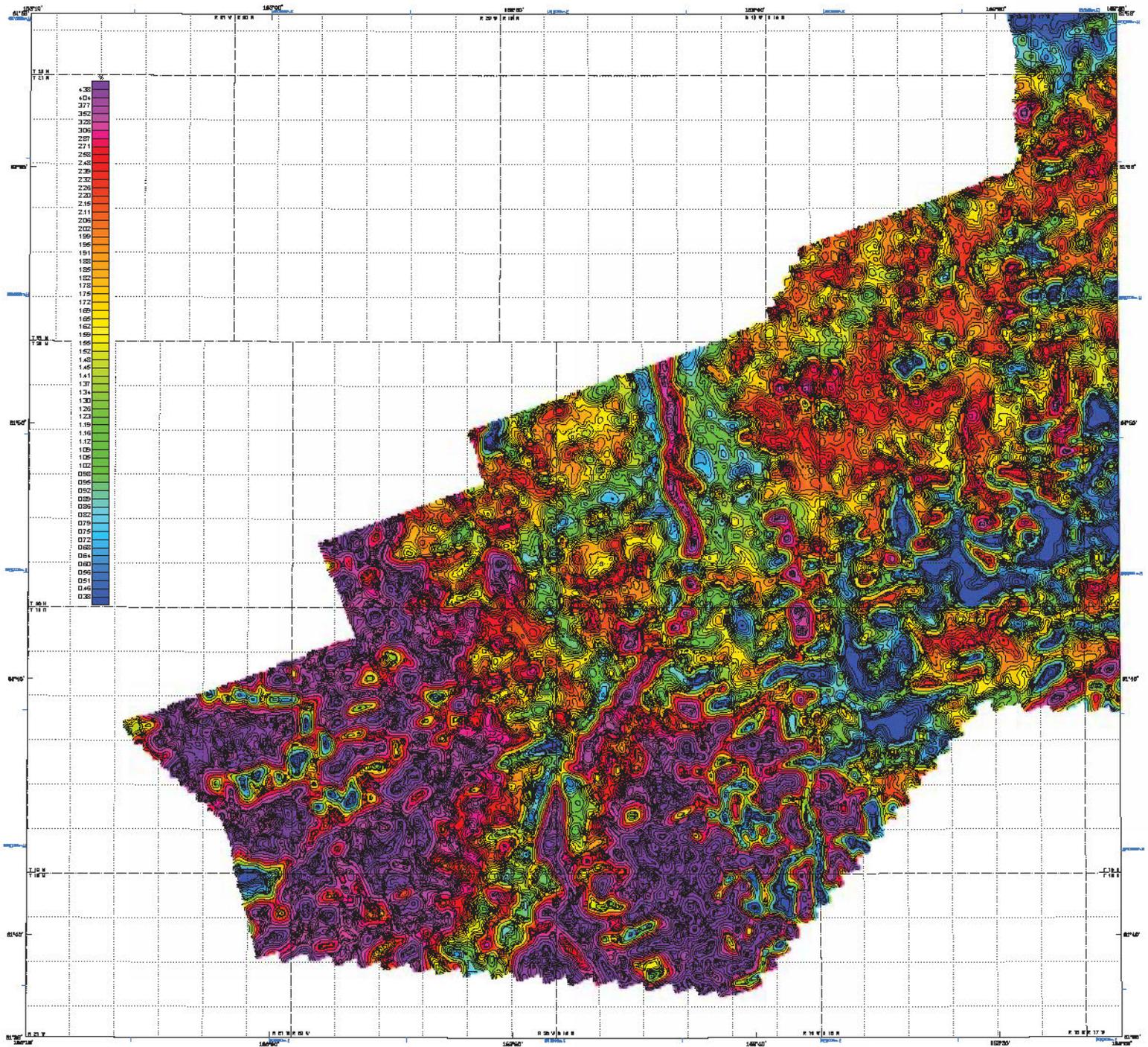
**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Fugro Geosciences, Inc. Airborne geophysical data for this area were acquired and processed by CGG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2707, and are downloadable free from the DGG&G website ([www.dggg.alaska.gov/pub/](http://www.dggg.alaska.gov/pub/)). Maps are also available on paper through the DGG&G office, on one variable width of the website in Adobe Acrobat PDF file format.

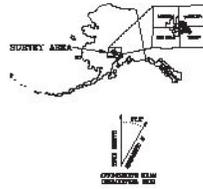
**DESCRIPTIVE NOTES**  
 The geophysical data were acquired with a DHEWY Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Bohrium 013 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 200/80 Hz motion and video camera, flight logs were performed with an AS-300-00 Spirit helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.  
 A Novatel OEM4-82L 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 3 m. Flight path positions were projected onto the Clarke 1886 (LTM zone 5) Spheroid, 1827 North American datum using a central meridian (CM) of 153° 3 north constant of 0 and an east constant of 300000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.







Scale: 1:63,360. UTM Zone 18N. Datum: NAD 83. Contour Interval: 200. Contour Labels: 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430.



**DESCRIPTIVE NOTES**

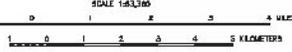
The geophysical data were acquired with a DHEWY Electromagnetic (EM) system, a GSI 01344 caesium magnetometer with a Bohmco C13 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic anomalies were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, DGPS RTK motion and video camera, flight logs performed with an AS-350-B3 Super Helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived every 2.5 seconds using post-flight differential positioning to a relative accuracy of better than 15 millimetres using real-time corrections from the CORS 1888 (UTM zone 18N), 1827 North American datum using a central meridian (CM) of 1637, a north coordinate of 0 and an east coordinate of 500000. Potential accuracy of the processed data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.8L (1024 cells, 10 inch) of NaI (scintillator) NaI crystal detector, and 423, (208 cells) of NaI of lower energy (crystal) detector. After optimization of noise adjusted Single Value Decomposition to the spectra, counts for Thorium (241D-241D keV), Uranium (188D-188D keV), potassium (132D-132D keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-28000 keV). Counts from the radon detector were recorded in the radon window (1880-1880 keV). The radon detector system was operated following methods outlined in ASG Report 302. After removal of the background, the data were corrected for spectral interferences, anomalies in temperature, pressure, and separation from the planned survey elevation of 200 feet. The data were then converted to standard concentrations while which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and find grids contained in this publication.

International Geophysics Agency, 1991. Airborne Gamma-Ray Spectrometer Surveying Technical Paper 333, International Atomic Energy Agency, Vienna.



**POTASSIUM (%K) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA**

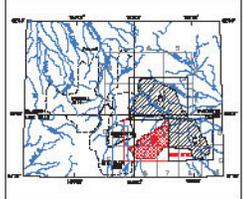
PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

**CONTOUR INTERVAL**

.....	200
.....	100
.....	0.10

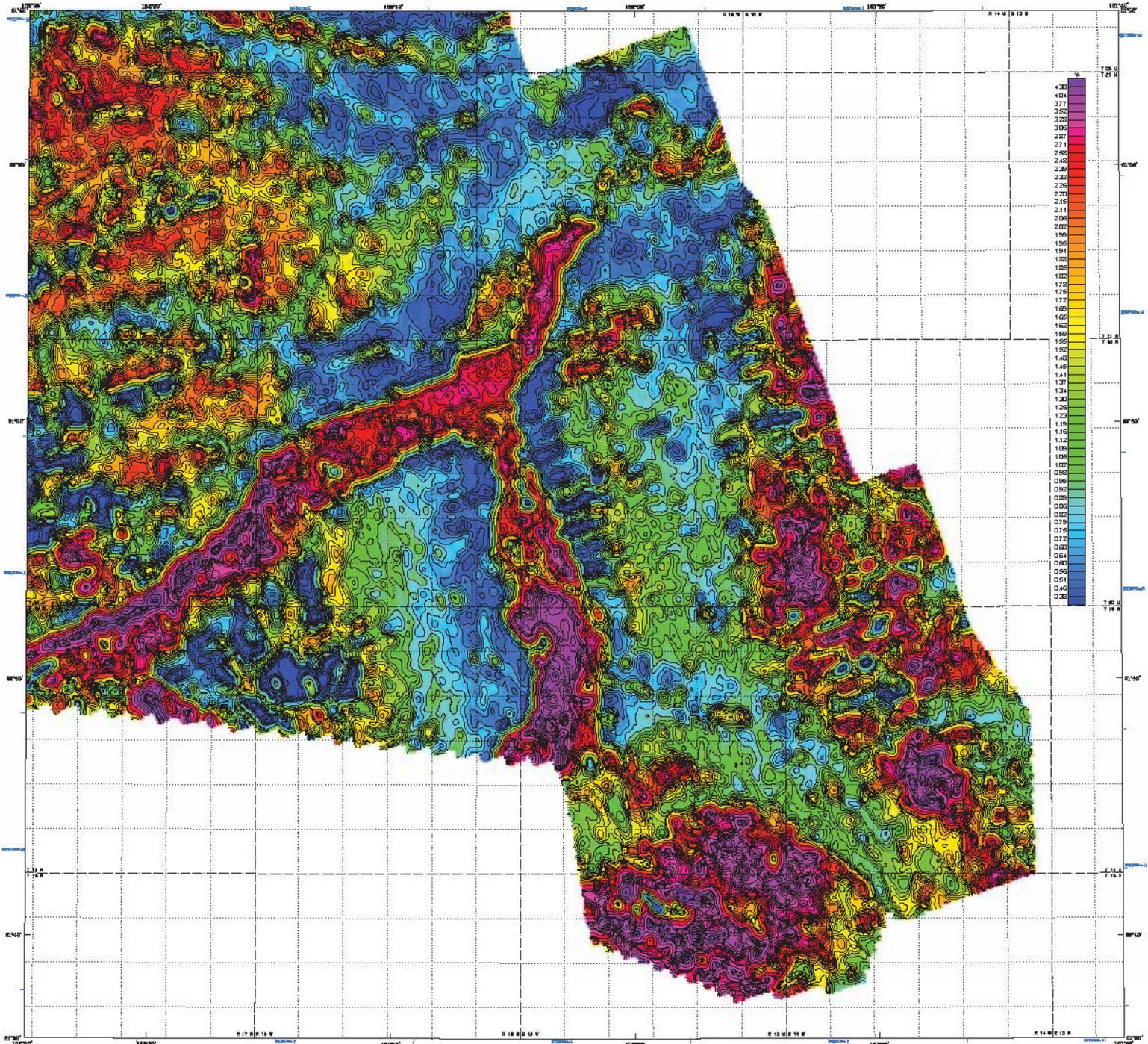
LOCATION INDEX OF 1:63,360-SCALE MAPS



**SURVEY HISTORY**

This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pigo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical (ASG&G) Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a period from through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2177, and are accessible by file from the DGG&G website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available in paper format. The DGG&G office and its various units of the website in Adobe Acrobat PDF file format.



Scale: 1:63,560. UTM Zone 18N, Datum: NAD 83, Contour Interval: 500, Contour Label: 330, Contour Color: Blue, Contour Style: Solid, Contour Width: 2, Contour Offset: 0, Contour Label Position: Inside, Contour Label Size: 10, Contour Label Color: Black, Contour Label Angle: 0, Contour Label Spacing: 100, Contour Label Offset: 0, Contour Label Font: Arial, Contour Label Weight: Normal, Contour Label Style: Plain, Contour Label Size: 10, Contour Label Color: Black, Contour Label Angle: 0, Contour Label Spacing: 100, Contour Label Offset: 0, Contour Label Font: Arial, Contour Label Weight: Normal, Contour Label Style: Plain.



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DICEHEV Electromagnetic (EM) system, a GE 01344 cesium magnetometer with a Schmidt C10 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 607/80 Hz motion and video camera, flight logs performed with an AS-300-00 Spirit Helicopter at a mean level in elevation of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using GPS records using post-flight differential positioning to a relative accuracy of better than 2 m. Flight path data were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° a north constant of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.8L (1024 cells, 10.2 inch) of NaI (Germanium) NaI crystal detector, and 4.2L (2048 cells) of NaI (Germanium) NaI crystal detector. After acquisition of NaI adjusted singular value decomposition to the spectra, counts from thorium (214Pb-214Bi), uranium (238U-234m, 235U), potassium (40K) (2000-28000 cps), counts from the radon detector were recorded in the radon window (1800-1850 cps). The radon detector system was oriented relative to the survey line. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and separation from the planned survey elevation of 200 feet. The data were then normalized to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in this publication.

Interpretation Agency: Energy Agency, 1991, Alaska Division for Spectrometer Surveying Technical Paper 333, International Atomic Energy Agency, Vienna.

**POTASSIUM (%K) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA**

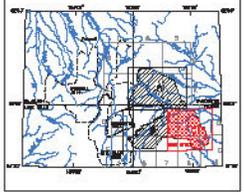
PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by Laurel E. Burns, COG, and Pigo Geoservices, Inc. 2014

**CONTOUR INTERVAL**

.....	500
.....	100
.....	10

LOCATION INDEX OF 1:63,560-SCALE MAPS

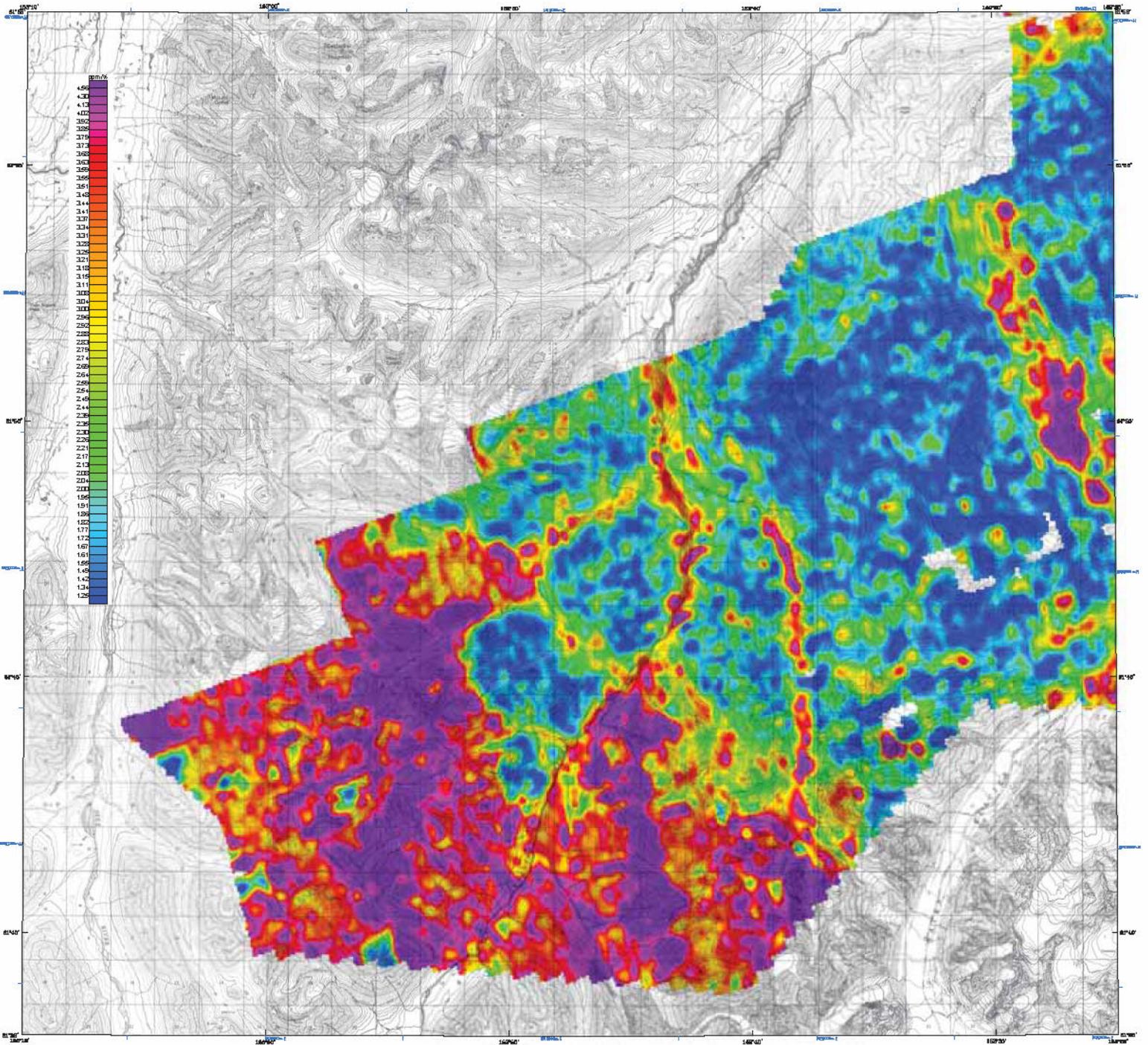


**SURVEY HISTORY**

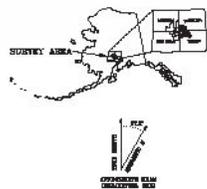
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGPS), and Pigo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey lines, and data of the bottom. The project was funded by the Alaska State Lands as part of the Hope, Alaska Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99708-3707, and an administrative fee from the DGGPS website ([www.dggs.alaska.gov](http://www.dggs.alaska.gov)). Maps are also available on paper through the DGGPS, and are available online at the website in Adobe Acrobat PDF file format.





Date: June 13, 2014; Survey Dates: 6-1-13, 6-4, 13; 6-7, 8, 9, 2014  
 Date: 2014-05-14; 1:50,000 Scale



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEW/EM Electromagnetic (EM) system, a GE 01344 caesium magnetometer with a Bohrium 013 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition to the primary data from the EM and lower altitudes, GPS navigation system, 200/80 Hz magnetic and video camera, flight logs performed with an AS-300-00 Spirit Helicopter at a mean height of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-82L 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 3 m. Flight path positions were projected onto the Clarke 1886 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 163° a north coordinate of 0 and an east coordinate of 500,000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.



**THORIUM / POTASSIUM (eTh / %K)  
 WITH TOPOGRAPHY,  
 EAST STYX SURVEY AREA,  
 SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 1628 (1024 chx) inches) of NaI (Scintiscan) NaI crystal detector, and 4.0 (288 chx) inches) of upper looking (upward) detector, after optimization of noise (Adjusted Singular Value Decomposition) to the spectra counts from the main detector were recorded in the windows corresponding to thorium (241D-281D keV), uranium (188B-189B keV), potassium (137B-137B keV), total radioactivity (100-281B keV) and cosmic radiation (3000-38000 keV). Counts from the upper detector were recorded in the main window (188B-189B keV). The radio detector system was calibrated before the flight (see also in USA Report 2014). After removal of the background, the data were corrected for spectral interferences, obtained in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were binarized in a 100 m grid using a minimum curvature technique. All grids were then reprojected from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in the products.

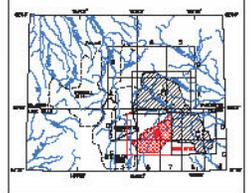
Interpreted Atomic Energy Agency, 1981; Alaska Division of Geophysical Surveys, Technical Report 2014; International Atomic Energy Agency, Vienna.

**THORIUM / POTASSIUM (eTh / %K)**

Measured radioelement concentrations for potassium and thorium will vary systematically with variations in soil thickness and moisture content. The ratio parameter reflects areas of enrichment of one radioelement relative to another.

A blank region indicates an area where the assumed concentrations fall below thresholds required for a meaningful calculation of the ratio.

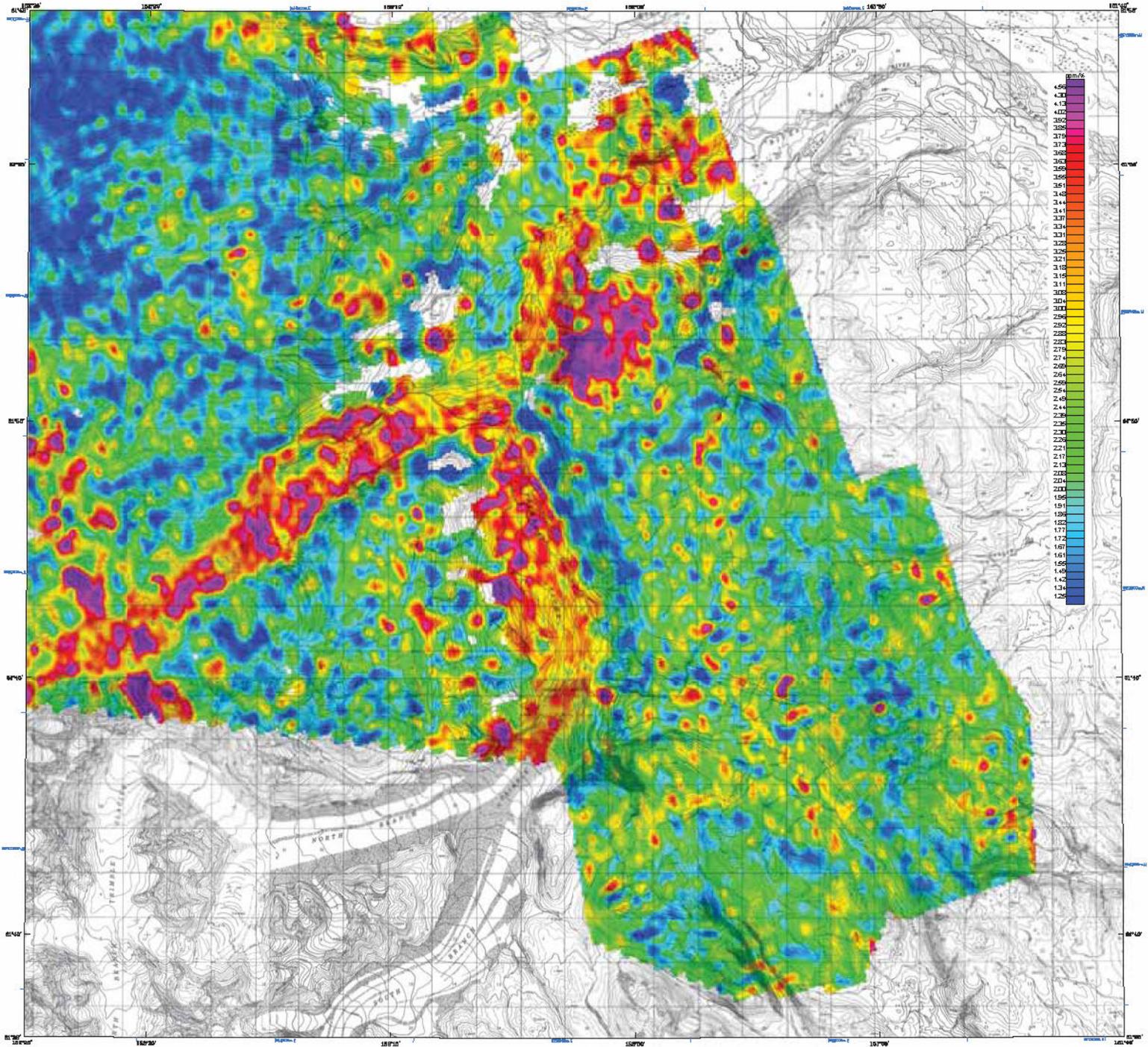
**LOCATION INDEX OF 1:63,560-SCALE MAPS**



**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 (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by DGGPS in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division of Geological & Geophysical Survey's program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGPS, 3304 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable for free from the DGGPS website ([www.dggs.alaska.gov/pubs](http://www.dggs.alaska.gov/pubs)). Maps are also available in paper through the DGGPS office, on one variable media of the media in Adobe Acrobat PDF file format.



Date: June 13, 2014; Project Name: STX 04, 05, 06, 07, 08, 09, 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



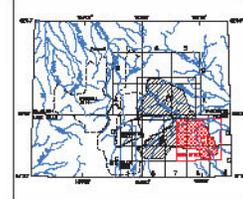
**DESCRIPTIVE NOTES**  
 The geophysical data were acquired with a DICEHYV Electromagnetic (EM) system, a GEI 01364 cesium magnetometer with a Bohrium C10 cesium sensor, and a Rodden Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 607/80 Hz magnetic and video camera, flight logs performed with an AS-350B3 Sikorski helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.  
 A Novatel OEM4-82L 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 2 m. Flight path waypoints were projected onto the Clarke 1882 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 153° 30' north coordinate of 0 and an east coordinate of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**THORIUM / POTASSIUM (eTh / %K)  
 WITH TOPOGRAPHY,  
 EAST STYX SURVEY AREA,  
 SOUTH-CENTRAL ALASKA**  
 PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

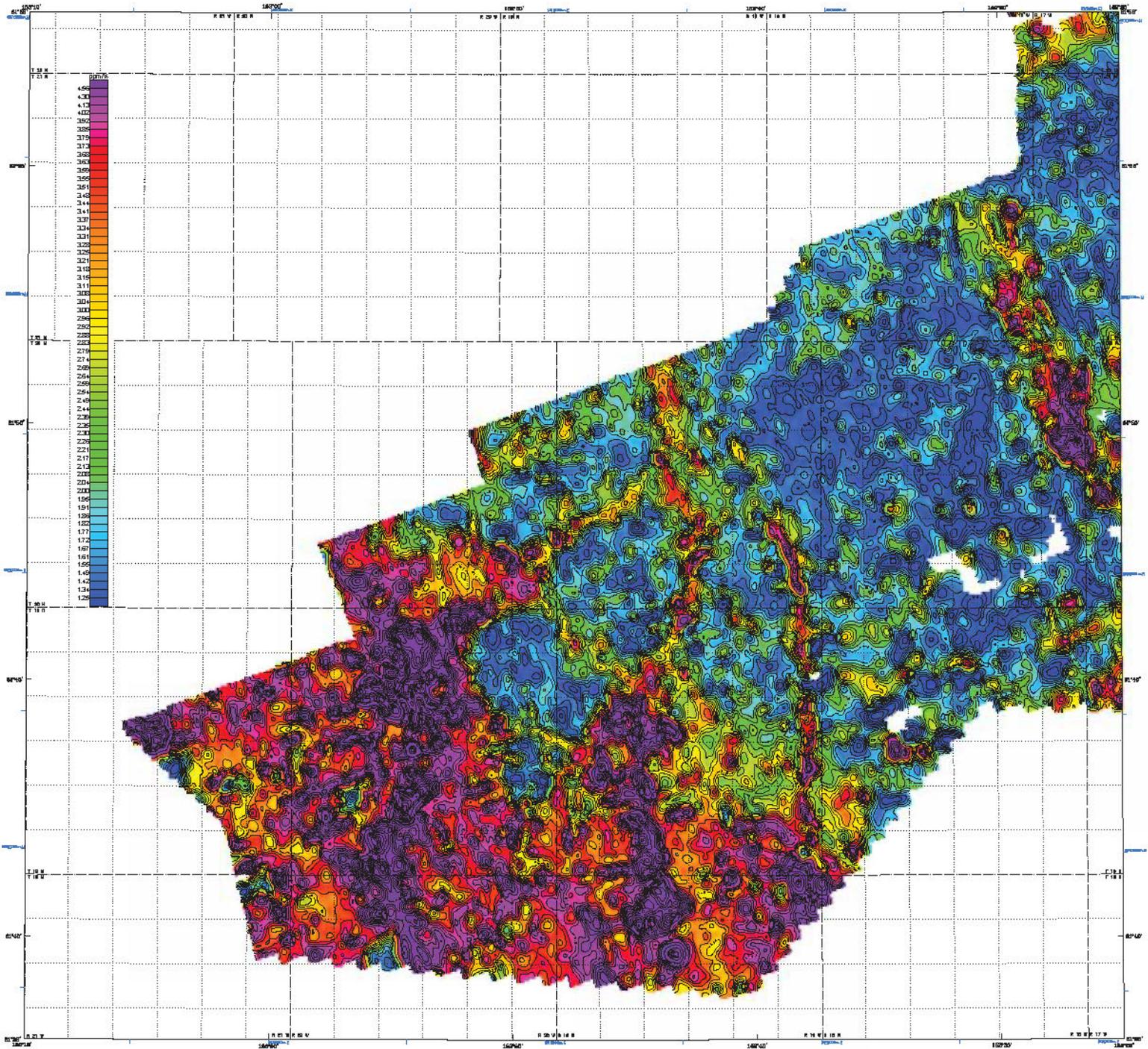
**RADIOMETRICS**  
 The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Rodden Solutions RS-300 gamma-ray spectrometer. It was configured with 1628 (1024 x 604) inches of lead (leadness) lead crystal detector, and 4.0 (200 cubic inches) of upward looking (upward) detector. After optimization of noise (Adjusted Singular Value Decomposition) to the spectra counts from the main detector were recorded in the windows corresponding to thorium (241D-281D keV), uranium (188B-189B keV), potassium (137B-137B keV), total radioactivity (100-281D keV) and cosmic radiation (3000-24800 keV). Counts from the main detector were recorded in the main window (188B-189B keV). The radio detector system was calibrated before the survey (see A-24 Report 2014). After removal of the background, the data were corrected for spectral interference, observed in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were binarized to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in the portfolio.  
 Thorium / Potassium (eTh / %K)  
 Measured radionuclide concentrations for potassium and thorium will vary systematically with variations in soil thickness and moisture content. The ratio parameter helps correct for enrichment of soil radionuclide relative to granite.  
 A blank region indicates an area where the assumed concentration fell below thresholds required for a meaningful calculation of the ratio.

LOCATION INDEX OF 1:63,360-SCALE MAPS

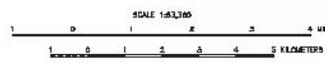
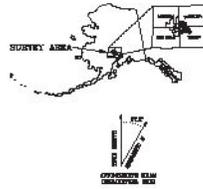


**SURVEY HISTORY**  
 This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGPS), and Pogo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by COG in 2013 and 2014. Previously flown DGGPS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.  
 All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 908E, 3304 College Road, Fairbanks, Alaska, 99709-2377, and are downloadable for free from the DGGPS website ([www.dggs.alaska.gov/gis/](http://www.dggs.alaska.gov/gis/)). Maps are also available in paper format through DGGPS office, or are available online at the website in Adobe Acrobat PDF file format.





Radioactive Isotope Data: Thorium, Potassium, Uranium, Radium, and Lead. Data from 1998-2000. U.S. Geological Survey, Denver, Colorado.

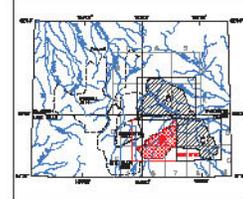


### THORIUM / POTASSIUM (eTh / %K) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo GeoServices, Inc.  
2014

LOCATION INDEX OF 1:63,360-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEW/EPA Radiometrics (RM) system, a GM 01344 cesium magnetometer with a Bohemia C13 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition, the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz motion and video camera, flight logs performed with an AS-350-B3 Squirrel helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of 0.25 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L 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 25 cm (RMS) per second. The data were projected onto the Albers 1983 (LHA zone 5) projection, 1827 North American datum using a central meridian (CM) of 153° 30' north-south of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.2L (1234 cubic inches) of high-purity NaI crystal detector, and 4.2L (258 cubic inches) of liquid NaI crystal detector. Other components of the Assembled Single-View Detector to the spectra counts from the main detector were recorded in the window corresponding to thorium (2410-2610 keV), uranium (1880-1890 keV), potassium (1460-1470 keV), total radioactivity (400-2810 keV) and several radionuclides (3000-28000 keV). Counts from the radon detector were recorded in the radon window (1680-1890 keV). The radon detector system was calibrated following methods outlined in USGS Report 303. After removal of the background, the data were corrected for spectral interference, checked for temperature, pressure, and moisture from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grid cells were resampled from the 100 m cell size down to a 25 m cell size to produce the maps and final grid contained in the publication.

International Atomic Energy Agency, 1991. *Alphabetic Reference For Spectrometer*. International Atomic Energy Agency, Vienna.

**THORIUM / POTASSIUM (eTh / %K)**

Measured radionuclide concentrations for potassium and thorium will vary systematically with variations in soil texture and moisture content. The ratio parameter below is a measure of enrichment of one radionuclide relative to another.

A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

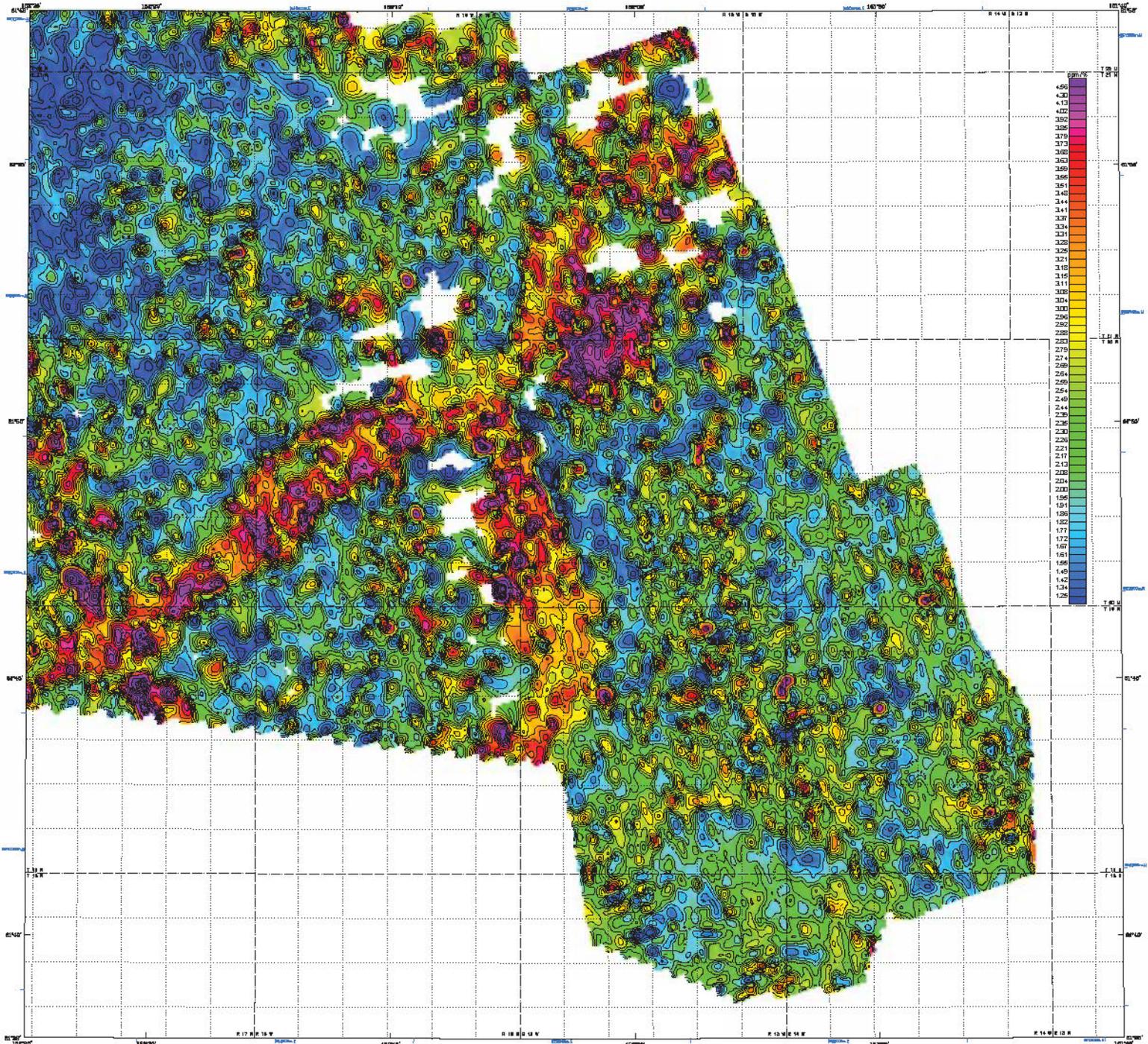
**CONTOUR INTERVAL**

.....	0.0 ppm/K
.....	1.0 ppm/K
.....	0.2 ppm/K

**SURVEY HISTORY**

This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Pigo GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGGGS in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and dates of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska State Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and are downloadable for free from the DGGGS website ([www.dgggs.alaska.gov/pubs](http://www.dgggs.alaska.gov/pubs)). Maps are also available in paper format through the DGGGS, and are available online at the website in Adobe Acrobat PDF file format.



Scale bar showing 0 to 5 miles and 0 to 5 kilometers.

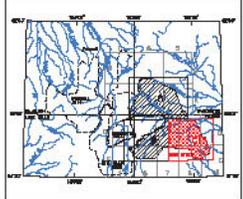


THORIUM / POTASSIUM (eTh / %K) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by Laurel E. Burns, COG, and Pogo Geoservices, Inc. 2014

LOCATION INDEX OF 1:63,560-SCALE MAPS



DESCRIPTIVE NOTES: The geophysical data were acquired with a DIXIEVEI Electromagnetic (EM) system, a GSI 01344 cesium magnetometer with a Schmidt C10 cesium sensor, and a Rodonics Spherics RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz magnetometer and video camera. Flight lines were performed with an AS-350-B3 Spirit Helicopter at a mean level of 500 feet above the ground. The survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

RADIOMETRICS: The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Rodonics Spherics RS-300 gamma-ray spectrometer. It was configured with 16.25 (1024 cells, 100% of max) (downward) for gamma detector, and 4.5 (256 cells, 100% of max) for gamma detector. Other acquisition of these Adjusted Single Value Decomposition to the spectra counts from thorium (210-2610 kcp), uranium (1680-1680 kcp), potassium (1200-1270 kcp), total radioactivity (400-5930 kcp) and cosmic radiation (3000-28000 kcp). Counts from the rodon detector were recorded in the rodon window (1880-1980 kcp). The rodon detector system was calibrated before the survey in a USA Report 352. After removal of the background, the data were corrected for spectral interference, checked for temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 20 m cell size to produce the maps and final grids contained in the publication.

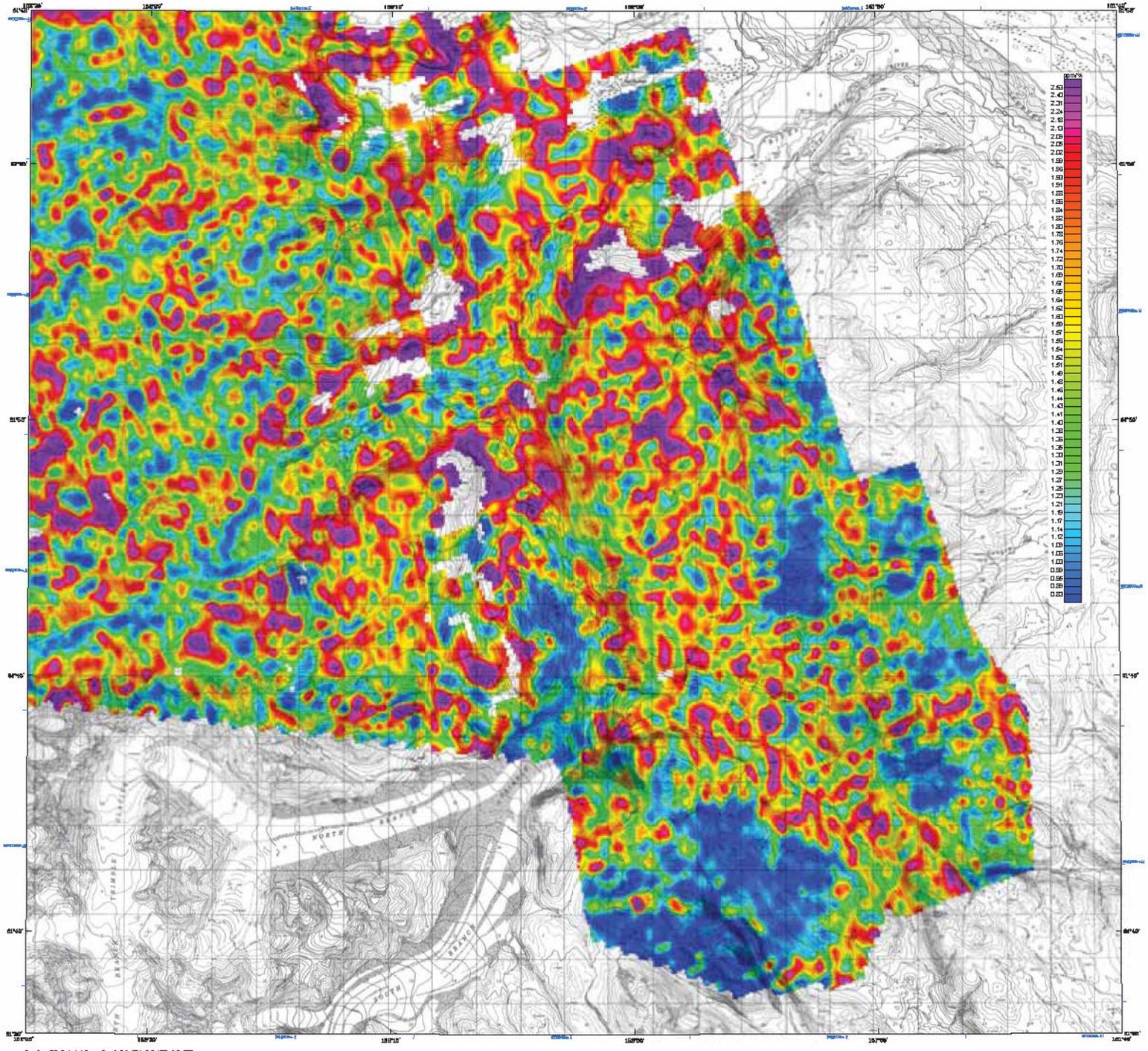
THORIUM / POTASSIUM (eTh / %K): Measured radionuclide concentrations for potassium and thorium will vary systematically with variations in soil texture and moisture content. The ratio parameter below is a measure of enrichment of the radionuclides relative to granite.

CONTOUR INTERVAL table with values 0.0 ppm/%, 1.0 ppm/%, 0.2 ppm/%

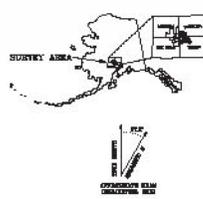
SURVEY HISTORY: This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were acquired and processed by COG in 2013 and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Lands as part of the Hope 2000 State Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on CD for a period for through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and an announcement for sale from the DGGS website (www.dggs.alaska.gov). Maps are also available on paper through the DGGS website (www.dggs.alaska.gov) or via satellite print of the maps in Adobe Acrobat PDF file format.







Date: June 13, 2014; Project Name: 2014-5-18C; Scale: 1:63,360; UTM Zone: 18N; Datum: NAD 83; Projection: UTM; Contour Interval: 20 Feet



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DICHEV Electromagnetic (EM) system, a GEI 01364 cesium magnetometer with a Bohrium C10 cesium sensor, and a Rodascan Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, DGPS RTK motion and video camera, flight logs performed with an AS-350B3 Sikorski helicopter at a mean level of 500 feet along NE-SW 7/8 survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L 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 2 m. Flight path positions were projected onto the Clarke 1886 (LHA zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 153° a north coordinate of 0 and an east coordinate of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

**URANIUM / POTASSIUM (eU / %K)  
WITH TOPOGRAPHY,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

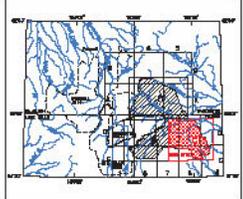
by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Rodascan Solutions RS-300 gamma-ray spectrometer. It was configured with 1628 (1024 x 604) inches of lead (Leadwell) lead crystal detector, and 432 (288 x 144) inches of sodium iodide (NaI) crystal detector. The operation of NaI (Adjusted Single Value Decomposition) to the spectra counts from the main detector was recorded in the window corresponding to thorium (2410-2810 keV), uranium (1880-1980 keV), potassium (1370-1570 keV), total radioactivity (100-2810 keV) and cosmic radiation (3000-24000 keV). Counts from the main detector were recorded in the main window (1880-1980 keV). The radio detector system was calibrated before the survey (see A-2 in Report 2014-5-18C). After removal of the background, the data were corrected for spectral interference, observed in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were binned into a 100 m grid using a minimum curvature technique. All grids were then reprojected from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in the products.

Interpreted Agency: Energy Agency, 1801, Alaska Division for Radiometric Surveys, Technical Report 2014, International Atomic Energy Agency, Vienna.

LOCATION INDEX OF 1:63,360-SCALE MAPS



**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 (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Mineral Inventory Program.

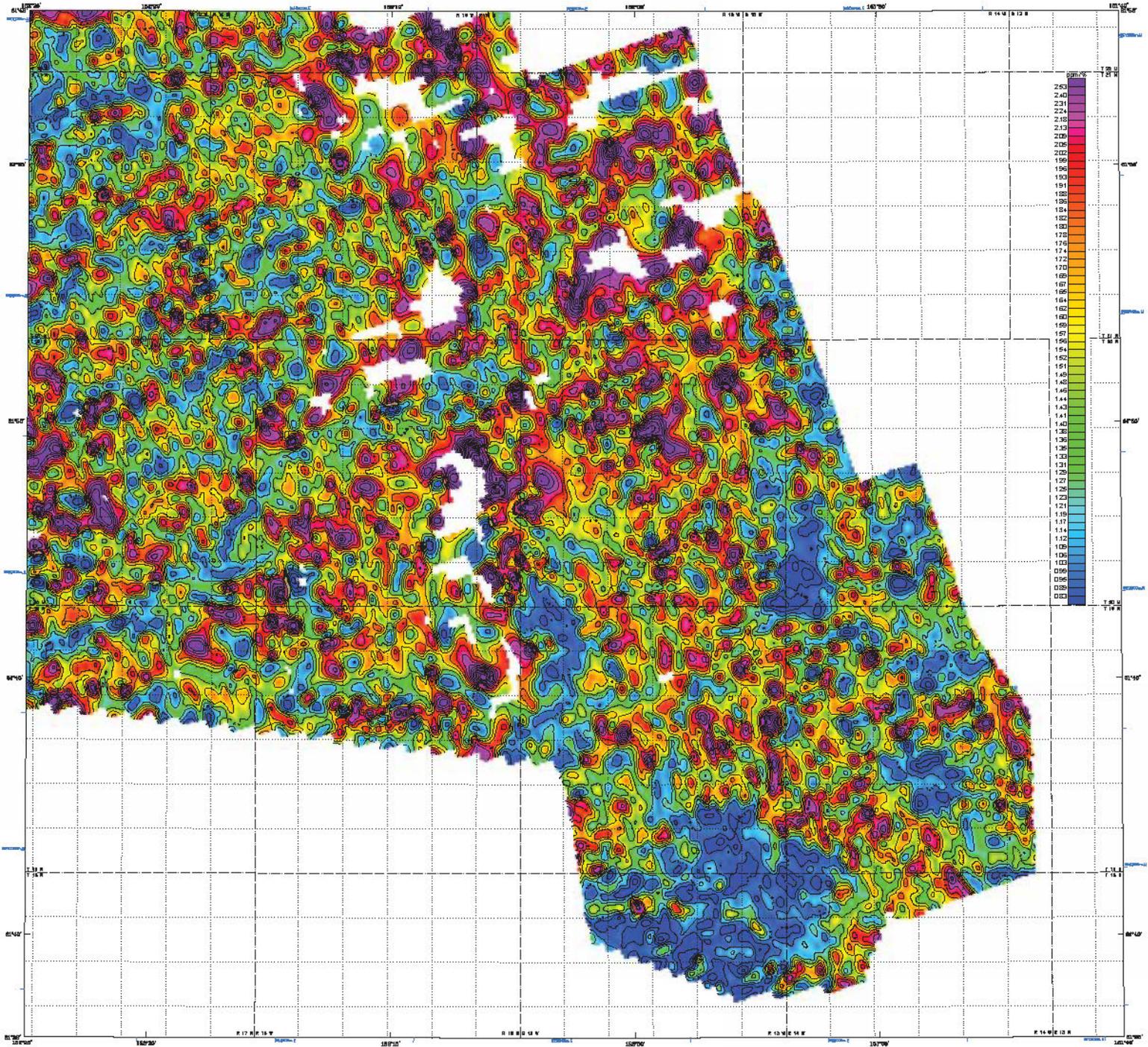
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGG&G, 3304 College Road, Fairbanks, Alaska, 99709-2177, and are downloadable for free from the DGG&G website ([www.dggg.alaska.gov/pubs](http://www.dggg.alaska.gov/pubs)). Maps are also available as pdf files through the DGG&G office, or via various online file sharing services in Adobe Acrobat PDF file format.

Measured radiometric concentrations for uranium and potassium will vary systematically with variations in soil thickness and moisture content. The ratio potassium/uranium is a useful indicator of enrichment of one radiometal relative to another.

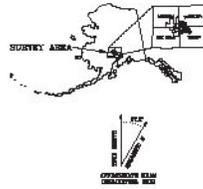
A blank region indicates an area where the assumed concentration fell below thresholds required for a meaningful calculation of the ratio.







Scale bar: 0 1 2 3 4 MILES

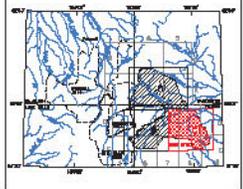


**URANIUM / POTASSIUM (eU / %K)  
WITH DATA CONTOURS,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKIETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

LOCATION INDEX OF 1:63,560-SCALE MAPS



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DICEHEV Electromagnetic (EM) system, a GEI 01364 cesium magnetometer with a Schmidt C60 cesium sensor, and a Radiation Systems RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz magnetometer and video camera. Flights were performed with an AS-300-B3 Spirit Helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using post-flight differential positioning to a relative accuracy of better than 5 m. Raw GPS data were processed using the Trimble TRIM (LTM issue 5) software. 1827 North American datum using a central meridian (CM) of 163° 3' north-south of 0 and an east constant of 500,000. Potential accuracy of the processed data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Systems RS-300 gamma-ray spectrometer. It was configured with 16.25 (1024 cubic inches) of NaI (downward) for gamma detection, and 4.5L (288 cubic inches) of upward looking (crystal) detector. After acquisition of these Adjusted Singular Value Decomposition to the spectra counts from the NaI detector were recorded in the windows corresponding to thorium (2410-2810 keV), uranium (1680-1880 keV), potassium (1320-1370 keV), total radioactivity (400-5930 keV) and cosmic radiation (3000-24000 keV). Counts from the NaI detector were recorded in the main window (1680-1880 keV). The radio detector system was calibrated for these radionuclides in USA Report 303. After removal of the background, the data were corrected for spectral interferences, checked for temperature, pressure and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were integrated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 20 m cell size to produce the maps and final grids contained in the publication.

**URANIUM / POTASSIUM (eU / %K)**

Measured radionuclide concentrations for uranium and potassium will vary systematically with variations in soil thickness and moisture content. The ratio parameter indicates areas of enrichment of one radionuclide relative to another.

A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

**CONTOUR INTERVAL**

- ..... 0.0 ppm/%
- ..... 1.0 ppm/%
- ..... 0.2 ppm/%

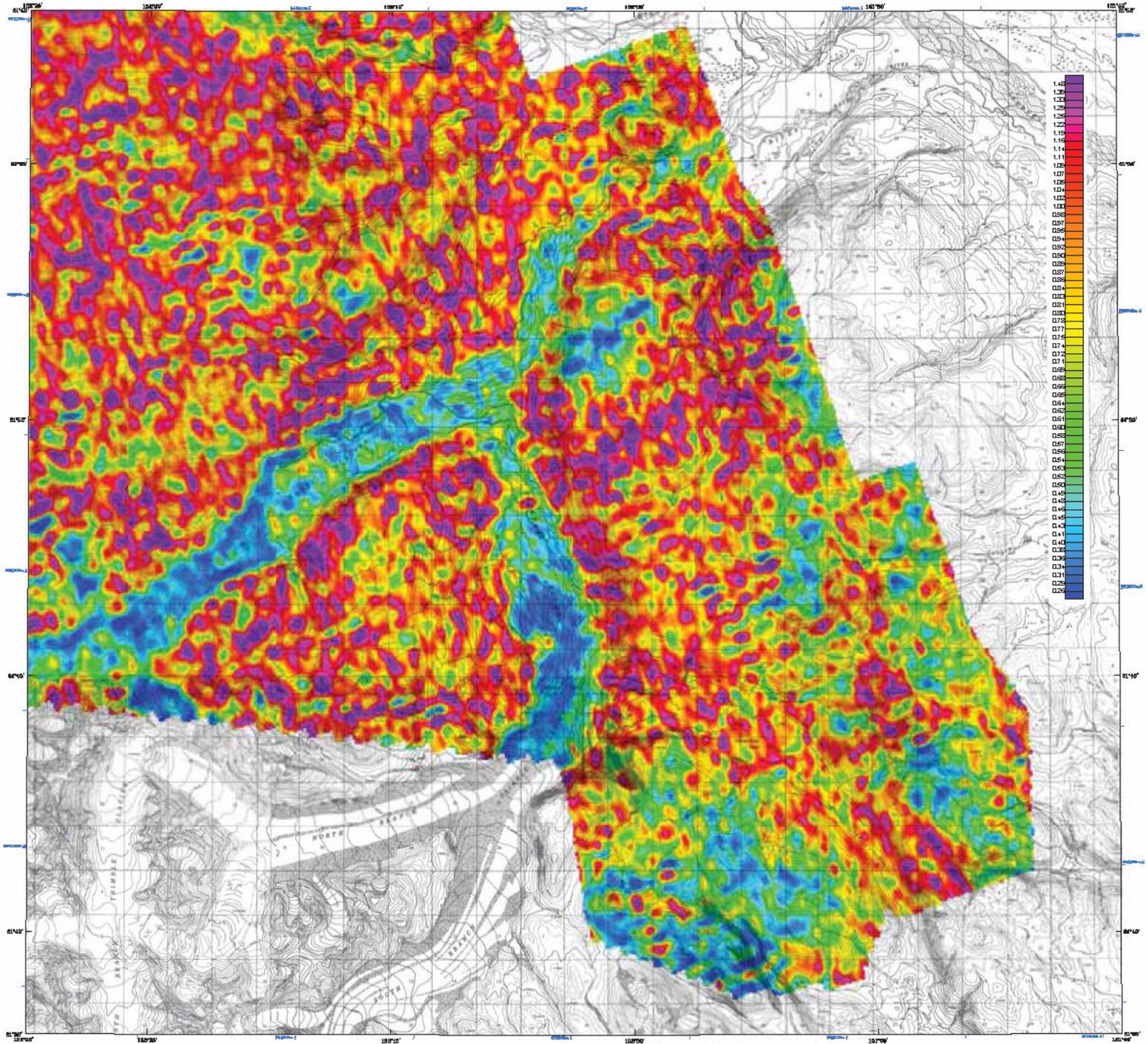
**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pigo Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Lands as part of the Hope, 100% Alaska Energy Survey and Geological (HES) Inventory Program.

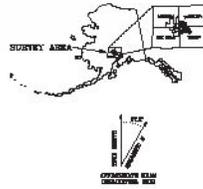
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and an arrangement for fees from the DGG&G website ([www.dgge.alaska.gov](http://www.dgge.alaska.gov)). Maps are also available on paper through the DGG&G and are available online at the website in Adobe Acrobat PDF file format.







Date: June 13, 2014; Revised Survey Track #4, 2014; 0-4, 1000, 4-4, 1000; P-4, 1000; 3-4, 2000; 7-7, 1000; 8-8, 1000; 9-9, 1000



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DICHEV Electromagnetic (EM) system, a GEI 01344 cesium magnetometer with a Bohemia C10 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 20/30 Hz magnetic and video camera, flight logs performed with an AS-300-00 Spirit helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM-620 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 25 m. Flight path waypoints were projected onto the Clarke 1882 (LTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 103° 3' north coordinate of 0 and an east coordinate of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

SCALE 1:63,360  
1 0 1 2 3 4 5 6 7 8 9 10 MILES  
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS

## URANIUM / THORIUM (eU / eTh) WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pigo Geoservices, Inc.  
2014

**RADIOMETRICS**

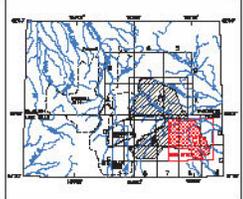
The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 1628 (1024 x 604) inches) of NaI (Cs) crystal detector, and 4.0 (200 counts/inch) of upward looking (upward) detector. After optimization of noise (Adjusted Singular Value Decomposition) to the spectra counts from the main detector were recorded in the windows corresponding to thorium (2410-2810 keV), uranium (1800-1900 keV), potassium (1370-1570 keV), total radioactivity (400-2810 keV) and cosmic radiation (3000-24000 keV). Counts from the main detector were recorded in the main window (1800-1900 keV). The radiometric system was calibrated before the mission (see A-24 Report 332). After removal of the background, the data were corrected for spectral interference, checked in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were binarized to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and the grids contained in the publication.

**URANIUM / THORIUM (eU / eTh)**

Measured radiometric concentrations for uranium and thorium are very sympathetic with variations in soil thickness and moisture content. The ratio parameter indicates areas of enrichment of one radiometal relative to another.

A blank region indicates an area where the assumed concentration fall below thresholds required for a meaningful calculation of the ratio.

LOCATION INDEX OF 1:63,360-SCALE MAPS



**SURVEY HISTORY**

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology & Geophysical Survey (DGG&S), and Pigo Geoservices, Inc. Airborne geophysical data for this area were collected and processed by COG in 2013 and 2014. Previously flown DGG&S surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division Geophysical and Geological Mineral Inventory Program.

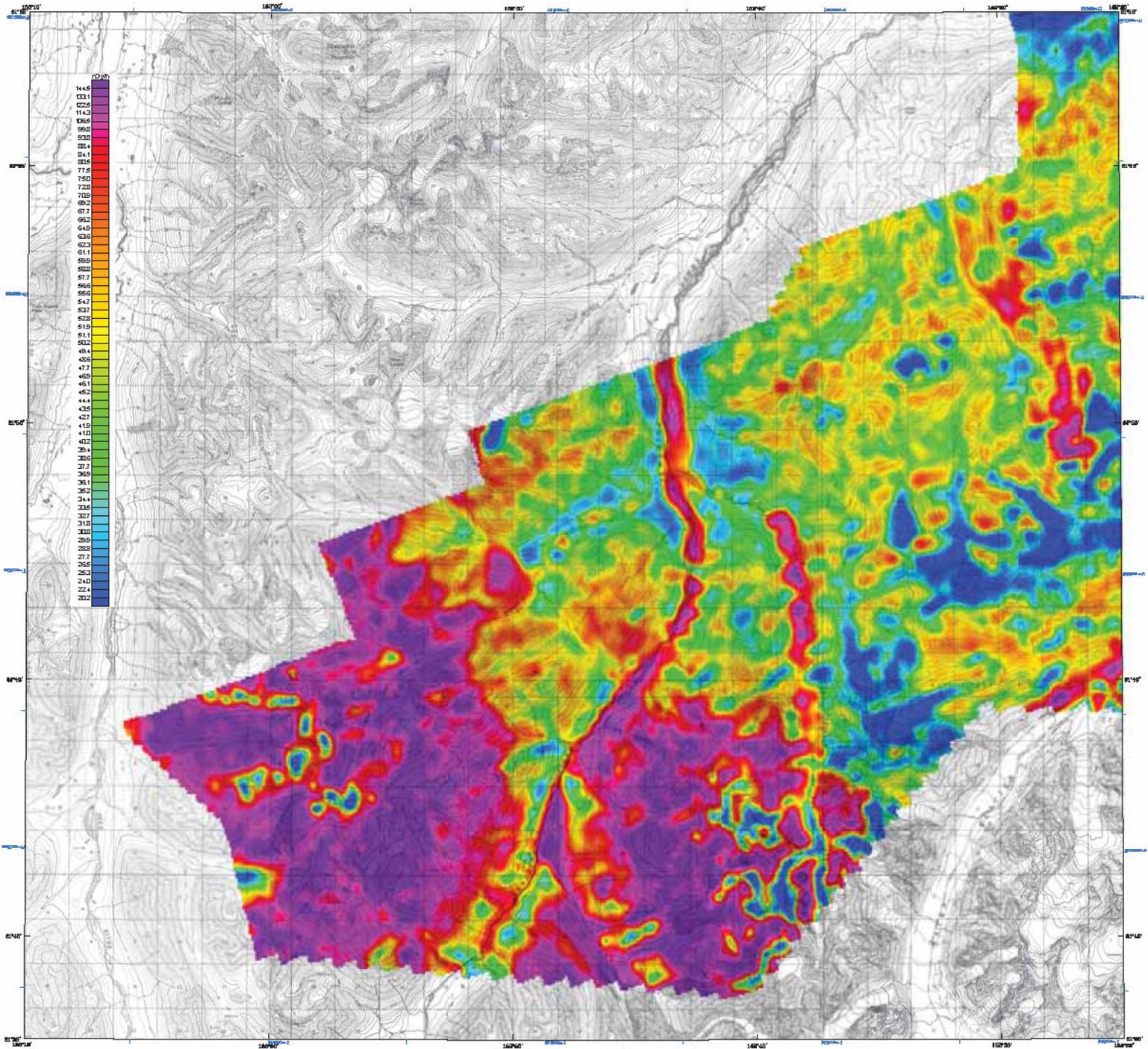
All data and maps produced to date from this survey are available in digital format on CD for a period for through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2107, and are accessible for free from the DGG&S website ([www.dggg.alaska.gov/pubs](http://www.dggg.alaska.gov/pubs)). Maps are also available on paper through the DGG&S office, or are available online at the website in Adobe Acrobat PDF file format.



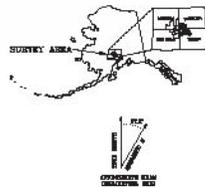








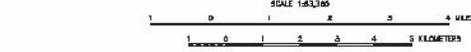
Date: June 13, 2014; Survey Area: 150°W-151°W, 61°N-62°N; Data: 150°W-151°W, 61°N-62°N; Scale: 1:63,360; Projection: UTM.



**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DHEM™ Electromagnetic (EM) system, a 0.5 m (1.64 ft) caesium magnetometer with a Bohemia C13 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition to the primary data, flight logs, GPS navigation system, and lower altitudes, GPS navigation system, 200/40 Hz motion and video camera, flight logs were performed with an AS-300-00 Spirit Helicopter at a mean level of 500 feet along NE-SW (71°) survey flight lines with a spacing of 0.25 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM-42L 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 3 m. Flight path positions were projected onto the Clarke 1886 (LTM zone 5) UTM grid. North American datum (NAD 83) central meridian (CM) of 150°30' north coordinate of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.



**NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by Laurel E. Burns, COG, and Pogo Geoservices, Inc. 2014

**RADIOMETRICS**

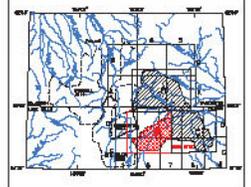
The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 1024 (1024 counts/inch) of mesh (beamstop) lead crystal detector, and 4.0 (200 counts/inch) of upper lead (crystal) detector. The operation of noise adjusted Singular Value Decomposition to the spectra counts from thorium (232Th-212Pb), uranium (238U-214Pb), potassium (40K-40K), total radioactivity (232Th-212Pb) and cosmic radiation (200-2800 keV). Counts from the upper detector were recorded in the main window (1800-1900 keV). The radiometric system was calibrated before the survey (see U.S. Report 323). After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were binarized to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in the publications.

International Atomic Energy Agency, 1991. *Alaska State Key Radiometric Survey*. Technical Report 323. International Atomic Energy Agency, Vienna.

**NATURAL AIR ABSORBED DOSE RATE**

Raw counts have been converted to radiometric concentrations and combined to produce natural air-absorbed dose rates, as that the results are independent of crystal volume and planned survey height. The technique compares to other surveys and ground data. Measurements are nanograys per hour (nGy/h).

**LOCATION INDEX OF 1:63,360-SCALE MAPS**

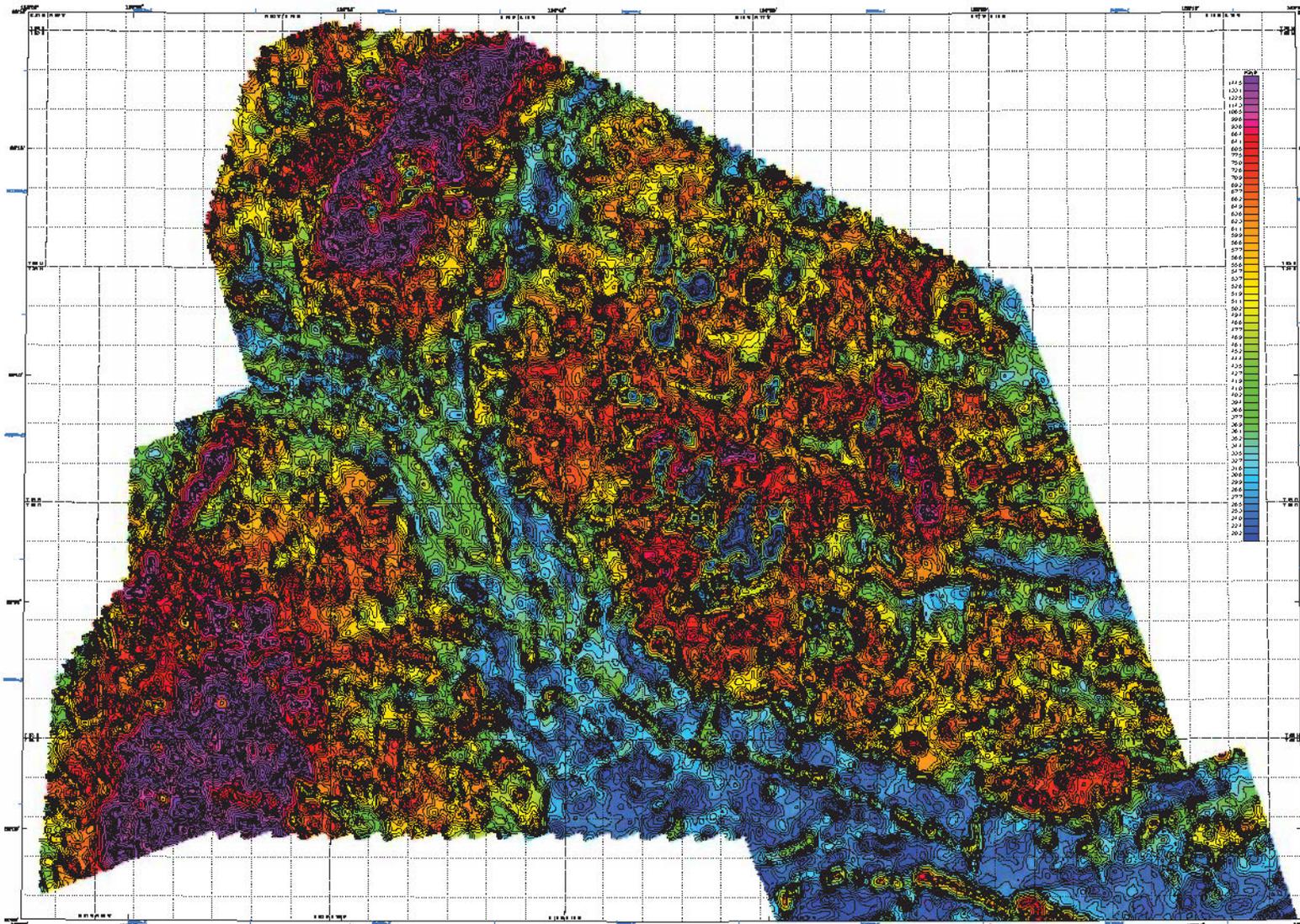


**SURVEY HISTORY**

This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGGS), and Pogo Geoservices, Inc. Airborne geophysical data for this area were acquired and processed by DGGGS in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3304 College Road, Fairbanks, Alaska, 99709-2377, and on microfilm for free from the DGGGS website ([www.dgggs.alaska.gov/pubs](http://www.dgggs.alaska.gov/pubs)). Maps are also available in paper through the DGGGS office, on one variable width of the media in Adobe Acrobat PDF file format.





**DESCRIPTIVE NOTES**

The geophysical data were collected with a DEWING Geophysical Systems (DGS) version of the DGS 1000 system survey and a Radiation Solutions RS-200 gamma-ray spectrometer. The RS-200 spectrometer was used to collect a range of data including gamma-ray counts, gamma-ray energy, and gamma-ray dose rate. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer.

**STATISTICS**

The gamma-ray spectrometer data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-200 gamma-ray spectrometer. It was calibrated with 137Cs and 60Co sources. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer.

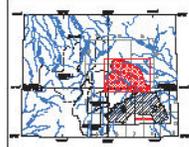
**NATURAL AIR ABSORBED DOSE RATE (nGy/h)  
WITH DATA CONTOURS,  
EAST STYX SURVEY AREA,  
SOUTH-CENTRAL ALASKA**

PARTS OF THE TALKIETNA, TYONEK, MEGORATH AND LIME HILLS QUADRANGLES

by  
Laural E. Bane, DGL and Fagan Classification, Inc.  
2014



LOCATION MAP OF 1:250,000-SCALE MAPS



**NATURAL AIR ABSORBED DOSE RATE**

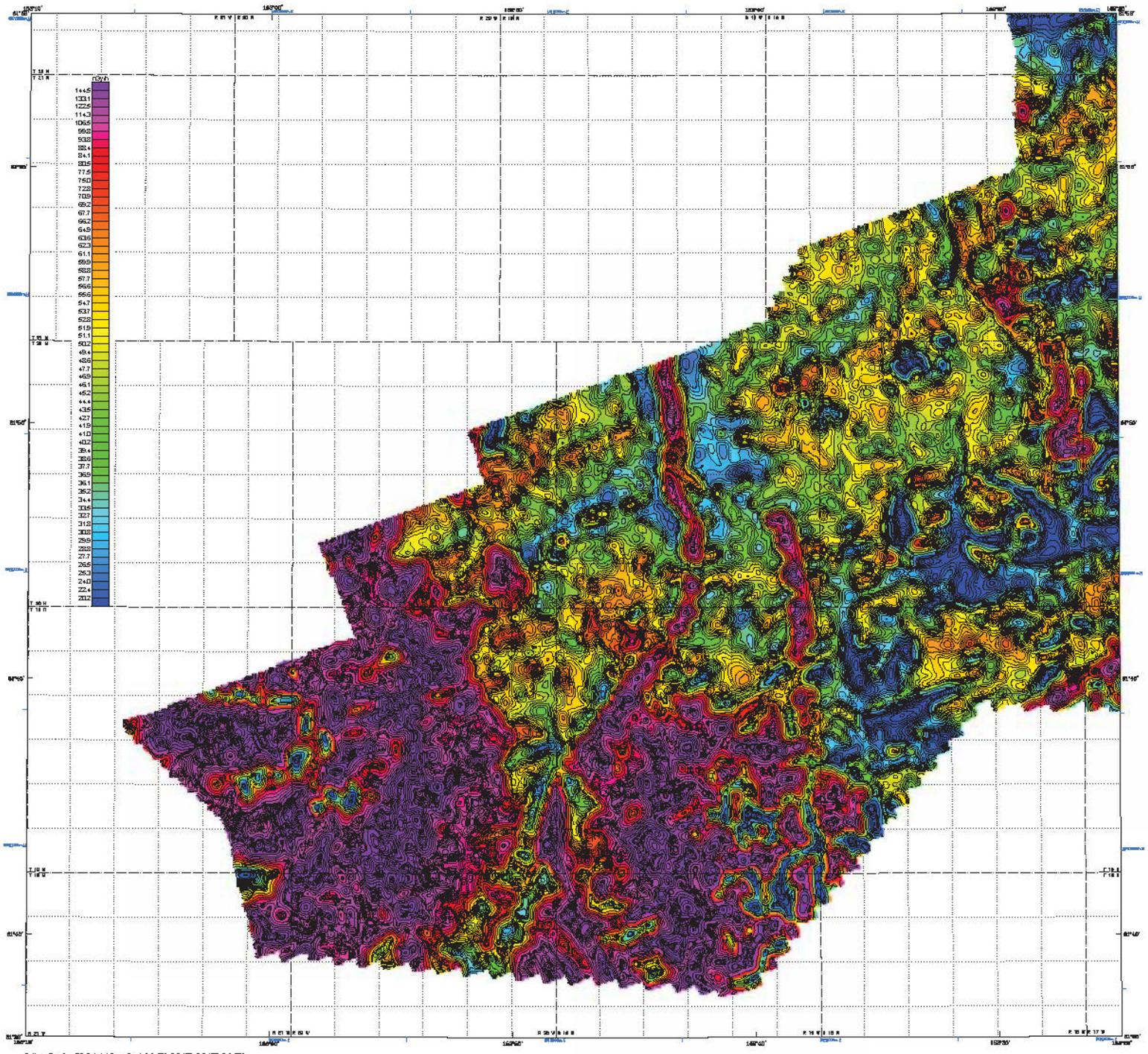
How counts have been converted to natural air absorbed dose rate, and methods to produce natural air absorbed dose rate are listed in the methods section of the report. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer.

**CONTOUR INTERVAL**

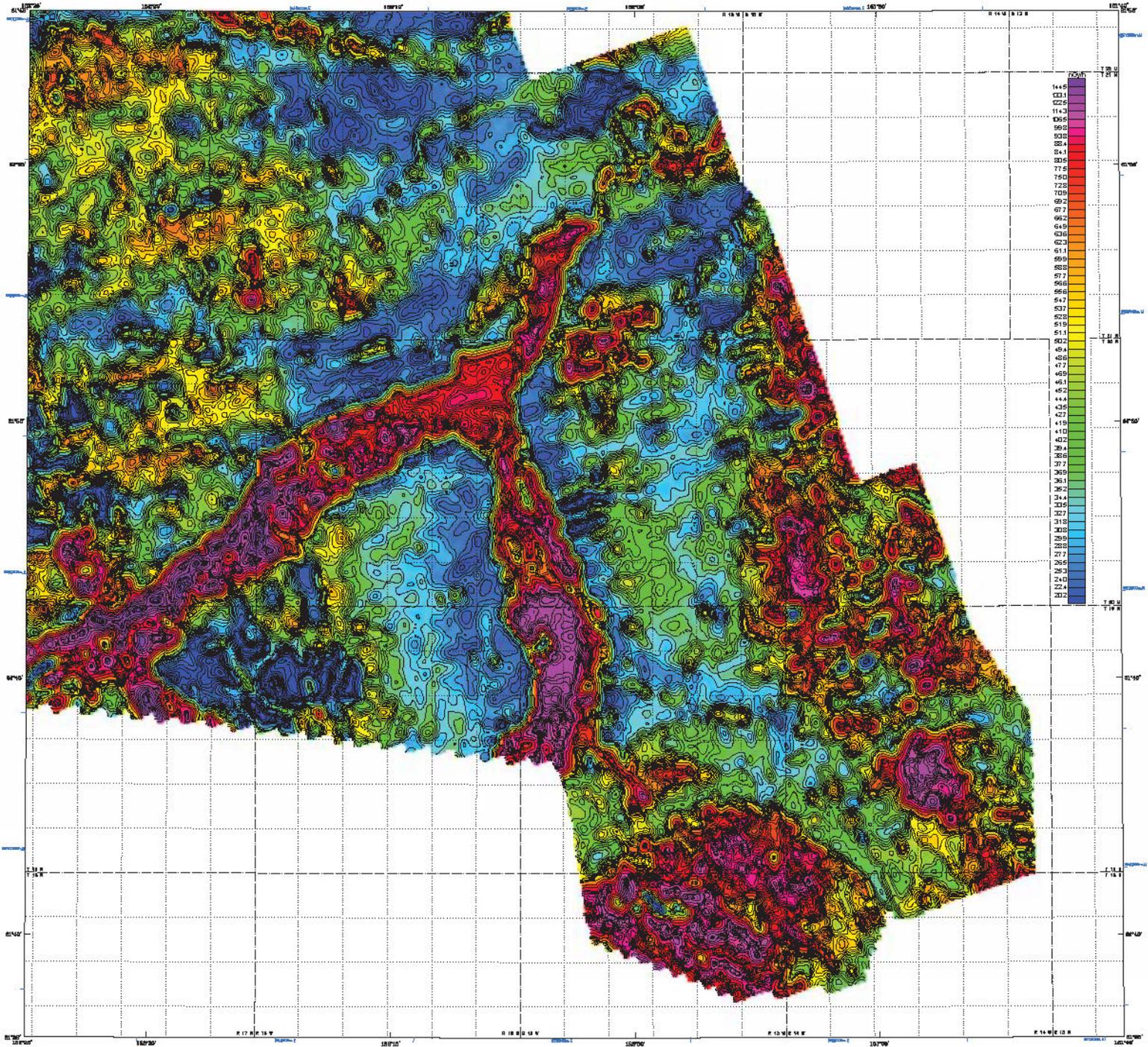
.....	10 nGy/h
.....	10 nGy/h
.....	5 nGy/h

**QUALITY HISTORY**

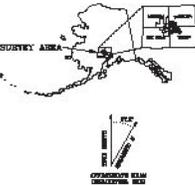
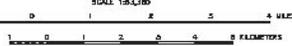
The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer. The data were collected using a DGS 1000 system survey and a Radiation Solutions RS-200 spectrometer.



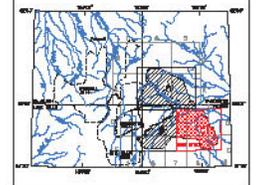
Scale: 1:163,360. UTM Zone 18N. Datum: NAD 83. Contour Interval: 2 nGy/h. Contour Labels: 23.2, 24.4, 25.6, 26.8, 28.0, 29.2, 30.4, 31.6, 32.8, 34.0, 35.2, 36.4, 37.6, 38.8, 40.0, 41.2, 42.4, 43.6, 44.8, 46.0, 47.2, 48.4, 49.6, 50.8, 52.0, 53.2, 54.4, 55.6, 56.8, 58.0, 59.2, 60.4, 61.6, 62.8, 64.0, 65.2, 66.4, 67.6, 68.8, 70.0, 71.2, 72.4, 73.6, 74.8, 76.0, 77.2, 78.4, 79.6, 80.8, 82.0, 83.2, 84.4, 85.6, 86.8, 88.0, 89.2, 90.4, 91.6, 92.8, 94.0, 95.2, 96.4, 97.6, 98.8, 100.0, 101.2, 102.4, 103.6, 104.8, 106.0, 107.2, 108.4, 109.6, 110.8, 112.0, 113.2, 114.4, 115.6, 116.8, 118.0, 119.2, 120.4, 121.6, 122.8, 124.0, 125.2, 126.4, 127.6, 128.8, 130.0, 131.2, 132.4, 133.6, 134.8, 136.0, 137.2, 138.4, 139.6, 140.8, 142.0, 143.2, 144.4, 145.6, 146.8, 148.0, 149.2, 150.4, 151.6, 152.8, 154.0, 155.2, 156.4, 157.6, 158.8, 160.0, 161.2, 162.4, 163.6, 164.8, 166.0, 167.2, 168.4, 169.6, 170.8, 172.0, 173.2, 174.4, 175.6, 176.8, 178.0, 179.2, 180.4, 181.6, 182.8, 184.0, 185.2, 186.4, 187.6, 188.8, 190.0, 191.2, 192.4, 193.6, 194.8, 196.0, 197.2, 198.4, 199.6, 200.8, 202.0, 203.2, 204.4, 205.6, 206.8, 208.0, 209.2, 210.4, 211.6, 212.8, 214.0, 215.2, 216.4, 217.6, 218.8, 220.0, 221.2, 222.4, 223.6, 224.8, 226.0, 227.2, 228.4, 229.6, 230.8, 232.0, 233.2, 234.4, 235.6, 236.8, 238.0, 239.2, 240.4, 241.6, 242.8, 244.0, 245.2, 246.4, 247.6, 248.8, 250.0, 251.2, 252.4, 253.6, 254.8, 256.0, 257.2, 258.4, 259.6, 260.8, 262.0, 263.2, 264.4, 265.6, 266.8, 268.0, 269.2, 270.4, 271.6, 272.8, 274.0, 275.2, 276.4, 277.6, 278.8, 280.0, 281.2, 282.4, 283.6, 284.8, 286.0, 287.2, 288.4, 289.6, 290.8, 292.0, 293.2, 294.4, 295.6, 296.8, 298.0, 299.2, 300.4, 301.6, 302.8, 304.0, 305.2, 306.4, 307.6, 308.8, 310.0, 311.2, 312.4, 313.6, 314.8, 316.0, 317.2, 318.4, 319.6, 320.8, 322.0, 323.2, 324.4, 325.6, 326.8, 328.0, 329.2, 330.4, 331.6, 332.8, 334.0, 335.2, 336.4, 337.6, 338.8, 340.0, 341.2, 342.4, 343.6, 344.8, 346.0, 347.2, 348.4, 349.6, 350.8, 352.0, 353.2, 354.4, 355.6, 356.8, 358.0, 359.2, 360.4, 361.6, 362.8, 364.0, 365.2, 366.4, 367.6, 368.8, 370.0, 371.2, 372.4, 373.6, 374.8, 376.0, 377.2, 378.4, 379.6, 380.8, 382.0, 383.2, 384.4, 385.6, 386.8, 388.0, 389.2, 390.4, 391.6, 392.8, 394.0, 395.2, 396.4, 397.6, 398.8, 400.0, 401.2, 402.4, 403.6, 404.8, 406.0, 407.2, 408.4, 409.6, 410.8, 412.0, 413.2, 414.4, 415.6, 416.8, 418.0, 419.2, 420.4, 421.6, 422.8, 424.0, 425.2, 426.4, 427.6, 428.8, 430.0, 431.2, 432.4, 433.6, 434.8, 436.0, 437.2, 438.4, 439.6, 440.8, 442.0, 443.2, 444.4, 445.6, 446.8, 448.0, 449.2, 450.4, 451.6, 452.8, 454.0, 455.2, 456.4, 457.6, 458.8, 460.0, 461.2, 462.4, 463.6, 464.8, 466.0, 467.2, 468.4, 469.6, 470.8, 472.0, 473.2, 474.4, 475.6, 476.8, 478.0, 479.2, 480.4, 481.6, 482.8, 484.0, 485.2, 486.4, 487.6, 488.8, 490.0, 491.2, 492.4, 493.6, 494.8, 496.0, 497.2, 498.4, 499.6, 500.8, 502.0, 503.2, 504.4, 505.6, 506.8, 508.0, 509.2, 510.4, 511.6, 512.8, 514.0, 515.2, 516.4, 517.6, 518.8, 520.0, 521.2, 522.4, 523.6, 524.8, 526.0, 527.2, 528.4, 529.6, 530.8, 532.0, 533.2, 534.4, 535.6, 536.8, 538.0, 539.2, 540.4, 541.6, 542.8, 544.0, 545.2, 546.4, 547.6, 548.8, 550.0, 551.2, 552.4, 553.6, 554.8, 556.0, 557.2, 558.4, 559.6, 560.8, 562.0, 563.2, 564.4, 565.6, 566.8, 568.0, 569.2, 570.4, 571.6, 572.8, 574.0, 575.2, 576.4, 577.6, 578.8, 580.0, 581.2, 582.4, 583.6, 584.8, 586.0, 587.2, 588.4, 589.6, 590.8, 592.0, 593.2, 594.4, 595.6, 596.8, 598.0, 599.2, 600.4, 601.6, 602.8, 604.0, 605.2, 606.4, 607.6, 608.8, 610.0, 611.2, 612.4, 613.6, 614.8, 616.0, 617.2, 618.4, 619.6, 620.8, 622.0, 623.2, 624.4, 625.6, 626.8, 628.0, 629.2, 630.4, 631.6, 632.8, 634.0, 635.2, 636.4, 637.6, 638.8, 640.0, 641.2, 642.4, 643.6, 644.8, 646.0, 647.2, 648.4, 649.6, 650.8, 652.0, 653.2, 654.4, 655.6, 656.8, 658.0, 659.2, 660.4, 661.6, 662.8, 664.0, 665.2, 666.4, 667.6, 668.8, 670.0, 671.2, 672.4, 673.6, 674.8, 676.0, 677.2, 678.4, 679.6, 680.8, 682.0, 683.2, 684.4, 685.6, 686.8, 688.0, 689.2, 690.4, 691.6, 692.8, 694.0, 695.2, 696.4, 697.6, 698.8, 700.0, 701.2, 702.4, 703.6, 704.8, 706.0, 707.2, 708.4, 709.6, 710.8, 712.0, 713.2, 714.4, 715.6, 716.8, 718.0, 719.2, 720.4, 721.6, 722.8, 724.0, 725.2, 726.4, 727.6, 728.8, 730.0, 731.2, 732.4, 733.6, 734.8, 736.0, 737.2, 738.4, 739.6, 740.8, 742.0, 743.2, 744.4, 745.6, 746.8, 748.0, 749.2, 750.4, 751.6, 752.8, 754.0, 755.2, 756.4, 757.6, 758.8, 760.0, 761.2, 762.4, 763.6, 764.8, 766.0, 767.2, 768.4, 769.6, 770.8, 772.0, 773.2, 774.4, 775.6, 776.8, 778.0, 779.2, 780.4, 781.6, 782.8, 784.0, 785.2, 786.4, 787.6, 788.8, 790.0, 791.2, 792.4, 793.6, 794.8, 796.0, 797.2, 798.4, 799.6, 800.8, 802.0, 803.2, 804.4, 805.6, 806.8, 808.0, 809.2, 810.4, 811.6, 812.8, 814.0, 815.2, 816.4, 817.6, 818.8, 820.0, 821.2, 822.4, 823.6, 824.8, 826.0, 827.2, 828.4, 829.6, 830.8, 832.0, 833.2, 834.4, 835.6, 836.8, 838.0, 839.2, 840.4, 841.6, 842.8, 844.0, 845.2, 846.4, 847.6, 848.8, 850.0, 851.2, 852.4, 853.6, 854.8, 856.0, 857.2, 858.4, 859.6, 860.8, 862.0, 863.2, 864.4, 865.6, 866.8, 868.0, 869.2, 870.4, 871.6, 872.8, 874.0, 875.2, 876.4, 877.6, 878.8, 880.0, 881.2, 882.4, 883.6, 884.8, 886.0, 887.2, 888.4, 889.6, 890.8, 892.0, 893.2, 894.4, 895.6, 896.8, 898.0, 899.2, 900.4, 901.6, 902.8, 904.0, 905.2, 906.4, 907.6, 908.8, 910.0, 911.2, 912.4, 913.6, 914.8, 916.0, 917.2, 918.4, 919.6, 920.8, 922.0, 923.2, 924.4, 925.6, 926.8, 928.0, 929.2, 930.4, 931.6, 932.8, 934.0, 935.2, 936.4, 937.6, 938.8, 940.0, 941.2, 942.4, 943.6, 944.8, 946.0, 947.2, 948.4, 949.6, 950.8, 952.0, 953.2, 954.4, 955.6, 956.8, 958.0, 959.2, 960.4, 961.6, 962.8, 964.0, 965.2, 966.4, 967.6, 968.8, 970.0, 971.2, 972.4, 973.6, 974.8, 976.0, 977.2, 978.4, 979.6, 980.8, 982.0, 983.2, 984.4, 985.6, 986.8, 988.0, 989.2, 990.4, 991.6, 992.8, 994.0, 995.2, 996.4, 997.6, 998.8, 1000.0, 1001.2, 1002.4, 1003.6, 1004.8, 1006.0, 1007.2, 1008.4, 1009.6, 1010.8, 1012.0, 1013.2, 1014.4, 1015.6, 1016.8, 1018.0, 1019.2, 1020.4, 1021.6, 1022.8, 1024.0, 1025.2, 1026.4, 1027.6, 1028.8, 1030.0, 1031.2, 1032.4, 1033.6, 1034.8, 1036.0, 1037.2, 1038.4, 1039.6, 1040.8, 1042.0, 1043.2, 1044.4, 1045.6, 1046.8, 1048.0, 1049.2, 1050.4, 1051.6, 1052.8, 1054.0, 1055.2, 1056.4, 1057.6, 1058.8, 1060.0, 1061.2, 1062.4, 1063.6, 1064.8, 1066.0, 1067.2, 1068.4, 1069.6, 1070.8, 1072.0, 1073.2, 1074.4, 1075.6, 1076.8, 1078.0, 1079.2, 1080.4, 1081.6, 1082.8, 1084.0, 1085.2, 1086.4, 1087.6, 1088.8, 1090.0, 1091.2, 1092.4, 1093.6, 1094.8, 1096.0, 1097.2, 1098.4, 1099.6, 1100.8, 1102.0, 1103.2, 1104.4, 1105.6, 1106.8, 1108.0, 1109.2, 1110.4, 1111.6, 1112.8, 1114.0, 1115.2, 1116.4, 1117.6, 1118.8, 1120.0, 1121.2, 1122.4, 1123.6, 1124.8, 1126.0, 1127.2, 1128.4, 1129.6, 1130.8, 1132.0, 1133.2, 1134.4, 1135.6, 1136.8, 1138.0, 1139.2, 1140.4, 1141.6, 1142.8, 1144.0, 1145.2, 1146.4, 1147.6, 1148.8, 1150.0, 1151.2, 1152.4, 1153.6, 1154.8, 1156.0, 1157.2, 1158.4, 1159.6, 1160.8, 1162.0, 1163.2, 1164.4, 1165.6, 1166.8, 1168.0, 1169.2, 1170.4, 1171.6, 1172.8, 1174.0, 1175.2, 1176.4, 1177.6, 1178.8, 1180.0, 1181.2, 1182.4, 1183.6, 1184.8, 1186.0, 1187.2, 1188.4, 1189.6, 1190.8, 1192.0, 1193.2, 1194.4, 1195.6, 1196.8, 1198.0, 1199.2, 1200.4, 1201.6, 1202.8, 1204.0, 1205.2, 1206.4, 1207.6, 1208.8, 1210.0, 1211.2, 1212.4, 1213.6, 1214.8, 1216.0, 1217.2, 1218.4, 1219.6, 1220.8, 1222.0, 1223.2, 1224.4, 1225.6, 1226.8, 1228.0, 1229.2, 1230.4, 1231.6, 1232.8, 1234.0, 1235.2, 1236.4, 1237.6, 1238.8, 1240.0, 1241.2, 1242.4, 1243.6, 1244.8, 1246.0, 1247.2, 1248.4, 1249.6, 1250.8, 1252.0, 1253.2, 1254.4, 1255.6, 1256.8, 1258.0, 1259.2, 1260.4, 1261.6, 1262.8, 1264.0, 1265.2, 1266.4, 1267.6, 1268.8, 1270.0, 1271.2, 1272.4, 1273.6, 1274.8, 1276.0, 1277.2, 1278.4, 1279.6, 1280.8, 1282.0, 1283.2, 1284.4, 1285.6, 1286.8, 1288.0, 1289.2, 1290.4, 1291.6, 1292.8, 1294.0, 1295.2, 1296.4, 1297.6, 1298.8, 1300.0, 1301.2, 1302.4, 1303.6, 1304.8, 1306.0, 1307.2, 1308.4, 1309.6, 1310.8, 1312.0, 1313.2, 1314.4, 1315.6, 1316.8, 1318.0, 1319.2, 1320.4, 1321.6, 1322.8, 1324.0, 1325.2, 1326.4, 1327.6, 1328.8, 1330.0, 1331.2, 1332.4, 1333.6, 1334.8, 1336.0, 1337.2, 1338.4, 1339.6, 1340.8, 1342.0, 1343.2, 1344.4, 1345.6, 1346.8, 1348.0, 1349.2, 1350.4, 1351.6, 1352.8, 1354.0, 1355.2, 1356.4, 1357.6, 1358.8, 1360.0, 1361.2, 1362.4, 1363.6, 1364.8, 1366.0, 1367.2, 1368.4, 1369.6, 1370.8, 1372.0, 1373.2, 1374.4, 1375.6, 1376.8, 1378.0, 1379.2, 1380.4, 1381.6, 1382.8, 1384.0, 1385.2, 1386.4, 1387.6, 1388.8, 1390.0, 1391.2, 1392.4, 1393.6, 1394.8, 1396.0, 1397.2, 1398.4, 1399.6, 1400.8, 1402.0, 1403.2, 1404.4, 1405.6, 1406.8, 1408.0, 1409.2, 1410.4, 1411.6, 1412.8, 1414.0, 1415.2, 1416.4, 1417.6, 1418.8, 1420.0, 1421.2, 1422.4, 1423.6, 1424.8, 1426.0, 1427.2, 1428.4, 1429.6, 1430.8, 1432.0, 1433.2, 1434.4, 1435.6, 1436.8, 1438.0, 1439.2, 1440.4, 1441.6, 1442.8, 1444.0, 1445.2, 1446.4, 1447.6, 1448.8, 1450.0, 1451.2, 1452.4, 1453.6, 1454.8, 1456.0, 1457.2, 1458.4, 1459.6, 1460.8, 1462.0, 1463.2, 1464.4, 1465.6, 1466.8, 1468.0, 1469.2, 1470.4, 1471.6, 1472.8, 1474.0, 1475.2, 1476.4, 1477.6, 1478.8, 1480.0, 1481.2, 1482.4, 1483.6, 1484.8, 1486.0, 1487.2, 1488.4, 1489.6, 1490.8, 1492.0, 1493.2, 1494.4, 1495.6, 1496.8, 1498.0, 1499.2, 1500.4, 1501.6, 1502.8, 1504.0, 1505.2, 1506.4, 1507.6, 1508.8, 1510.0, 1511.2, 1512.4, 1513.6, 1514.8, 1516.0, 1517.2, 1518.4, 1519.6, 1520.8, 1522.0, 1523.2, 1524.4, 1525.6, 1526.8, 1528.0, 1529.2, 1530.4, 1531.6, 1532.8, 1534.0, 1535.2, 1536.4, 1537.6, 1538.8, 1540.0, 1541.2, 1542.4, 1543.6, 1544.8, 1546.0, 1547.2, 1548.4, 1549.6, 1550.8, 1552.0, 1553.2, 1554.4, 1555.6, 1556.8, 1558.0, 1559.2, 1560.4, 1561.6, 1562.8, 1564.0, 1565.2, 1566.4, 1567.6, 1568.8, 1570.0, 1571.2, 1572.4, 1573.6, 1574.8, 1576.0, 1577.2, 1578.4, 1579.6, 1580.8, 1582.0, 1583.2, 1584.4, 1585.6, 1586.8, 1588.0, 1589.2, 1590.4, 1591.6, 1592.8, 1594.0, 1595.2, 1596.4, 1597.6, 1598.8, 1600.0, 1601.2, 1602.4, 1603.6, 1604.8, 1606.0, 1607.2, 1608.4, 1609.6, 1610.8, 1612.0, 1613.2, 1614.4, 1615.6, 1616.8, 1618.0, 1619.2, 1620.4, 1621.6, 1622.8, 1624.0, 1625.2, 1626.4, 1627.6, 1628.8, 1630.0, 1631.2, 1632.4, 1633.6, 1634.8, 1636.0, 1637.2, 1638.4, 1639.6, 1640.8, 1642.0, 1643.2, 1644.4, 1645.6, 1646.8, 1648.0, 1649.2, 1650.4, 1651.6, 1652.8, 1654.0, 1655.2, 1656.4, 1657.6, 1658.8, 1660.0, 1661.2, 1662.4, 1663.6, 1664.8, 1666.0, 1667.2, 1668.4, 1669.6, 1670.8, 1672.0, 1673.2, 1674.4, 1675.6, 1676.8, 1678.0, 1679.2, 1680.4, 1681.6, 1682.8, 1684.0, 1685.2, 1686.4, 1687.6, 1688.8, 1690.0, 1691.2, 1692.4, 1693.6, 1694.8, 1696.0, 1697.2, 1698.4, 1699.6, 1700.8, 1702.0, 1703.2, 1704.4, 1705.6, 1706.8, 1708.0, 1709.2, 1710.4, 1711.6, 1712.8, 1714.0, 1715.2, 1716.4, 1717.6, 1718.8, 1720.0, 1721.2, 1722.4, 1723.6, 1724.8, 1726.0, 1727.2, 1728.4, 1729.6, 1730.8, 1732.0, 1733.2, 1734.4, 1735.6, 1736.8, 1738.0, 1739.2, 1740.4, 1741.6, 1742.8, 1744.0, 1745.2, 1746.4, 1747.6, 1748.8, 1750.0, 1751.2, 1752.4, 1753.6, 1754.8, 1756.0, 1757.2, 1758.4, 1759.6, 1760.8, 1762.0, 1763.2, 1764.4, 1765.6, 1766.8, 1768.0, 1769.2, 1770.4, 1771.6, 1772.8, 1774.0, 1775.2, 1776.4, 1777.6, 1778.8, 1780.0, 1781.2, 1782.4, 1783.6, 1784.8, 1786.0, 1787.2, 1788.4, 1789.6, 1790.8, 1792.0, 1793.2, 1794.4, 1795.6, 1796.8, 1798.0, 1799.2, 1800.4, 1801.6, 1802.8, 1804.0, 1805.2, 1806.4, 1807.6, 1808.8, 1810.0, 1811.2, 1812.4, 1813.6, 1814.8, 1816.0, 1817.2, 1818.4, 1819.6, 1820.8, 1822.0, 1823.2, 1824.4, 1825.6, 1826.8, 1828.0, 1829.2, 1830.4, 1831.6, 1832.8, 1834.0, 1835.2, 1836.4, 1837.6, 1838.8, 1840.0, 1841.2, 1842.4, 1843.6, 1844.8, 1846.0, 1847.2, 1848.4, 1849.6, 1850.8, 1852.0, 1853.2, 1854.4, 1855.6, 1856.8, 1858.0, 1859.2, 1860.4, 1861.6, 1862.8, 1864.0, 1865.2, 1866.4, 1867.6, 1868.8, 1870.0, 1871.2, 1872.4, 1873.6, 1874.8, 1876.0, 1877.2, 1878.4, 1879.6, 1880.8, 1882.0, 1883.2, 1884.4, 1885.6, 1886.8, 1888.0, 1889.2, 1890.4, 1891.6, 1892.8, 1894.0, 1895.2, 1896.4, 1897.6, 1898.8, 1900.0, 1901.2, 1902.4, 1903.6, 1904.8, 1906.0, 1907.2, 1908.4, 1909.6, 1910.8, 1912.0, 1913.2, 1914.4, 1915.6, 1916.8, 1918.0, 1919.2, 1920.4, 1921.6, 1922.8, 1924.0, 1925.2, 1926.4, 1927.6, 1928.8, 1930.0, 1931.2, 1932.4, 1933.6, 1934.8, 1936.0, 1937.2, 1938.4, 1939.6, 1940.8, 1942.0, 1943.2, 1944.4, 1945.6, 1946.8, 1948.0, 1949.2, 1950.4, 1951.6, 1952.8, 1954.0, 1955.2, 1956.4, 1957.6, 1958.8, 1960.0, 1961.2, 1962.4, 1963.6, 1964.



Scale: 1:63,560  
 UTM Zone 18N, Datum: NAD 83, Spheroid: GRS 80, Datum Shift: 111.5 m, False Easting: 500,000 m, False Northing: 0 m, Units: Meter



LOCATION INDEX OF 1:63,560-SCALE MAPS



# NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH DATA CONTOURS, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

PARTS OF THE TALKEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
 Laurel E. Burns, COG, and Pogo Geoservices, Inc.  
 2014

**DESCRIPTIVE NOTES**

The geophysical data were acquired with a DICHEM<sup>®</sup> Electromagnetic (EM) system, a GE 01344 cesium magnetometer with a Schimadzu C10 cesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 600/80 Hz magnetometer and video camera. Flight logs were performed with an AS-300-00 Spirit helicopter at a mean level of 5000 feet along NE-SW (71°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel OEM4-82L Global Positioning System was used for navigation. The helicopter position was derived using GPS using post-flight differential positioning to a relative accuracy of better than 5 m. Flight paths were projected onto the Clarke 1886 (UTM zone 5) spheroid, 1827 North American datum using a central meridian (CM) of 123° 30' north-south of 0 and an east constant of 500,000. Potential accuracy of the projected data is better than 10 m with respect to the UTM grid.

**RADIOMETRICS**

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.8L (1024 cells) inches of lead (beamrod) lead crystal detector, and 4.2L (2048 cells) inches of leaded cerium (crystal) detector. After acquisition of noise-adjusted singular value decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (241Pb-241Bi keV), uranium (235Th-235Pa keV), potassium (40K-40Ca keV), total radioactivity (40K-235Th keV) and cosmic radiation (5000-26000 keV). Counts from the radar detector were recorded in the radar window (1600-1800 keV). The radar detector system was operated following methods outlined in ASG Report 333. After removal of the background, the data were corrected for spectral interferences, corrected for temperature, air mass, and separation from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and find grids contained in the publication.

International Geophysics Agency, 1991. Airborne Gamma-Ray Spectrometer Surveying Technical Paper 333, International Atomic Energy Agency, Vienna.

**NATURAL AIR ABSORBED DOSE RATE**

Raw counts have been converted to radiometric concentrations, and combined to produce natural air-absorbed dose rates so that the results are independent of crystal volume and planned survey height. This suite also compares to other surveys and ground data. Measurements are in nanograys per hour (nGy/h).

**CONTOUR INTERVAL**

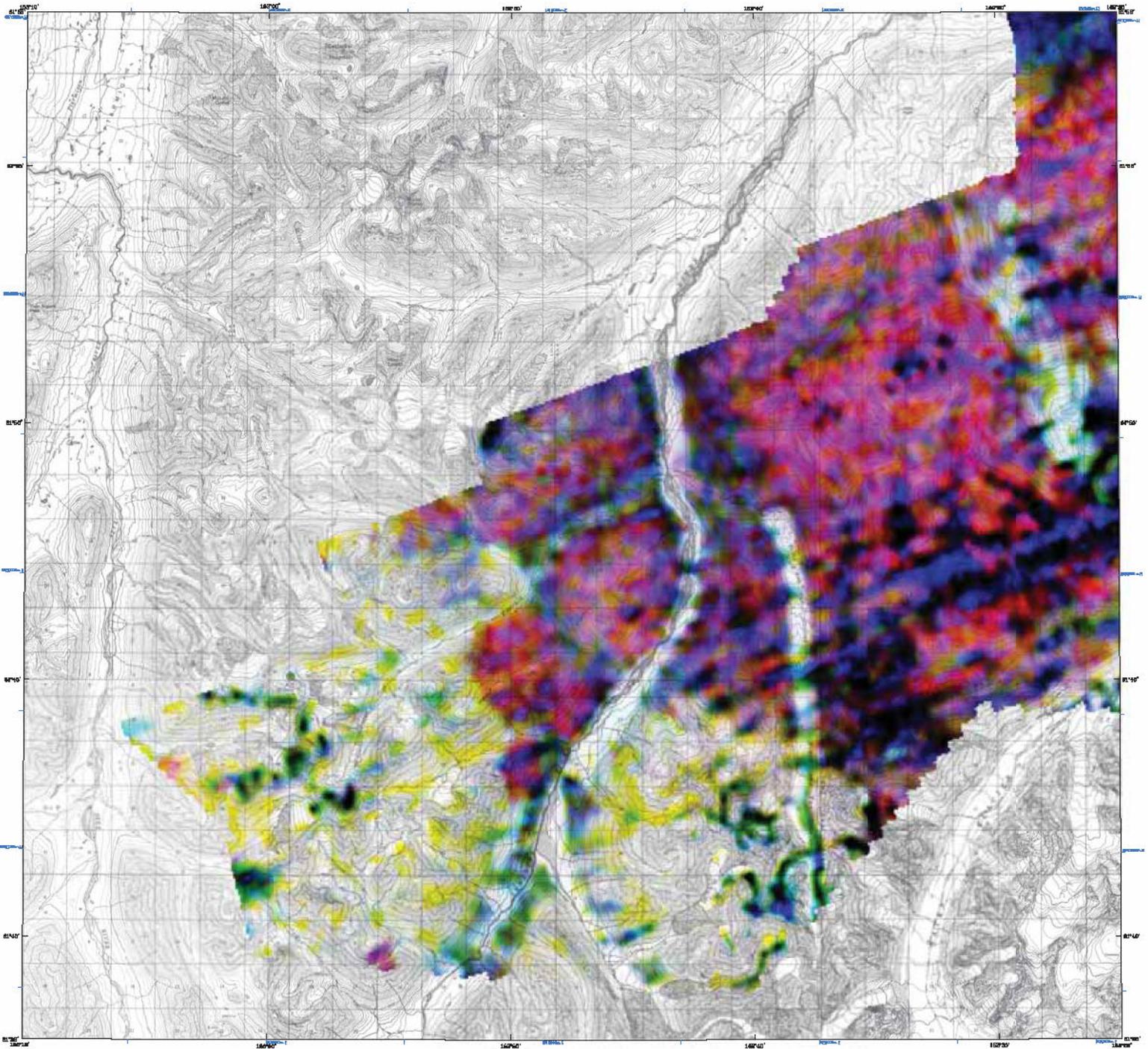
- ..... 40 nGy/h
- ..... 10 nGy/h
- ..... 2 nGy/h

**SURVEY HISTORY**

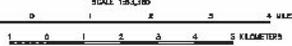
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGGS), and Pogo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by DGGGS in 2013 and 2014. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Statewide Geophysical and Geological (ASG) Inventory Program.

All data and maps produced to date from this survey are available in digital format on CD for a nominal fee through 2016, 3304 College Road, Fairbanks, Alaska, 99709-2197, and are downloadable for free from the DGGGS website ([www.dggg.alaska.gov/pogo](http://www.dggg.alaska.gov/pogo)). Maps are also available on paper through the DGGGS, and are available online at the website in Adobe Acrobat PDF file format.

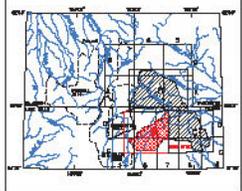




Date: June 13, 2014. Original Survey Date: 6-13-2014, 6-14, 14-15, 6-17, 6-18, 6-19, 6-20, 6-21, 6-22, 6-23, 6-24, 6-25, 6-26, 6-27, 6-28, 6-29, 6-30, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7, 7-8, 7-9, 7-10, 7-11, 7-12, 7-13, 7-14, 7-15, 7-16, 7-17, 7-18, 7-19, 7-20, 7-21, 7-22, 7-23, 7-24, 7-25, 7-26, 7-27, 7-28, 7-29, 7-30, 7-31, 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, 8-12, 8-13, 8-14, 8-15, 8-16, 8-17, 8-18, 8-19, 8-20, 8-21, 8-22, 8-23, 8-24, 8-25, 8-26, 8-27, 8-28, 8-29, 8-30, 8-31, 9-1, 9-2, 9-3, 9-4, 9-5, 9-6, 9-7, 9-8, 9-9, 9-10, 9-11, 9-12, 9-13, 9-14, 9-15, 9-16, 9-17, 9-18, 9-19, 9-20, 9-21, 9-22, 9-23, 9-24, 9-25, 9-26, 9-27, 9-28, 9-29, 9-30, 10-1, 10-2, 10-3, 10-4, 10-5, 10-6, 10-7, 10-8, 10-9, 10-10, 10-11, 10-12, 10-13, 10-14, 10-15, 10-16, 10-17, 10-18, 10-19, 10-20, 10-21, 10-22, 10-23, 10-24, 10-25, 10-26, 10-27, 10-28, 10-29, 10-30, 10-31, 11-1, 11-2, 11-3, 11-4, 11-5, 11-6, 11-7, 11-8, 11-9, 11-10, 11-11, 11-12, 11-13, 11-14, 11-15, 11-16, 11-17, 11-18, 11-19, 11-20, 11-21, 11-22, 11-23, 11-24, 11-25, 11-26, 11-27, 11-28, 11-29, 11-30, 12-1, 12-2, 12-3, 12-4, 12-5, 12-6, 12-7, 12-8, 12-9, 12-10, 12-11, 12-12, 12-13, 12-14, 12-15, 12-16, 12-17, 12-18, 12-19, 12-20, 12-21, 12-22, 12-23, 12-24, 12-25, 12-26, 12-27, 12-28, 12-29, 12-30, 12-31.



LOCATION INDEX OF 1:63,360-SCALE MAPS



# RADIOELEMENT - TERNARY WITH TOPOGRAPHY, EAST STYX SURVEY AREA, SOUTH-CENTRAL ALASKA

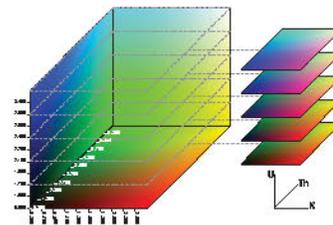
PARTS OF THE TALKIEETNA, TYONEK, McGRATH AND LIME HILLS QUADRANGLES

by  
Lauri E. Burns, COG, and Pogo Geoservices, Inc.  
2014

### RADIOMETRICS

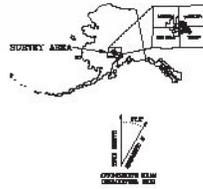
The gamma-ray spectrometry data were recorded at a 10 second sample rate using a Radiation Solutions RS-300 gamma-ray spectrometer. It was configured with 16.2L (1034 cubic inches) of NaI (scintillator) and crystal detector, and 4.0L (246 cubic inches) of NaI (scintillator) and crystal detector. The optimization of NaI (scintillator) Single Value Decomposition to the spectra counts from the main detector were recorded in the windows corresponding to thorium (241D-281D keV), uranium (188B-188D keV), potassium (137B-137D keV), total radioactivity (100-281D keV) and cosmic radiation (3000-3800 keV). Counts from the main detector were recorded in the main window (188B-188D keV). The radio detection system was calibrated before the mission (see A-1 in A-1 Report 2014). After removal of the background, the data were corrected for spectral interference, obtained in temperature, pressure, and departure from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were histogrammed in a 100 m grid using a minimum curvature technique. All grids were then resampled from the 100 m cell size down to a 25 m cell size to produce the maps and grid grids contained in the products.

International Atomic Energy Agency, 1991. *Alaska Gamma Ray Spectrometry Survey*. Technical Report 202. International Atomic Energy Agency, Vienna.



### SURVEY HISTORY

This map has been compiled and drawn under contract to the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Pogo Geoservices, Inc. Airborne geophysical data for the area were collected and processed by COG in 2013 and 2014. Previously flown DGG&G surveys adjacent to the current survey are shown in the location map by dashed lines, survey names, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Division Geological and Geophysical Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGG&G, 3304 College Road, Fairbanks, Alaska, 99709-2707, and are downloadable for free from the DGG&G website ([www.dggg.alaska.gov/pubs](http://www.dggg.alaska.gov/pubs)). Maps are also available in paper through the DGG&G office, and are available online at the website in Adobe Acrobat PDF file format.



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DICEHEV Electromagnetic (EM) system, a D1344 caesium magnetometer with a Bohrium C13 caesium sensor, and a Radiation Solutions RS-300 gamma-ray spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimetry, GPS navigation system, 200/80 Hz motion and video camera, flight logs were performed with an AS-300-00 Spirit Helicopter at a mean level of 200 feet along the NE-SW (717) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles. A Novatel OEM4-82L 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 (LHA zone 5) Spheroid, 1827 North American datum using a central meridian (CM) of 153° a north coordinate of 0 and an east coordinate of 500000. Positional accuracy of the projected data is better than 10 m with respect to the UTM grid.

