# FAREWELL ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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

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DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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# FAREWELL ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.[1], Graham, G.R.C.[1], Emond, A.M.[1], Barefoot, J.D.[1], CGG, and Fugro GeoServices Inc.

## ABSTRACT

The Farewell geophysical survey is located in the Alaska Range of southcentral Alaska in the Yentna and McGrath mining districts, about 150 kilometers northwest of Anchorage, Alaska. Frequency domain electromagnetic, magnetic, and radiometric data were collected with the DIGHEMV system from September 12th to November 3rd, 2012 and June 29th to September 27th, 2013. A total of 7187.5 line kilometers were collected covering 2544.9 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

## PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private sector exploration, discovery, and ultimate development and production. The primary goal of the Farewell project is to delineate prospective mineral zones and to support detailed geologic mapping. Many prospects are in the survey area and are thought to represent several different deposit types, including polymetallic veins, epithermal veins, and porphyry copper deposits.

## 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, the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project (SCMA), and by a contribution from Cook Inlet Region, Inc.

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

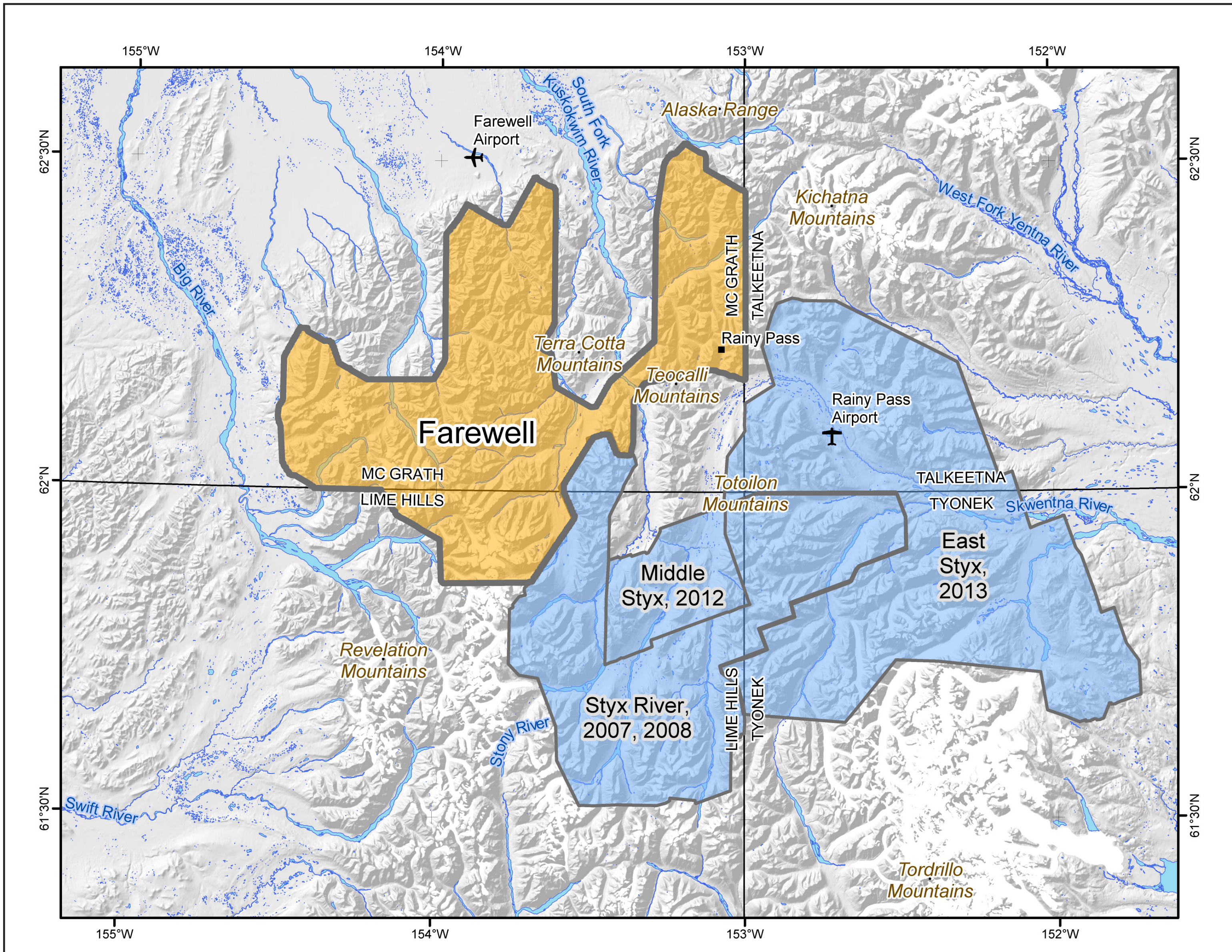
## AVAILABLE DATA

| Data Type | Provider | Description |
|---|---|---|
| ascii_data | contractor | ASCII format line data, other ASCII data |
| databases_geosoft | contractor | Geosoft format database of final line data, other Geosoft format databases |
| documents | contractor and DGGS | Project and field reports, survey background information, gridded data explanations, other documentation |
| grids_ermapper | contractor | Geographically registered gridded data, ER Mapper ERS format |
| grids_geosoft | contractor and DGGS | Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or the free viewer available from Geosoft |
| images_registered | DGGS | GeoTiff format images of all gridded data |
| kmz | DGGS | keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs |
| maps_pdf_format | contractor | Printable maps in pdf format |
| 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, Farewell survey area: Airborne magnetic, electromagnetic and radiometric data in line (point), grid, vector, and map formats, McGrath and Lime Hills quadrangles, south-central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2014-2, scale 1:63,360, 1 DVD. http://doi.org/10.14509/27291



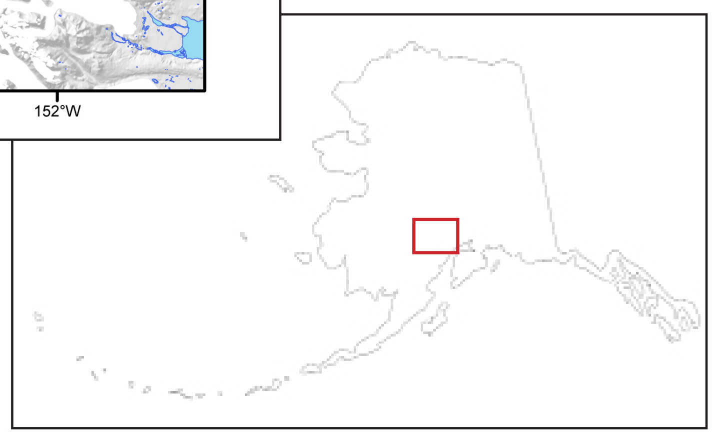



**Figure 1.** Farewell electromagnetic and magnetic airborne geophysical survey location shown in southcentral Alaska (inset). Farewell survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation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

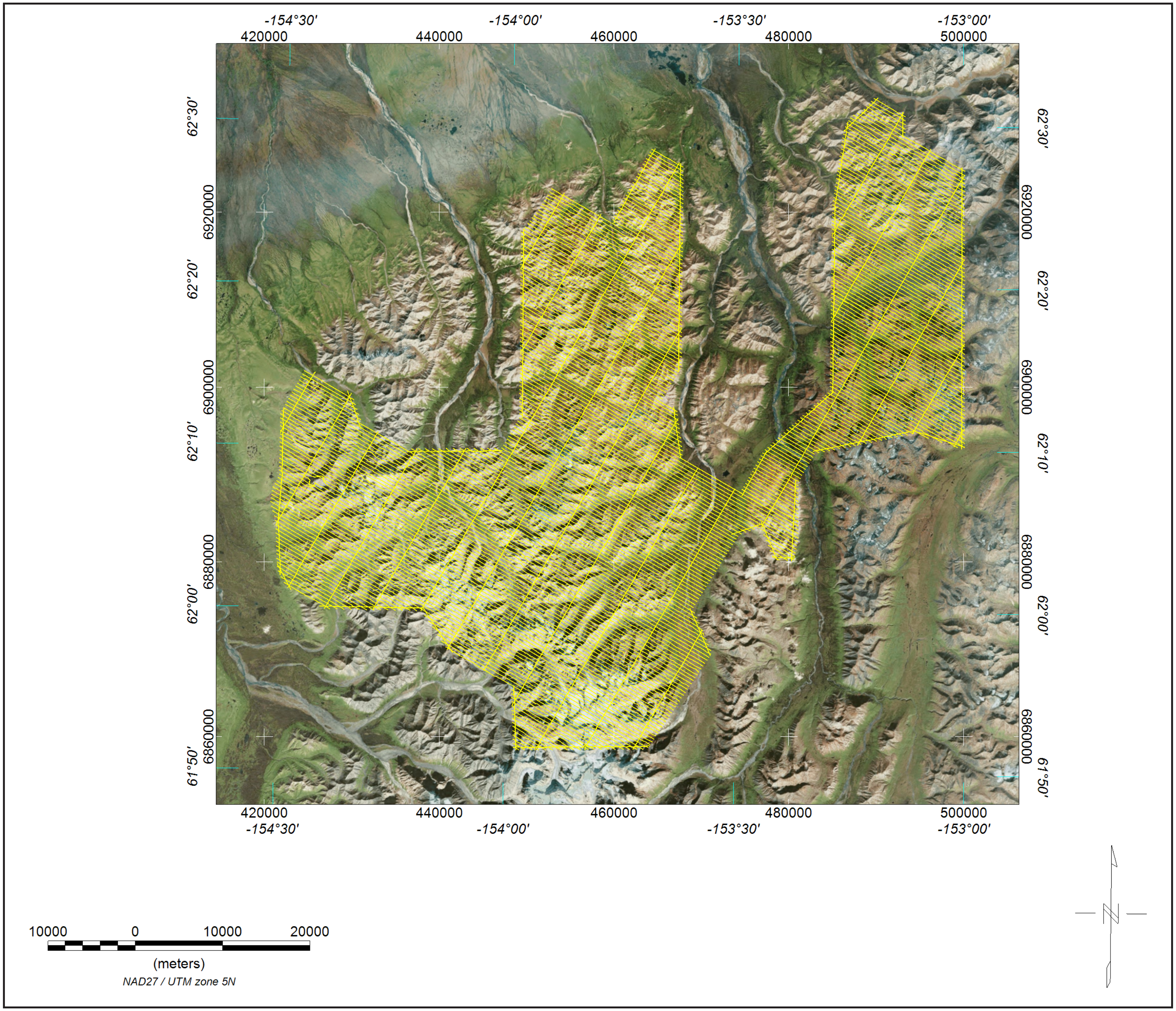



**Figure 2.** Flight path with orthometric image.

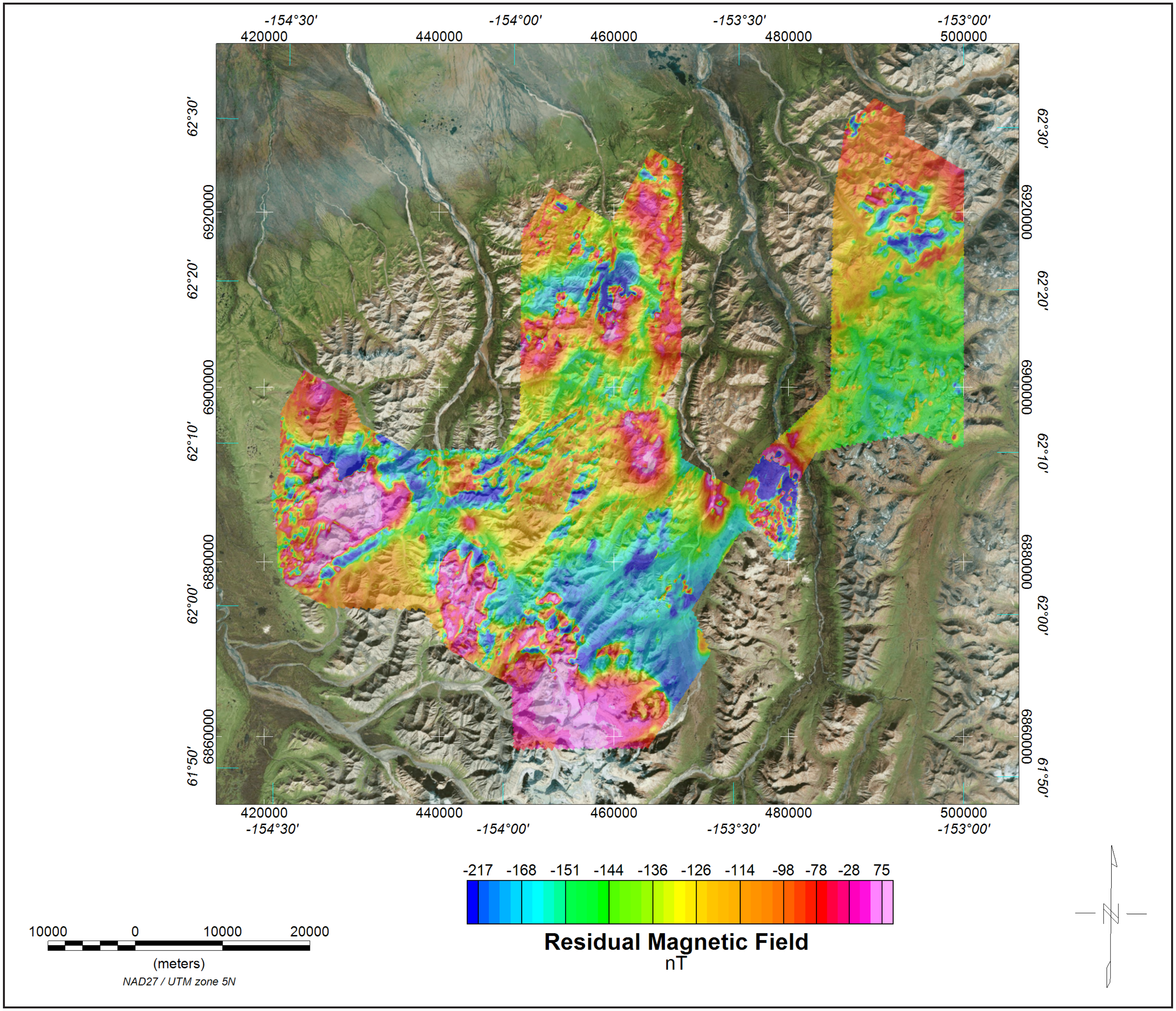



**Figure 3.** The magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally 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.

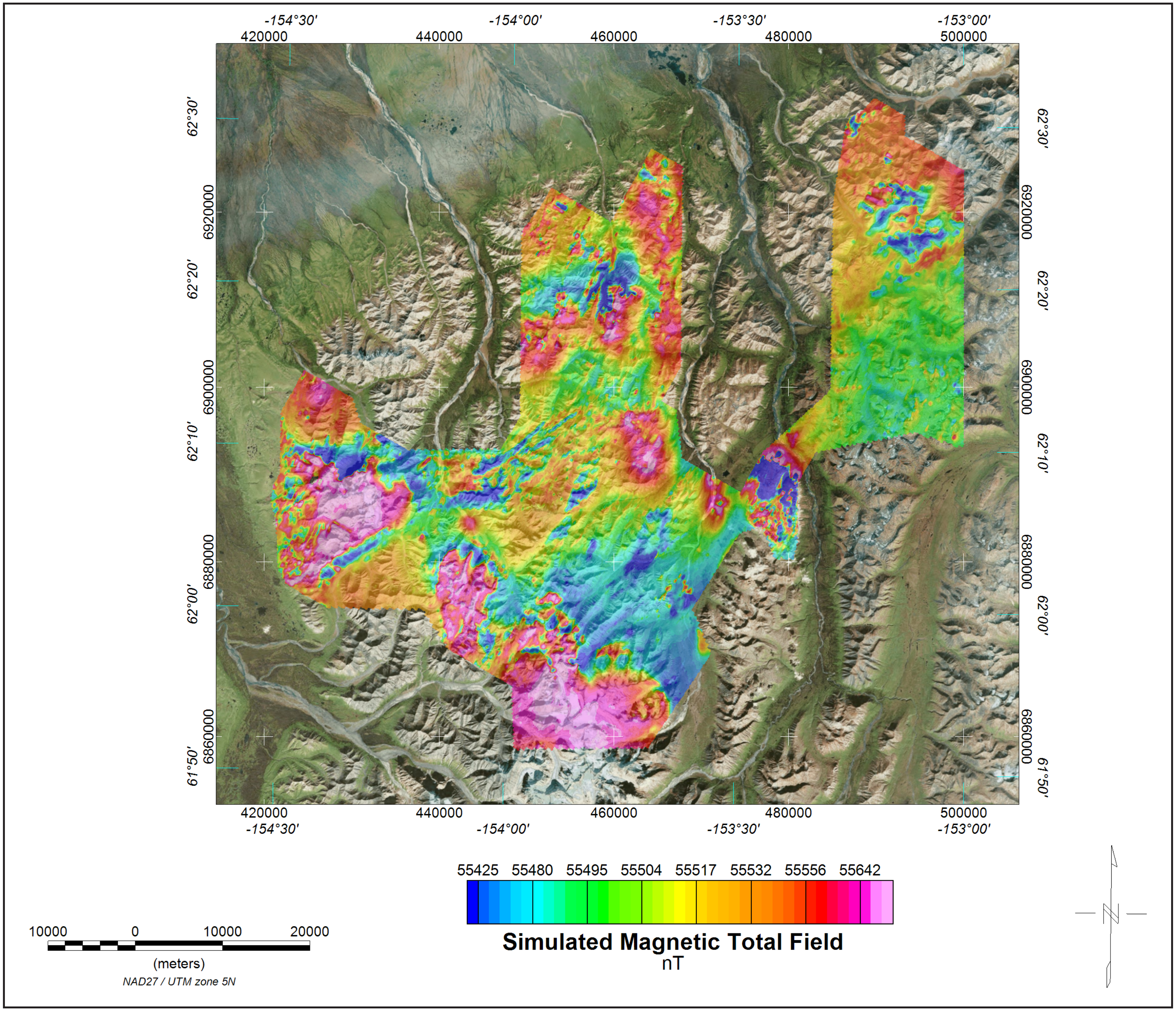



**Figure 4.** The simulated magnetic total field data were created using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the 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.

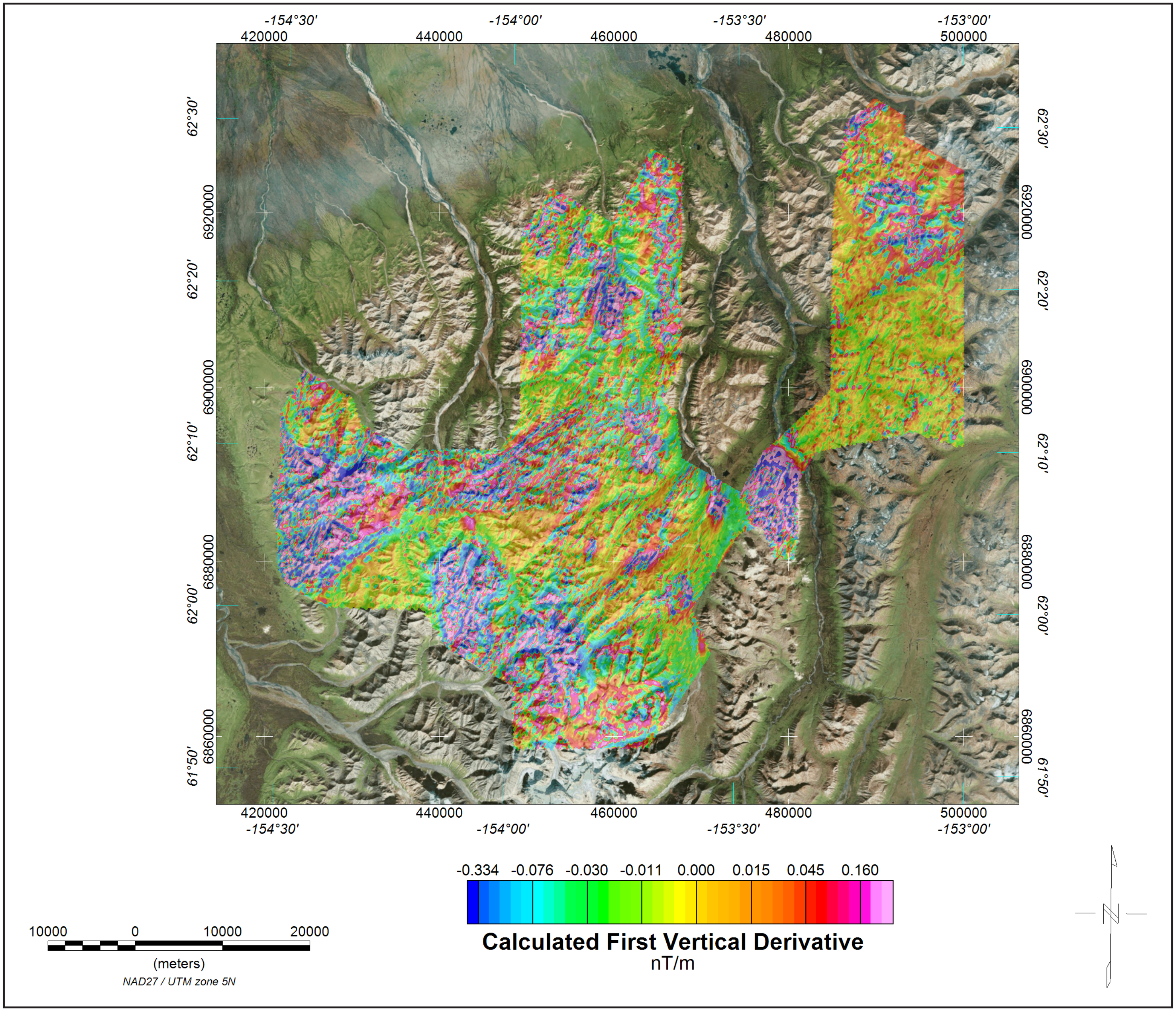



**Figure 5.** The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

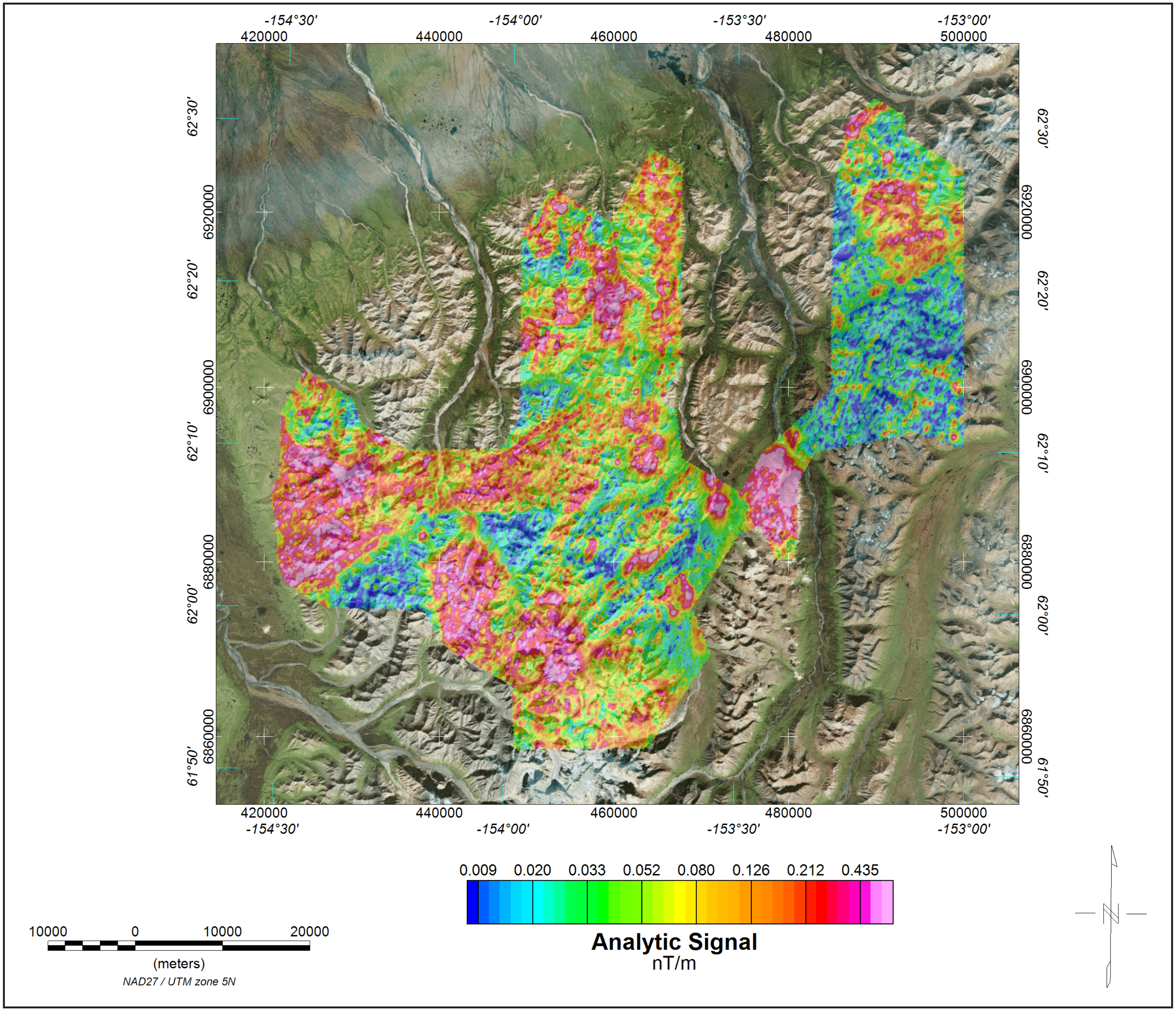



**Figure 6.** Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, 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.

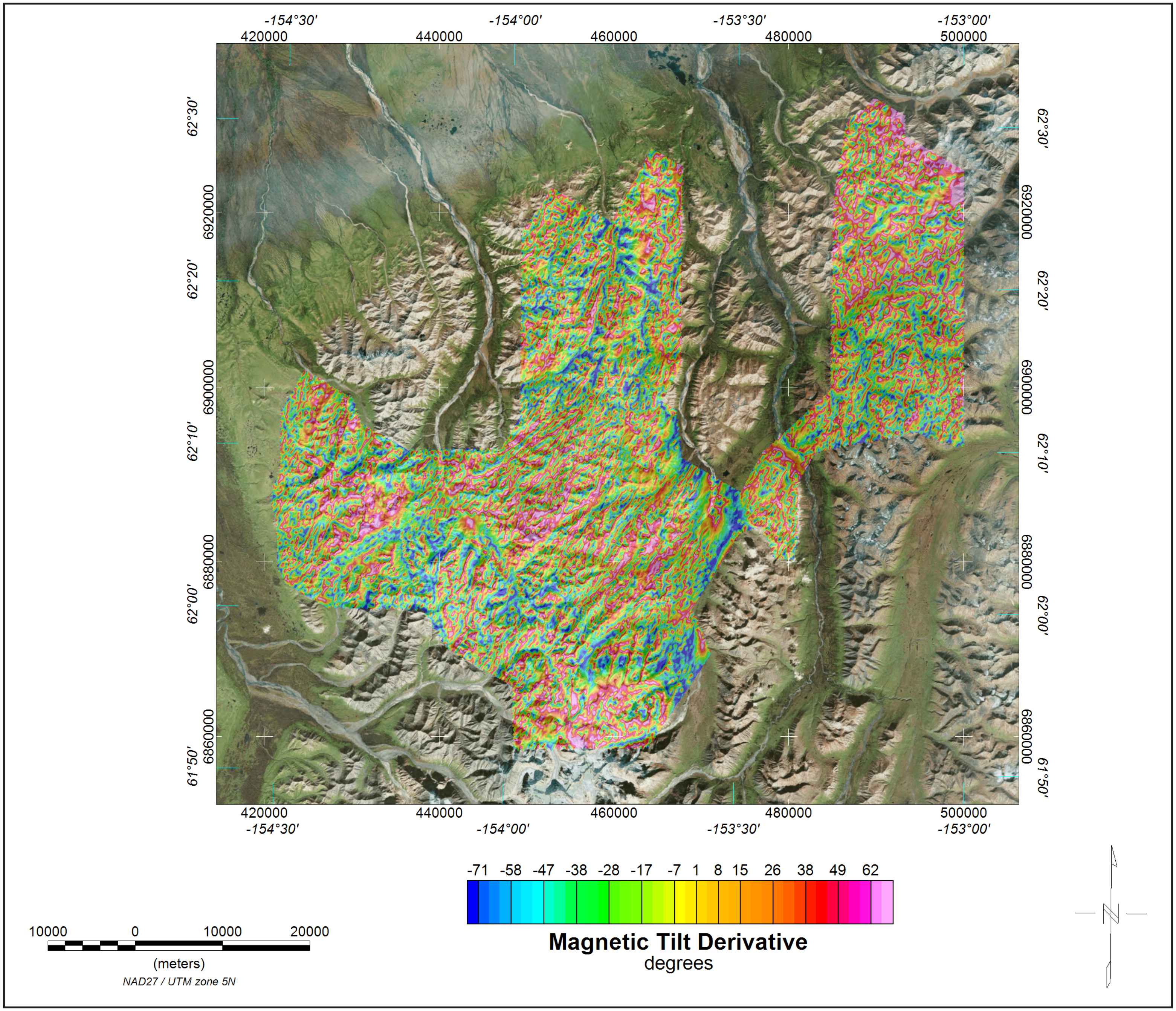



**Figure 7.** The tilt derivative is the angle between the horizontal gradient and the total gradient, which is useful for identifying the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside 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.

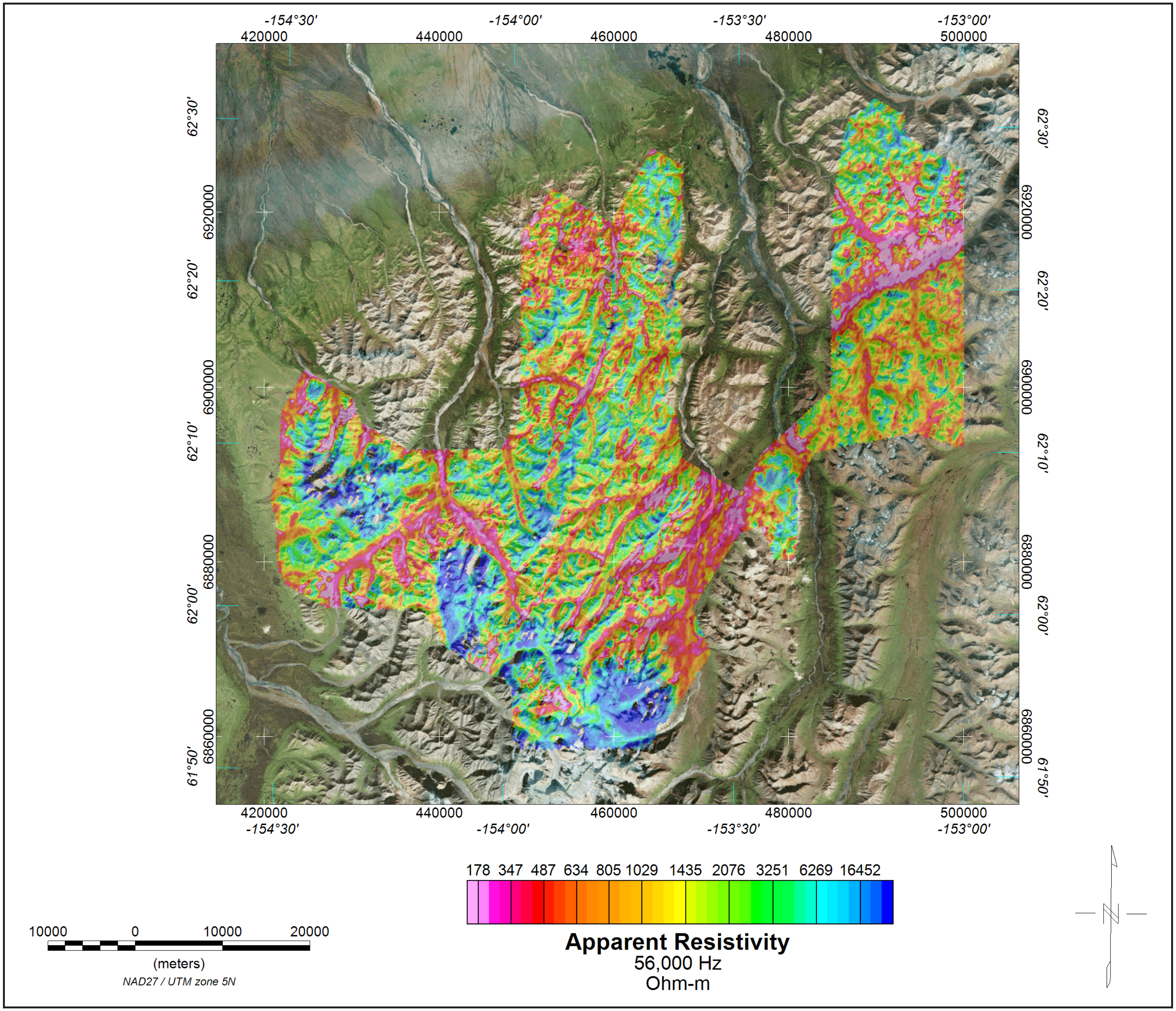



**Figure 8.** The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system 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.

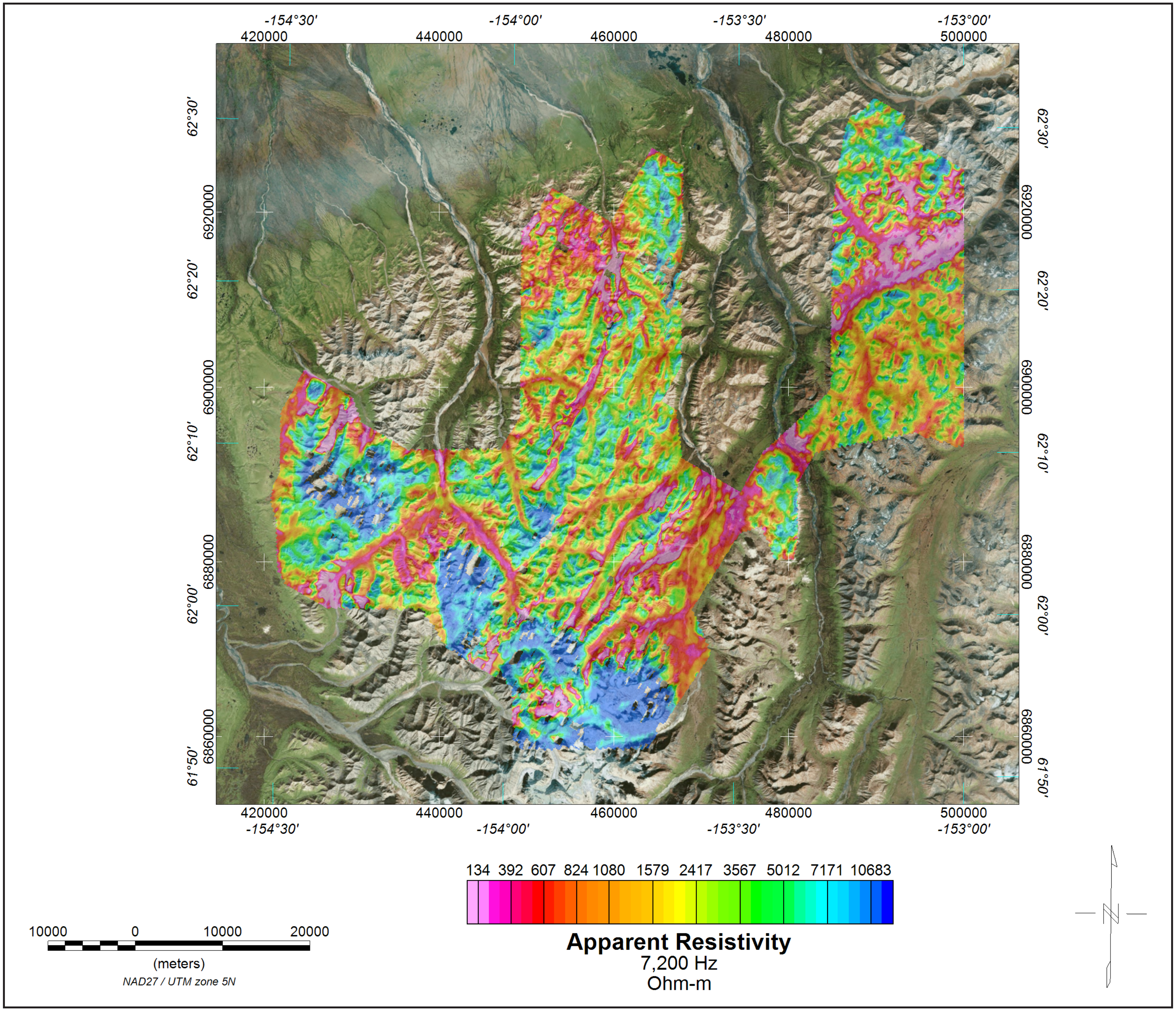



**Figure 9.** The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system 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.

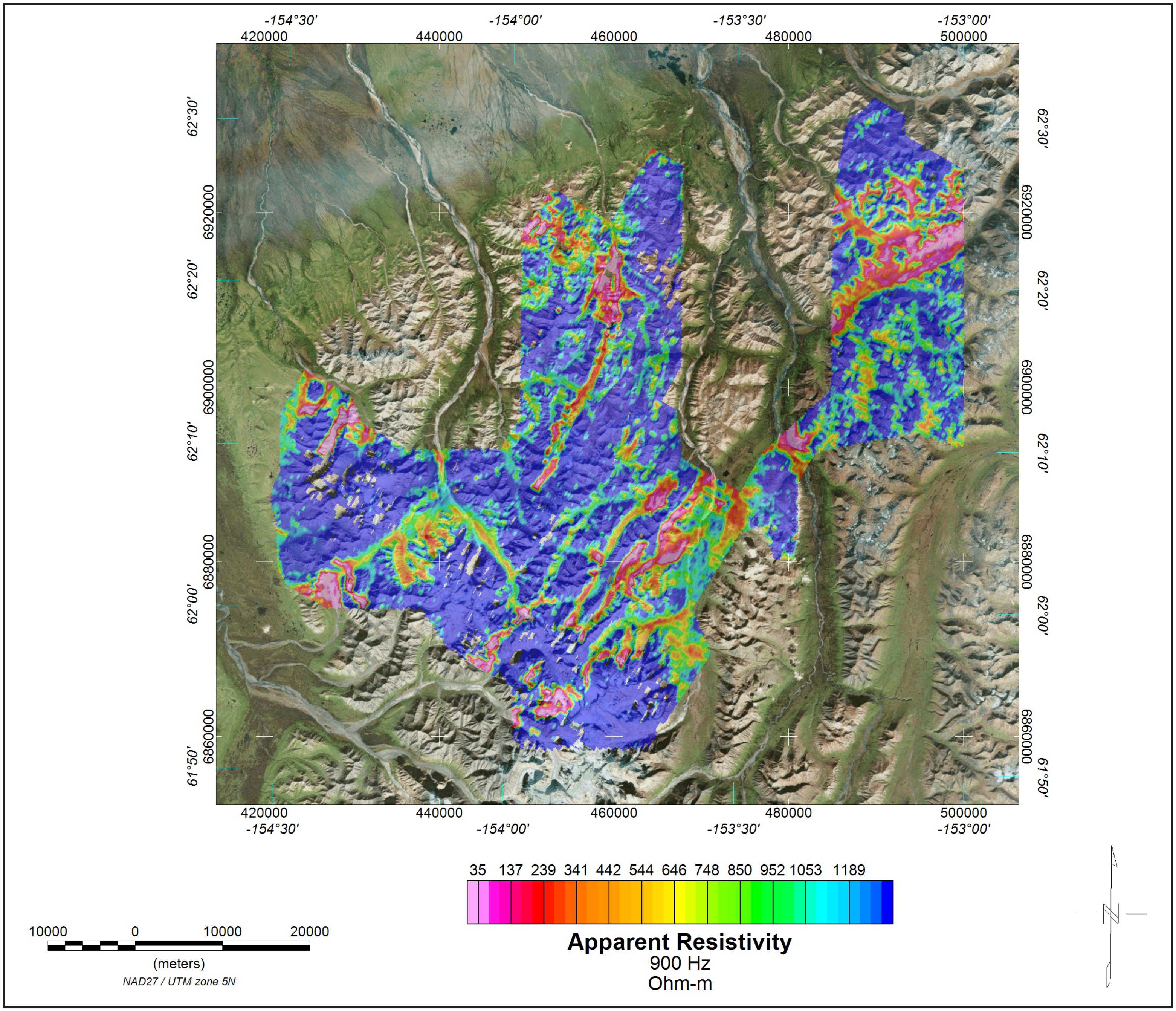



**Figure 10.** The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system 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.

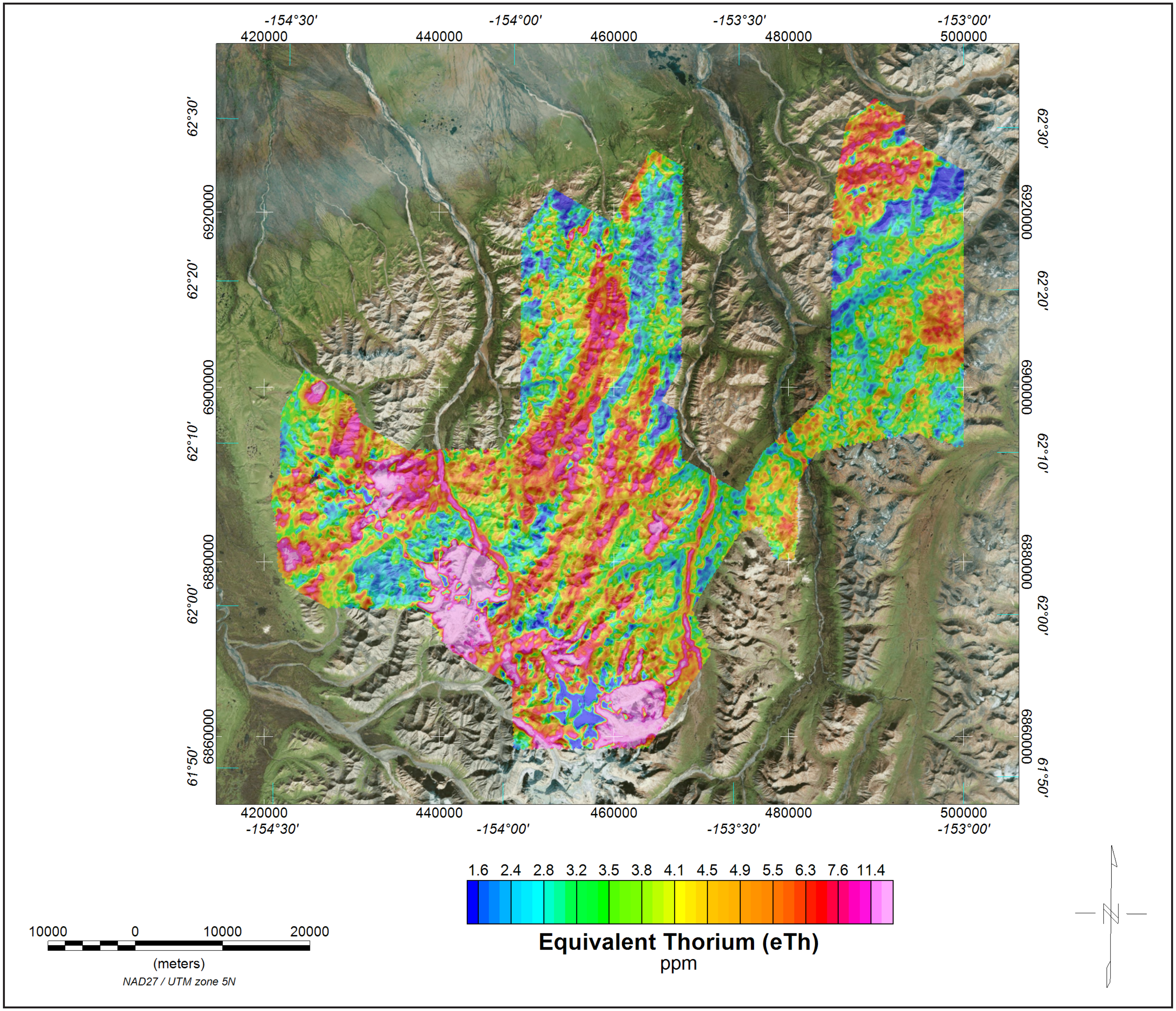



**Figure 11.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

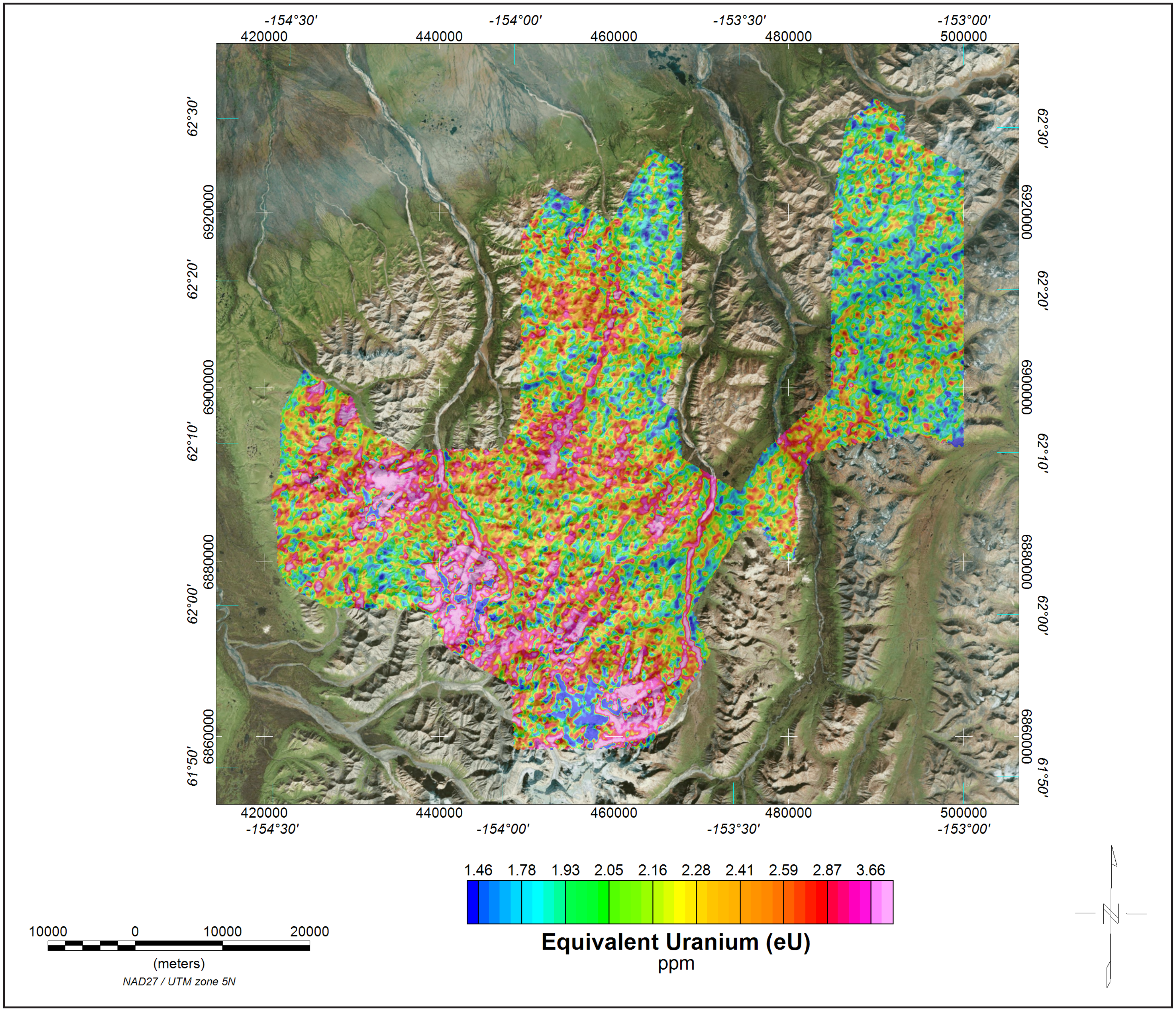



**Figure 12.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

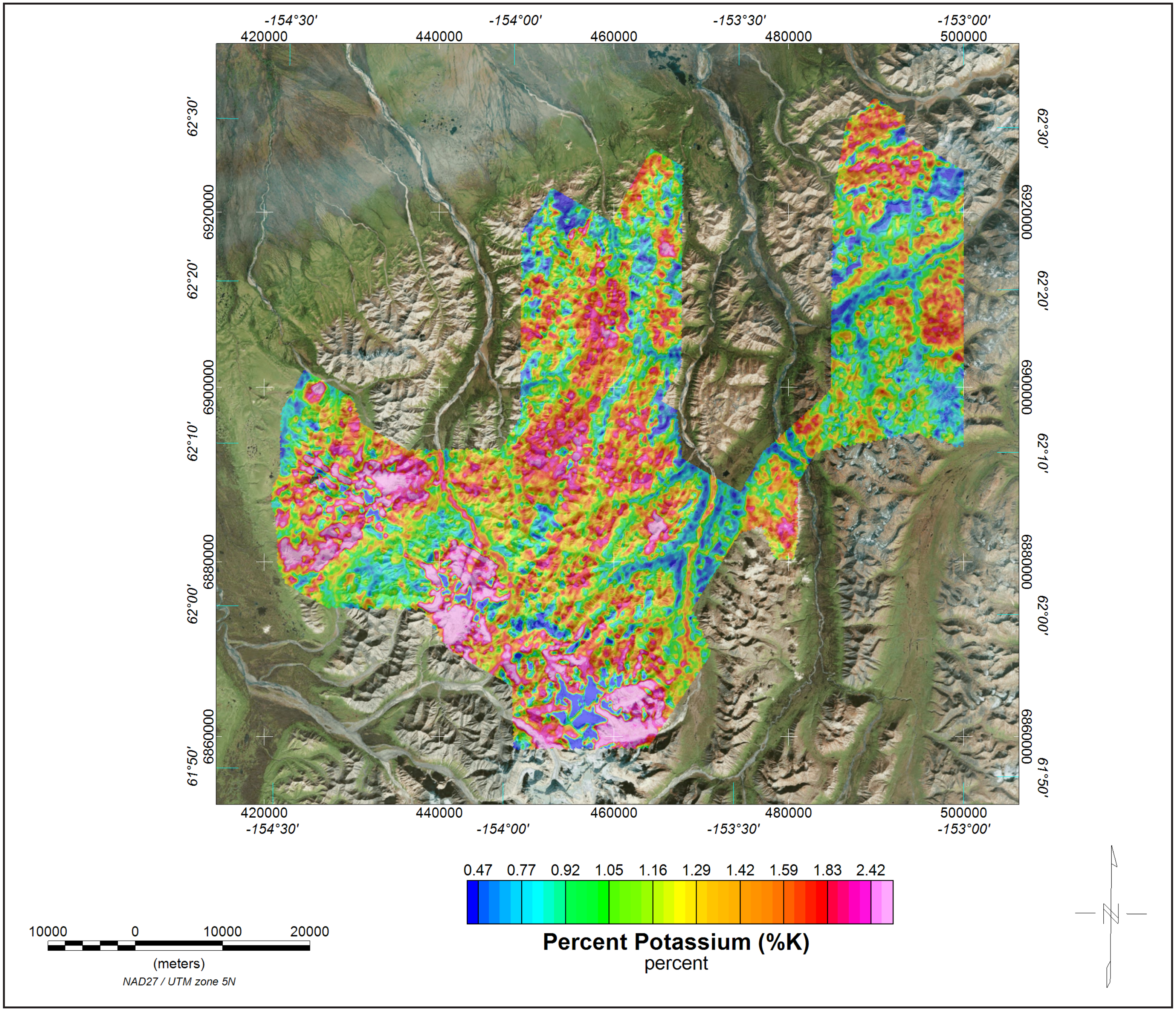



**Figure 13.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

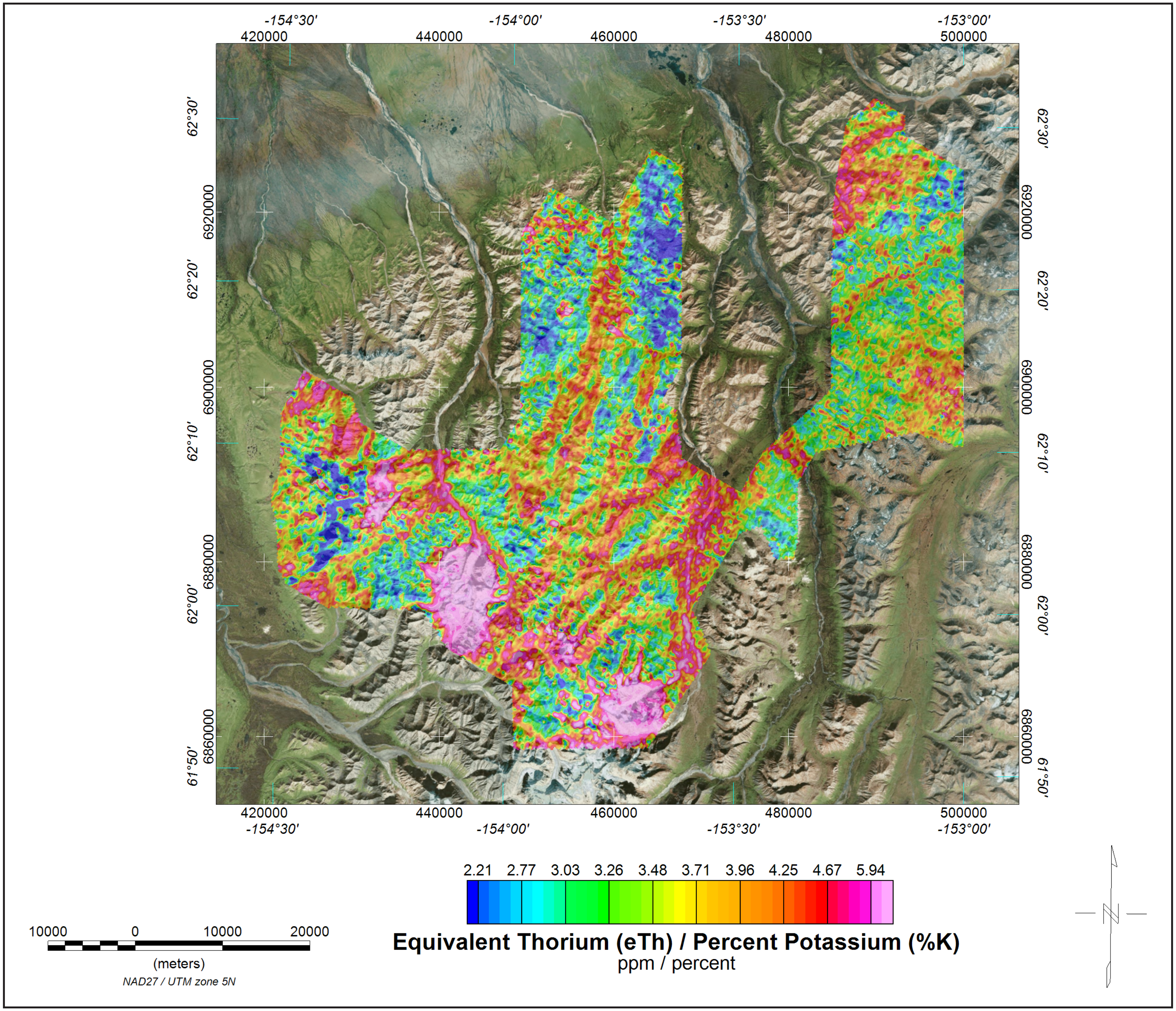



**Figure 14.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

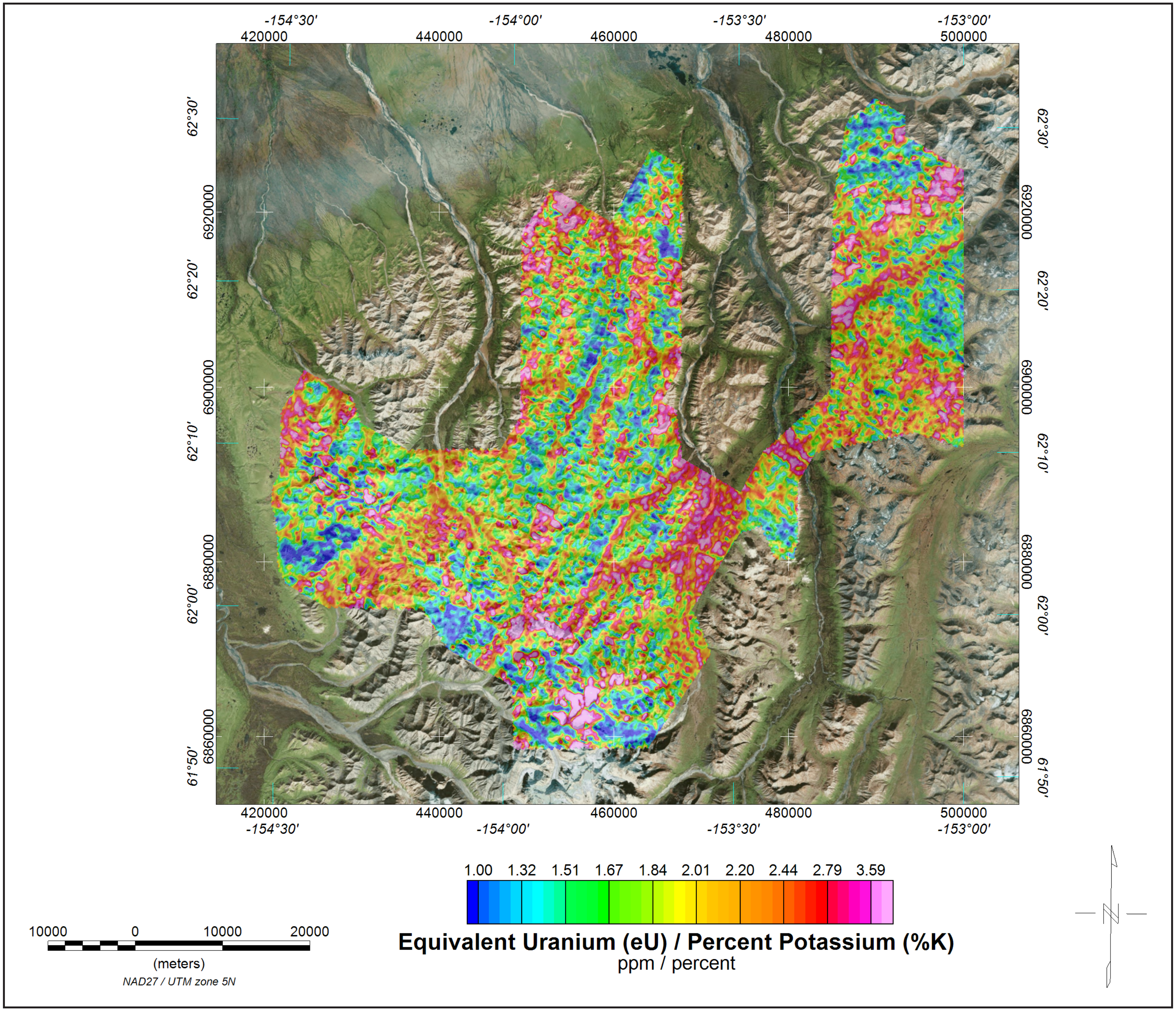



**Figure 15.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

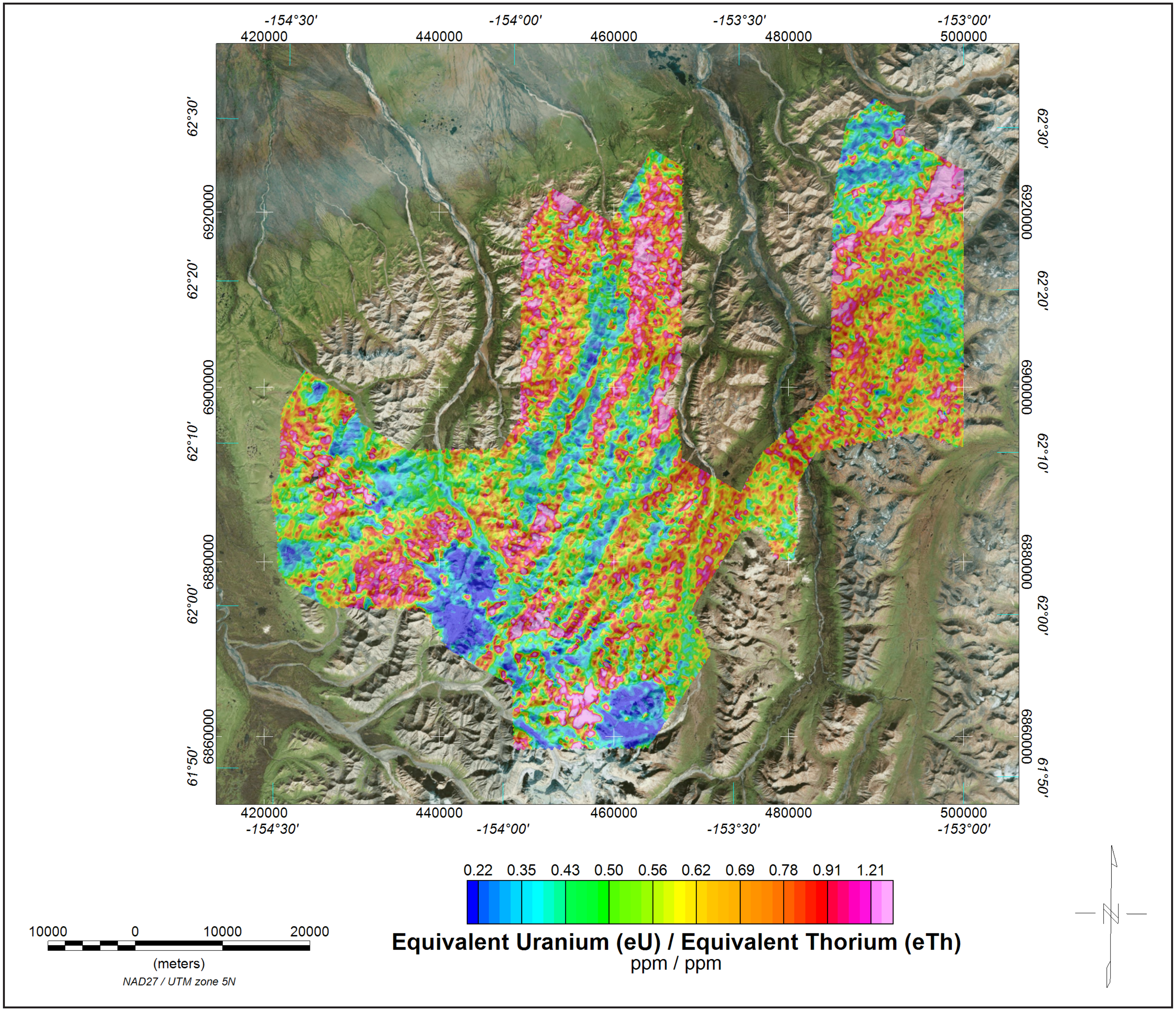



**Figure 16.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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.

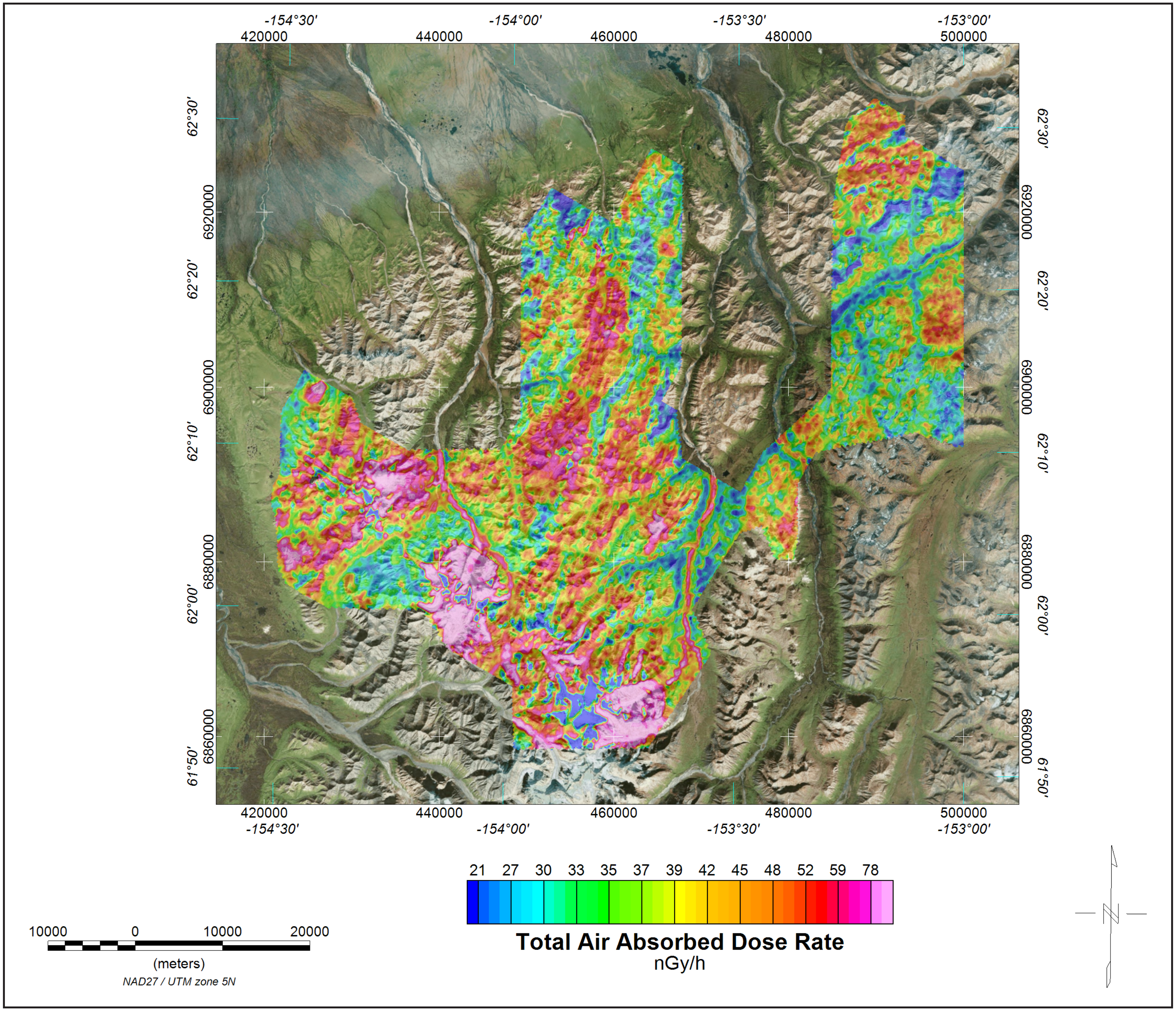



**Figure 17.** The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using primarily a Radiation Solutions RS-500 gamma-ray spectrometer, but an Exploranium GR-820 spectrometer was used on some flights. After removal of the background, the 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/10.14509/30190.

| Map Title | Description |
|---|---|
| farewell_flightpath_topo_map_1of4.pdf | flightpath grid with topographic base map |
| farewell_flightpath_topo_map_2of4.pdf | flightpath grid with topographic base map |
| farewell_flightpath_topo_map_3of4.pdf | flightpath grid with topographic base map |
| farewell_flightpath_topo_map_4of4.pdf | flightpath grid with topographic base map |
| farewell_residualmag_topo_map_1of4.pdf | residual magnetic intesity grid with topographic base map |
| farewell_residualmag_topo_map_2of4.pdf | residual magnetic intesity grid with topographic base map |
| farewell_residualmag_topo_map_3of4.pdf | residual magnetic intesity grid with topographic base map |
| farewell_residualmag_topo_map_4of4.pdf | residual magnetic intesity grid with topographic base map |
| farewell_residualmag_contours_plss_map_1of4.pdf | residual magnetic intesity grid and contours with public land survey system base layer |
| farewell_residualmag_contours_plss_map_2of4.pdf | residual magnetic intesity grid and contours with public land survey system base layer |
| farewell_residualmag_contours_plss_map_3of4.pdf | residual magnetic intesity grid and contours with public land survey system base layer |
| farewell_residualmag_contours_plss_map_4of4.pdf | residual magnetic intesity grid and contours with public land survey system base layer |
| farewell_analyticsignal_topo_map_1of4.pdf | magnetic analytic signal grid with topographic base map |
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| farewell_analyticsignal_topo_map_3of4.pdf | magnetic analytic signal grid with topographic base map |
| farewell_analyticsignal_topo_map_4of4.pdf | magnetic analytic signal grid with topographic base map |
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| farewell_analyticsignal_contours_plss_map_2of4.pdf | magnetic analytic signal grid and contours with public land survey system base layer |
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| farewell_tiltderivative_contours_topo_map_3of4.pdf | magnetic tiltderivative grid and contours with topographic base map |
| farewell_tiltderivative_contours_topo_map_4of4.pdf | magnetic tiltderivative grid and contours with topographic base map |
| farewell_residualmag_shaded_tiltderivative_contours_topo_map_1of4.pdf | residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map |

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| Map Title | Description |
|---|---|
| farewell_residualmag_shaded_tiltderivative_contours_topo_map_2of4.pdf | residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map |
| farewell_residualmag_shaded_tiltderivative_contours_topo_map_3of4.pdf | residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map |
| farewell_residualmag_shaded_tiltderivative_contours_topo_map_4of4.pdf | residual magnetic intensity grid and magnetic tilt derivative contours with topographic base map |
| farewell_res56khz_topo_map_1of4.pdf | 56,000 Hz apparent resitivity grid with topographic base map |
| farewell_res56khz_topo_map_2of4.pdf | 56,000 Hz apparent resitivity grid with topographic base map |
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| farewell_res56khz_topo_map_4of4.pdf | 56,000 Hz apparent resitivity grid with topographic base map |
| farewell_res56khz_contours_plss_map_1of4.pdf | 56,000 Hz apparent resitivity grid and contours with public land survey system base layer |
| farewell_res56khz_contours_plss_map_2of4.pdf | 56,000 Hz apparent resitivity grid and contours with public land survey system base layer |
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| farewell_res56khz_contours_plss_map_4of4.pdf | 56,000 Hz apparent resitivity grid and contours with public land survey system base layer |
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| farewell_res7200hz_topo_map_4of4.pdf | 7,200 Hz apparent resitivity grid with topographic base map |
| farewell_res7200hz_contours_plss_map_1of4.pdf | 7,200 Hz apparent resitivity grid and contours with public land survey system base layer |
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| farewell_res7200hz_contours_plss_map_3of4.pdf | 7,200 Hz apparent resitivity grid and contours with public land survey system base layer |
| farewell_res7200hz_contours_plss_map_4of4.pdf | 7,200 Hz apparent resitivity grid and contours with public land survey system base layer |
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| farewell_res900hz_contours_plss_map_1of4.pdf | 900 Hz apparent resitivity grid and contours with public land survey system grid |
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| farewell_rad_ratio_th_k_topo_map_2of4.pdf | equivalent thorium percent potassium ratio grid with topographic base map |
| farewell_rad_ratio_th_k_topo_map_3of4.pdf | equivalent thorium percent potassium ratio grid with topographic base map |

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|---|---|
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| farewell_rad_ratio_th_k_contours_plss_map_1of4.pdf | equivalent thorium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_th_k_contours_plss_map_2of4.pdf | equivalent thorium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_th_k_contours_plss_map_3of4.pdf | equivalent thorium percent potassium ratio grid and contours with public land survey system base layer |
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| farewell_rad_ratio_u_k_topo_map_1of4.pdf | equivalent uranium percent potassium ratio grid with topographic base map |
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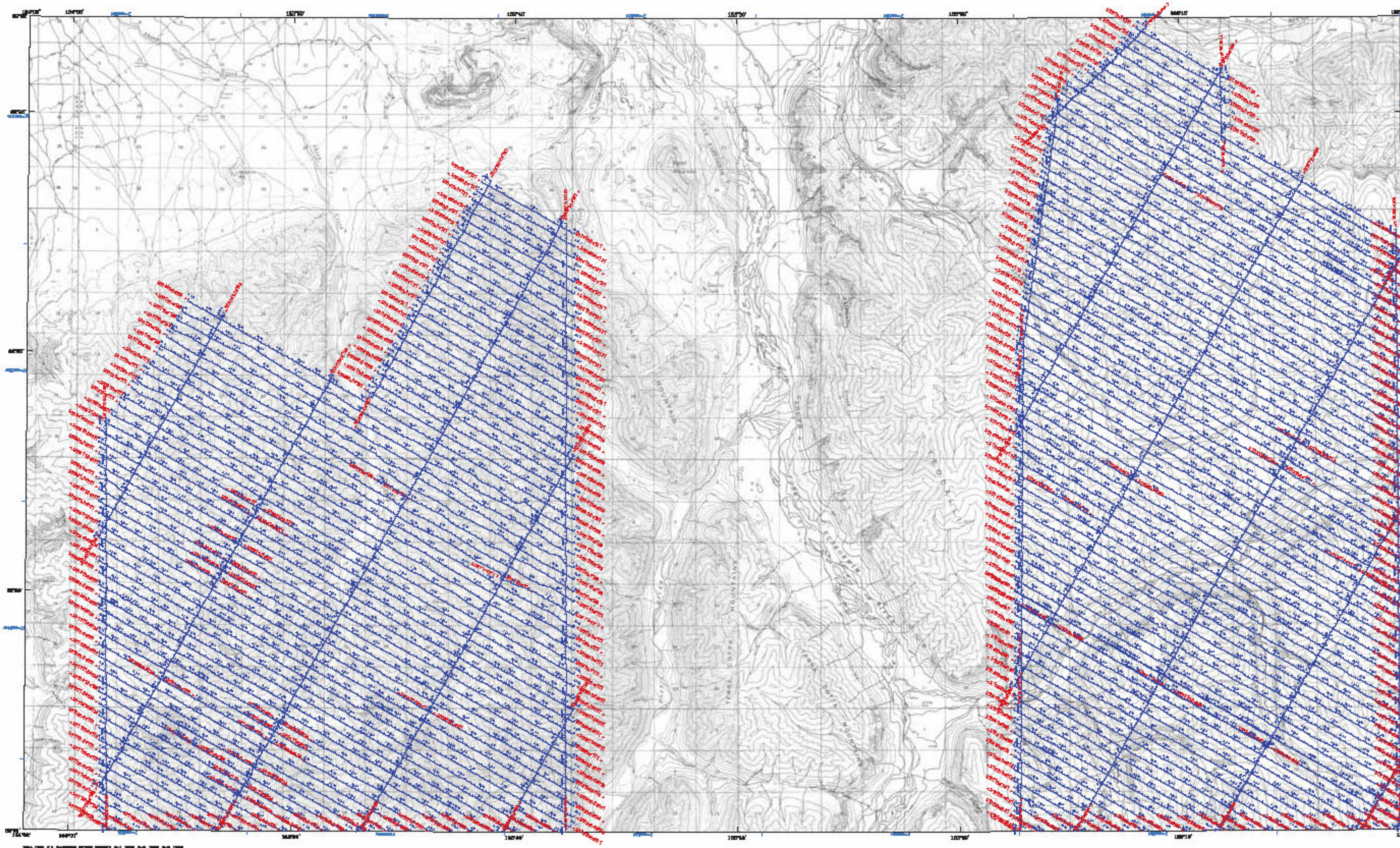
| farewell_rad_ratio_u_k_topo_map_3of4.pdf | equivalent uranium percent potassium ratio grid with topographic base map |
| farewell_rad_ratio_u_k_topo_map_4of4.pdf | equivalent uranium percent potassium ratio grid with topographic base map |
| farewell_rad_ratio_u_k_contours_plss_map_1of4.pdf | equivalent uranium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_k_contours_plss_map_2of4.pdf | equivalent uranium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_k_contours_plss_map_3of4.pdf | equivalent uranium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_k_contours_plss_map_4of4.pdf | equivalent uranium percent potassium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_th_topo_map_1of4.pdf | equivalent uranium equivalent thorium ratio grid with topographic base map |
| farewell_rad_ratio_u_th_topo_map_2of4.pdf | equivalent uranium equivalent thorium ratio grid with topographic base map |
| farewell_rad_ratio_u_th_topo_map_3of4.pdf | equivalent uranium equivalent thorium ratio grid with topographic base map |
| farewell_rad_ratio_u_th_topo_map_4of4.pdf | equivalent uranium equivalent thorium ratio grid with topographic base map |
| farewell_rad_ratio_u_th_contours_plss_map_1of4.pdf | equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_th_contours_plss_map_2of4.pdf | equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_th_contours_plss_map_3of4.pdf | equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer |
| farewell_rad_ratio_u_th_contours_plss_map_4of4.pdf | equivalent uranium equivalent thorium ratio grid and contours with public land survey system base layer |
| farewell_rad_pct_k_topo_map_1of4.pdf | percent potassium grid with topographic base map |
| farewell_rad_pct_k_topo_map_2of4.pdf | percent potassium grid with topographic base map |
| farewell_rad_pct_k_topo_map_3of4.pdf | percent potassium grid with topographic base map |
| farewell_rad_pct_k_topo_map_4of4.pdf | percent potassium grid with topographic base map |
| farewell_rad_pct_k_contours_plss_map_1of4.pdf | percent potassium grid and contours with public land survey system base layer |
| farewell_rad_pct_k_contours_plss_map_2of4.pdf | percent potassium grid and contours with public land survey system base layer |
| farewell_rad_pct_k_contours_plss_map_3of4.pdf | percent potassium grid and contours with public land survey system base layer |
| farewell_rad_pct_k_contours_plss_map_4of4.pdf | percent potassium grid and contours with public land survey system base layer |
| farewell_rad_equiv_th_topo_map_1of4.pdf | equivalent thorium grid with topographic base map |

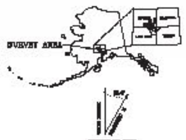
**Table 1.** Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30190.

| Map Title | Description |
|---|---|
| farewell_rad_equiv_th_topo_map_2of4.pdf | equivalent thorium grid with topographic base map |
| farewell_rad_equiv_th_topo_map_3of4.pdf | equivalent thorium grid with topographic base map |
| farewell_rad_equiv_th_topo_map_4of4.pdf | equivalent thorium grid with topographic base map |
| farewell_rad_equiv_th_contours_plss_map_1of4.pdf | equivalent thorium grid and contours with public land survey system base layer |
| farewell_rad_equiv_th_contours_plss_map_2of4.pdf | equivalent thorium grid and contours with public land survey system base layer |
| farewell_rad_equiv_th_contours_plss_map_3of4.pdf | equivalent thorium grid and contours with public land survey system base layer |
| farewell_rad_equiv_th_contours_plss_map_4of4.pdf | equivalent thorium grid and contours with public land survey system base layer |
| farewell_rad_equiv_u_topo_map_1of4.pdf | equivalent uranium grid with topographic base map |
| farewell_rad_equiv_u_topo_map_2of4.pdf | equivalent uranium grid with topographic base map |
| farewell_rad_equiv_u_topo_map_3of4.pdf | equivalent uranium grid with topographic base map |
| farewell_rad_equiv_u_topo_map_4of4.pdf | equivalent uranium grid with topographic base map |
| farewell_rad_equiv_u_contours_plss_map_1of4.pdf | equivalent uranium grid and contours with public land survey system base layer |
| farewell_rad_equiv_u_contours_plss_map_2of4.pdf | equivalent uranium grid and contours with public land survey system base layer |
| farewell_rad_equiv_u_contours_plss_map_3of4.pdf | equivalent uranium grid and contours with public land survey system base layer |
| farewell_rad_equiv_u_contours_plss_map_4of4.pdf | equivalent uranium grid and contours with public land survey system base layer |
| farewell_rad_taadr_topo_map_1of4.pdf | total air absorbed dose rate grid with topographic base map |
| farewell_rad_taadr_topo_map_2of4.pdf | total air absorbed dose rate grid with topographic base map |
| farewell_rad_taadr_topo_map_3of4.pdf | total air absorbed dose rate grid with topographic base map |
| farewell_rad_taadr_topo_map_4of4.pdf | total air absorbed dose rate grid with topographic base map |
| farewell_rad_taadr_contours_plss_map_1of4.pdf | total air absorbed dose rate grid and contours with public land survey system base layer |
| farewell_rad_taadr_contours_plss_map_2of4.pdf | total air absorbed dose rate grid and contours with public land survey system base layer |
| farewell_rad_taadr_contours_plss_map_3of4.pdf | total air absorbed dose rate grid and contours with public land survey system base layer |
| farewell_rad_taadr_contours_plss_map_4of4.pdf | total air absorbed dose rate grid and contours with public land survey system base layer |
| farewell_rad_ternary_topo_map_1of4.pdf | radioelement ternary grid with topographic base map |
| farewell_rad_ternary_topo_map_2of4.pdf | radioelement ternary grid with topographic base map |
| farewell_rad_ternary_topo_map_3of4.pdf | radioelement ternary grid with topographic base map |
| farewell_rad_ternary_topo_map_4of4.pdf | radioelement ternary grid with topographic base map |
| farewell_interpretation_plss_map_1of5.pdf | interpretation with public land survey system base layer |
| farewell_interpretation_plss_map_2of5.pdf | interpretation with public land survey system base layer |
| farewell_interpretation_plss_map_3of5.pdf | interpretation with public land survey system base layer |

**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/10.14509/30190.

| Map Title | Description |
|---|---|
| farewell_interpretation_plss_map_4of5.pdf | interpretation with public land survey system base layer |
| farewell_interpretation_plss_map_5of5.pdf | interpretation with public land survey system base layer |
| farewell_interpretation_residualmag_plss_map_1of5.pdf | interpretation and residual magnetic intensity grid with public land survey system base layer |
| farewell_interpretation_residualmag_plss_map_2of5.pdf | interpretation and residual magnetic intensity grid with public land survey system base layer |
| farewell_interpretation_residualmag_plss_map_3of5.pdf | interpretation and residual magnetic intensity grid with public land survey system base layer |
| farewell_interpretation_residualmag_plss_map_4of5.pdf | interpretation and residual magnetic intensity grid with public land survey system base layer |
| farewell_interpretation_residualmag_plss_map_5of5.pdf | interpretation and residual magnetic intensity grid with public land survey system base layer |
| farewell_emanomalies_residualmag_detailed_topo_map1of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map2of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map3of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map4of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map5of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map6of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map7of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map8of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map9of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |
| farewell_emanomalies_residualmag_detailed_topo_map10of10.pdf | em anomalies and residual magnetic intensity grid with topographic base map |





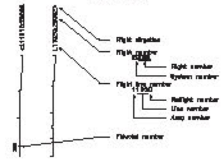


# FLIGHT PATH WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

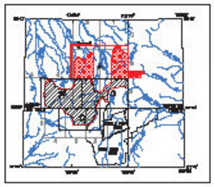
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

FLIGHT LINES




LOCATION INDEX OF 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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.

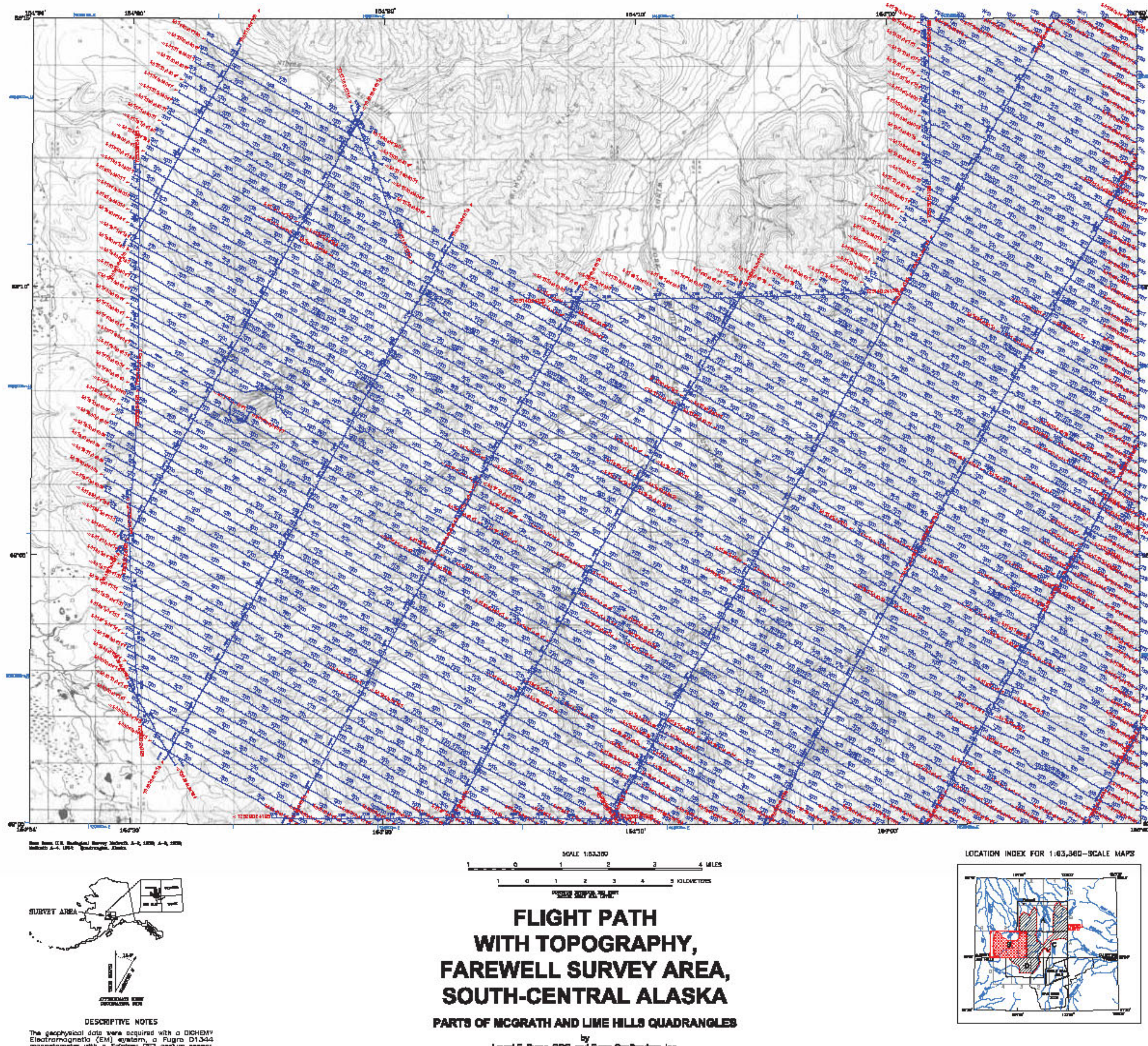
A Novatel OEM5-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

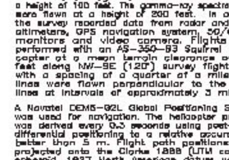
### SURVEY HISTORY

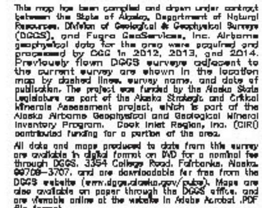
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 2013, and 2014. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

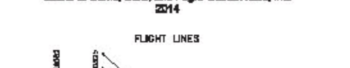
All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat .PDF file format.

GEOPHYSICAL REPORT 2014-2-29B





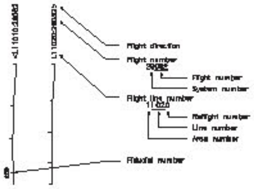




# FLIGHT PATH WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

FLIGHT LINES




### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### 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 the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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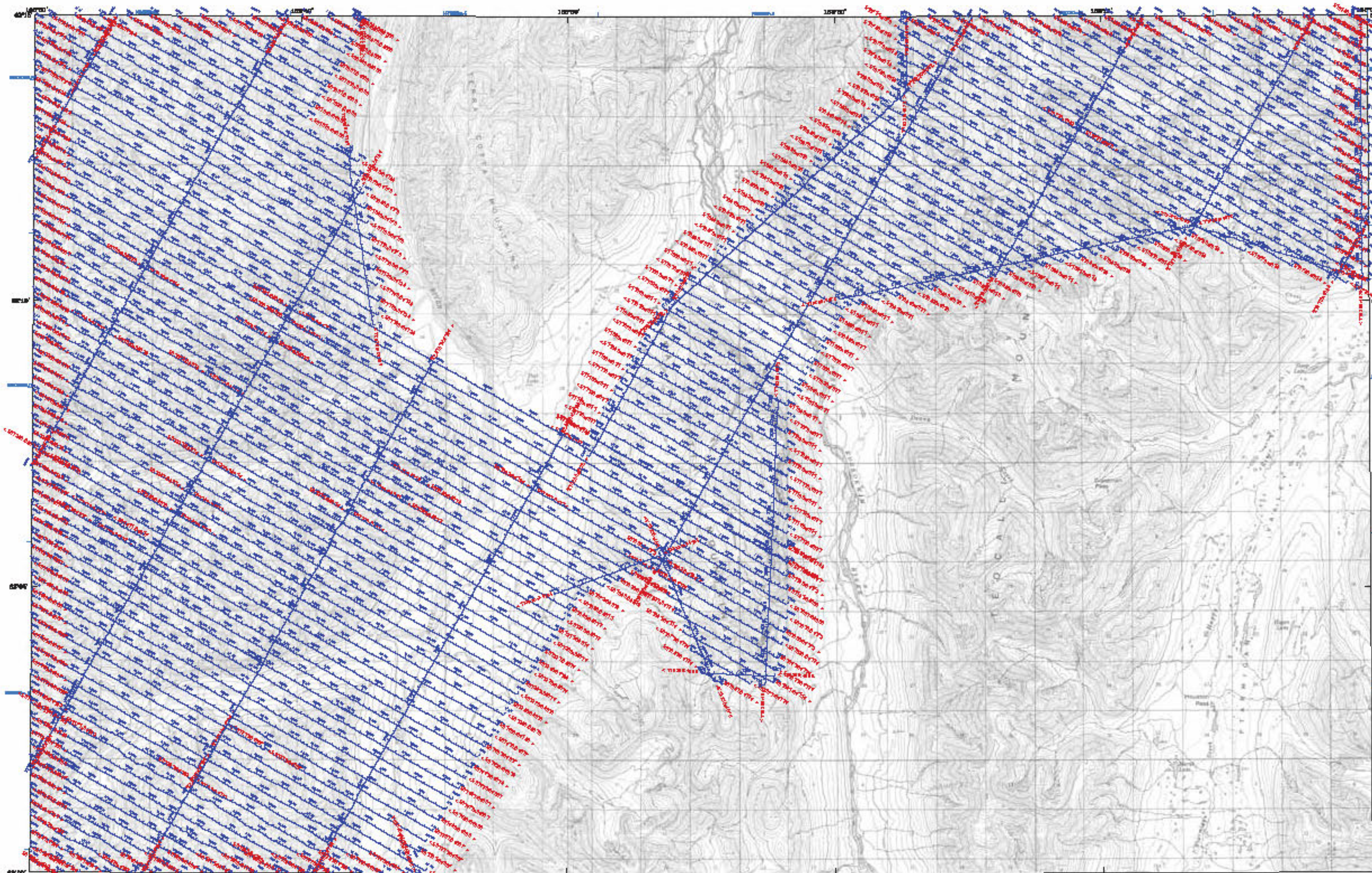
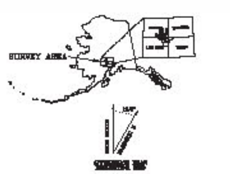




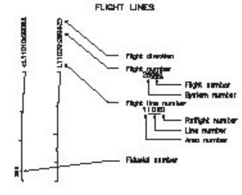

SCALE 1:63,360

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

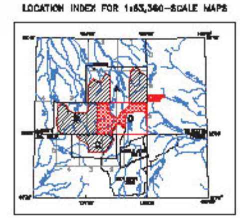
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

FLIGHT LINES




LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### SURVEY HISTORY

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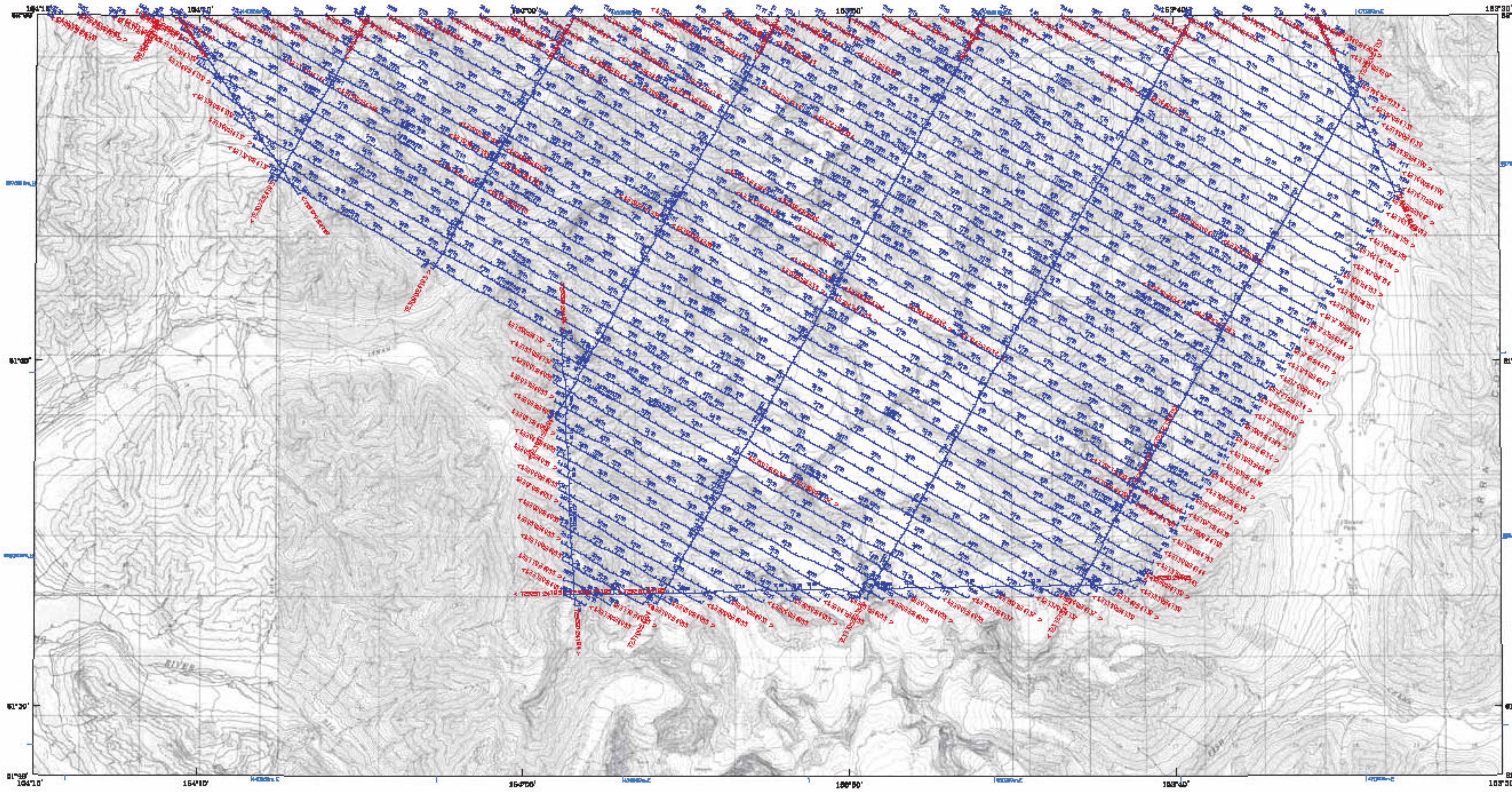



SCALE 1:63,360

1 0 1 2 3 4 MILES

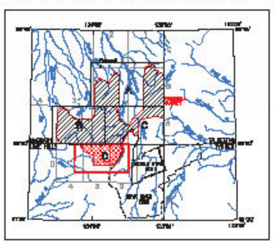
1 0 1 2 3 4 5 KILOMETERS

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

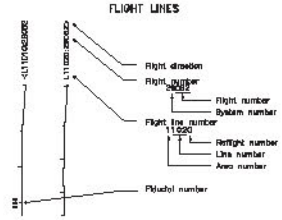
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



FLIGHT LINES




### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### SURVEY HISTORY

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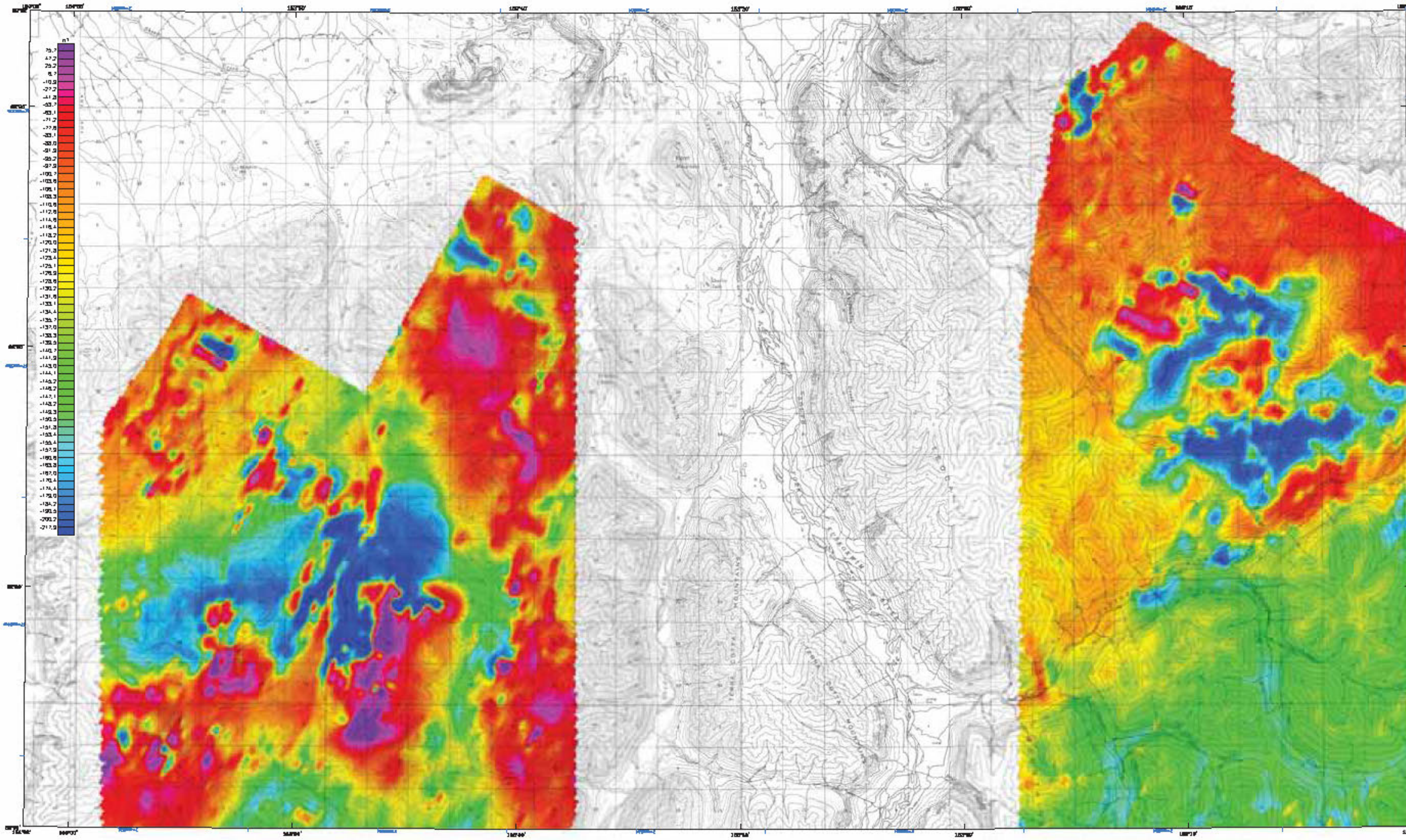
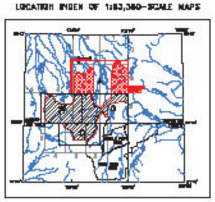



SCALE 1:63,360

# RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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




### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[illegible] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEMV-3DL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### SURVEY HISTORY

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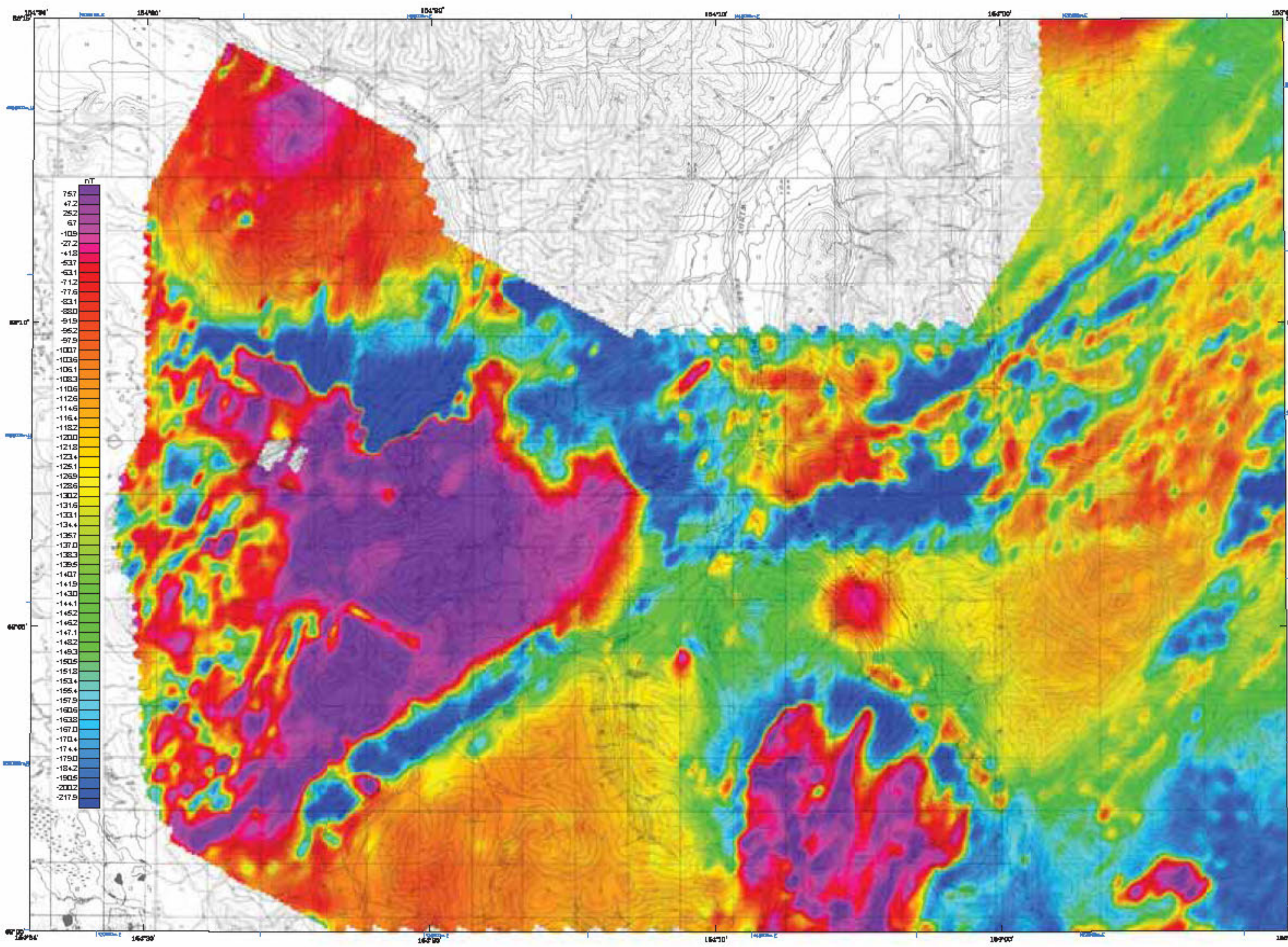
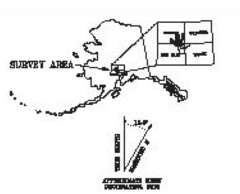



Base from U.S. Geological Survey McGrath A-2, 1958; A-3, 1958; McGrath A-4, 1954 Quadrangles, Alaska.

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

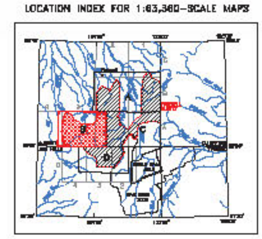



# RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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.

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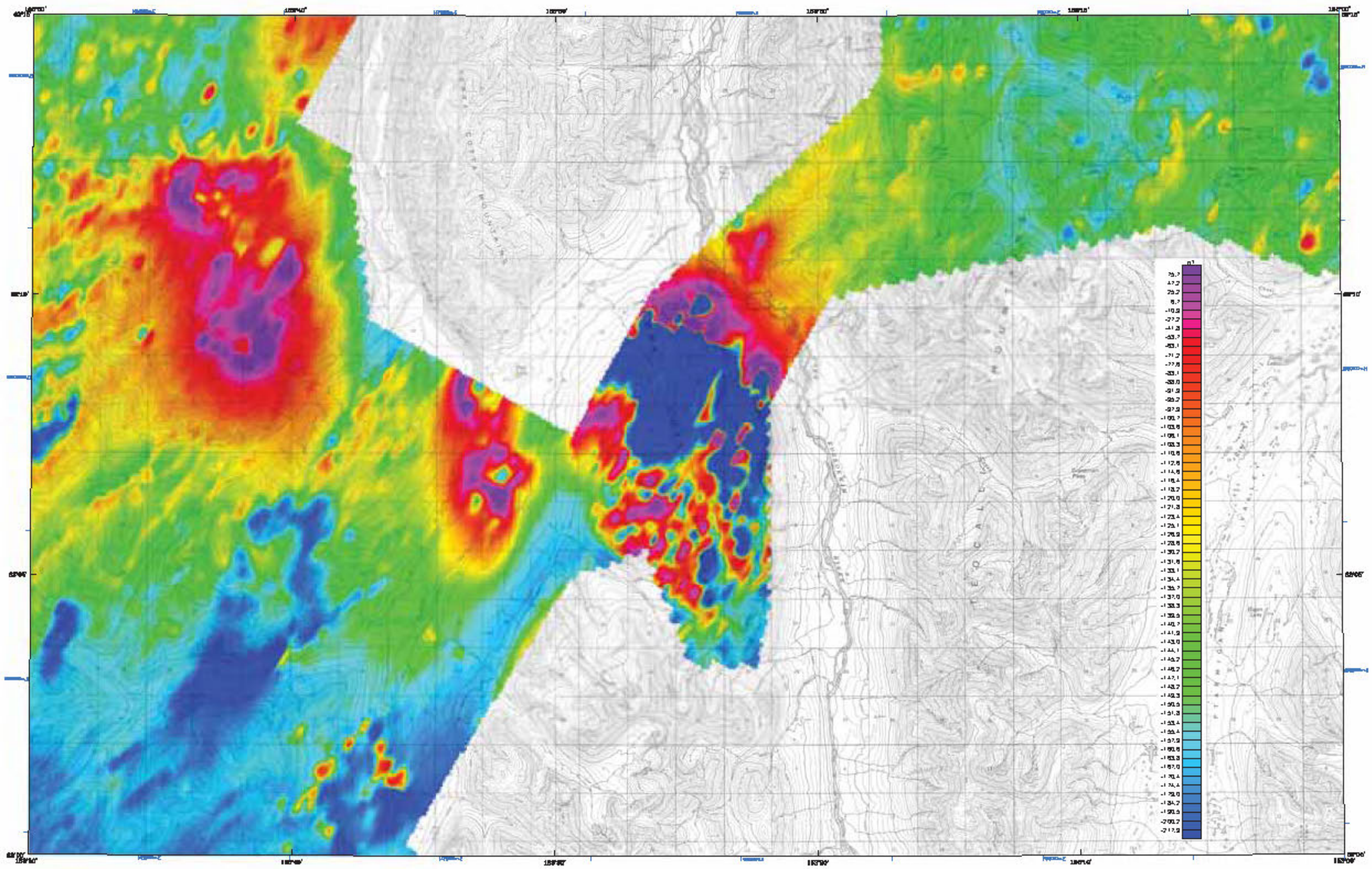


SCALE 1:63,360

1 0 1 2 3 4 MILES

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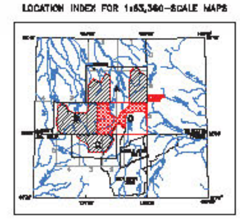

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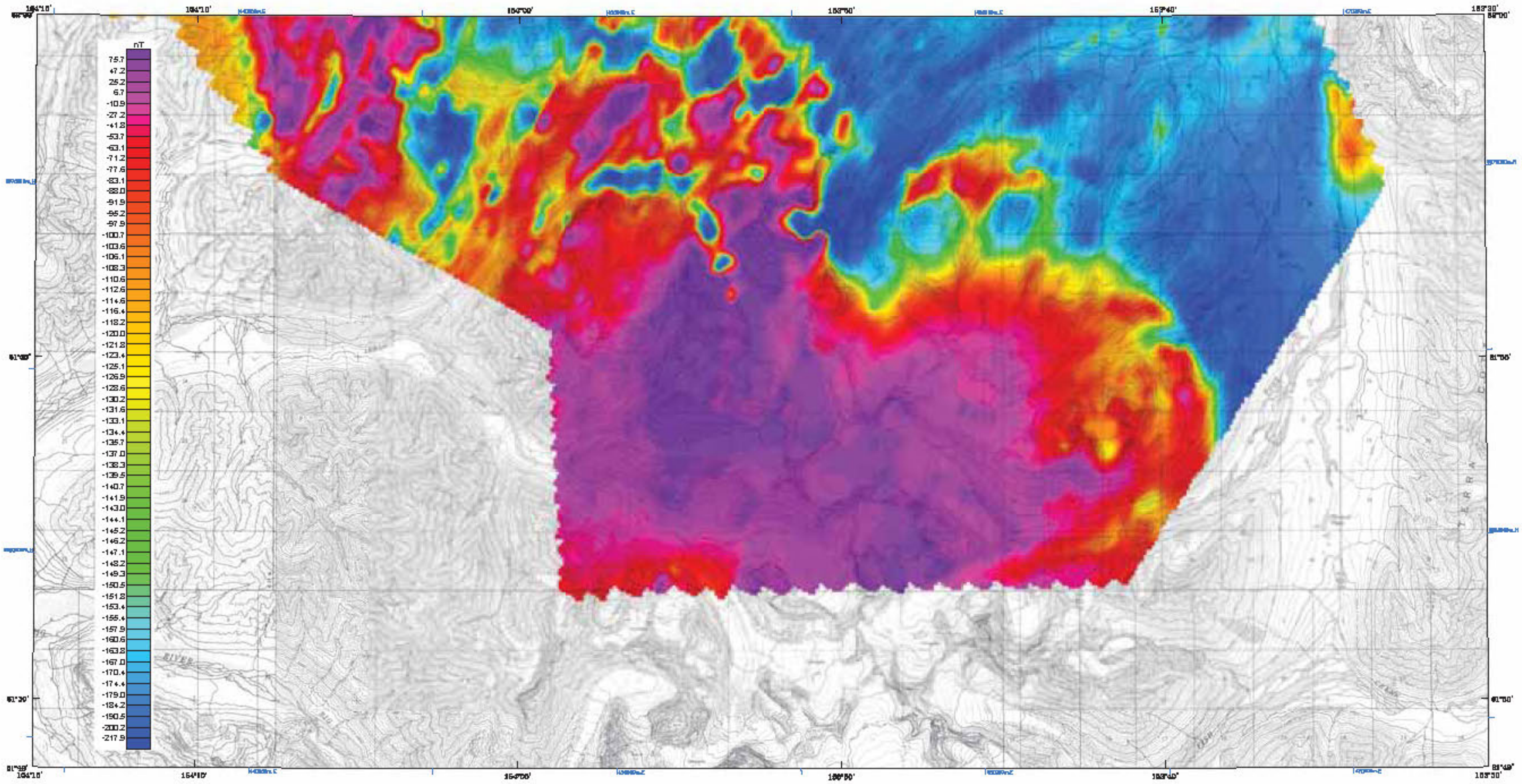


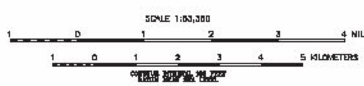



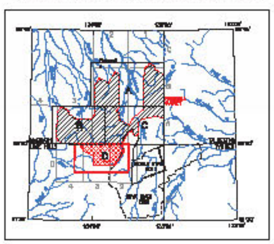


# RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by

Laurel E. Burns, CGG, and Fugro GeoServices, Inc.

2014

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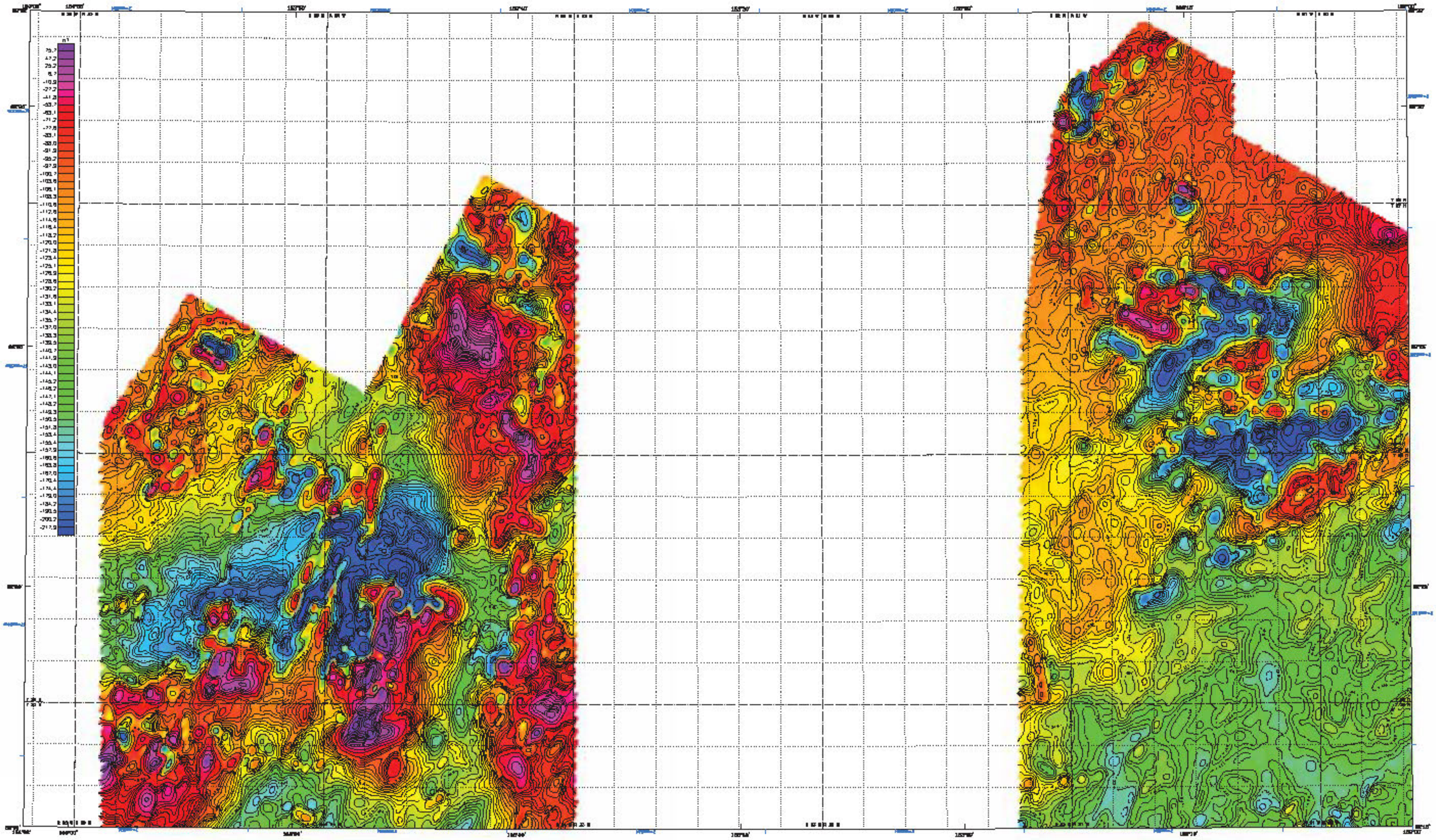


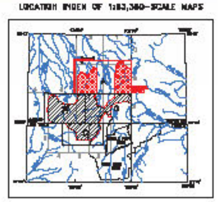
SCALE 1:63,360


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX OF 1:63,360-SCALE MAPS



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MAGNETIC CONTOURS

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

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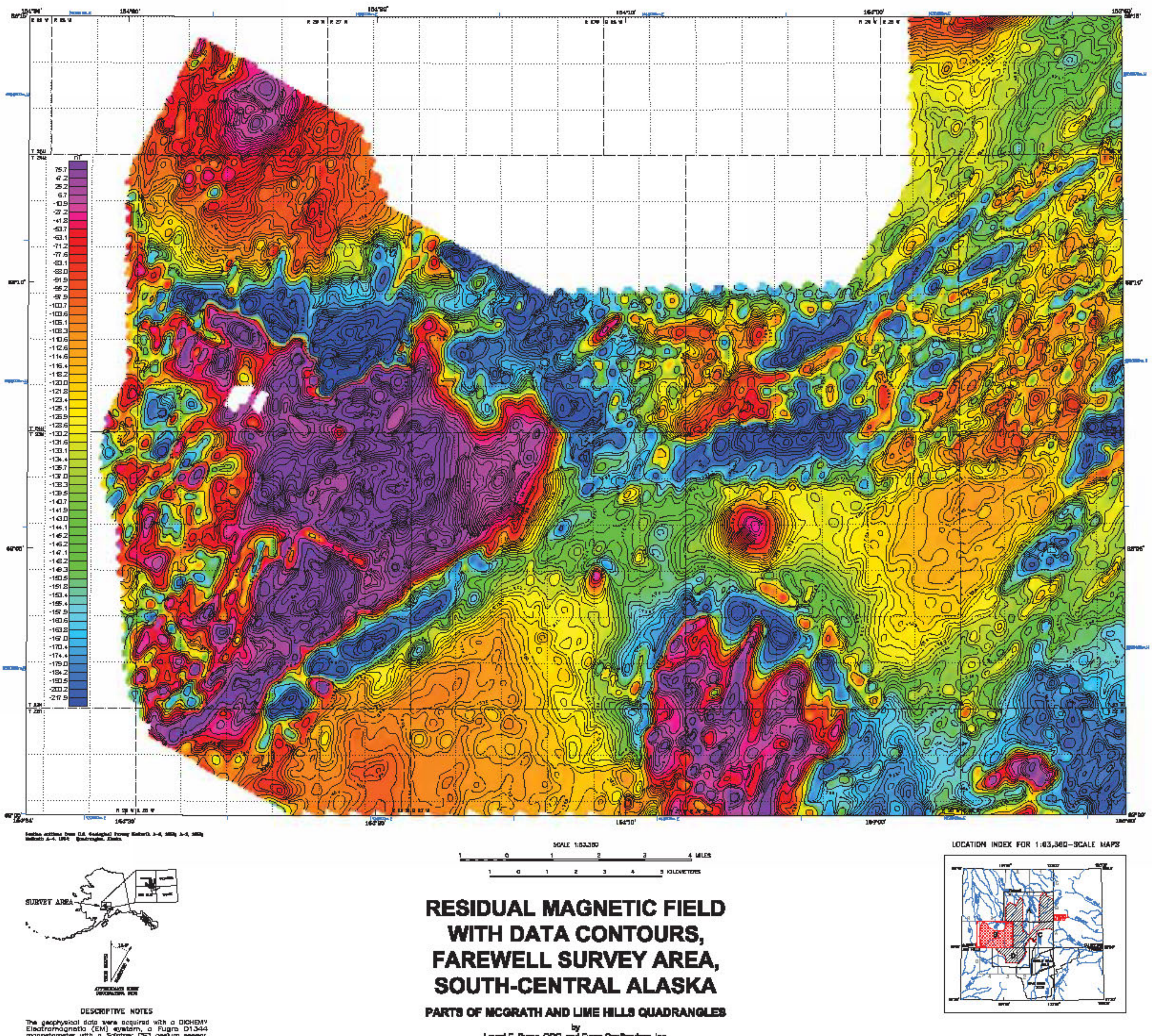
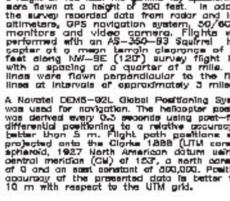
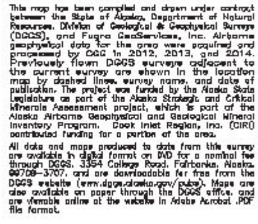



SCALE 1:63,360

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
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2014

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### MAGNETIC CONTOURS

| | |
|---|---|
| ———— | 100 nT |
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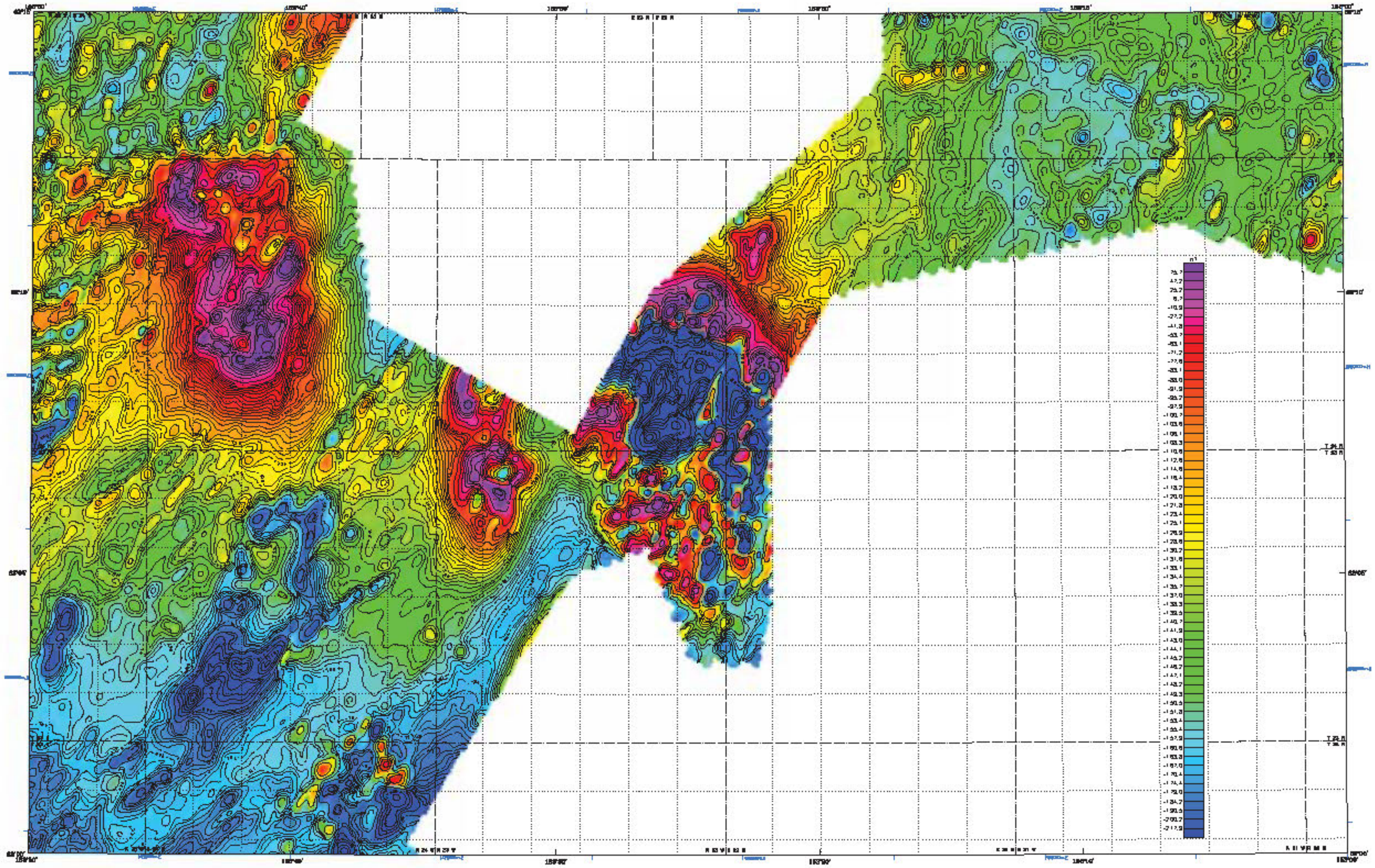


SCALE 1:63,360

1 0 1 2 3 4 MILES

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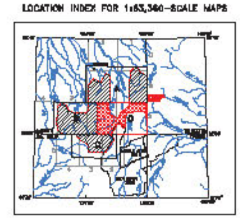

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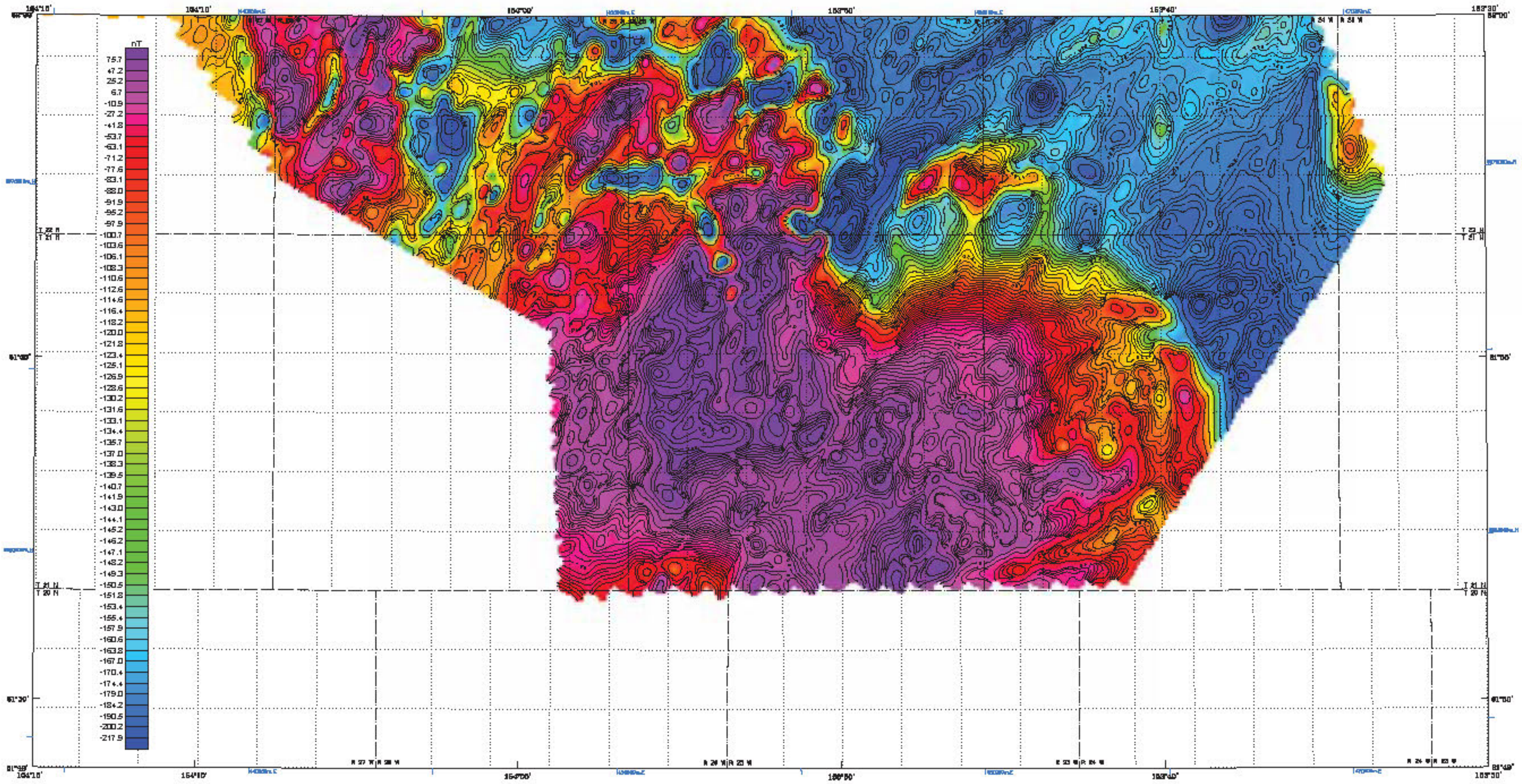


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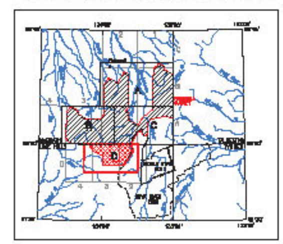

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### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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.

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

### MAGNETIC CONTOURS

| | |
|---|---|
| ———— | 100 nT |
| ———— | 20 nT |
| ———— | 4 nT |
| — — — — | 2 nT |

### SURVEY HISTORY

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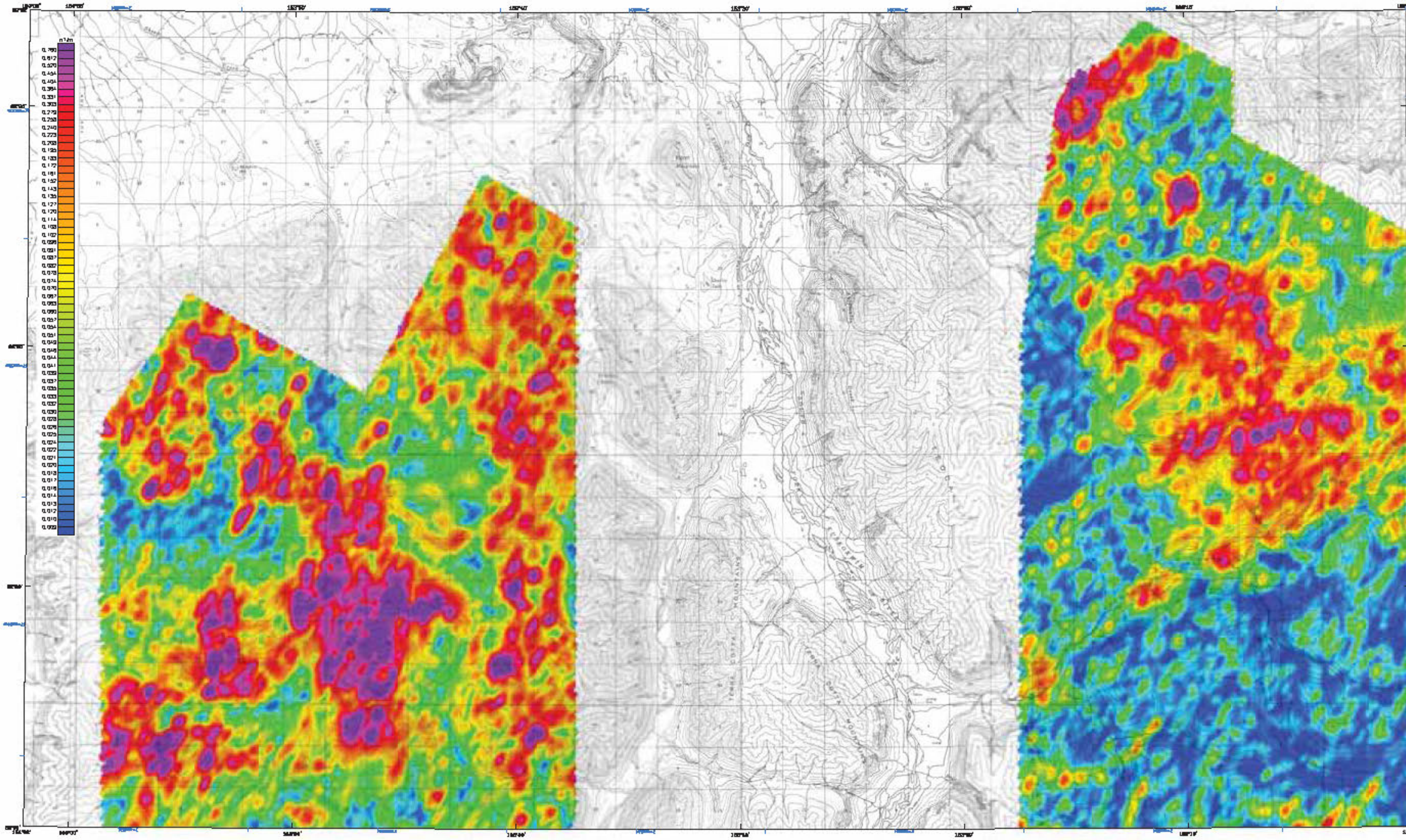

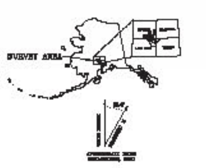


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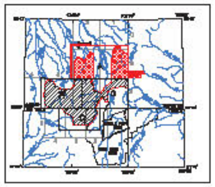


# ANALYTIC SIGNAL WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM$^{V}$ Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### 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. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (e.g., contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

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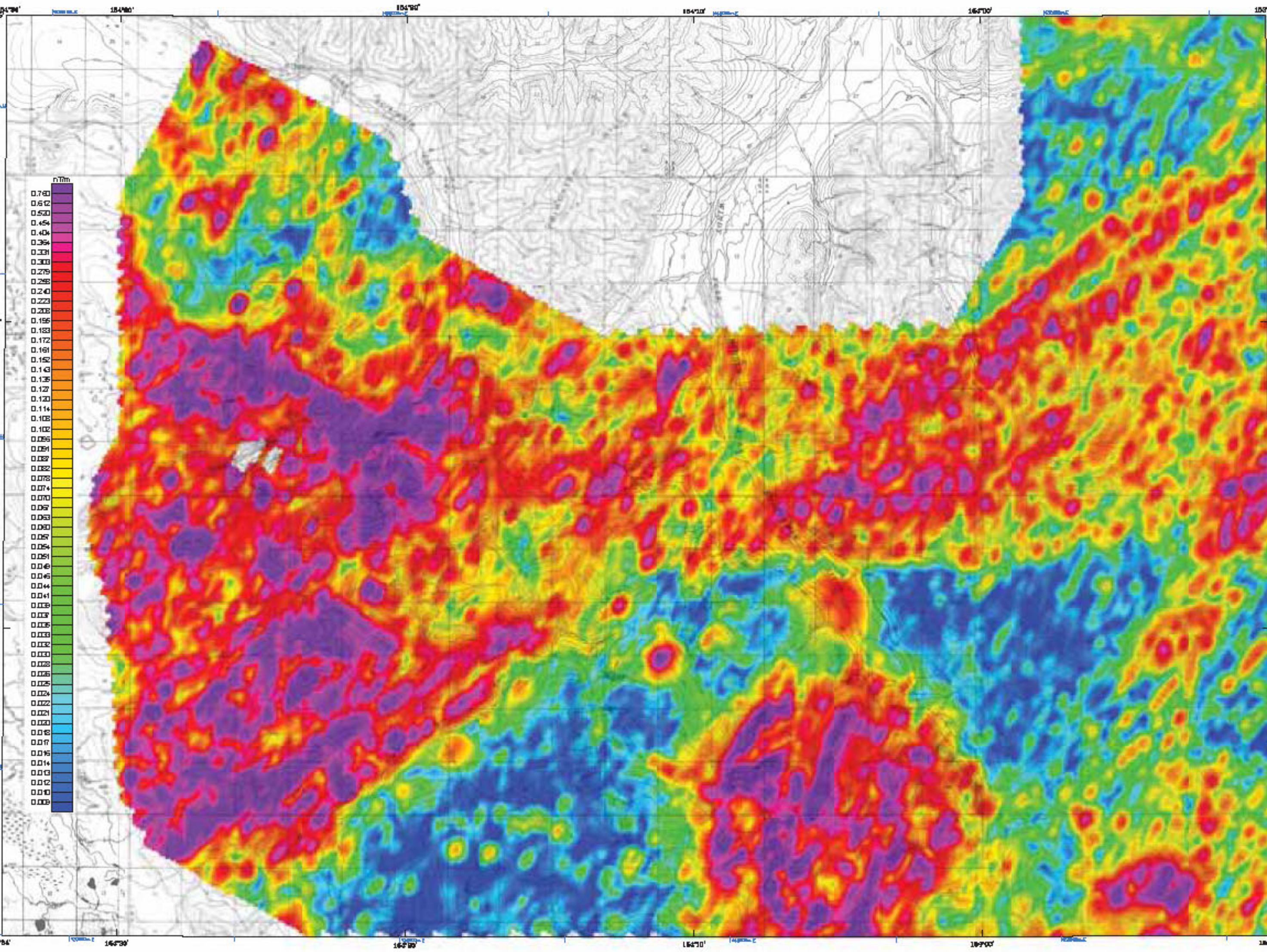
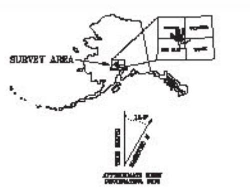



Base from U.S. Geological Survey McGrath A-2, 1959; A-3, 1959; McGrath A-4, 1954 Quadrangles, Alaska.

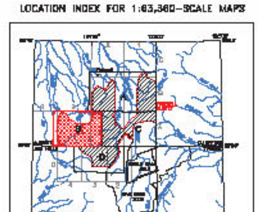
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
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2014

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A Novatel OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

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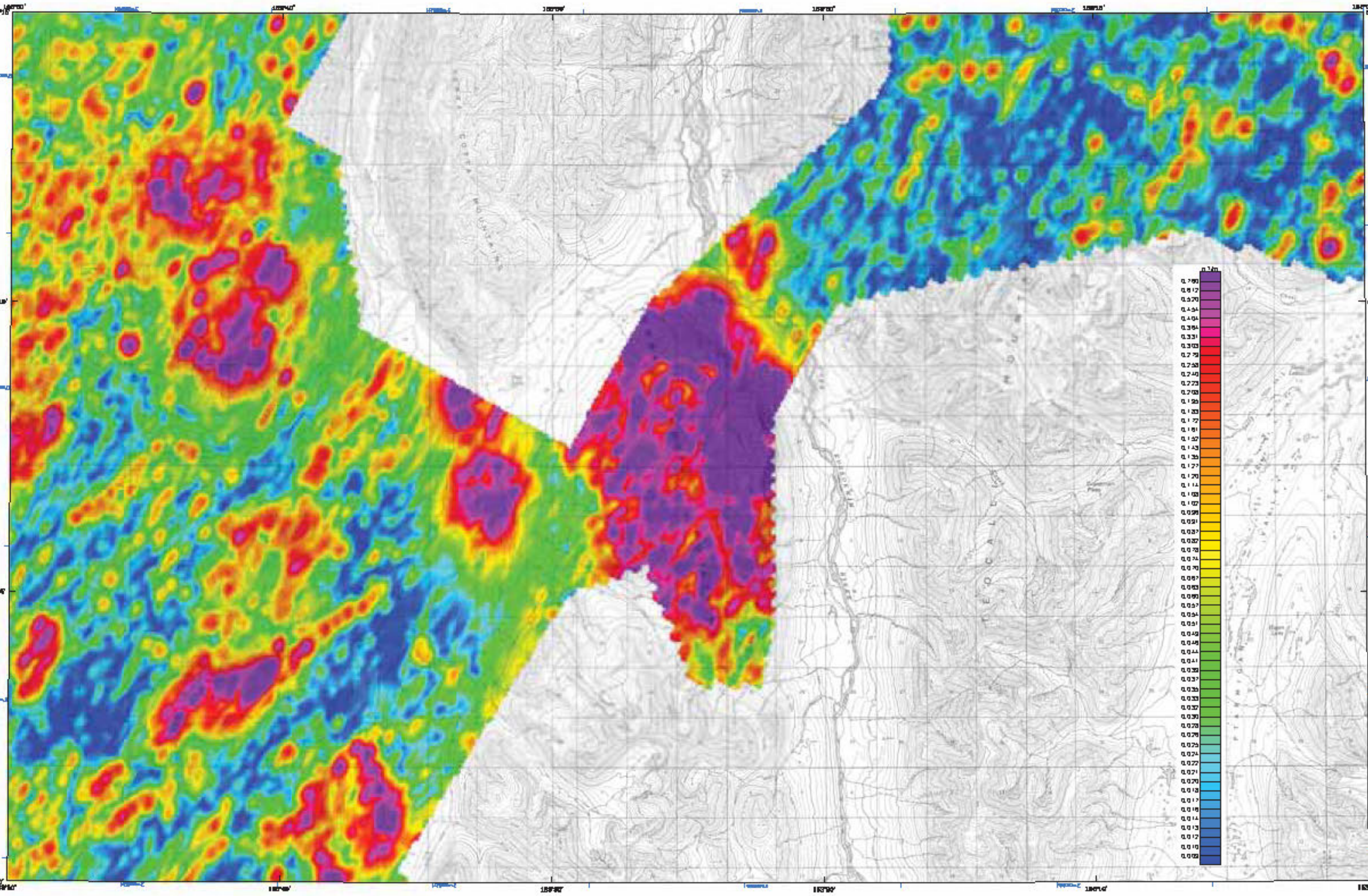
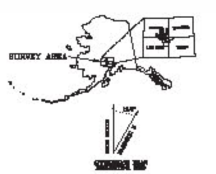


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

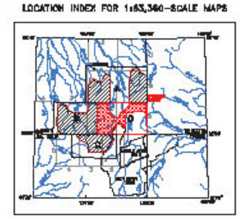



# ANALYTIC SIGNAL WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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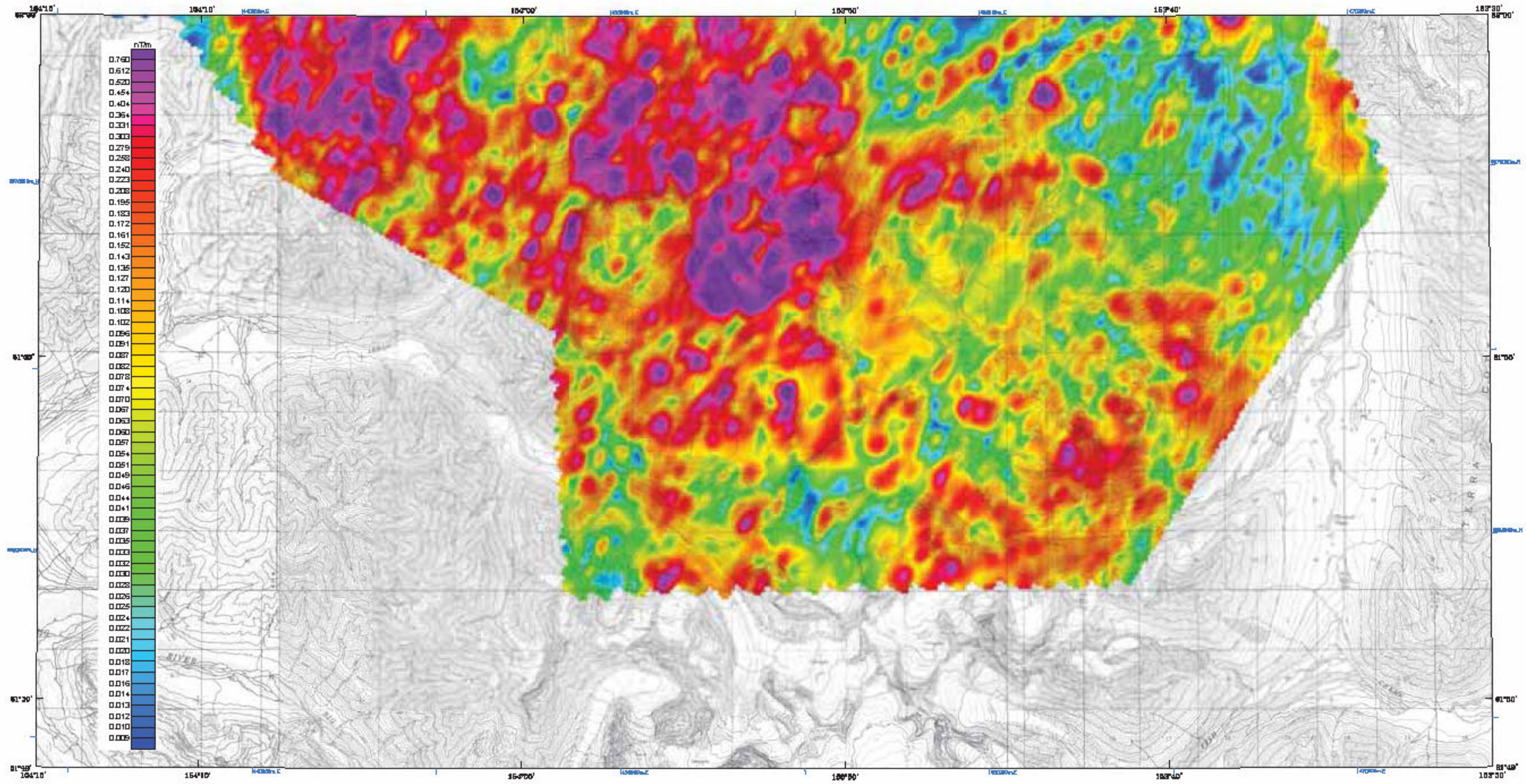



SCALE 1:63,360

1 0 1 2 3 4 MILES

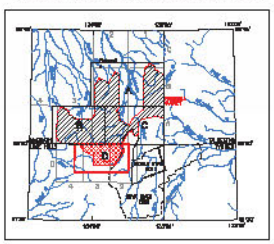
1 0 1 2 3 4 5 KILOMETERS


# ANALYTIC SIGNAL WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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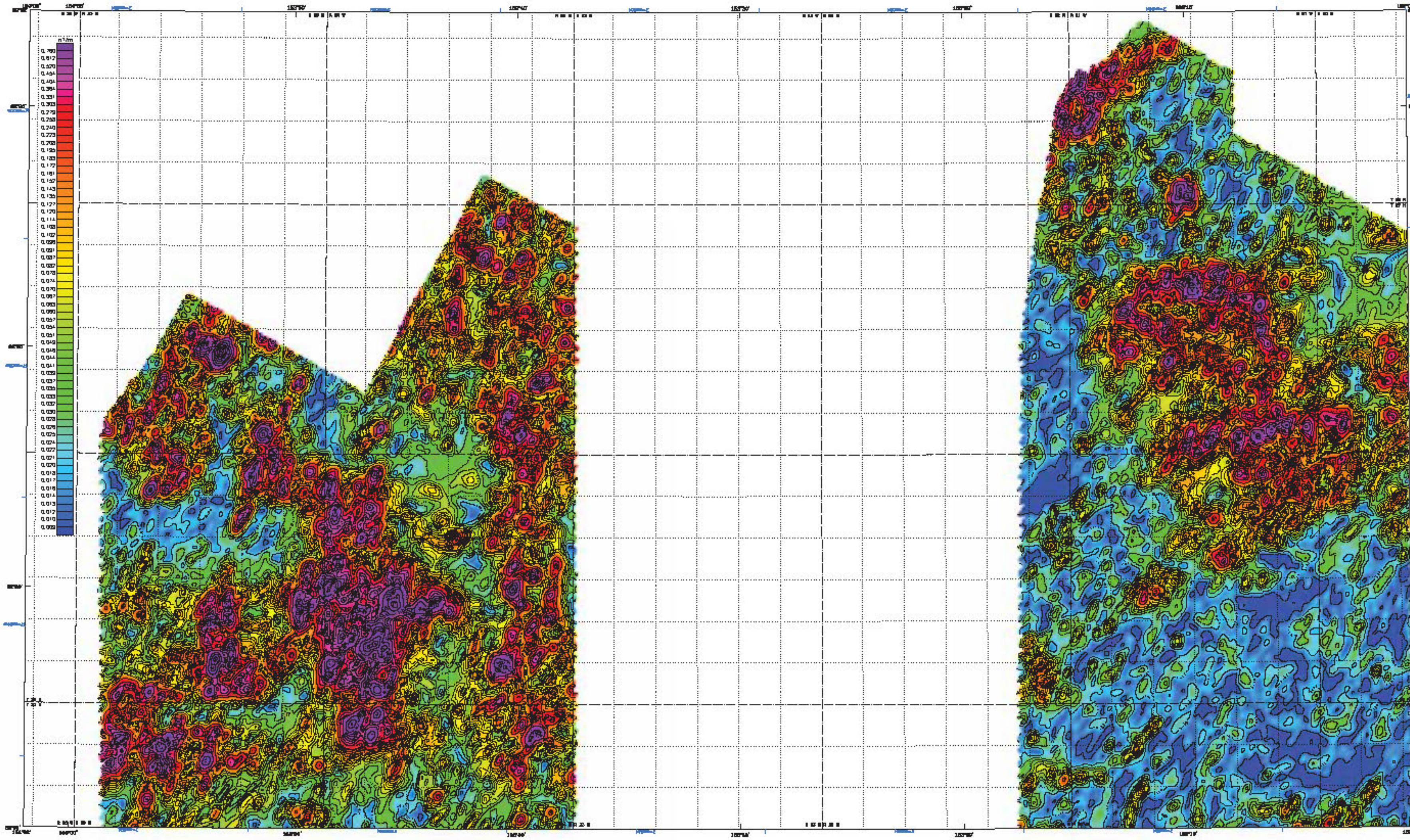
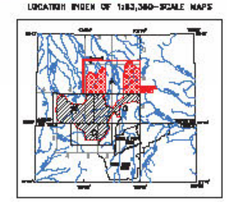



SCALE 1:63,360


LOCATION INDEX OF 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

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A Novatel OEMV-3DL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 3) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ANALYTIC SIGNAL

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### ANALYTIC SIGNAL CONTOURS

| | |
|---|---|
| ———— | 0.50 nT/meter |
| ———— | 0.10 nT/meter |
| ———— | 0.02 nT/meter |
| — — — | 0.01 nT/meter |

### SURVEY HISTORY

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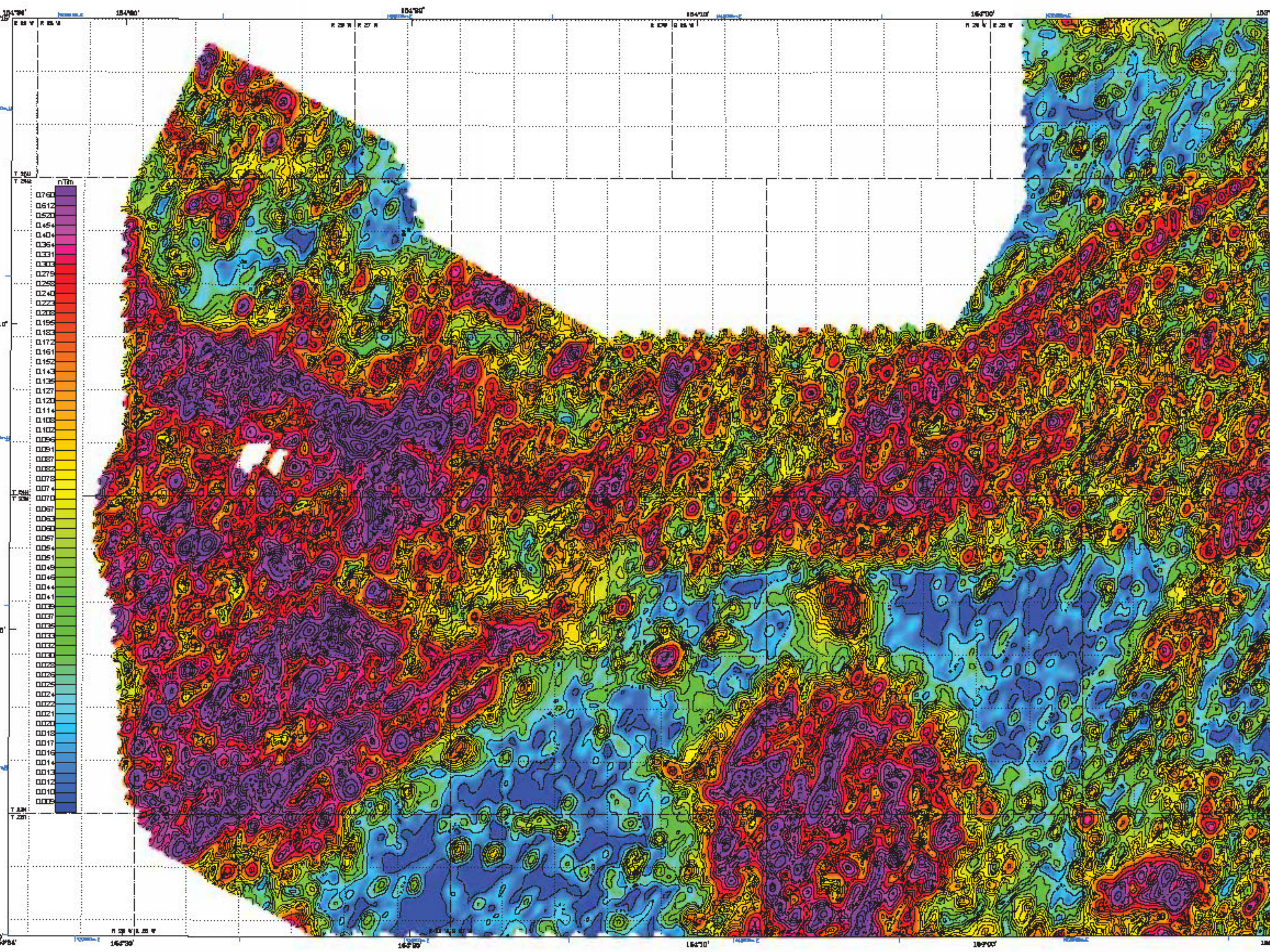
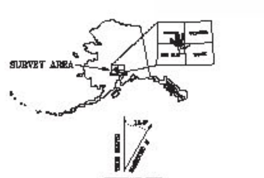


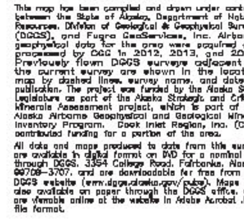
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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2014

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### ANALYTIC SIGNAL CONTOURS

| | |
|---|---|
| solid line | 0.50 nT/metre |
| solid line | 0.10 nT/metre |
| solid line | 0.02 nT/metre |
| dashed line | 0.01 nT/metre |

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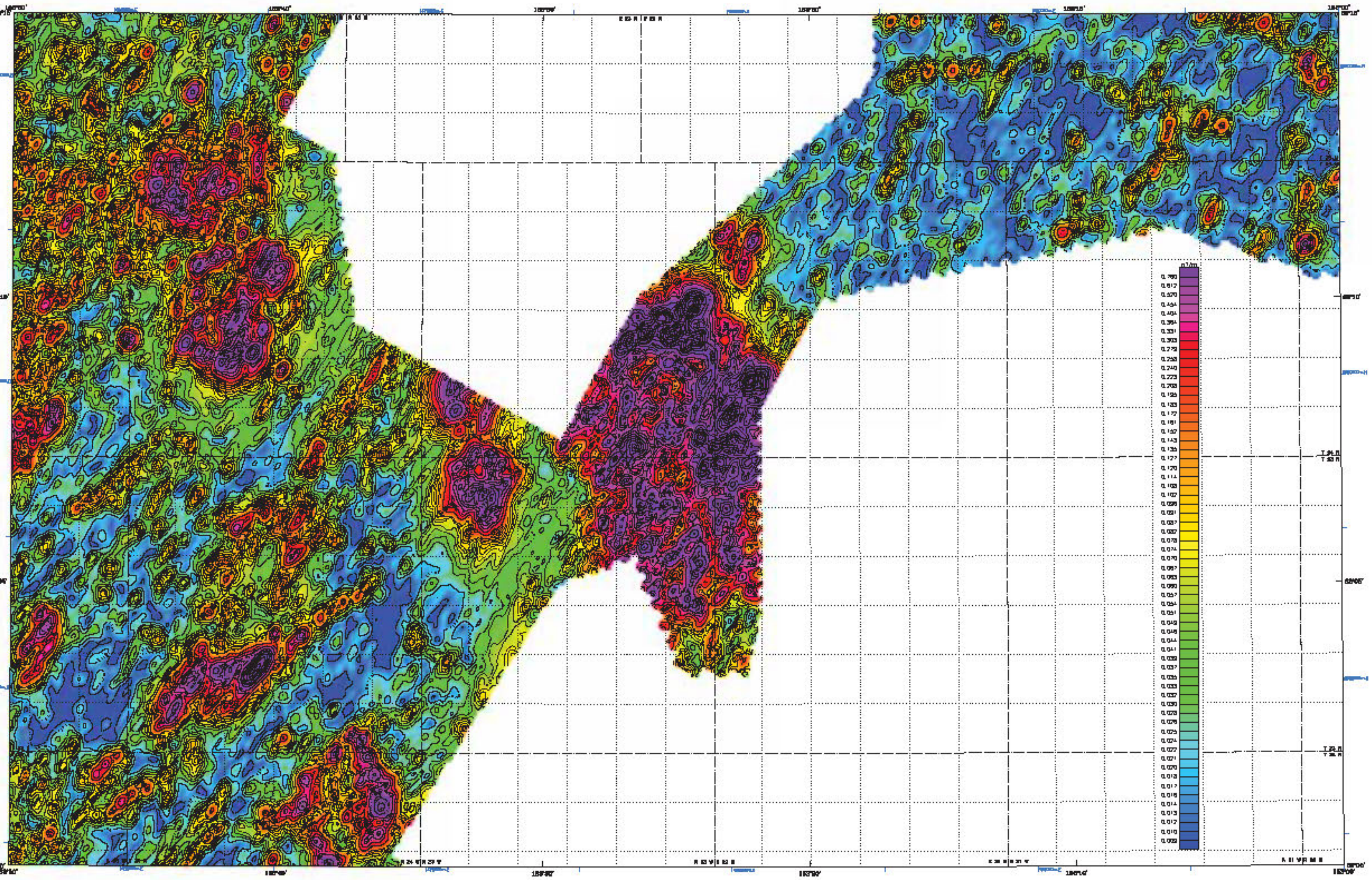

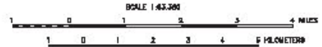


# ANALYTIC SIGNAL WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
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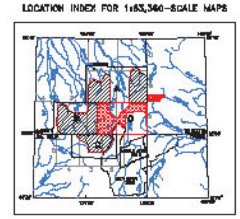
### ANALYTIC SIGNAL CONTOURS

- 0.50 nT/metre
- 0.10 nT/metre
- 0.02 nT/metre
- 0.01 nT/metre

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### SURVEY HISTORY

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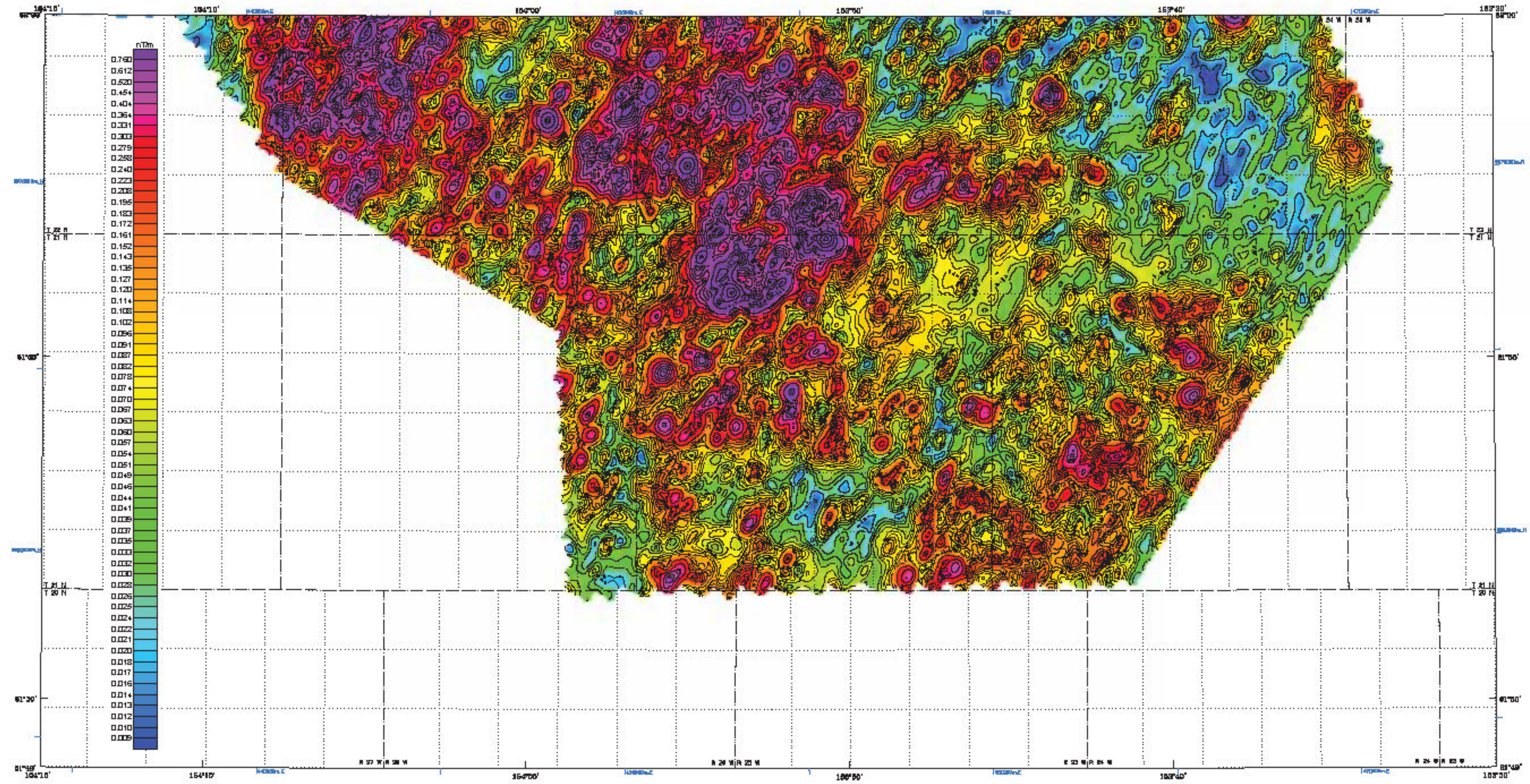



SCALE 1:63,360

1 0 1 2 3 4 MILES

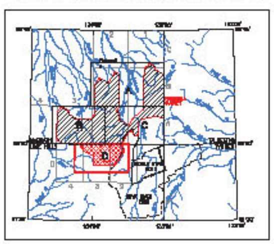
1 0 1 2 3 4 5 KILOMETERS


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### 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. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (e.g., contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

### ANALYTIC SIGNAL CONTOURS

........ 0.50 nT/metre

........ 0.10 nT/metre

........ 0.02 nT/metre

........ 0.01 nT/metre

### SURVEY HISTORY

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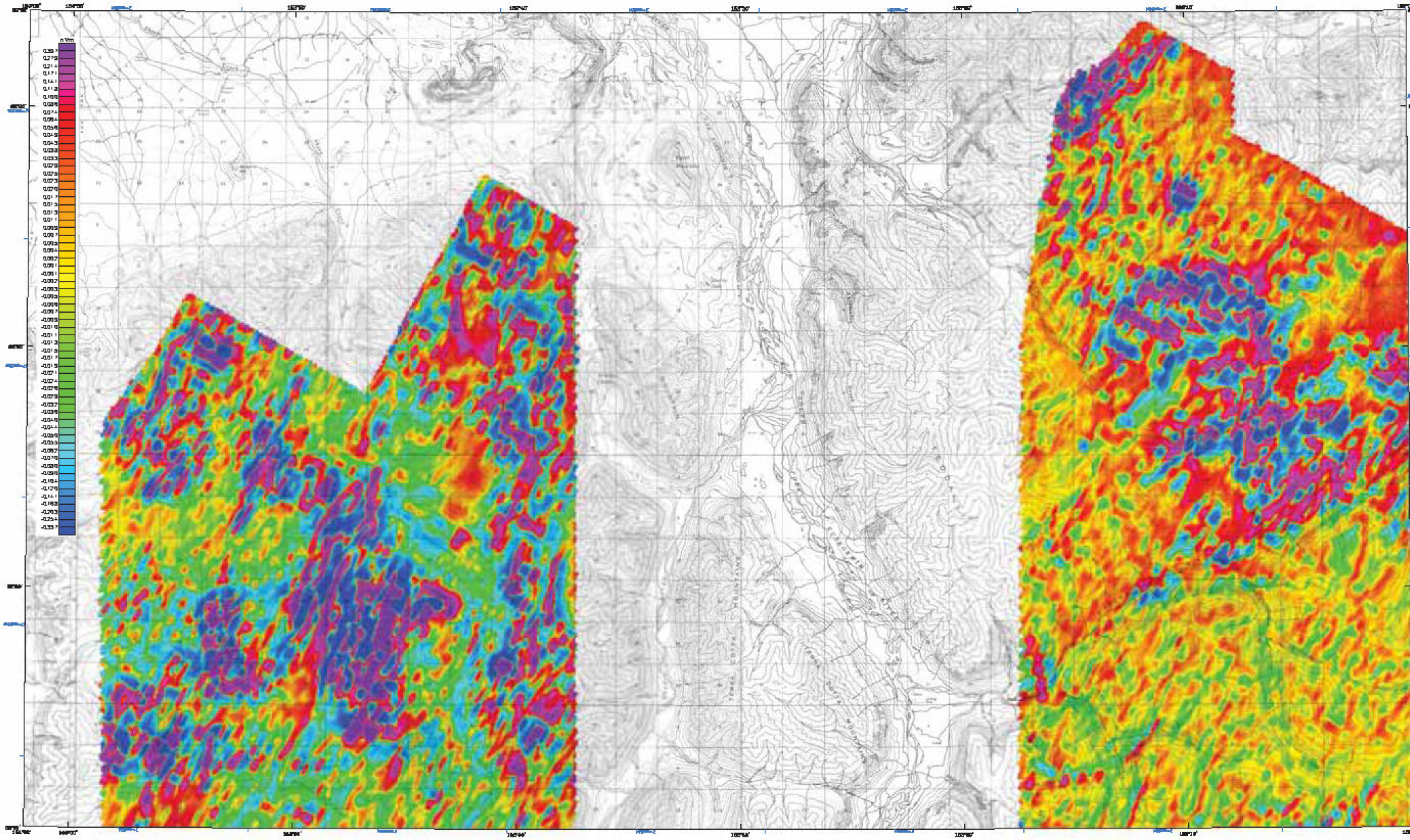

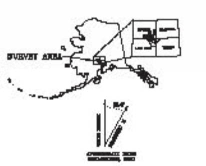


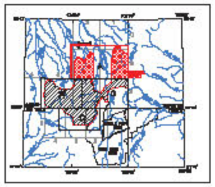


# FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### COLOR BAR HISTOGRAM

Approximately 95% of the first vertical derivative of the magnetic field for the Farewell Survey Area dataset lie within the range displayed on the color bar. Data values actually range from −15.881 nT/m (dark blue) to about 7.867 nT/m (magenta).

### FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first 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.

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

### SURVEY HISTORY

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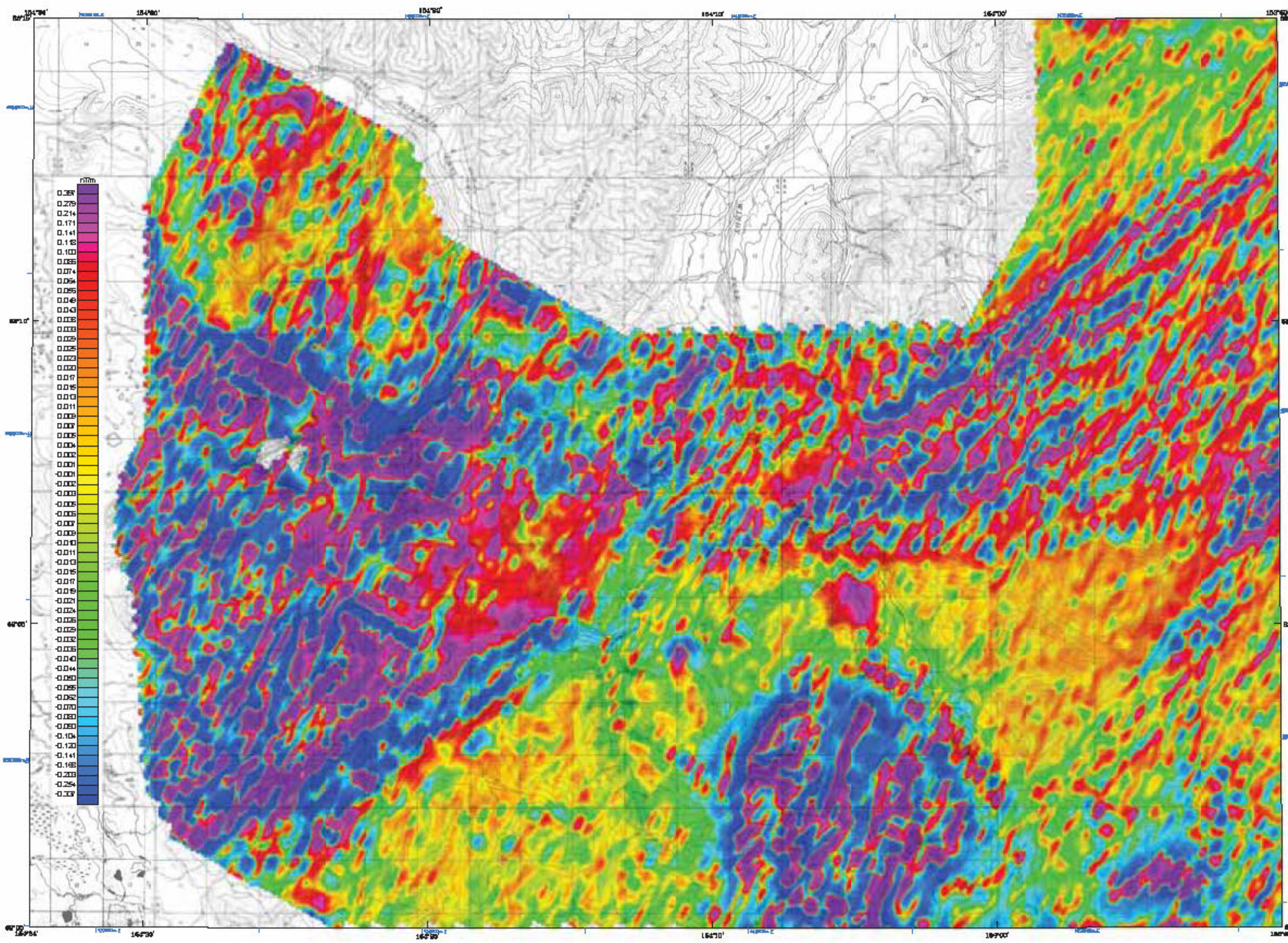
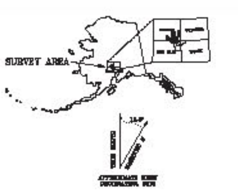



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

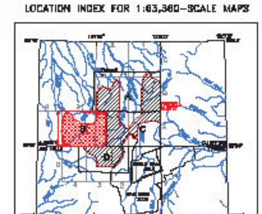



# FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### COLOR BAR HISTOGRAM

Approximately 80% of the first vertical derivative of the magnetic field for the Wrangellia Survey Area dataset lie within the range displayed on the color bar. Data values actually range from −15.881 nT/m (dark blue) to about 7.967 nT/m (magenta).

### FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first 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.

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

### SURVEY HISTORY

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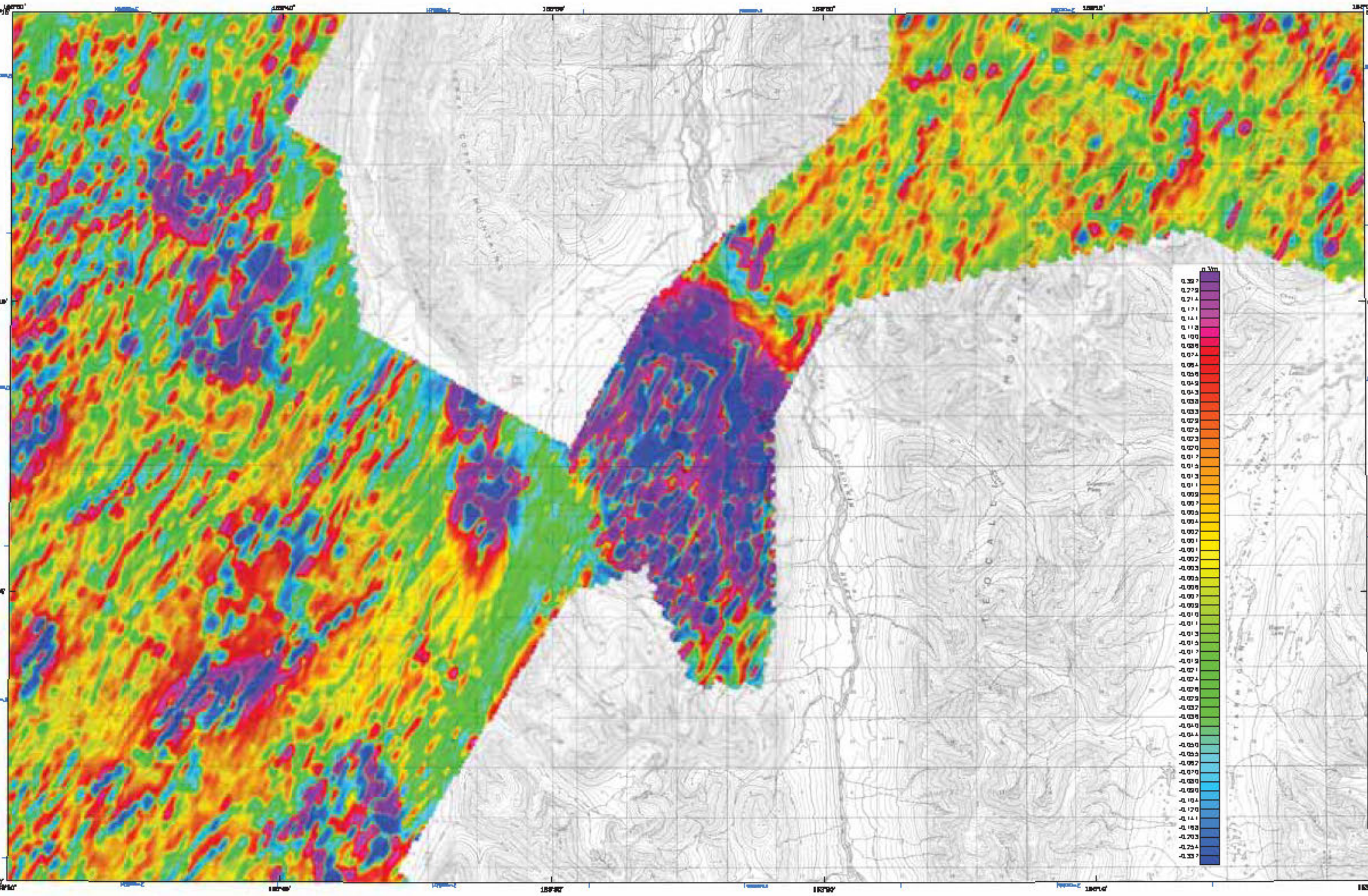

SCALE 1:63,360


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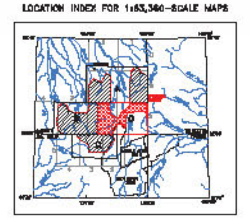
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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### COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Wrangellia Survey Area dataset lie within the range displayed on the color bar. Data values actually range from −13.881 nT/m (dark blue) to about 7.987 nT/m (magenta).

### FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first 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.

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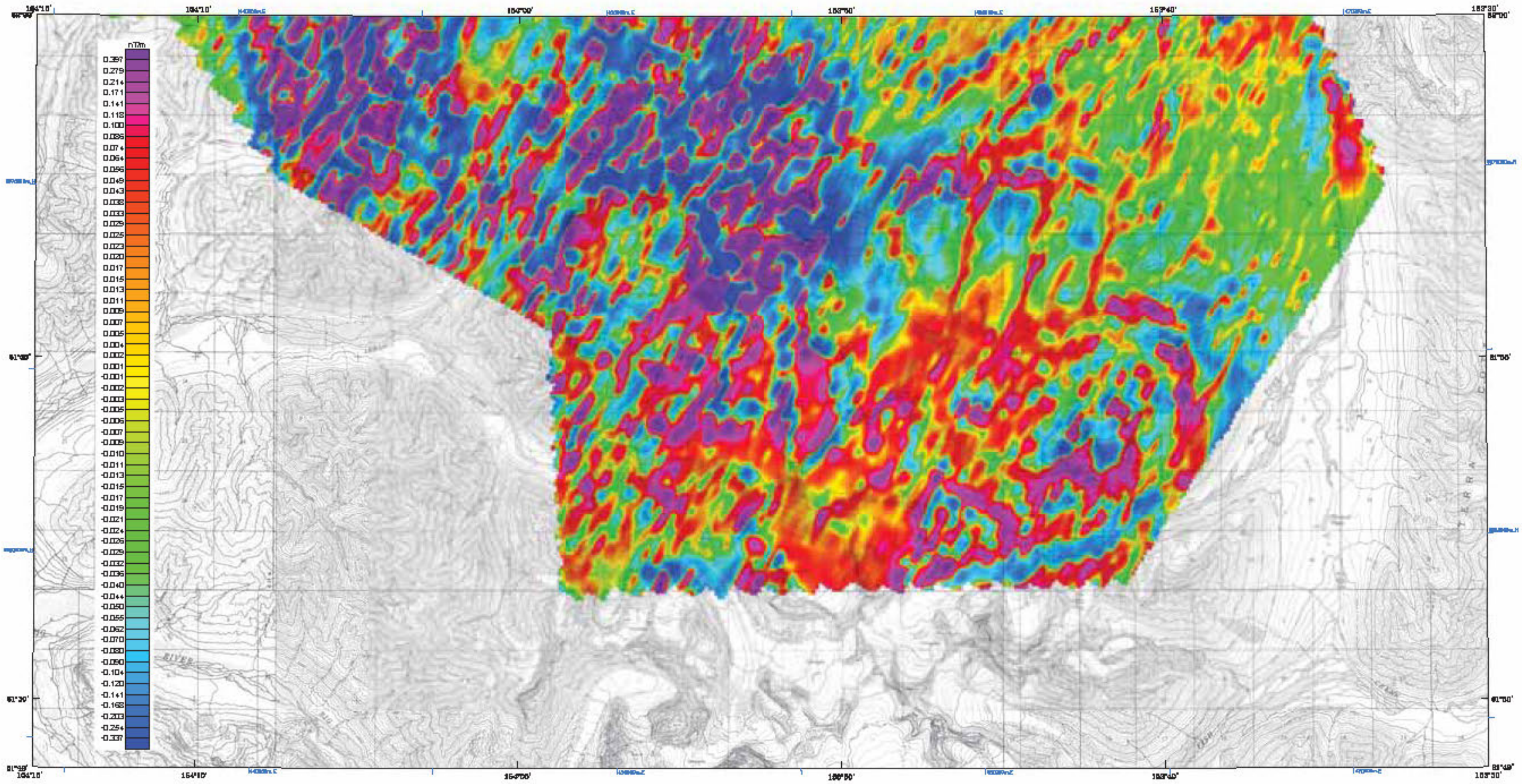


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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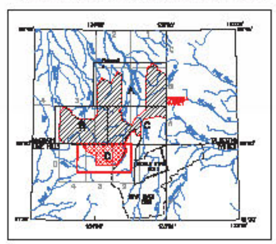
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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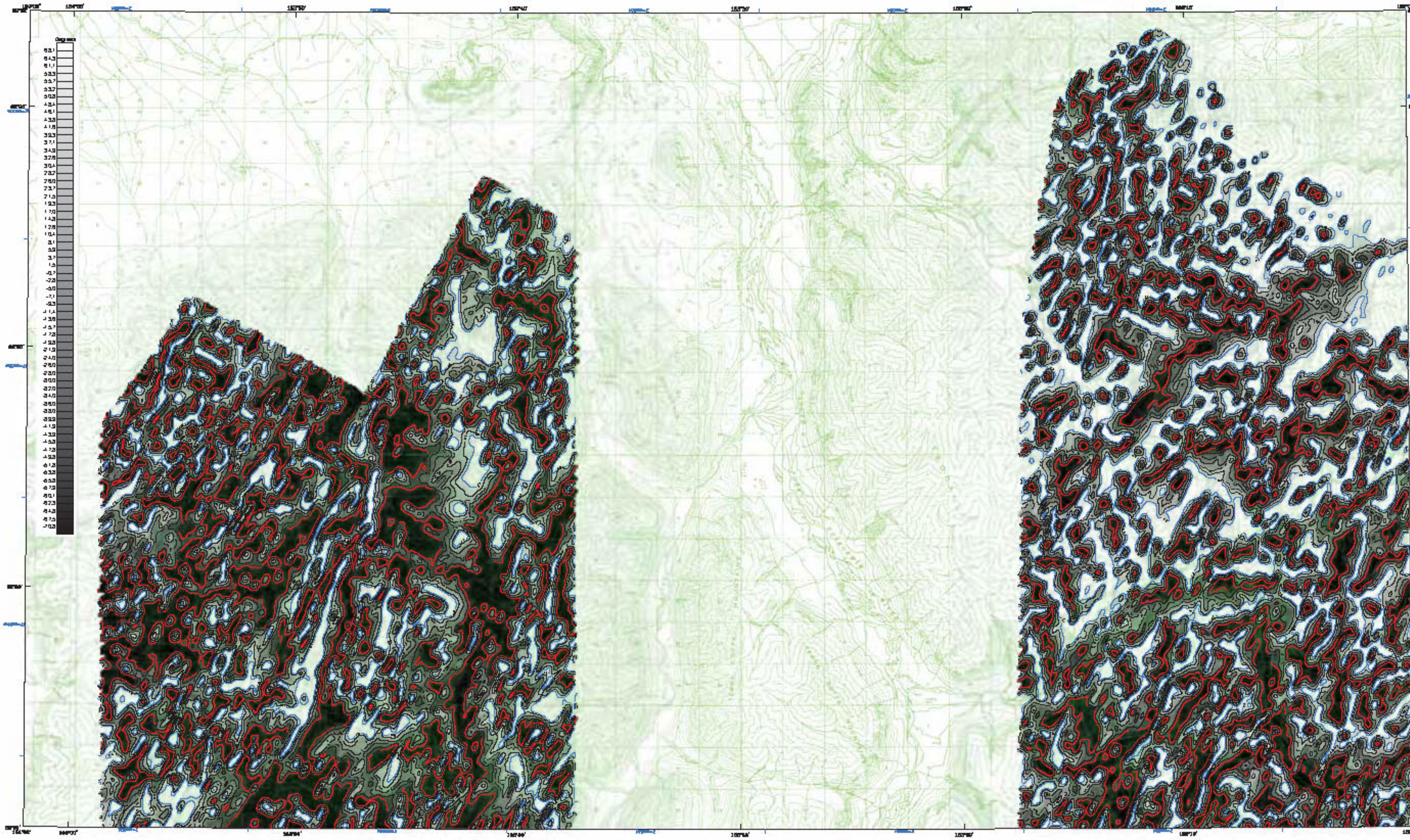

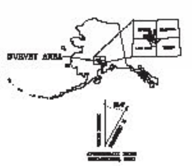


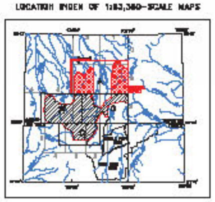


# MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
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2014

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### 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 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.

### MAGNETIC TILT DERIVATIVE CONTOURS

- +45 degrees (blue line)
- +30 degrees
- +15 degrees
- 0 degrees
- −15 degrees
- −30 degrees
- −45 degrees (red 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 Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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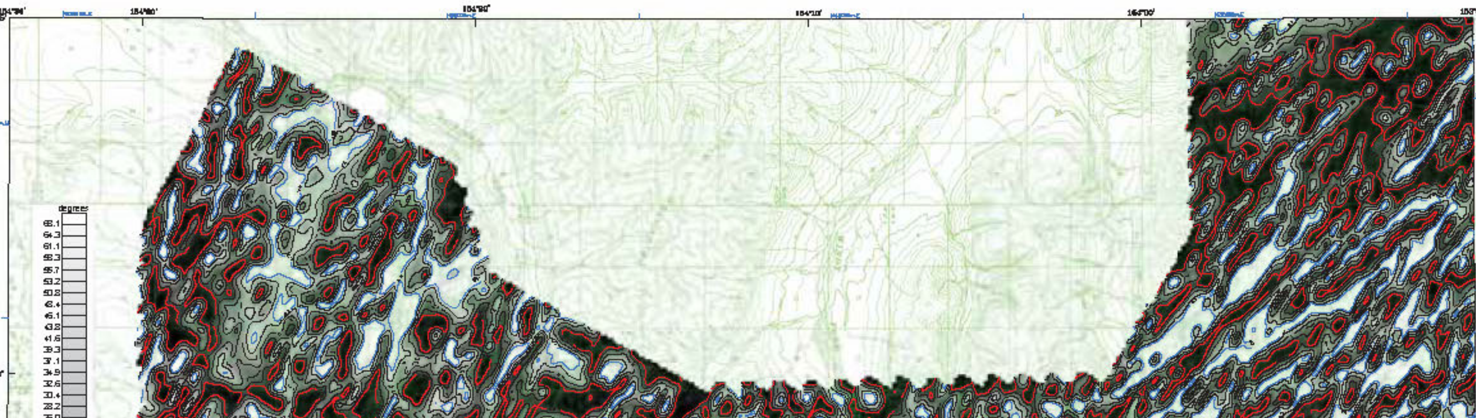
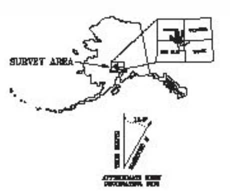


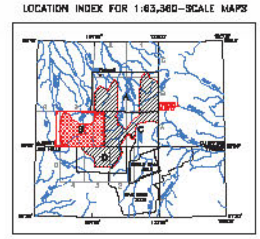

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.3 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### 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 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.

### MAGNETIC TILT DERIVATIVE CONTOURS

- ..........+45 degrees
- ..........+30 degrees
- ..........+15 degrees
- .......... 0 degrees
- ..........-15 degrees
- ..........-30 degrees
- ..........-45 degrees

### 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 the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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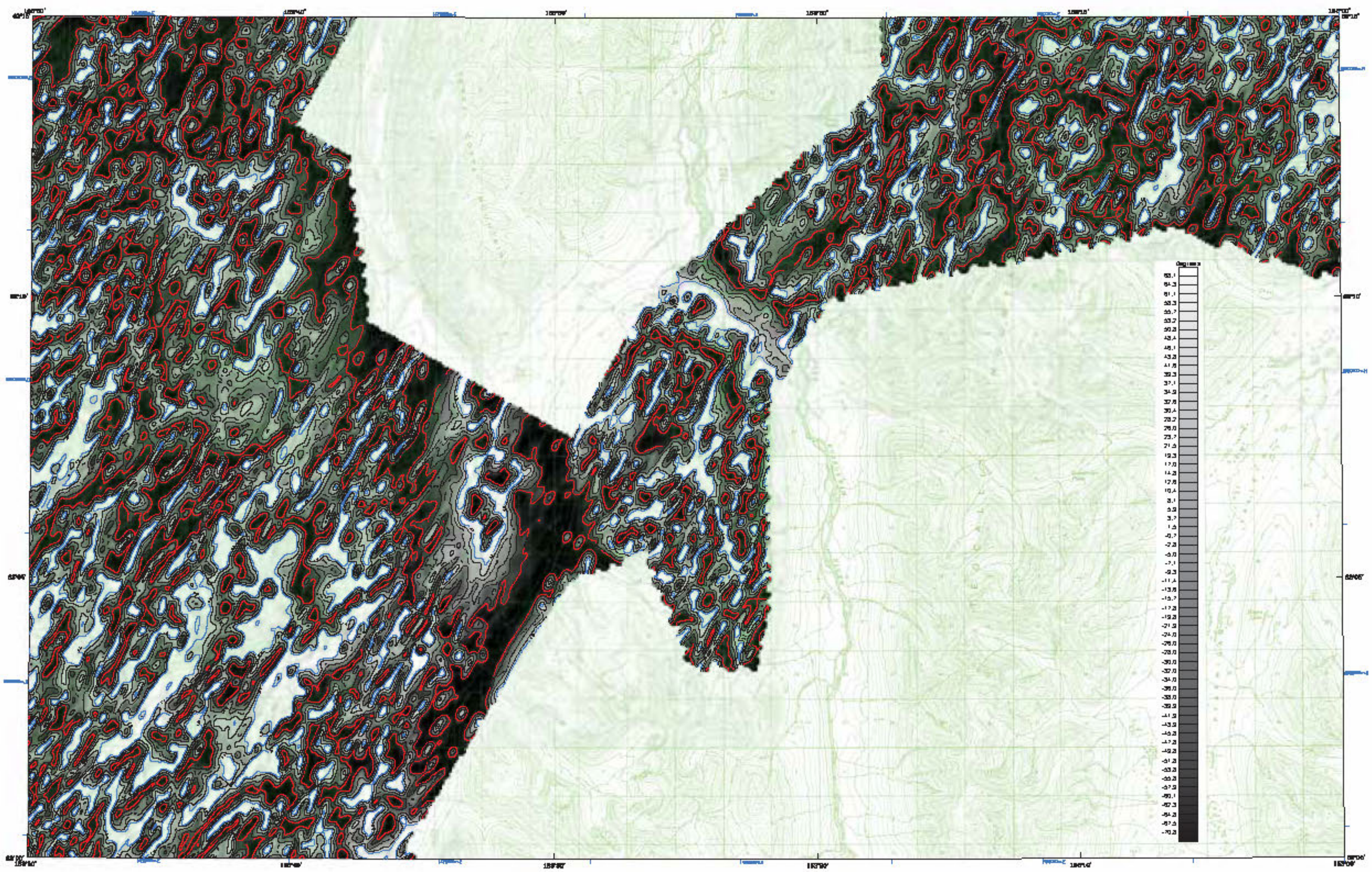

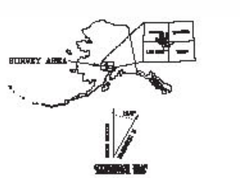


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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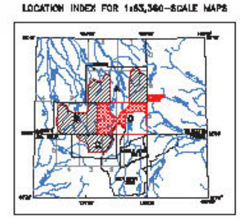
by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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. . . . . . . . . +45 degrees
. . . . . . . . . +30 degrees
. . . . . . . . . +15 degrees
. . . . . . . . . 0 degrees
. . . . . . . . . -15 degrees
. . . . . . . . . -30 degrees
. . . . . . . . . -45 degrees

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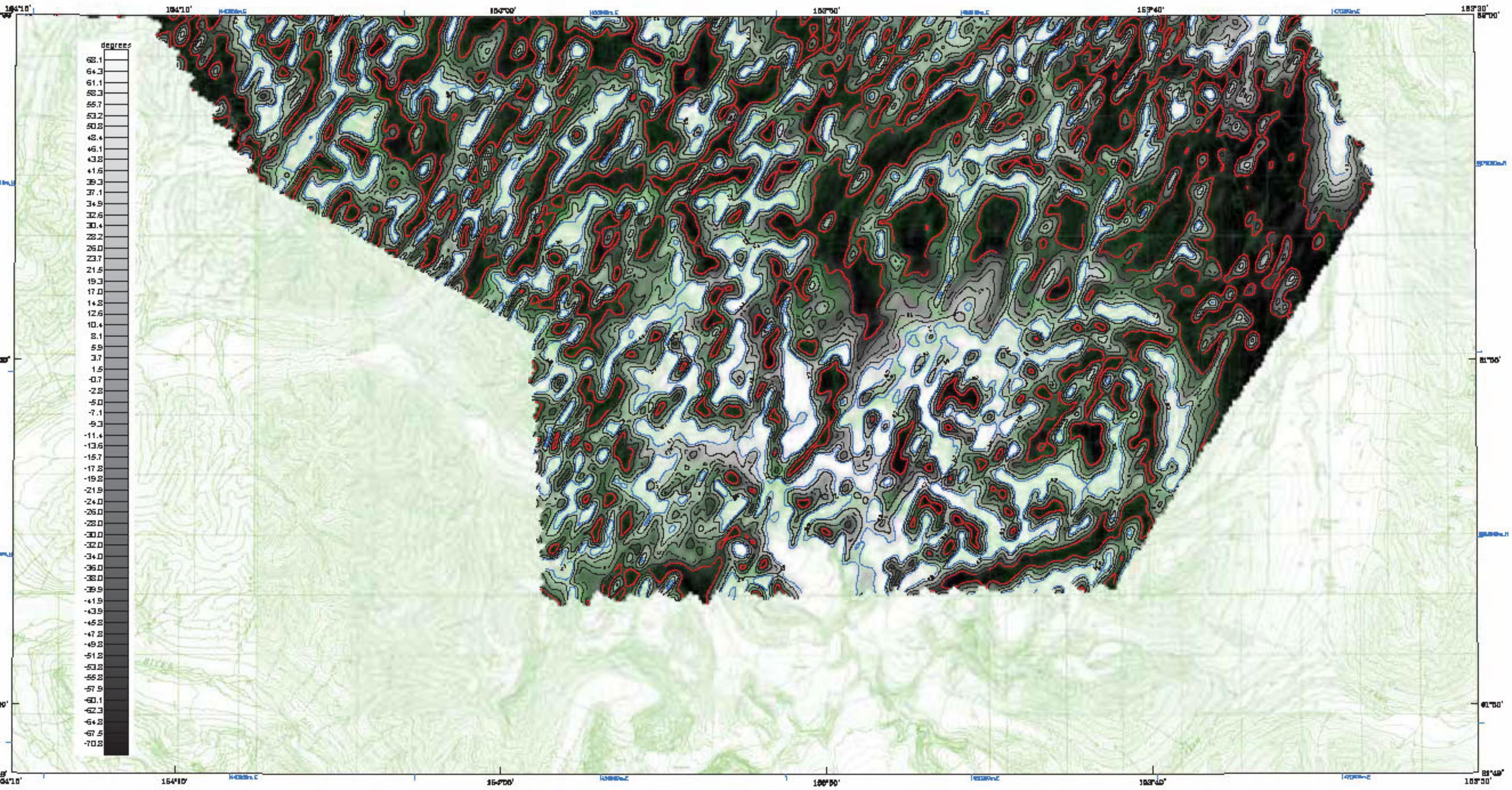


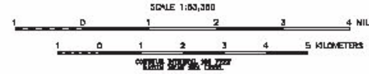



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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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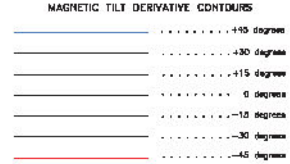
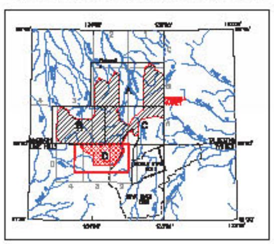
### MAGNETIC TILT DERIVATIVE CONTOURS




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



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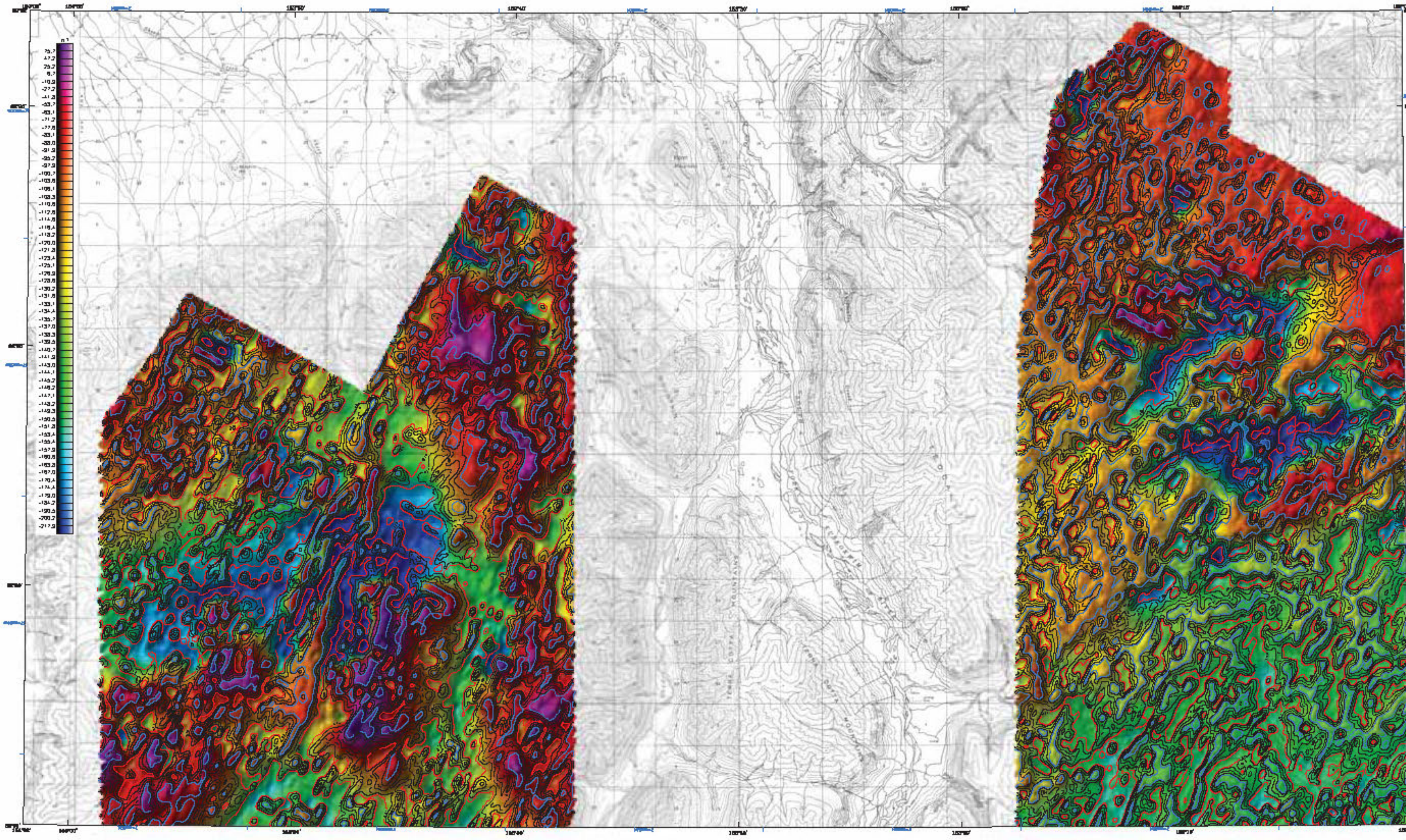


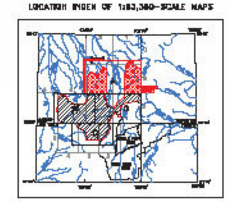

# COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

Sun Azimuth: 300 degrees; Sun Inclination: 45 degrees

LOCATION INDEX OF 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 3) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

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### MAGNETIC TILT DERIVATIVE CONTOURS

+45 degrees
+30 degrees
+15 degrees
0 degrees
−15 degrees
−30 degrees
−45 degrees

### SURVEY HISTORY

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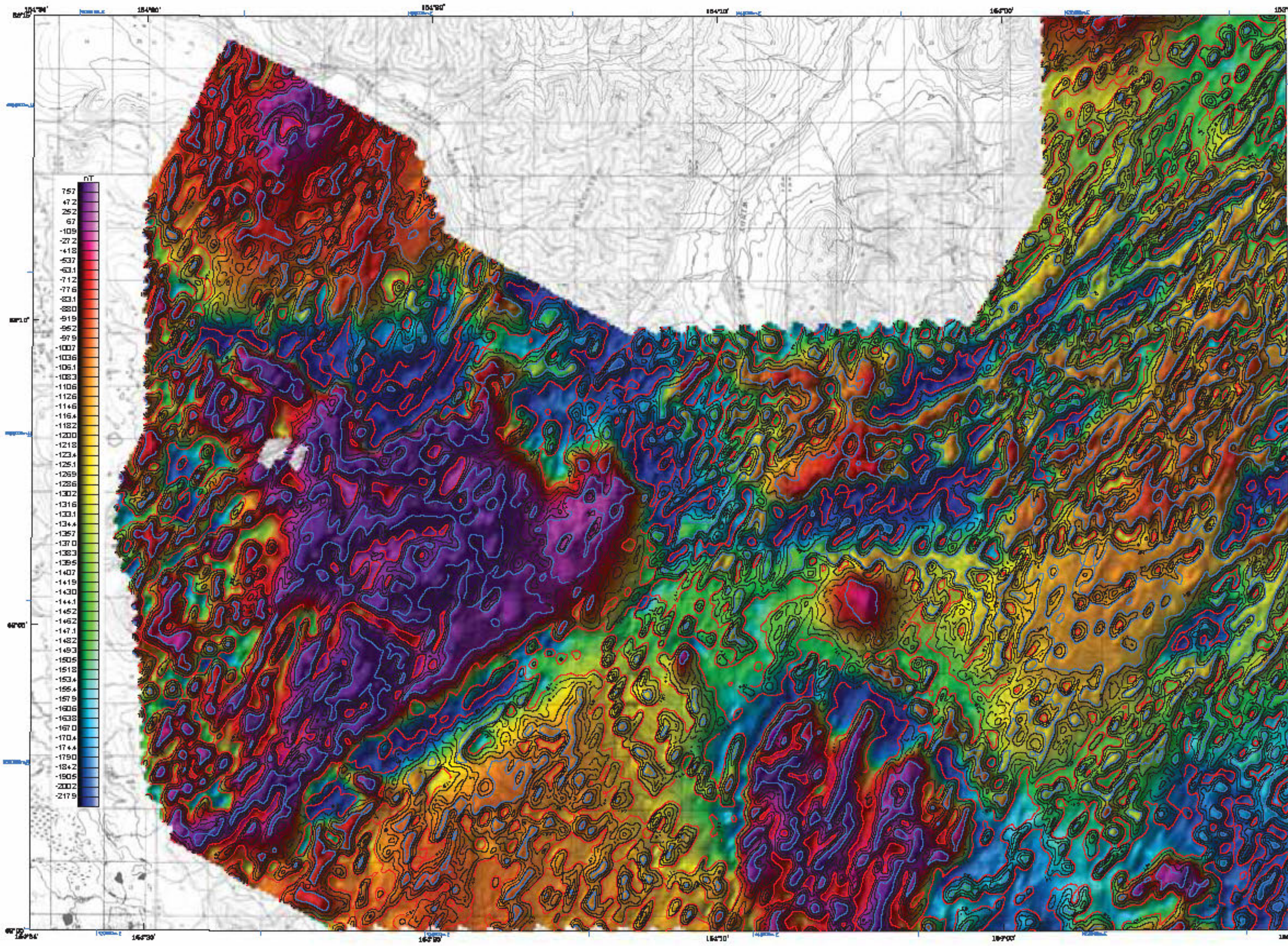
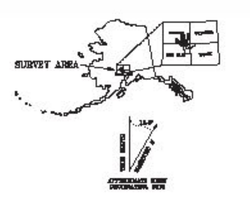


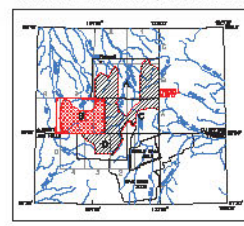
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CPG, and Fugro GeoServices, Inc.
2014

Sun Azimuth: 300 degrees; Sun Inclination: 45 degrees

### DESCRIPTIVE NOTES

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### RESIDUAL MAGNETIC FIELD

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### MAGNETIC TILT DERIVATIVE CONTOURS

| Line | Value |
|---|---|
| blue line | +45 degrees |
| black line | +30 degrees |
| black line | +15 degrees |
| black line | 0 degrees |
| black line | −15 degrees |
| black line | −30 degrees |
| red line | −45 degrees |

### SURVEY HISTORY

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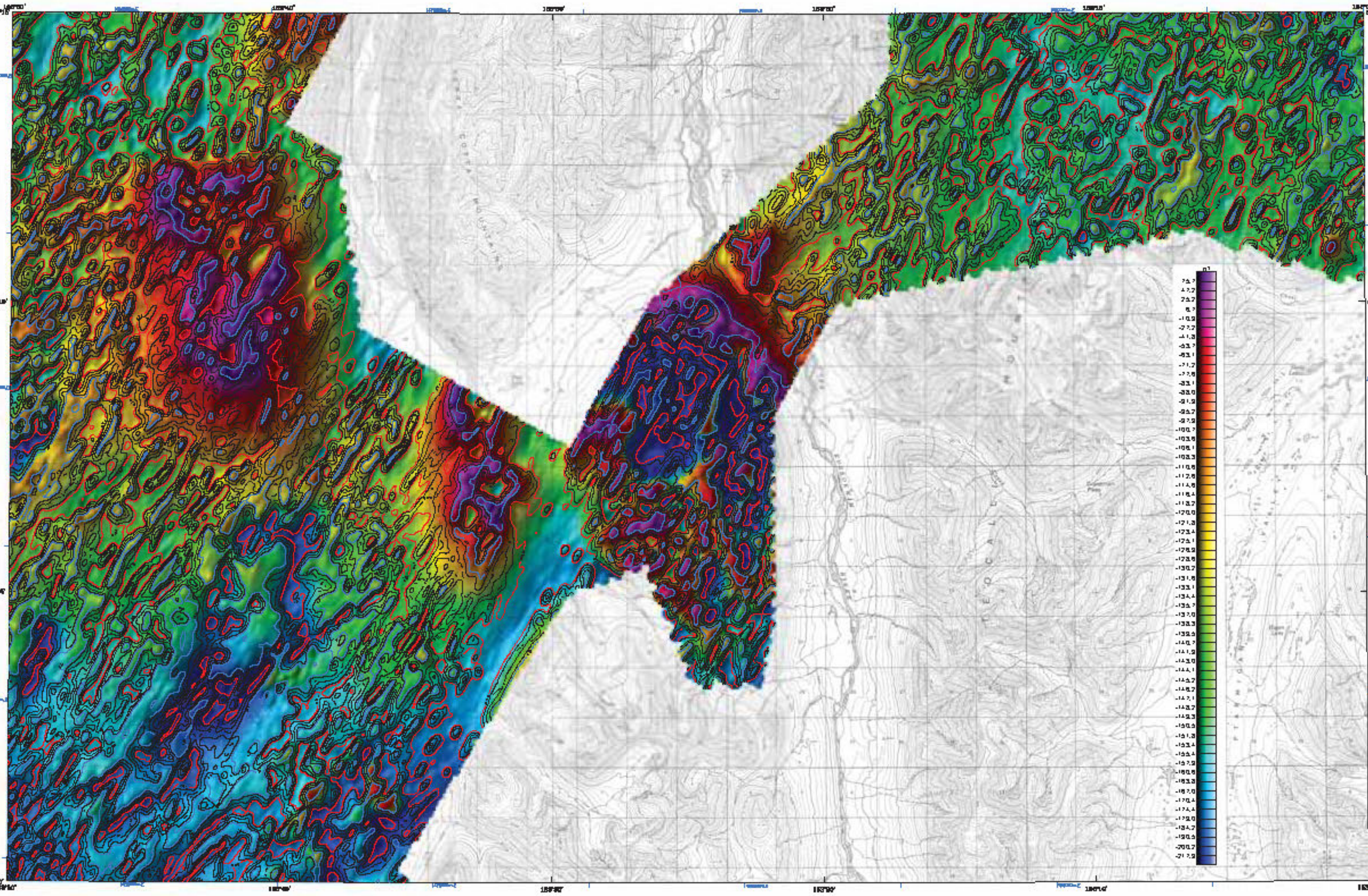
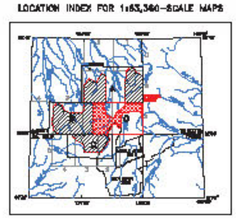



LOCATION INDEX FOR 1:63,360-SCALE MAPS



SCALE 1:63,360

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2014

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| | |
|---|---|
| blue line | +45 degrees |
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| black line | +15 degrees |
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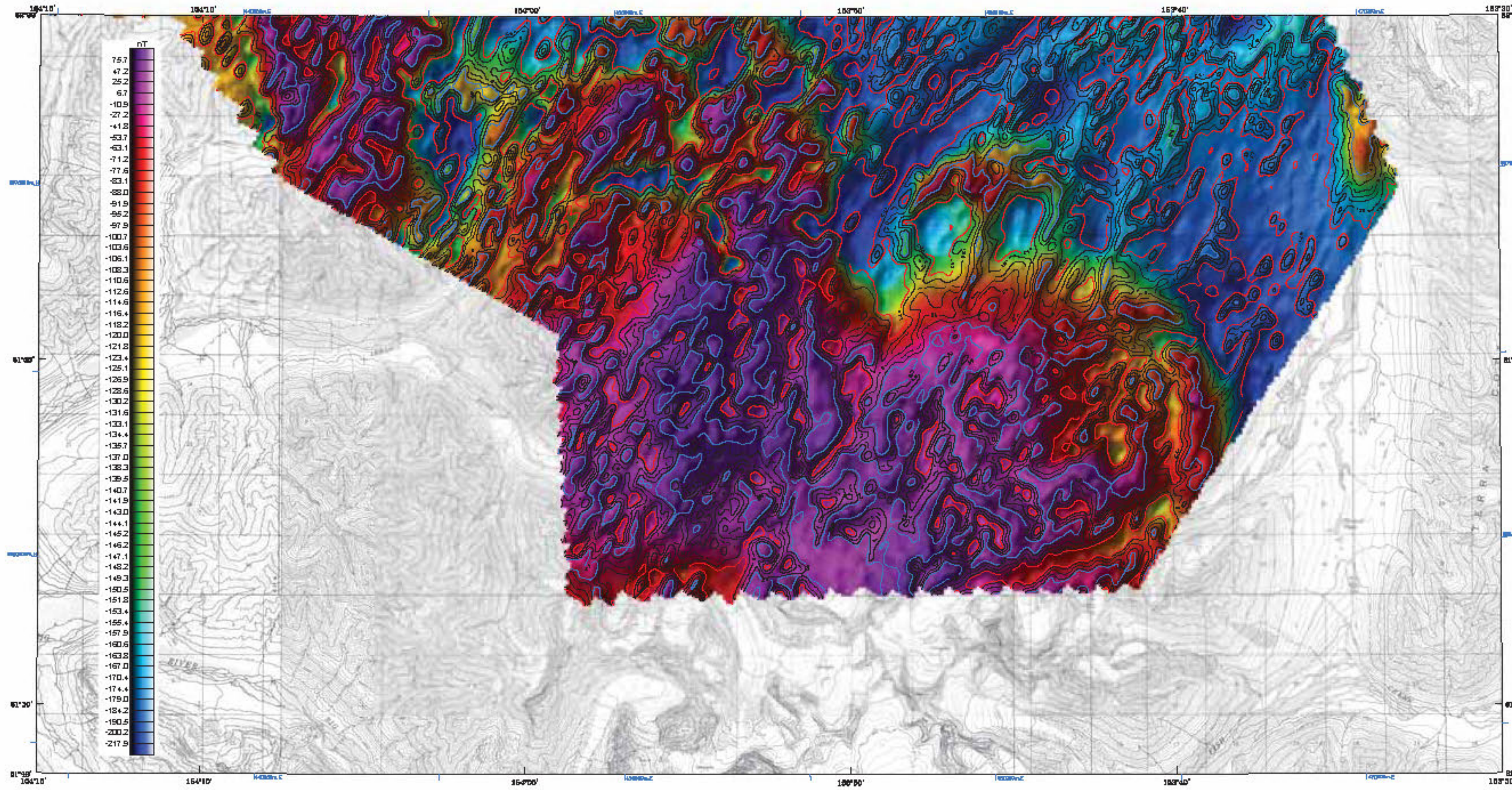


SCALE 1:63,360


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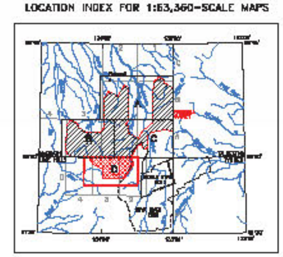
2014

**Sun Azimuth: 300 degrees; Sun Inclination: 45 degrees**

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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.

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

### MAGNETIC 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 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.

### MAGNETIC TILT DERIVATIVE CONTOURS

- +45 degrees (blue line)
- +30 degrees
- +15 degrees
- 0 degrees
- −15 degrees
- −30 degrees
- −45 degrees (red 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 Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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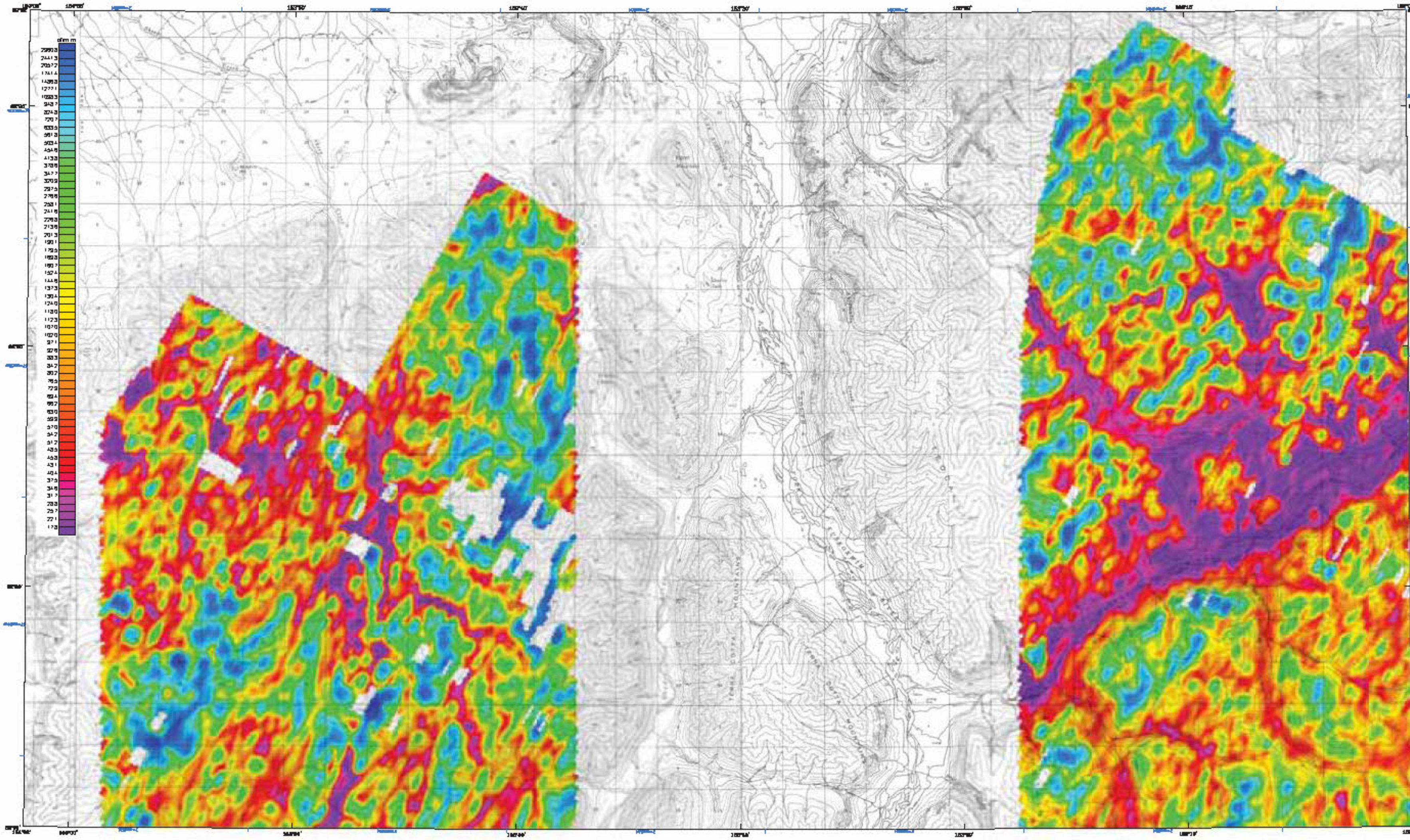
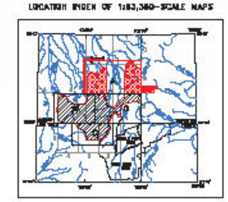



SCALE 1:63,360


# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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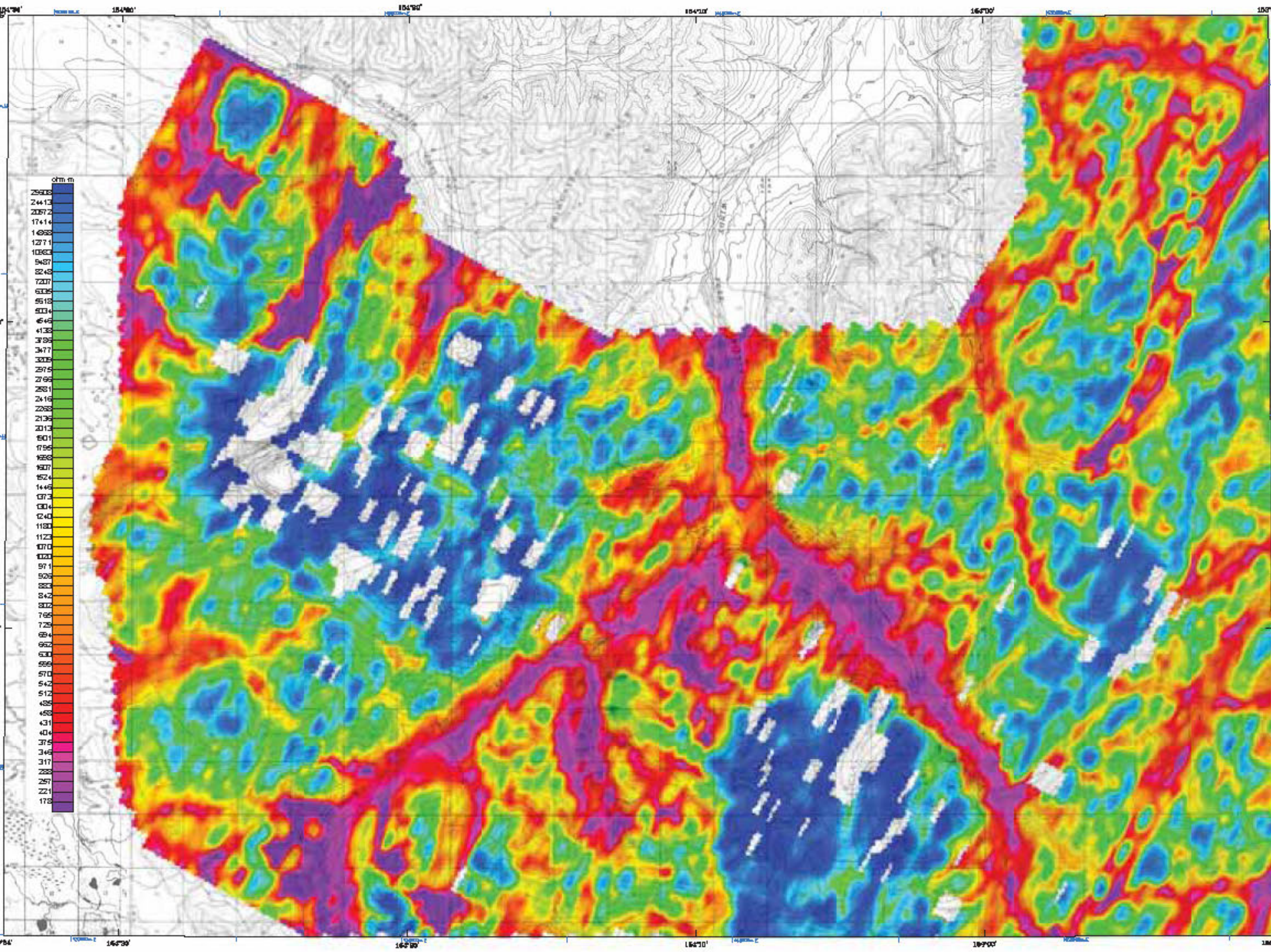


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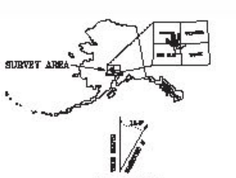
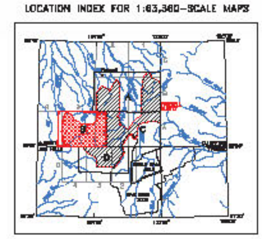



LOCATION INDEX FOR 1:63,360-SCALE MAPS



# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-92L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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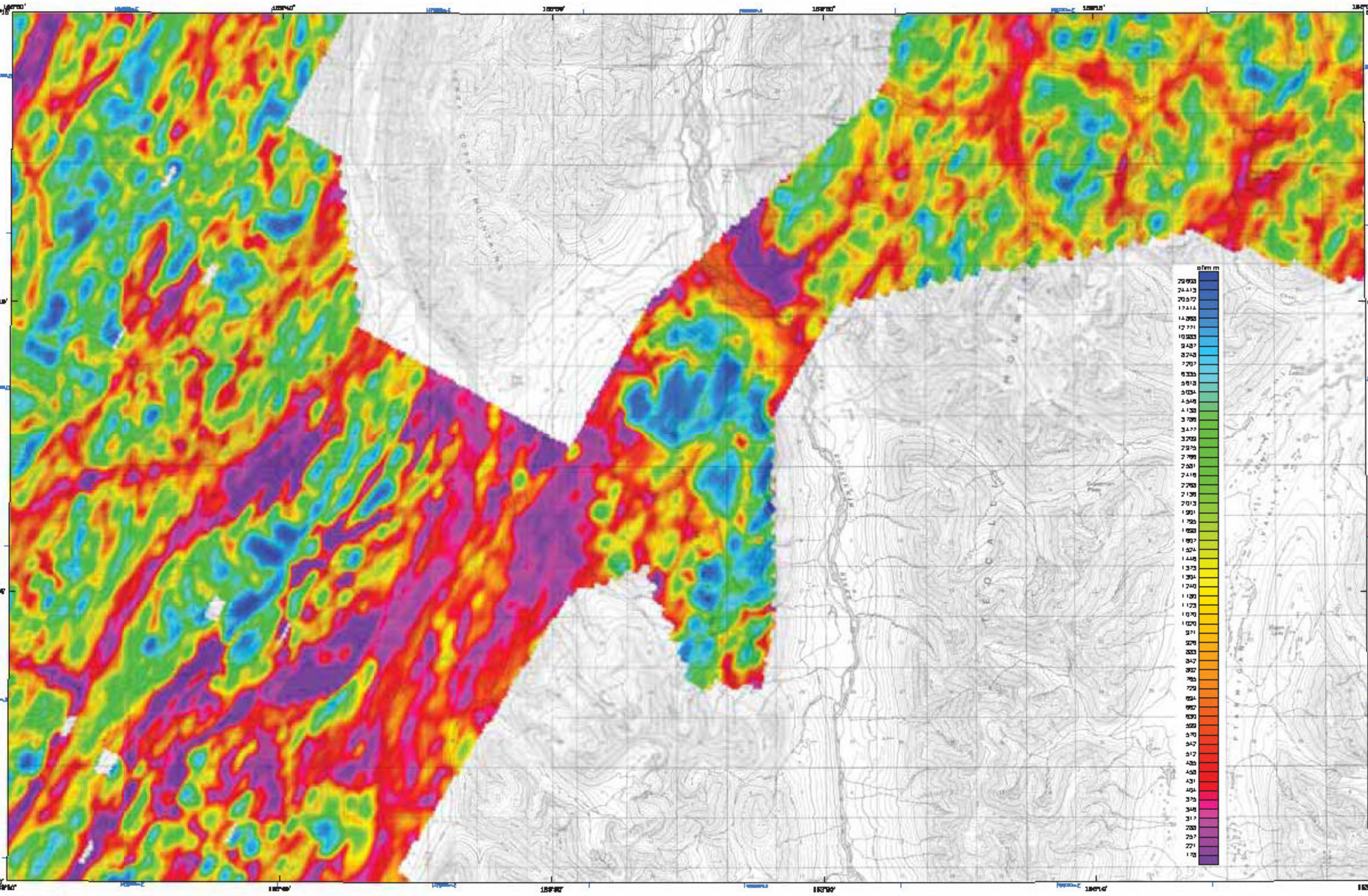


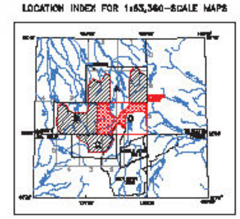


SCALE 1:63,360

# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

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A Novatel OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. Those values at edges of the grid holes due to flying height should be viewed with caution.

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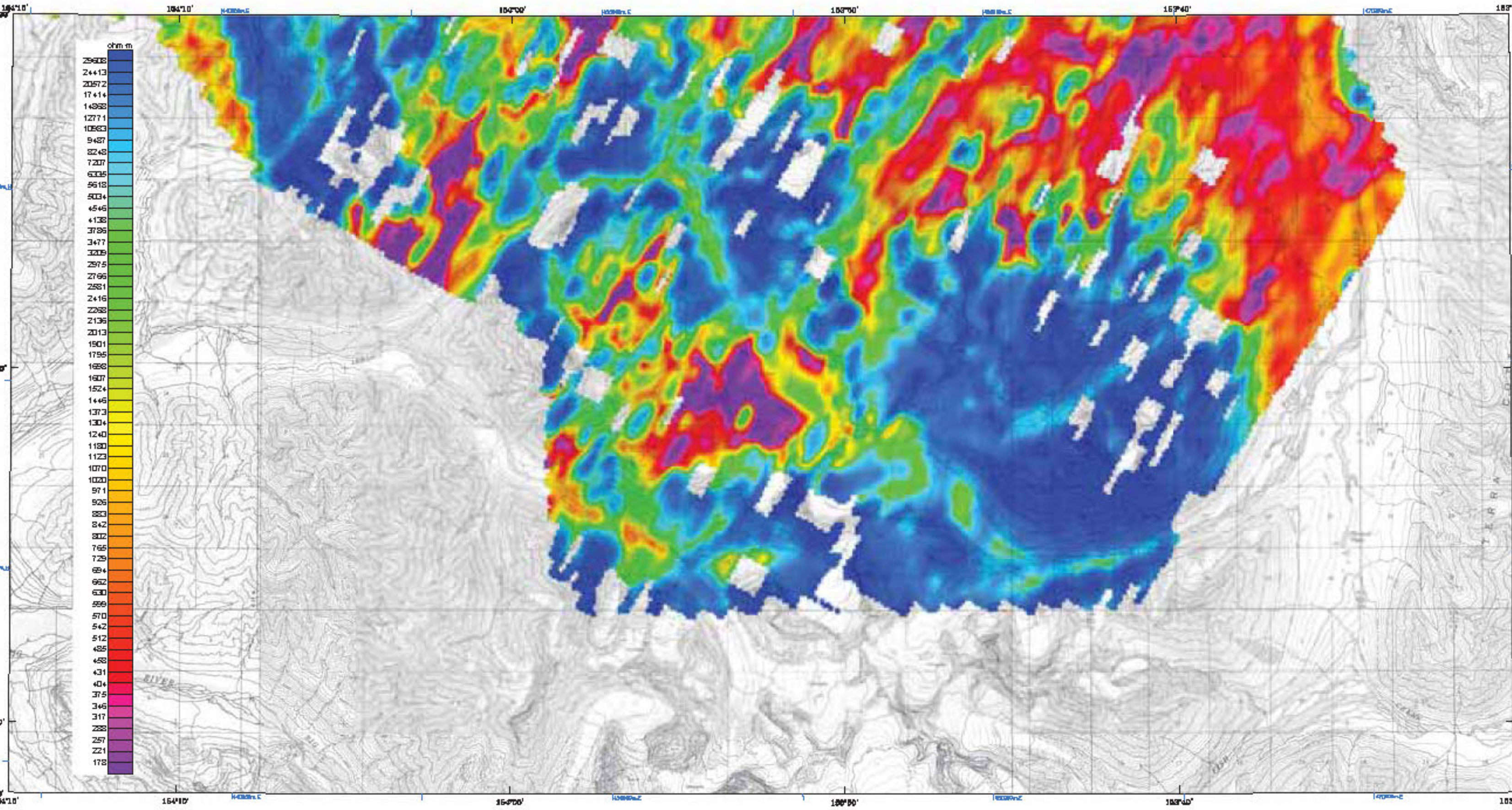



SCALE 1:63,360

1 0 1 2 3 4 MILES

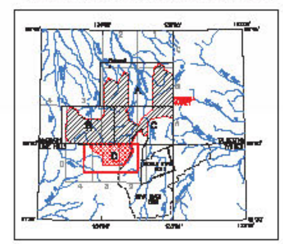
1 0 1 2 3 4 5 KILOMETERS


# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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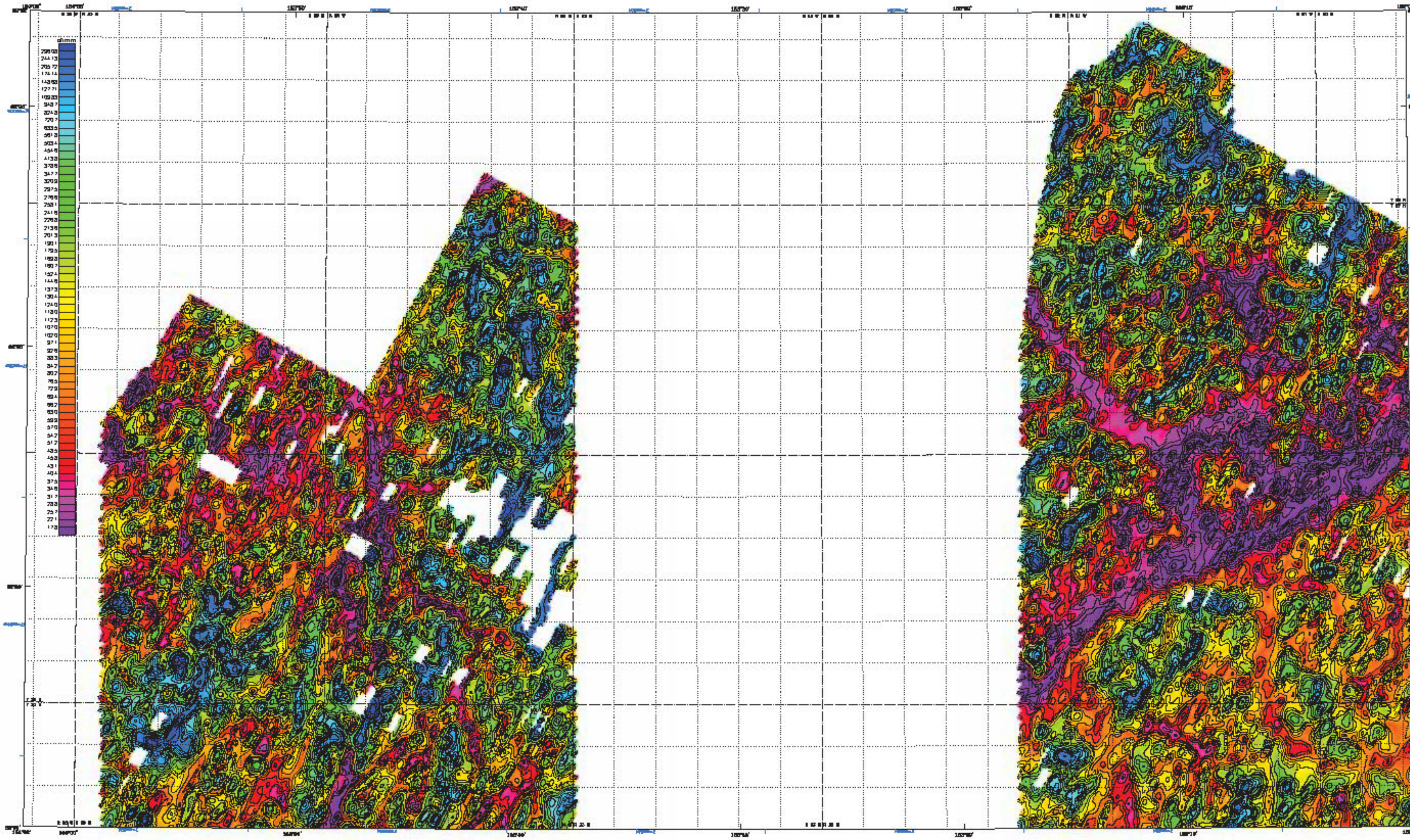
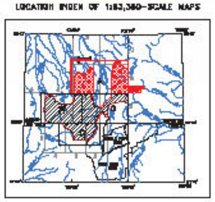


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by

Laurel E. Burns, CPG, and Fugro GeoServices, Inc.

2014

### DESCRIPTIVE NOTES

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A Novatel OEM5-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

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### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 1-30 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
165
125
100

Contours in ohm-m at 16 intervals per decade

resistivity low

### SURVEY HISTORY

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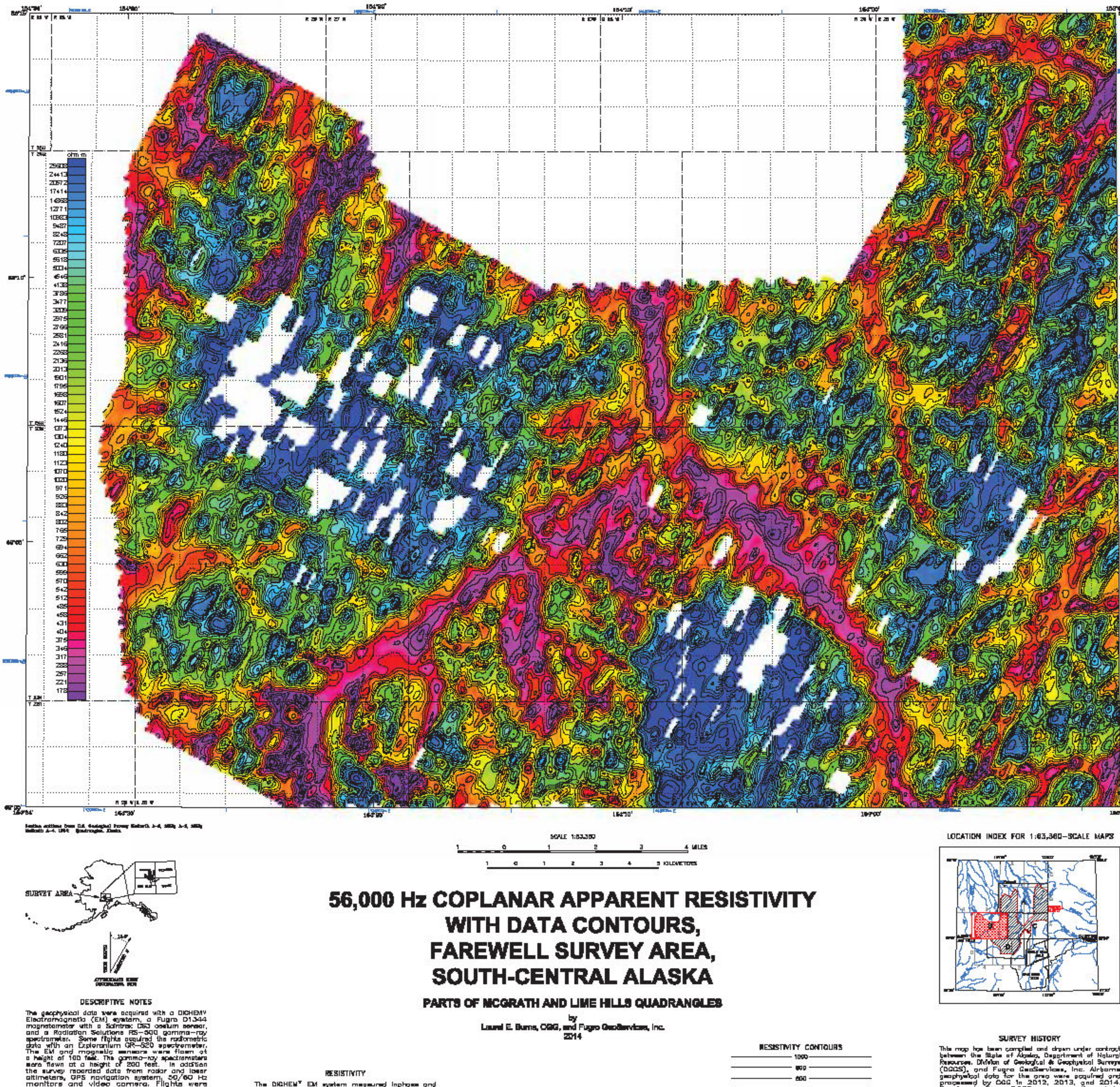
**ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS** **GEOPHYSICAL REPORT 2014-2-9B**



SCALE 1:63,360

SURVEY AREA

LOCATION INDEX FOR 1:63,360-SCALE MAPS

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### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 16 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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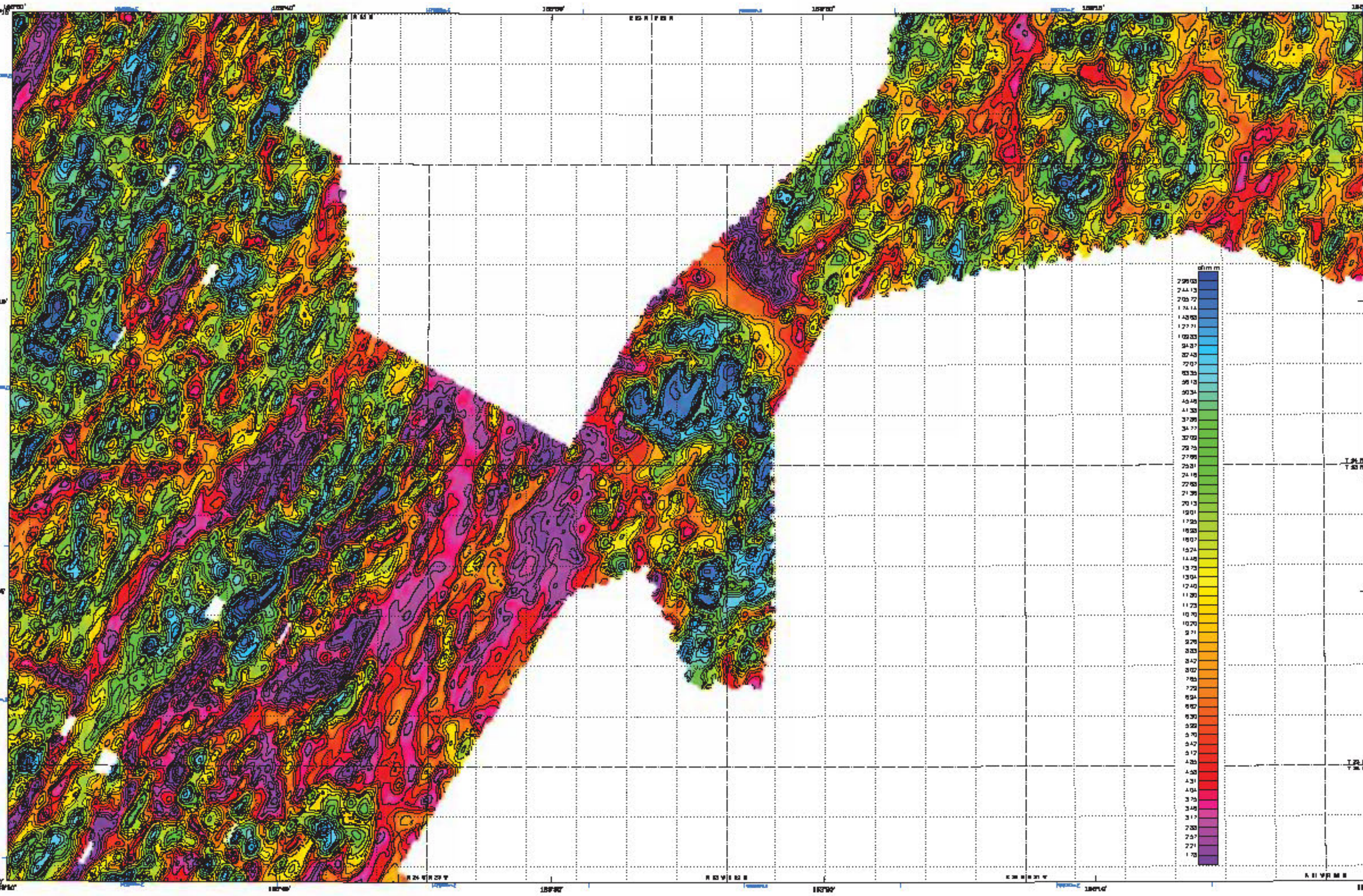
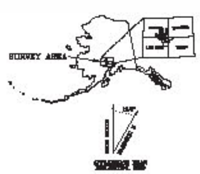


SCALE 1:63,360

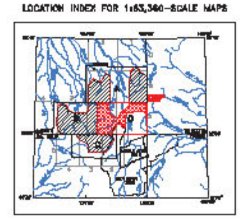



# 56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-C2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1040
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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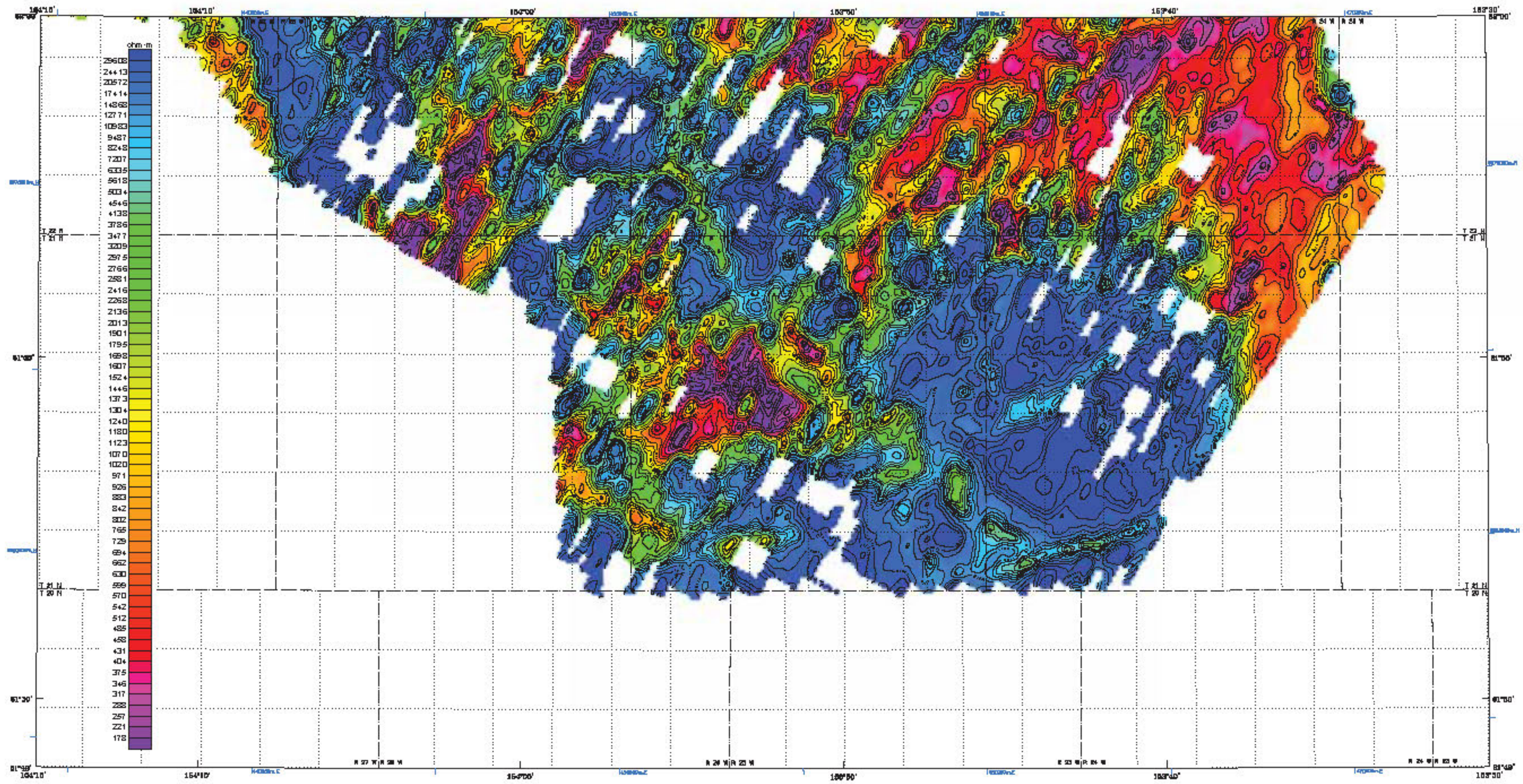


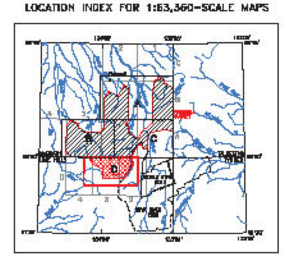

SCALE 1:63,360


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEMV EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 130 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
800
500
400
300
230
200
150
126
100

Contours in ohm-m at 10 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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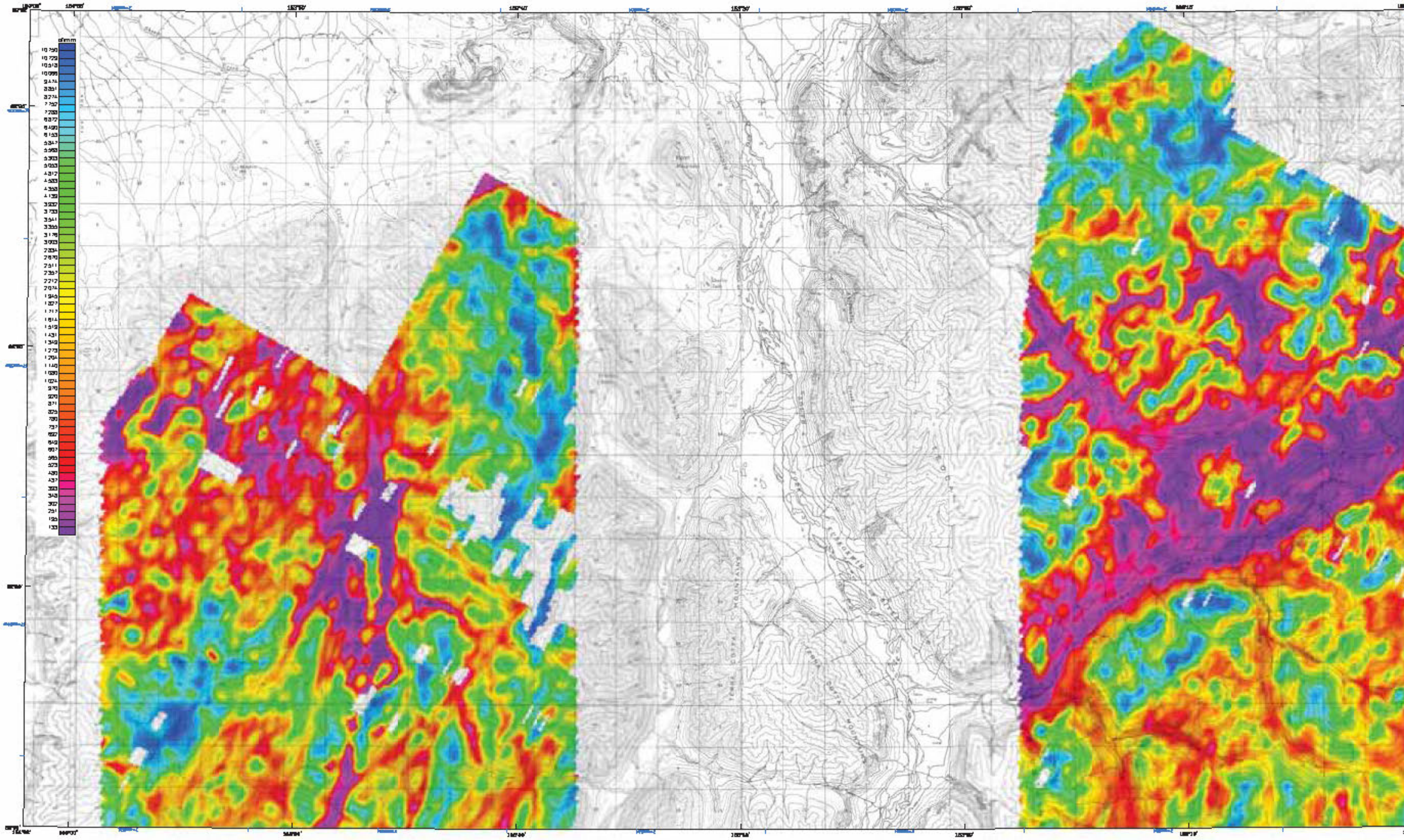
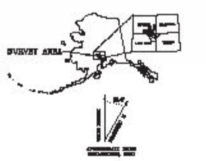


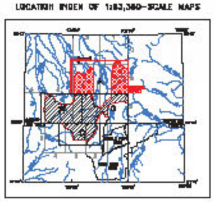



# 7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX OF 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEMS-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 130 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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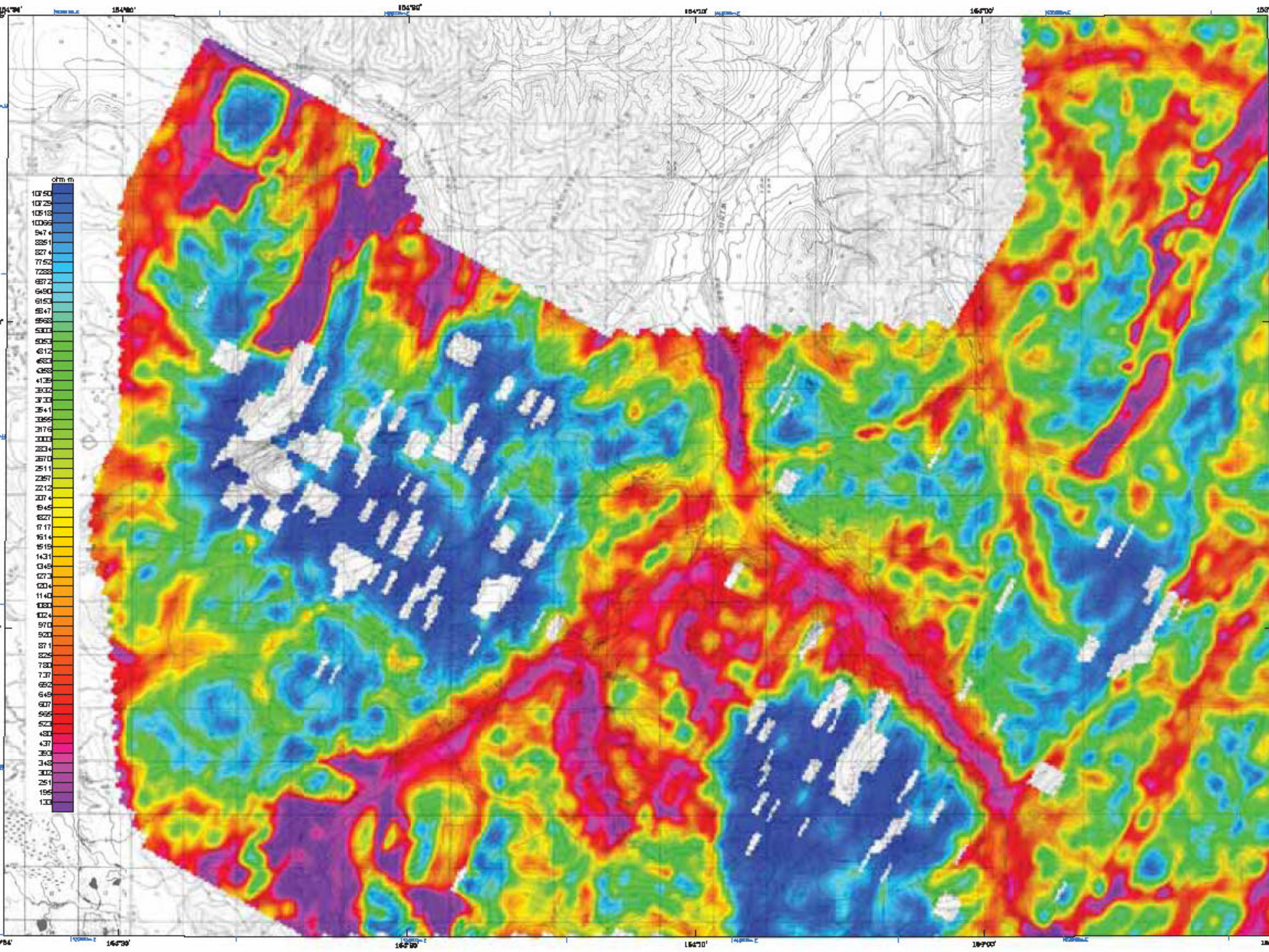
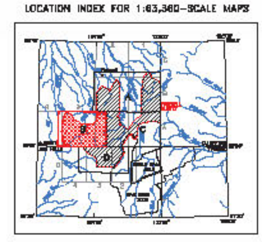


SCALE 1:63,360


LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 160 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

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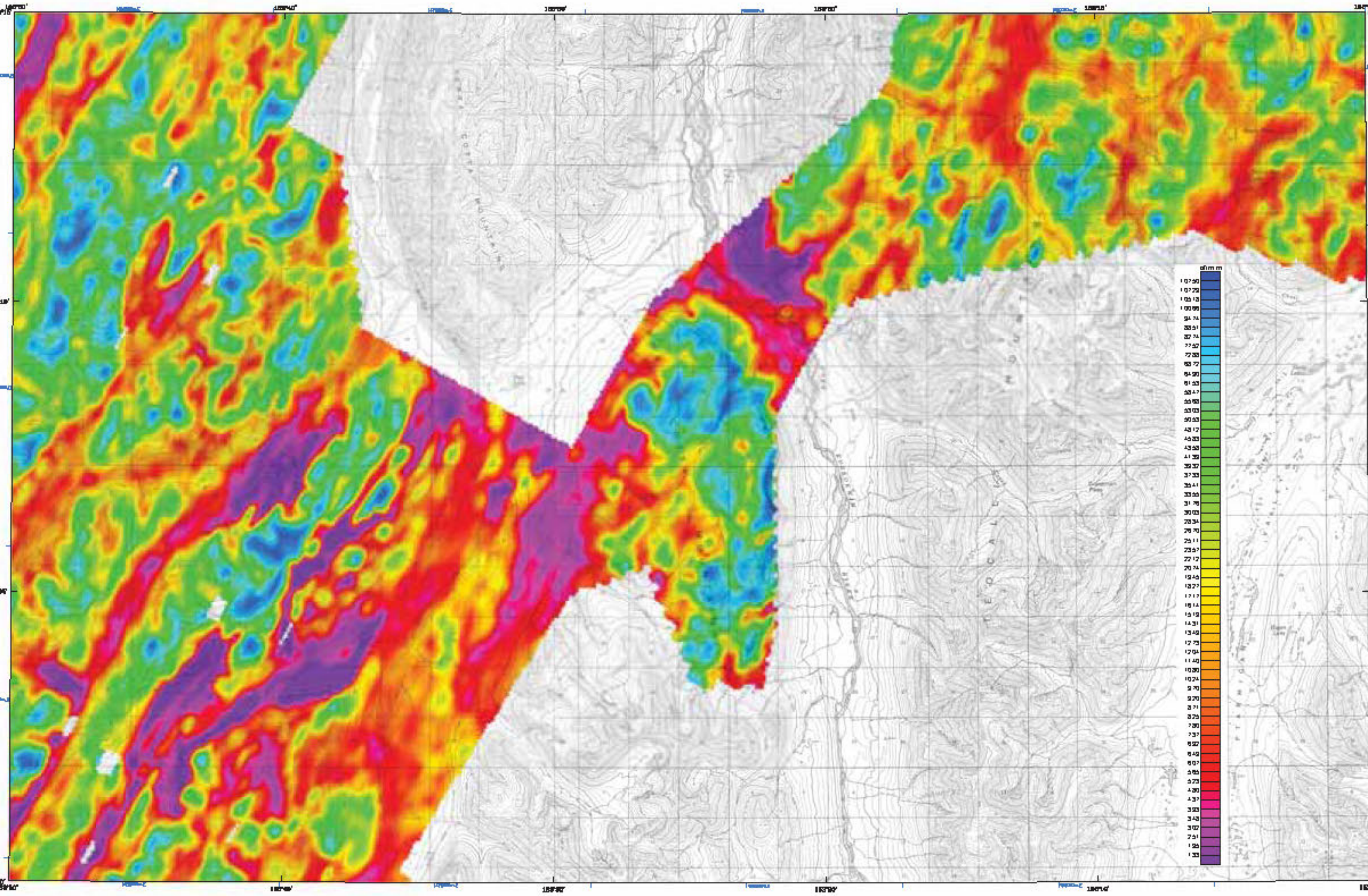


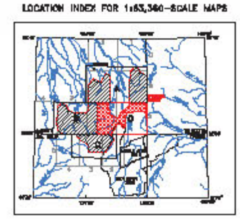

SCALE 1:63,360

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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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### RESISTIVITY ALTITUDE LIMITS

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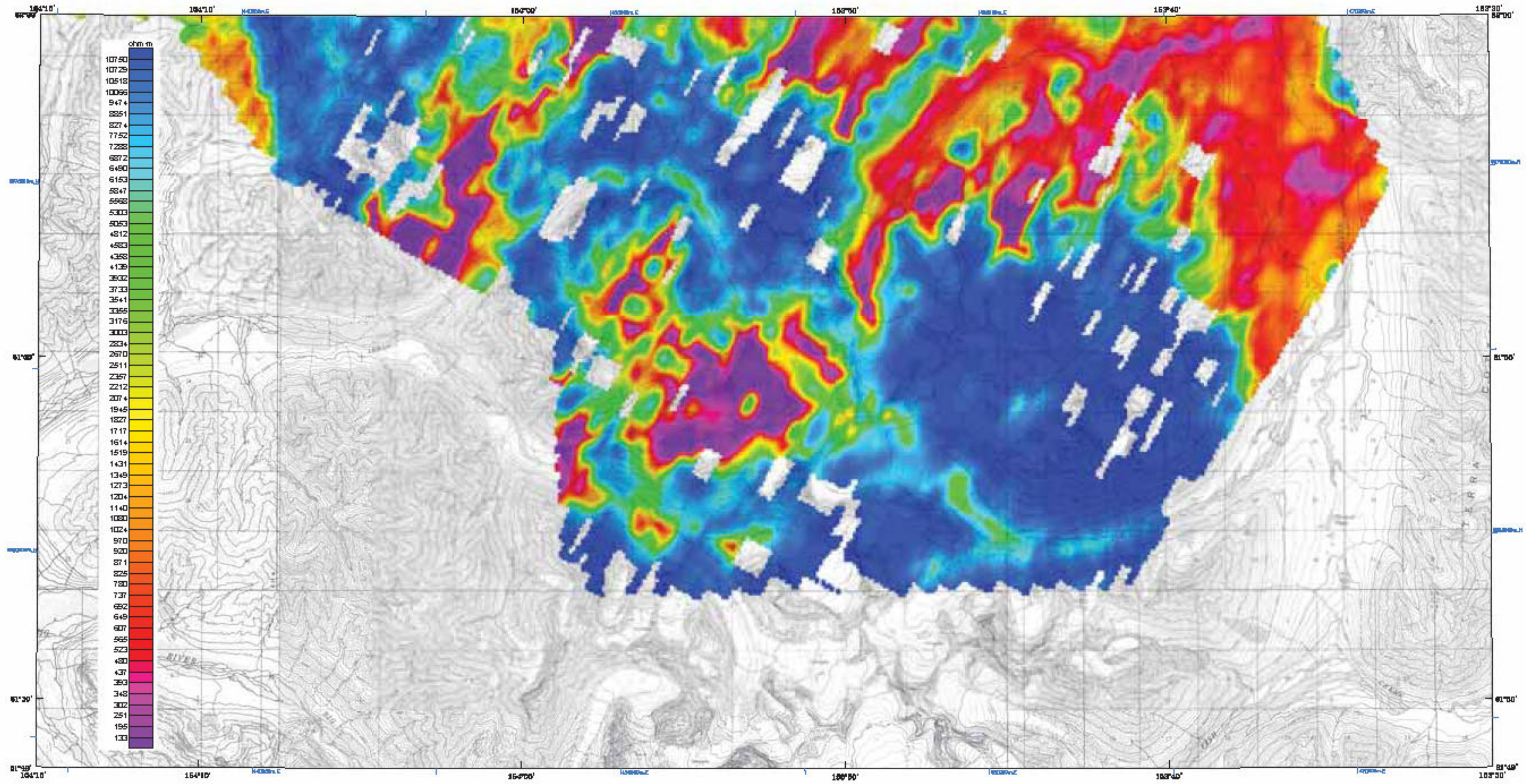



SCALE 1:63,360

1 0 1 2 3 4 MILES

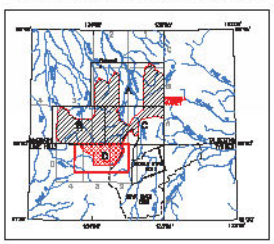
1 0 1 2 3 4 5 KILOMETERS


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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A Novatel OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM$^V$ EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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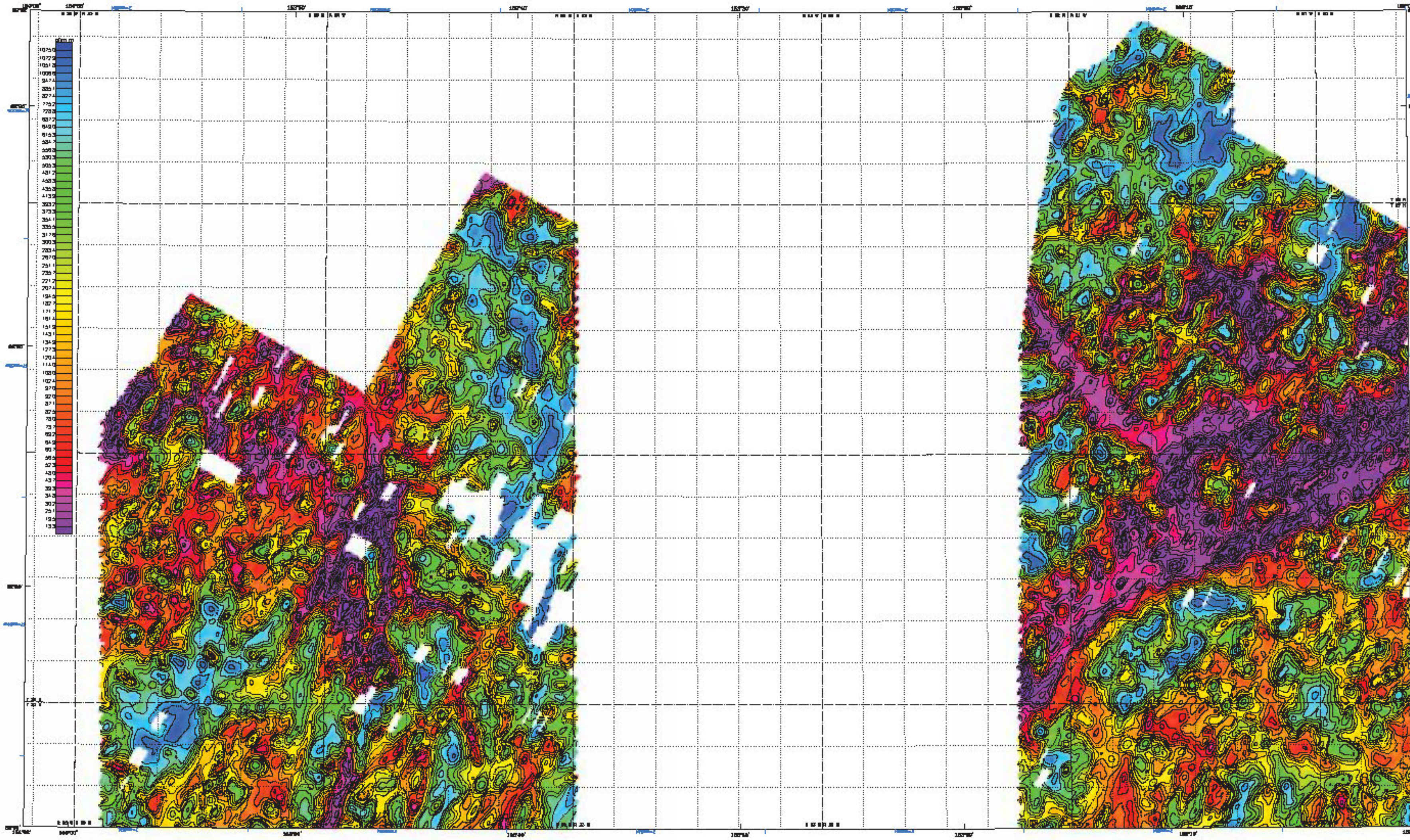
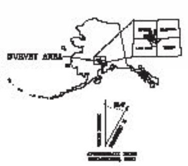
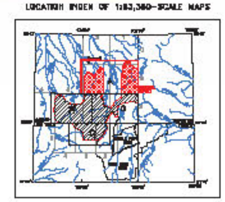


SCALE 1:63,360




# 7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids meaningless 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 coincided over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 16 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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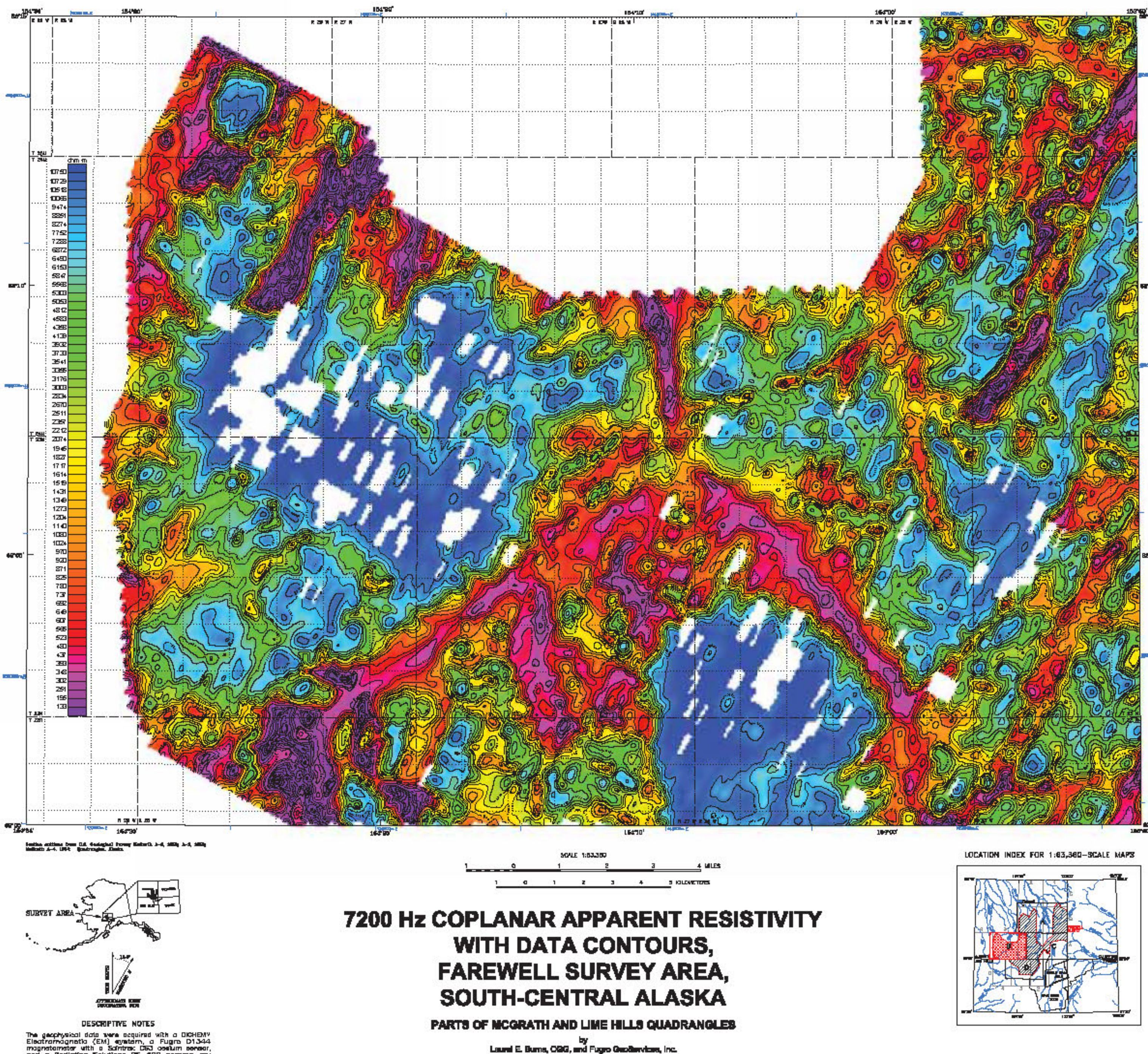
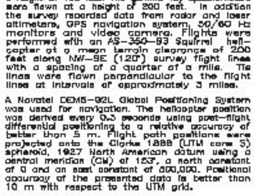


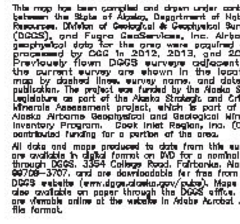

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



# 7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM™ EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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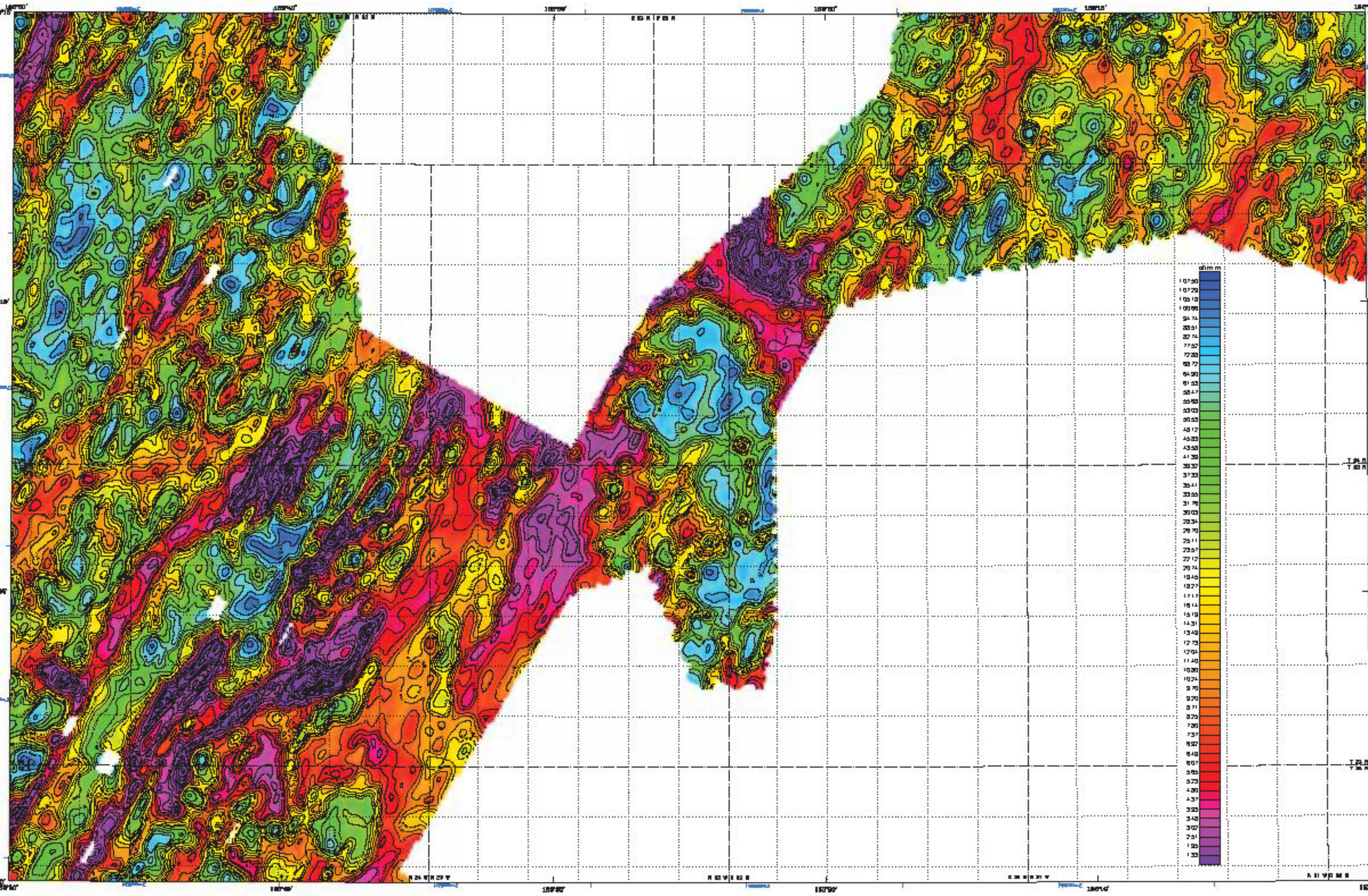
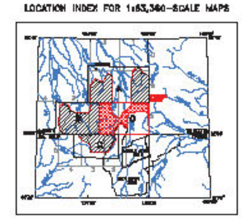



Base map modified from U.S. Geological Survey McGrath A-1, 1955; A-2, 1955, Quadrangles, Alaska

SCALE 1:63,360


LOCATION INDEX FOR 1:63,360-SCALE MAPS



# 7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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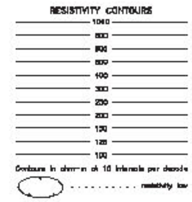
RESISTIVITY CONTOURS




Contours in ohm-m at 10 intervals per decade

### SURVEY HISTORY

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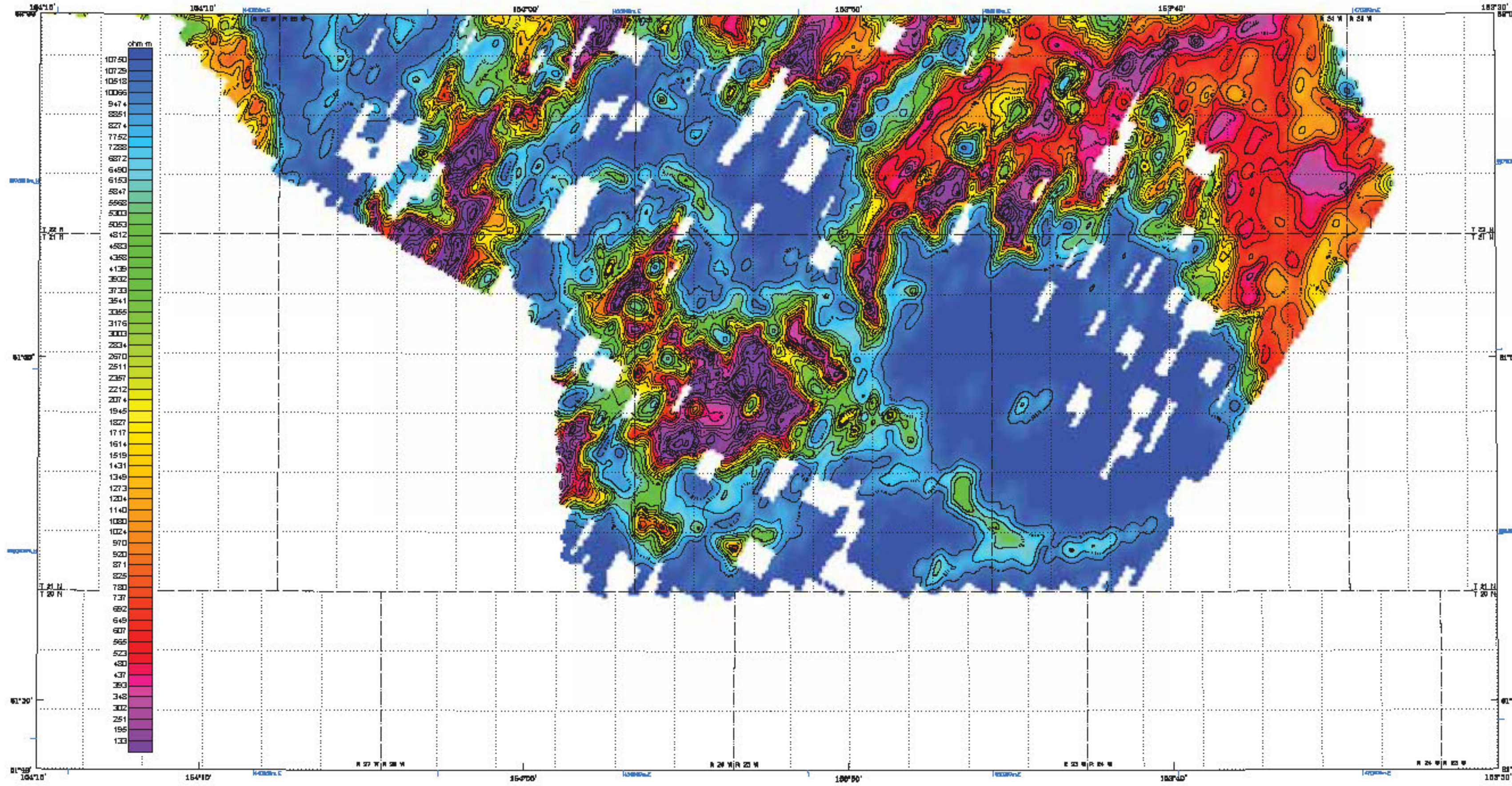
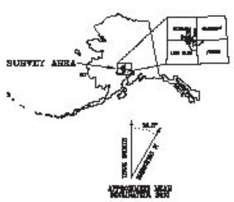



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

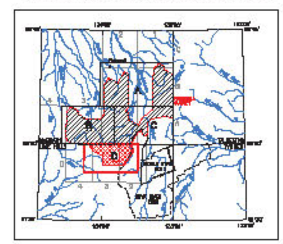



# 7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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### RESISTIVITY

The DIGHEMV EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

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### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . . . . . . resistivity low

### SURVEY HISTORY

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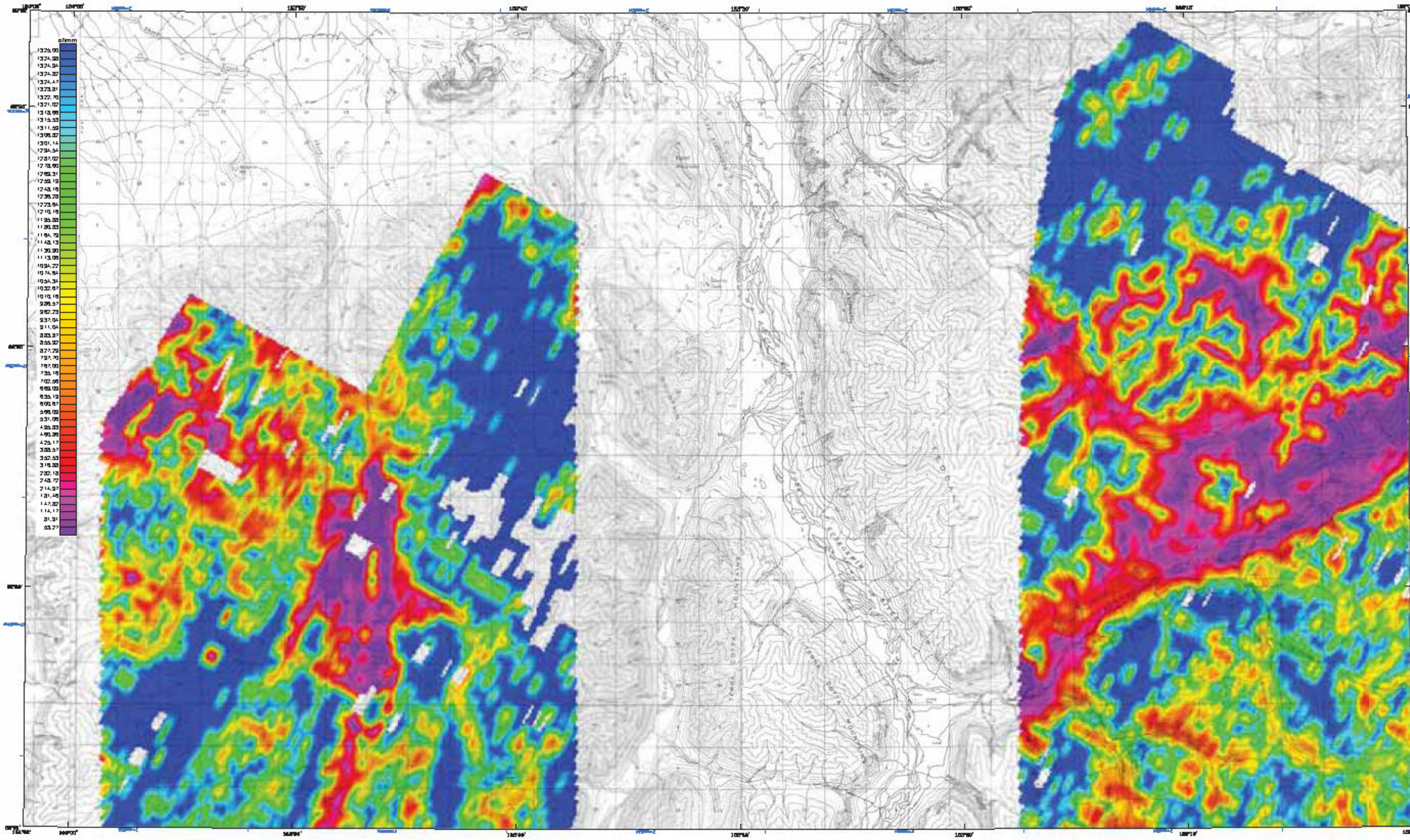
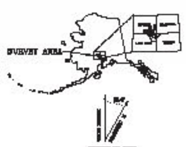


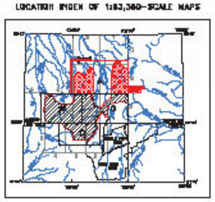



# 900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX OF 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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### RESISTIVITY

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 130 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

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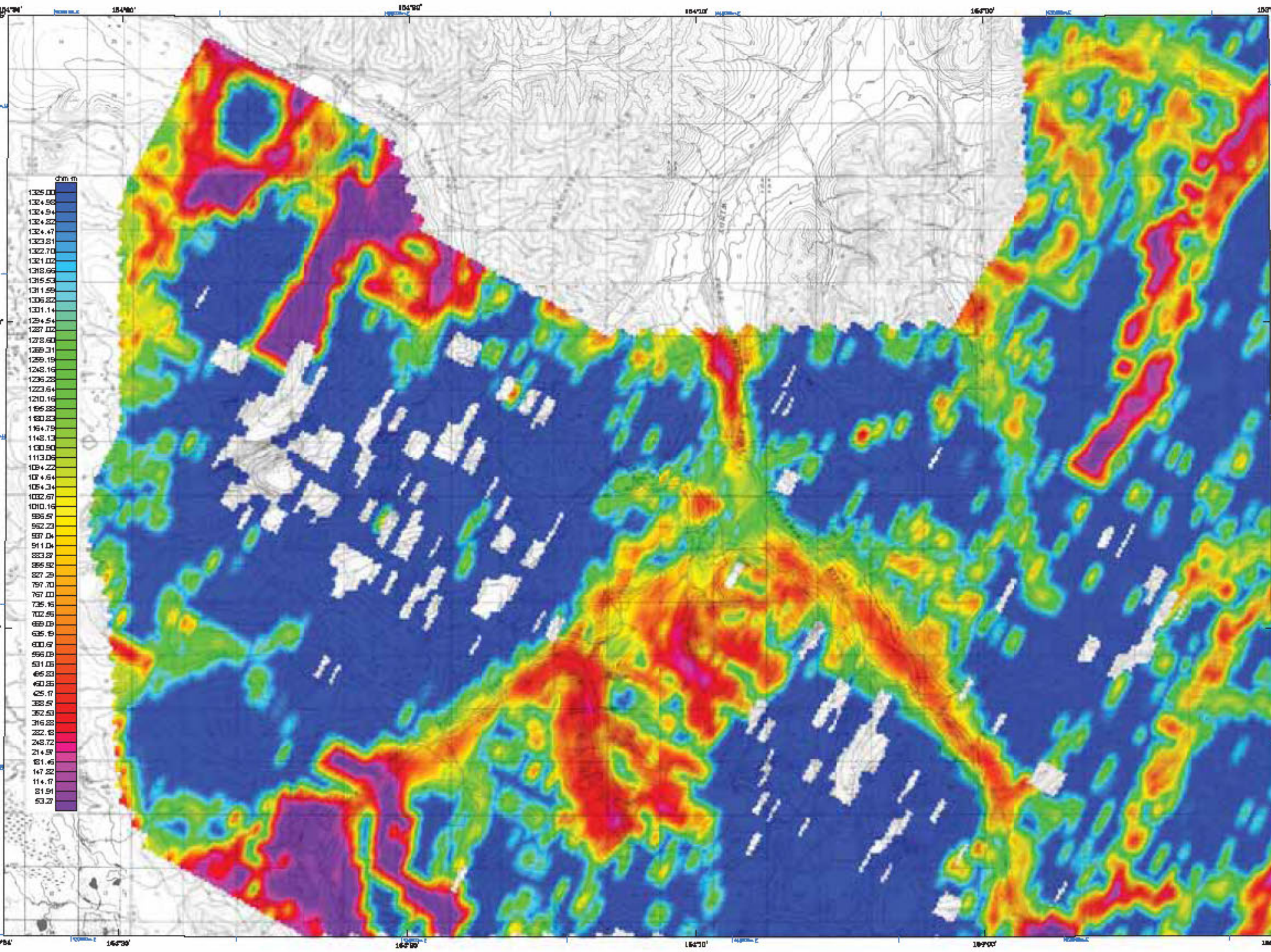
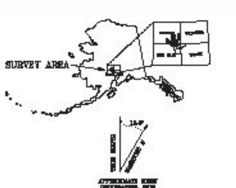


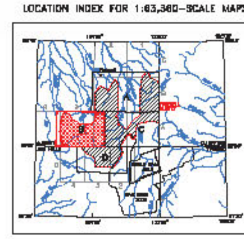

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 100 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### 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 the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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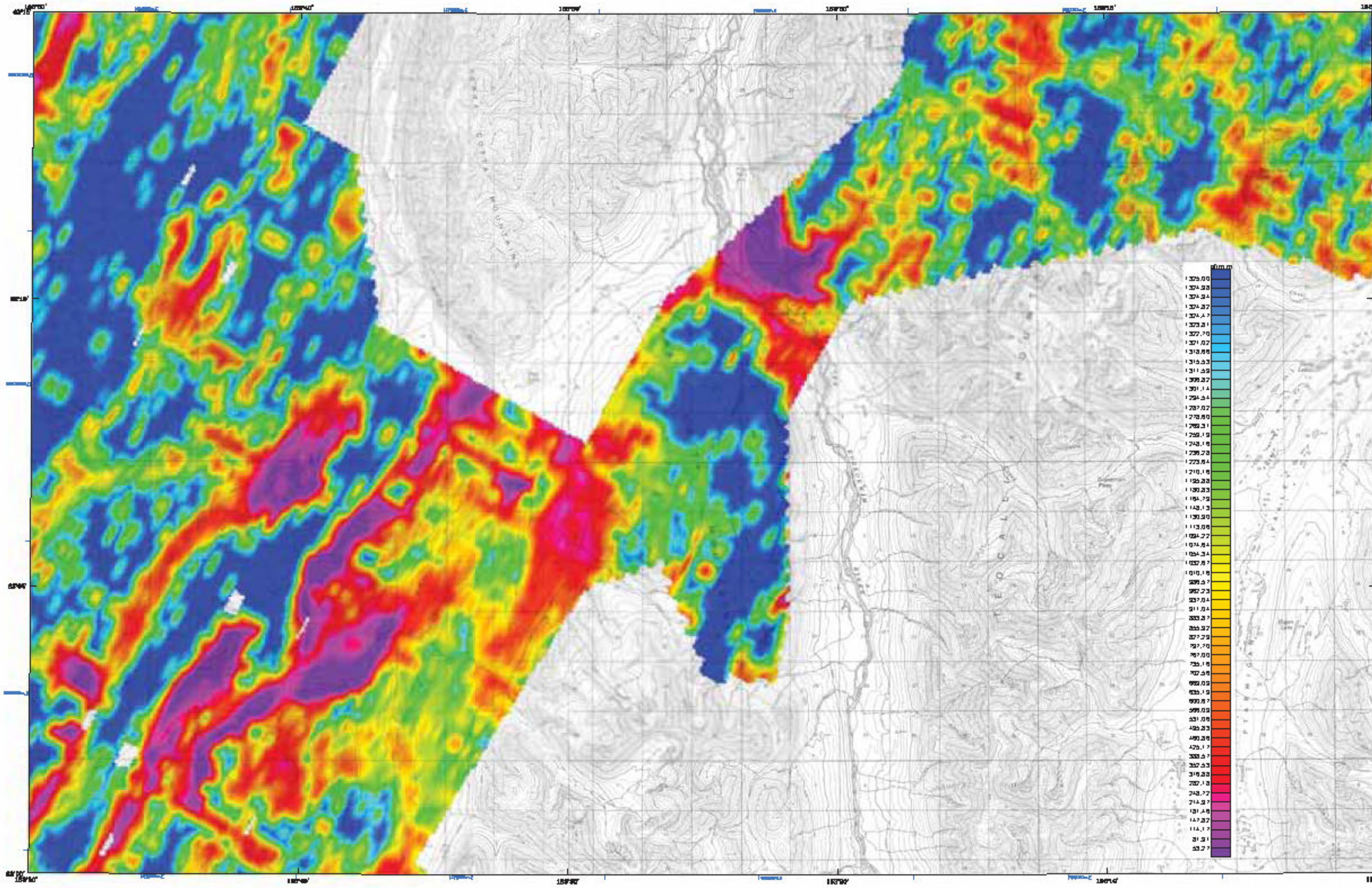
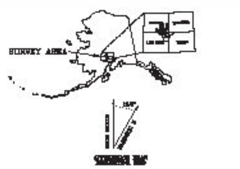
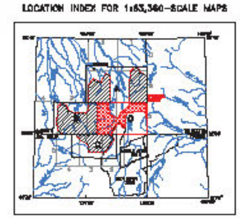


SCALE 1:63,360




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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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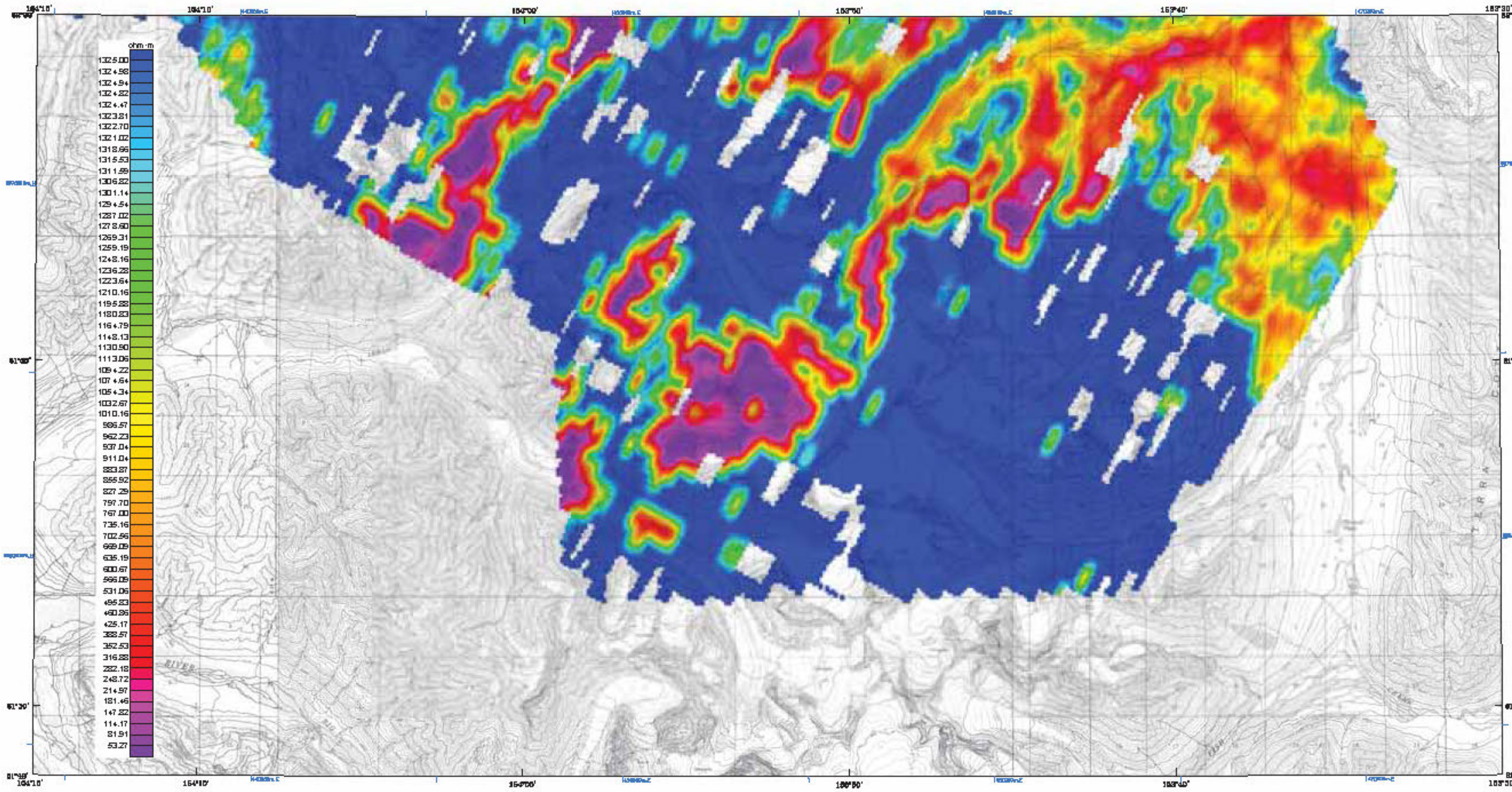


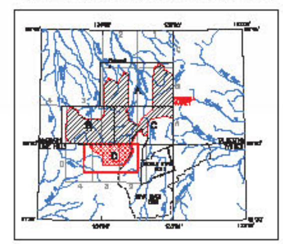

SCALE 1:63,360


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### SURVEY HISTORY

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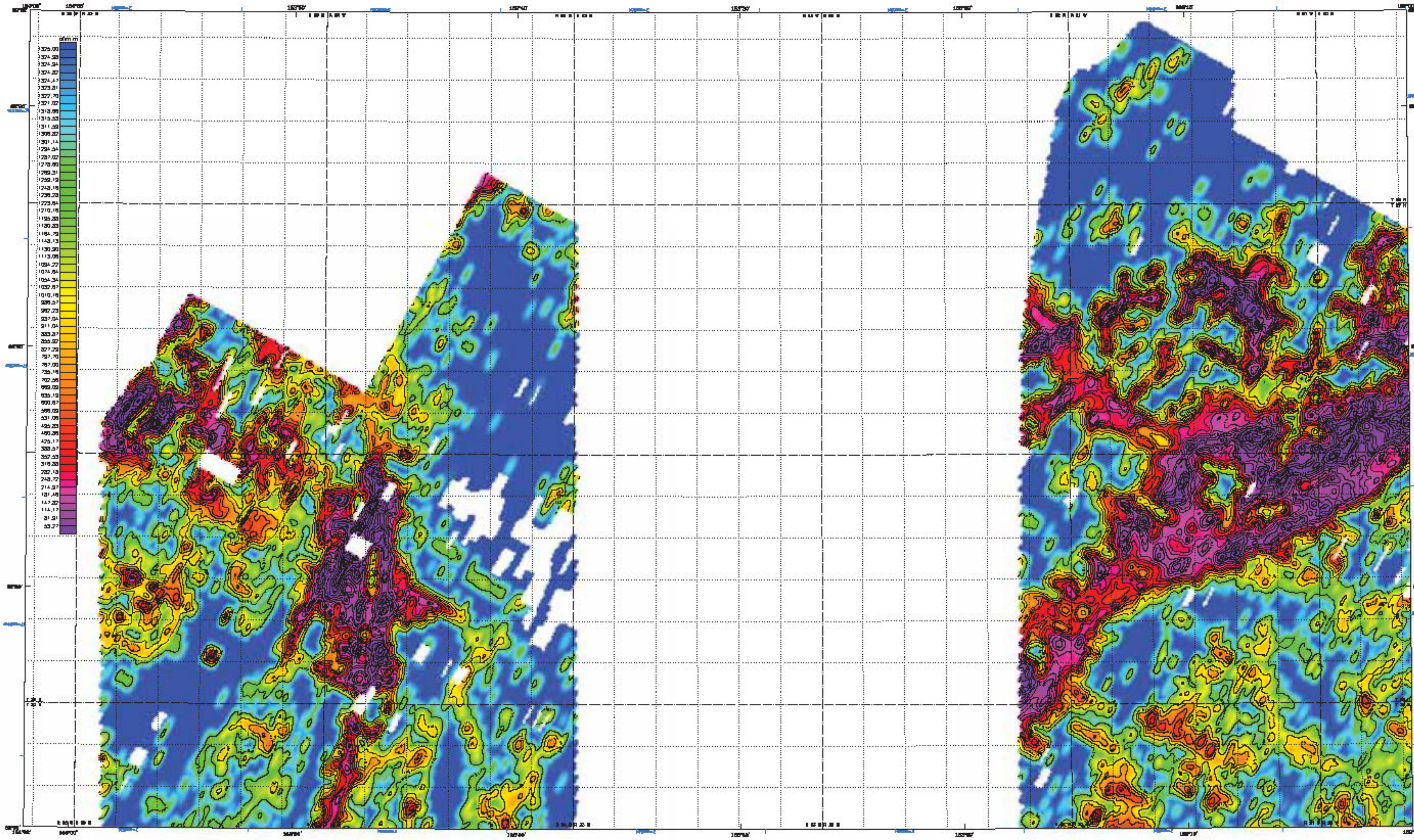


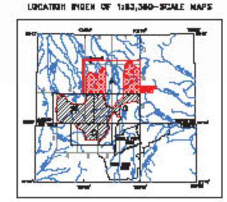


# 900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CPG, and Fugro GeoServices, Inc.
2014

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 120 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

| |
|---|
| 1000 |
| 800 |
| 650 |
| 500 |
| 400 |
| 300 |
| 250 |
| 200 |
| 165 |
| 125 |
| 100 |

Contours in ohm-m at 16 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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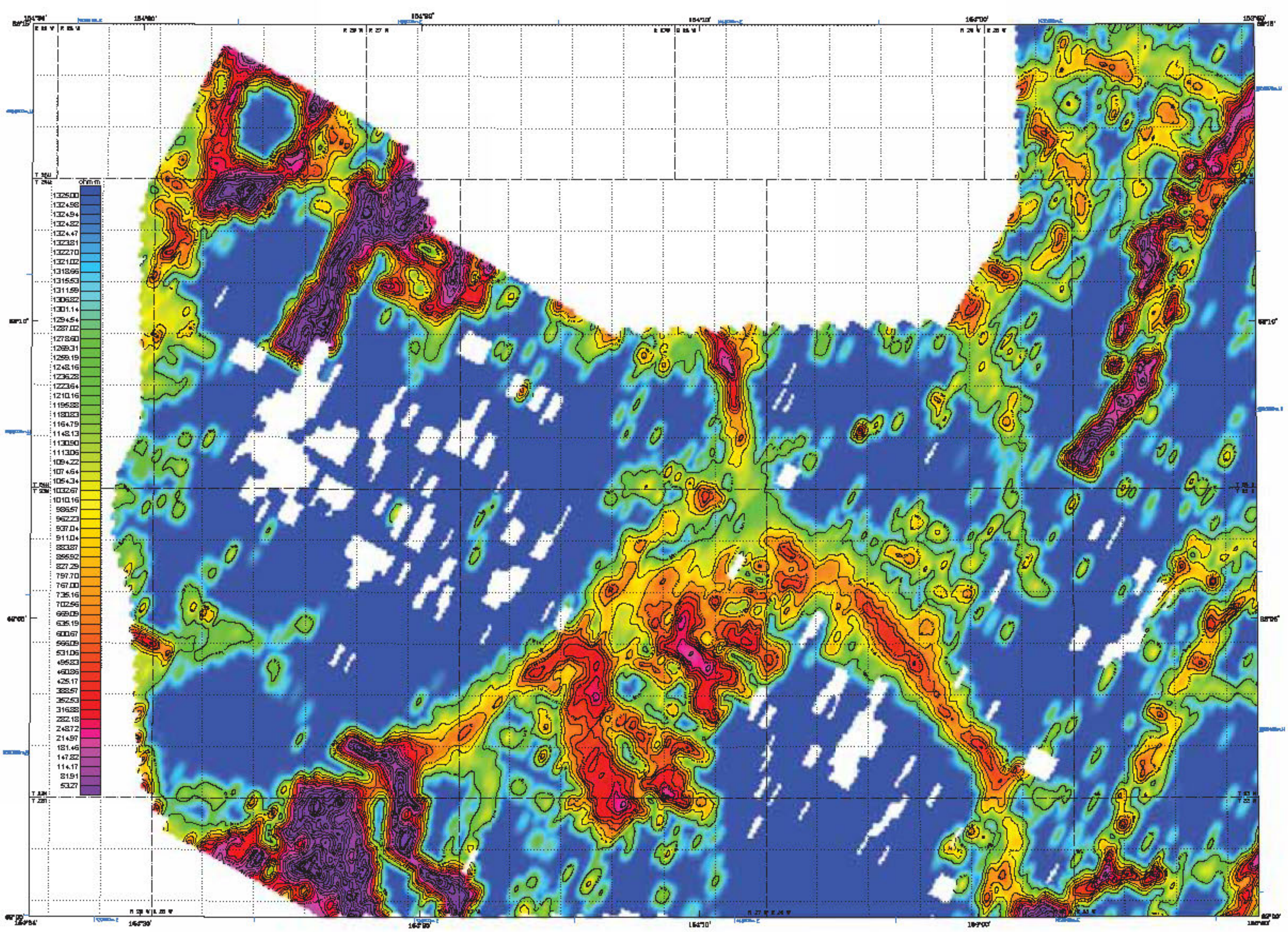
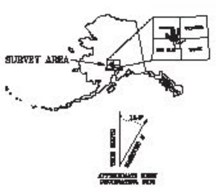
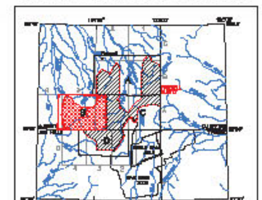


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



LOCATION INDEX FOR 1:63,360-SCALE MAPS

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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

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### RESISTIVITY

The DIGHEM$^V$ EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 180 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 50 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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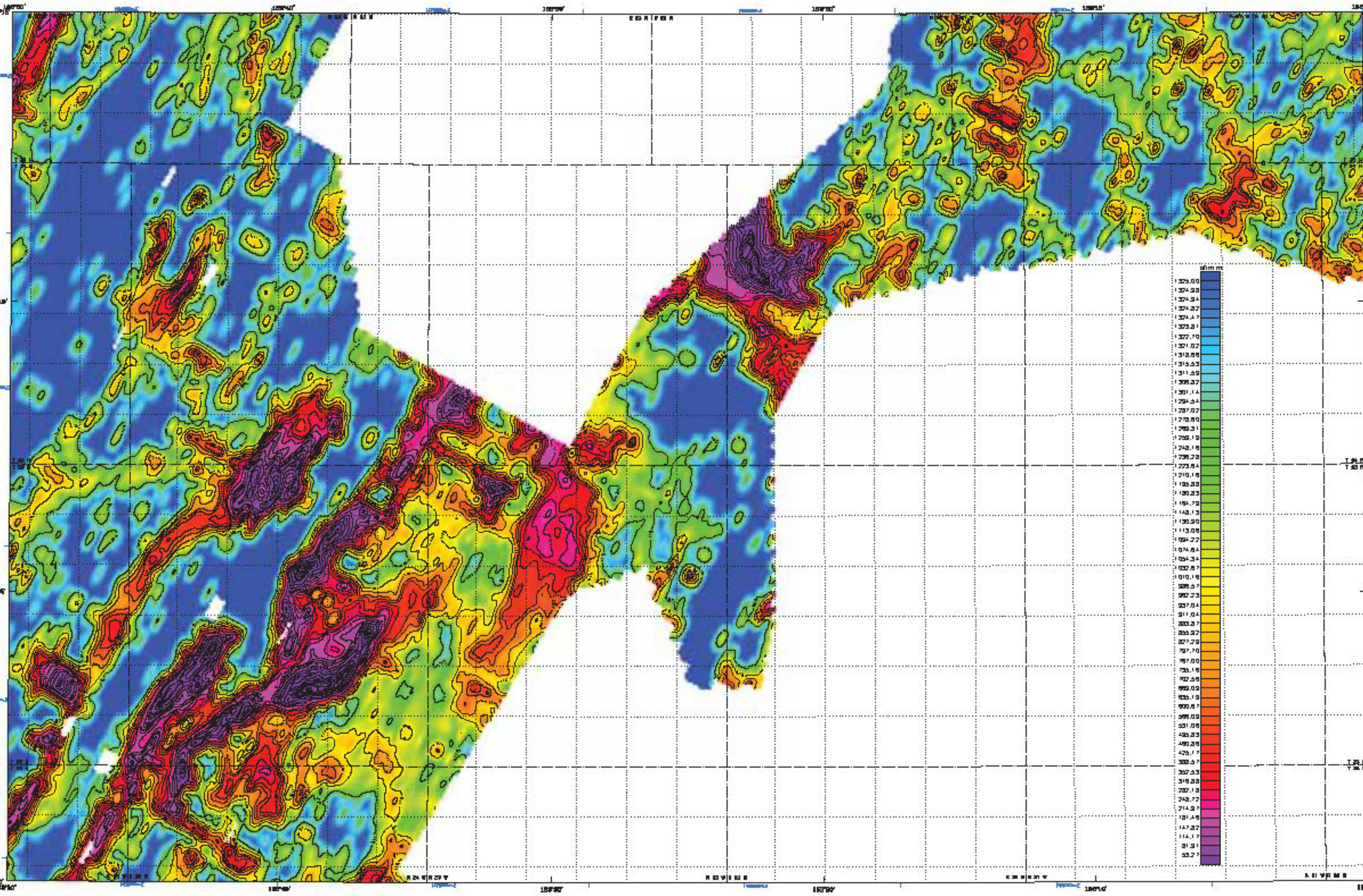


SCALE 1:63,360

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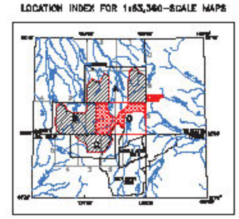
LOCATION INDEX FOR 1:63,360-SCALE MAPS



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### RESISTIVITY

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### RESISTIVITY ALTITUDE LIMITS

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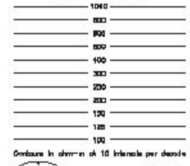


### SURVEY HISTORY

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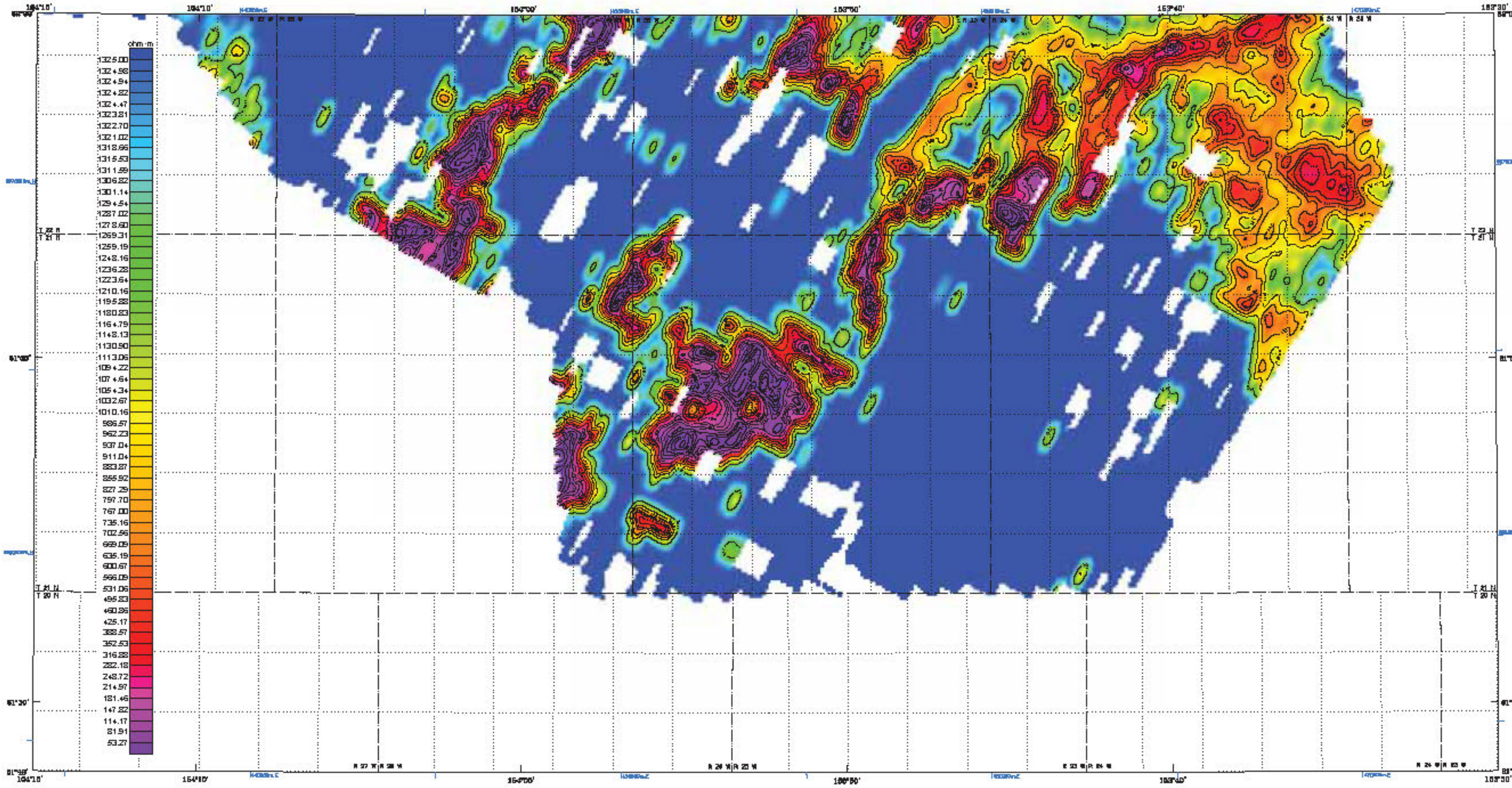
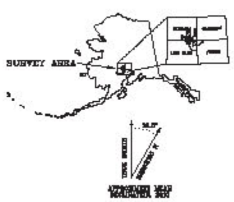


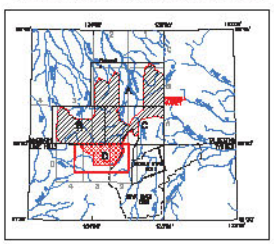

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



# 900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RESISTIVITY

The DIGHEMV EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. 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.

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

### RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless 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 correlated over more than one survey line. Spurious grid values may be evident after the resampling of the gridded data from the 80 meter to the 25 meter cell size at the grid edges and are an artifact of the grid resampling. These values at edges of the grid holes due to flying height should be viewed with caution.

### RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

.......... resistivity low

### SURVEY HISTORY

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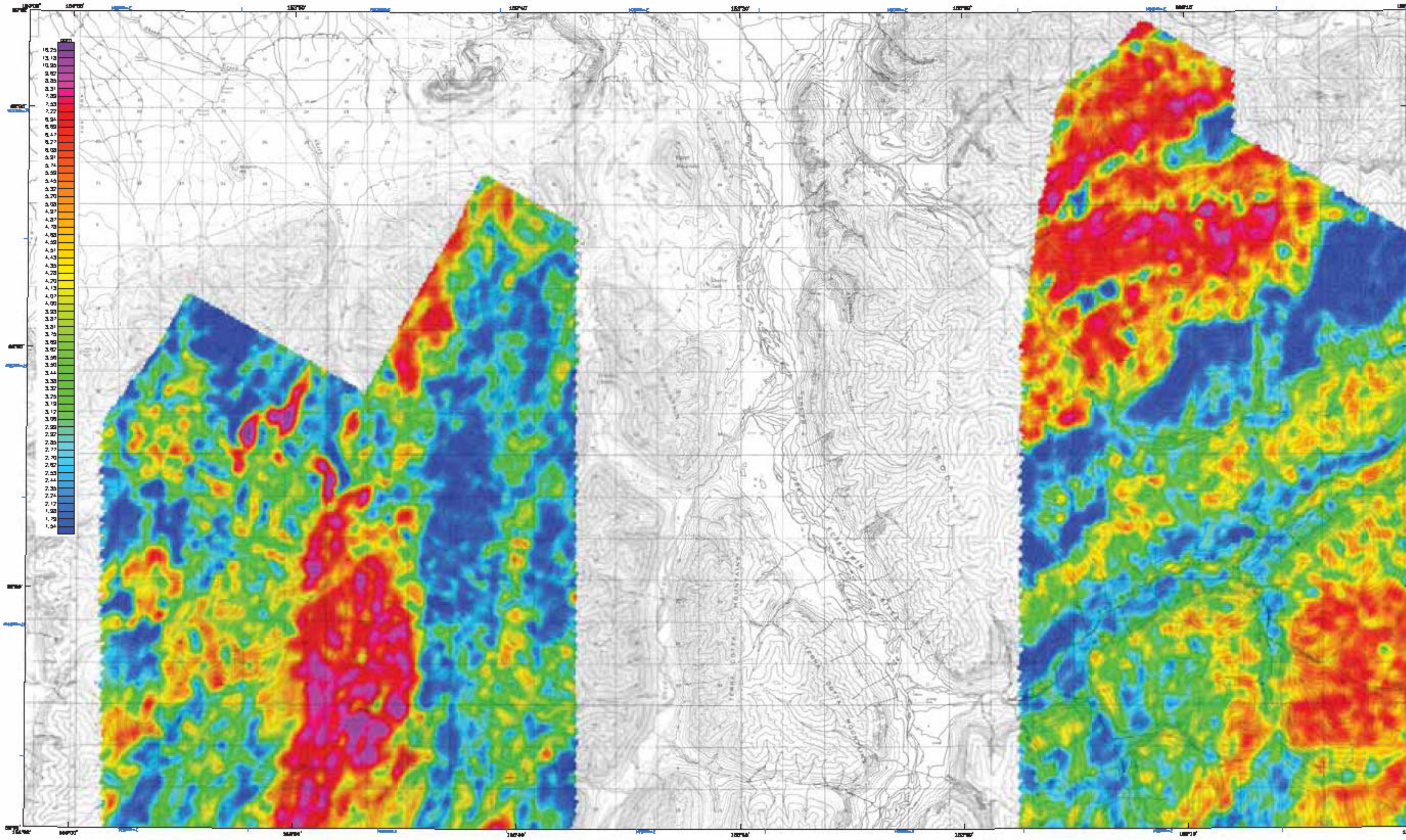
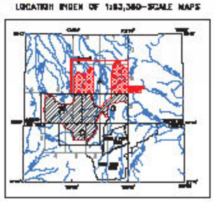


SCALE 1:63,360

LOCATION INDEX OF 1:63,360-SCALE MAPS




# THORIUM (eTH) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
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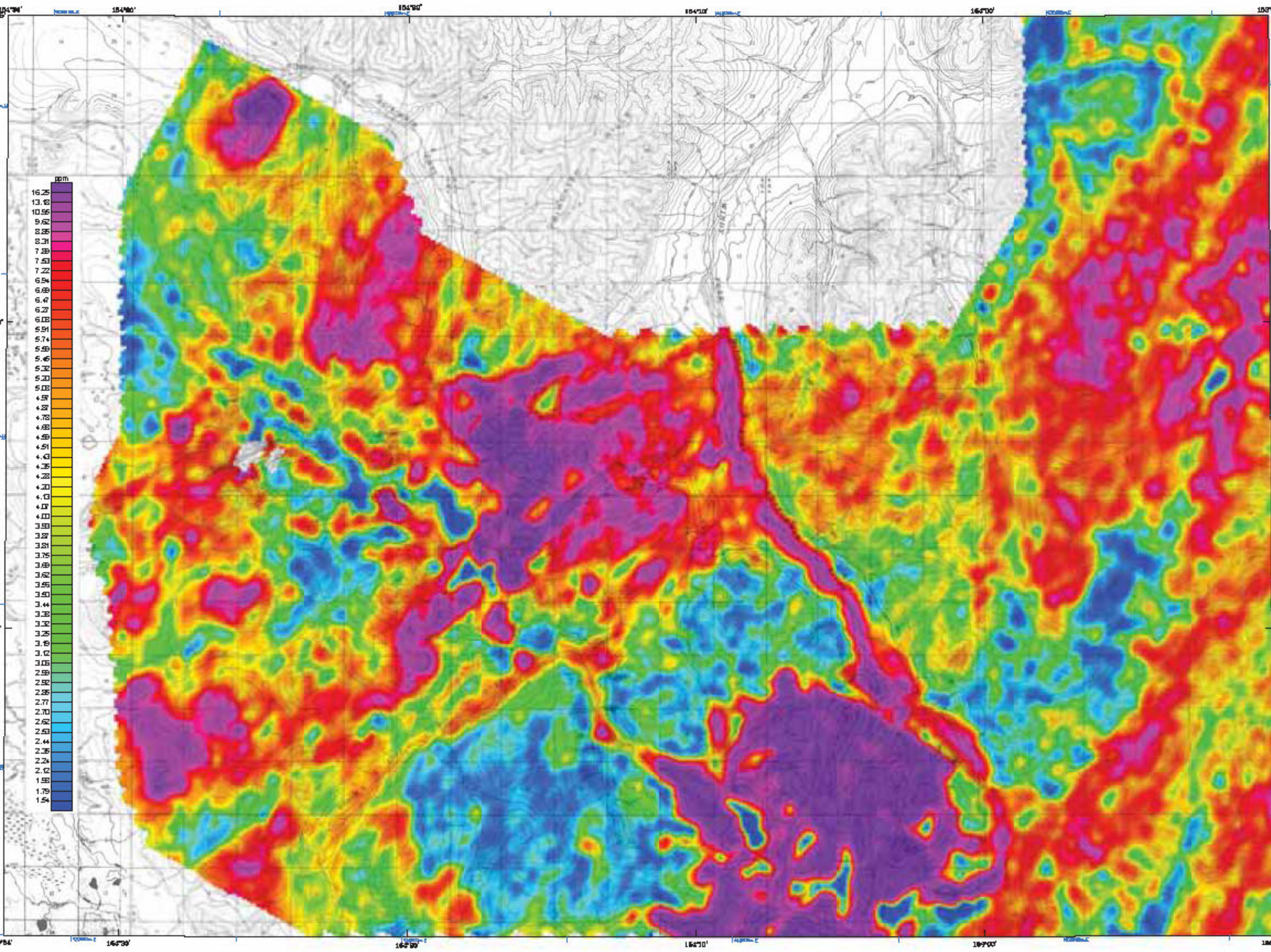

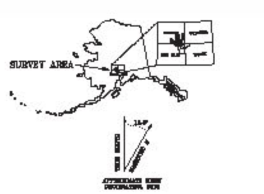


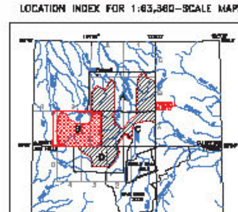


SCALE 1:63,360

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by
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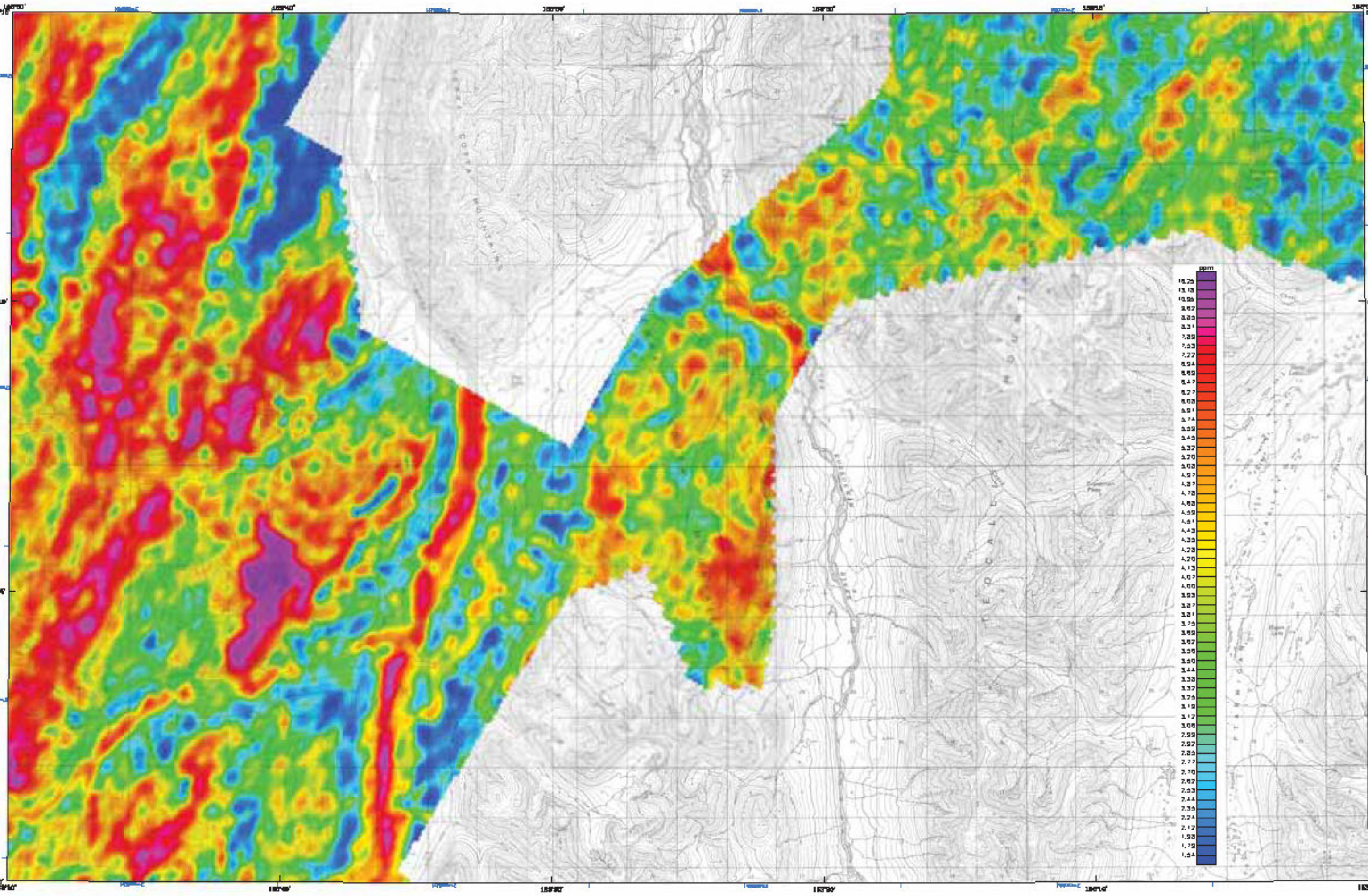
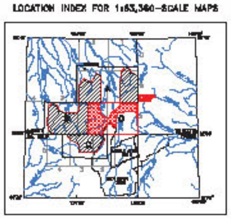



SCALE 1:63,360

LOCATION INDEX FOR 1:63,360-SCALE MAPS

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by
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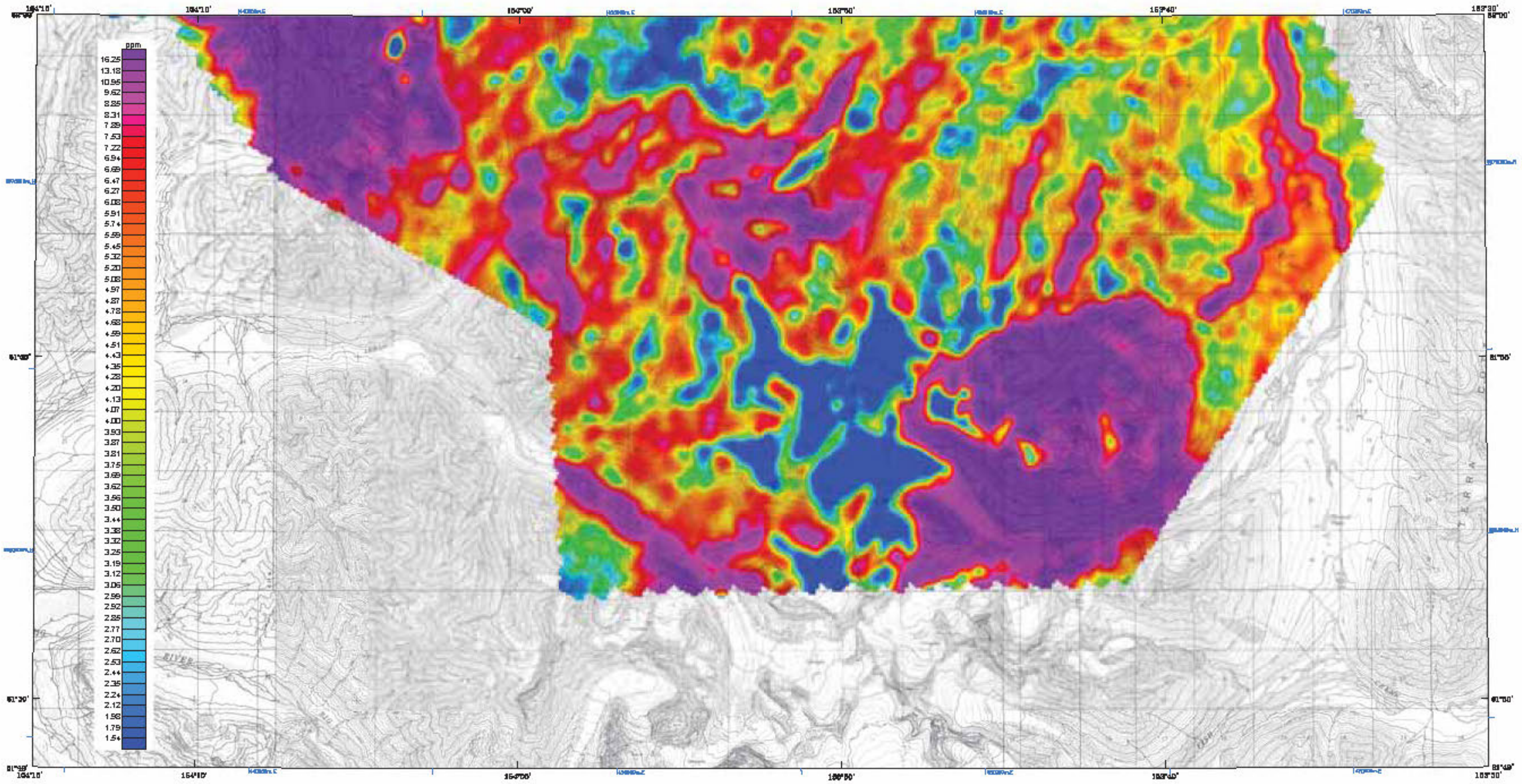



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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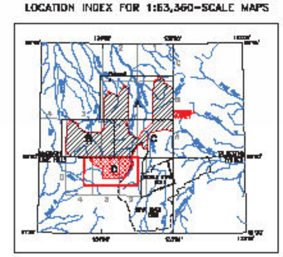

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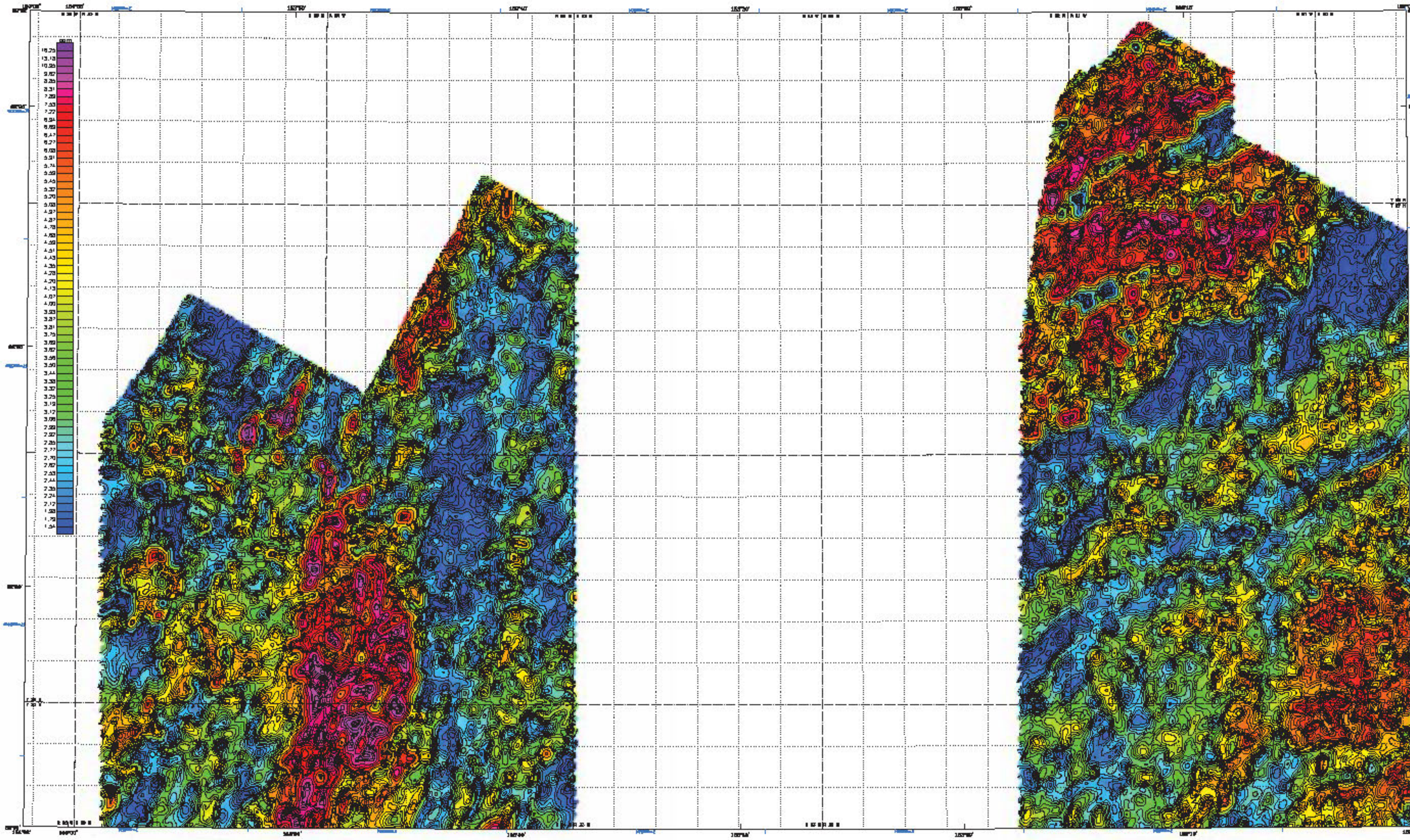

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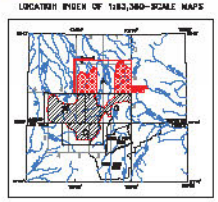

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CONTOUR INTERVAL

- - - - - - - - - 5.00 ppm
- - - - - - - - - 1.00 ppm
- - - - - - - - - 0.20 ppm

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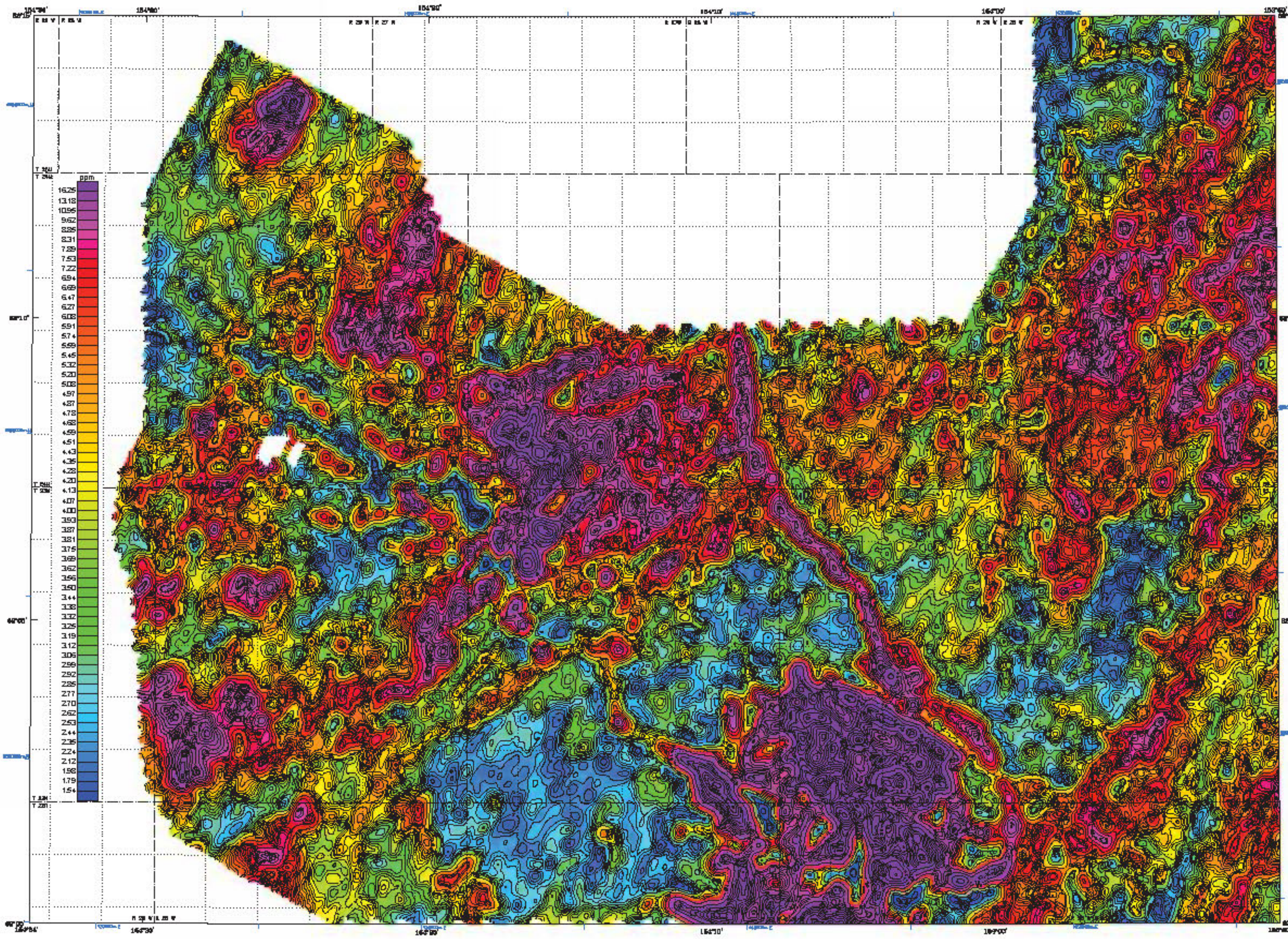


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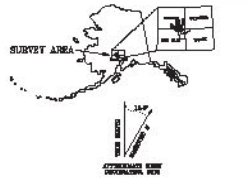


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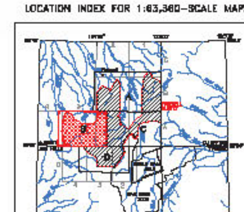

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

5.00 ppm
1.00 ppm
0.20 ppm

### SURVEY HISTORY

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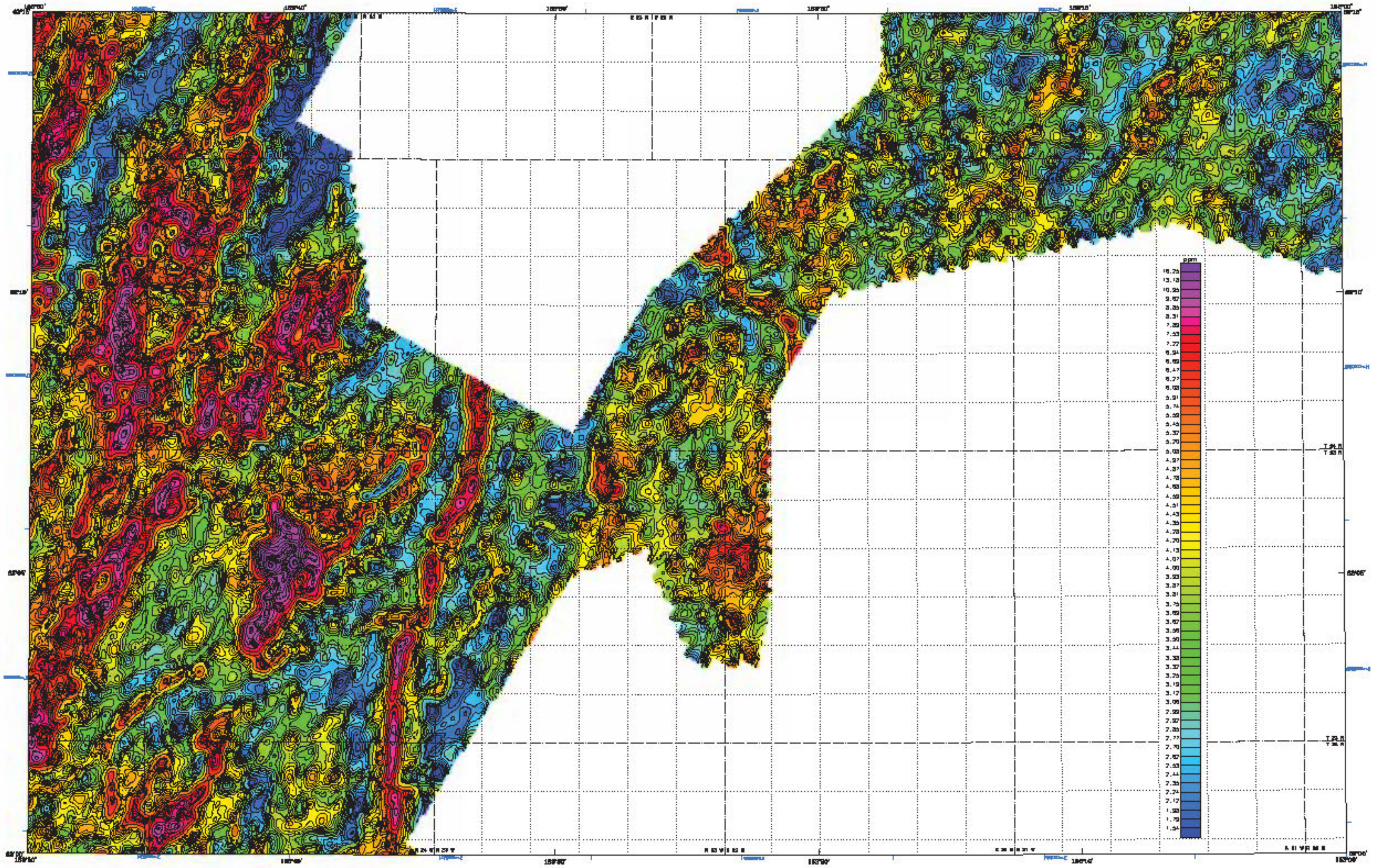


Base map contours from U.S. Geological Survey McGrath A-1, 1990; A-2, 1990; Quadrangles, Alaska

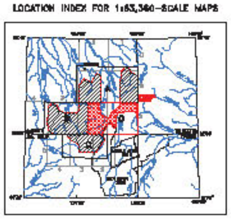
SCALE 1:63,360


# THORIUM (eTH) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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CONTOUR INTERVAL

3.24 ppm

1.00 ppm

0.24 ppm

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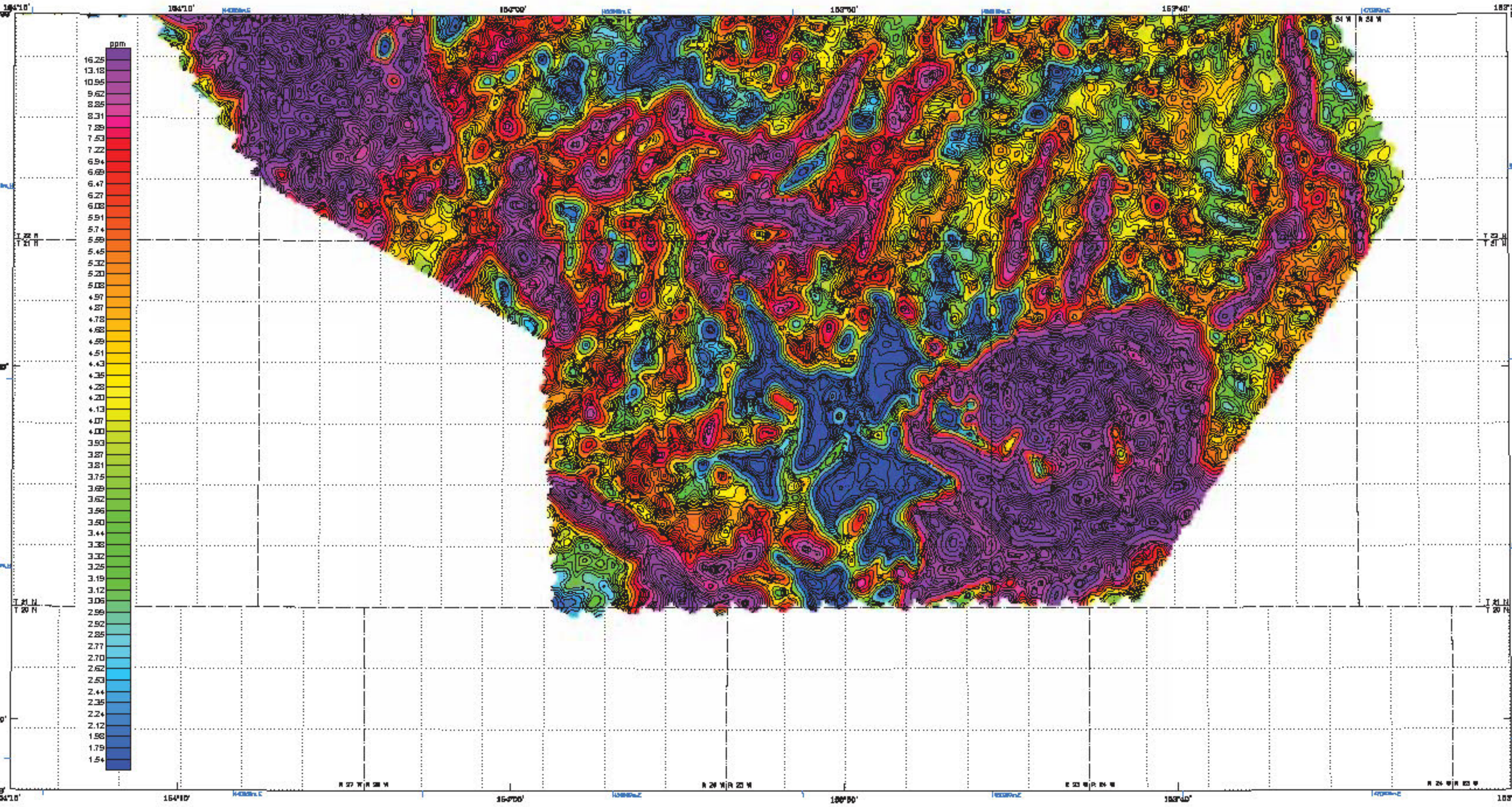
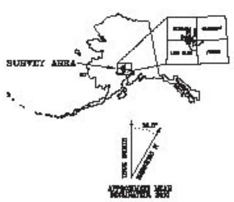



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

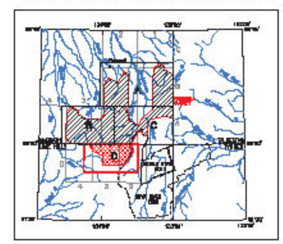



# THORIUM (eTH) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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CONTOUR INTERVAL

5.00 ppm

1.00 ppm

0.20 ppm

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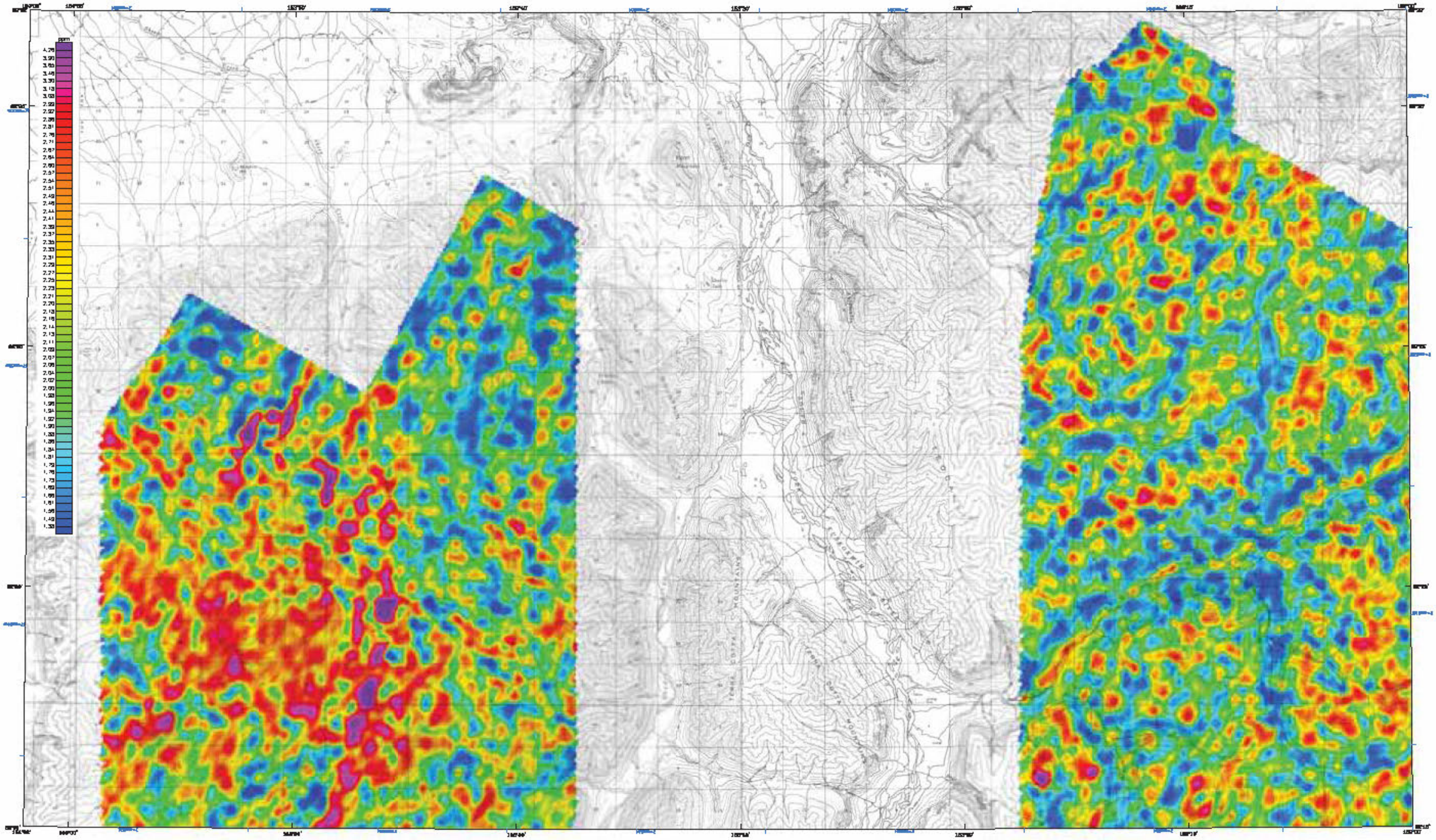



SCALE 1:63,360

# URANIUM (eU) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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LOCATION INDEX OF 1:63,360-SCALE MAPS

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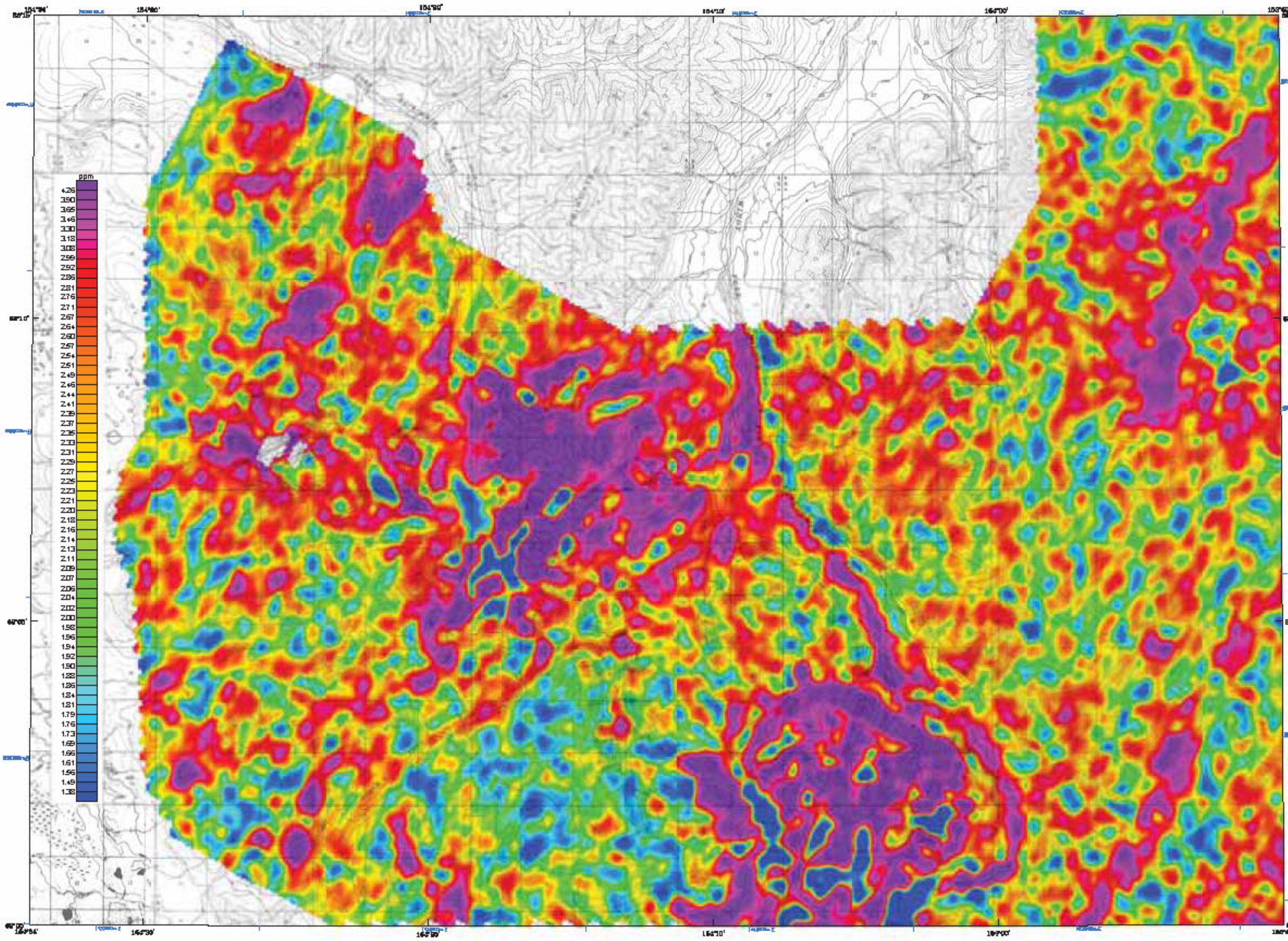
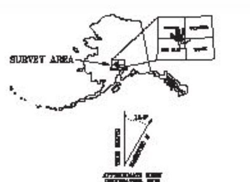



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




# URANIUM (eU) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

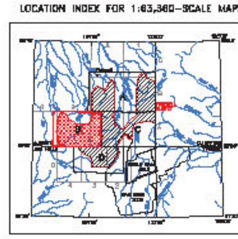
## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by

Laurel E. Burns, CGG, and Fugro GeoServices, Inc.

2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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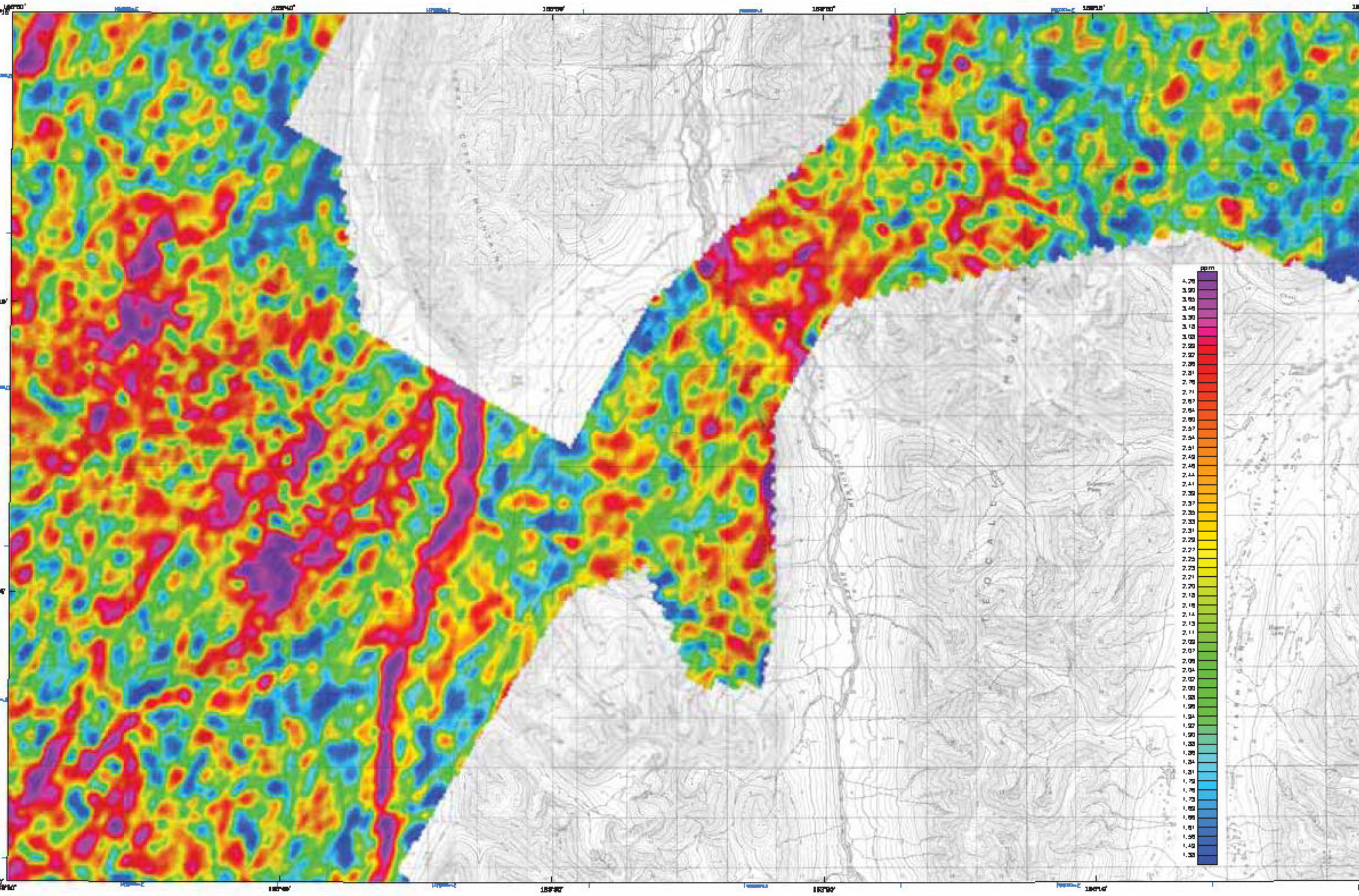
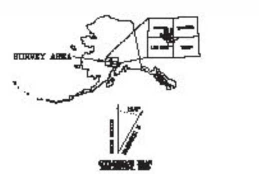
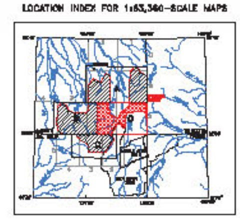



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by

Laurel E. Burns, CGG, and Fugro GeoServices, Inc.

2014

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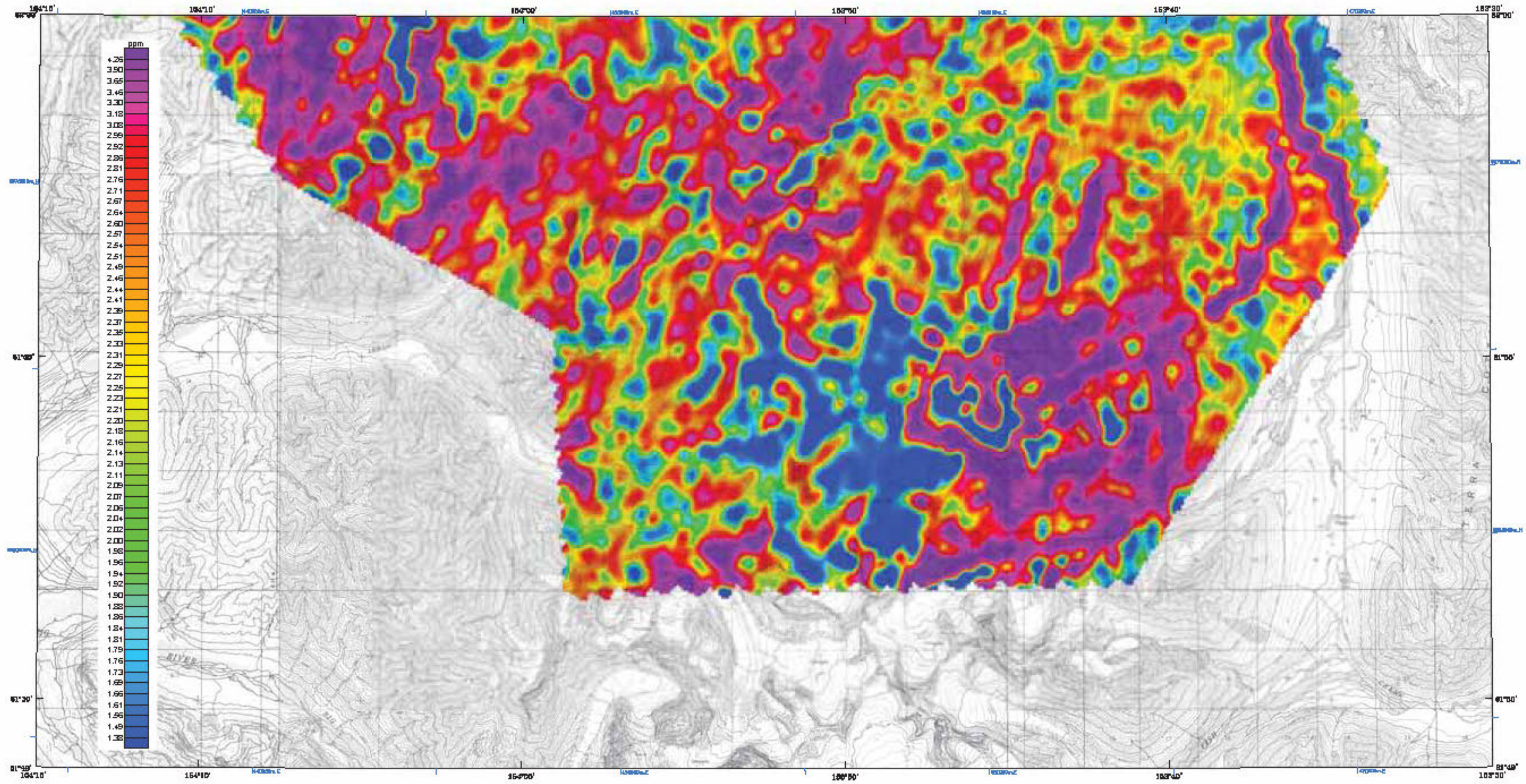



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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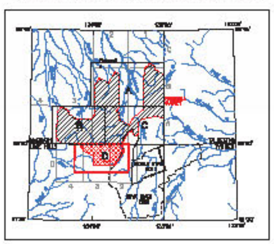
LOCATION INDEX FOR 1:63,360-SCALE MAPS



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A Novatel DUALEM-C2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2815 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.

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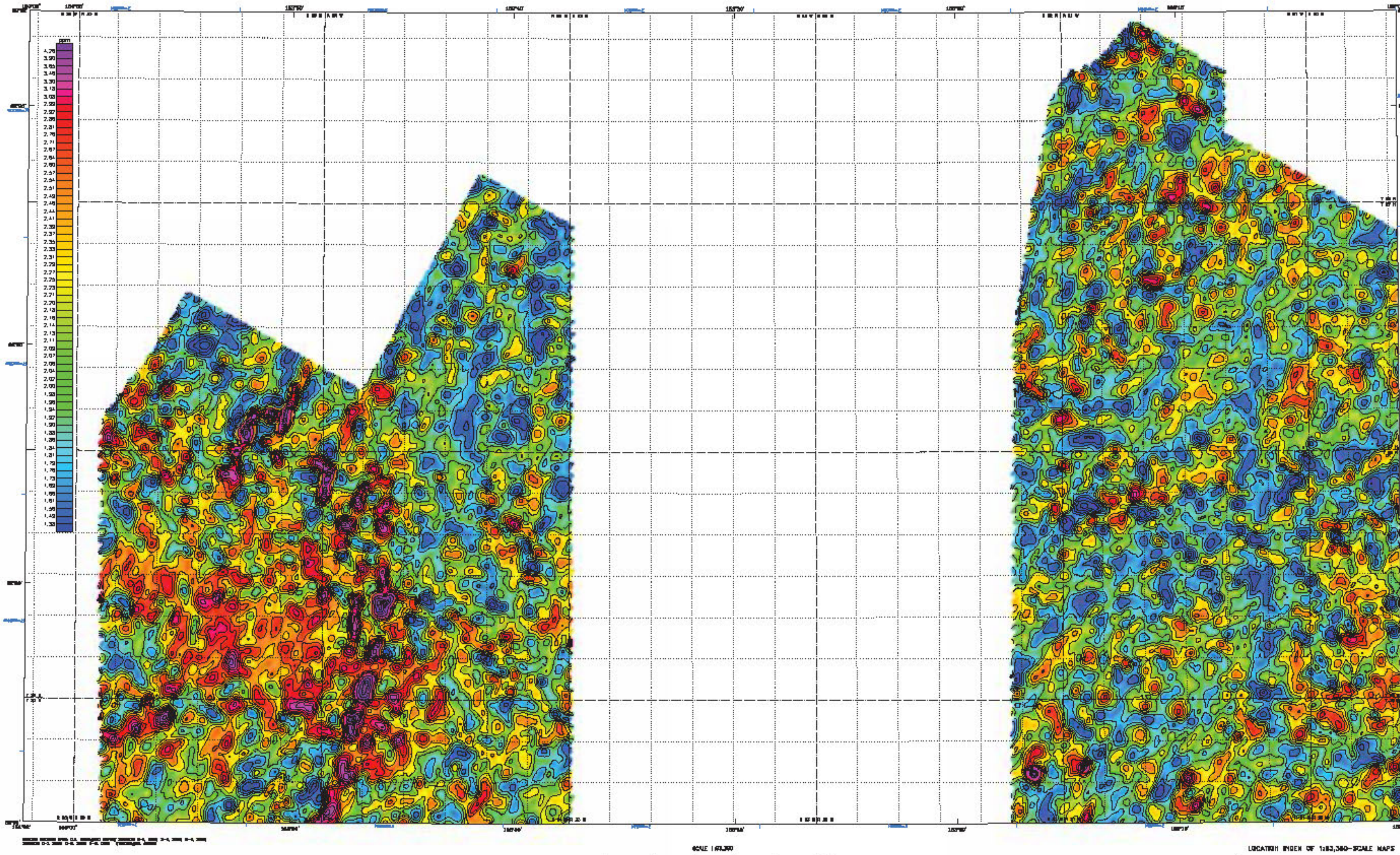



SCALE 1:63,360

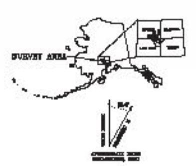
1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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




### DESCRIPTIVE NOTES

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A Novatel OEMV-3 Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

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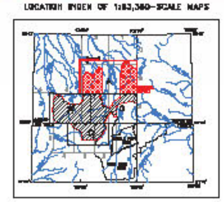
LOCATION INDEX OF 1:63,360-SCALE MAPS



CONTOUR INTERVAL

| | |
|---|---|
| ———— | 5.00 ppm |
| ———— | 1.00 ppm |
| ———— | 0.20 ppm |

### SURVEY HISTORY

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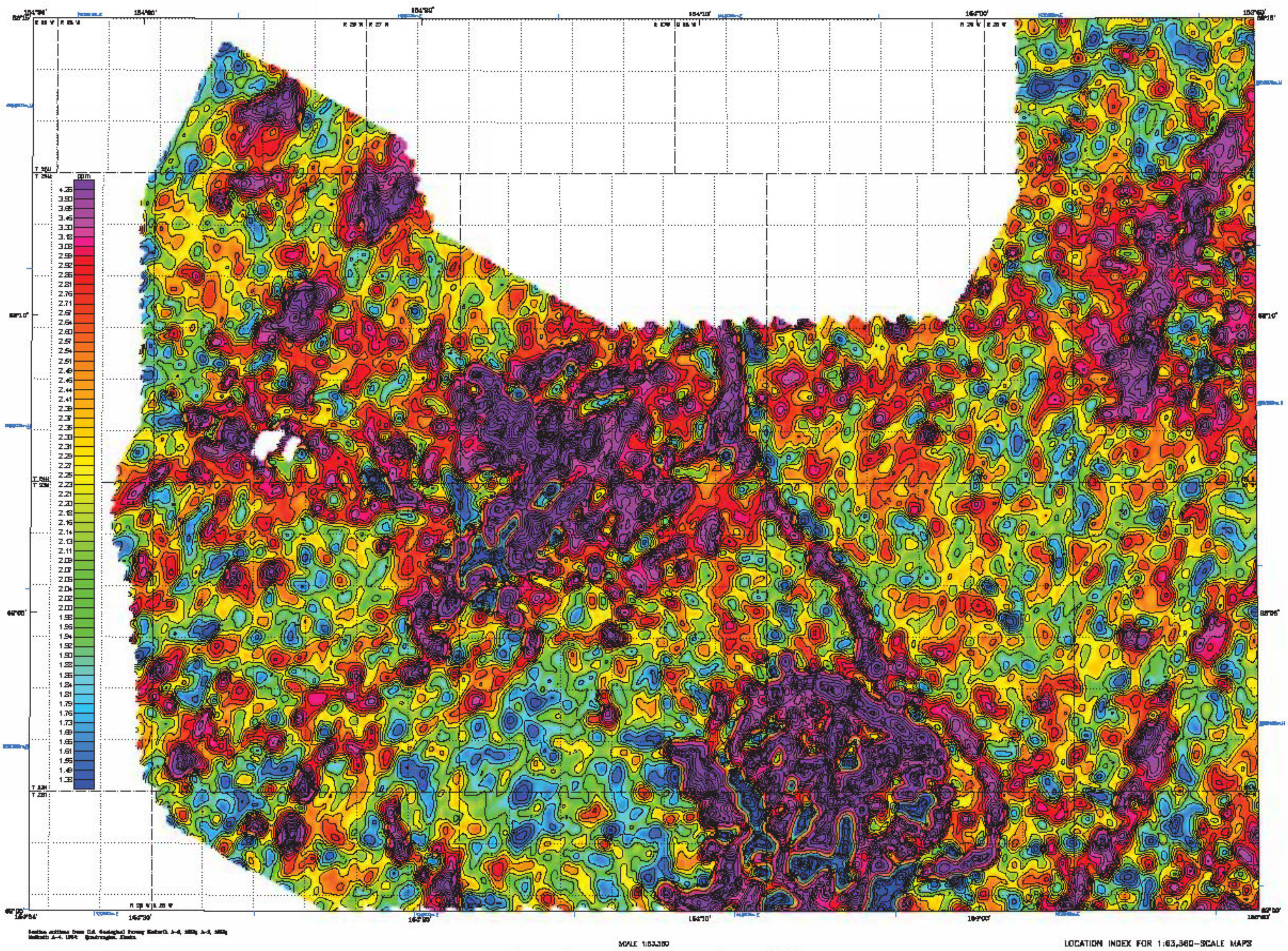
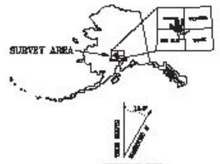



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

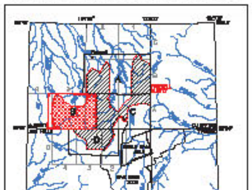



# URANIUM (eU) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2815 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.

International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

. . . . . . . . . . 5.00 ppm

. . . . . . . . . . 1.00 ppm

. . . . . . . . . . 0.20 ppm

### SURVEY HISTORY

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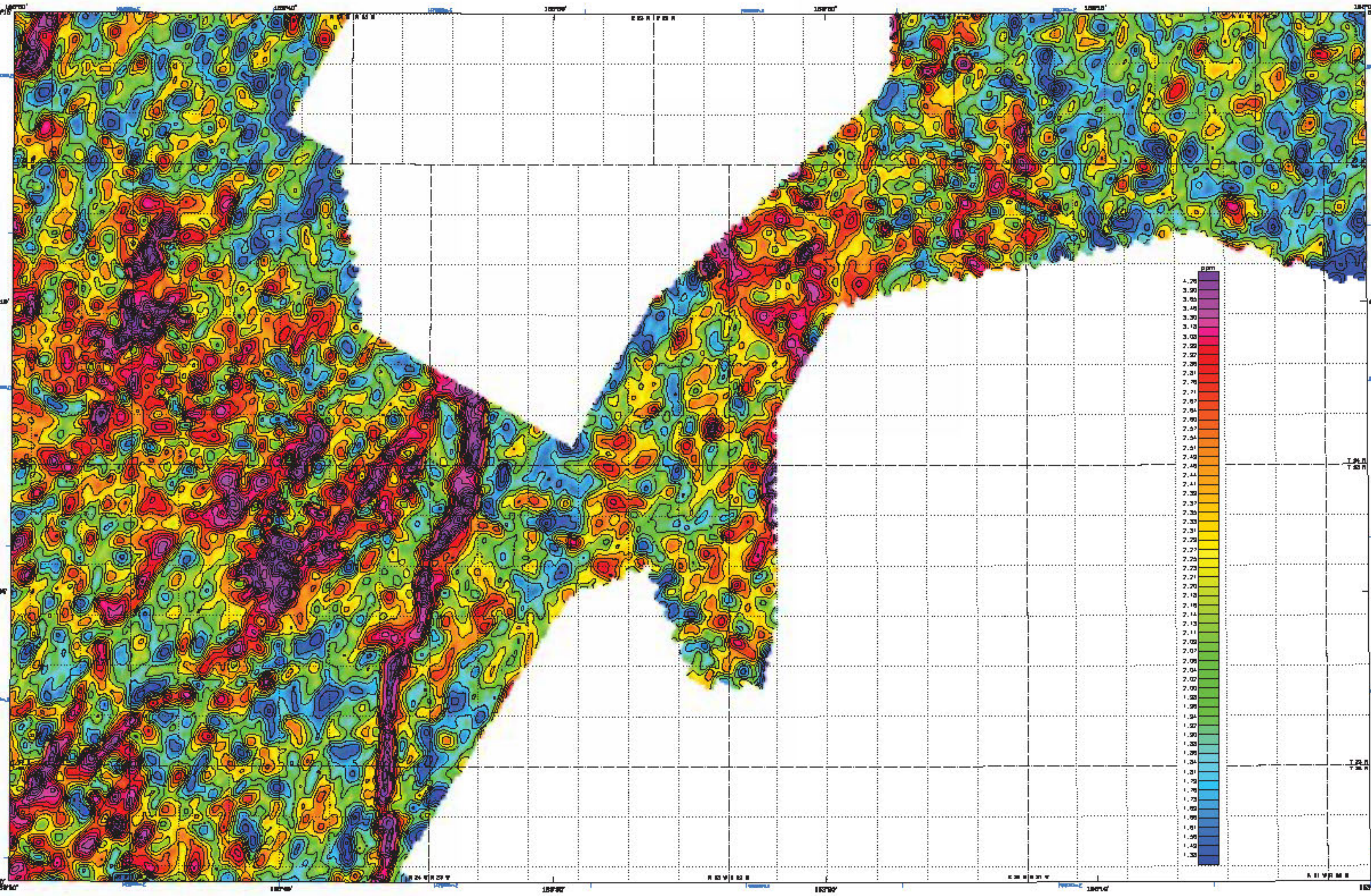


SCALE 1:63,360

1 0 1 2 3 4 MILES

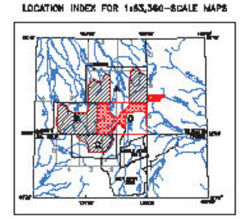
1 0 1 2 3 4 5 KILOMETERS


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

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CONTOUR INTERVAL

0.04 ppm

1.00 ppm

0.24 ppm

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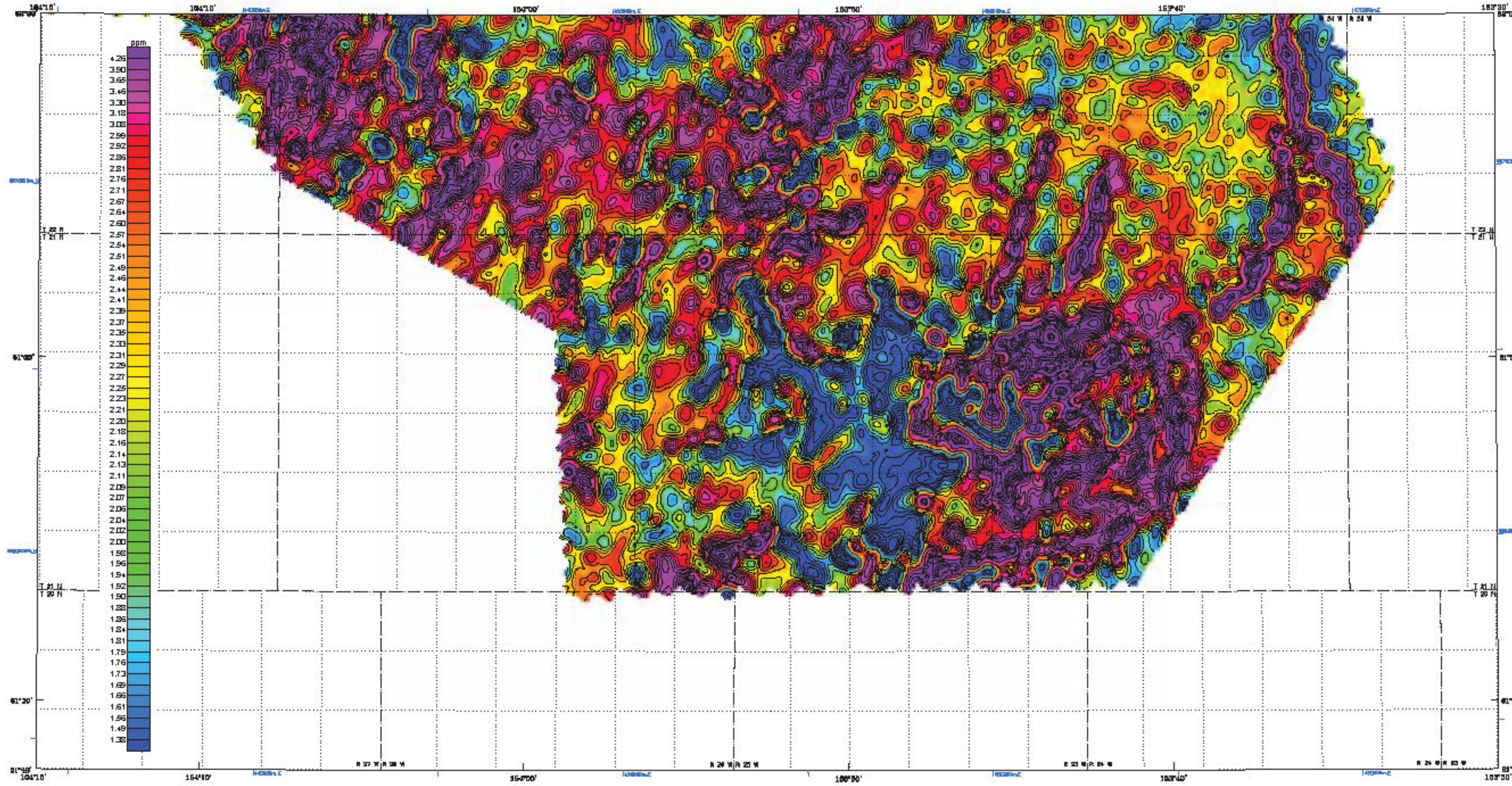
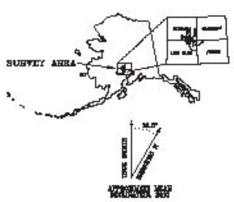


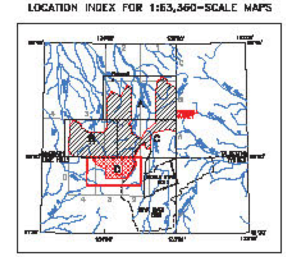

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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CONTOUR INTERVAL

5.00 ppm

1.00 ppm

0.20 ppm

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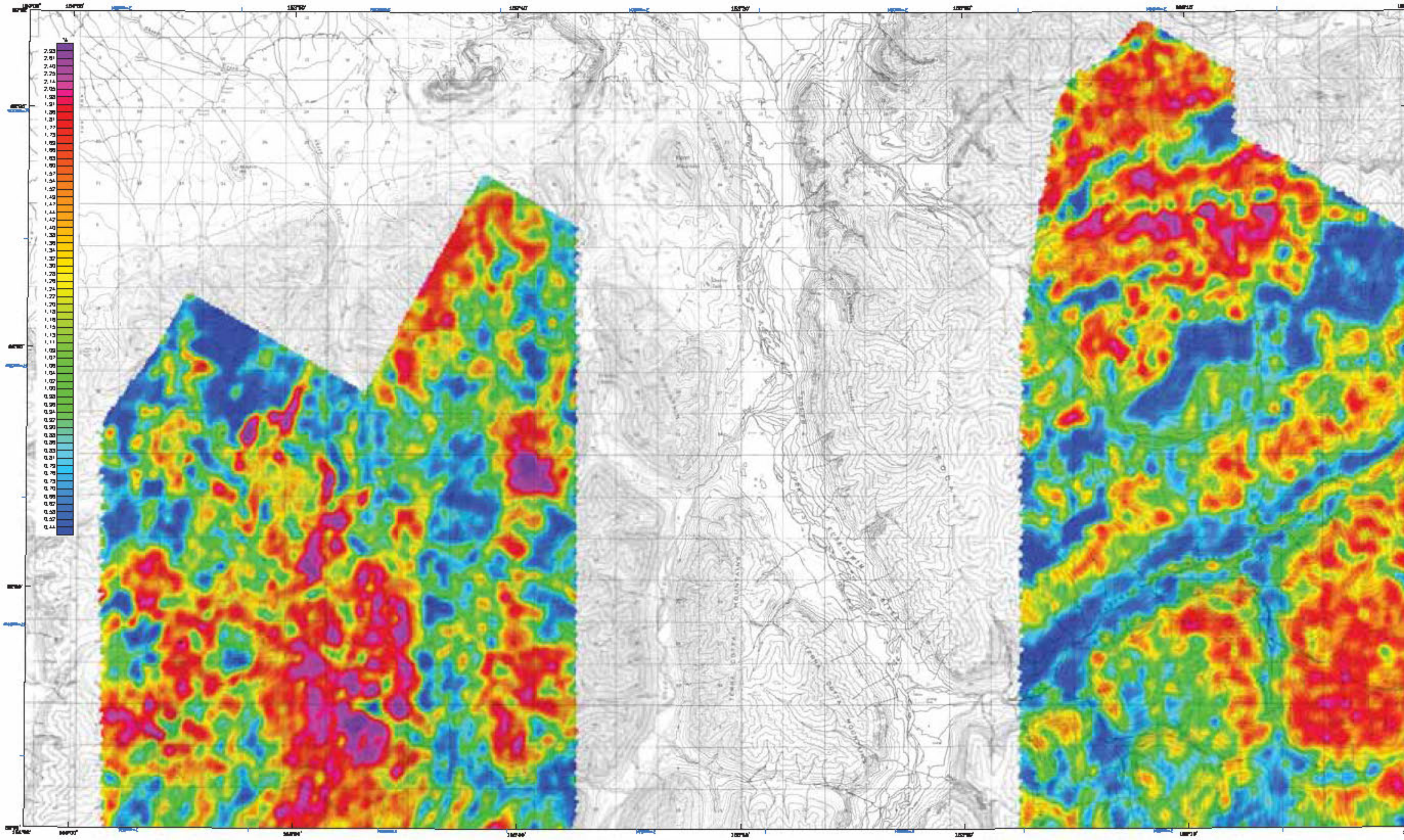
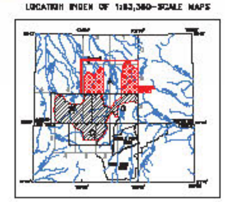



SCALE 1:63,360

LOCATION INDEX OF 1:63,360-SCALE MAPS



# POTASSIUM (% K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

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by
Laurel E. Burns, DGG, and Fugro GeoServices, Inc.
2014

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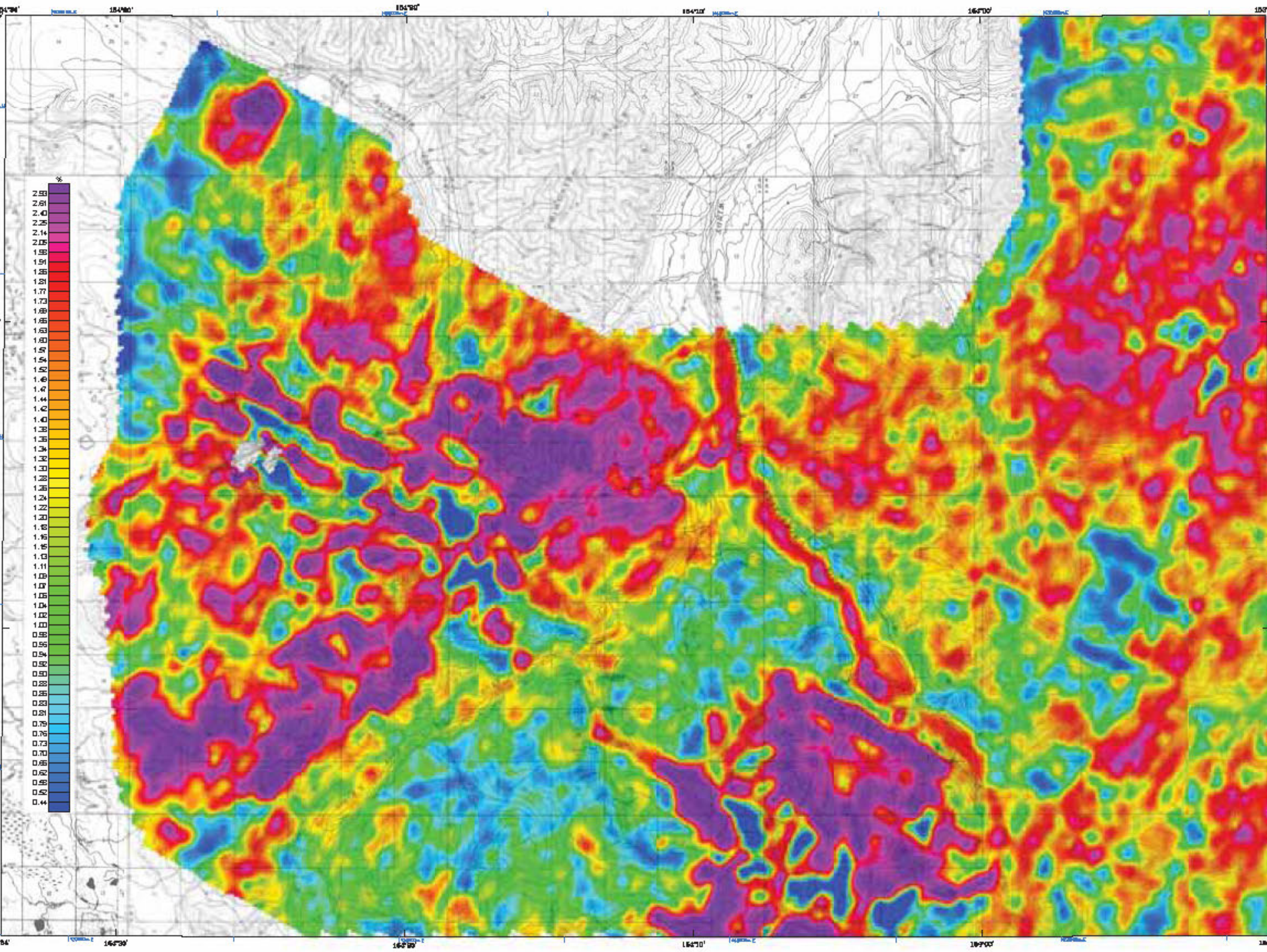
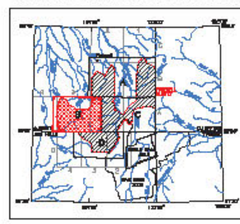



SCALE 1:63,360

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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by
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2014

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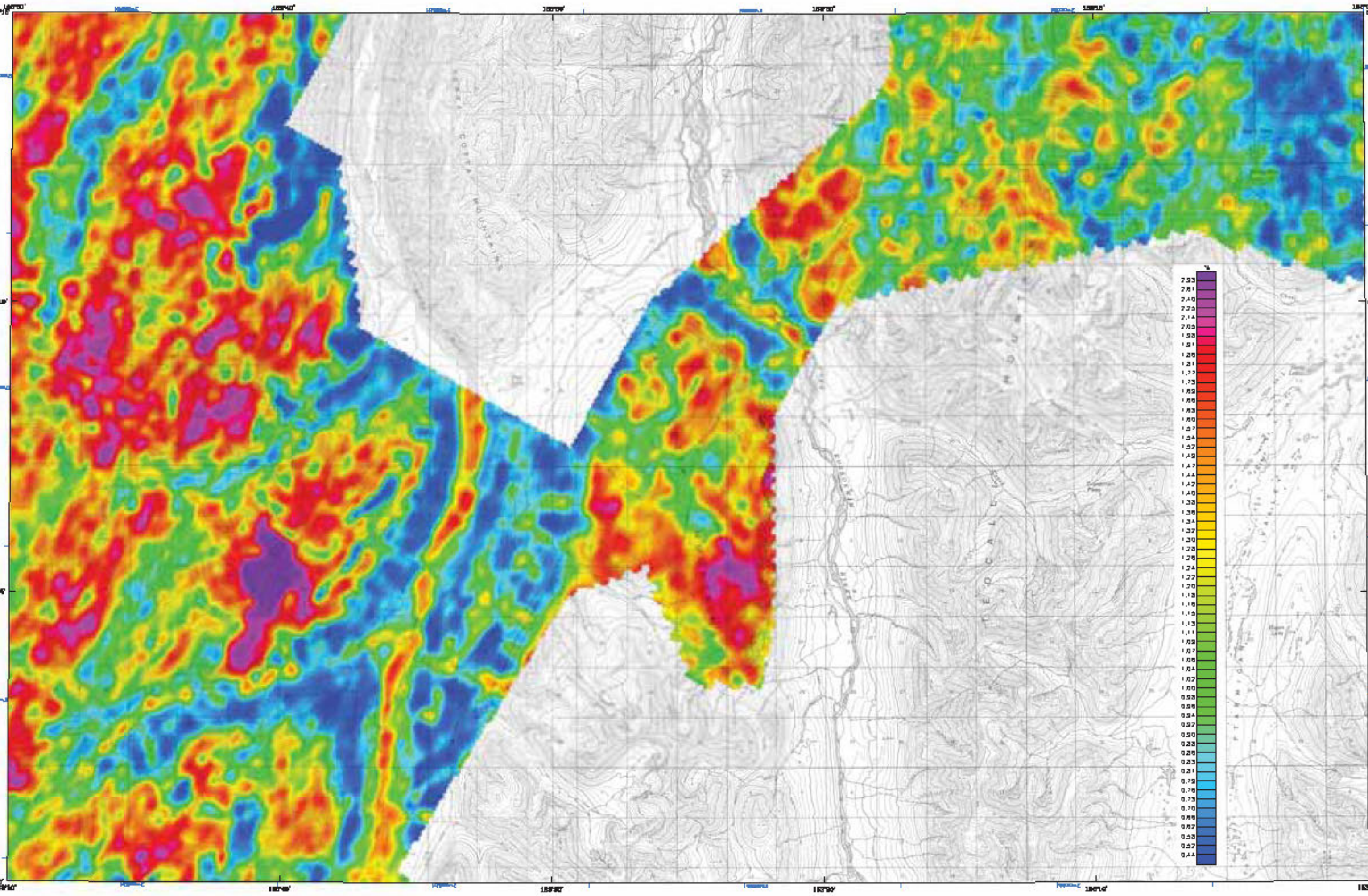
GEOPHYSICAL REPORT 2014-2-20C



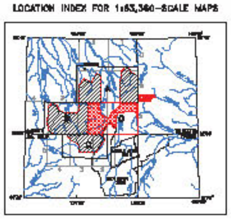
SCALE 1:63,360


# POTASSIUM (% K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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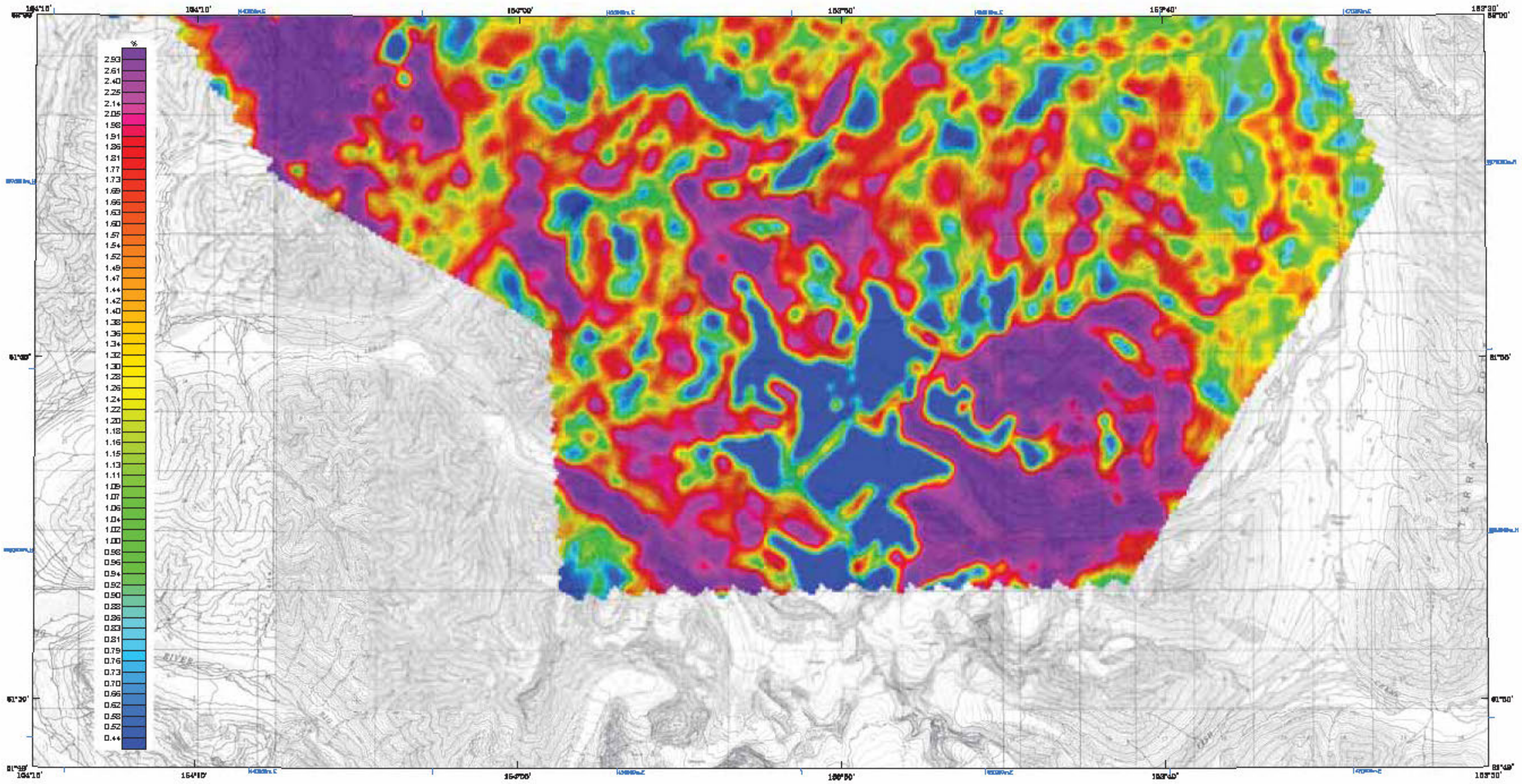


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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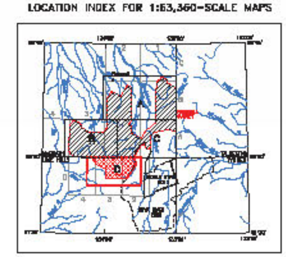
by
Laurel E. Burns, CGG, and Fugro GeoServices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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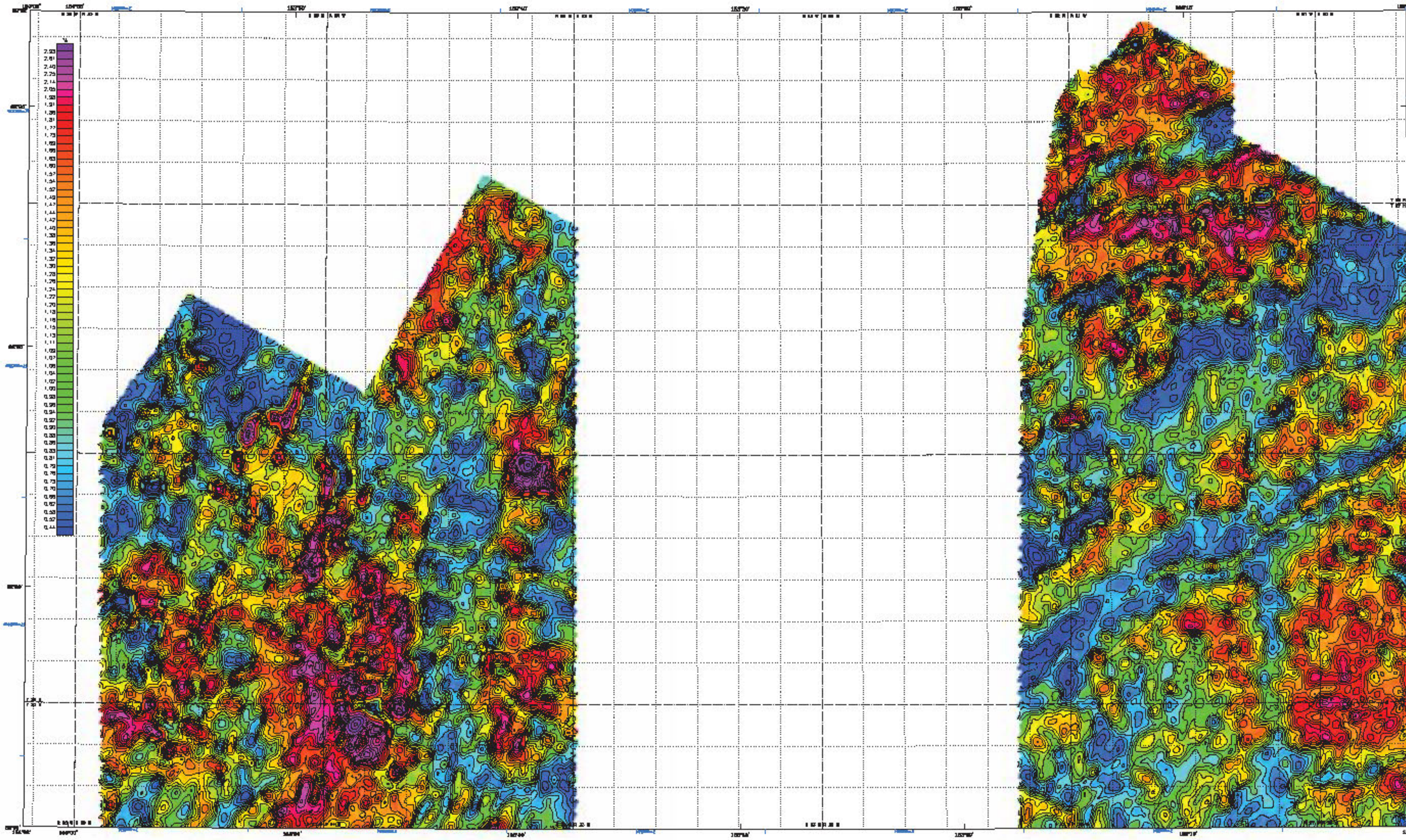
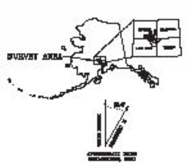
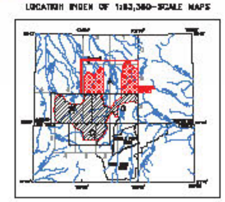





SCALE 1:63,360

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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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CONTOUR INTERVAL

0.20 %

0.30 %

0.10 %

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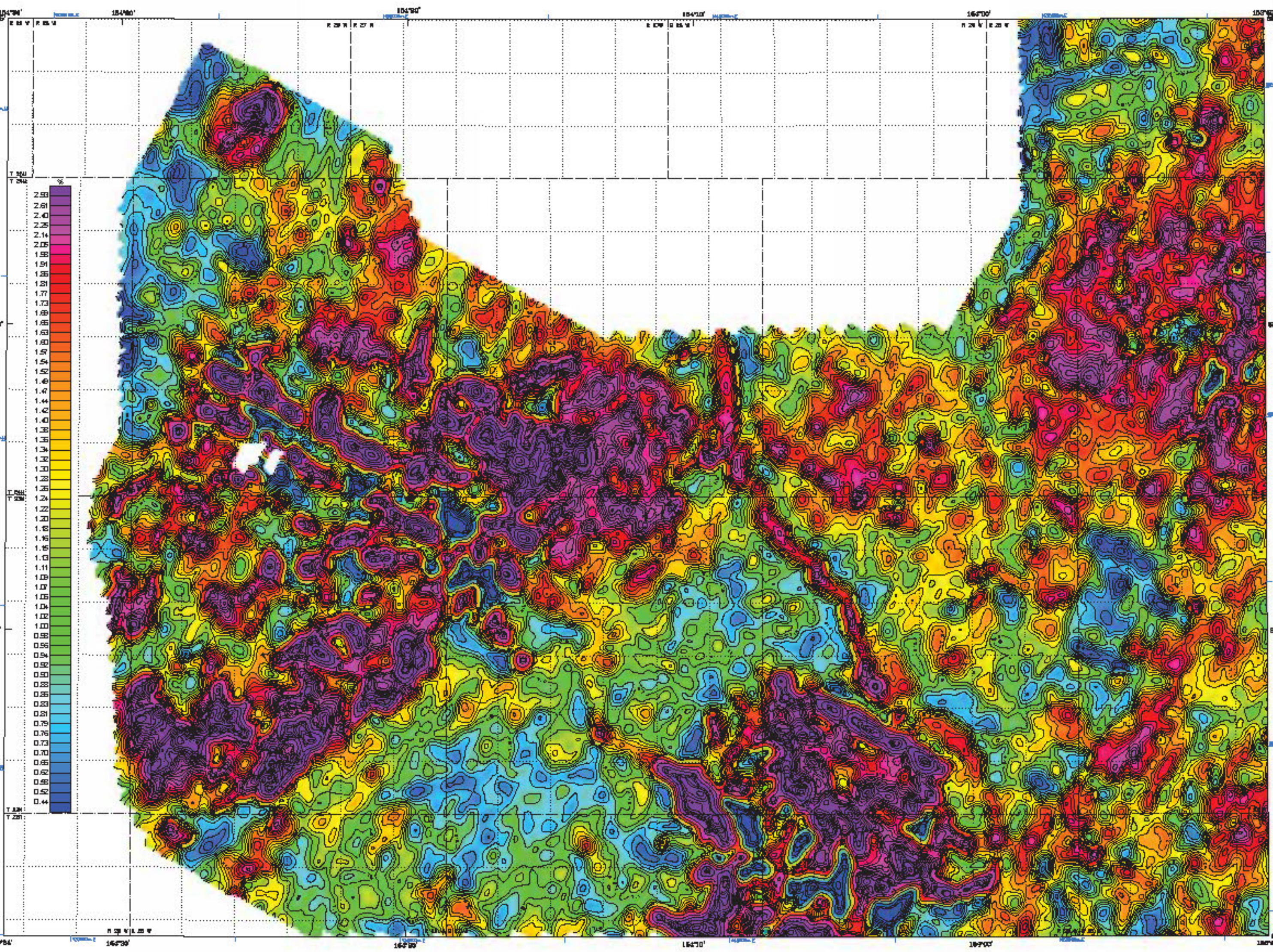
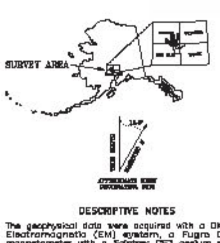
**ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS** **GEOPHYSICAL REPORT 2014-2-21B**



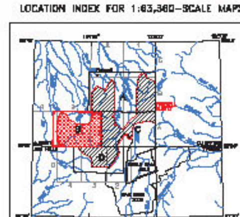

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360–SCALE MAPS



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CONTOUR INTERVAL

2.50 %

0.50 %

0.10 %

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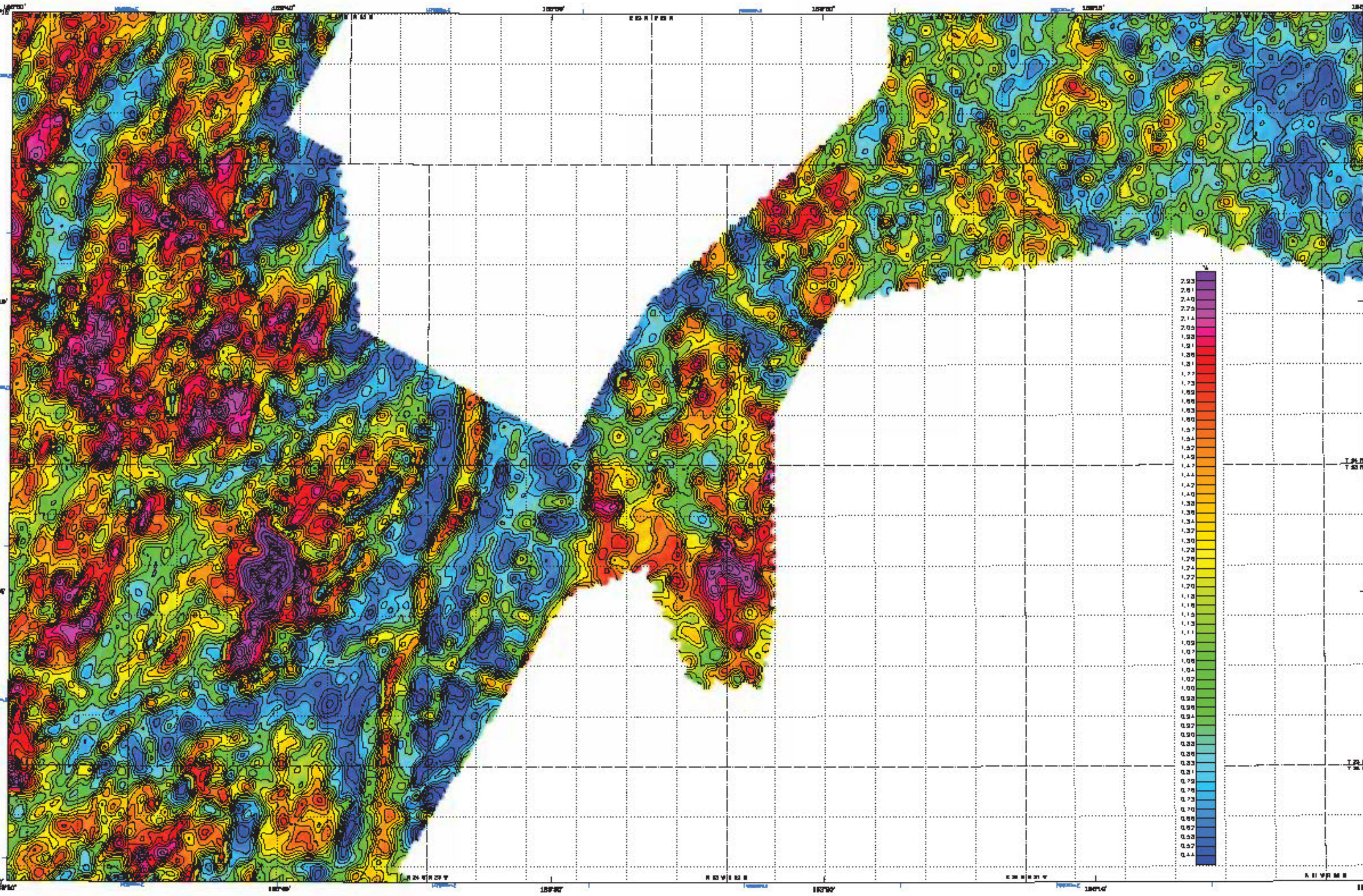

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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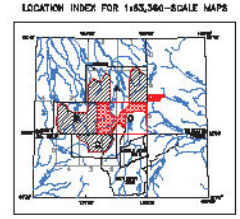

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### CONTOUR INTERVAL

| | |
|---|---|
| ———— | 2.24 % |
| ———— | 0.30 % |
| ———— | 0.14 % |

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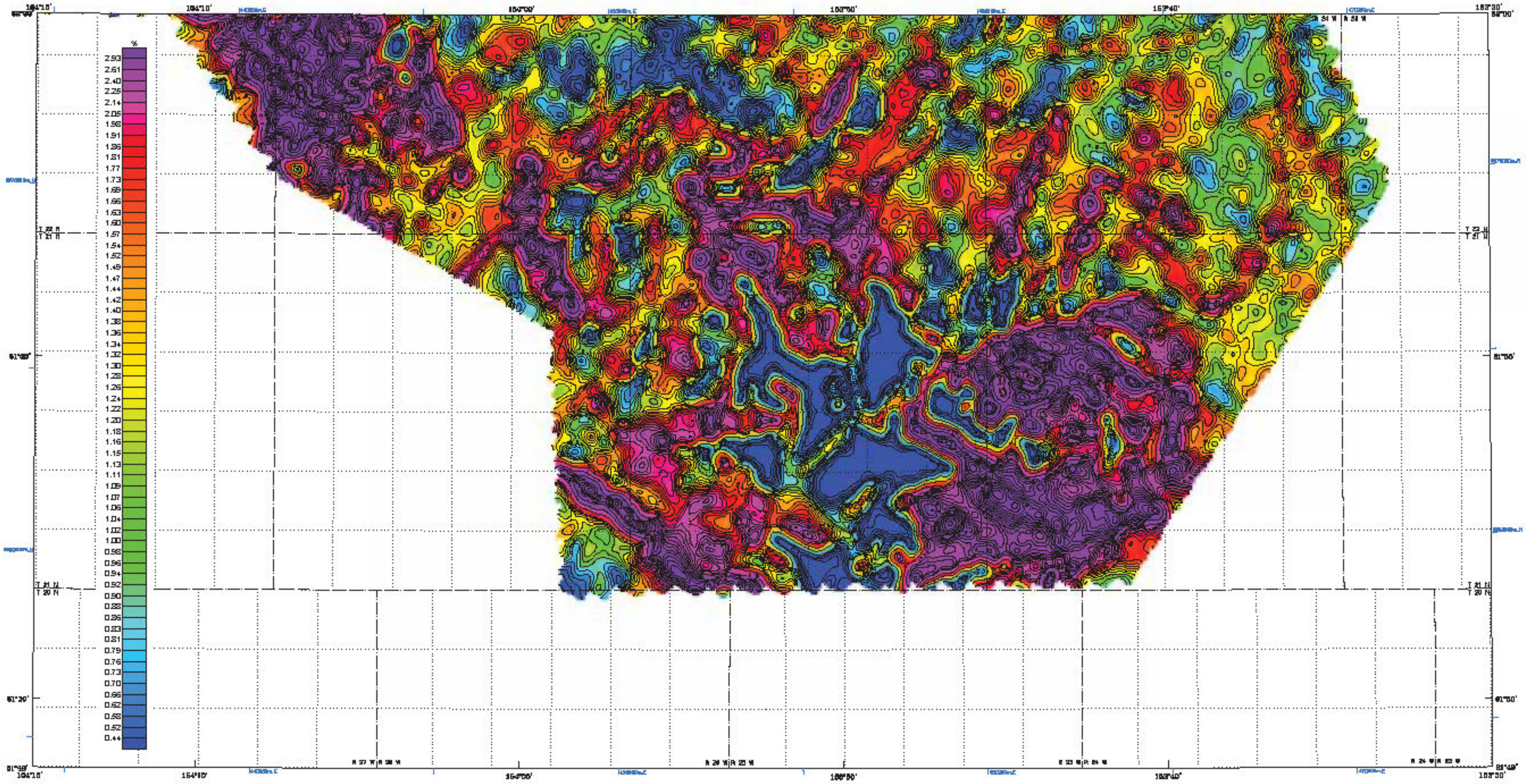


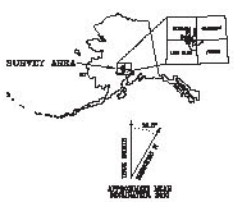


SCALE 1:63,360

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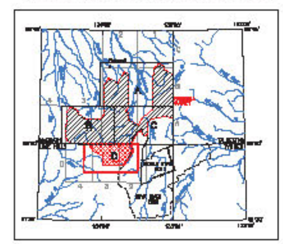

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International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

. . . . . . . . . . 2.00 %

. . . . . . . . . . 0.50 %

. . . . . . . . . . 0.10 %

### SURVEY HISTORY

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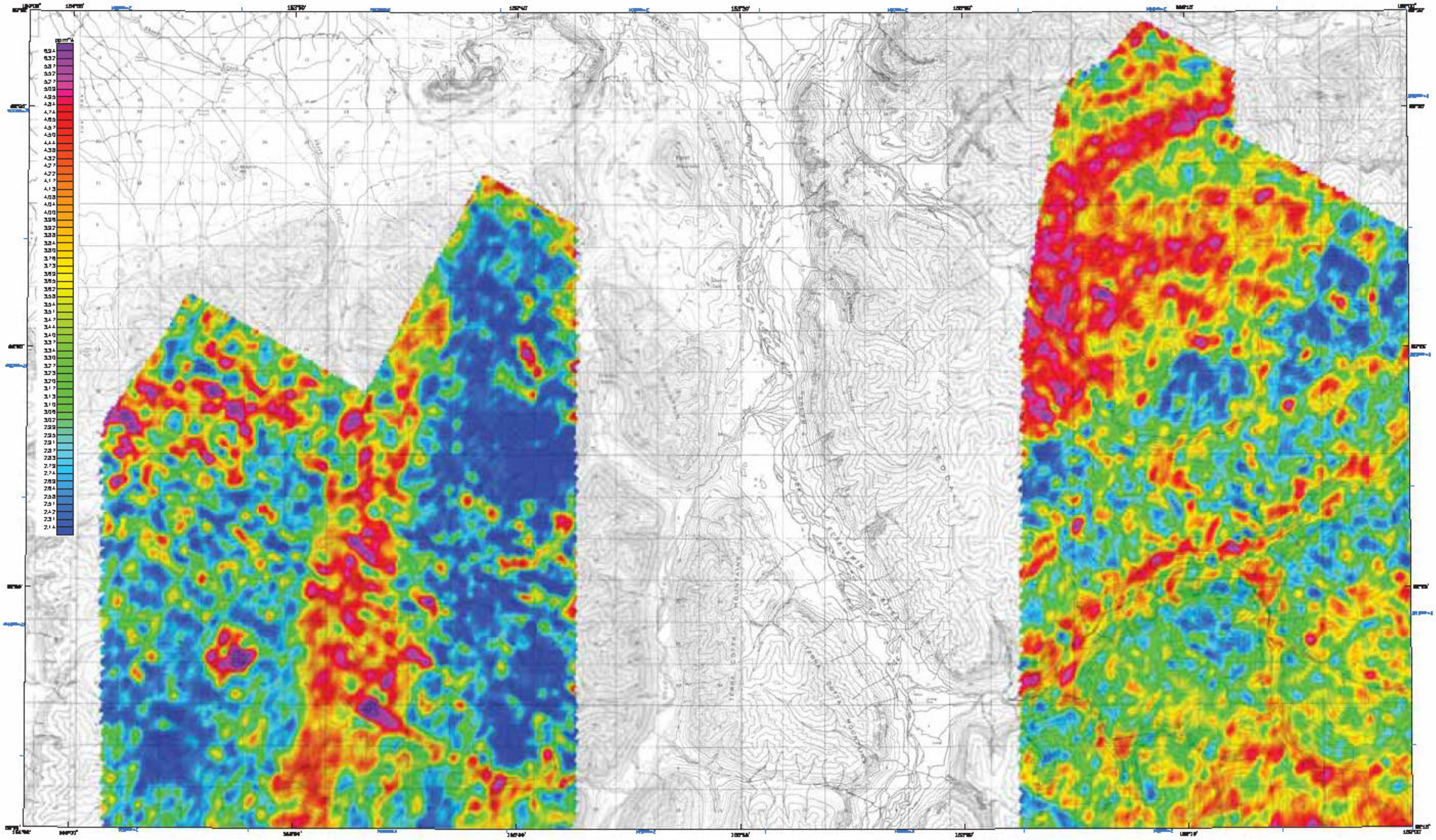


# THORIUM / POTASSIUM (eTh / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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


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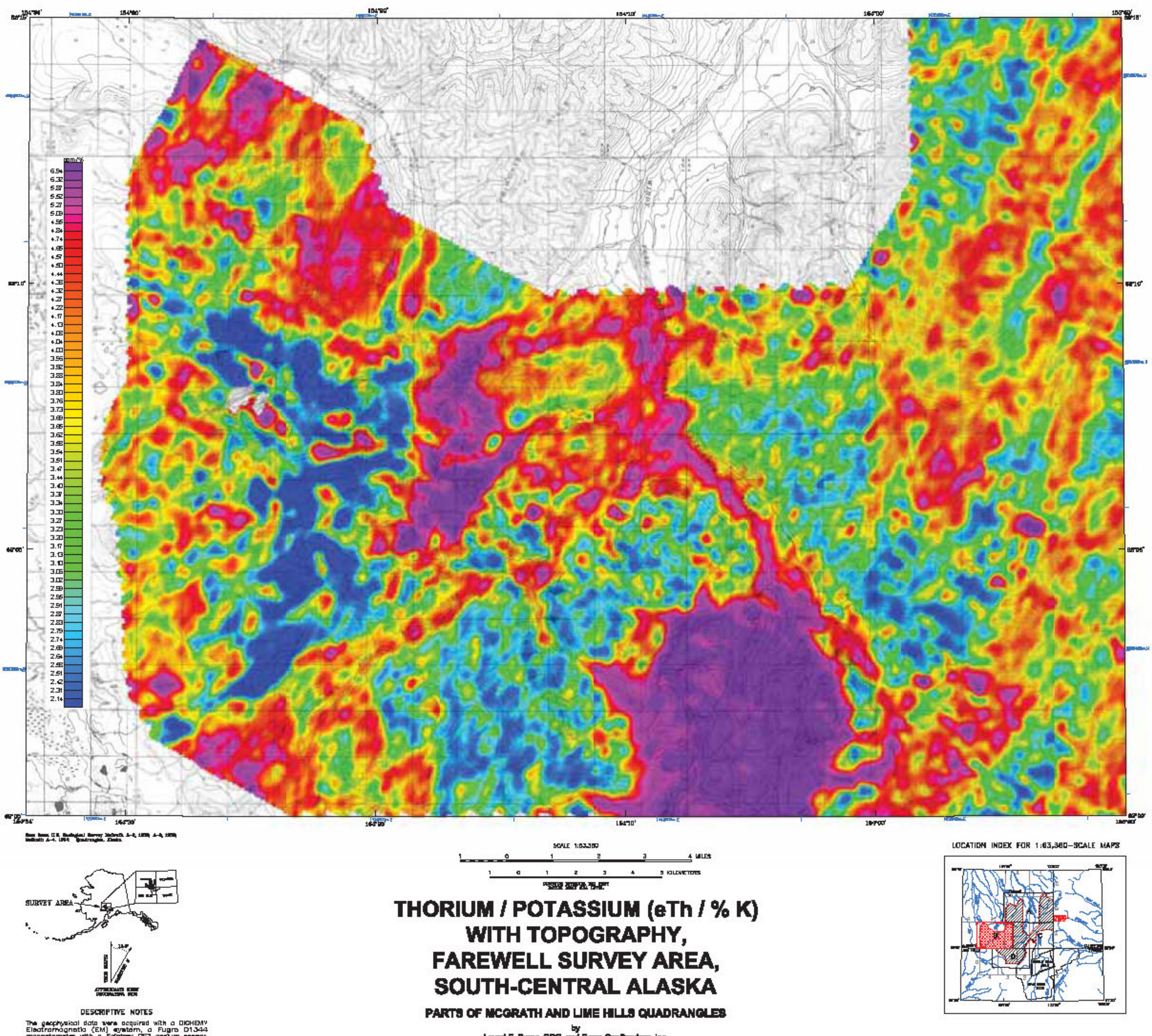
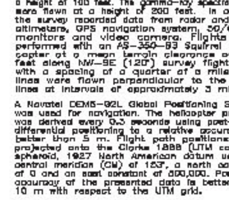


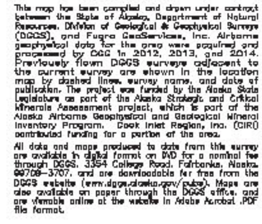

SCALE 1:63,360

# THORIUM / POTASSIUM (eTh / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
Laurel E. Burns, DGG, and Fugro GeoServices, Inc.
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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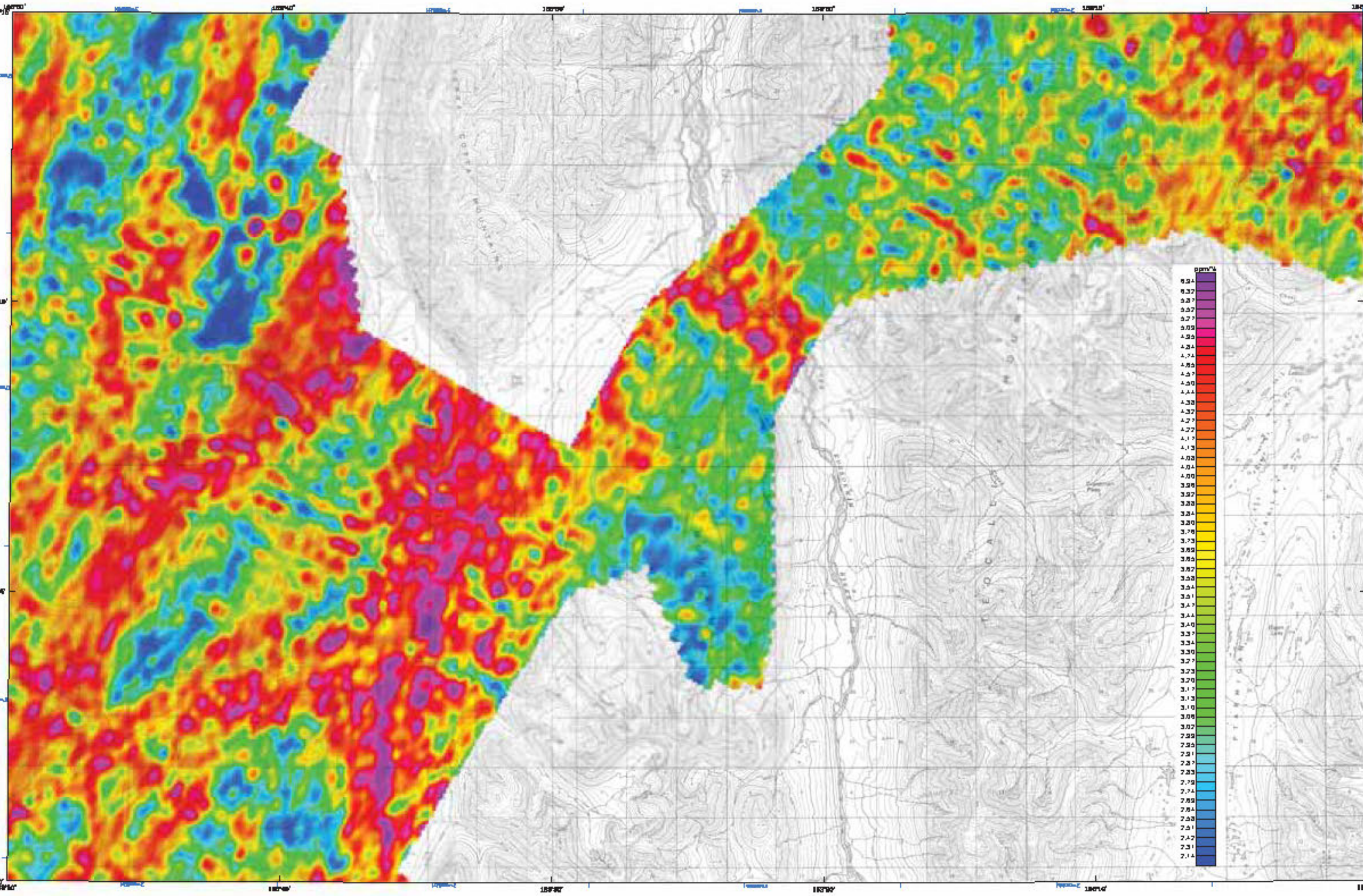



SCALE 1:63,360

MILES

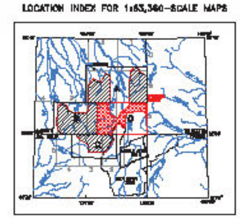
KILOMETERS

# THORIUM / POTASSIUM (eTh / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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


LOCATION INDEX FOR 1:63,360-SCALE MAPS



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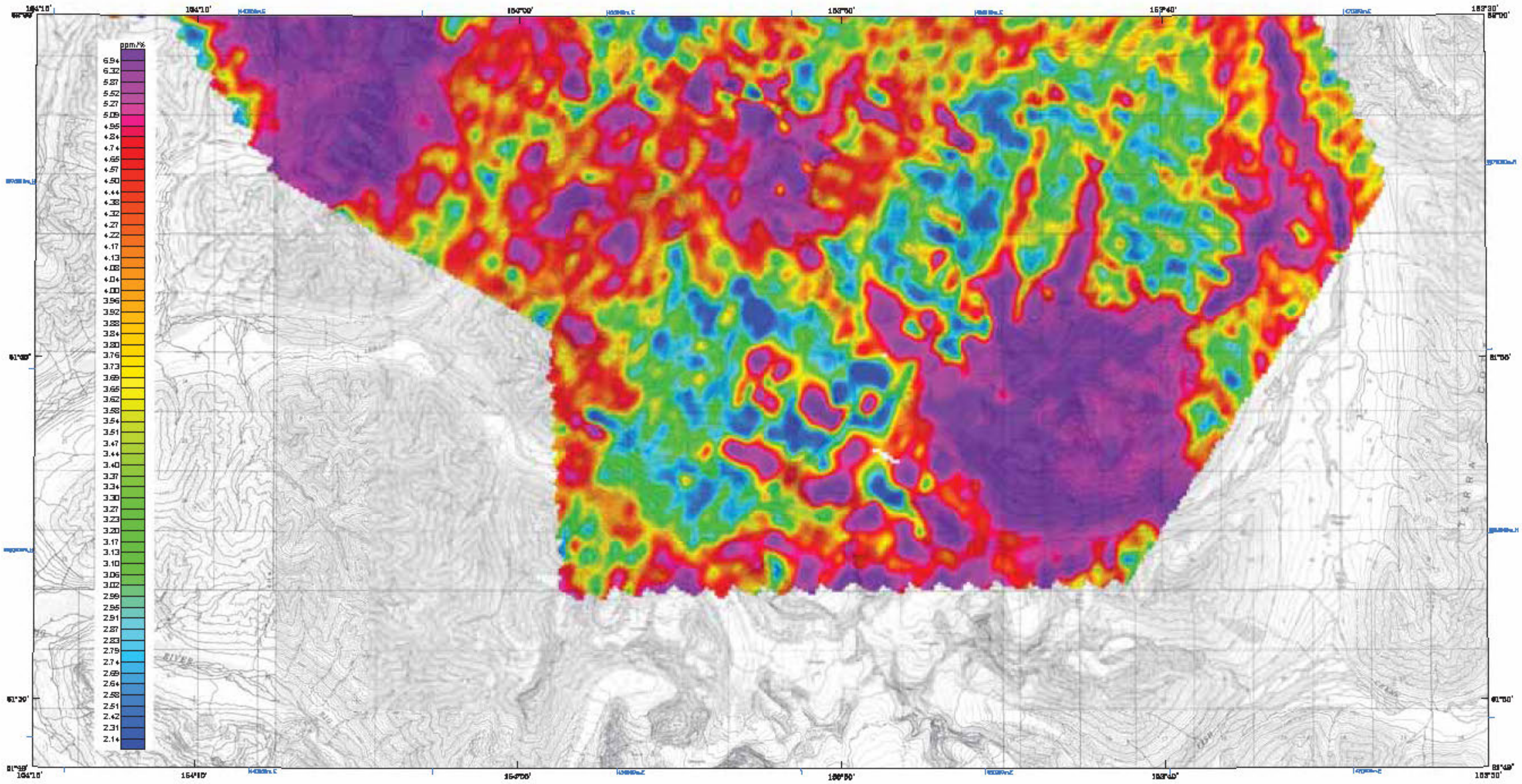
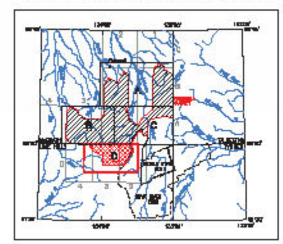


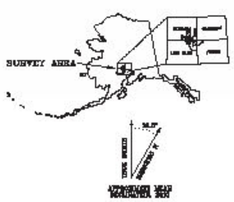

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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by
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2014

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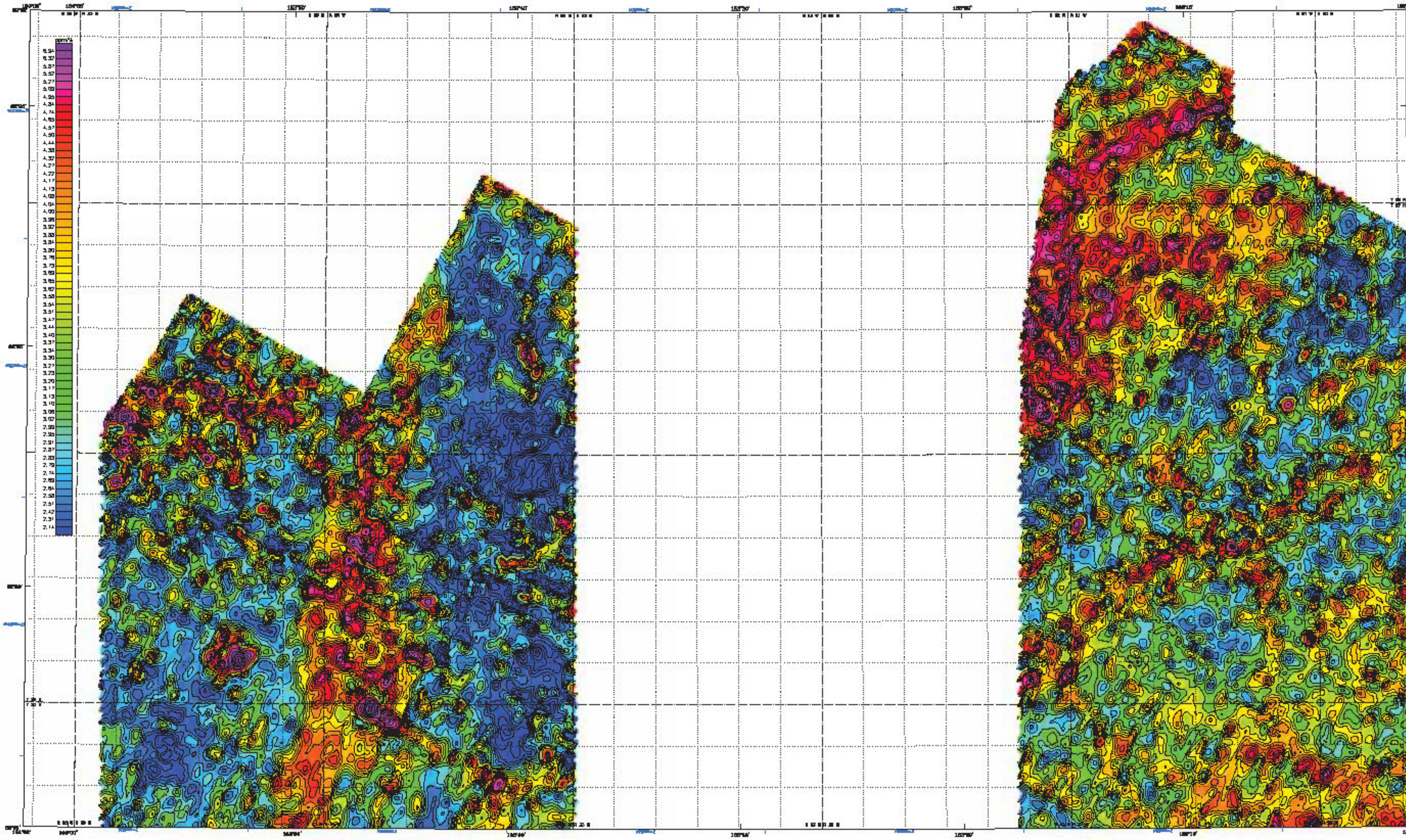
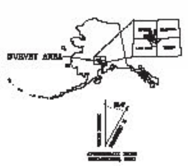
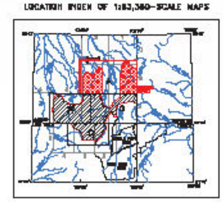





LOCATION INDEX OF 1:63,360-SCALE MAPS



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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by
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2014

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### CONTOUR INTERVAL

- ............ 0.5 ppm/%
- ............ 1.0 ppm/%
- ............ 0.2 ppm/%

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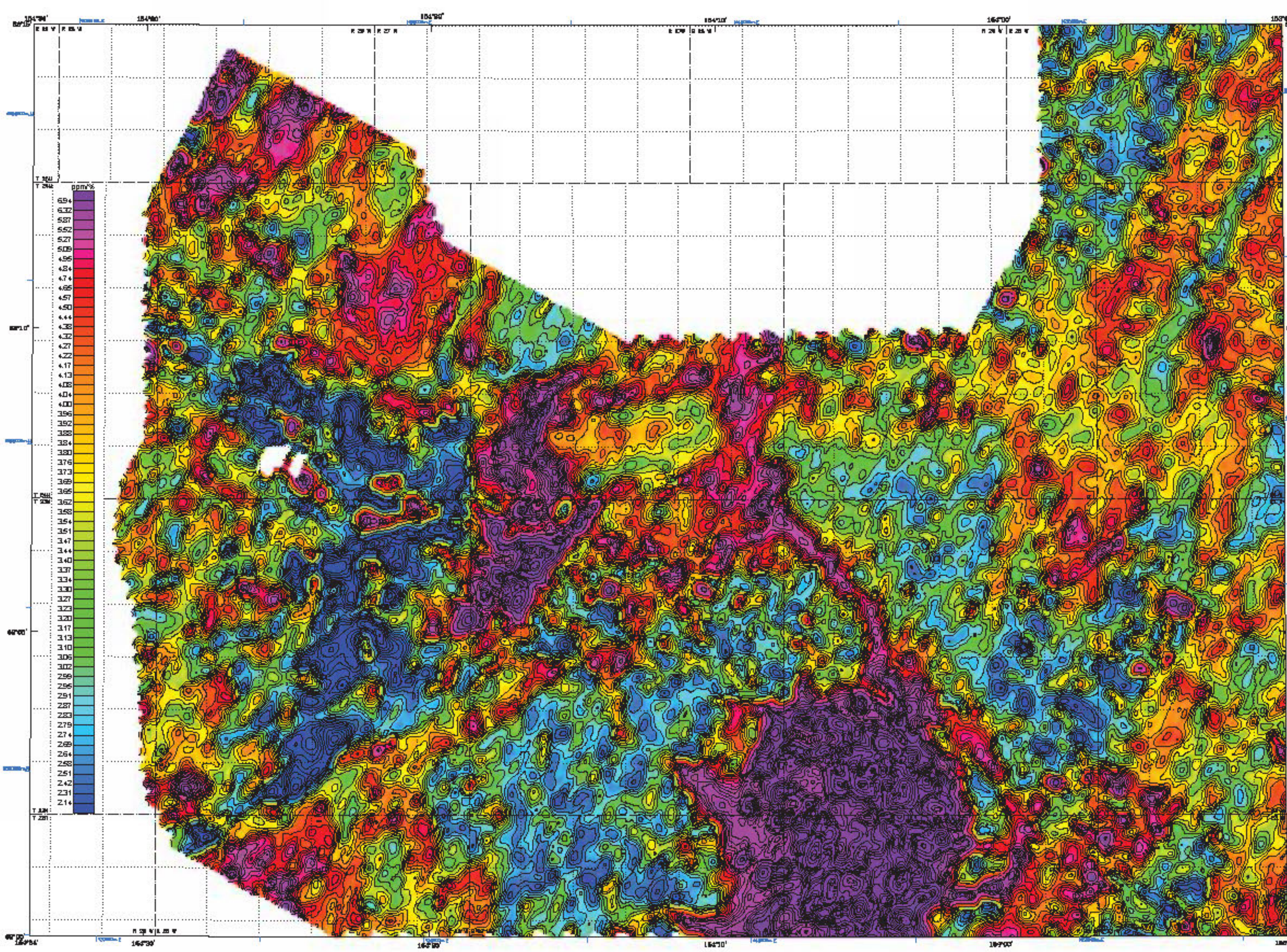
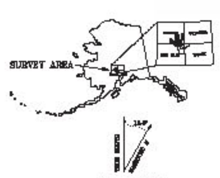
**ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS** **GEOPHYSICAL REPORT 2014-2-15B**



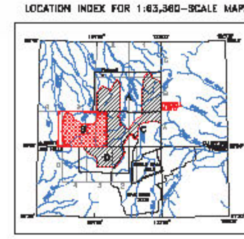

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




LOCATION INDEX FOR 1:63,360-SCALE MAPS



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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2815 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.

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### THORIUM / POTASSIUM (eTh/K)

Measured radioelement concentrations for potassium and thorium will vary sympathetically with variations in soil thickness and moisture content. The ratio parameter isolates areas of enrichment of one radioelement 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

| | |
|---|---|
| ——— | 5.0 ppm/% |
| ——— | 1.0 ppm/% |
| ——— | 0.2 ppm/% |

### SURVEY HISTORY

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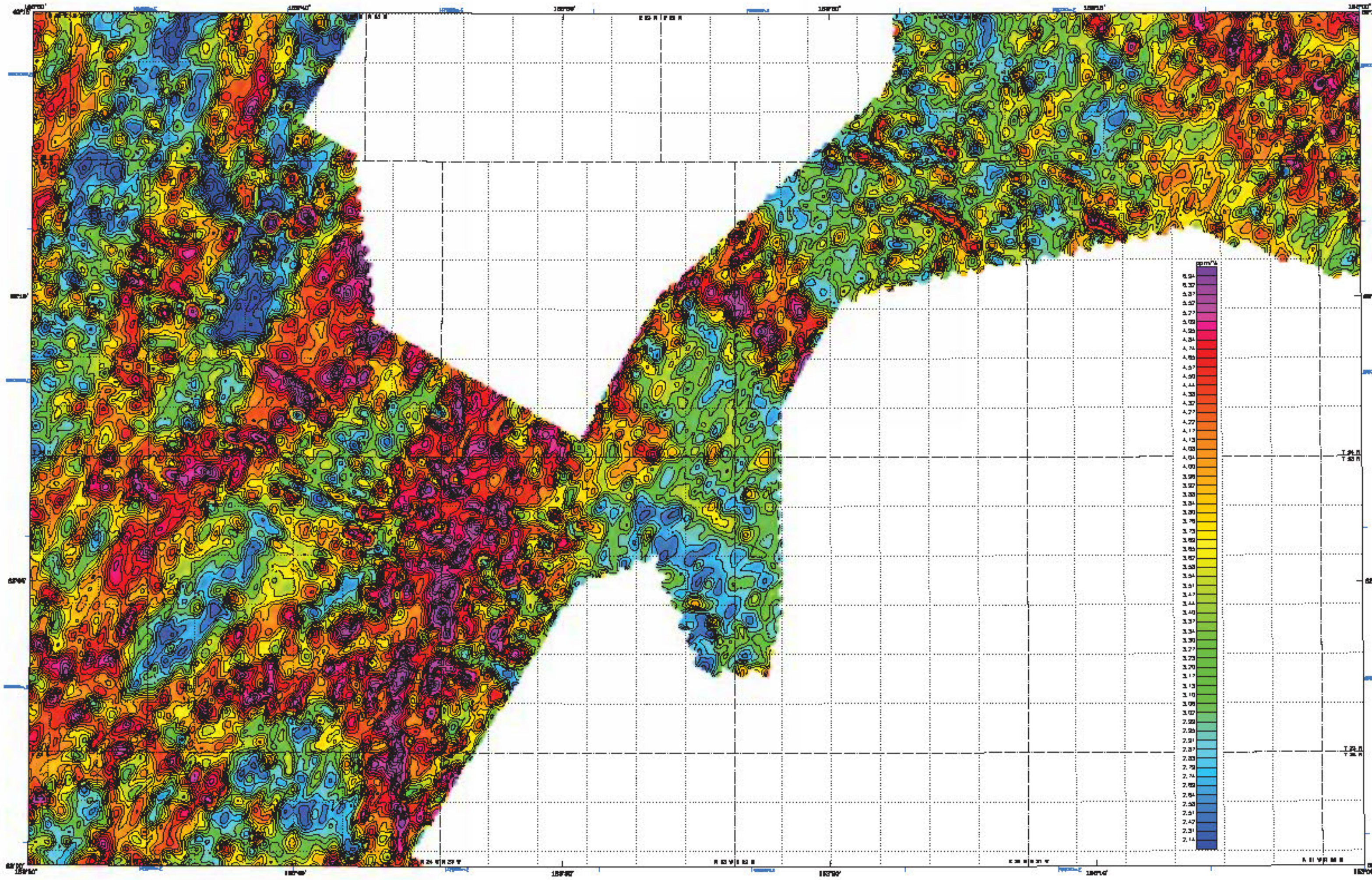

SCALE 1:63,360


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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

by
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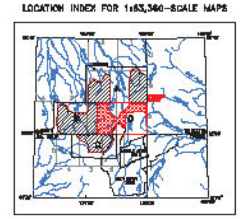
2014

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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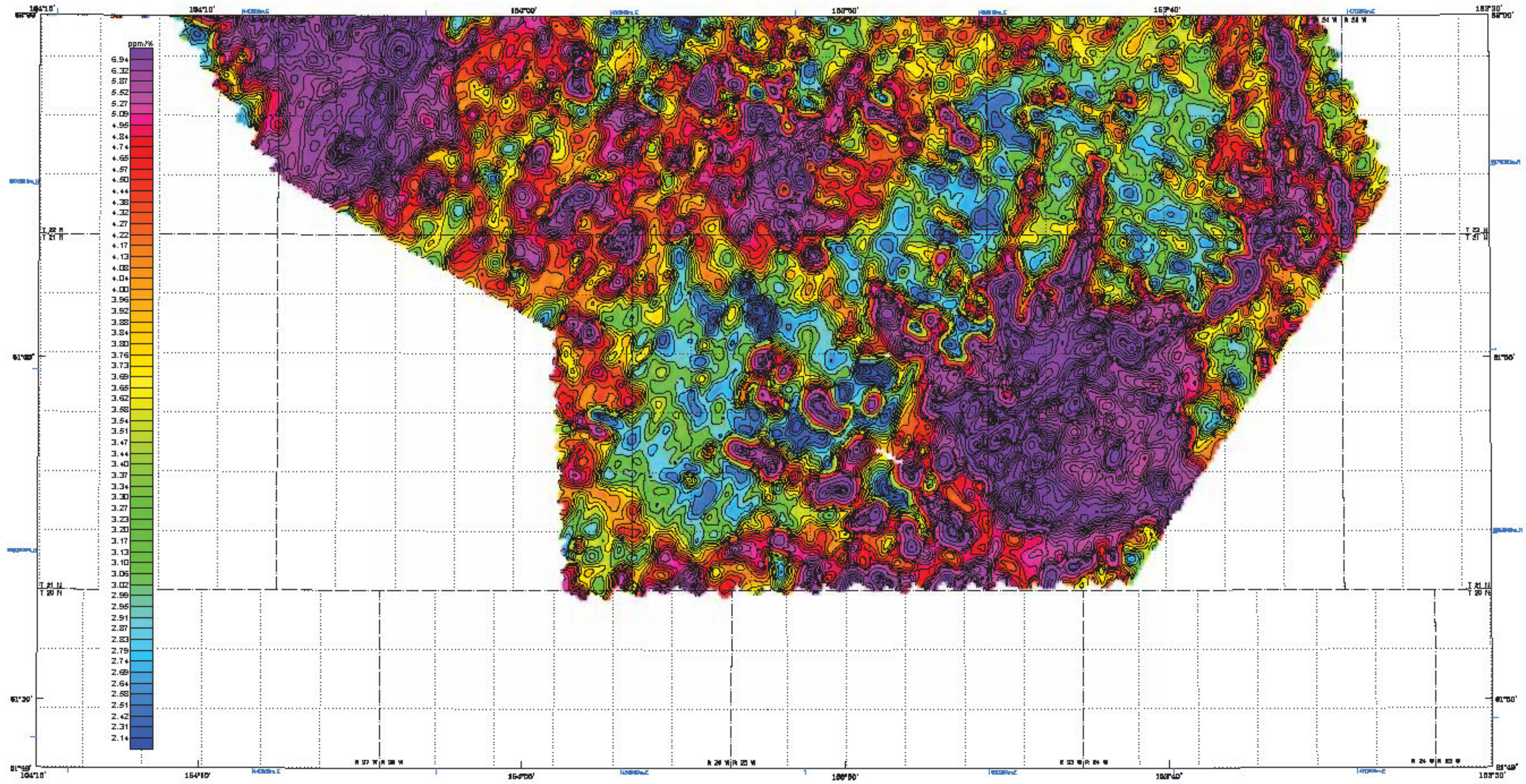
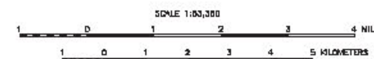


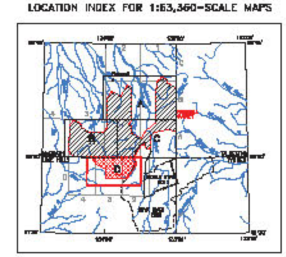


# THORIUM / POTASSIUM (eTh / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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

### CONTOUR INTERVAL

| | |
|---|---|
| ______ | . . . . . . . . . . 5.0 ppm/% |
| ______ | . . . . . . . . . . 1.0 ppm/% |
| ______ | . . . . . . . . . . 0.2 ppm/% |

### SURVEY HISTORY

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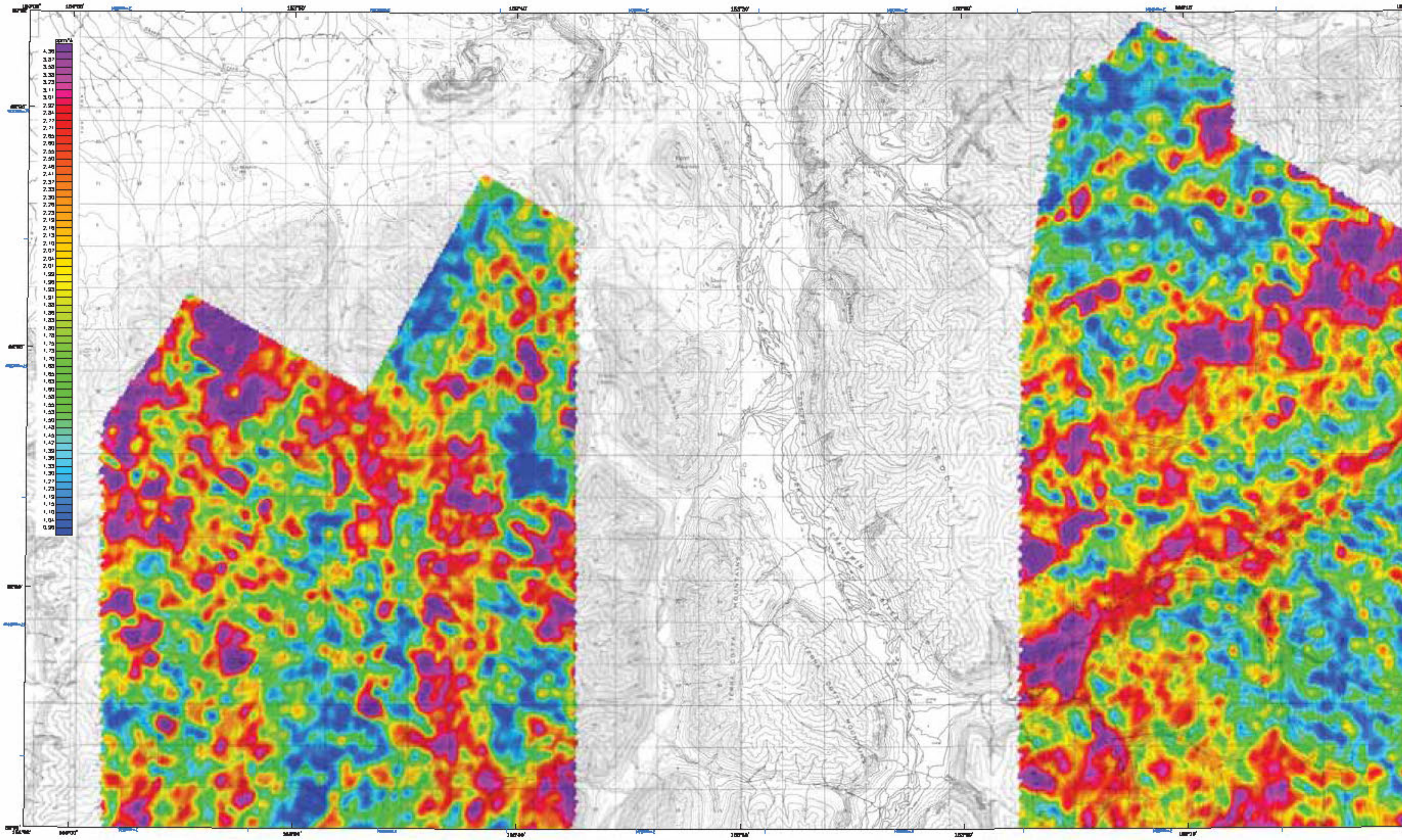
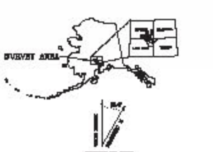


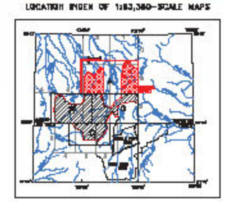



# URANIUM / POTASSIUM (eU / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX OF 1:63,360-SCALE MAPS



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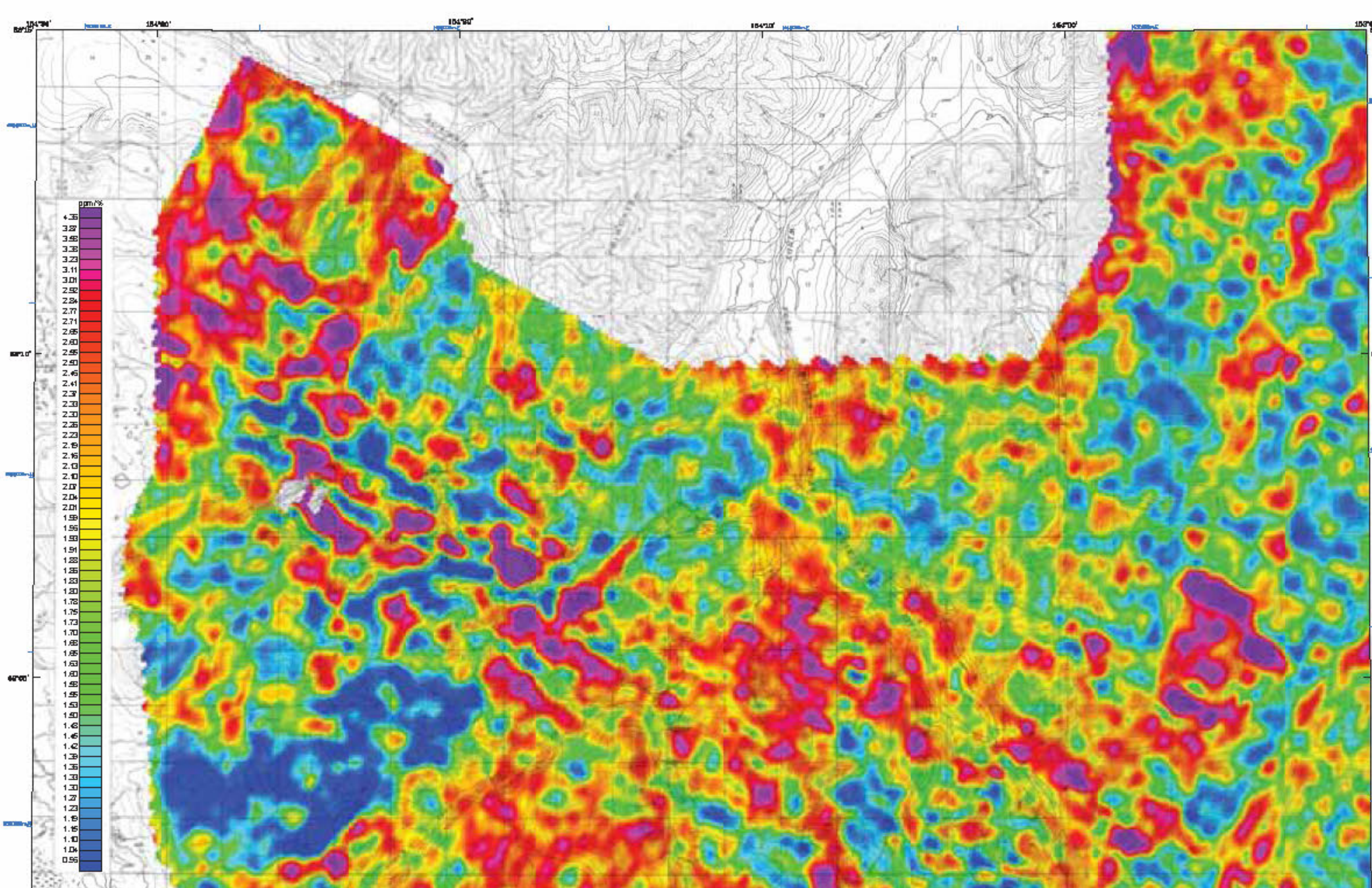
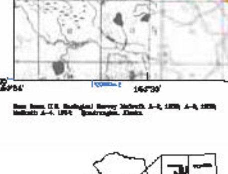
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2014-2-16B



Base from U.S. Geological Survey McGrath A-2, 1959; A-3, 1959; and Lime Hills D-4, 1954 Quadrangles, Alaska.

SCALE 1:63,360

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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES


by
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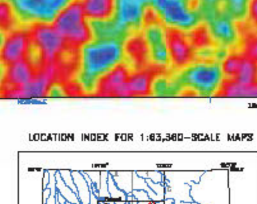
2014


LOCATION INDEX FOR 1:63,360-SCALE MAPS



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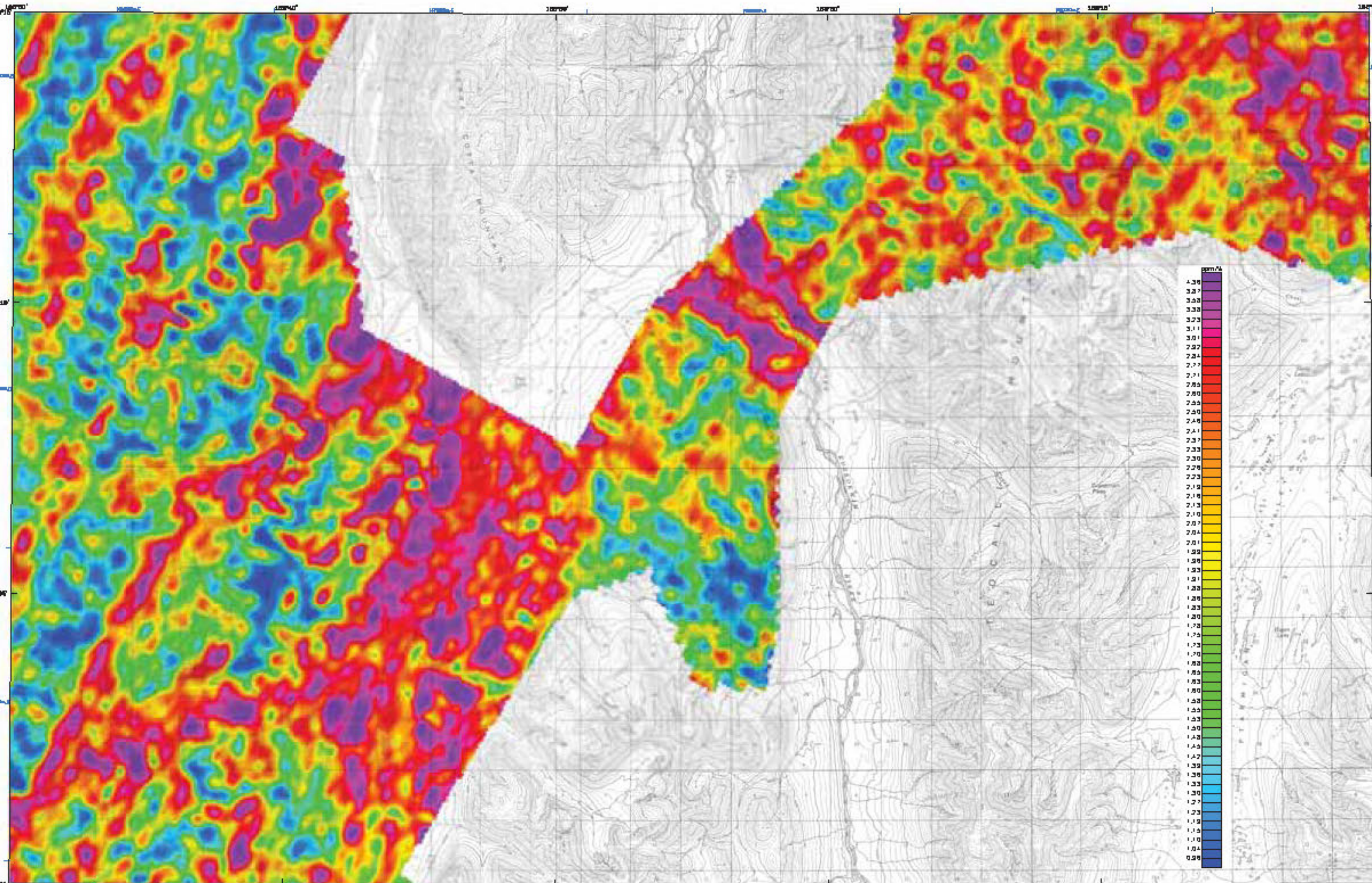

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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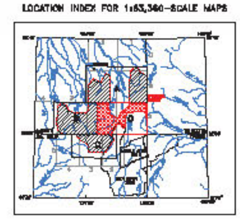

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International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

### URANIUM / POTASSIUM (eU/K)

Measured radioelement concentrations for uranium and potassium will vary sympathetically with variations in soil thickness and moisture content. The ratio parameter isolates areas of enrichment of one radioelement relative to another.
A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio.

### SURVEY HISTORY

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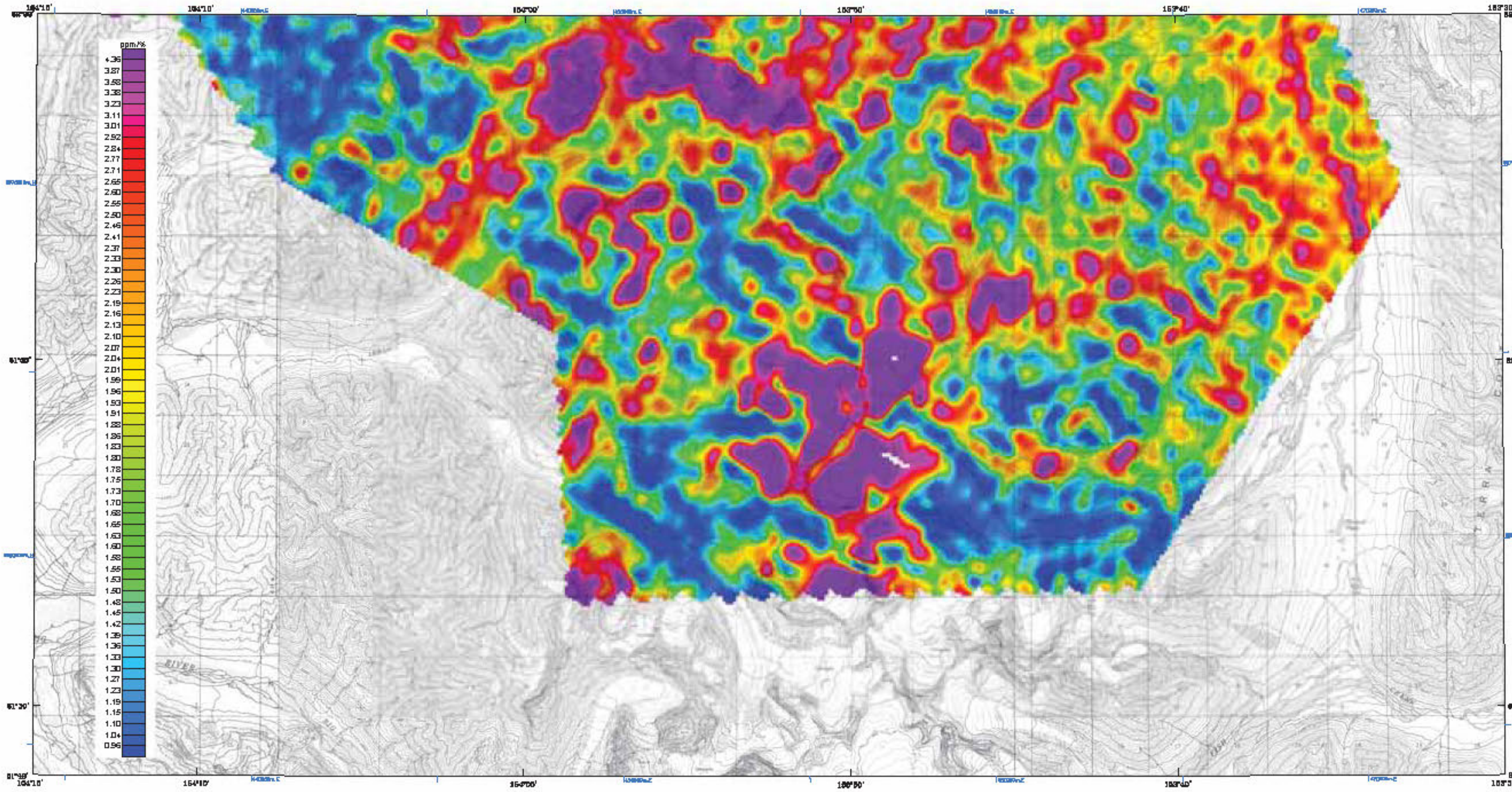
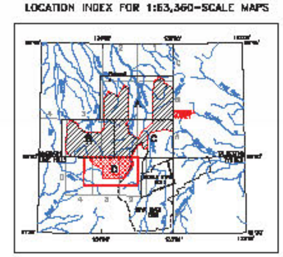



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


LOCATION INDEX FOR 1:63,360-SCALE MAPS



# URANIUM / POTASSIUM (eU / % K) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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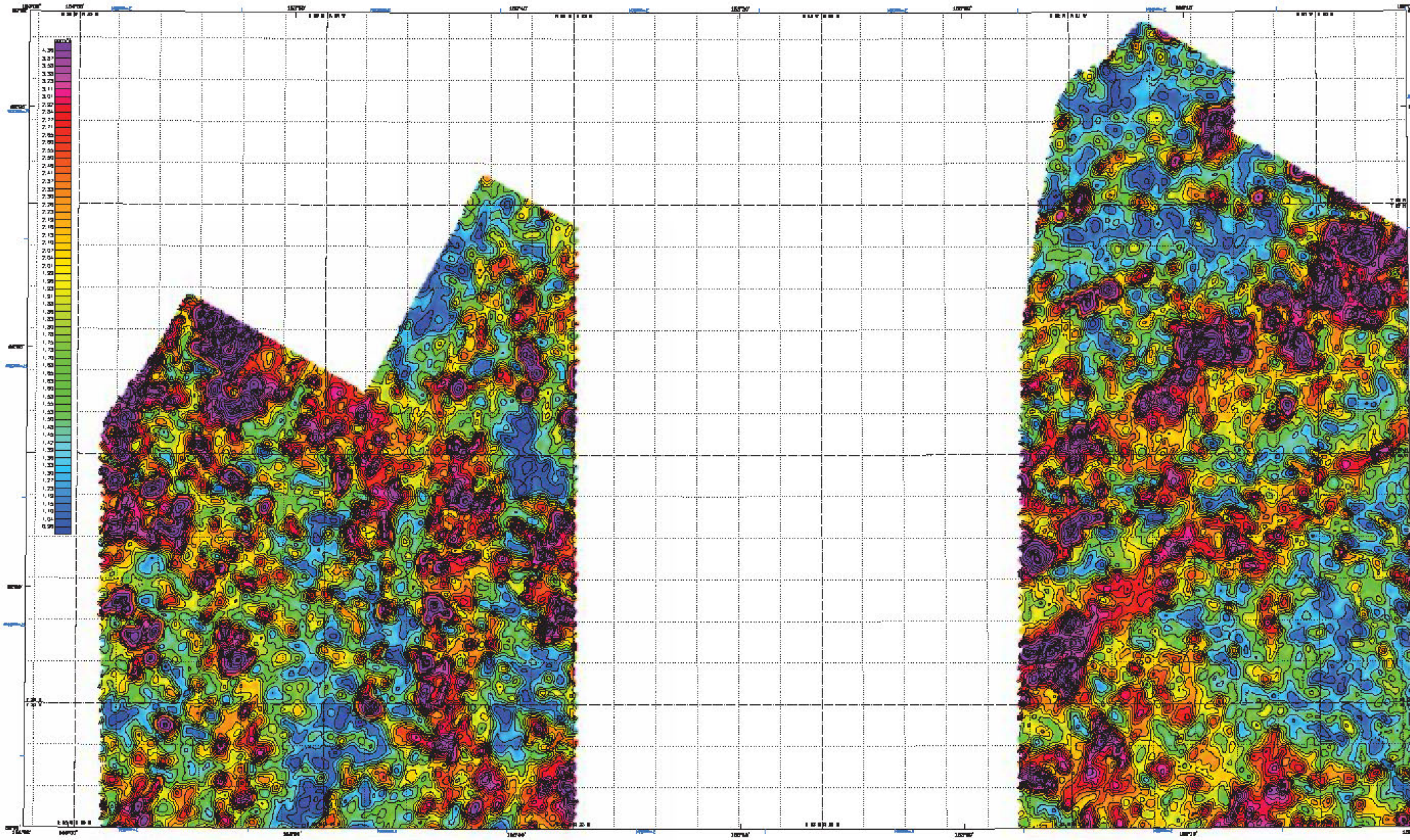
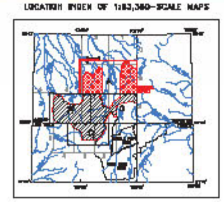



SCALE 1:63,360

LOCATION INDEX OF 1:63,360-SCALE MAPS



# URANIUM / POTASSIUM (eU / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEMV-3DL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

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

### CONTOUR INTERVAL

| | |
|---|---|
| ———— | ........... 0.9 ppm/% |
| ———— | ........... 1.0 ppm/% |
| ———— | ........... 1.2 ppm/% |

### SURVEY HISTORY

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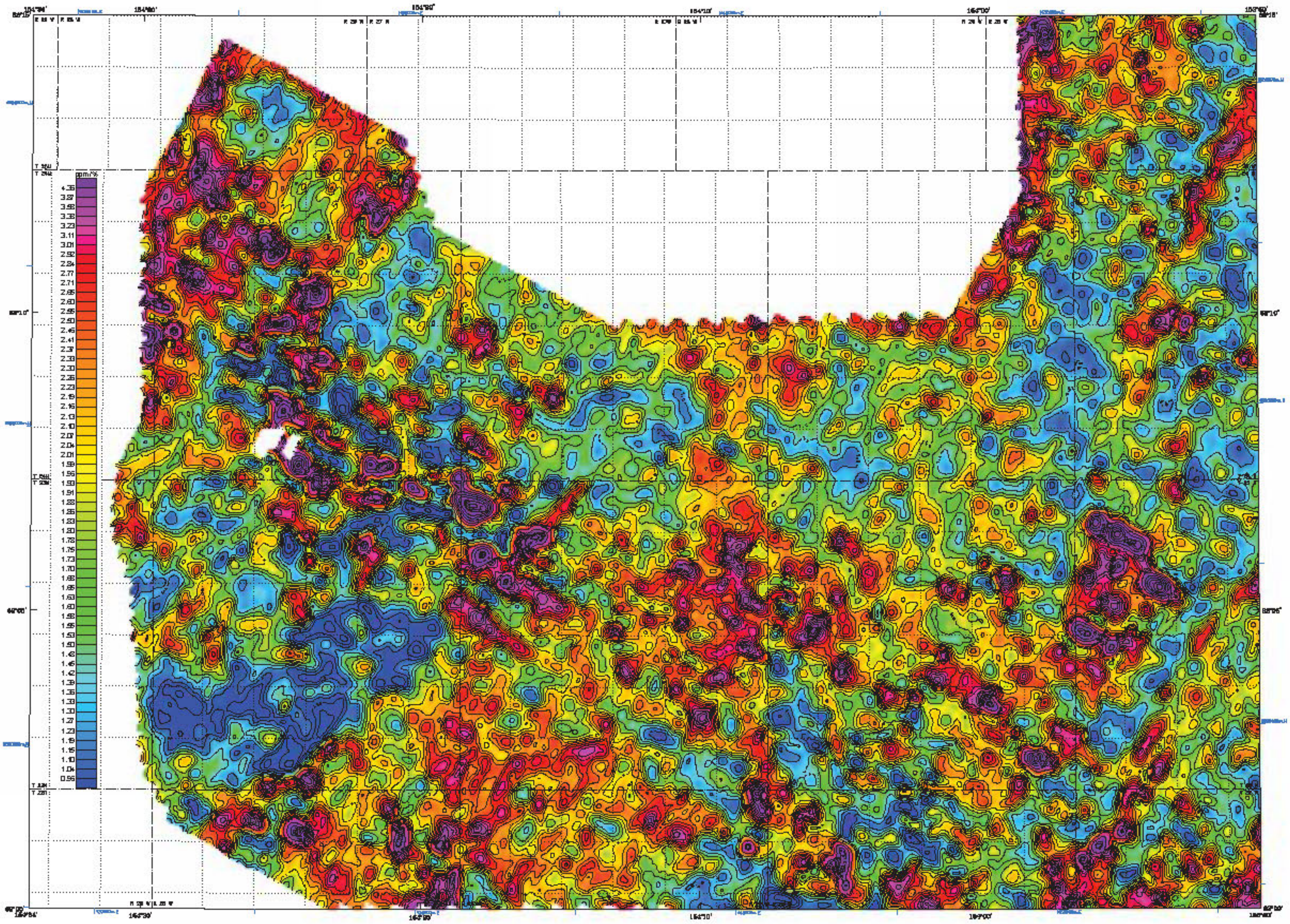
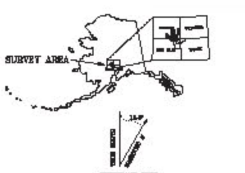
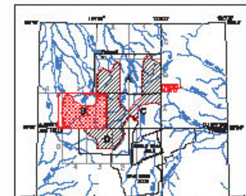


SCALE 1:63,360




LOCATION INDEX FOR 1:63,360-SCALE MAPS



# URANIUM / POTASSIUM (eU / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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

### CONTOUR INTERVAL

| | |
|---|---|
| ———— | 5.0 ppm/% |
| ———— | 1.0 ppm/% |
| ———— | 0.2 ppm/% |

### SURVEY HISTORY

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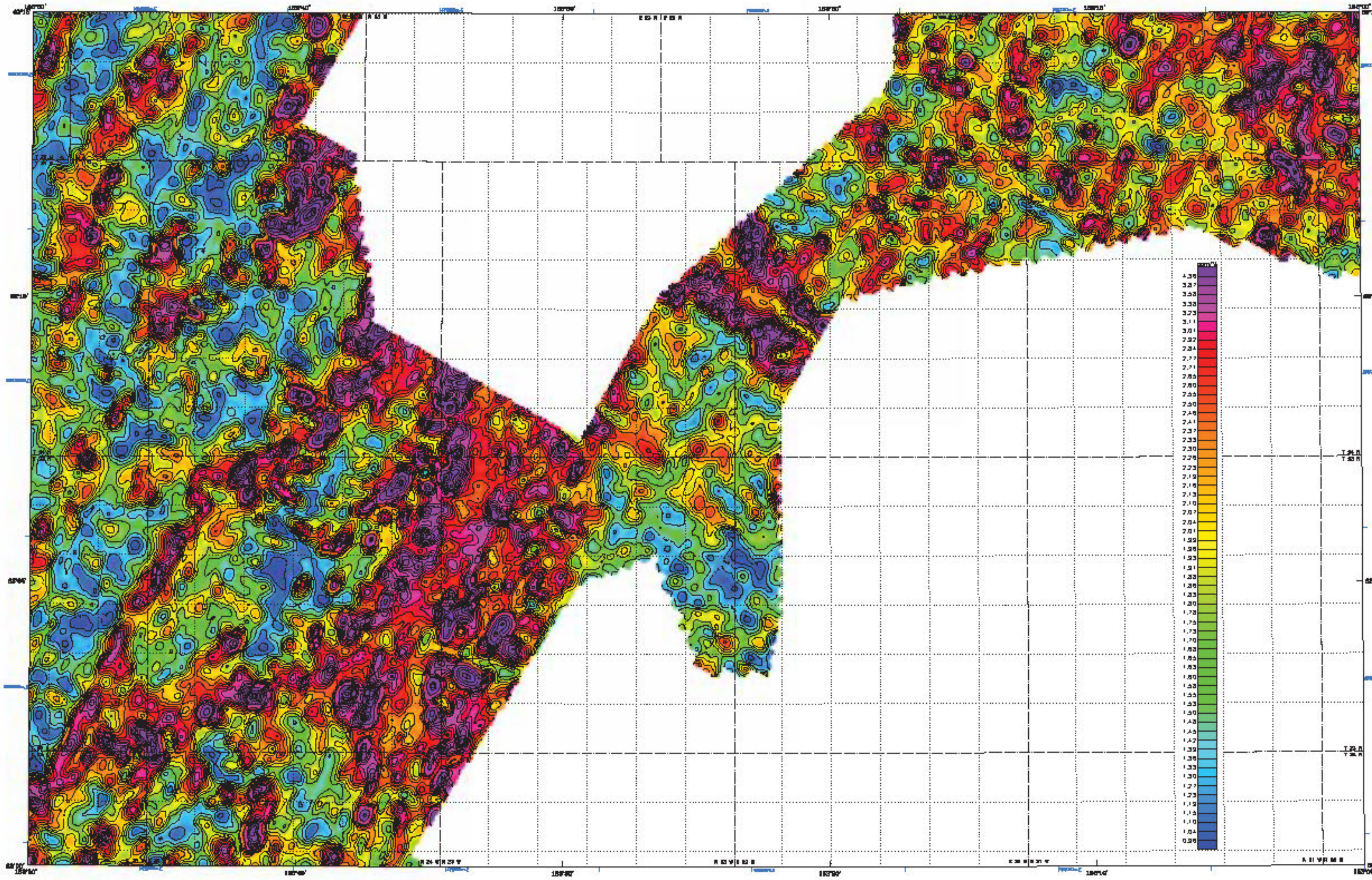

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

# URANIUM / POTASSIUM (eU / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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


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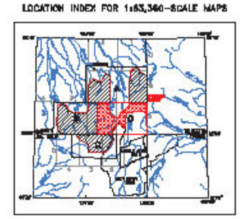
### CONTOUR INTERVAL

| | |
|---|---|
| ———— | 5.0 ppm/% |
| ———— | 1.0 ppm/% |
| ———— | 0.2 ppm/% |

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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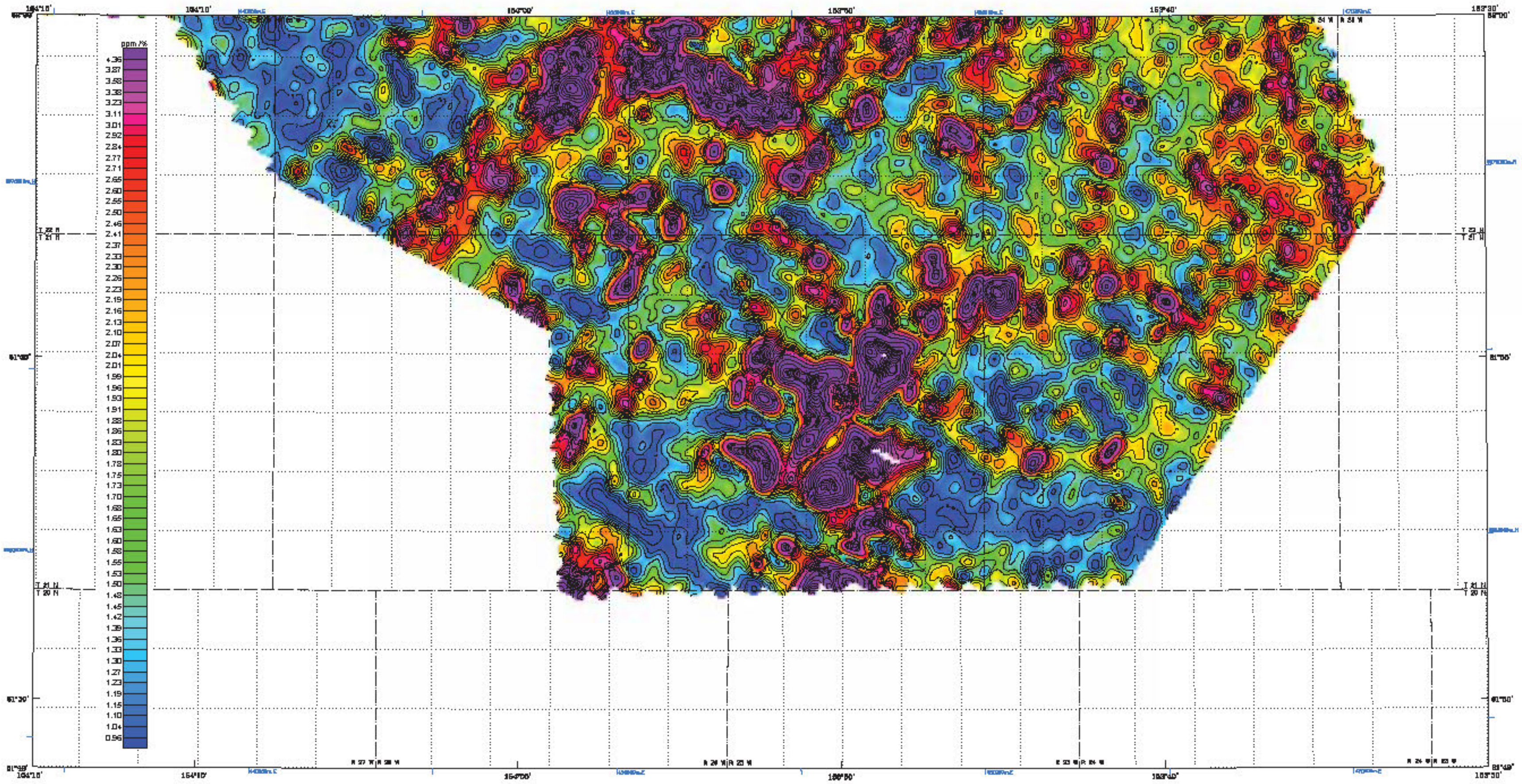



SCALE 1:63,360

1 0 1 2 3 4 MILES

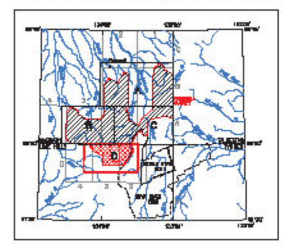
1 0 1 2 3 4 5 KILOMETERS


# URANIUM / POTASSIUM (eU / % K) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS



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### CONTOUR INTERVAL

. . . . . . . . . . . 5.0 ppm/%
. . . . . . . . . . . 1.0 ppm/%
. . . . . . . . . . . 0.2 ppm/%

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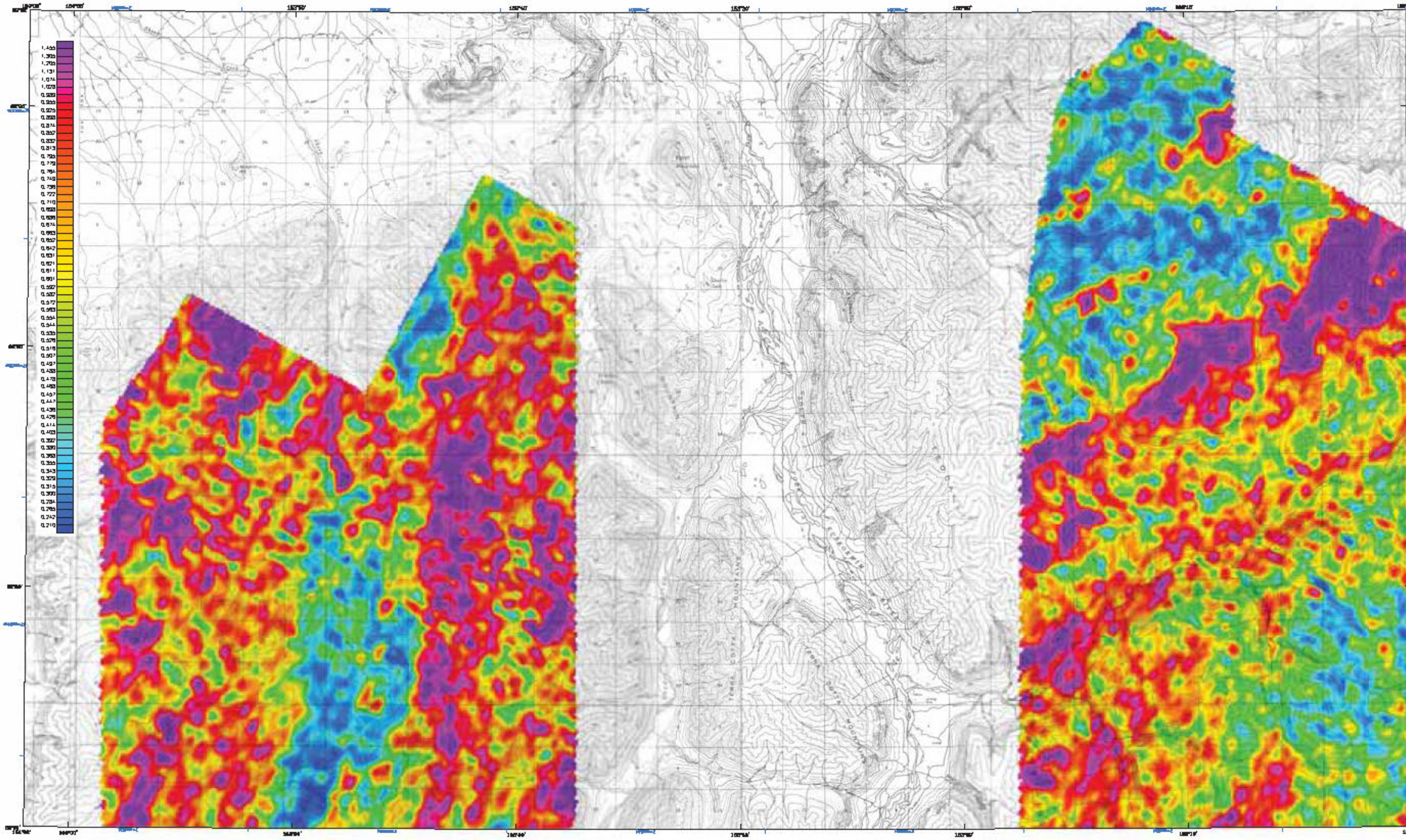
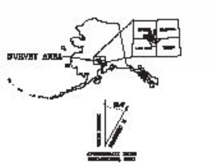





SCALE 1:63,360

1 0 1 2 3 4 MILES

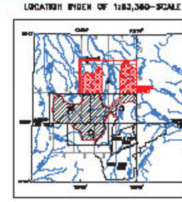
1 0 1 2 3 4 5 KILOMETERS

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

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX OF 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM EM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2810 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.

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### URANIUM / THORIUM (eU/eTh)

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

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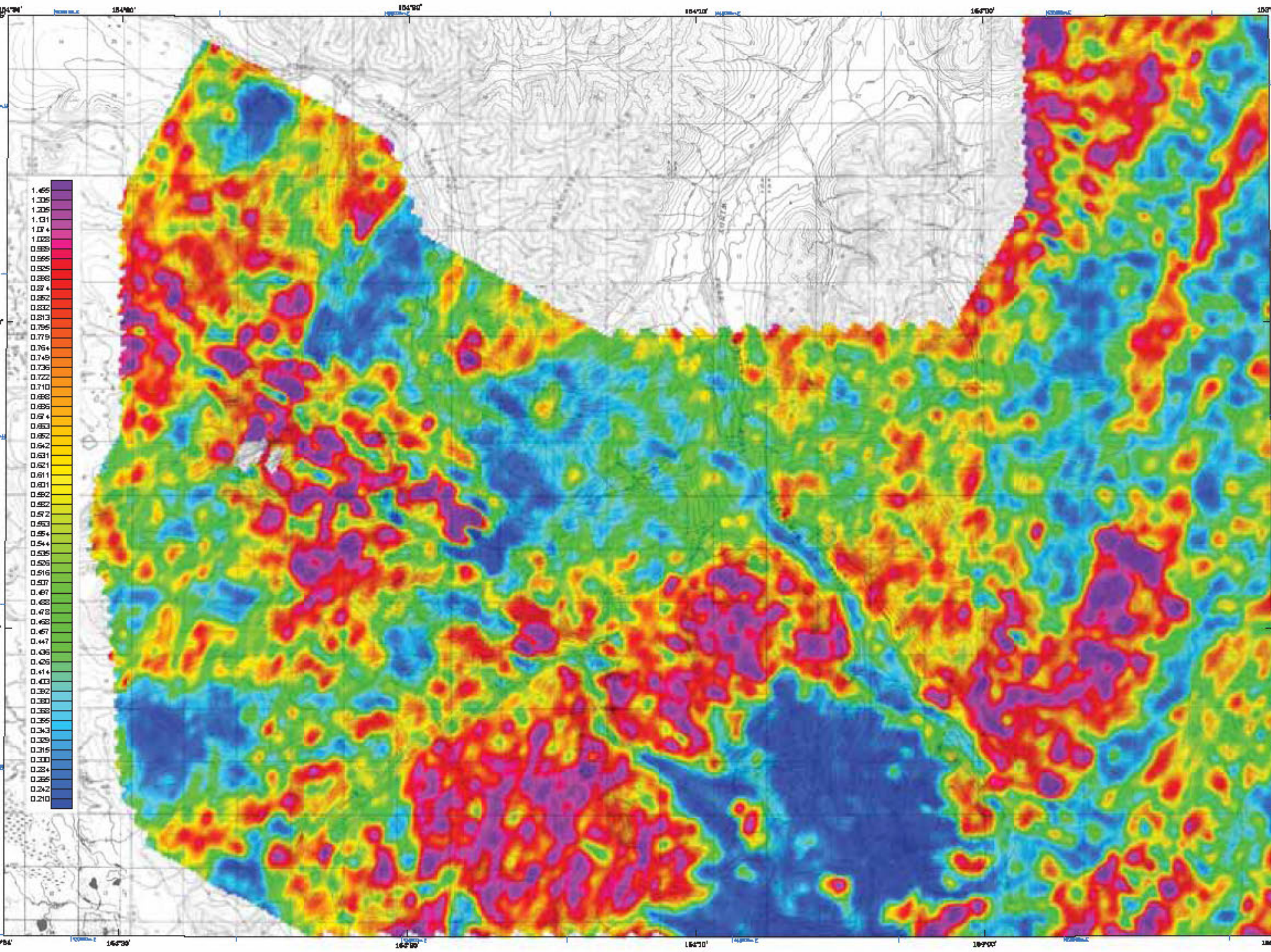
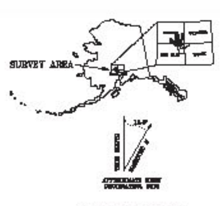



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS




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

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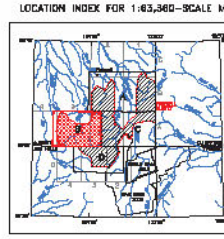

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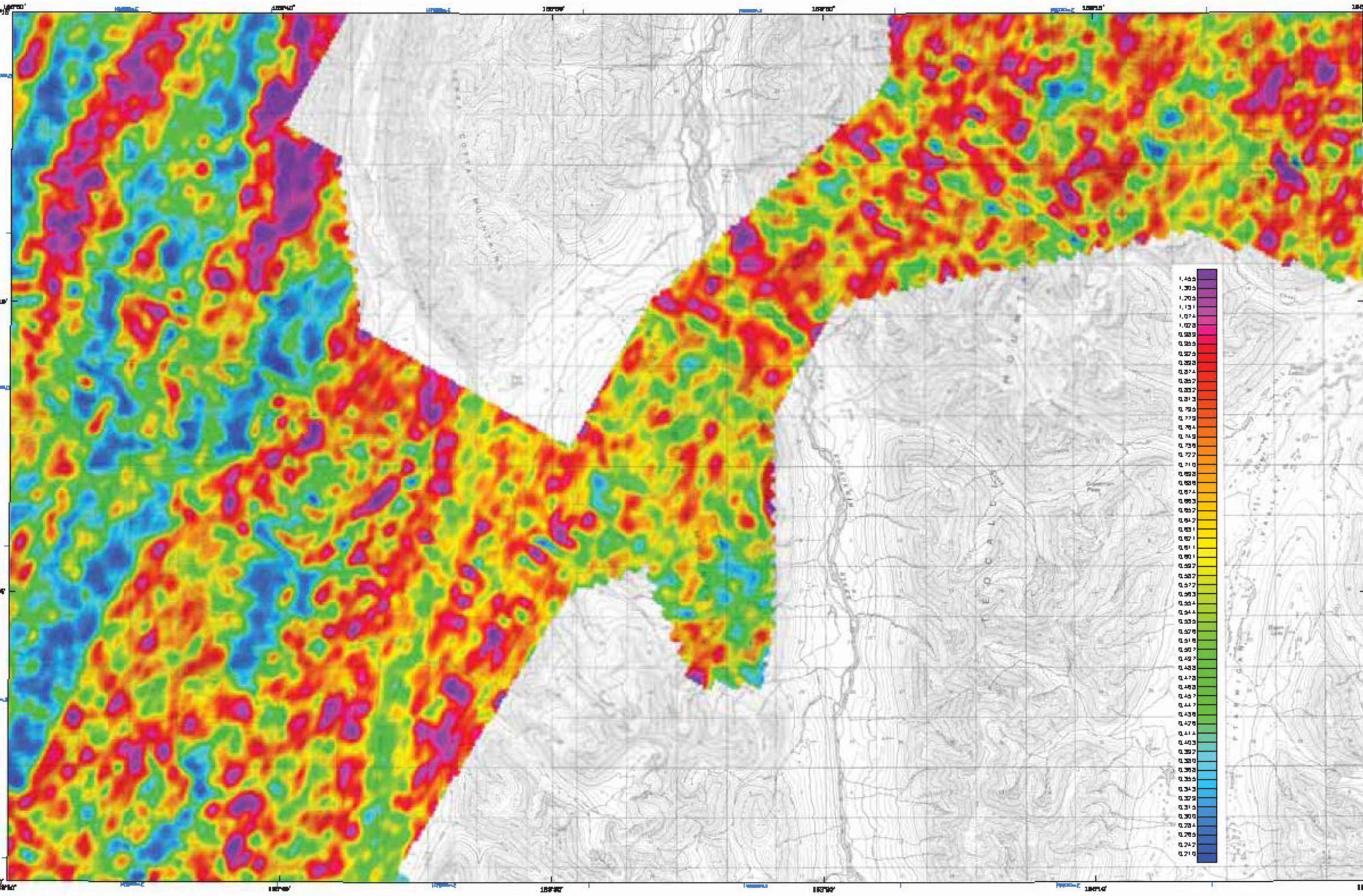
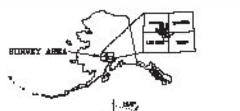


Base from U.S. Geological Survey McGrath A-1, 1959; A-1, NW, Quadrangles, Alaska.

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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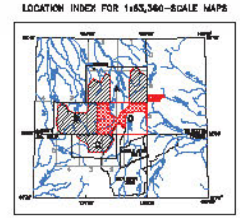

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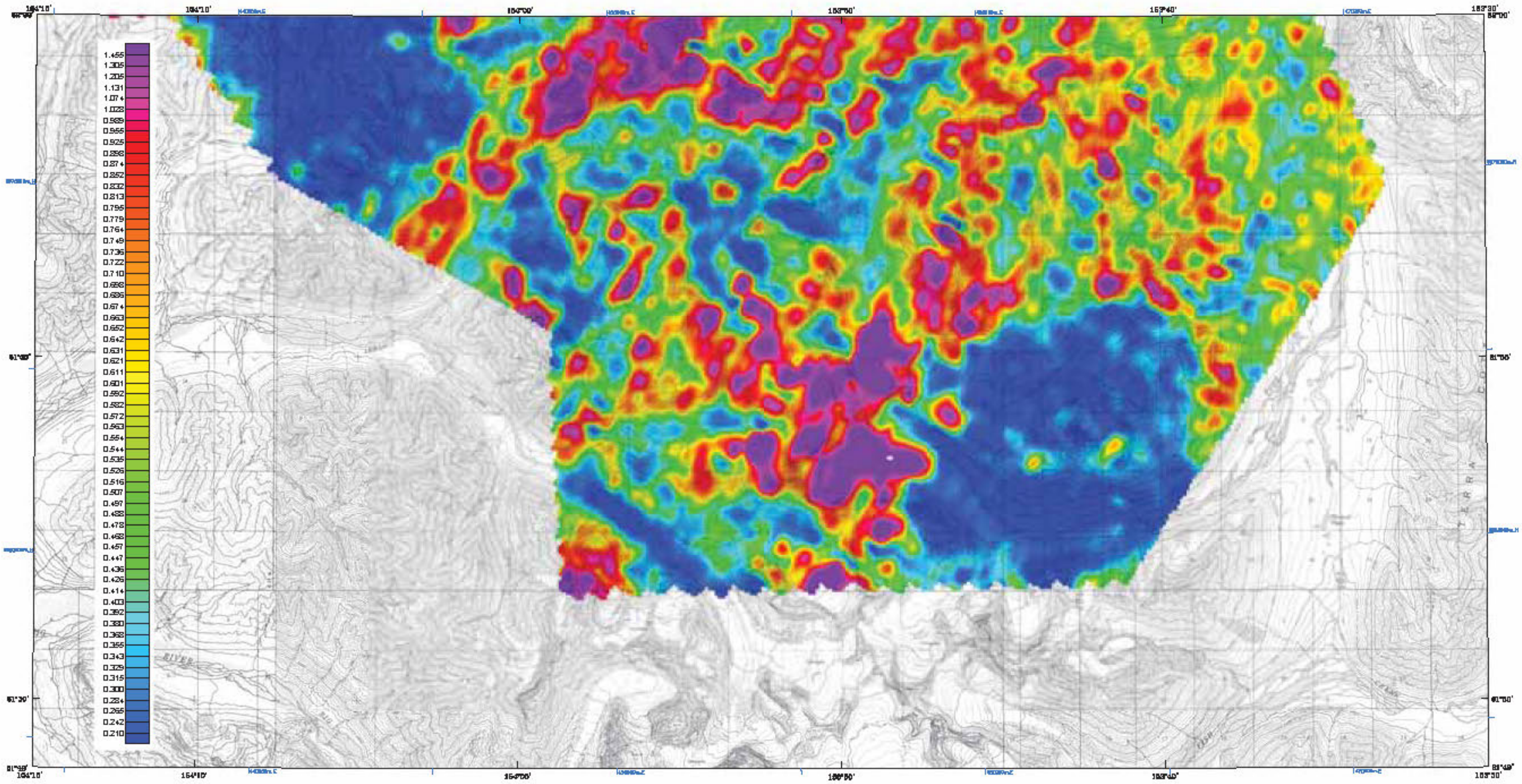


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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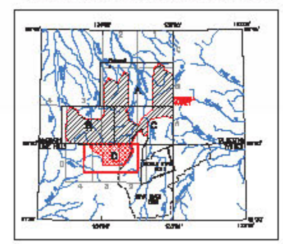

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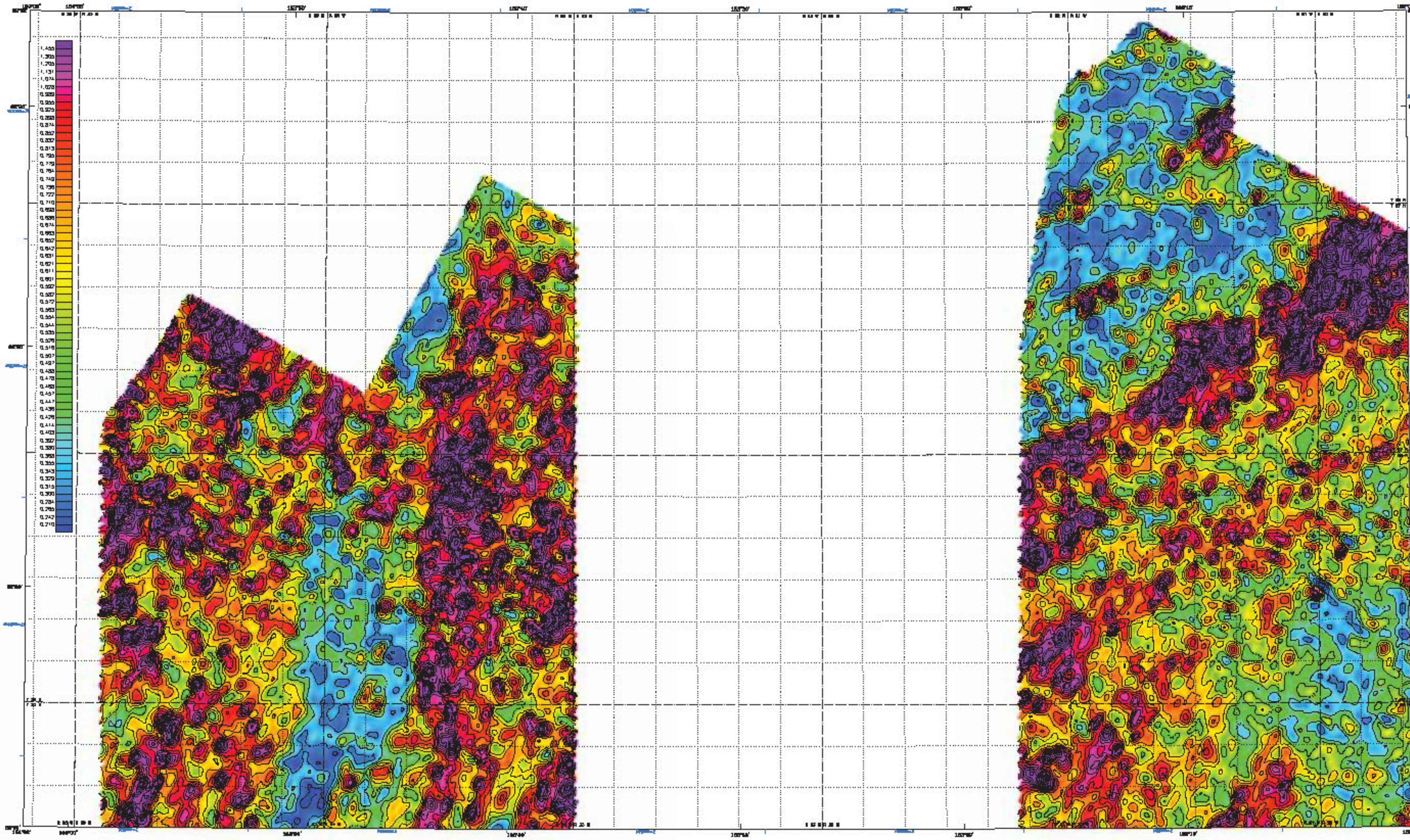

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS


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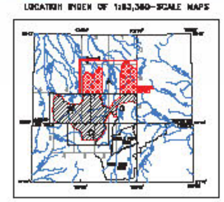

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### CONTOUR INTERVAL

| | |
|---|---|
| ———————— . . . . . . . . . . . . . . | 2.50 |
| ———————— . . . . . . . . . . . . . . | 0.50 |
| ———————— . . . . . . . . . . . . . . | 0.10 |

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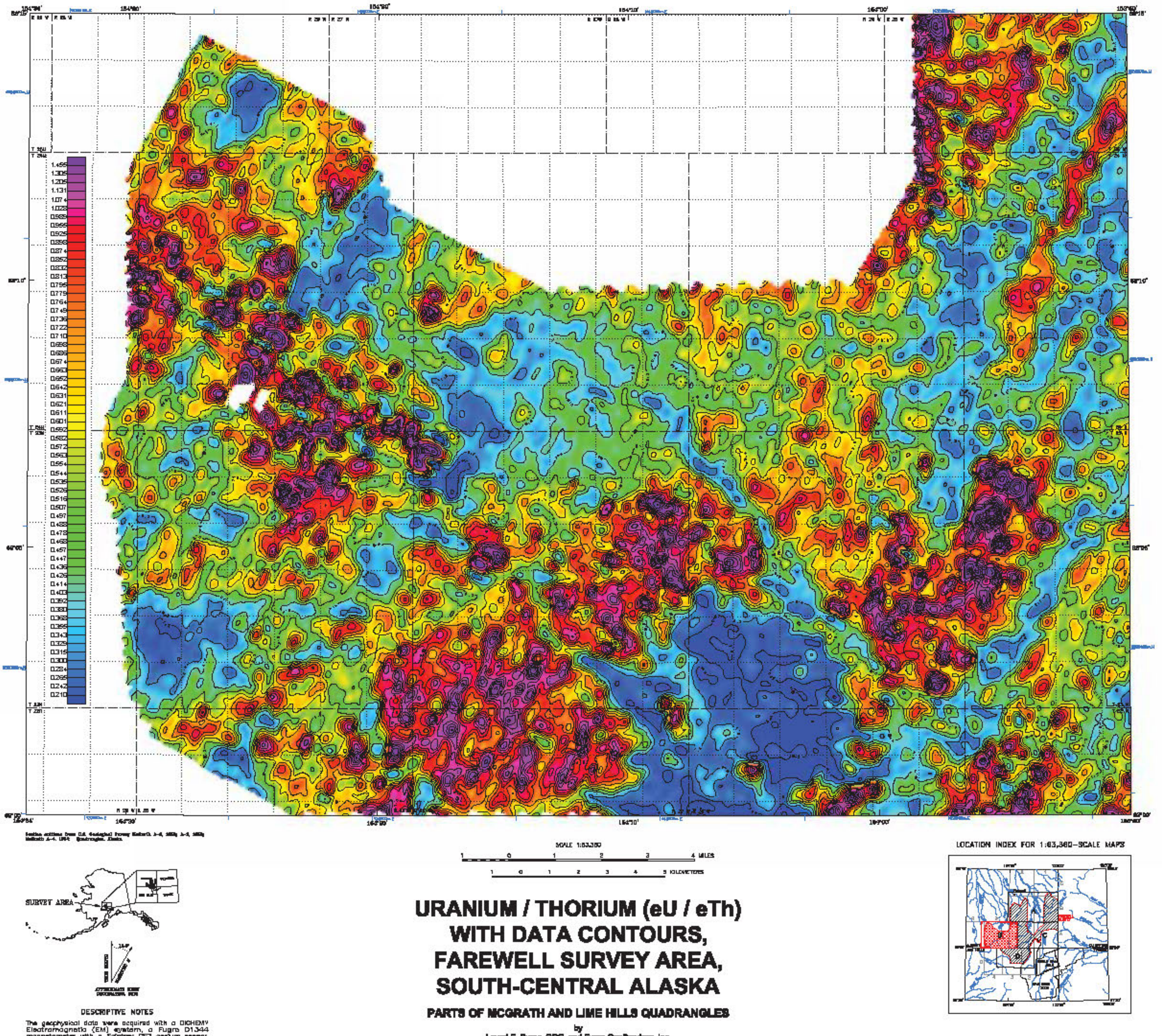


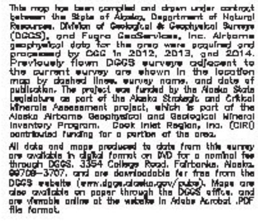


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| | |
|---|---|
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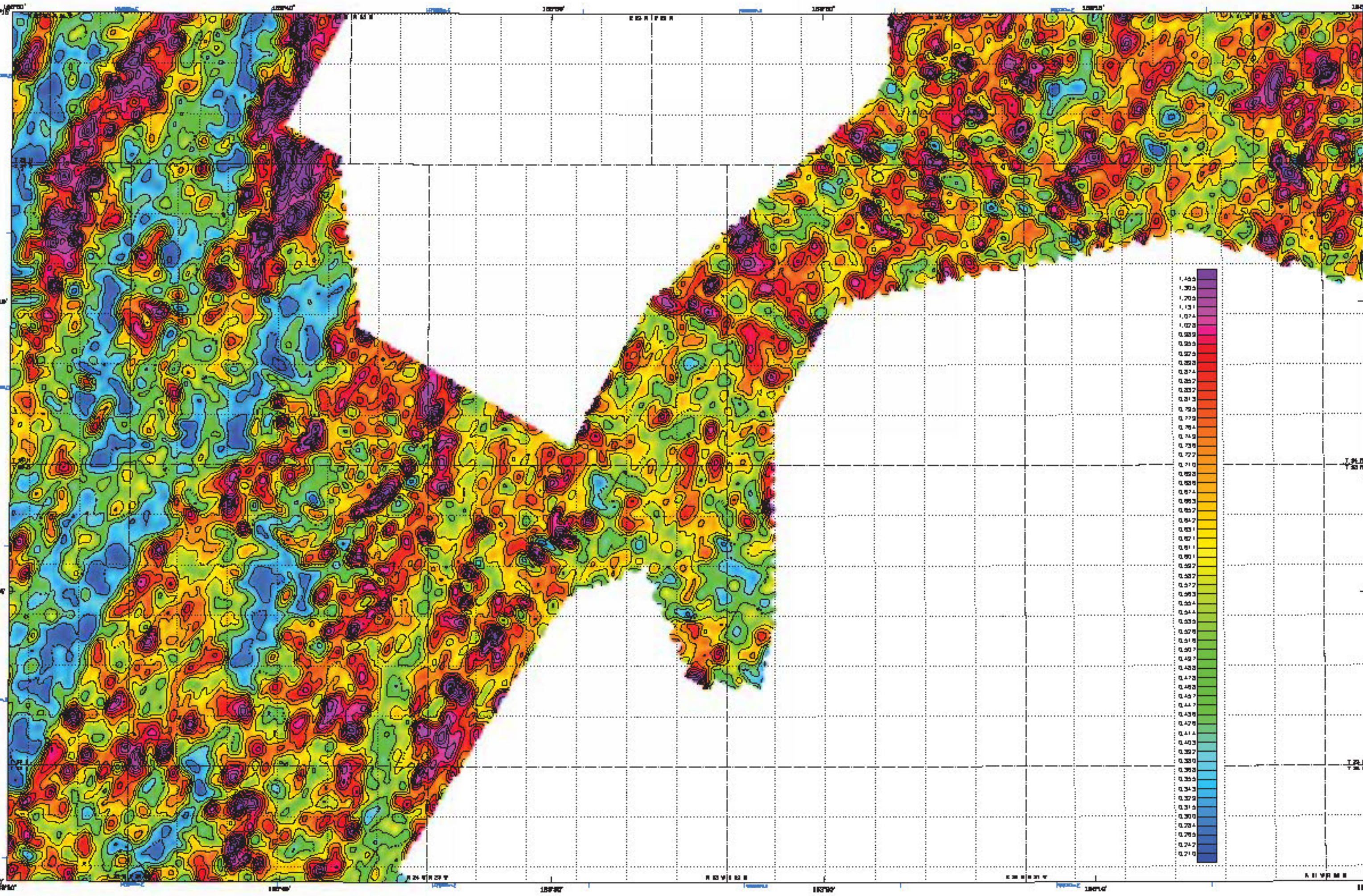
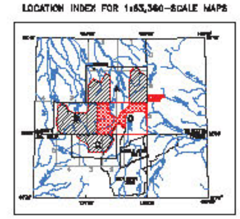


SCALE 1:63,360


# URANIUM / THORIUM (eU / eTh) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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



LOCATION INDEX FOR 1:63,360-SCALE MAPS

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| | |
|---|---|
| ............... | 2.50 |
| ............... | 0.50 |
| ............... | 0.10 |

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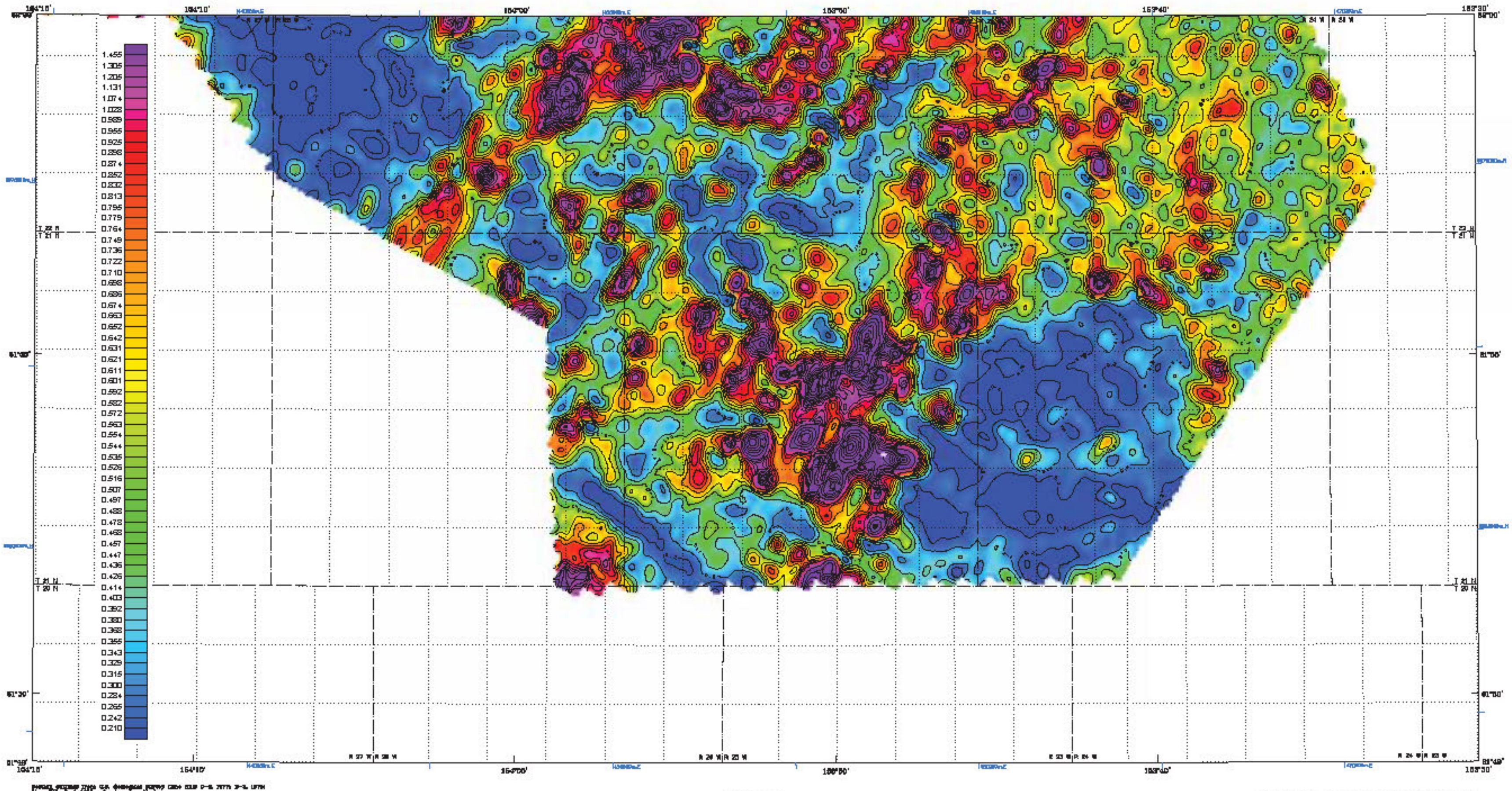
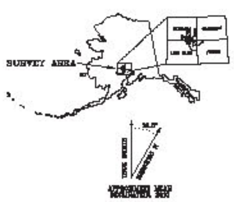


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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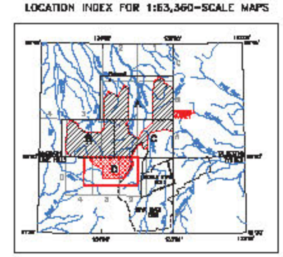

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by
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2014

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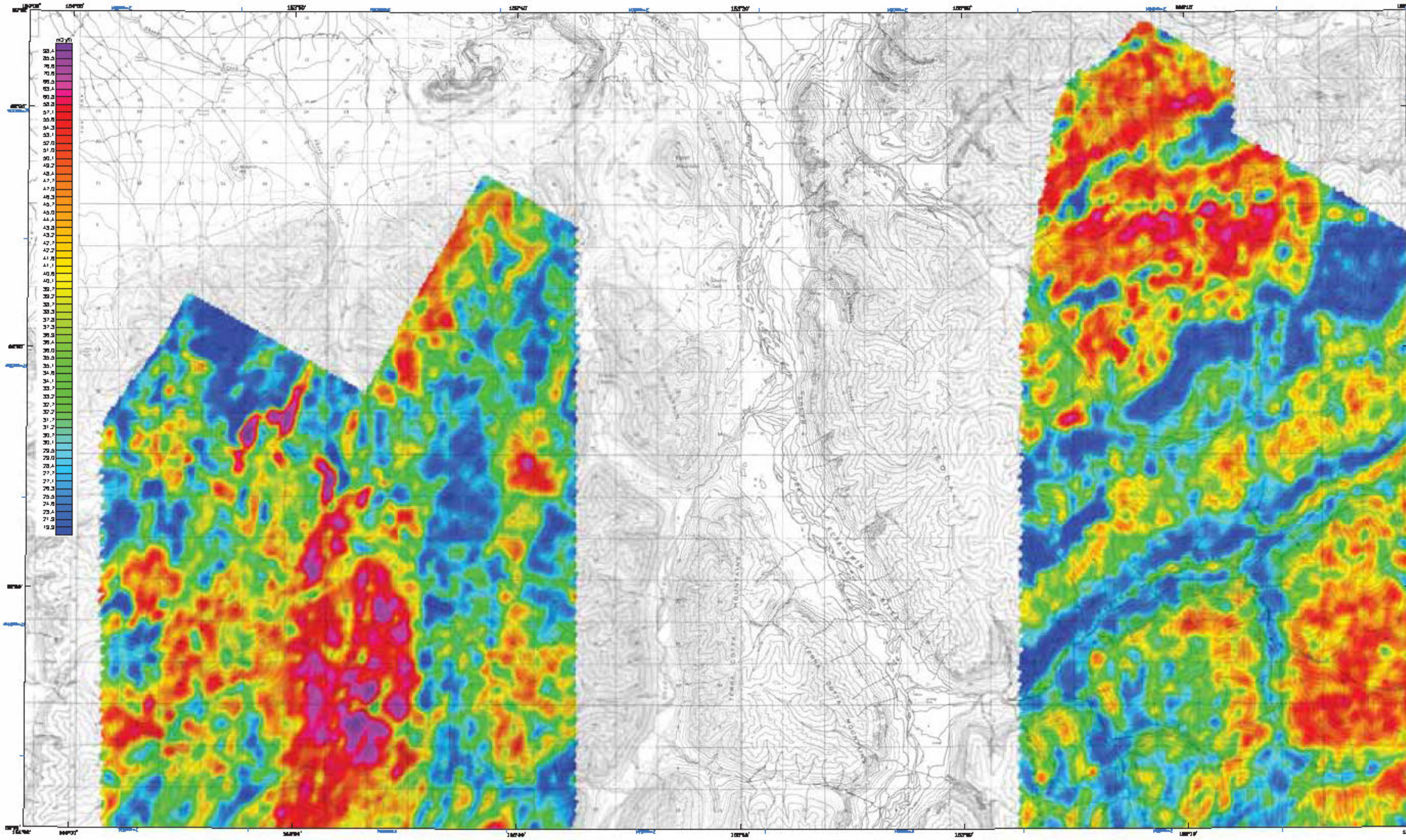


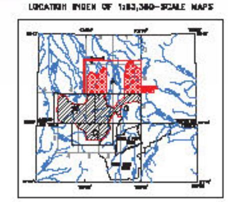


# NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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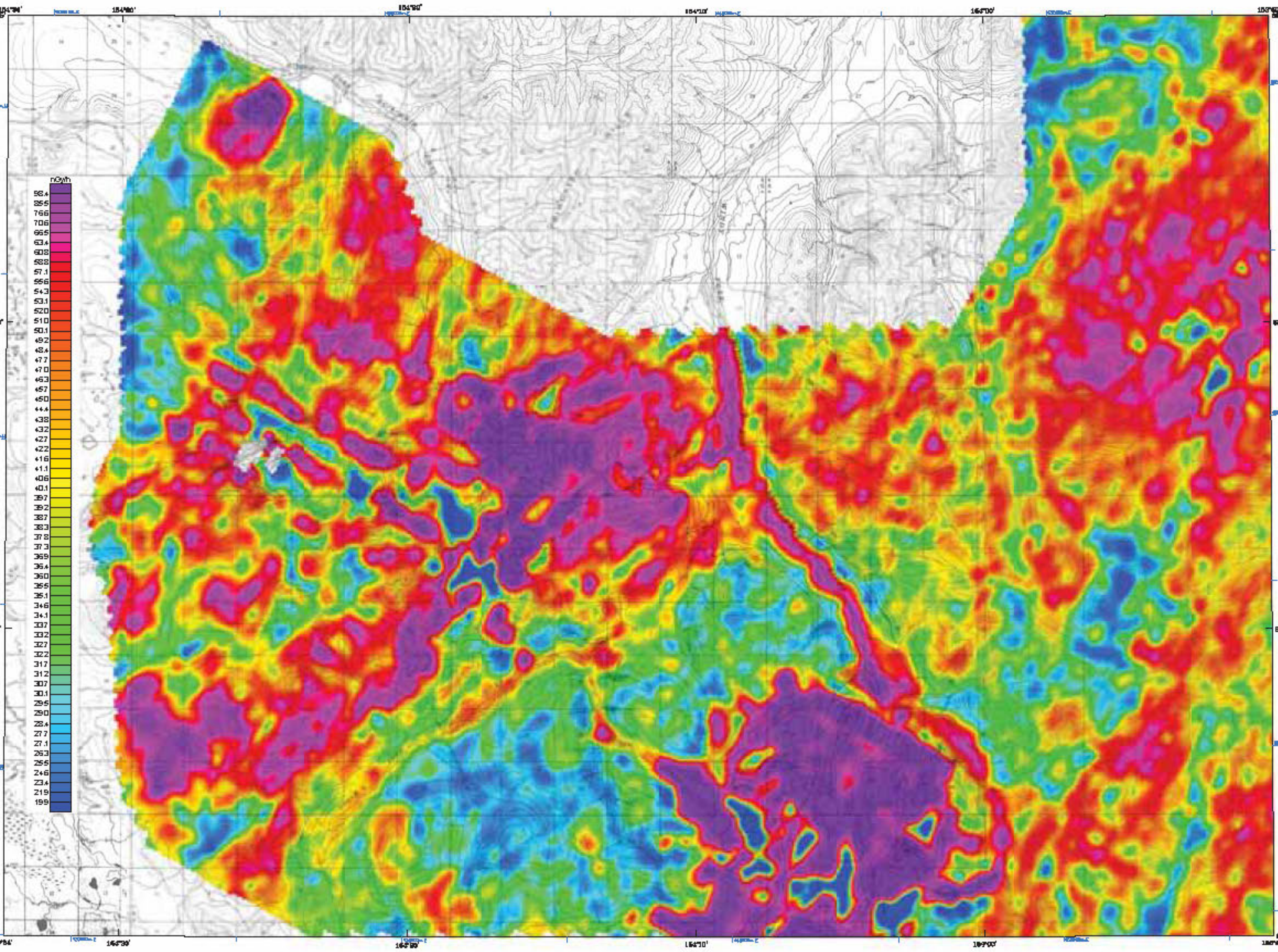


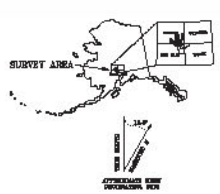


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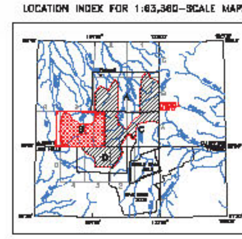

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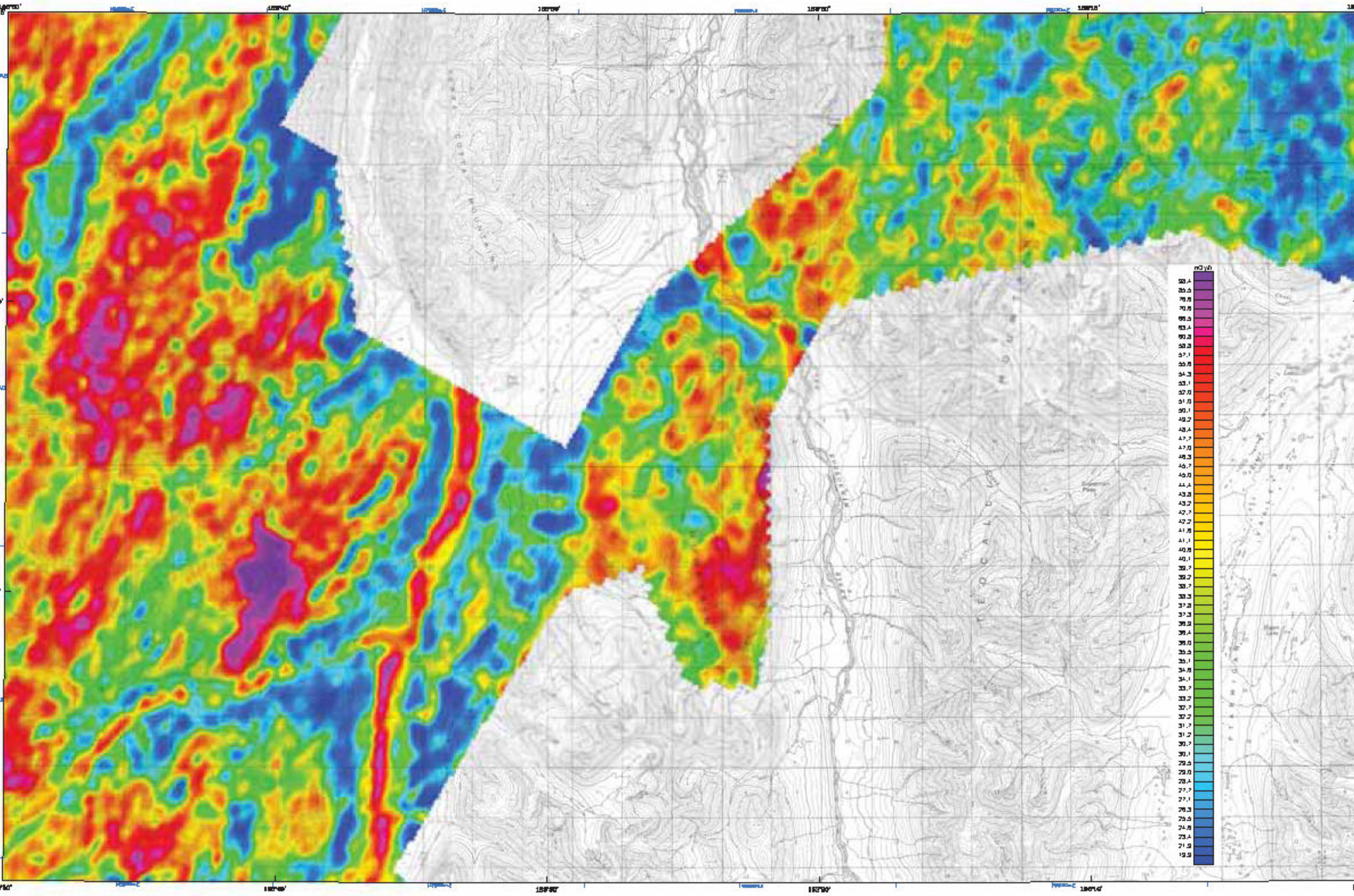


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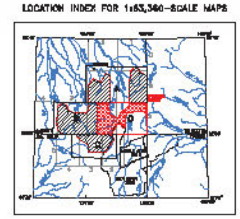

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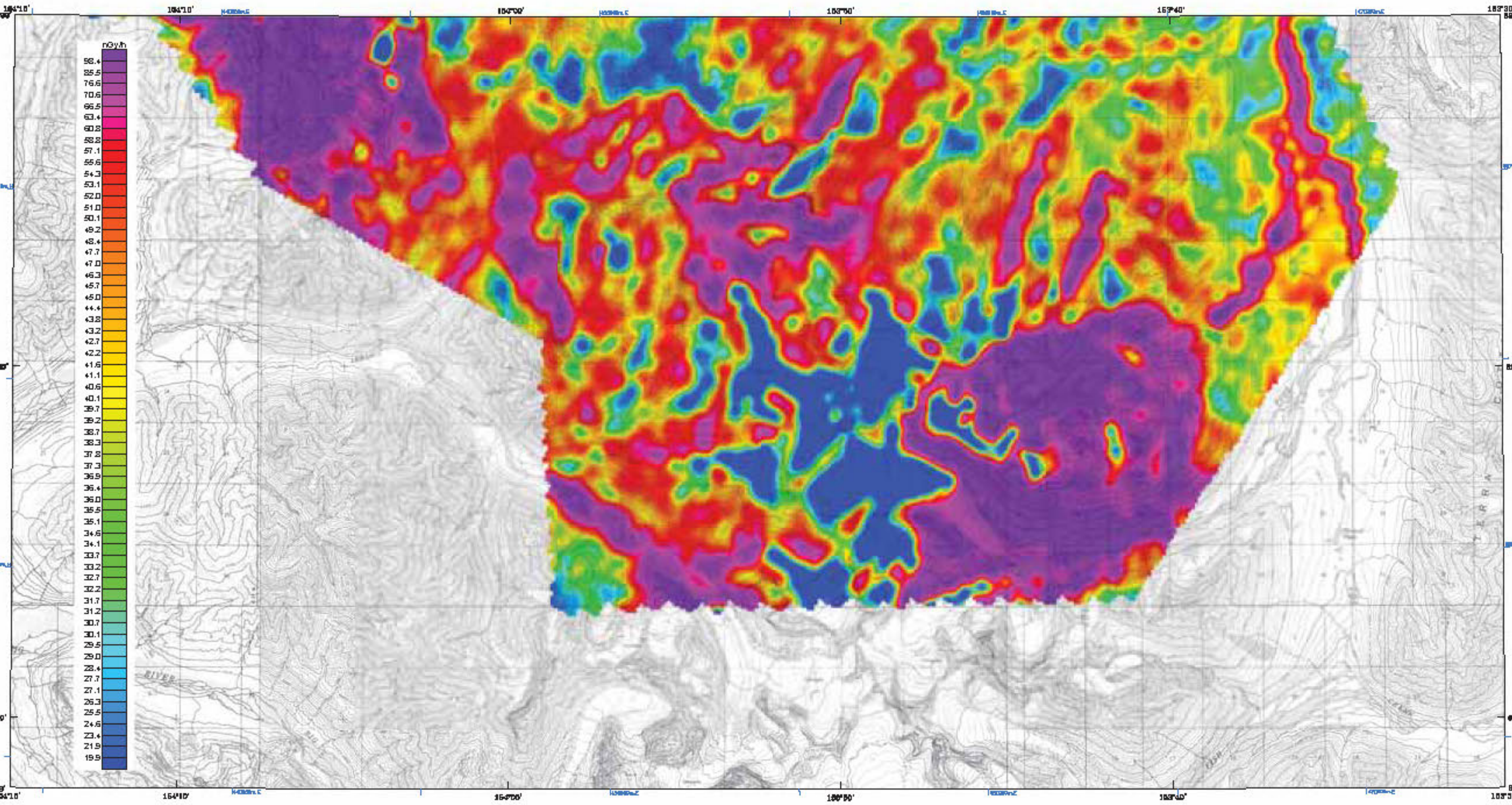


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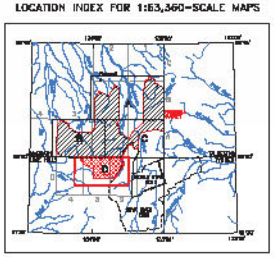

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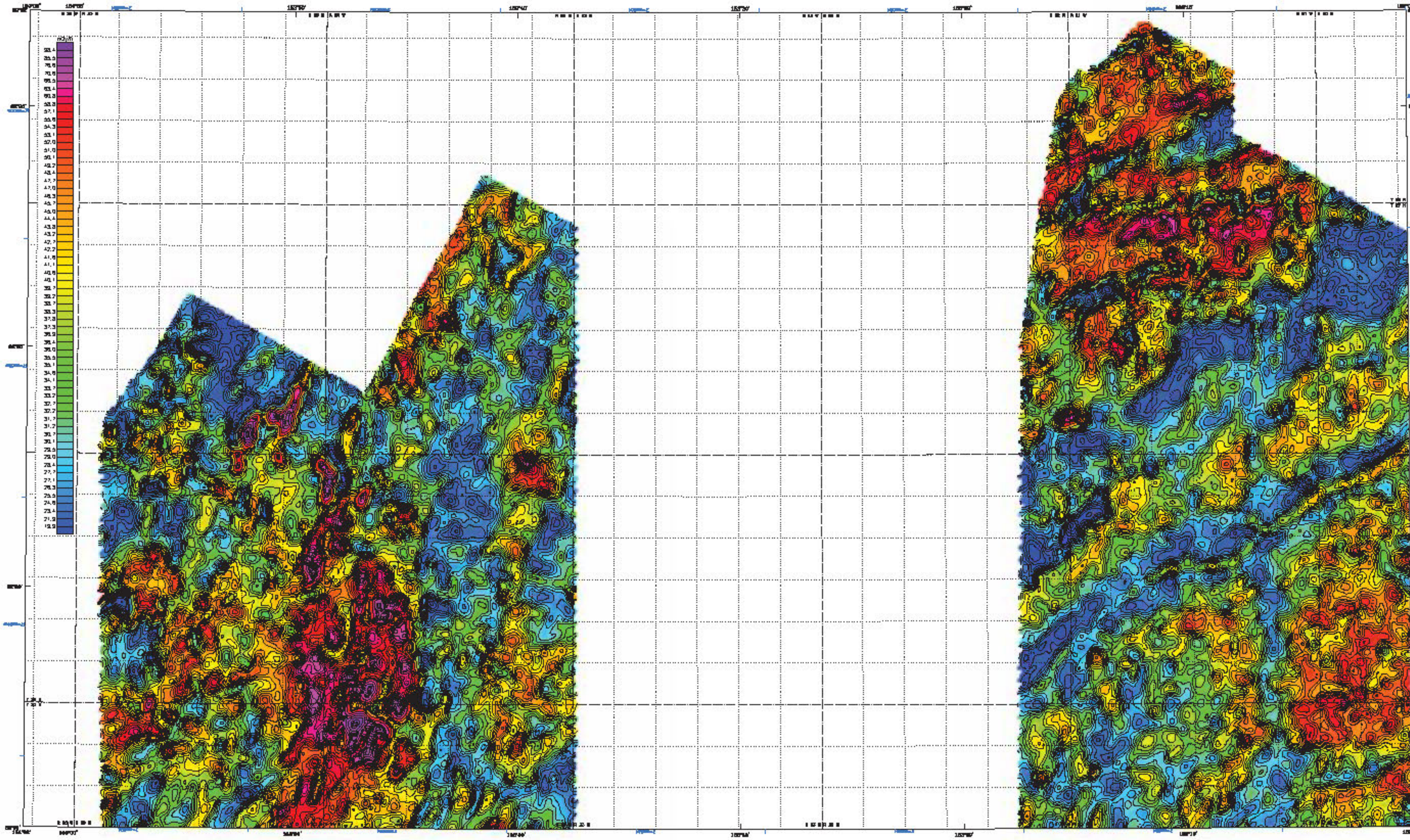


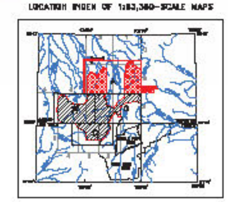


# NATURAL AIR ABSORBED DOSE RATE (nGy/h) WITH DATA CONTOURS, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

SCALE 1:63,360

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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CONTOUR INTERVAL

| | |
|---|---|
| ———— | 100 nGy/h |
| ———— | 10 nGy/h |
| ———— | 1 nGy/h |

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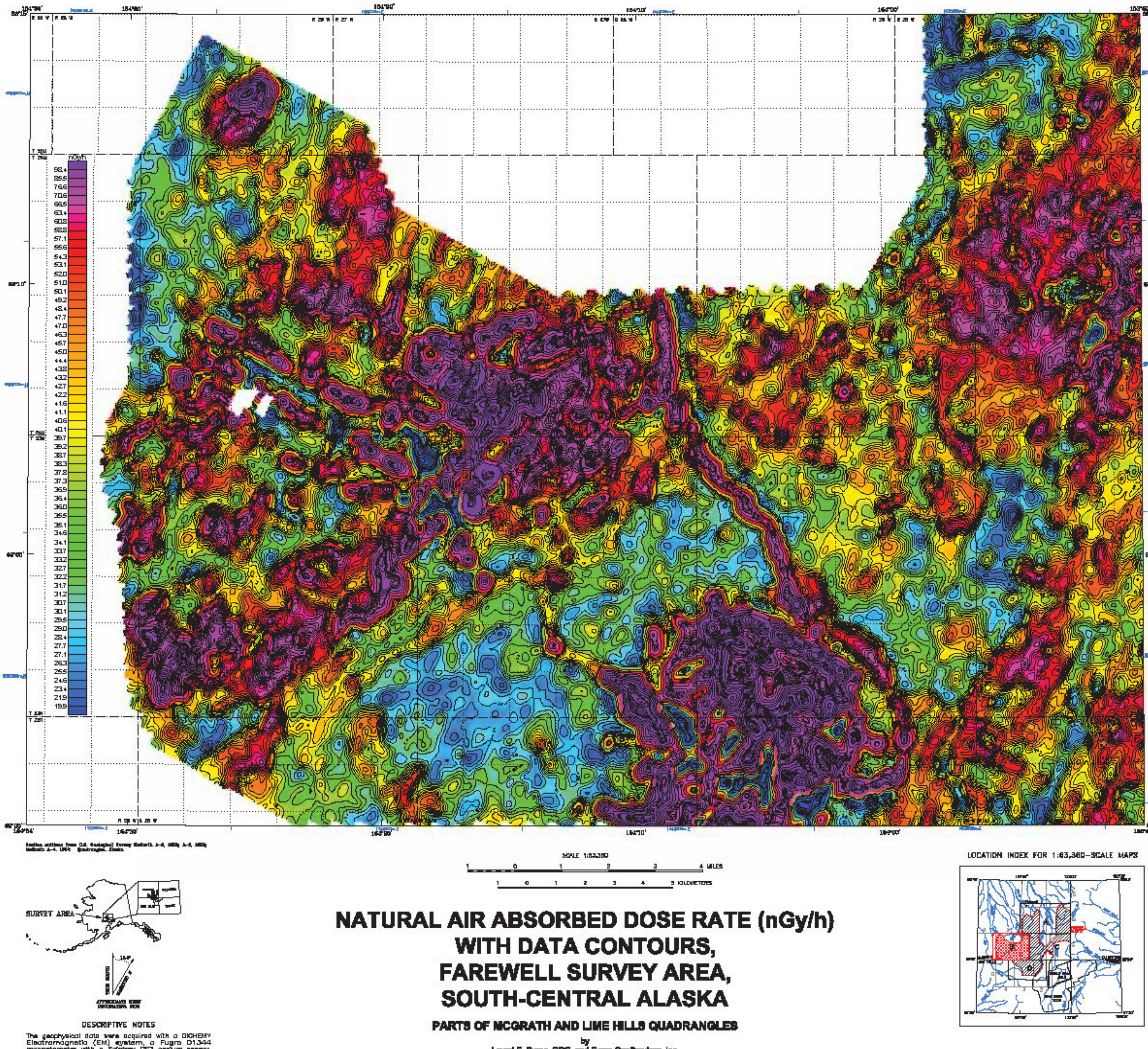

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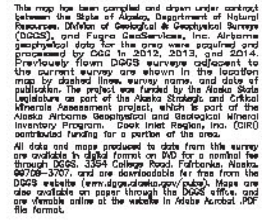


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by
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| | |
|---|---|
| ———— | 100 nGy/h |
| ———— | 10 nGy/h |
| ———— | 2 nGy/h |

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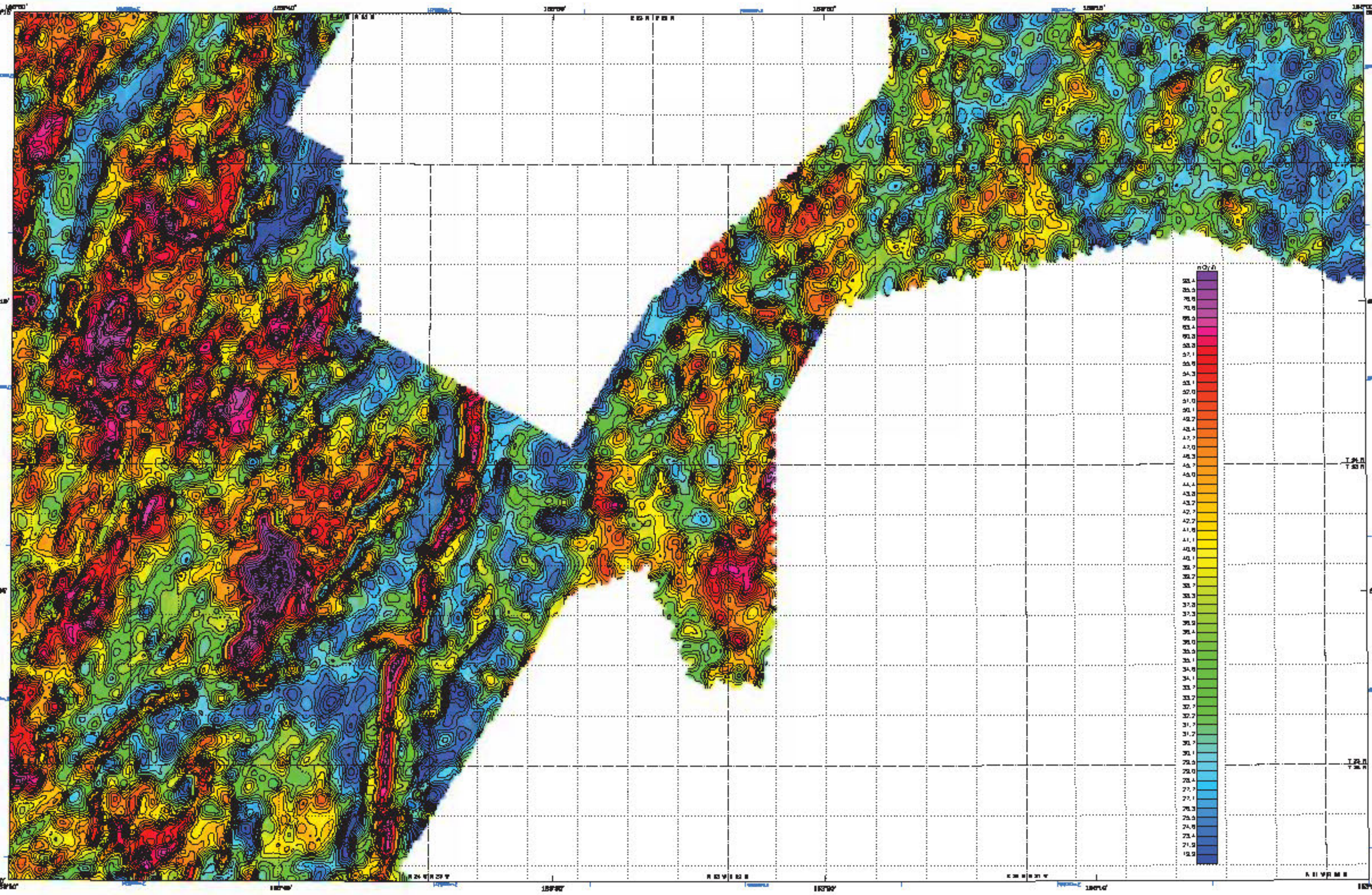
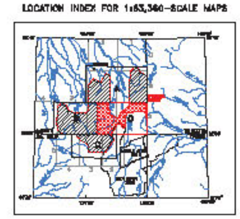


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX FOR 1:63,360-SCALE MAPS

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## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

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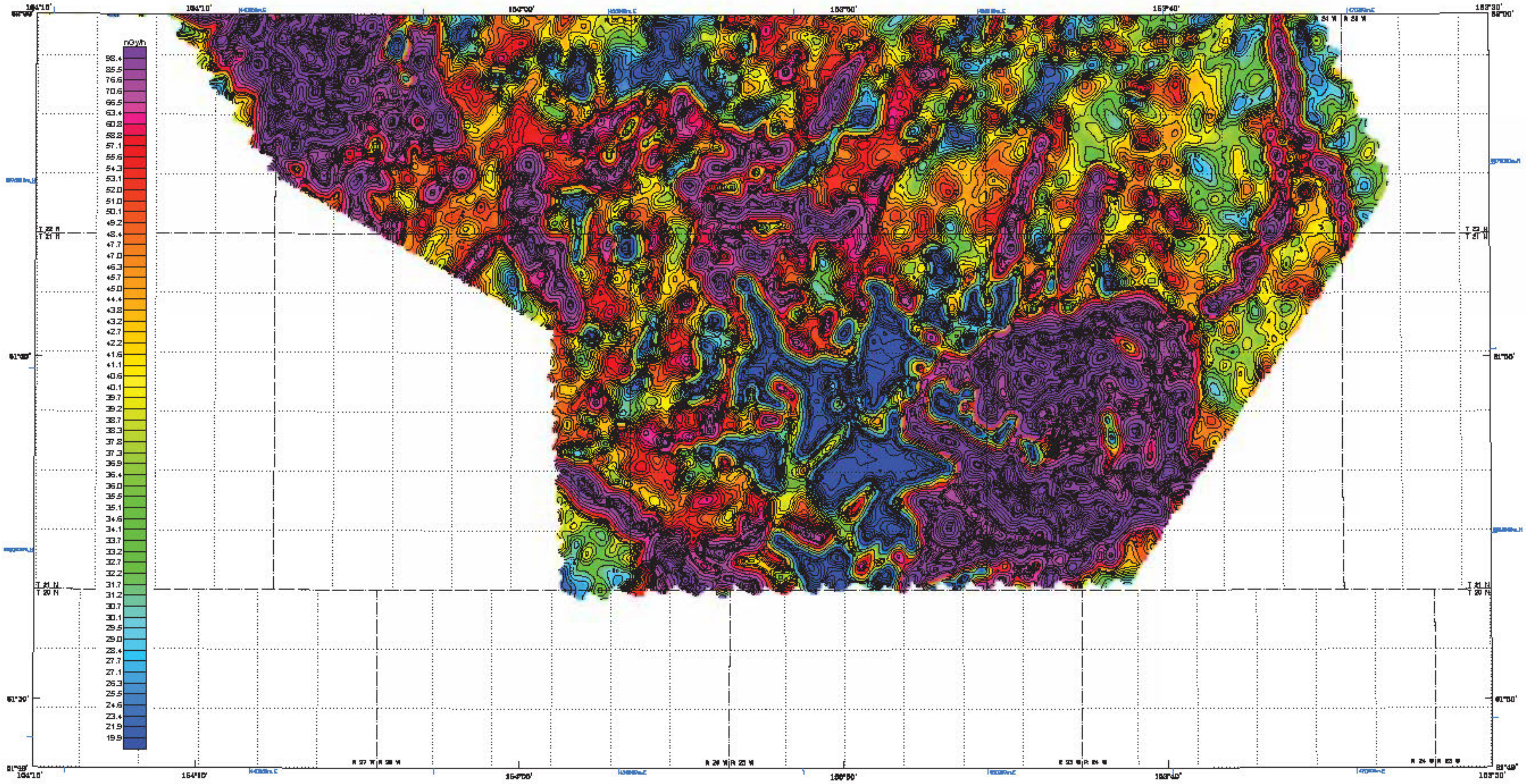


SCALE 1:63,360

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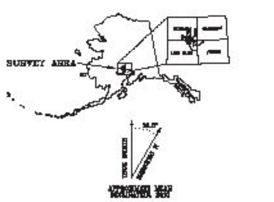


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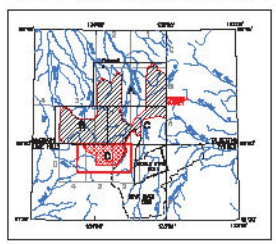
LOCATION INDEX FOR 1:63,360-SCALE MAPS



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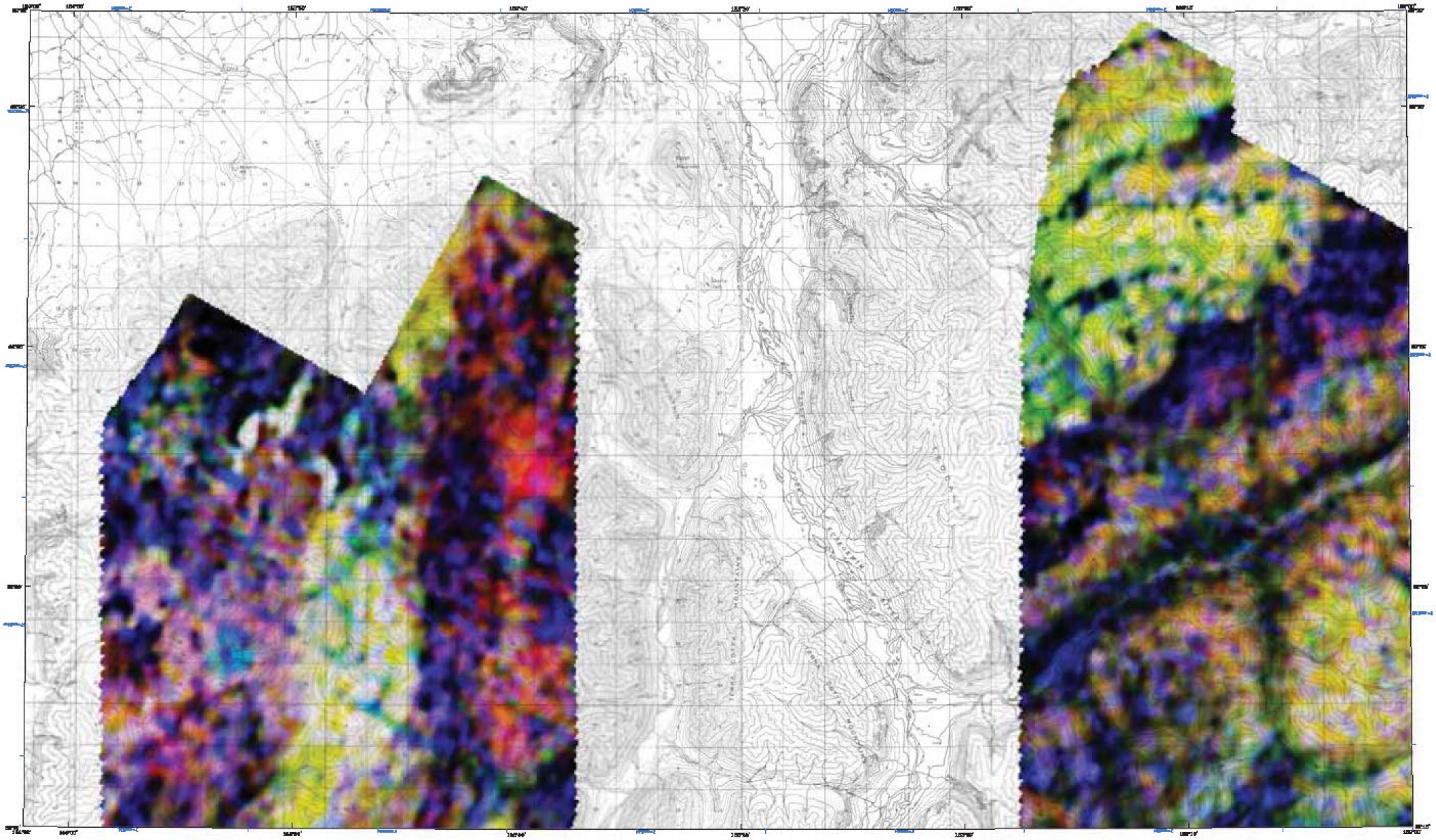

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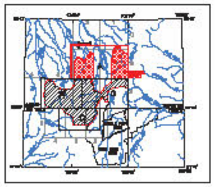


# RADIOELEMENT - TERNARY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

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by
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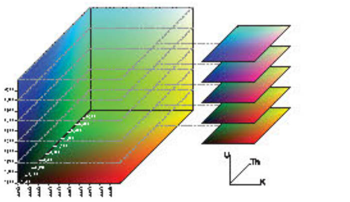


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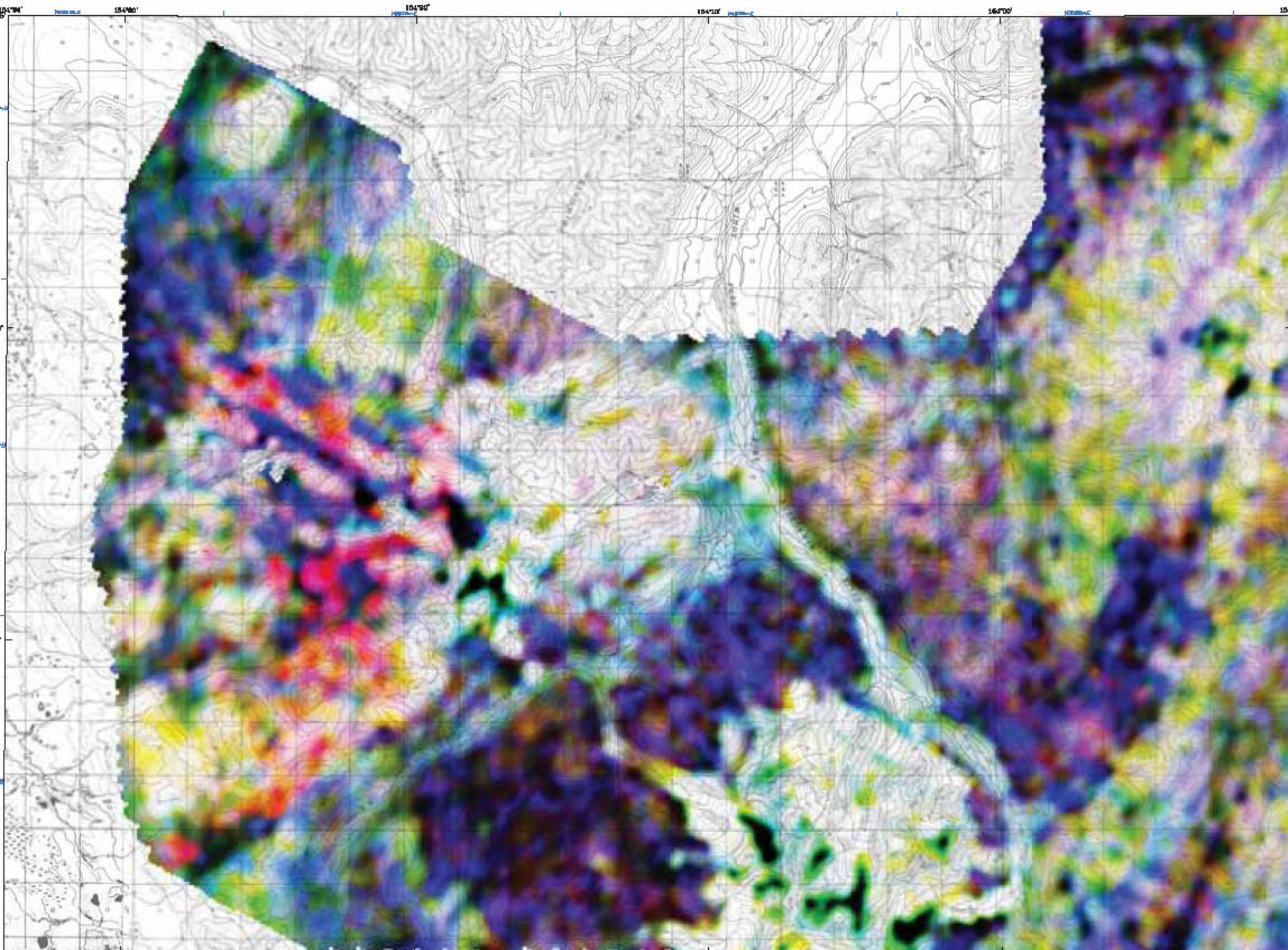
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2014-2-28B



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS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by


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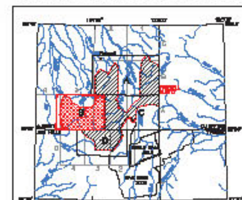
LOCATION INDEX FOR 1:63,360-SCALE MAPS



### DESCRIPTIVE NOTES

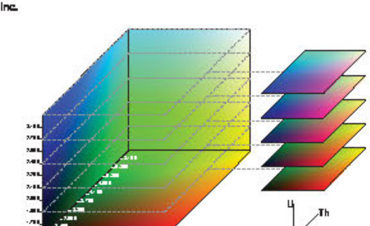
The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2815 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.


International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.


### 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 the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.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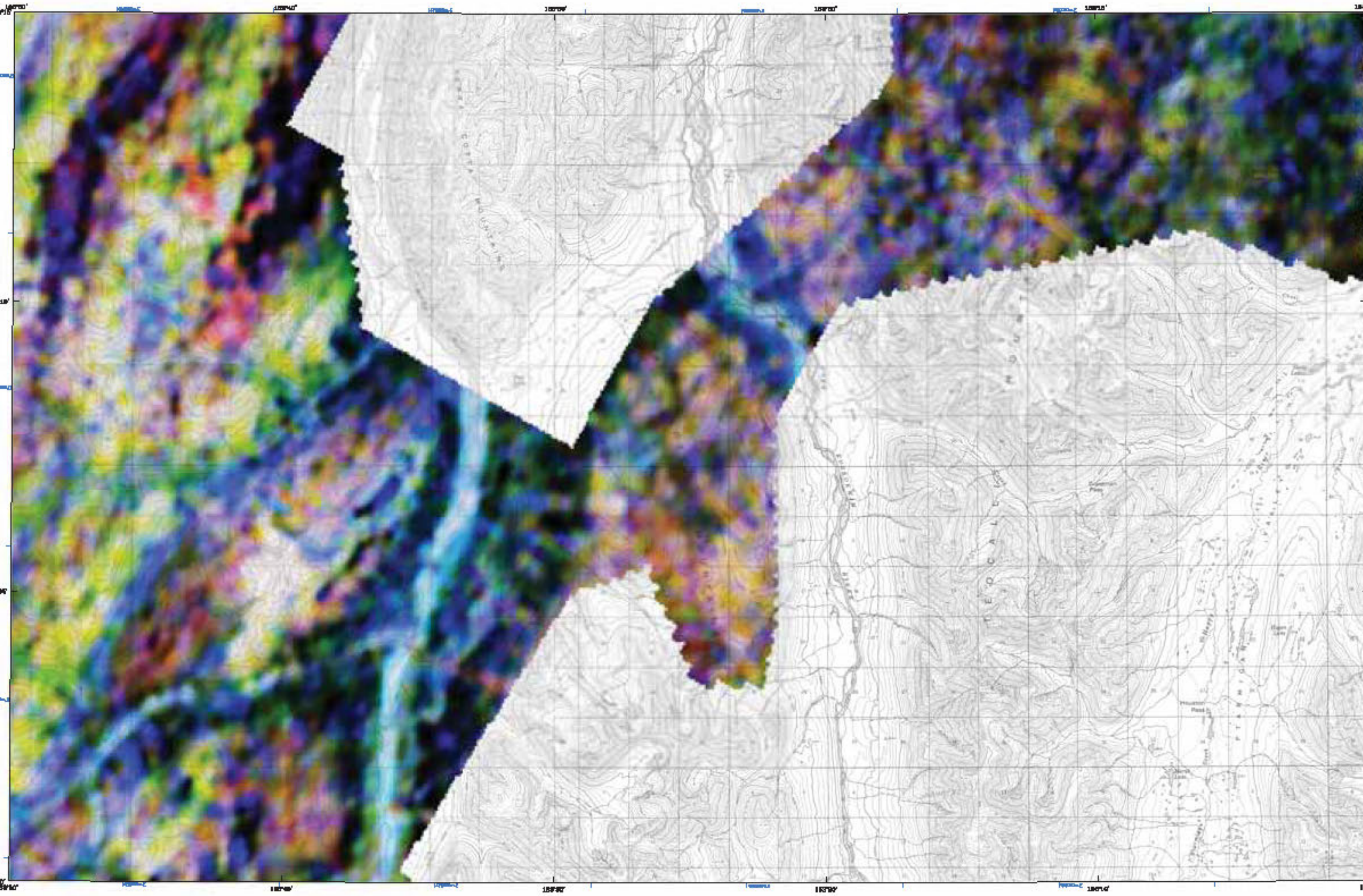


SCALE 1:63,360

1 0 1 2 3 4 MILES

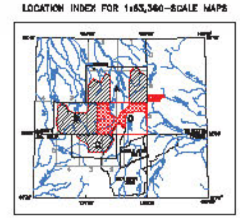
1 0 1 2 3 4 5 KILOMETERS

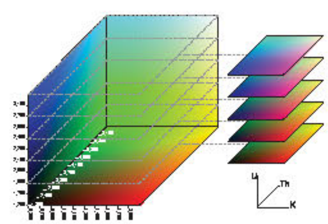
# RADIOELEMENT - TERNARY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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


LOCATION INDEX FOR 1:63,360-SCALE MAPS






### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMV Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate. A Radiation Solutions RS-500 gamma-ray spectrometer was the primary instrument used, however an Exploranium GR-820 spectrometer was used for some flights. Both were configured with 16.8L (1024 cubic inches) of main (downward) NaI crystal detector, and 4.2L (256 cubic inches) of upward looking (radon) detector. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 keV), uranium (1660–1860 keV), potassium (1370–1570 keV), total radioactivity (400–2810 keV) and cosmic radiation (3000–>6000 keV). Counts from the radon detector were recorded in the radon window (1660–1860 keV). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures 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 final grids contained in this publication.

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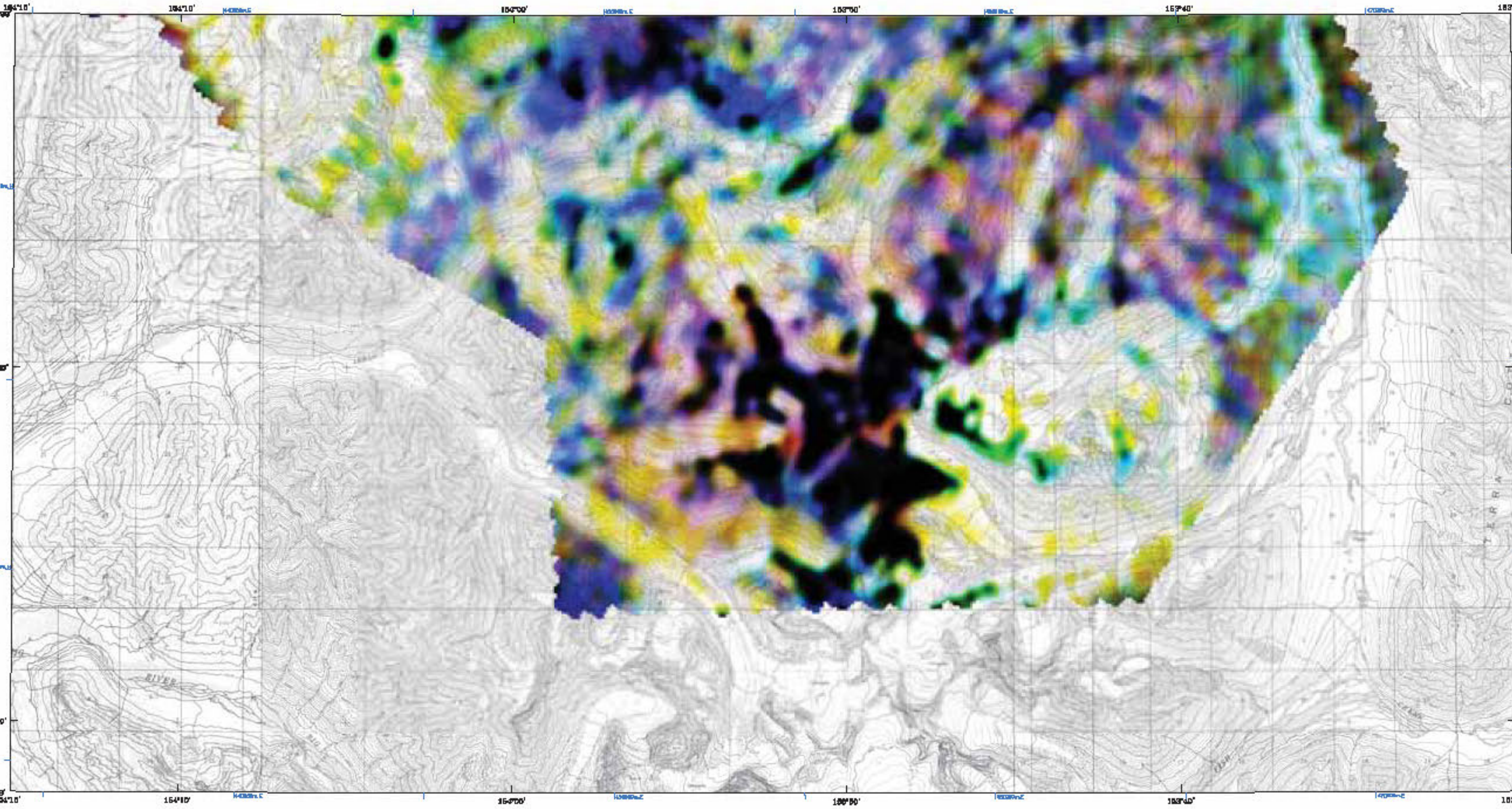
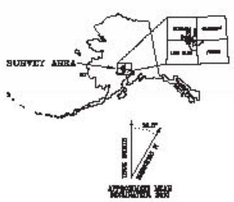



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

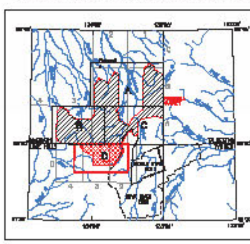


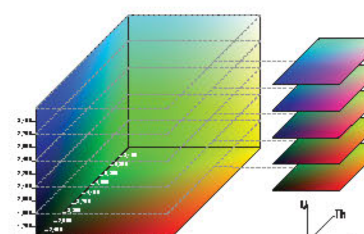

# RADIOELEMENT - TERNARY WITH TOPOGRAPHY, FAREWELL SURVEY AREA, SOUTH-CENTRAL ALASKA

## PARTS OF MCGRATH AND LIME HILLS QUADRANGLES

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

LOCATION INDEX FOR 1:63,360-SCALE MAPS






### DESCRIPTIVE NOTES

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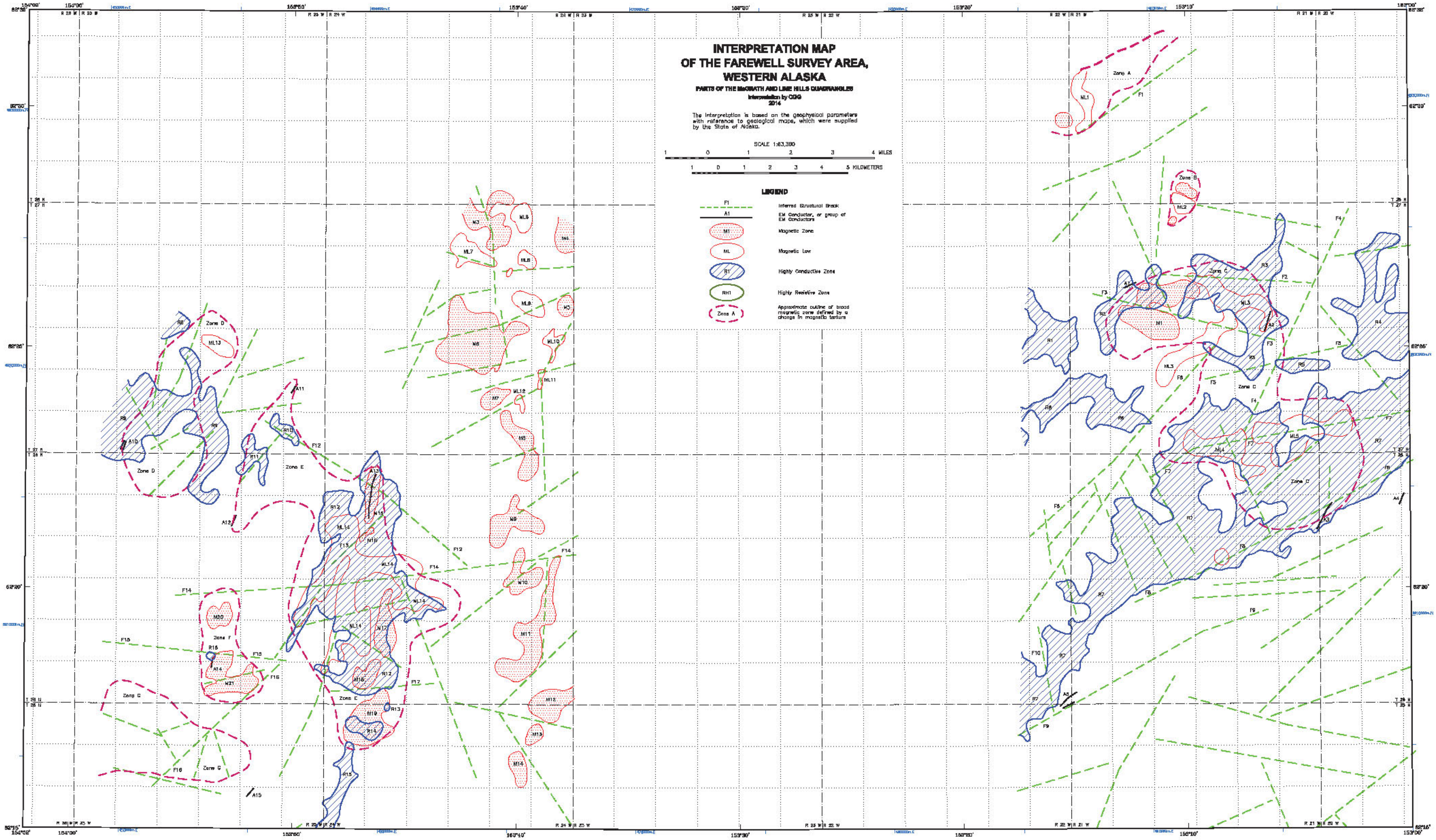
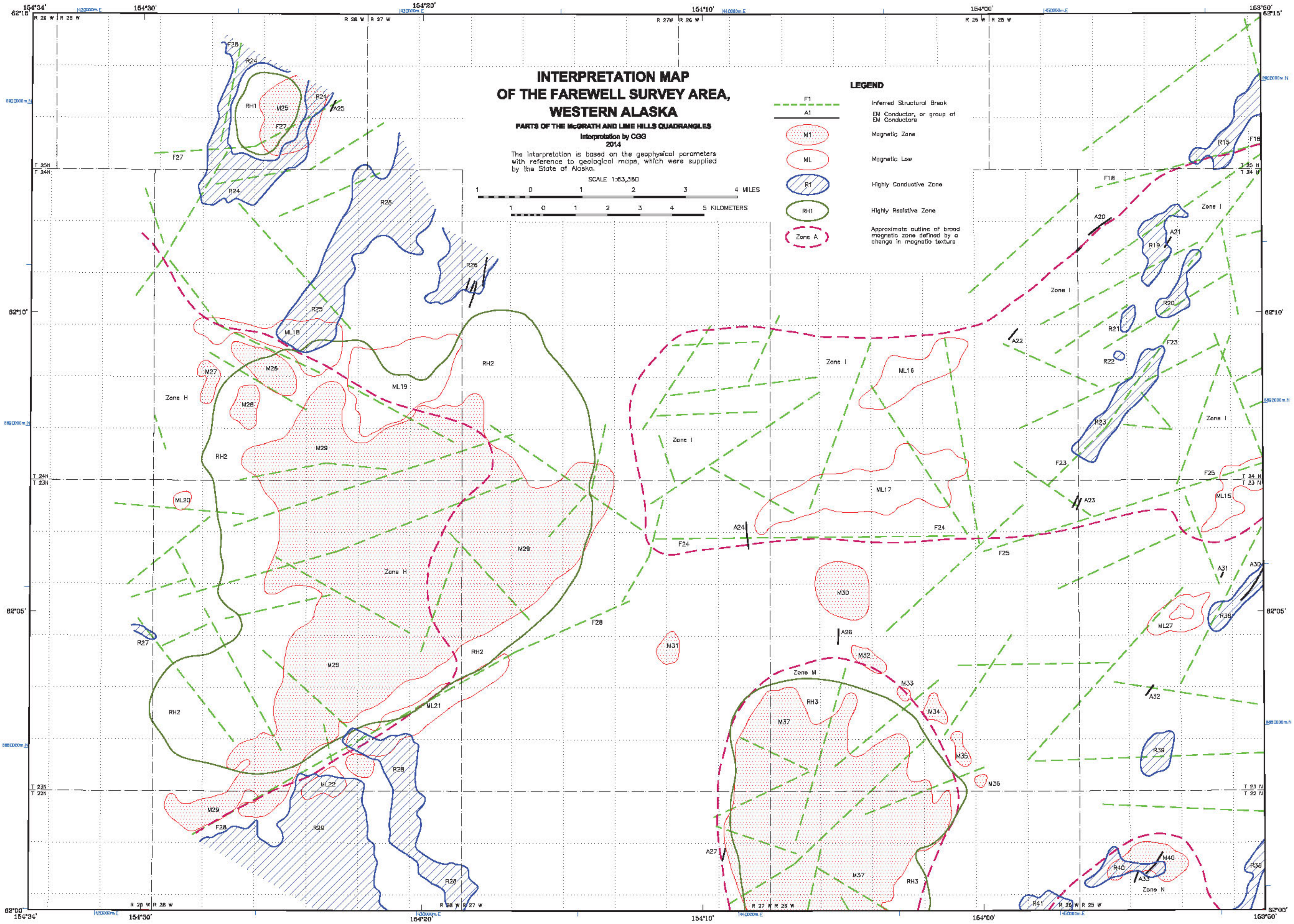

INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
Interpretation by CGG
2014
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
F1
Inferred Structural Break
A1
EM Conductor, or group of EM Conductors
M1
Magnetic Zone
ML
Magnetic Low
R1
Highly Conductive Zone
RH1
Highly Resistive Zone
Zone A
Approximate outline of broad magnetic zone defined by a change in magnetic texture


INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
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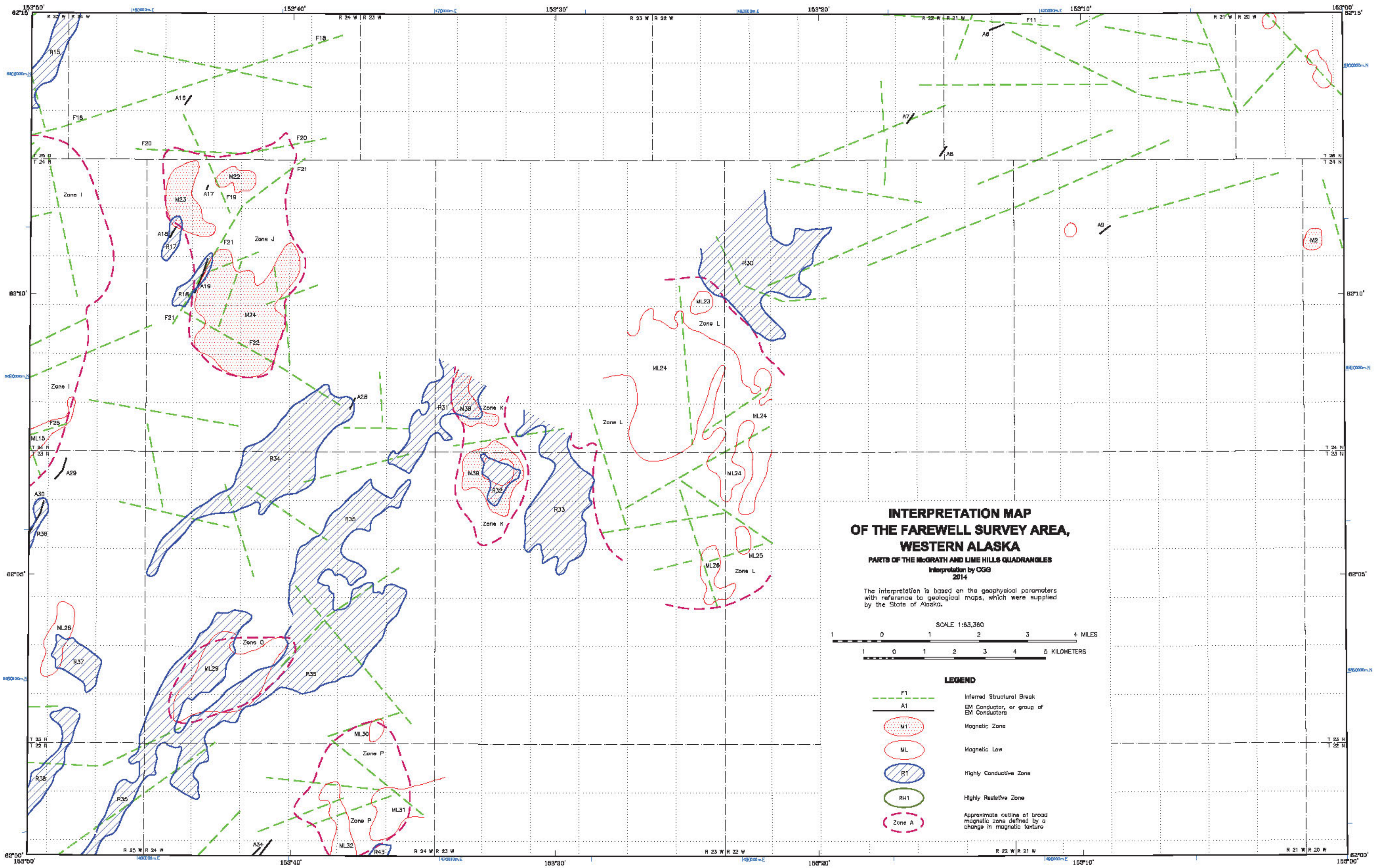
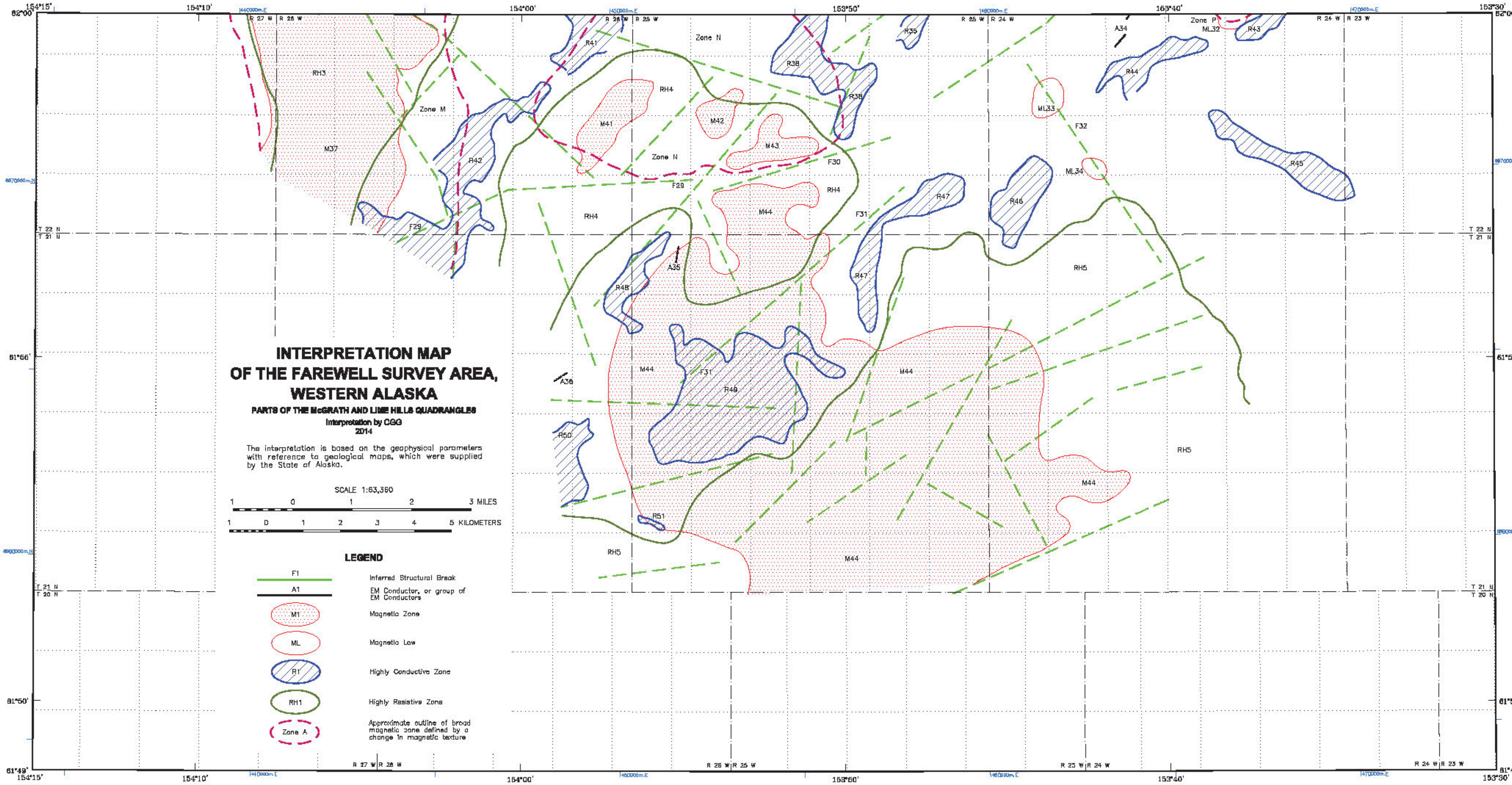
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
F1 Inferred Structural Break
A1 EM Conductor, or group of EM Conductors
M1 Magnetic Zone
ML Magnetic Low
R1 Highly Conductive Zone
RH1 Highly Resistive Zone
Zone A Approximate outline of broad magnetic zone defined by a change in magnetic texture
154°34'
154°30'
154°20'
154°10'
154°00'
153°50'
62°15'
62°10'
62°05'
62°00'
Zone H
Zone I
Zone M
Zone N
T 25 N
T 24 N
T 23 N
T 22 N
R 29 W
R 28 W
R 27 W
R 26 W
R 25 W


INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
Interpretation by CGG
2014
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
Inferred Structural Break
EM Conductor, or group of EM Conductors
Magnetic Zone
Magnetic Low
Highly Conductive Zone
Highly Resistive Zone
Approximate outline of broad magnetic zone defined by a change in magnetic texture
153°50'
153°40'
153°30'
153°20'
153°10'
153°00'
62°15'
62°10'
62°05'
62°00'
Zone I
Zone J
Zone K
Zone L
Zone O
Zone P
M22
M23
M24
M2
ML24
ML25
ML26
ML29
ML30
ML31
ML32
R15
R17
R18
R30
R31
R32
R33
R34
R35
R36
R37
R38
R43
A16
A17
A18
A19
A28
A29
A30
A34
A7
A8
A9
F18
F19
F20
F21
F22
F25
F11




# INTERPRETATION MAP OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

**PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES**

**Interpretation by CGG**

**2014**

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

SCALE 1:63,360

1 0 1 2 3 MILES

1 0 1 2 3 4 5 KILOMETERS

## LEGEND

| | |
|---|---|
| F1 | Inferred Structural Break |
| A1 | EM Conductor, or group of EM Conductors |
| M1 | Magnetic Zone |
| ML | Magnetic Low |
| R1 | Highly Conductive Zone |
| RH1 | Highly Resistive Zone |
| Zone A | Approximate outline of broad magnetic zone defined by a change in magnetic texture |

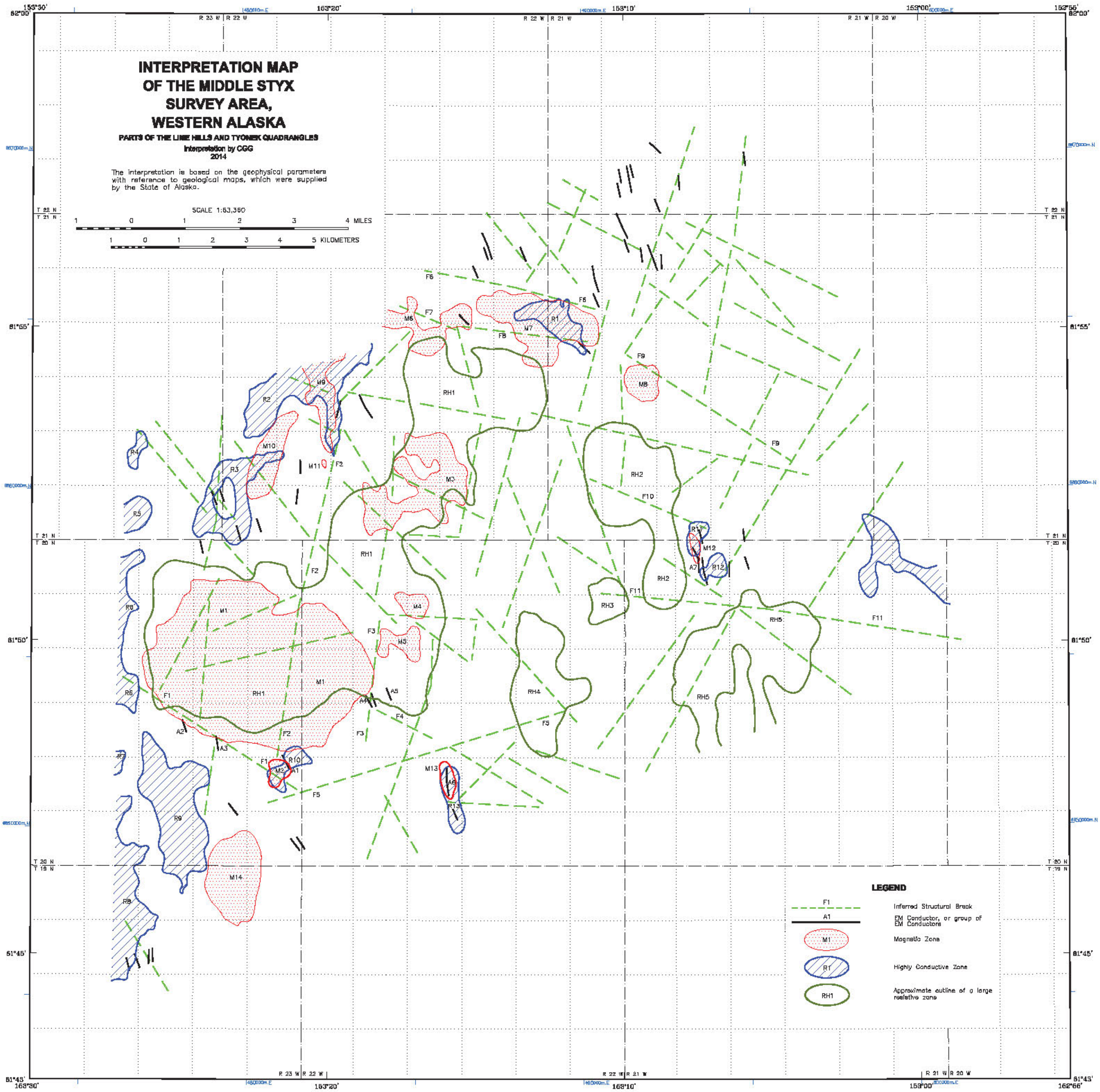
# INTERPRETATION MAP OF THE MIDDLE STYX SURVEY AREA, WESTERN ALASKA

PARTS OF THE LIME HILLS AND TYONEK QUADRANGLES

Interpretation by CGG
2014

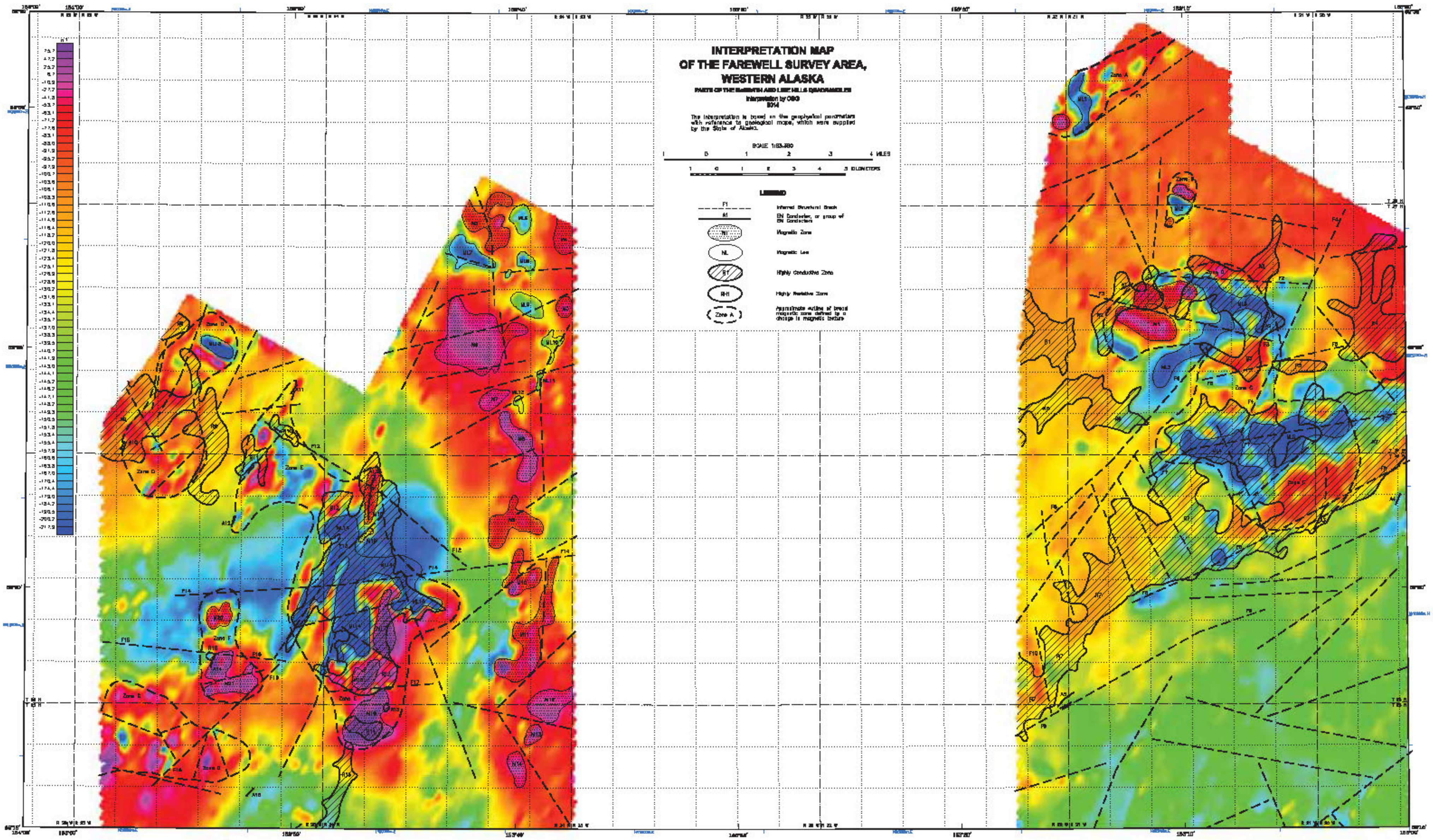
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.

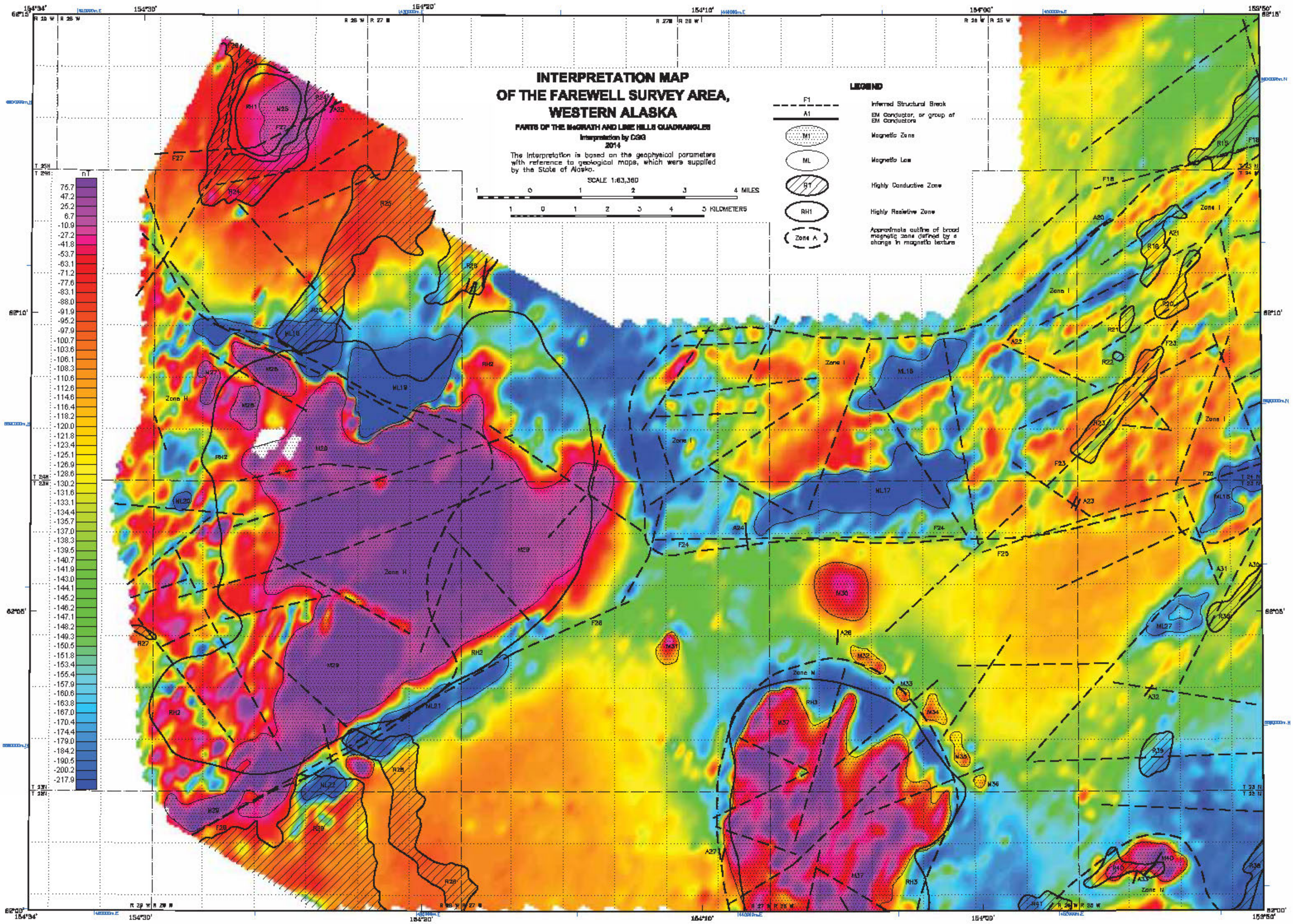
SCALE 1:63,360

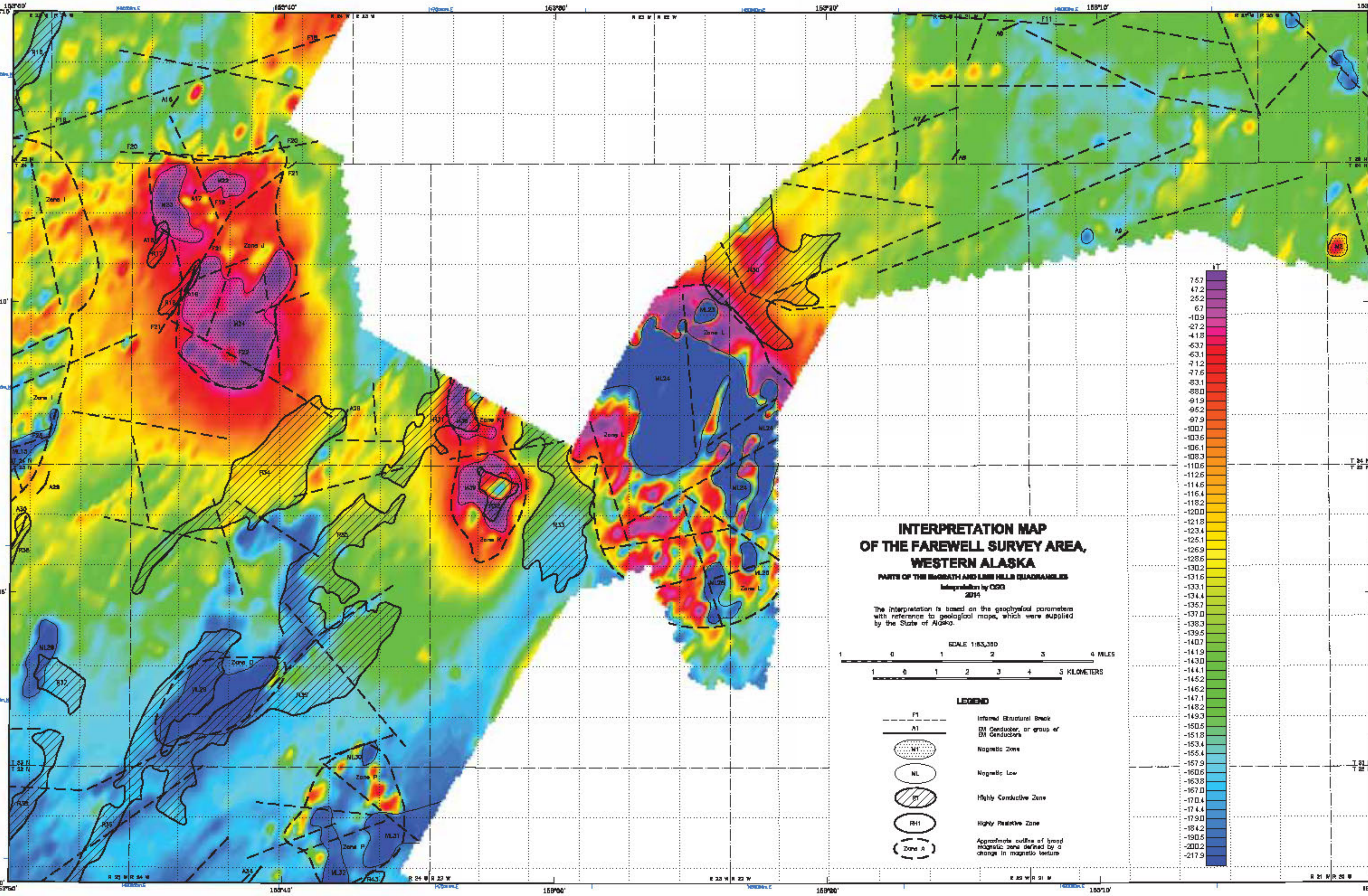



## LEGEND

| | |
|---|---|
| F1 | Inferred Structural Break |
| A1 | EM Conductor, or group of EM Conductors |
| M1 | Magnetic Zone |
| R1 | Highly Conductive Zone |
| RH1 | Approximate outline of a large resistive zone |


INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
Interpretation by CGG
2014
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
MILES
KILOMETERS
LEGEND
Inferred Structural Break
EM Conductor, or group of EM Conductors
Magnetic Zone
Magnetic Low
Highly Conductive Zone
Highly Resistive Zone
Zone A
Approximate outline of broad magnetic zone defined by a change in magnetic texture

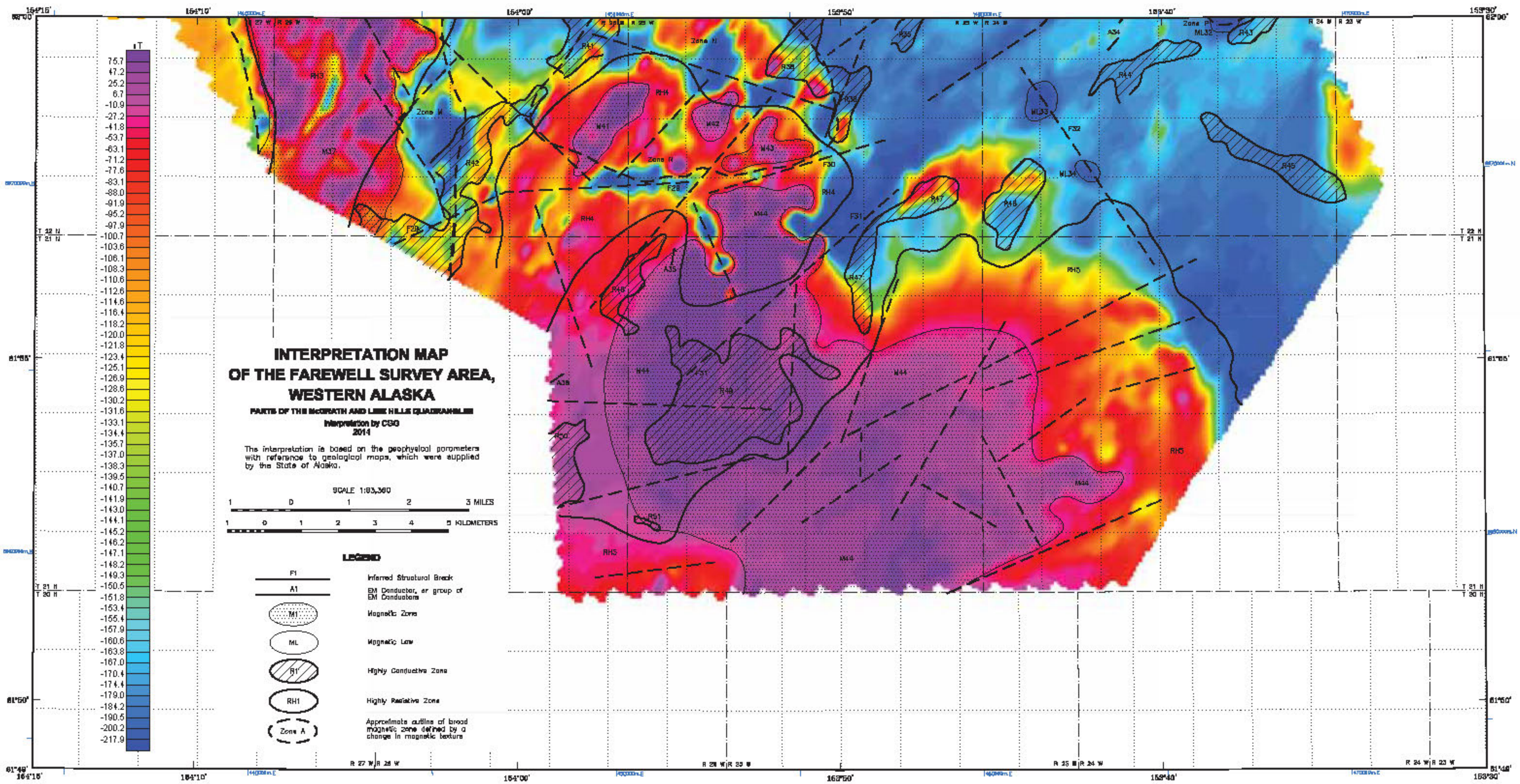

INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
Interpretation by CGG
2014
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
F1
Inferred Structural Break
A1
EM Conductor, or group of EM Conductors
M1
Magnetic Zone
ML
Magnetic Low
RT
Highly Conductive Zone
RH1
Highly Resistive Zone
Zone A
Approximate outline of broad magnetic zone defined by a change in magnetic texture
nT
75.7
47.2
25.2
6.7
-10.9
-27.2
-41.8
-53.7
-63.1
-71.2
-77.6
-83.1
-88.0
-91.9
-95.2
-97.9
-100.7
-103.6
-106.1
-108.3
-110.6
-112.6
-114.6
-116.4
-118.2
-120.0
-121.8
-123.4
-125.1
-126.9
-128.6
-130.2
-131.6
-133.1
-134.4
-135.7
-137.0
-138.3
-139.5
-140.7
-141.9
-143.0
-144.1
-145.2
-146.2
-147.1
-148.2
-149.3
-150.5
-151.8
-153.4
-155.4
-157.9
-160.6
-163.8
-167.0
-170.4
-174.4
-179.0
-184.2
-190.5
-200.2
-217.9
154°34'
154°30'
154°20'
154°10'
154°00'
153°50'
62°15'
62°10'
62°05'
62°00'

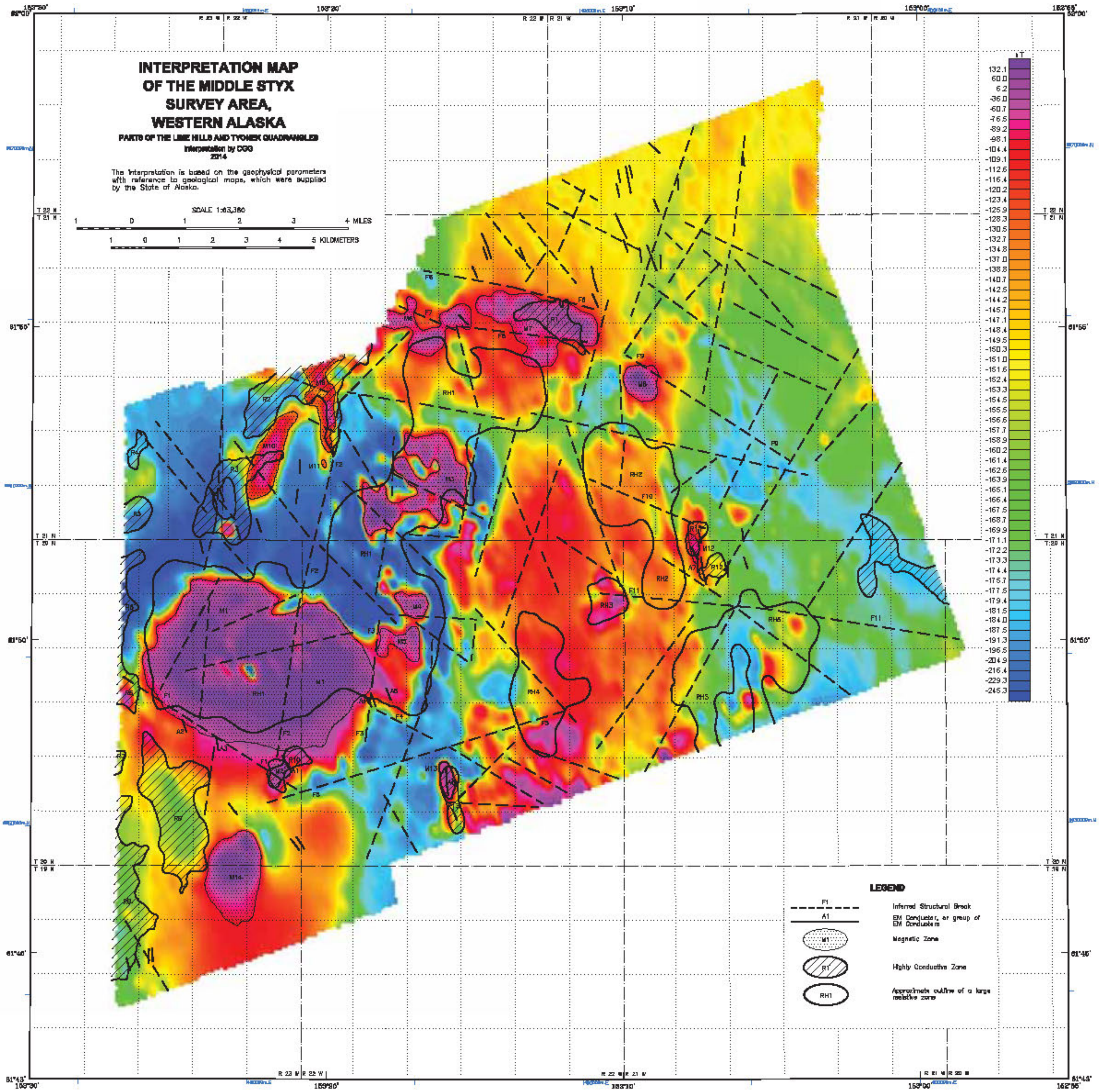

INTERPRETATION MAP
OF THE FAREWELL SURVEY AREA,
WESTERN ALASKA
PARTS OF THE McGRATH AND LIME HILLS QUADRANGLES
Interpretation by CGG
2014
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
F1
Inferred Structural Break
A1
EM Conductor, or group of EM Conductors
M1
Magnetic Zone
ML
Magnetic Low
R1
Highly Conductive Zone
RH1
Highly Resistive Zone
Zone A
Approximate outline of broad magnetic zone defined by a change in magnetic texture
nT
75.7
47.2
25.2
6.7
-10.9
-27.2
-41.8
-53.7
-63.1
-71.2
-77.6
-83.1
-88.0
-91.9
-95.2
-97.9
-100.7
-103.6
-106.1
-108.3
-110.5
-112.6
-114.6
-116.4
-118.2
-120.0
-121.8
-123.4
-125.1
-126.9
-128.6
-130.2
-131.6
-133.1
-134.4
-135.7
-137.0
-138.3
-139.5
-140.7
-141.9
-143.0
-144.1
-145.2
-146.2
-147.1
-148.2
-149.3
-150.5
-151.8
-153.4
-155.4
-157.9
-160.6
-163.8
-167.0
-170.4
-174.4
-179.0
-184.2
-190.5
-200.2
-217.9

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2011-4-1I

LARGE FIGURE 14

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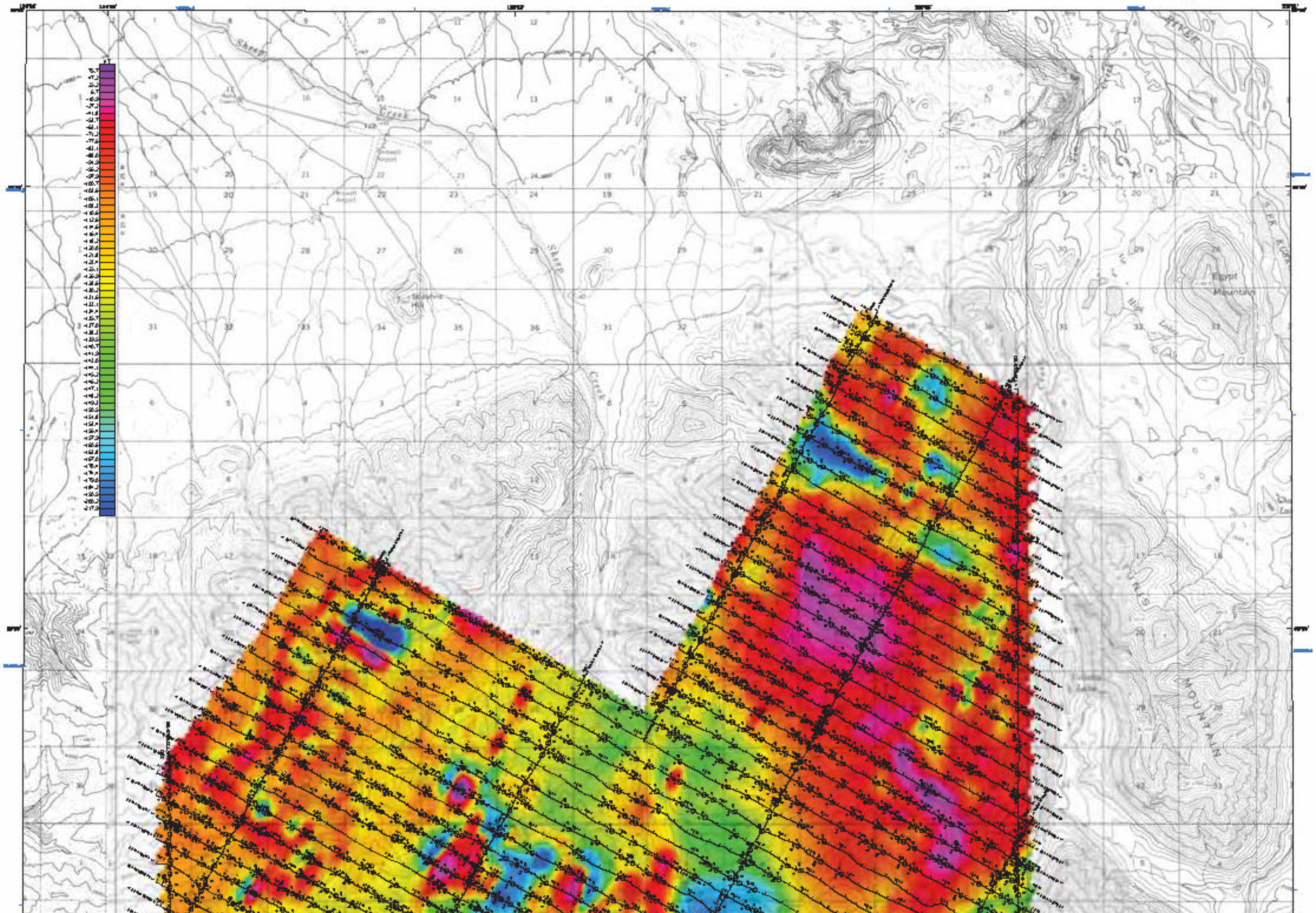
MILES
KILOMETERS
LEGEND
F1
Inferred Structural Break
A1
EM Conductor, or group of EM Conductors
M1
Magnetic Zone
R1
Highly Conductive Zone
RH1
Approximate outline of a large resistive zone
nT
132.1
60.0
6.2
-36.0
-60.7
-76.5
-89.2
-98.1
-104.4
-109.1
-112.6
-116.4
-120.2
-123.4
-125.9
-128.3
-130.5
-132.7
-134.8
-137.0
-138.8
-140.7
-142.5
-144.2
-145.7
-147.1
-148.4
-149.5
-150.3
-151.0
-151.6
-152.4
-153.3
-154.5
-155.5
-156.6
-157.7
-158.9
-160.2
-161.4
-162.6
-163.9
-165.1
-166.4
-167.5
-168.7
-169.9
-171.1
-172.2
-173.3
-174.4
-175.7
-177.5
-179.4
-181.5
-184.0
-191.3
-196.5
-204.9
-216.4
-229.3
-245.3
T 22 N
T 21 N
T 20 N
T 19 N
61°55'
61°50'
61°45'
61°43'
153°20'
153°10'
153°00'
152°55'
RH1
RH2
RH3
RH4
RH5
M1
M14
F11



# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

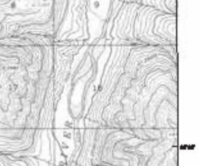
PARTS of McGRATH B-2, B-3, C-2 and C-3 QUADRANGLES

by

Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.

2014

LOCATION INDEX OF 1:31,680-SCALE MAPS



## DESCRIPTIVE NOTES

## ELECTROMAGNETIC ANOMALIES

## ELECTROMAGNETICS

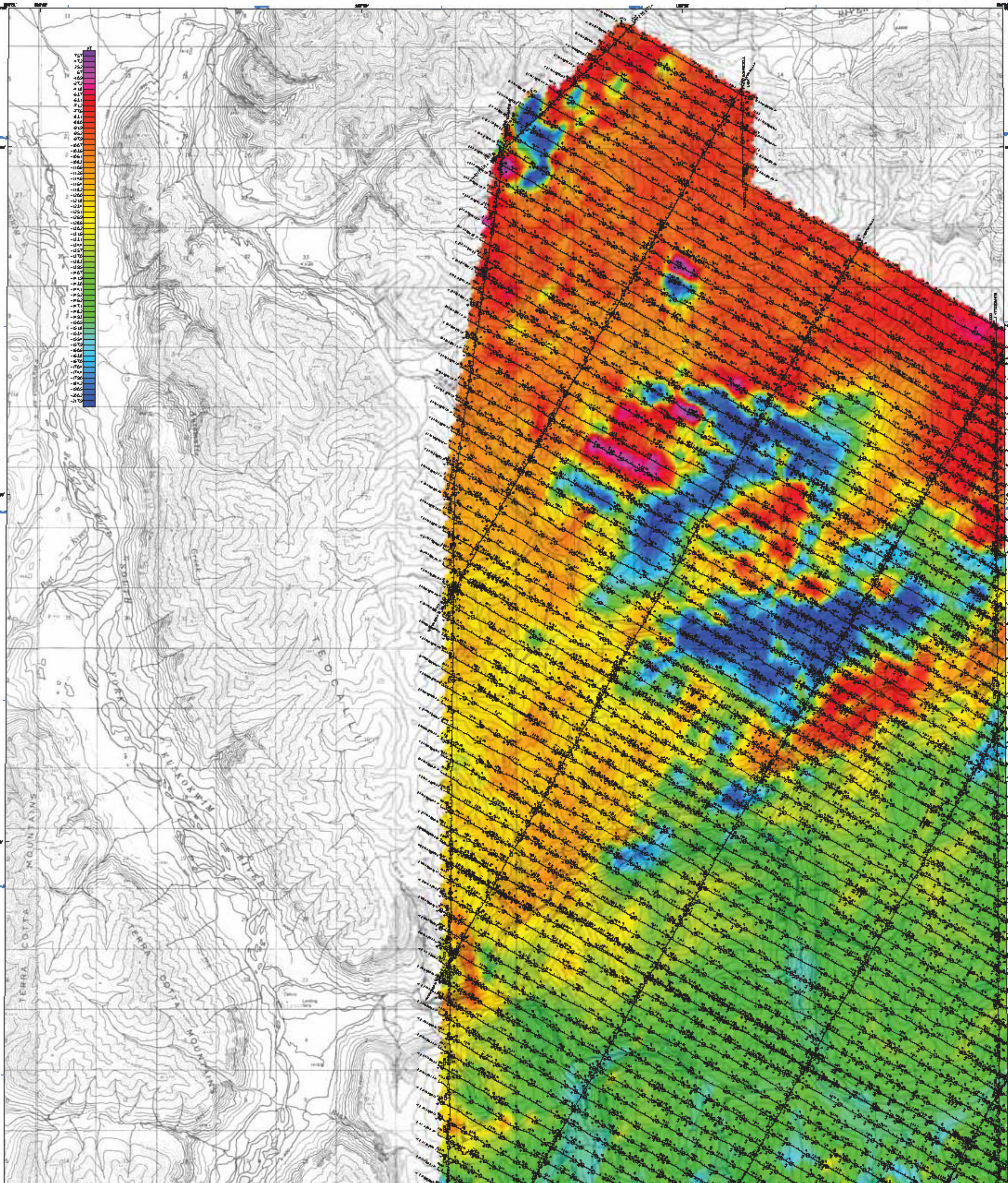
## RESIDUAL MAGNETIC FIELD

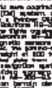
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer ... 2010, updated for date of flight and elevation ... Akima (1970) technique. All grids were then resampled ... produce the maps and final grids contained in this publication.

## 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 the area were acquired and processed by DGGS in 2012, 2013, and 2014. ... Alaska Airborne Geophysical and Geological Mineral Inventory Program. ...

All data and maps produced to date from this survey ... College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). ...

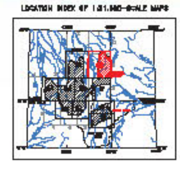


# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of McGRATH B-1, B-2, C-1 and C-2 QUADRANGLES

by
Laurel E. Burns, DGGS and Fugro GeoServices, Inc.
2014




### DESCRIPTIVE NOTES

The geophysical data were acquired with a [illegible] Electromagnetic (EM) system, a Fugro D1344 magnetometer, [illegible] and a Radiation Solutions RS-500 gamma-ray spectrometer. [illegible] The EM and magnetic sensors were flown at a height of 100 feet [illegible] were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along [illegible] 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 OEMV-3 Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone [illegible]) spheroid, 1927 North American datum using a central meridian (CM) of [illegible], a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES

[illegible]

### ELECTROMAGNETICS

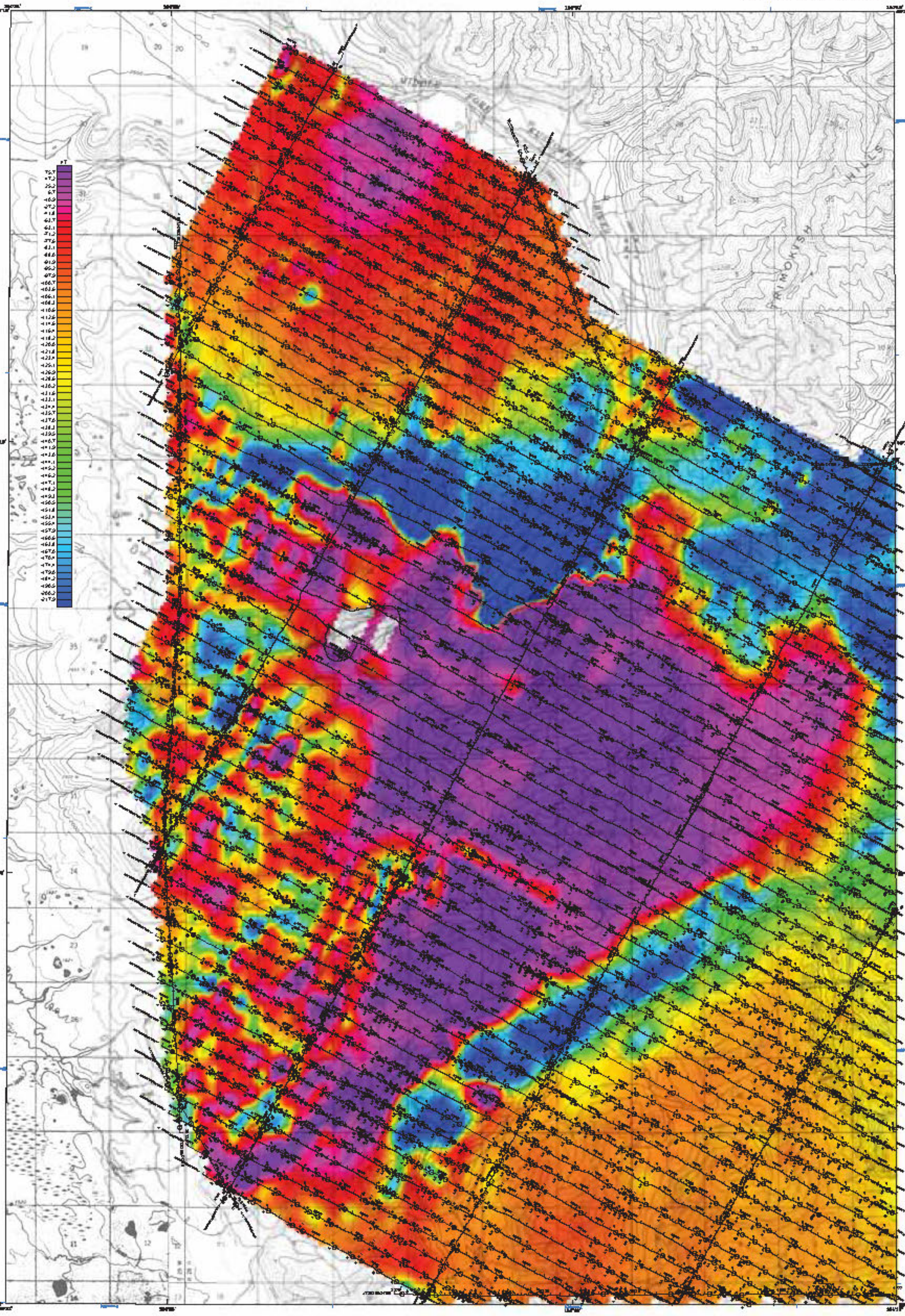
[illegible]

### RESIDUAL MAGNETIC FIELD

[illegible]

### SURVEY HISTORY

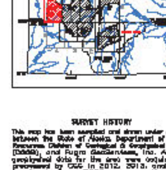
[illegible]



SCALE 1:31,680



LOCATION INDEX OF 1:31,680–SCALE MAPS



# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of McGRATH A-3 and A-4 QUADRANGLES

by
Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.
2014

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet; the gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along N47-8E (127) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.2 seconds using post-flight differential positioning to a relative accuracy of better than 3 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES

[illegible]

### ELECTROMAGNETICS

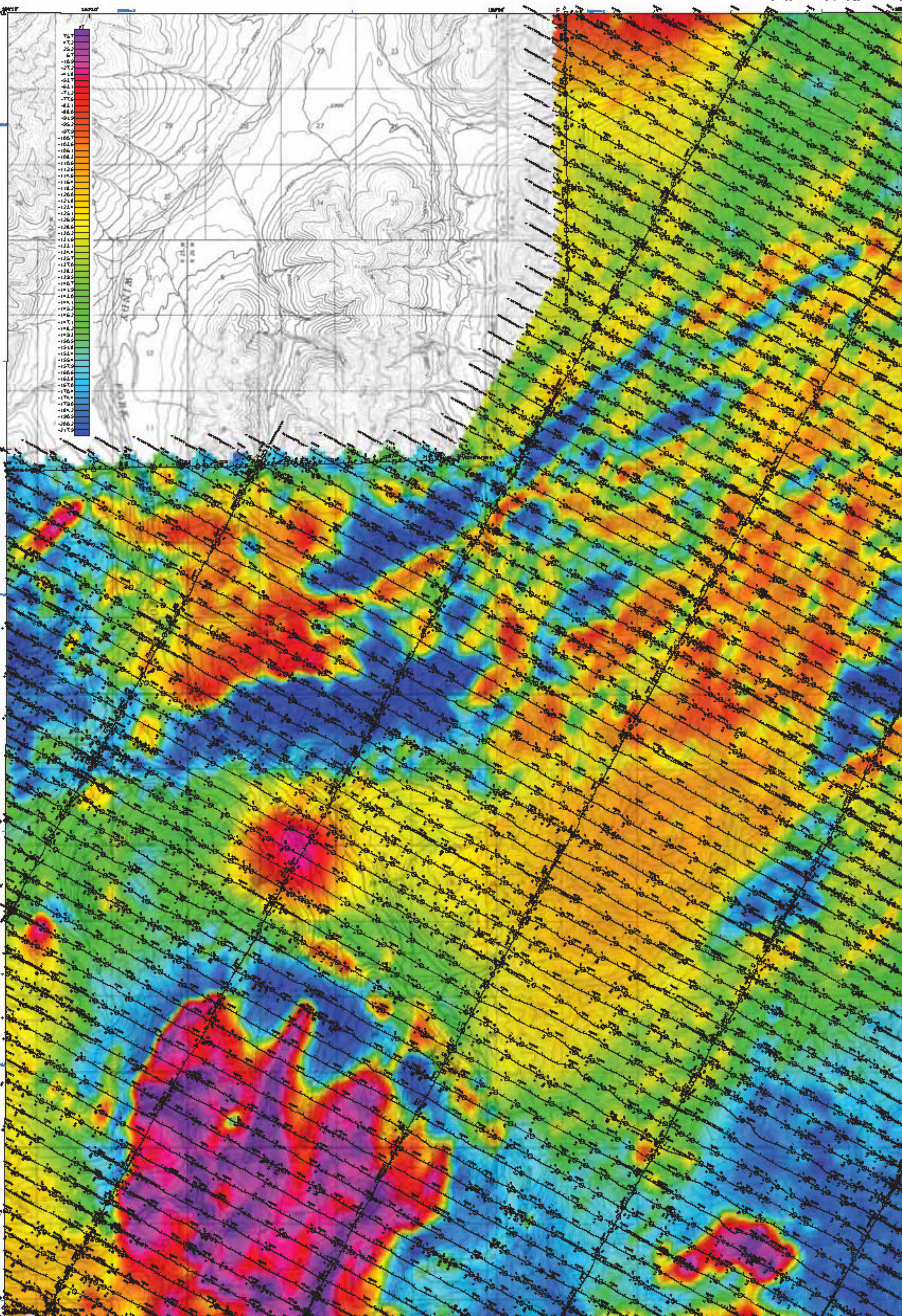
[illegible]

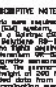
### RESIDUAL MAGNETIC FIELD

[illegible]

### SURVEY HISTORY

[illegible]



LOCATION INDEX OF 1:63,360-SCALE MAPS

# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of McGRATH A-2 and A-3 QUADRANGLES

by
Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.
2014

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a RadiaTion Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (150°) 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 OEM5-G2L Global Positioning System was used for navigation. [illegible] better than 3 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES

| Anomaly | Conductance |
|---|---|
| | >100 siemens |
| | 50-100 siemens |
| | 20-50 siemens |
| | 10-20 siemens |
| | 5-10 siemens |
| | 1-5 siemens |
| | < 1 siemens |
| | Questionable anomaly |
| | EM magnetic response |
| | Culture |

### ELECTROMAGNETICS

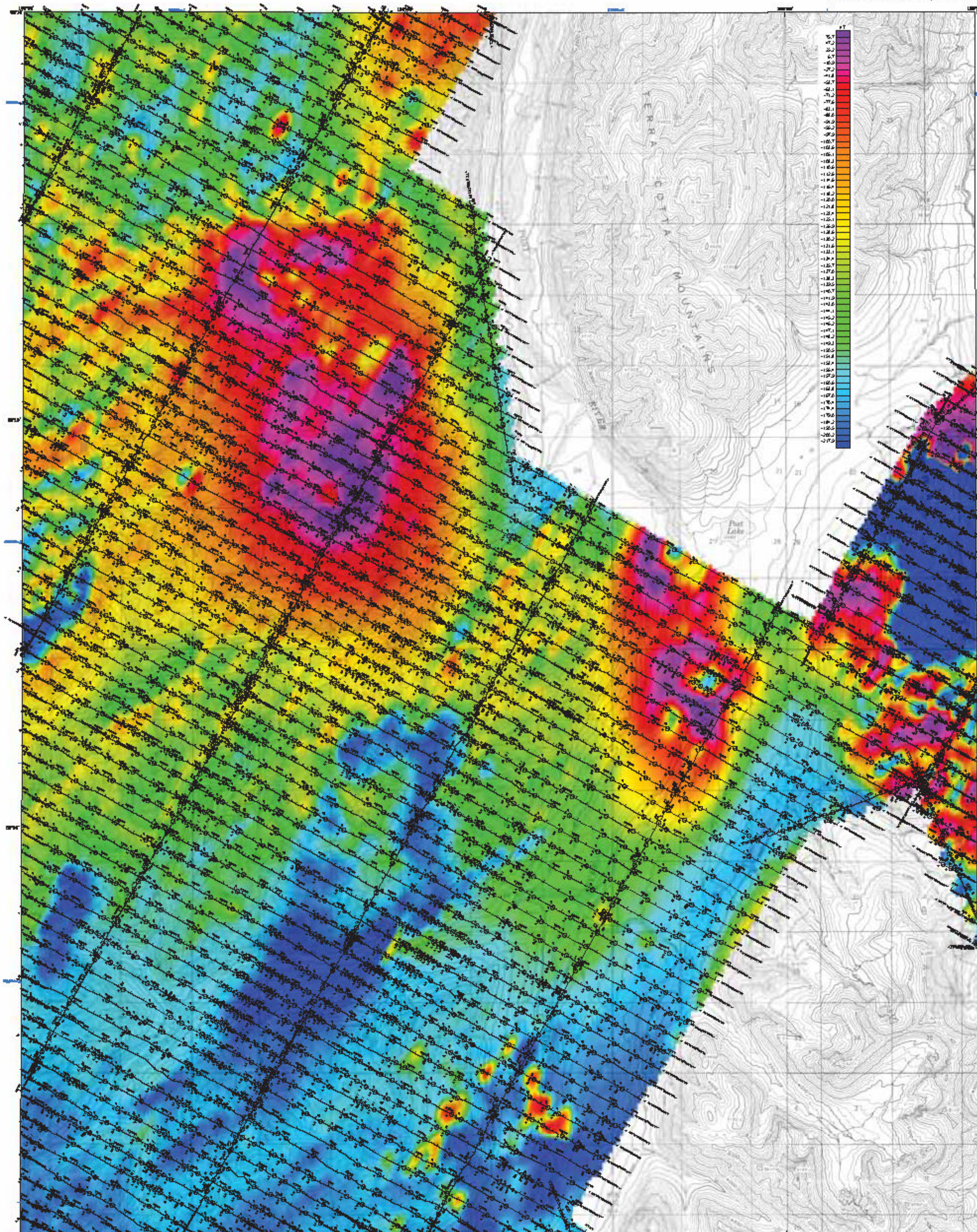
[illegible]

### RESIDUAL MAGNETIC FIELD

[illegible]

### 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 the area were acquired and processed by CGG in 2012, 2013, and 2014. [illegible]




SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

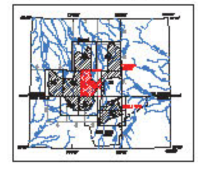
0.5 0 0.5 1 1.5 2 2.5 KILOMETERS


# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of McGRATH A-1 and A-2 QUADRANGLES

by
Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.
2014

LOCATION INDEX OF 1:31,680-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (153°) 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 OEMV-3RL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES

Line indicates the conductor has a thickness >10 m
Dip direction
Magnetic correlation in nT

| Anomaly | Conductance |
|---|---|
| | >100 siemens |
| | 50–100 siemens |
| | 20–50 siemens |
| | 10–20 siemens |
| | 5–10 siemens |
| | 1–5 siemens |
| | < 1 siemens |
| | Questionable anomaly |
| | EM magnetite response |
| | Culture |

Anomaly identifier
Interpretation symbol

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

### ELECTROMAGNETICS

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

### RESIDUAL MAGNETIC FIELD

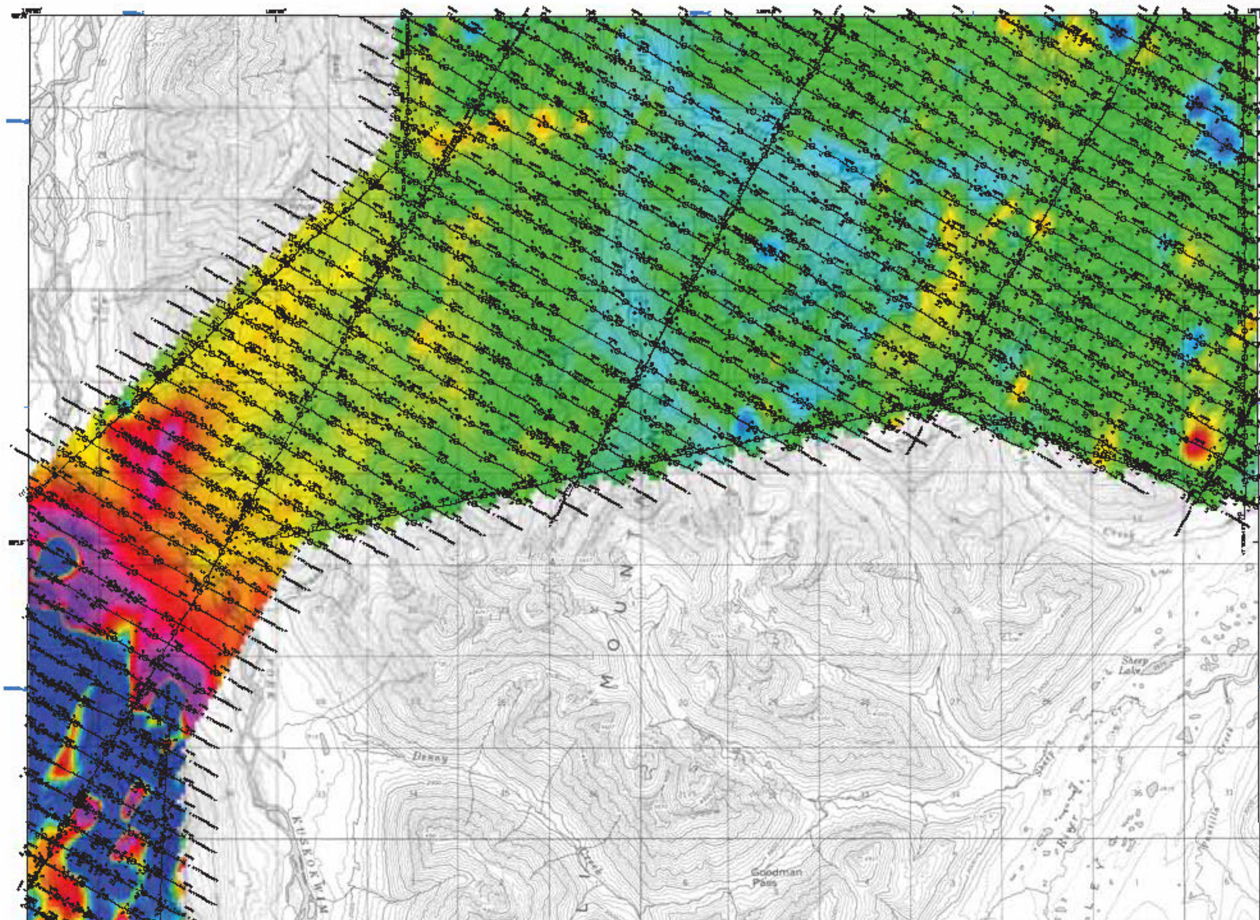
The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

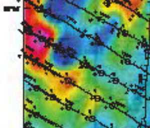
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by DGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.




SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

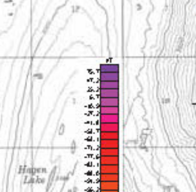
0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PART of McGRATH A-1 QUADRANGLE

by
Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.
2014

LOCATION INDEX OF 1:31,680-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the [illegible] data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (155°) 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 OEMV-3RL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 3) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES

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

### ELECTROMAGNETICS

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

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

### SURVEY HISTORY

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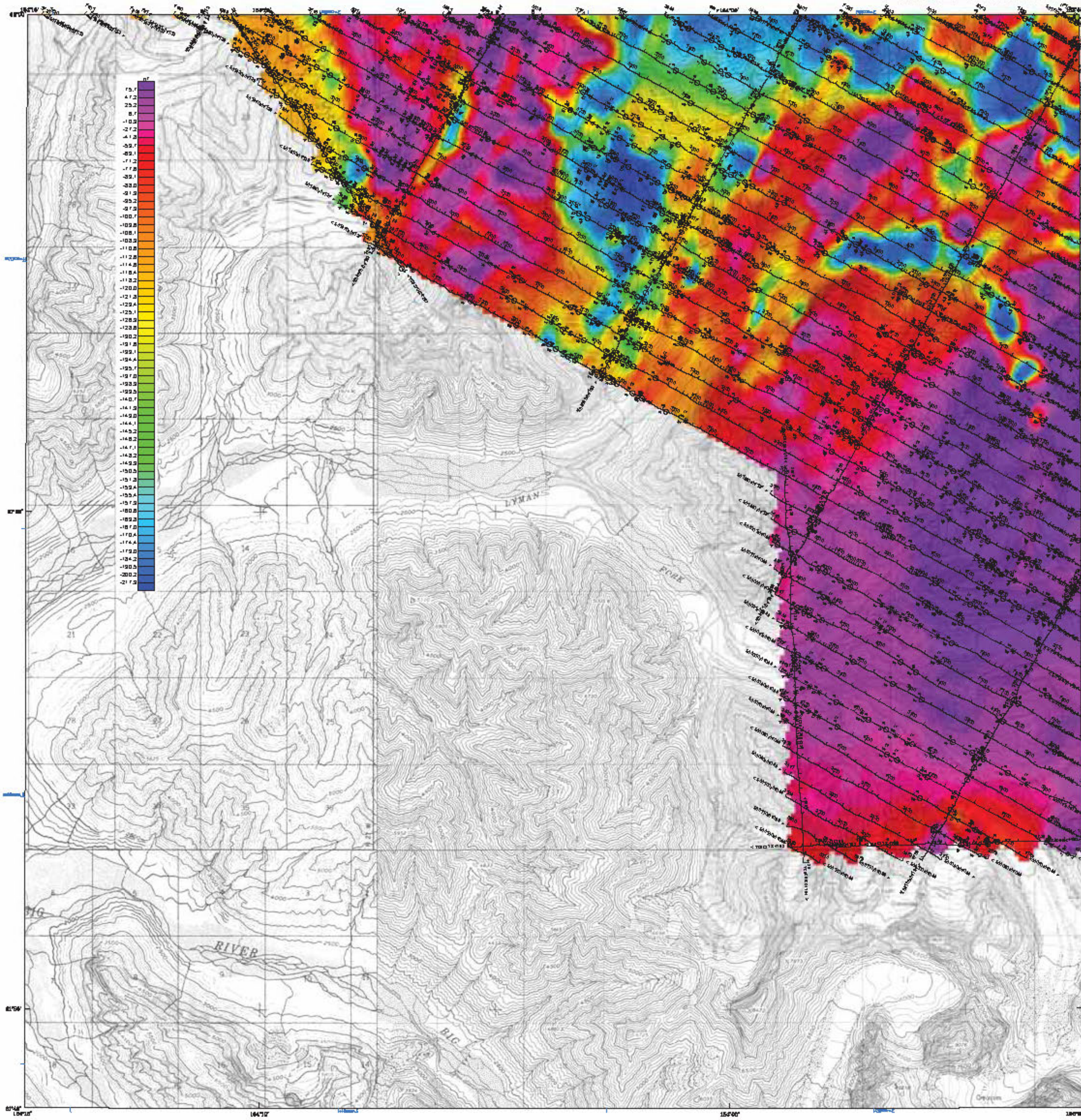
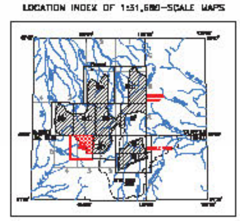


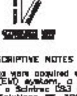

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

LOCATION INDEX OF 1:31,680-SCALE MAPS



# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of LIME HILLS D-3 and D-4 QUADRANGLES

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

### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 DENS-02L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

### ELECTROMAGNETIC ANOMALIES


| Anomaly | Conductance |
|---|---|
| ● | >100 siemens |
| ◓ | 50-100 siemens |
| ◓ | 20-50 siemens |
| ⊕ | 10-20 siemens |
| ⊕ | 5-10 siemens |
| ○ | 1-5 siemens |
| ○ | < 1 siemens |
| ✳ | Questionable anomaly |
| △ | EM magnetic response |
| □ | Culture |


| Interpretive symbol | Conductor model |
|---|---|
| B | Bedrock conductor |
| D | Narrow bedrock conductor ("thin dike") |
| S | Conductive cover ("horizontal thin sheet") |
| H | Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half-space") |
| E | Edge of broad conductor ("edge of half space") |
| L | Culture, e.g. power line, metal building or fence |
| M | Magnetite |
| "?" | Indicates some uncertainty as to the most appropriate EM source model, but does not question the validity of the EM anomaly. |

### ELECTROMAGNETICS

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

### RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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. 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.

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

### SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2012, 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 publication. The project was funded by the Alaska State Legislature as part of the Alaska Strategic and Critical Minerals Assessment project, which is part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program. Cook Inlet Region, Inc. (CIRI) contributed funding for a portion of the area.

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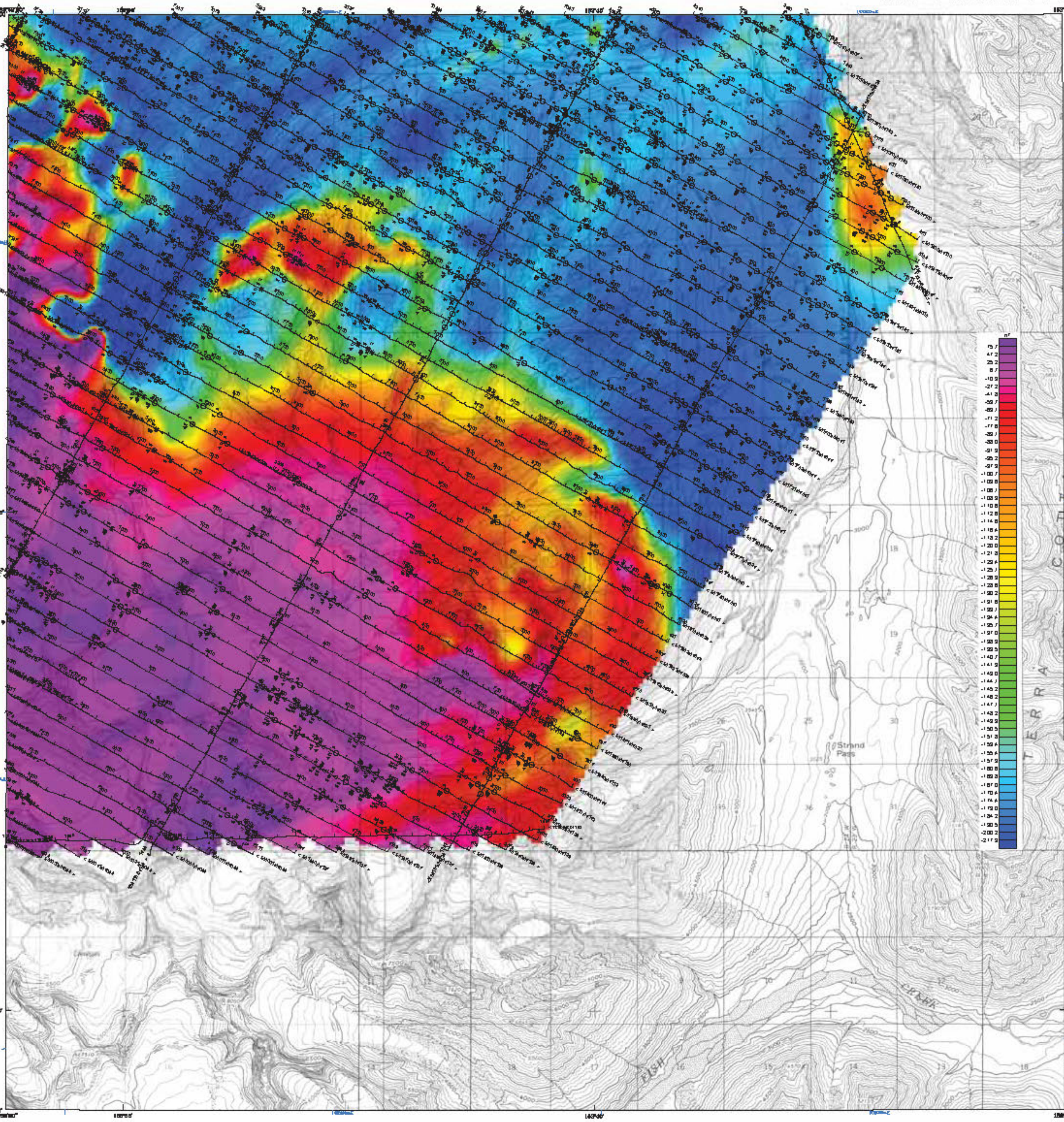
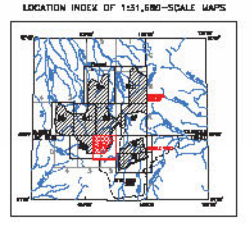



# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE FAREWELL SURVEY AREA, WESTERN ALASKA

## PARTS of LIME HILLS D-2 and D-3 QUADRANGLES

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

LOCATION INDEX OF 1:31,680-SCALE MAPS



## DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor, and a Radiation Solutions RS-500 gamma-ray spectrometer. Some flights acquired the radiometric data with an Exploranium GR-820 spectrometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometers were flown at a height of 200 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (120°) 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 OEM5-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

## ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m

Dip direction

Magnetic correlation in nT

| Anomaly | Conductance |
|---|---|
| ● | >100 siemens |
| ● | 50–100 siemens |
| ● | 20–50 siemens |
| ● | 10–20 siemens |
| ● | 5–10 siemens |
| ○ | 1–5 siemens |
| ○ | < 1 siemens |
| ⌗ | Questionable anomaly |
| △ | EM magnetite response |
| □ | Culture |

Anomaly identifier

Interpretive symbol

| Interpretive symbol | Conductor model |
|---|---|
| B | Bedrock conductor |
| D | Narrow bedrock conductor ("thin dike") |
| S | Conductive cover ("horizontal thin sheet") |
| H | Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half-space") |
| E | Edge of broad conductor ("edge of half space") |
| L | Culture, e.g. power line, metal building or fence |
| M | Magnetite |
| "?" | Indicates some uncertainty as to the most appropriate EM source model, but does not question the validity of the EM anomaly. |

## ELECTROMAGNETICS

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

## RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed 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 subtraction of 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 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

## SURVEY HISTORY

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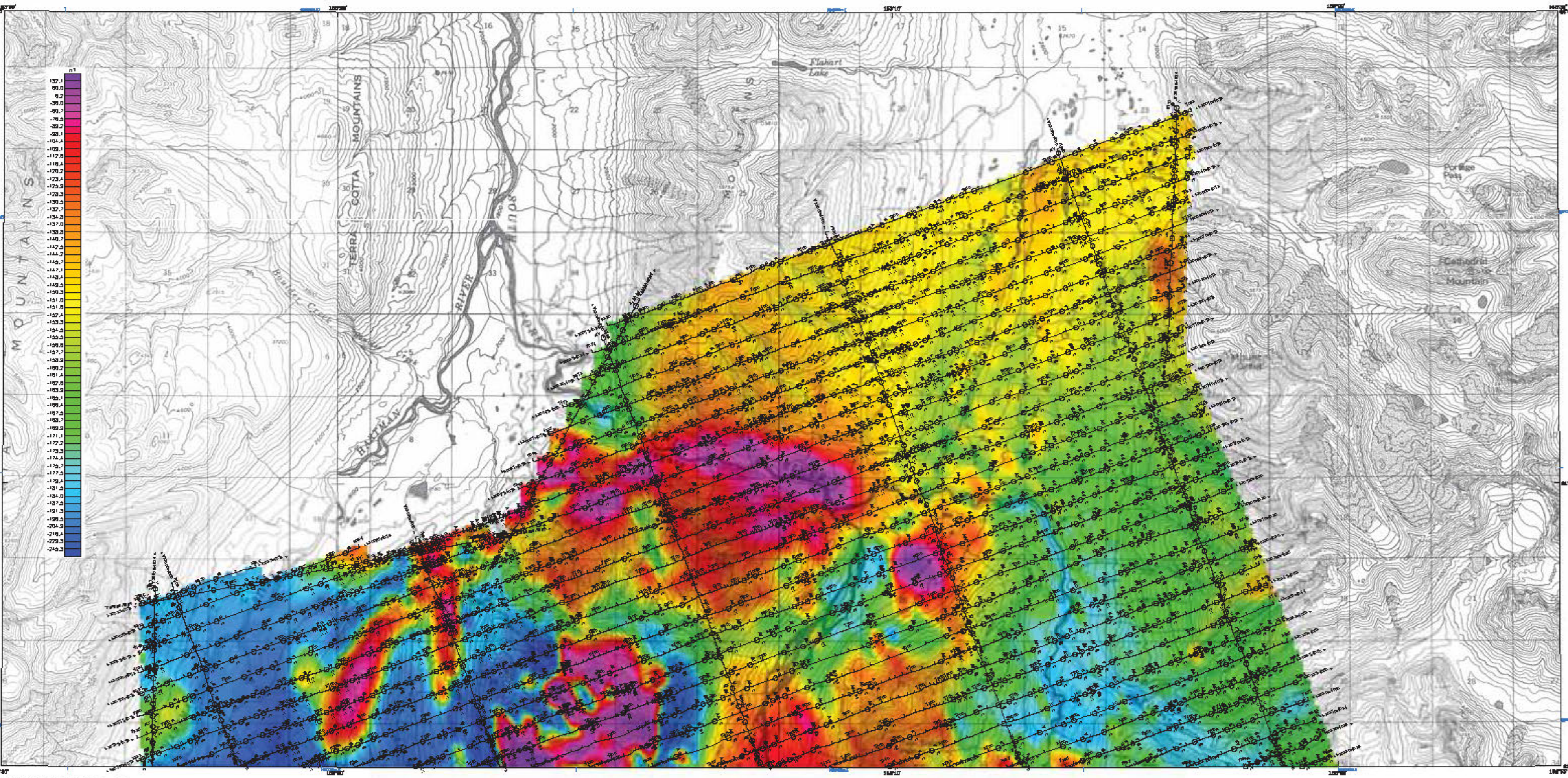




SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

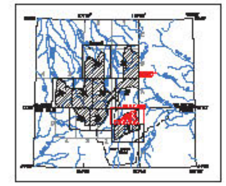
0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

# RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE MIDDLE STYX SURVEY AREA, WESTERN ALASKA

## PARTS of LIME HILLS D-1, D-2 and TYONEK D-8 QUADRANGLES

by
Laurel E. Burns, DGGS, and Fugro GeoServices, Inc.
2014

LOCATION INDEX OF 1:31,680-SCALE MAPS



### DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, Radiation Solutions RS-500 gamma-ray spectrometer and a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 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-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 5) spheroid, 1927 North American datum using a central meridian (CM) of 153°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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| | EM magnetite response |
| | Culture |

Anomaly identifier

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### ELECTROMAGNETICS

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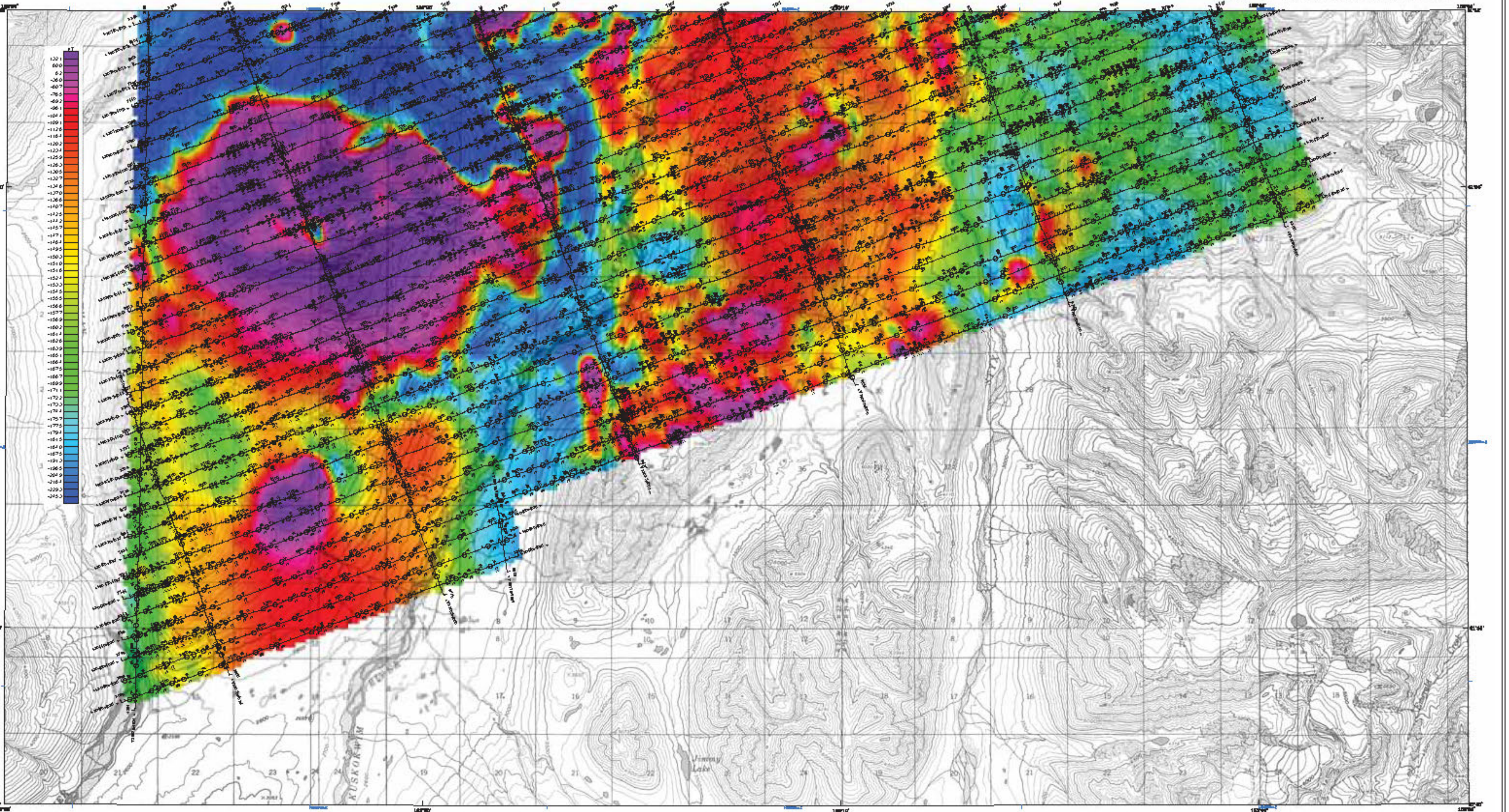
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2014-4-2J

PARTS of LIME HILLS C-1, C-2, D-1, D-2, TYONEK C-8 and D-8 QUADRANGLES

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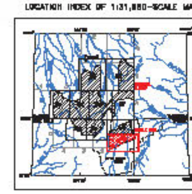

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