TOK ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Emond, A.M., CGG, Burns, L.E., Graham, G.R.C., and CGG Land (US) Inc.

Geophysical Report 2015-2

2021
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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TOK ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Emond, A.M.[1] , CGG, Burns, L.E.[1], Graham, G.R.C.[1], and CGG Land (US) Inc.[2]

ABSTRACT

The Tok geophysical survey is located in eastern interior Alaska. The Tok survey area is roughly centered about 35 miles west-southwest of Tok. Almost all the area is in the Tok mining district; with a minor amount in the Chistochina mining district. Frequency domain electromagnetic and magnetic data were collected with the DIGHEMV system from August 21, 2014 to November 13, 2014 . A total of 7338.7 line kilometers were collected covering 2597.4 square kilometers. Line spacing was 400 meters (m). Data were collected with an average ground surface clearance 52.55 m from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

The purpose of this airborne survey was to map the magnetic and conductive properties of the Tok survey area, and to detect zones of conductive mineralization. The survey area contains many copper, gold, and gold-silver-copper prospects. These data will assist future geological mapping in the region.

SURVEY OVERVIEW DESCRIPTION

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

ACKNOWLEDGMENTS

Funding was provided by the Alaska State Legislature under the Strategic and Critical Minerals Assessment Capital Improvement Project.

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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 supporting documentation.
grids_ermapper	contractor and DGGS	Geographically registered gridded data, ER Mapper ERS format.
grids_geosoft	contractor and DGGS	Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or the free viewer available from Geosoft.
images_registered	DGGS	GeoTiff format images of all gridded data.
kmz	DGGS	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs.
maps_pdf_format	contractor and DGGS	Printable maps in pdf format. Includes a geographically registered pdf (GeoPDF) for use with mobile devices such as GPS enabled smartphones and tablets, other devices, and programs.
maps_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.
resistivity_models	USGS	Resistivity models created by USGS from the electromagnetic data. Not available at time of publication. Contact USGS for publication status.
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.

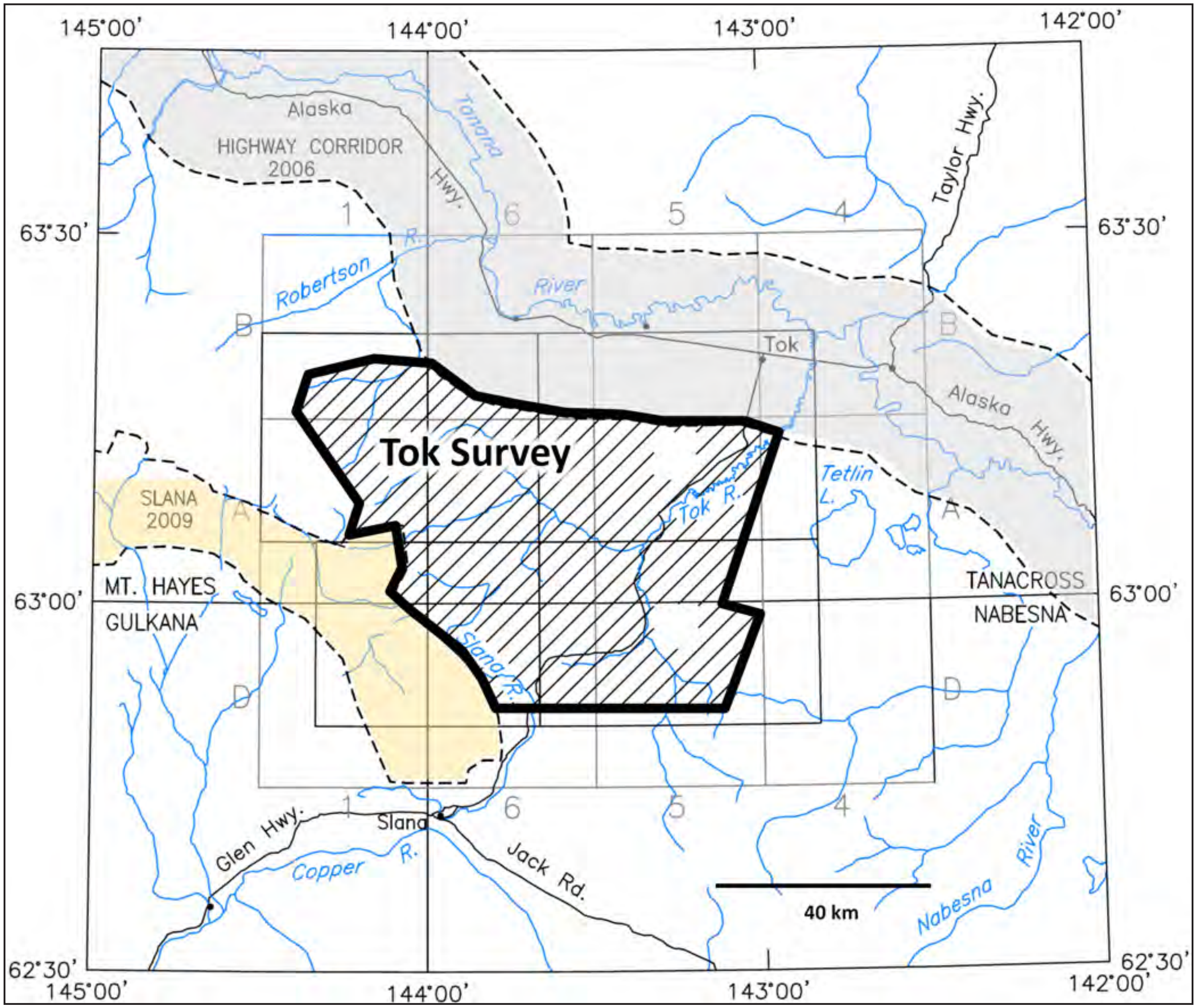


Figure 1. Tok magnetic and electromagnetic airborne geophysical survey location shown in eastern interior Alaska (right). Survey area shown with landmarks, relevant 1:250,000-scale quadrangle boundaries, major roads, and rivers.

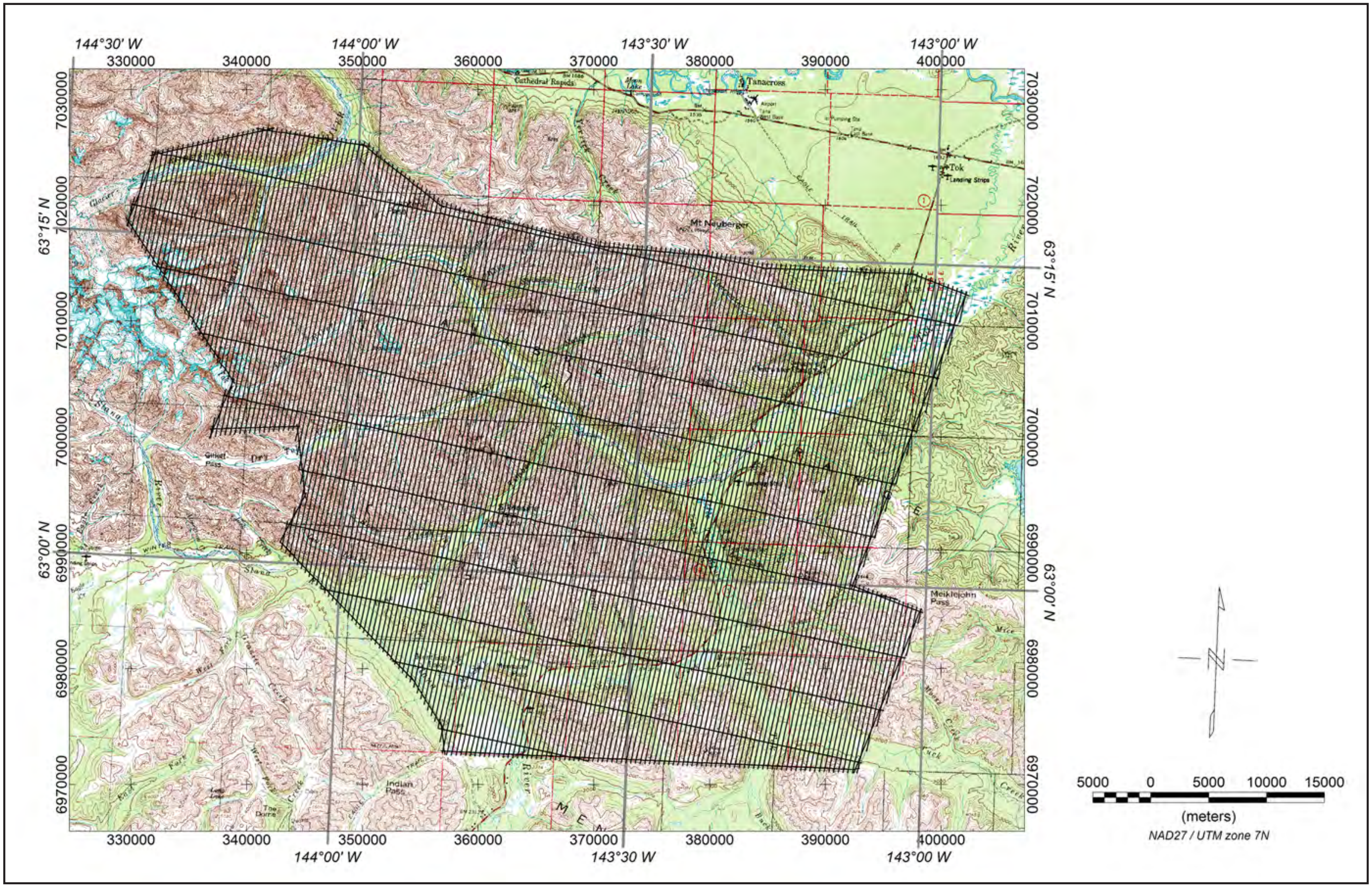


Figure 2. Flight path with topographic basemap.

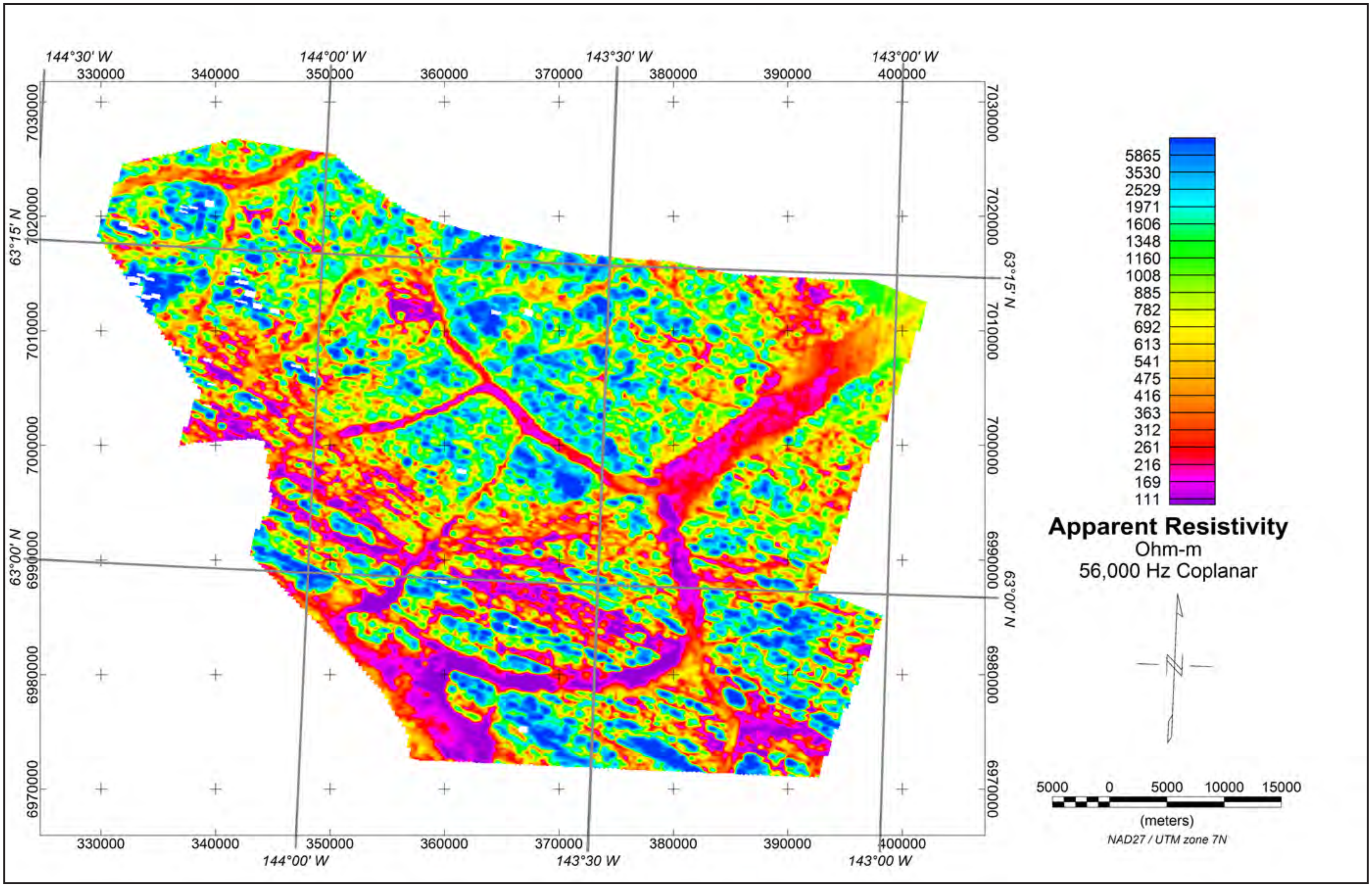


Figure 3. 56,000 Hz apparent resistivity grid.

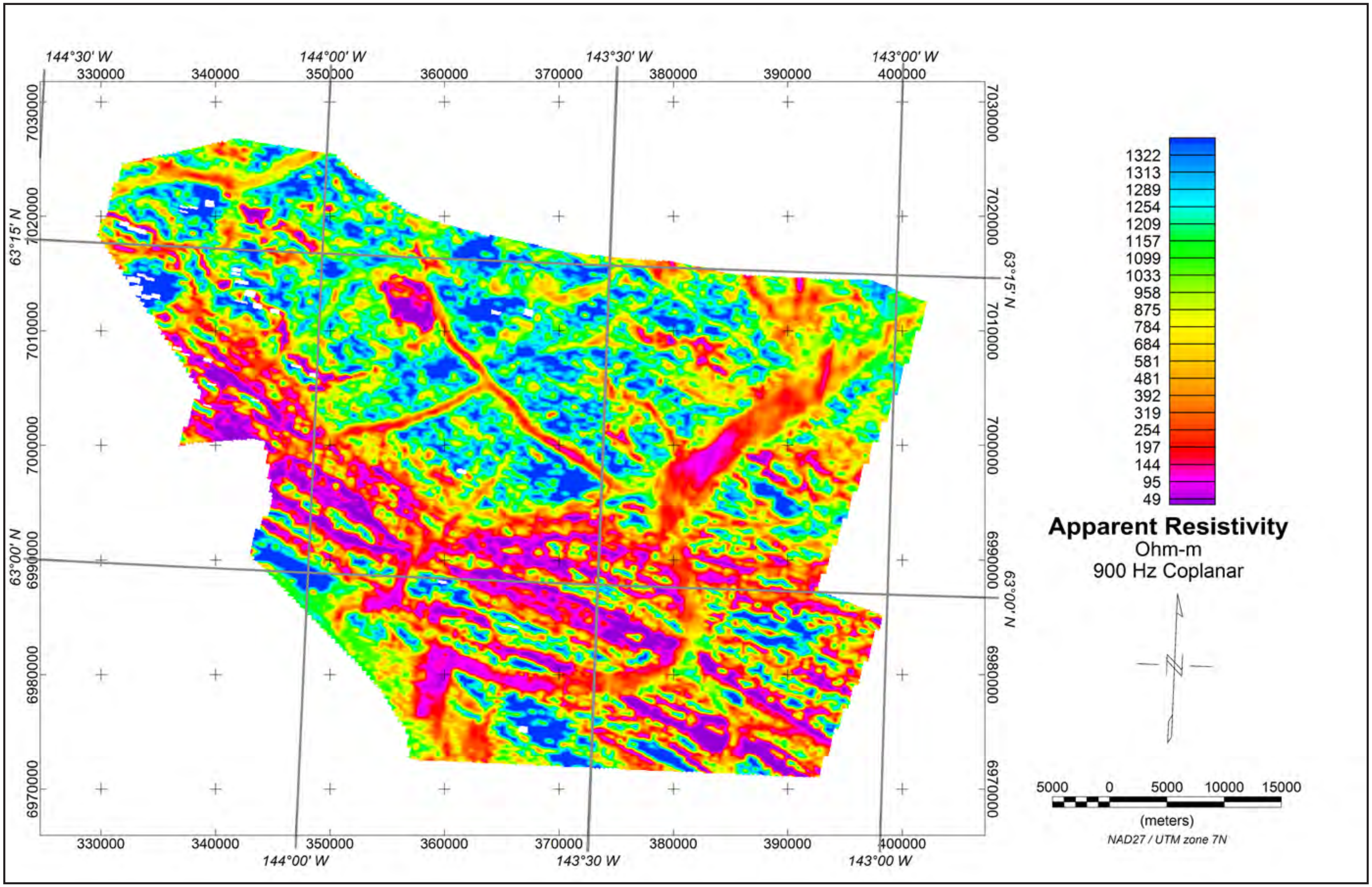


Figure 4. 900 Hz apparent resistivity grid.

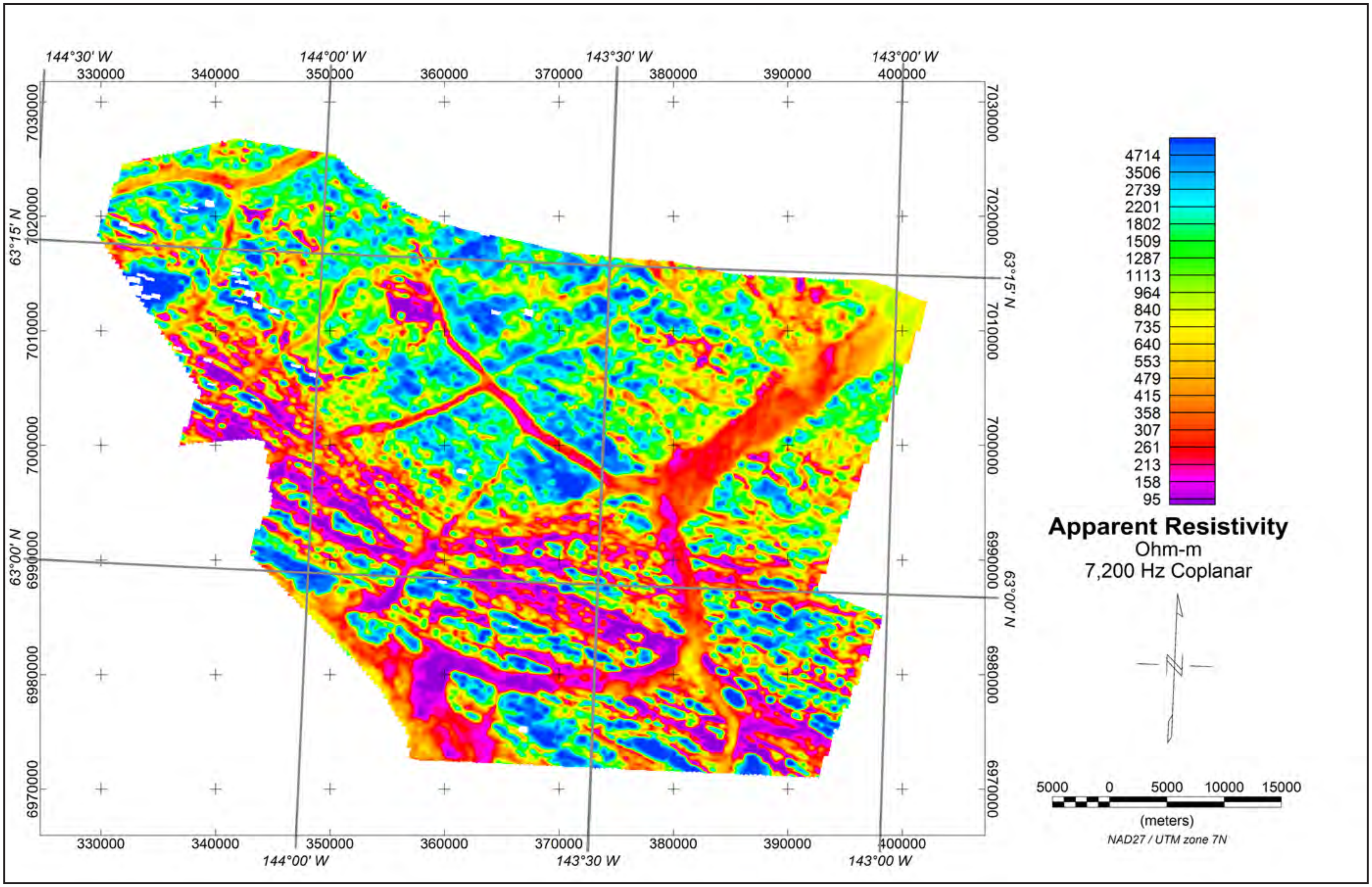


Figure 5. 7,200 Hz apparent resistivity grid.

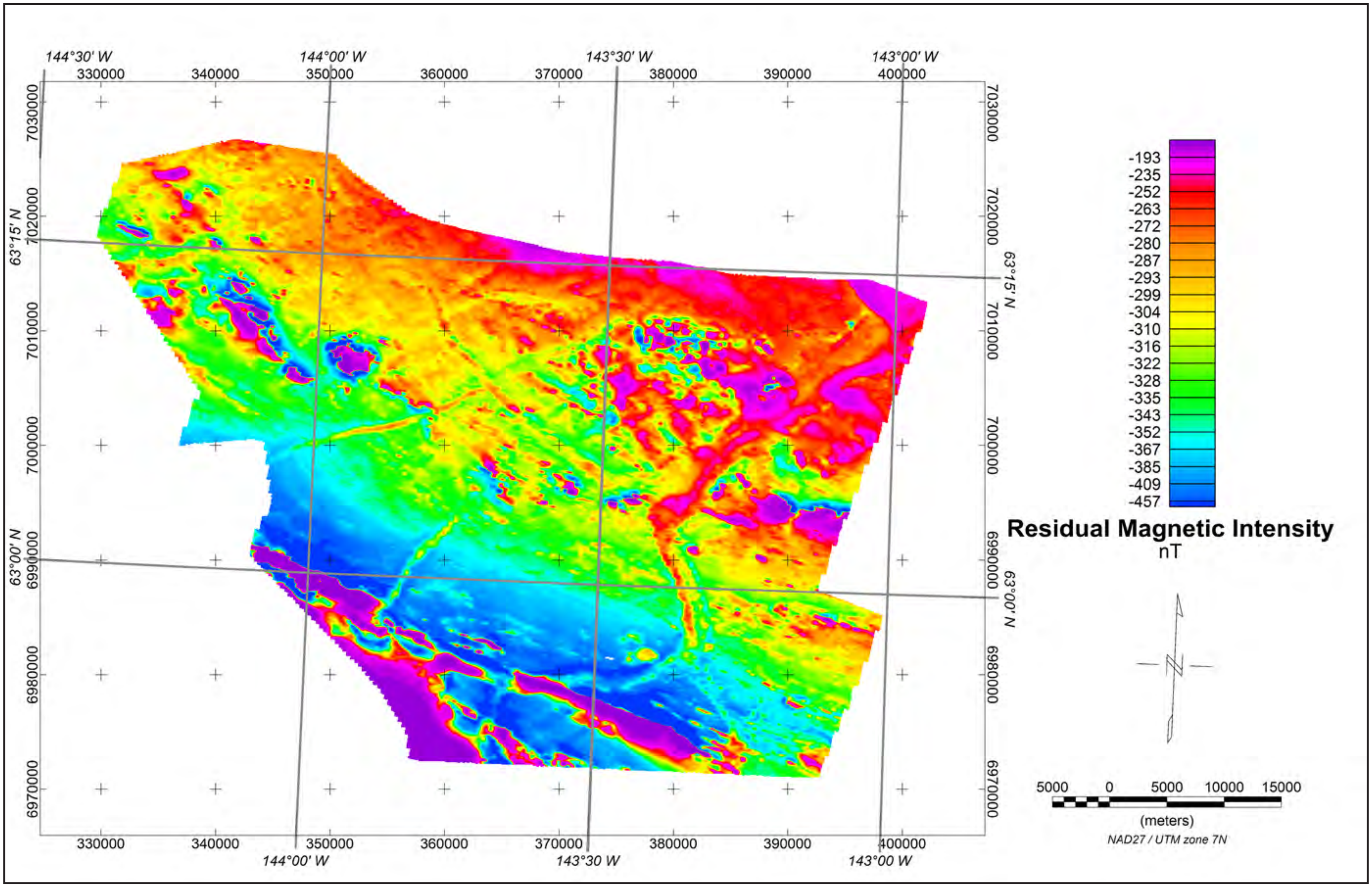


Figure 6. Residual magnetic intensity grid.

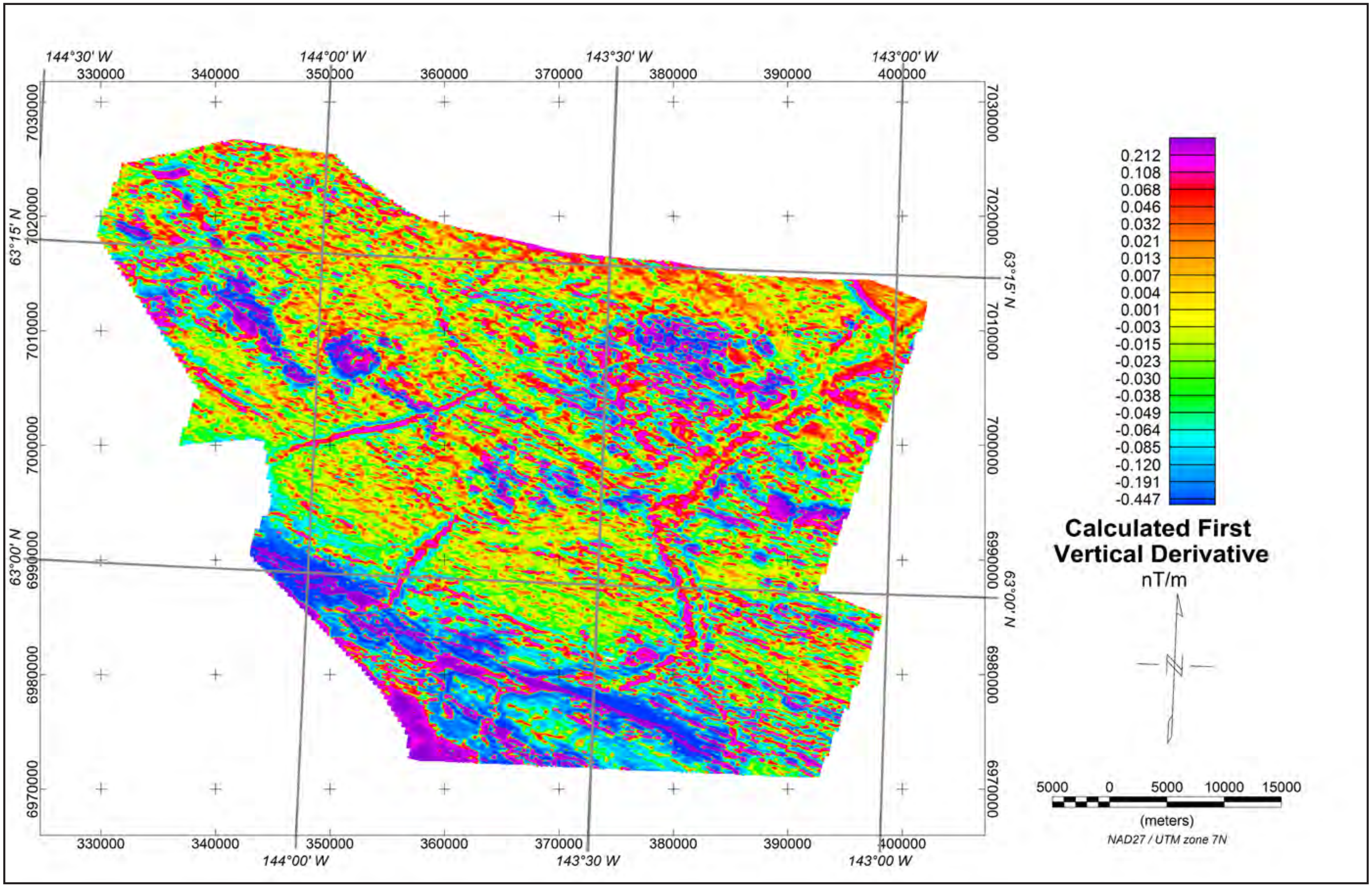


Figure 7. Magnetic calculated first vertical derivative grid.

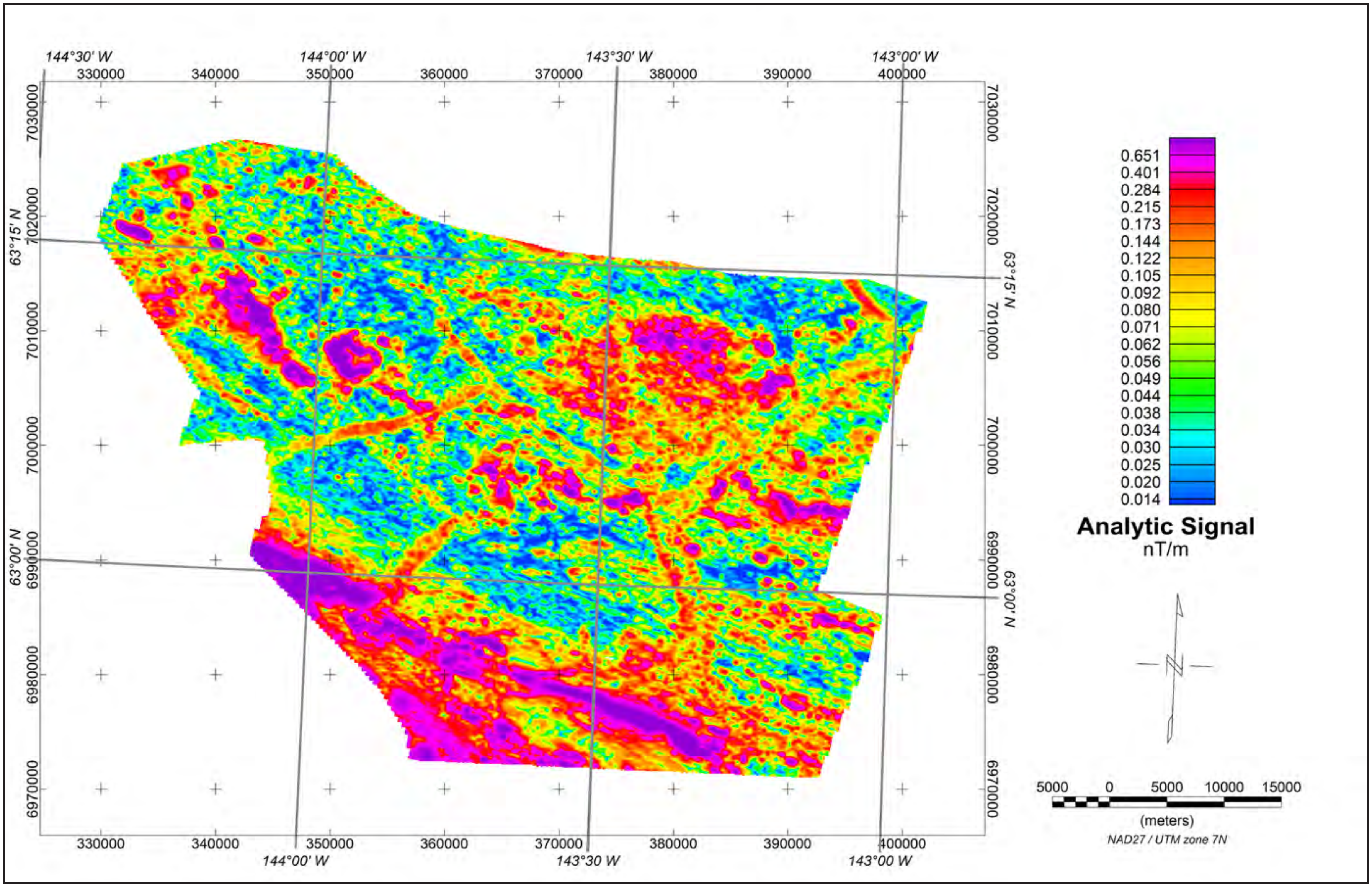


Figure 8. Magnetic analytic signal grid.

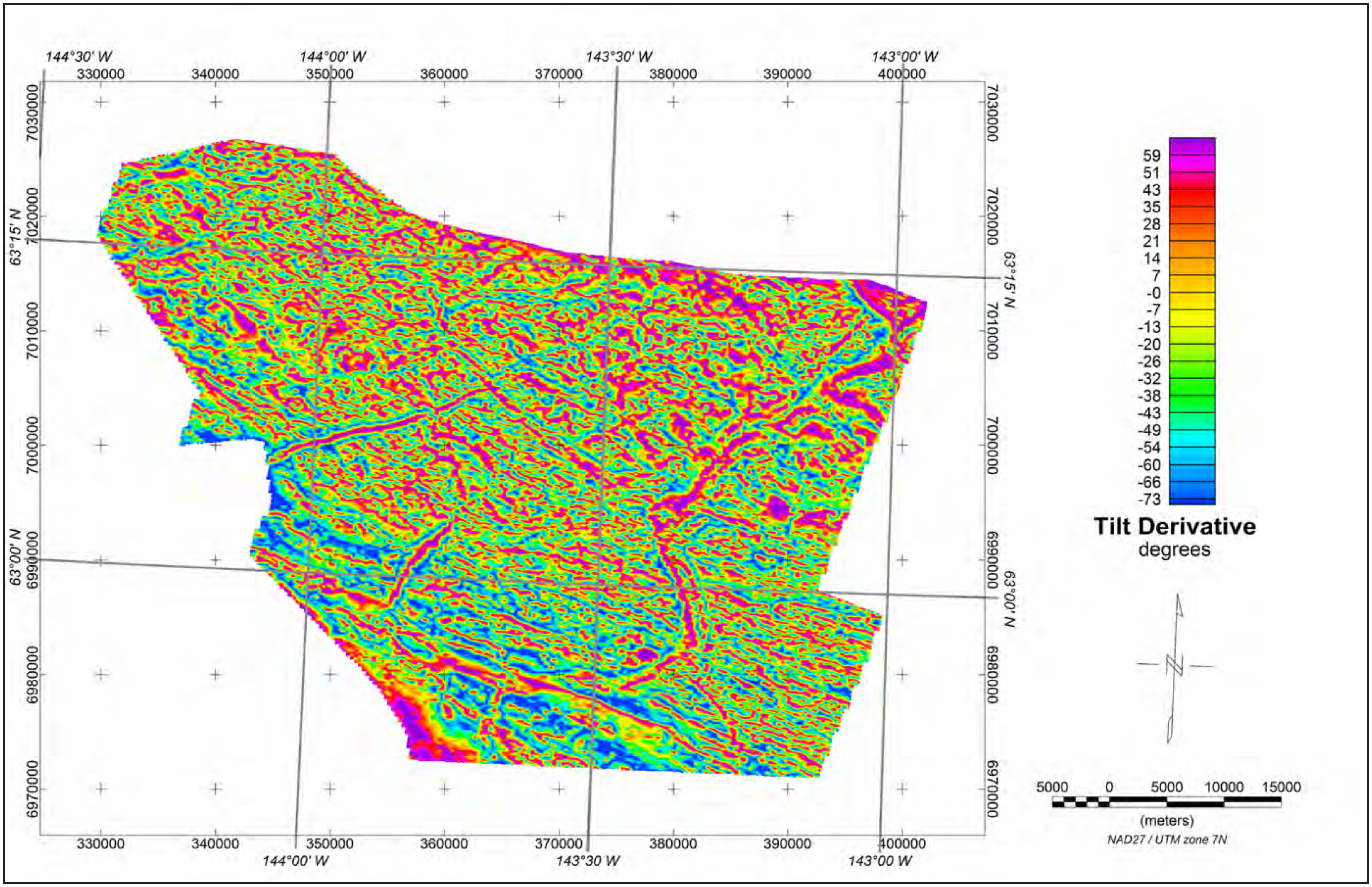


Figure 9. Magnetic tilt derivative grid.

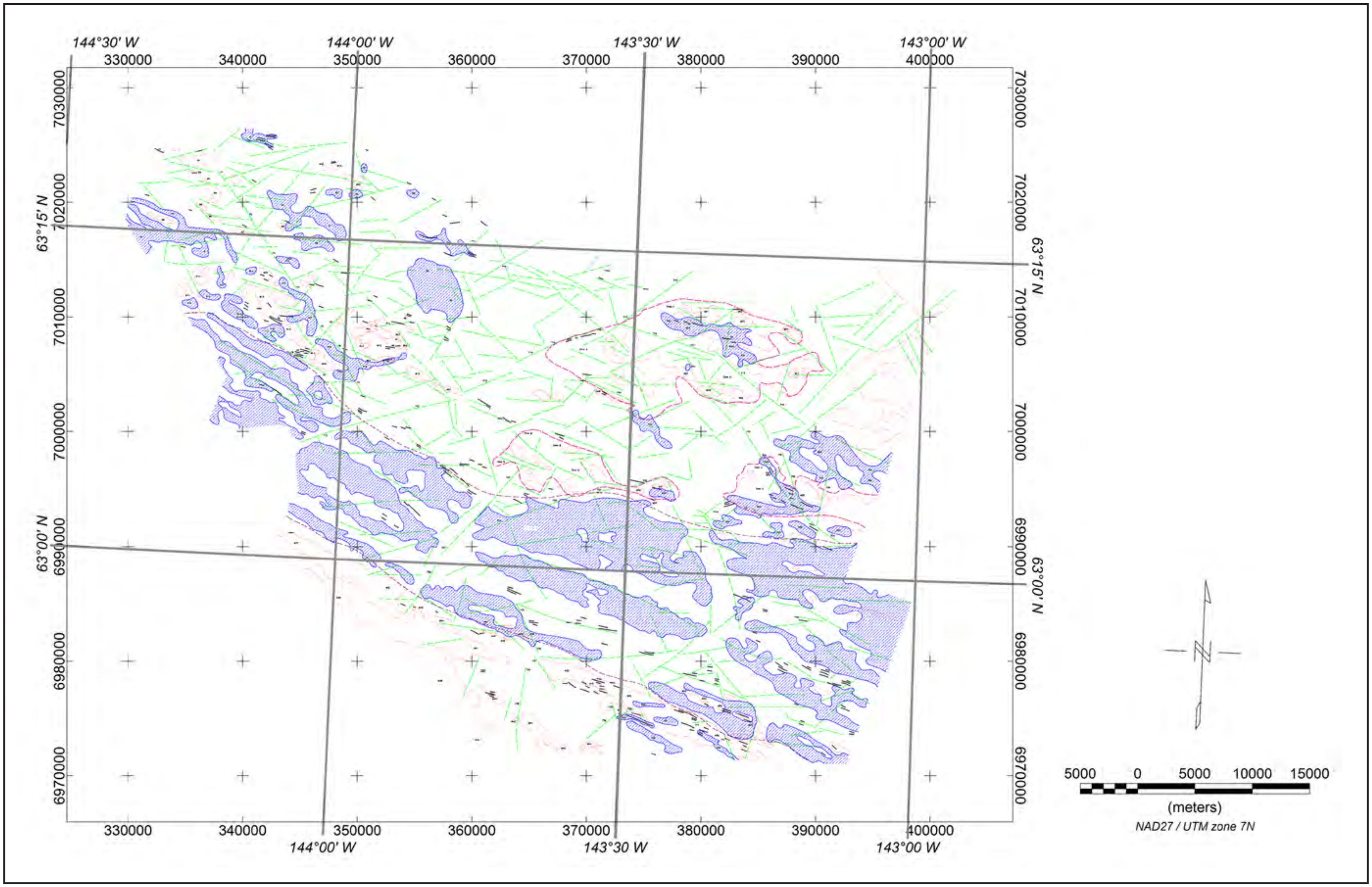


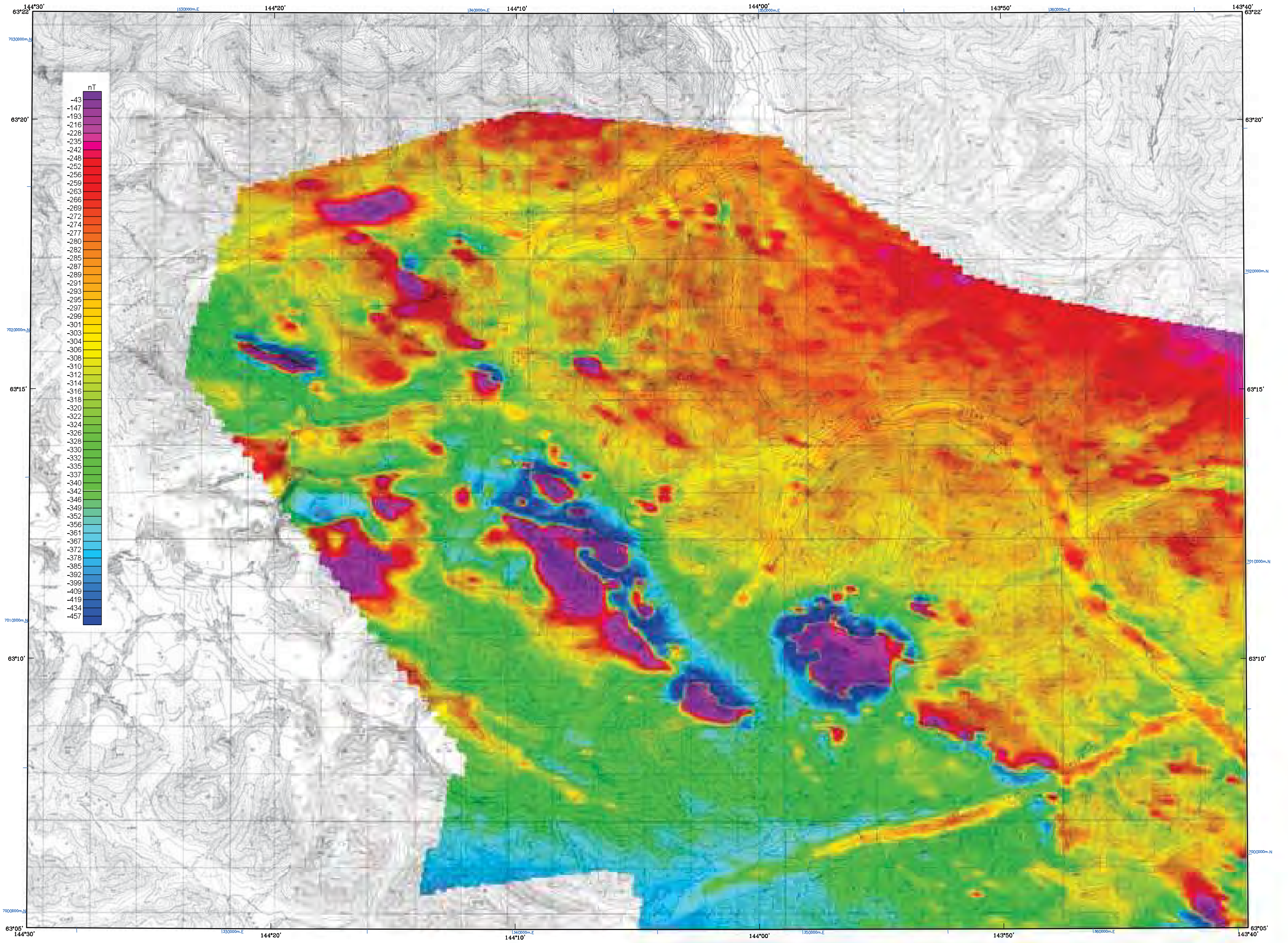
Figure 10. Magnetic and electromagnetic interpretation by the contractor.

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: https://doi.org/10.14509/29347

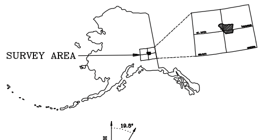
Pages	Map No.	Grid Shown	With
		1:63,360-scale maps	
14–17	GPR2015-2, sheet 1a–d	Residual magnetic intensity, IGRF removed	Topography
18–21	GPR2015-2, sheet 2a–d	Residual magnetic intensity, IGRF removed	Magnetic contours
22–25	GPR2015-2, sheet 3a–d	First vertical derivative of the RMI	Topography
26–29	GPR2015-2, sheet 4a–d	Analytic Signal of the RMI	Topography
30–33	GPR2015-2, sheet 5a–d	Analytic Signal of the RMI	Analytic signal contours
34–37	GPR2015-2, sheet 6a–d	Tilt Derivative of the RMI	Tilt Derivative contours
38–41	GPR2015-2, sheet 7a–d	Shadowed RMI	Topography and Tilt Derivative contours
42–45	GPR2015-2, sheet 8a–d	56K Hz coplanar apparent resistivity	Topography
46–49	GPR2015-2, sheet 9a–d	56K Hz coplanar apparent resistivity	56K contours
50–53	GPR2015-2, sheet 10a–d	7200 Hz coplanar apparent resistivity	Topography
54–57	GPR2015-2, sheet 11a–d	7200 Hz coplanar apparent resistivity	7200 contours
58–61	GPR2015-2, sheet 12a–d	900 Hz coplanar apparent resistivity	Topography
62–65	GPR2015-2, sheet 13a–d	900 Hz coplanar apparent resistivity	900 contours
66–69	GPR2015-2, sheet 14a–d	Flight path	Topography
82–85	GPR2015-2, sheet 16a–d	Electromagnetic and magnetic interpretation	Township, range, and section
86–89	GPR2015-2, sheet 17a–d	EM and magnetic interpretation, residual magnetic intensity	Township, range, and section
		1:31,680-scale maps	
70–81	GPR2015-2, sheet 15a–l	Detailed EM anomalies, residual magnetic data grid	Topography

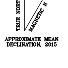
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 1A

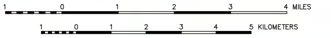


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





SCALE 1:63,360

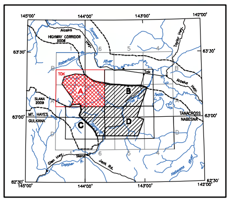


RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE-SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, 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

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[1] 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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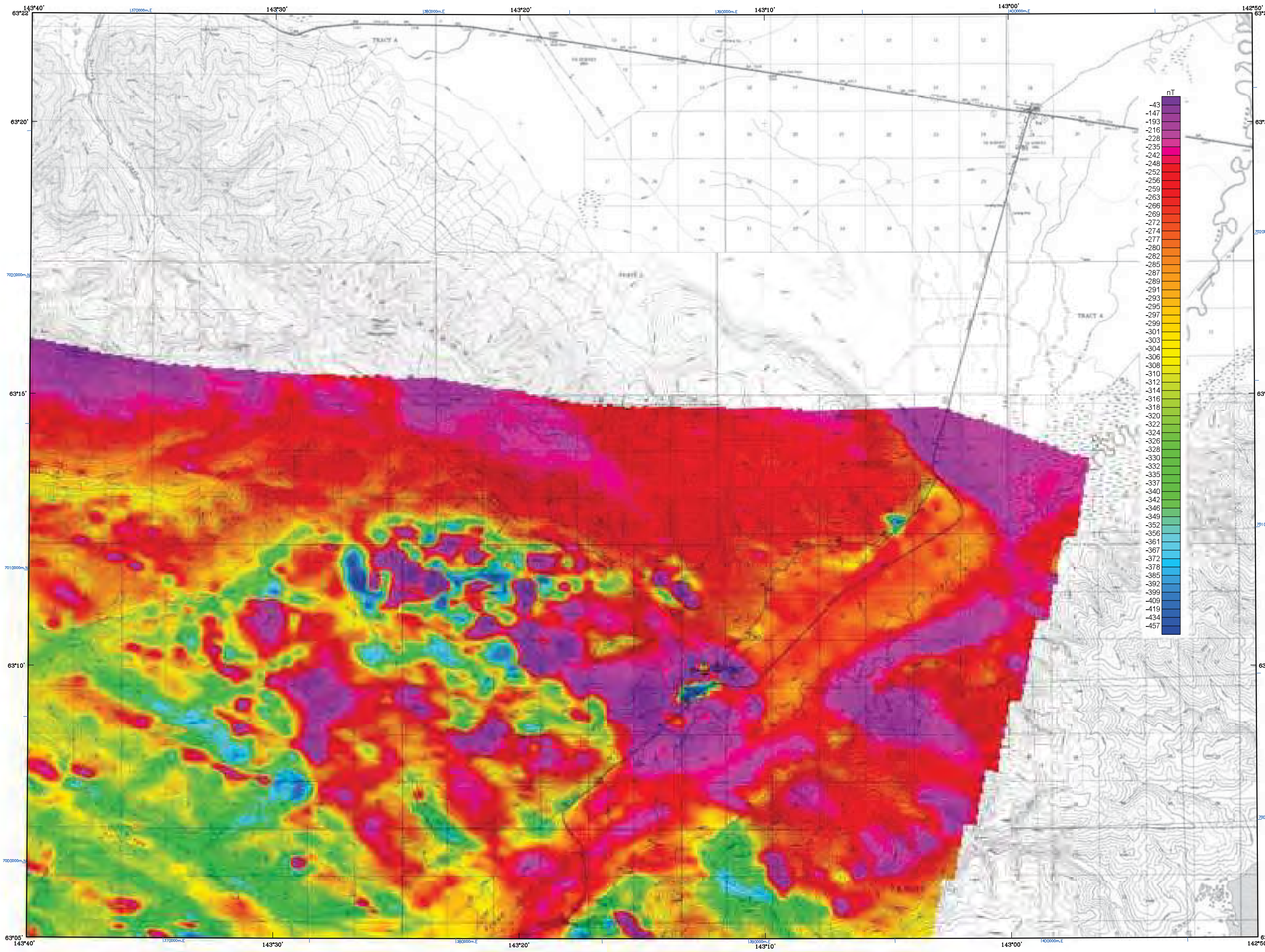
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 1B**

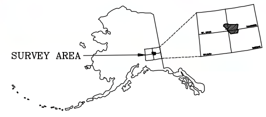


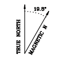
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





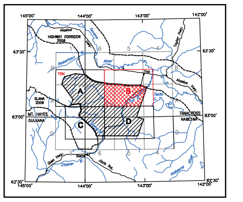
APPROXIMATE MEAN
DECLINATION, 2015

RESIDUAL MAGNETIC FIELD WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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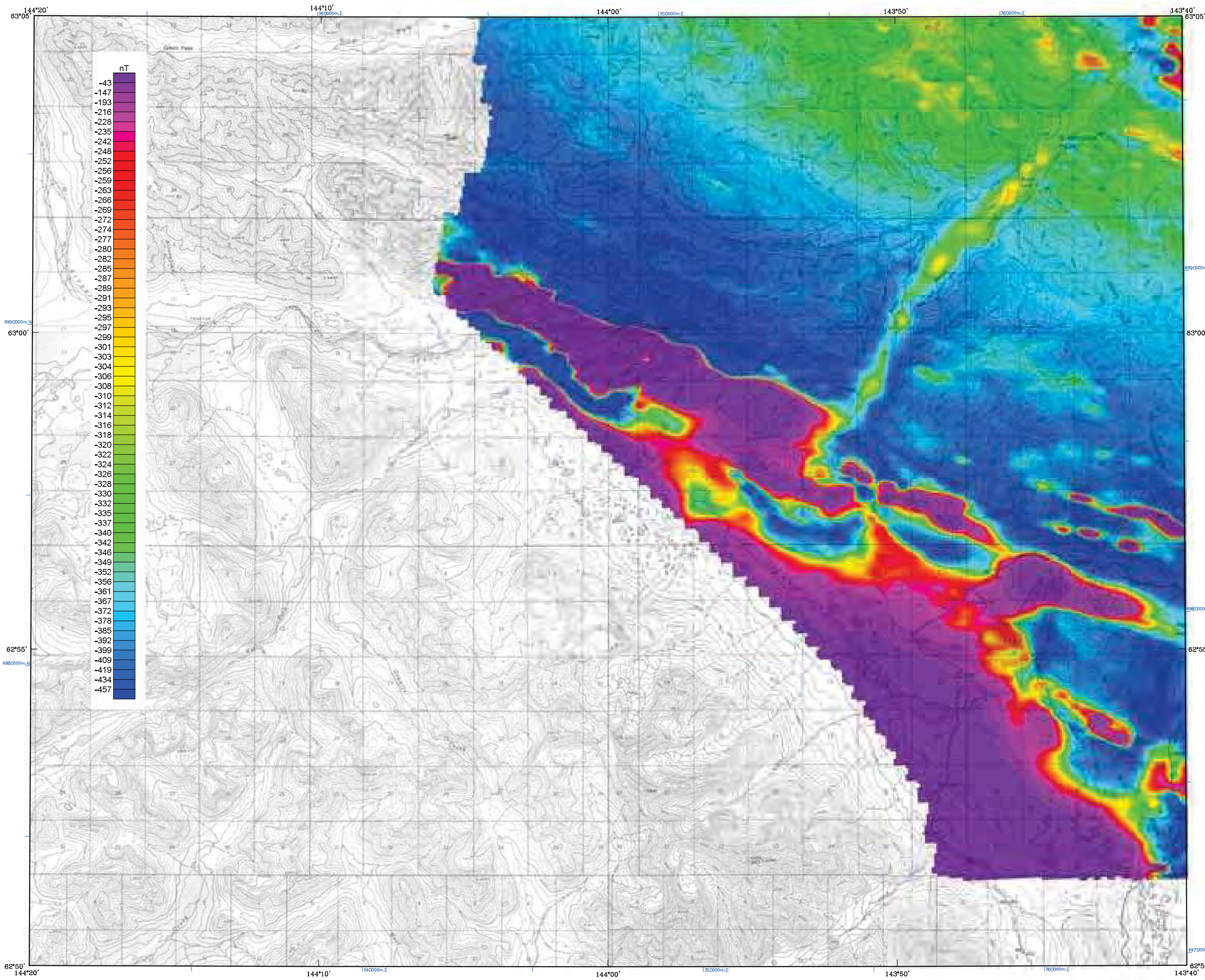
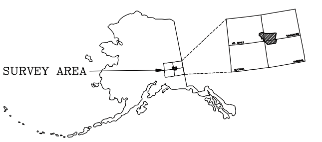
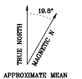


Base from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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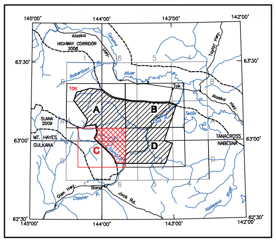
LOCATION INDEX OF 1:63,360–SCALE MAP



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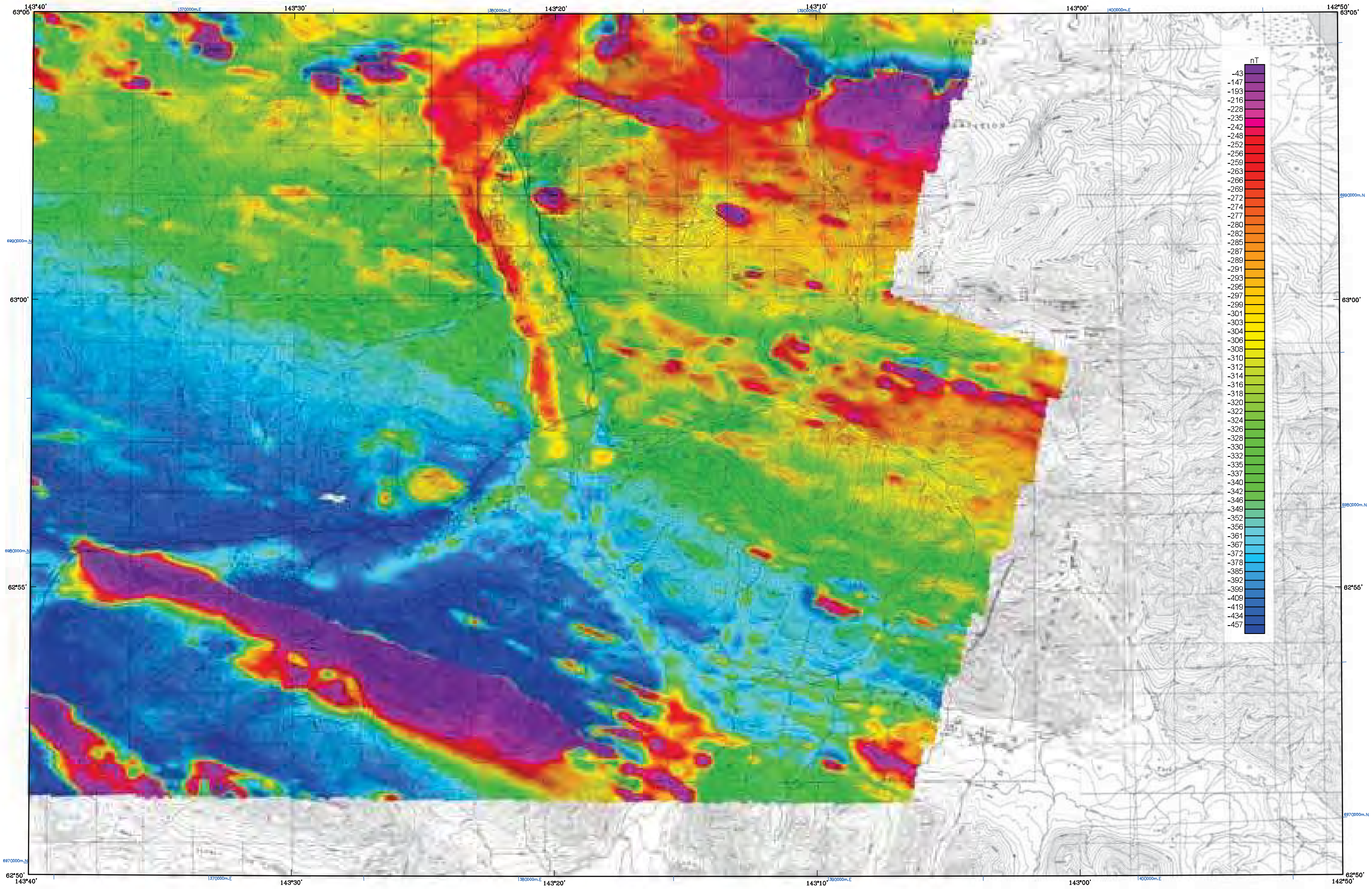
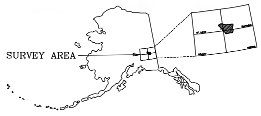
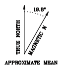
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 1D



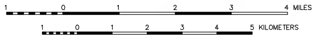
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

SCALE 1:63,360



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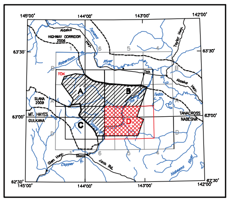
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG 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[1]) 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.

[1] 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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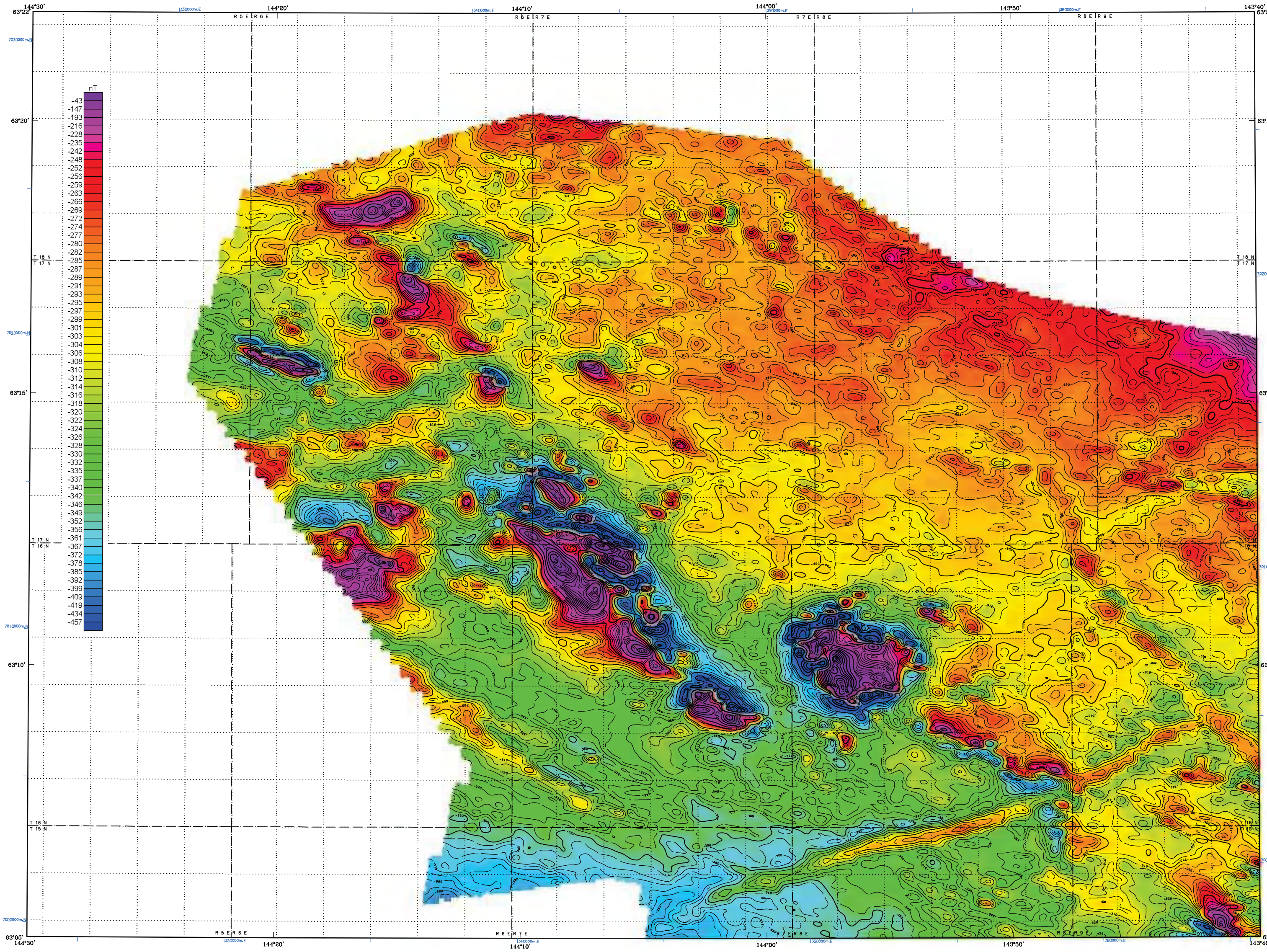
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 2A



Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

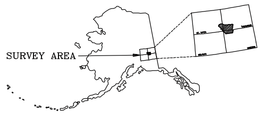
1 0 1 2 3 4 MILES

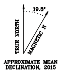
1 0 1 2 3 4 5 KILOMETERS

RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015





APPROXIMATE MEAN DECLINATION, 2015

DESCRIPTIVE NOTES

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RESIDUAL MAGNETIC FIELD

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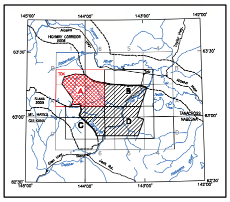
[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

MAGNETIC CONTOURS

━━━━━━━━	250 nT
────────	50 nT
────────	10 nT
— — — —	5 nT

LOCATION INDEX OF 1:63,360-SCALE MAP



SURVEY HISTORY

This map was compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and CGG Land (U.S.) Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2014 and 2015. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program and the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project.

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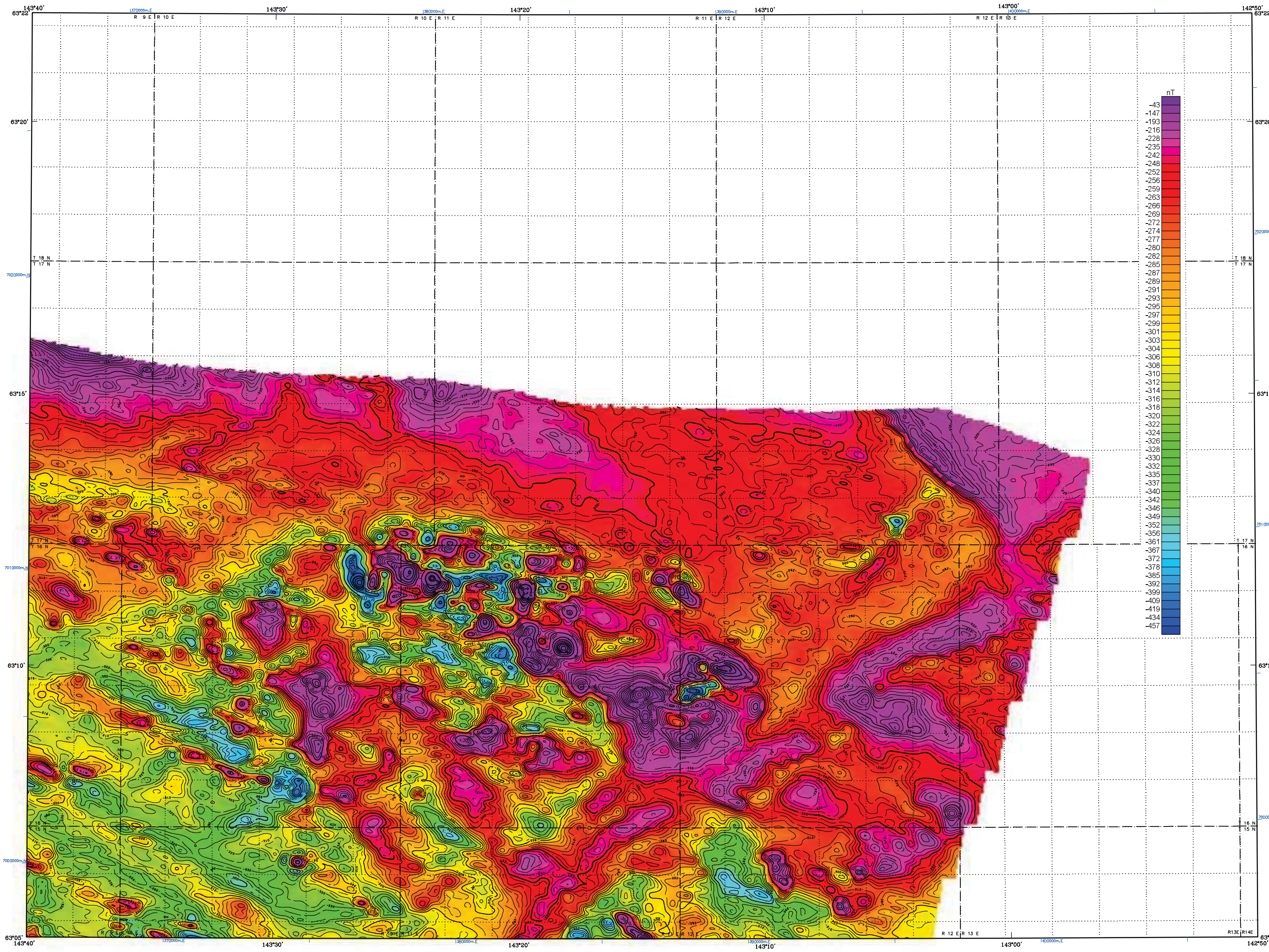
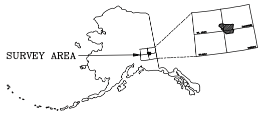
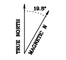
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, , Sheet 2B



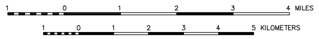
Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

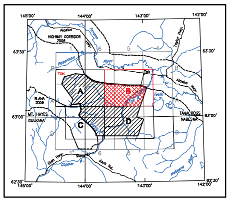
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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RESIDUAL MAGNETIC FIELD

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[1] 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

━━━━━━━━	. . . . 250 nT
────────	. . . . 50 nT
────────	. . . . 10 nT
— — — —	. . . . 5 nT

SURVEY HISTORY

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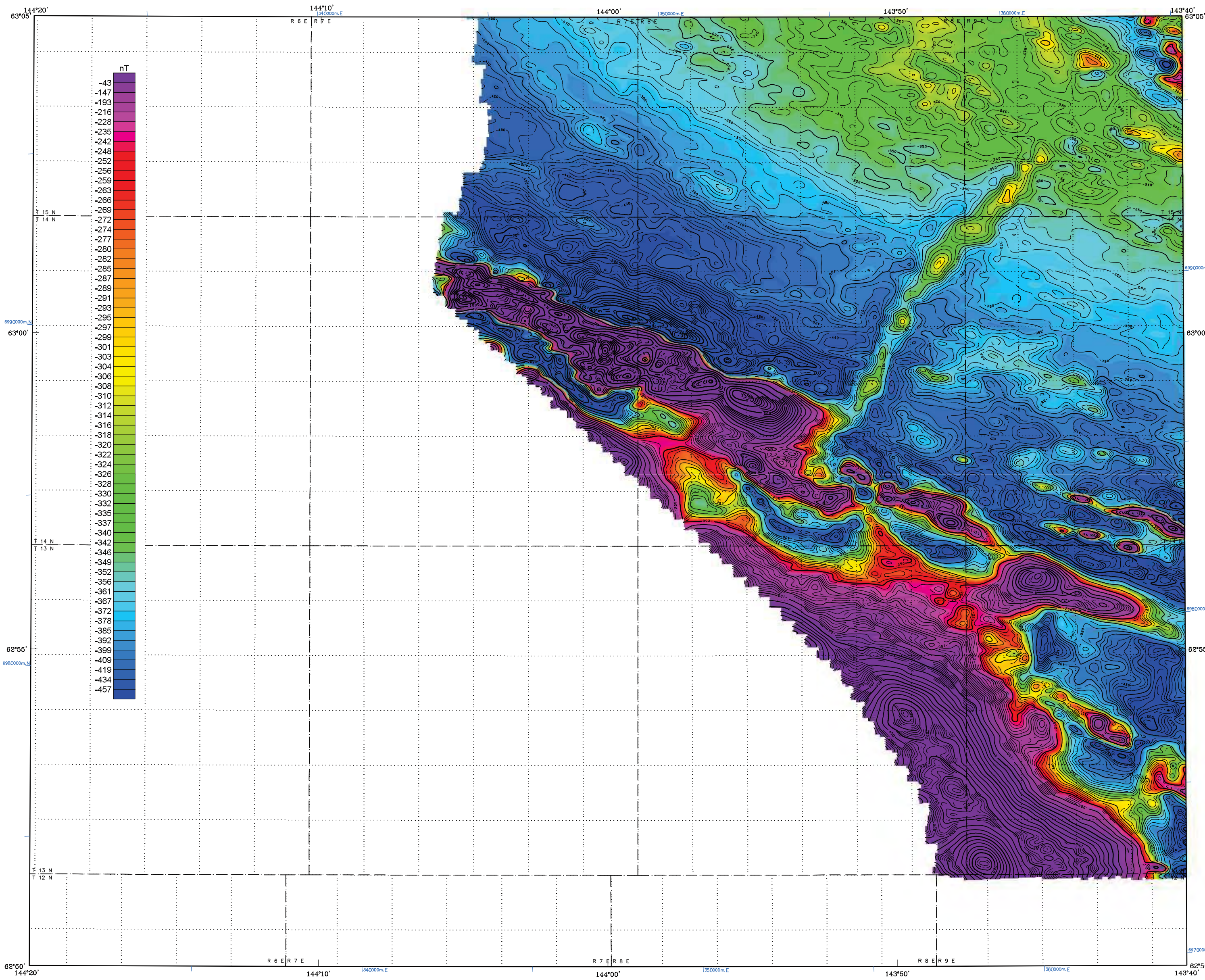
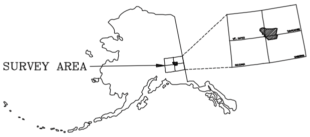
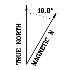
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 2C



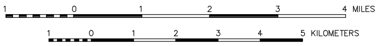
Section outlines from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

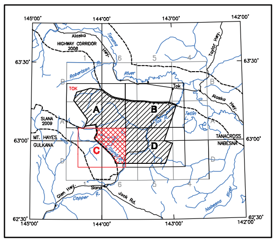
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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RESIDUAL MAGNETIC FIELD

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[1] 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

━━━━━━	. . . . 250 nT
━━━━━━	. . . . 50 nT
──────	. . . . 10 nT
— — — —	. . . . 5 nT

SURVEY HISTORY

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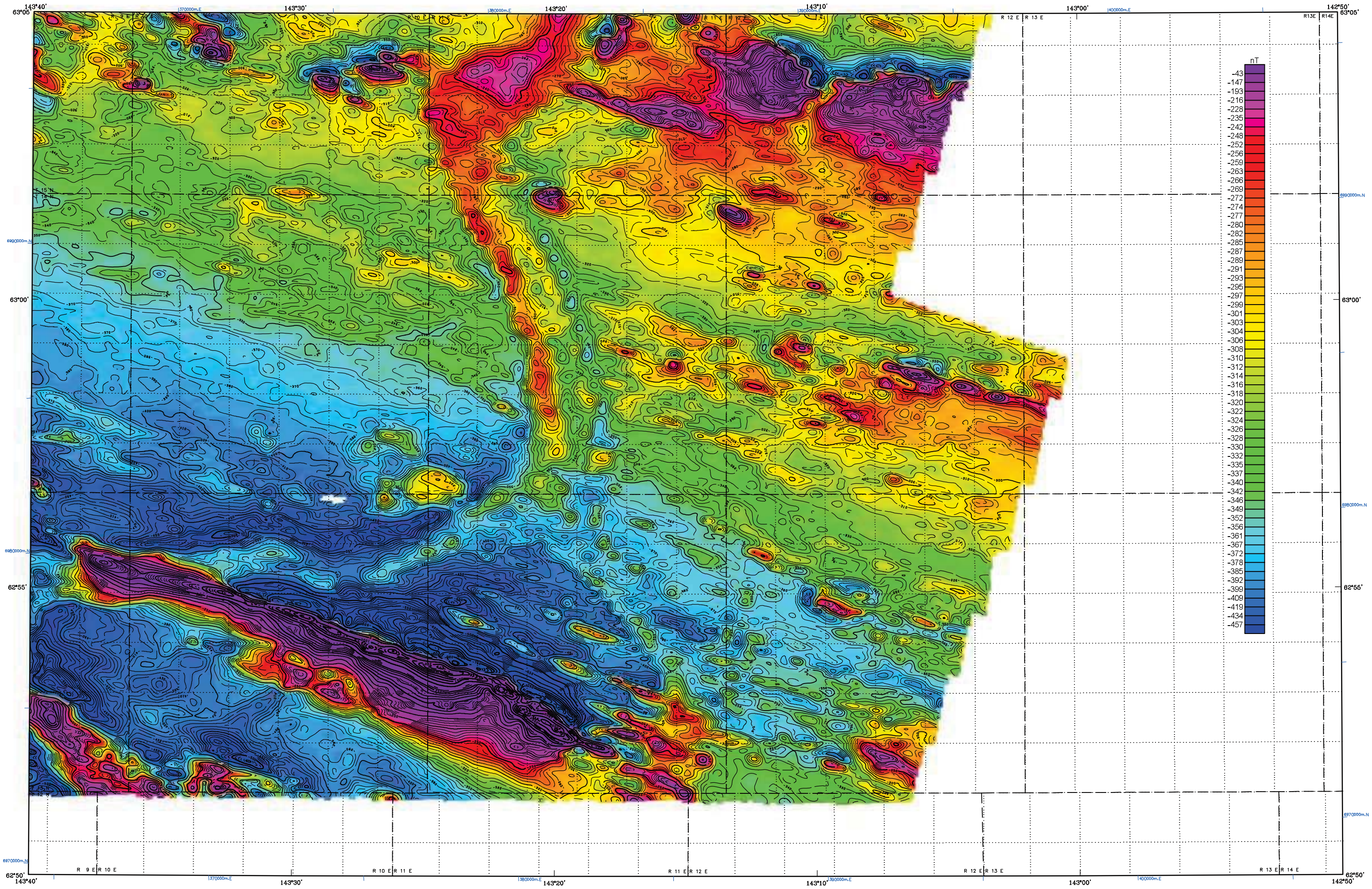
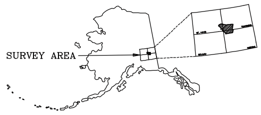
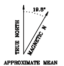
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 2D**



Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

RESIDUAL MAGNETIC FIELD WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

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RESIDUAL MAGNETIC FIELD

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MAGNETIC CONTOURS

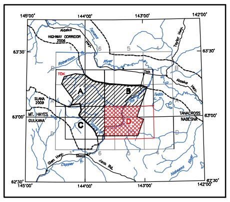
━━━━━━━━ . . . . 250 nT

──────── . . . . 50 nT

──────── . . . . 10 nT

— — — — . . . . 5 nT

LOCATION INDEX OF 1:63,360-SCALE MAP



SURVEY HISTORY

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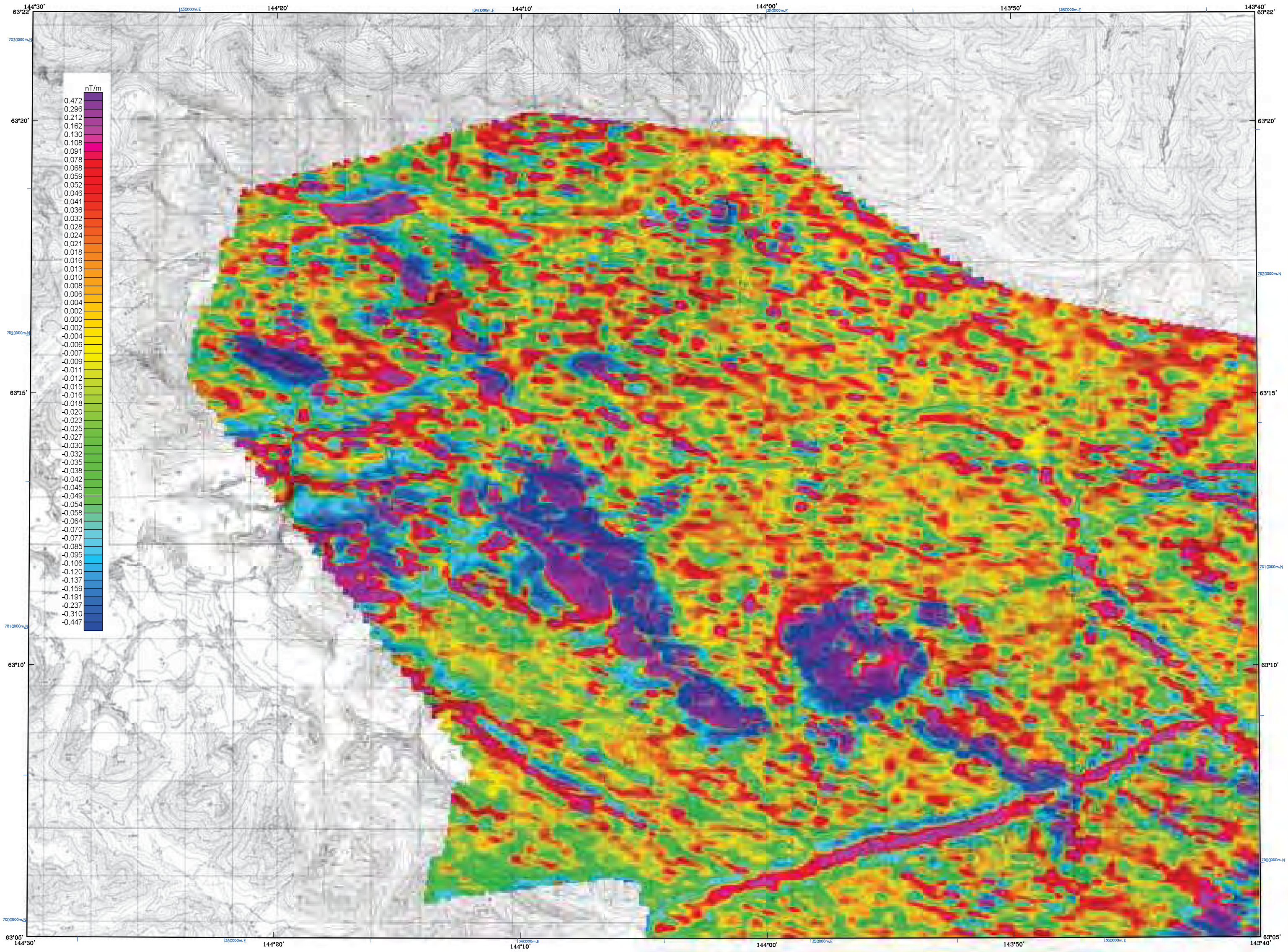
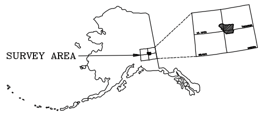
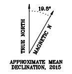
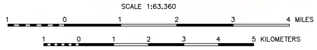


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska







FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

DESCRIPTIVE NOTES

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COLOR BAR HISTOGRAM

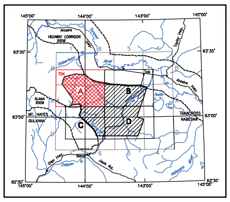
Approximately 98% of the first vertical derivative of the magnetic field for the Tok Survey Area dataset lie within the range displayed on the color bar. Data values actually range from −16.363 nT/m (dark blue) to about 21.049 nT/m (magenta).

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG 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[1]) 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 in this publication The first vertical derivative grid was calculated from the processed total magnetic field grid using an FFT base frequency domain filtering algorithm. The resulting first veritical derivative grid provides better definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

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

LOCATION INDEX OF 1:63,360-SCALE MAP



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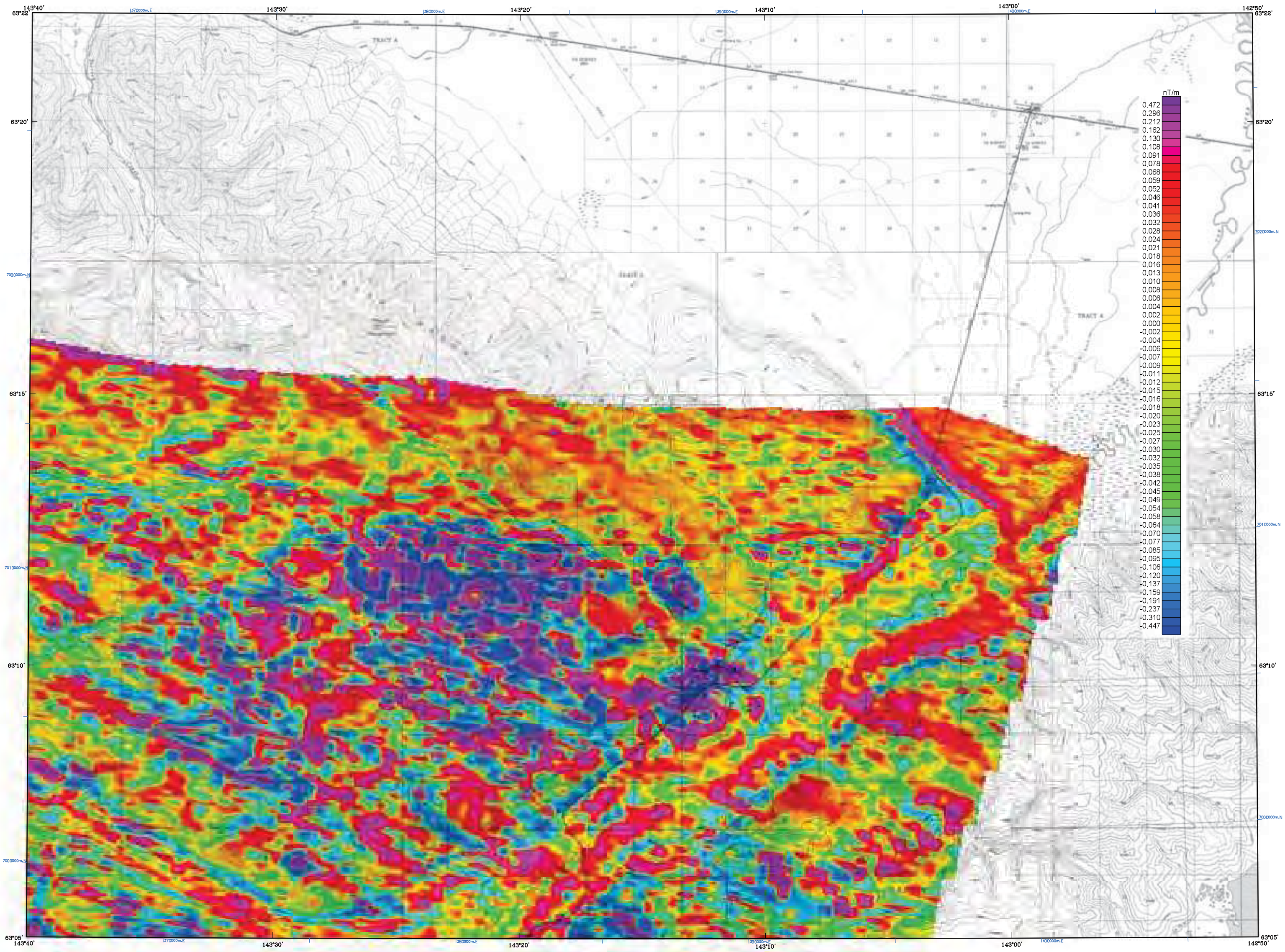
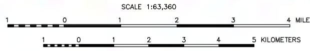
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 3B



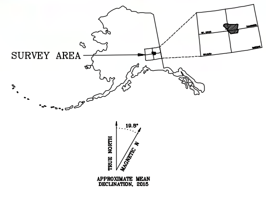
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska



FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Tok Survey Area dataset lie within the range displayed on the color bar. Data values actually range from −16.363 nT/m (dark blue) to about 21.049 nT/m (magenta).

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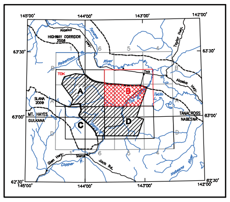
[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

LOCATION INDEX OF 1:63,360–SCALE MAP



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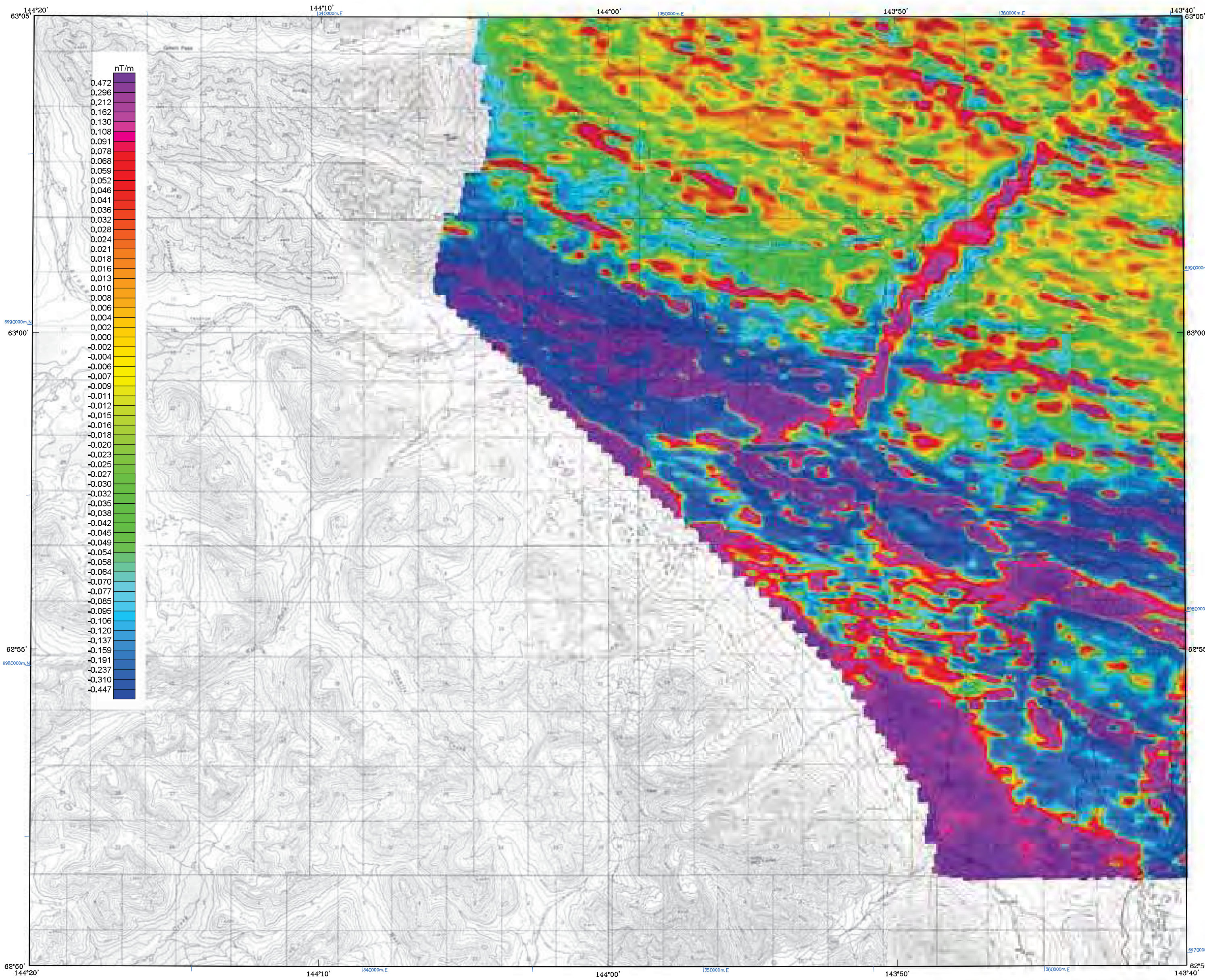
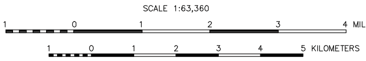
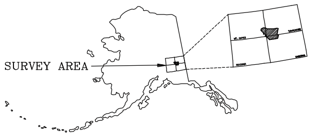
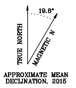


Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska







APPROXIMATE MEAN DECLINATION, 2015

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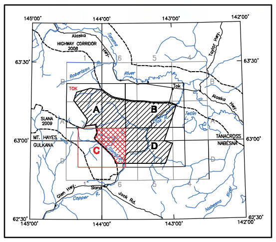
LOCATION INDEX OF 1:63,360-SCALE MAP



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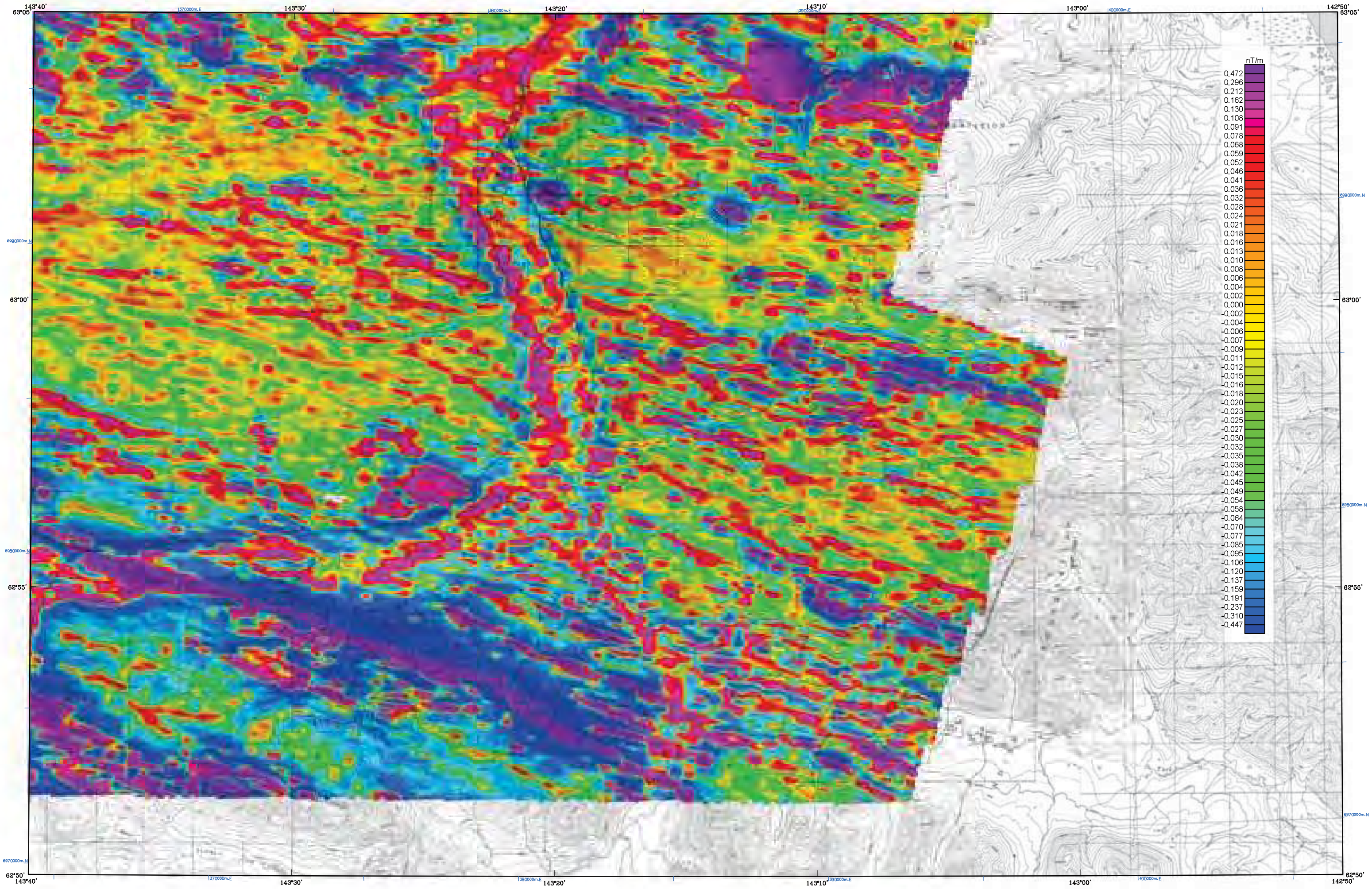
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 3D

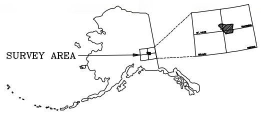


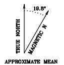
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

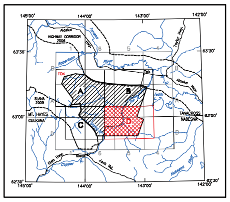
1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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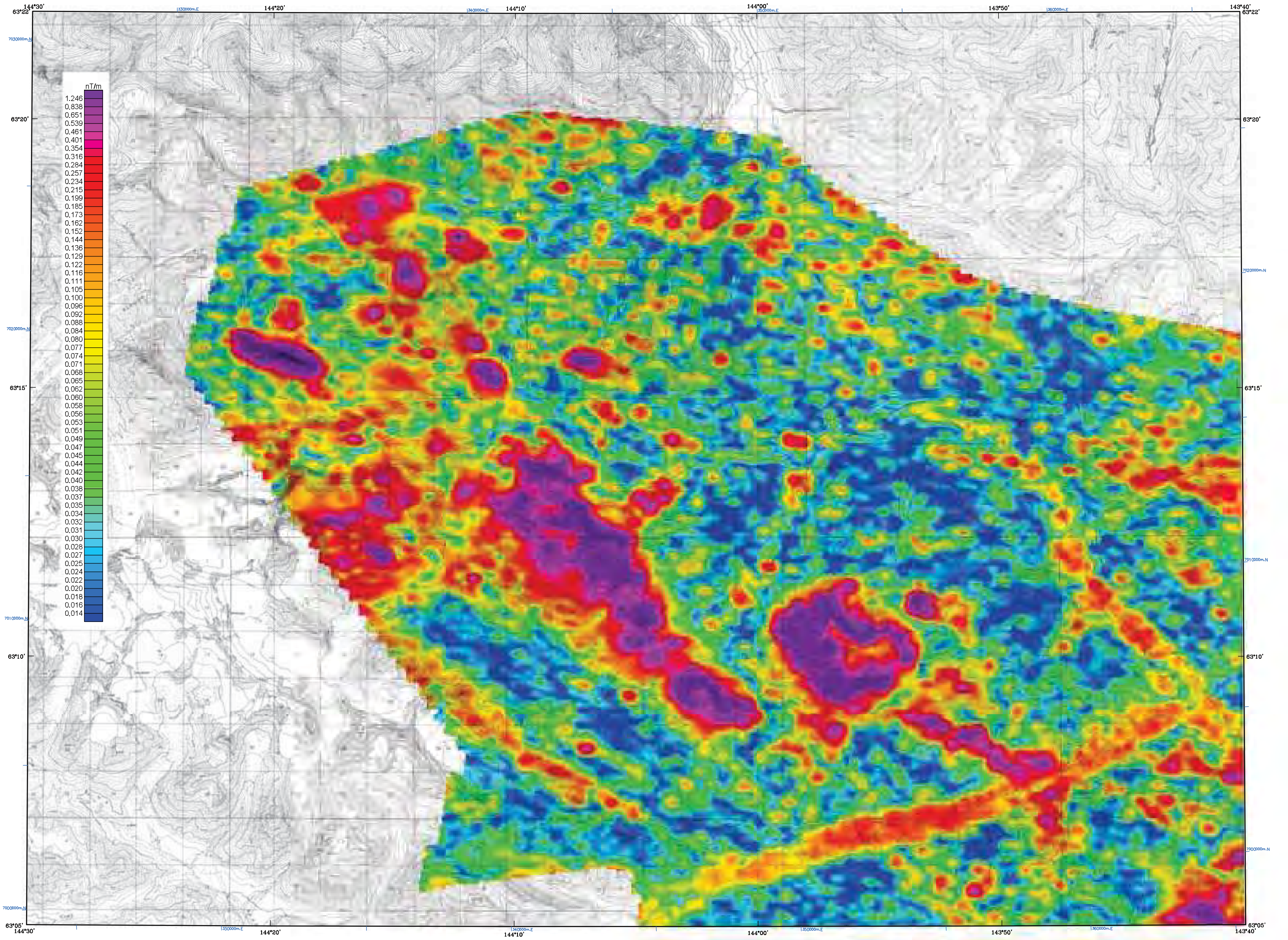
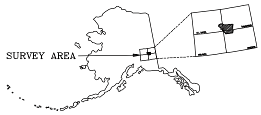
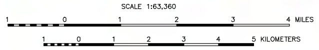
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 4A



Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





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by

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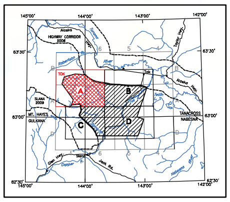
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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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 (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.

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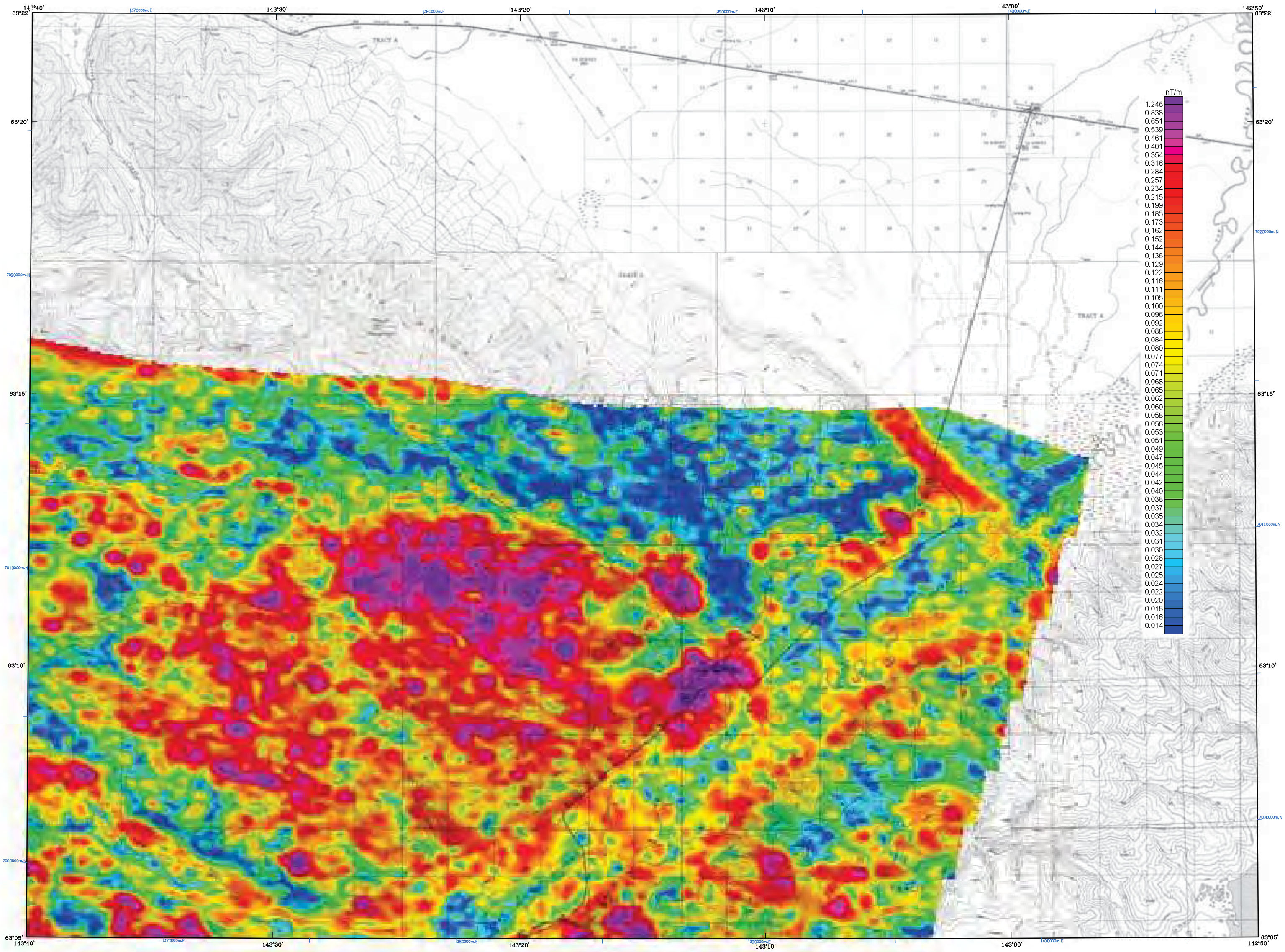
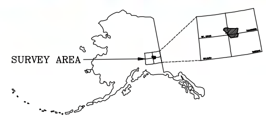
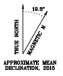
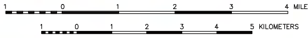


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska





SCALE 1:63,360



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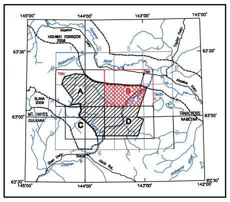

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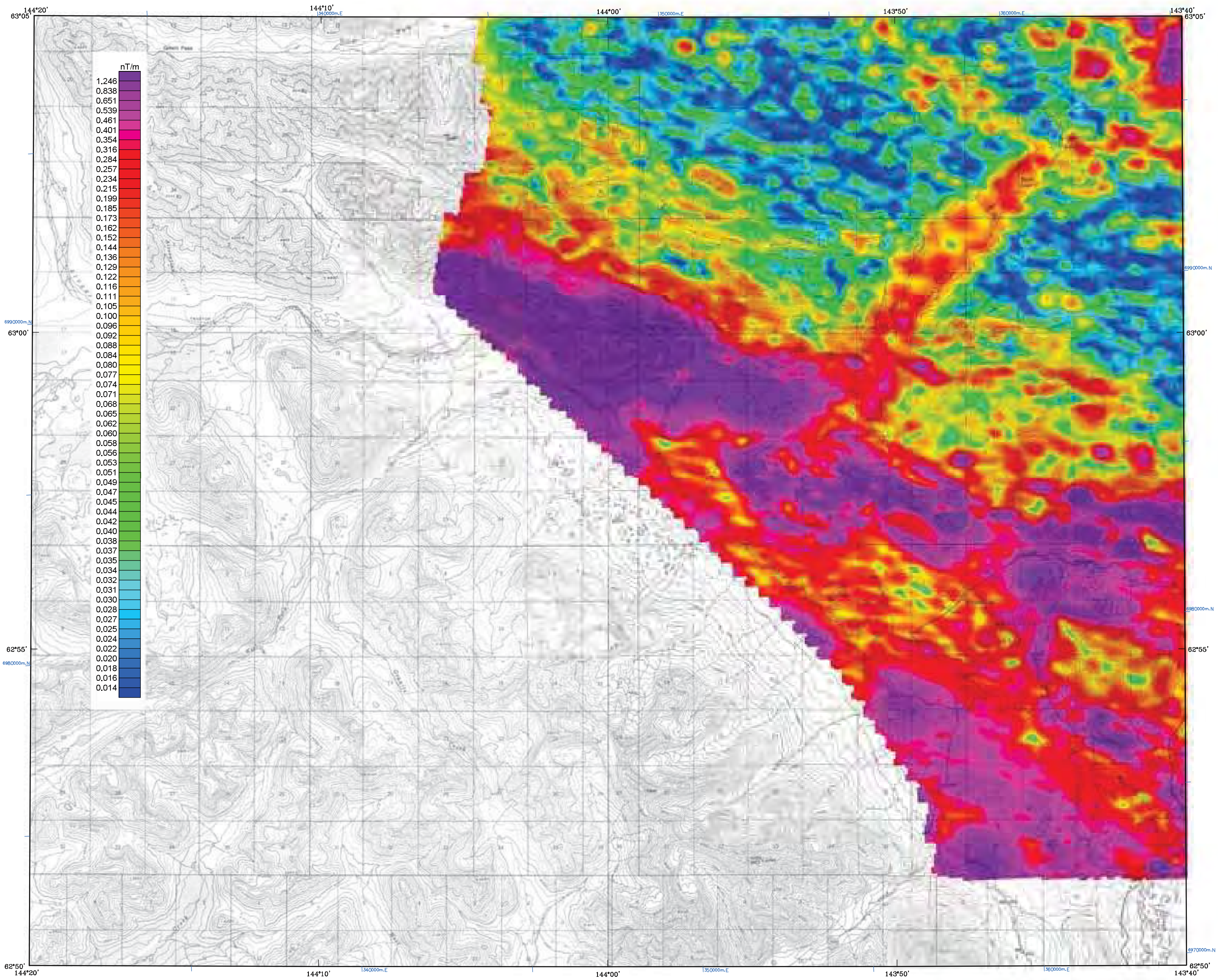
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 4C



Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969;
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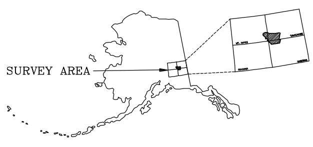
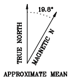
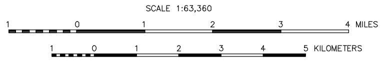




APPROXIMATE MEAN
DECLINATION, 2015



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2015

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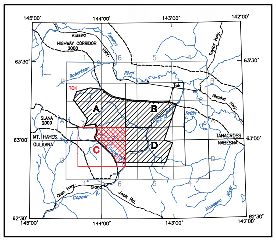

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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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 (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.

SURVEY HISTORY

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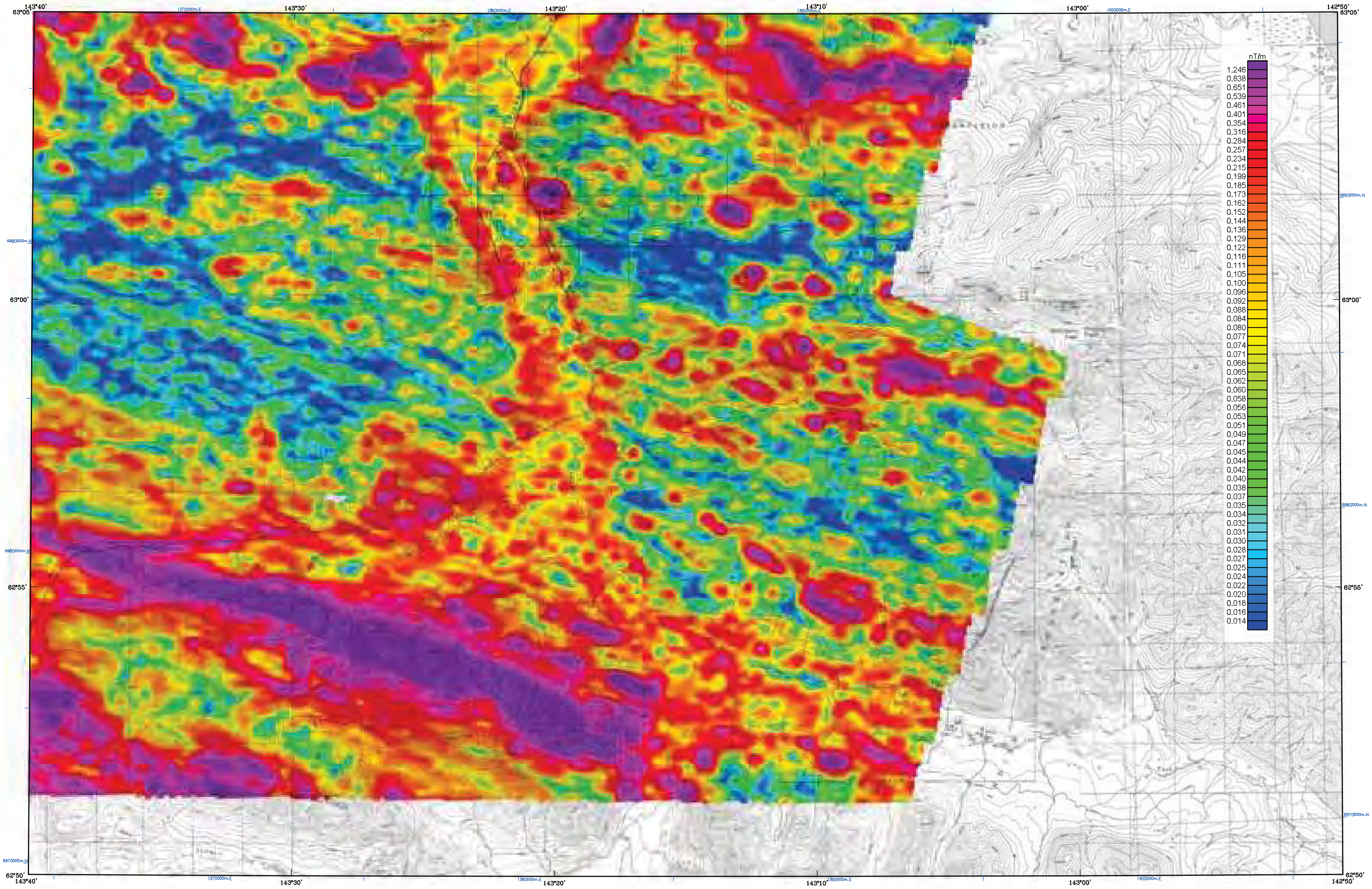
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 4D**

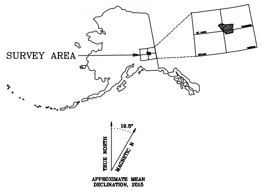


Base from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; Nabesna D–4, 1954; D–5, 1952; D–6, 1969; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

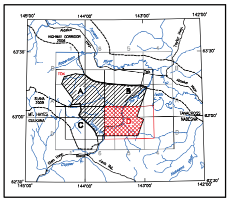


ANALYTIC SIGNAL WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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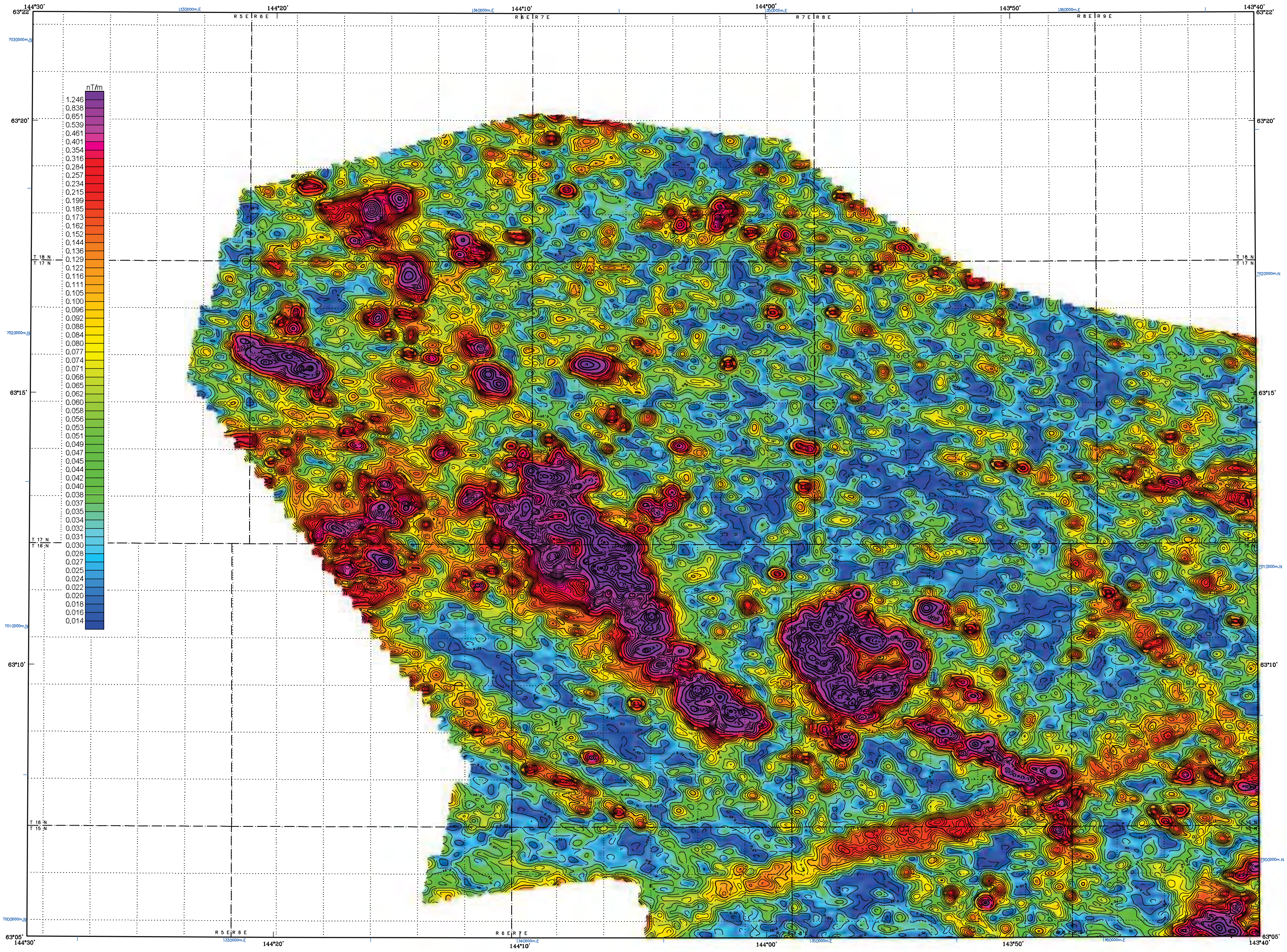
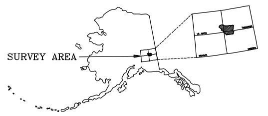
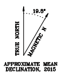
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 5A

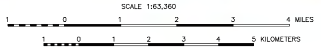


Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

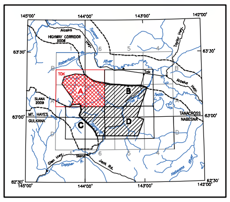


ANALYTIC SIGNAL WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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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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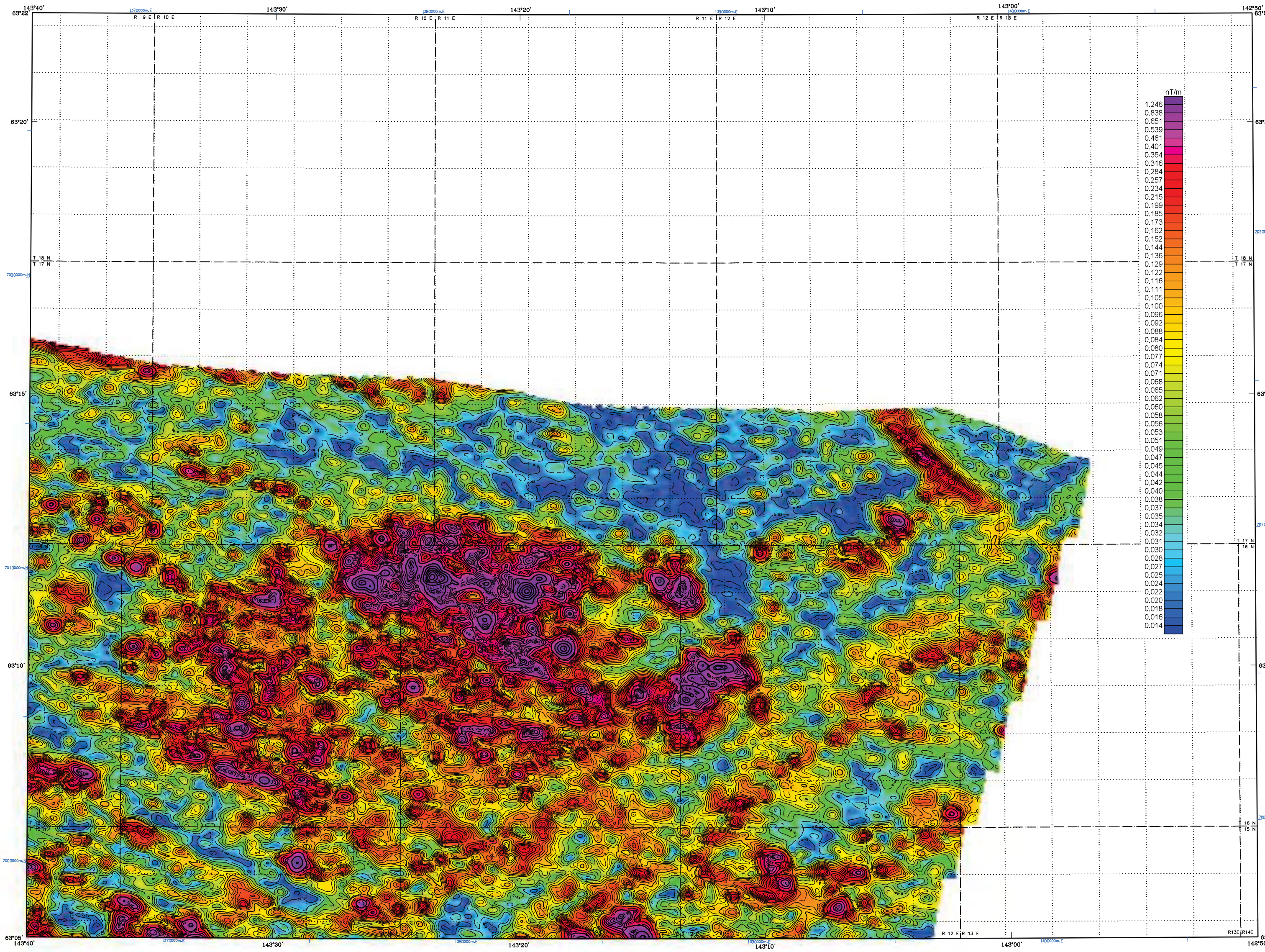
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 5B

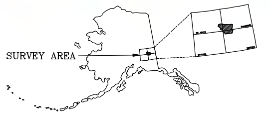


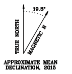
Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 2015

ANALYTIC SIGNAL WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

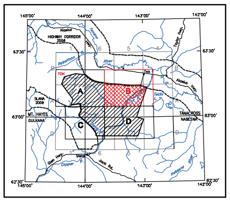
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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ANALYTIC SIGNAL CONTOURS

━━━━	.... 0.50 nT/metre
────	.... 0.10 nT/metre
────	.... 0.02 nT/metre
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SURVEY HISTORY

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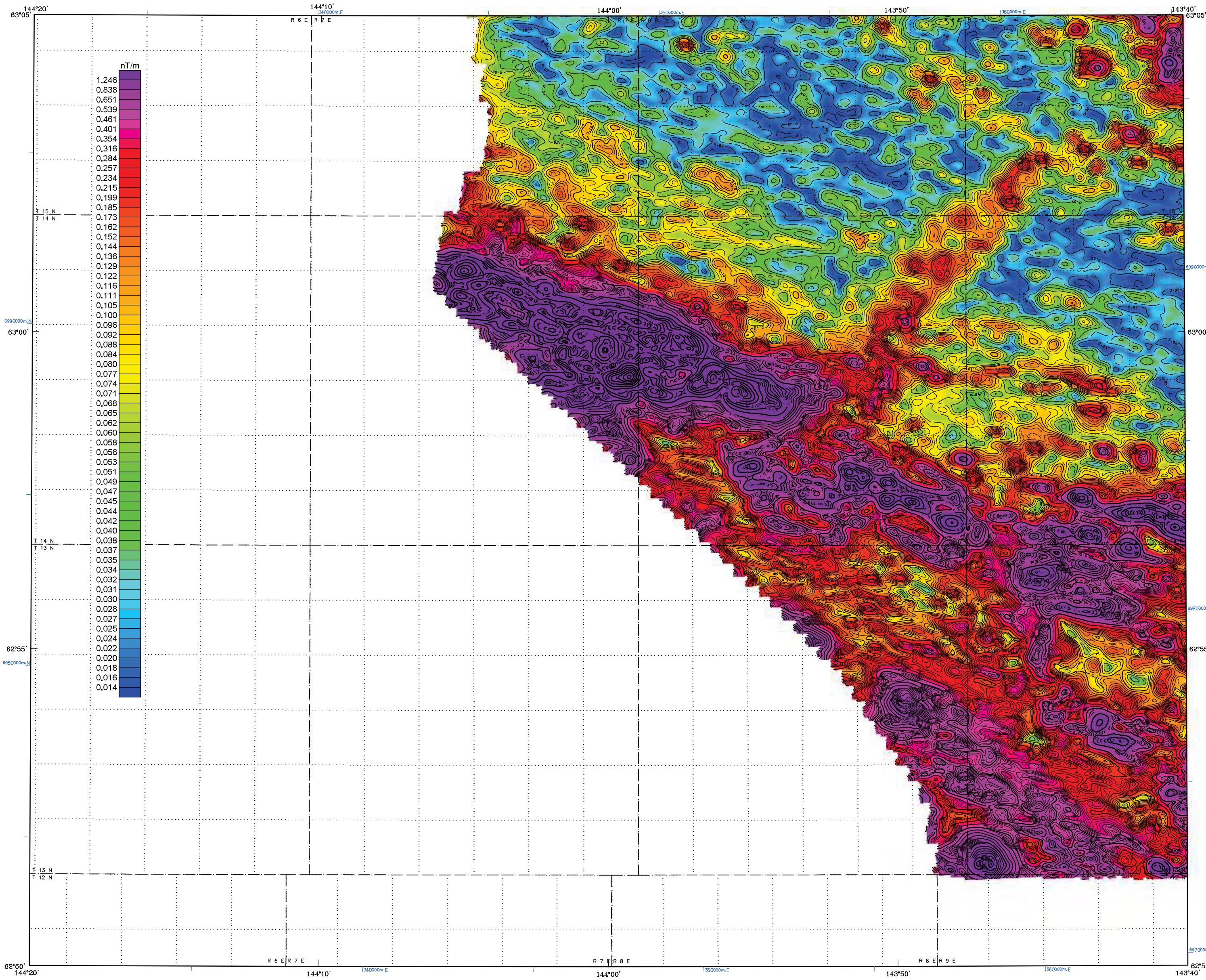
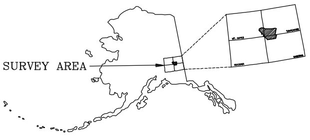
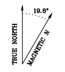
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 5C

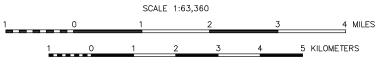


Section outlines from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

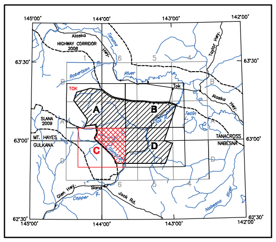


ANALYTIC SIGNAL WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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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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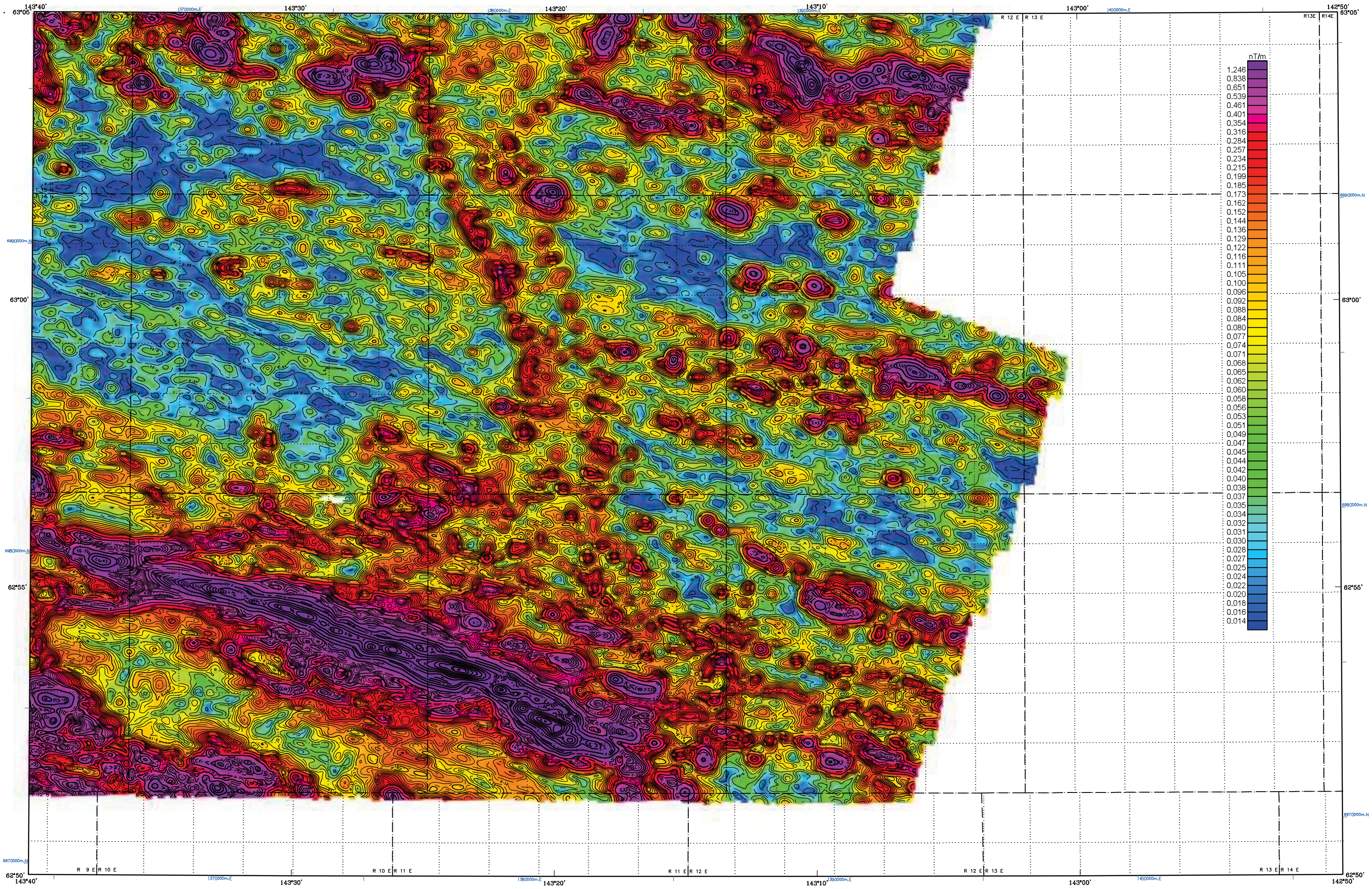
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 5D



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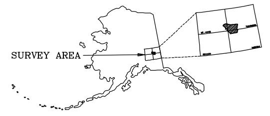
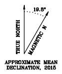
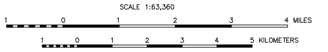
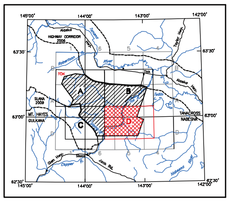






LOCATION INDEX OF 1:63,360–SCALE MAP



ANALYTIC SIGNAL WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

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━━━━━━━━ . . . . 0.50 nT/metre
──────── . . . . 0.10 nT/metre
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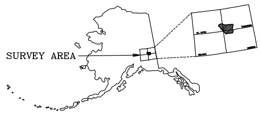
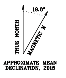
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 6A

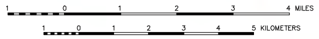
Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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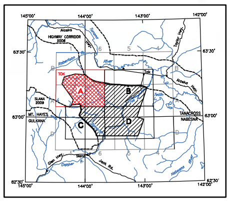
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE-SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient and the total gradient, which can be used 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. The tilt derivative 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 was compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and CGG Land (U.S.) Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2014 and 2015. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program and the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project.

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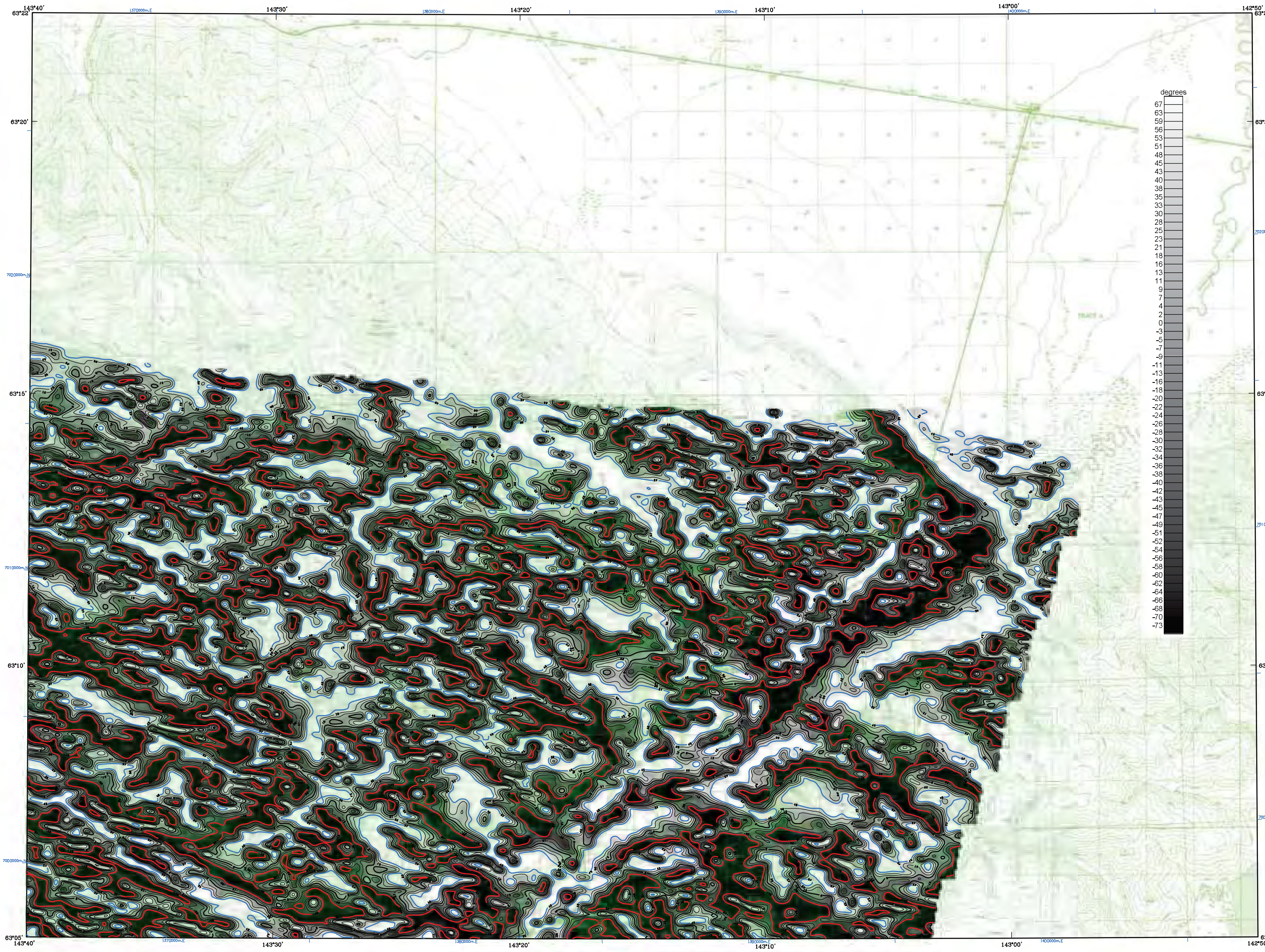
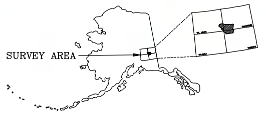
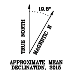
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 6B**



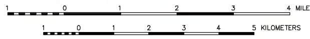
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

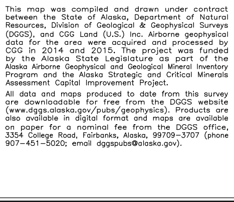


MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



DESCRIPTIVE NOTES

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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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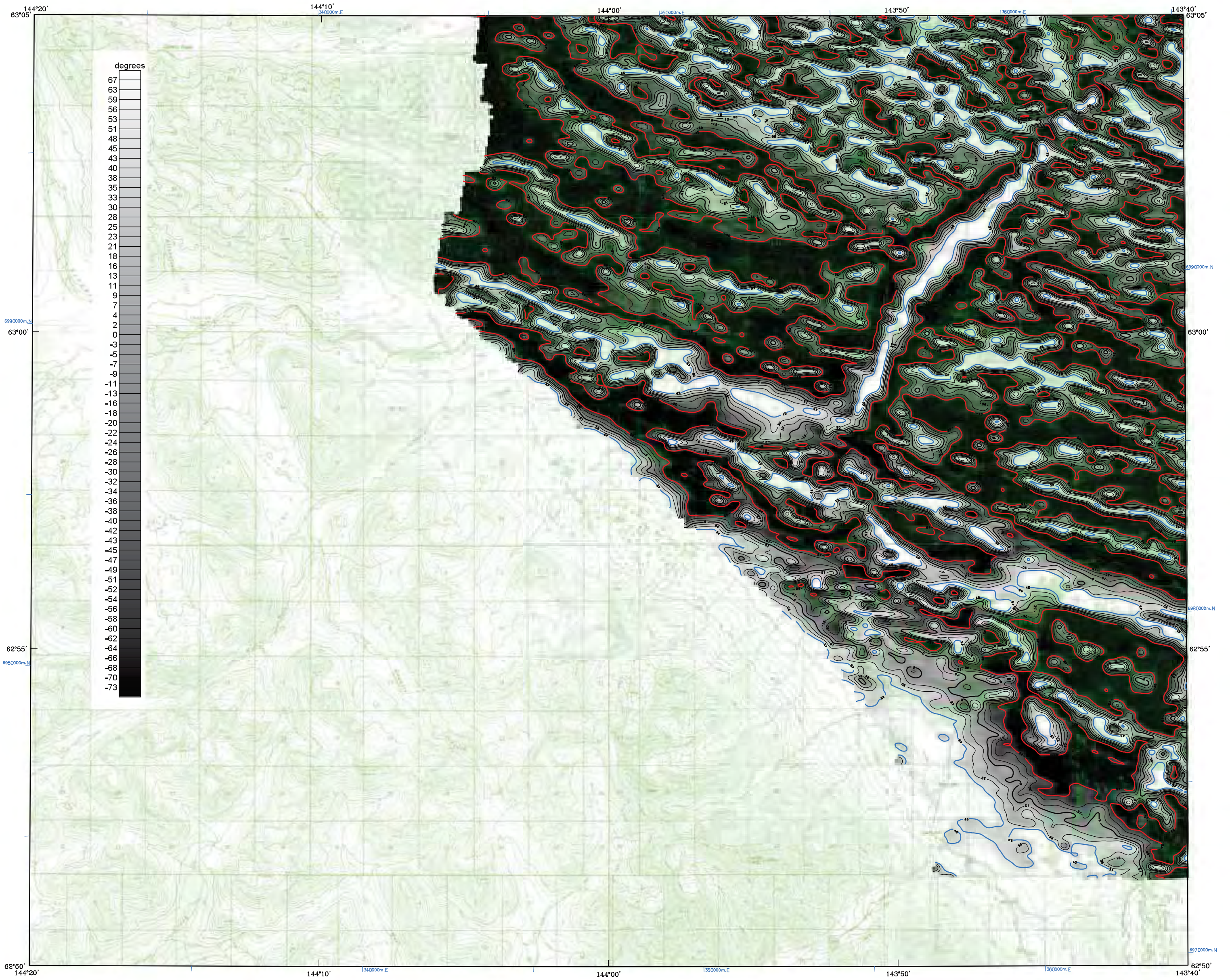
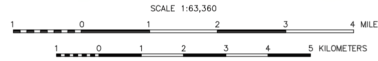
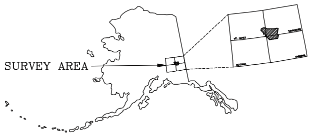
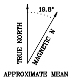
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 6C**



Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska







APPROXIMATE MEAN DECLINATION, 2015

MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

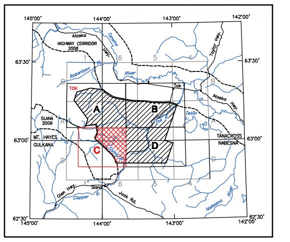
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



DESCRIPTIVE NOTES

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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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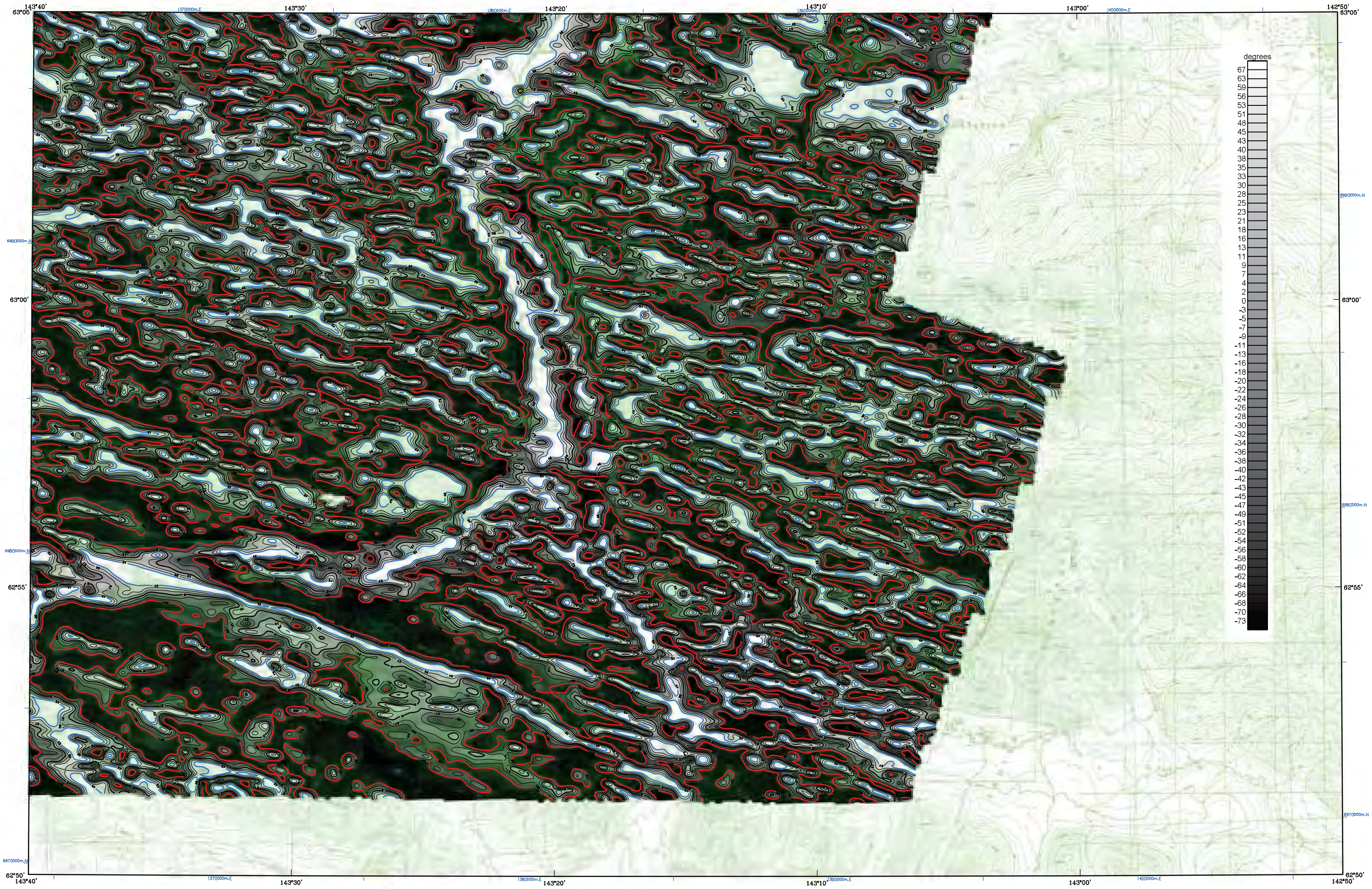
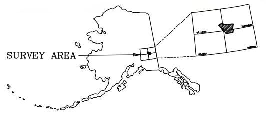
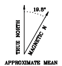


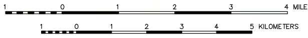
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

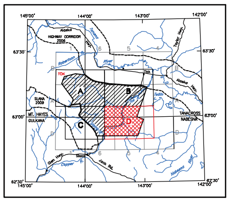


MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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MAGNETIC TILT DERIVATIVE

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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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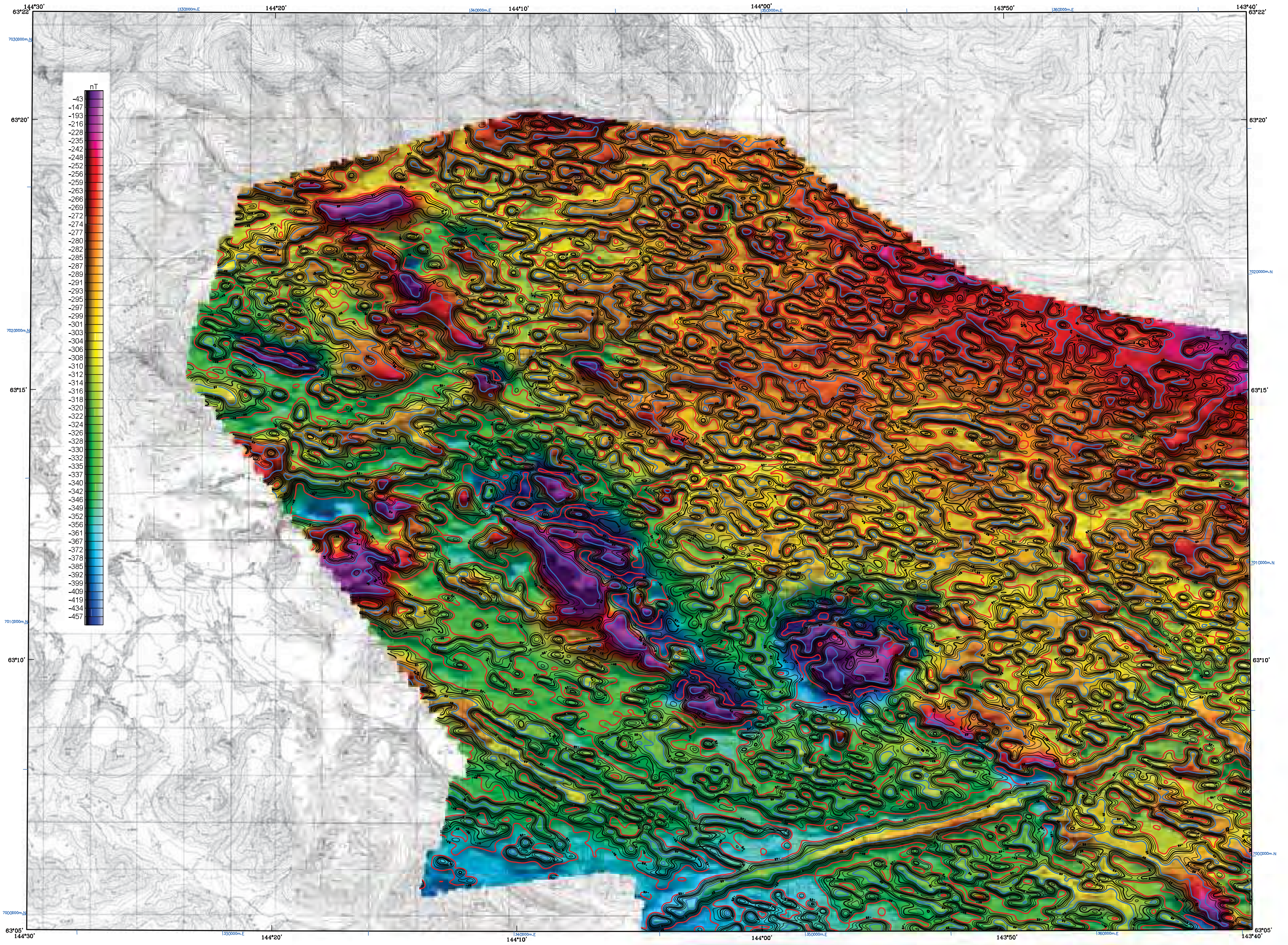
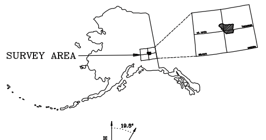


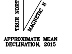
Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982;
Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





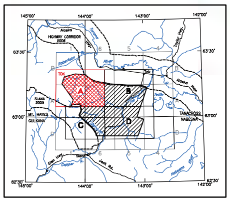
APPROXIMATE MEAN
DECLINATION, 2015

COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG 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[1]) 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.

[1] 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

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MAGNETIC TILT DERIVATIVE CONTOURS

─	. . . .+45 degrees
─	. . . .+30 degrees
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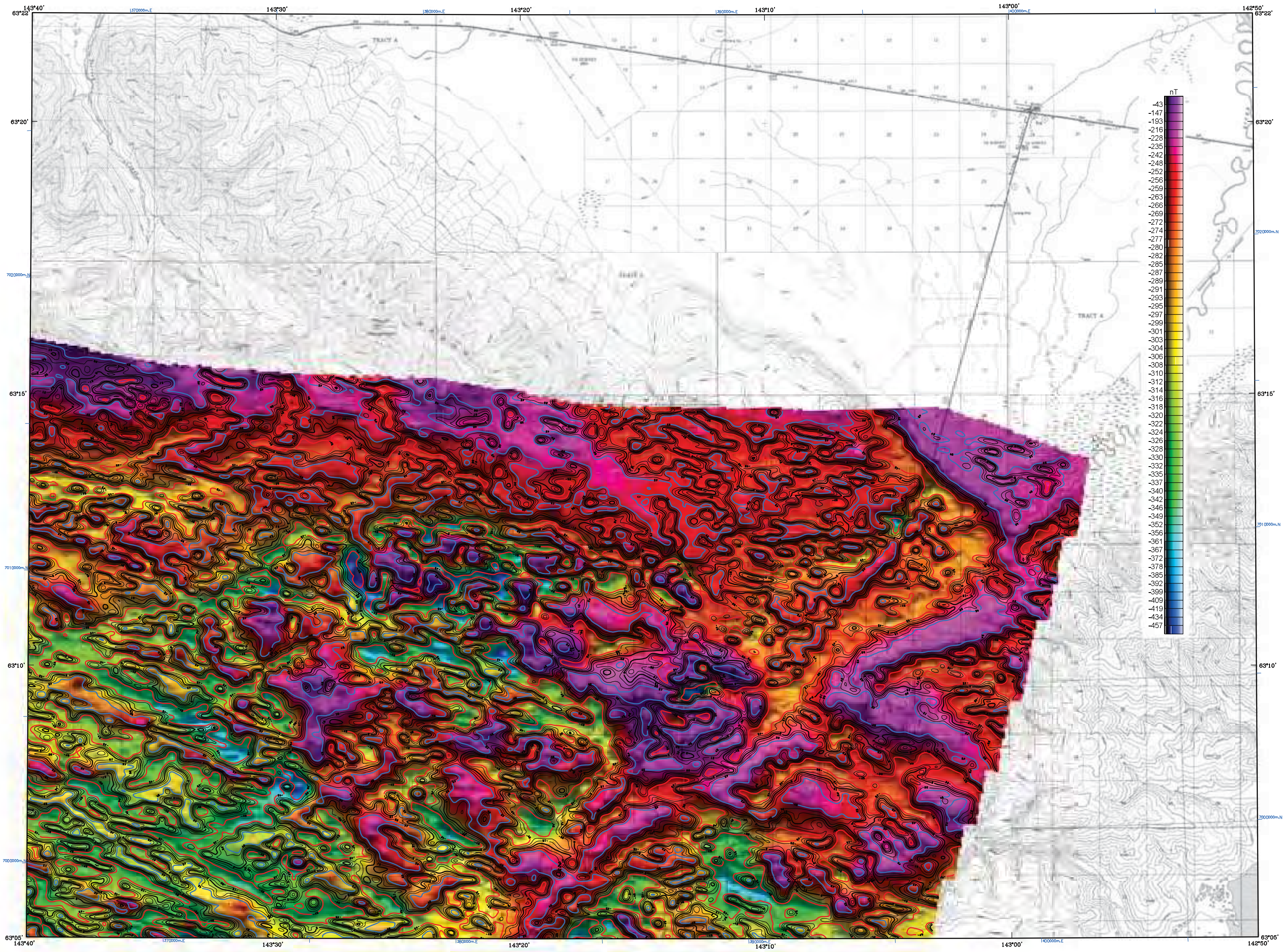
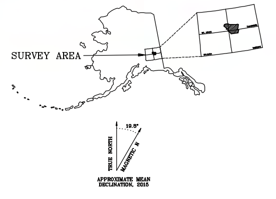
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 7B

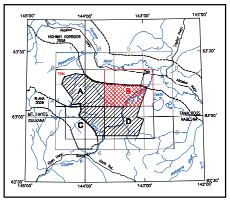


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360



LOCATION INDEX OF 1:63,360–SCALE MAP



COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

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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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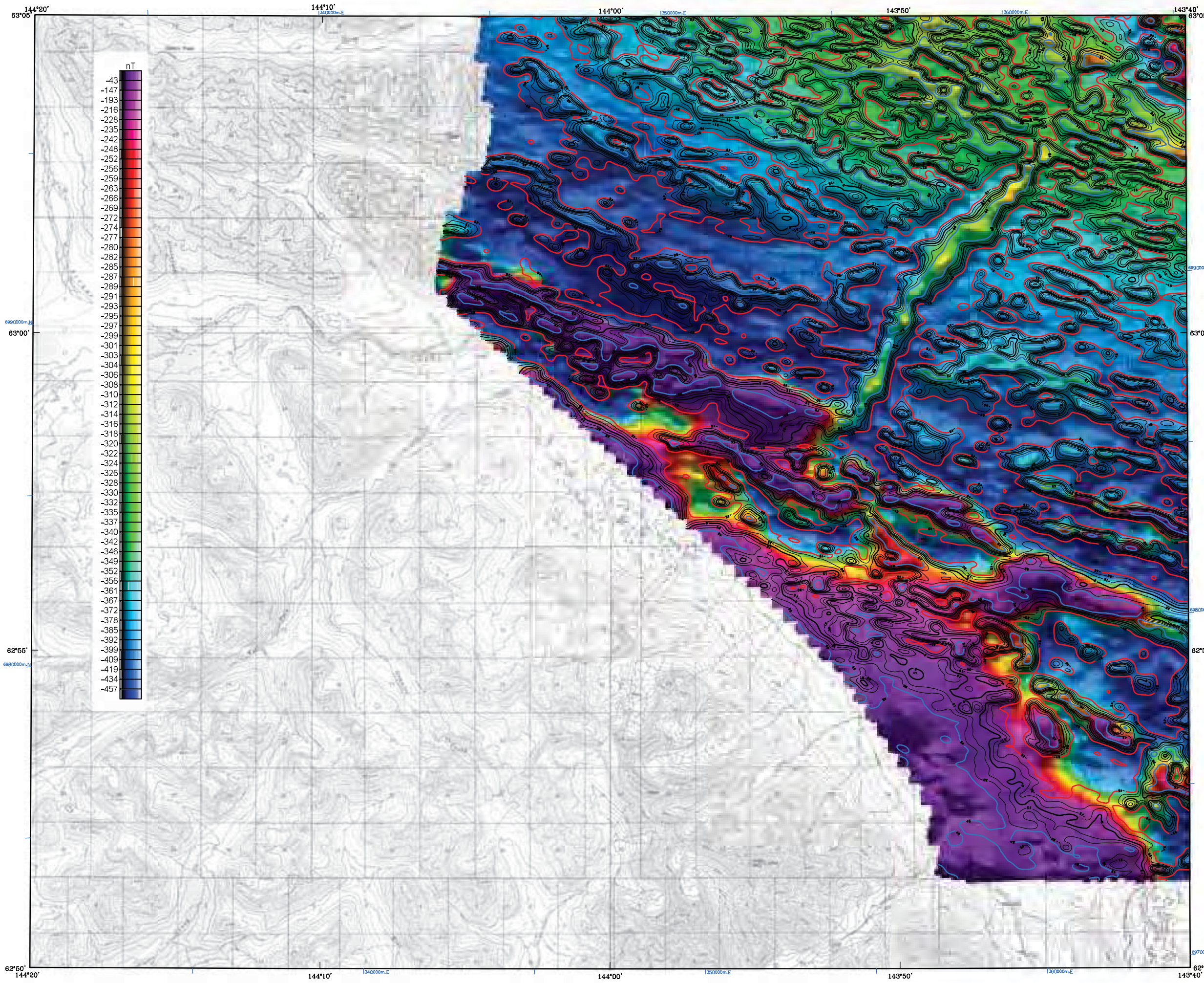
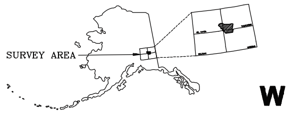


Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 2015

COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS TOK SURVEY AREA, EASTERN INTERIOR ALASKA

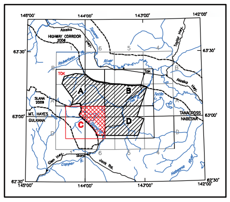
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient and the total gradient, which can be used 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. The tilt derivative 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

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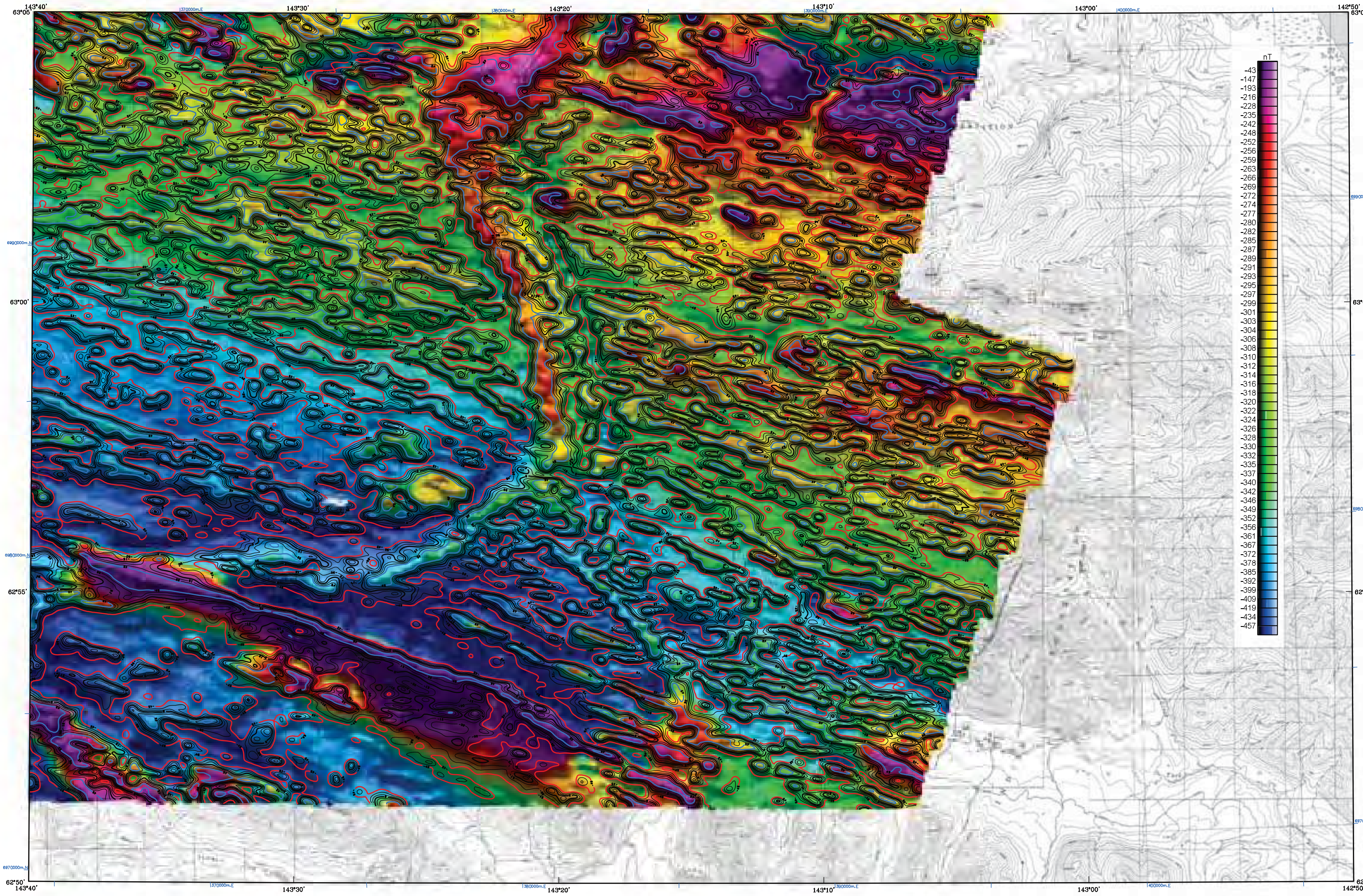
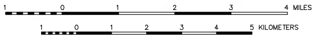
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

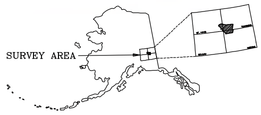
GEOPHYSICAL REPORT 2015-2, Sheet 7D

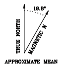


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska

SCALE 1:63,360

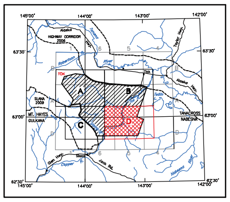






APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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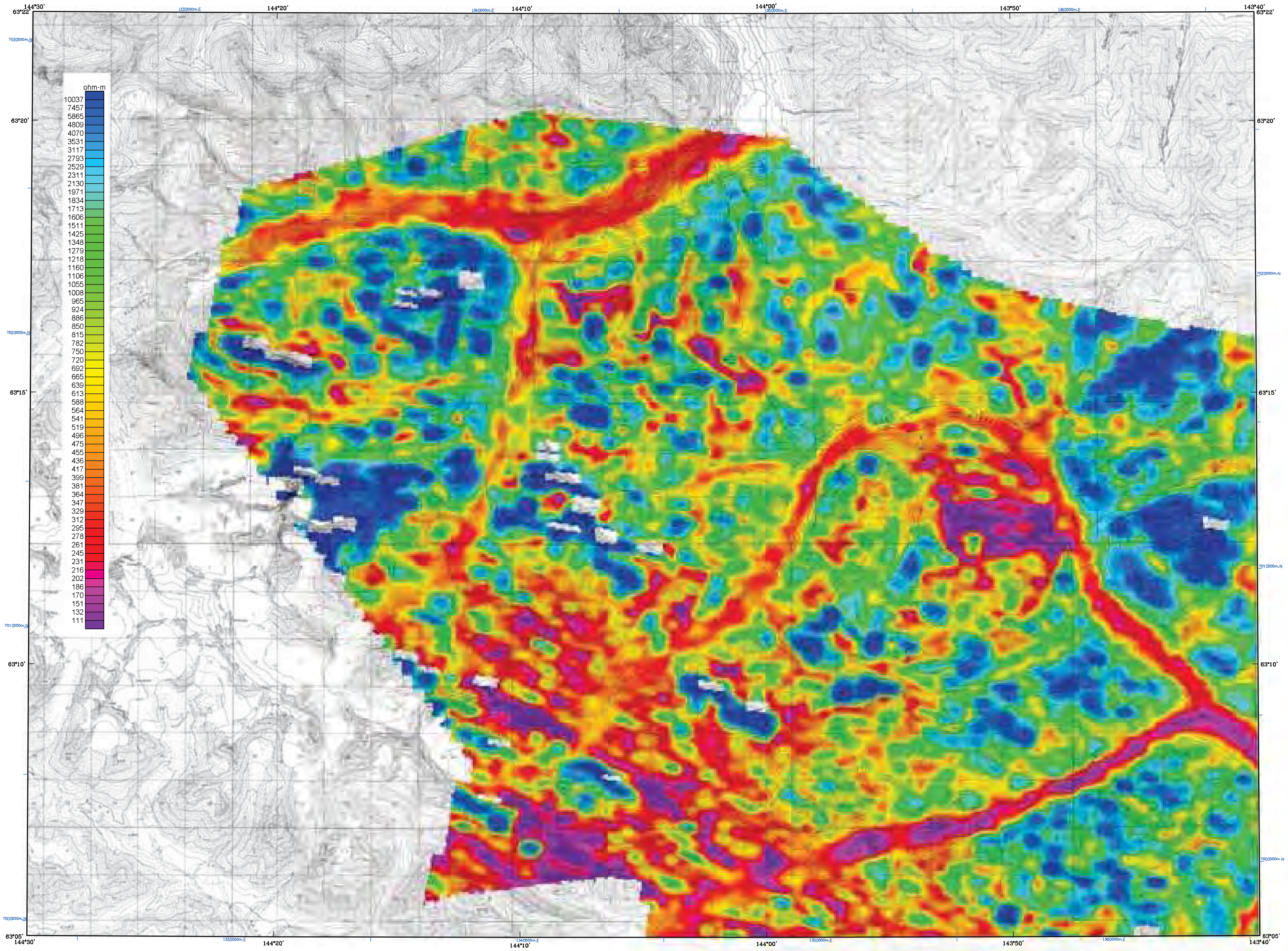
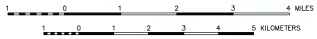
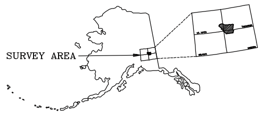
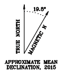


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360







APPROXIMATE MEAN DECLINATION, 2015

56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

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RESISTIVITY

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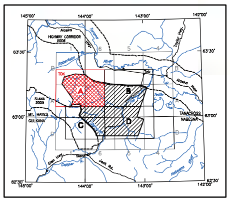
LOCATION INDEX OF 1:63,360–SCALE MAP



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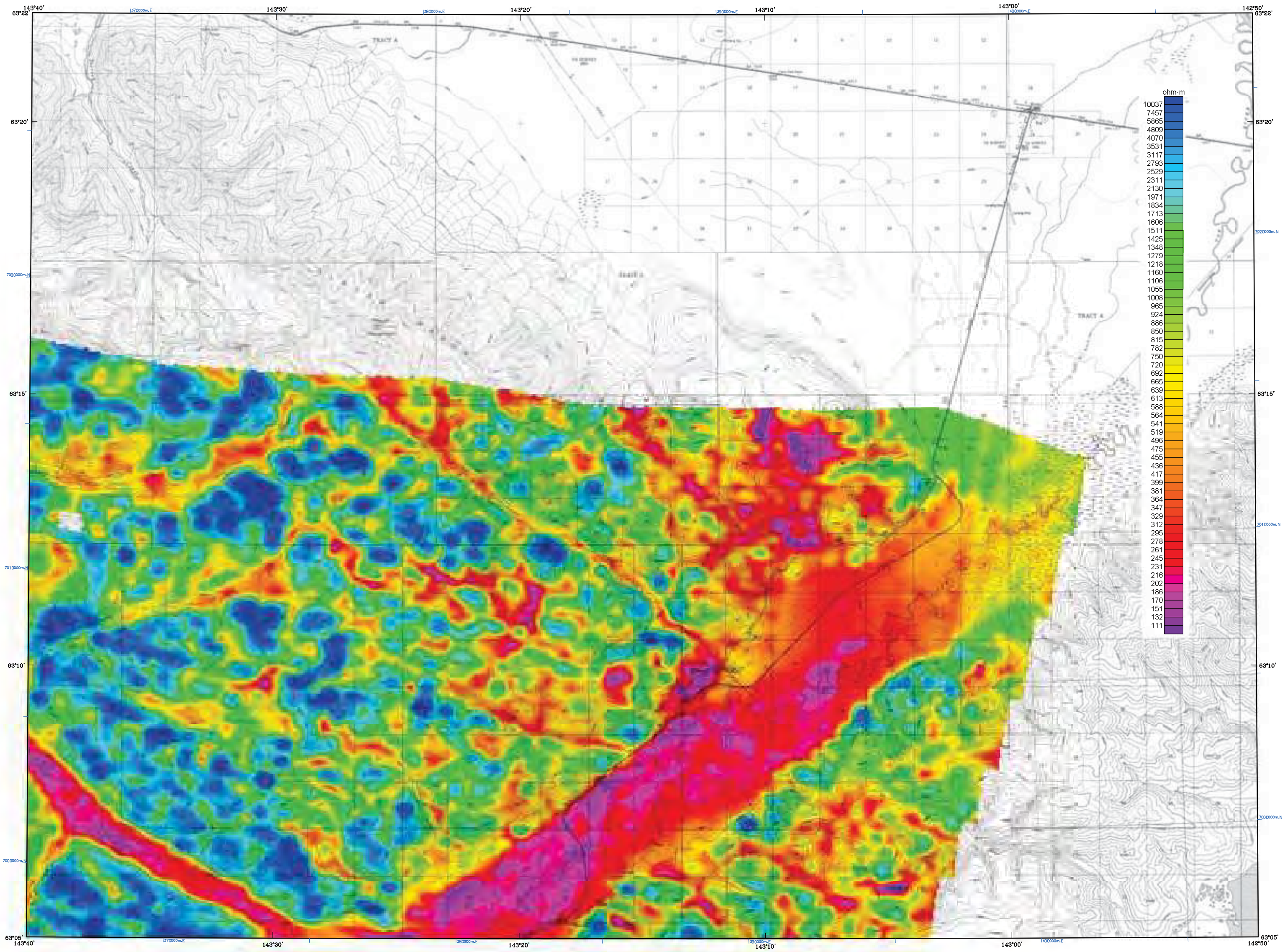
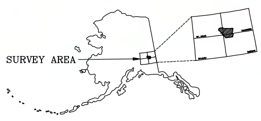
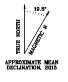
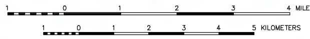


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

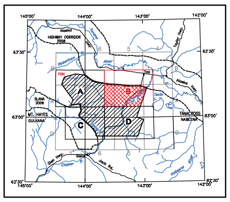




SCALE 1:63,360



LOCATION INDEX OF 1:63,360-SCALE MAP



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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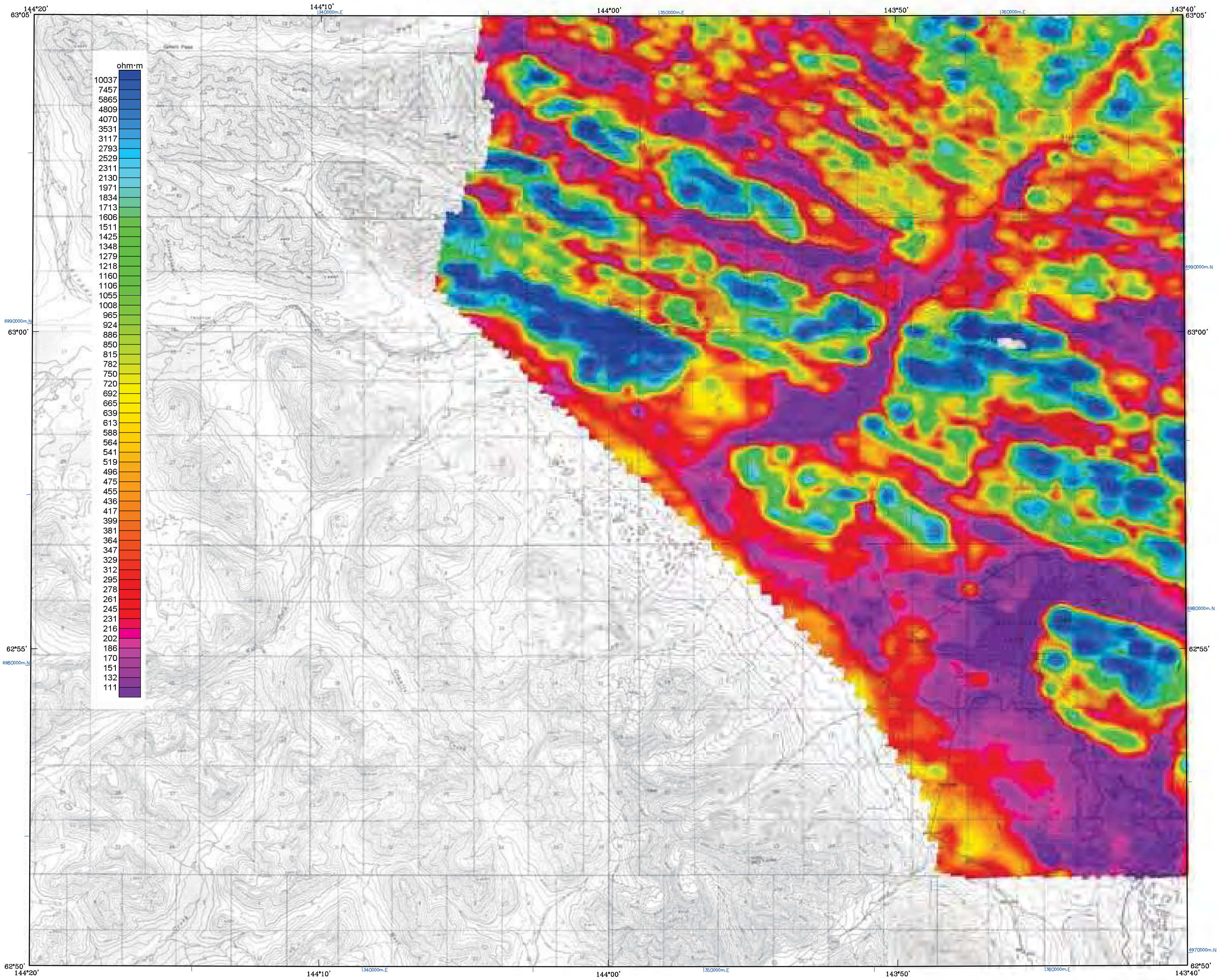

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1 0 1 2 3 4 MILES

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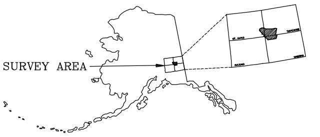
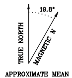
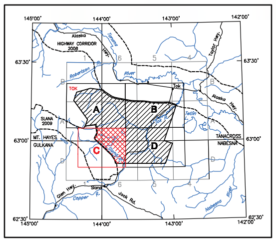




APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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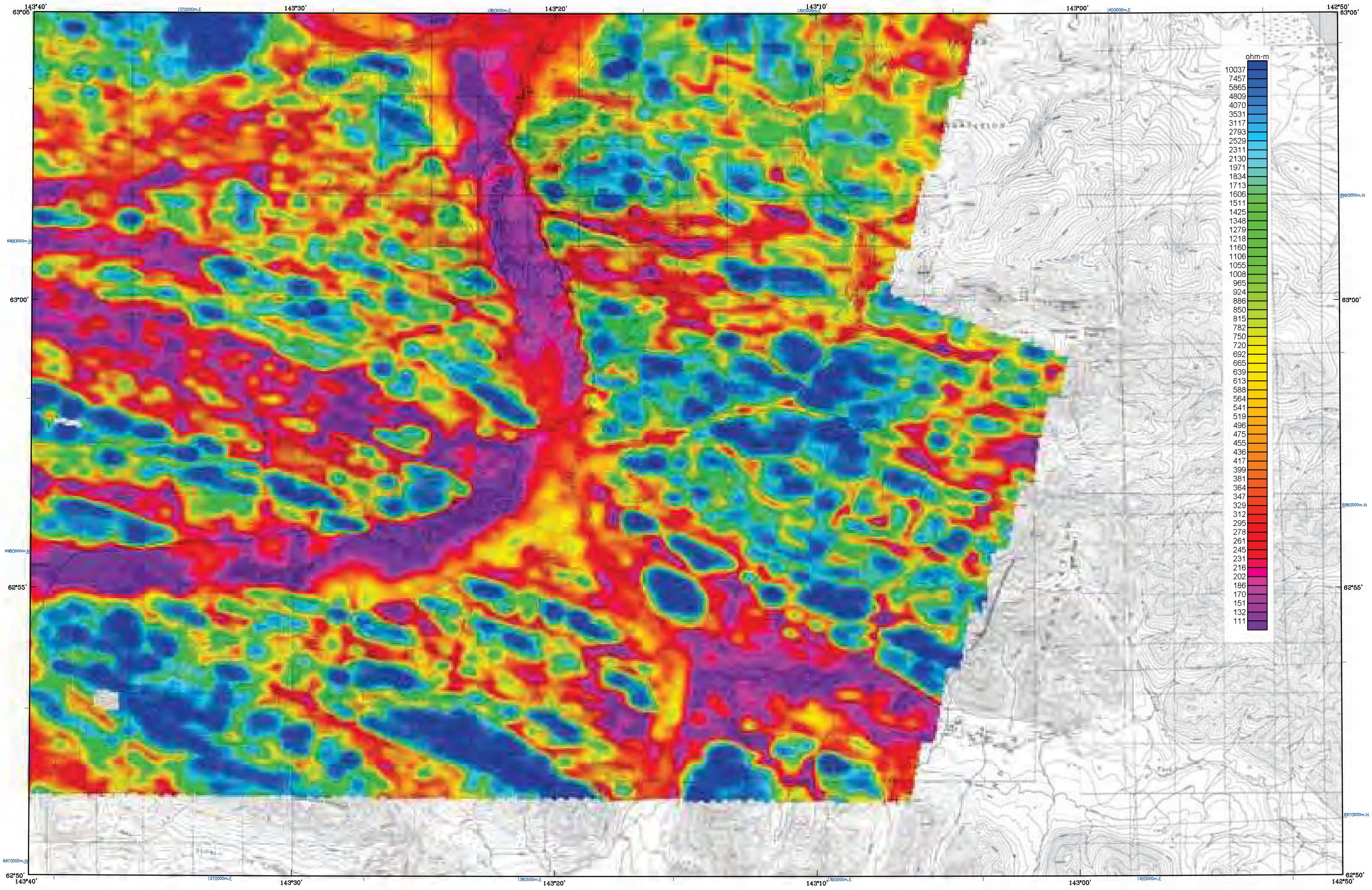

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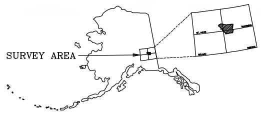

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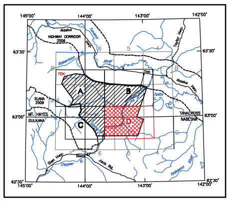
1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX OF 1:63,360–SCALE MAP



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, 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 in–phase 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[1]) 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 in this publication.

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[1] 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 to avoid meaningless resistivity calculations for 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.

SURVEY HISTORY

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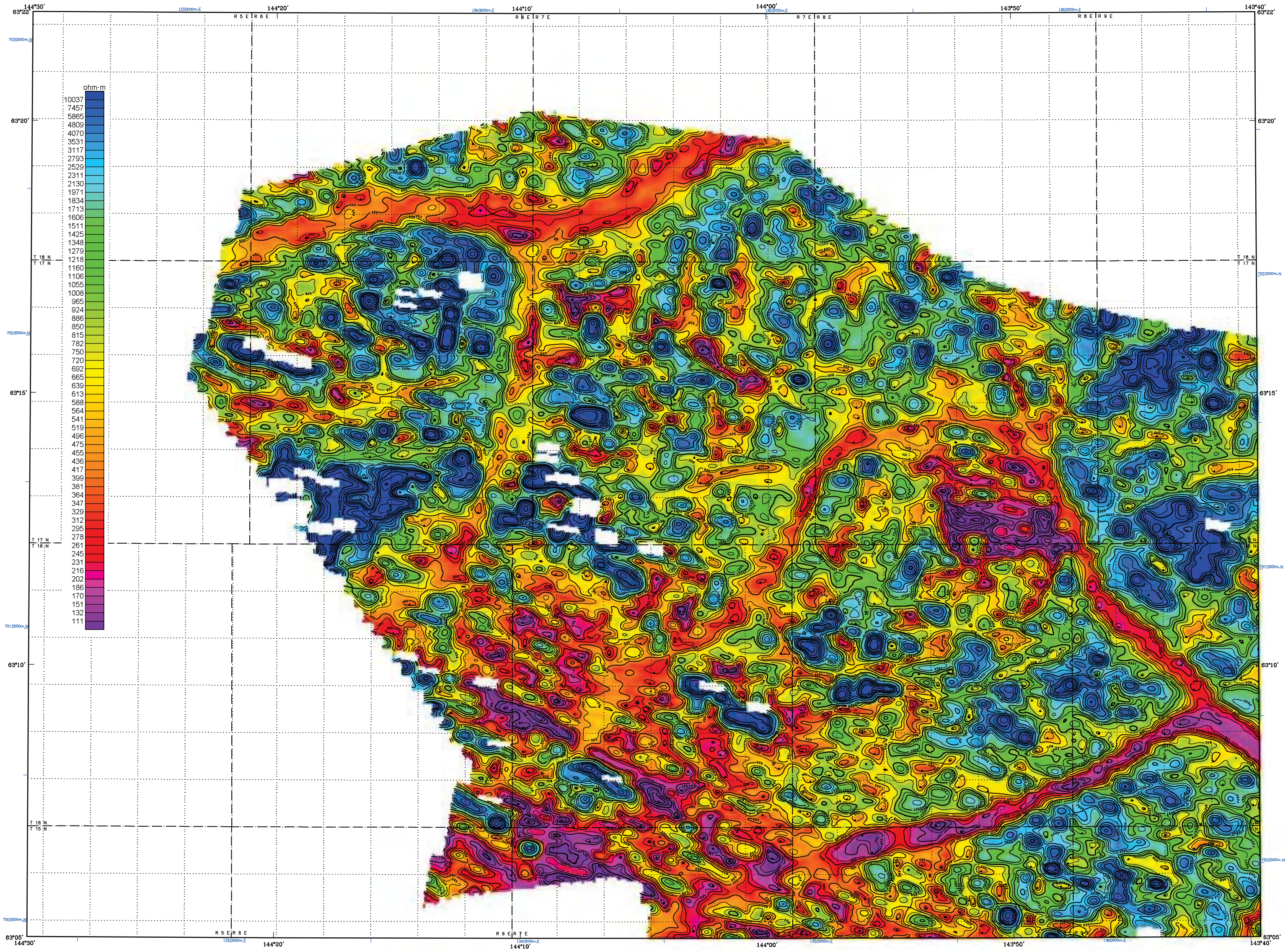
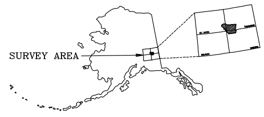
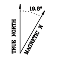


Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

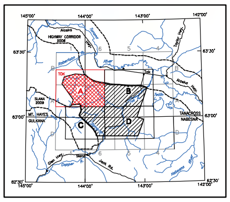
1 0 1 2 3 4 5 KILOMETERS

56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE-SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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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

This map was compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and CGG Land (U.S.) Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2014 and 2015. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program and the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project.

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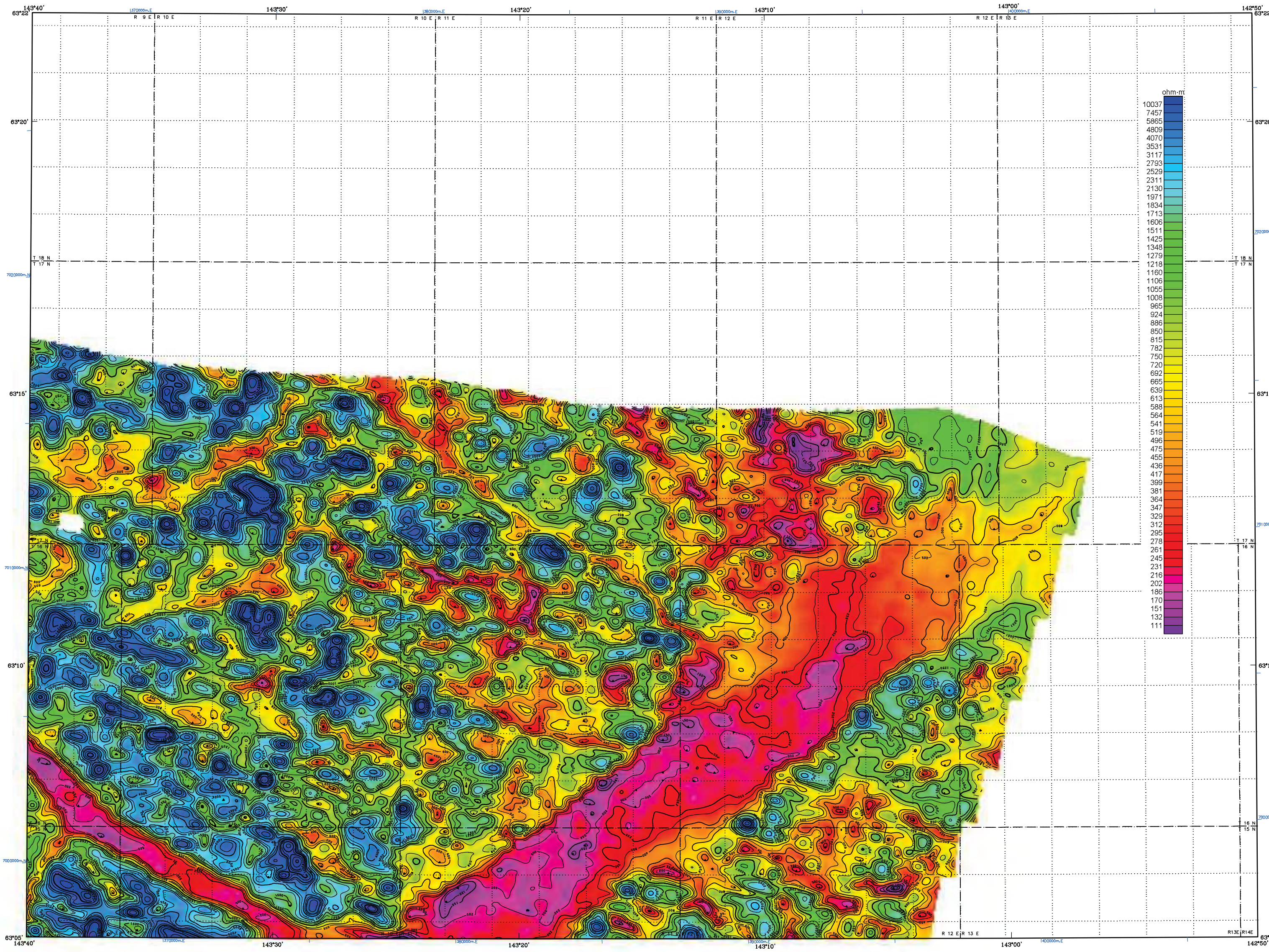
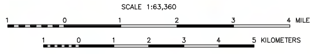
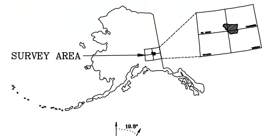
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

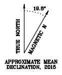
GEOPHYSICAL REPORT 2015-2, Sheet 9B



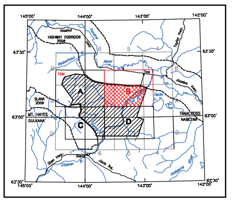
Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska







LOCATION INDEX OF 1:63,360-SCALE MAP



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

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 in-phase 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[1]) 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 in this publication.

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RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated to avoid meaningless resistivity calculations for 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.

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 was compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and CGG Land (U.S.) Inc. Airborne geophysical data for the area were acquired and processed by CGG in 2014 and 2015. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical and Geological Mineral Inventory Program and the Alaska Strategic and Critical Minerals Assessment Capital Improvement Project.

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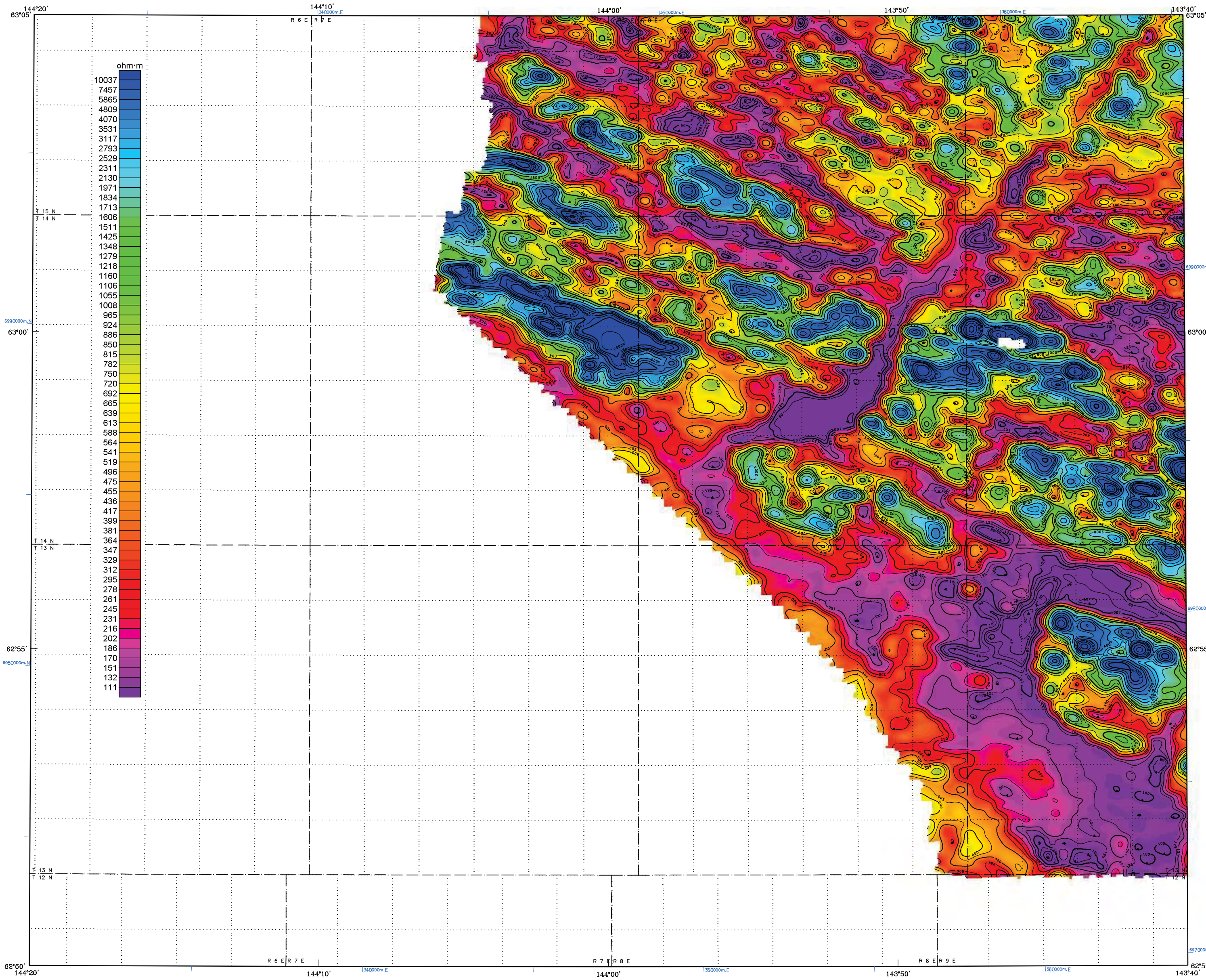
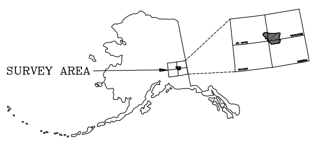
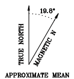
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 9C

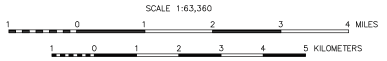


Section outlines from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015



56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

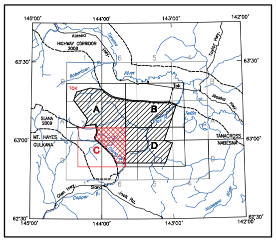
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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RESISTIVITY

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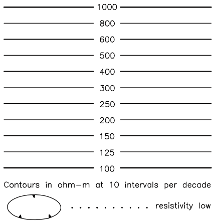
RESISTIVITY CONTOURS



Contours in ohm–m at 10 intervals per decade

SURVEY HISTORY

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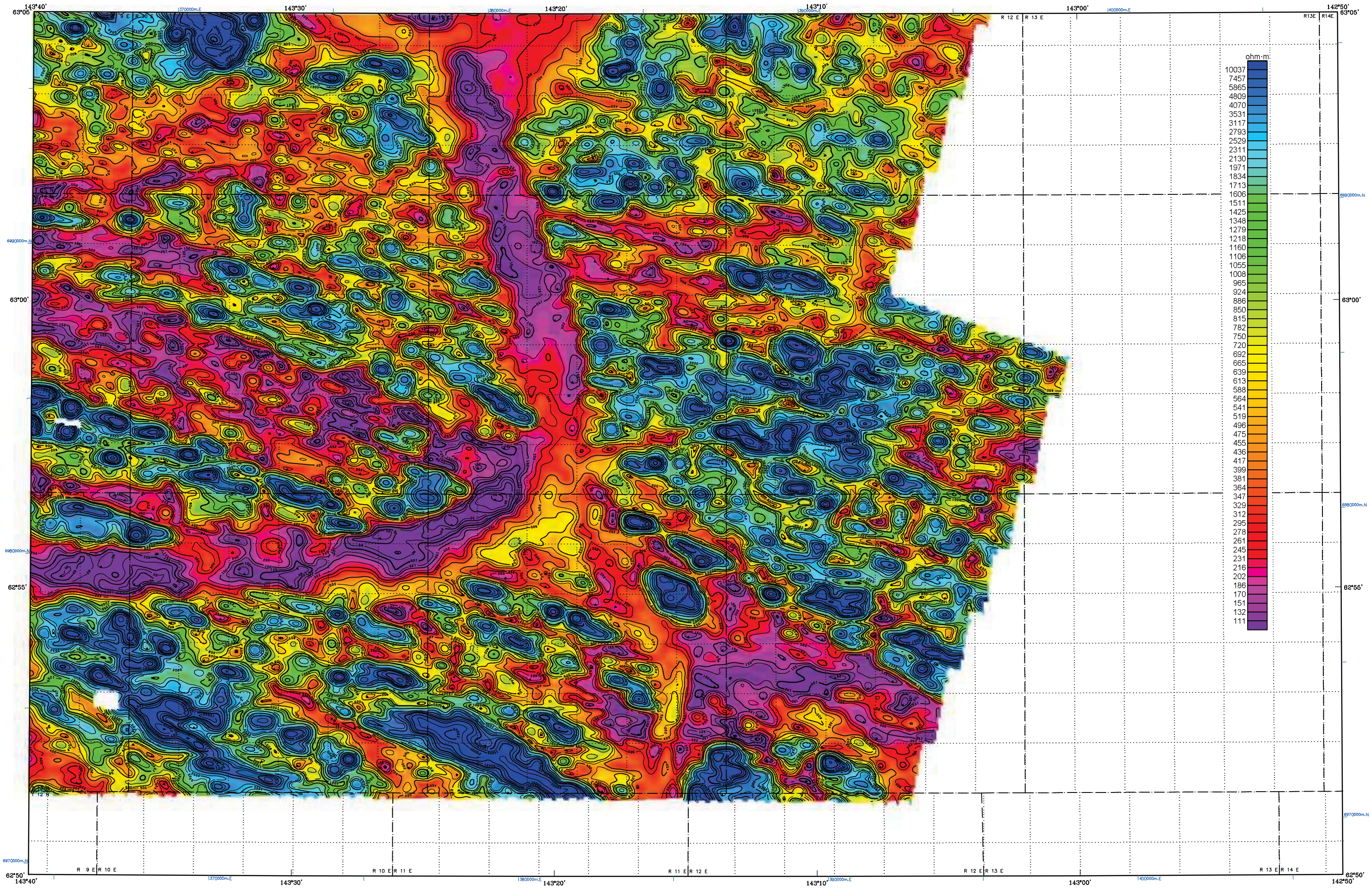
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 9D

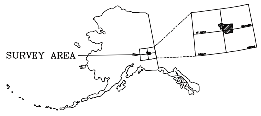


Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 2015

56,000 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

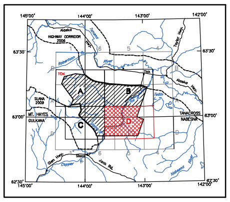
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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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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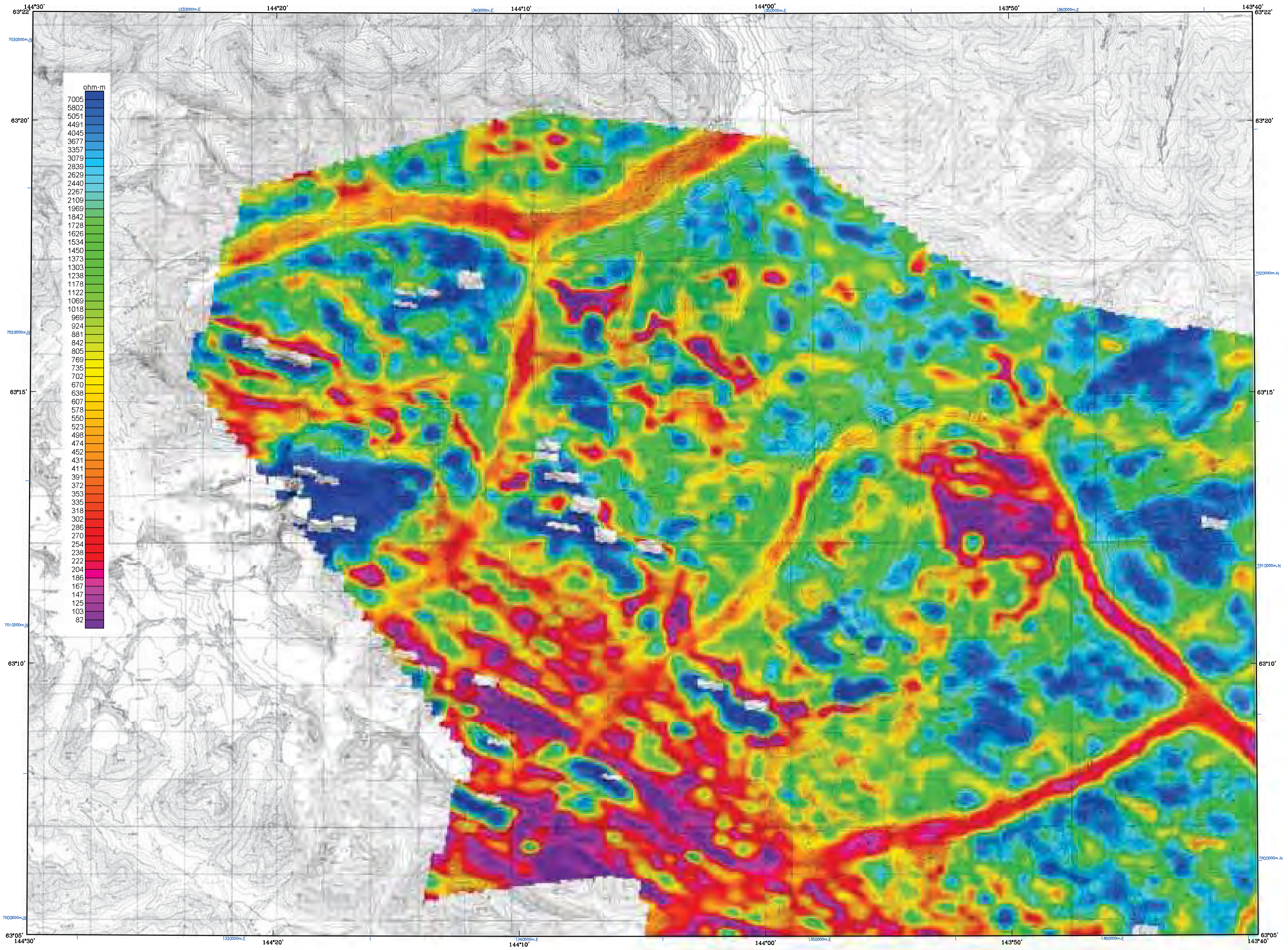
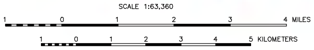
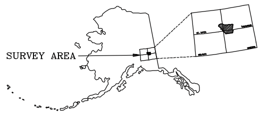
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

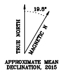
GEOPHYSICAL REPORT 2015-2, Sheet 10A



Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1962;
Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska

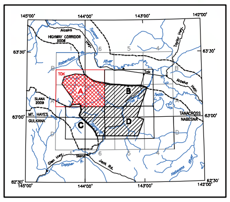






APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360-SCALE MAP



7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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2015

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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 in–phase and quadrature component of the coplanar 7200 Hz using the pseudo–layer half–space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970[1]) 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 in this publication.

[1] 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 to avoid meaningless resistivity calculations for 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.

SURVEY HISTORY

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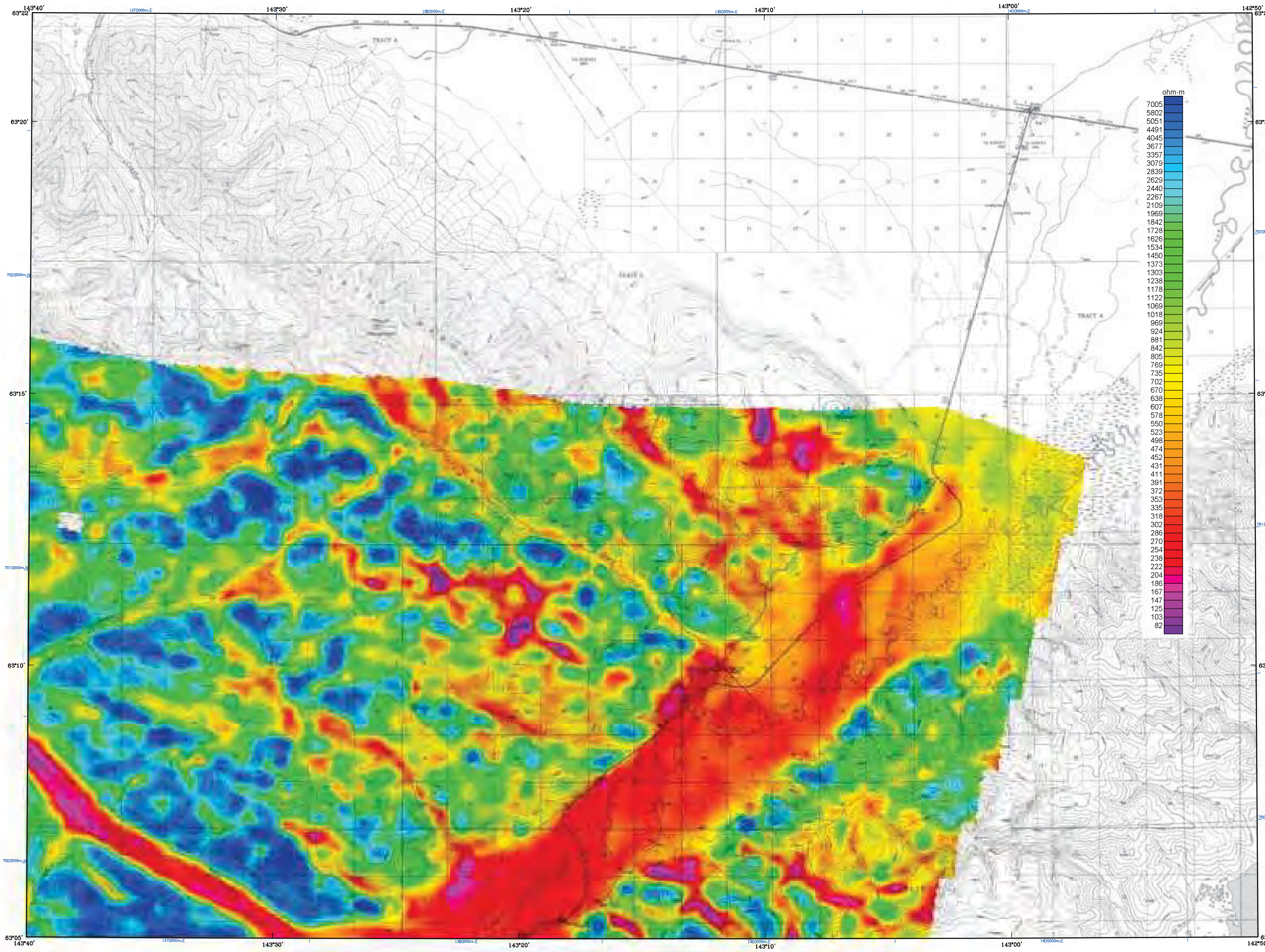
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2015-2, Sheet 10B**

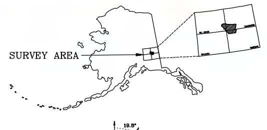


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 2015

7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

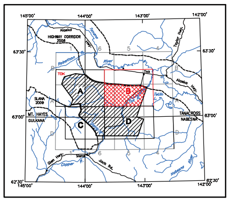
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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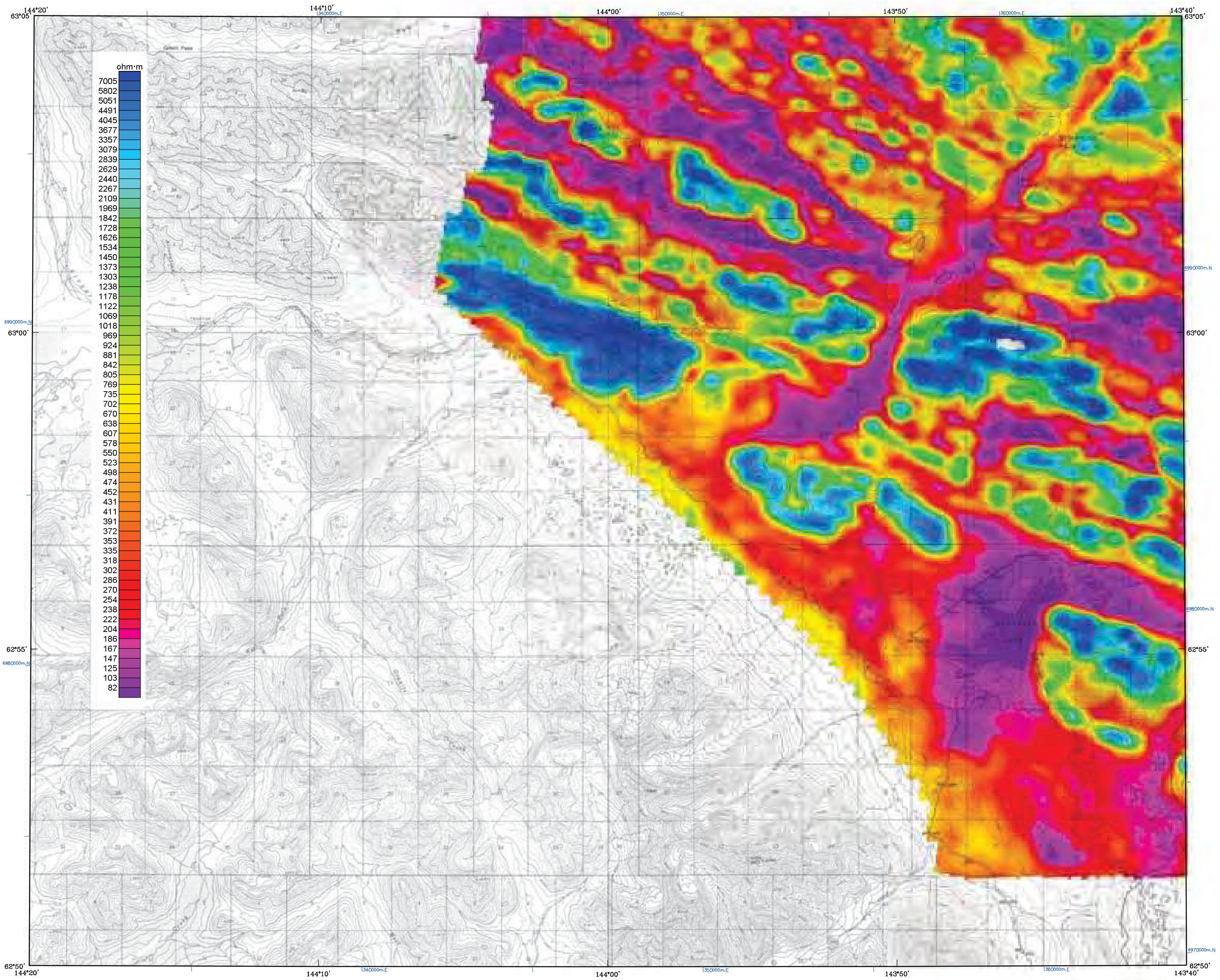
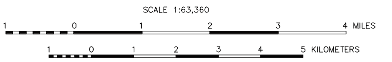
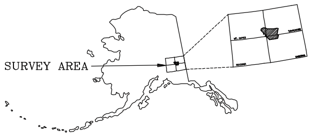
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

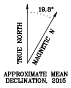
GEOPHYSICAL REPORT 2015-2, Sheet 10C



Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska







7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

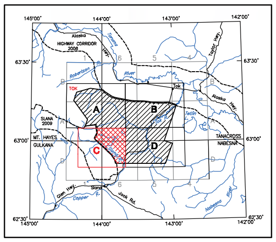
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

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SURVEY HISTORY

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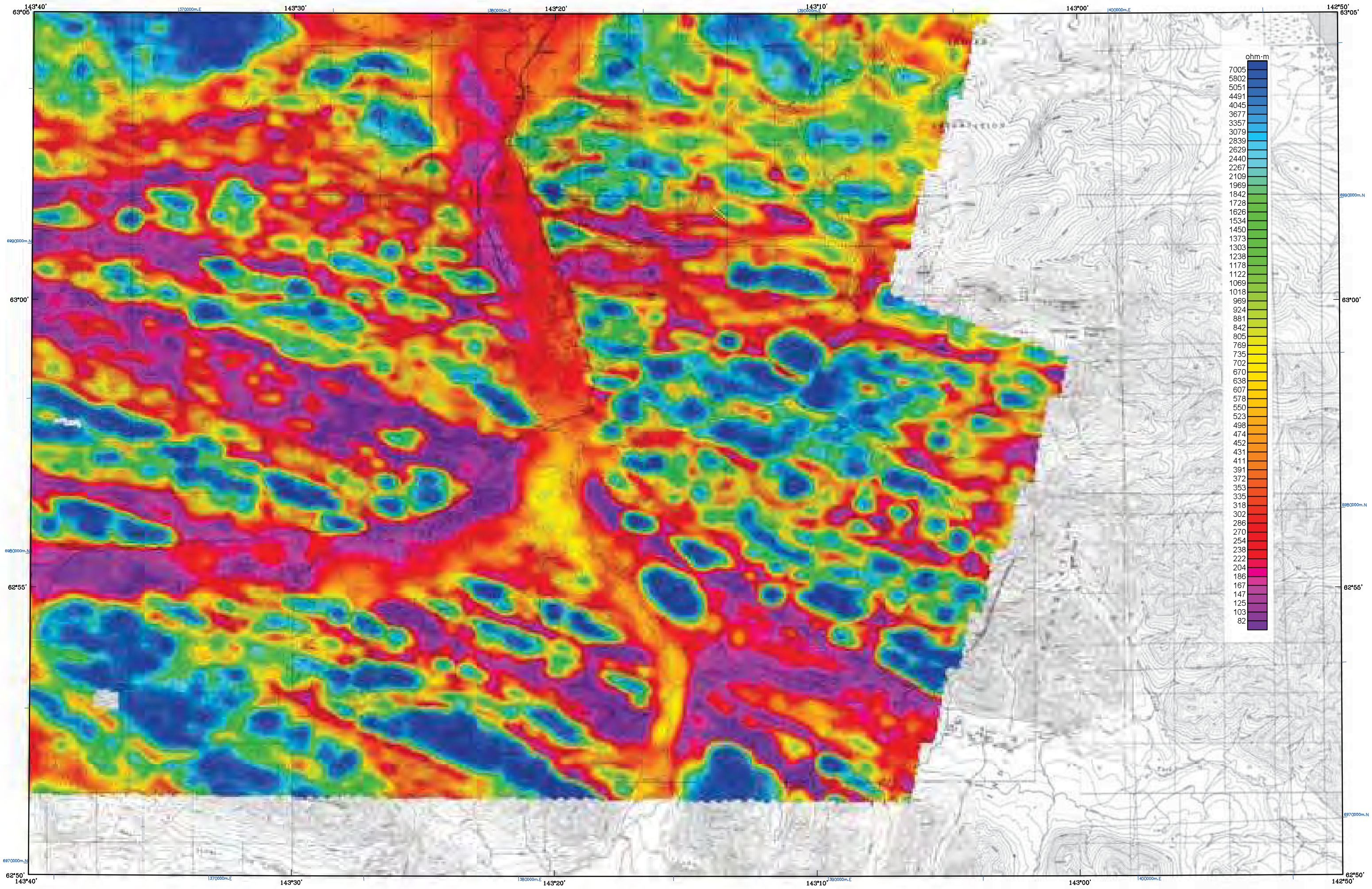
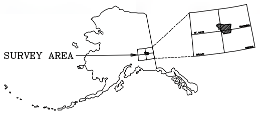
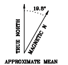
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 10D



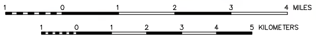
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



7200 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

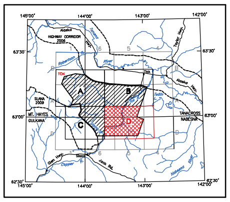
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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RESISTIVITY

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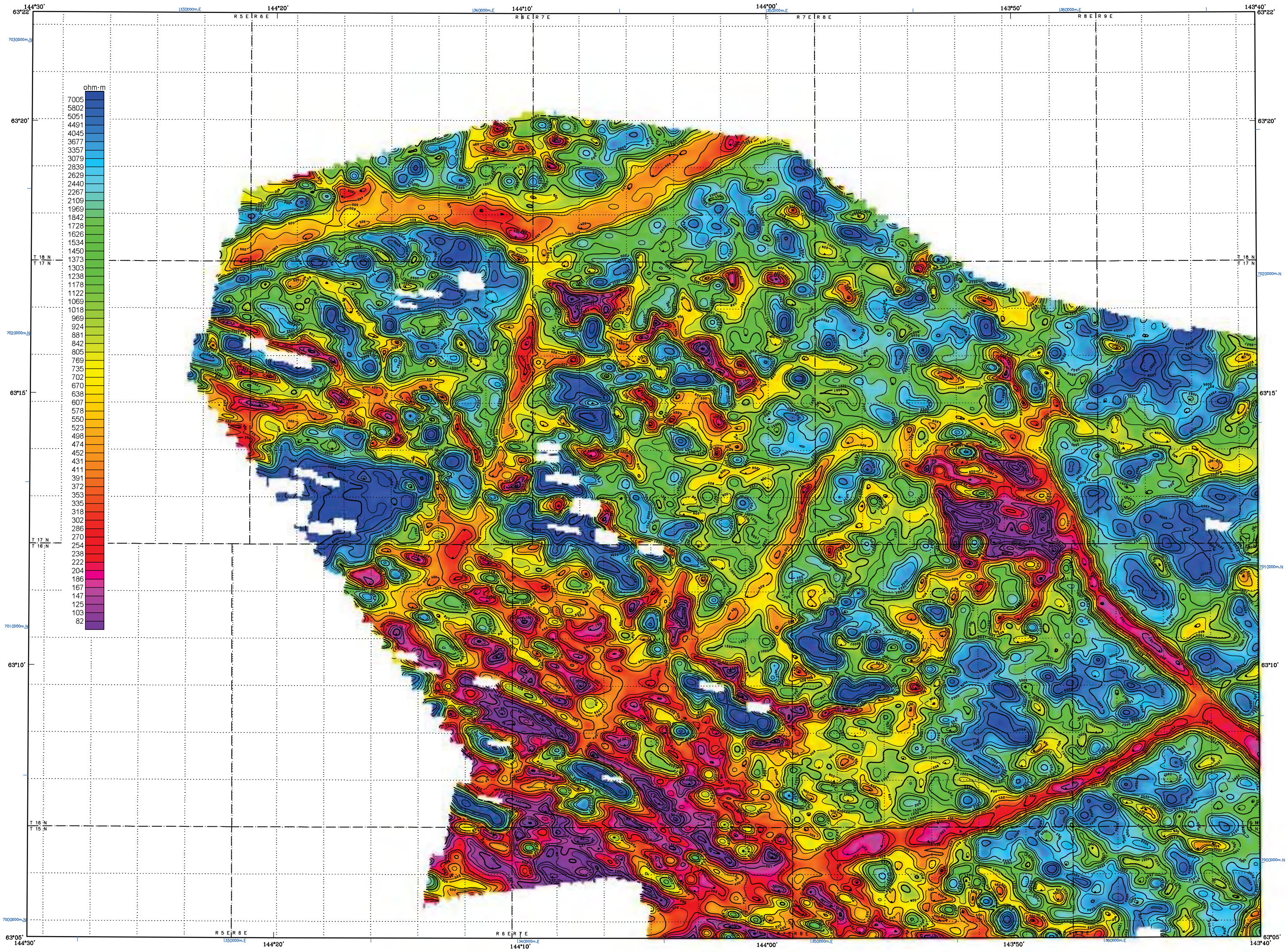
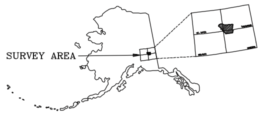
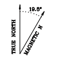
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 11A



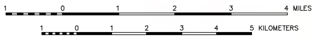
Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

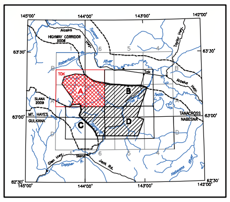
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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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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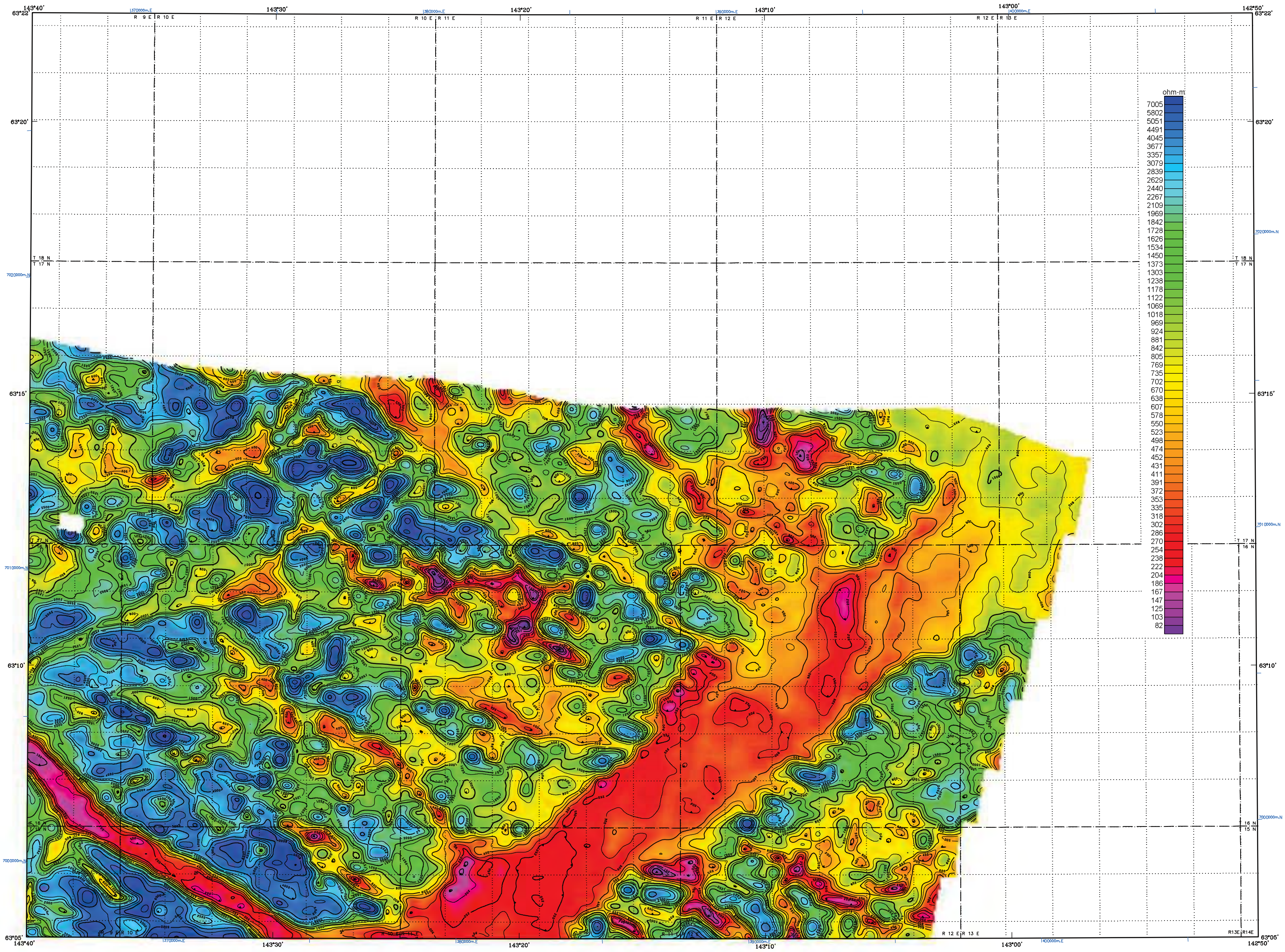
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 11B



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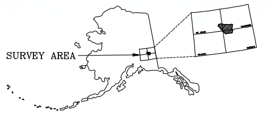
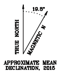




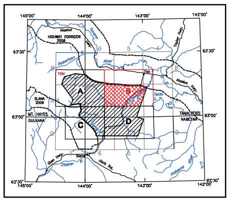
APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX OF 1:63,360-SCALE MAP



7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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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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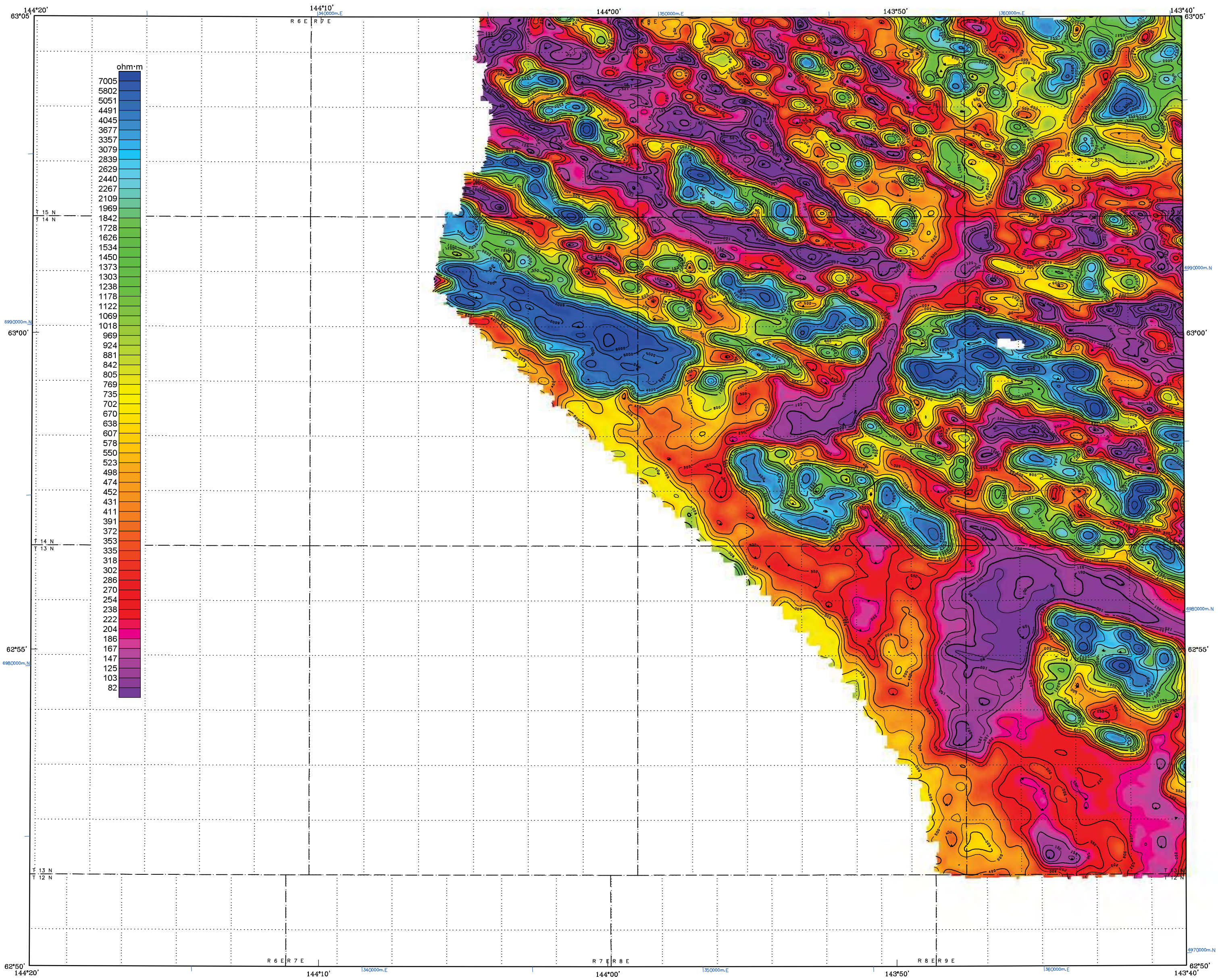
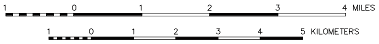
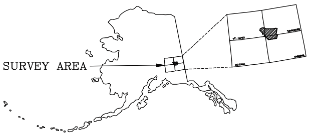
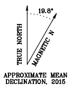


Section outlines from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska

SCALE 1:63,360

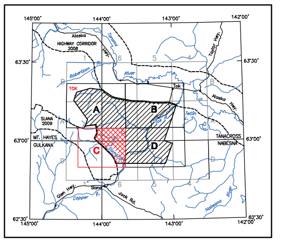






APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360–SCALE MAP



7200 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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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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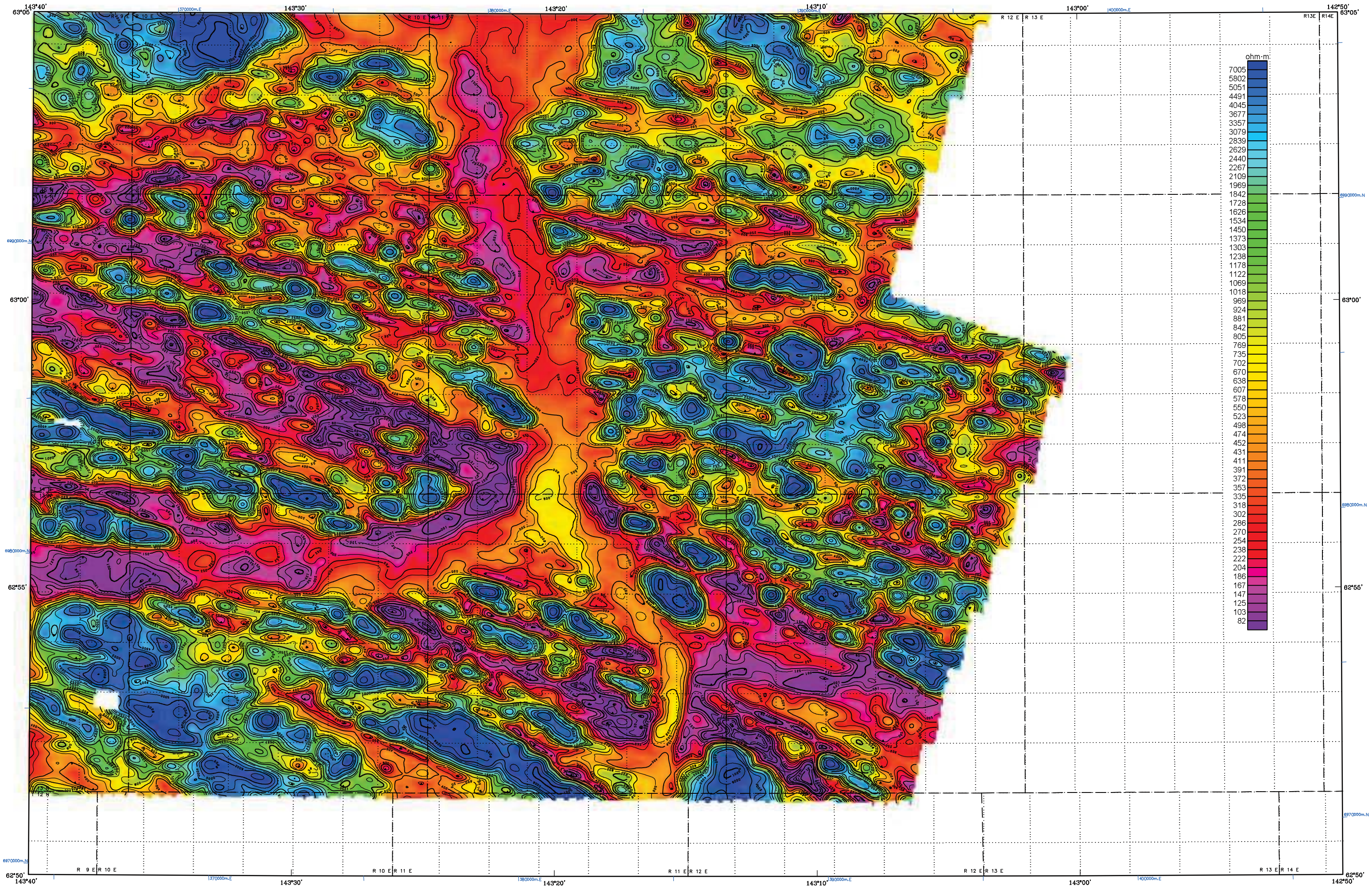

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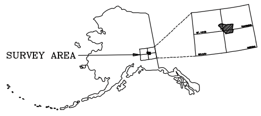
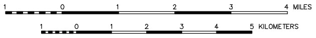


SCALE 1:63,360



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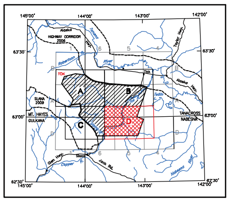
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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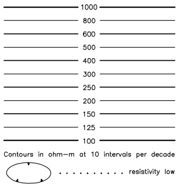
RESISTIVITY CONTOURS



Contours in ohm–m at 10 intervals per decade

.... resistivity low

SURVEY HISTORY

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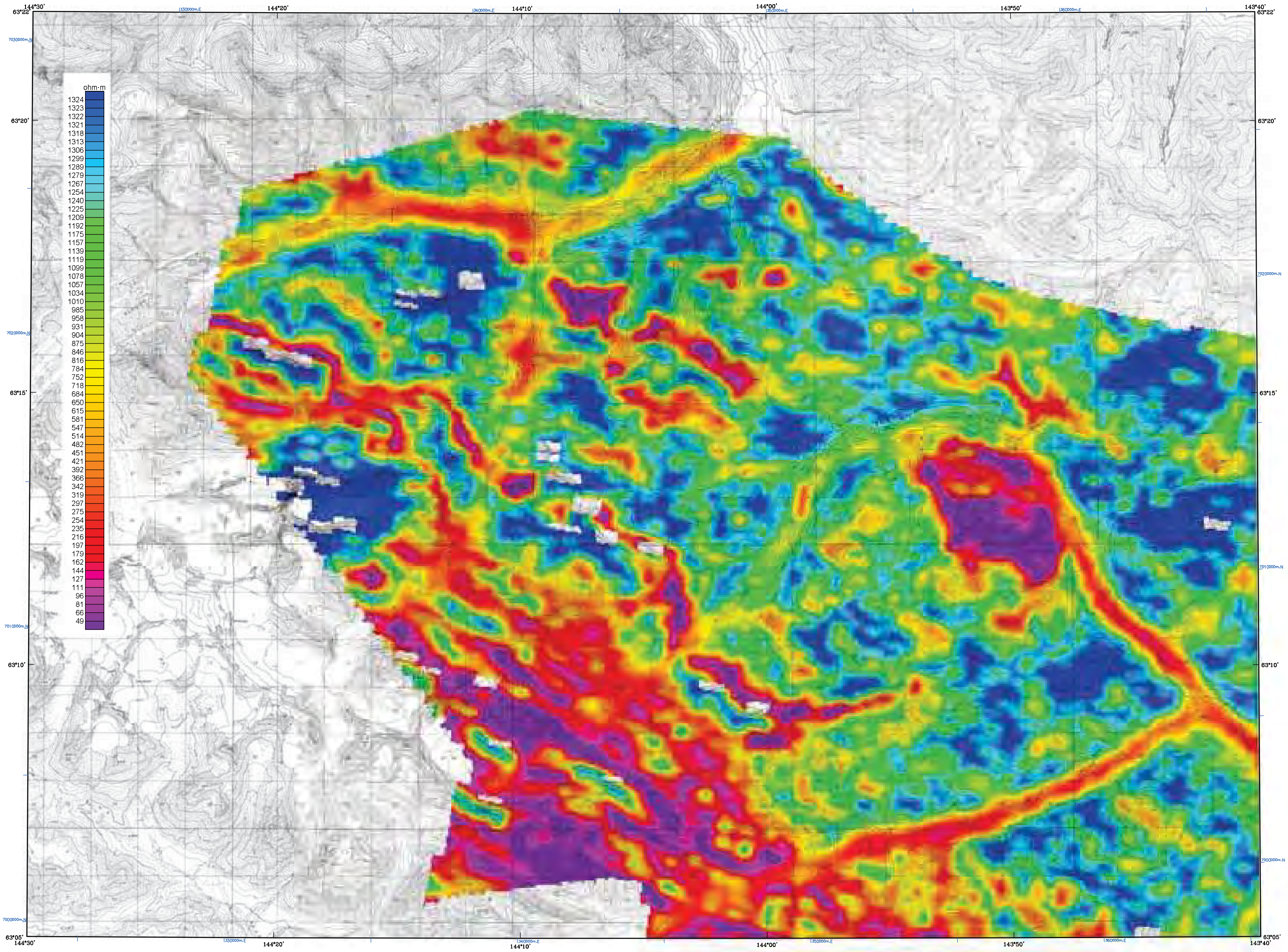
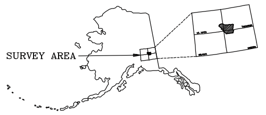
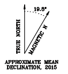


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





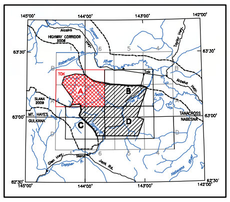
APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX OF 1:63,360-SCALE MAP



900 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
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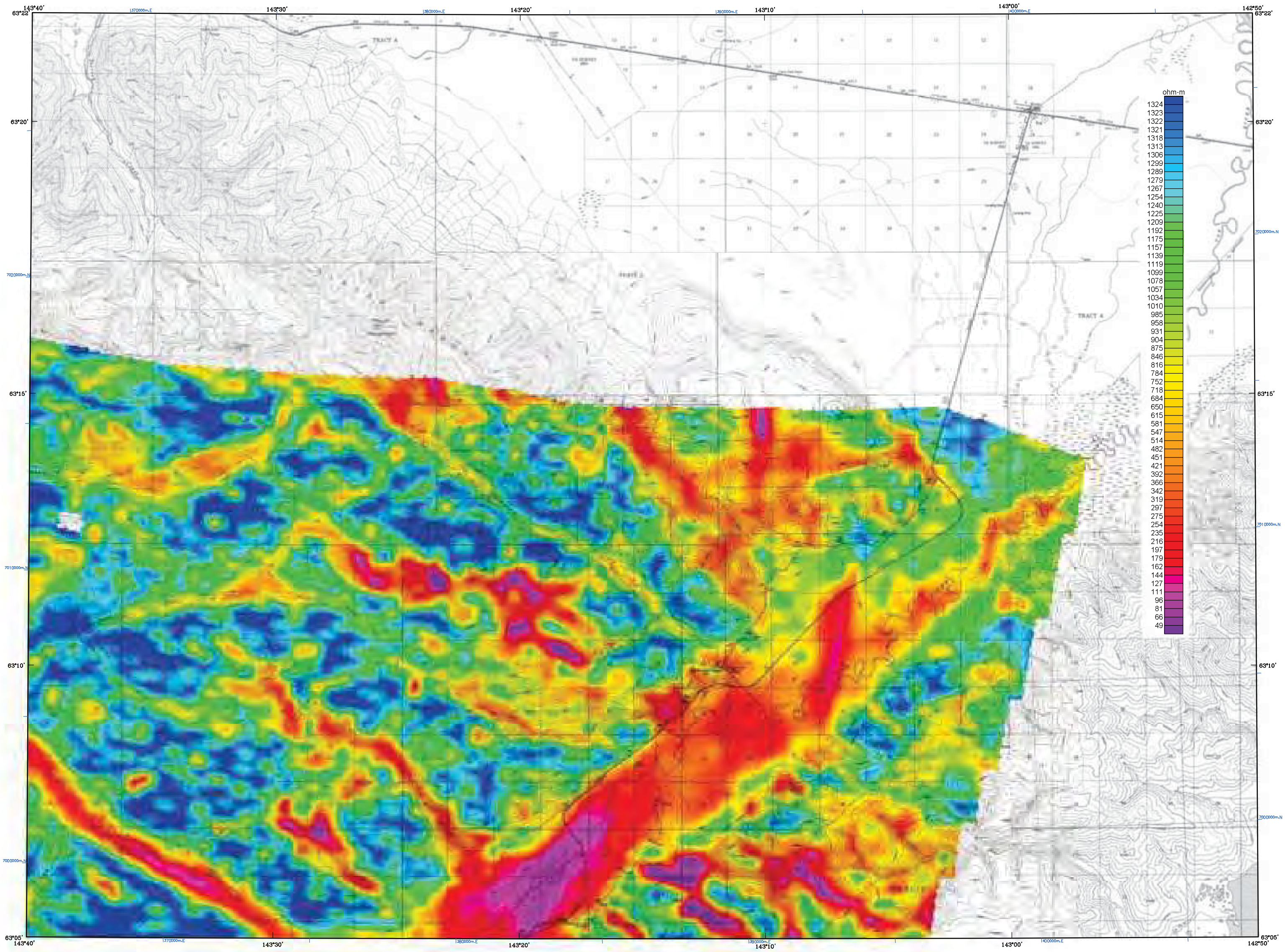

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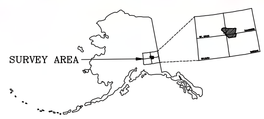
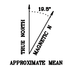
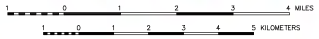


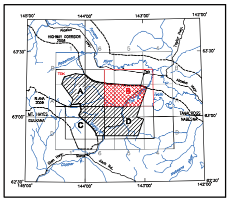


APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



LOCATION INDEX OF 1:63,360-SCALE MAP



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PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
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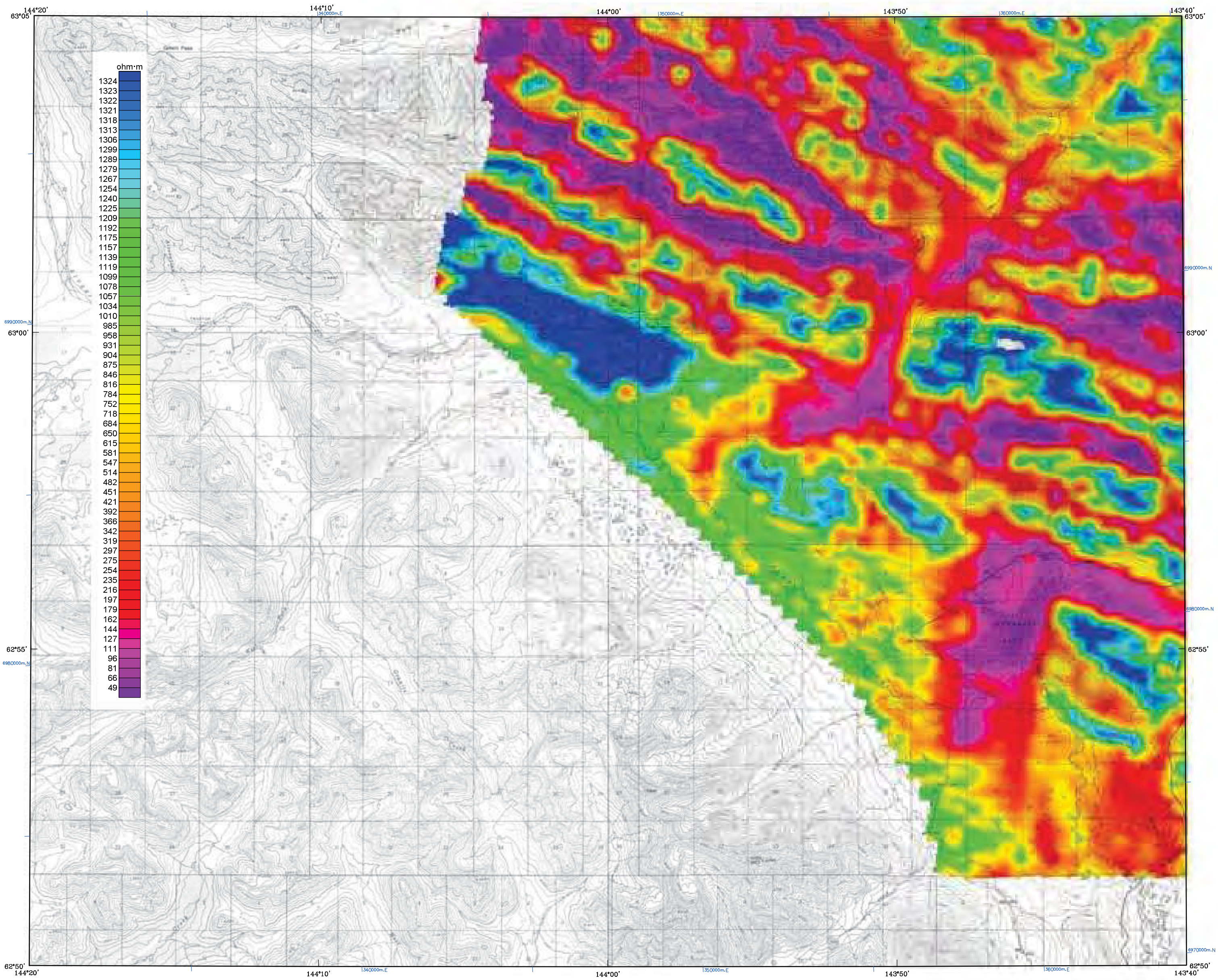

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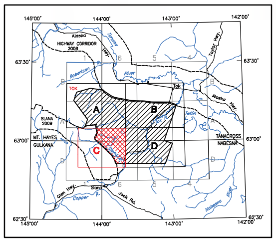
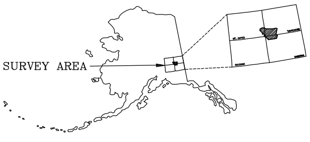
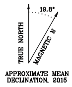
LOCATION INDEX OF 1:63,360–SCALE MAP







APPROXIMATE MEAN DECLINATION, 2015

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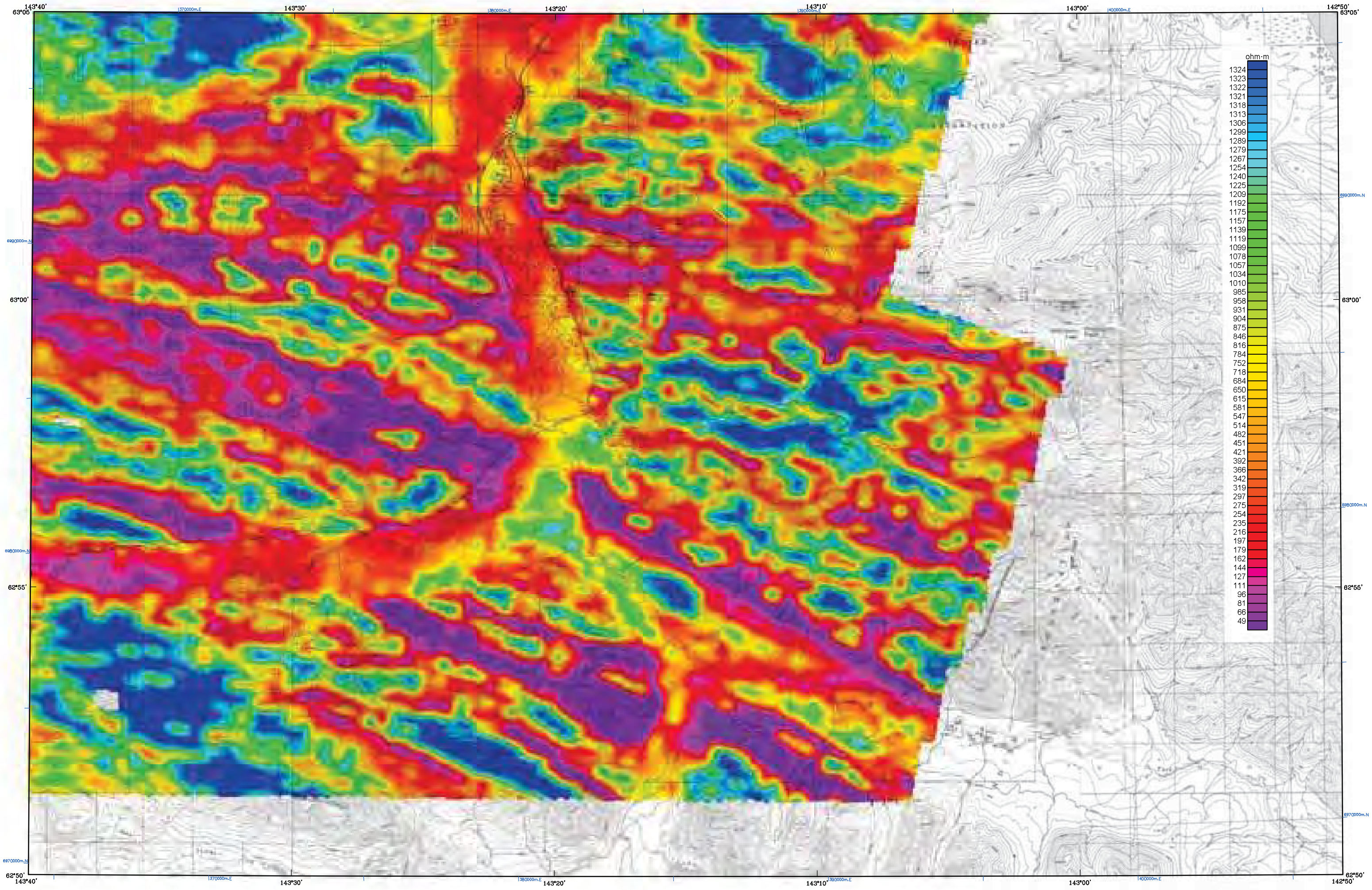
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 12D



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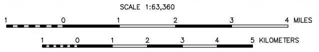

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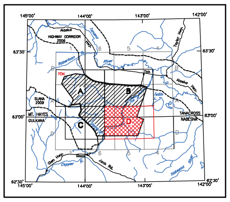
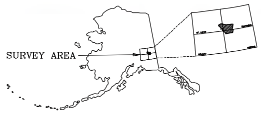
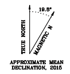
2015

LOCATION INDEX OF 1:63,360–SCALE MAP







APPROXIMATE MEAN DECLINATION, 2015

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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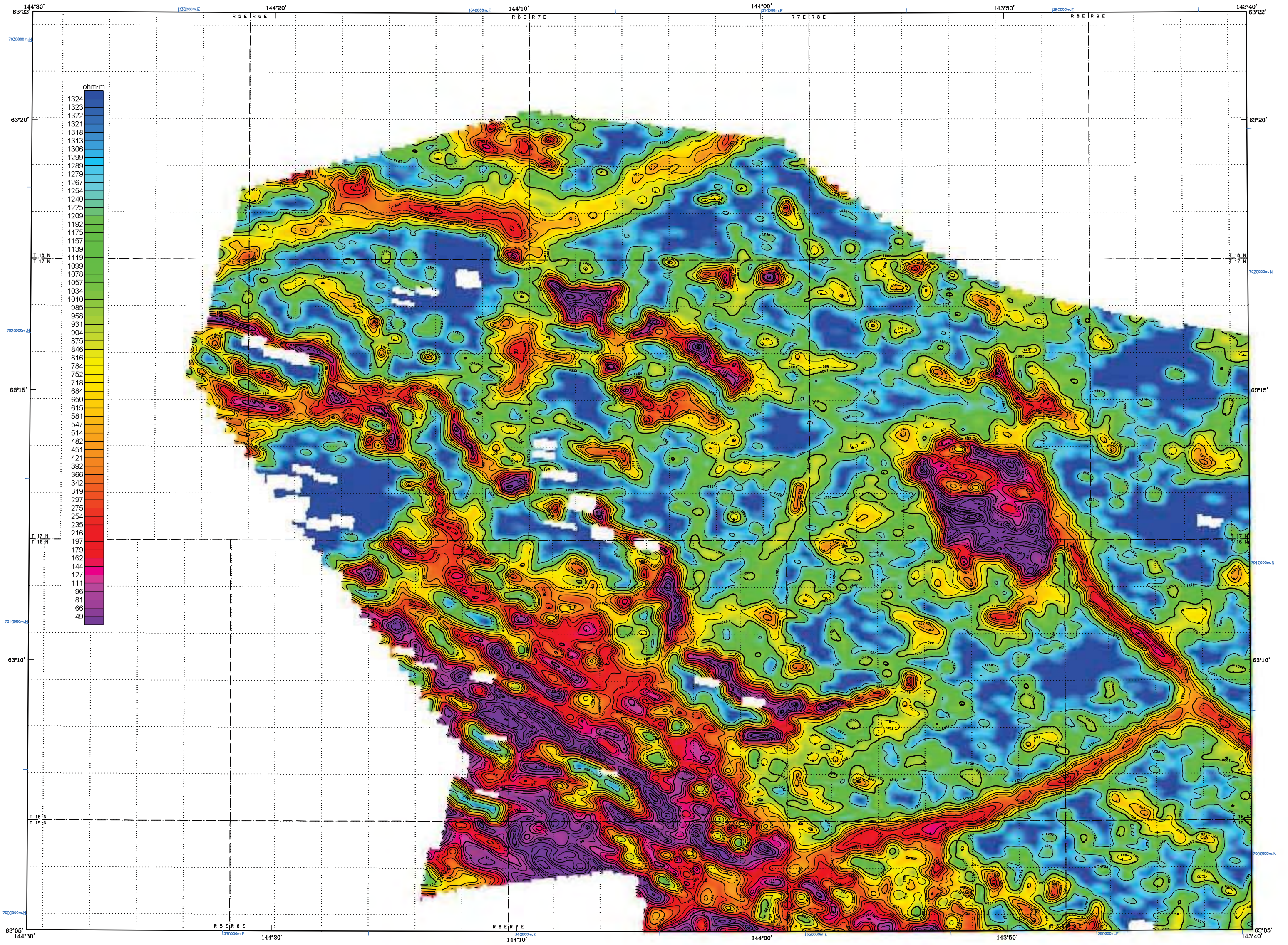
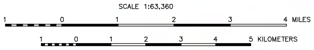
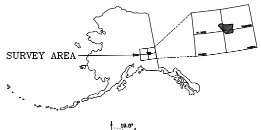
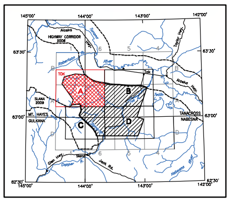


Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska





LOCATION INDEX OF 1:63,360-SCALE MAP



900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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RESISTIVITY CONTOURS

1000
800
600
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400
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150
125
100

Contours in ohm–m at 10 intervals per decade

. . . . resistivity low

SURVEY HISTORY

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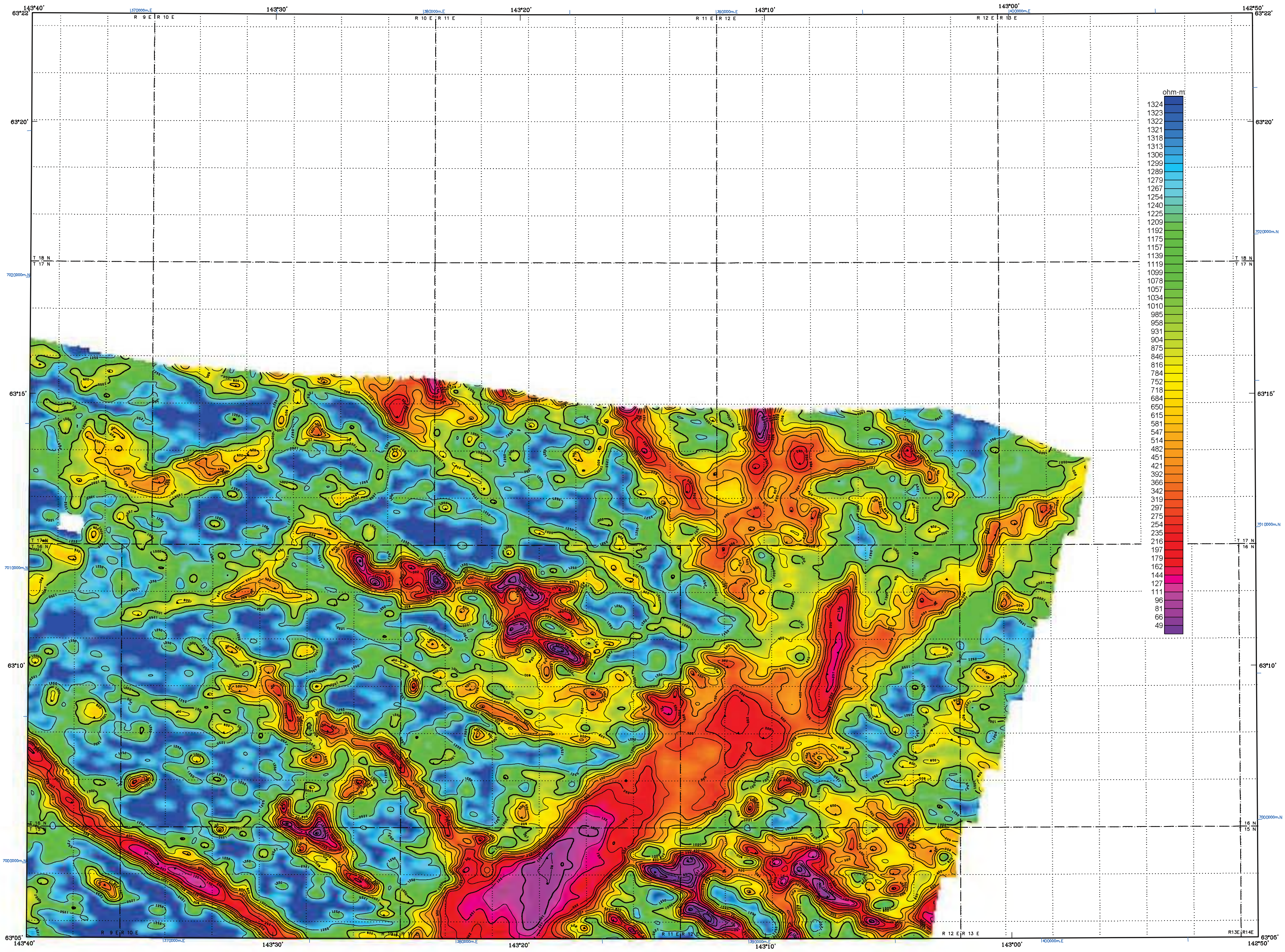
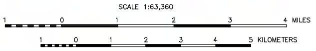
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

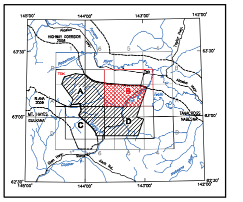
GEOPHYSICAL REPORT 2015-2, Sheet 13B

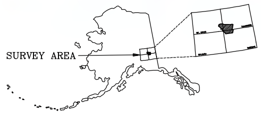


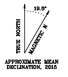
Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska



LOCATION INDEX OF 1:63,360-SCALE MAP







900 Hz COPLANAR APPARENT RESISTIVITY WITH DATA CONTOURS, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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2015

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RESISTIVITY

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1000
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600
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Contours in ohm–m at 10 intervals per decade

. . . . resistivity low

SURVEY HISTORY

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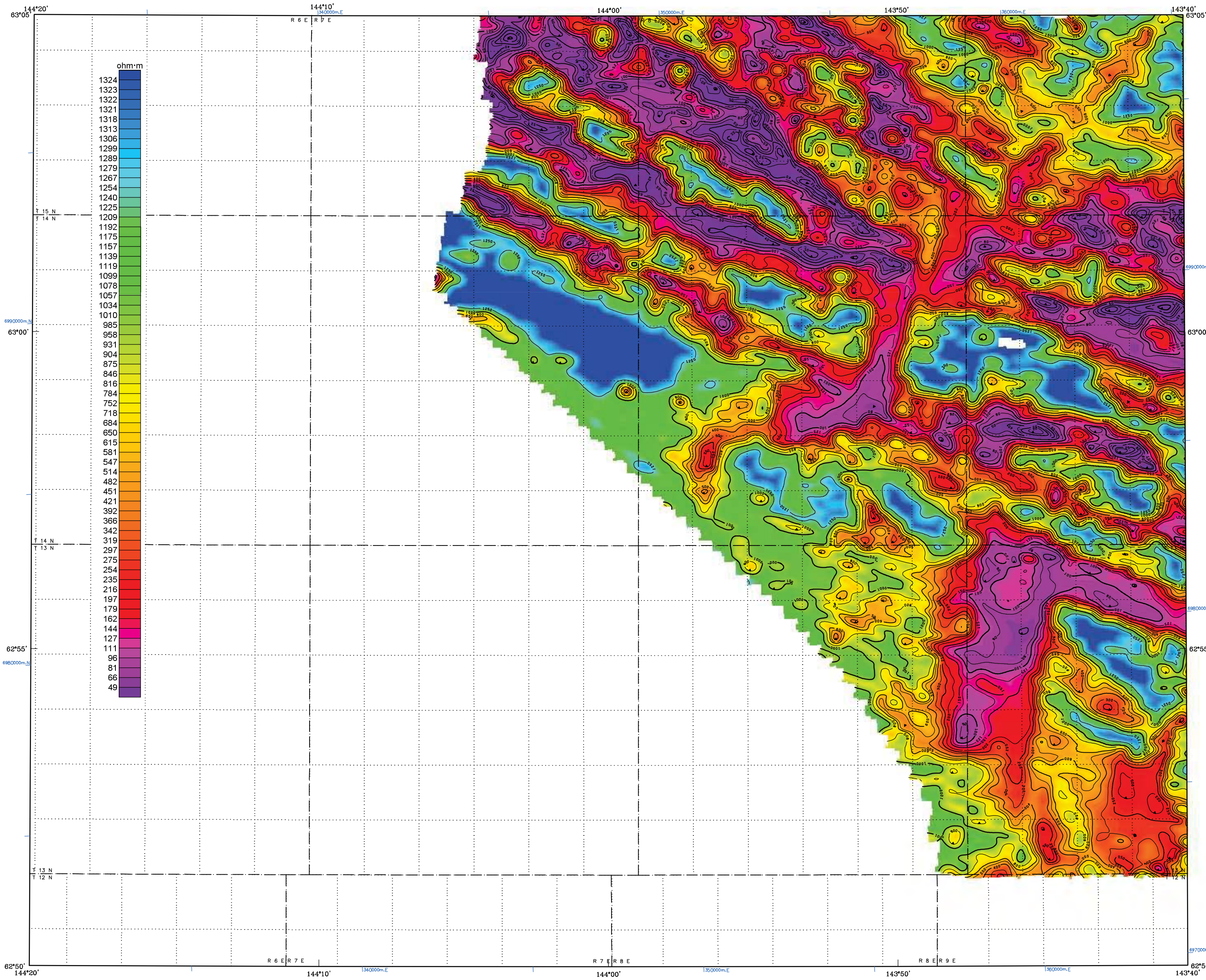
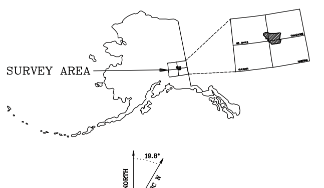
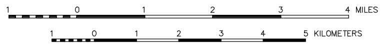


Section outlines from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska



APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



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PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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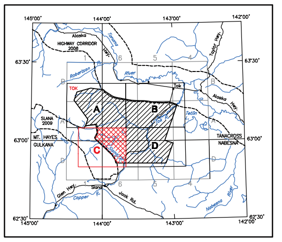
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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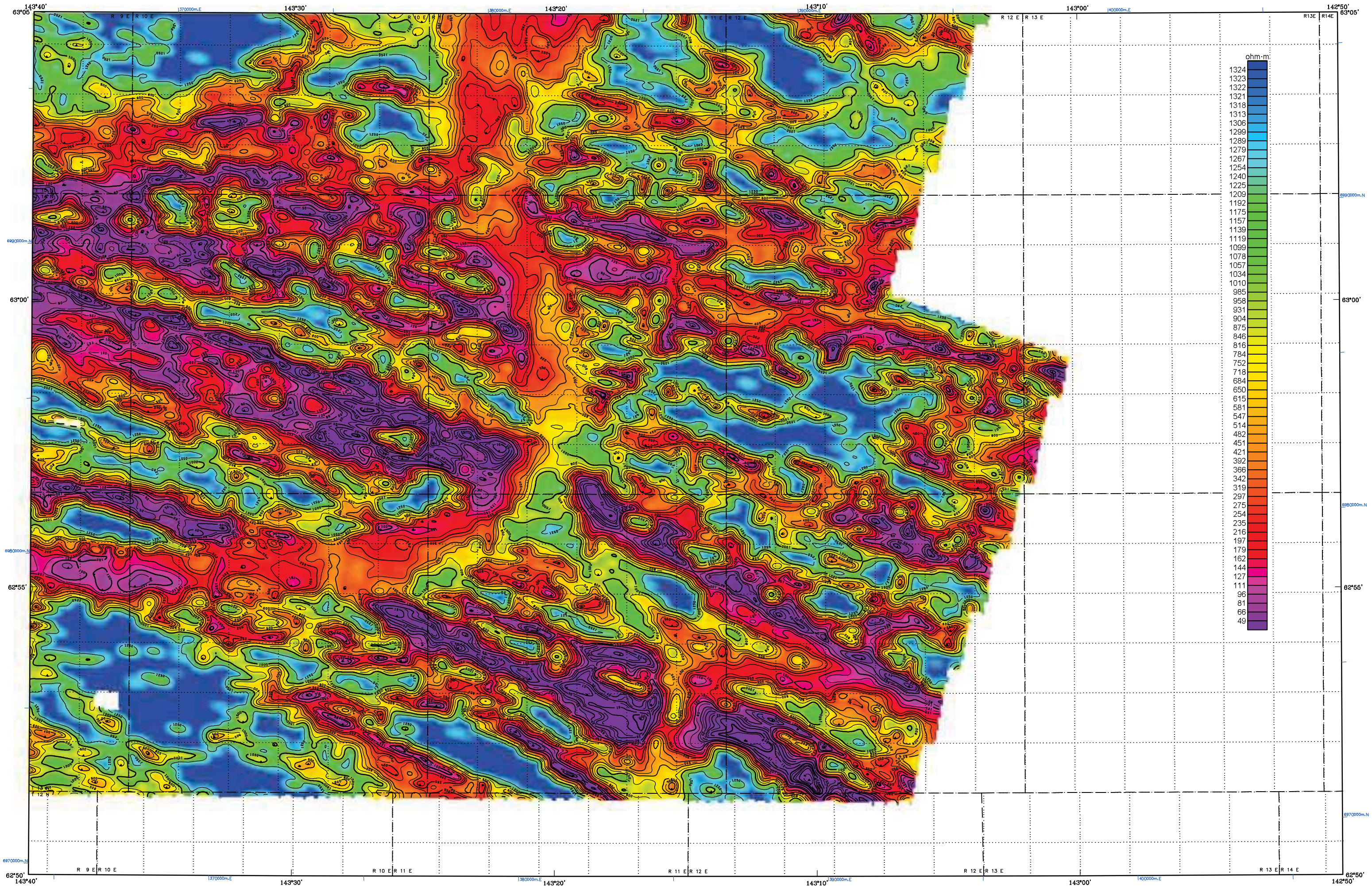

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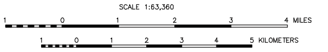
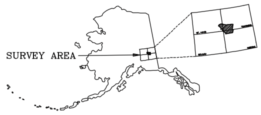
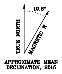
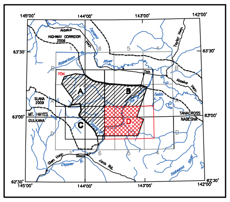






APPROXIMATE MEAN DECLINATION, 2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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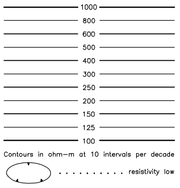

Contours in ohm–m at 10 intervals per decade

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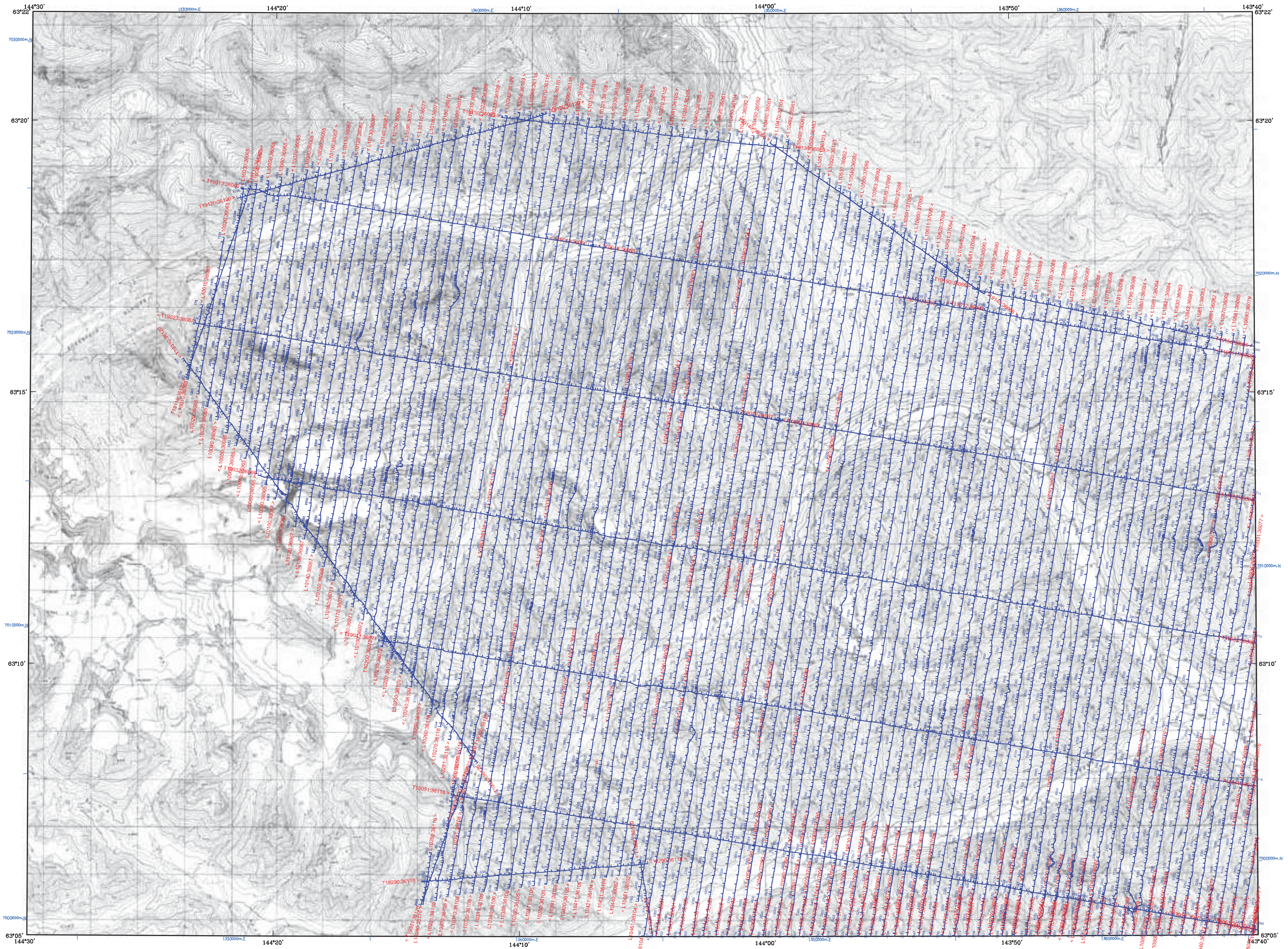

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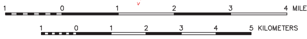
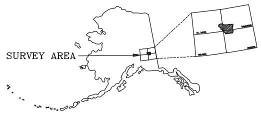
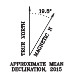
SCALE 1:63,360







FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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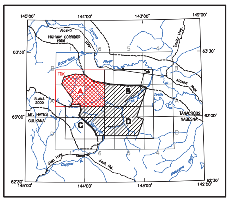

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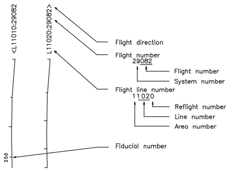

SURVEY HISTORY

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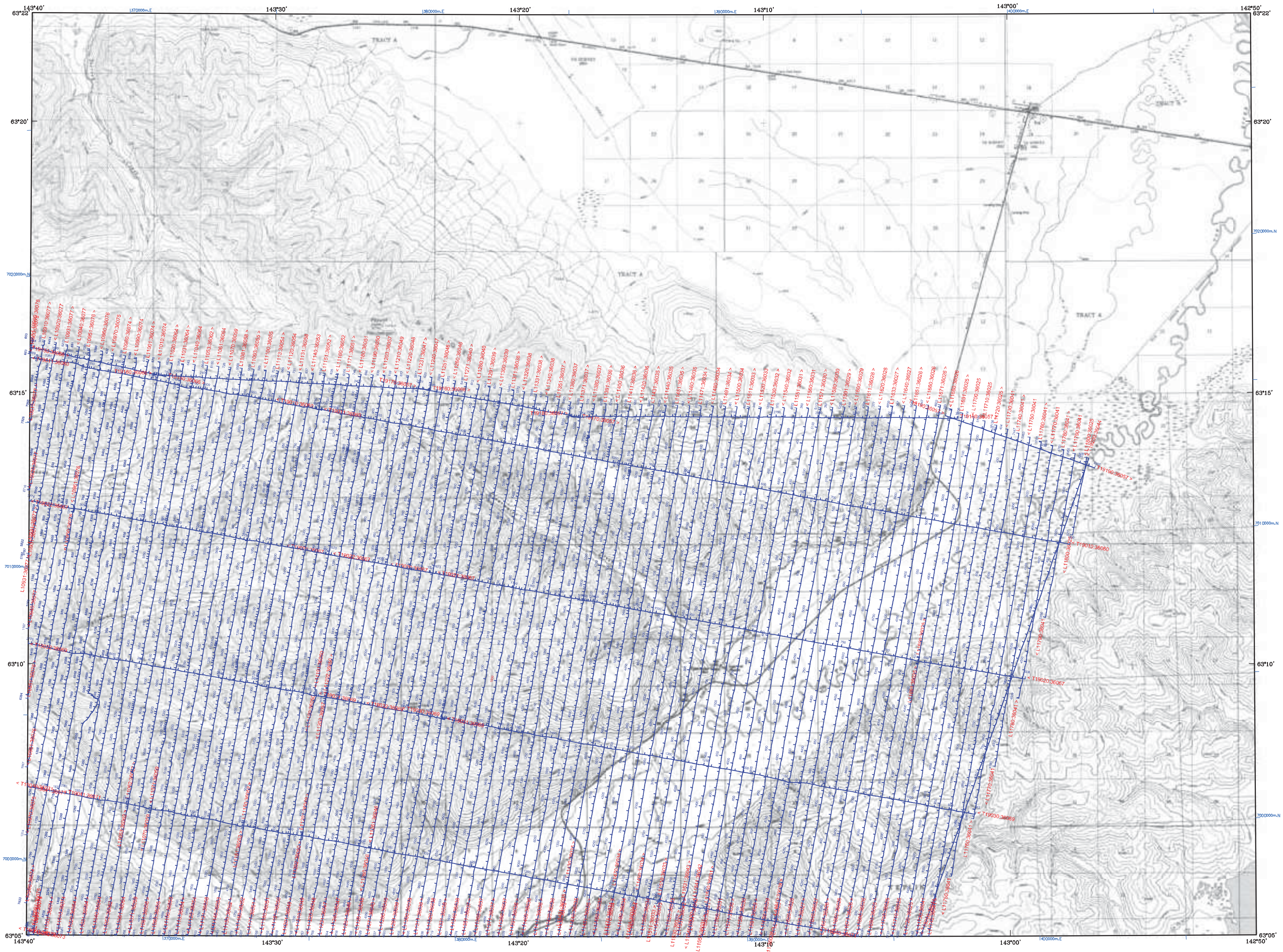
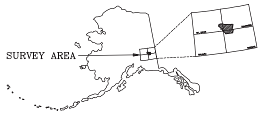
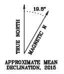
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 14B



Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

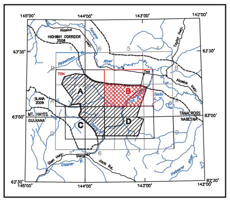
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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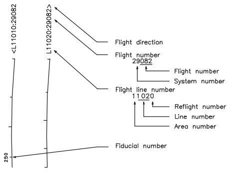

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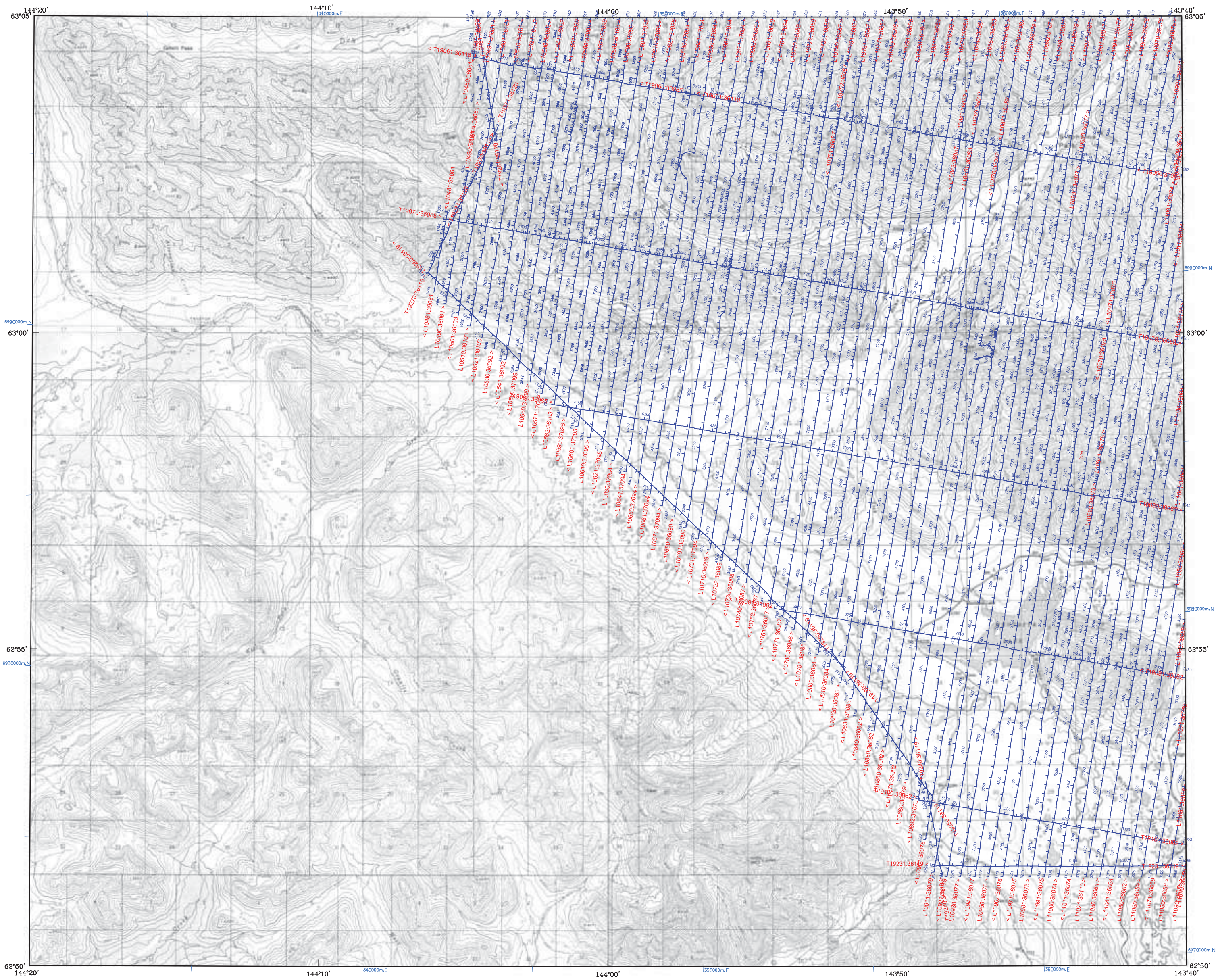
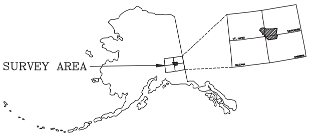
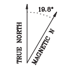


Base from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska





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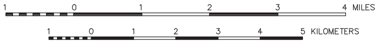
SCALE 1:63,360



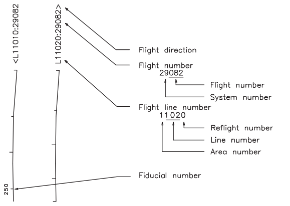
FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

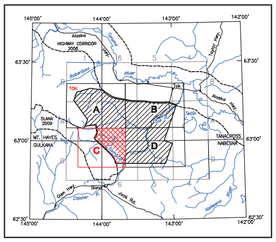
by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015



LOCATION INDEX OF 1:63,360-SCALE MAP



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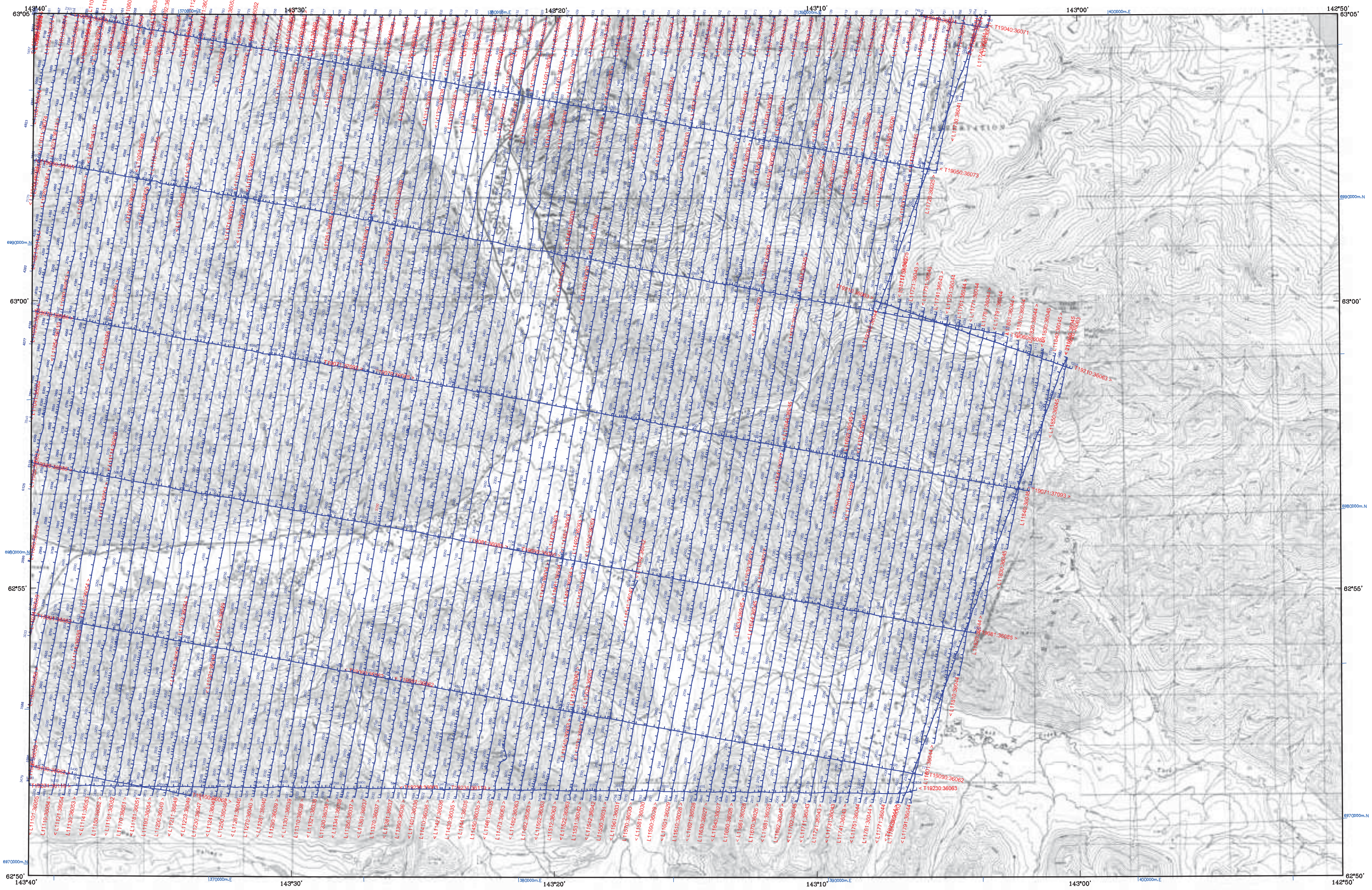
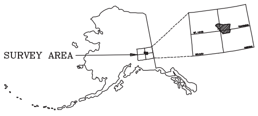
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

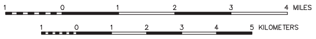
GEOPHYSICAL REPORT 2015-2, Sheet 14D



Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska



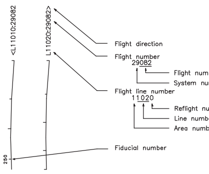
SCALE 1:63,360



FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015



DESCRIPTIVE NOTES

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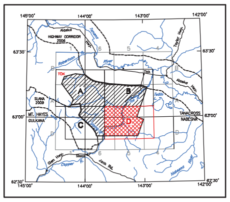
LOCATION INDEX OF 1:63,360–SCALE MAP



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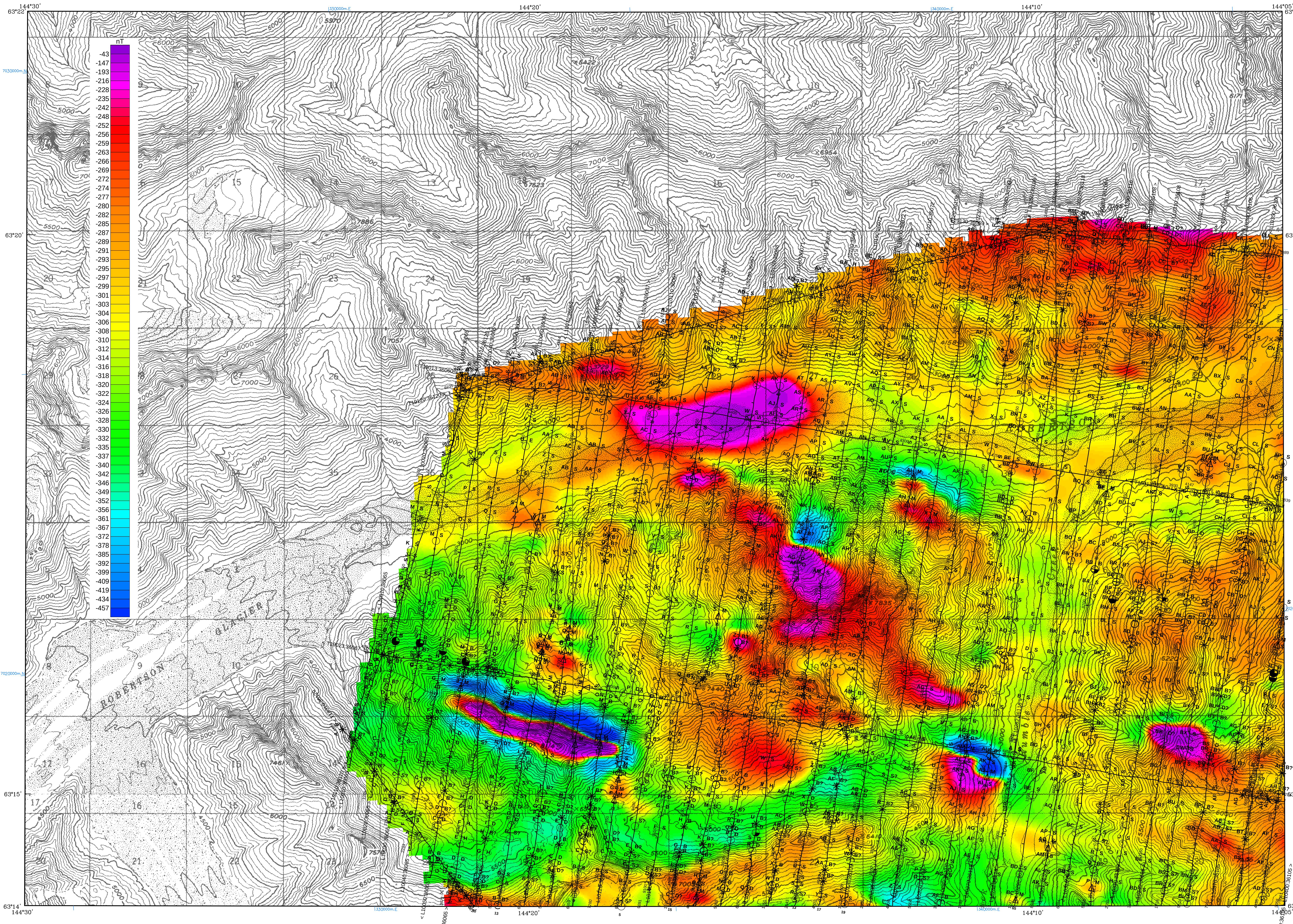
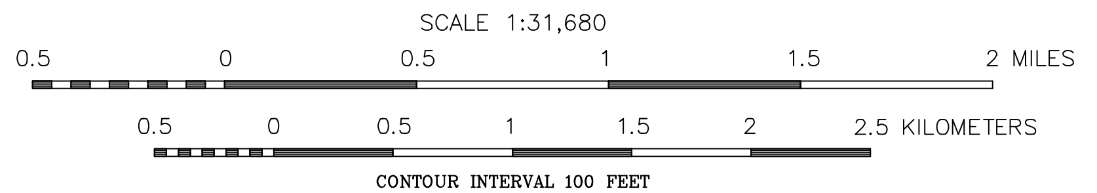
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

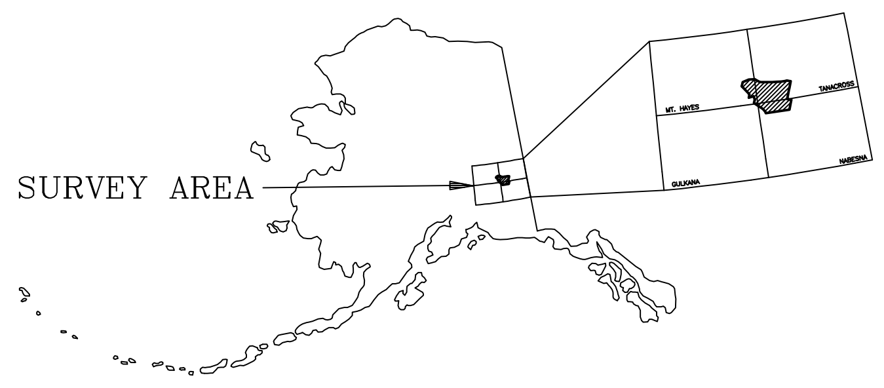
GEOPHYSICAL REPORT 2015-2-15a
PARTS of MT. HAYES A-1 and B-1 QUADRANGLES

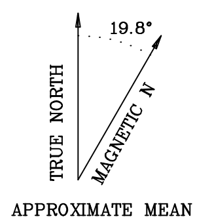


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Quadrangles, Alaska



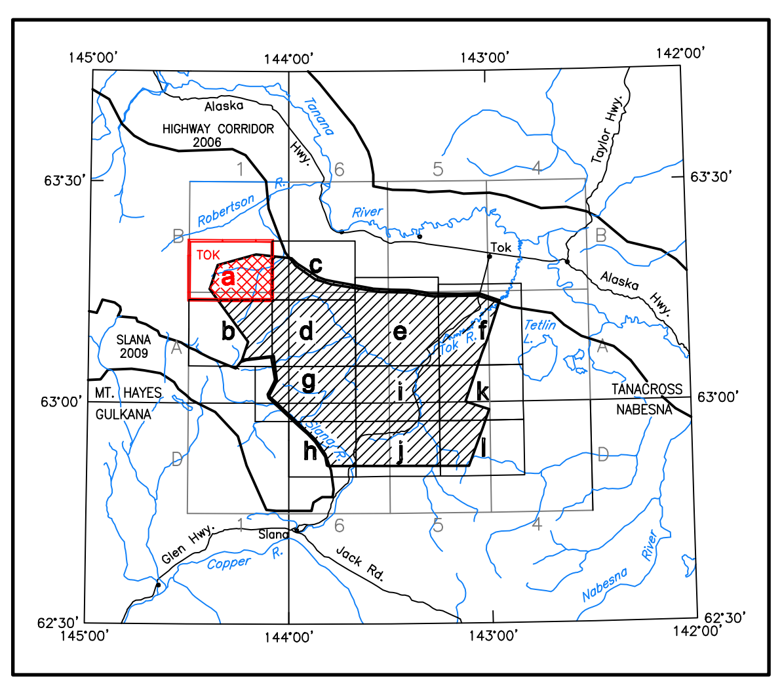
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN
DECLINATION, 2015

LOCATION INDEX OF 1:31,680–SCALE MAP



RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS of MT. HAYES A-1 and B-1 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

DESCRIPTIVE NOTES

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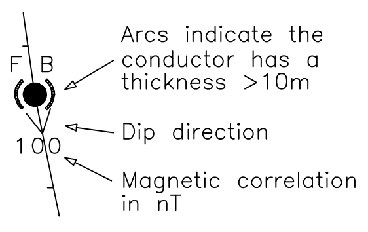
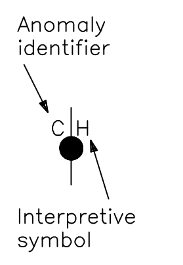
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◒	20–50 siemens
⊕	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
△	EM magnetite 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 aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial– and coplanar–coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG 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[1]) 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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[1] 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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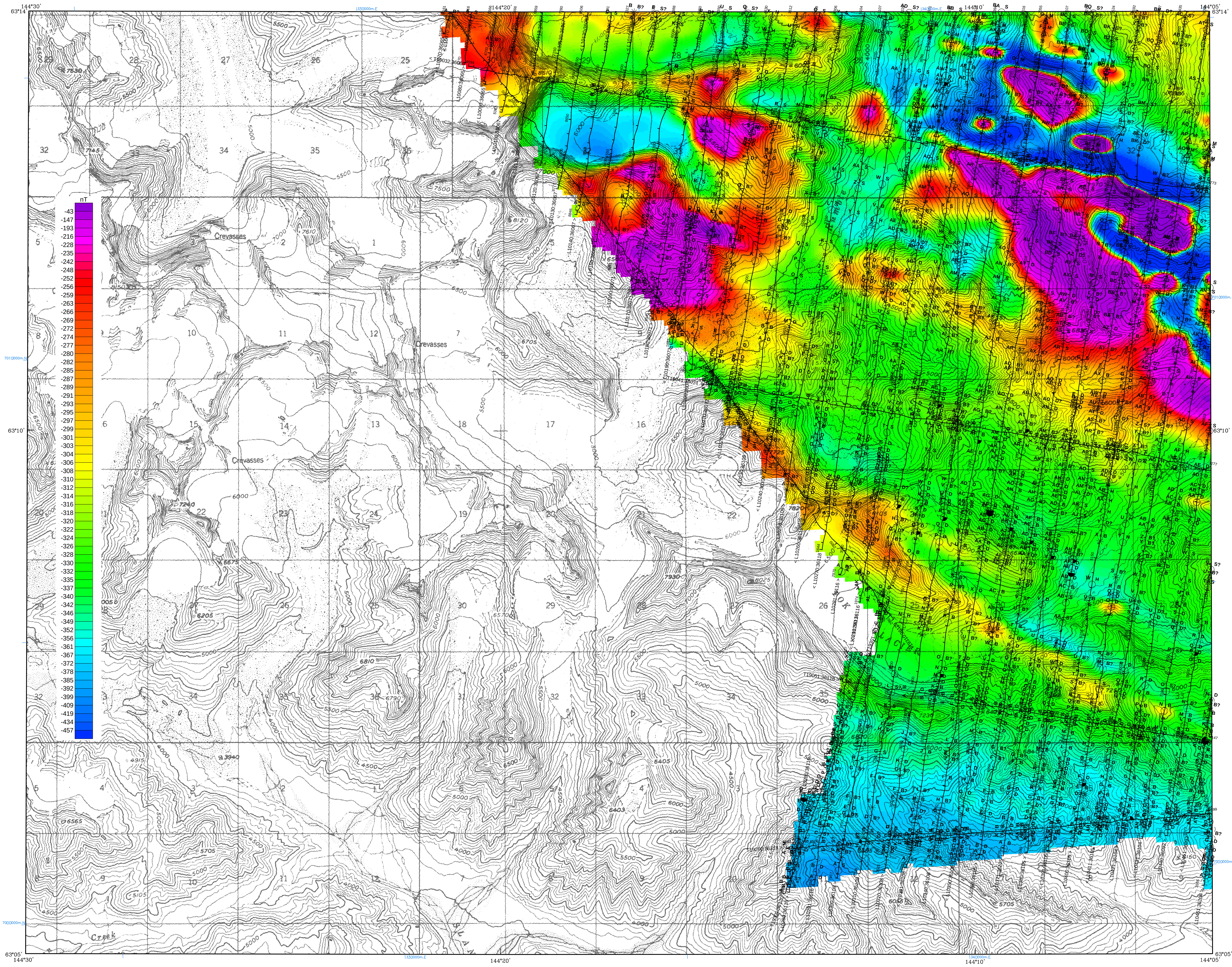
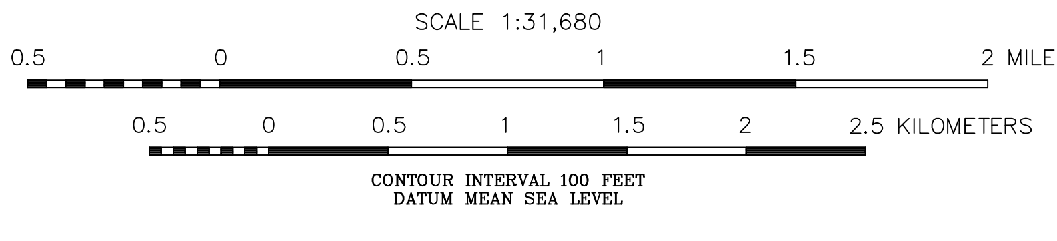
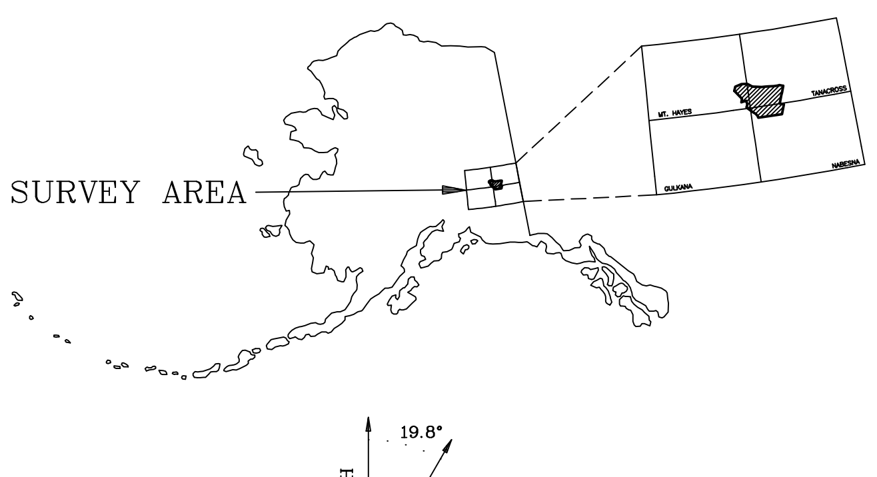
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

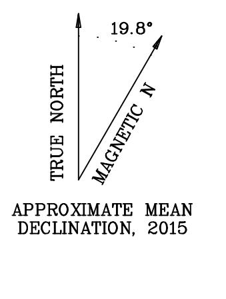
GEOPHYSICAL REPORT 2015-2-15b
PARTS of MT. HAYES A-1 QUADRANGLE



Base from U.S. Geological Survey Mt. Hayes A-1, 1975; Quadrangle, Alaska





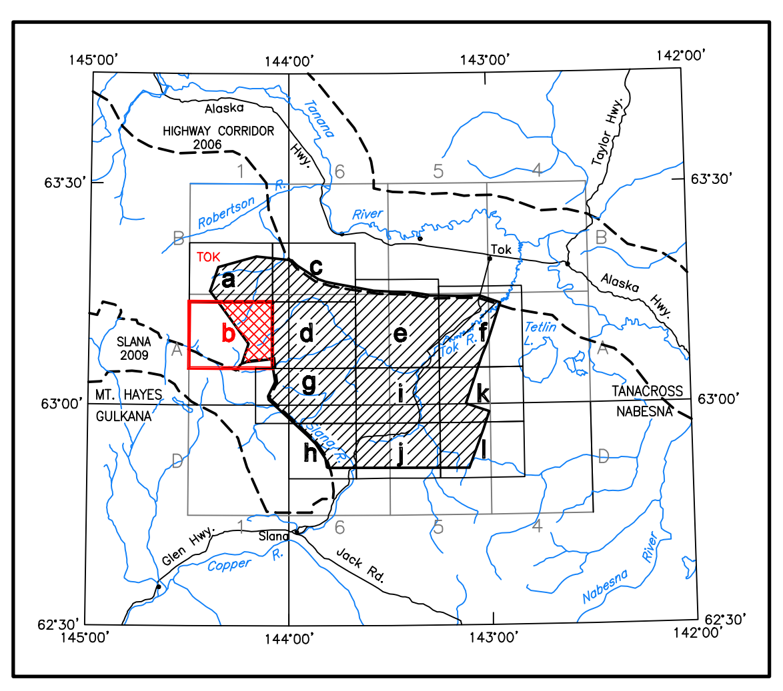


RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PART of MT. HAYES A-1 QUADRANGLE

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:31,680-SCALE MAP



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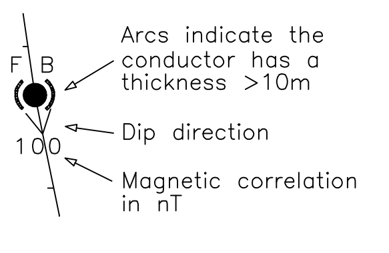

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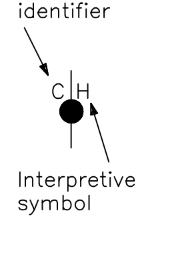

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RESIDUAL MAGNETIC FIELD

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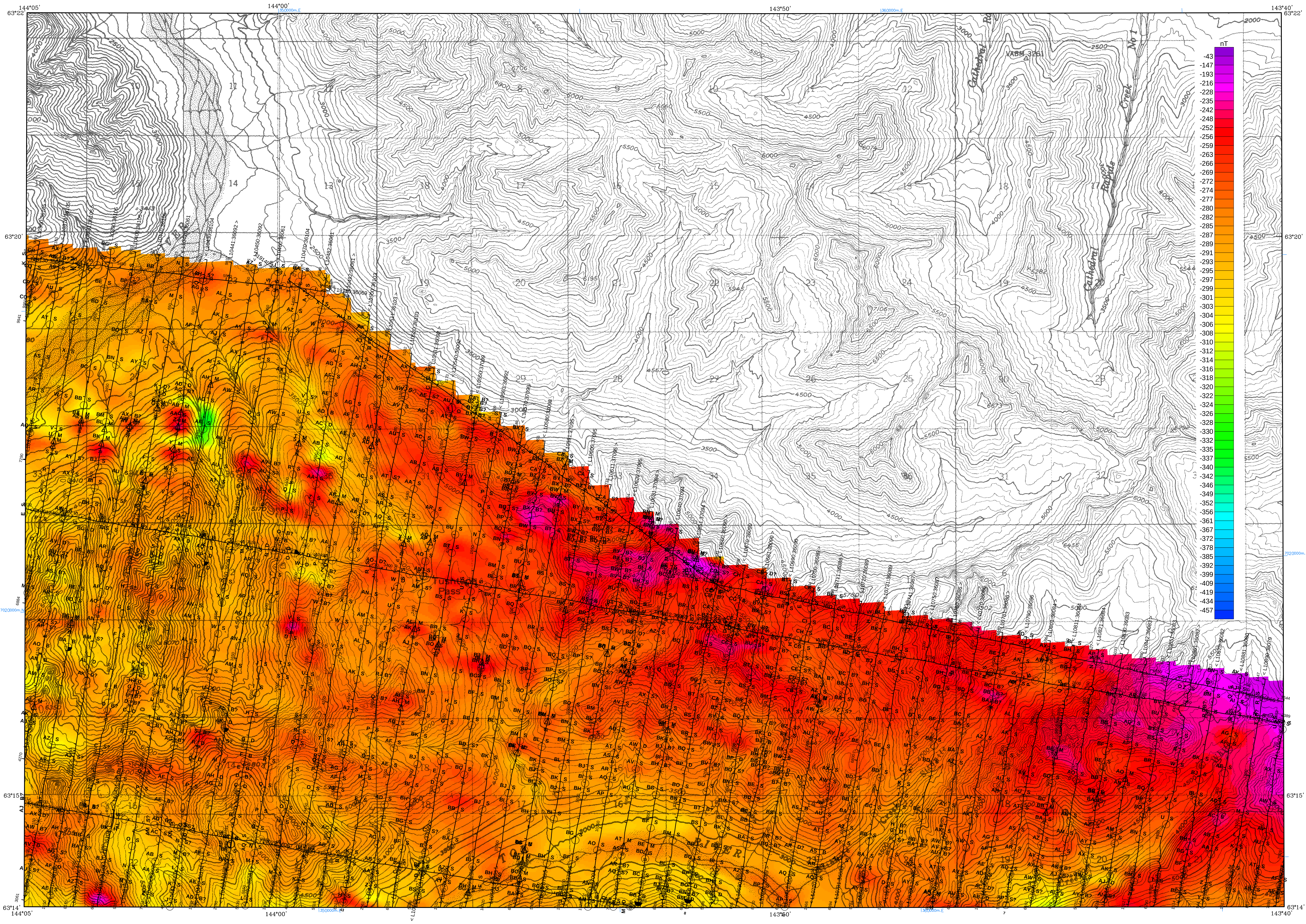
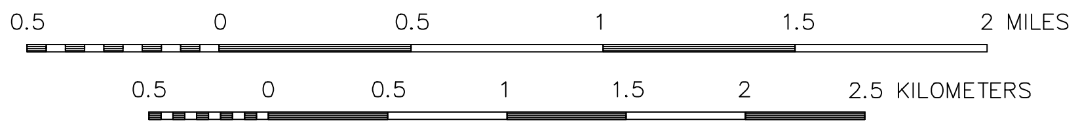


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982;
Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:31,680

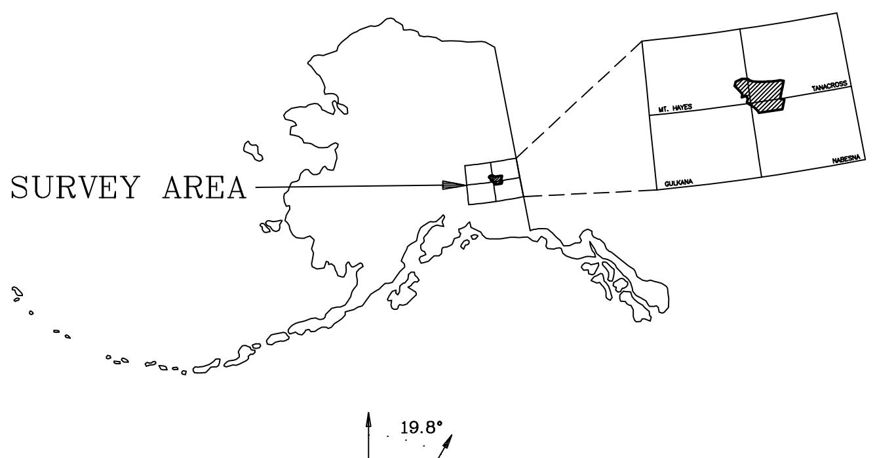


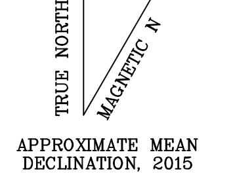
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS of TANACROSS A-6, B-6, MT. HAYES A-1 and B-1 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015





APPROXIMATE MEAN
DECLINATION, 2015

DESCRIPTIVE NOTES

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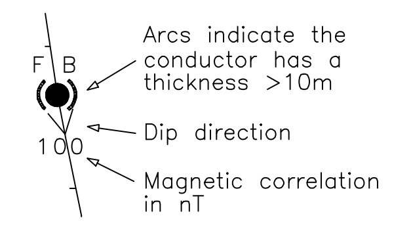
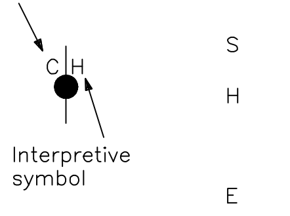
ELECTROMAGNETIC ANOMALIES



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

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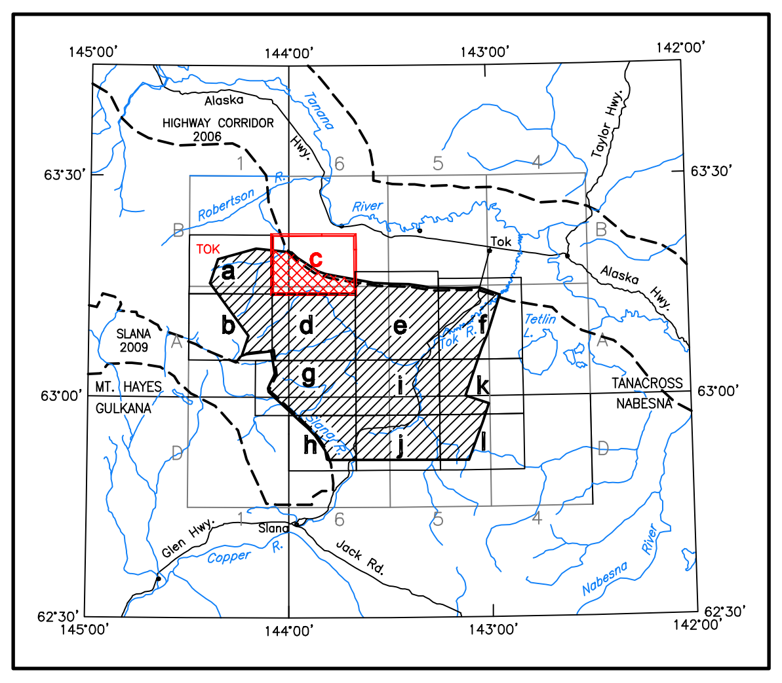
[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

LOCATION INDEX OF 1:31,680–SCALE MAP



SURVEY HISTORY

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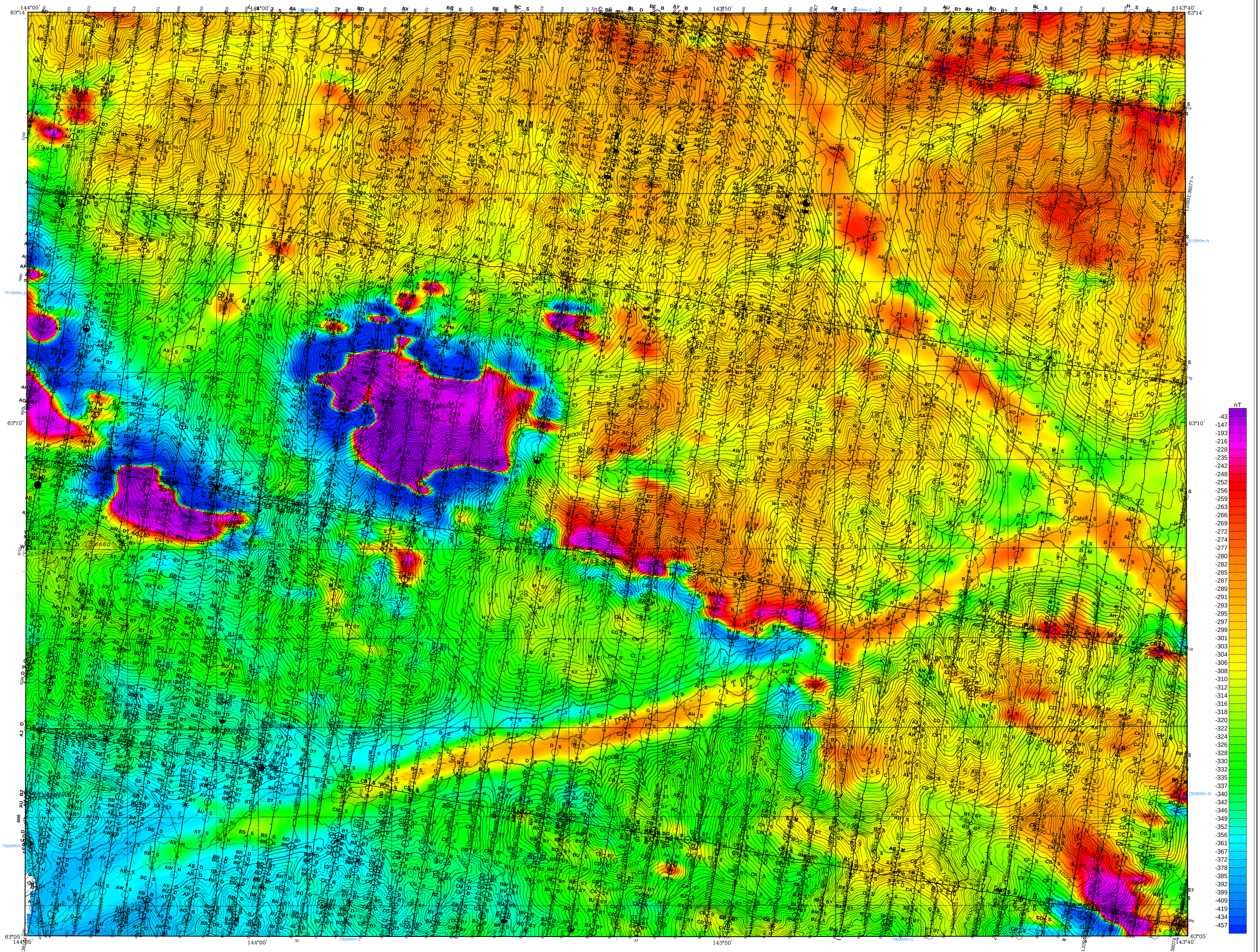
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15d

PARTS of TANACROSS A-6 and MT. HAYES A-1 QUADRANGLES



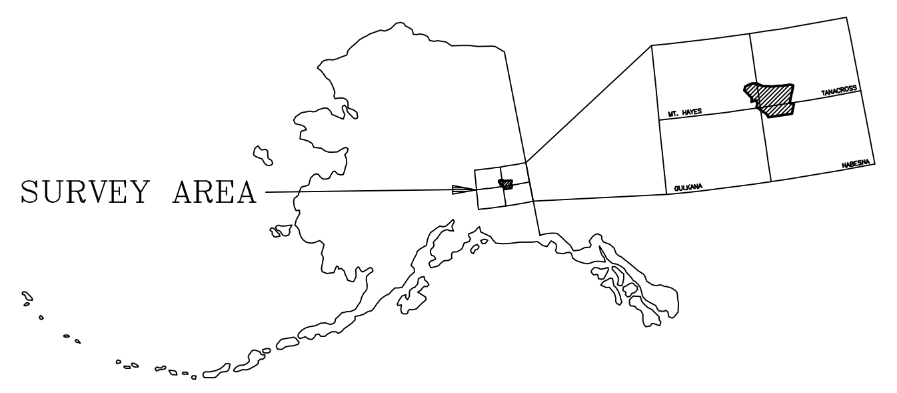
Base from U.S. Geological Survey Mt. Hayes A-1, 1975;
Tanacross A-6, 1964; Quadrangles, Alaska

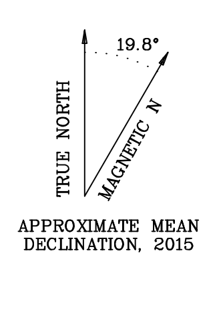
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS of TANACROSS A-6 and MT. HAYES A-1 QUADRANGLES

by

Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

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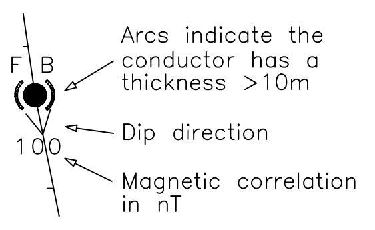
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
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◕	50–100 siemens
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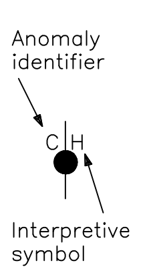
△	EM magnetite response
□	Culture



Interpretive symbol	Conductor model
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
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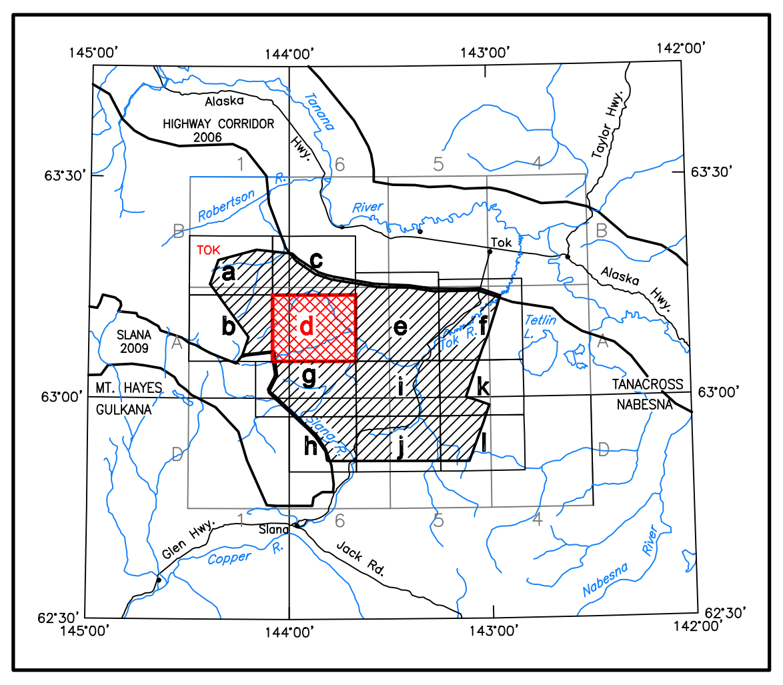
LOCATION INDEX OF 1:31,680–SCALE MAP



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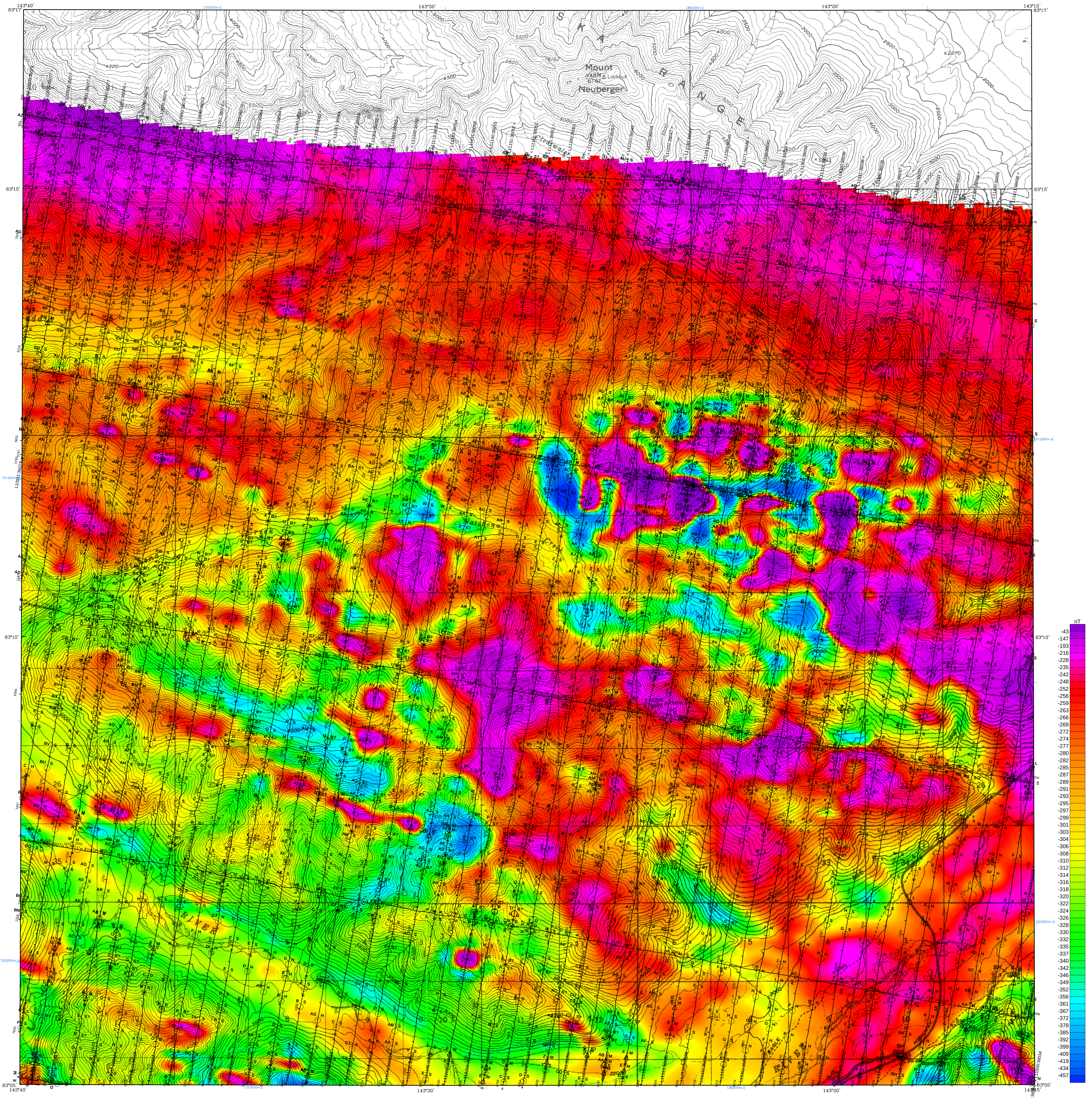
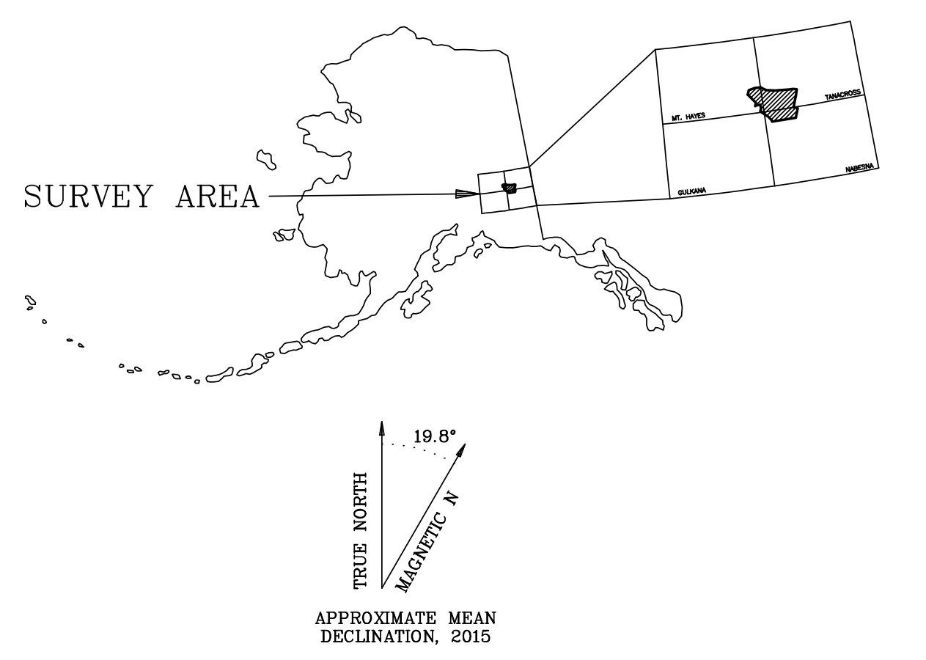
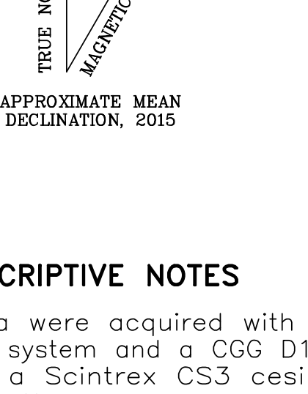
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15e
PARTS of TANACROSS A-5, A-6, B-5, and B-6 QUADRANGLES



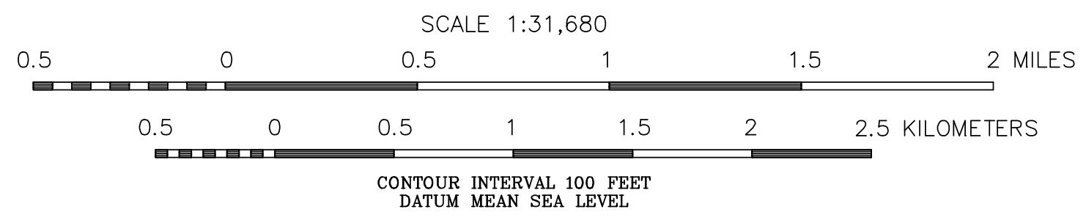
Base from U.S. Geological Survey Tanacross A-5, 1973; A-6, 1964; B-5, 1994; B-6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:31,680



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

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PARTS of TANACROSS A-5, A-6, B-5, and B-6 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

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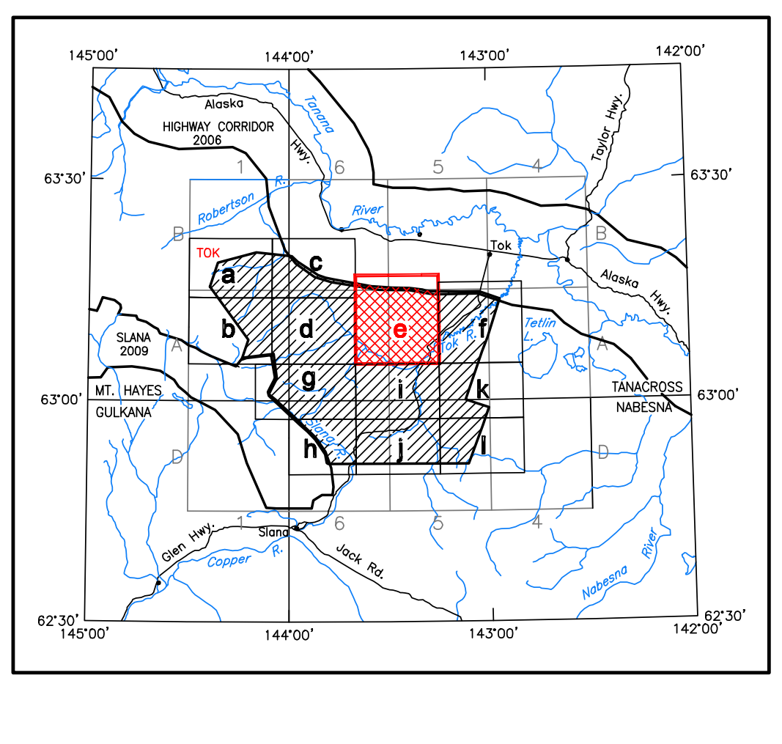
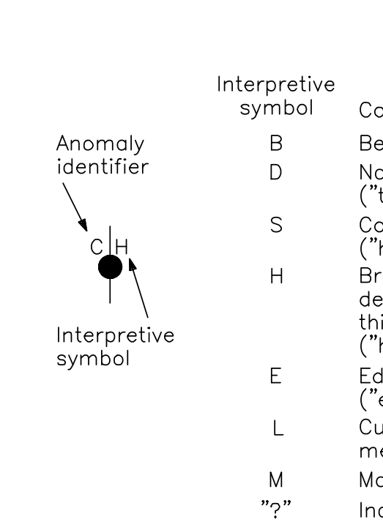


ELECTROMAGNETIC ANOMALIES



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

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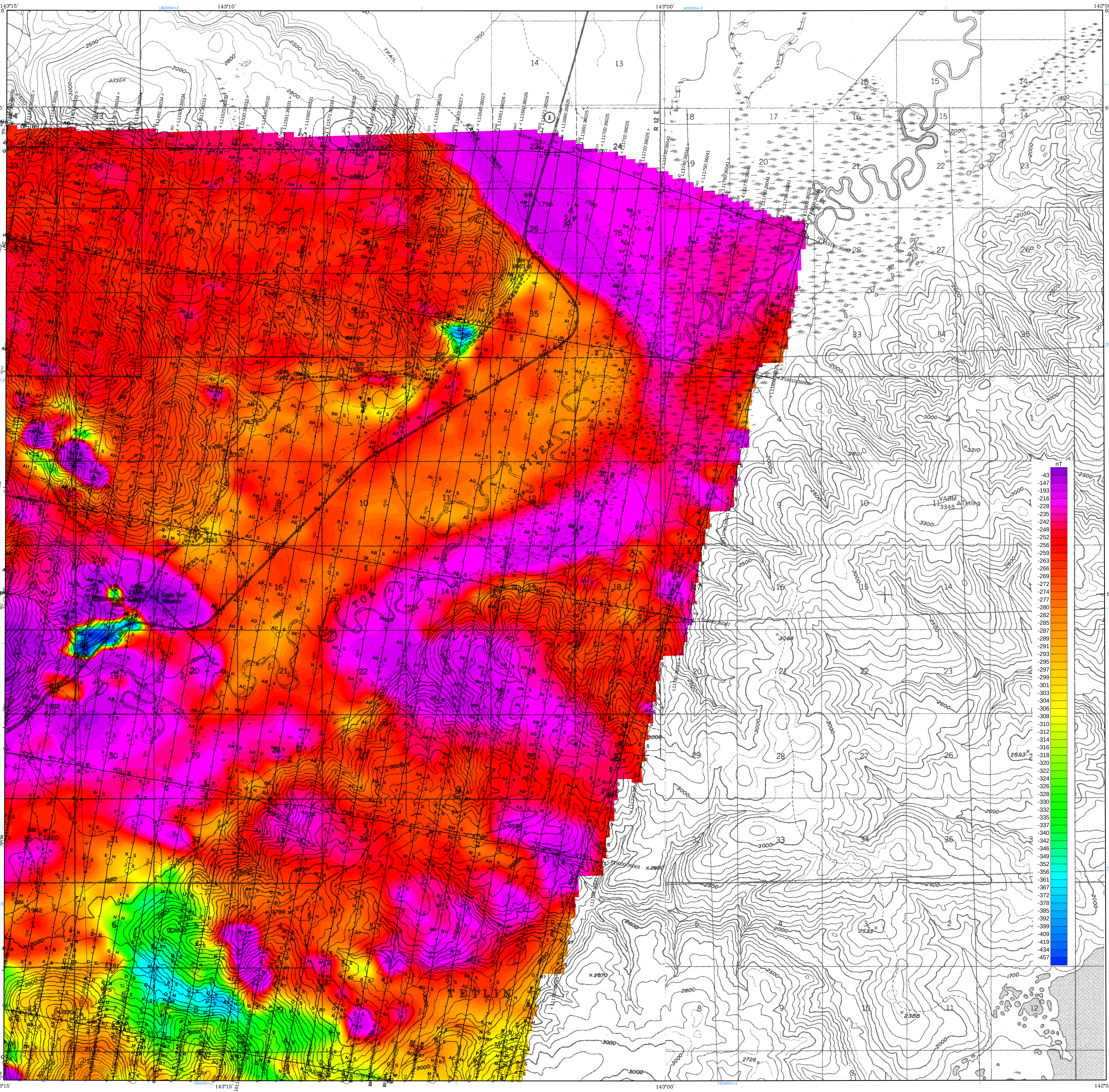
GEOPHYSICAL REPORT 2015-2-15f
PARTS of TANACROSS A-4, A-5, B-4, and B-5 QUADRANGLES



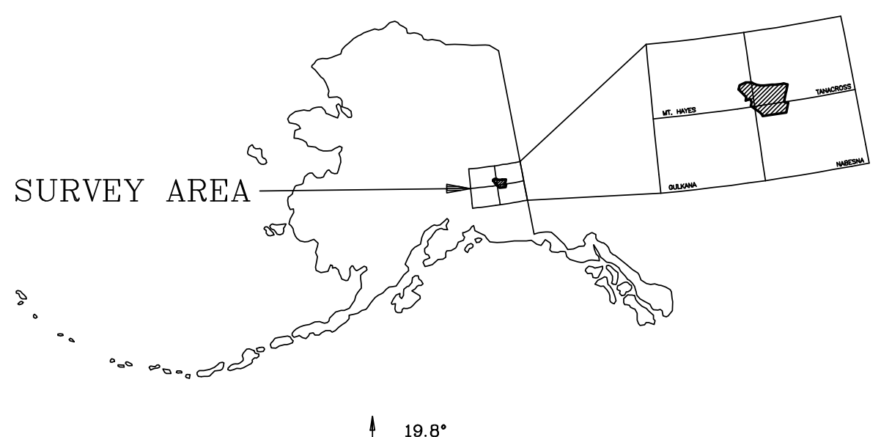
Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973;
B-4, 1949; B-5, 1994; Quadrangles, Alaska

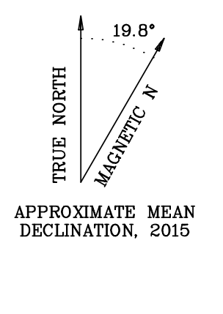
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





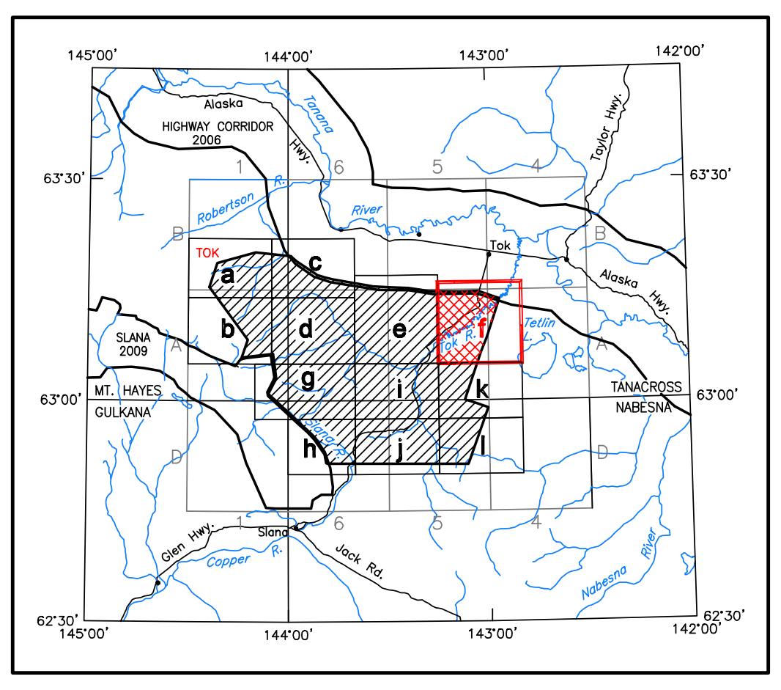
APPROXIMATE MEAN
DECLINATION, 2015

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

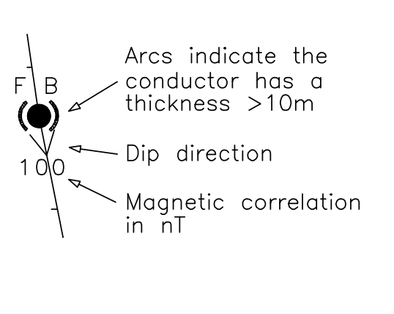
PARTS of TANACROSS A-4, A-5, B-4, and B-5 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:31,680-SCALE MAP



ELECTROMAGNETIC ANOMALIES



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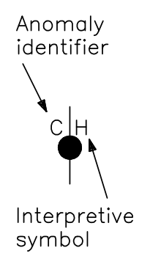

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ELECTROMAGNETICS

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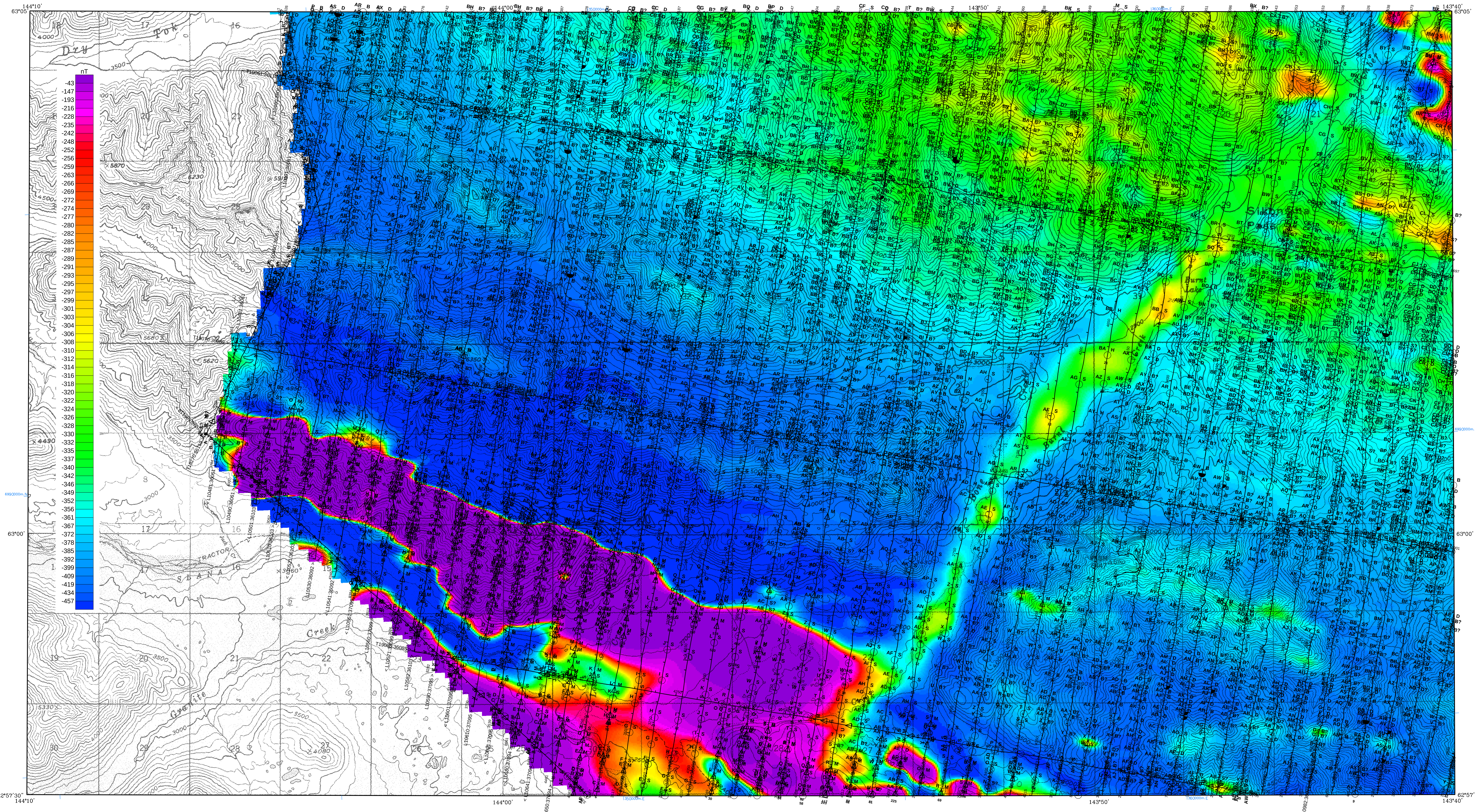
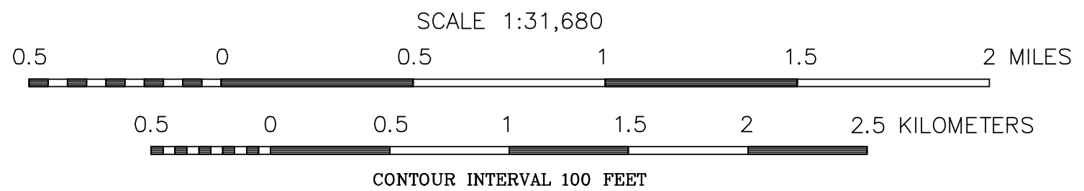
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15g

PARTS of TANACROSS A-6, NABESNA D-6, GULKANA D-1, and MT. HAYES A-1 QUADRANGLES

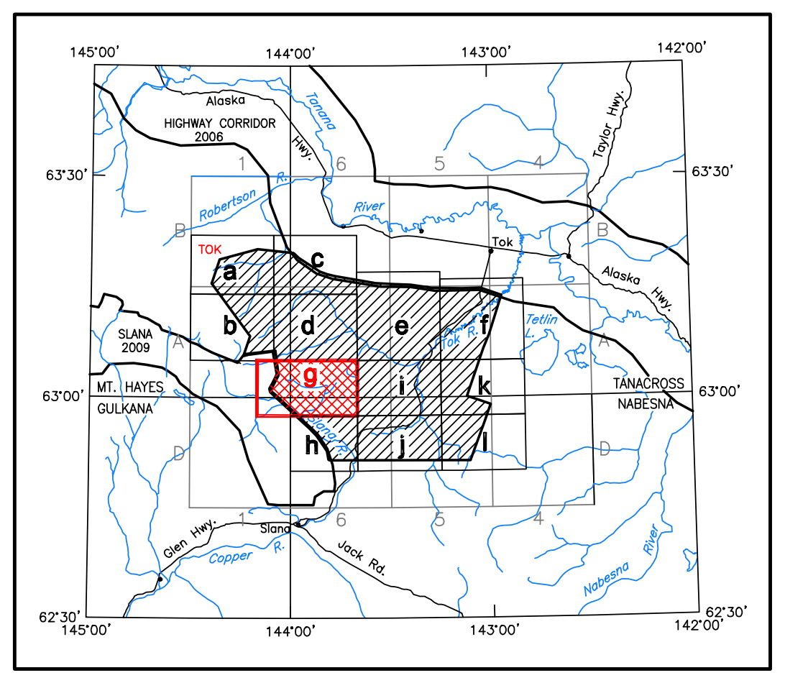


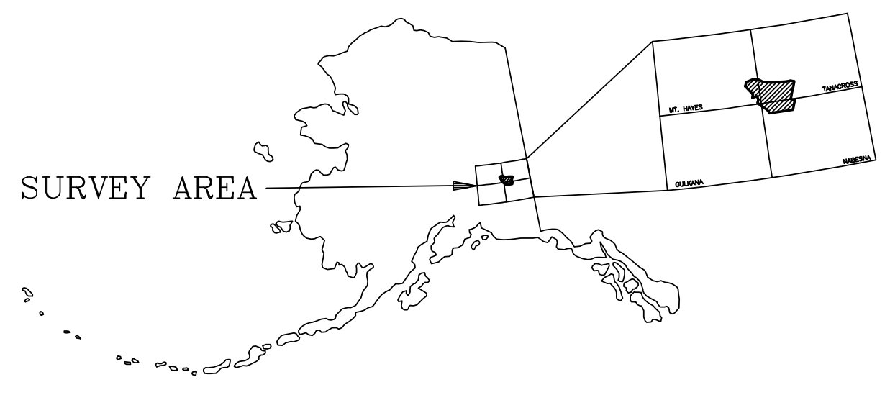
Base from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska

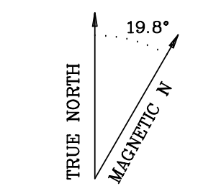


CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

LOCATION INDEX OF 1:31,680–SCALE MAP







APPROXIMATE MEAN
DECLINATION, 2015

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS of TANACROSS A-6, NABESNA D-6 GULKANA D-1, and MT. HAYES A-1 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

DESCRIPTIVE NOTES

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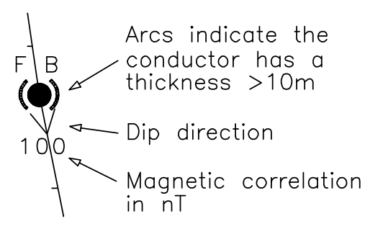
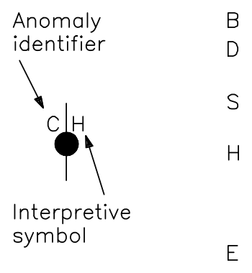
ELECTROMAGNETIC ANOMALIES



Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◒	20–50 siemens
◔	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
△	EM magnetite 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 aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial– and coplanar–coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a CGG 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[1]) 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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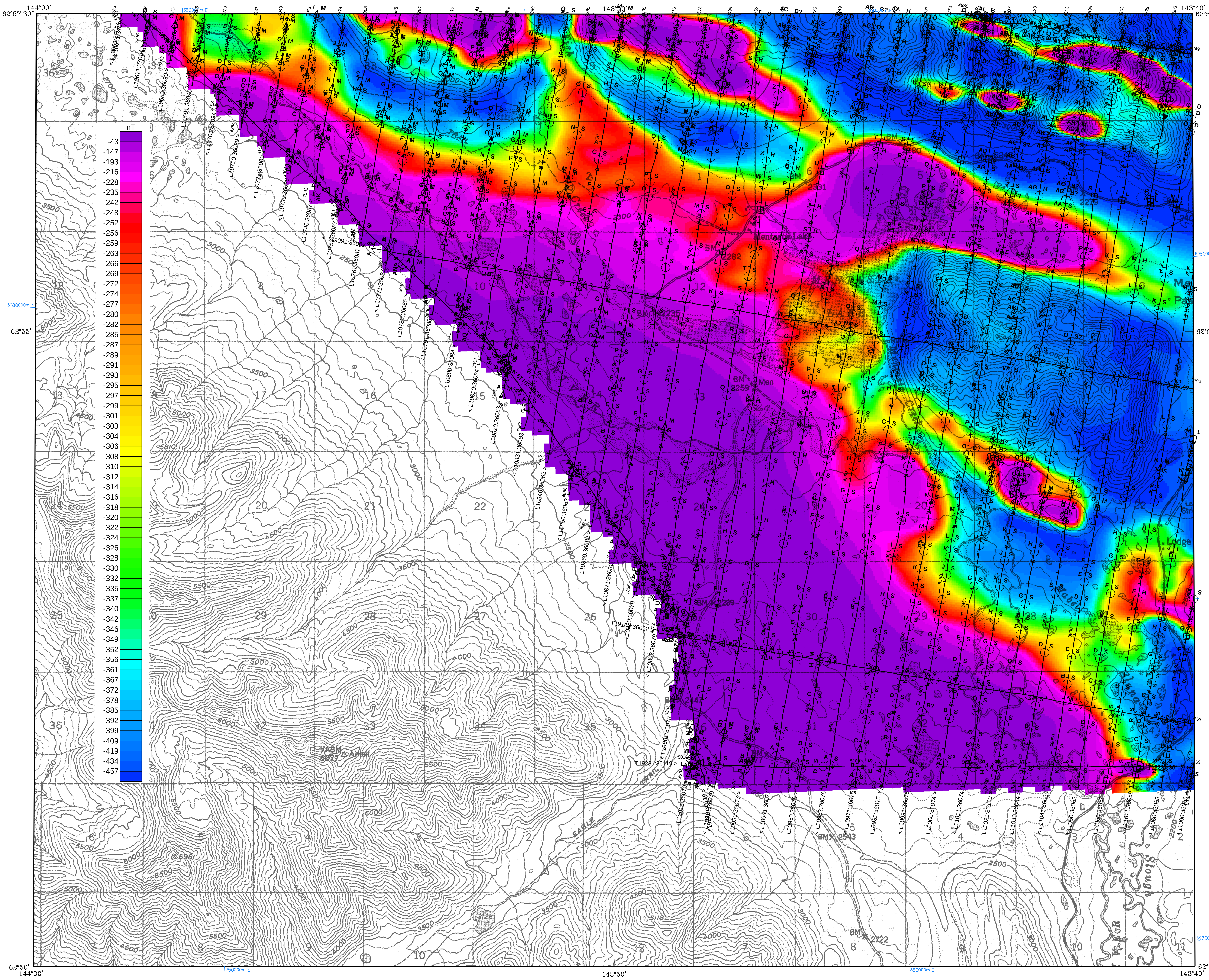
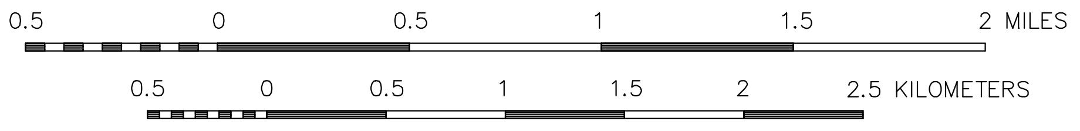
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15h
PART of NABESNA D-6 QUADRANGLE

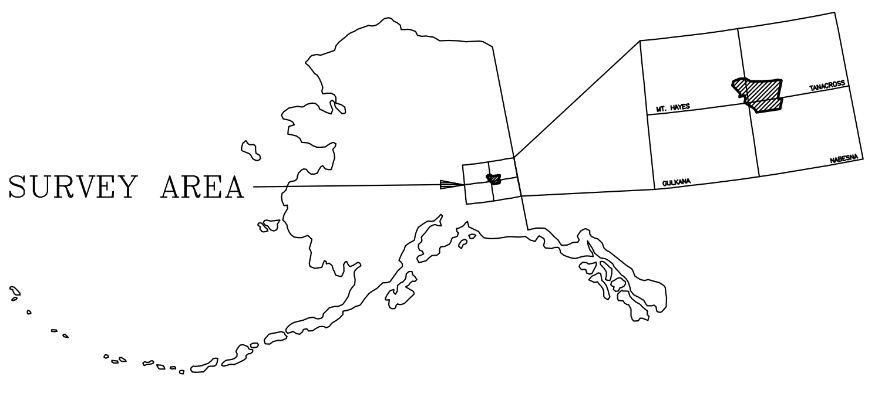


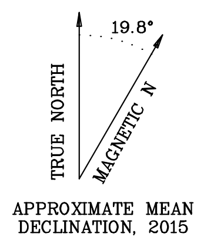
Base from U.S. Geological Survey Nabesna D-6, 1969; Quadrangle, Alaska

SCALE 1:31,680



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





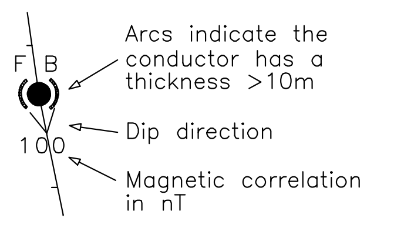
APPROXIMATE MEAN
DECLINATION, 2015

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PART of NABESNA D-6 QUADRANGLE

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

ELECTROMAGNETIC ANOMALIES



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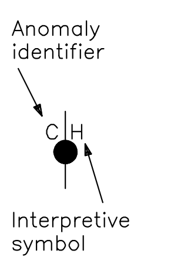
◌	< 1 siemens
✳	Questionable anomaly
△	EM magnetite response
□	Culture



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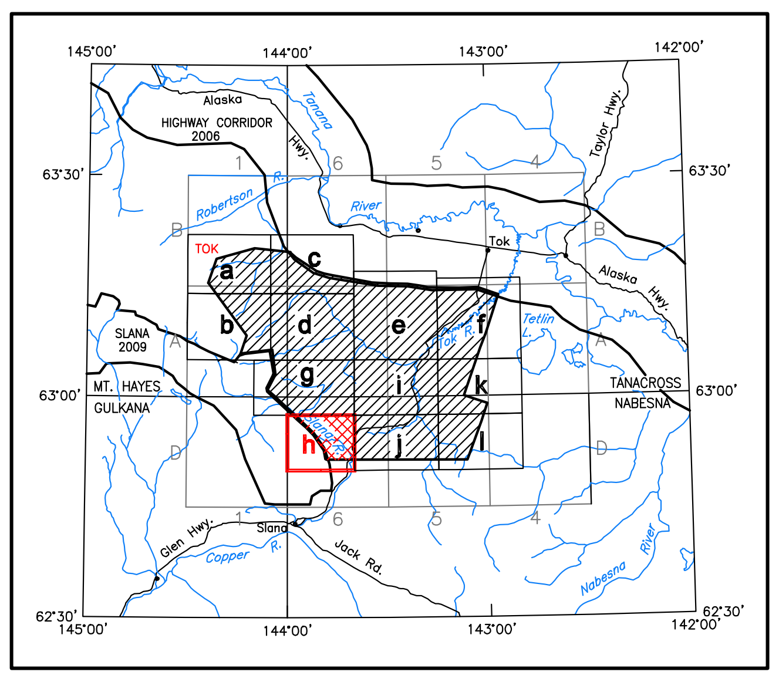
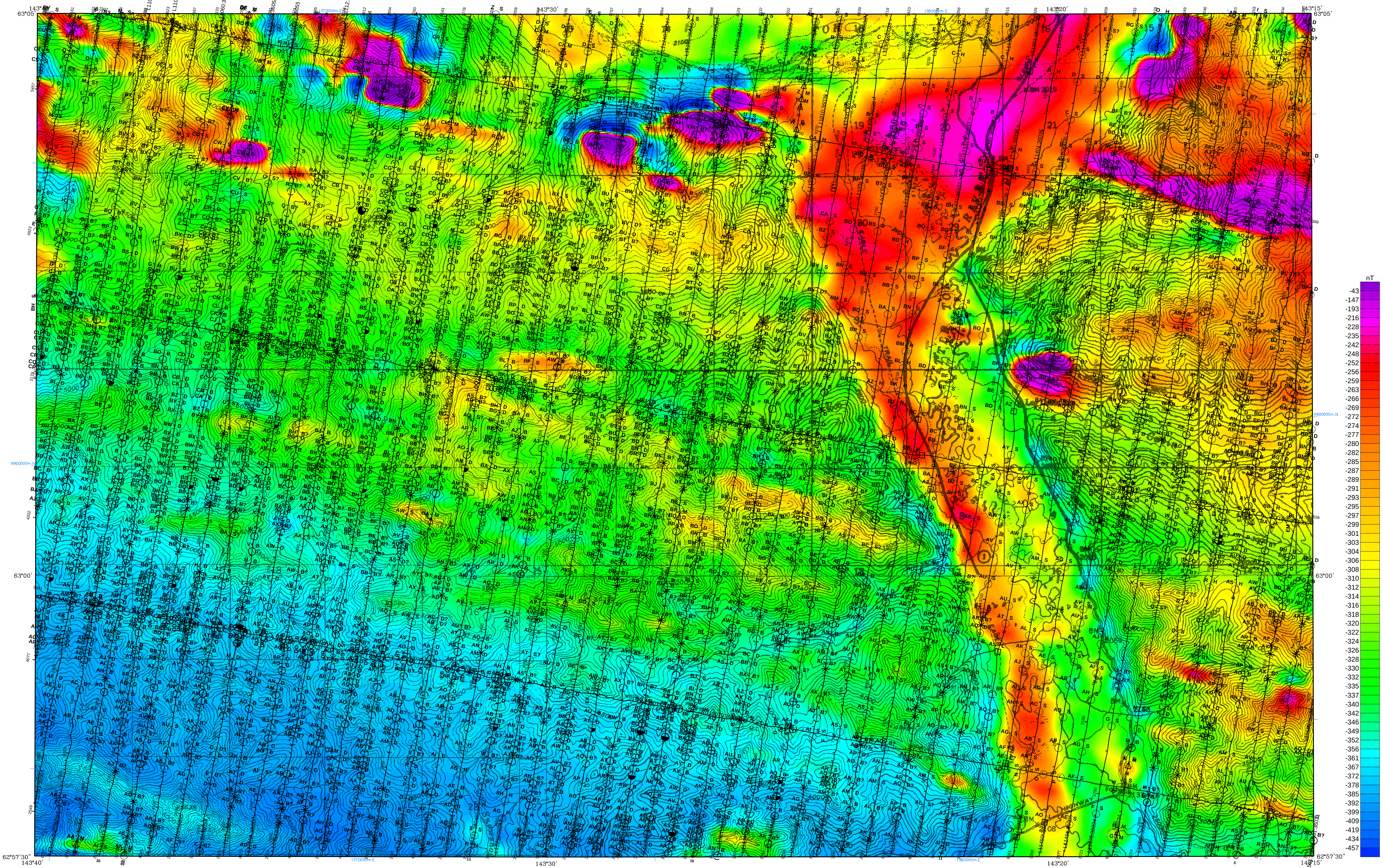
LOCATION INDEX OF 1:31,680–SCALE MAP



ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15i
PARTS of TANACROSS A-5, A-6, NABESNA D-5, and D-6 QUADRANGLES



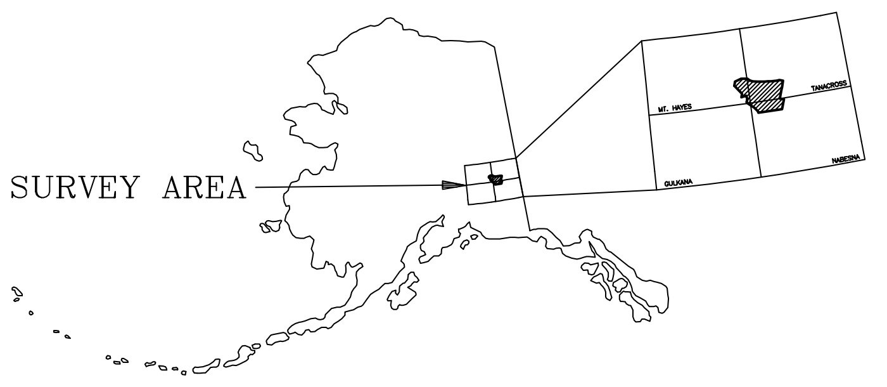
Base from U.S. Geological Survey Tanacross A–5, 1973; A–6, 1964;
Nabesna D–5, 1952; D–6, 1969; Quadrangles, Alaska

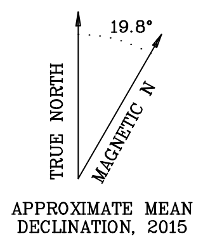
SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN
DECLINATION, 2015

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PARTS of TANACROSS A-5, A-6, NABESNA D-5, and D-6 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

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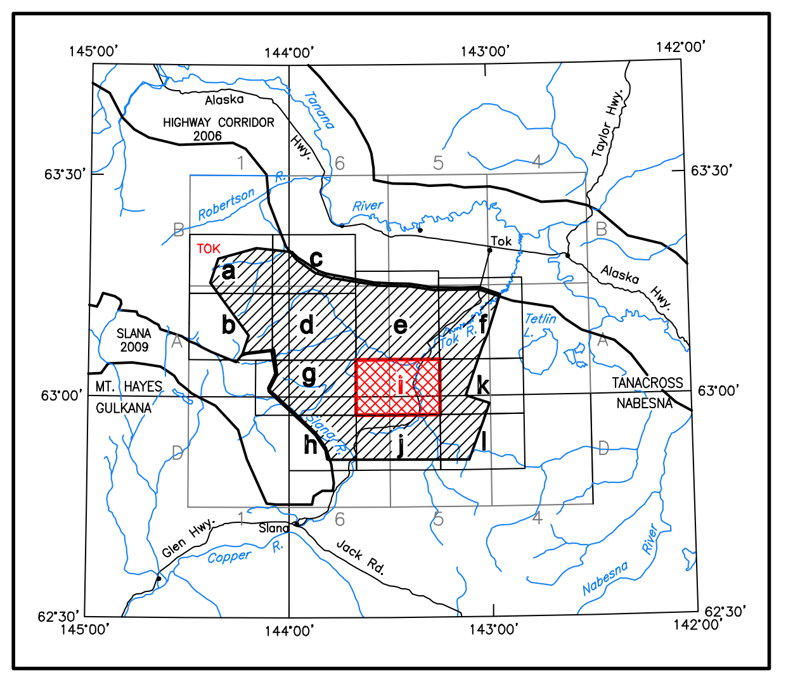
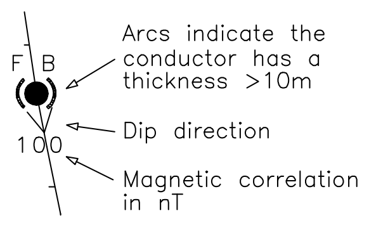


ELECTROMAGNETIC ANOMALIES



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⊖	20–50 siemens
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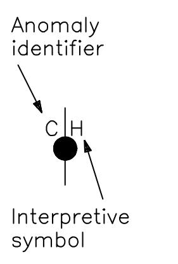

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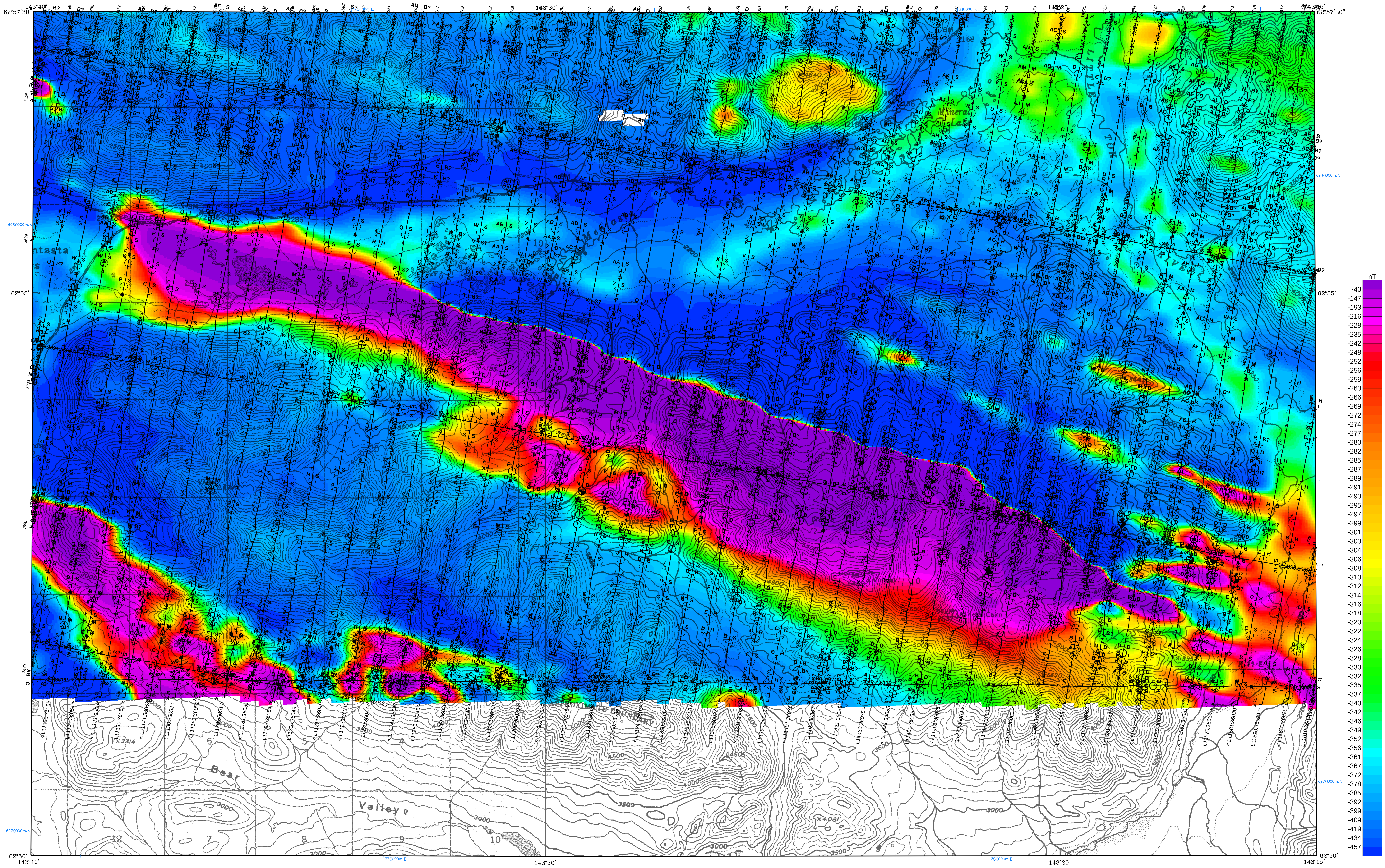
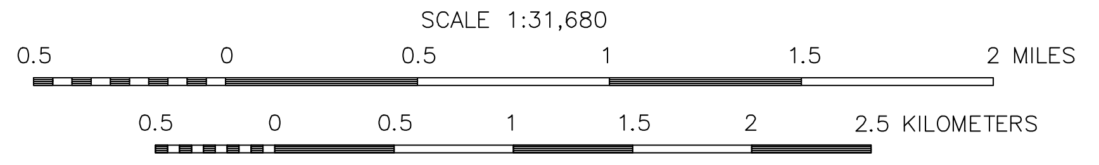
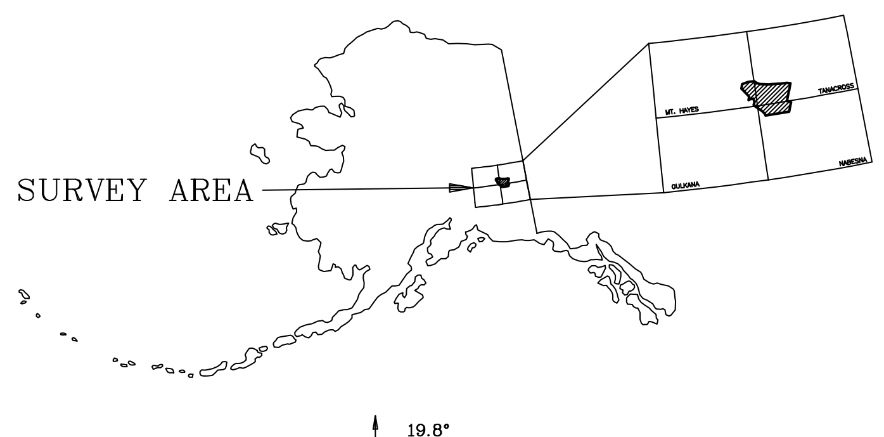
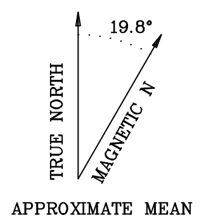


Base from U.S. Geological Survey Nabesna D–5, 1952; D–6, 1969; Quadrangles, Alaska



CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL





APPROXIMATE MEAN
DECLINATION, 2015

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PARTS of NABESNA D-5 and D-6 QUADRANGLES

by
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2015

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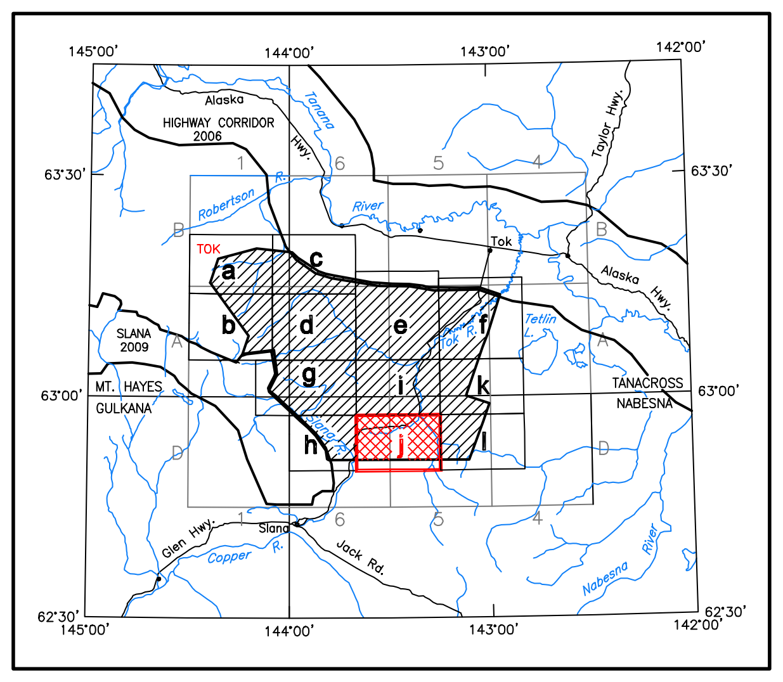

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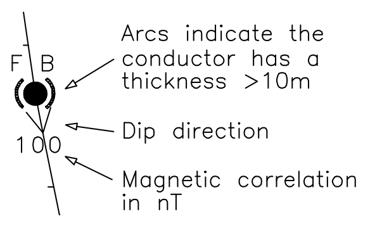
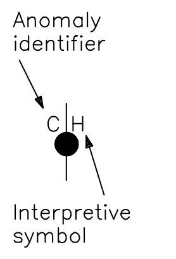


Anomaly	Conductance
●	>100 siemens
◕	50–100 siemens
◒	20–50 siemens
⊕	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
◌	< 1 siemens
✳	Questionable anomaly
△	EM magnetite response
□	Culture



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.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ELECTROMAGNETICS

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

RESIDUAL MAGNETIC FIELD

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[1] 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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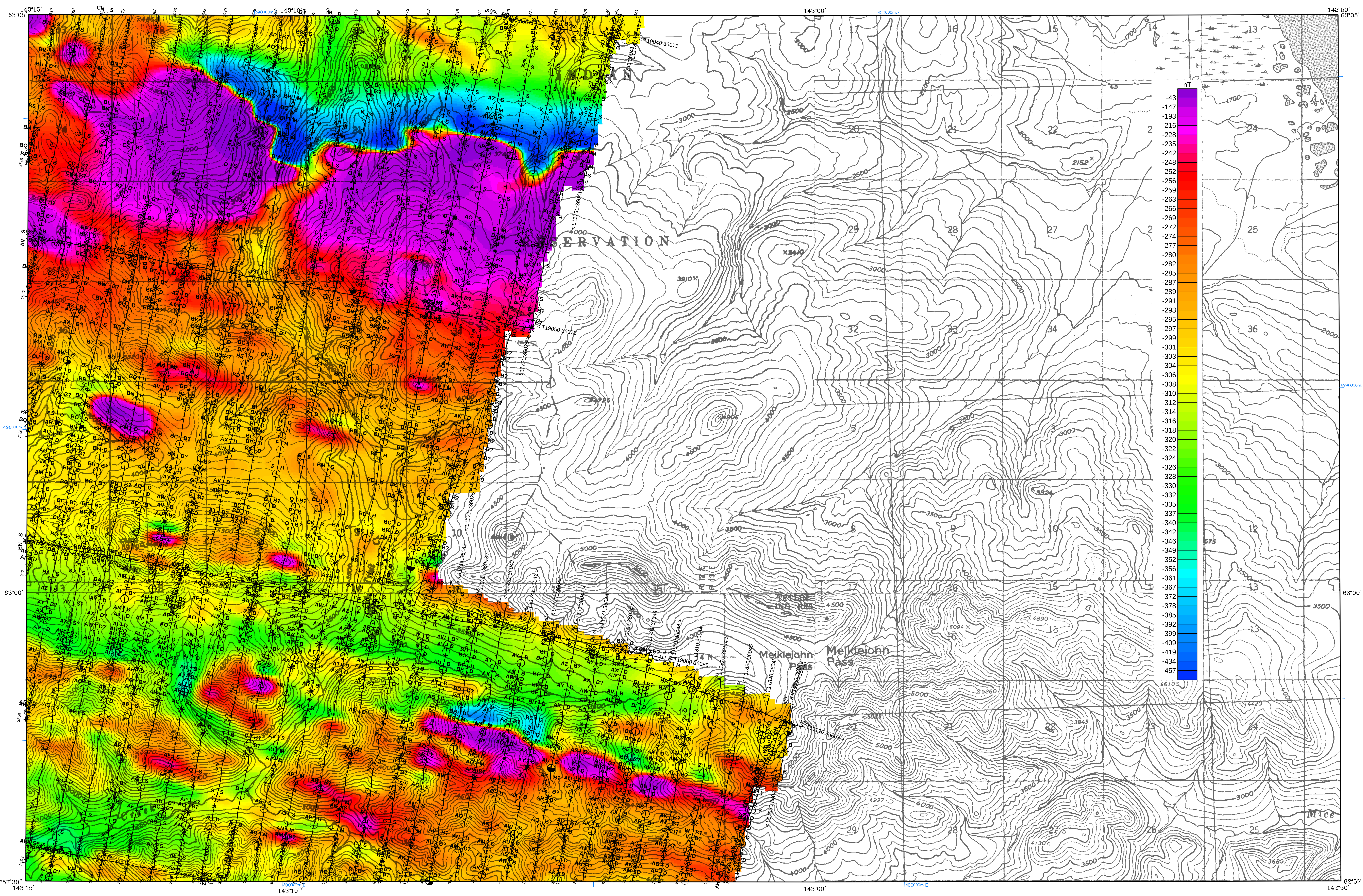
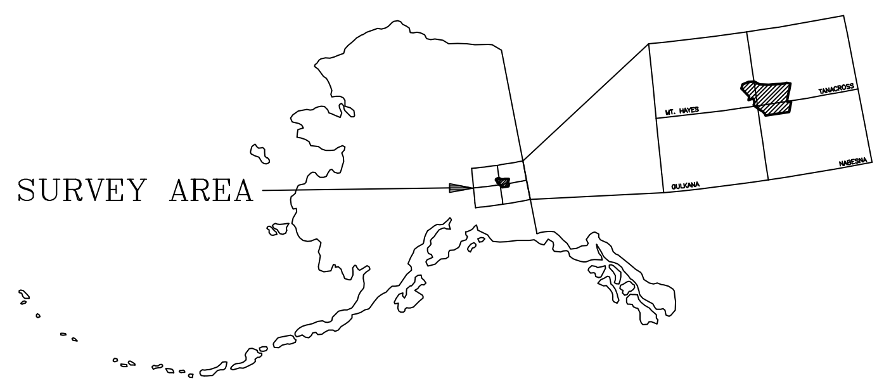
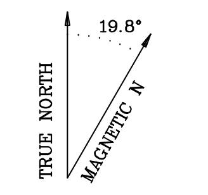
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15k
PARTS of TANACROSS A-4, A5, NABESNA D-4, and D-5 QUADRANGLES

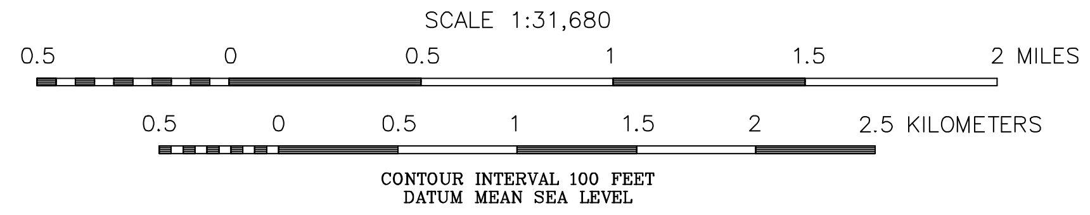


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; Nabesna D-4, 1954; D-5, 1952; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

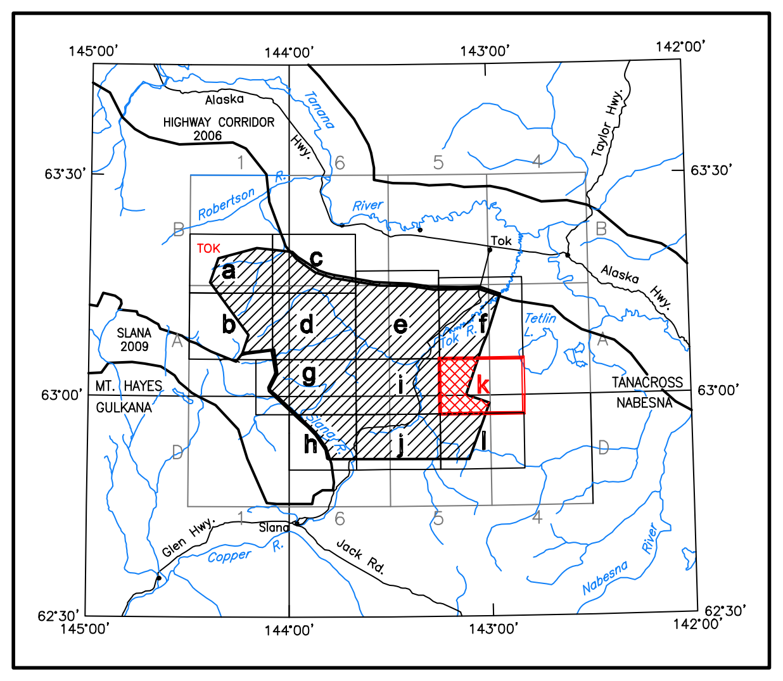


RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

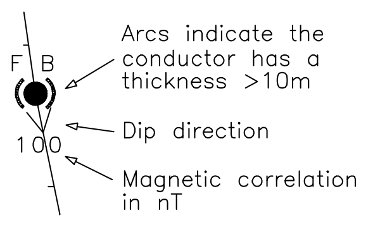
PARTS of TANACROSS A-4, A-5, NABESNA D-4, and D-5 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

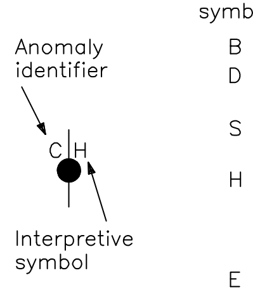
LOCATION INDEX OF 1:31,680-SCALE MAP



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 magnetite 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
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"?"	Indicates some uncertainty as to the most appropriate EM source model, but does not question the validity of the EM anomaly.

DESCRIPTIVE NOTES

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To determine the location of EM anomalies or their boundaries, 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. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial– and coplanar–coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

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SURVEY HISTORY

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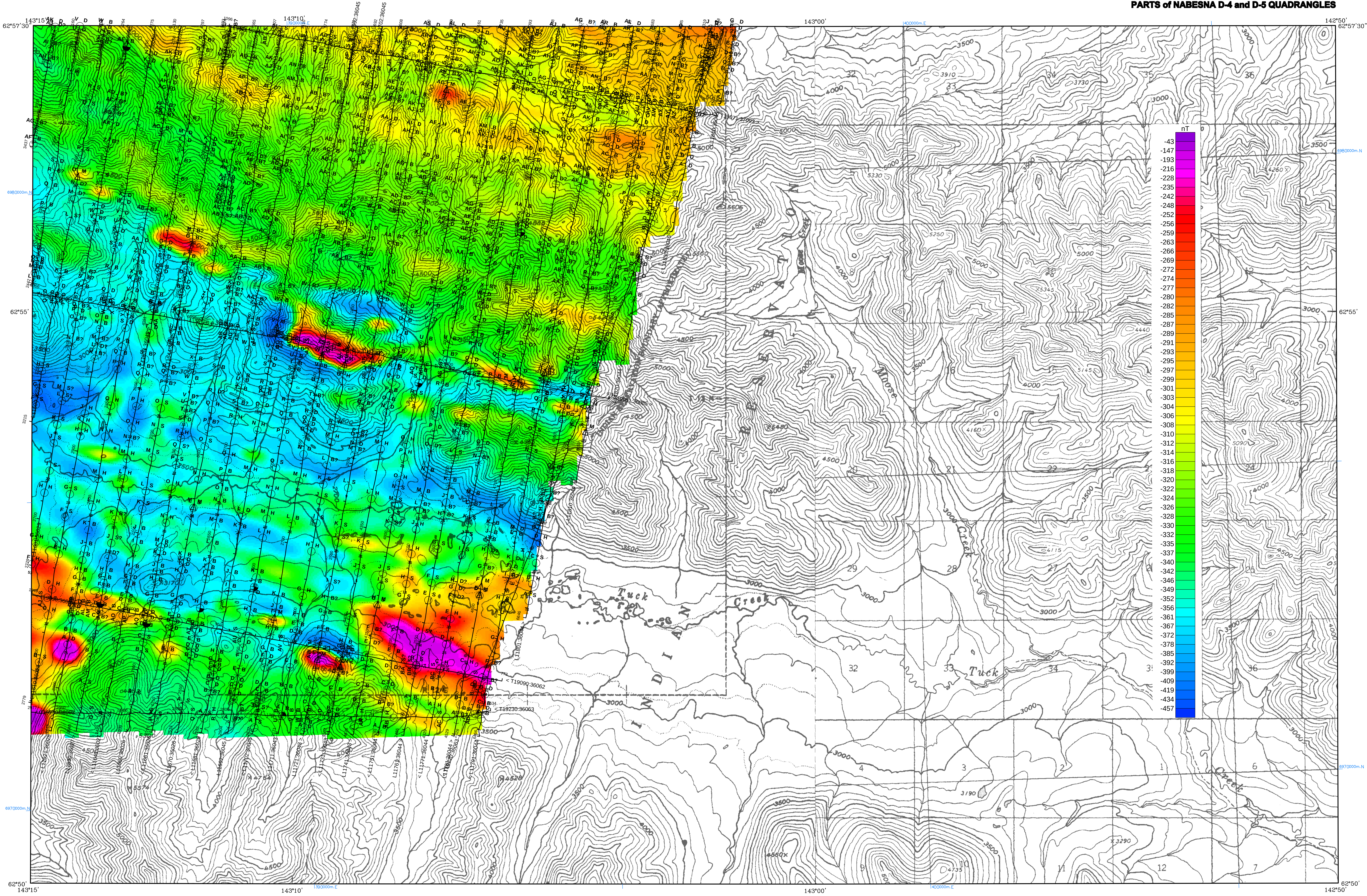
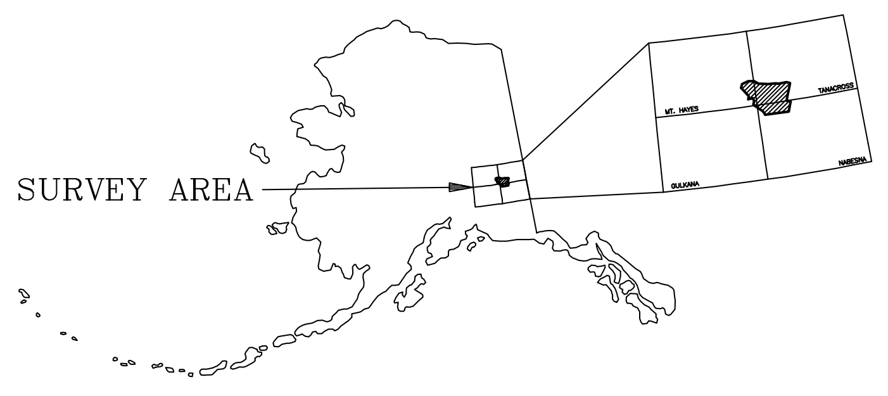
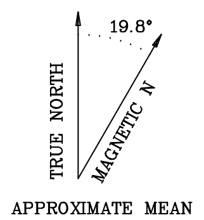
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15I
PARTS of NABESNA D-4 and D-5 QUADRANGLES



Base from U.S. Geological Survey Nabesna D-4, 1954; D-5, 1952; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

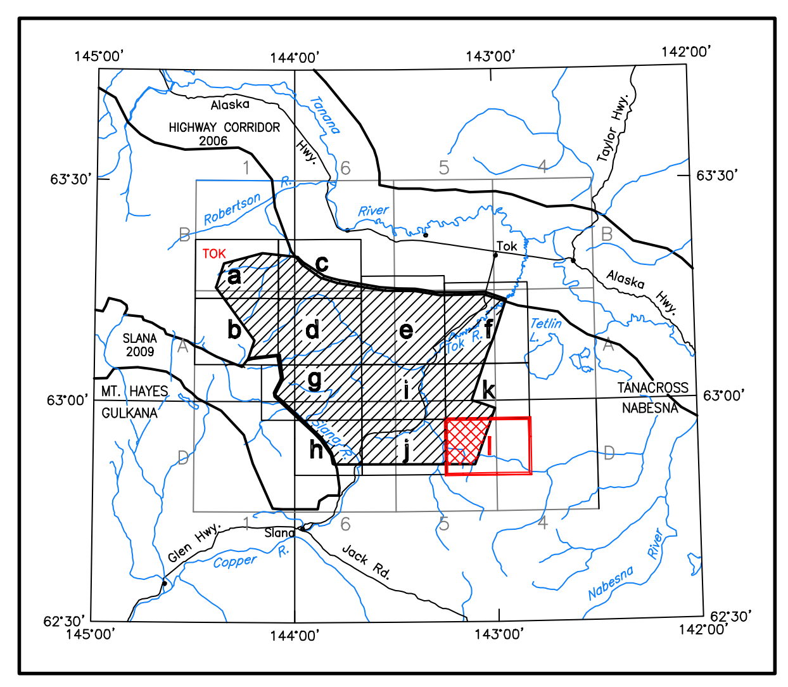
CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS of NABESNA D-4 and D-5 QUADRANGLES

by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

LOCATION INDEX OF 1:31,680-SCALE MAP



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ELECTROMAGNETIC ANOMALIES

F B
100
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
C H
Interpretive symbol

Interpretive symbol	Conductor model
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
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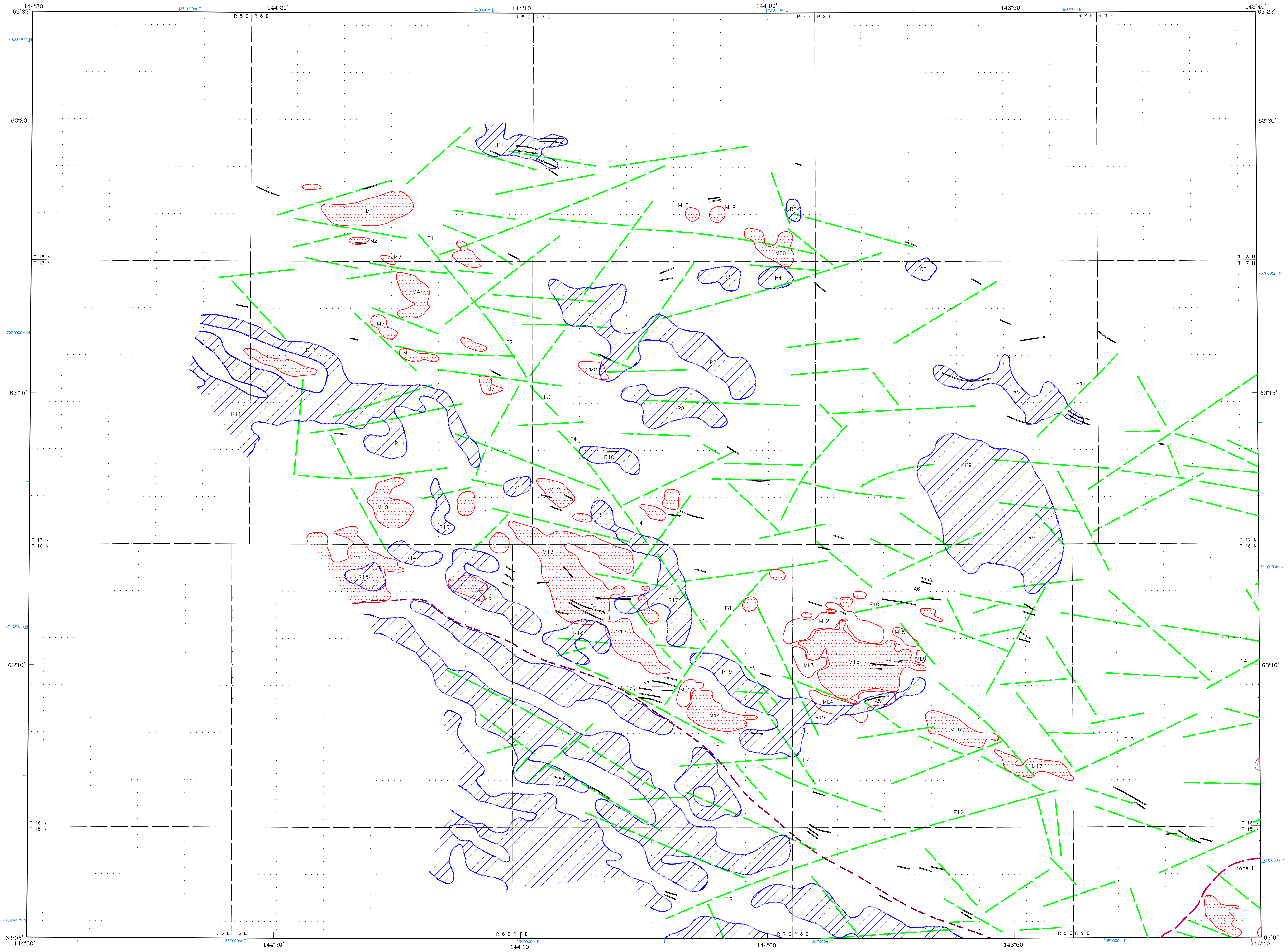
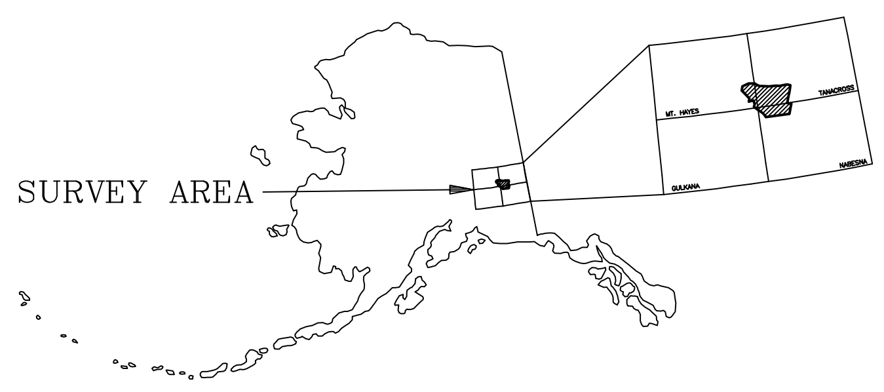
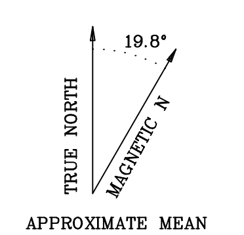


Section outlines from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982;
Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

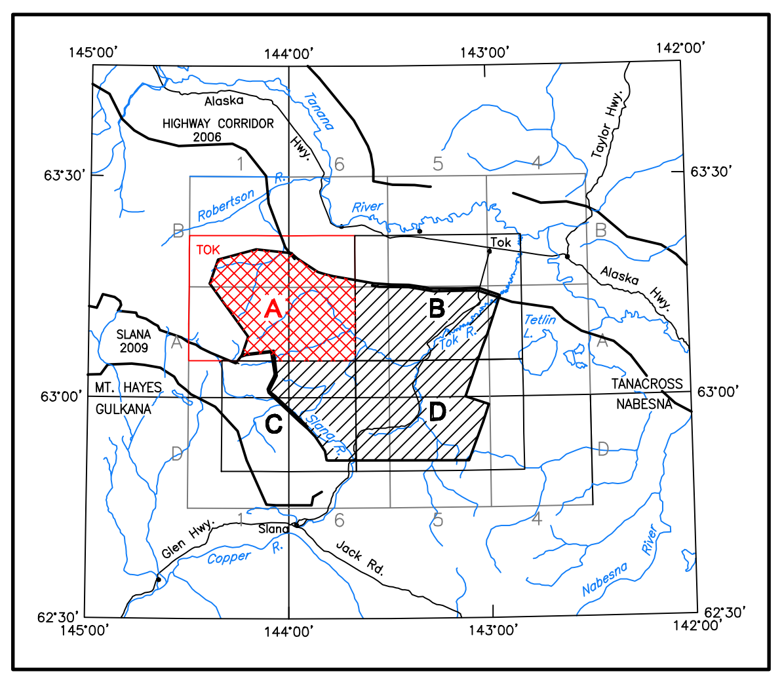
INTERPRETATION MAP, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

Interpretation by CGG
2015

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

LOCATION INDEX OF 1:63,360–SCALE MAP



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LEGEND

F1	Inferred Structural Break
A1	EM Conductor, or group of EM Conductors
	Possible Folded Unit
	Highly conductive zone boundary associated with a geologic unit
M1	Magnetic Zone
ML1	Magnetic Low
R1	Highly Conductive Zone
Zone A	Approximate outline of broad magnetic zone defined by a change in magnetic texture

SURVEY HISTORY

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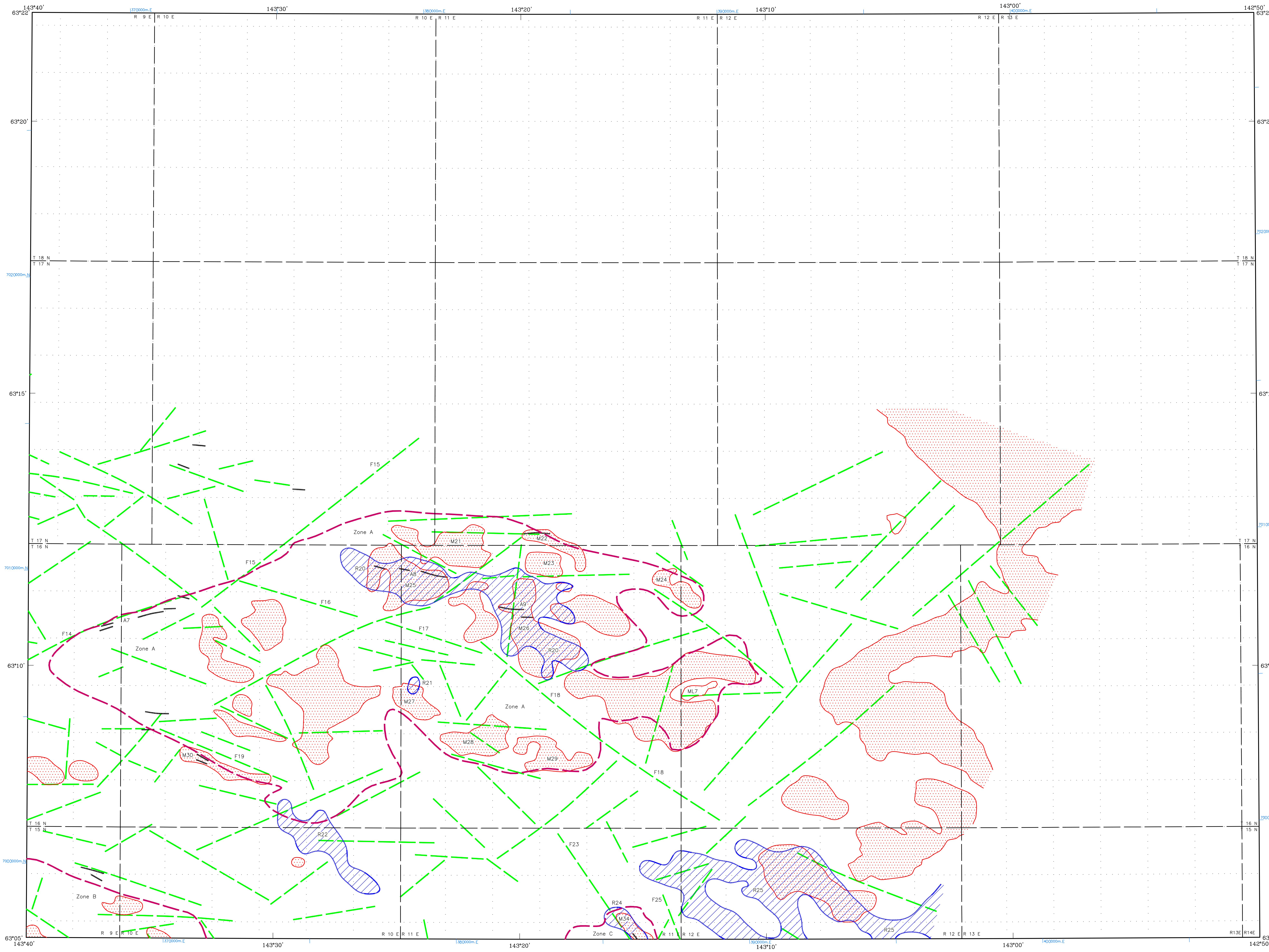
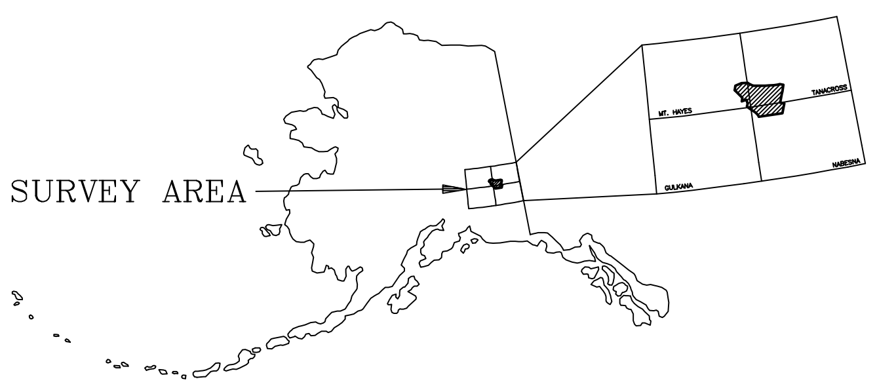
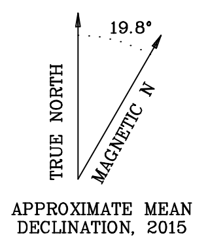
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, , Sheet 16B



Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

INTERPRETATION MAP, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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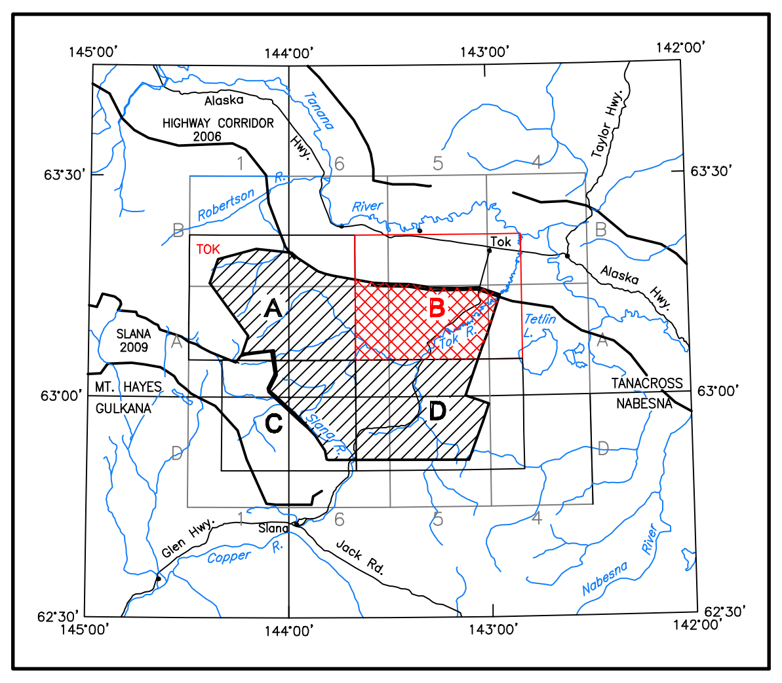
LOCATION INDEX OF 1:63,360-SCALE MAP



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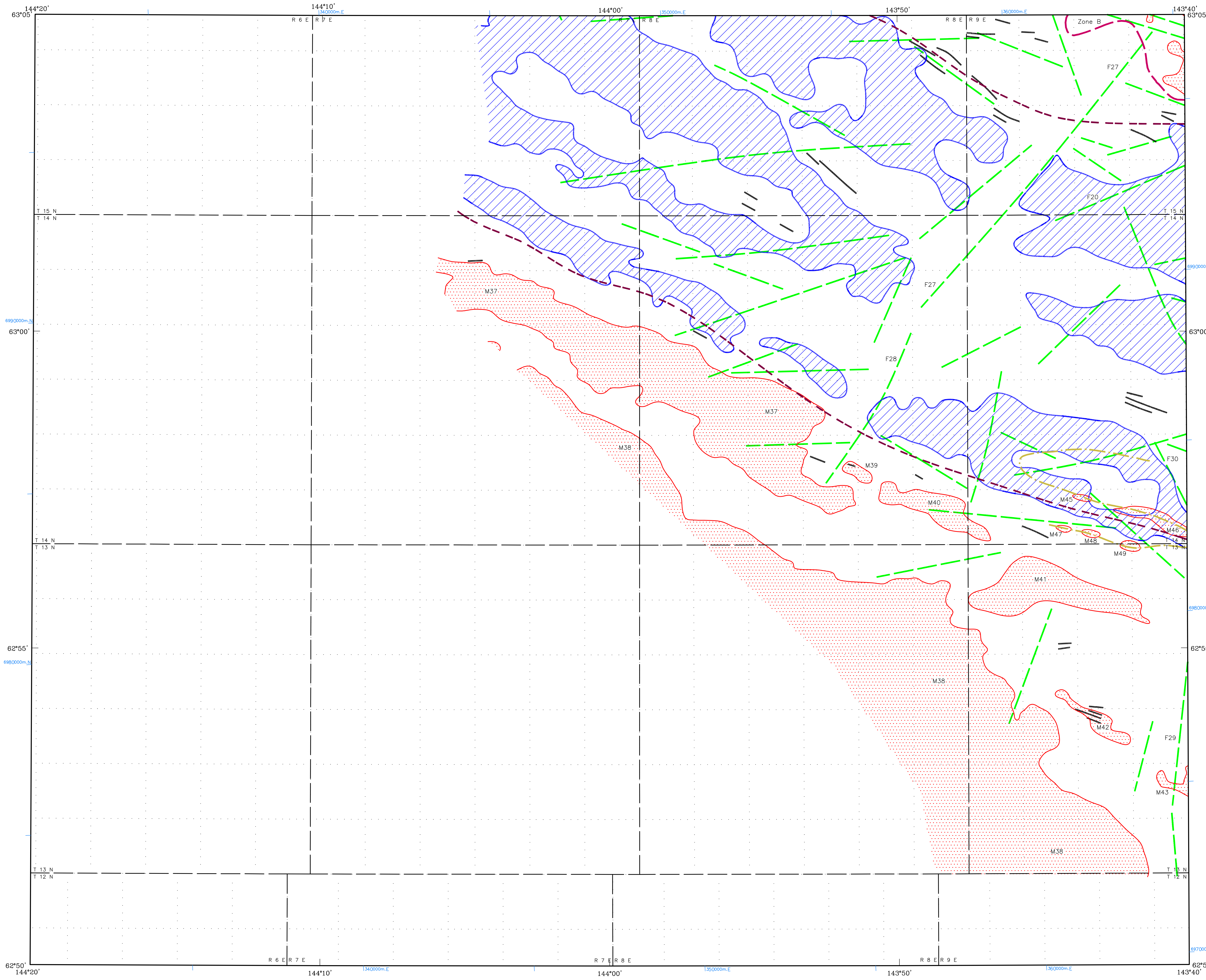
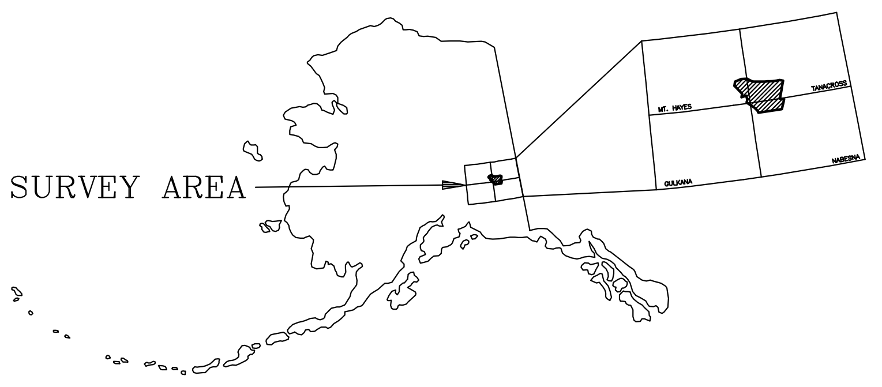
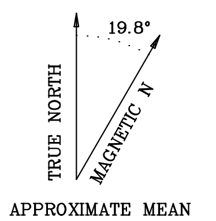
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 16C



Section outlines from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

INTERPETATION MAP, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

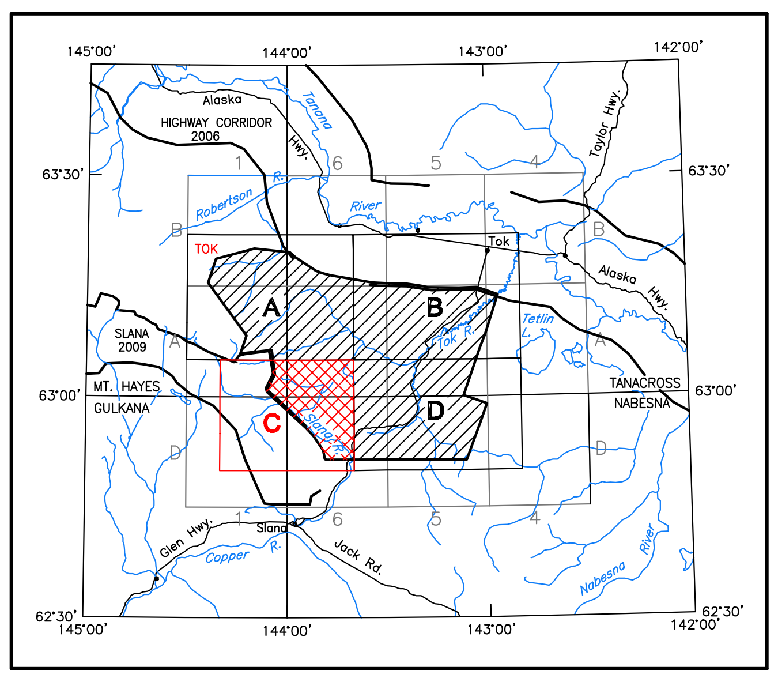
Interpretation by CGG
2015

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

LEGEND

F1 — — —	Inferred Structural Break
A1 ——	EM Conductor, or group of EM Conductors
— · — · —	Possible Folded Unit
— — — —	Highly conductive zone boundary associated with a geologic unit
M1	Magnetic Zone
ML1	Magnetic Low
R1	Highly Conductive Zone
Zone A	Approximate outline of broad magnetic zone defined by a change in magnetic texture

LOCATION INDEX OF 1:63,360-SCALE MAP



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system and a CGG D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 30 meters (m). In addition the survey recorded data from radar and laser altimeters, a 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 60 m along NE–SW (012°) survey flight lines with a spacing of 400 m. Tie lines were flown perpendicular to the flight lines at intervals of approximately 4,800 m.

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 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, 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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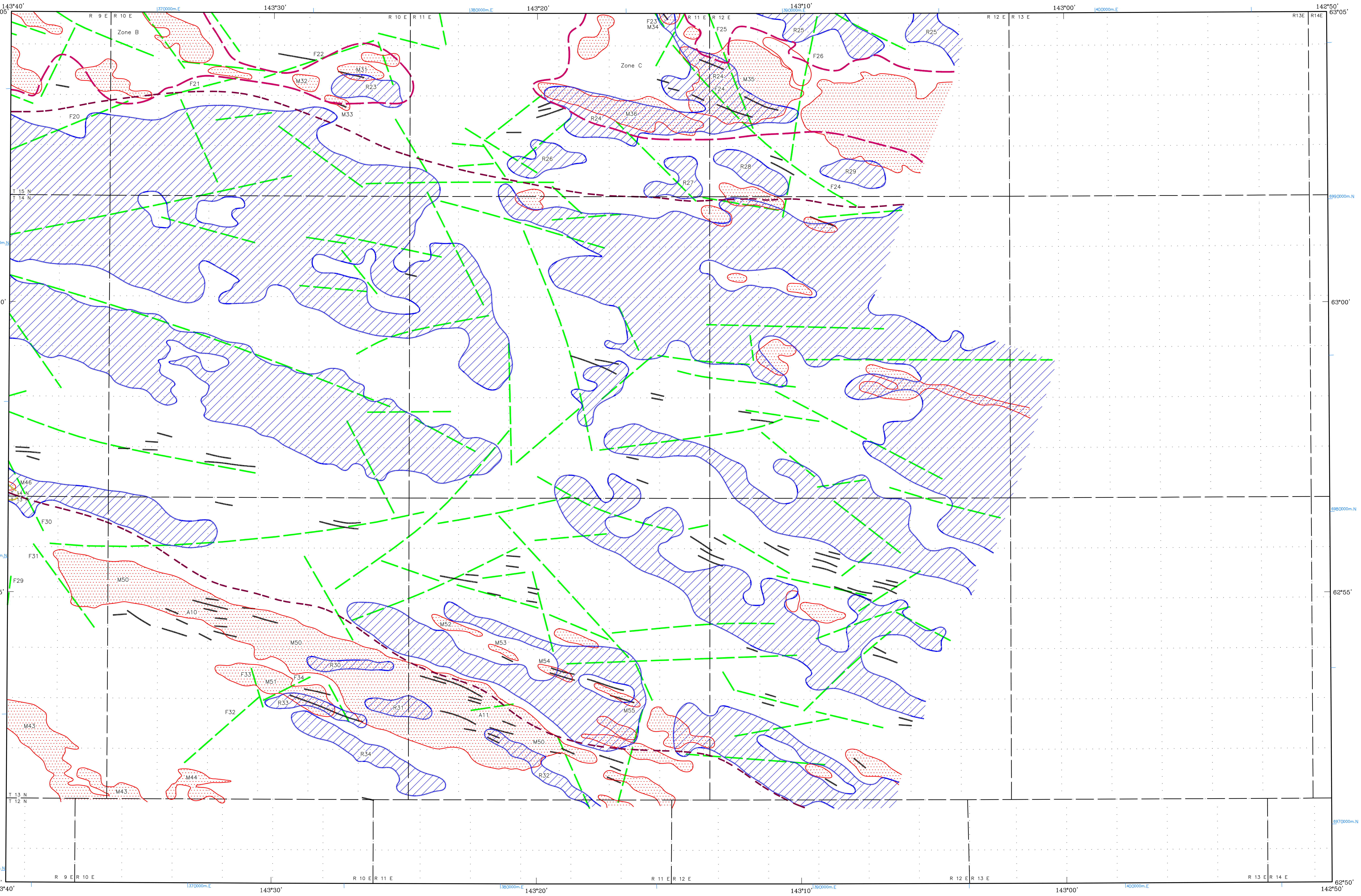
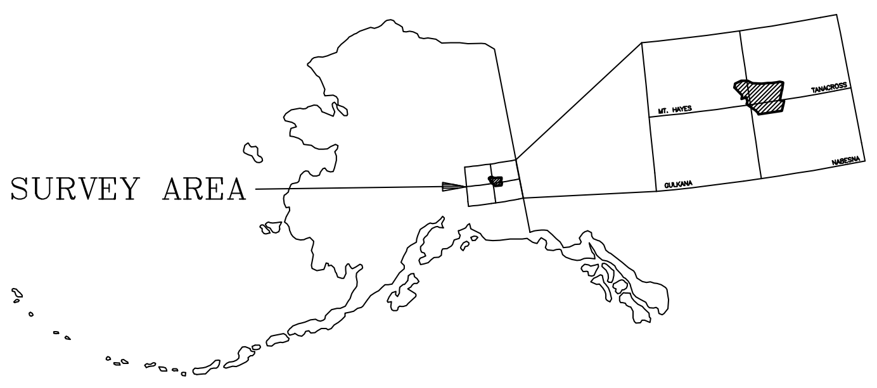
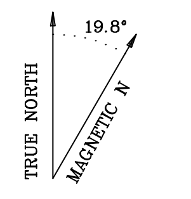


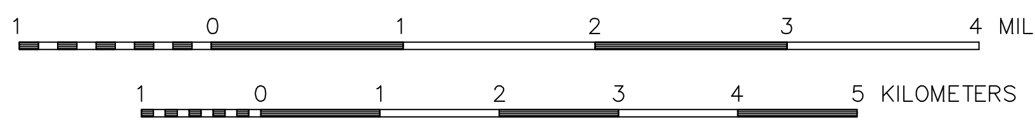
Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; Nabesna D–4, 1954; D–5, 1952; D–6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN
DECLINATION, 2015

SCALE 1:63,360



INTERPRETATION MAP,
TOK SURVEY AREA,
EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

Interpretation by CGG
2015

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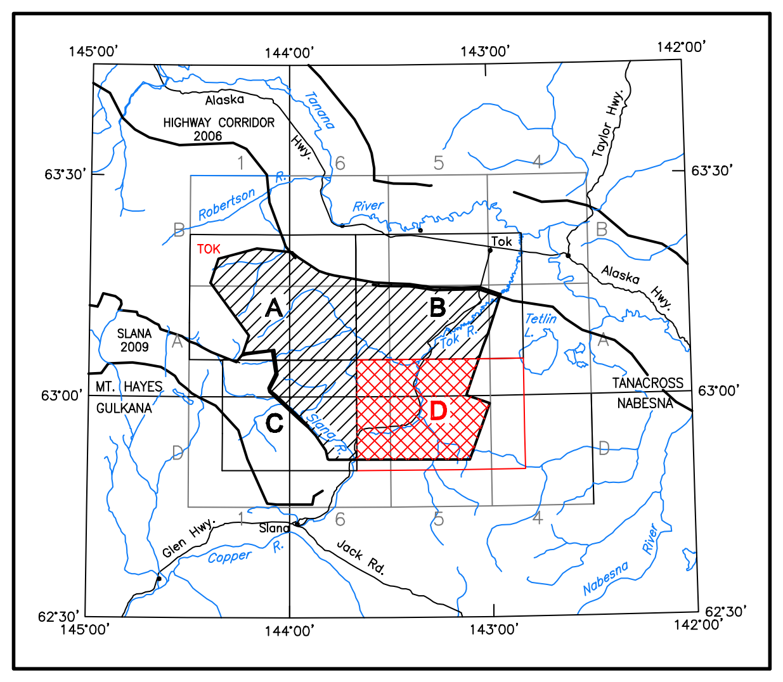
LOCATION INDEX OF 1:63,360–SCALE MAP



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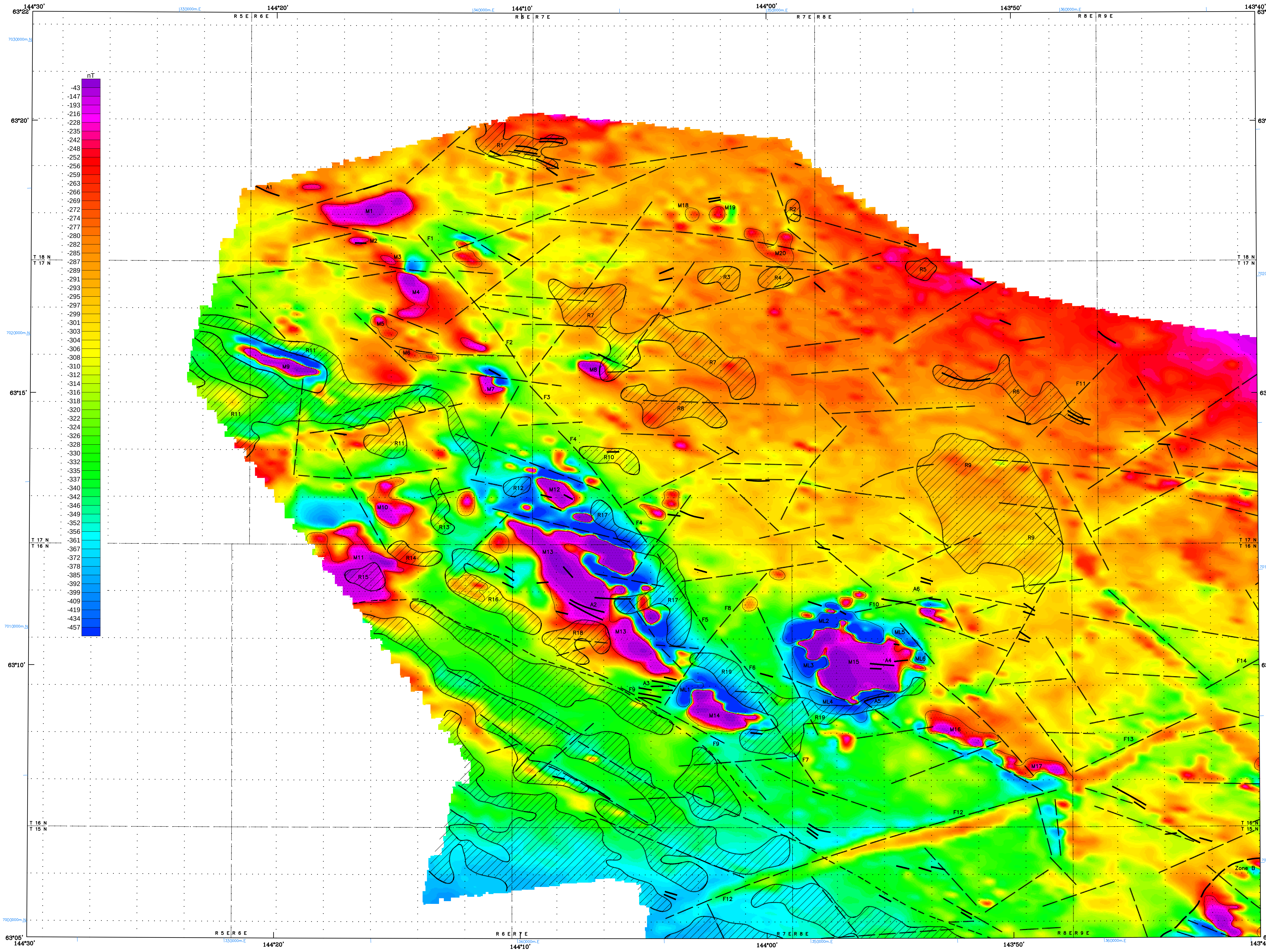
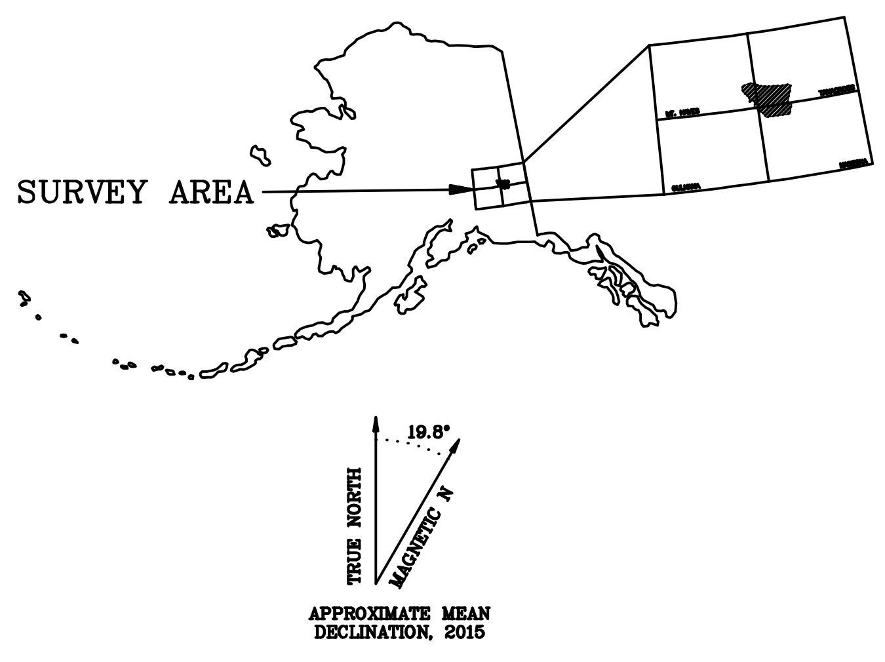
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, Sheet 17A
LARGE FIGURE 6



Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

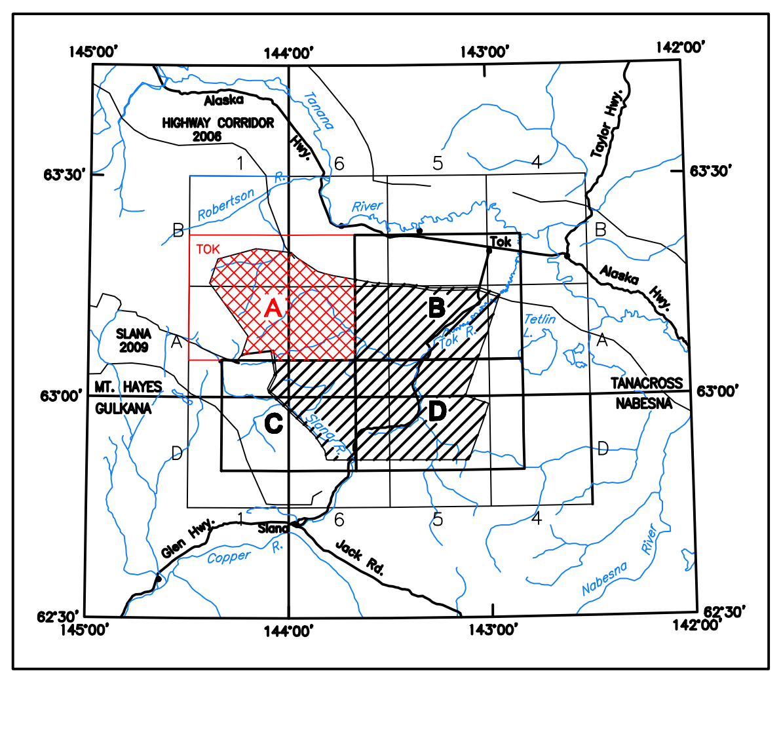
1 0 1 2 3 4 5 KILOMETERS

INTERPRETATION MAP WITH RESIDUAL MAGNETIC FIELD, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

Interpretation by CGG
2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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[1] 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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SURVEY HISTORY

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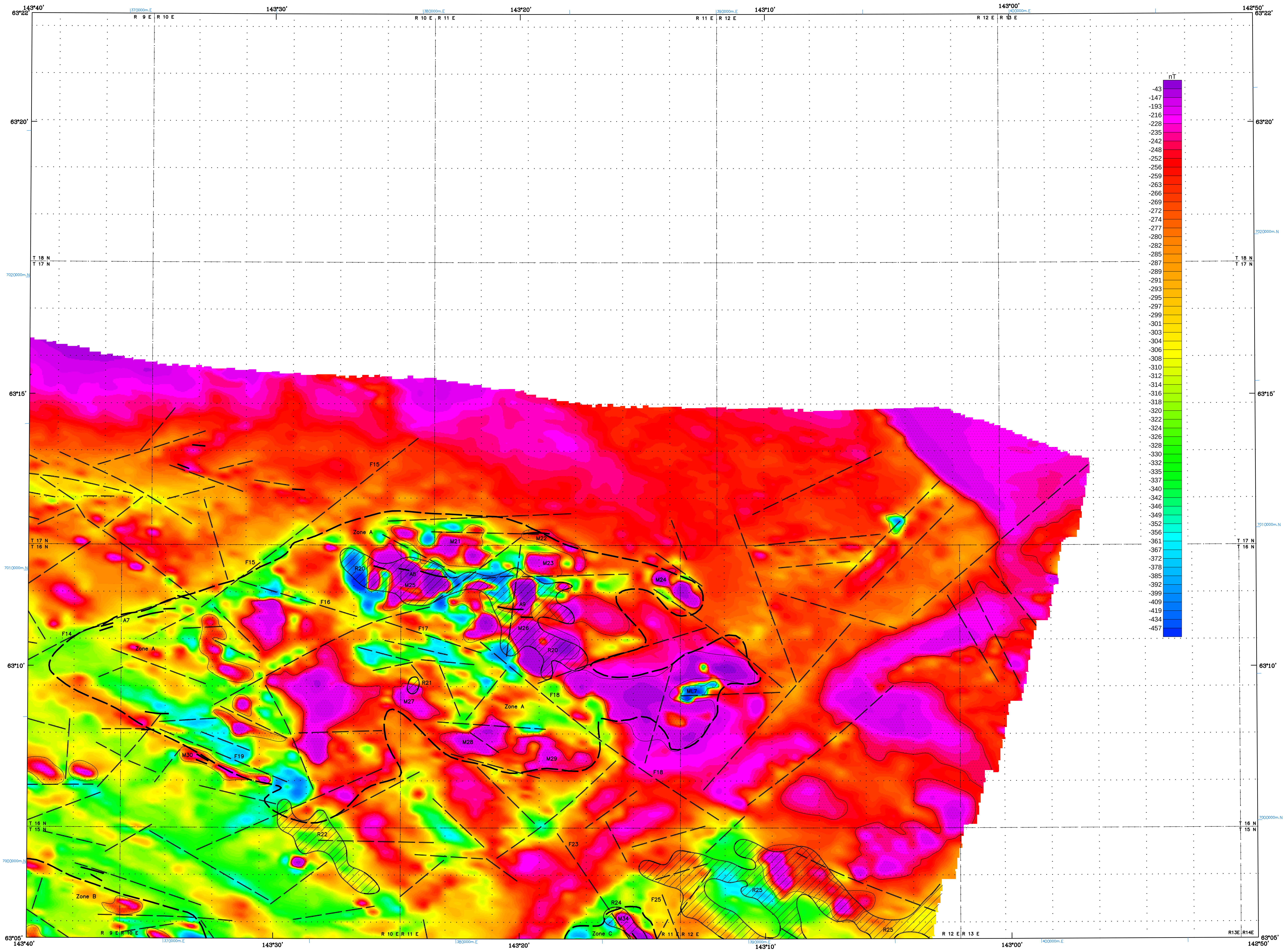
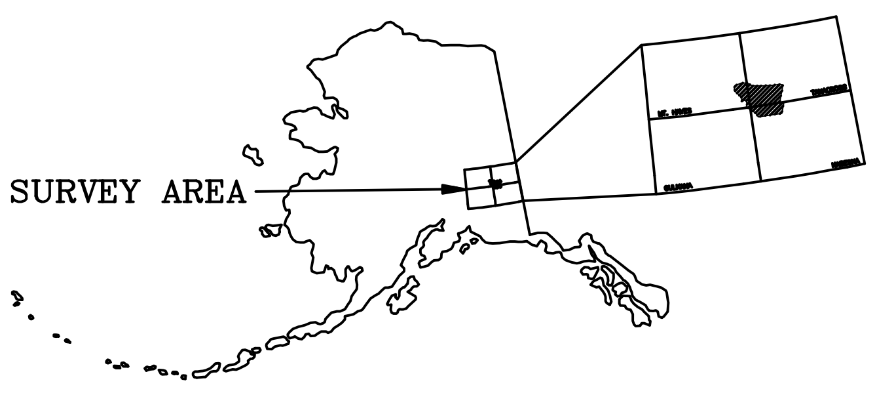
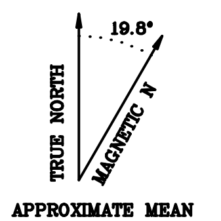
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2, , Sheet 17B
LARGE FIGURE 7



Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

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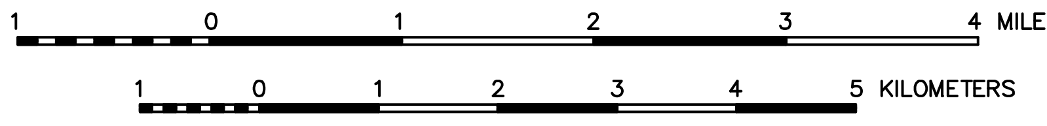
SCALE 1:63,360



INTERPRETATION MAP WITH RESIDUAL MAGNETIC FIELD TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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2015

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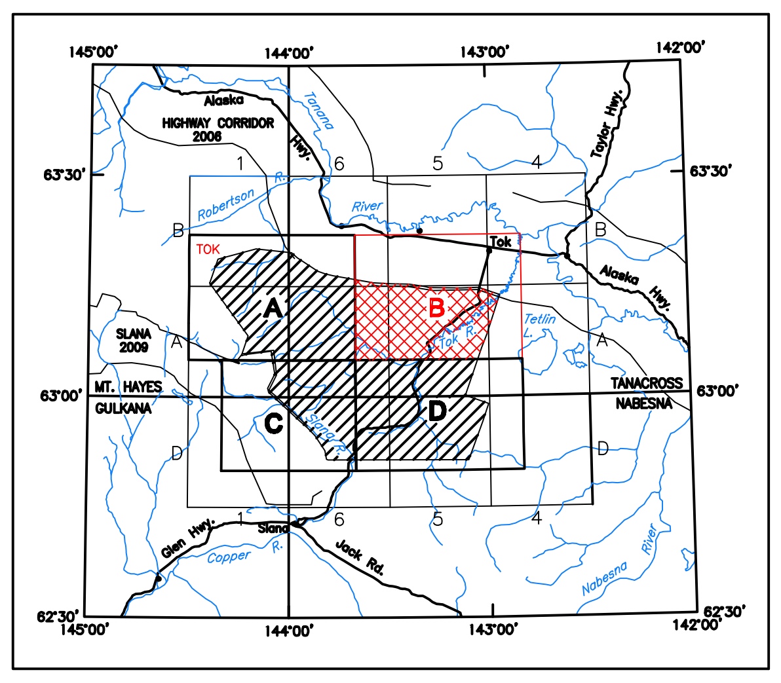
LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY HISTORY

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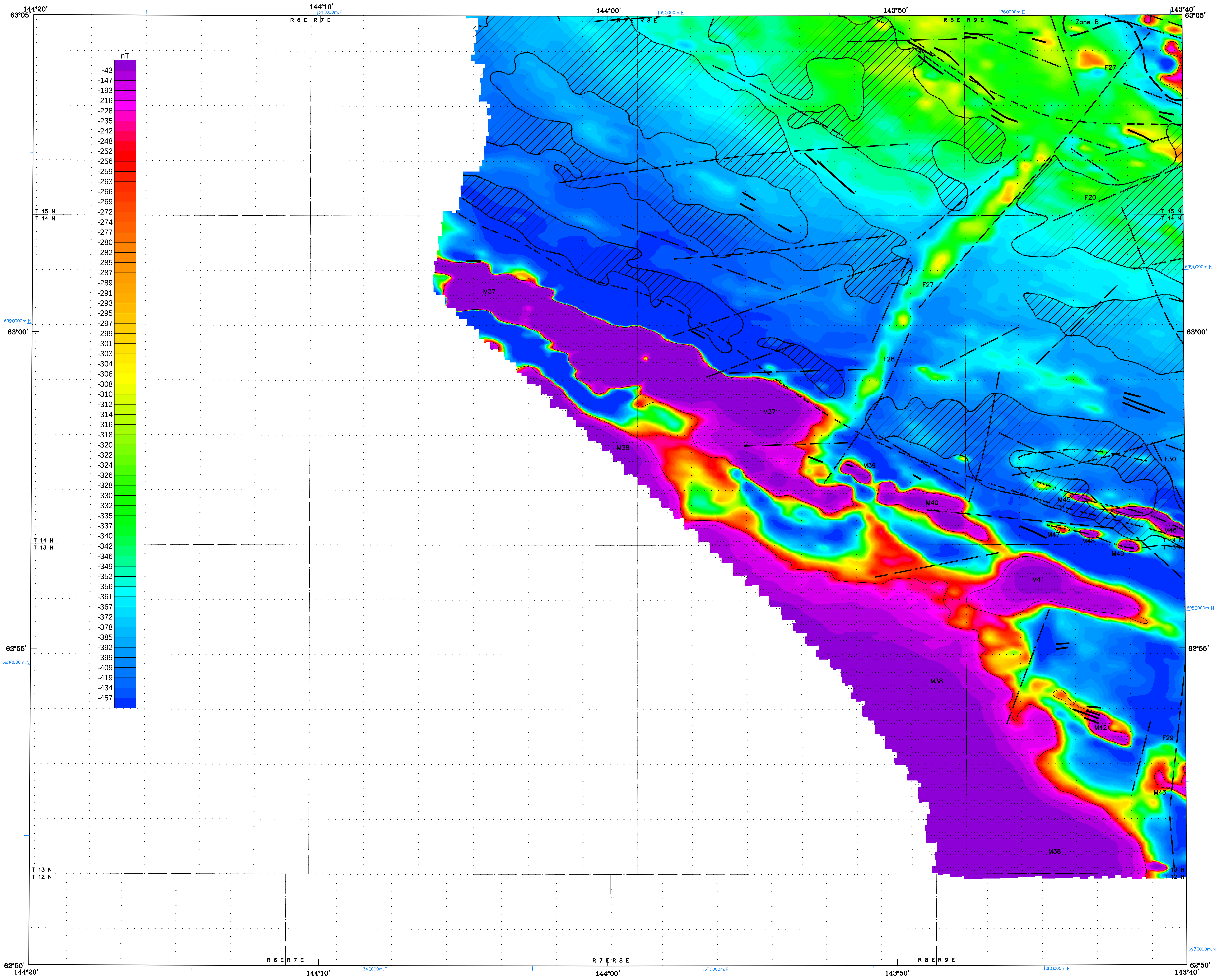

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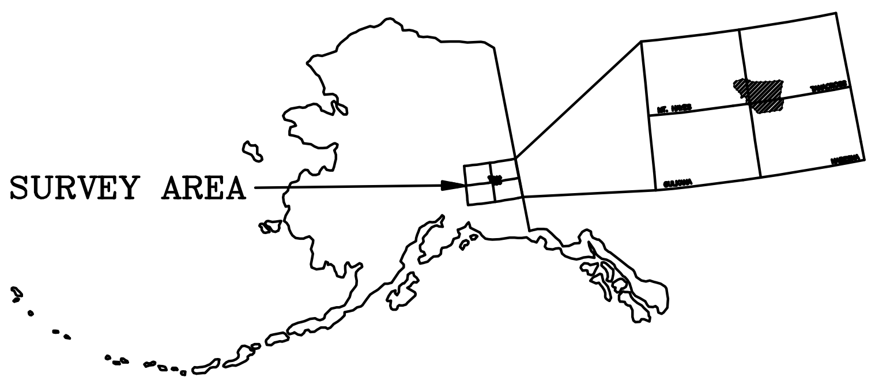
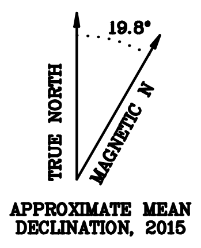




APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

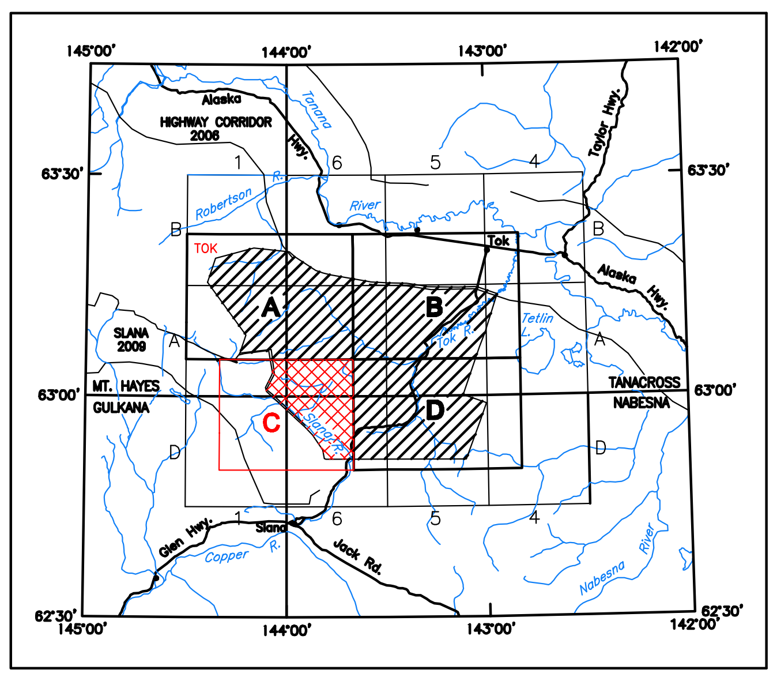
1 0 1 2 3 4 5 KILOMETERS

INTERPETATION MAP WITH RESIDUAL MAGNETIC FIELD, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

Interpretation by CGG
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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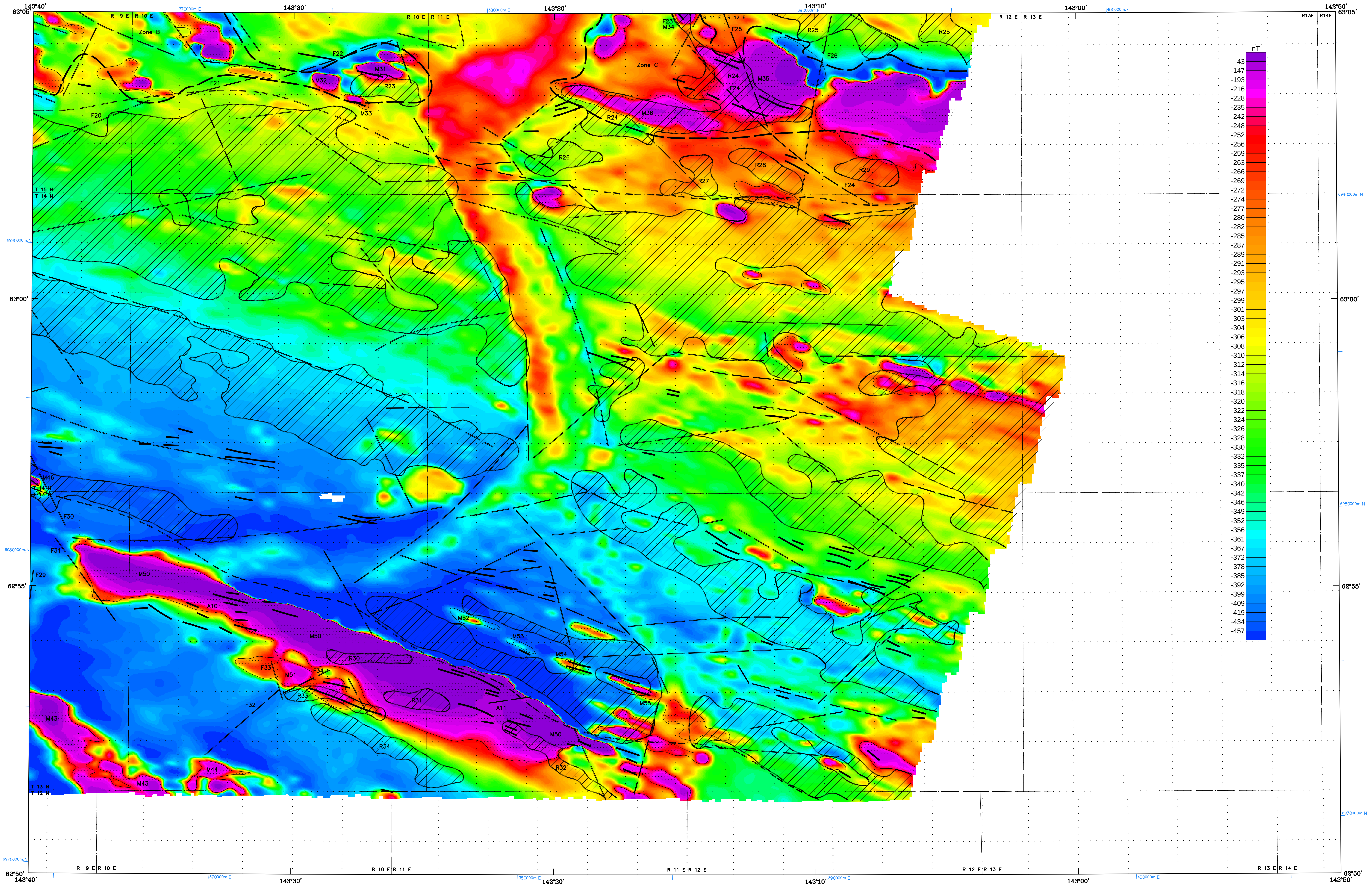

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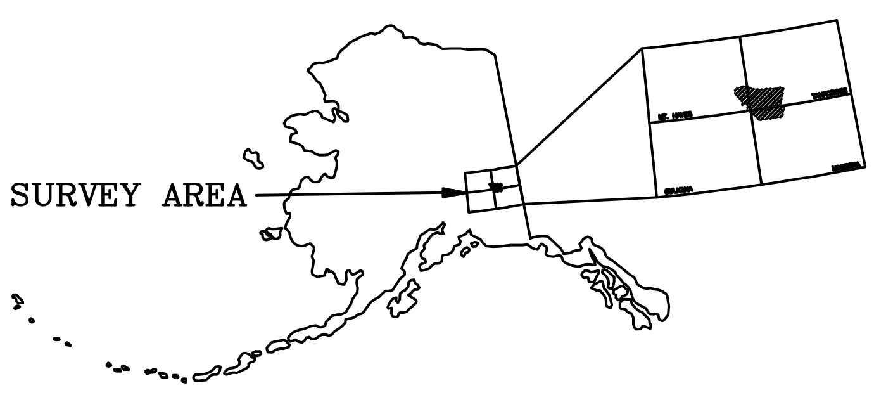
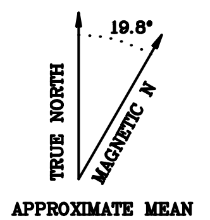
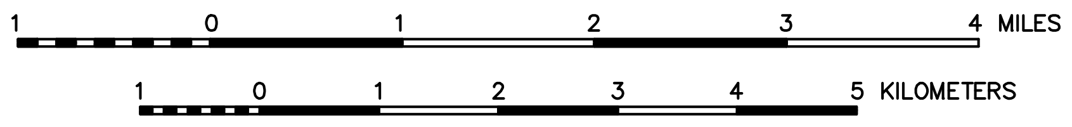




APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360



INTERPRETATION MAP WITH MAGNETIC RESIDUAL FIELD, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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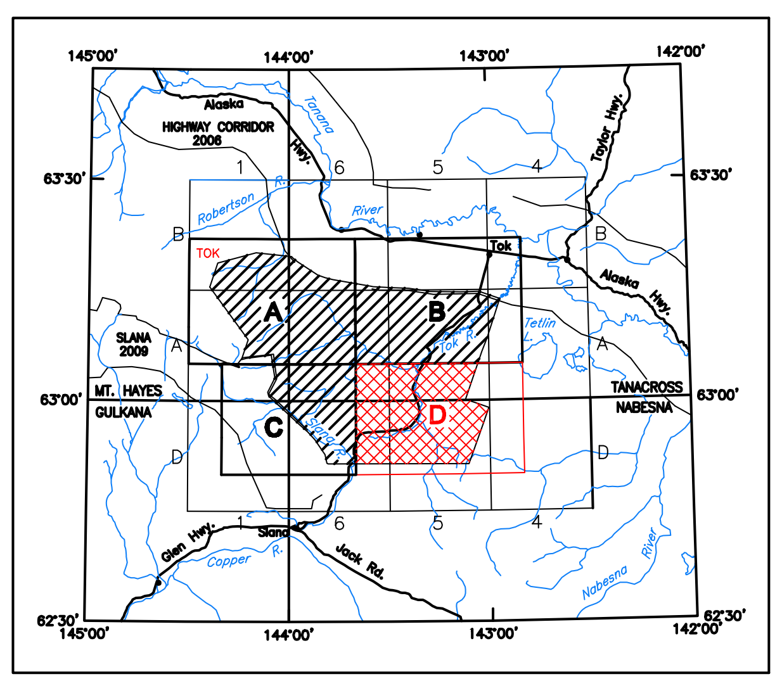

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