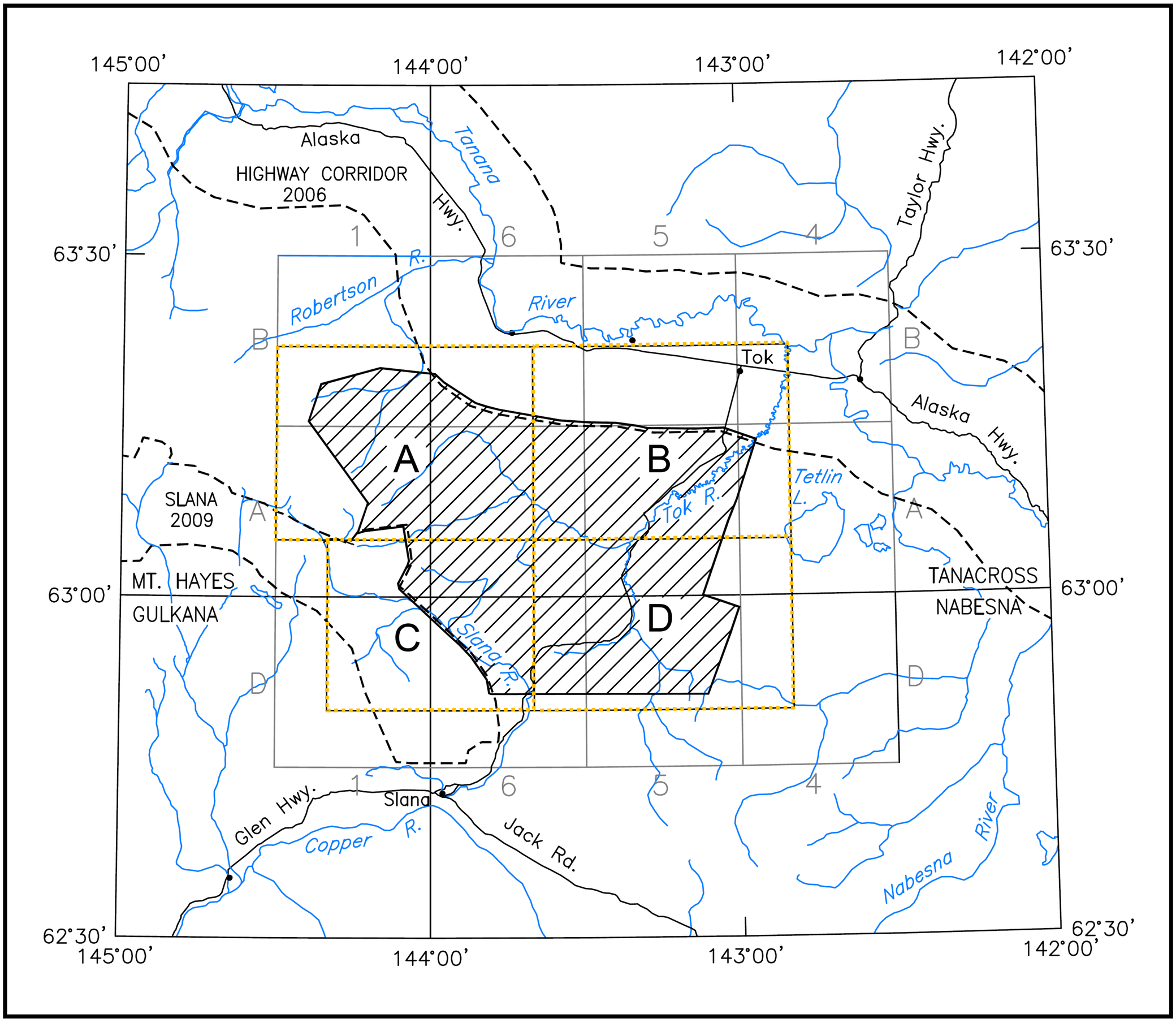
Tok Electromagnetic and Magnetic Airborne Geophysical Survey Data Compilation

State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys and CGG

http://dx.doi.org/10.14509/29347

Map Catalog



Tok survey 1:63,360-scale map sheet index, showing the map sheets A–D (orange short dashes), survey area (hatched), prior surveys (outlined by long dashes), highways, towns, rivers, relevant 1:250,000 quadrangle boundaries (solid black lines), and relevant 1:63,360 quadrangle boundaries (light grey grid with alphanumeric labels).

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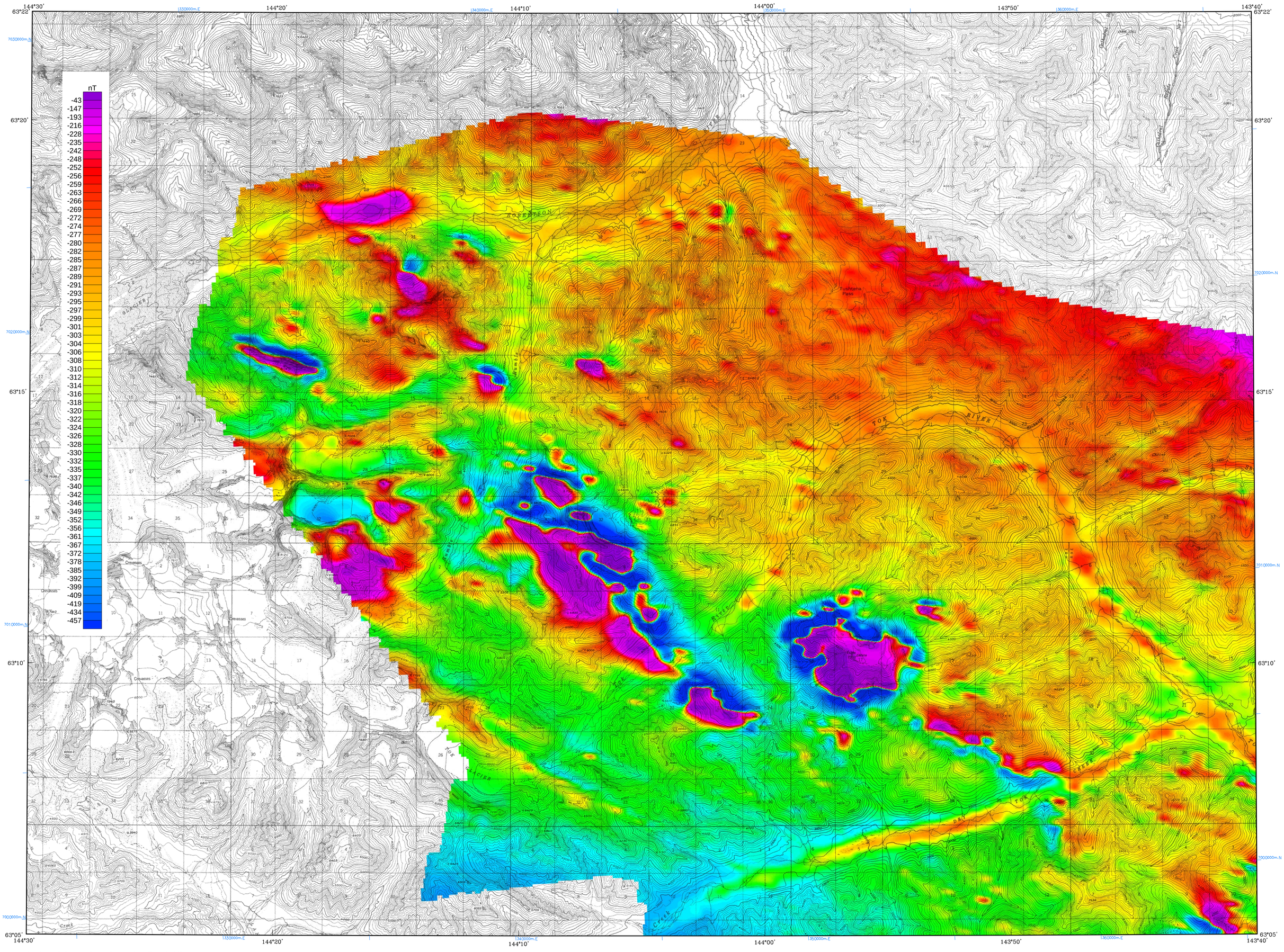
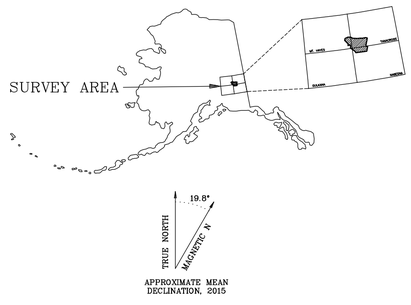


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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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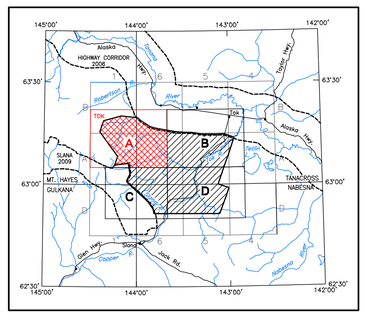
LOCATION INDEX OF 1:63,360–SCALE MAP



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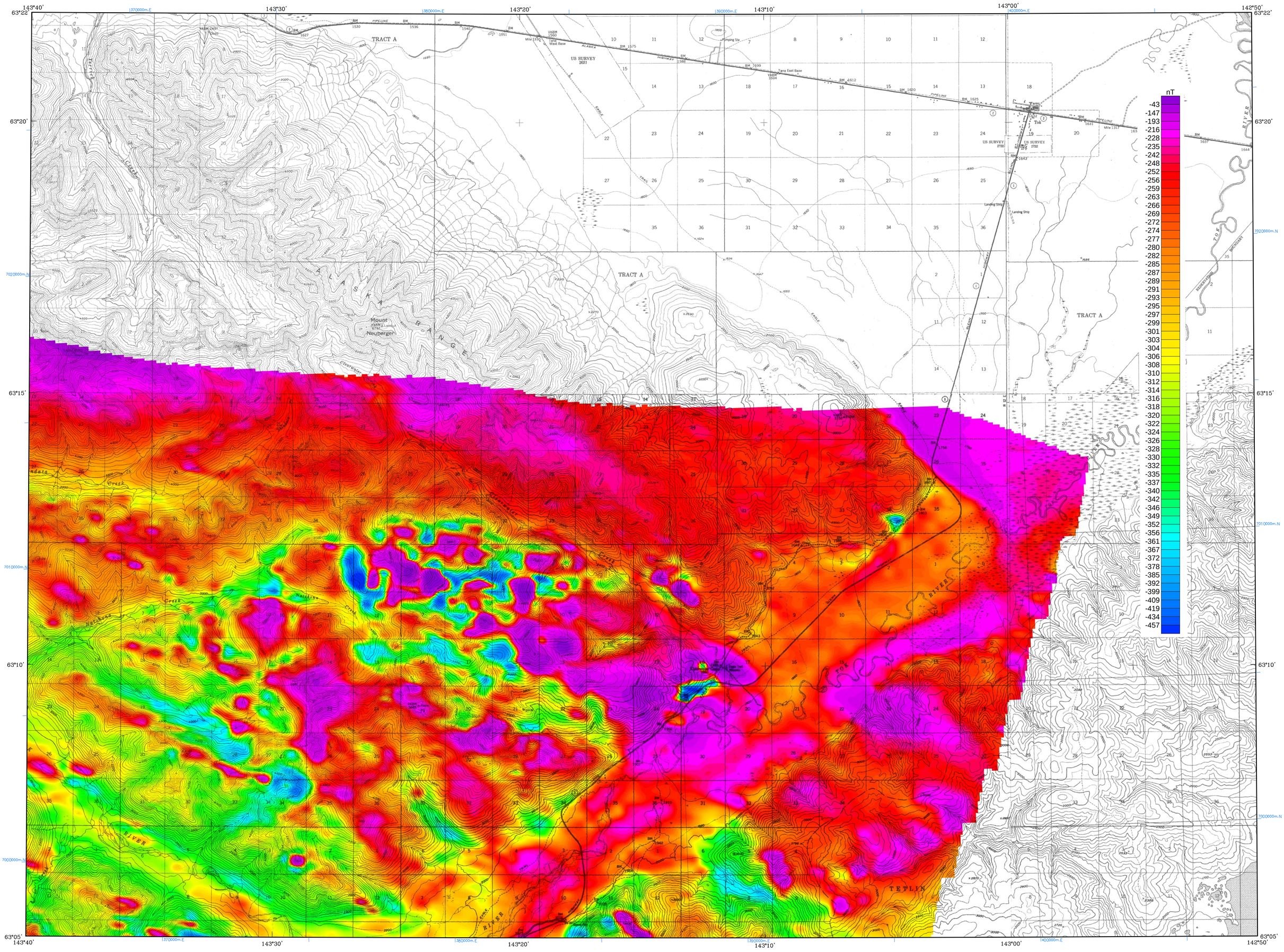

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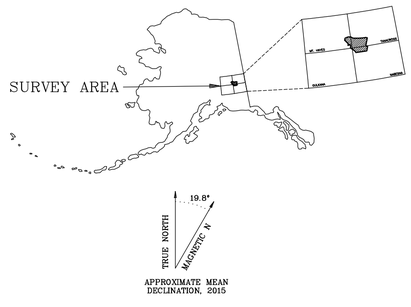

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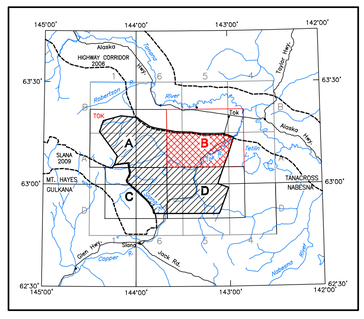

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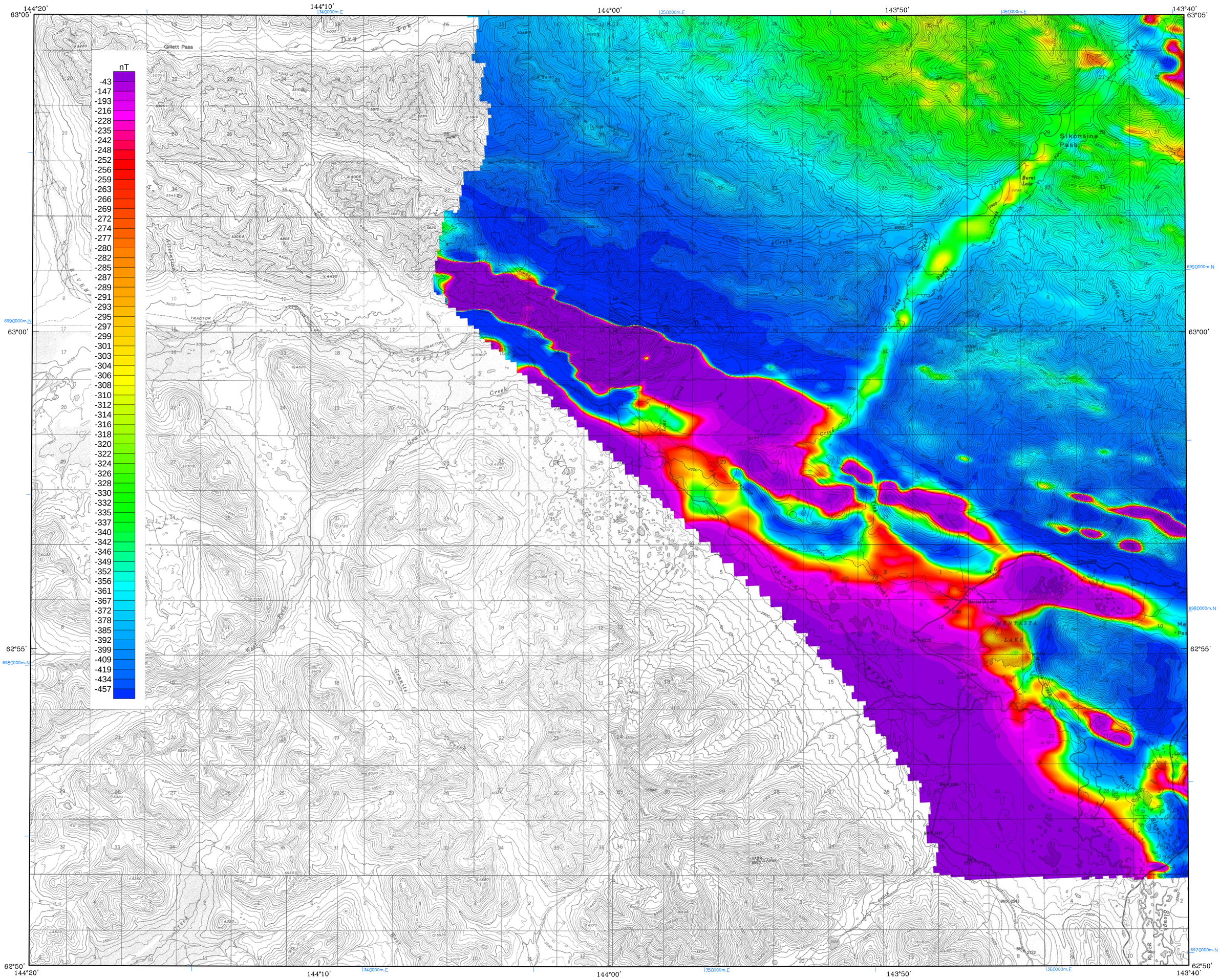

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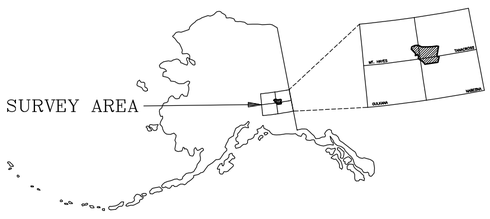

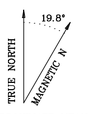

APPROXIMATE MEAN DECLINATION, 2015

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1 0 1 2 3 4 MILES

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2015

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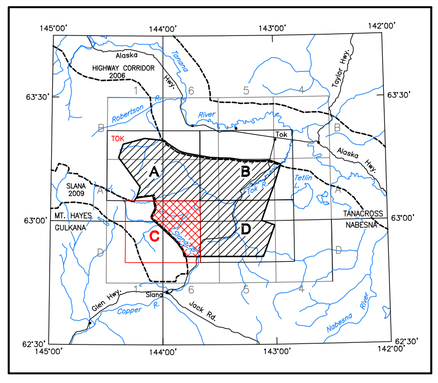

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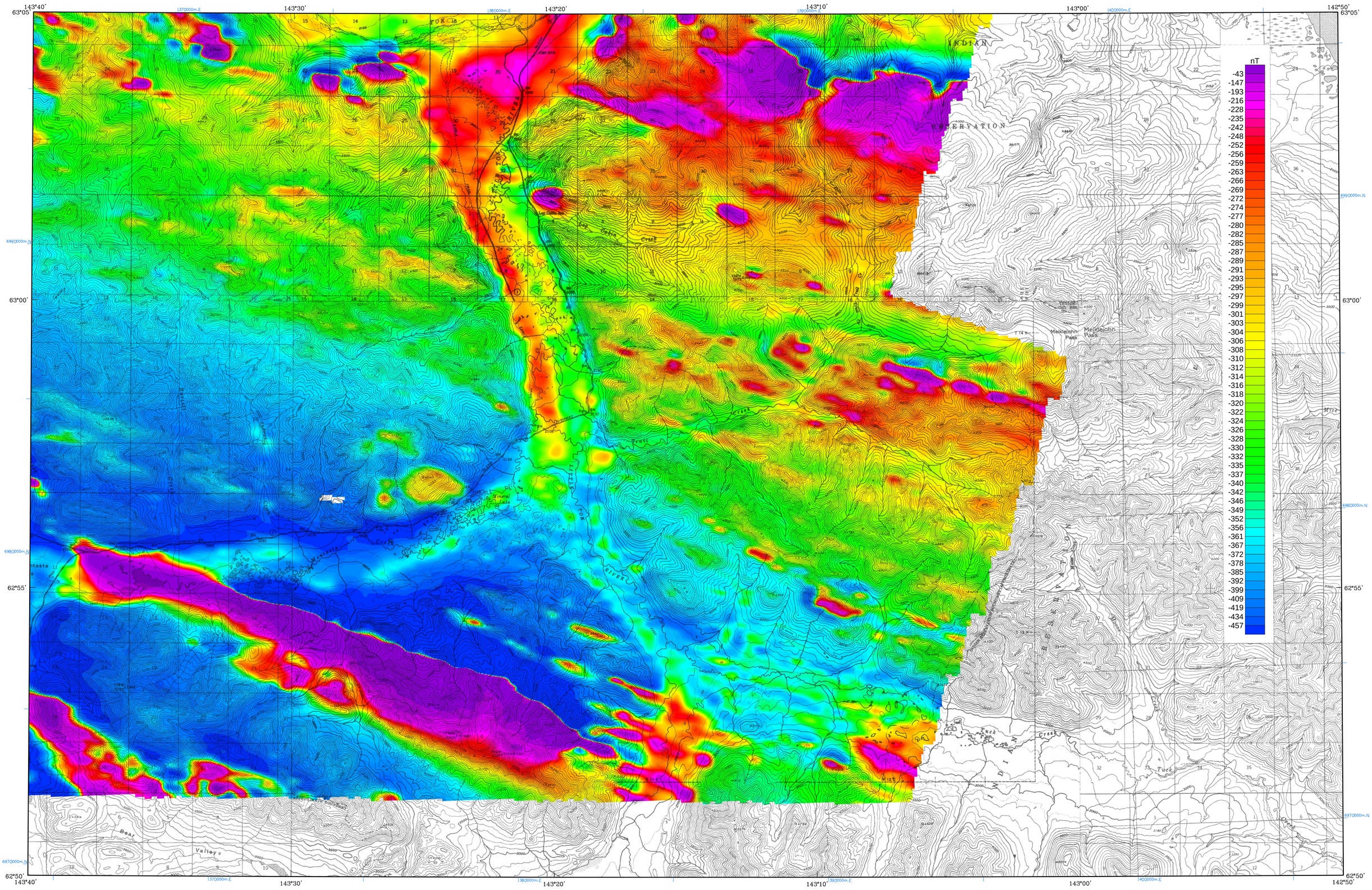
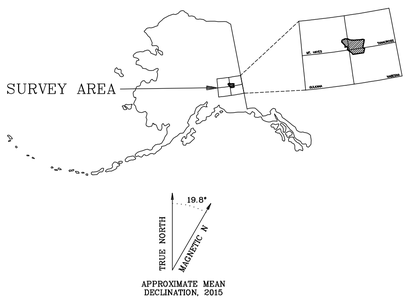


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska



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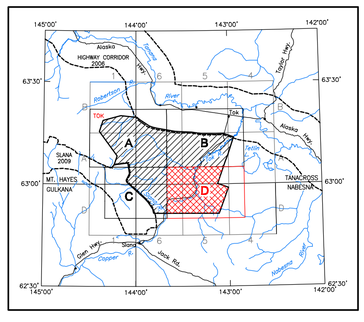

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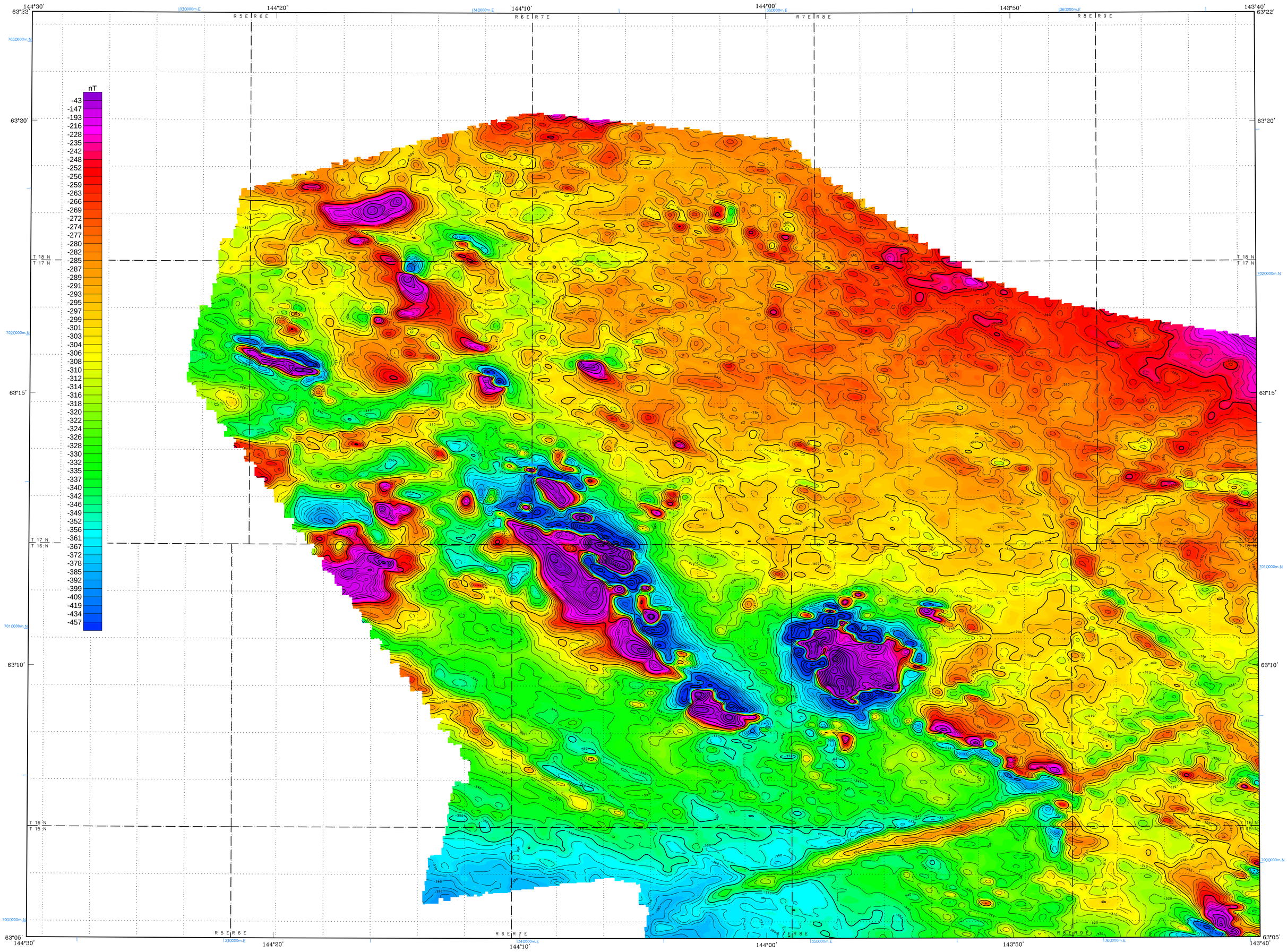

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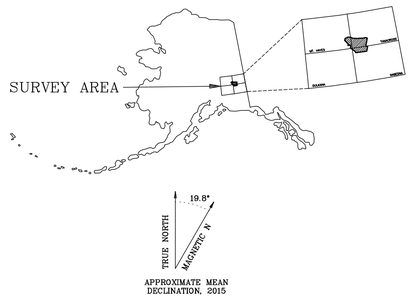

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MAGNETIC CONTOURS

250 nT

50 nT

10 nT

5 nT

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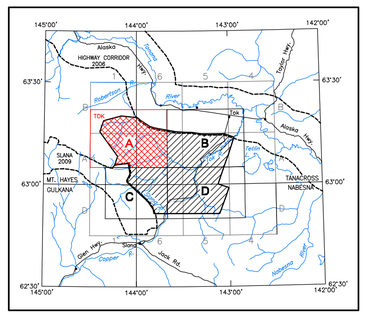

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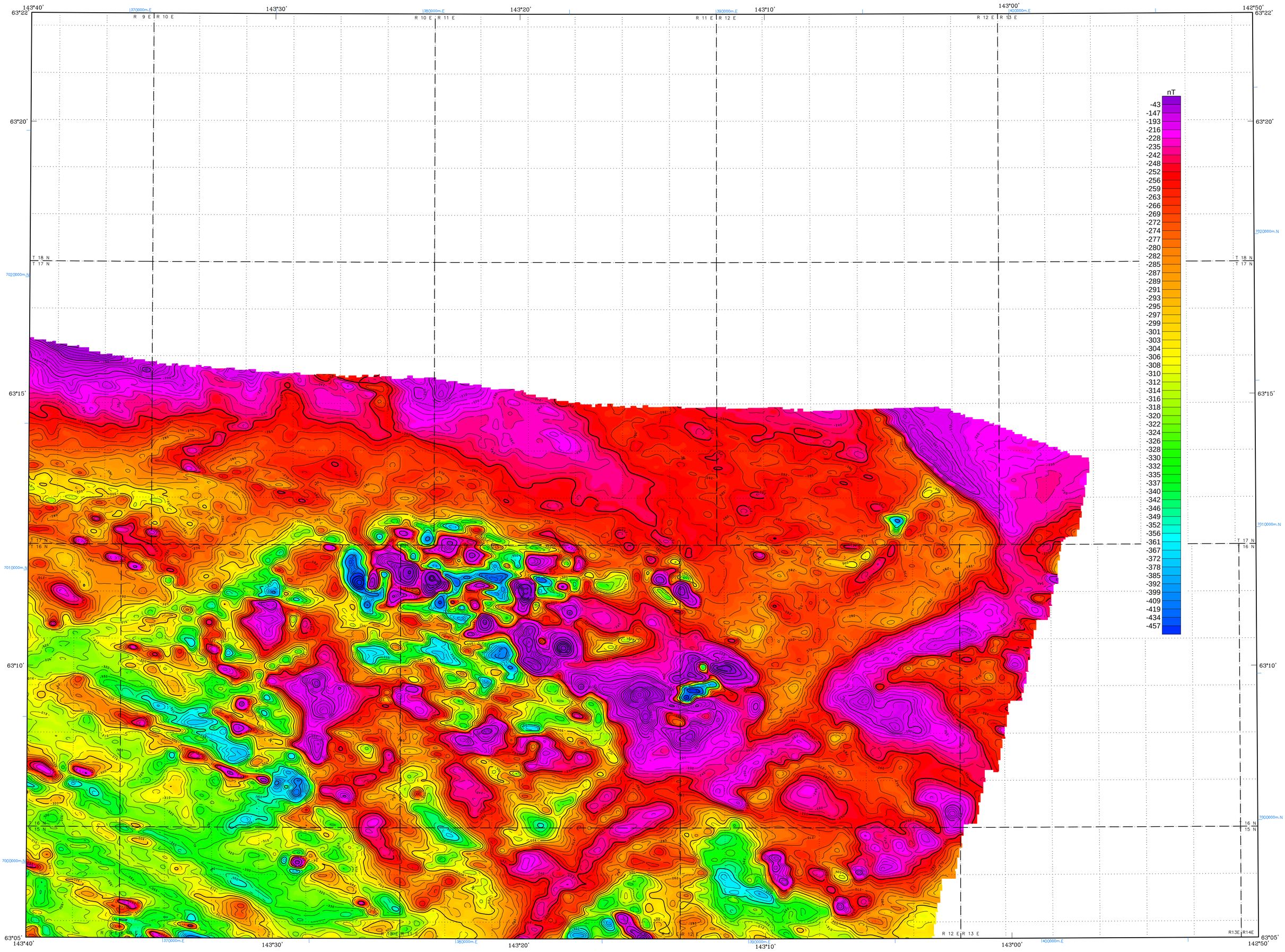

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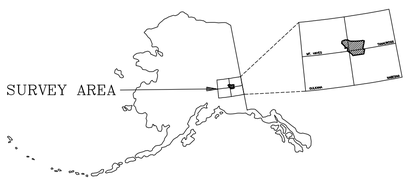

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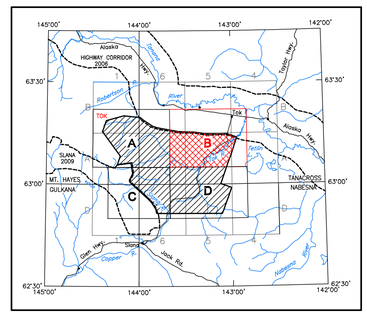

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[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

MAGNETIC CONTOURS

250 nT

50 nT

10 nT

5 nT

SURVEY HISTORY

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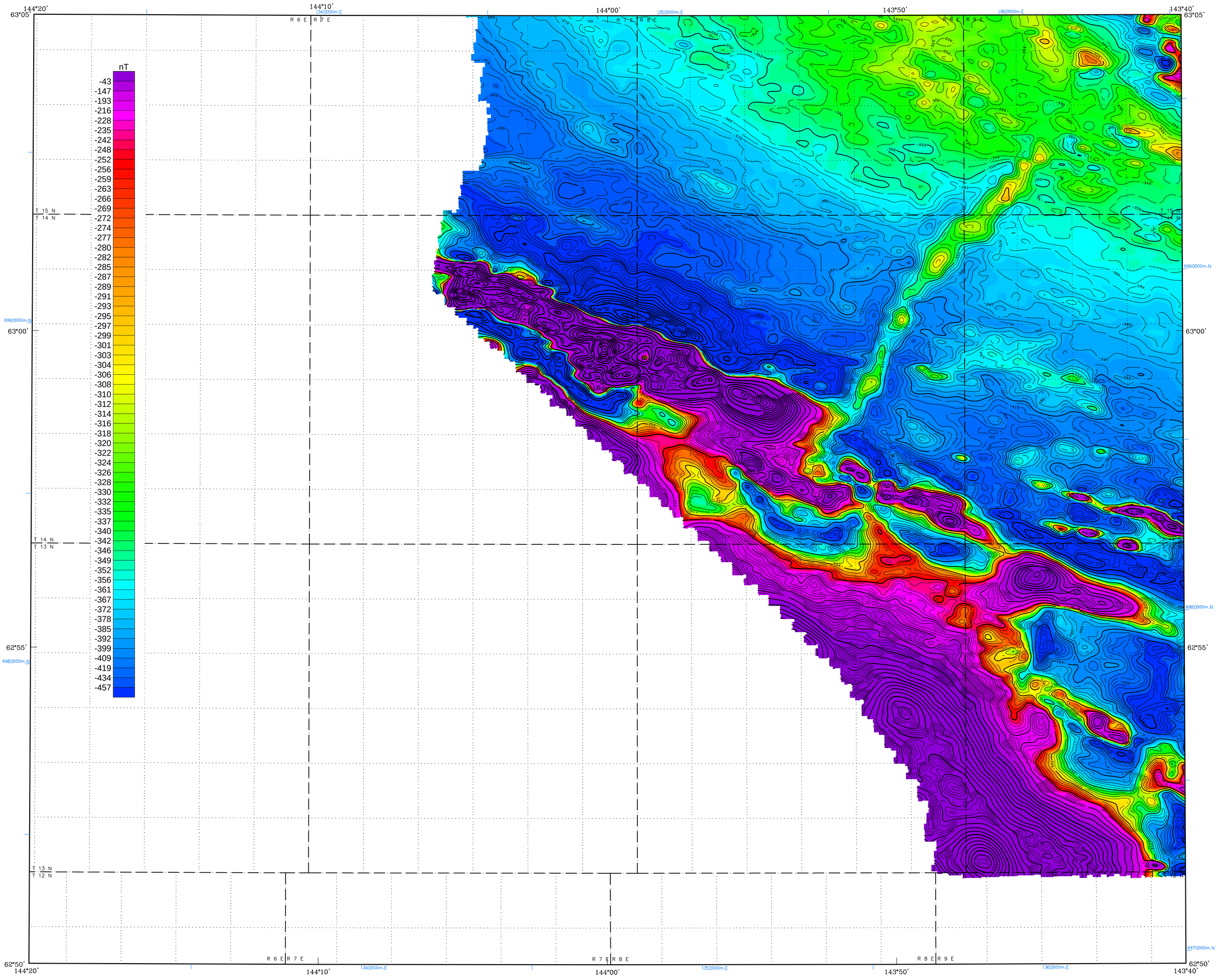
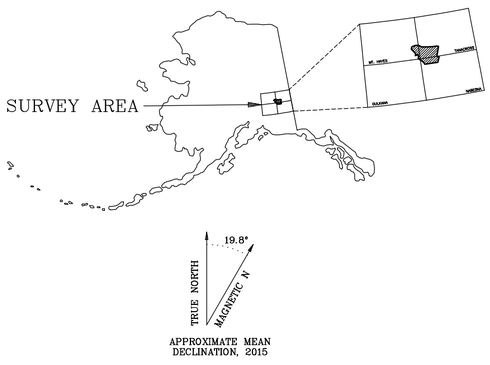


Section outlines from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska



SCALE 1:63,360

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

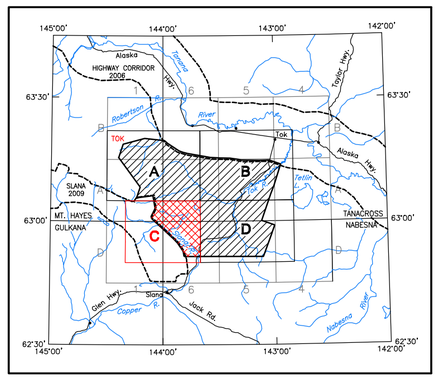
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360-SCALE MAP



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MAGNETIC CONTOURS

- 250 nT
- 50 nT
- 10 nT
- 5 nT

SURVEY HISTORY

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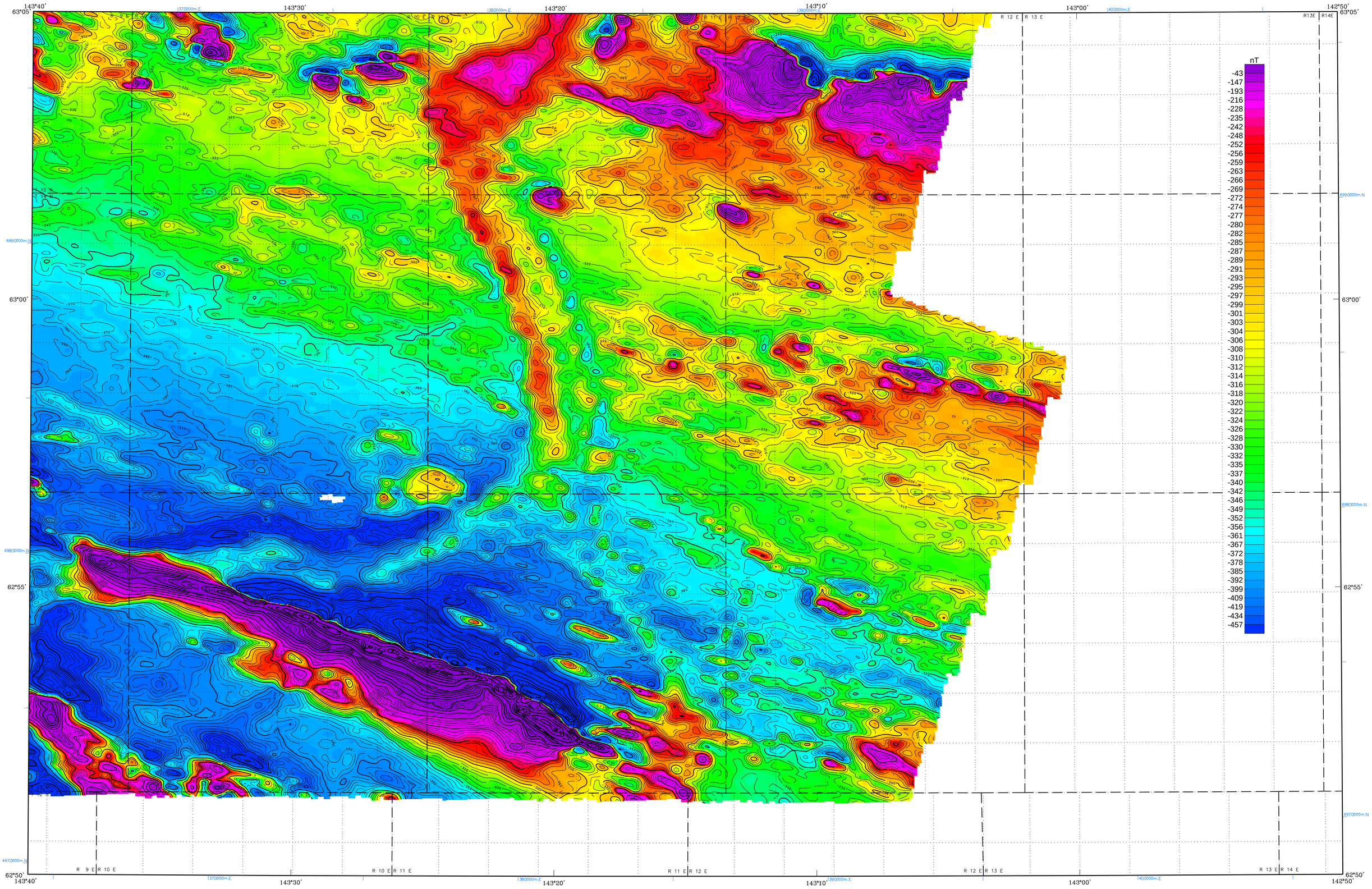

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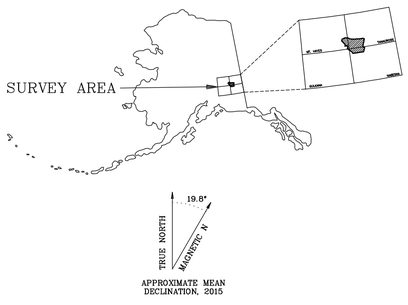


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

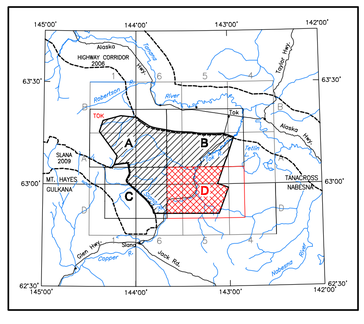
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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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250 nT

50 nT

10 nT

5 nT

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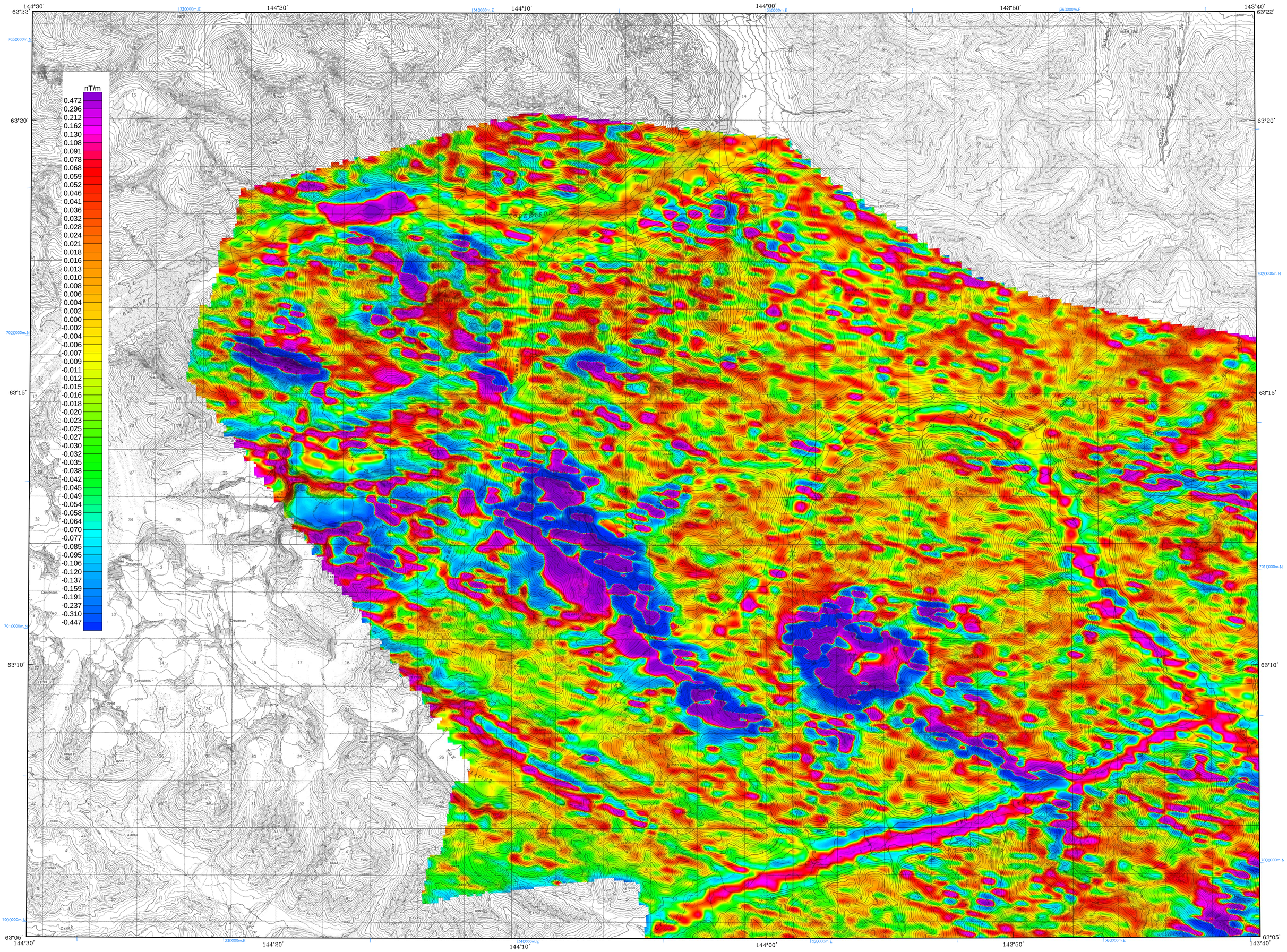
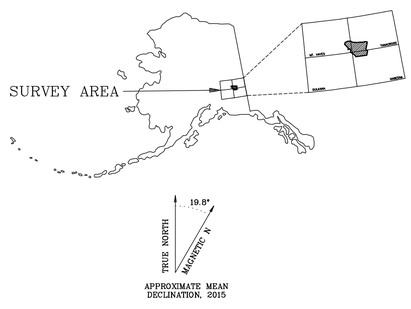


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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

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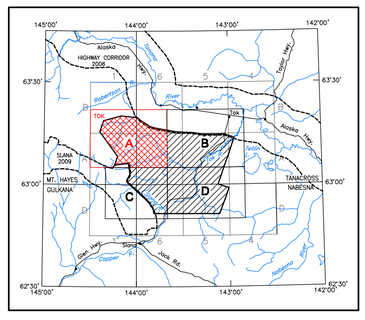
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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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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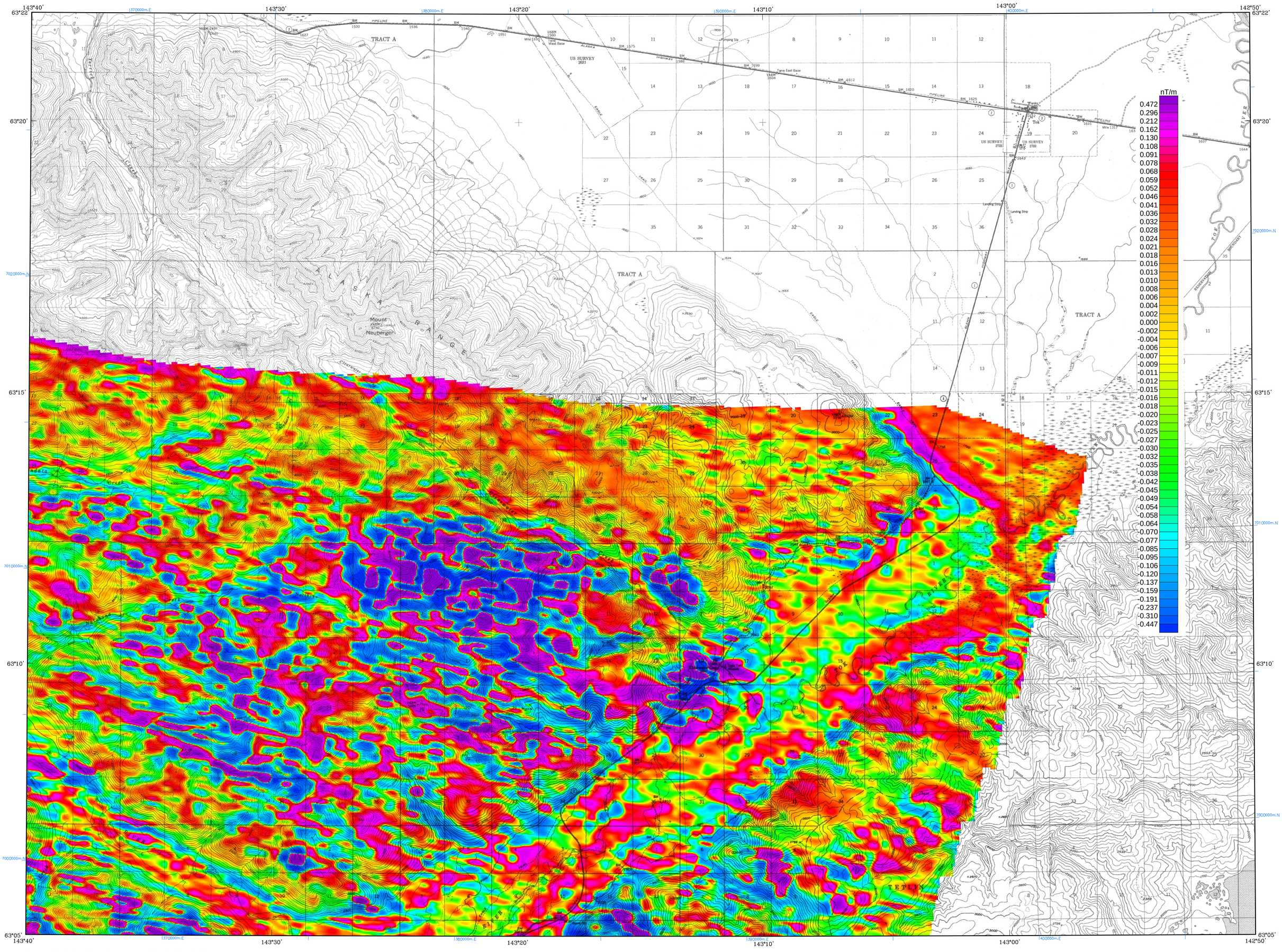
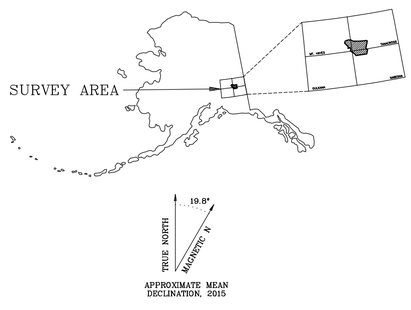


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 2015

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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

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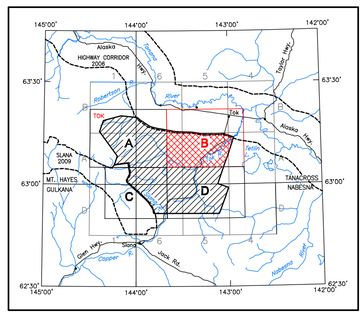
LOCATION INDEX OF 1:63,360-SCALE MAP



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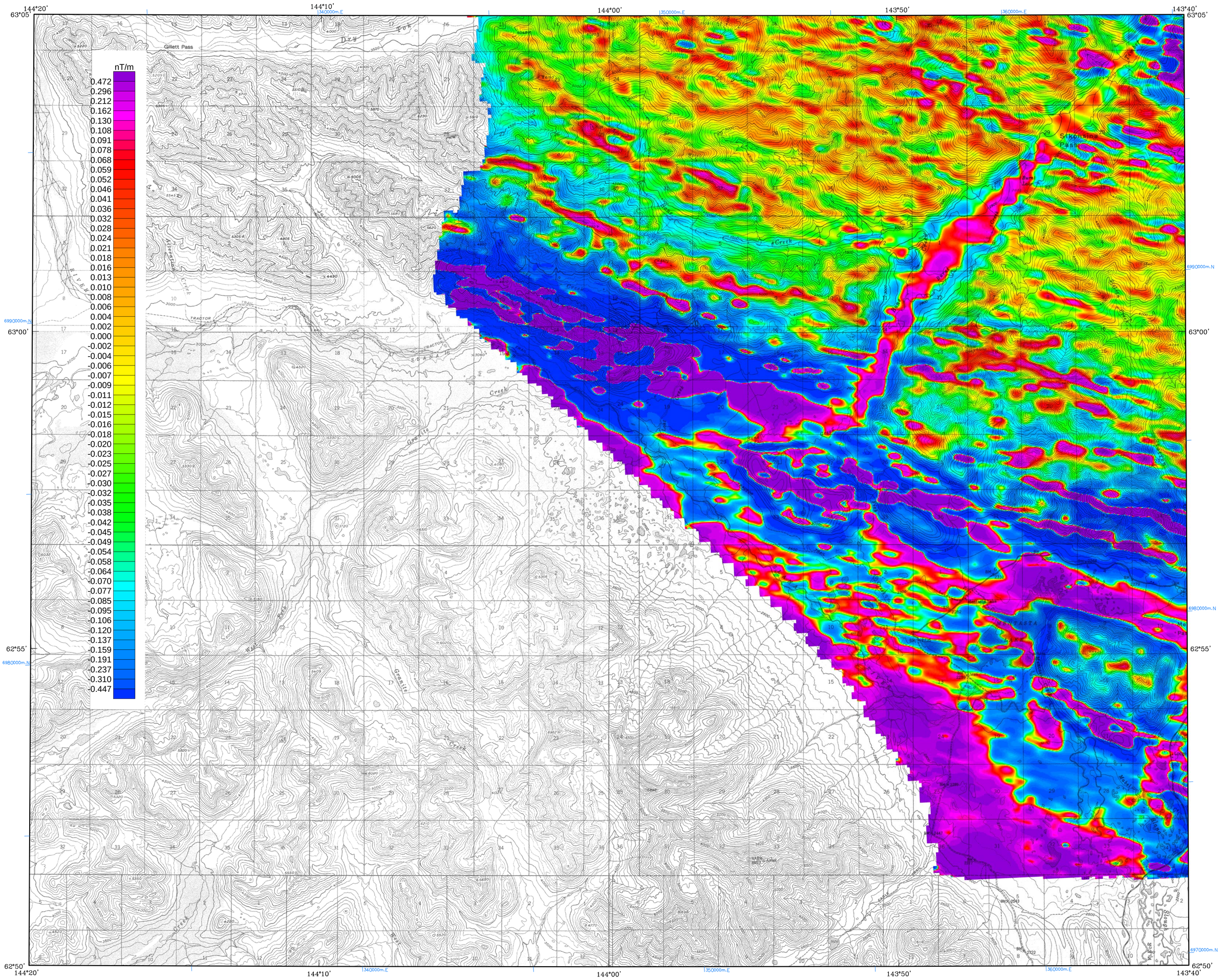
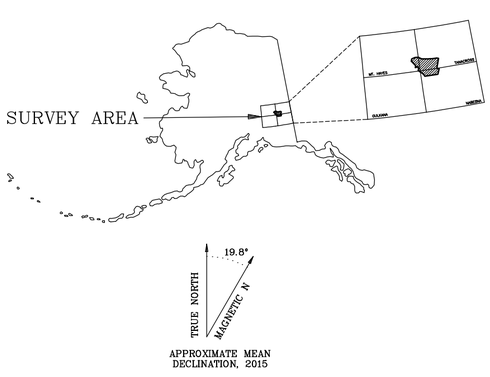


Base from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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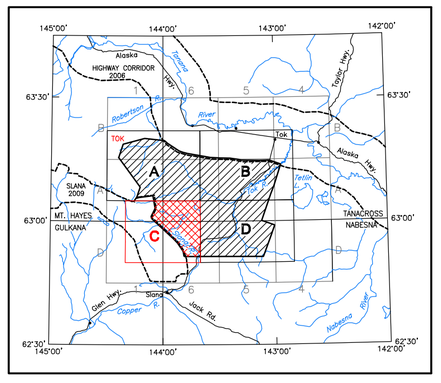

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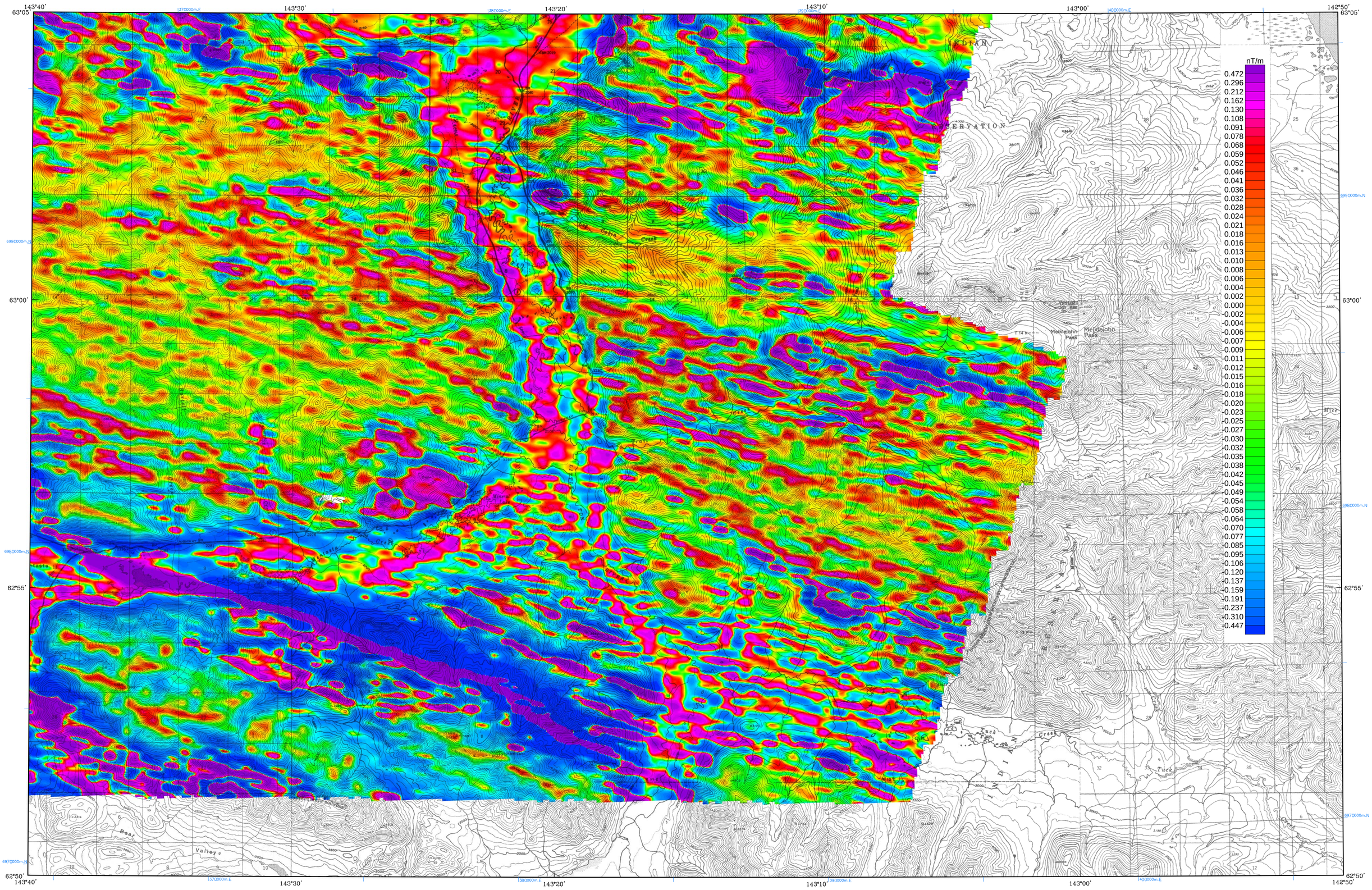

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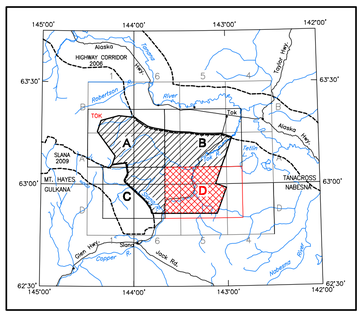
SCALE 1:63,360

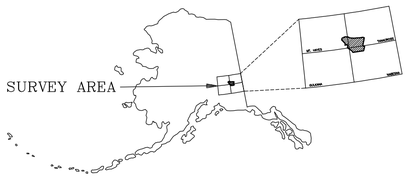
1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY AREA



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).

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.

SURVEY HISTORY

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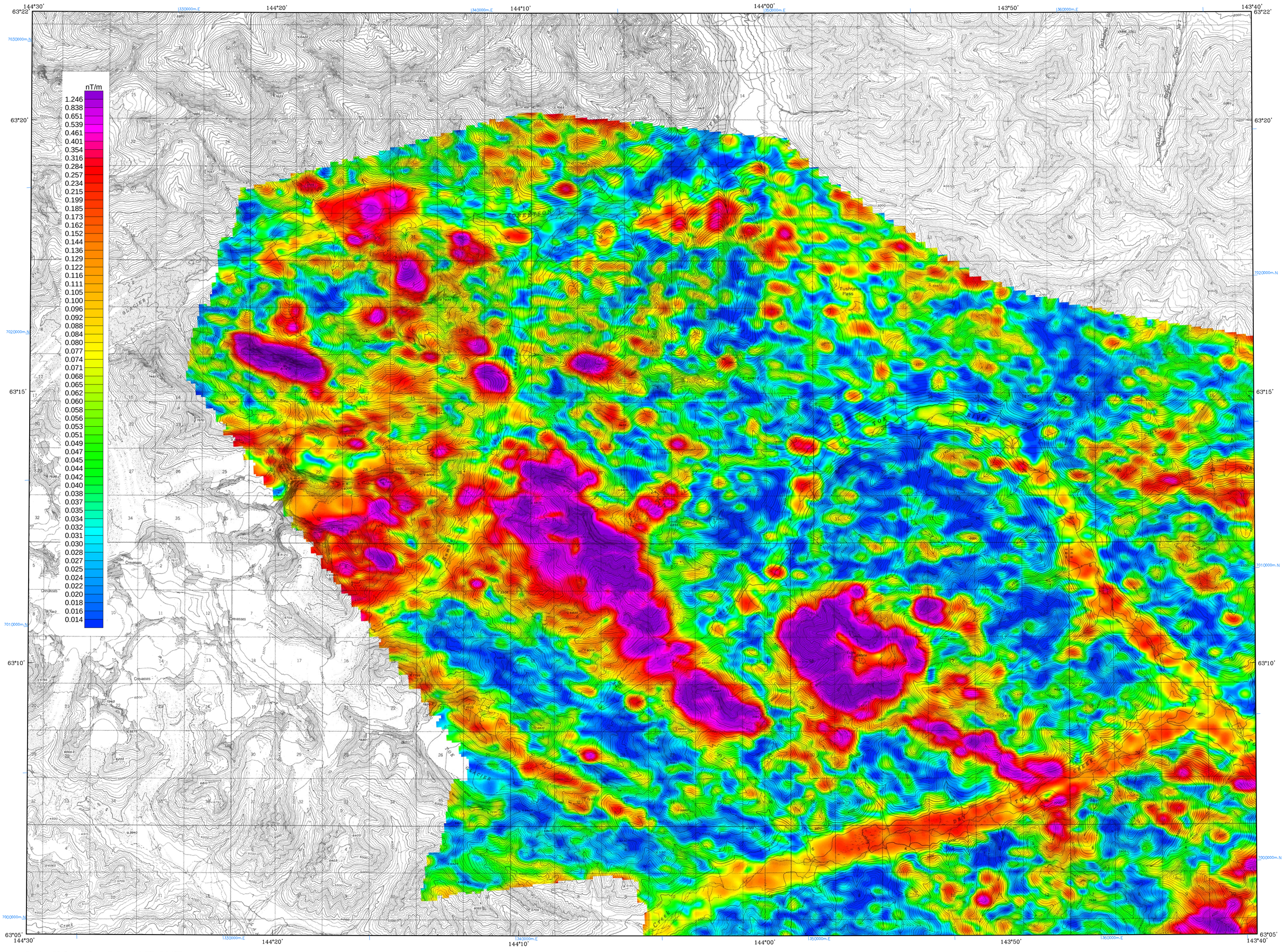

Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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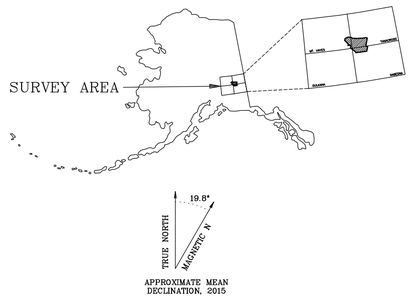

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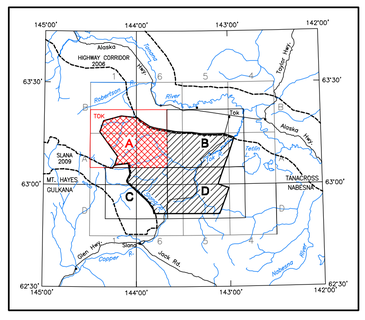

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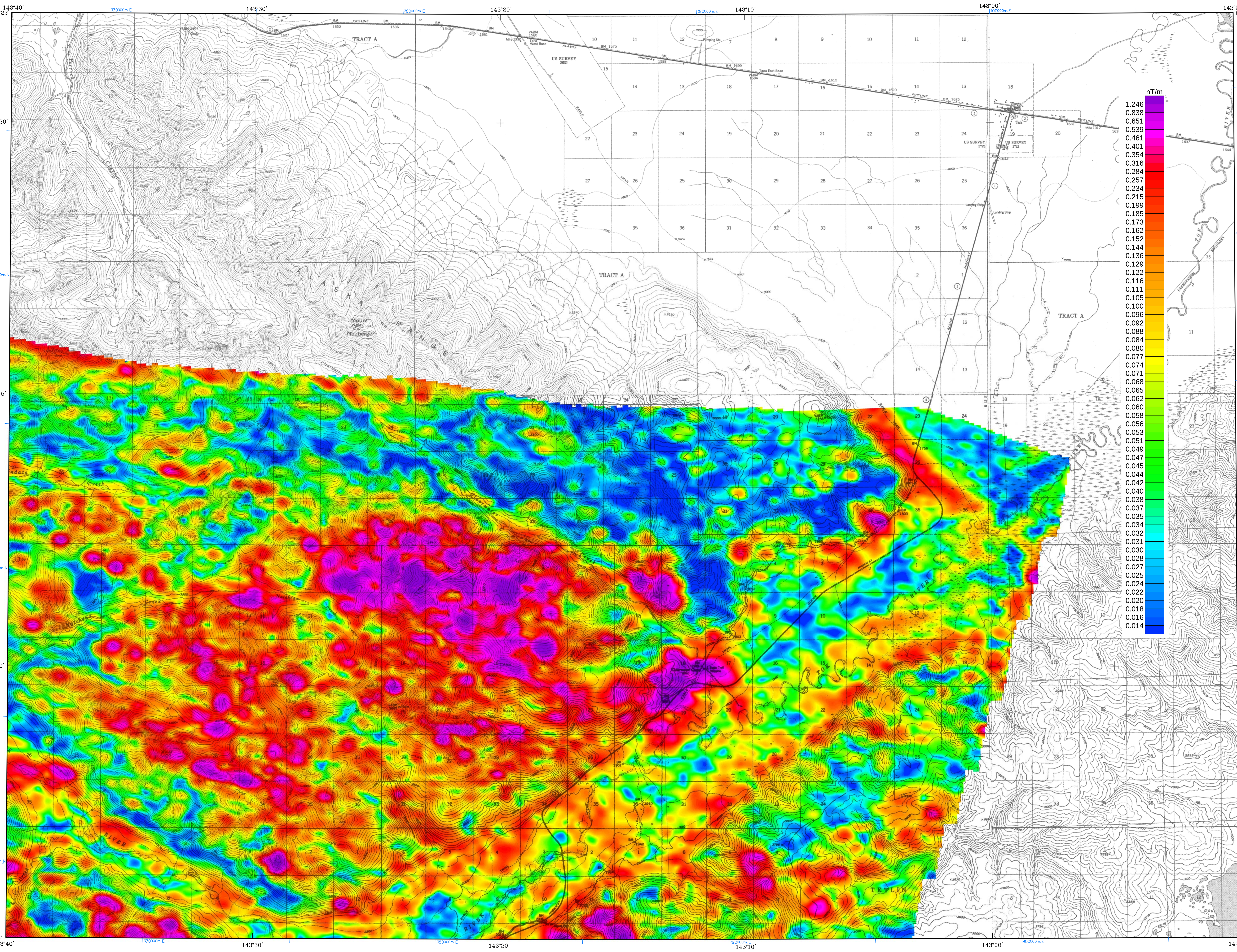

Base from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska

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1 0 1 2 3 4 MILES

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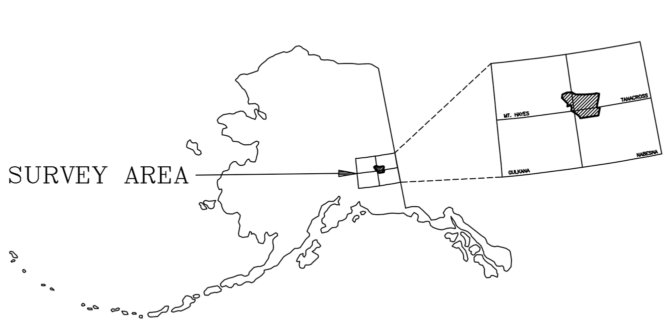

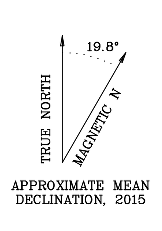

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by
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.
2015

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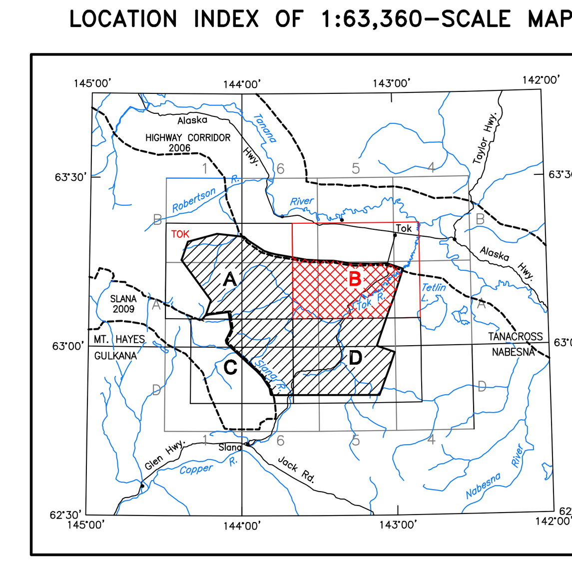

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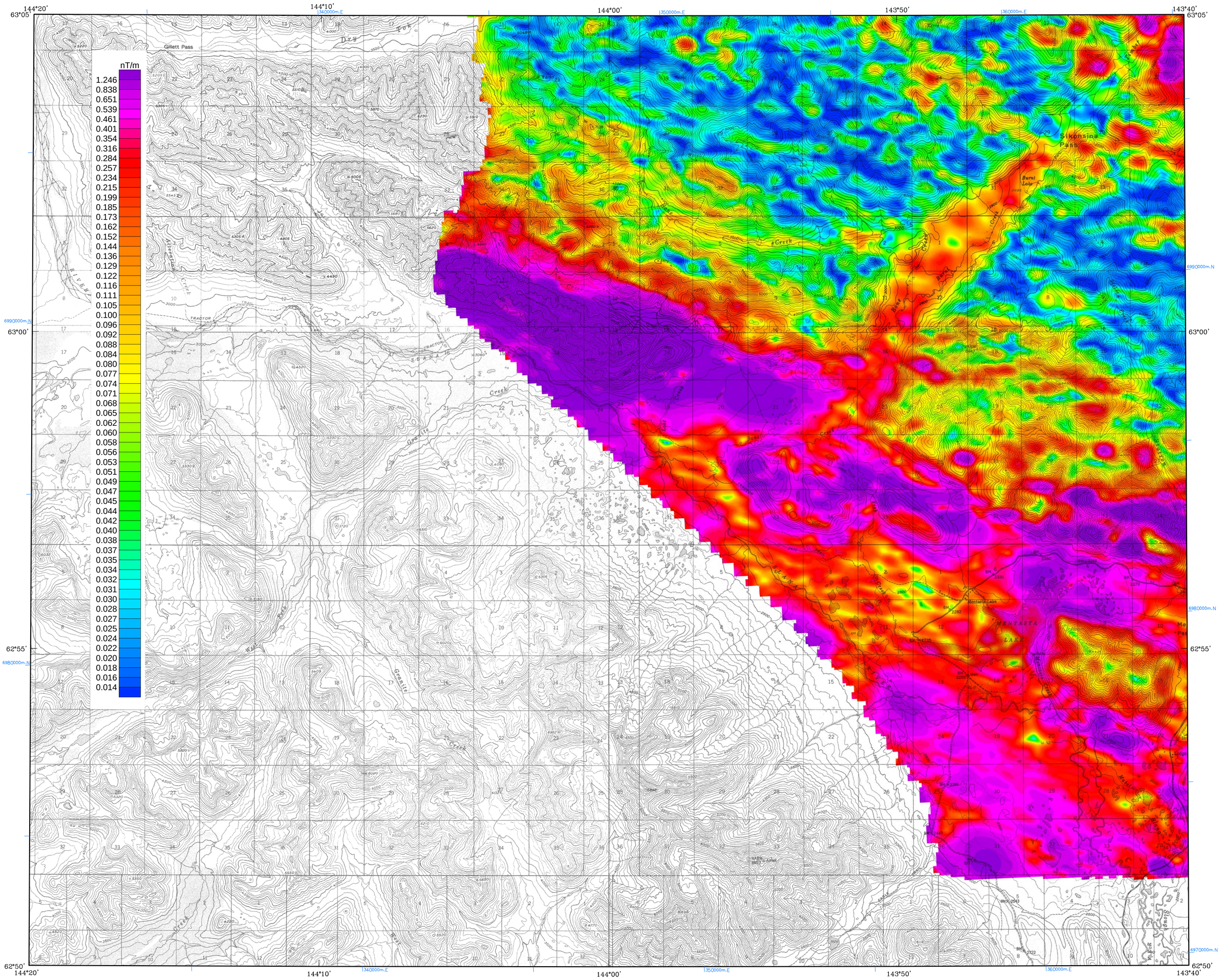
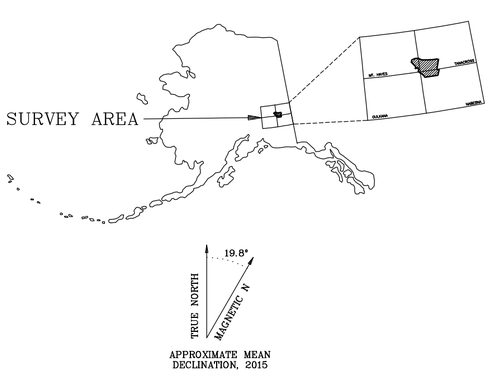


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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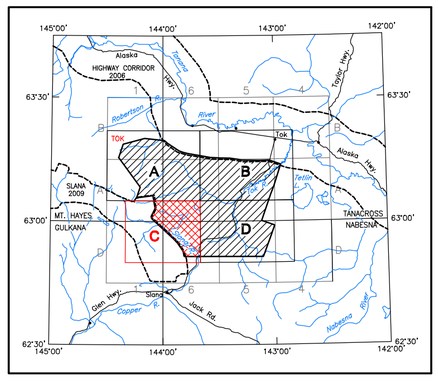

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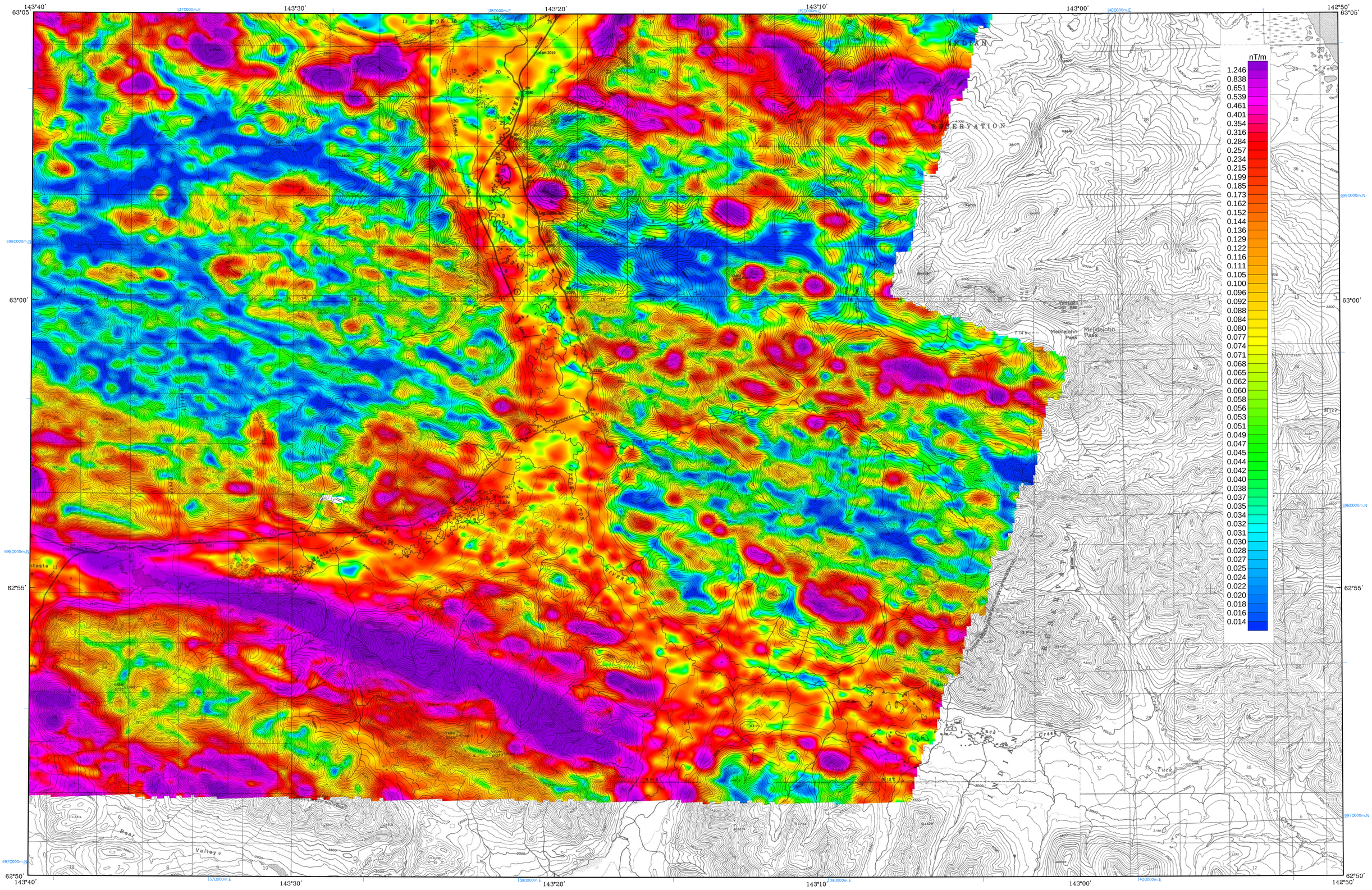
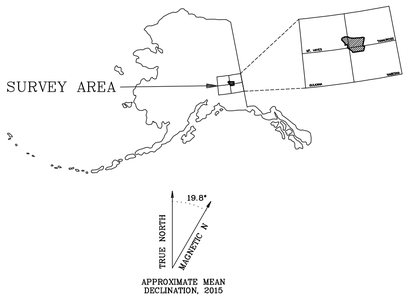


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska



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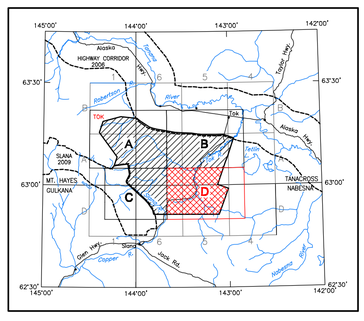

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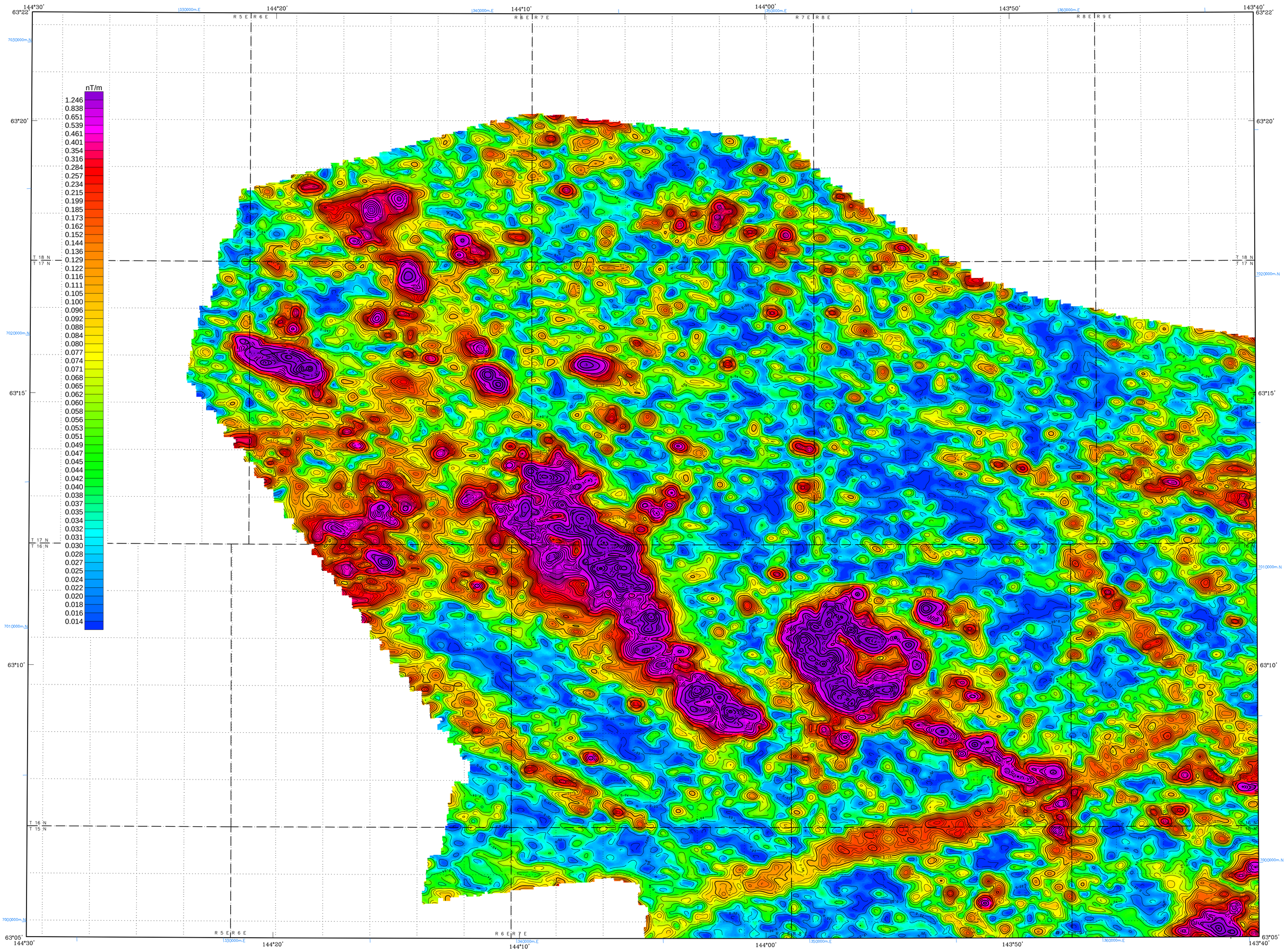

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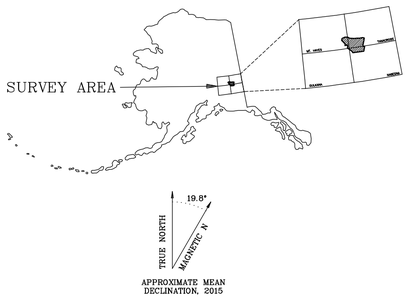

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ANALYTIC SIGNAL CONTOURS

0.50 nT/metre

0.10 nT/metre

0.02 nT/metre

0.01 nT/metre

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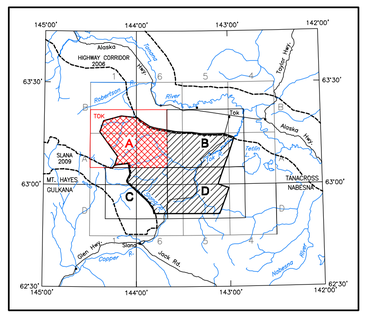

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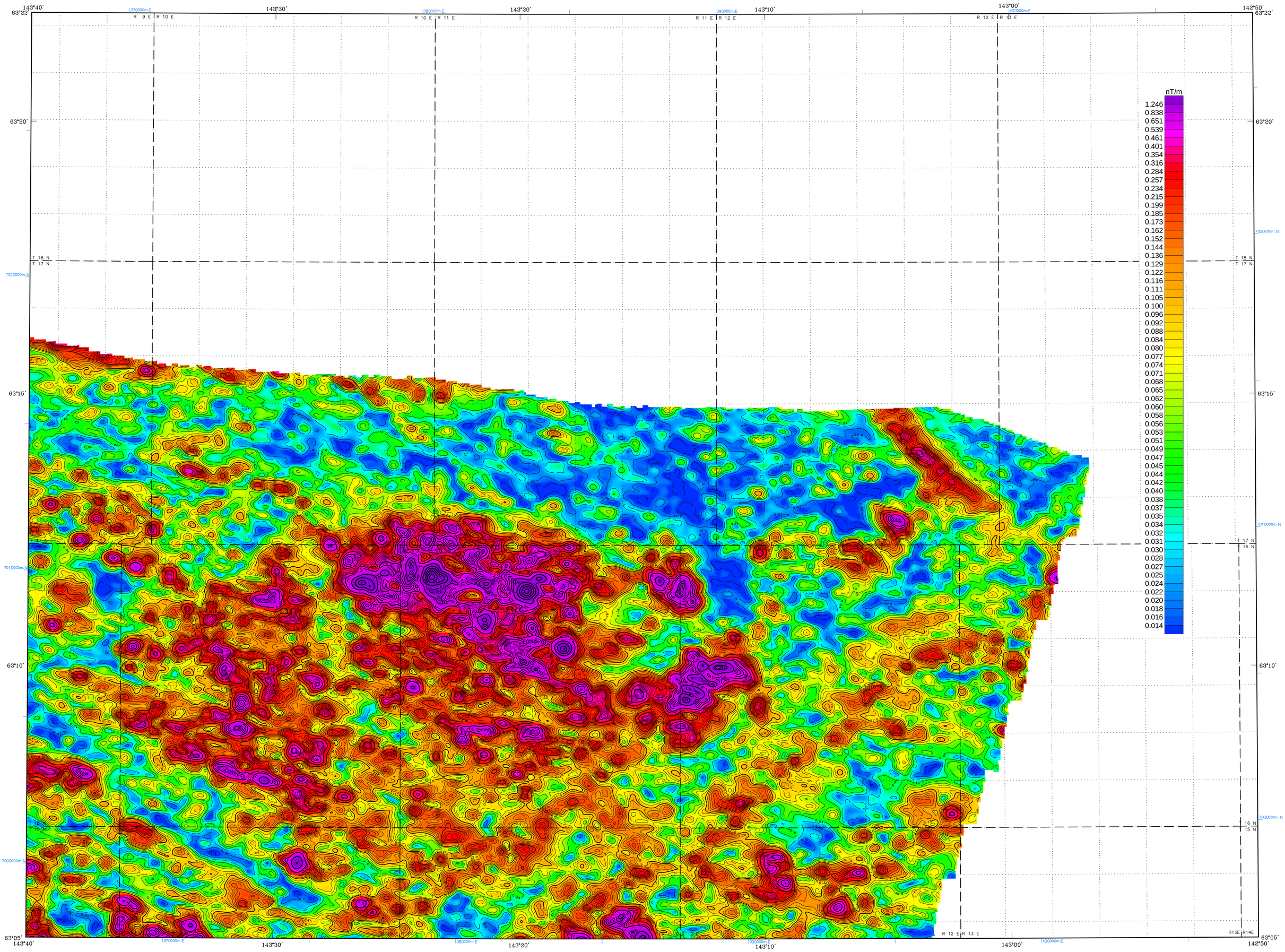

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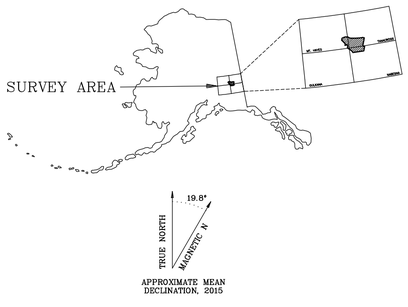

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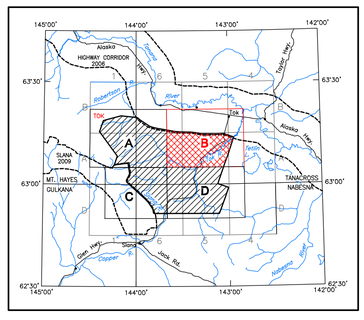
0.02 nT/metre

0.01 nT/metre

LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY HISTORY

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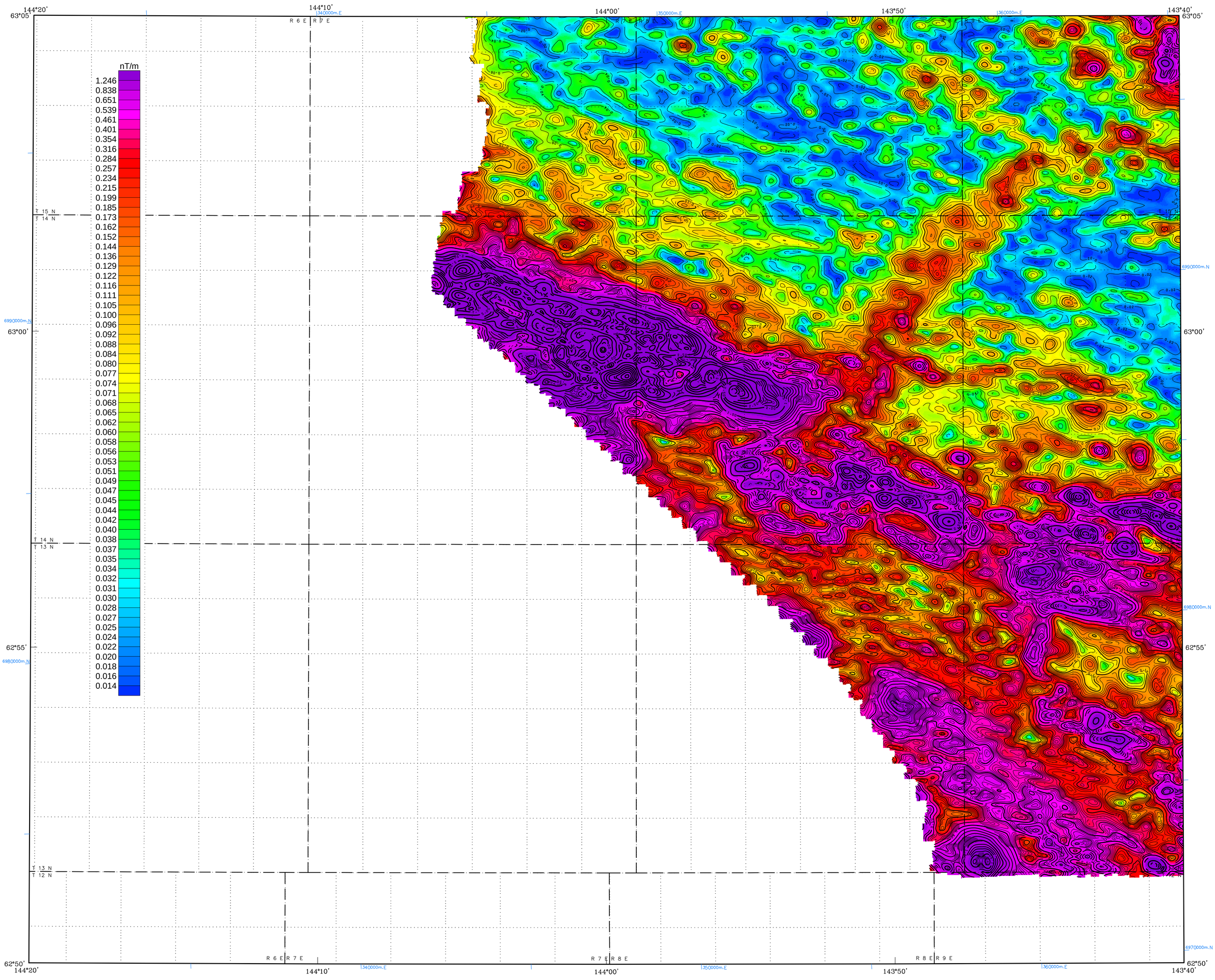
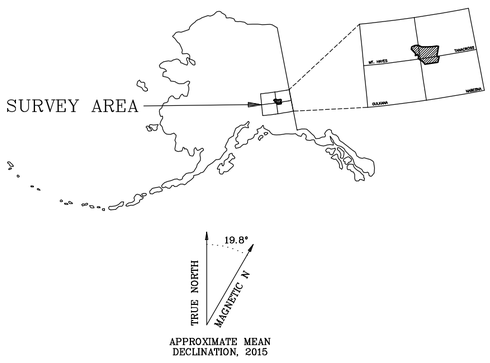


Section outlines from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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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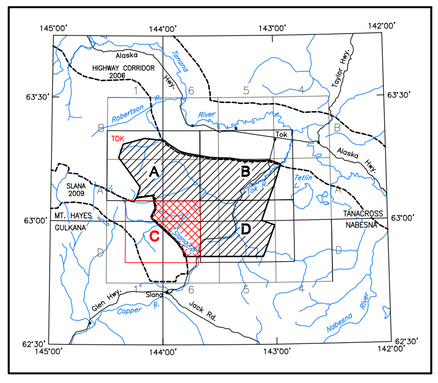

DESCRIPTIVE NOTES

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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.

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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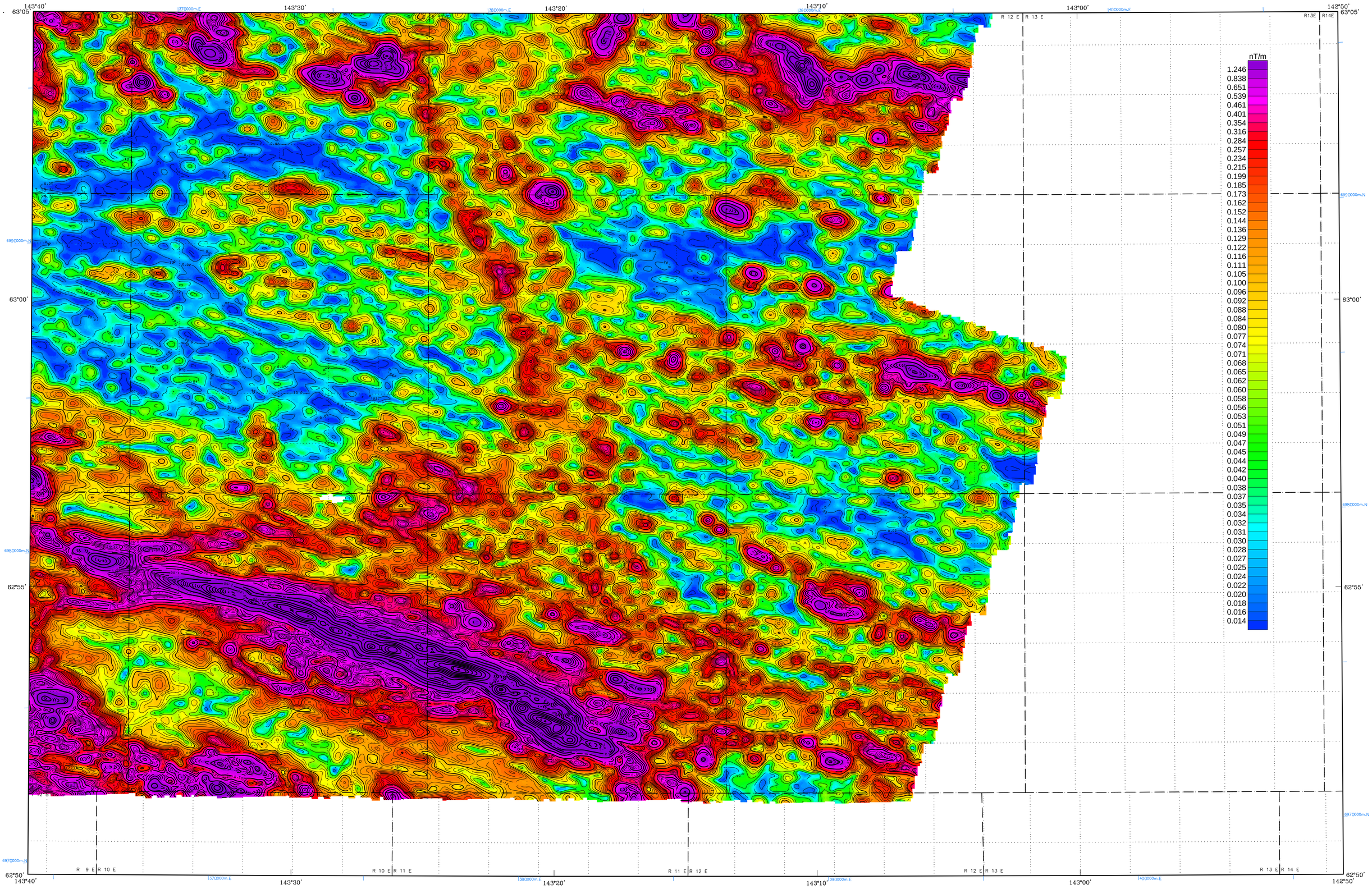

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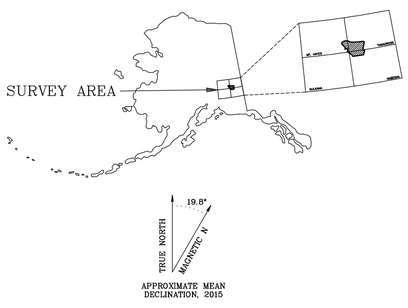

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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

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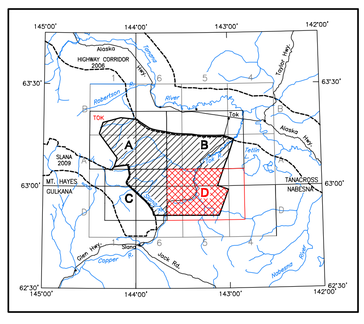
2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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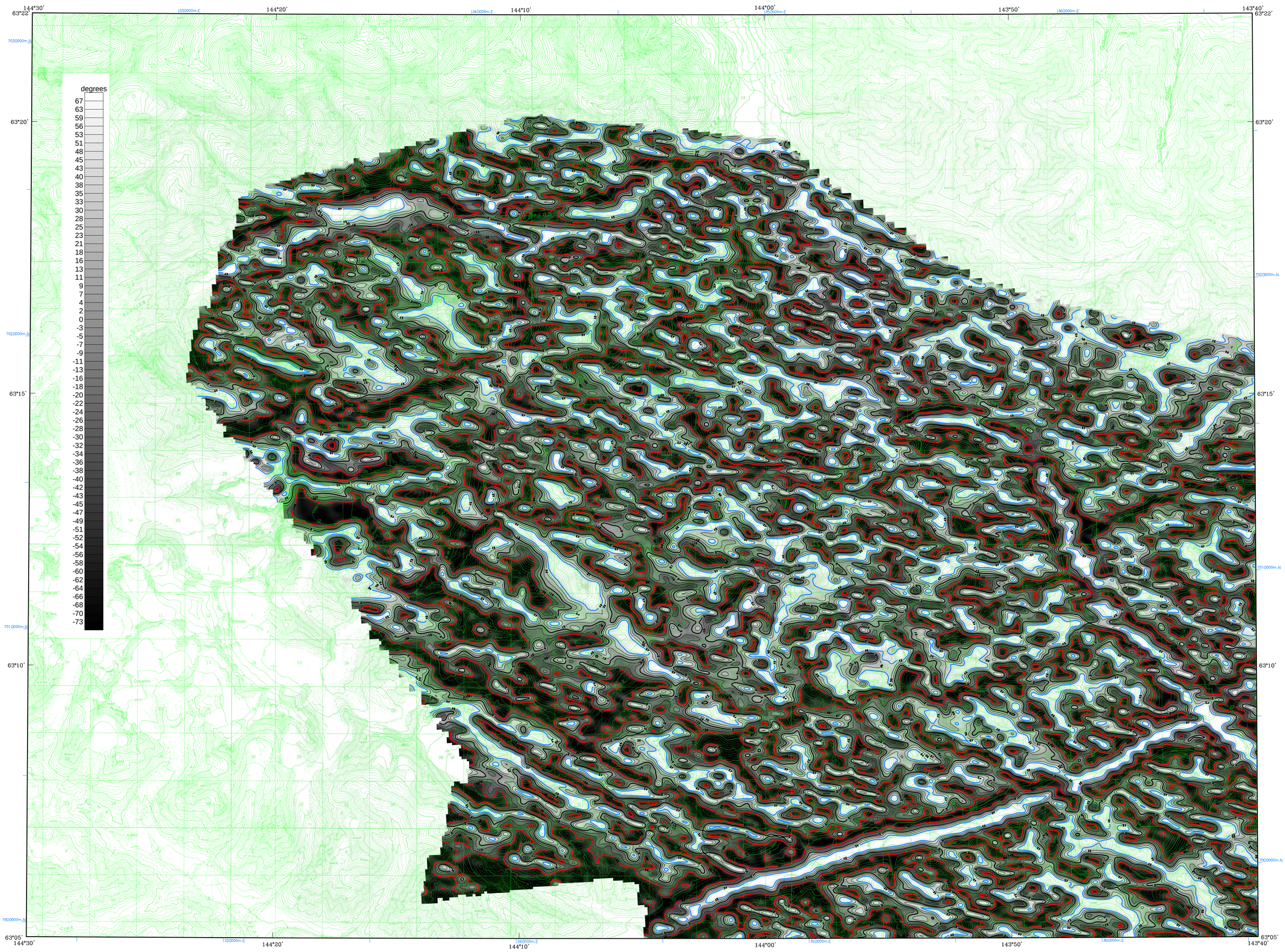
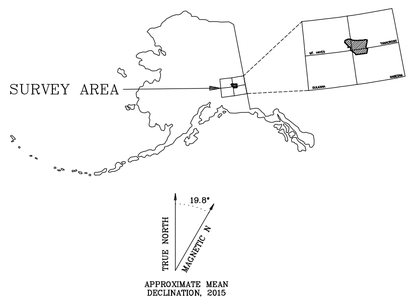


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



MAGNETIC TILT DERIVATIVE WITH TOPOGRAPHY AND DATA CONTOURS, 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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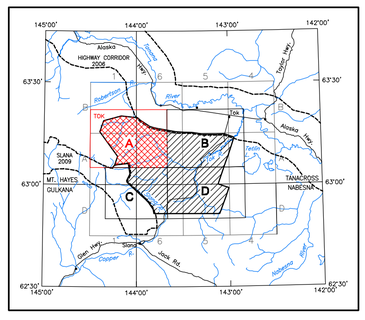
MAGNETIC TILT DERIVATIVE

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

LOCATION INDEX OF 1:63,360–SCALE MAP



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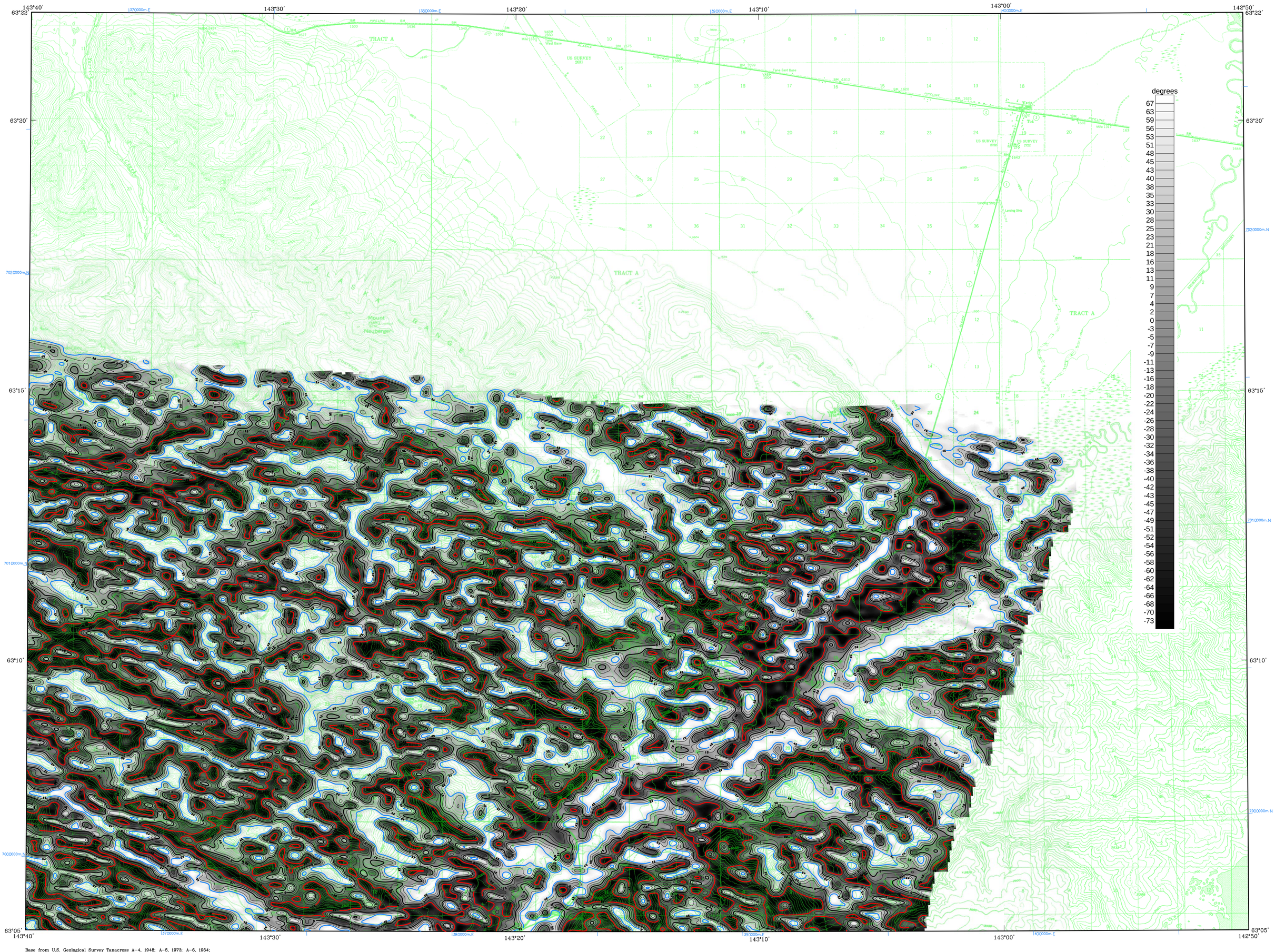
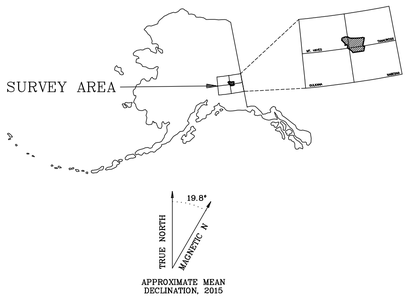


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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MAGNETIC TILT DERIVATIVE CONTOURS

+45 degrees

+30 degrees

+15 degrees

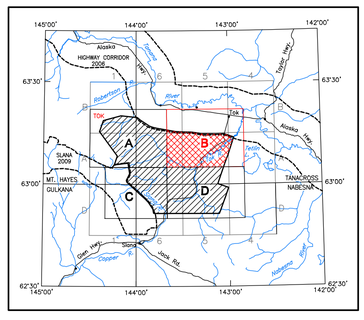
0 degrees

-15 degrees

-30 degrees

-45 degrees

LOCATION INDEX OF 1:63,360-SCALE MAP



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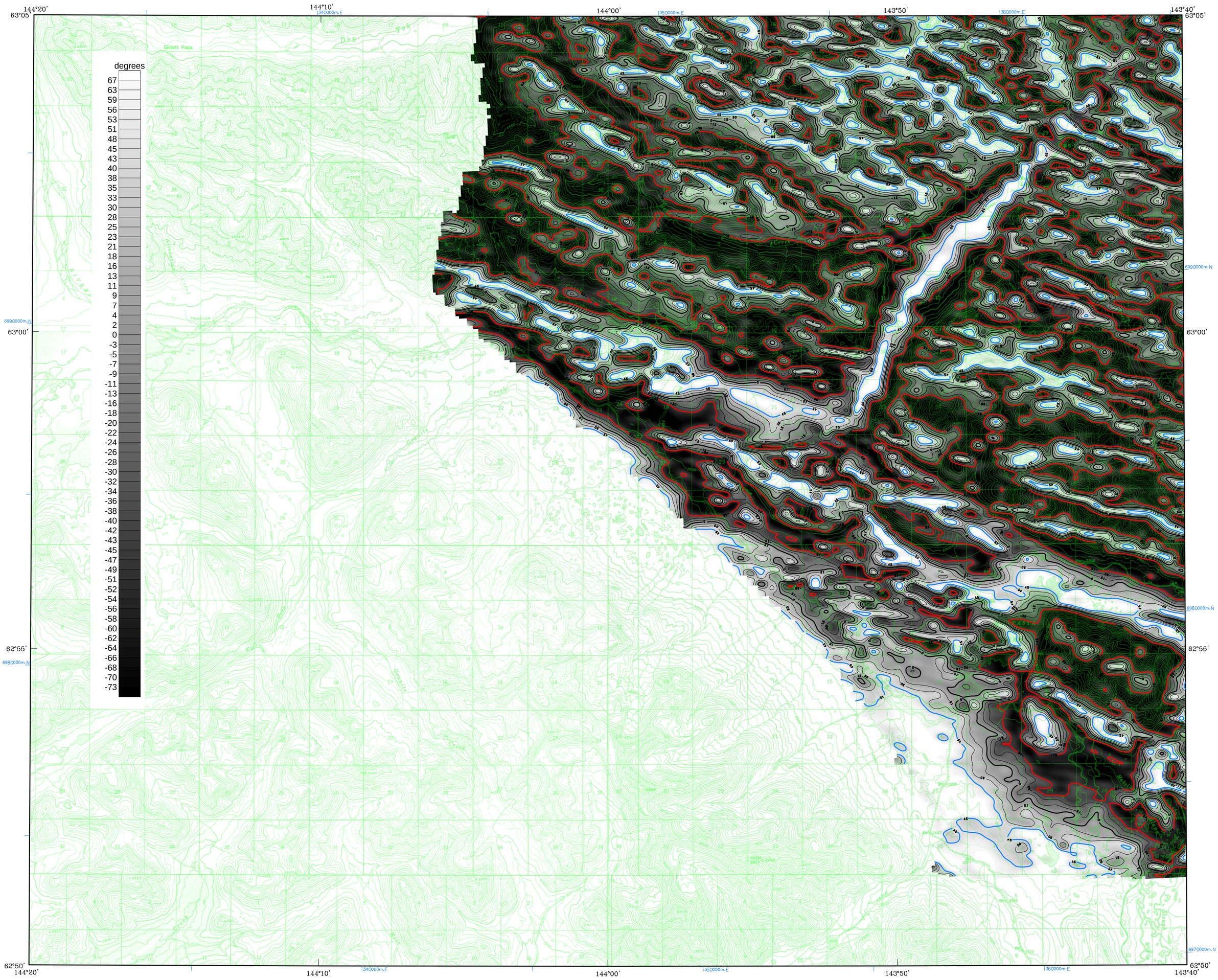

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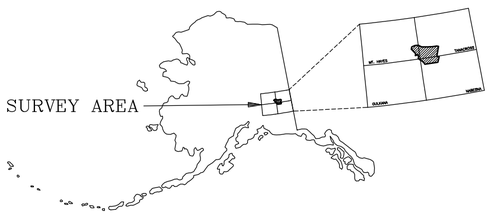

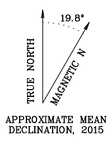

APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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by

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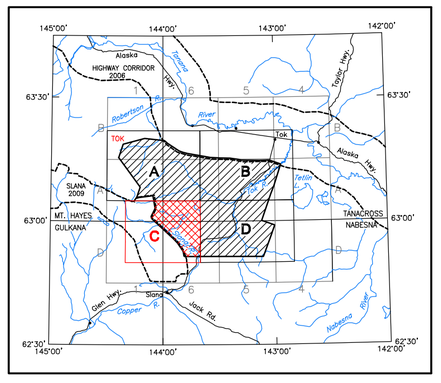

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MAGNETIC TILT DERIVATIVE CONTOURS

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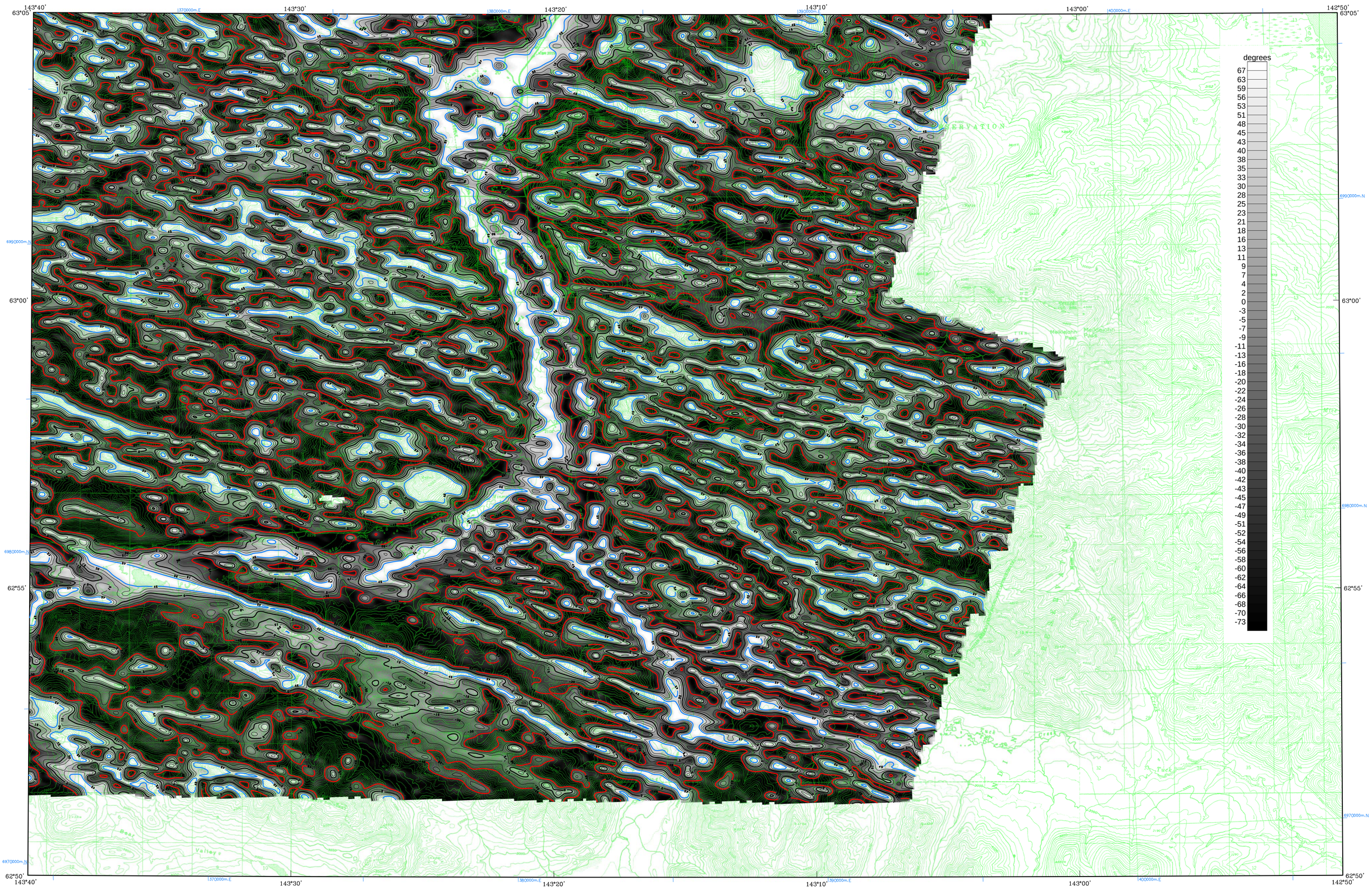

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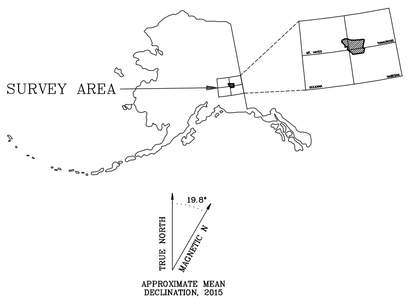

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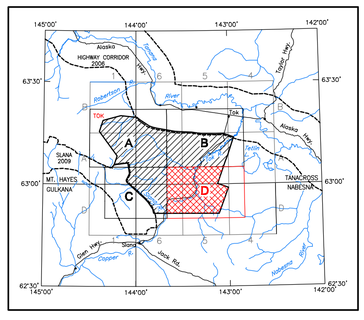

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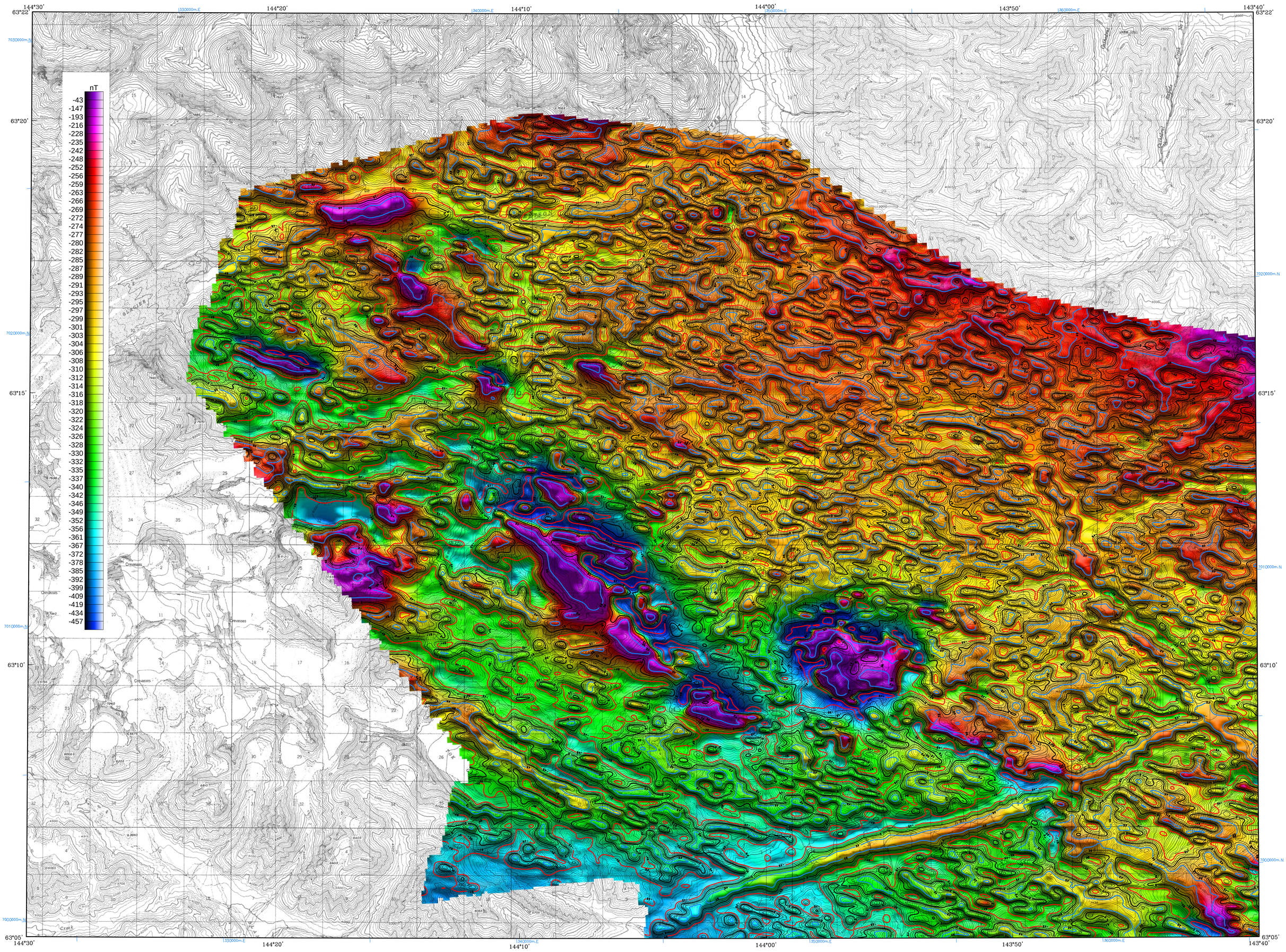
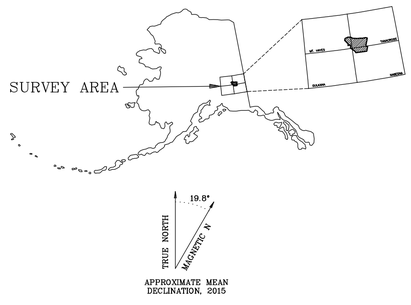


Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska



APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

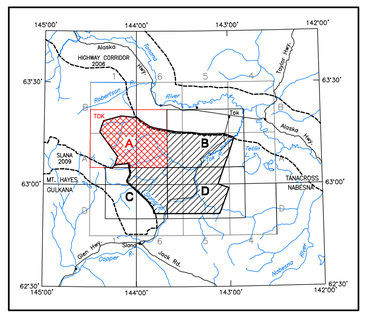
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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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MAGNETIC TILT DERIVATIVE CONTOURS

- +45 degrees
- +30 degrees
- +15 degrees
- 0 degrees
- –15 degrees
- –30 degrees
- –45 degrees

SURVEY HISTORY

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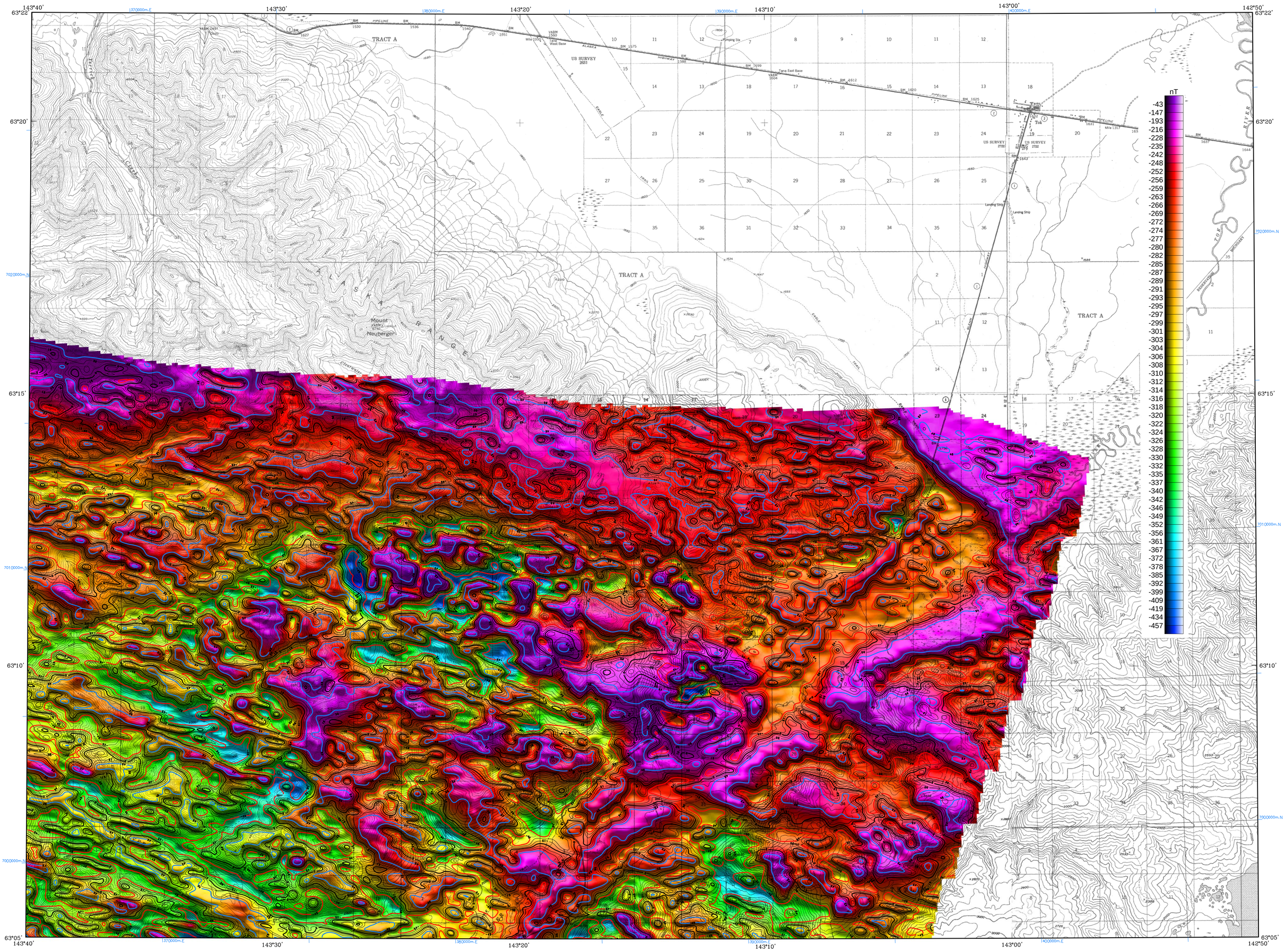
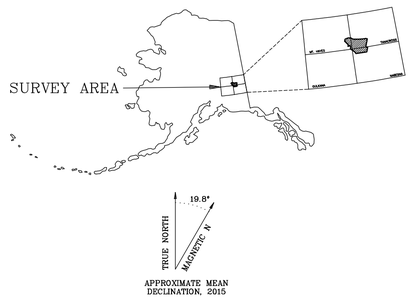


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; B-4, 1949; B-5, 1994; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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

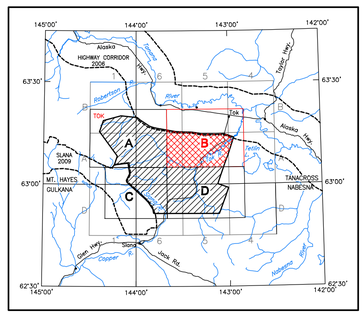
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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RESIDUAL MAGNETIC FIELD

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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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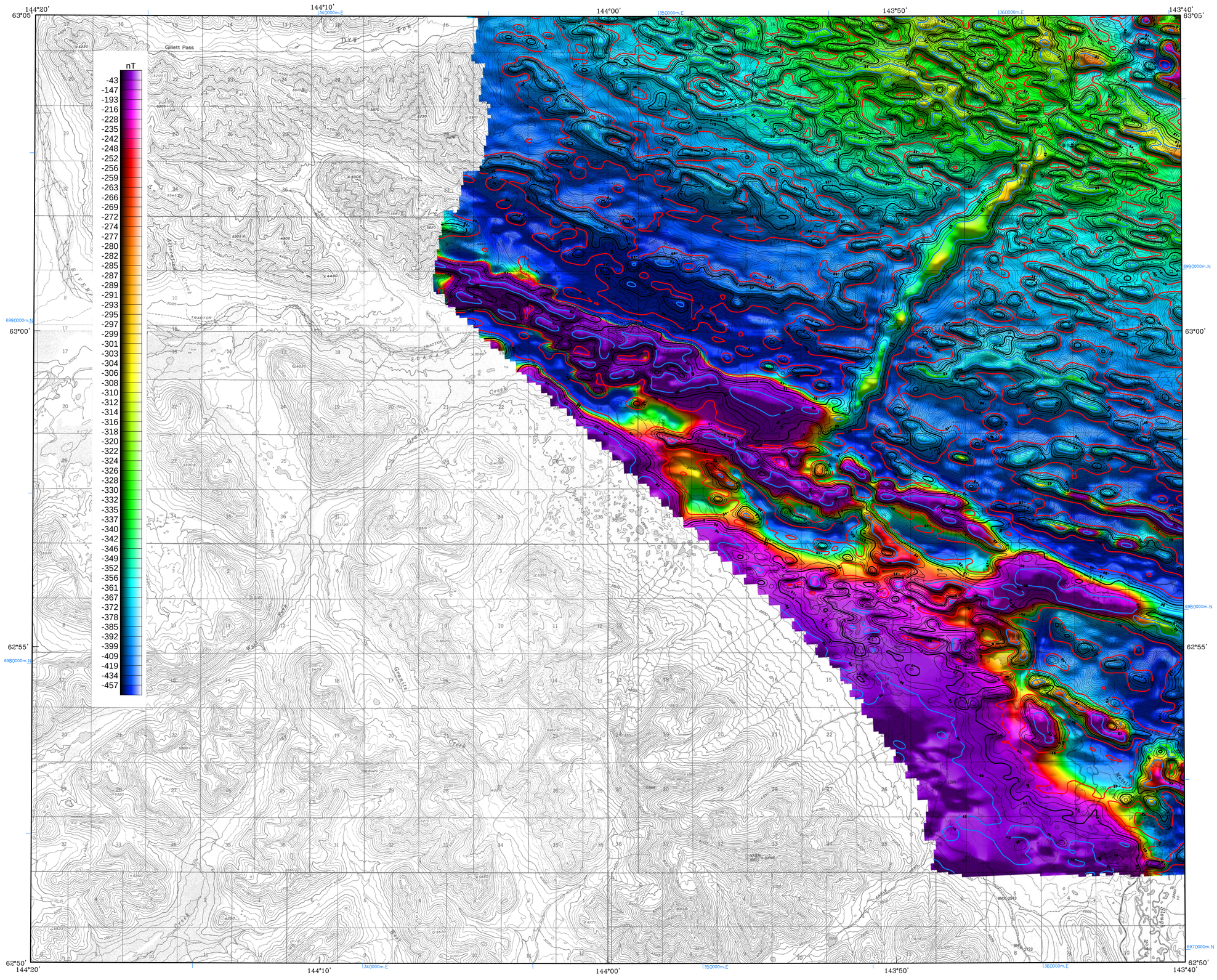
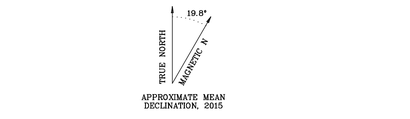


SURVEY AREA



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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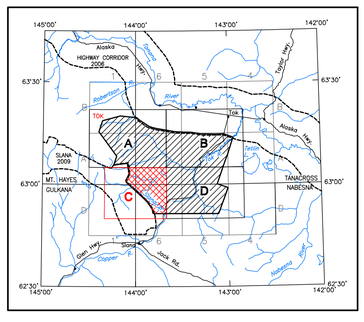
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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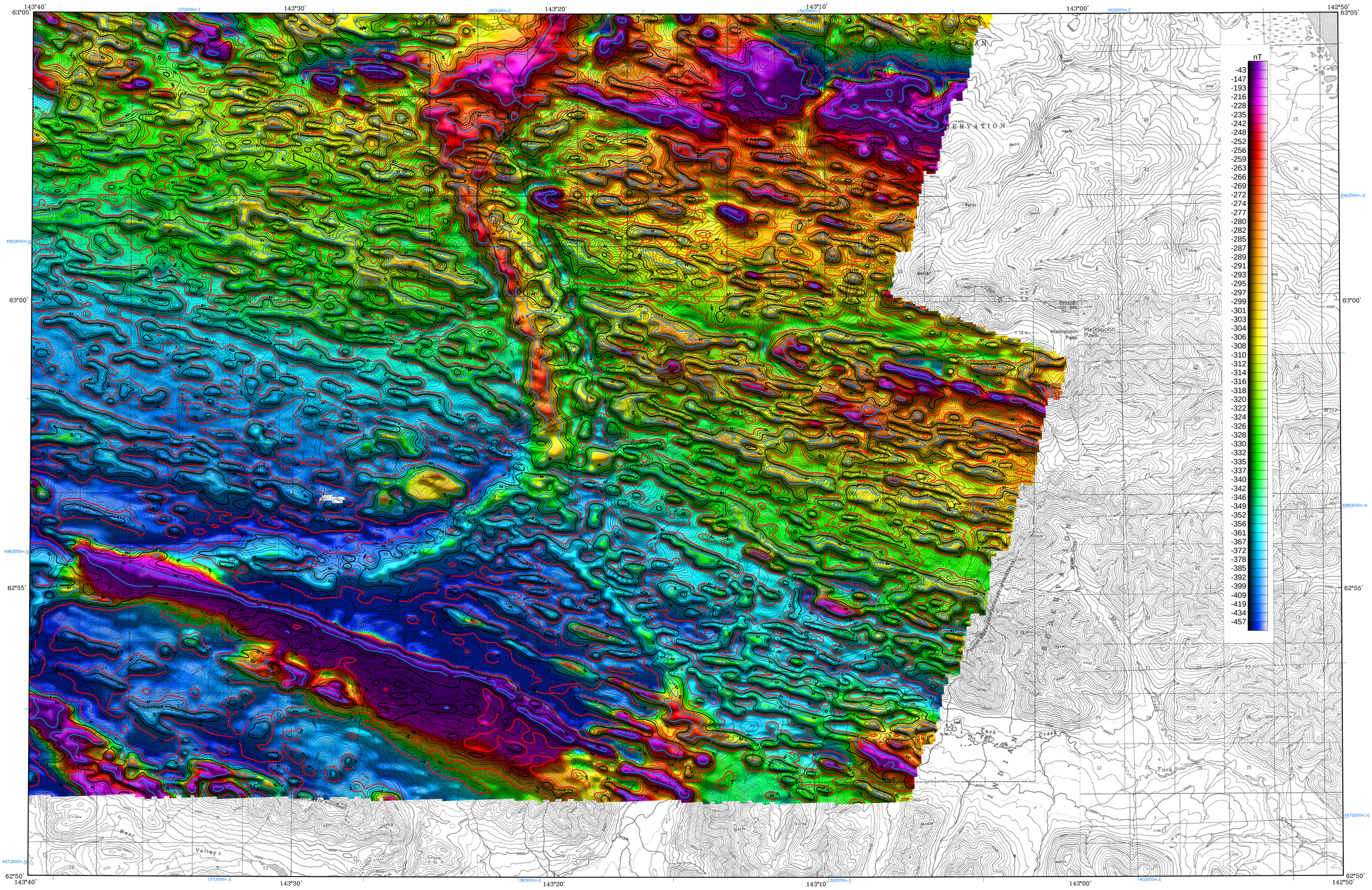

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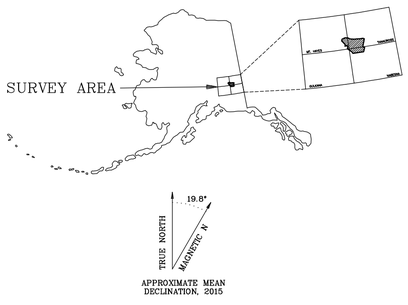


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

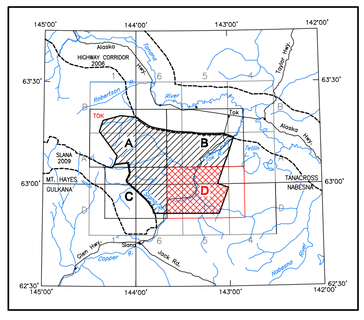
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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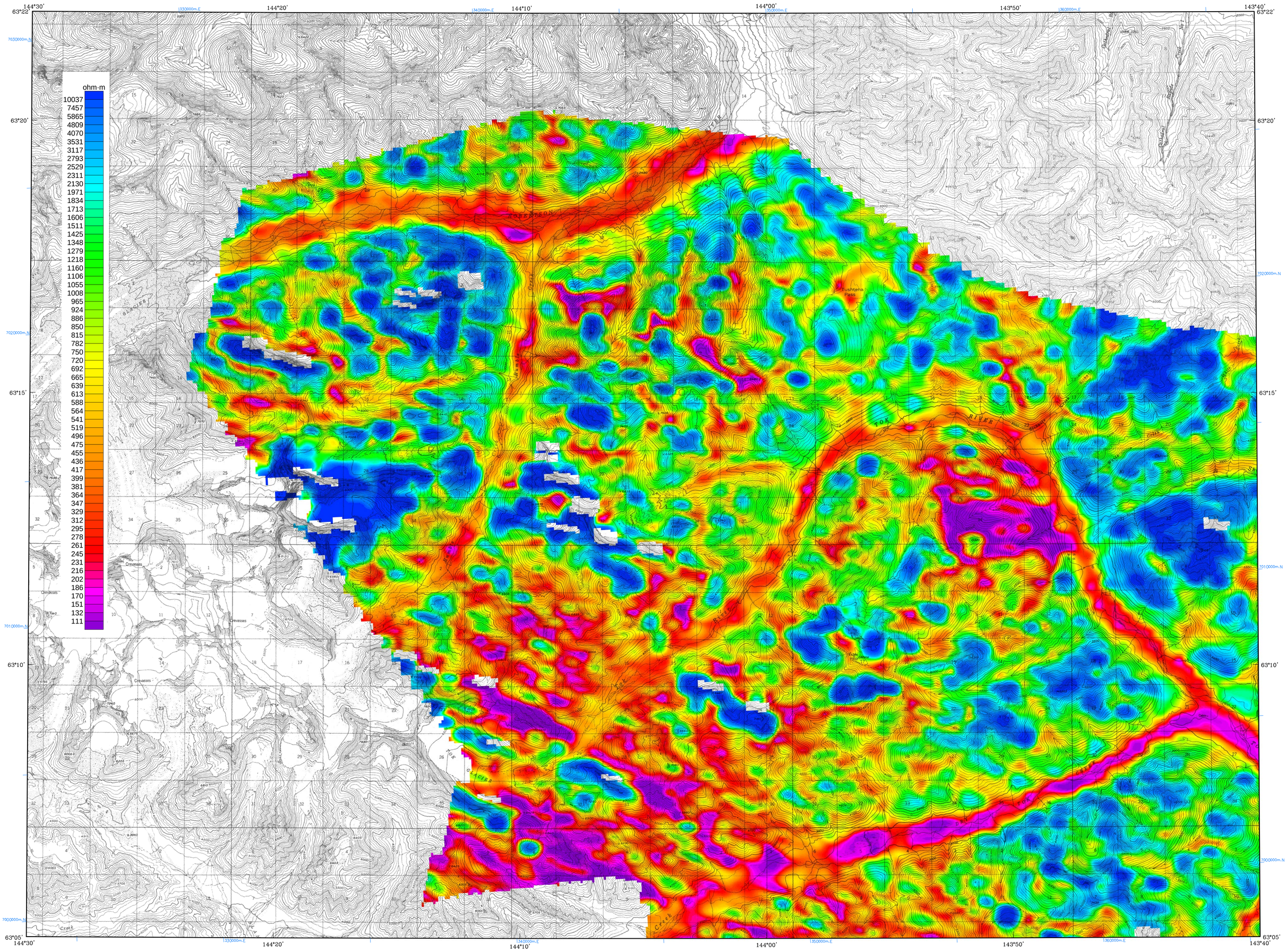

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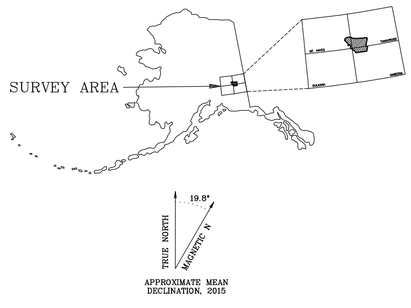

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

56,000 Hz COPLANAR APPARENT RESISTIVITY WITH TOPOGRAPHY, 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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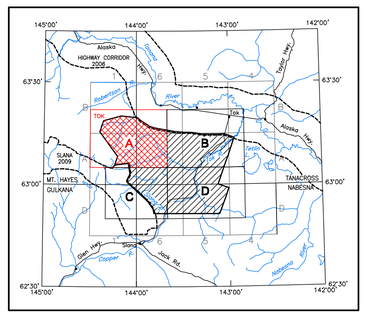

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RESISTIVITY

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.

SURVEY HISTORY

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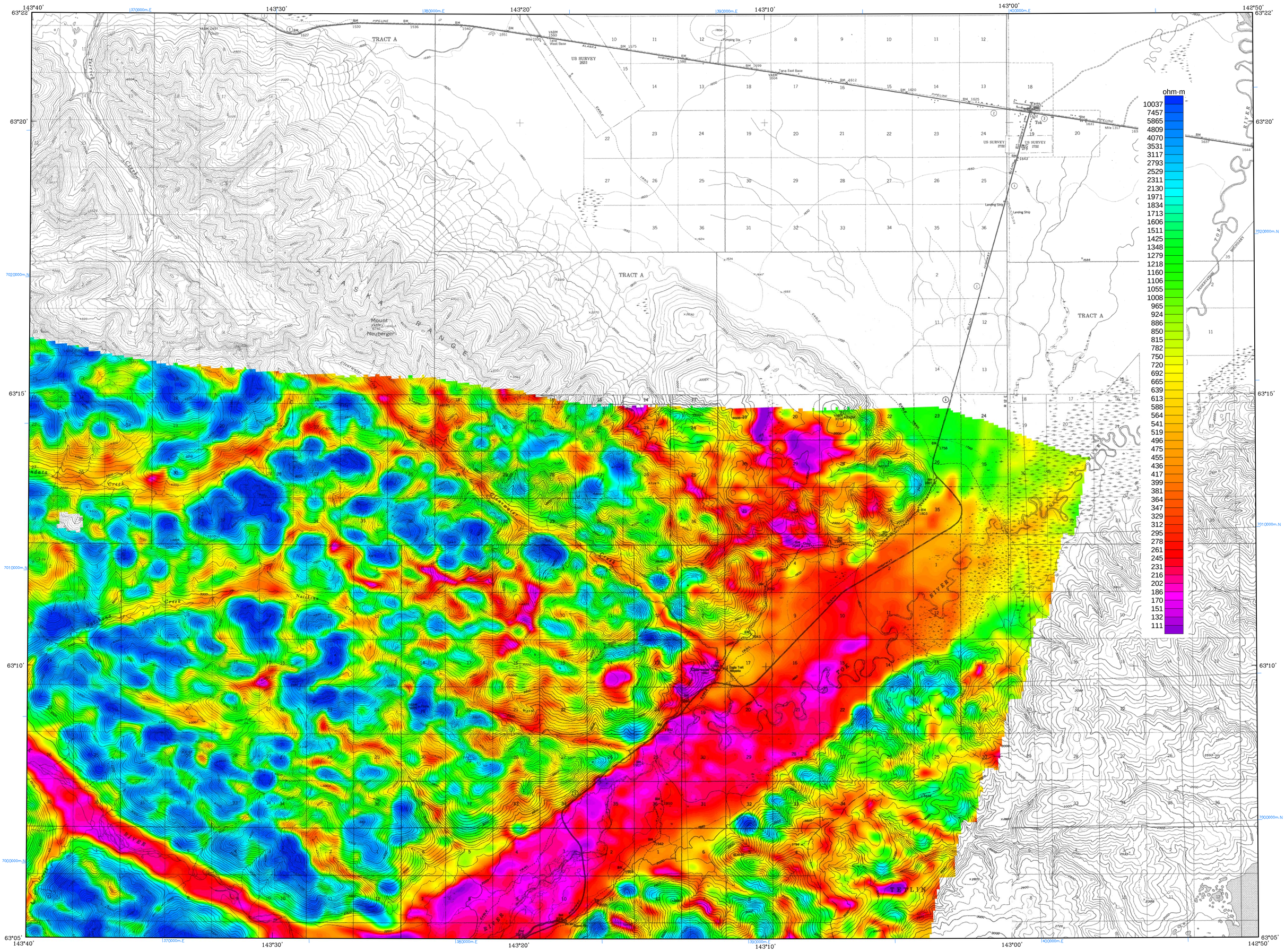

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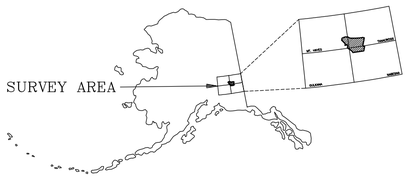

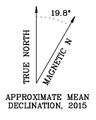

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SCALE 1:63,360

1 0 1 2 3 4 MILES

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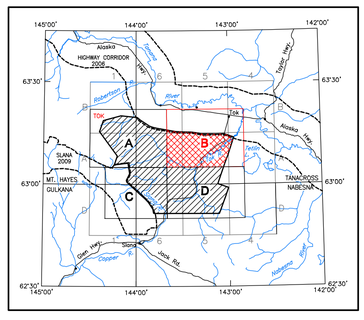
LOCATION INDEX OF 1:63,360-SCALE MAP



SURVEY HISTORY

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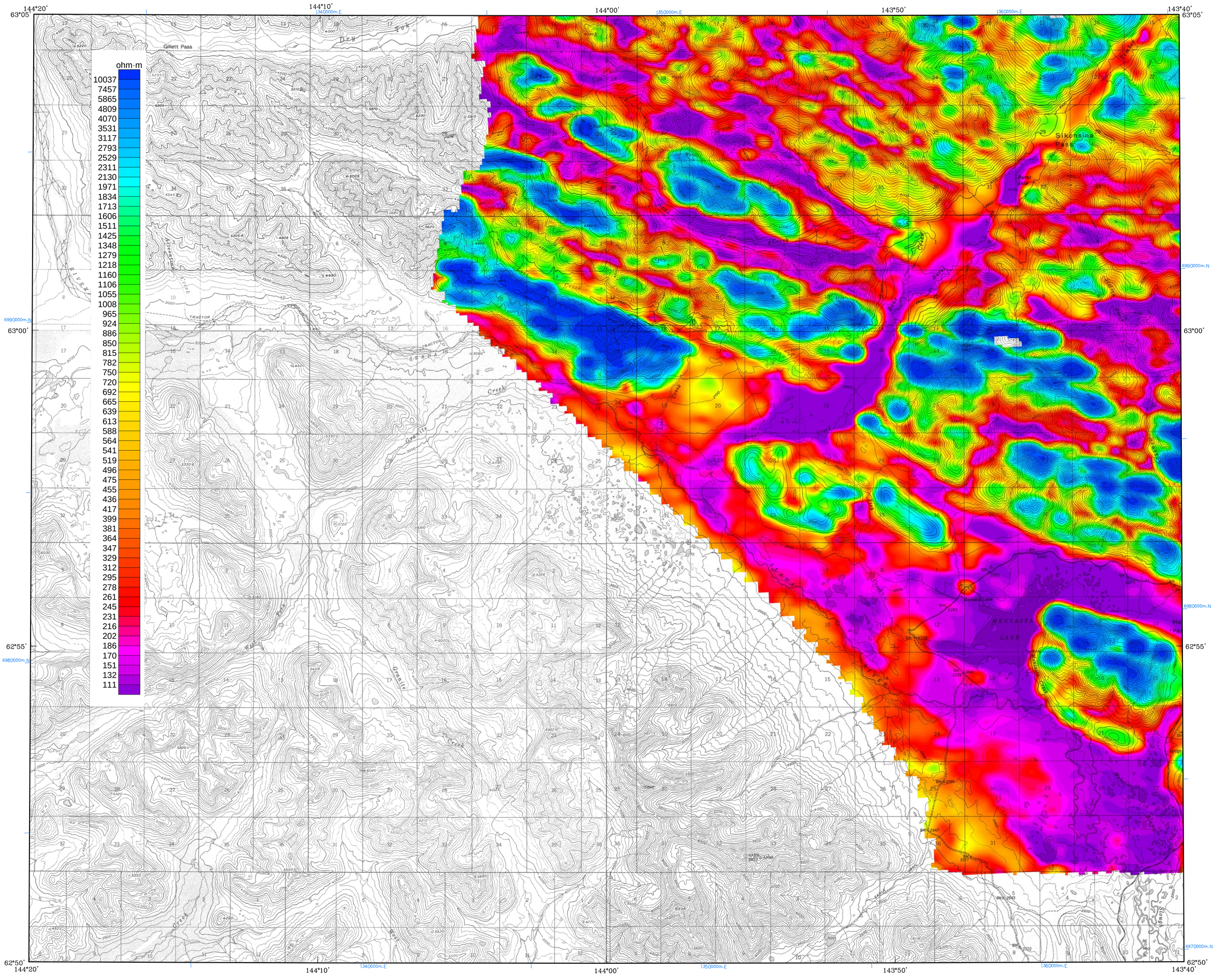
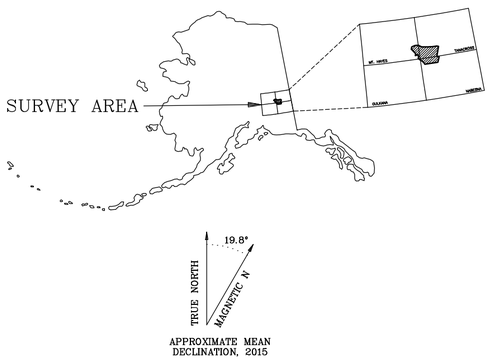


Base from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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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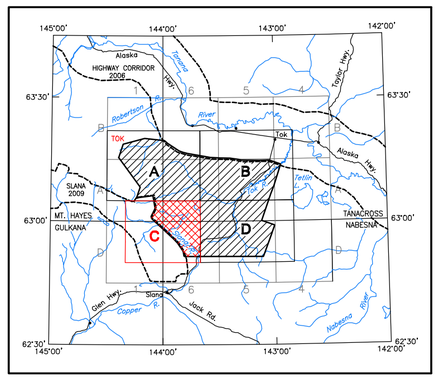

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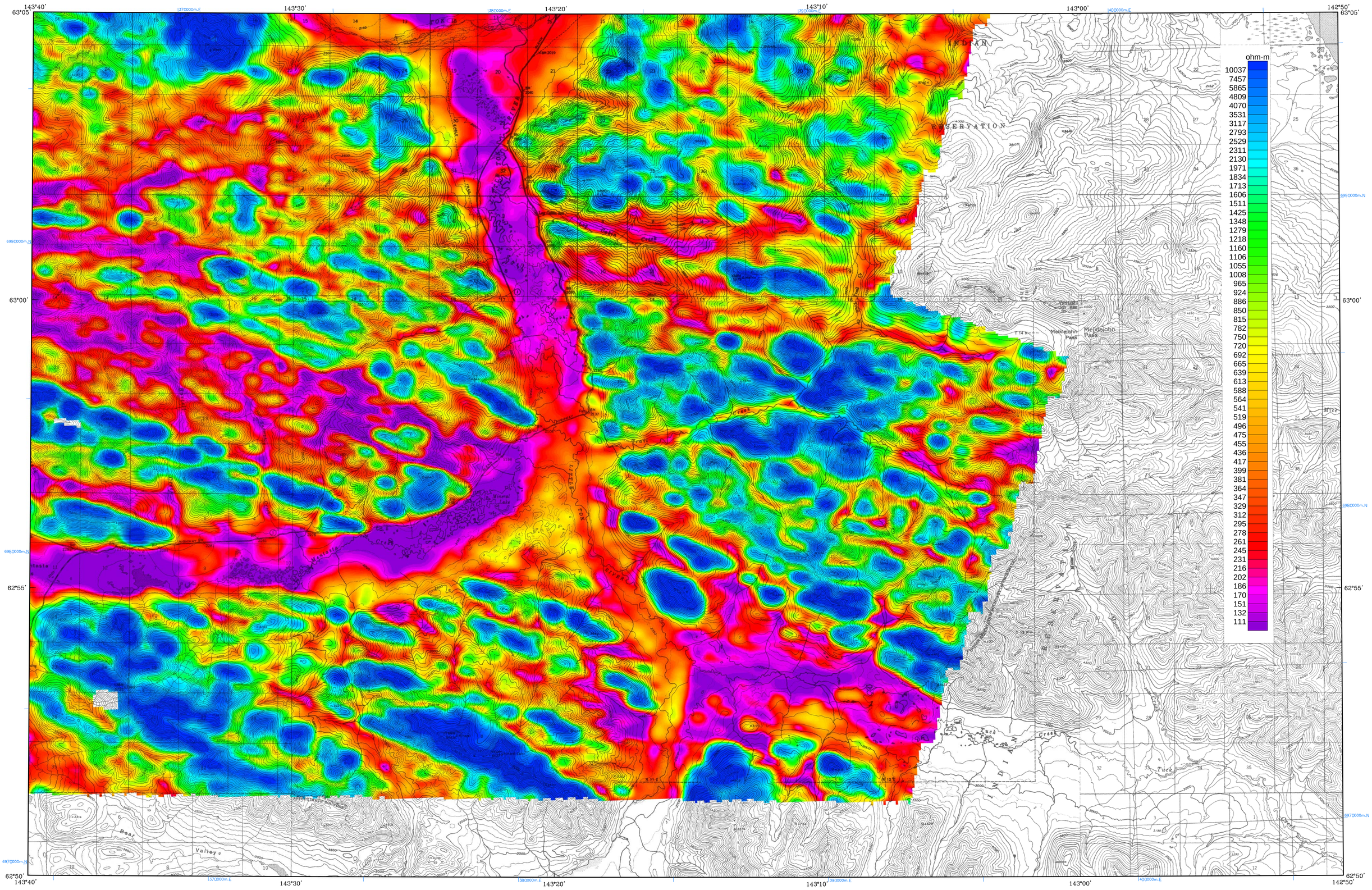
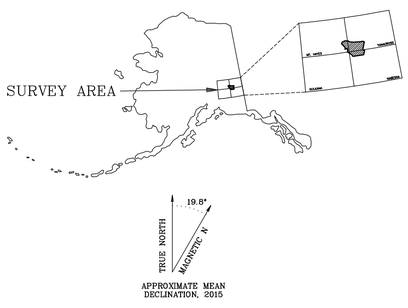


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska



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1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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2015

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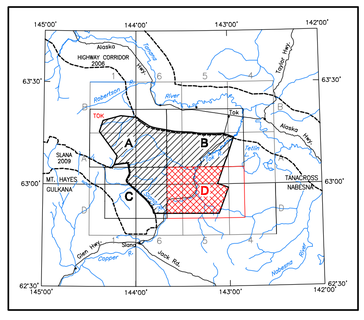

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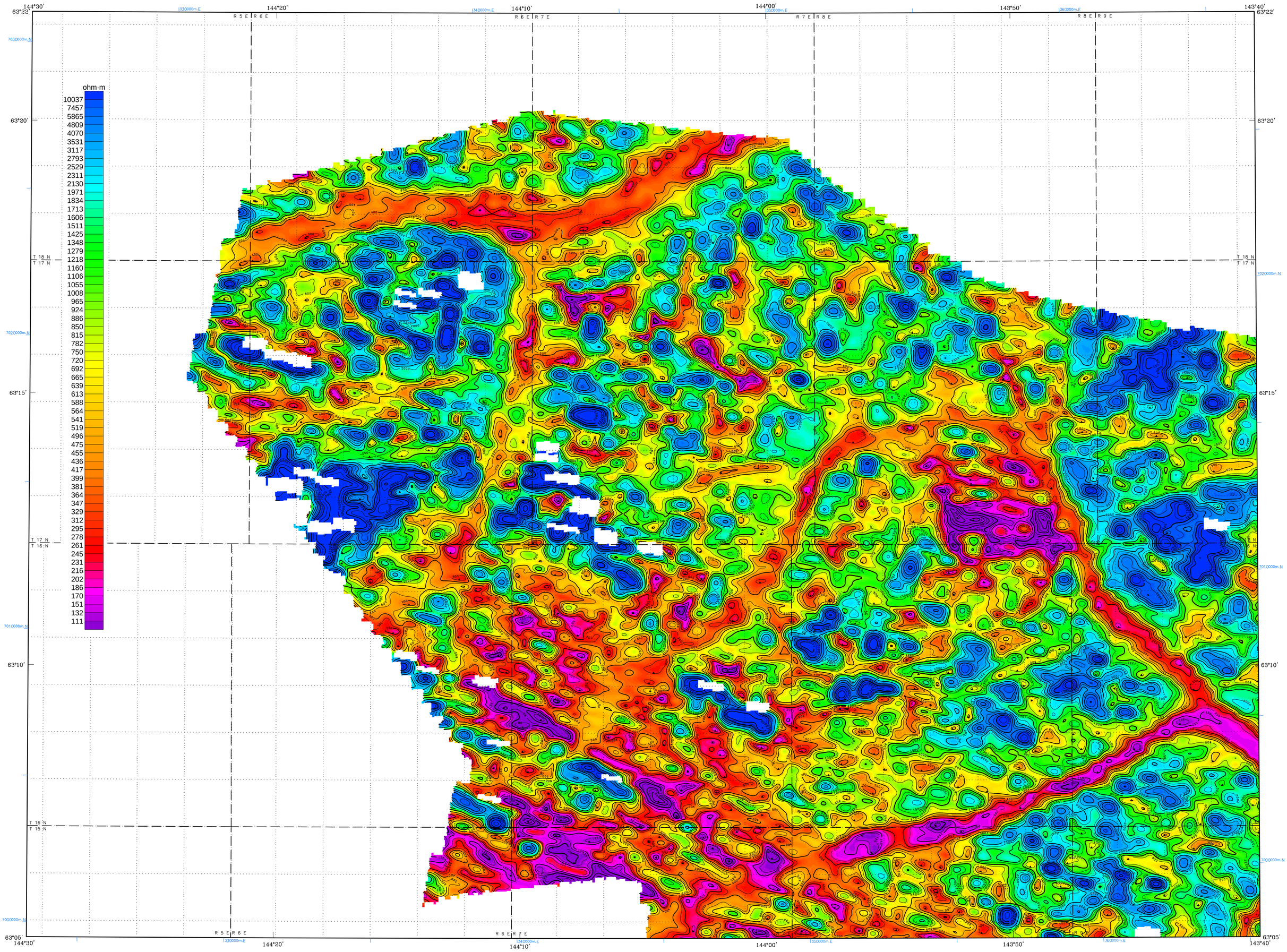

Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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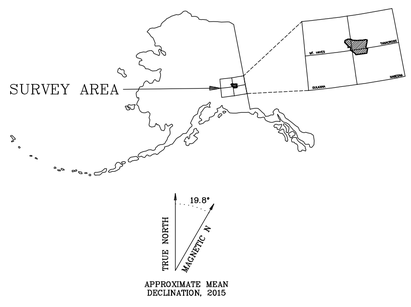

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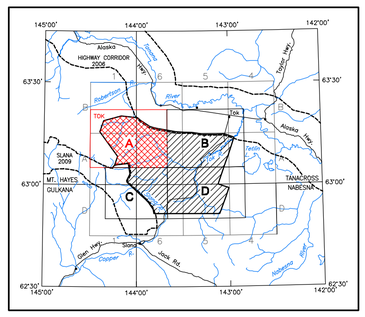
1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360-SCALE MAP



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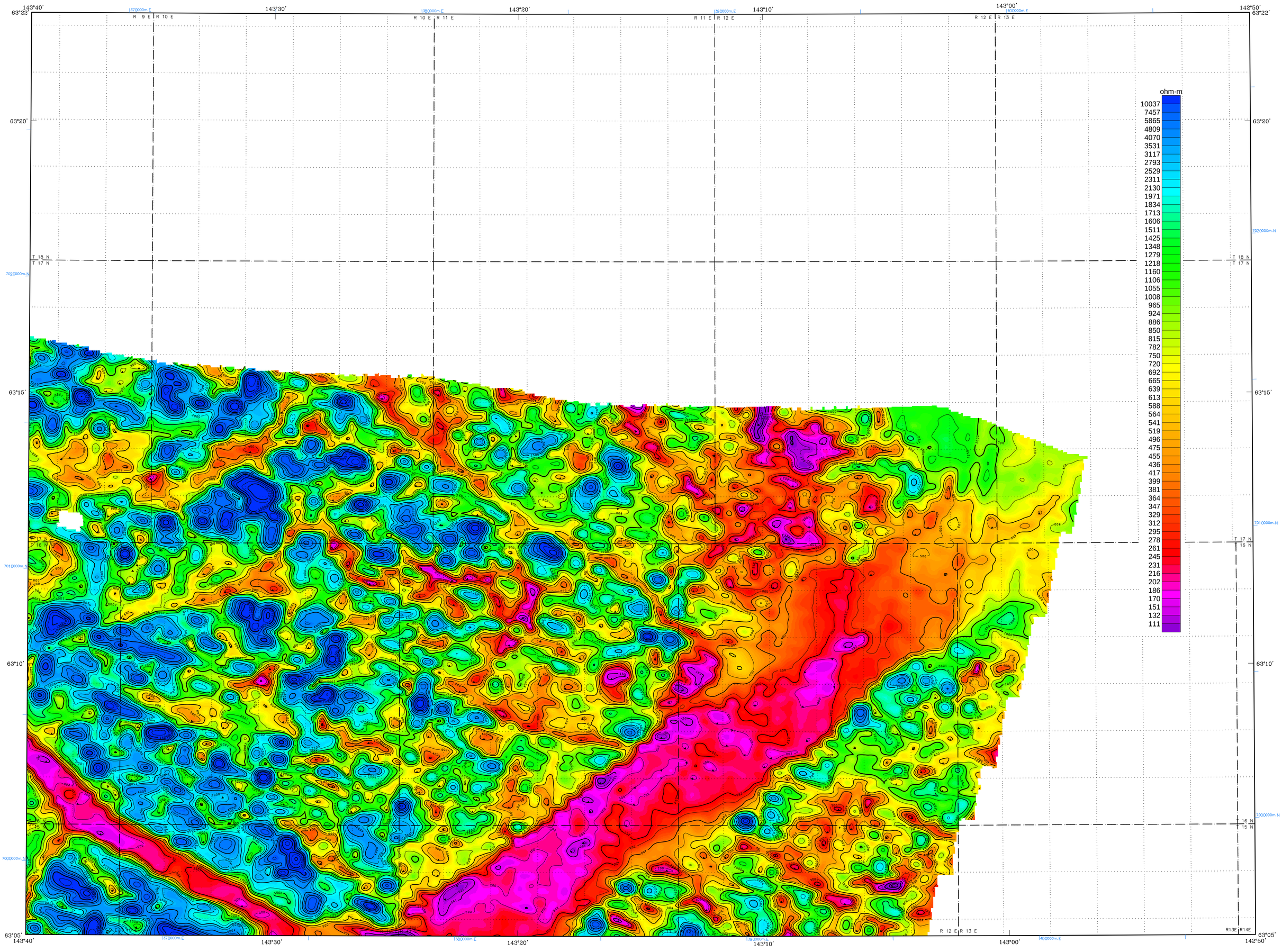

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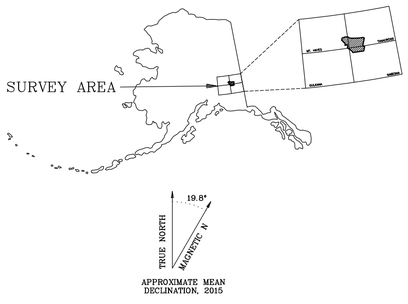

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1 0 1 2 3 4 MILES

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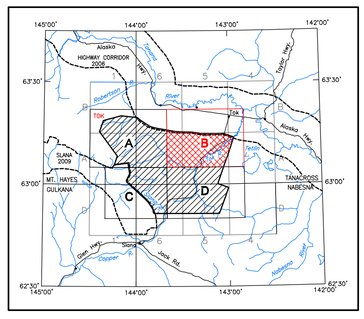
Contours in ohm–m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360–SCALE MAP



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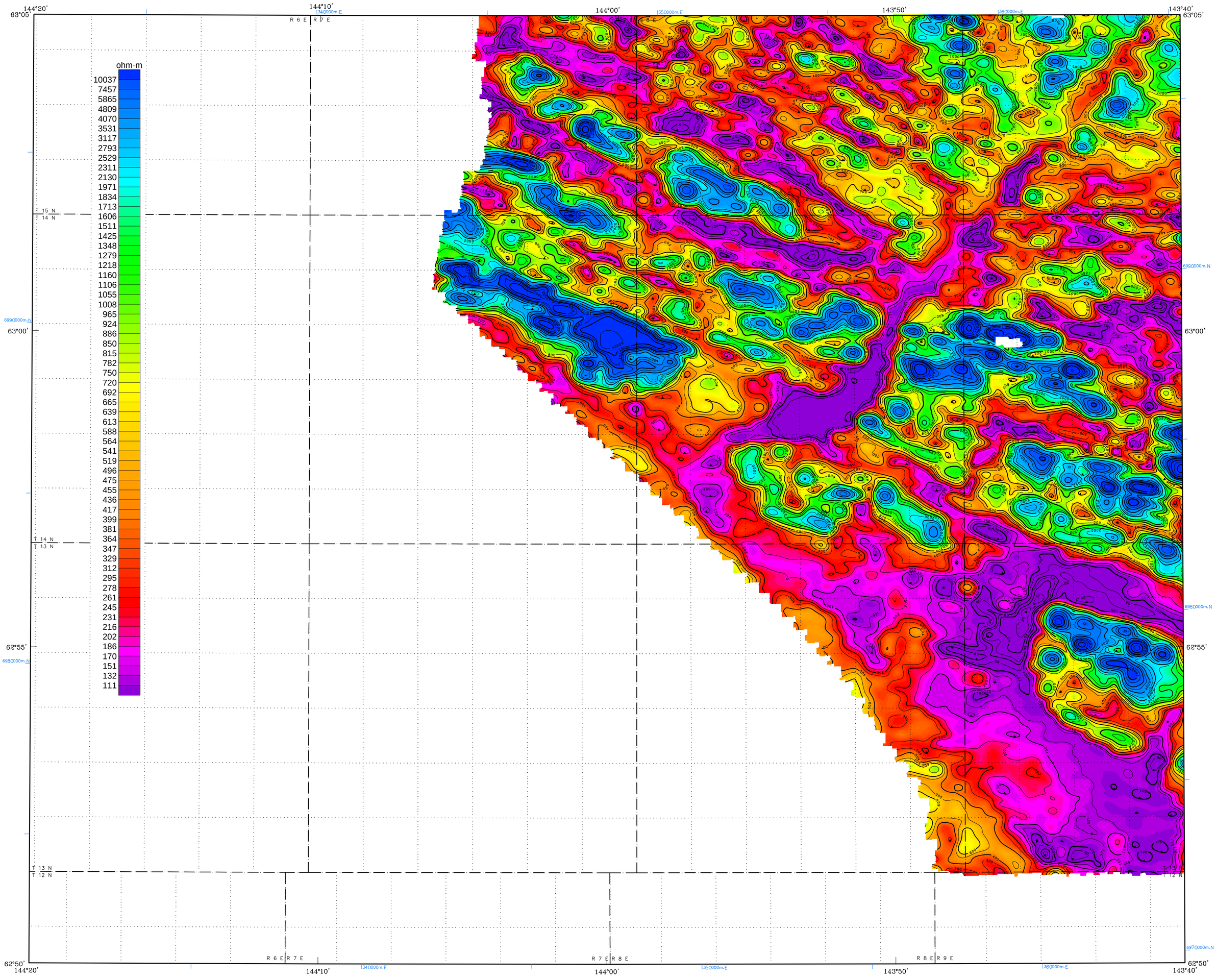

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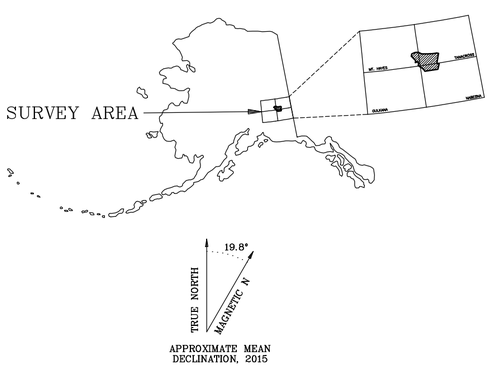

APPROXIMATE MEAN DECLINATION, 2015

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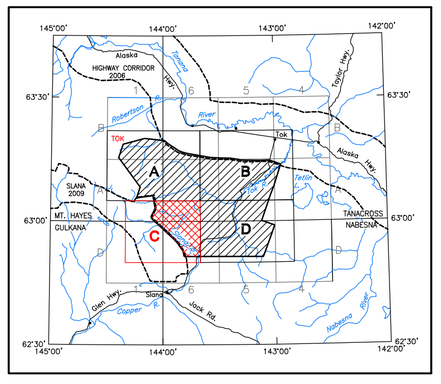

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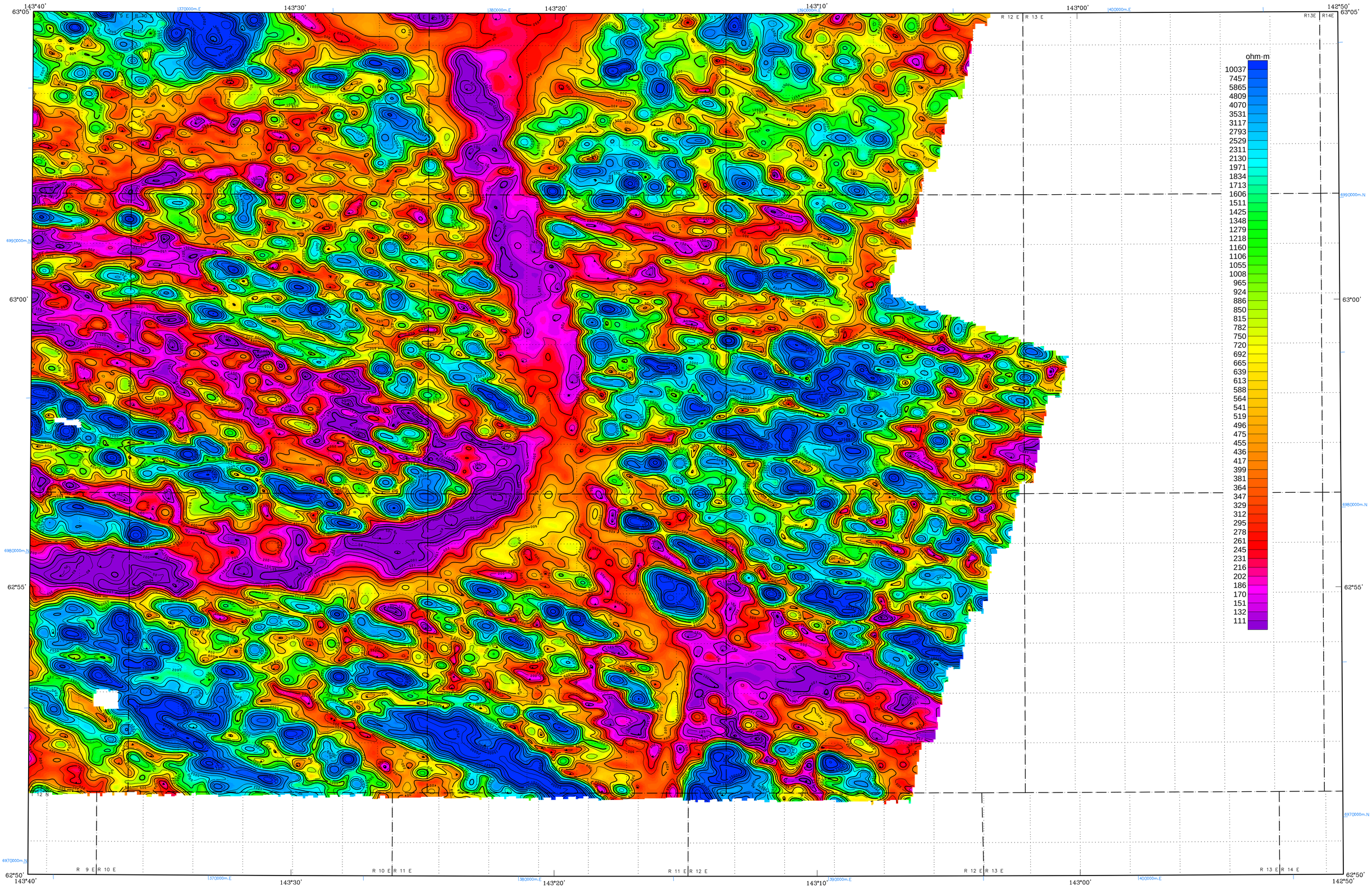
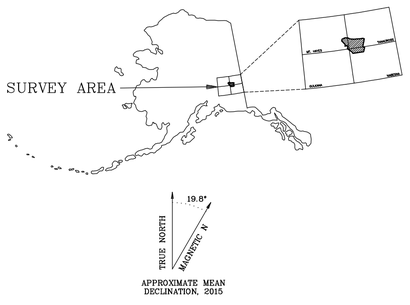


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; Nabesna D–4, 1954; D–5, 1952; D–6, 1969; Quadrangles, Alaska



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

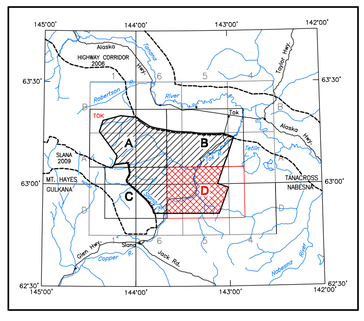
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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.

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.

[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.

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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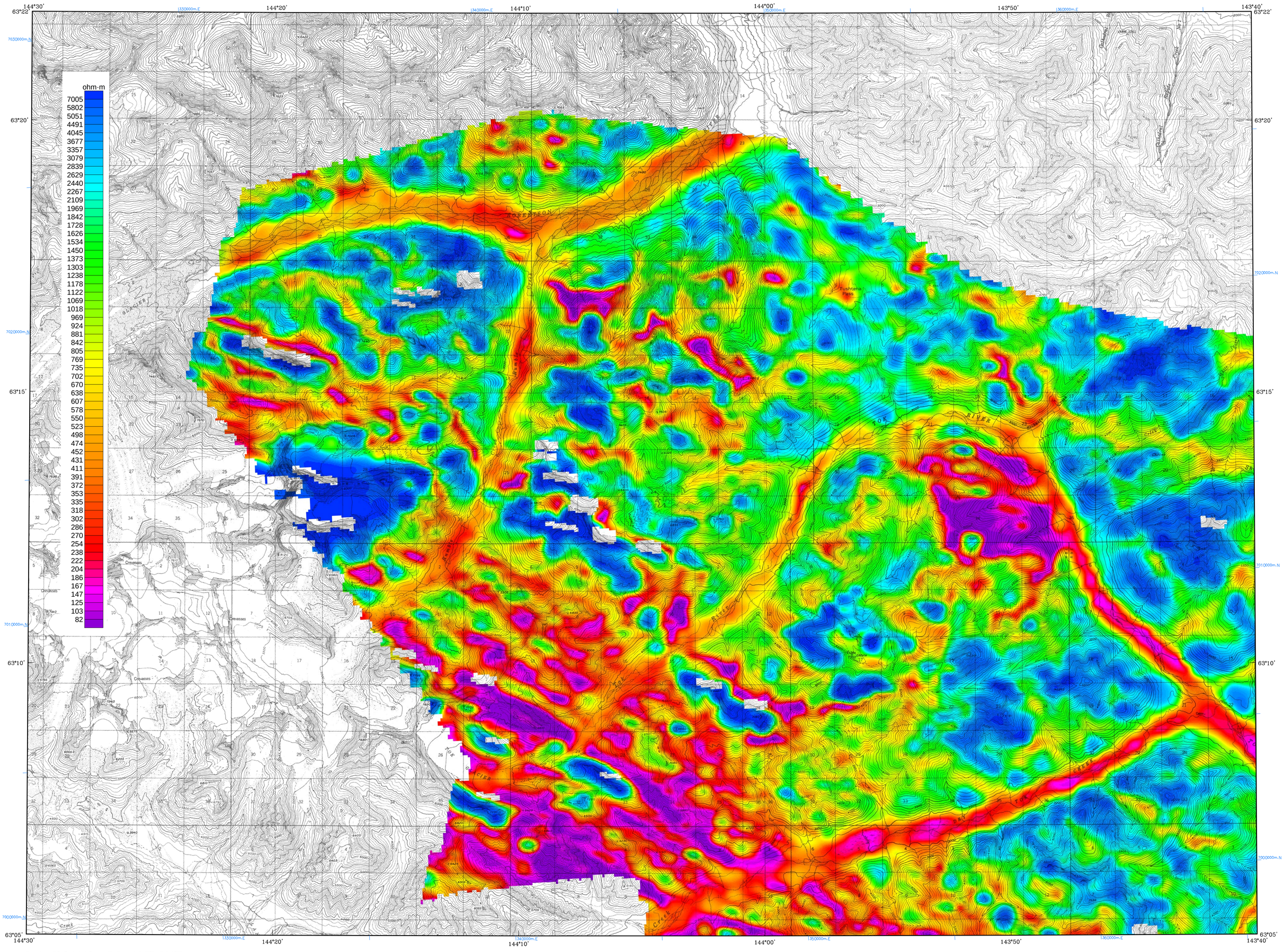
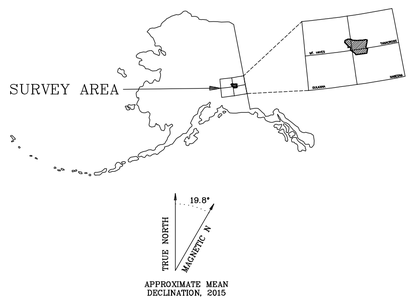


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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

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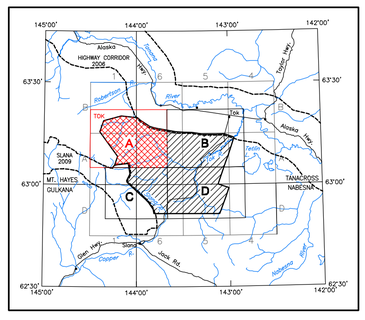
LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY HISTORY

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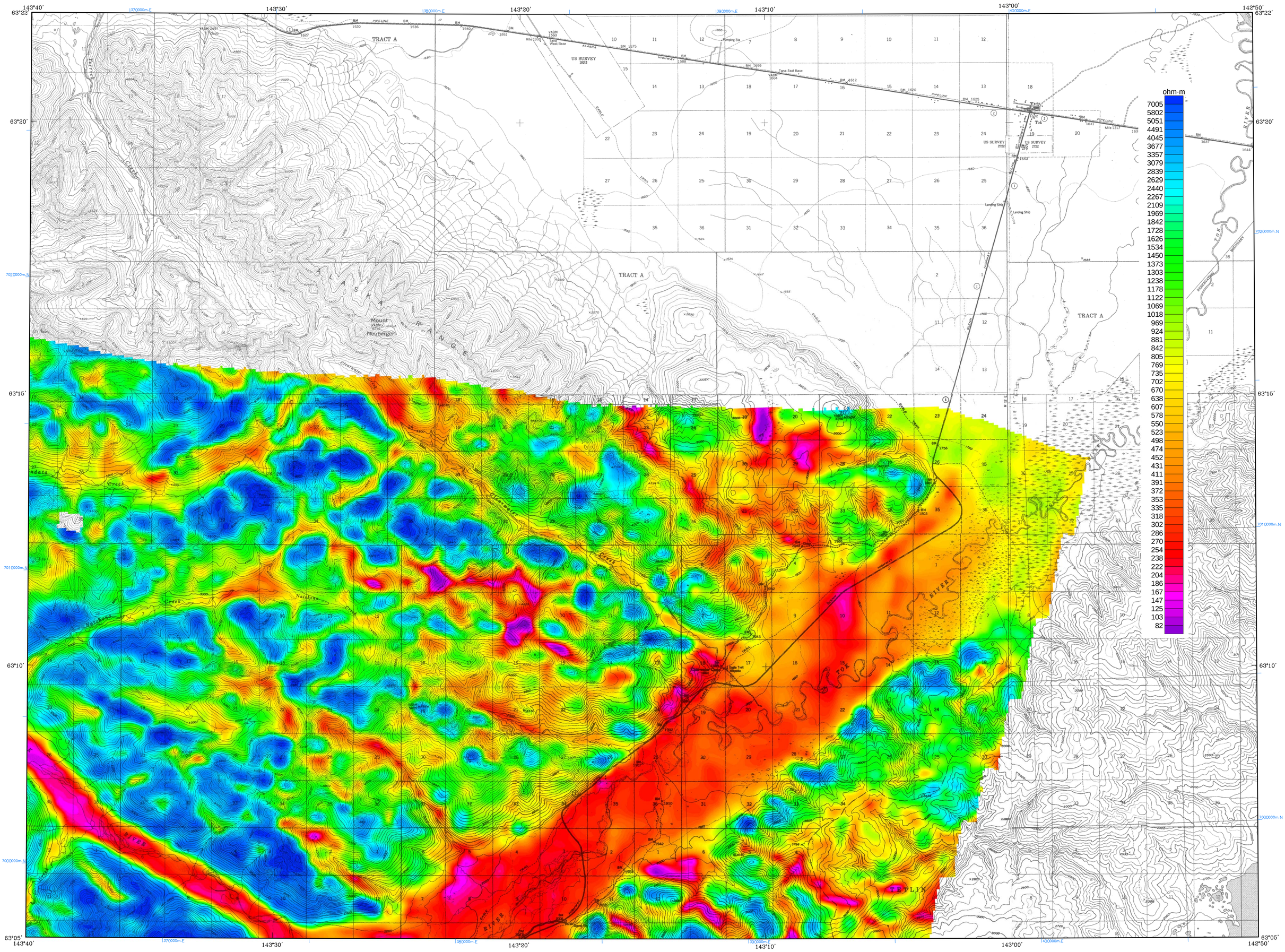
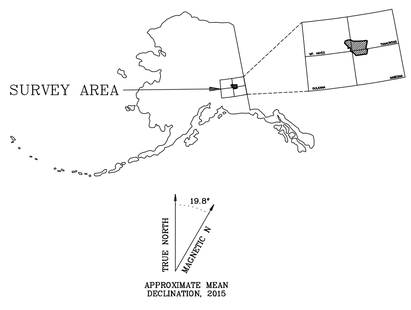


Base from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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

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RESISTIVITY

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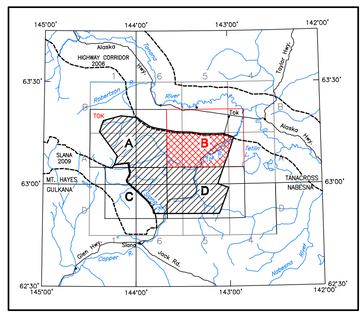
LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY HISTORY

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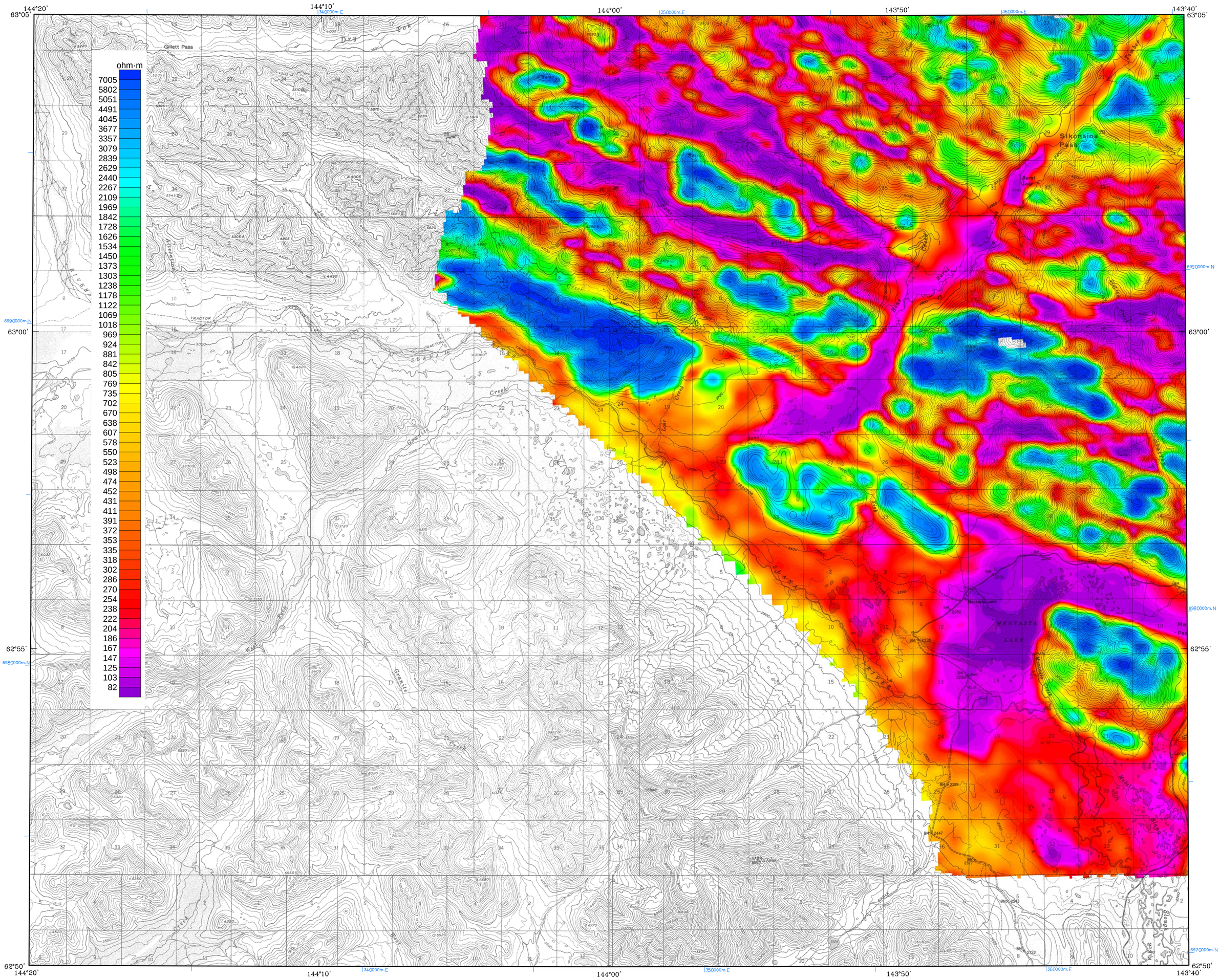
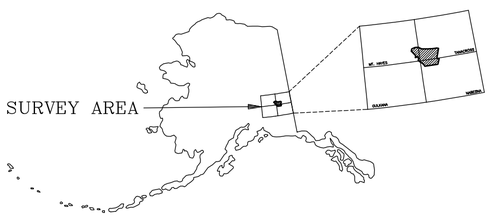


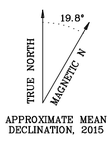
Base from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 2015

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

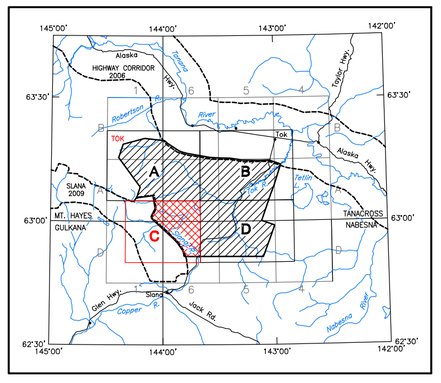
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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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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.

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SURVEY HISTORY

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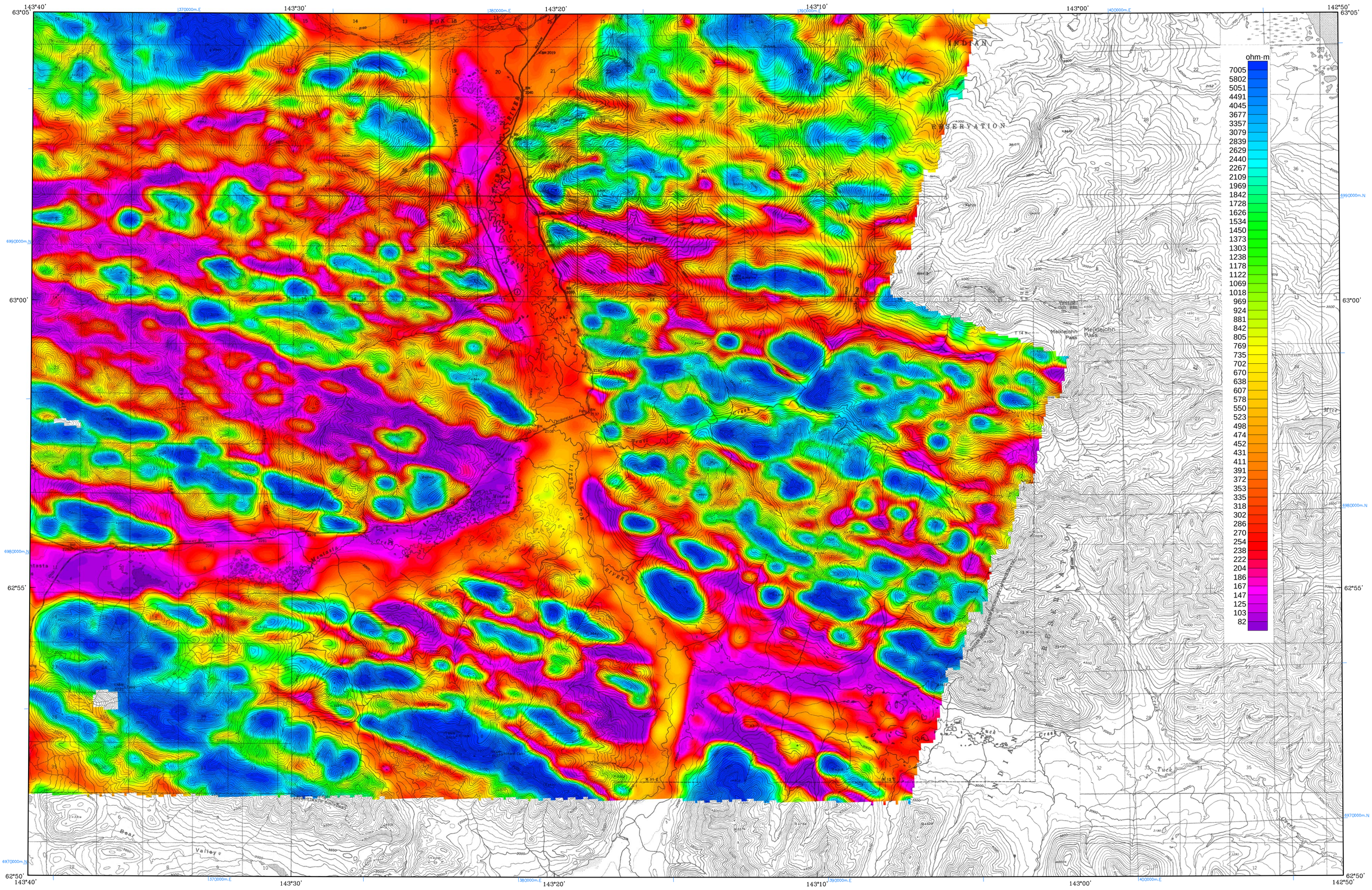
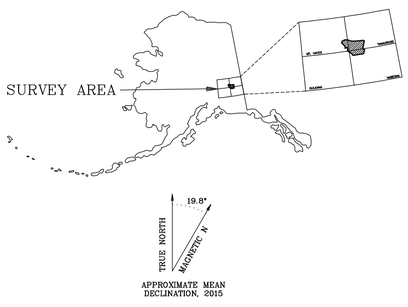


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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2015

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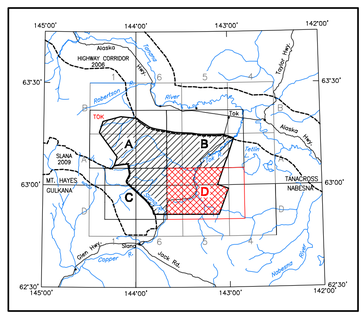

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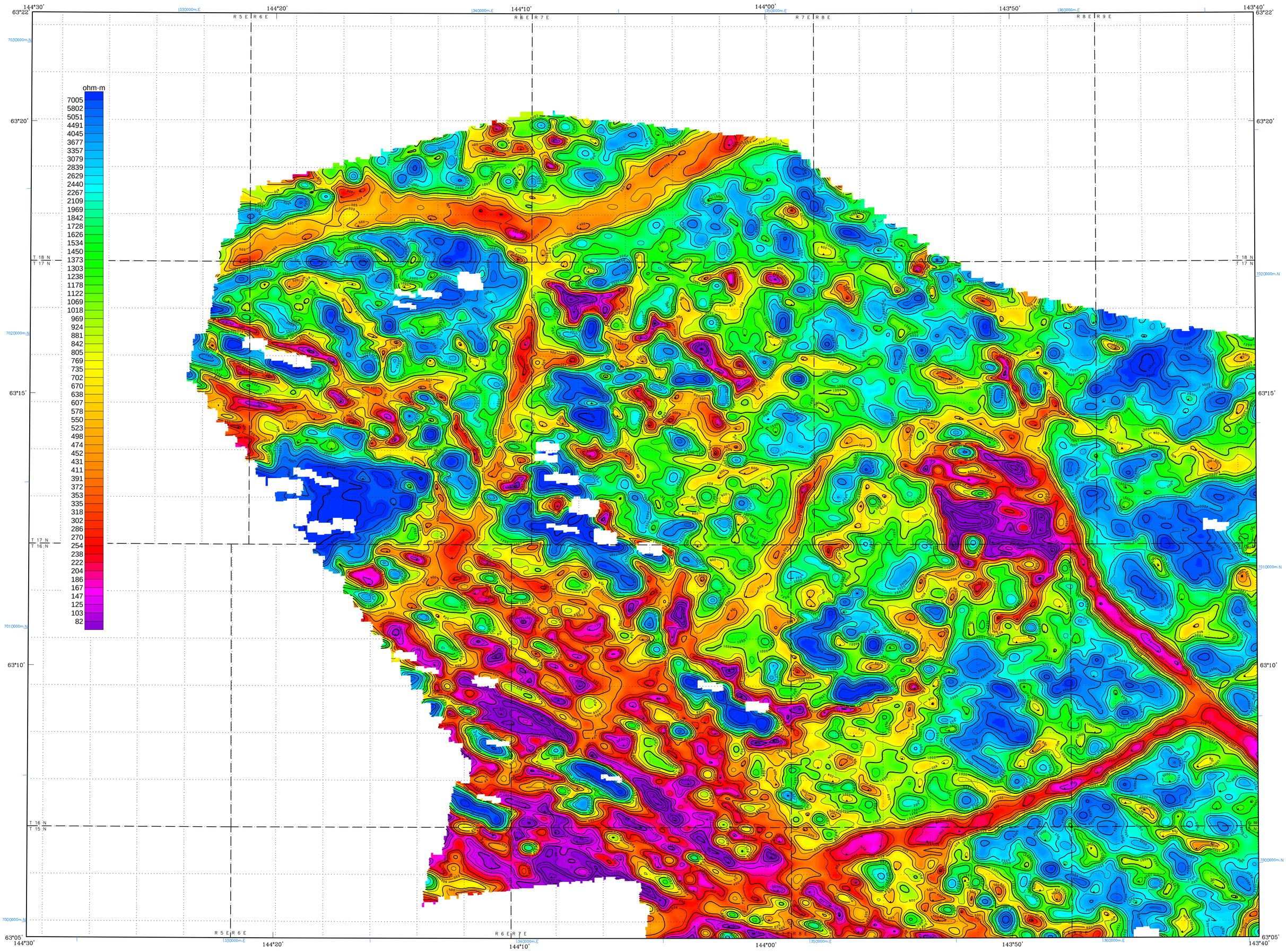
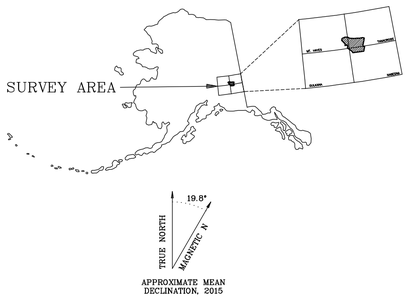


Section outlines from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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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.

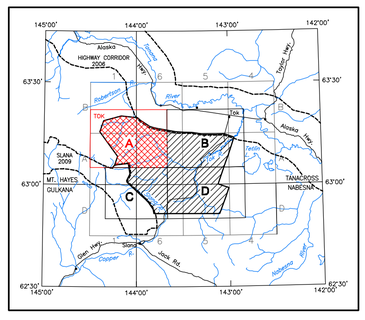
RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360-SCALE MAP



SURVEY HISTORY

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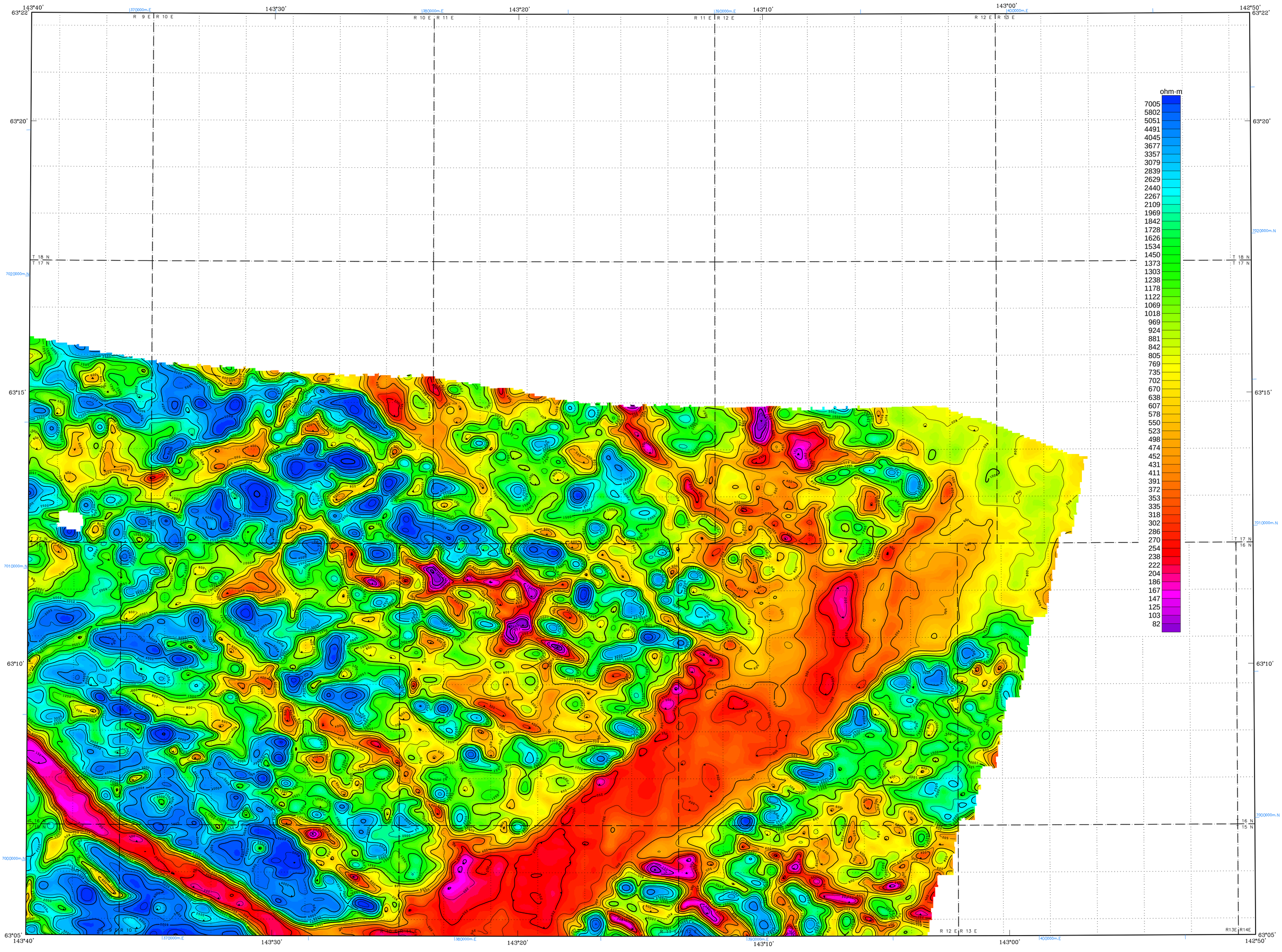
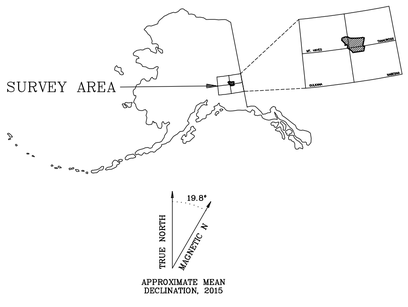


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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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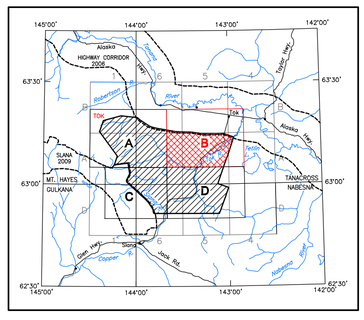
RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360–SCALE MAP



SURVEY HISTORY

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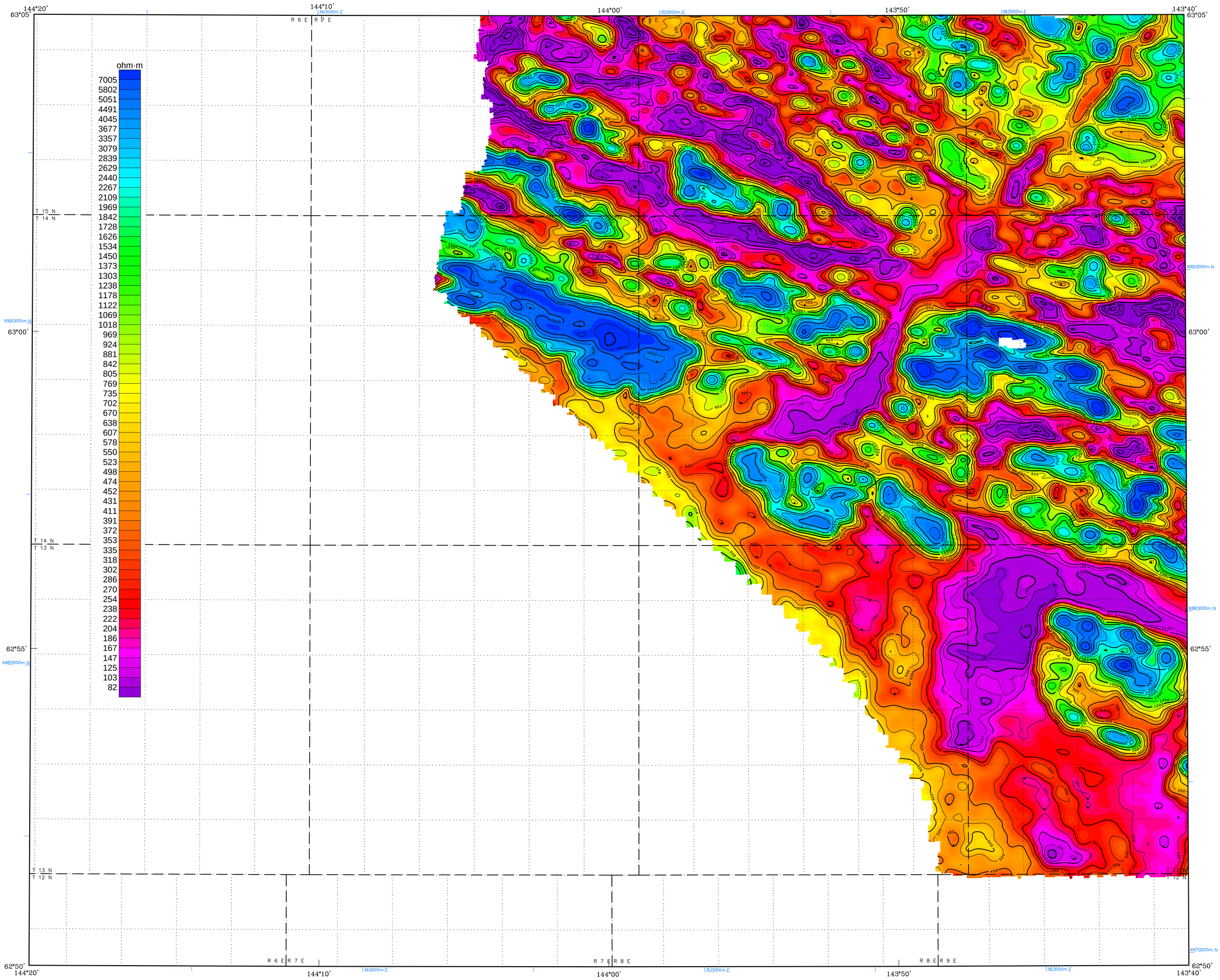
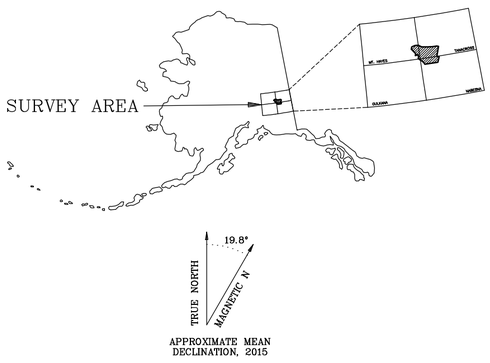


Section outlines from U.S. Geological Survey Tanacross A–6, 1964; Nabesna D–6, 1969; Gulkana D–1, 1978; Mt. Hayes A–1, 1975; Quadrangles, Alaska



APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

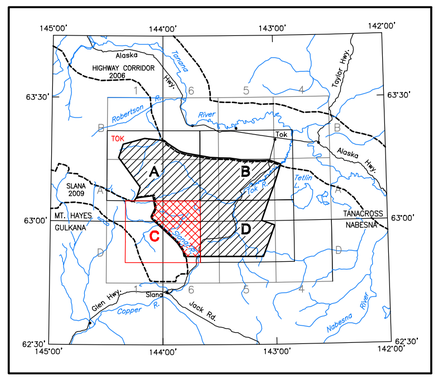
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



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 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.

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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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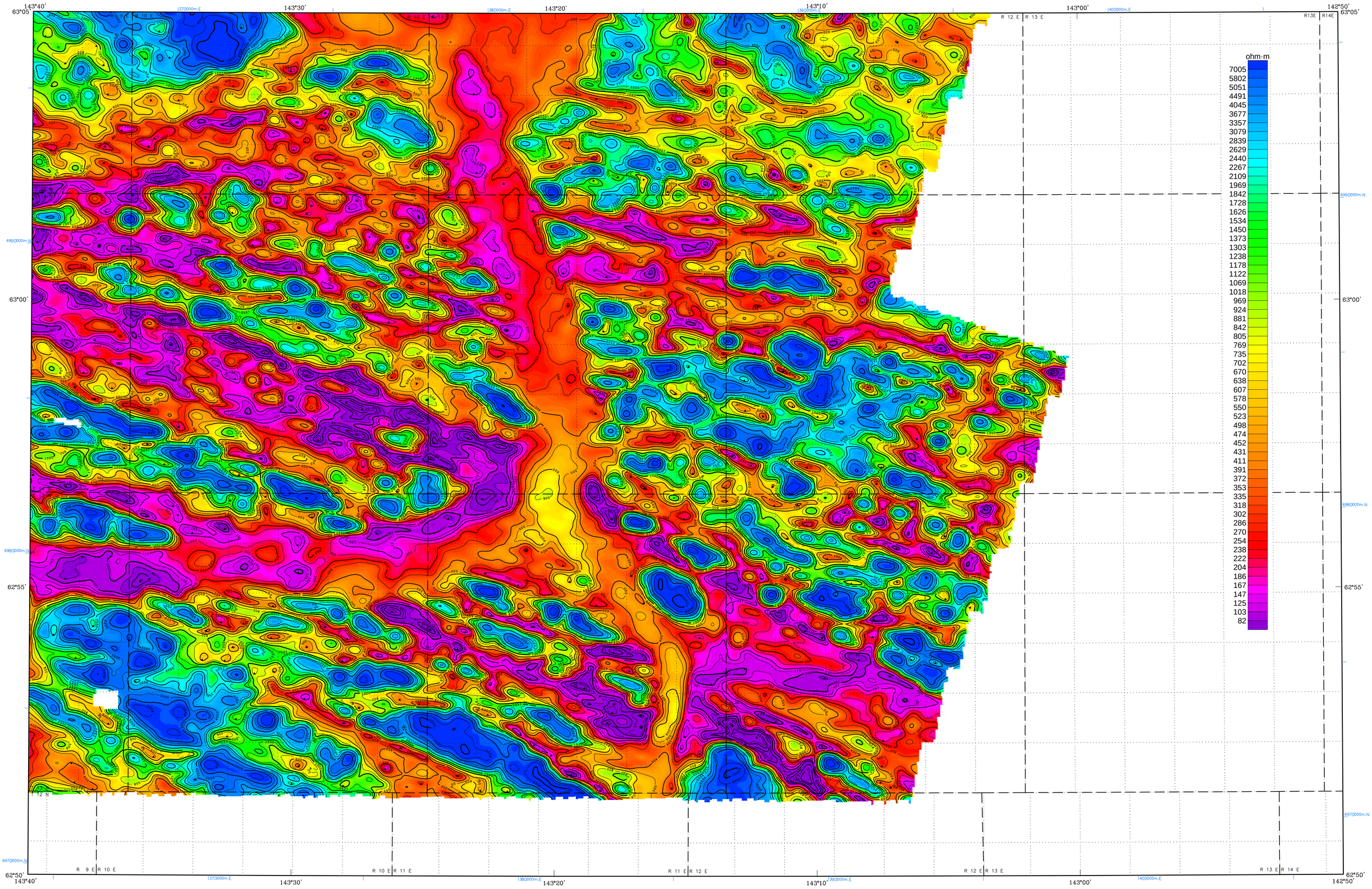
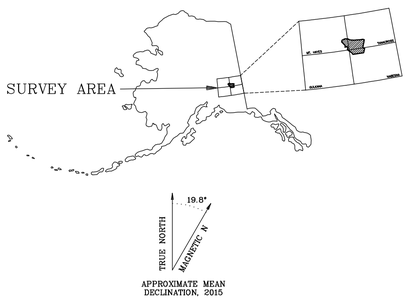


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; Nabesna D–4, 1954; D–5, 1952; D–6, 1969; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

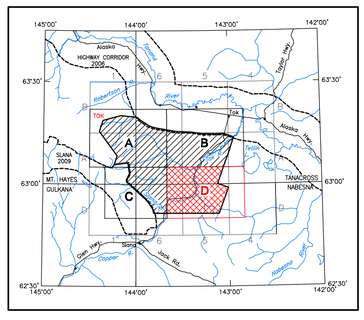
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

by

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

2015

LOCATION INDEX OF 1:63,360–SCALE MAP



DESCRIPTIVE NOTES

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RESISTIVITY

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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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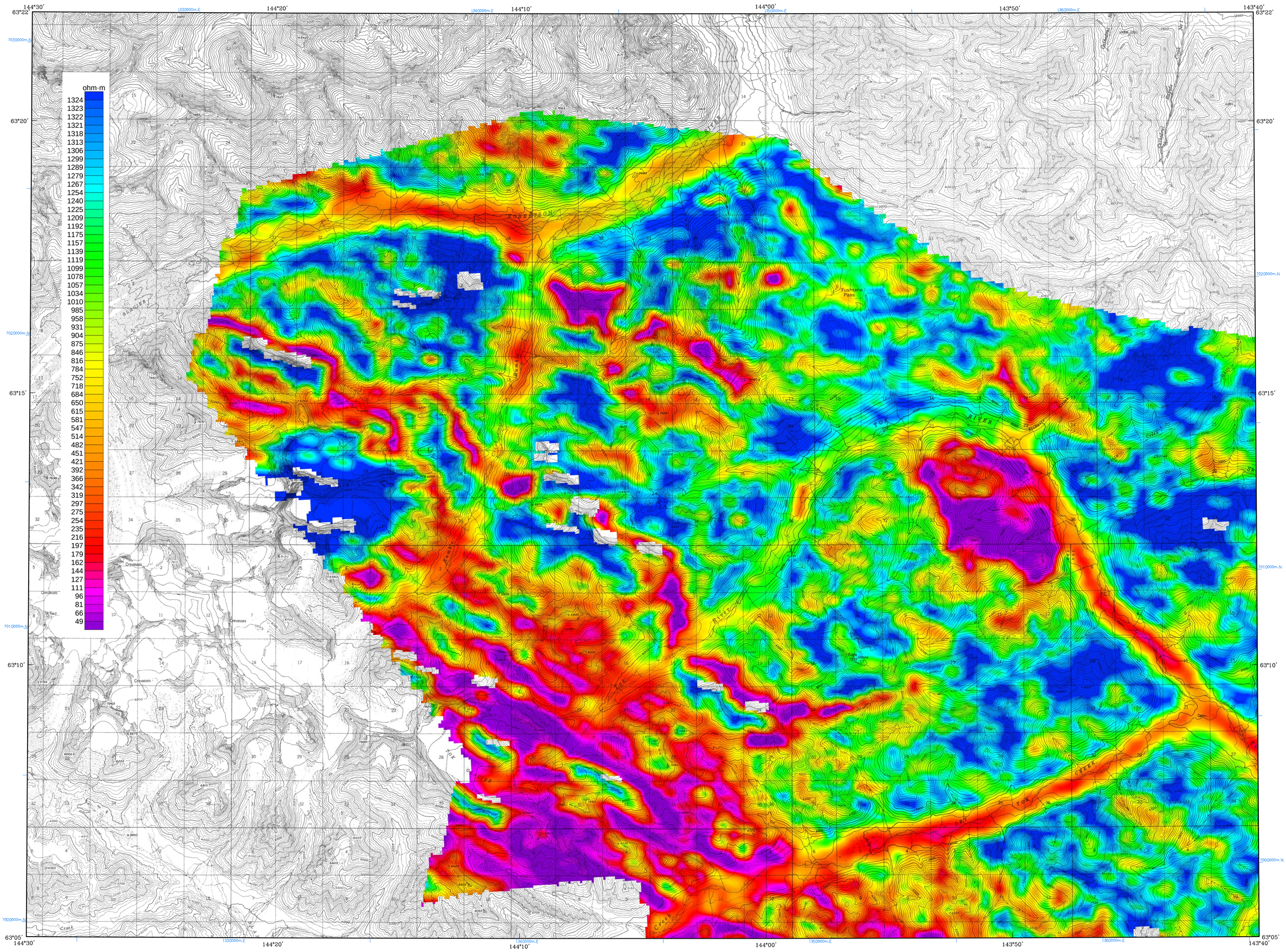
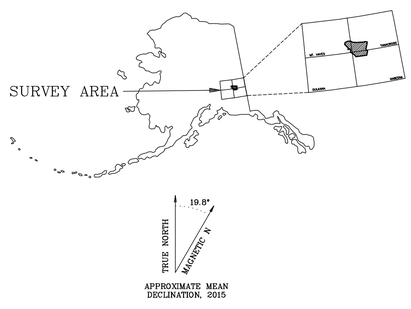


Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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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2015

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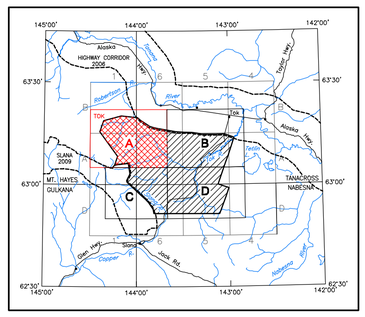
LOCATION INDEX OF 1:63,360–SCALE MAP



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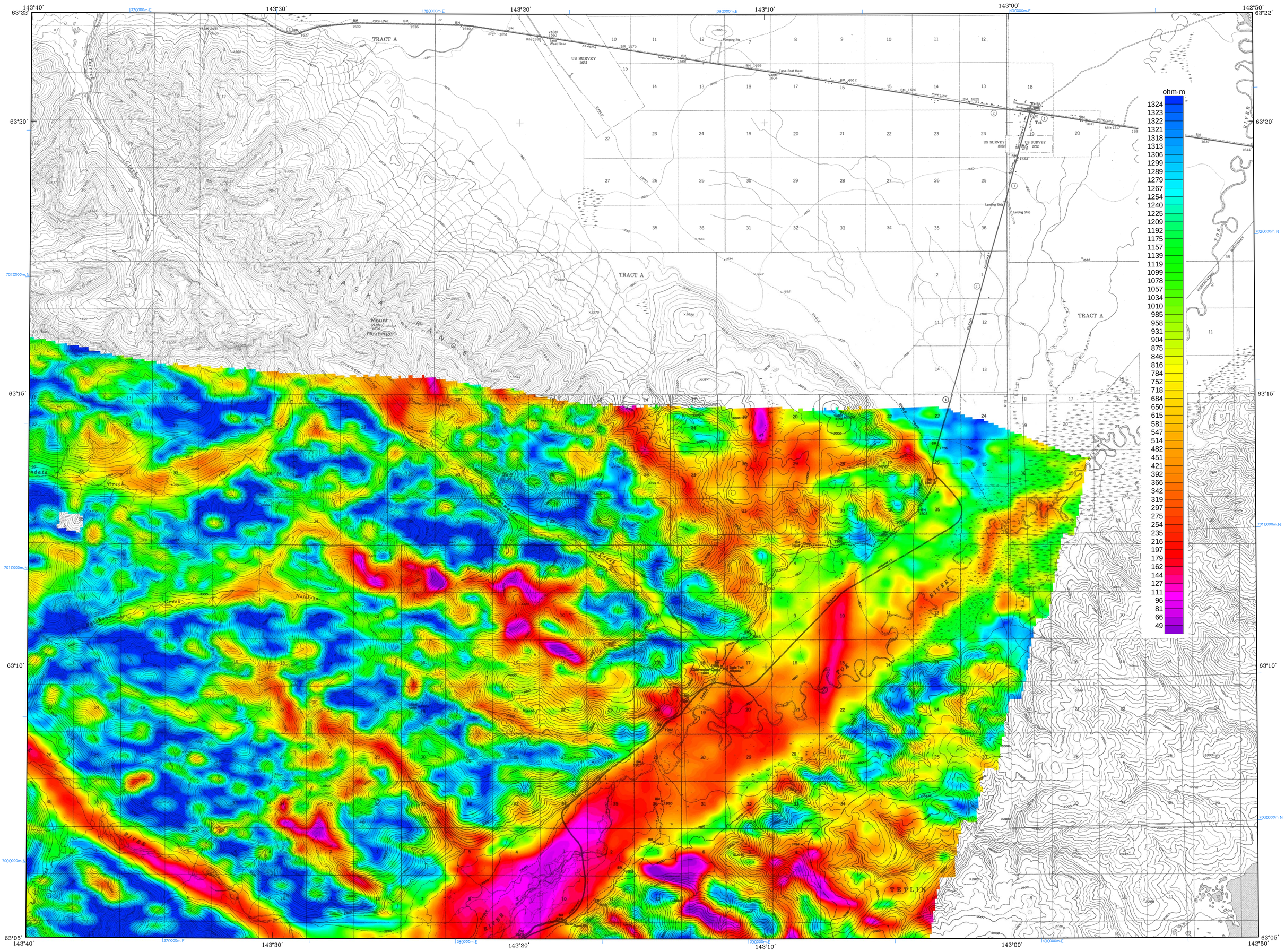
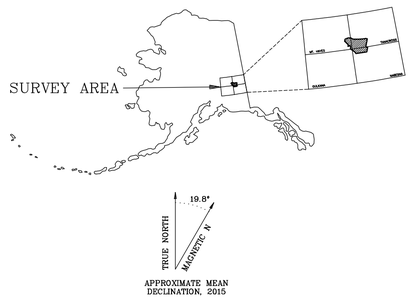


Base from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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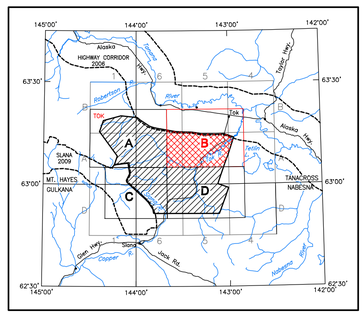
LOCATION INDEX OF 1:63,360–SCALE MAP



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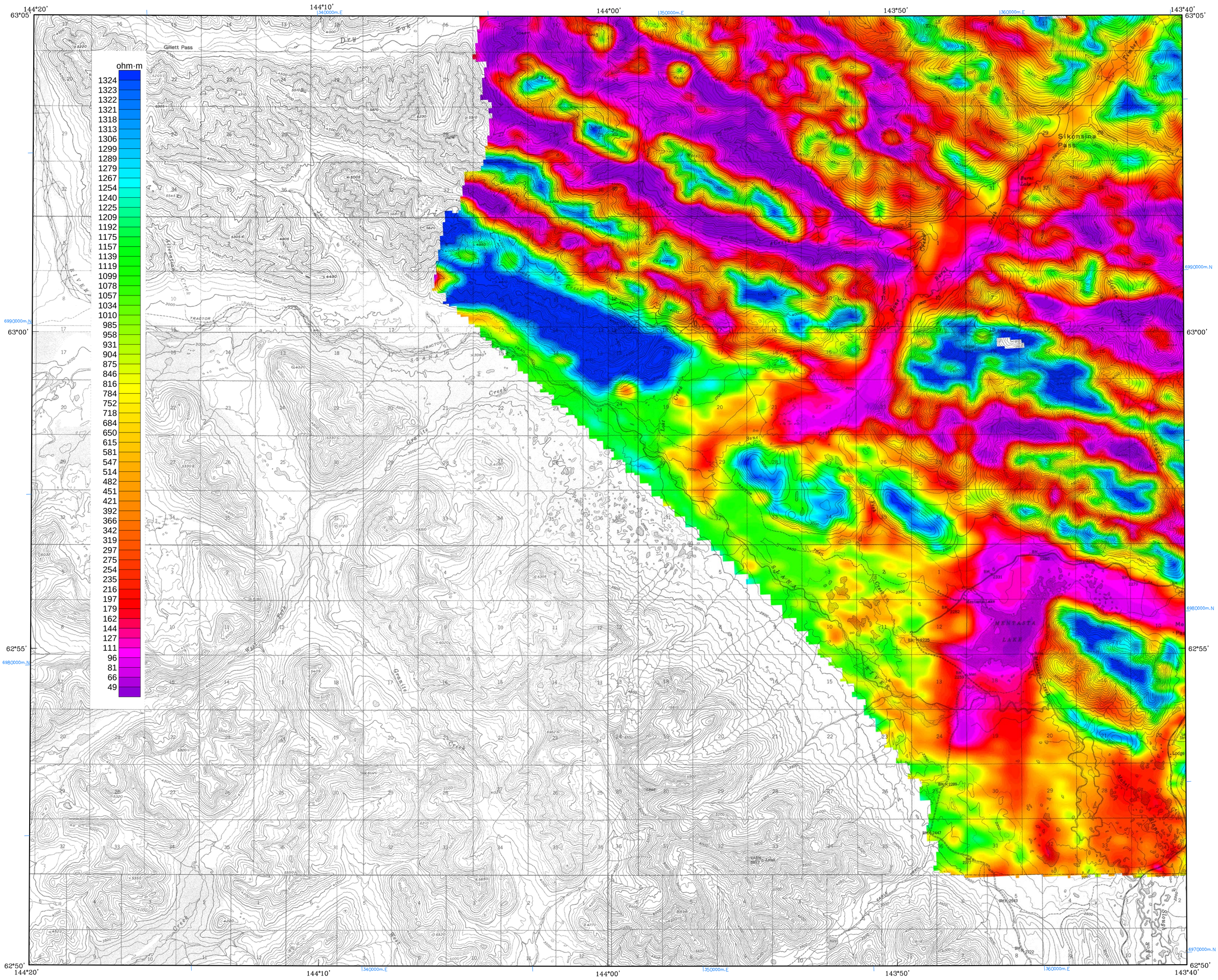
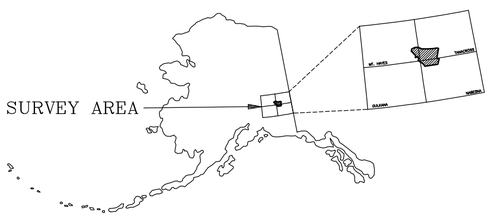
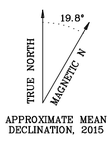


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 2015

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

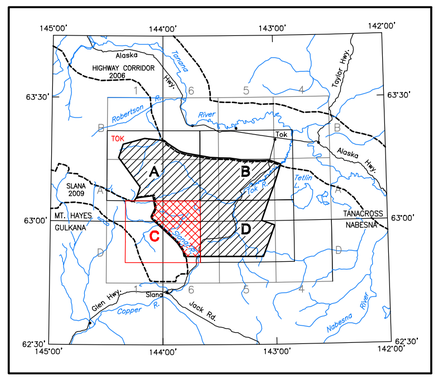
PARTS OF THE TANACROSS, NABESNA, MT. HAYES, AND GULKANA QUADRANGLES

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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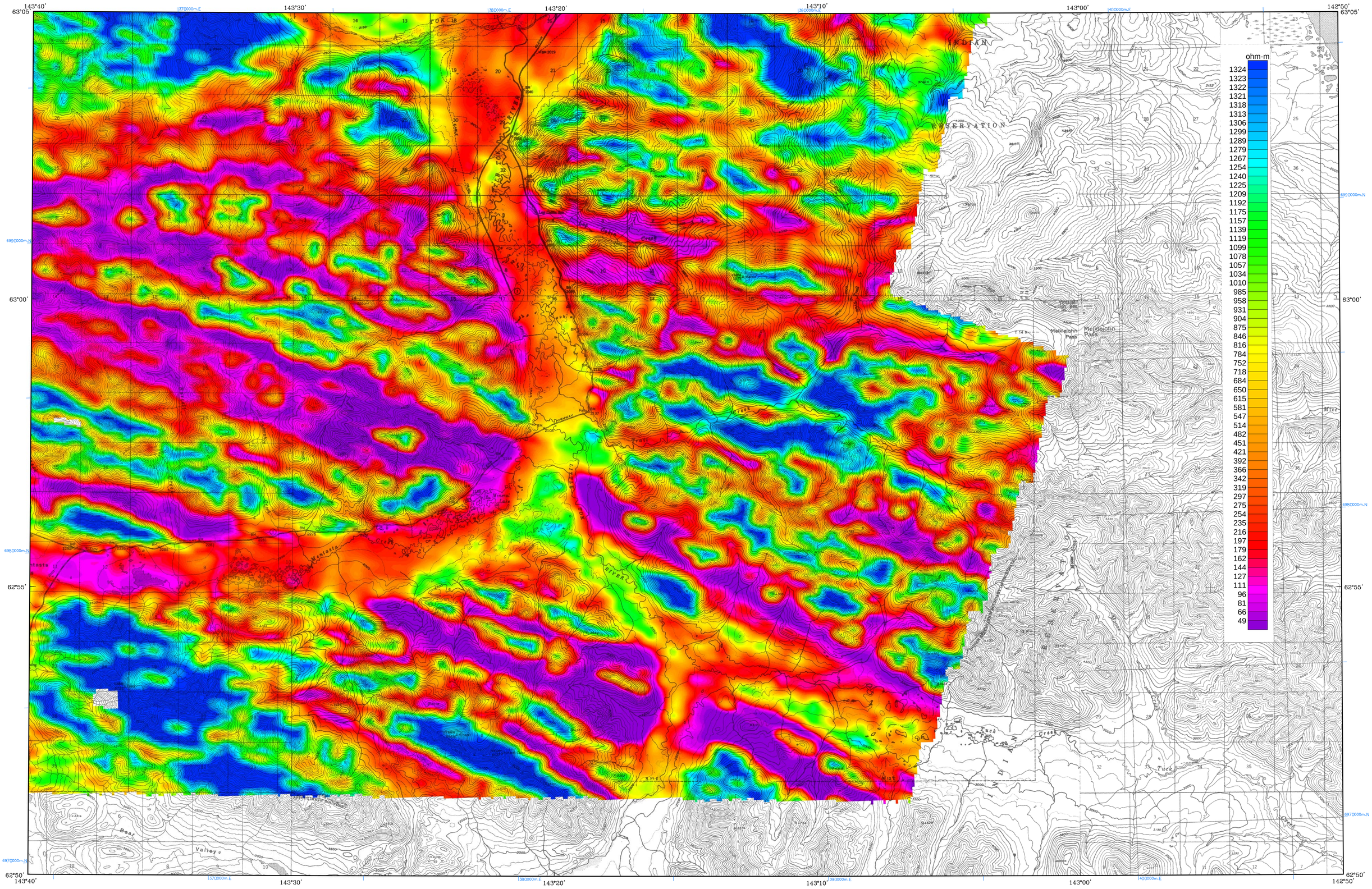
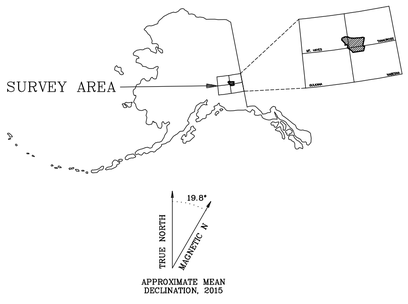


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1968; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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2015

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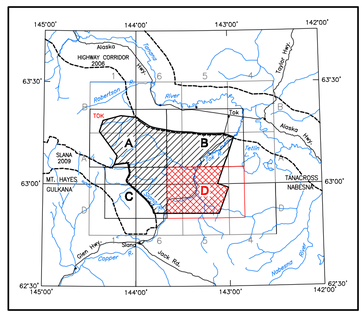

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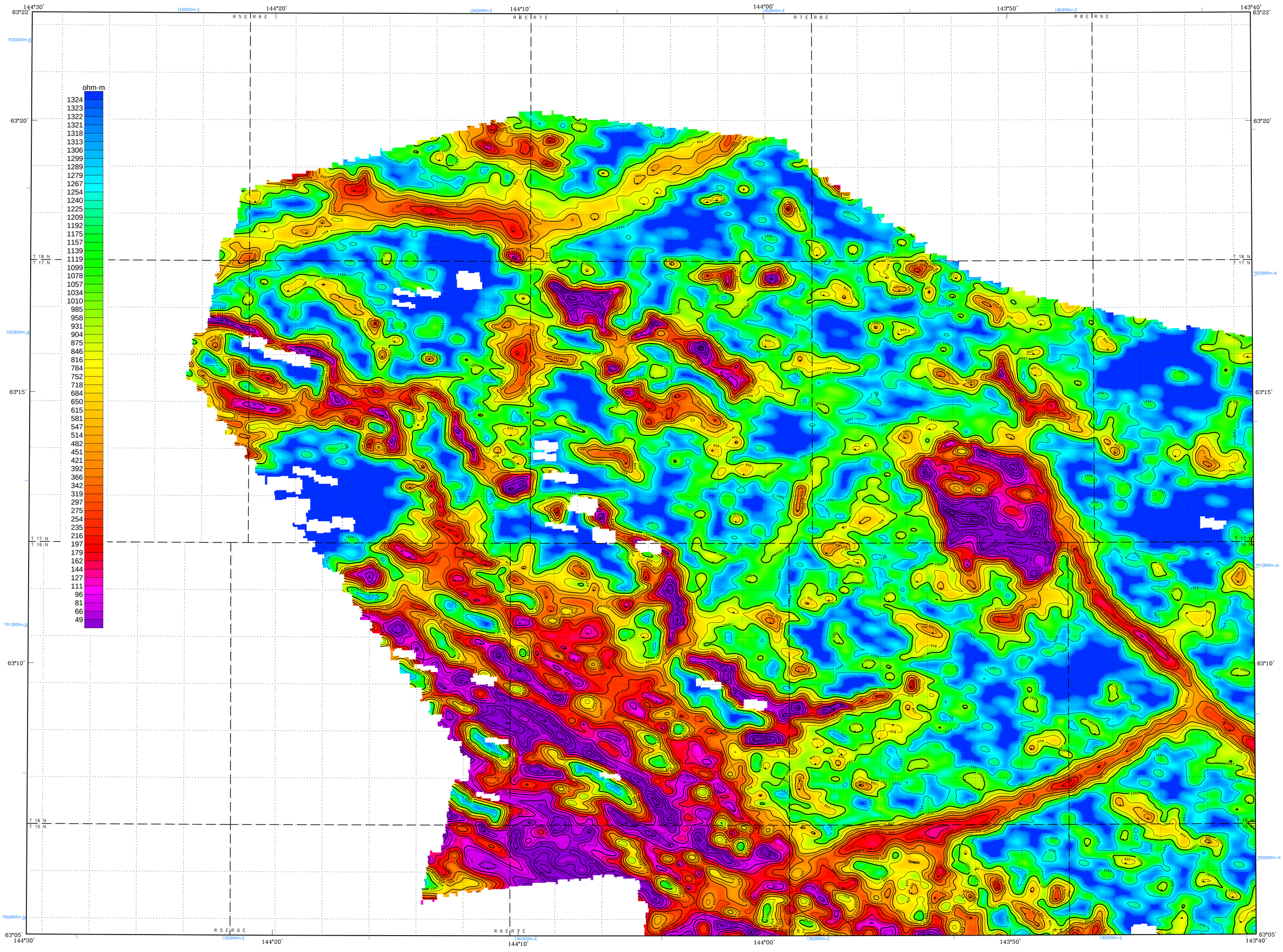
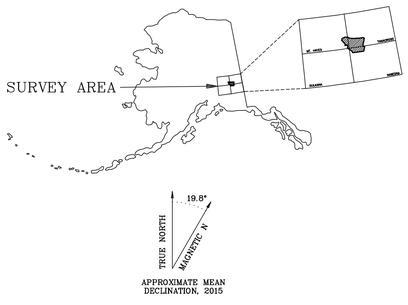


Section outlines from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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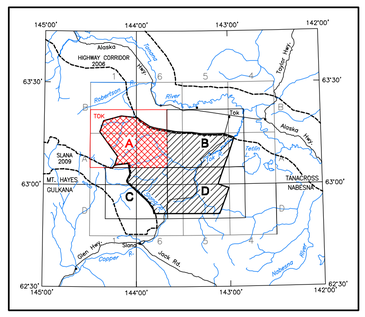
RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm–m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360–SCALE MAP



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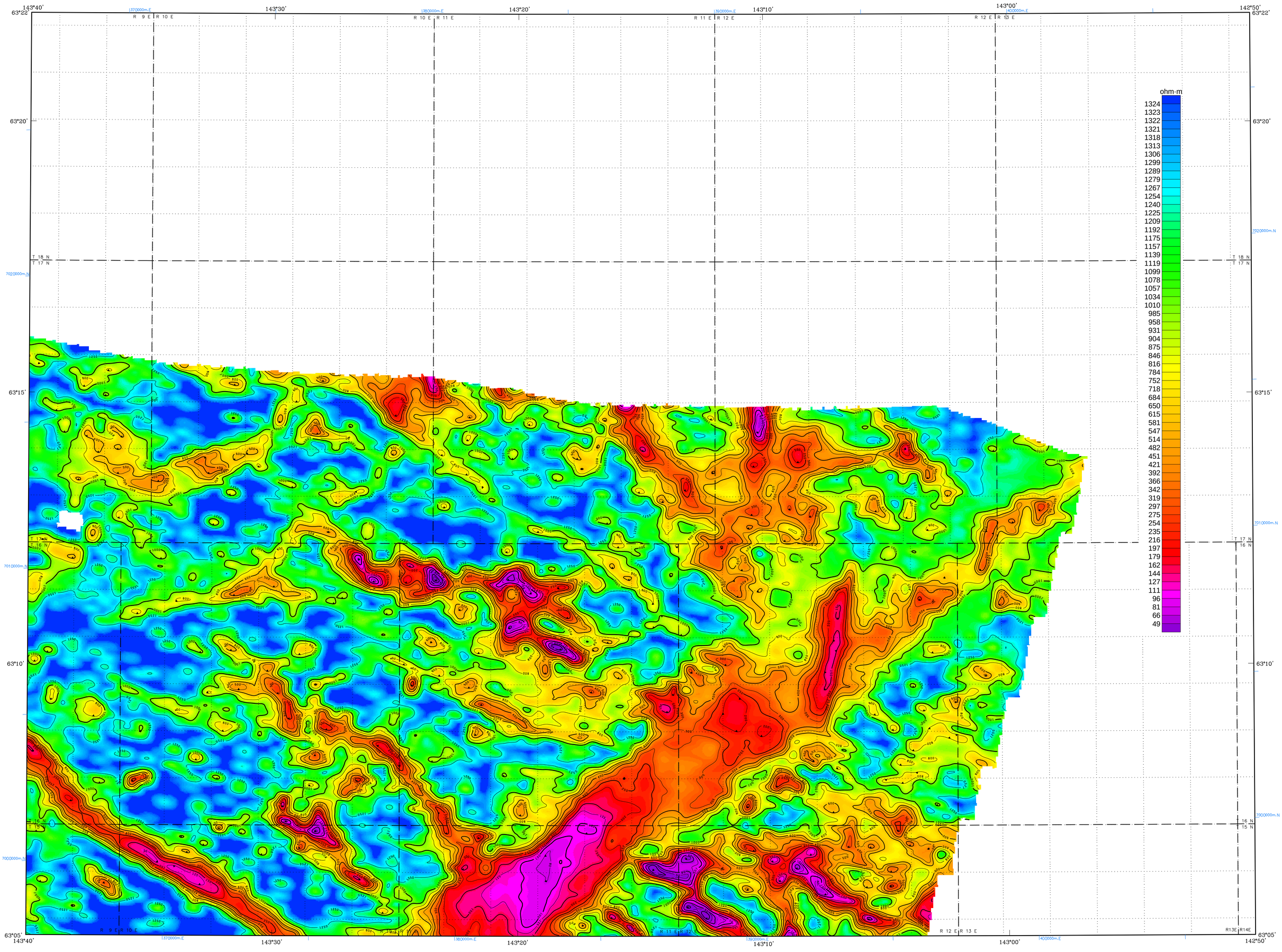
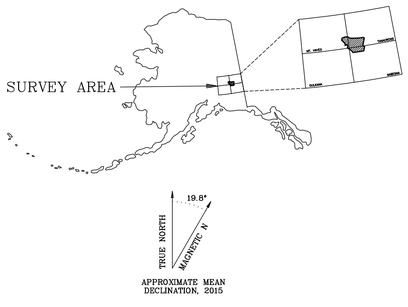


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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by

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2015

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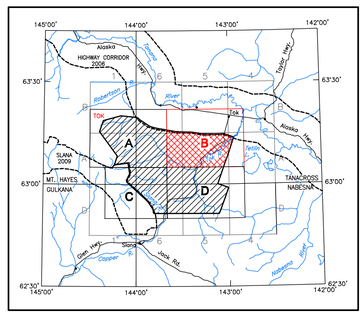
Contours in ohm–m at 10 intervals per decade

. . . . . resistivity low

LOCATION INDEX OF 1:63,360–SCALE MAP



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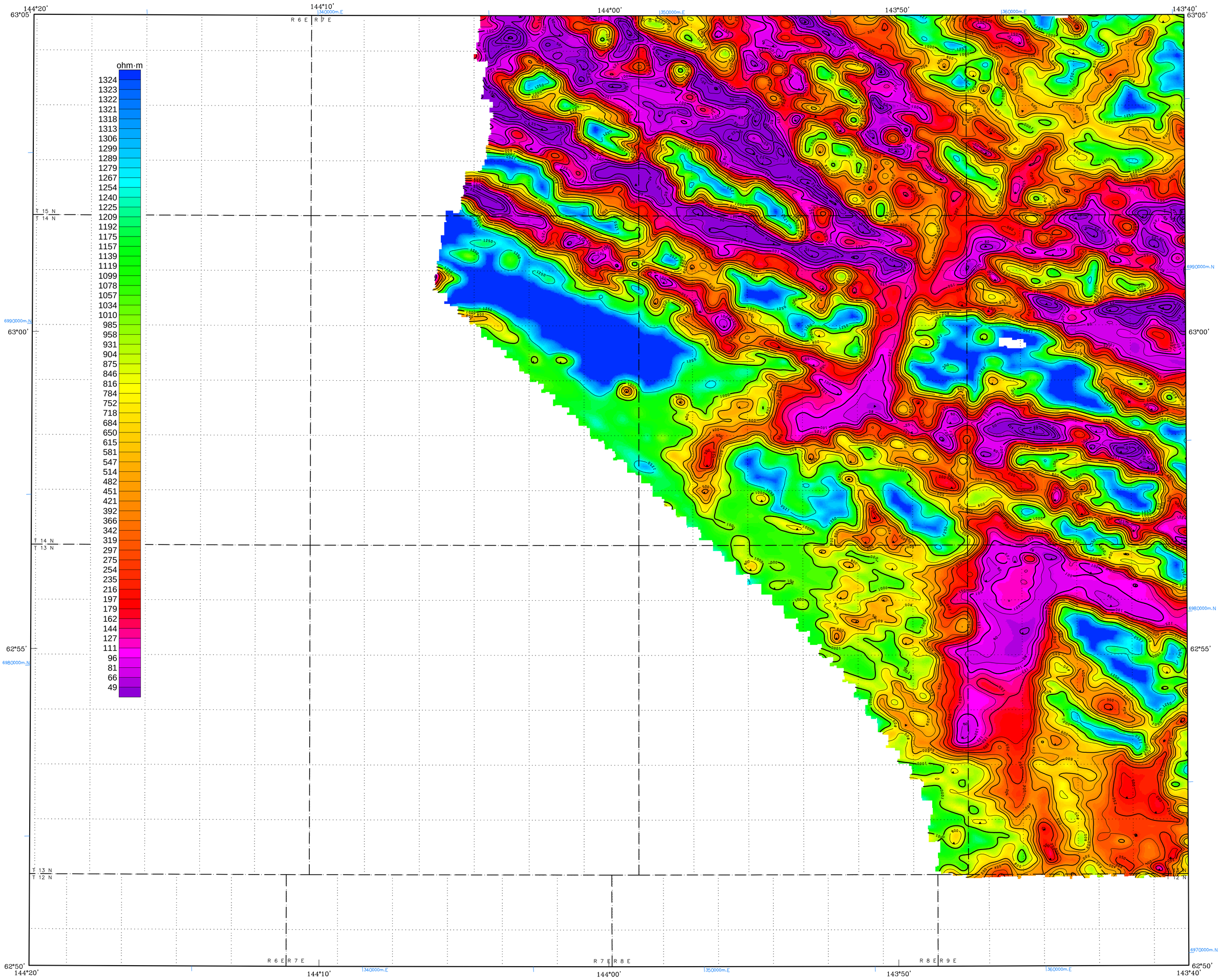

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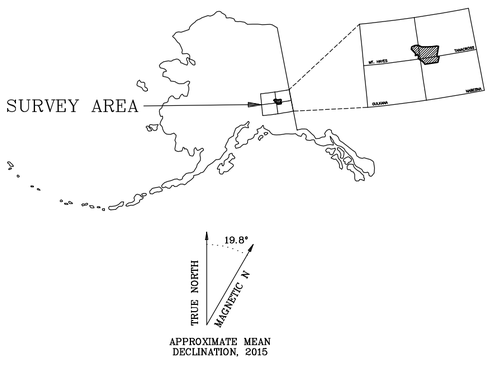

SCALE 1:63,360

1 0 1 2 3 4 MILES

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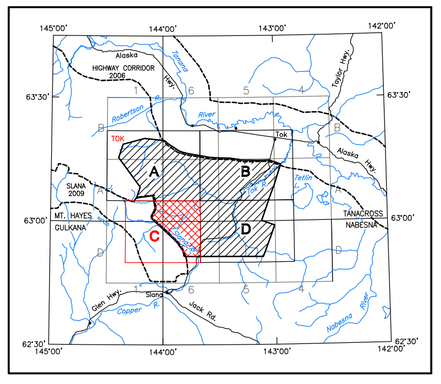

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Contours in ohm-m at 10 intervals per decade

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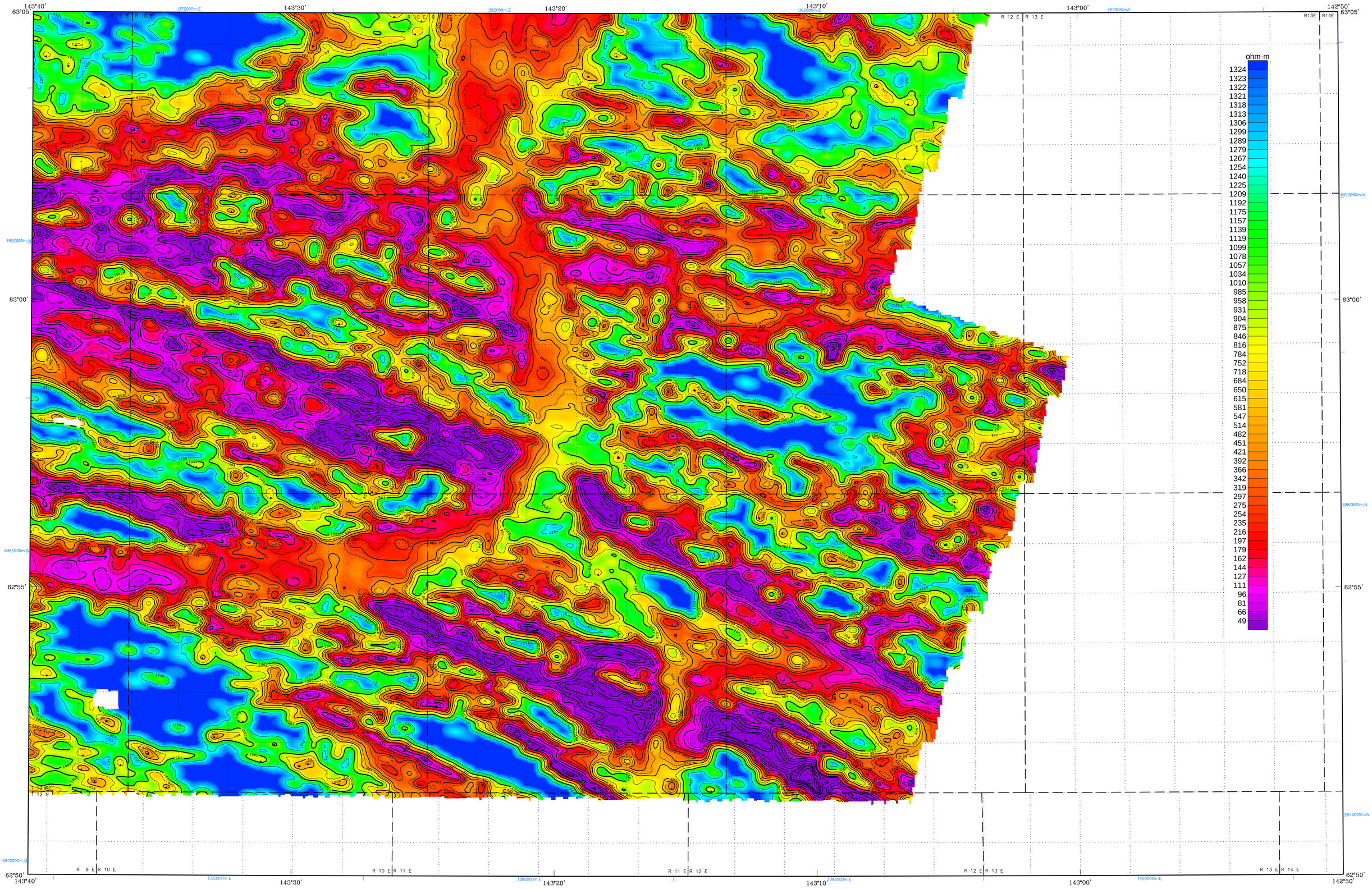

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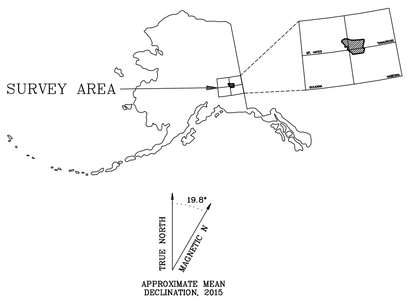

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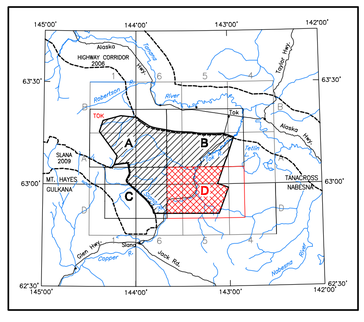

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[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

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.

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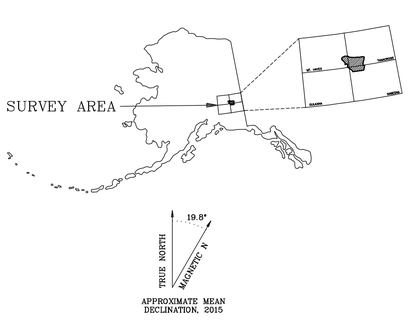
Base from U.S. Geological Survey Mt. Hayes A-1, 1975; B-1, 1982; Tanacross A-6, 1964; B-6, 1970; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

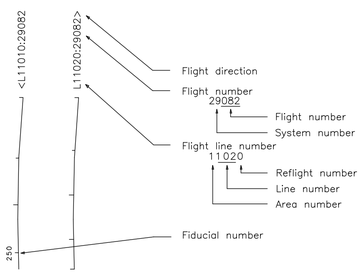
FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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

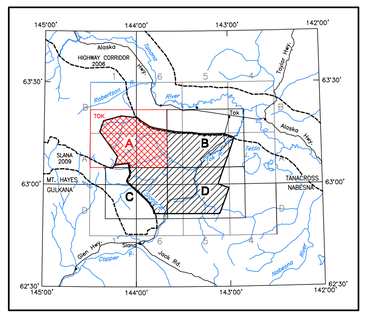
by

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

2015



LOCATION INDEX OF 1:63,360–SCALE MAP



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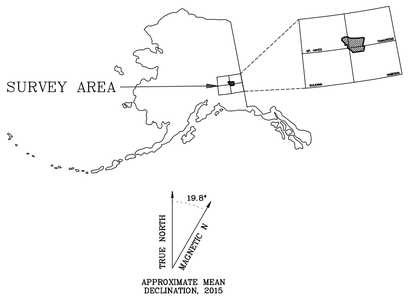

SCALE 1:63,360

1 0 1 2 3 4 MILES

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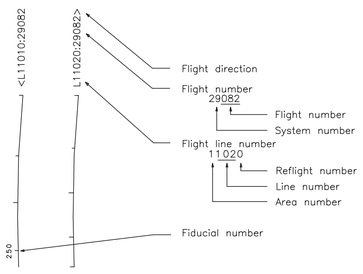
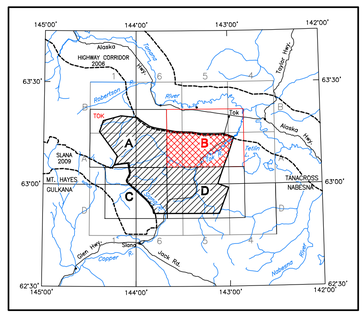
2015



LOCATION INDEX OF 1:63,360–SCALE MAP



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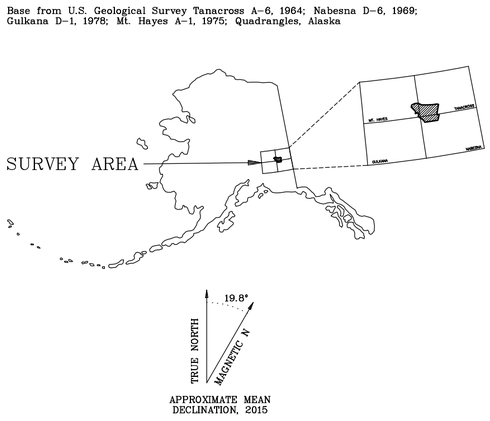
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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

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

by

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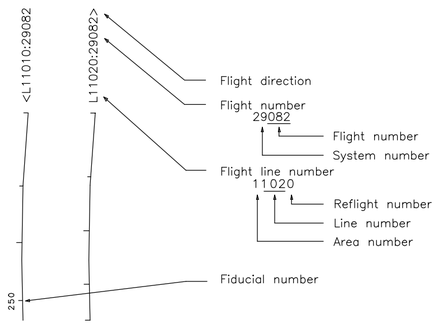
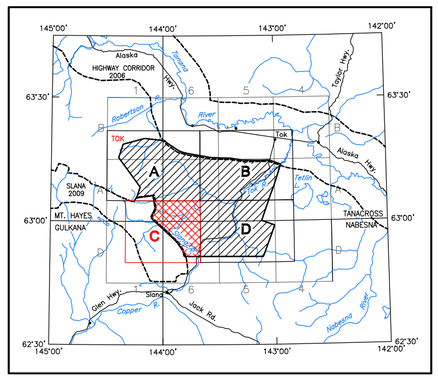
2015



LOCATION INDEX OF 1:63,360–SCALE MAP



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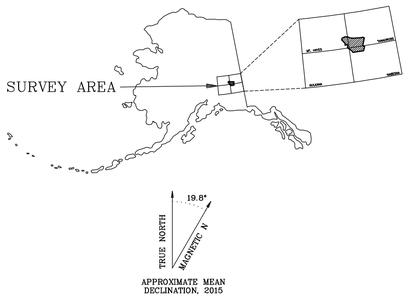


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

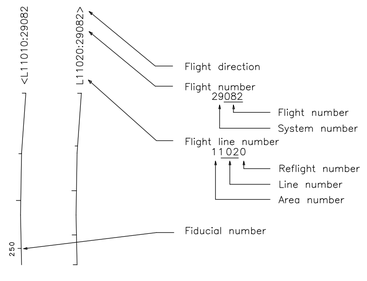
FLIGHT PATH WITH TOPOGRAPHY, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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

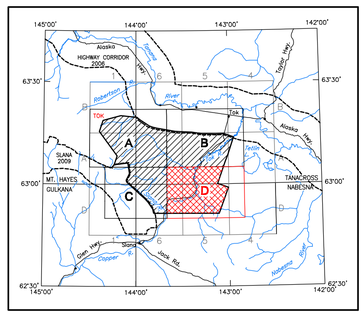
by

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

2015



LOCATION INDEX OF 1:63,360–SCALE MAP



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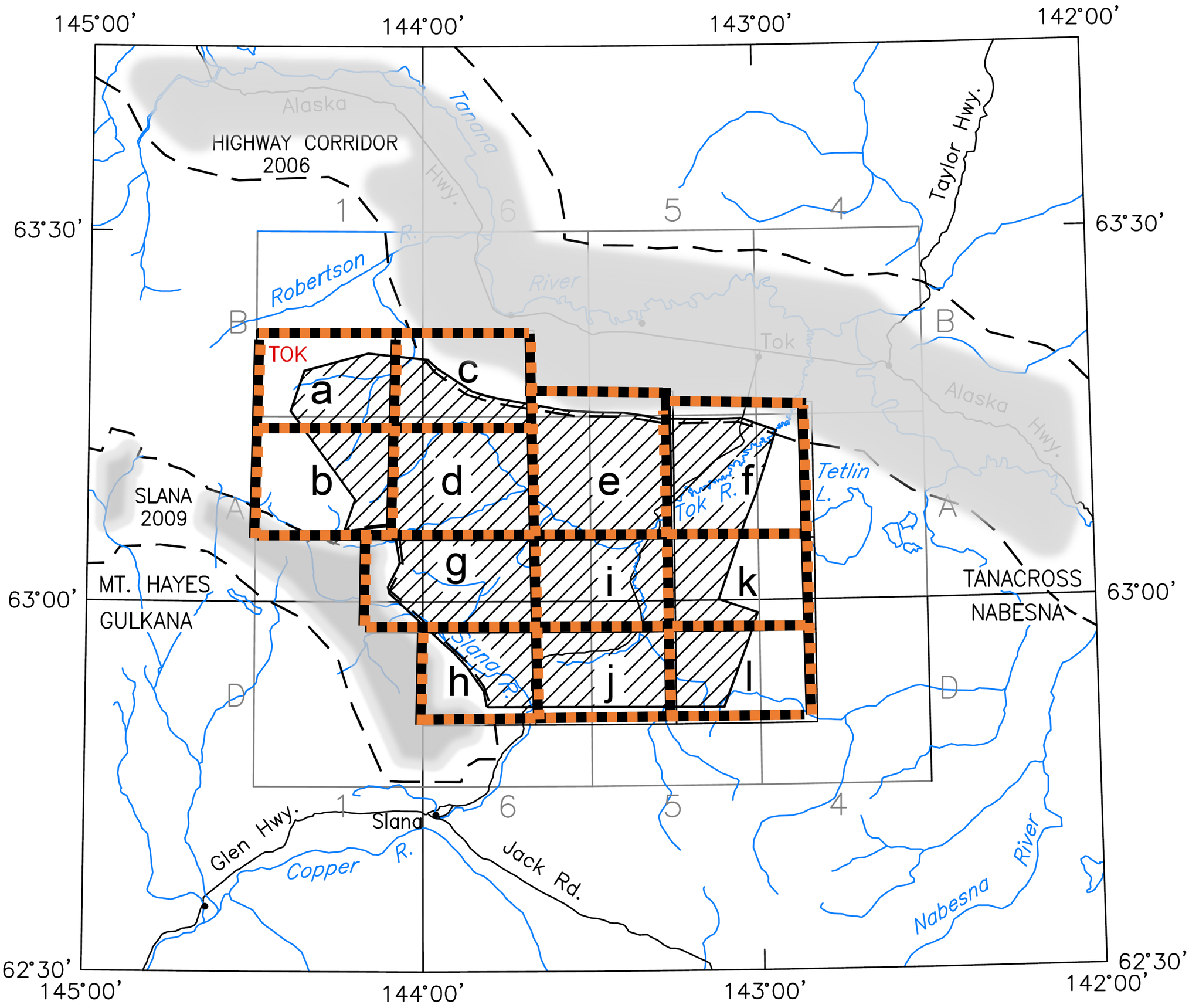
1:31,680-scale map sheet index

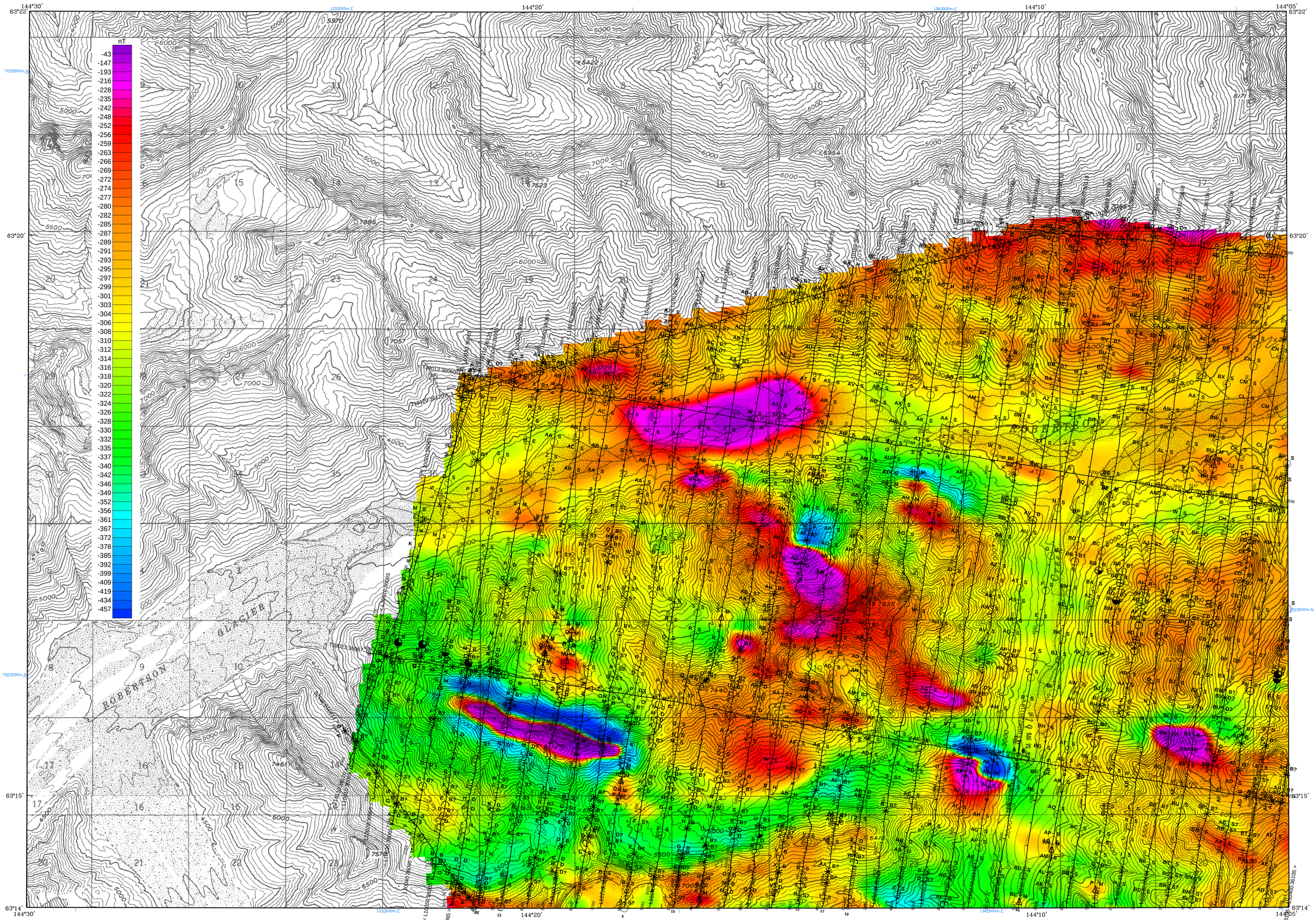


Tok survey 1:31,680-scale map sheet index, showing the map sheets a–l (orange dashes), survey area (hatched), prior surveys (shaded), highways, towns, rivers, relevant 1:250,000 quadrangle boundaries (solid black lines), and relevant 1:63,360 quadrangle boundaries (light grey grid with alphanumeric labels).

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15a

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



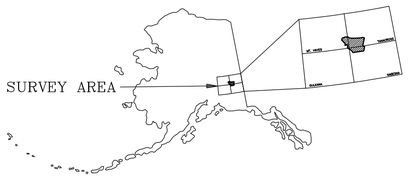
Base from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Quadrangles, Alaska

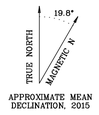
SCALE 1:31,680

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

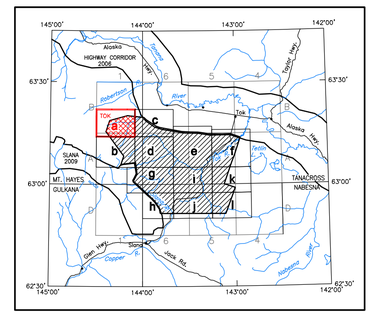
PARTS of MT. HAYES A-1 and B-1 QUADRANGLES

by

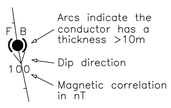
Abraham M. Emond, CGG, and CGG Land (U.S.) Inc.

2015

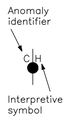
LOCATION INDEX OF 1:31,680–SCALE MAP



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

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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.

[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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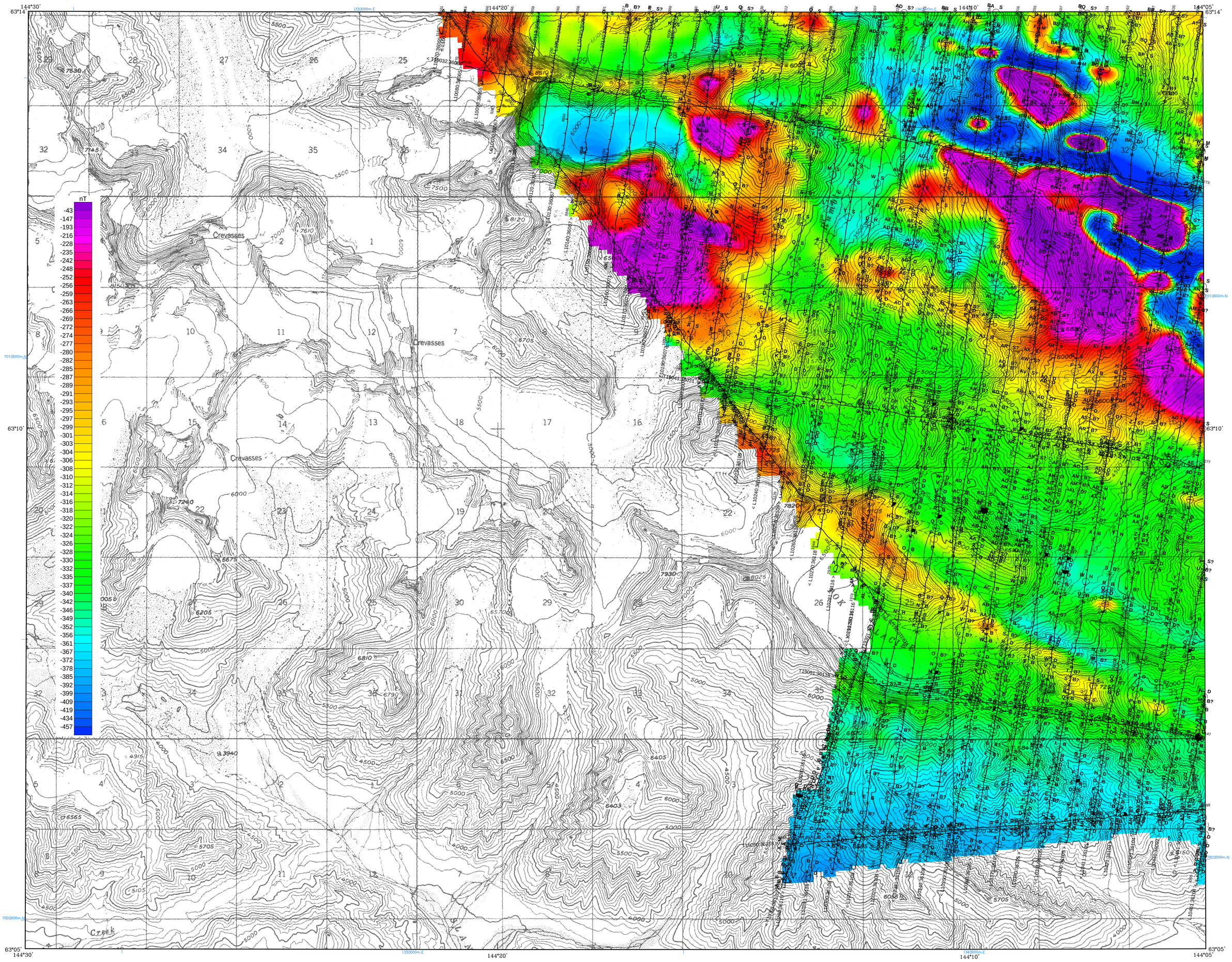


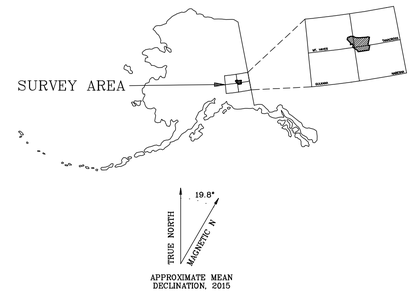
Base from U.S. Geological Survey Mt. Hayes A-1, 1975; Quadrangle, Alaska

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

PART of MT. HAYES A-1 QUADRANGLE

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2015

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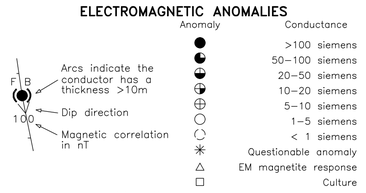
ELECTROMAGNETIC ANOMALIES



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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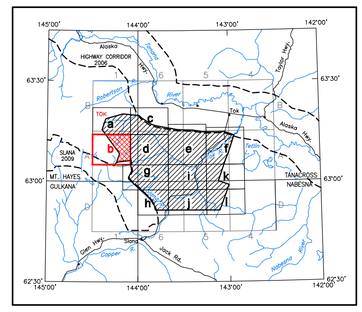
LOCATION INDEX OF 1:31,680–SCALE MAP



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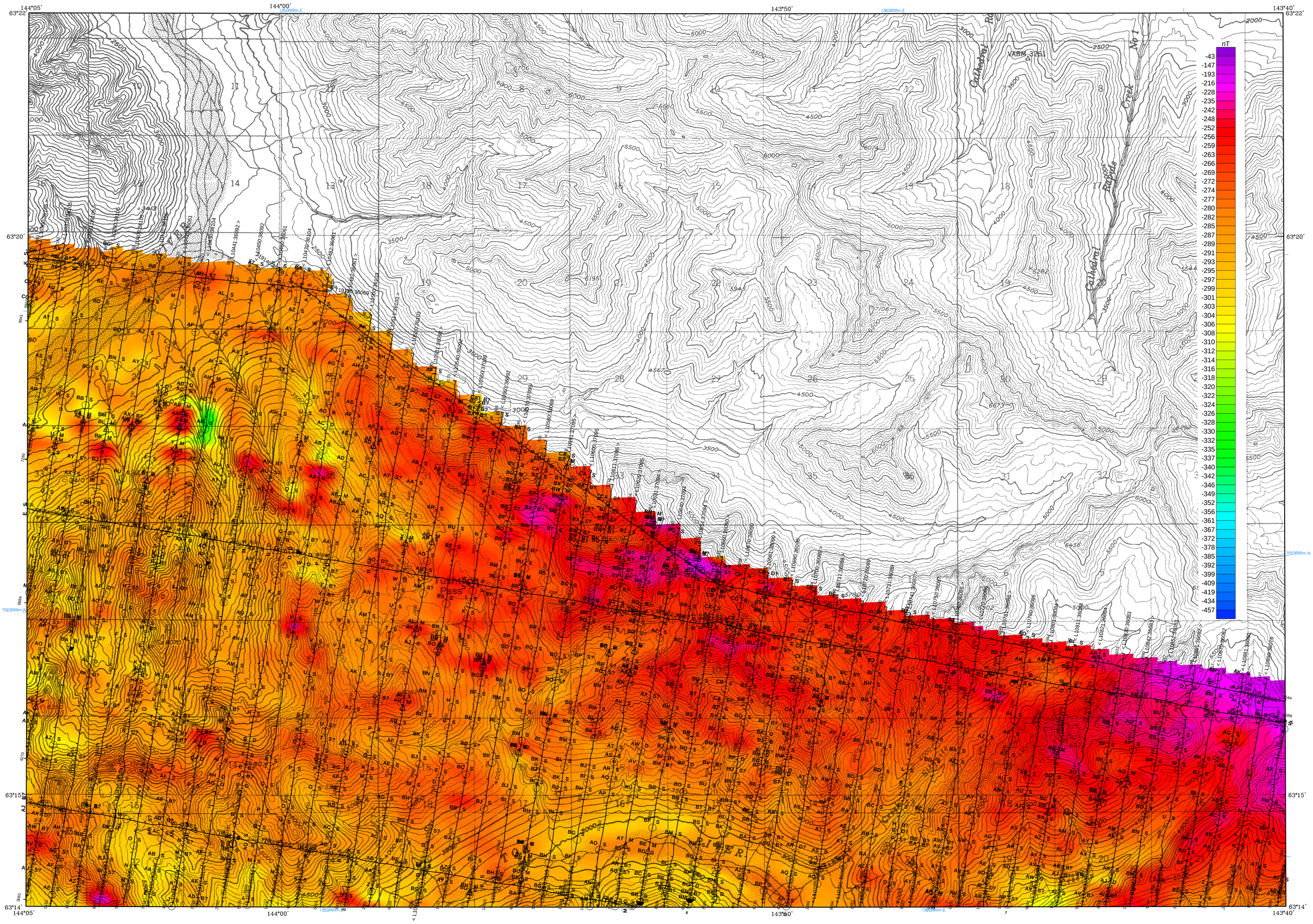
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15c
PARTS of TANACROSS A-6, B-6, MT. HAYES A-1 and B-1 QUADRANGLES

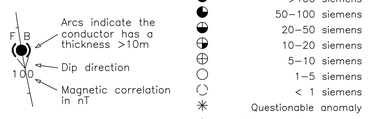


RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

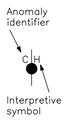
PARTS of TANACROSS A-6, B-6, MT. HAYES A-1 and B-1 QUADRANGLES

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

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
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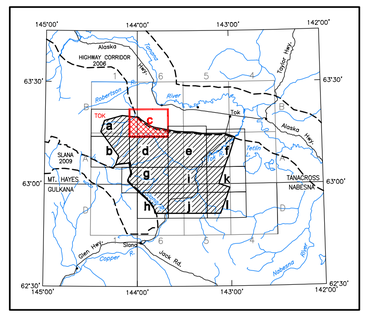

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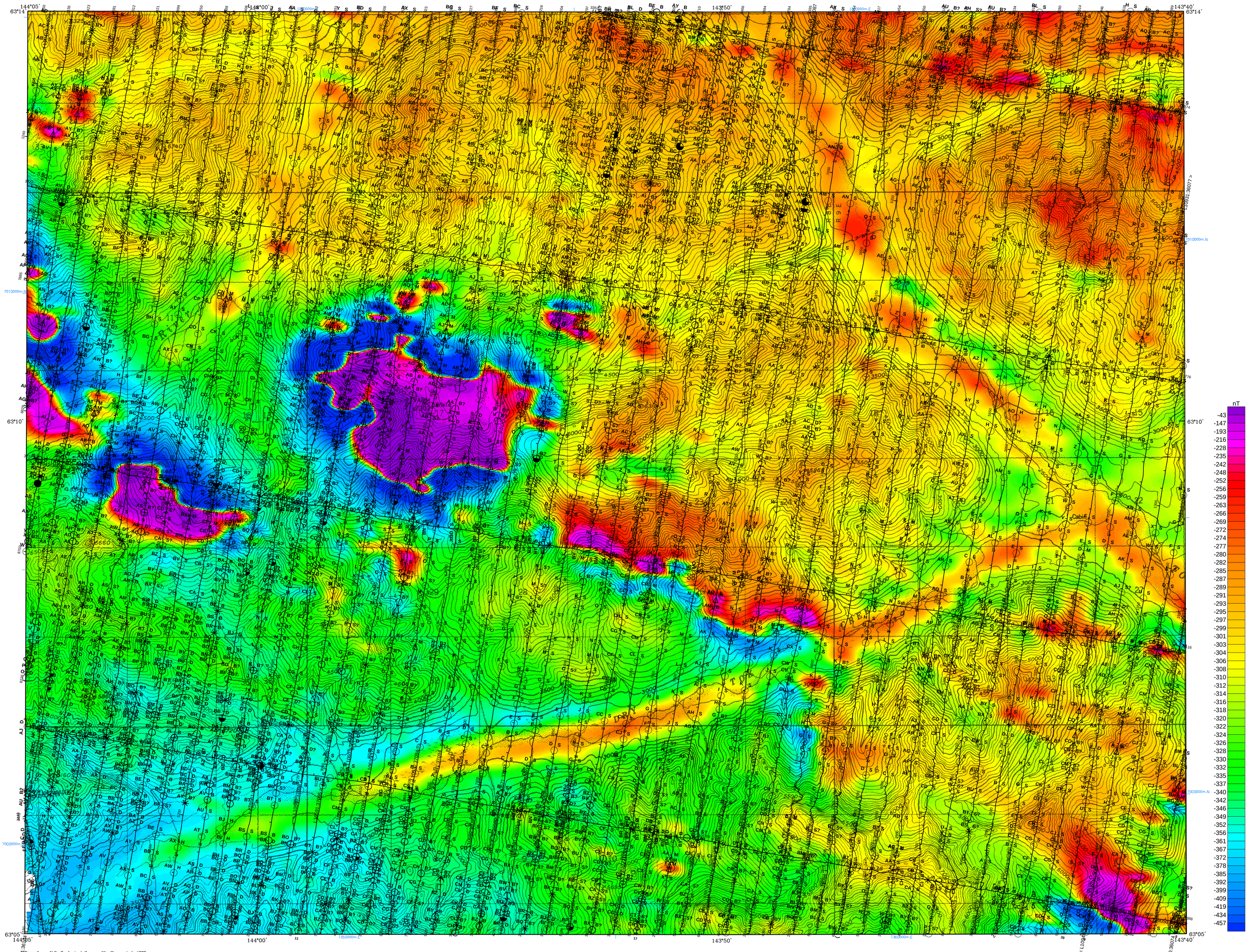
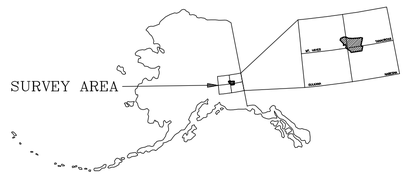
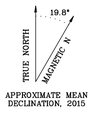
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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





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

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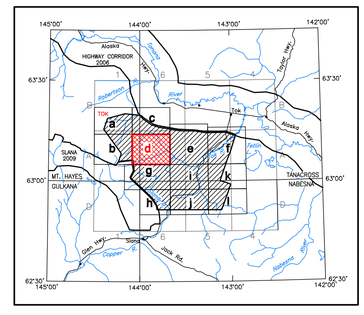
PARTS of TANACROSS A-6 and MT. HAYES A-1 QUADRANGLES

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

LOCATION INDEX OF 1:31,680–SCALE MAP



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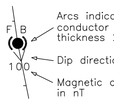

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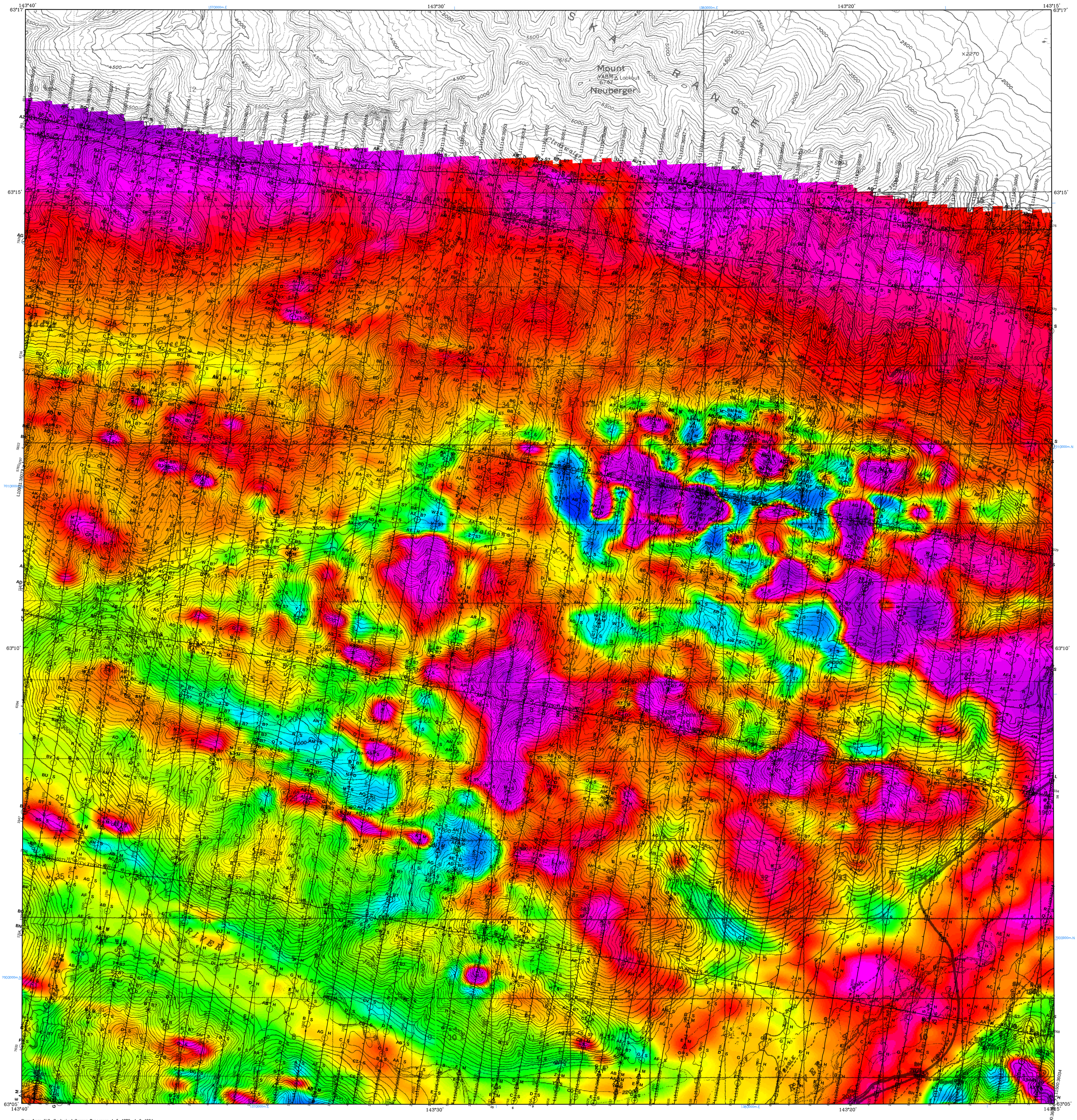
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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

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

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by
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2015

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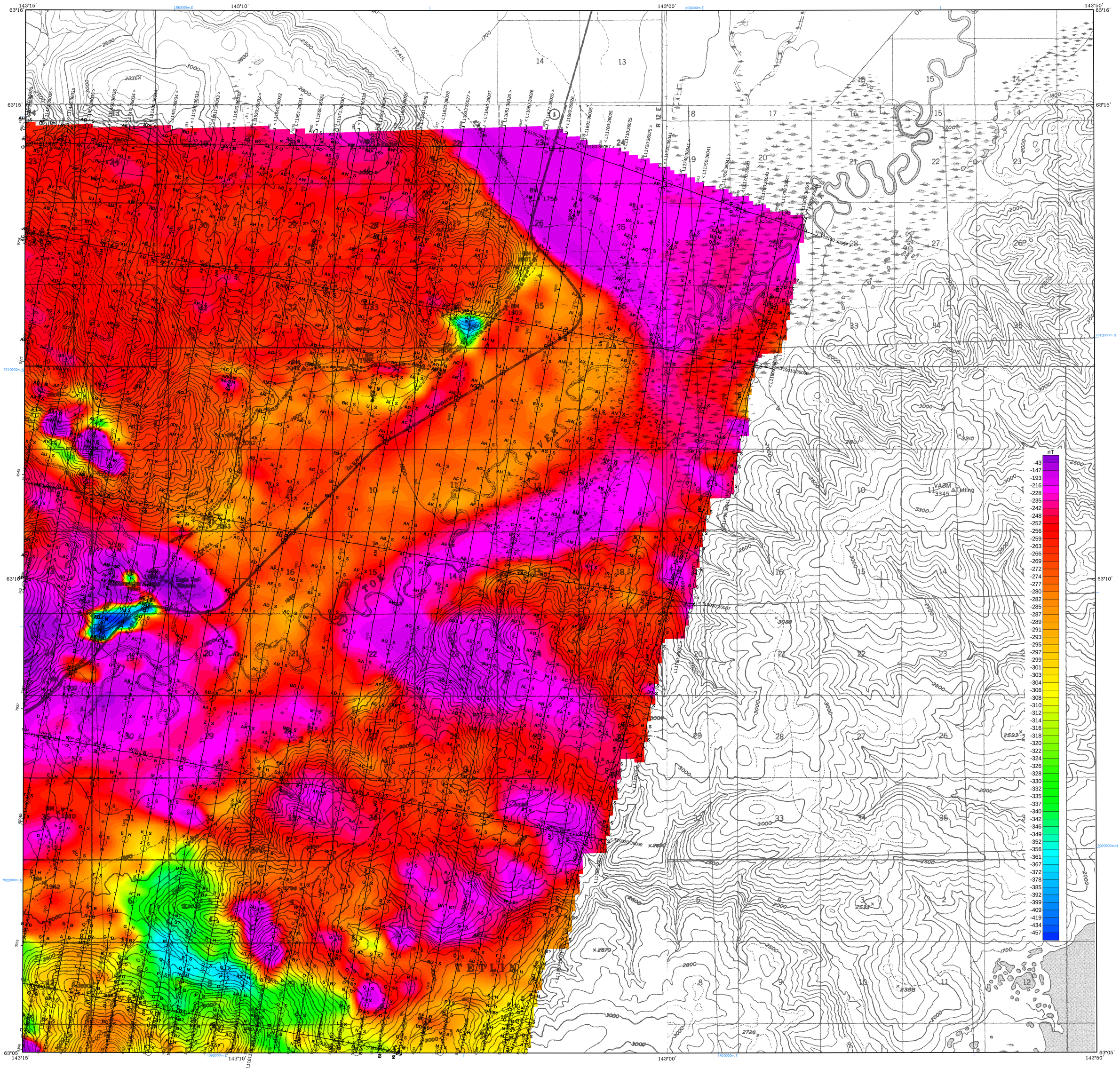
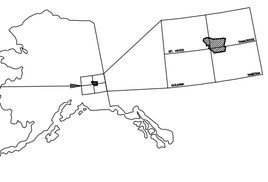
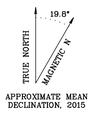


Base from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; B-4, 1949; B-5, 1994; Quadrangles, Alaska

SURVEY AREA





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2015

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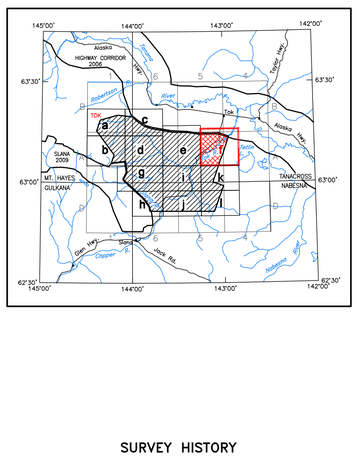

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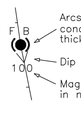

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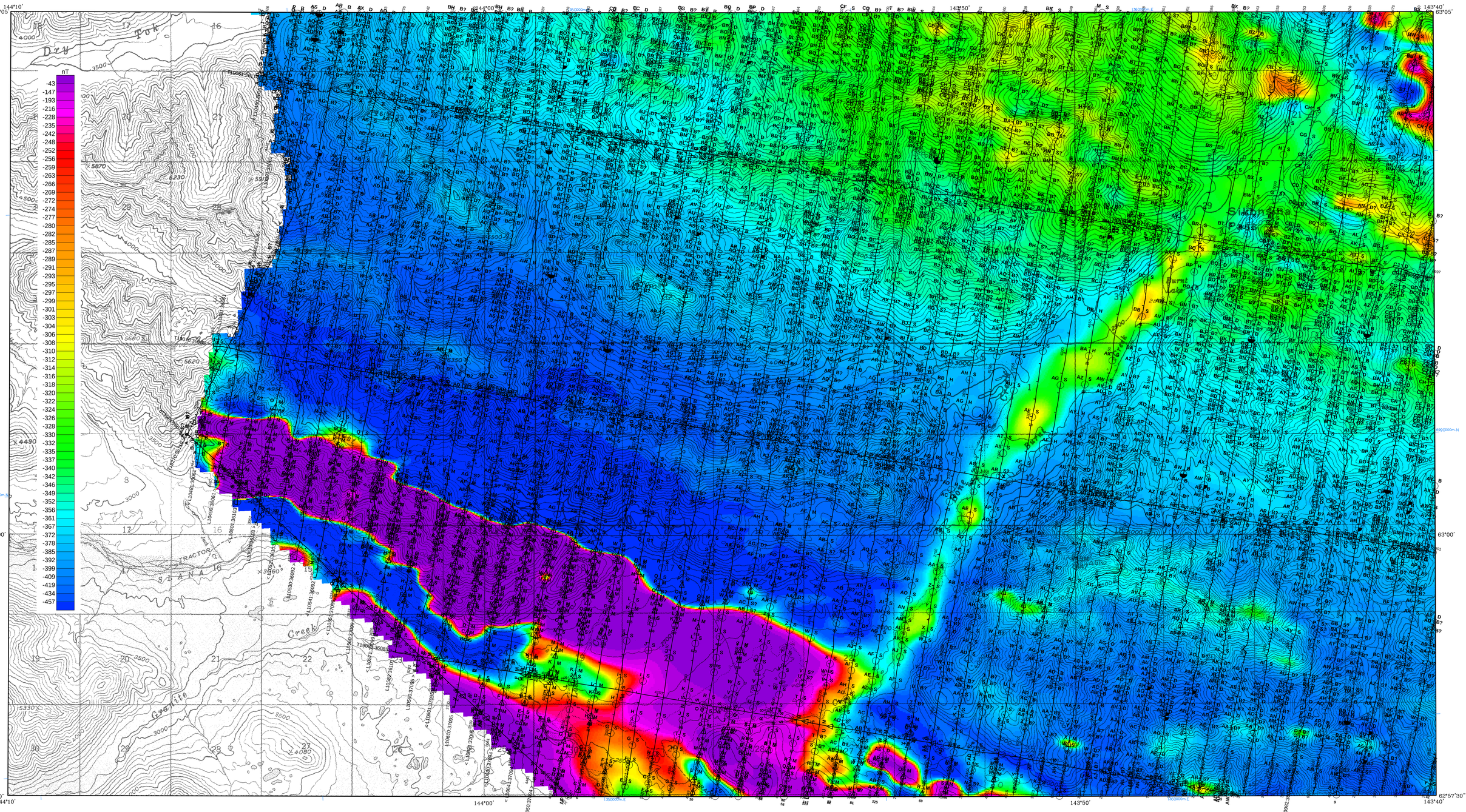


SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

0.5 0 0.5 1 1.5 2 2.5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

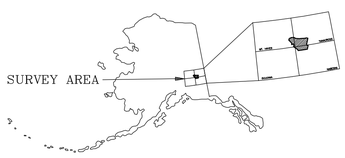
RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES WITH TOPOGRAPHY OF THE TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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

by

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

2015



APPROXIMATE MEAN DECLINATION, 2015

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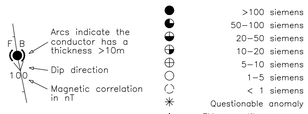
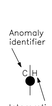
ELECTROMAGNETIC ANOMALIES



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
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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")
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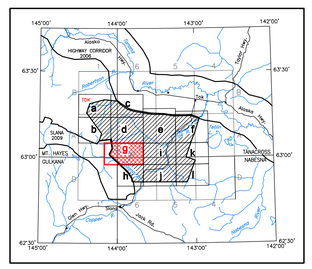
LOCATION INDEX OF 1:31,680–SCALE MAP



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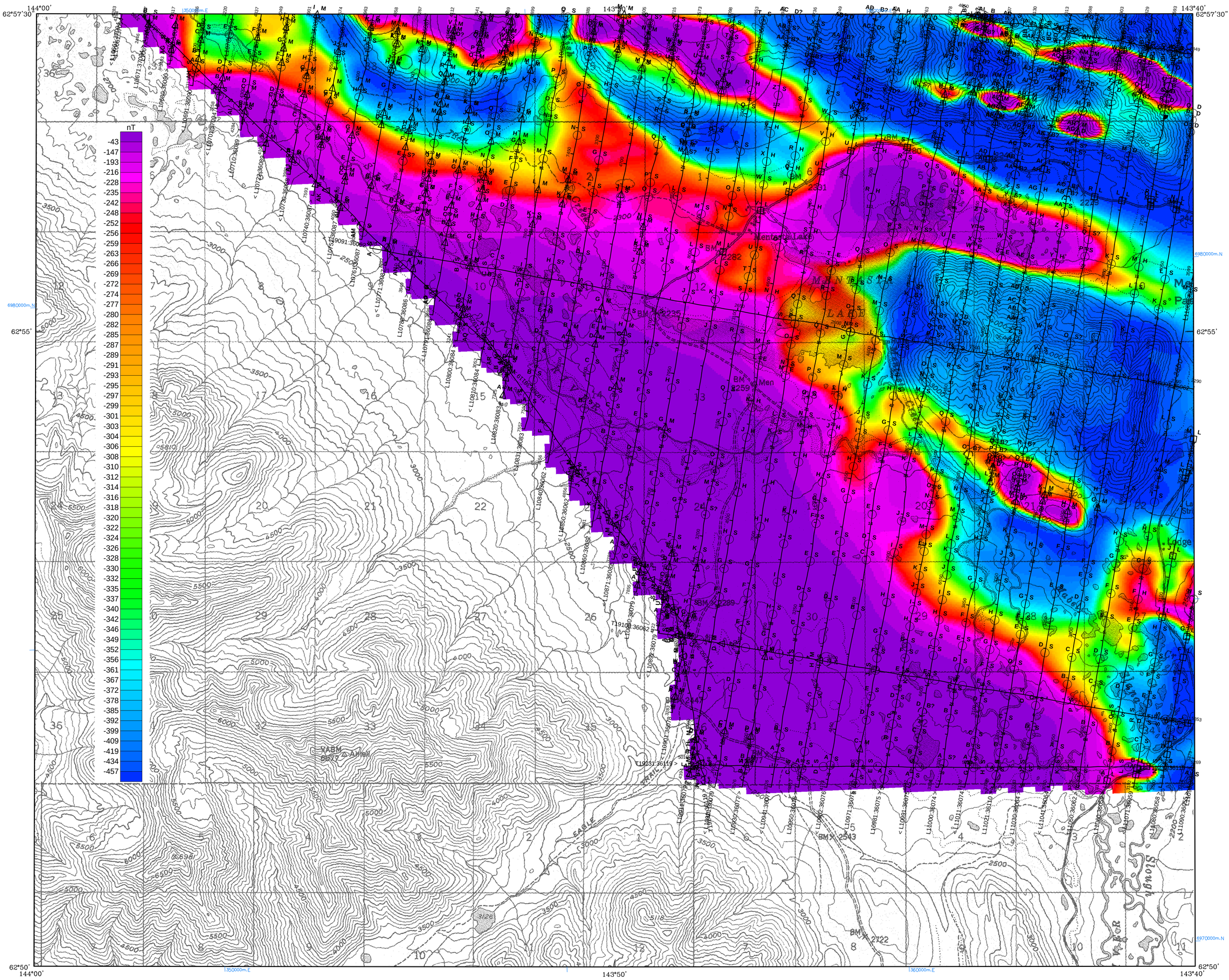


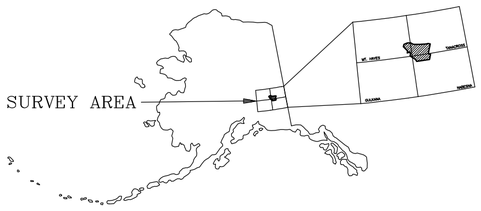
Base from U.S. Geological Survey Nabesna D–6, 1969; Quadrangle, Alaska

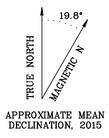
SCALE 1:31,680

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





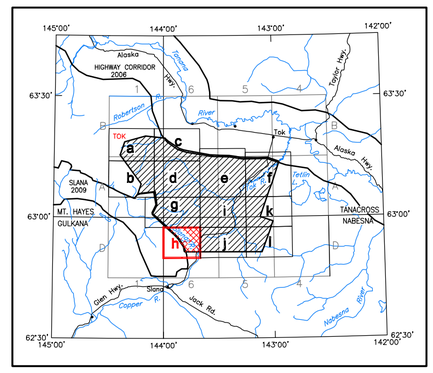
APPROXIMATE MEAN DECLINATION, 2015

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

PART of NABESNA D-6 QUADRANGLE

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
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◌	< 1 siemens
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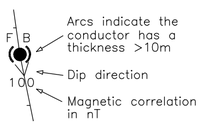

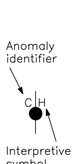

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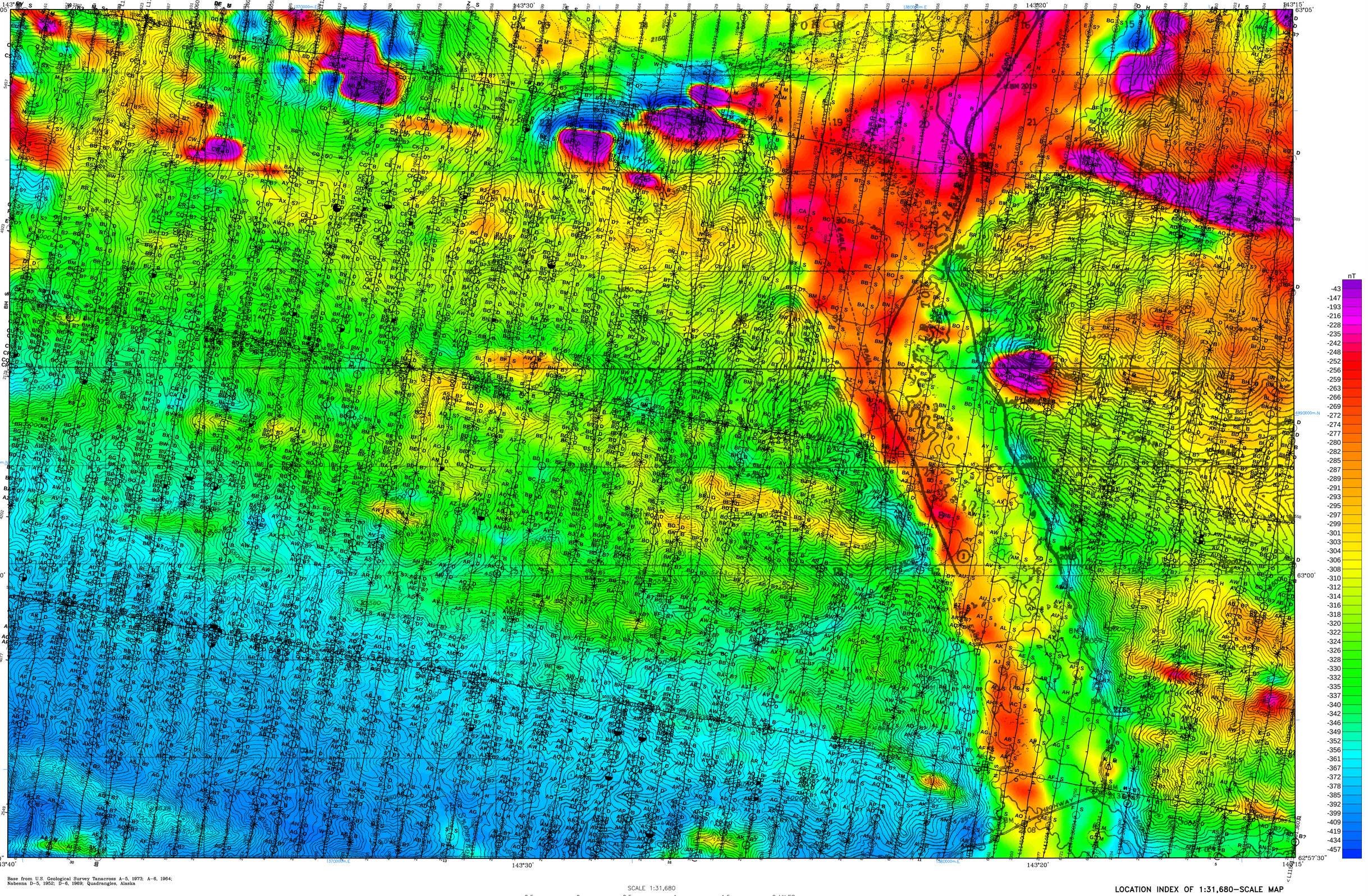
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2015-2-15i

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



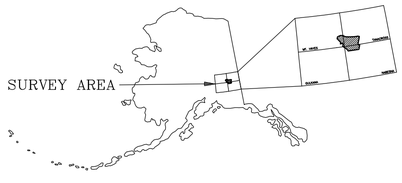
Base from U.S. Geological Survey Tanacross A–5, 1973; A–6, 1964; Nabesna D–5, 1952; D–6, 1969; Quadrangles, Alaska

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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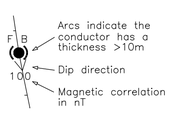

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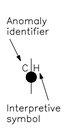

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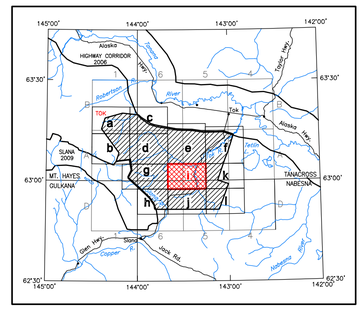

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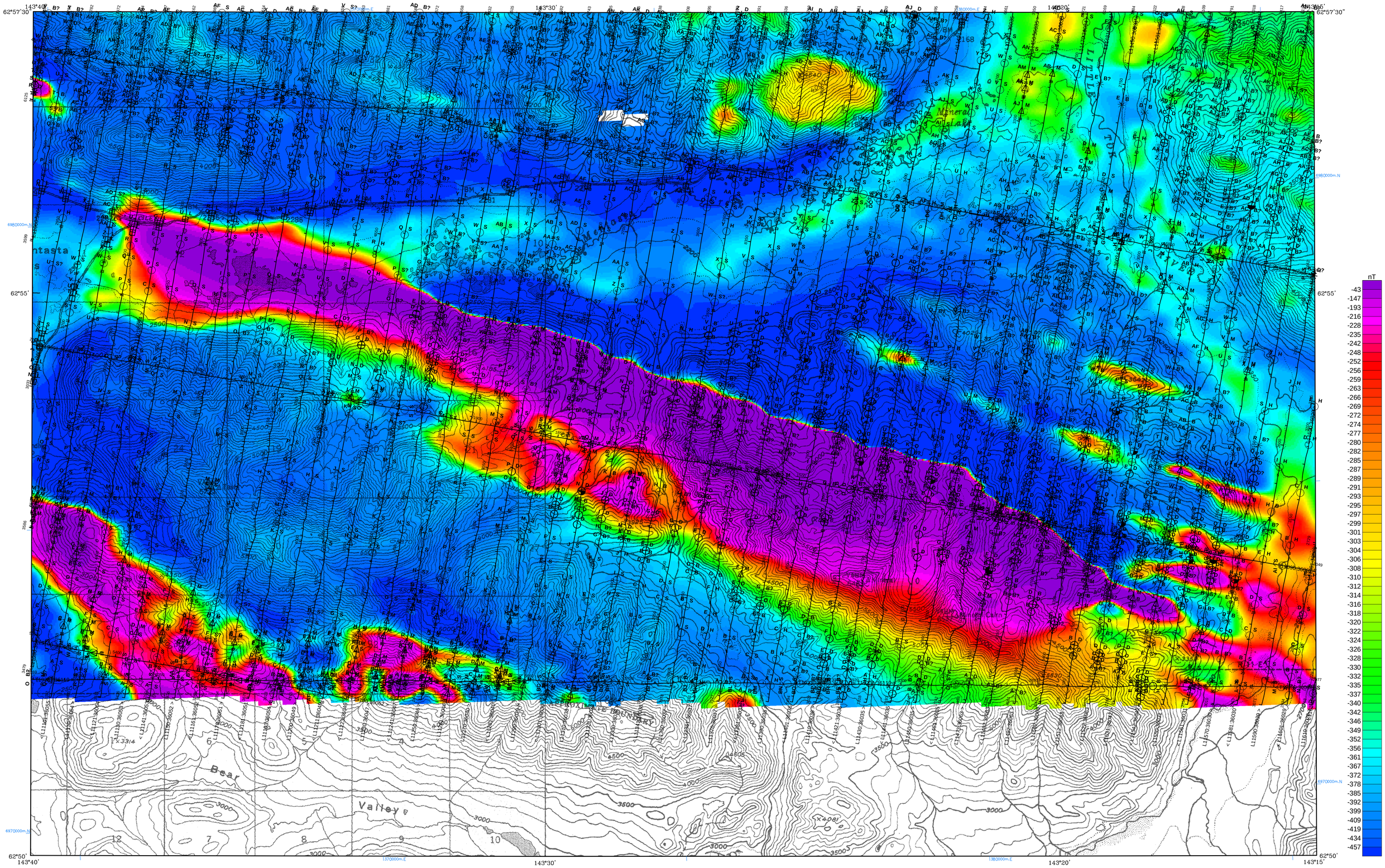

Base from U.S. Geological Survey Nabesna D-5, 1952; D-6, 1969; Quadrangles, Alaska

SCALE 1:31,680

0.5 0 0.5 1 1.5 2 MILES

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PARTS of NABESNA D-5 and D-6 QUADRANGLES

by
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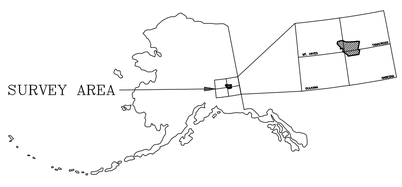
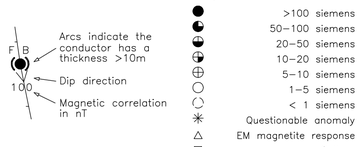
2015

SURVEY AREA



APPROXIMATE MEAN DECLINATION, 2015

ELECTROMAGNETIC ANOMALIES



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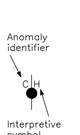

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M	Magnetite
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ELECTROMAGNETICS

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.

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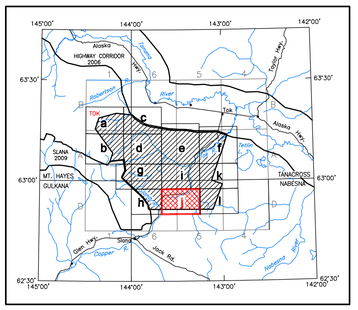
[1] Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

LOCATION INDEX OF 1:31,680–SCALE MAP



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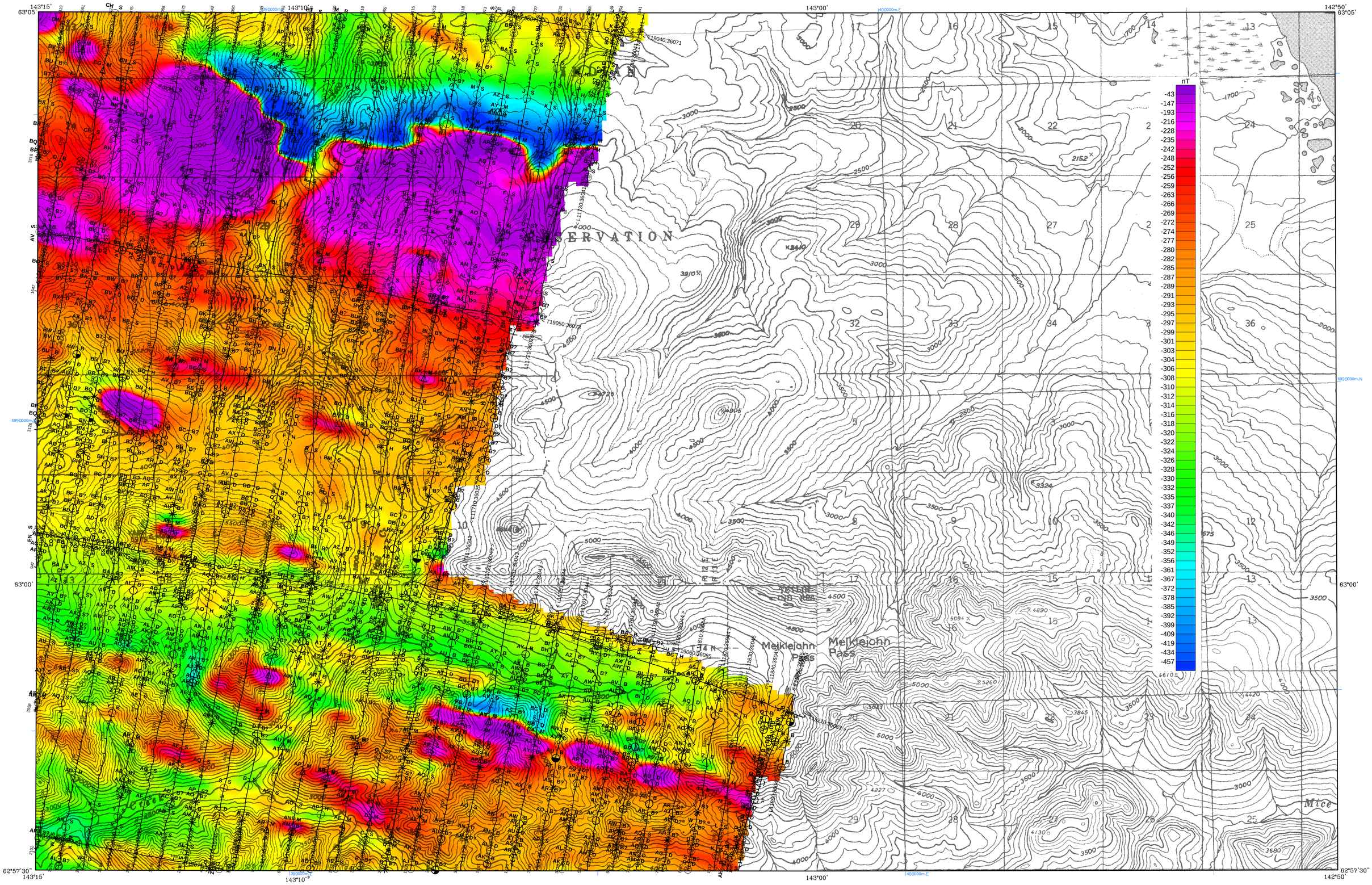


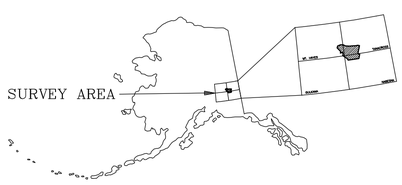
Base from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; Nabesna D–4, 1954; D–5, 1952; Quadrangles, Alaska

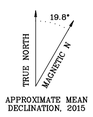
SCALE 1:31,680

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





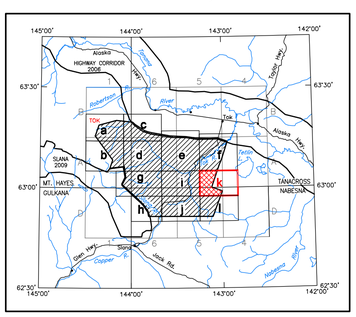
APPROXIMATE MEAN DECLINATION, 2015

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

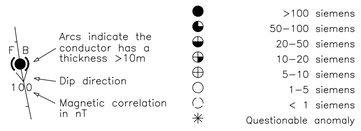
PARTS of TANACROSS A-4, A-5, NABESNA D-4, and D-5 QUADRANGLES

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

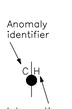
LOCATION INDEX OF 1:31,680–SCALE MAP



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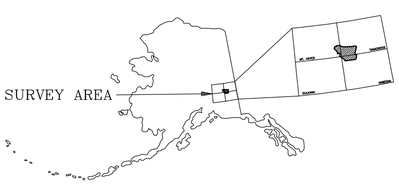
Base from U.S. Geological Survey Nabesna D–4, 1954; D–5, 1952; Quadrangles, Alaska

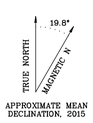
SCALE 1:31,680

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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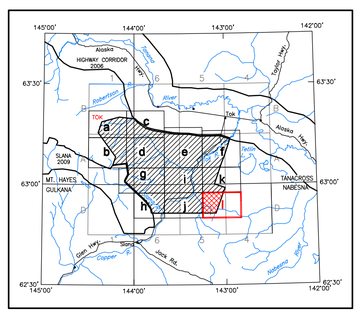
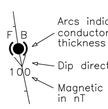
PARTS of NABESNA D-4 and D-5 QUADRANGLES

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

LOCATION INDEX OF 1:31,680–SCALE MAP



ELECTROMAGNETIC ANOMALIES



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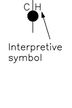

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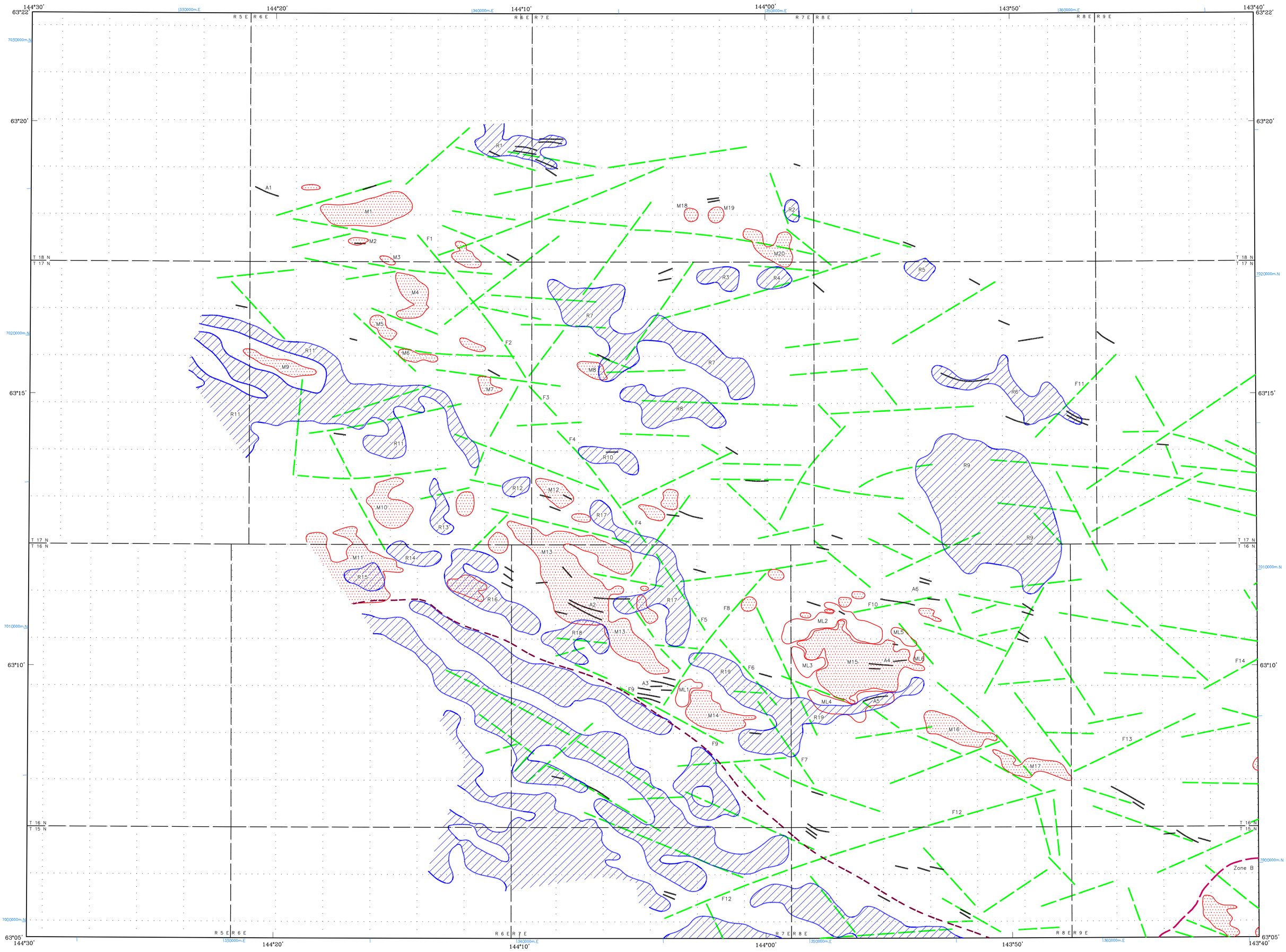
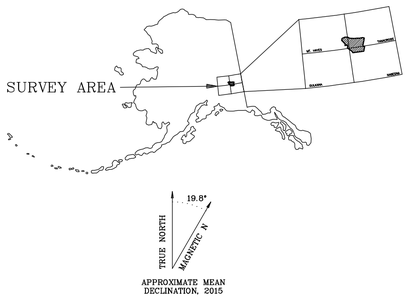


Section outlines from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska



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

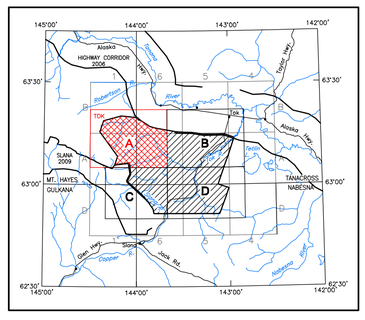
Interpretation by CGG
2015

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

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



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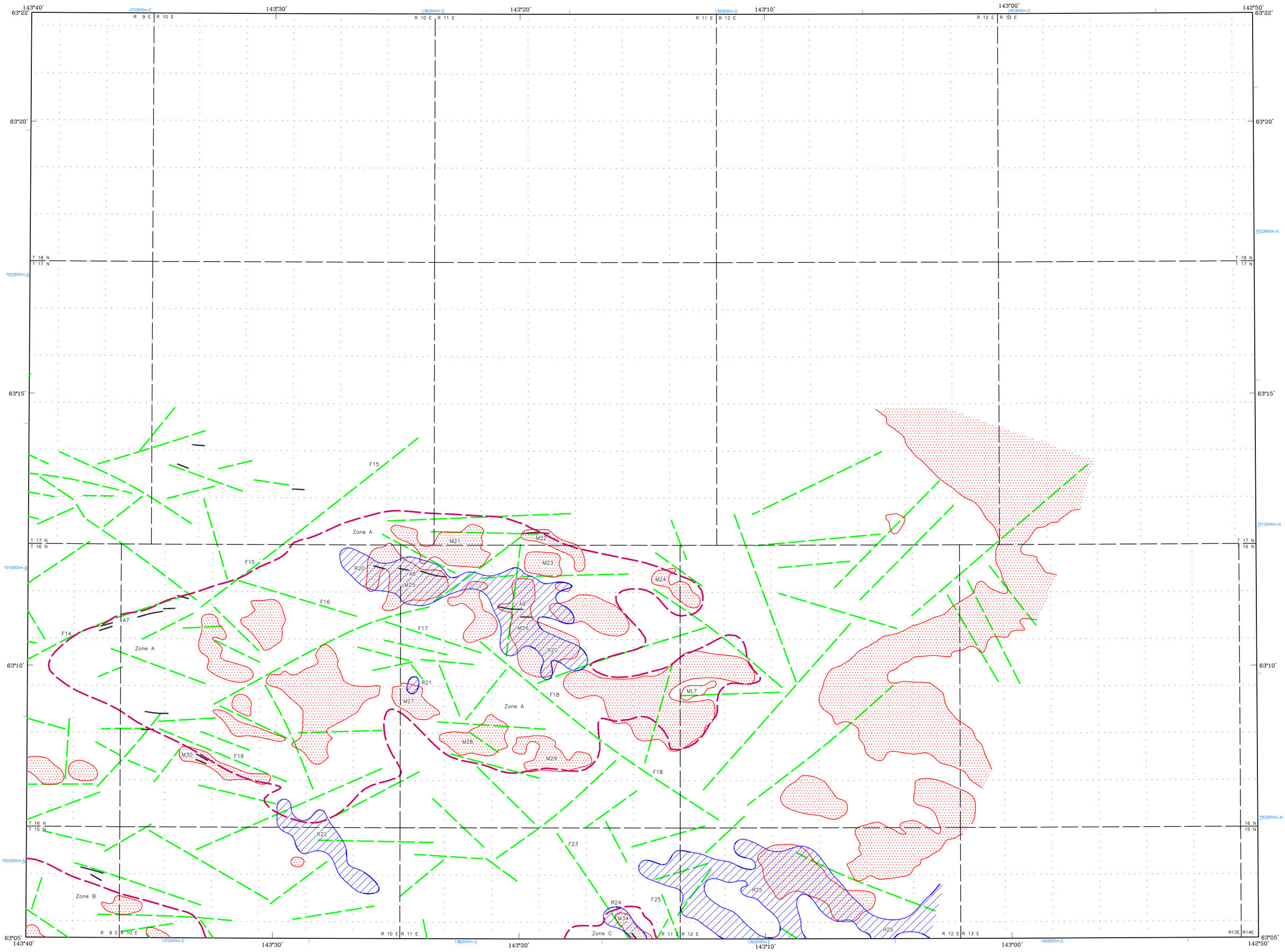
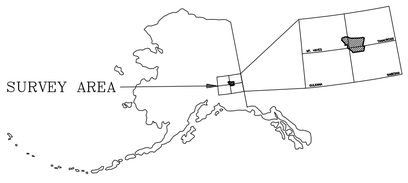
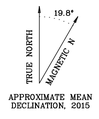


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

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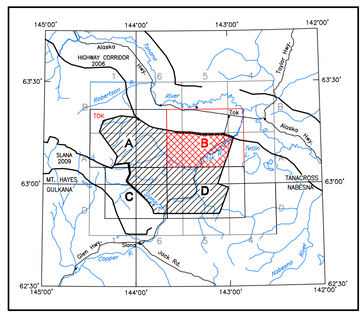

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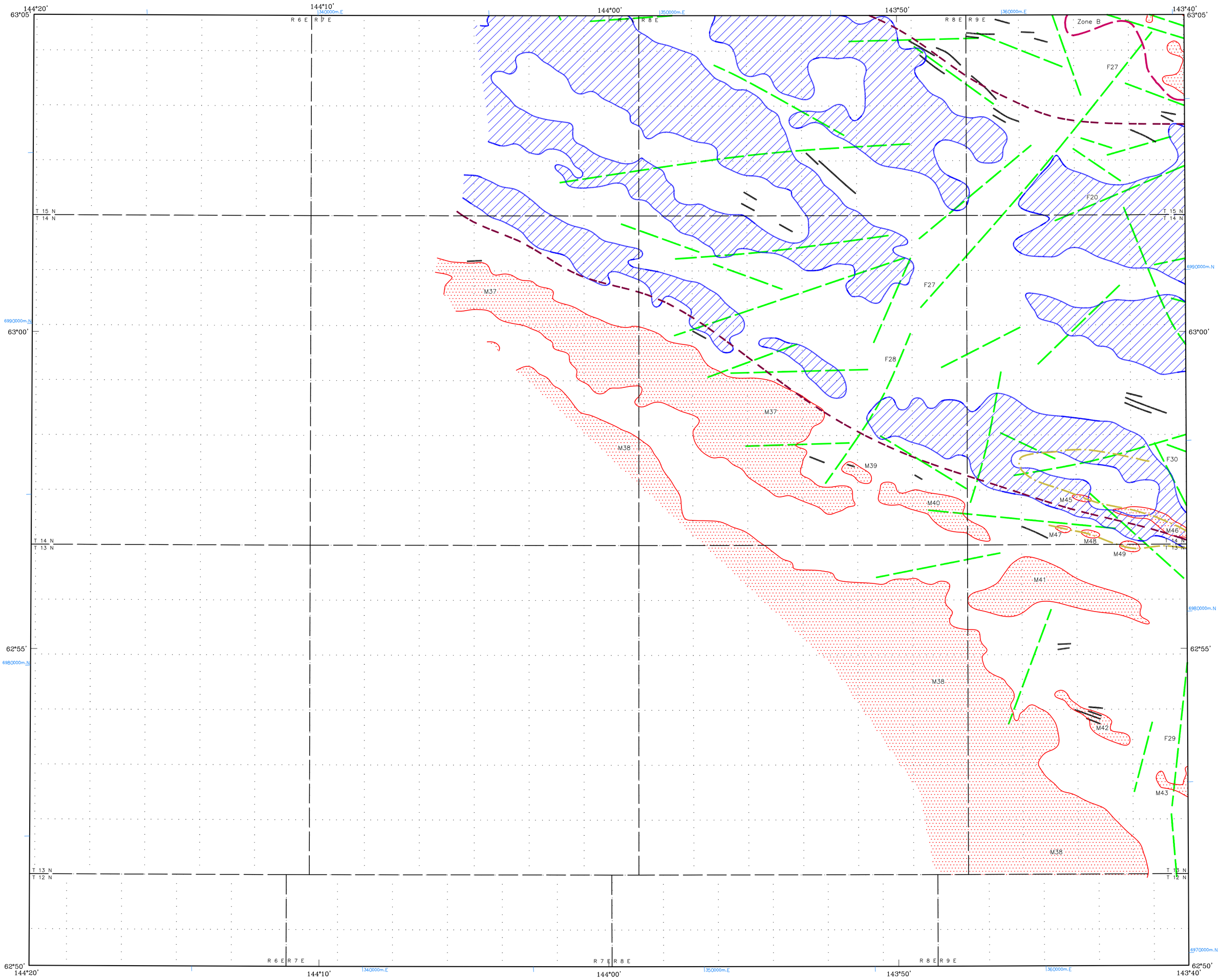

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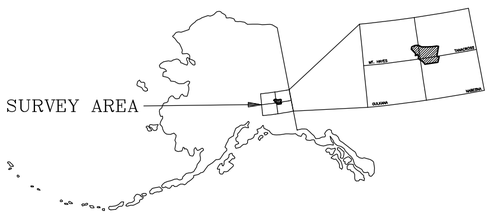
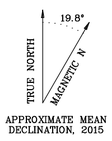
1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS





APPROXIMATE MEAN DECLINATION, 2015

INTERPETATION MAP, TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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

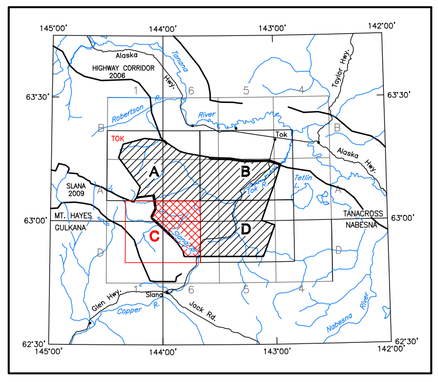
Interpretation by CGG
2015

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.

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SURVEY HISTORY

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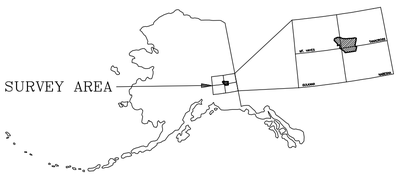
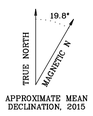
Section outlines from U.S. Geological Survey Tanacross A-4, 1948; A-5, 1973; A-6, 1964; Nabesna D-4, 1954; D-5, 1952; D-6, 1969; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

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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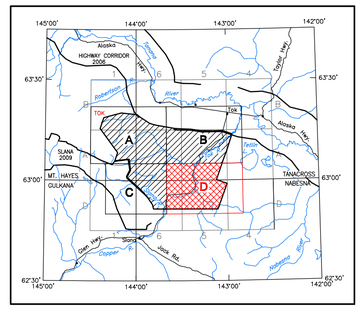
LOCATION INDEX OF 1:63,360-SCALE MAP



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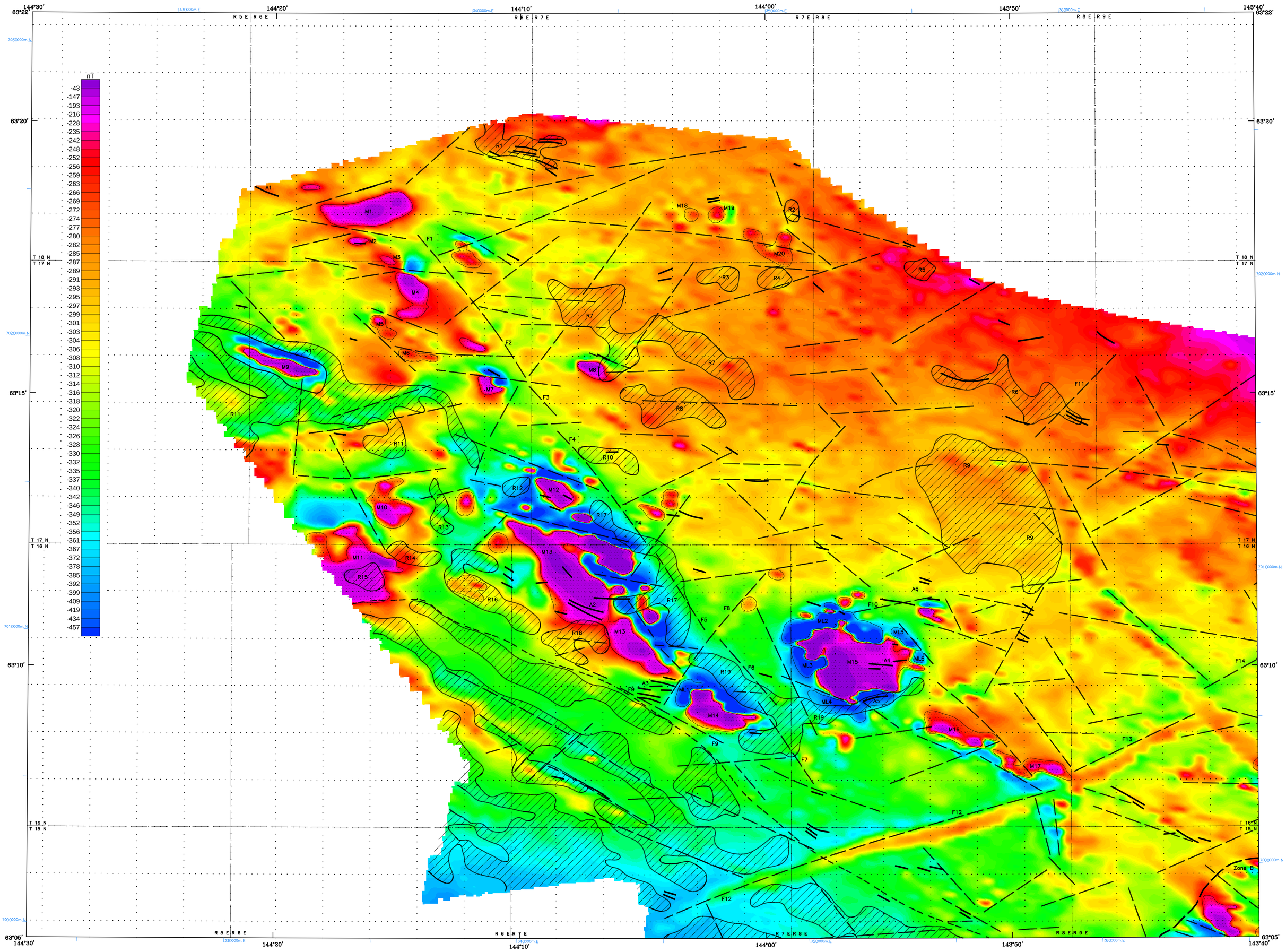
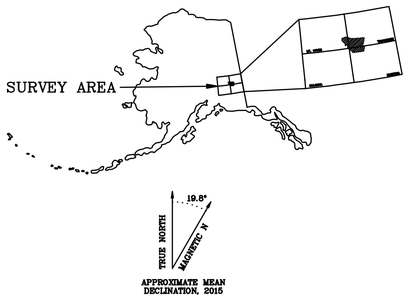


Section outlines from U.S. Geological Survey Mt. Hayes A–1, 1975; B–1, 1982; Tanacross A–6, 1964; B–6, 1970; Quadrangles, Alaska



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
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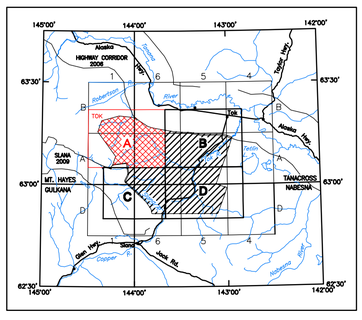
LOCATION INDEX OF 1:63,360–SCALE MAP



DESCRIPTIVE NOTES

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ML1	Magnetic Low
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SURVEY HISTORY

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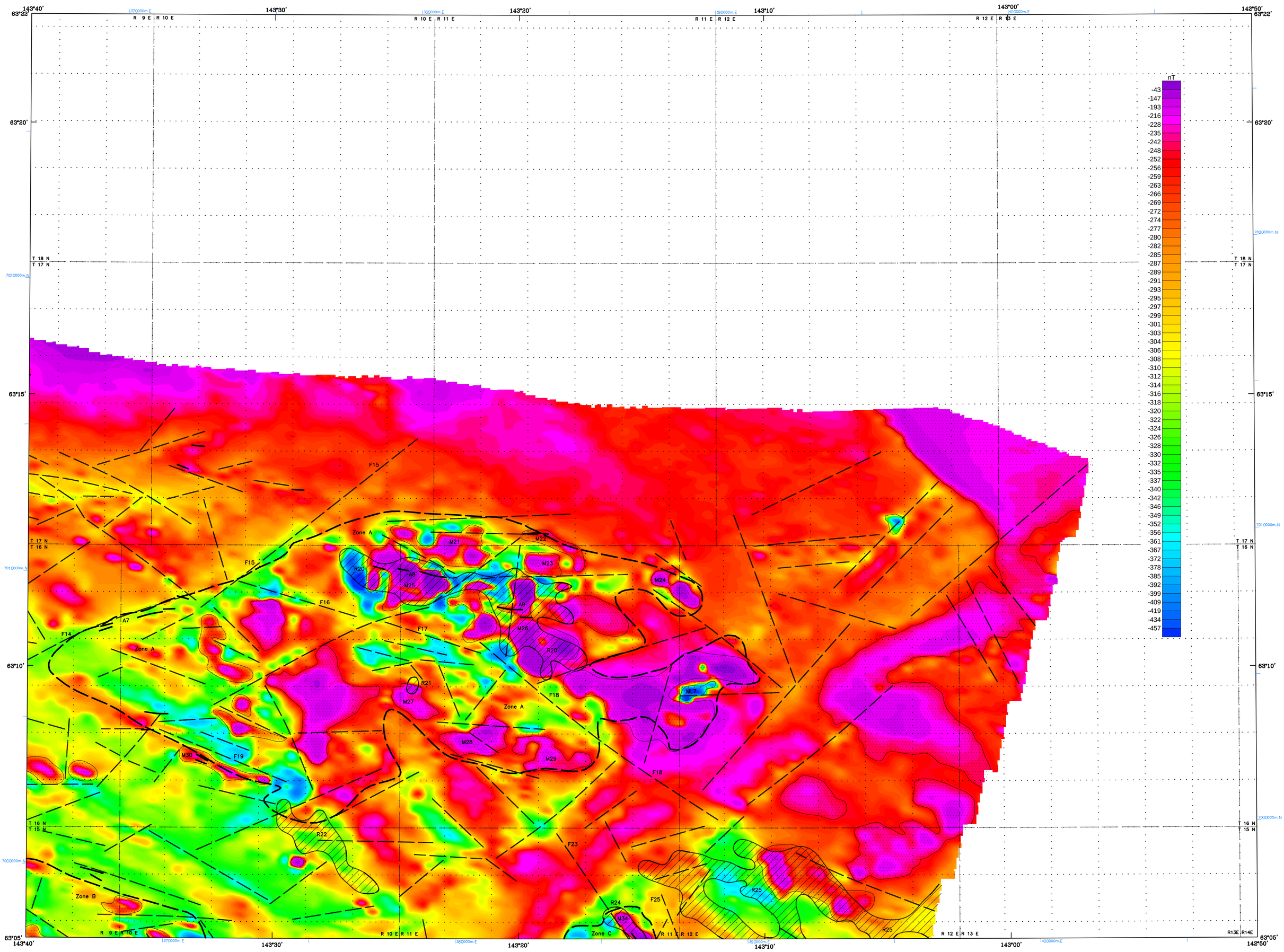
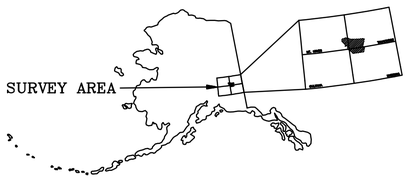


Section outlines from U.S. Geological Survey Tanacross A–4, 1948; A–5, 1973; A–6, 1964; B–4, 1949; B–5, 1994; B–6, 1970; Quadrangles, Alaska



APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

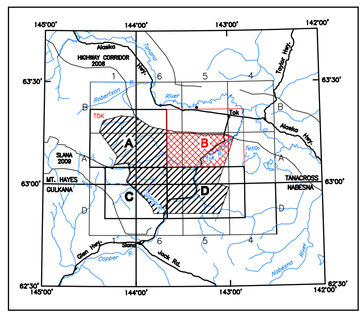
INTERPRETATION MAP WITH RESIDUAL MAGNETIC FIELD TOK SURVEY AREA, EASTERN INTERIOR ALASKA

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



DESCRIPTIVE NOTES

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RESIDUAL MAGNETIC FIELD

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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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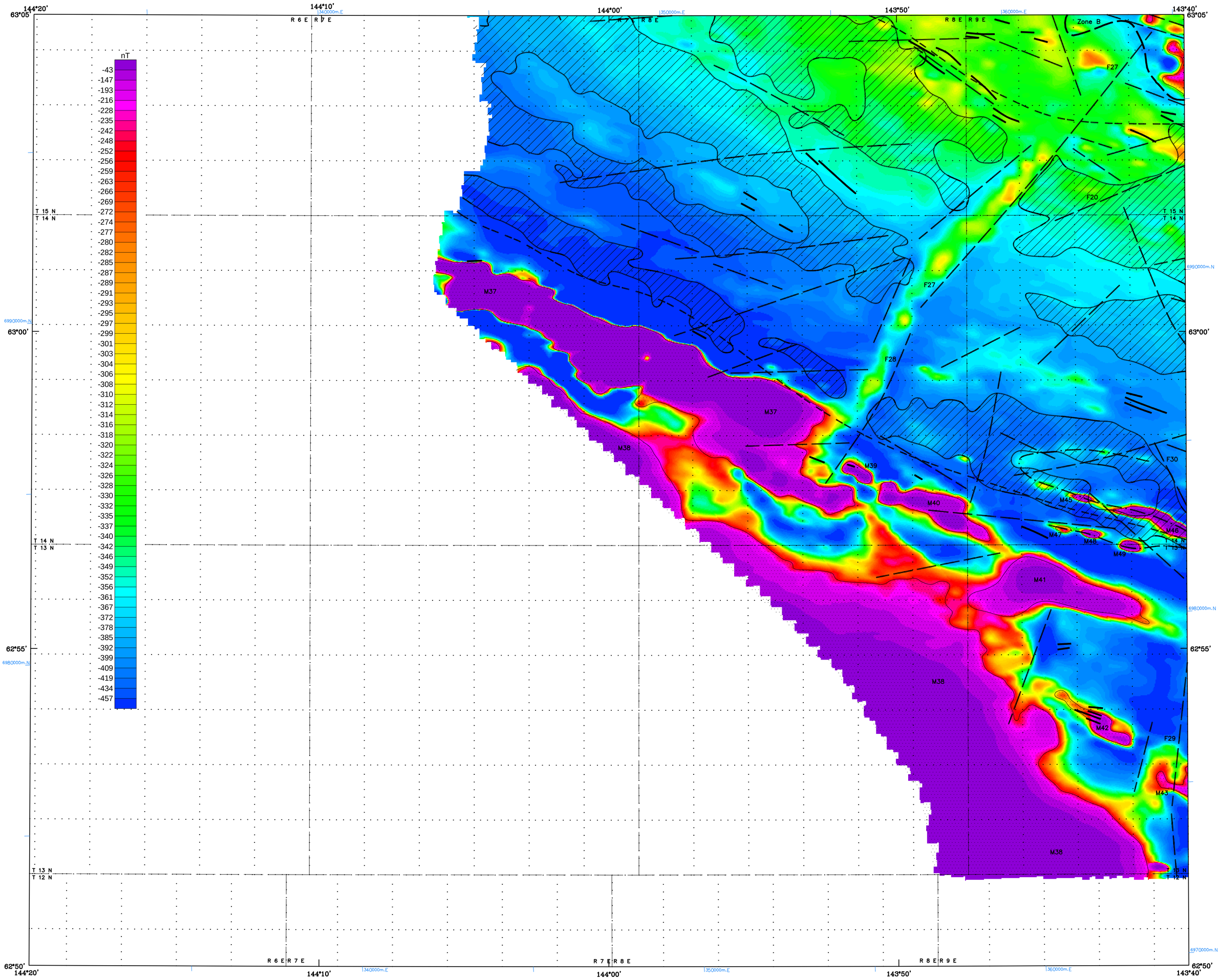
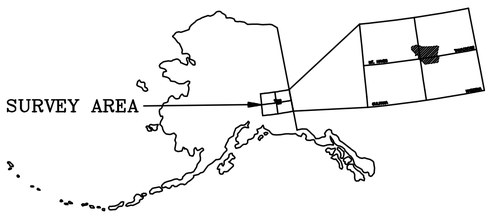
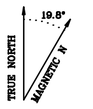


Section outlines from U.S. Geological Survey Tanacross A-6, 1964; Nabesna D-6, 1969; Gulkana D-1, 1978; Mt. Hayes A-1, 1975; Quadrangles, Alaska





APPROXIMATE MEAN DECLINATION, 2015

SCALE 1:63,360

1 0 1 2 3 4 MILES

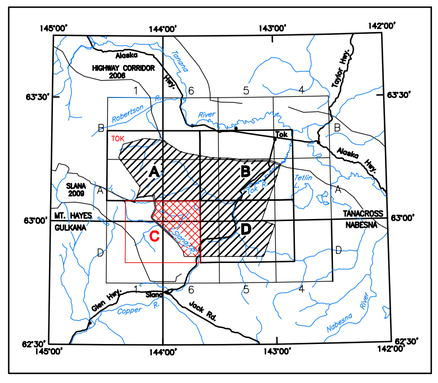
1 0 1 2 3 4 5 KILOMETERS

INTERPETATION MAP 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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LEGEND

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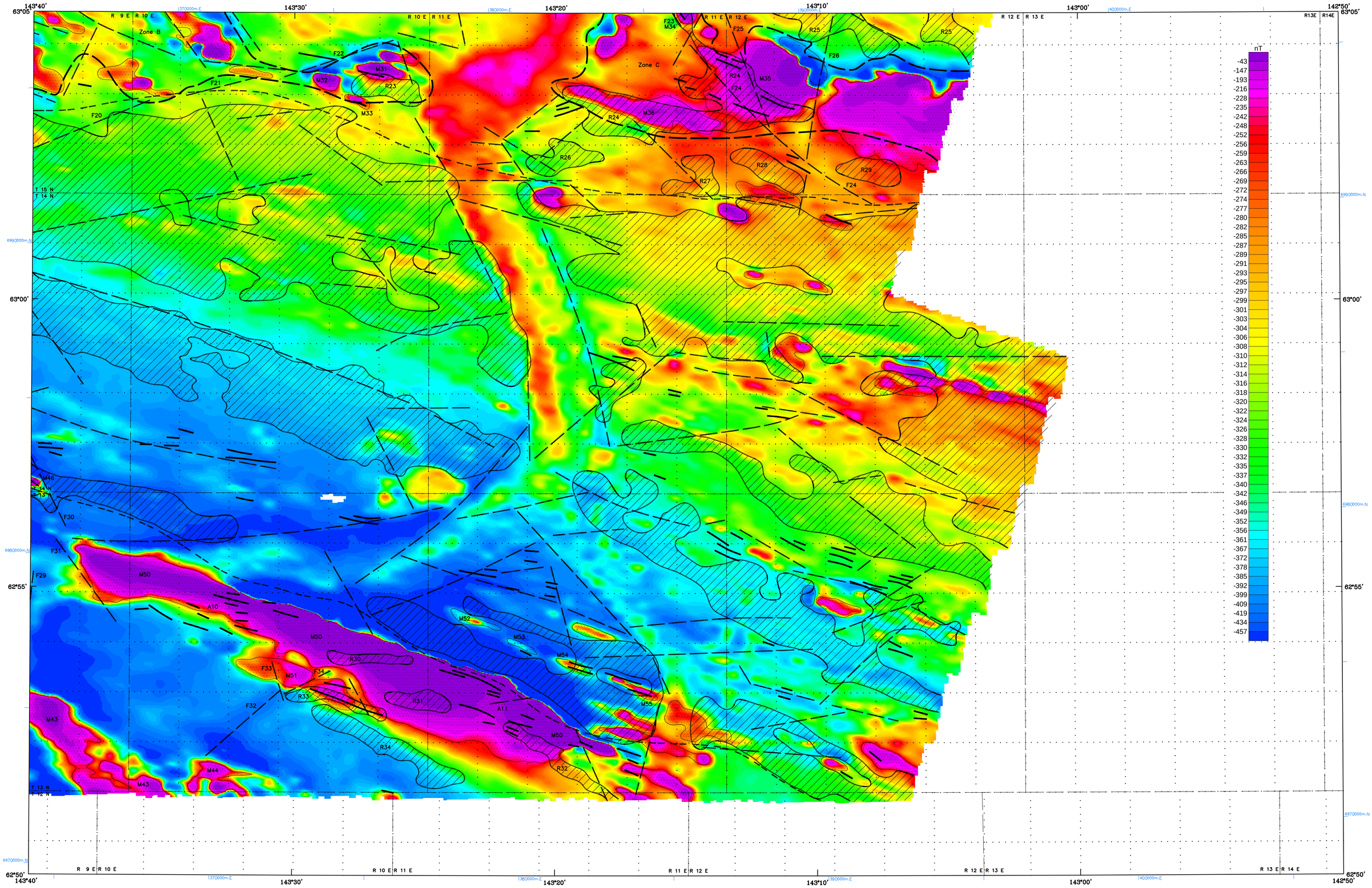

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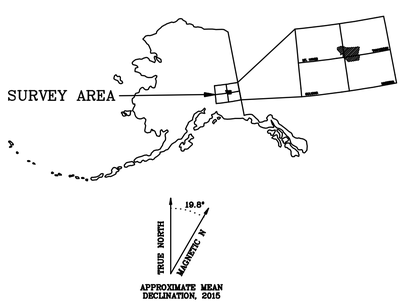

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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

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

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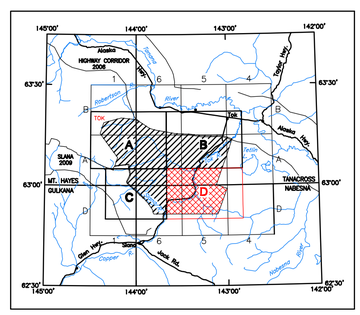

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