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SALCHA RIVER - POGO ELECTROMAGNETIC, MAGNETIC, AND RADIOMETRIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.,[1] Barefoot, J.D.[1], Graham, G.R.C.[1], Naibert, T.J.[1], Geoterrex-Dighem, and Stevens Exploration Management Corp.

ABSTRACT

This geophysical survey is located in interior Alaska in the Sacha River-Pogo mining area, about 100 kilometers east of Fairbanks. Frequency domain electromagnetic, magnetic, and radiometric data were collected with the DIGHEMV system from August to September 1999. A total of 7033.0 line kilometers were collected covering 2483.3 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. The survey area includes the Pogo mine and the West Pogo prospect. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

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

ACKNOWLEDGMENTS

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

AVAILABLE DATA

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

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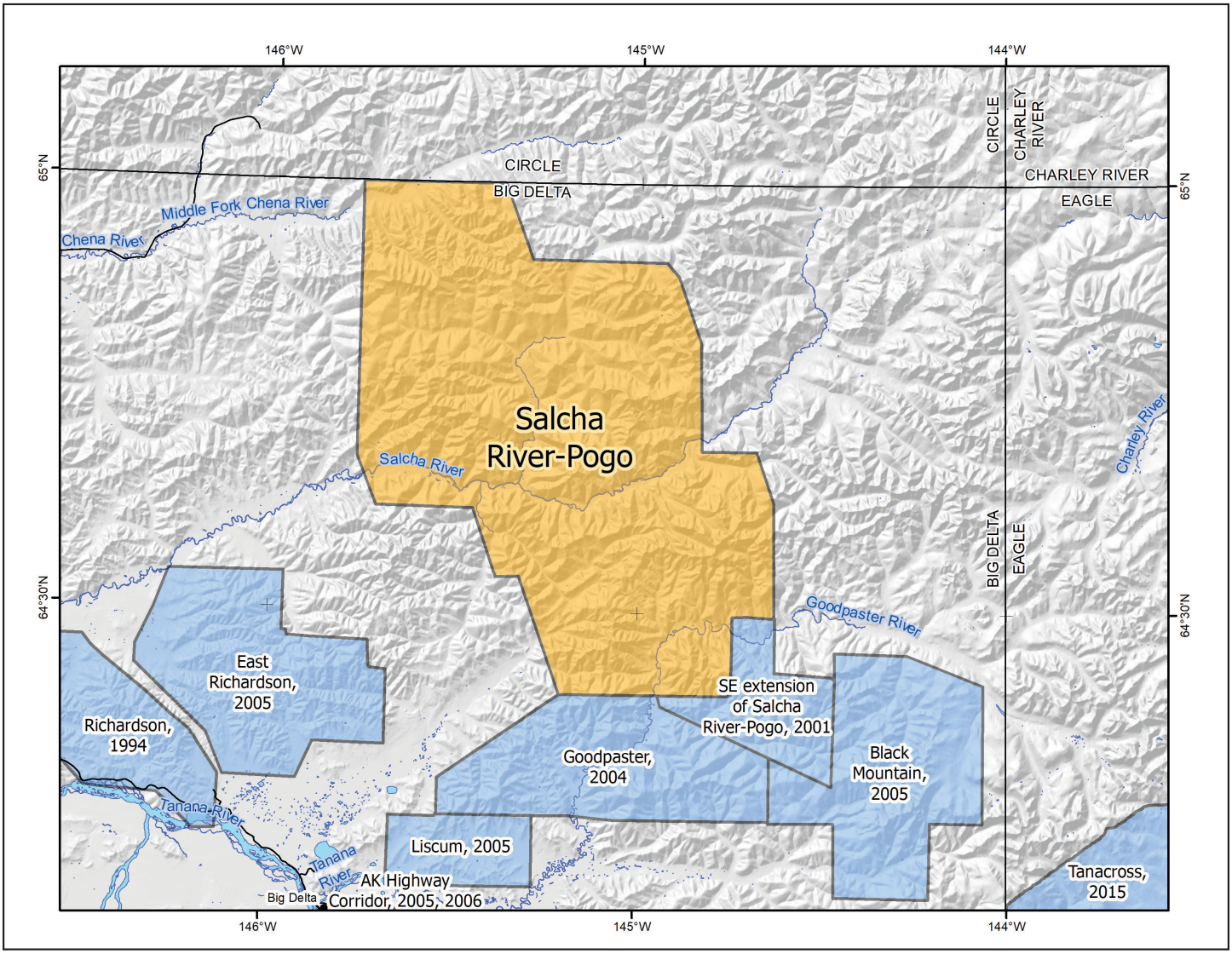
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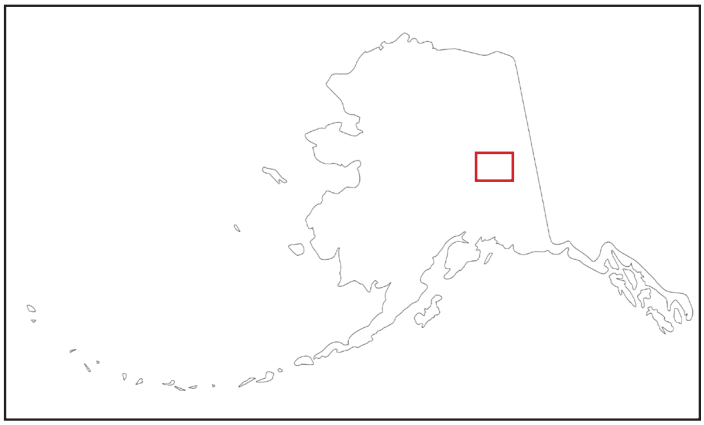


Figure 1. Salcha River–Pogo electromagnetic, magnetic, and radiometric airborne geophysical survey location shown in Alaska (right). Salcha River–Pogo survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.

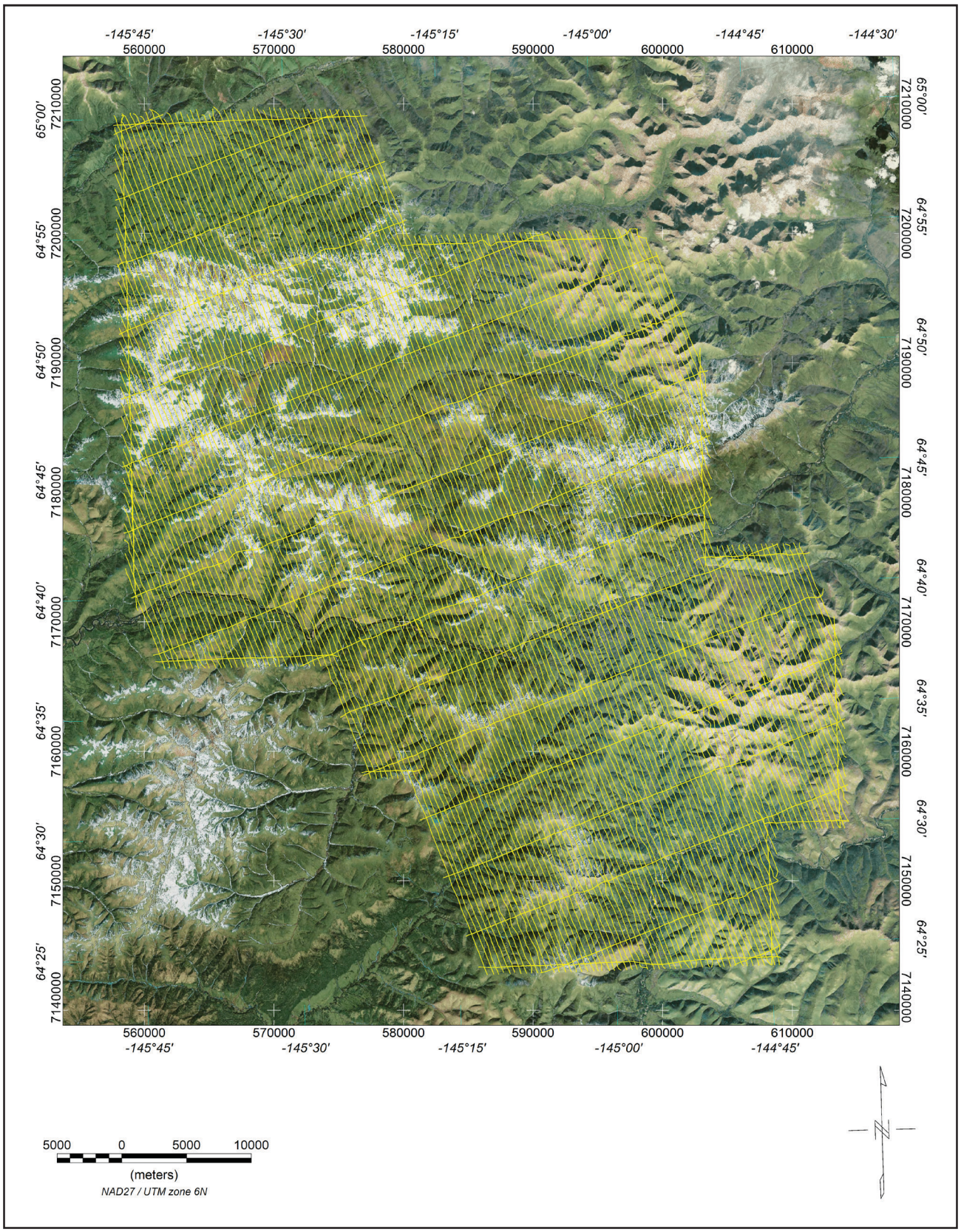


Figure 2. Flight path with orthometric image.

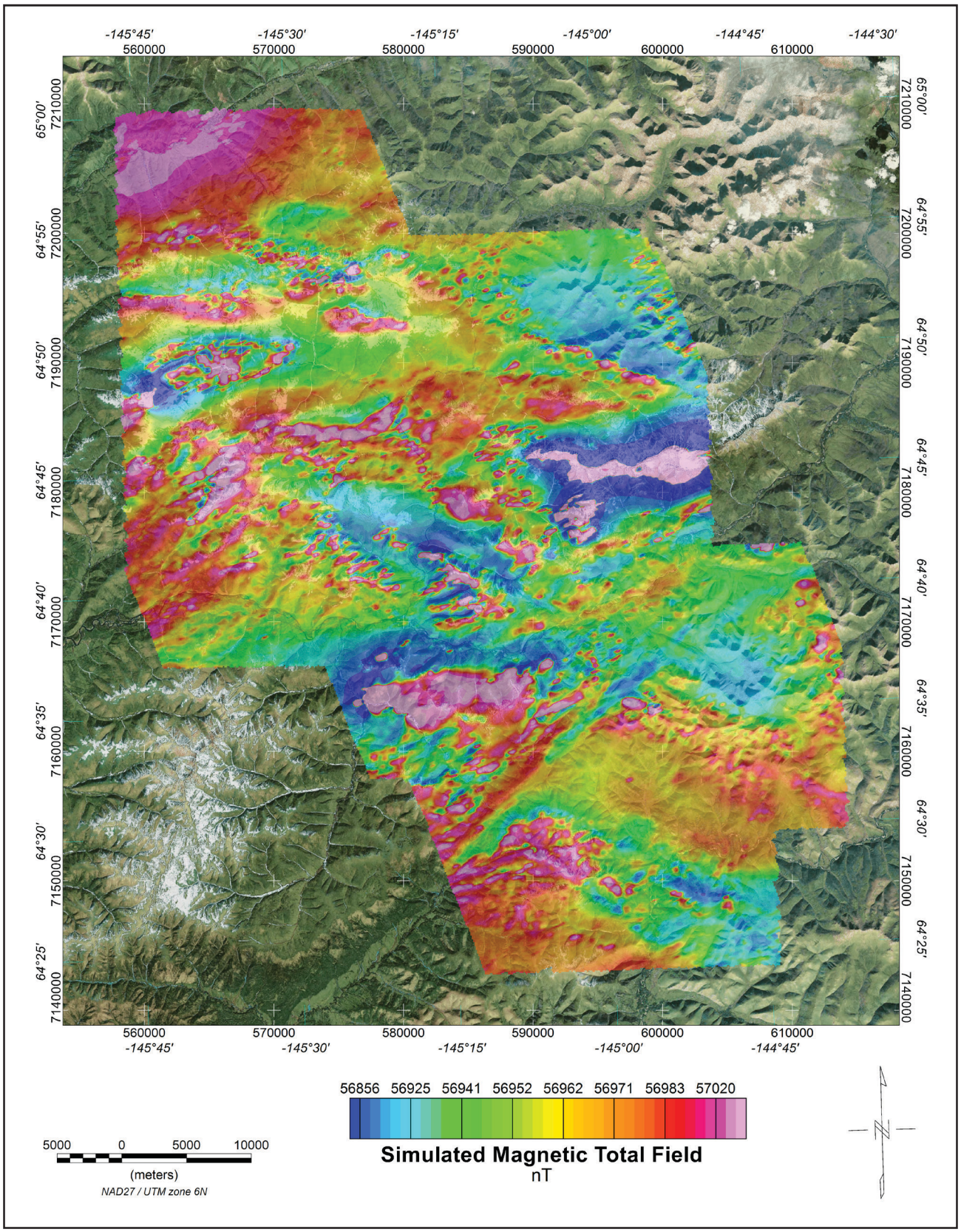


Figure 3. The simulated magnetic total field data were created using digitally recorded data from a Scintrex magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1995, updated to September 1999 for date of flight and altimeter variations), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

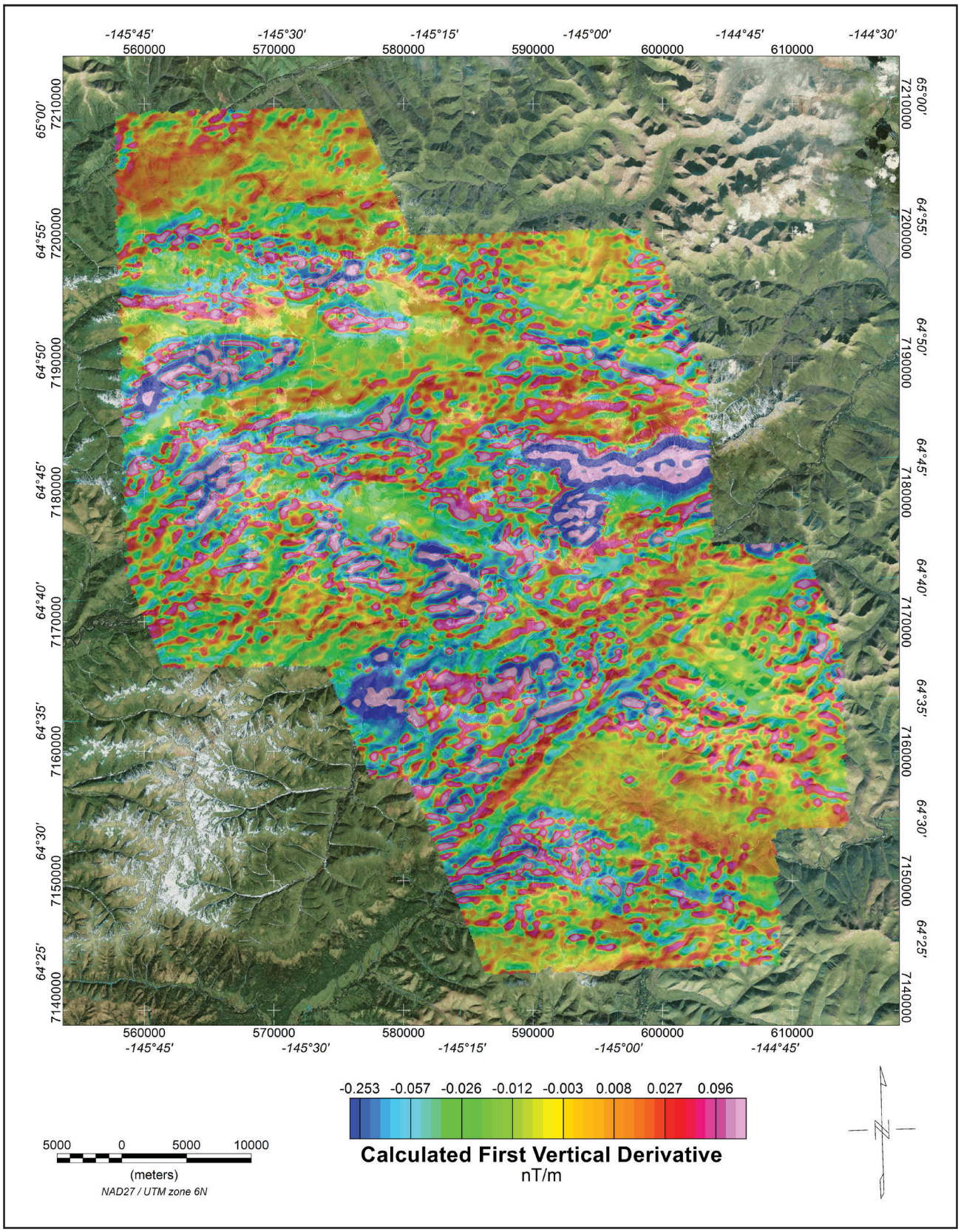


Figure 4. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units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

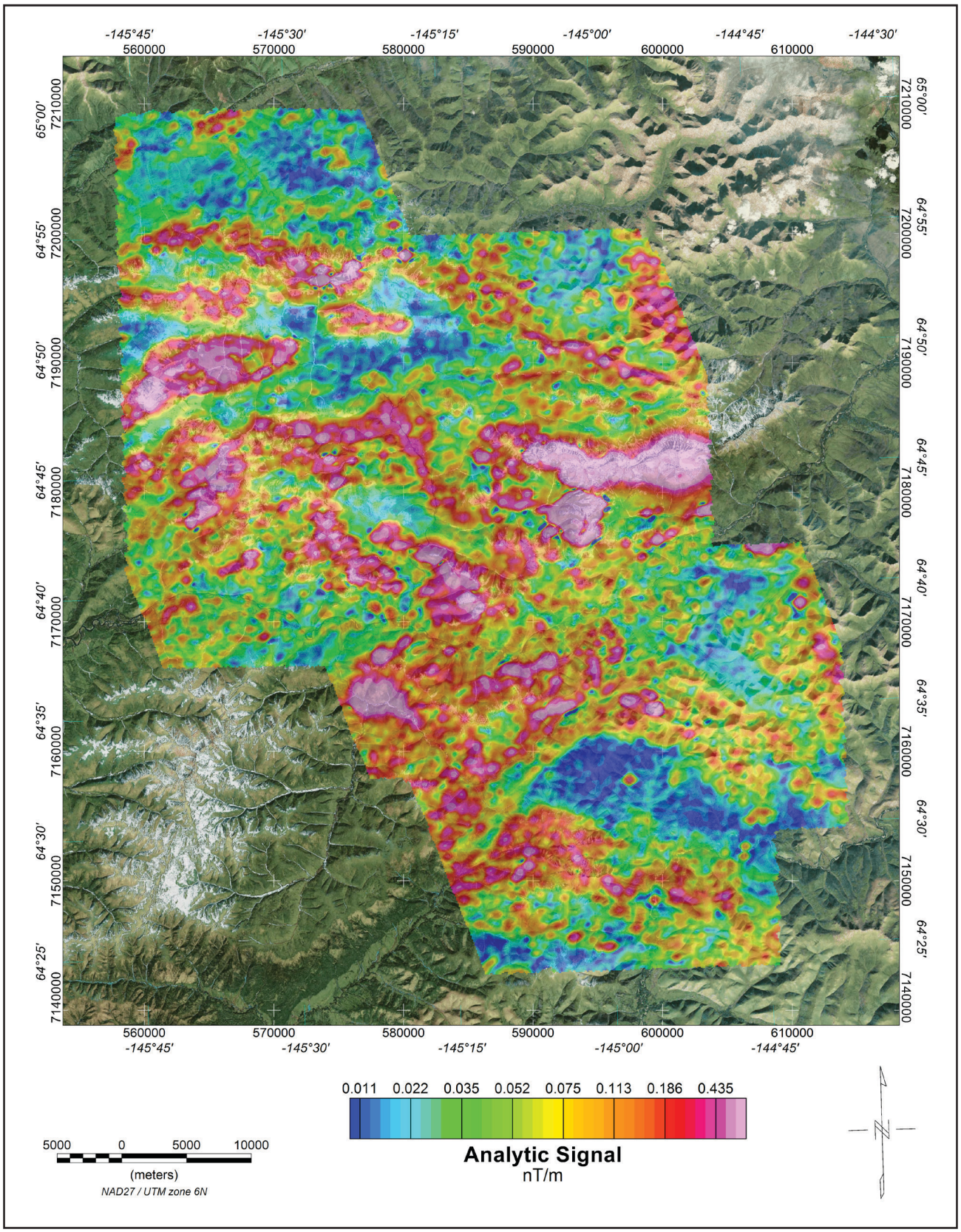


Figure 5. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts,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

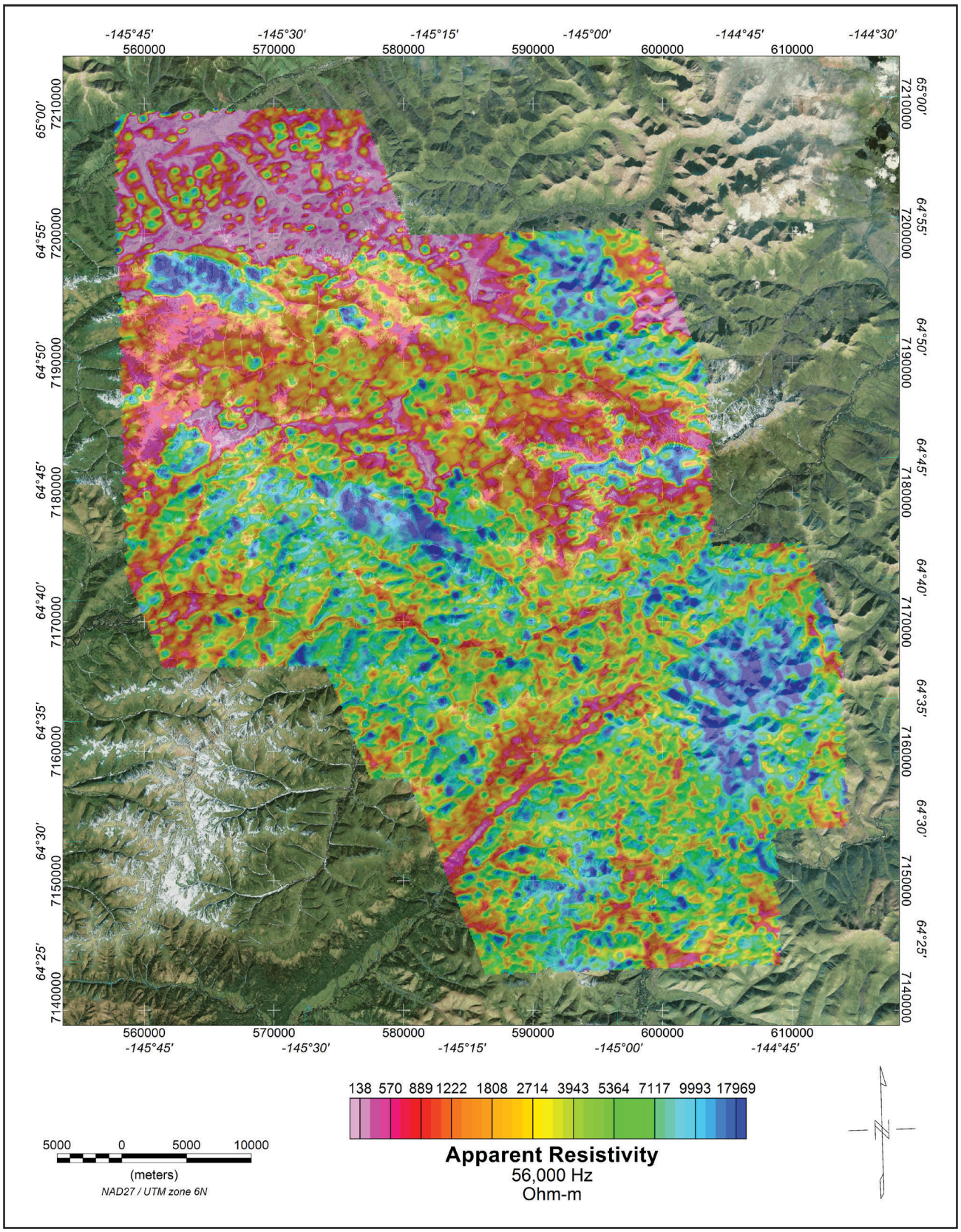


Figure 6. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

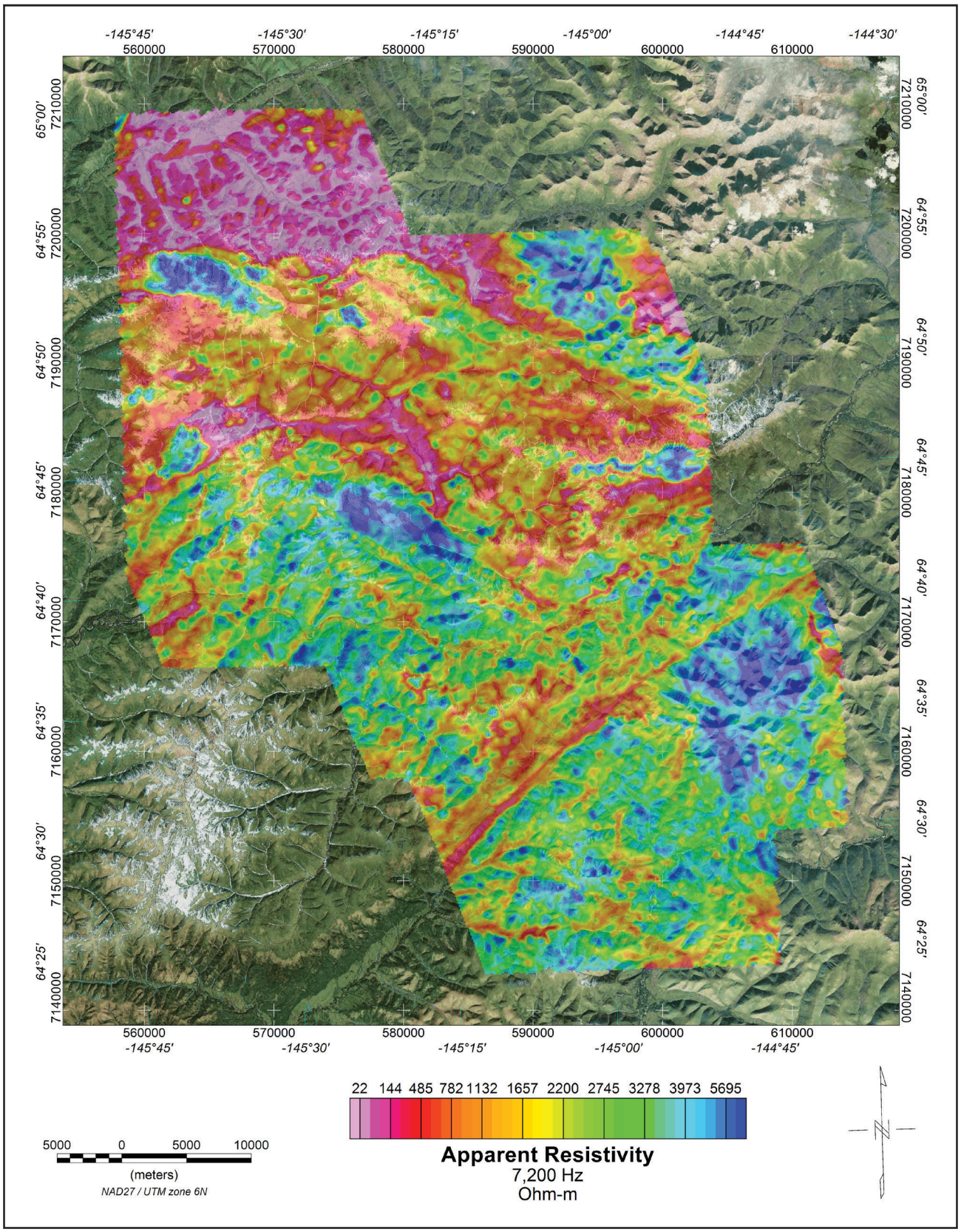


Figure 7. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

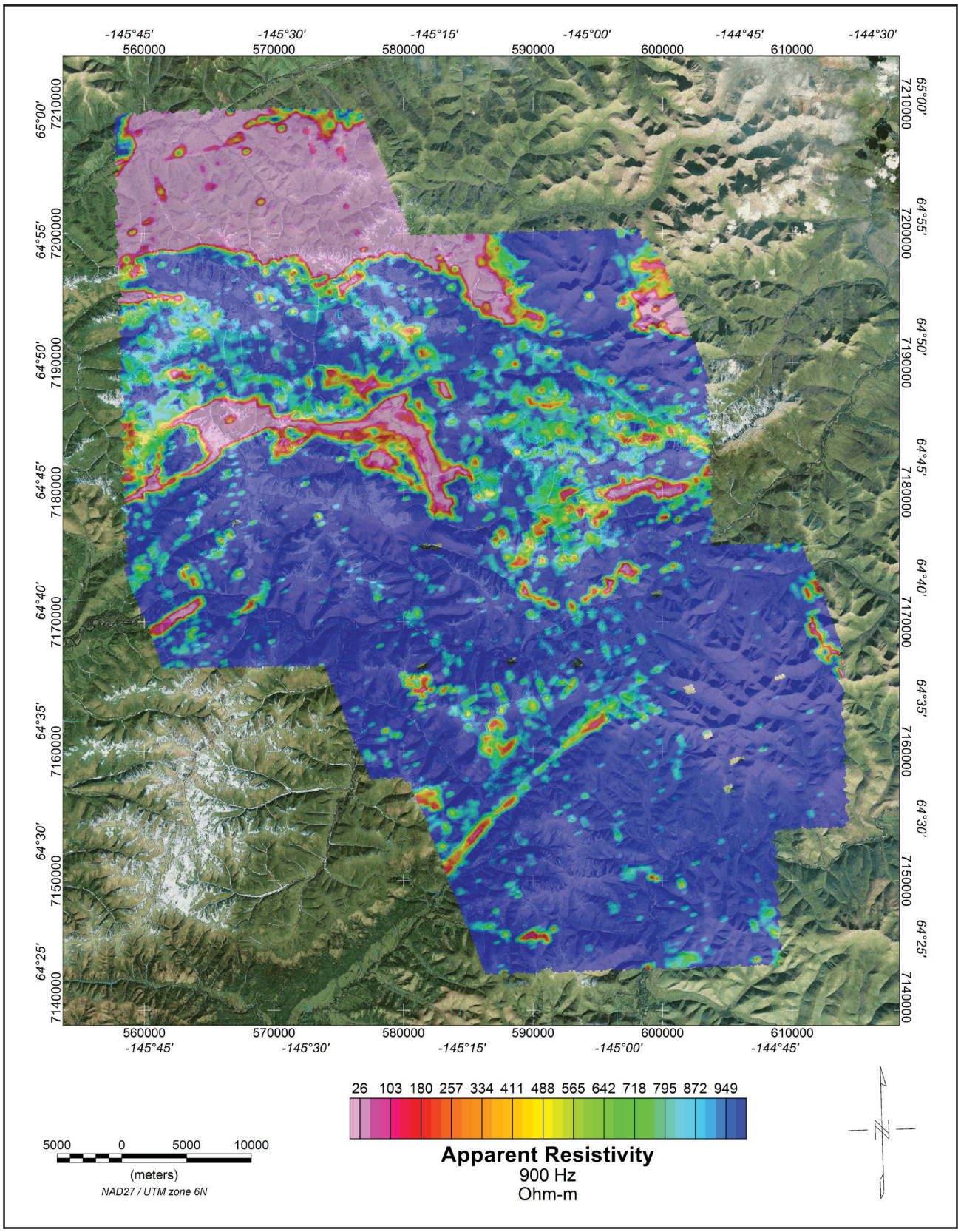


Figure 8. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

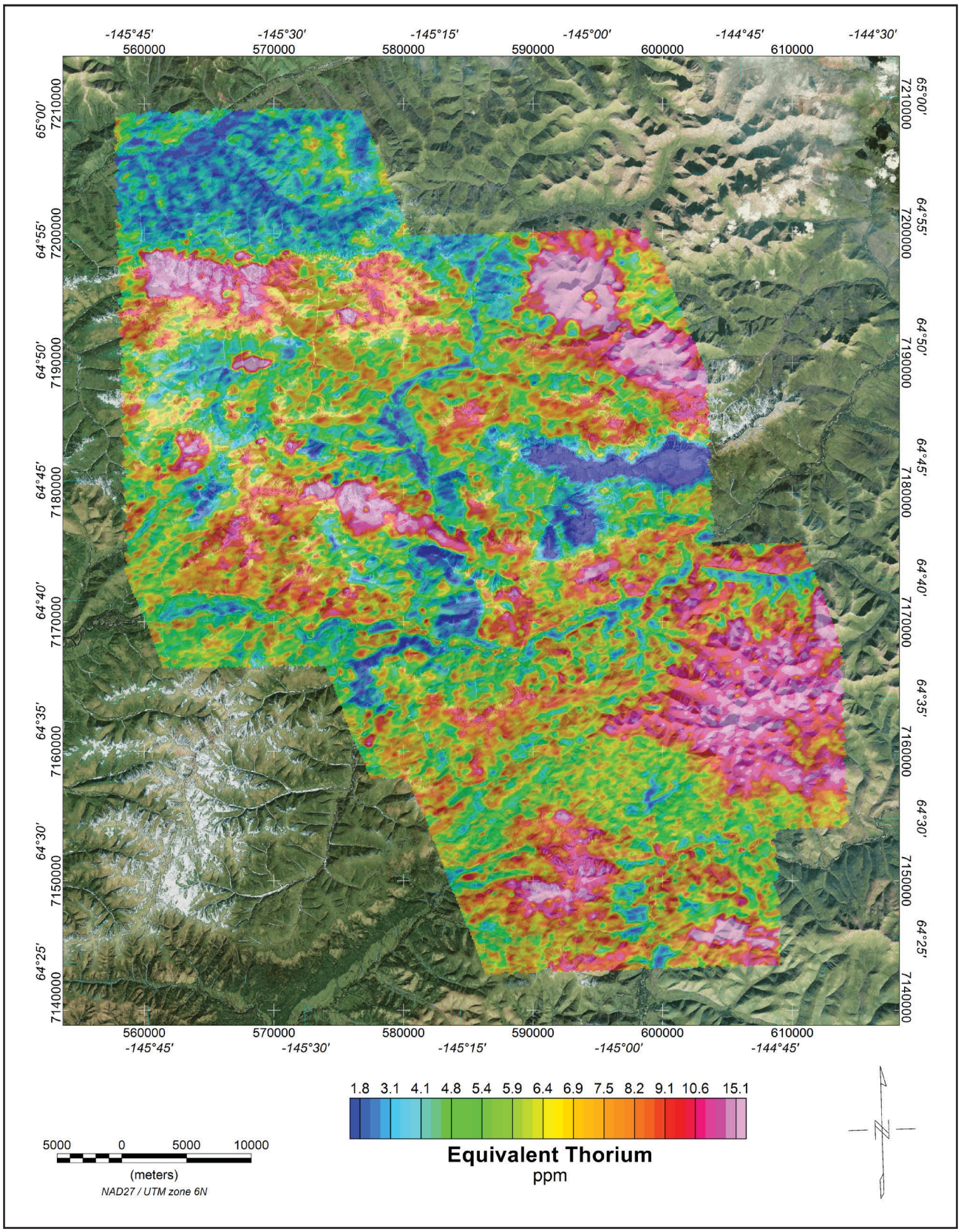


Figure 9. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

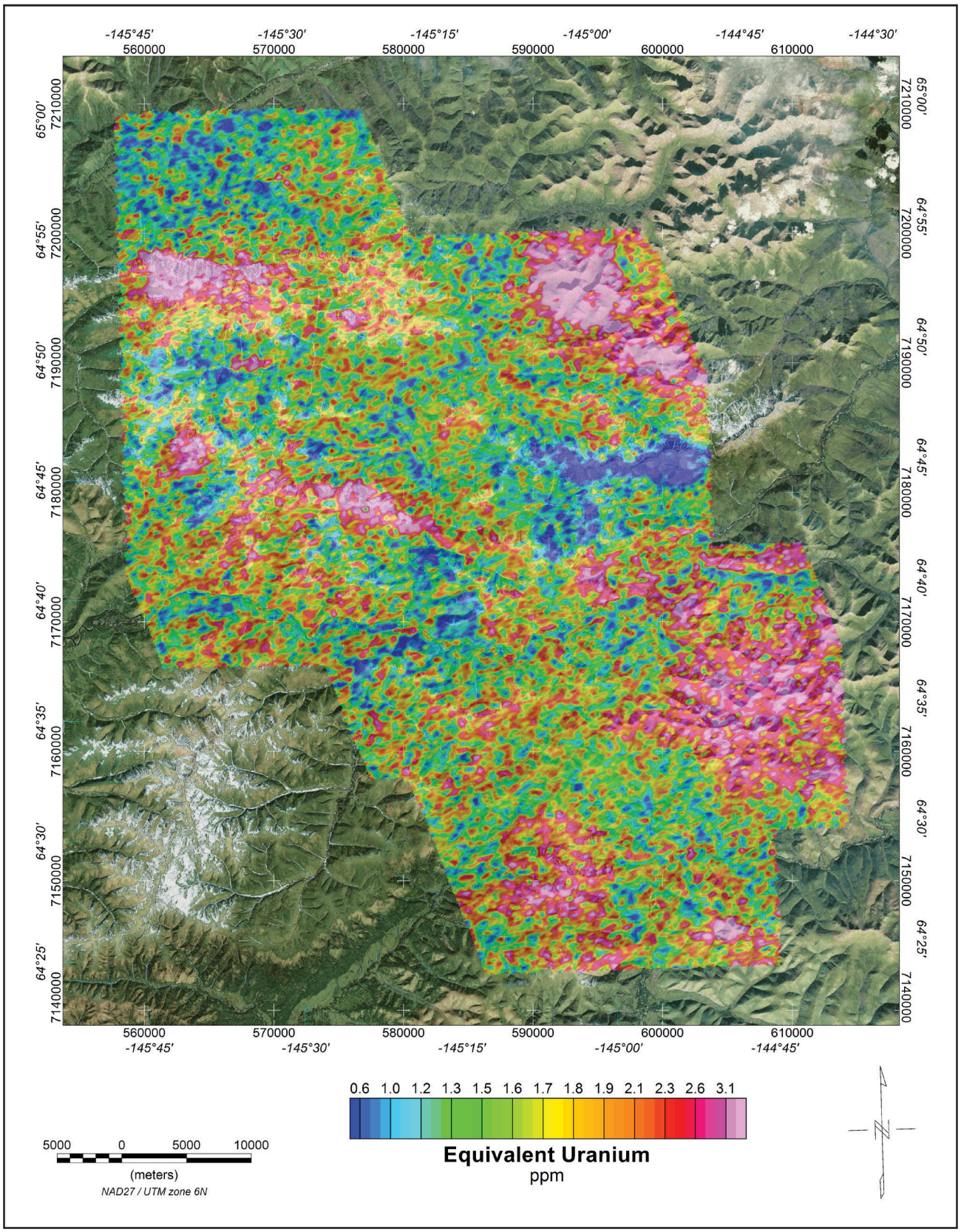


Figure 10. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

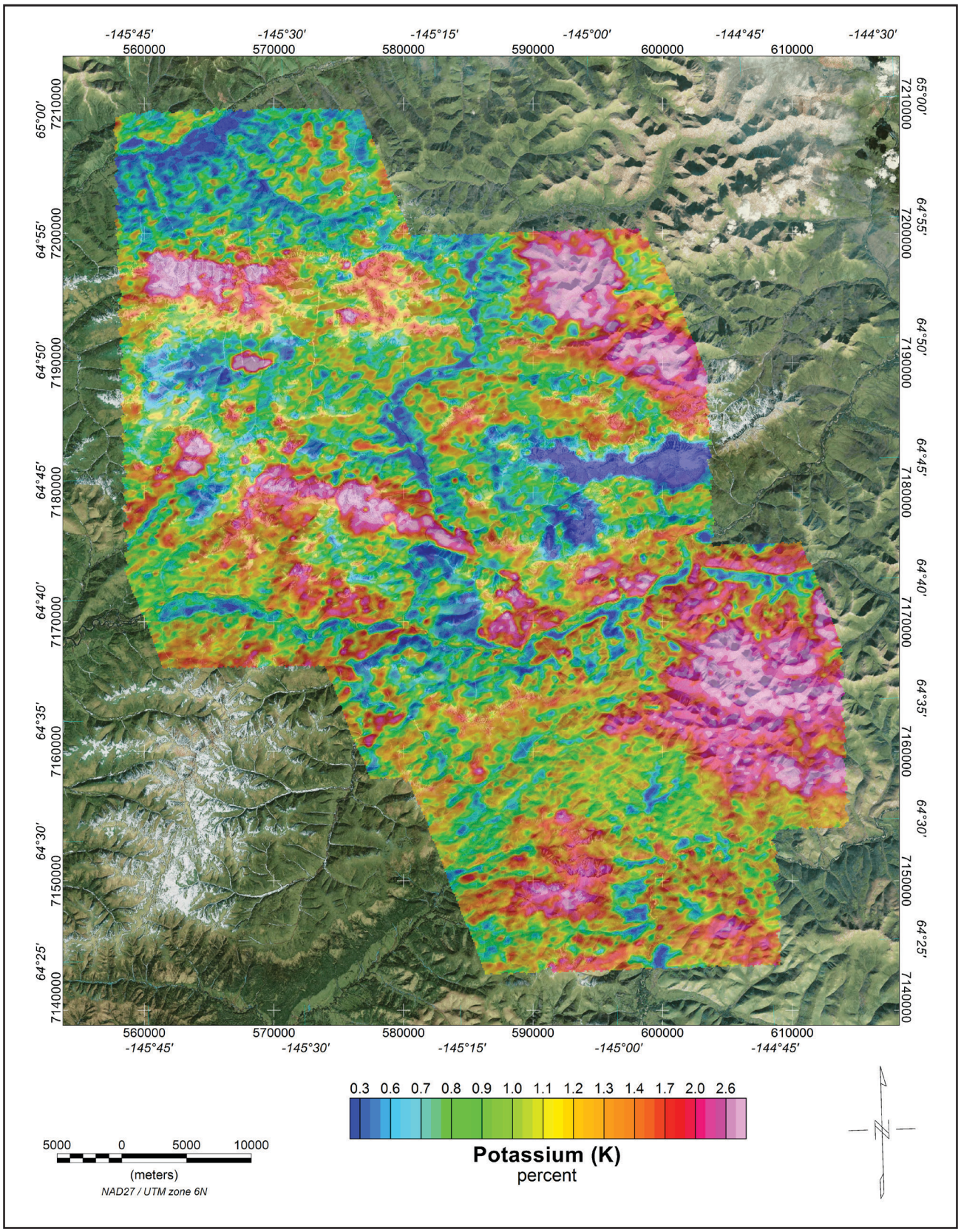


Figure 11. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

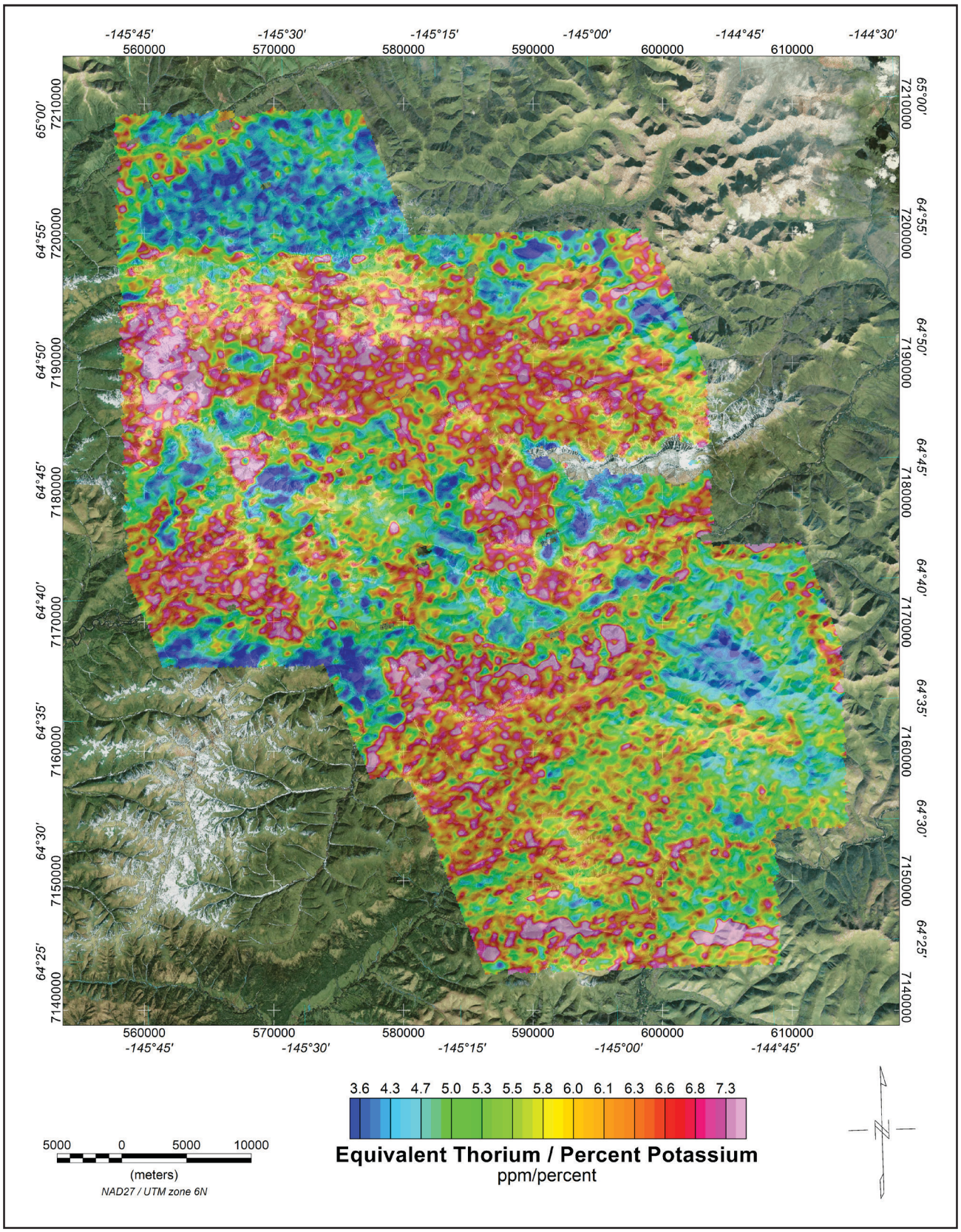


Figure 12. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

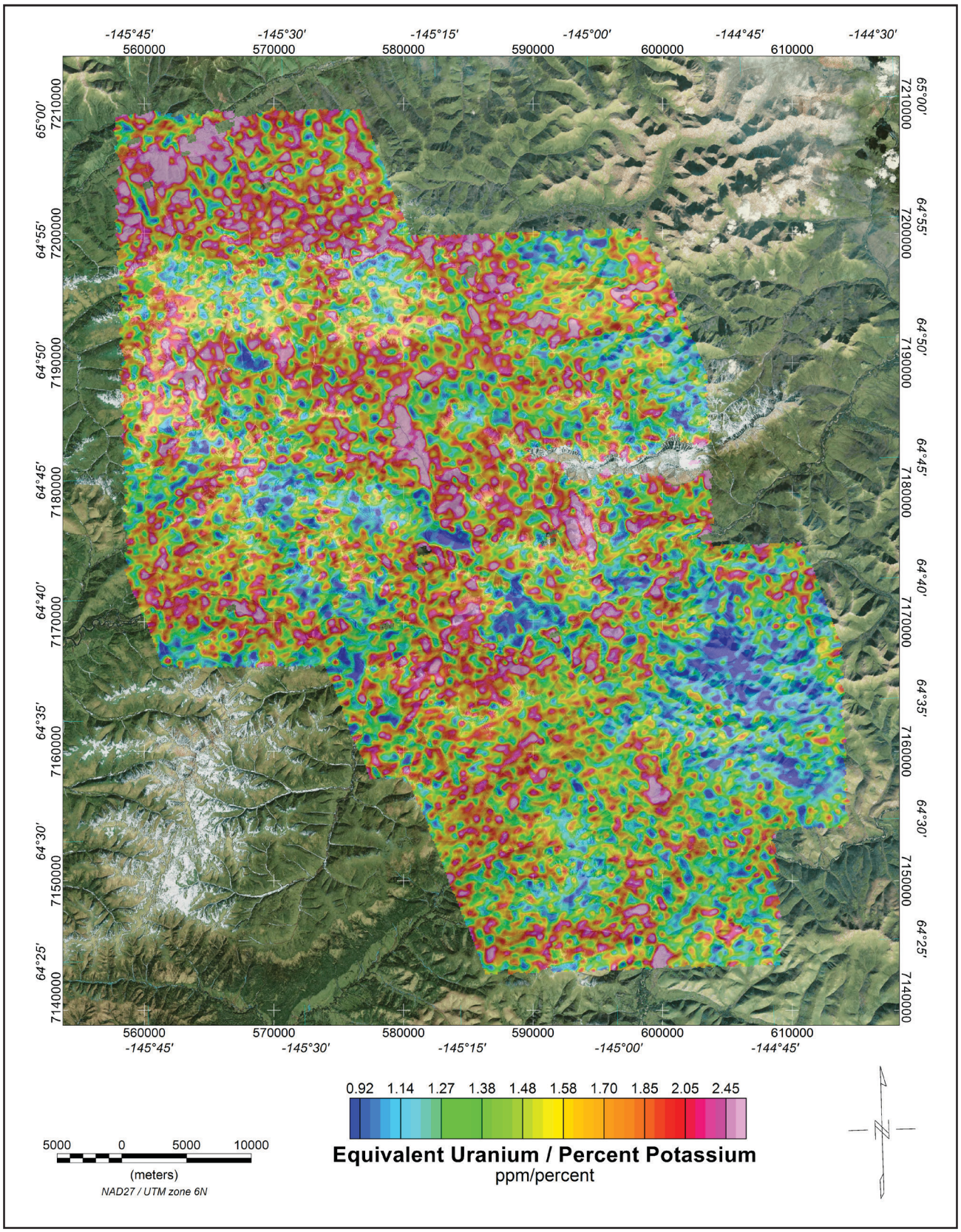


Figure 13. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

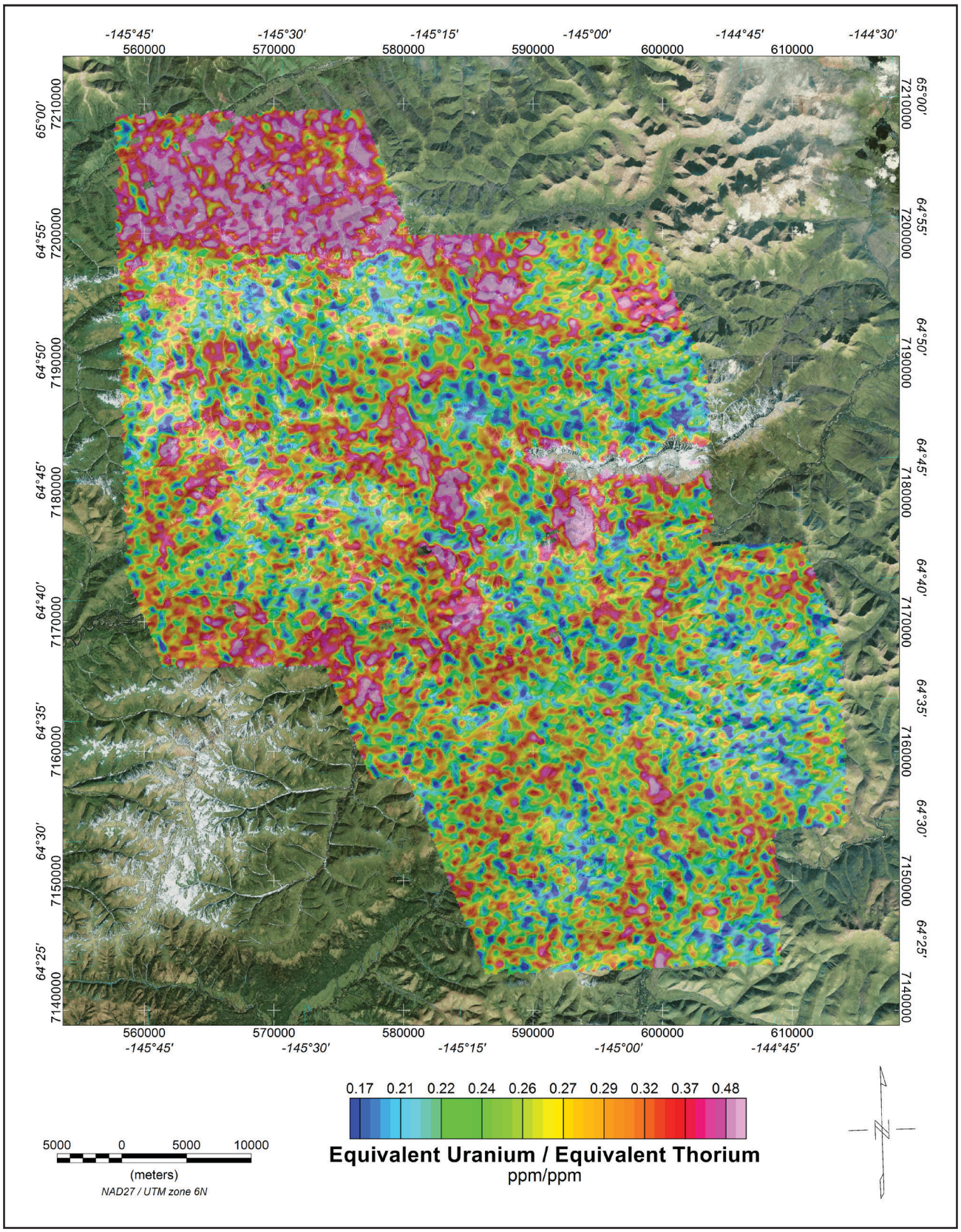


Figure 14. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

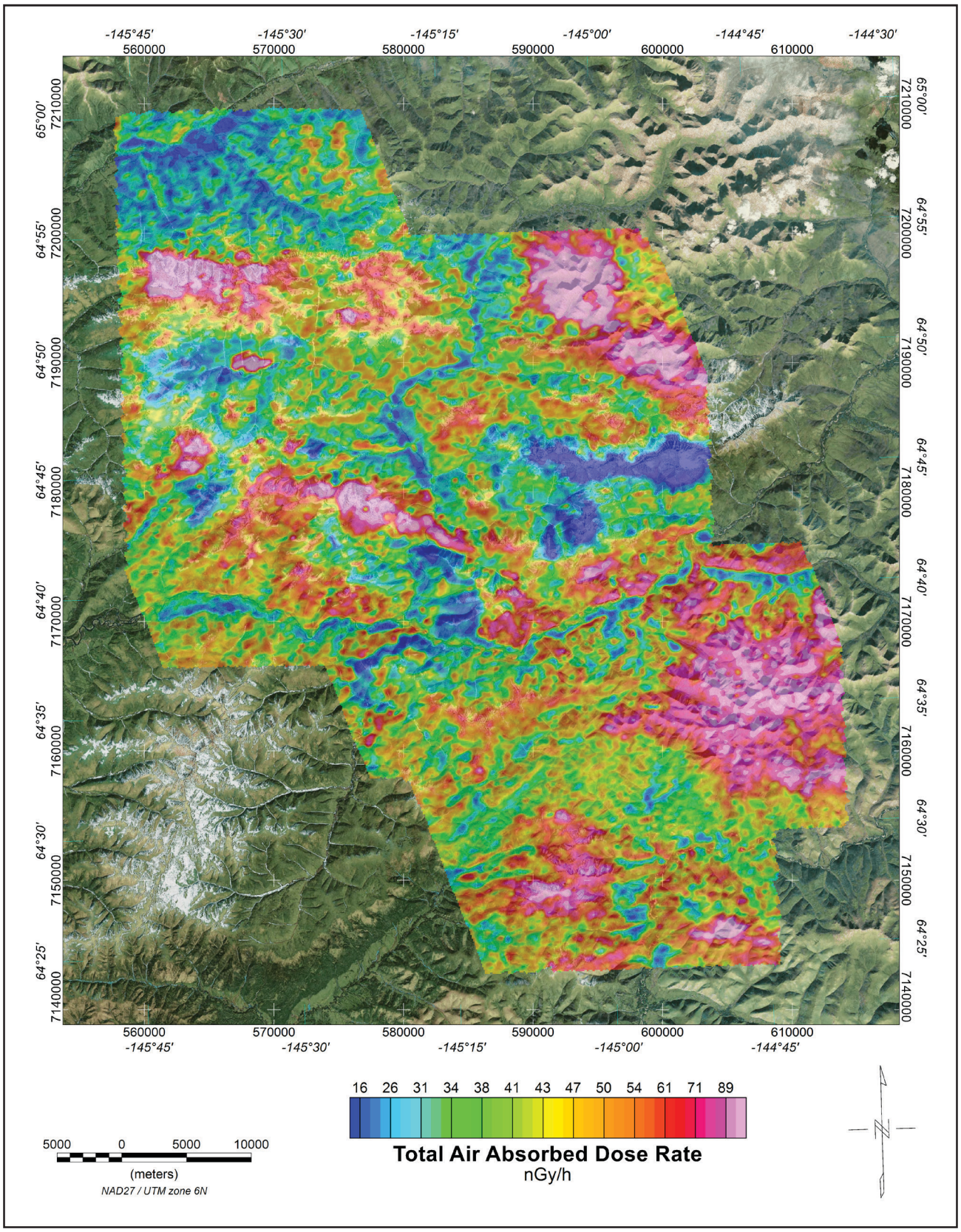


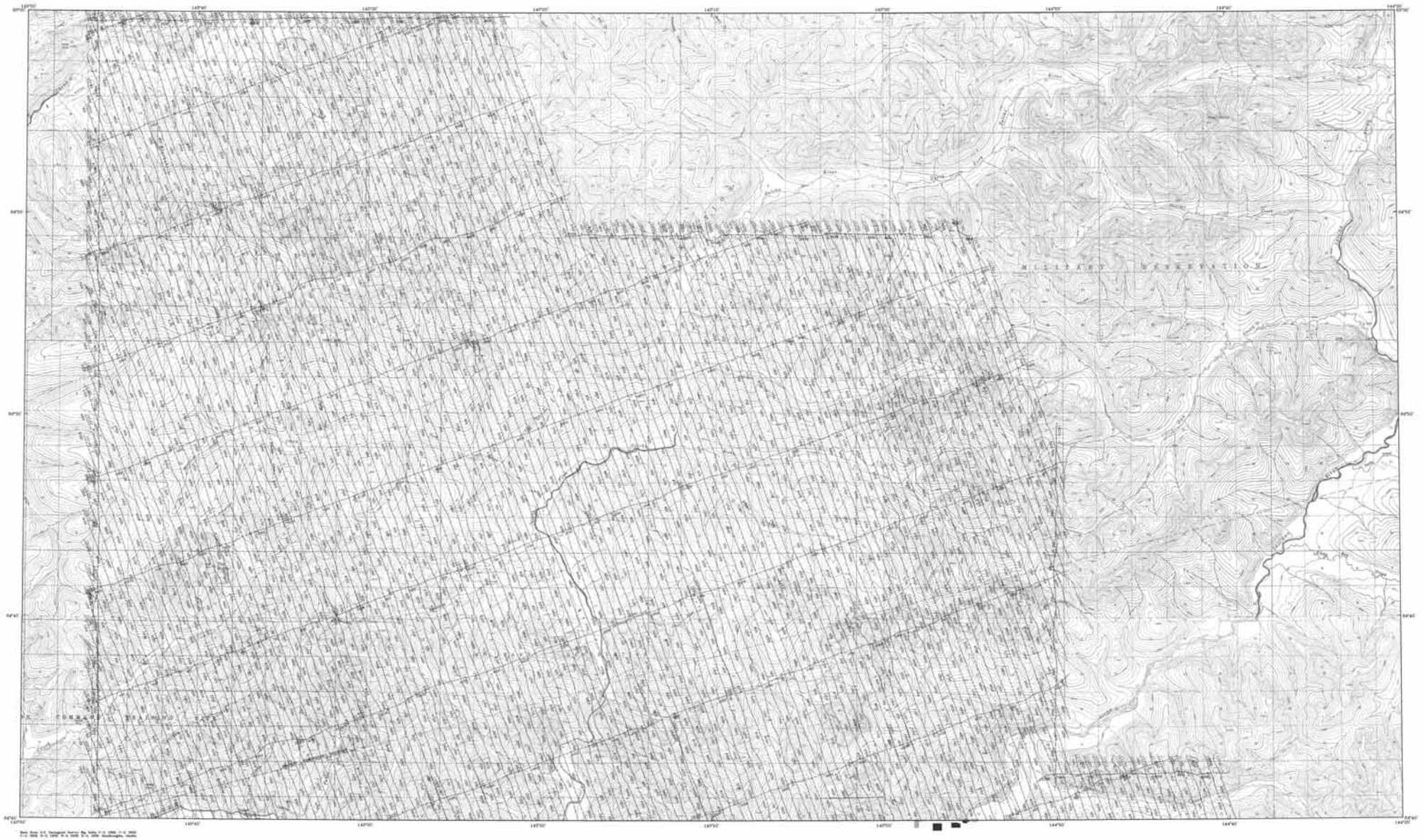
Figure 15. The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into a 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 60 m. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30179.

Map Title	Description
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_a.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_b.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_c.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_d.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_e.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_f.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_detailed_topo_map_g.pdf	detailed EM anomaly map with simulated magnetic total field contours and topographic base map
salchapogo_emanomalies_sim_magtf_contours_plss_map_1of2.pdf	EM anomaly map with simulated magnetic total field contours and public land survey system base layer
salchapogo_emanomalies_sim_magtf_contours_plss_map_2of2.pdf	EM anomaly map with simulated magnetic total field contours and public land survey system base layer
salchapogo_flightlines_topo_map_1of2.pdf	flight lines with topographic base map
salchapogo_flightlines_topo_map_2of2.pdf	flight lines with topographic base map
salchapogo_interpretation_plss_map_1of2.pdf	interpretation with public land survey system base layer
salchapogo_interpretation_plss_map_2of2.pdf	interpretation with public land survey system base layer
salchapogo_rad_pct_k_contours_plss_map_1of2.pdf	percent potassium grid with contours and public land survey system base layer
salchapogo_rad_pct_k_contours_plss_map_2of2.pdf	percent potassium grid with contours and public land survey system base layer
salchapogo_rad_pct_k_bw_contours_plss_map_1of2.pdf	black and white percent potassium contours with public land survey system base layer
salchapogo_rad_pct_k_bw_contours_plss_map_2of2.pdf	black and white percent potassium contours with public land survey system base layer
salchapogo_rad_equiv_th_bw_contours_plss_map_1of2.pdf	black and white equivalent thorium contours and public land survey system base layer
salchapogo_rad_equiv_th_bw_contours_plss_map_2of2.pdf	black and white equivalent thorium contours and public land survey system base layer
salchapogo_rad_equiv_u_bw_contours_plss_map_1of2.pdf	black and white equivalent uranium contours and public land survey system base layer
salchapogo_rad_equiv_u_bw_contours_plss_map_2of2.pdf	black and white equivalent uranium contours and public land survey system base layer
salchapogo_rad_ratio_th_k_bw_contours_plss_map_1of2.pdf	black and white equivalent thorium to percent potassium ratio contours with public land survey system base layer

Table 1, continued. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30179.

Map Title	Description
salchapogo_rad_ratio_th_k_bw_contours_plss_map_2of2.pdf	black and white equivalent thorium to percent potassium ratio contours with public land survey system base layer
salchapogo_rad_ratio_th_k_contours_plss_map_1of2.pdf	equivalent thorium to percent potassium ratio grid with contours with public land survey system base layer
salchapogo_rad_ratio_th_k_contours_plss_map_2of2.pdf	equivalent thorium to percent potassium ratio grid with contours with public land survey system base layer
salchapogo_rad_ratio_th_k_topo_map_1of2.pdf	equivalent thorium to percent potassium ratio grid with topographic base map
salchapogo_rad_ratio_th_k_topo_map_2of2.pdf	equivalent thorium to percent potassium ratio grid with topographic base map
salchapogo_rad_taadr_bw_contours_plss_map_1of2.pdf	black and white total air absorbed dose rate contours with public land survey system base layer
salchapogo_rad_taadr_bw_contours_plss_map_2of2.pdf	black and white total air absorbed dose rate contours with public land survey system base layer
salchapogo_rad_taadr_contours_plss_map_1of2.pdf	total air absorbed dose rate grid with contours and public land survey system base layer
salchapogo_rad_taadr_contours_plss_map_2of2.pdf	total air absorbed dose rate grid with contours and public land survey system base layer
salchapogo_rad_ternary_topo_map_1of2.pdf	radioelement ternary map with topographic base map
salchapogo_rad_ternary_topo_map_2of2.pdf	radioelement ternary map with topographic base map
salchapogo_res7200hz_bw_contours_plss_map_1of2.pdf	black and white 7,200 Hz apparent resistivity contours with public land survey system base layer
salchapogo_res7200hz_bw_contours_plss_map_2of2.pdf	black and white 7,200 Hz apparent resistivity contours with public land survey system base layer
salchapogo_res7200hz_contours_plss_map_1of2.pdf	7,200 Hz apparent resistivity grid with contours and public land system survey base layer
salchapogo_res7200hz_contours_plss_map_2of2.pdf	7,200 Hz apparent resistivity grid with contours and public land system survey base layer
salchapogo_res7200hz_topo_map_1of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
salchapogo_res7200hz_topo_map_2of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
salchapogo_sim_magtf_shaded_plss_map_1of2.pdf	color shaded simulated magnetic total field with public land survey system base layer
salchapogo_sim_magtf_shaded_plss_map_2of2.pdf	color shaded simulated magnetic total field with public land survey system base layer
salchapogo_sim_magtf_contours_plss_map_1of2.pdf	simulated magnetic total field grid with contours and public land survey system base layer
salchapogo_sim_magtf_contours_plss_map_2of2.pdf	simulated magnetic total field grid with contours and public land survey system base layer
salchapogo_sim_magtf_topo_map_1of2.pdf	simulated magnetic total field grid with topographic base map
salchapogo_sim_magtf_topo_map_2of2.pdf	simulated magnetic total field grid with topographic base map



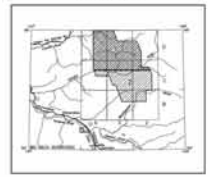


FLIGHT LINES
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

LOCATION INDEX

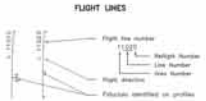


DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 Hz fluxgate and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a real-time accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 6J spheroid, North American datum using a central meridian (CM) of 147°W, false 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.

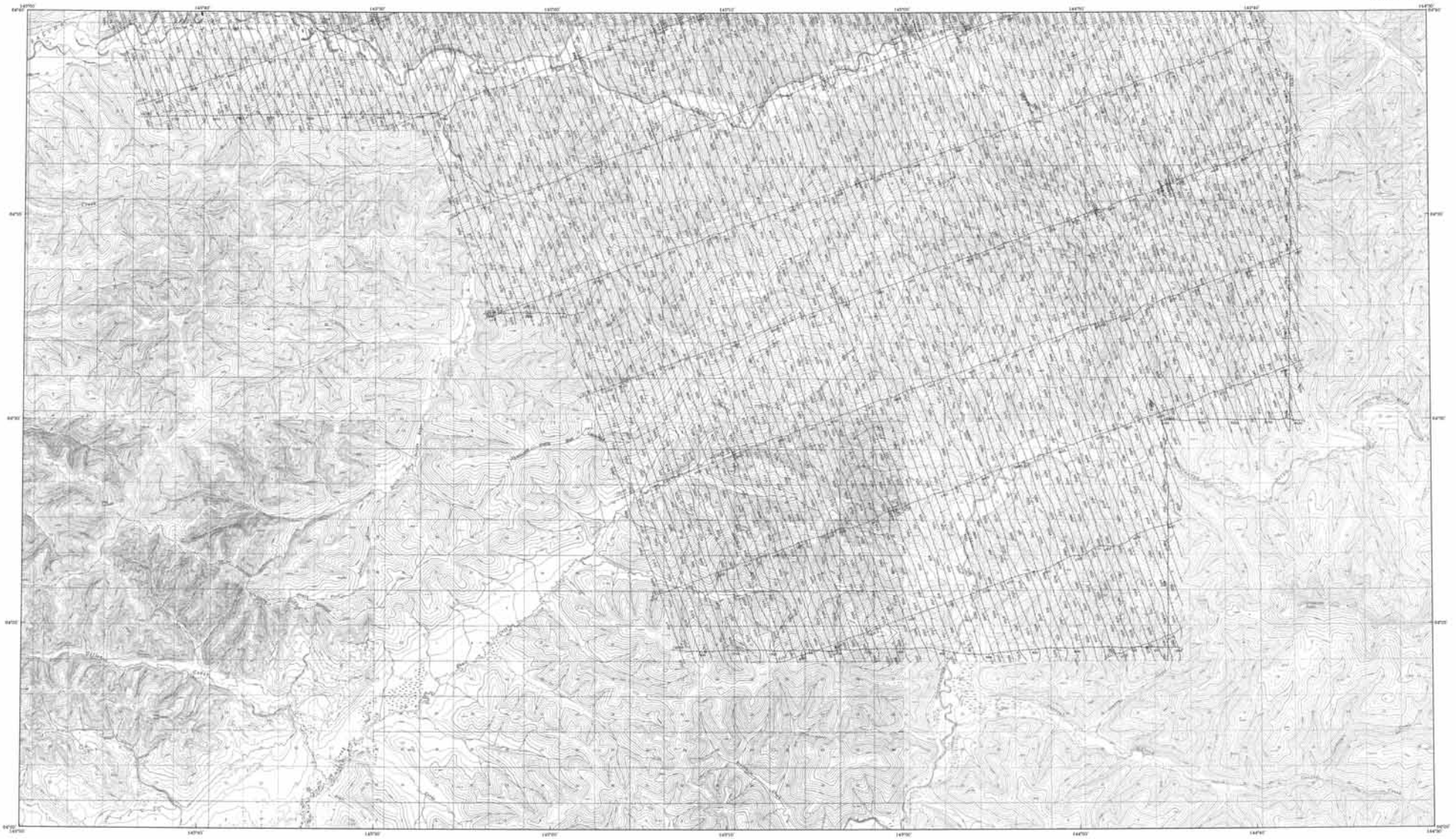
FLIGHT LINES



SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired by Geoterrex-Dighem, a division of CGG Canada Ltd., in 1999. Laurel Burns was the contract manager for DGGS.

This map and other products from this survey are available by mail order or in person from DGGS, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.





FLIGHT LINES
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

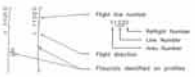


DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-3 Squirrel helicopter at a mean airspeed of 80 knots. The data were filtered to 0.2 second. Survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 3 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, 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.

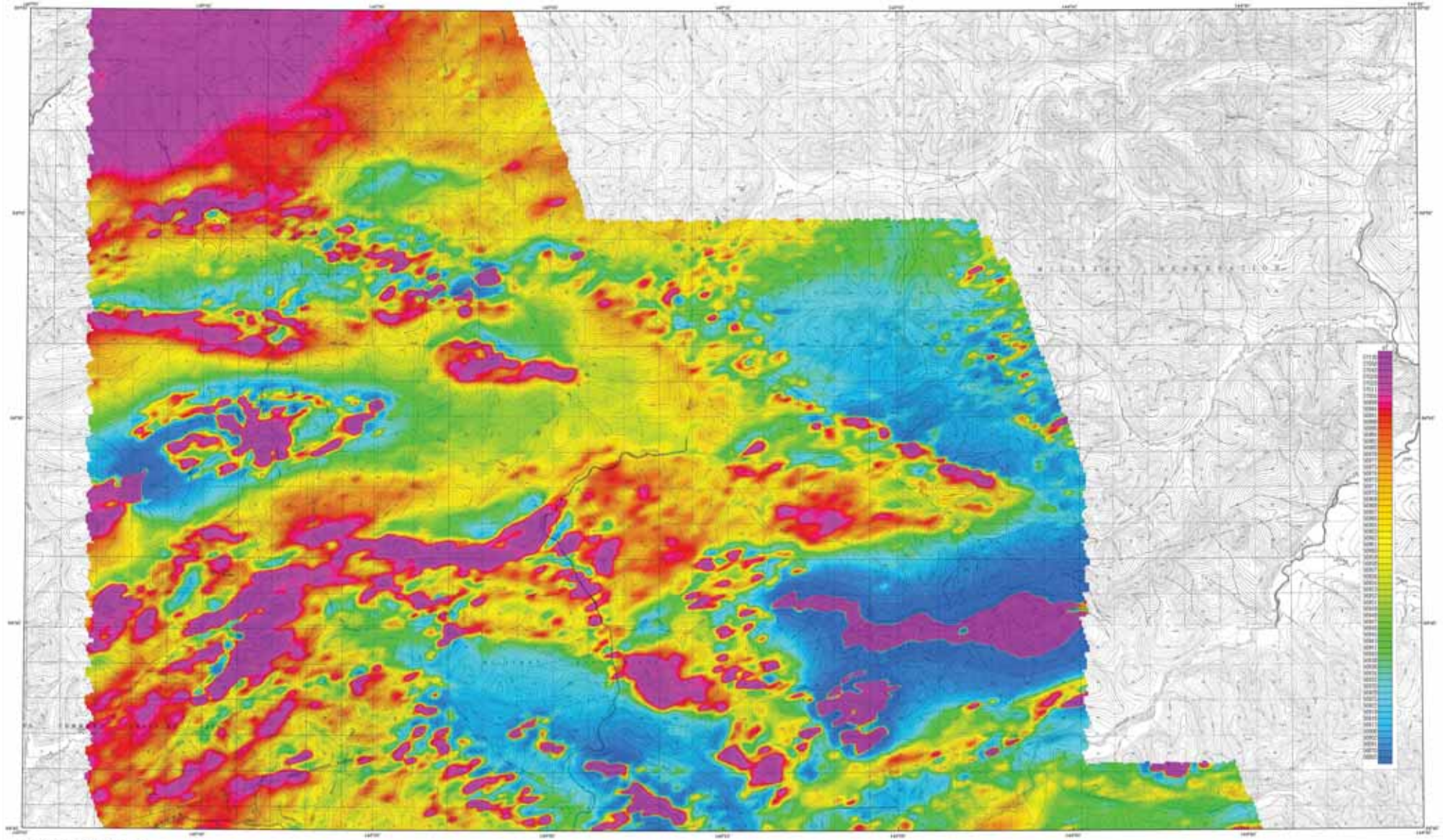
FLIGHT LINES



SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired by Geoterrex-Dighem, a division of CGG Canada Ltd., in 1999. David Burns was the contract manager for DGGS.

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TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

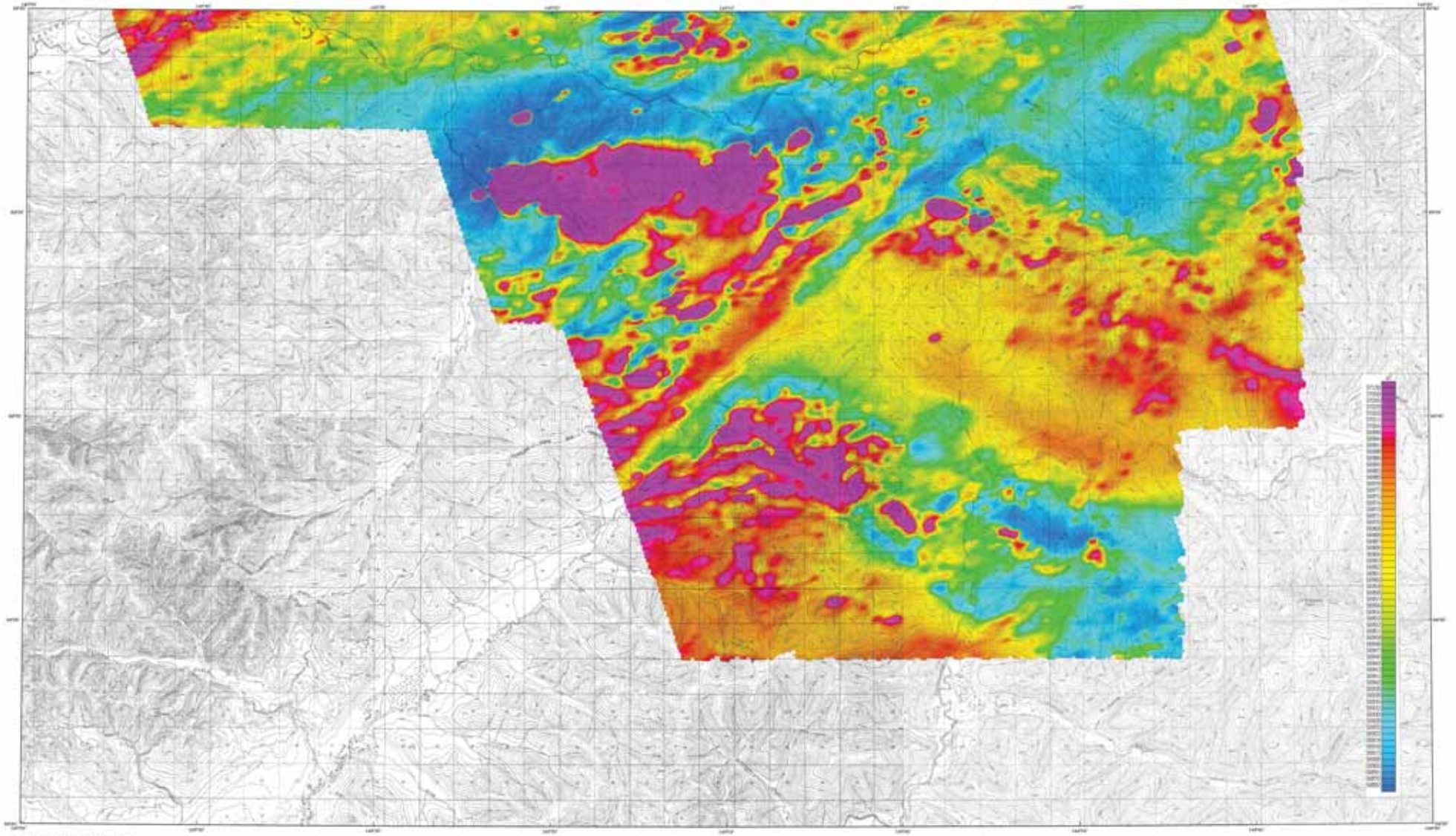
2000

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TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



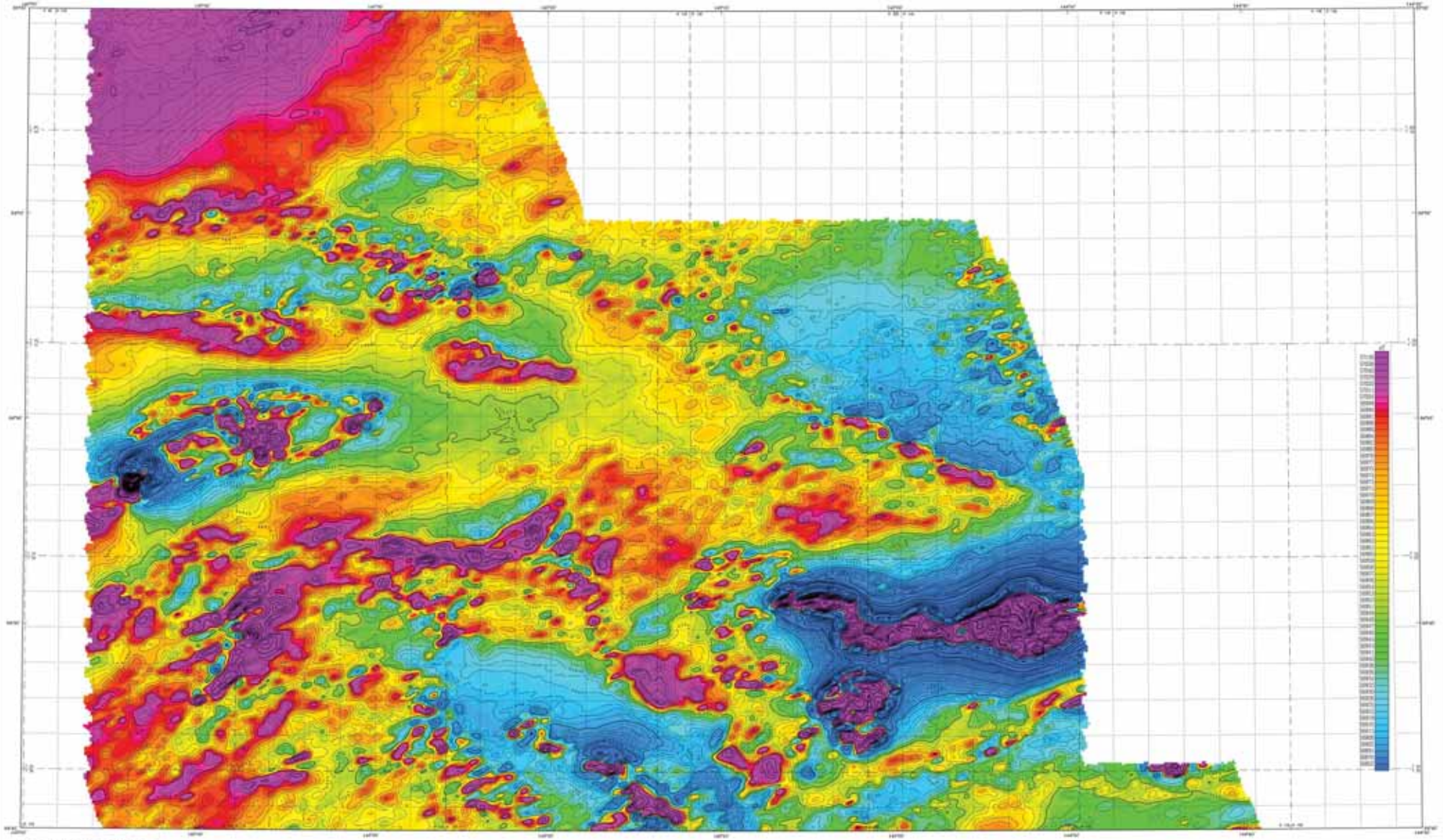


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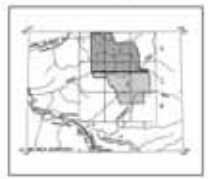


TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000





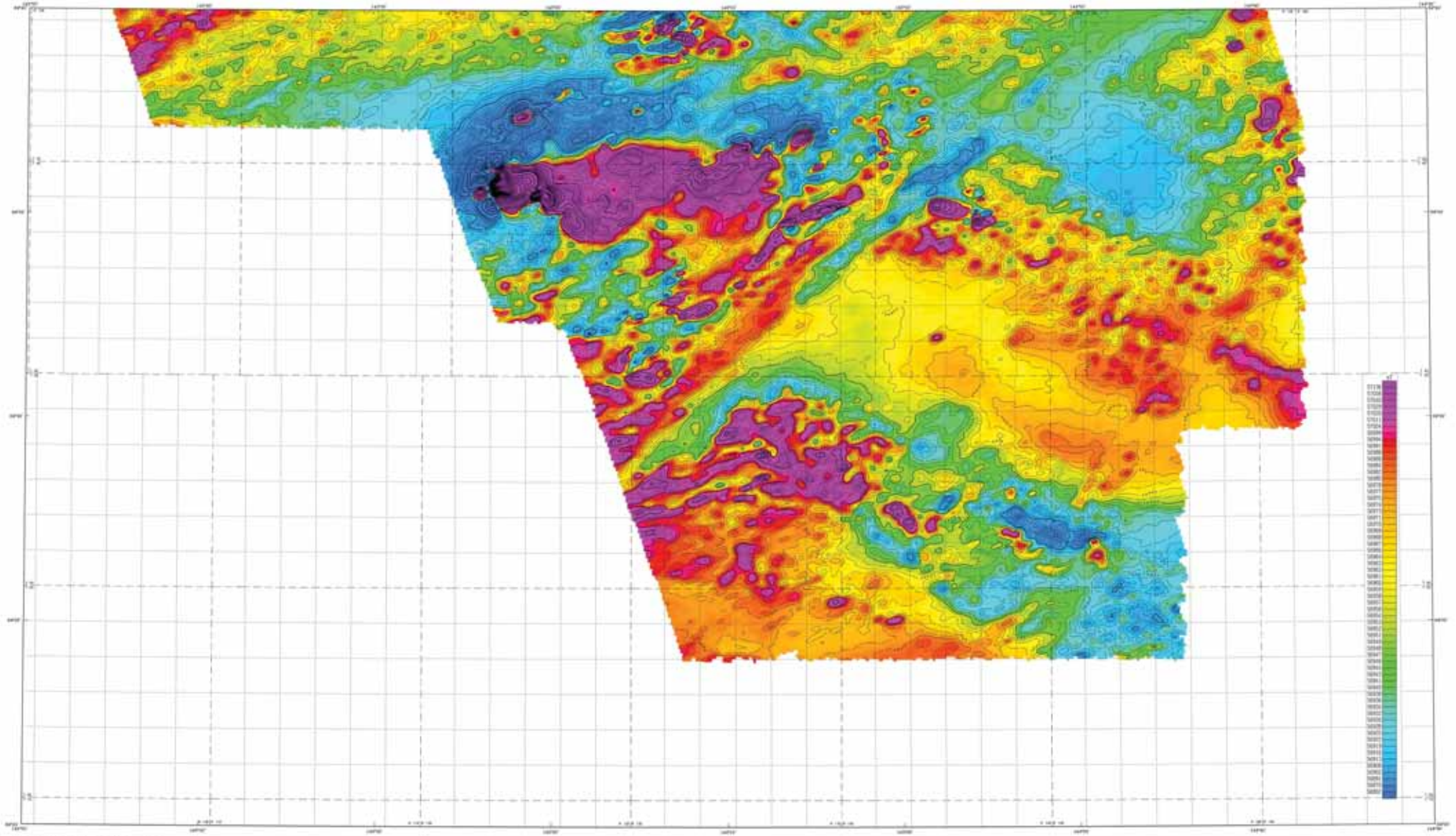
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DESCRIPTIVE NOTES

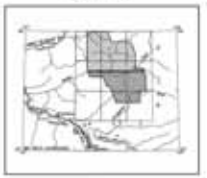
TOTAL MAGNETIC FIELD

MAGNETIC CONTOUR INTERVAL

SURVEY HISTORY







TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

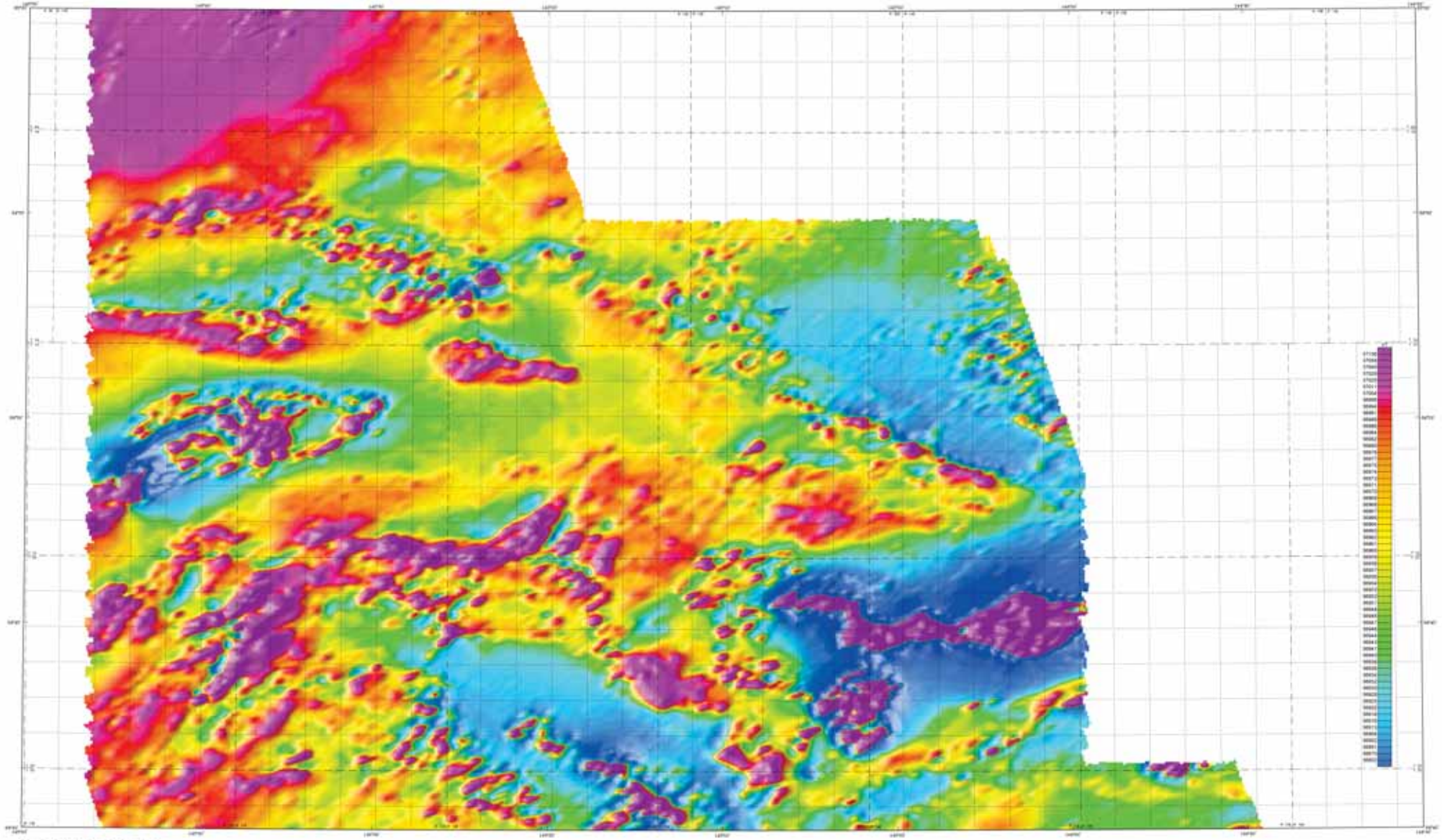
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DESCRIPTIVE NOTES

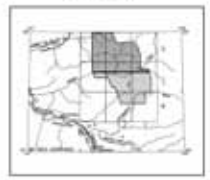
TOTAL MAGNETIC FIELD

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SURVEY HISTORY







COLOR SHADOW TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

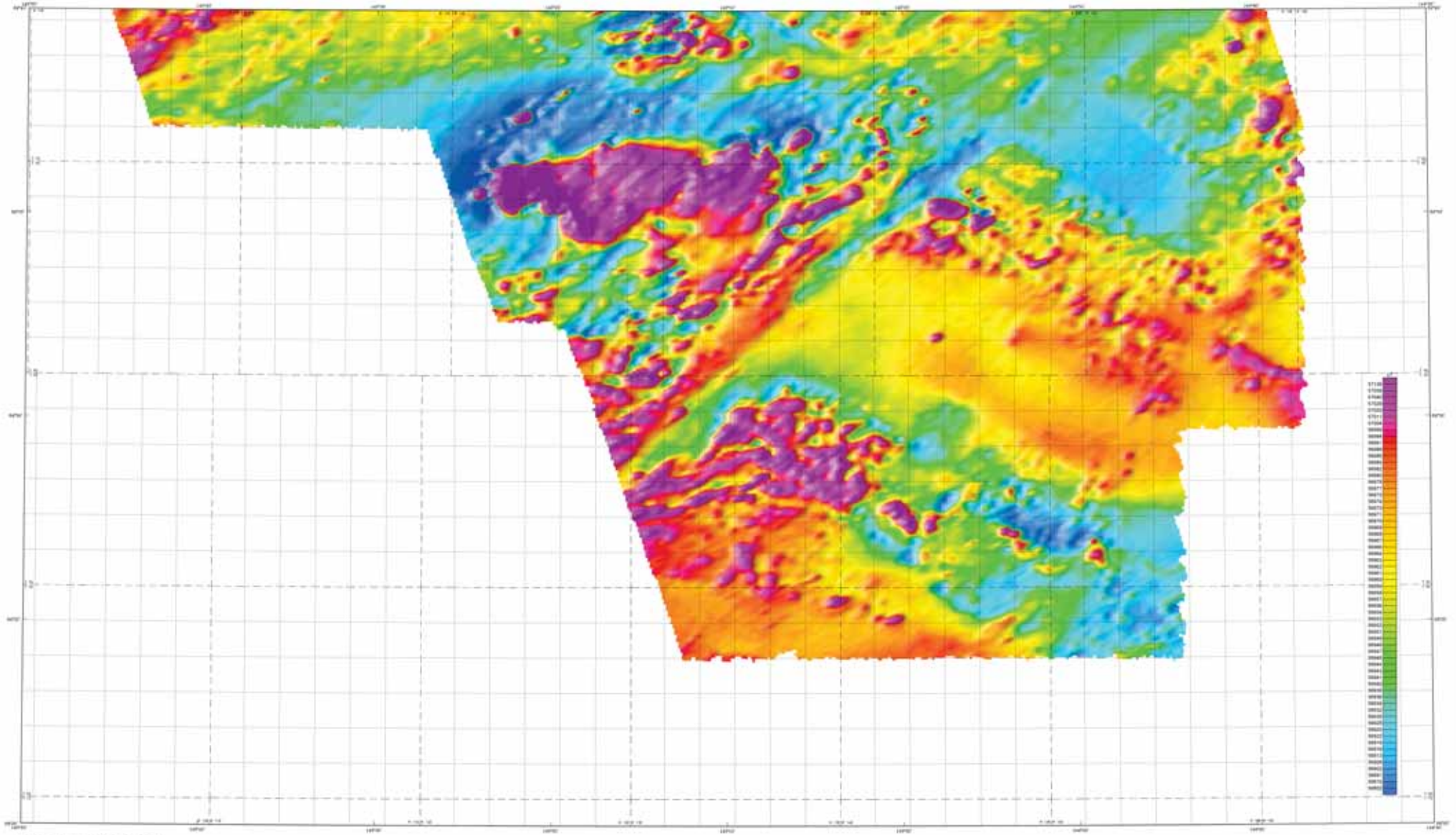
Sun Azimuth- 270 degrees

Inclination- 35 degrees

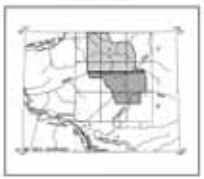
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TOTAL MAGNETIC FIELD

SURVEY HISTORY







COLOR SHADOW TOTAL MAGNETIC FIELD OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

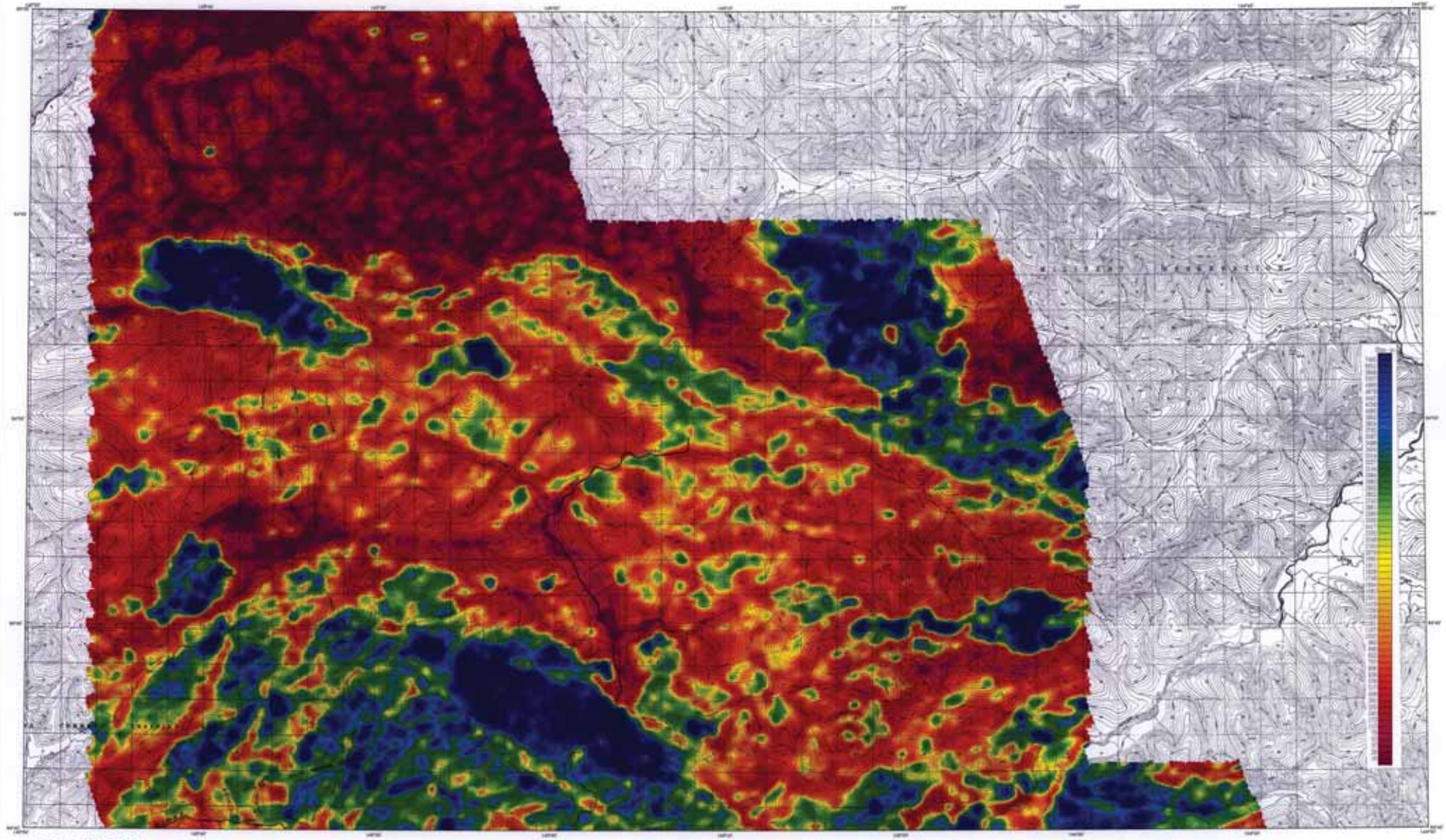
Sun Azimuth- 270 degrees

Inclination- 35 degrees

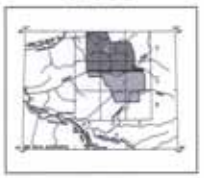
DESCRIPTIVE NOTES

TOTAL MAGNETIC FIELD

SURVEY HISTORY







7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

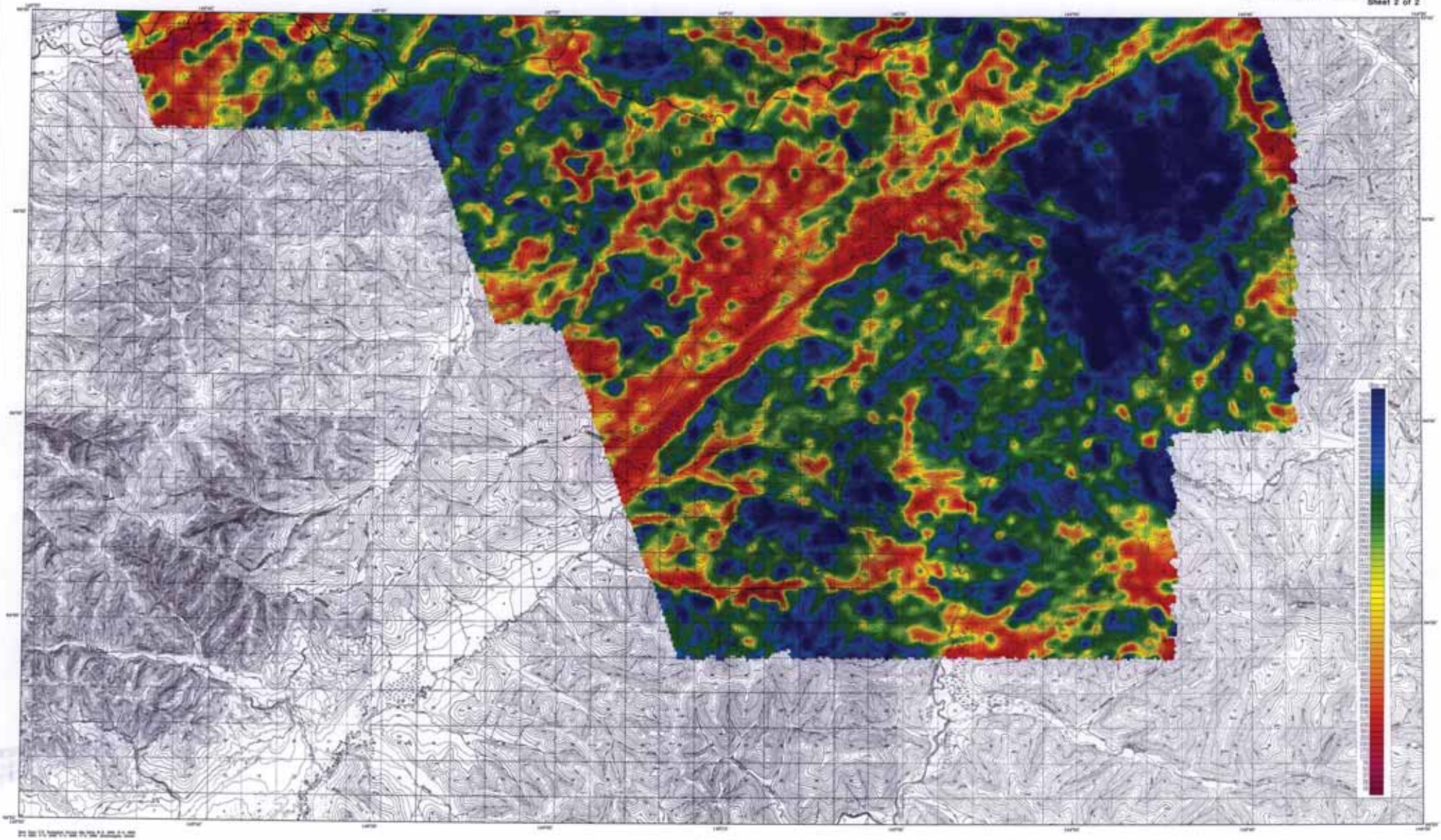
BIG DELTA QUADRANGLE

2000

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SURVEY HISTORY



7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

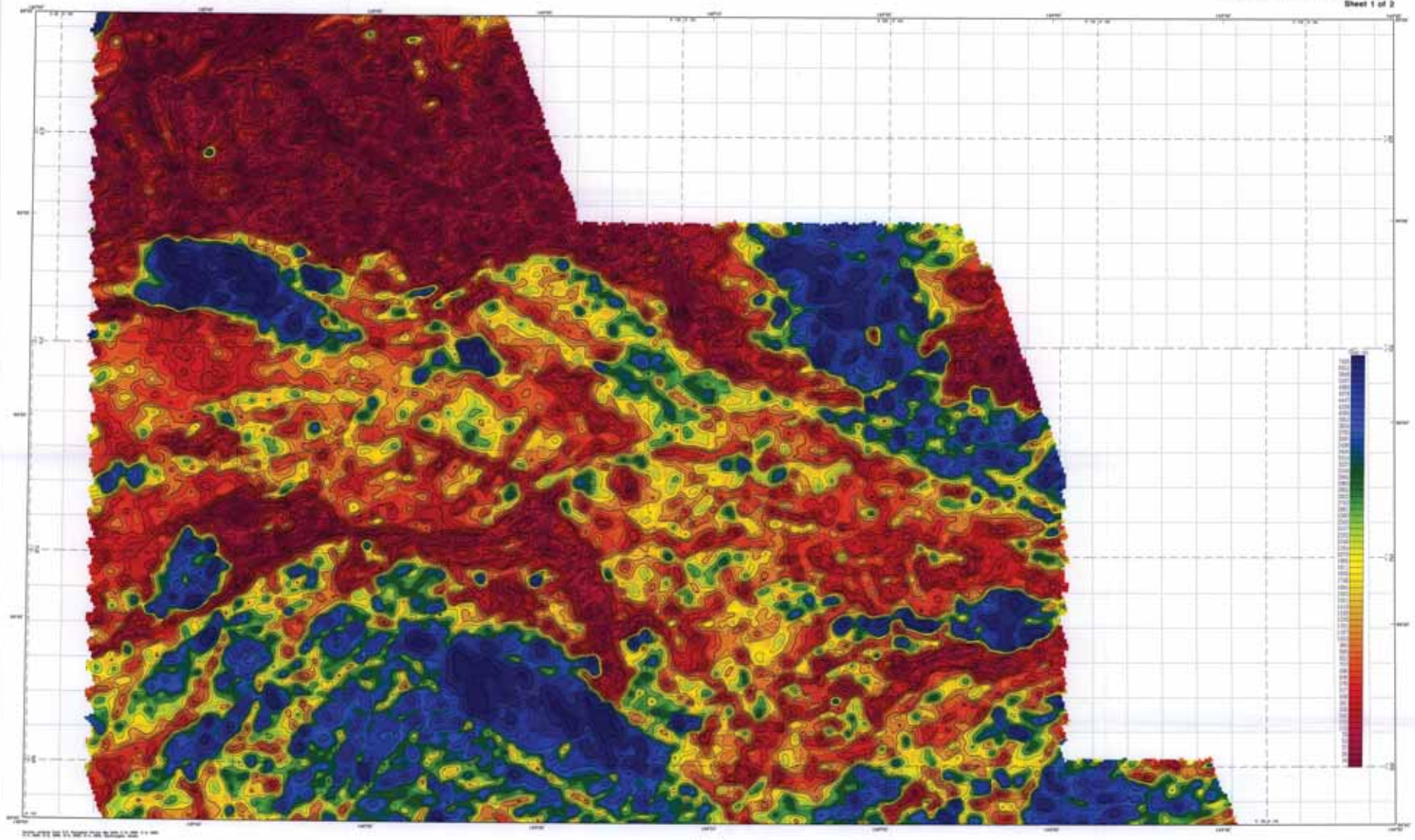




DESCRIPTIVE NOTES

RESISTIVITY

SURVEY HISTORY



7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a Dighem[V] frequency-domain (DIS) system. Electromagnetic (EM), gamma-ray spectrometer and a fluxgate vector magnetometer. The EM and magnetic sensors were flown on a height of 200 feet. The gamma-ray spectrometer was flown at a height of 400 feet above the survey terrain with data from a nominal 256 cubic inch downward looking detector. The magnetometer was used to measure the total field and an additional vertical component. The data were recorded digitally on a PCMCIA flash card with a sampling of a number of 0.1 second. The nominal survey speed was 120 knots. The flight lines at intervals of approximately 0.2 miles.

An Aerquest X500 helicopter (~ 10,000lb Gross Weight) was used for navigation. The navigation system was derived every 0.5 seconds. Differential corrections were applied using a base station operating in differential mode. Final flight path positions were produced using the Dighem DGPS software. NAD 27 datum, UTM zone 6N projection. The GPS antenna was mounted above the helicopter cockpit, providing a reference horizontal clearance of 10 feet and an exact separation of 9500.000 meters between the GPS antenna and the EM receiver. Positional accuracy of the interpolated data is better than 10 m, with respect to the GPS grid.

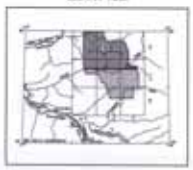
RESISTIVITY

The DIGHEM[V] EM system measures twelve (six quadrature components of five frequencies). Two vertical coplanar coil pairs operated at 900 (not used), 7200, and 56,000 Hz. The EM data were sampled at 10.1 second intervals. The EM system responds to bedrock conductivity, overburden conductivity, and surficial sources. Apparent resistivity is generated from the inphase and quadrature components of the coplanar 7200 Hz using the pseudo-layer half space model (Fraser 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1978) technique.

NOTE: In cases of low values of conductivity and coupled noise, the inphase component may yield a more geologically meaningful result than the apparent resistivity. In such cases, the inphase channel should be used.



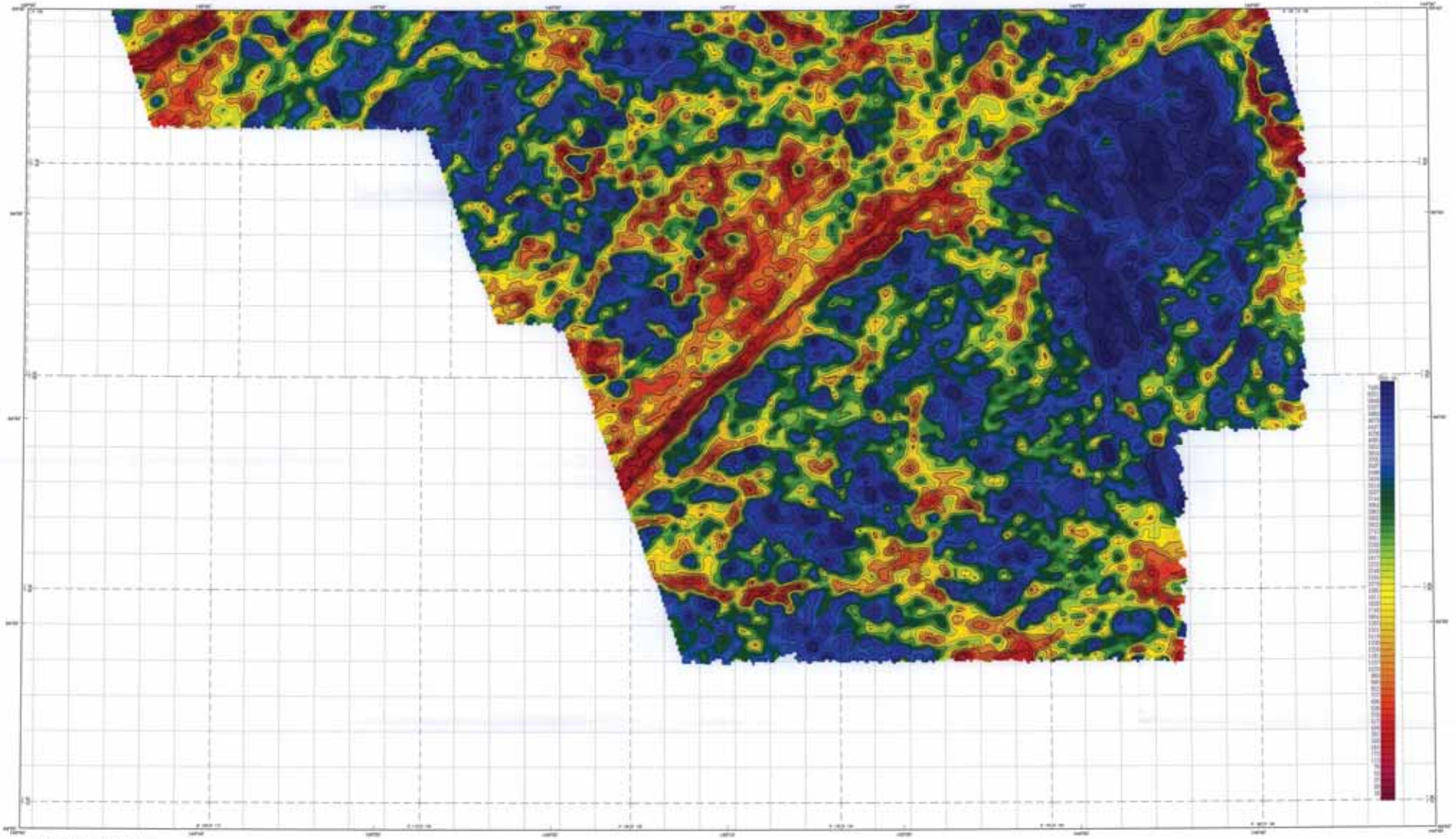
RESISTIVITY CONTOURS



LOCATION INDEX

SURVEY HISTORY

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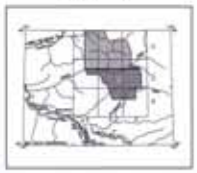




7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

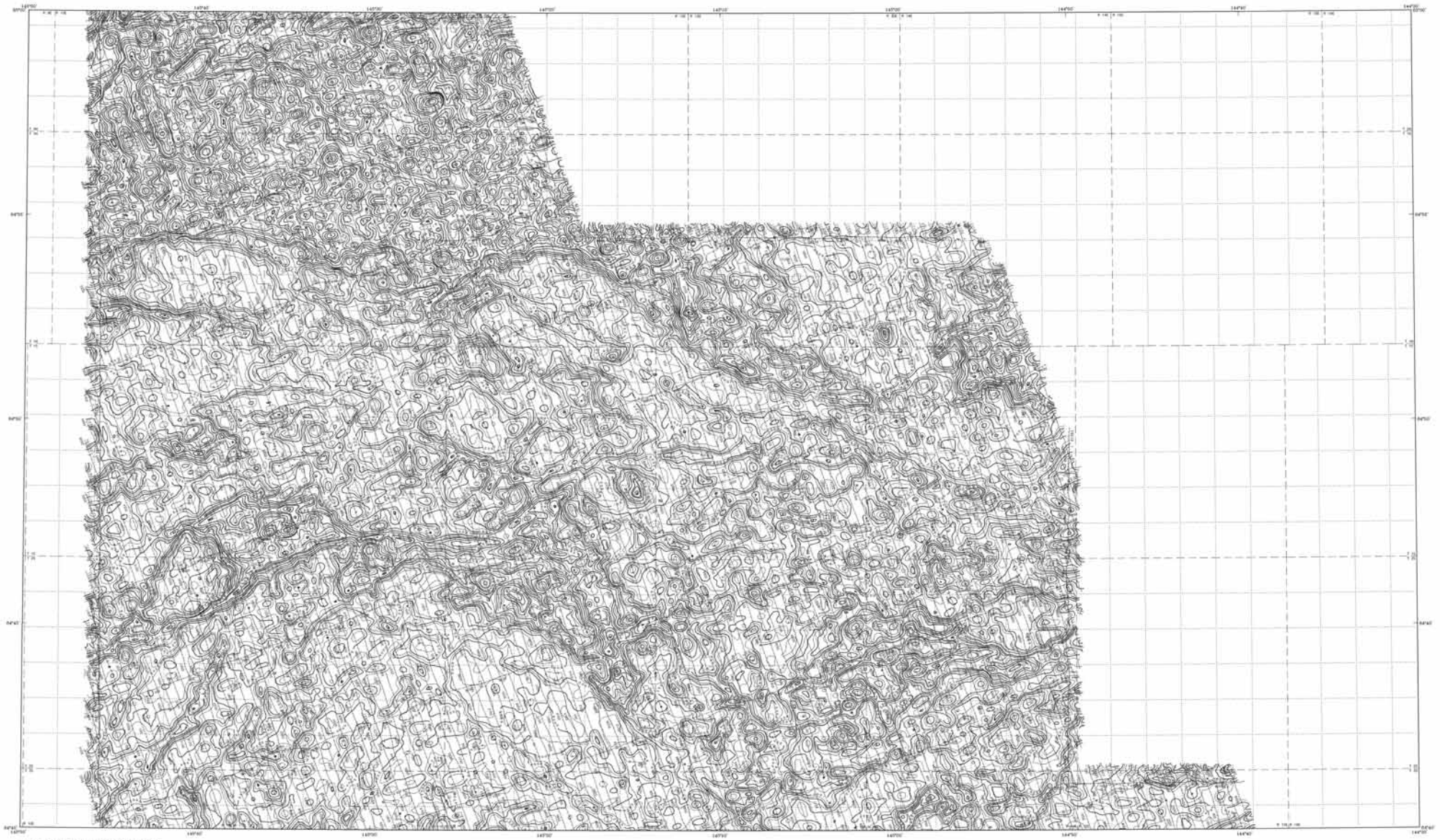


DESCRIPTIVE NOTES

RESISTIVITY

RESISTIVITY CONTOURS

SURVEY HISTORY

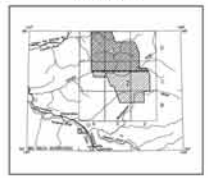




7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flightly were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAUSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 10m. Flight line positions were projected onto the Clarke 1866 UTM zone 6 projection, North American datum using a central meridian (CM) of 147°W, scale constant of 0.9 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 900 and 5500 Hz while three coplanar coil pairs operated at 900, 7200, and 56,200 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature components of the coplanar 7200 Hz using the pseudo-layer half space model (Fraser 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the association of Computing Machinery, v. 17, no. 4, p. 580-602.

Fraser, D.C.,1978, Resistivity mapping with an airborne multicoil electromagnetic system: Geophysics, v. 43, p. 144-172.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
100

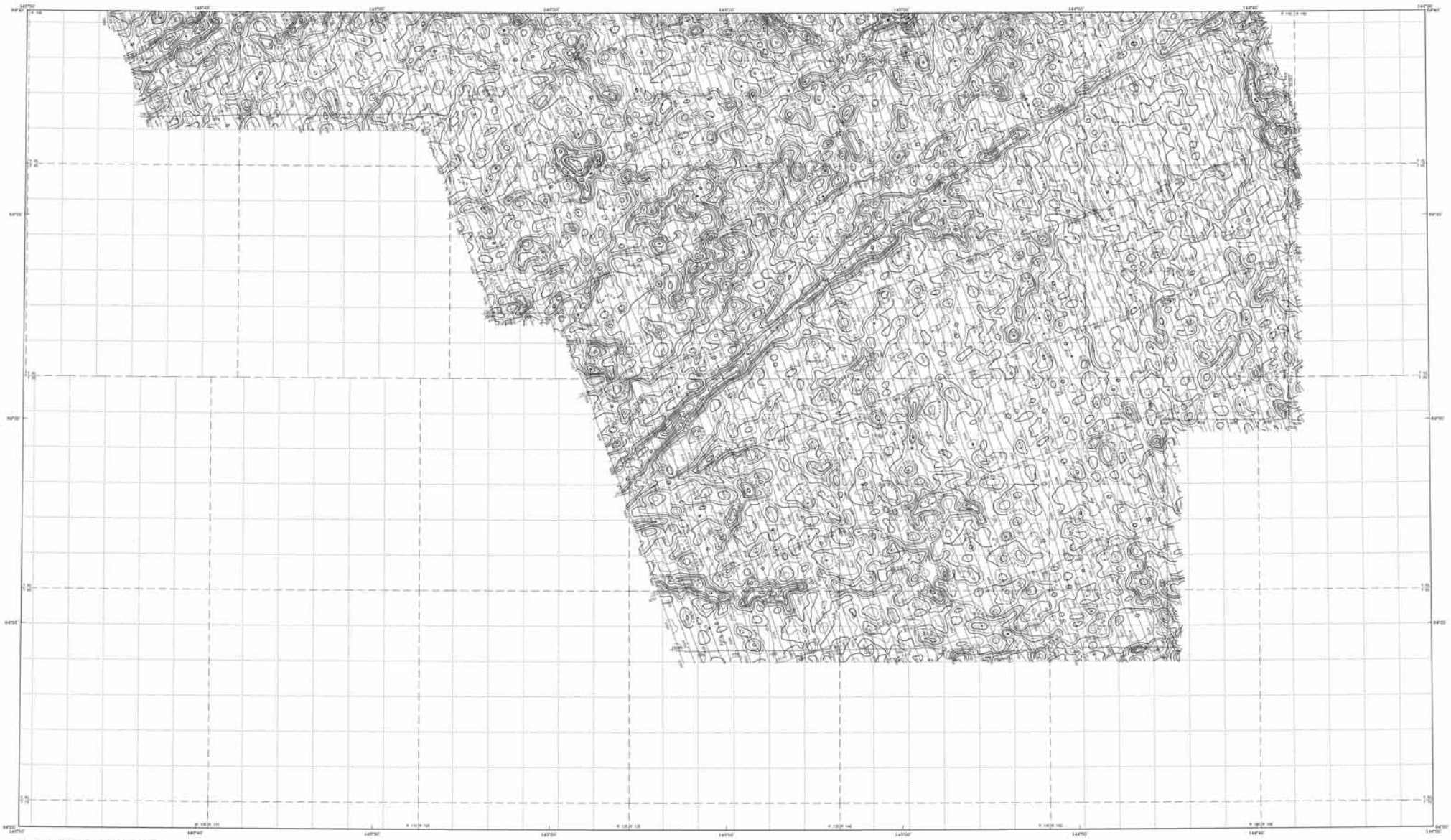
Contours in ohm-m at 10 intervals per decade

resistivity low

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for this area were acquired by Geotemex-Gishem, a division of CGG Canada Ltd., in 1999. Laurel Burns was the contract manager for DGGS.

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SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

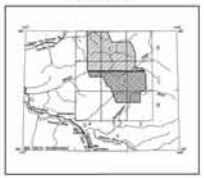


7200 Hz COPLANAR RESISTIVITY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

LOCATION INDEX



RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along WA-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected using the Clarke 1866 (NAD27) spheroid, NAD27 horizontal datum, using a central meridian (CM) of 145°30' west, a CM scale factor of 1, and an equal 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 in-phase and quadrature components of five frequencies. Two vertical coplanar coil pairs operated at 900 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 components of the coplanar 7200 Hz using the pseudo-layer half space model (Fraser 1978). The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

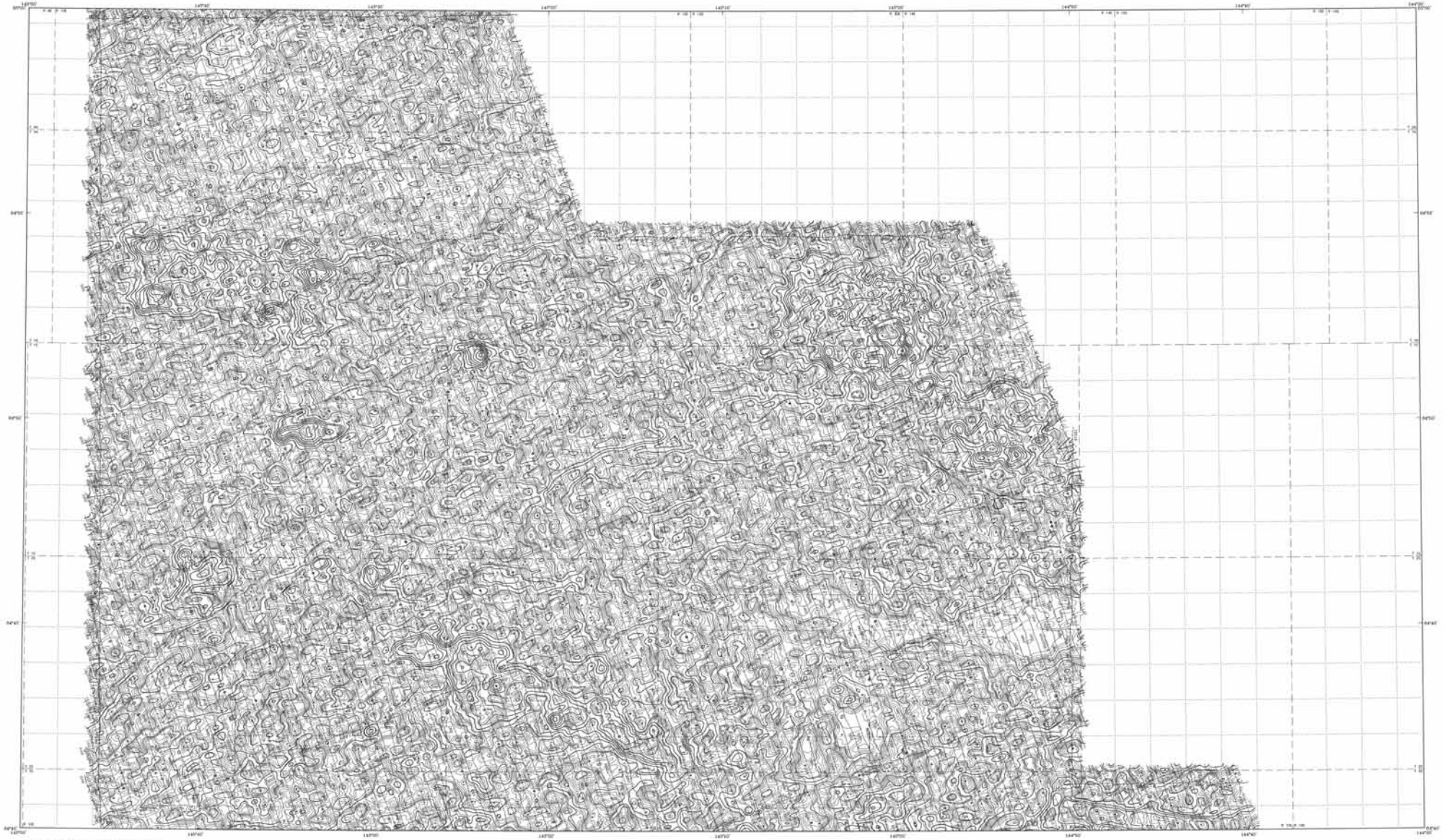
Akima, H. 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

Fraser, D.C. 1978, Resistivity mapping with an airborne multicoil electromagnetic system: Geophysics, v. 43, p. 144–172.

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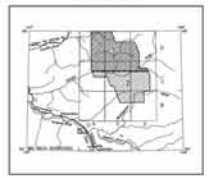




THORIUM (eTH)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



LOCATION INDEX

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM² Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAUSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected using the Clarke 1866 UTM zone 6 projection, North American Datum using a central meridian (CM) of 147°W, scale constant of 1.0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of that in the two detectors comprising the system were, main detector 16.7L, radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 kev), uranium (1660–1980 kev), potassium (1370–1570 kev), total radioactivity (400–2815 kev) and cosmic radiation (3000–6000 kev). Counts from the radon detector were recorded in the radon window (1660–1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

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

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

CONTOUR INTERVAL

100 ppm

10 ppm

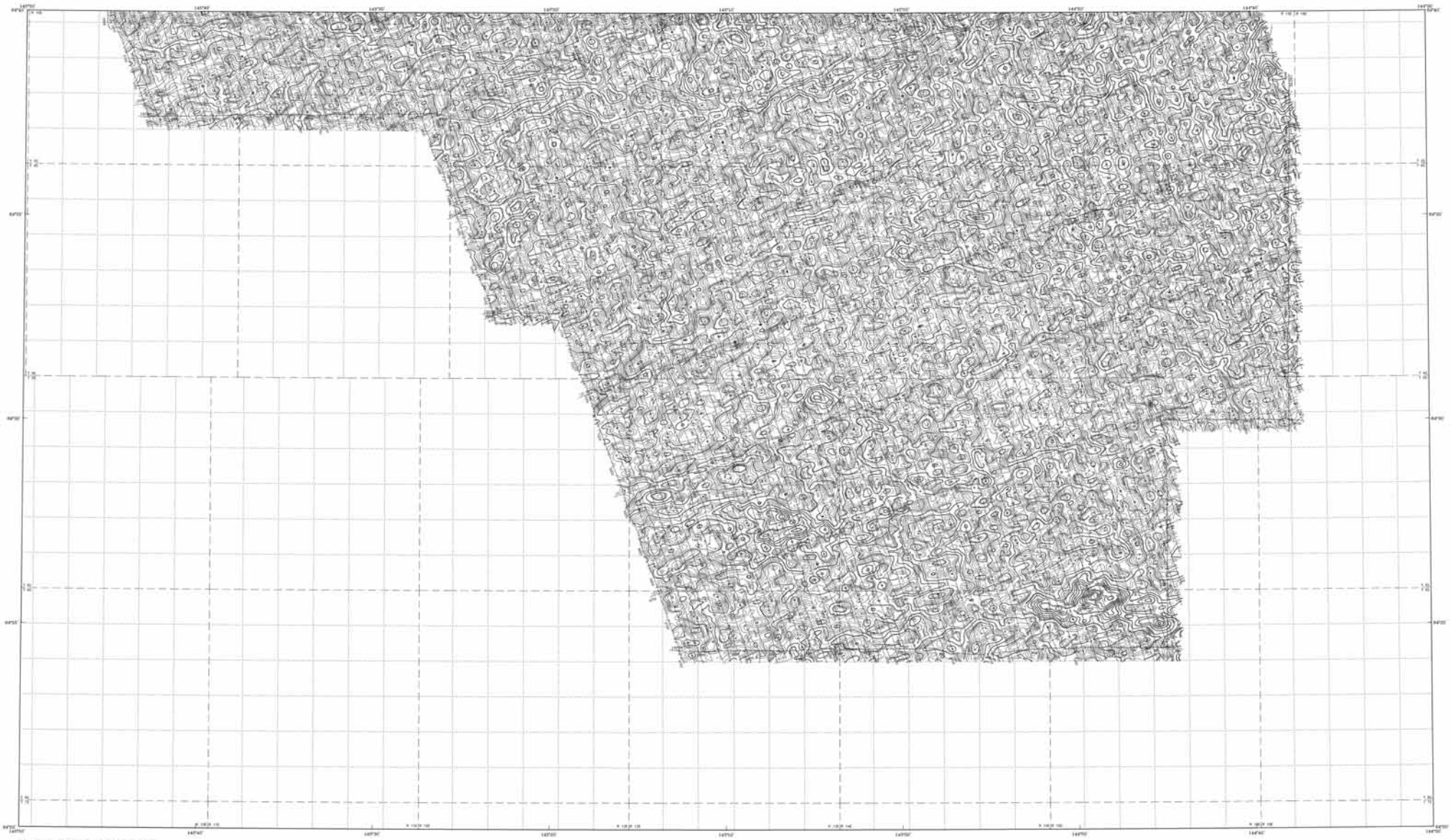
1.0 ppm

low

SURVEY HISTORY

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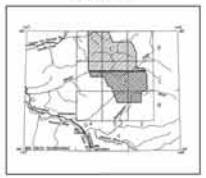




THORIUM (eTH)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along W-E (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected using the Clarke 1866 (UTM zone 6) spheroid, NAD27 datum and UTM grid using a central meridian (CM) of 147°W, north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of four in the two detectors comprising the system were, main detector, 15.7L; radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 kev), uranium (1660–1900 kev), potassium (1370–1570 kev), total radioactivity (400–2810 kev) and cosmic radiation (3000–>6000 kev). Counts from the radon detector were recorded in the radon window (1660–1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m. grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.
International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

100 ppm

2.0 ppm

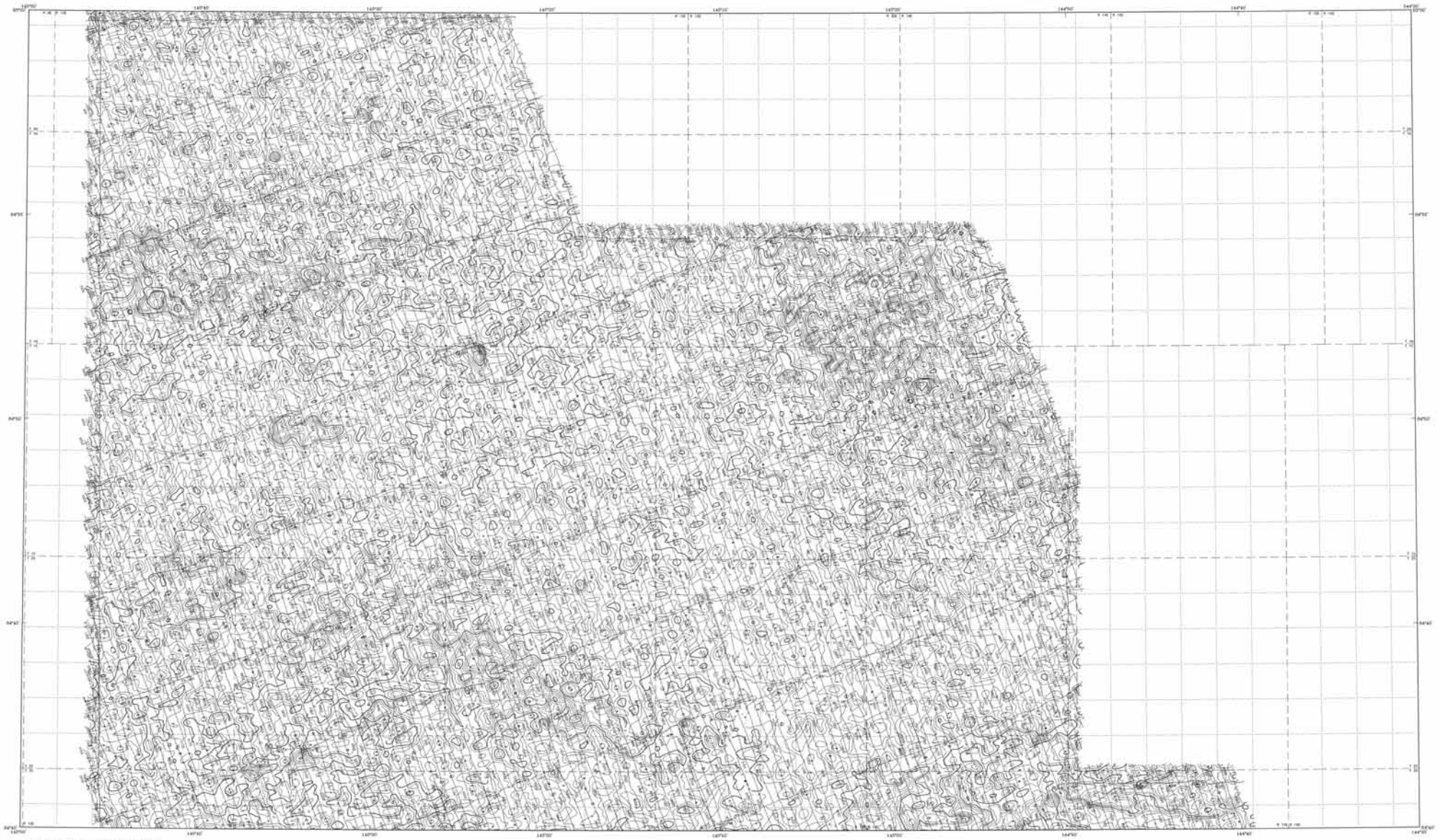
0.4 ppm

low

SURVEY HISTORY

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URANIUM (eU)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAUSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected using the Clarke 1866 (UTM zone 6) spheroid, North American Datum using a central meridian (CM) of 147°west, scale constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of that in the two detectors comprising the system were, main detector 16.7L, radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to Thorium (2410–2810 kev), uranium (1660–1860 kev), potassium (1370–1570 kev), total radioactivity (400–2815 kev) and cosmic radiation (3000–6000 kev). Counts from the radon detector were recorded in the radon window (1660–1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interferences, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

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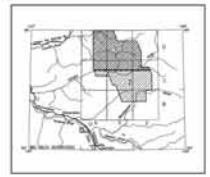
International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

SCALE 1:63,300

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LOCATION INDEX



CONTOUR INTERVAL

10.0 ppm

2.0 ppm

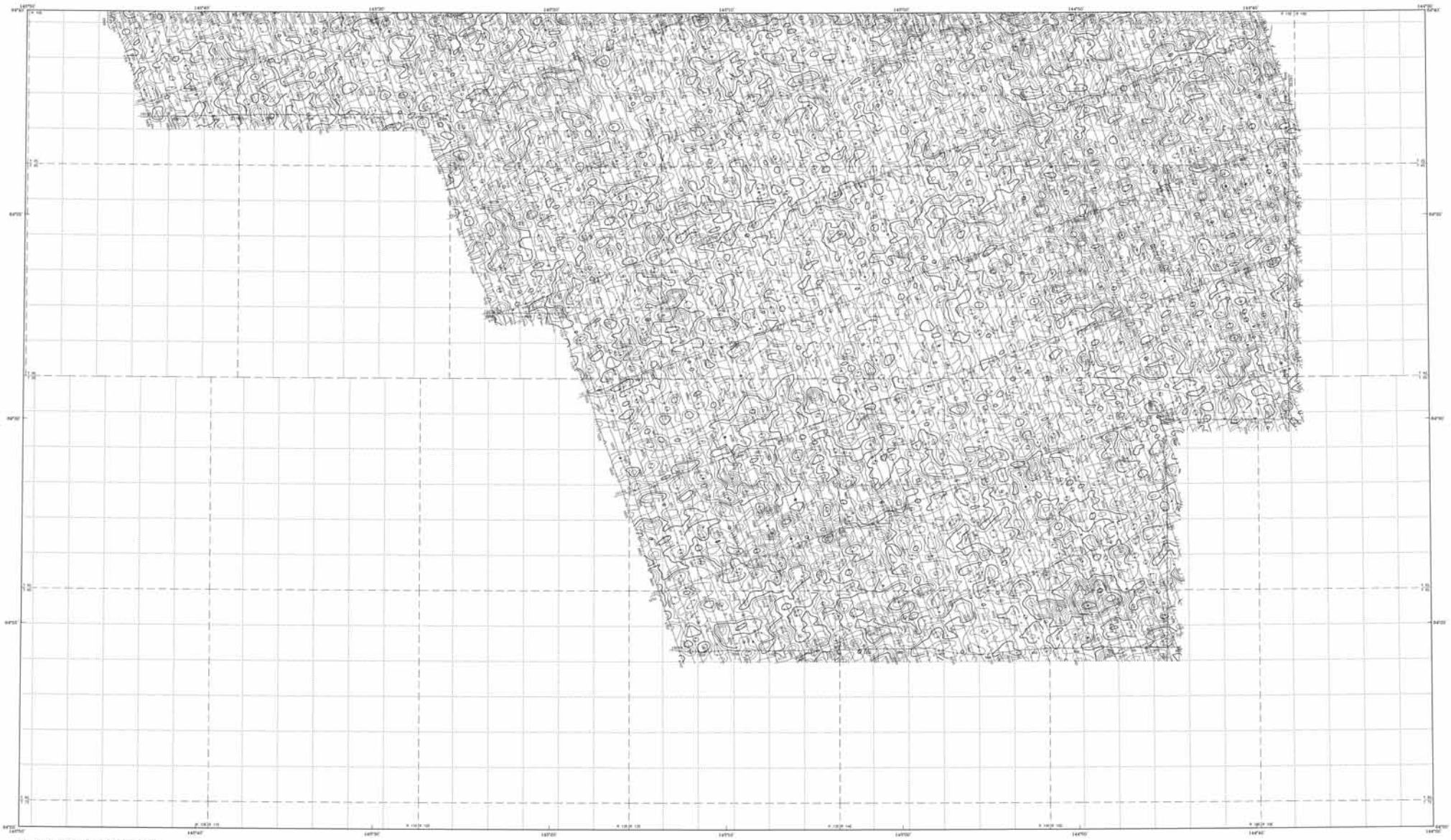
0.4 ppm

0m

SURVEY HISTORY

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SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



URANIUM (eU)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along WA-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected using the Clarke 1866 (UTM zone 6) spheroid, 140° Central meridian datum using a central meridian (CM) of -147°, a north constant of 0, and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of four in the two detectors comprising the system were, main detector, 15.7L; radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410-2810 kev), uranium (1660-1900 kev), potassium (1370-1570 kev), total radioactivity (400-2810 kev) and cosmic radiation (3000->6000 kev). Counts from the radon detector were recorded in the radon window (1660-1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m. grid using a modified Kelmo (1976) technique.

Kelmo, R., 1976, A new method of interpolation and smooth curve filling based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 584-602.

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

CONTOUR INTERVAL

100 ppm

2.0 ppm

0.4 ppm

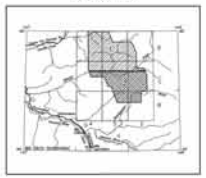
low

SURVEY HISTORY

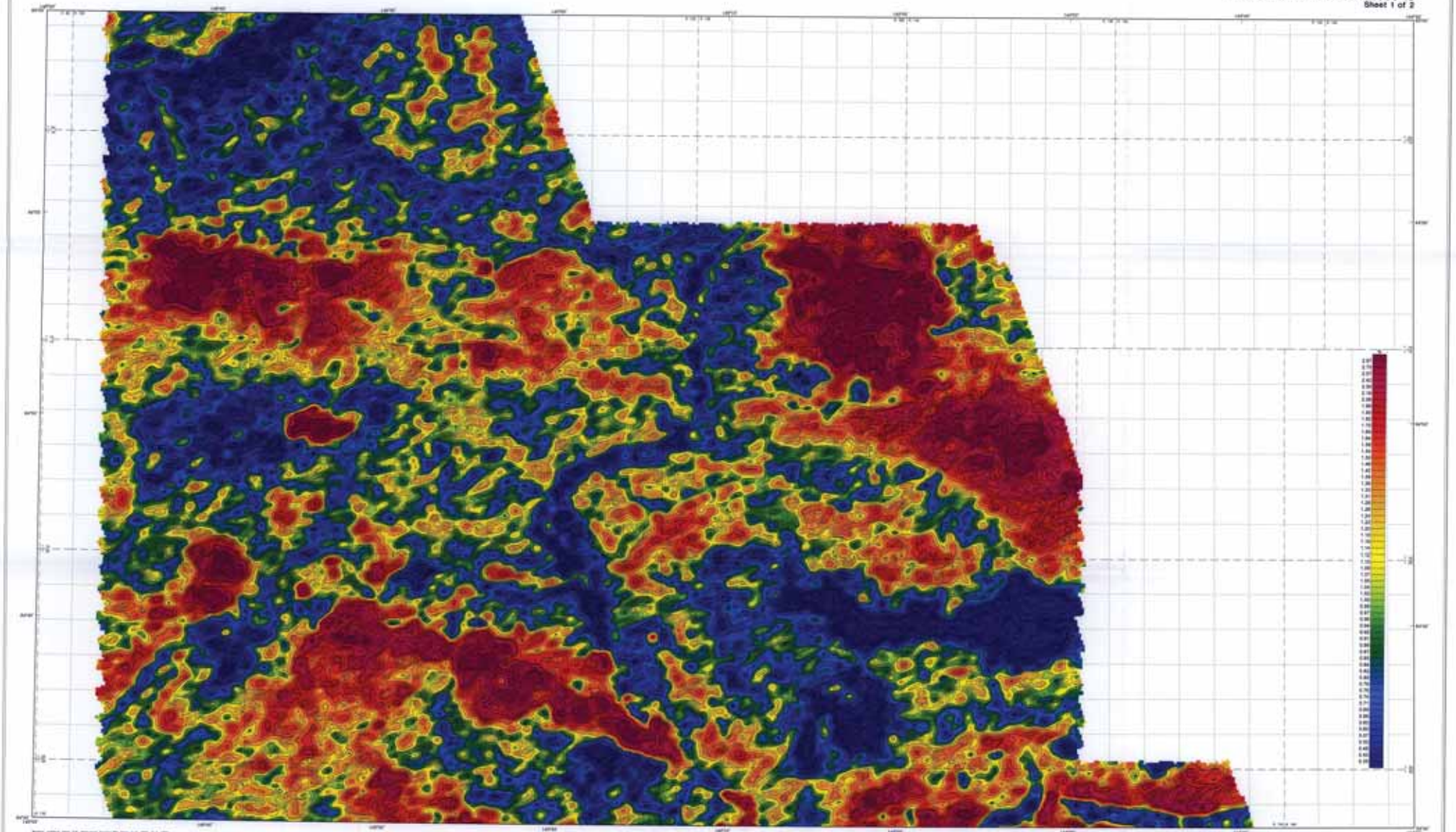
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LOCATION INDEX



GEOPHYSICAL REPORT 2000-15
Sheet 1 of 2

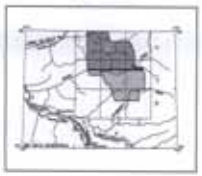


POTASSIUM (K%)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



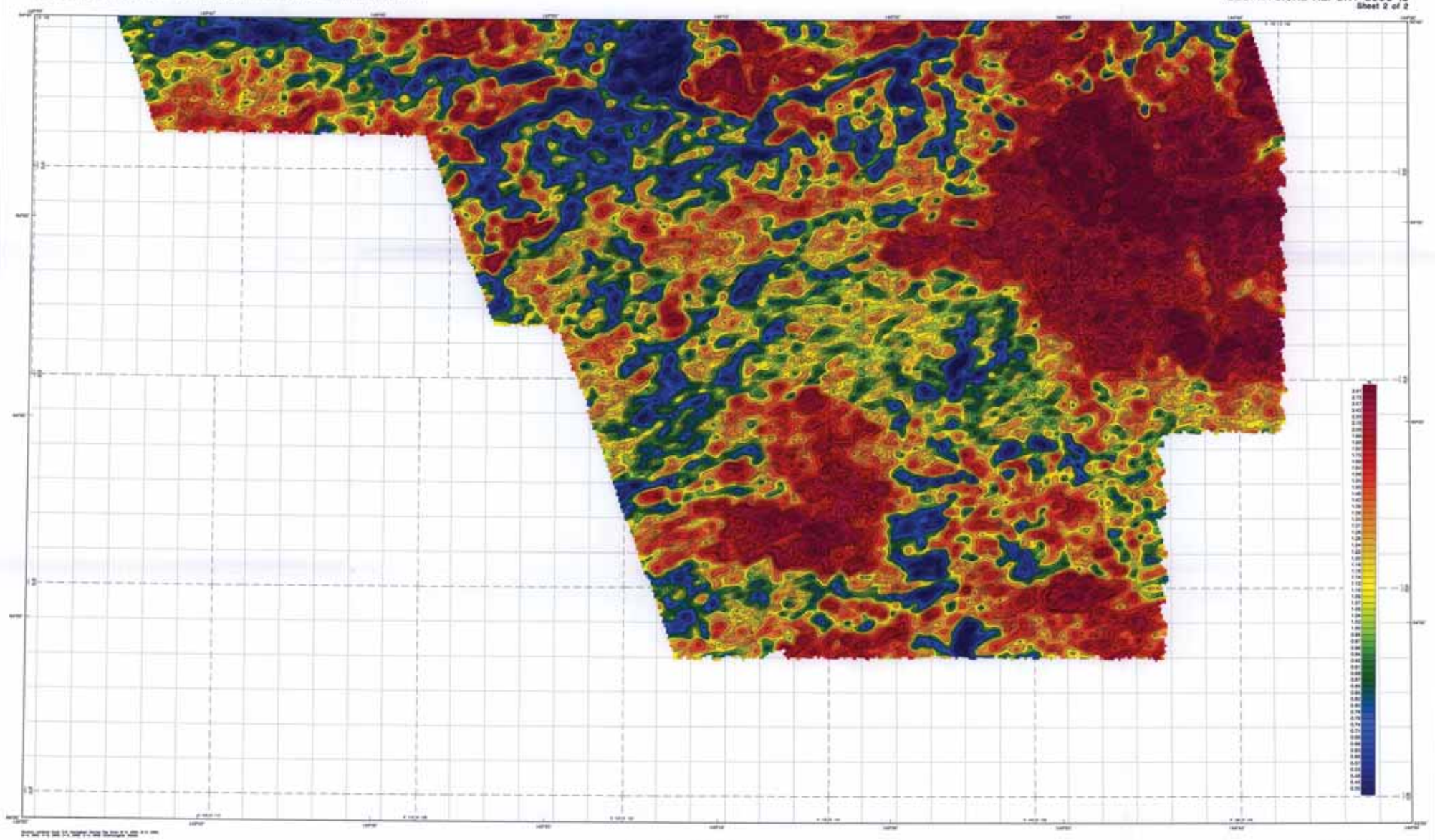


DESCRIPTIVE NOTES

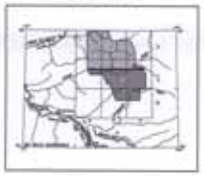
RADIOMETRICS

CONTOUR INTERVAL

SURVEY HISTORY







POTASSIUM (K%)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

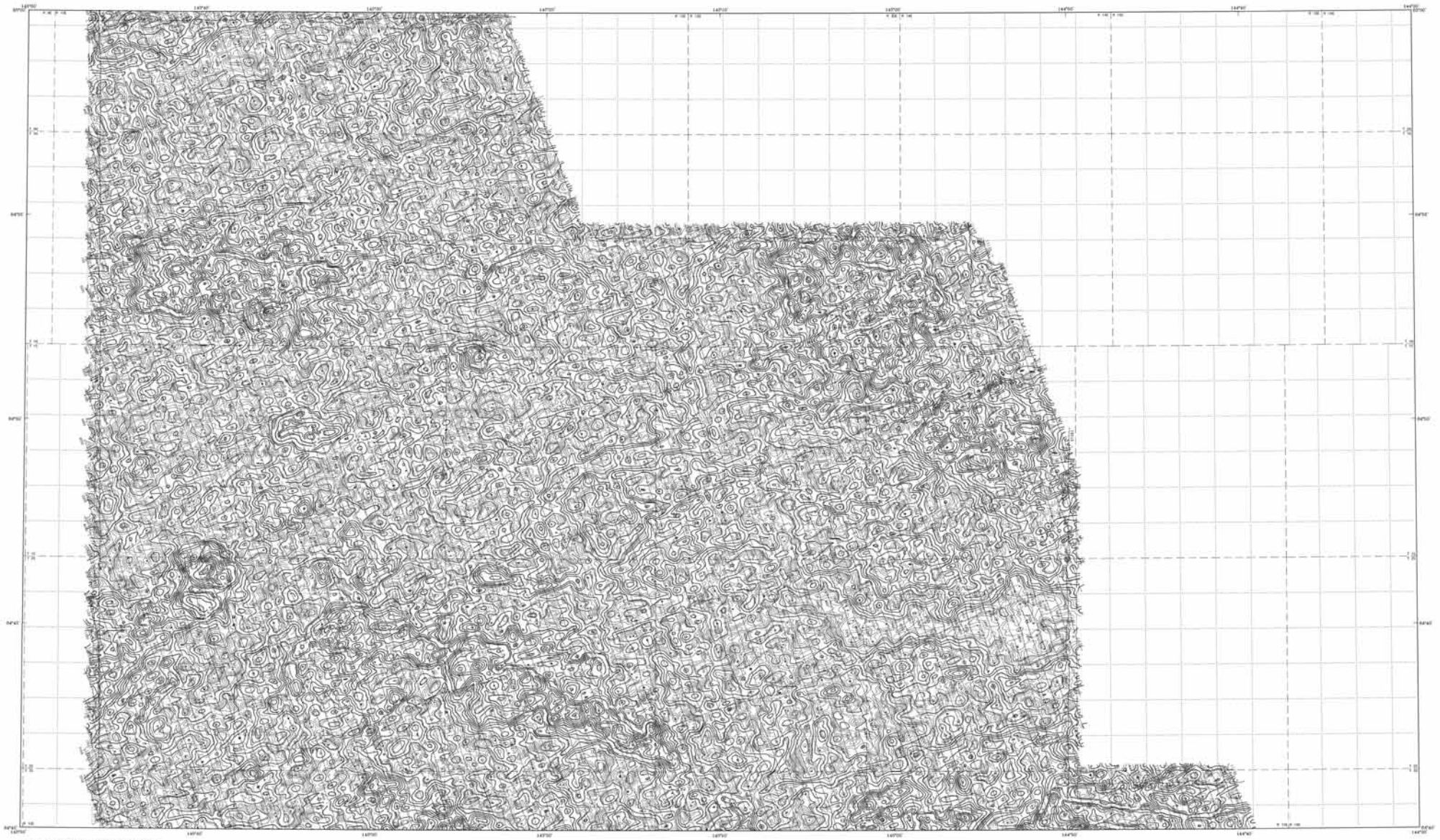
2000

DESCRIPTIVE NOTES

RADIOMETRICS

CONTOUR INTERVAL

SURVEY HISTORY

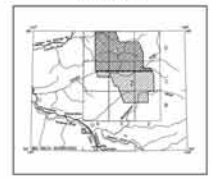




POTASSIUM (K%)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM² Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 hz towlines and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 mile.

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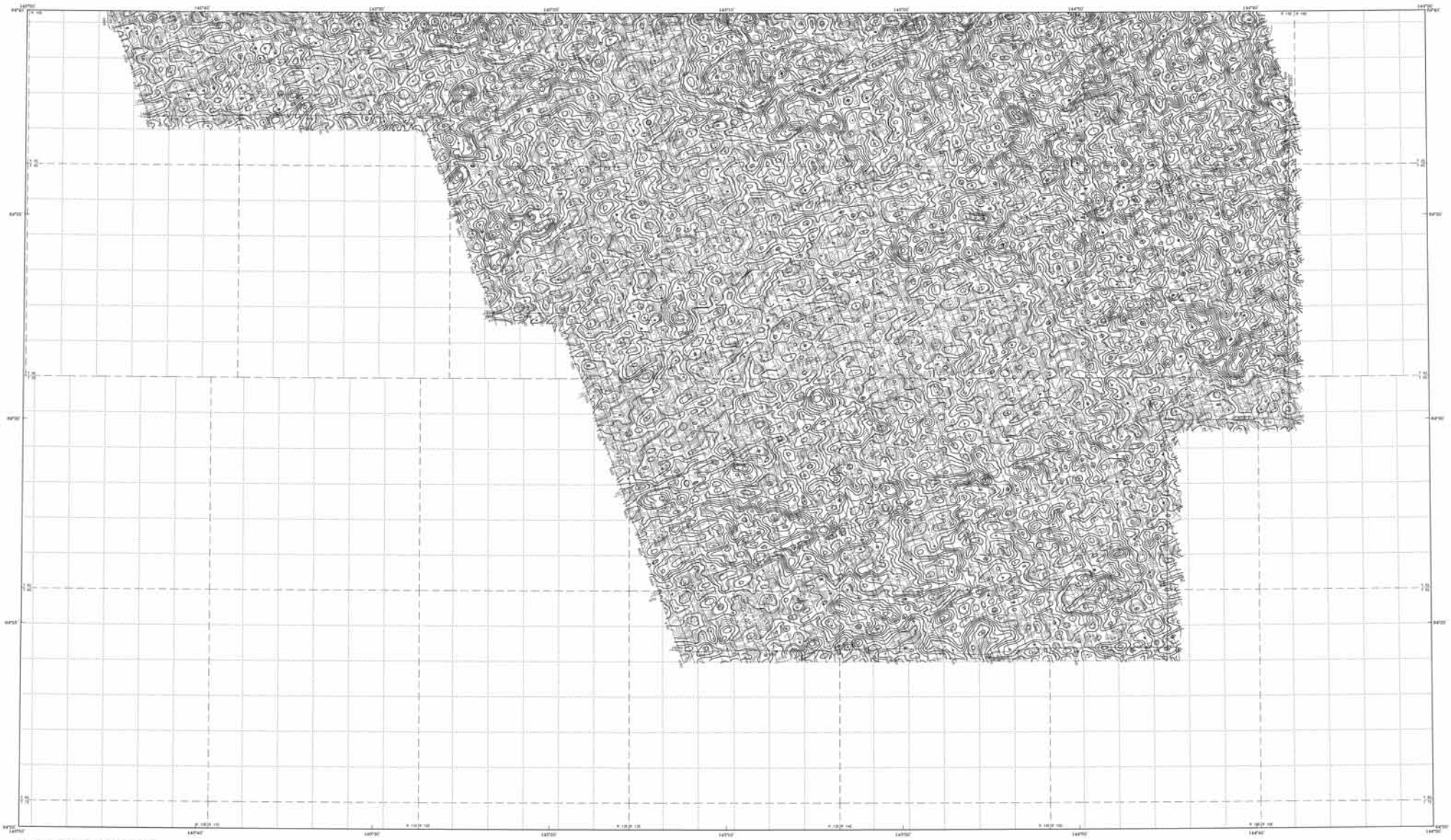
CONTOUR INTERVAL

- 500 ft
- 100 ft
- 20 ft
- 5 ft
- 1m

SURVEY HISTORY

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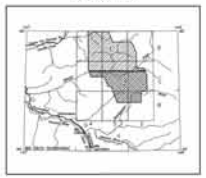




POTASSIUM (K%)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along W-E (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

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RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of four in the two detectors comprising the system were, main detector, 15.7L; radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 kev), uranium (1660–1900 kev), potassium (1370–1570 kev), total radioactivity (400–2810 kev) and cosmic radiation (3000–>8000 kev). Counts from the radon detector were recorded in the radon window (1660–1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.
International Atomic Energy Agency, 1991, Airborne Gamma Ray Spectrometer Surveying, Technical Report 323, International Atomic Energy Agency, Vienna.

CONTOUR INTERVAL

3.00 %

1.00 %

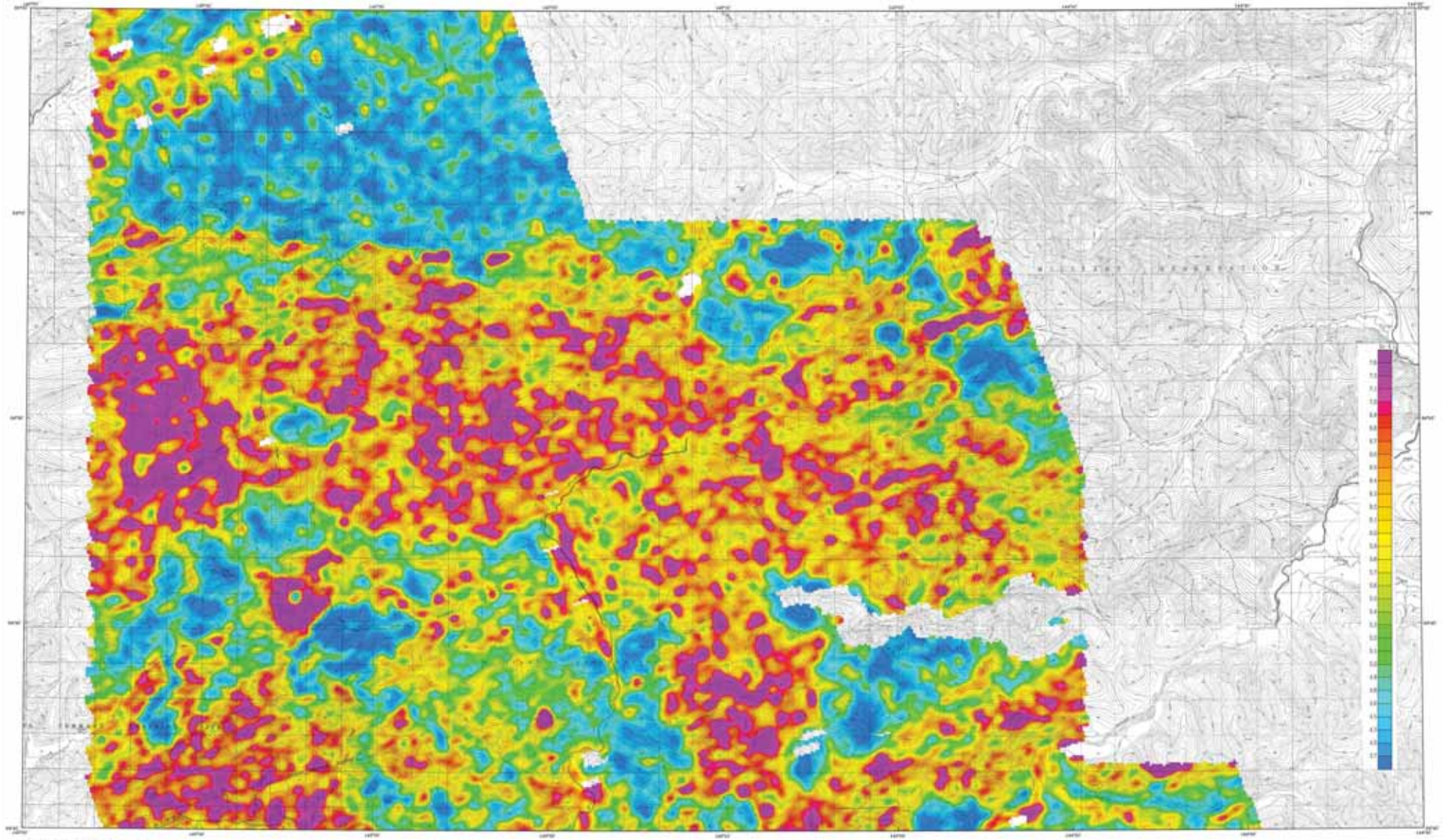
0.20 %

0.04 %

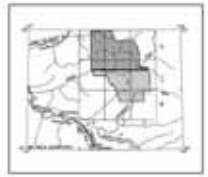
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THORIUM / POTASSIUM (eTh/K) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

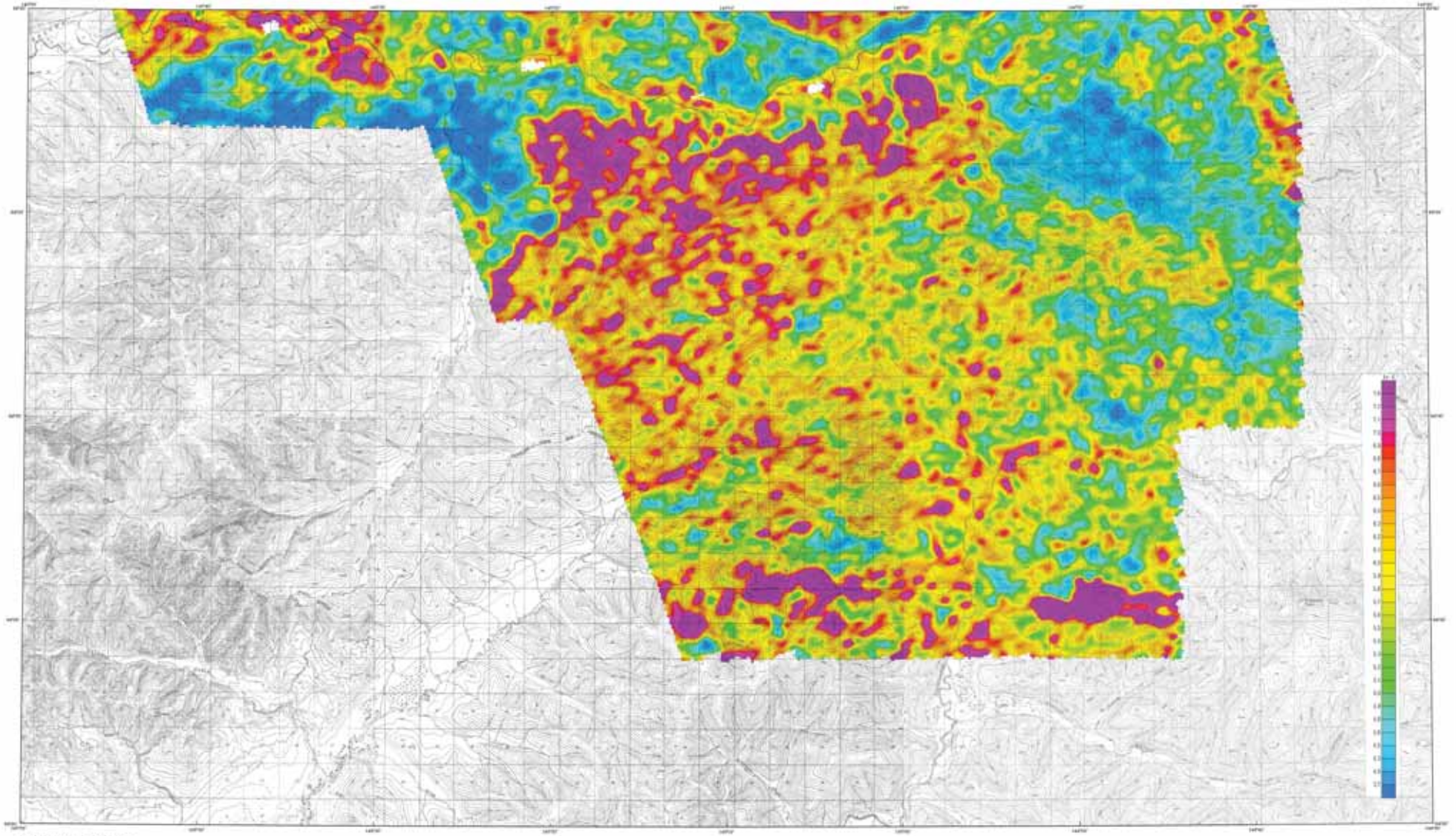
DESCRIPTIVE NOTES

RADIOMETRICS

THORIUM / POTASSIUM (eTh/K)

SURVEY HISTORY

LOCATION INDEX



THORIUM / POTASSIUM (eTh/K) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

LOCATION INDEX



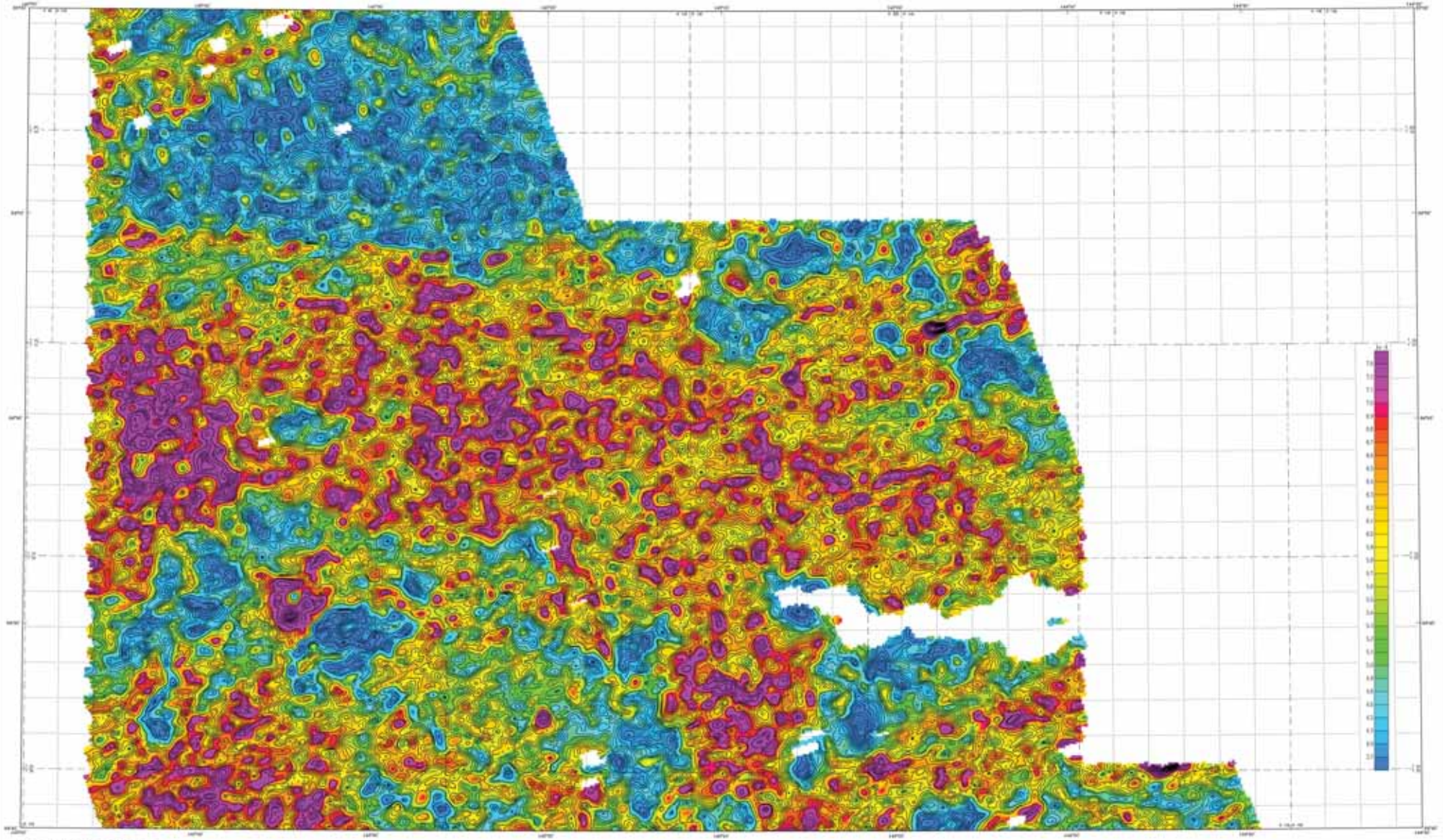


DESCRIPTIVE NOTES

RADIOMETRICS

THORIUM / POTASSIUM (eTh/K)

SURVEY HISTORY

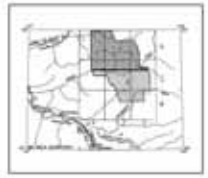




THORIUM / POTASSIUM (eTh/K) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



LOCATION INDEX

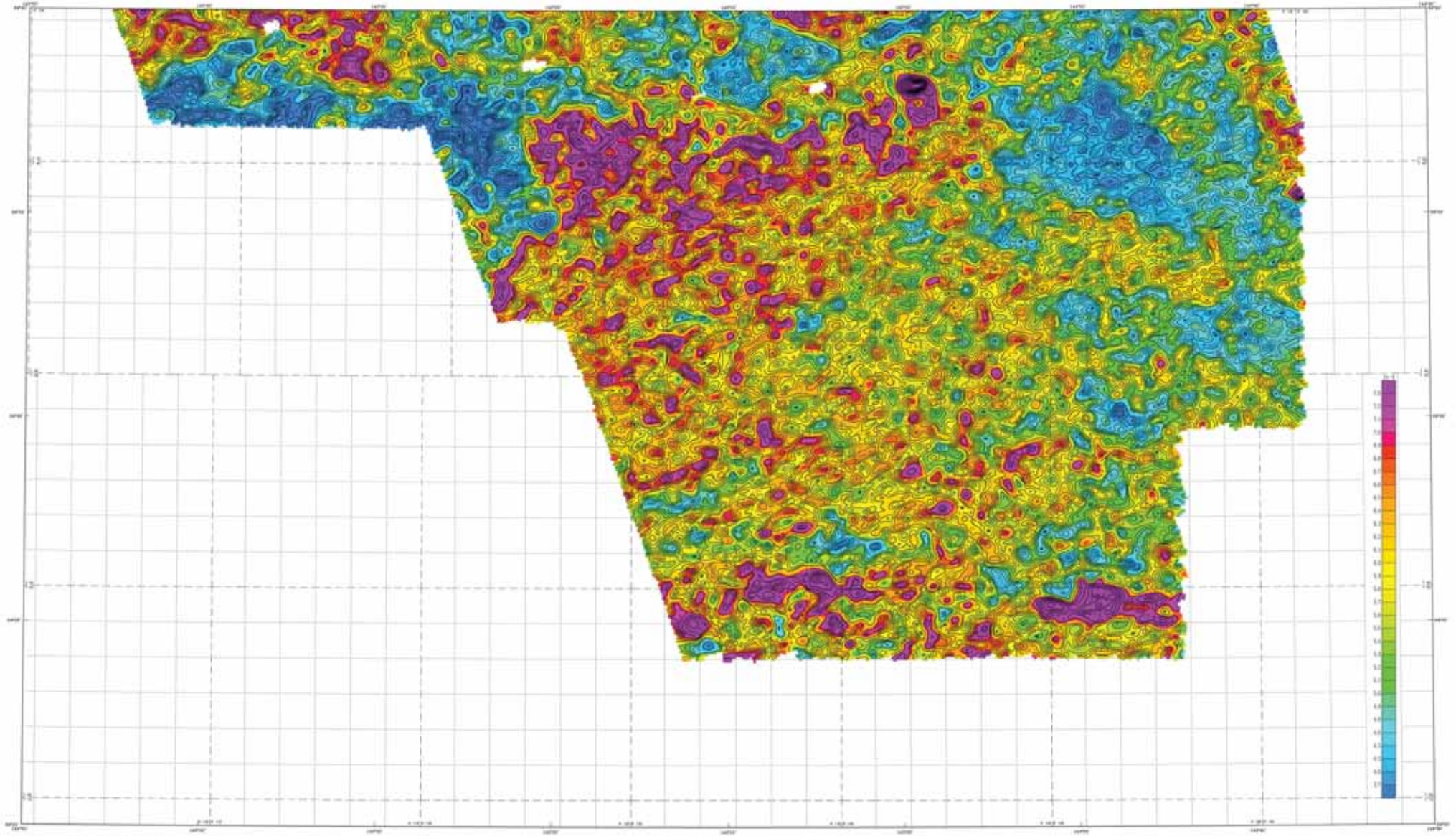
DESCRIPTIVE NOTES

RADIOMETRICS

THORIUM / POTASSIUM (eTh/K)

CONTOUR INTERVAL

SURVEY HISTORY

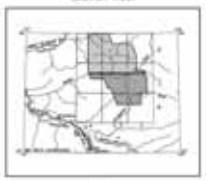


THORIUM / POTASSIUM (eTh/K) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000





LOCATION INDEX

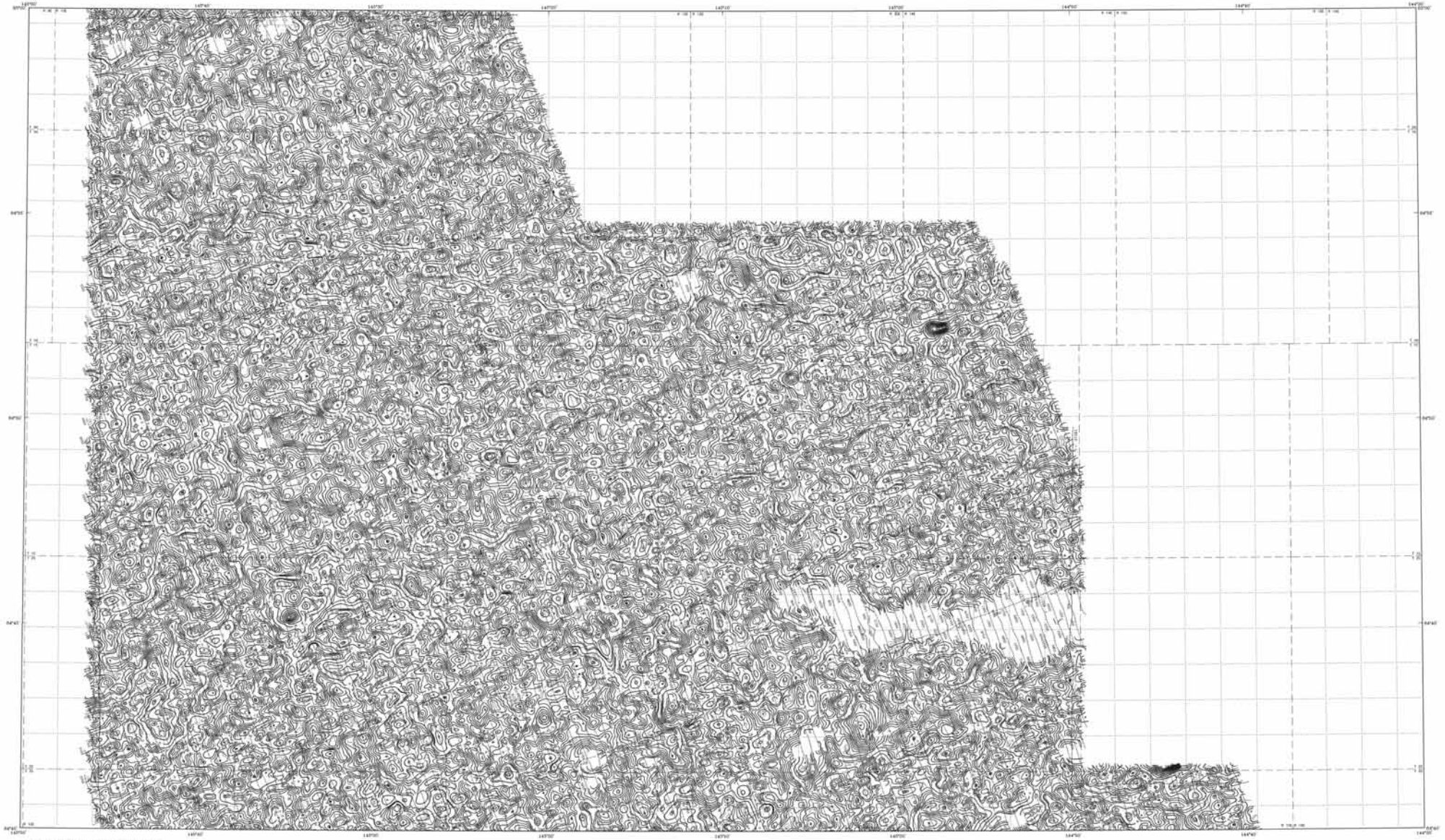
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THORIUM / POTASSIUM (eTh/K)

CONTOUR INTERVAL

SURVEY HISTORY





THORIUM / POTASSIUM (eTh/K)
OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 hz towlines and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a nominal accuracy of better than 5m. Flight line positions were projected onto the Clarke 1866 UTM zone 6 (0) projection, North American 1927 using a central meridian (CM) of 147°W, scale constant of 1.0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m. with respect to the UTM grid.

RADIOMETRICS

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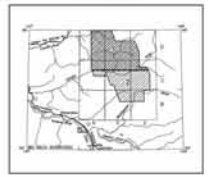
THORIUM / POTASSIUM (eTh/K)

Measured radioelement concentrations for potassium and thorium will vary sympathetically with variations in soil thickness and moisture content. The ratio parameter isolates areas of enrichment of one radioelement relative to another.
A blank region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio. Equivalent thorium/potassium concentration ratio results have been multiplied by 10^4 for clarity in presentation.

CONTOUR INTERVAL

- ——— ····· 1.00 (x10^{-4})
- ——— ····· 0.50 (x10^{-4})
- ——— ····· 0.25 (x10^{-4})
- ——— ····· 0.12 (x10^{-4})
- ⊕ ····· low

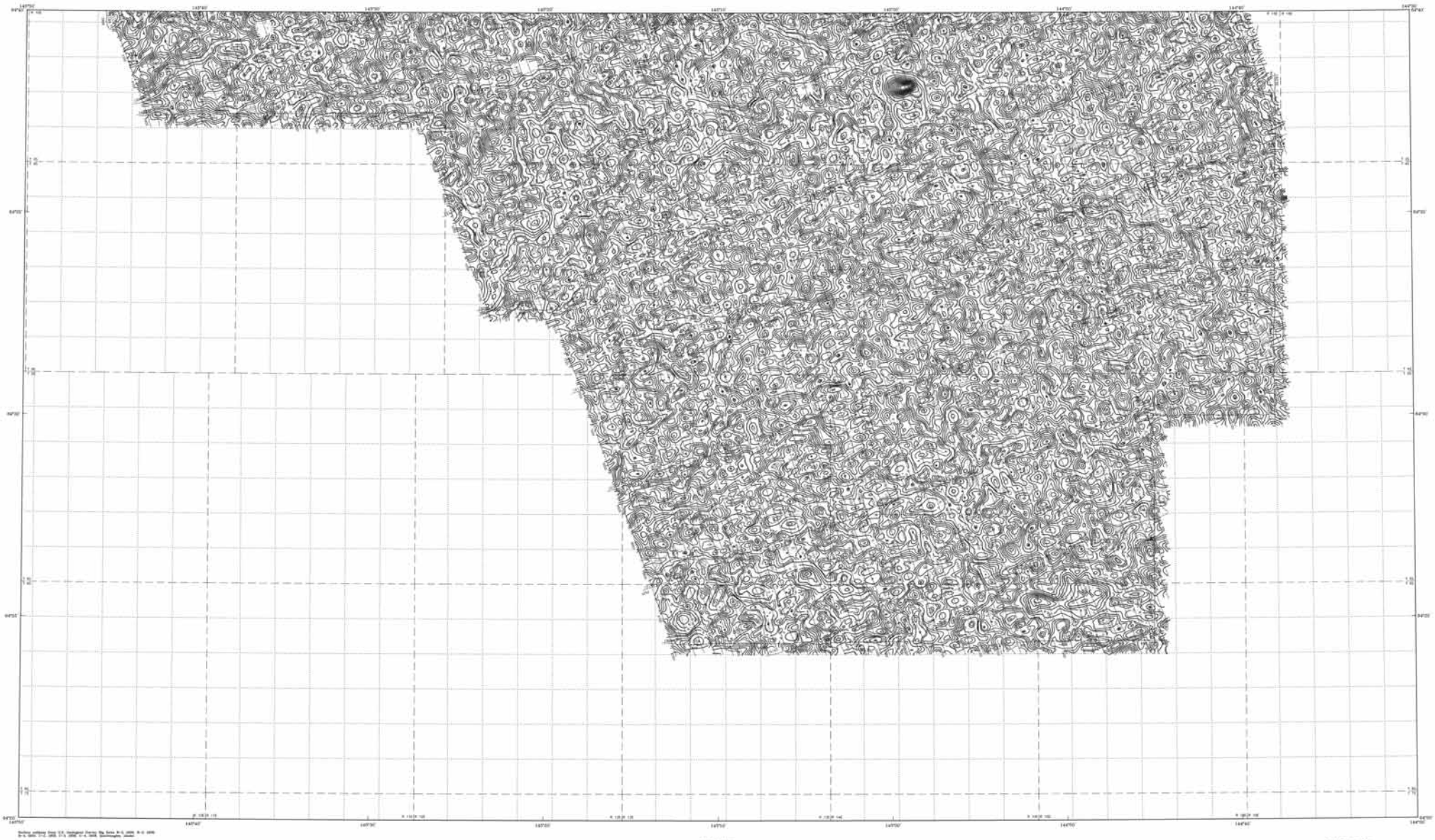
LOCATION INDEX



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SCALE 1:63,360

THORIUM / POTASSIUM (eTh/K) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

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RADIOMETRICS

The gamma-ray spectrometry data were recorded at a 1.0 second sample rate into 256 channel main and radon spectra using an Exploranium GR820 gamma-ray spectrometer. The volume of NaI in the two detectors comprising the system were; main detector, 15.7L; radon detector 4.2L. After application of Noise Adjusted Singular Value Decomposition to the spectra, counts from the main detector were recorded in five windows corresponding to thorium (2410–2810 kev), uranium (1660–1900 kev), potassium (1370–1570 kev), total radioactivity (400–2810 kev) and cosmic radiation (3000–>6000 kev). Counts from the radon detector were recorded in the radon window (1660–1860 kev). The radon detection system was calibrated following methods outlined in IAEA Report 323. After removal of the background, the data were corrected for spectral interference, changes in temperature, pressure, and departures from the planned survey elevation of 200 feet. The data were then converted to standard concentration units which were interpolated to a 100 m grid using a modified Akima (1970) technique.

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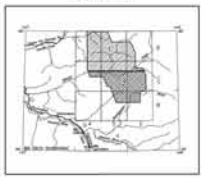
THORIUM / POTASSIUM (eTh/K)

Measured radioelement concentrations for potassium and thorium are very sympathetically with variations in soil thickness and moisture content. The ratio parameter isolates areas of enrichment of one radioelement relative to another.
A stable region indicates an area where the summed concentrations fall below thresholds required for a meaningful calculation of the ratio. Equivalent thorium/potassium concentration ratio results have been multiplied by 10^{4} for clarity in presentation.

CONTOUR INTERVAL

———	1.00 (x10^{4})
———	0.20 (x10^{4})
———	0.04 (x10^{4})
———	0.02 (x10^{4})
⊕	pit

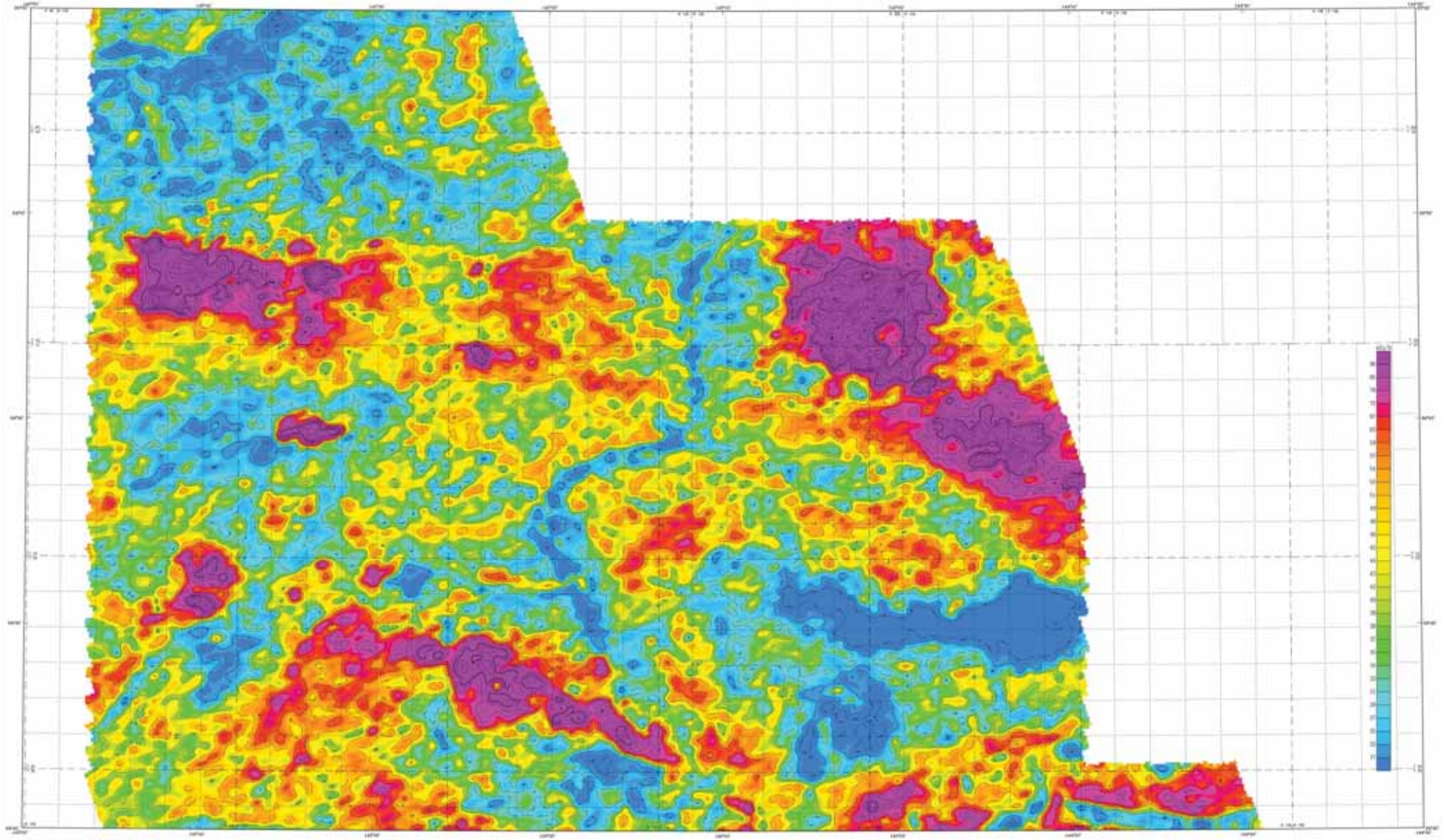
LOCATION INDEX



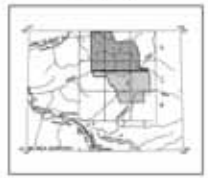
SURVEY HISTORY

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TOTAL AIR ABSORBED DOSE RATE (nGy/h) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

DESCRIPTIVE NOTES

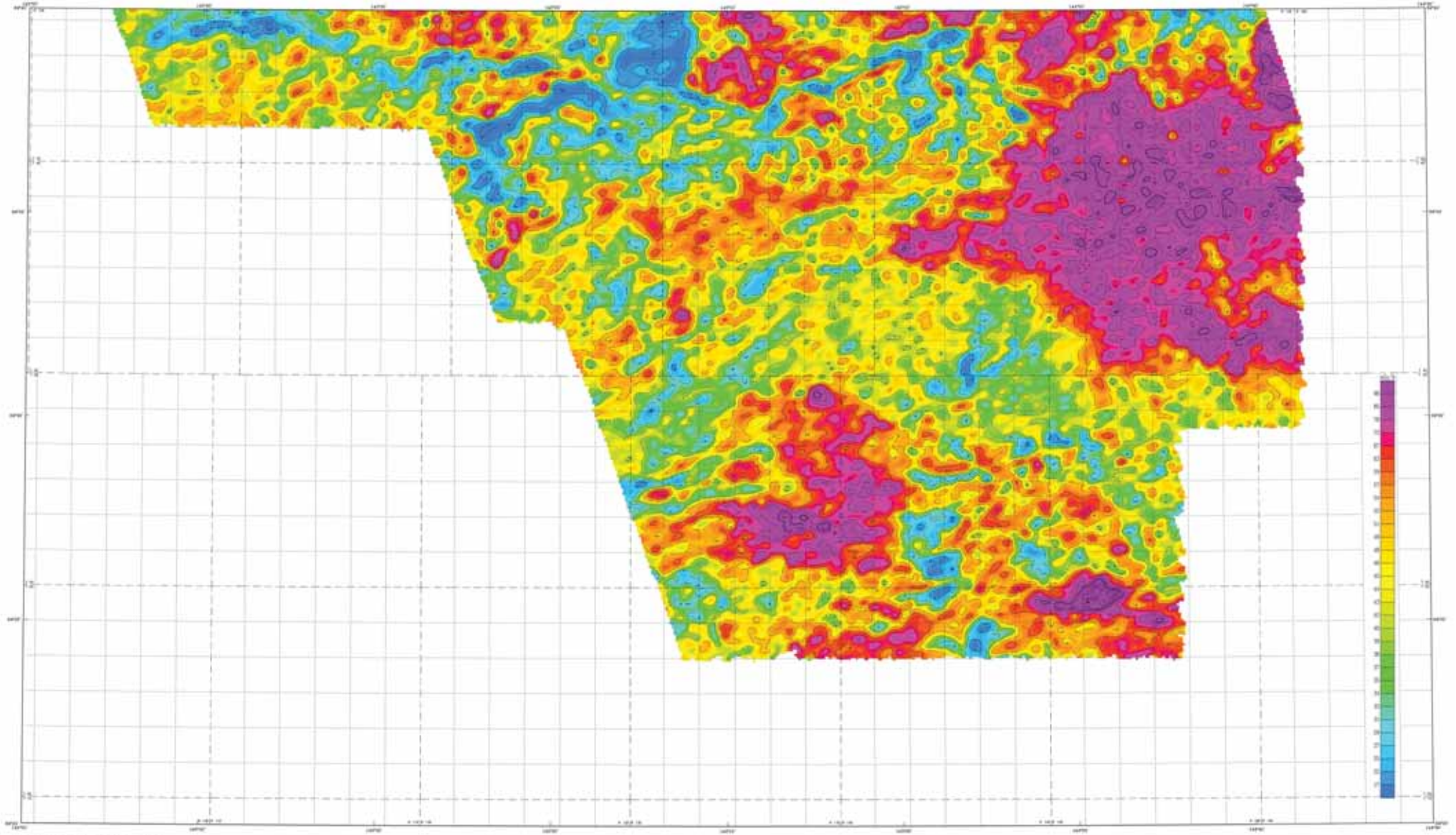
RADIOMETRICS

TOTAL AIR ABSORBED DOSE RATE

CONTOUR INTERVAL

LOCATION INDEX

SURVEY HISTORY

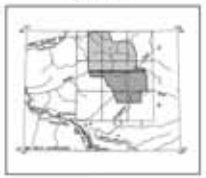


TOTAL AIR ABSORBED DOSE RATE (nGy/h) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000





LOCATION INDEX

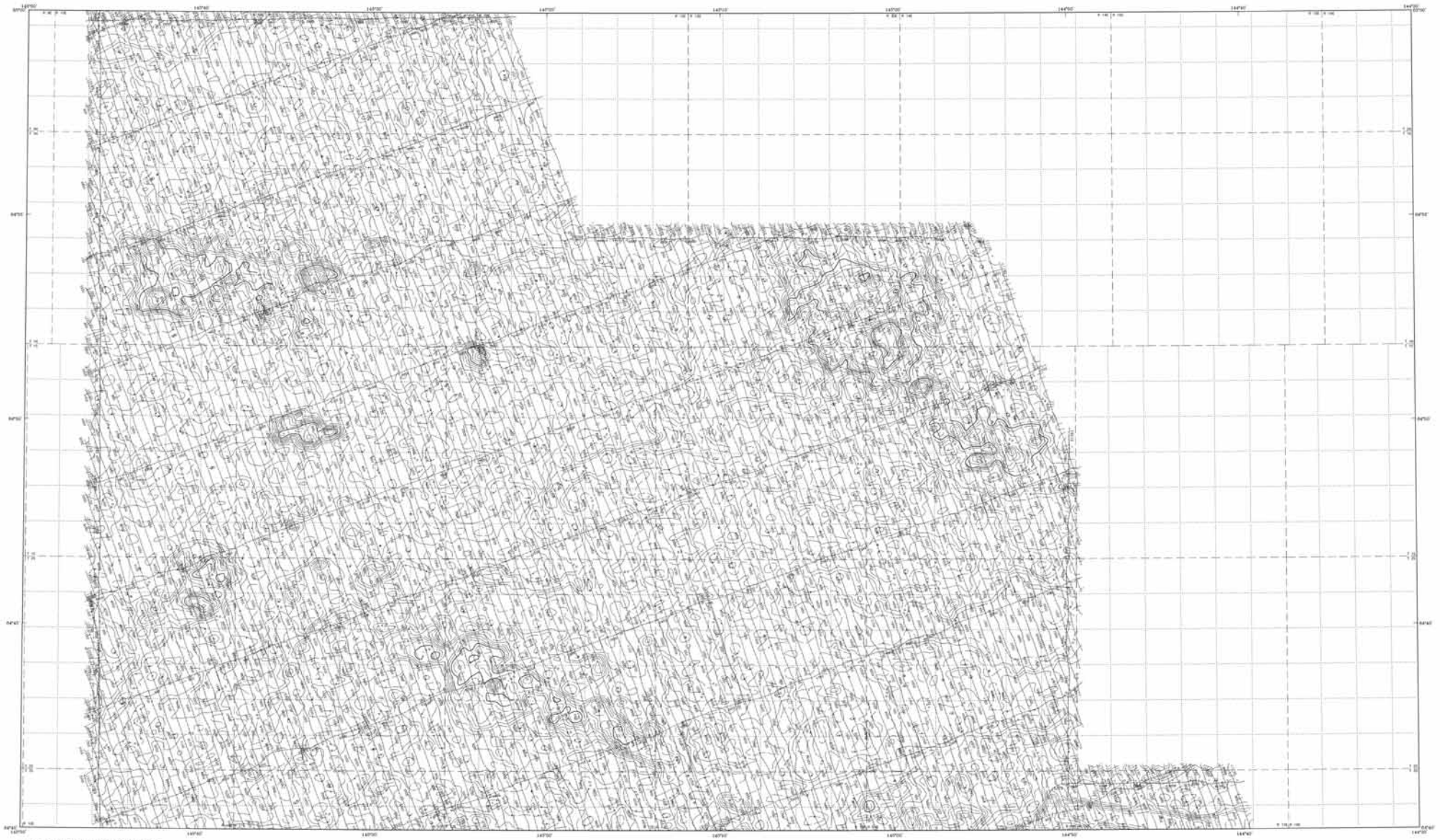
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RADIOMETRICS

TOTAL AIR ABSORBED DOSE RATE

CONTOUR INTERVAL

SURVEY HISTORY





TOTAL AIR ABSORBED DOSE RATE (nGy/h) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

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

TOTAL AIR ABSORBED DOSE RATE

Flux counts have been converted to radioelement concentrations, and total counts to total air-absorbed dose rate, so that the results are independent of crystal volume and planned survey height. This facilitates comparisons to other surveys and ground data. Measurements are nanogrys per hour (nGy/h).

CONTOUR INTERVAL

500 nGy/h

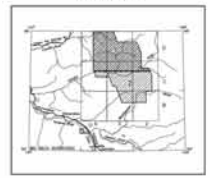
100 nGy/h

50 nGy/h

10 nGy/h

flat

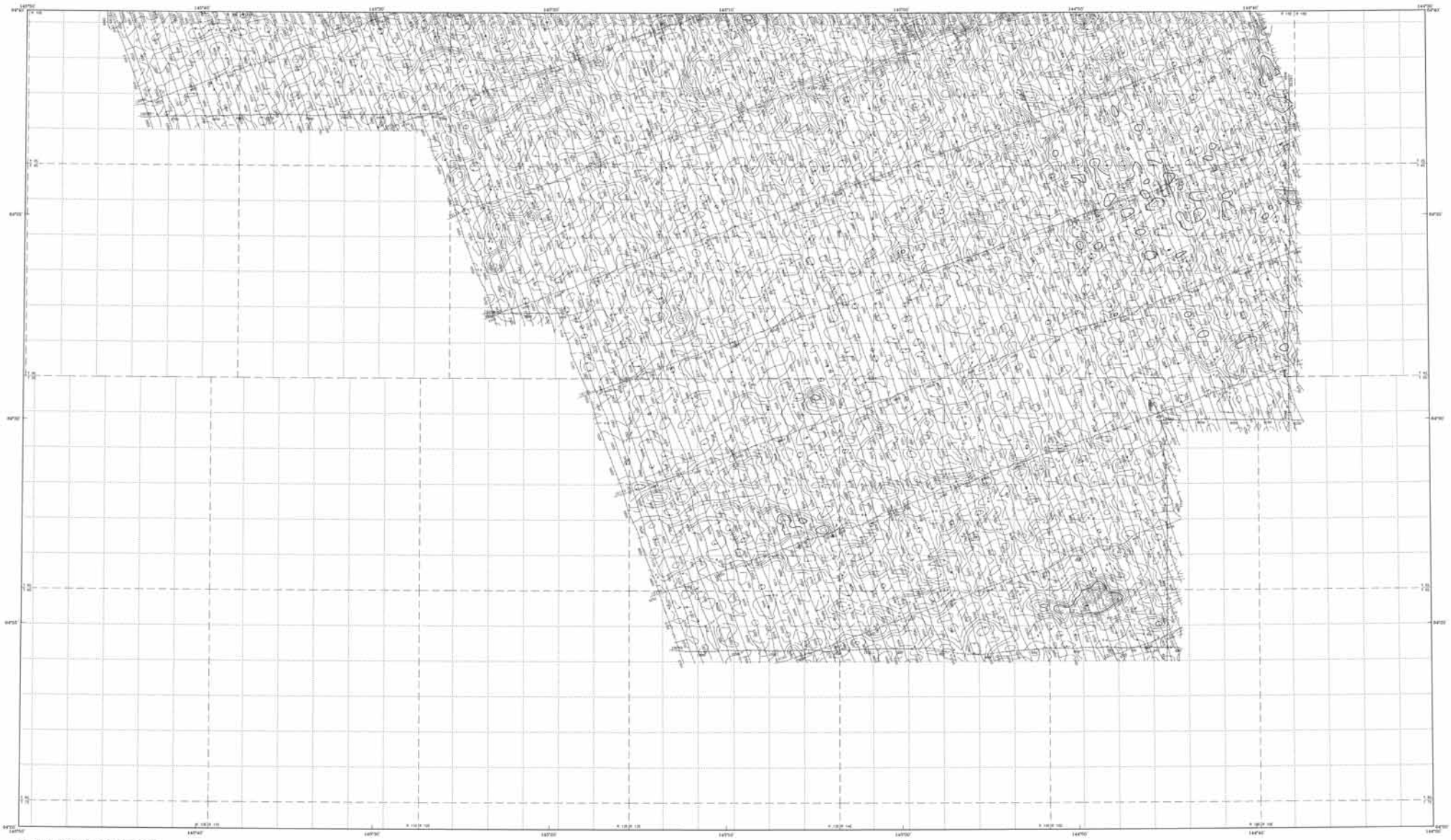
LOCATION INDEX



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TOTAL AIR ABSORBED DOSE RATE (nGy/h) OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

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CONTOUR INTERVAL

500 nGy/h

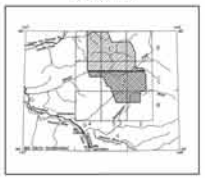
100 nGy/h

20 nGy/h

10 nGy/h

none

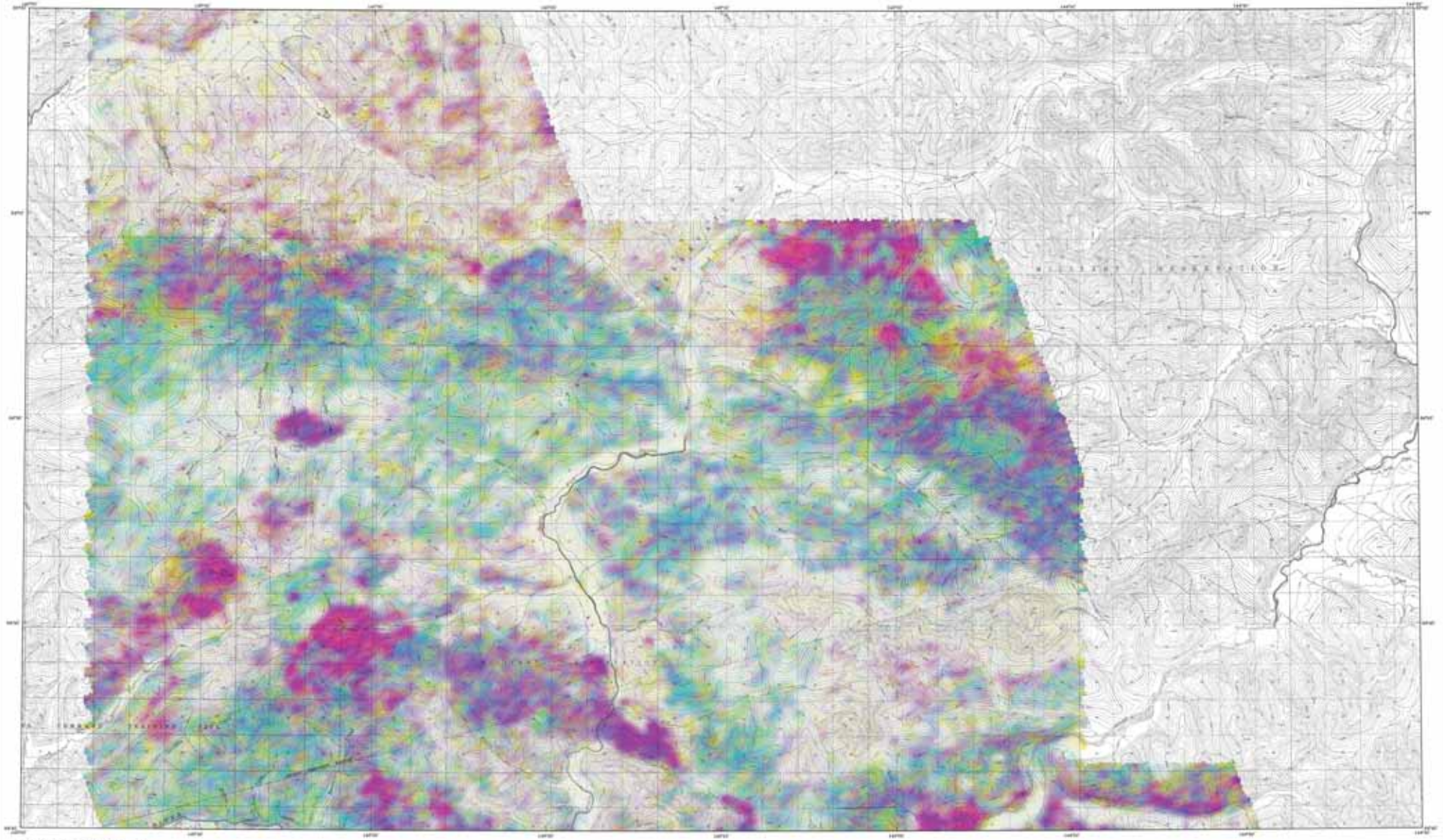
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RADIOELEMENT - TERNARY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

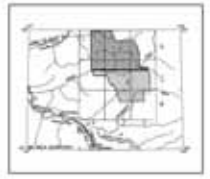
BIG DELTA QUADRANGLE

2000









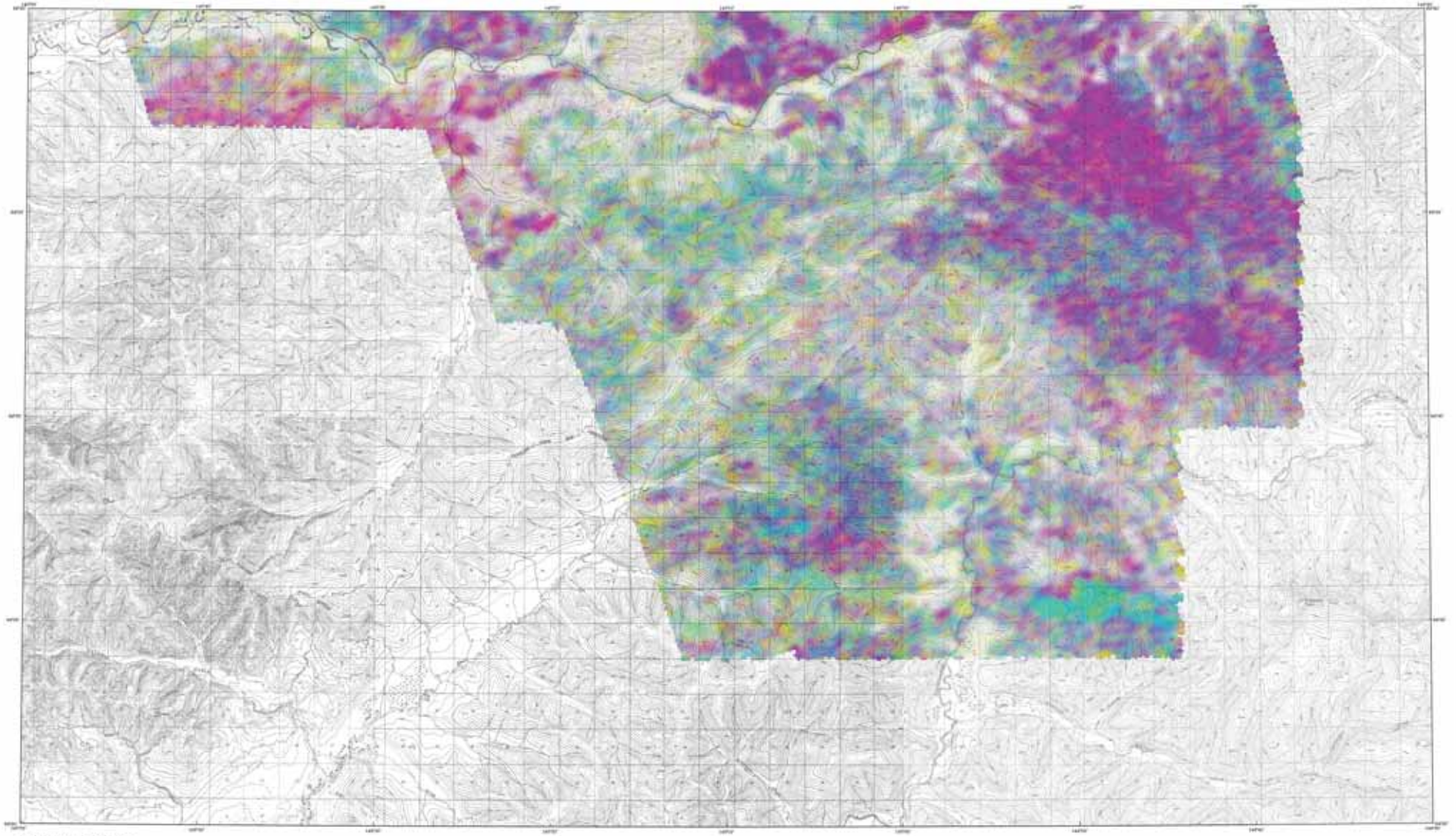
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RADIOELEMENT - TERNARY OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000





RELATIVE CONCENTRATIONS

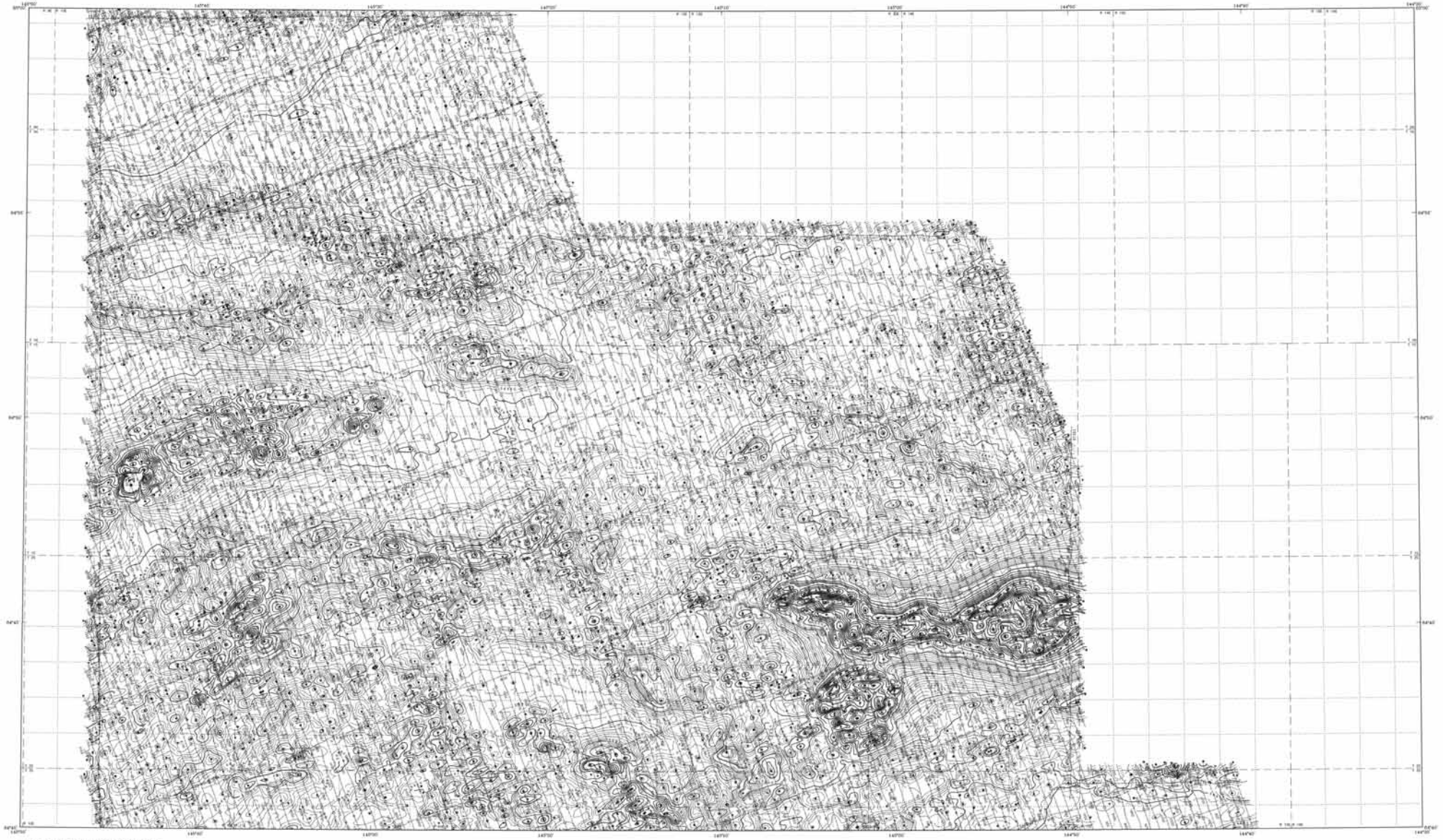


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TOTAL MAGNETIC FIELD AND ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^{V} Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 35/60 hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 1 miles.

An Ashtech GG24 NAUSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight line positions were projected onto the Clarke 1866 (WGS 84 for NAD83) North American spheroid using a central meridian (CM) of 147° and scale constant of 1.0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES

Symbols	Conductance
●	> 50 siemens
○	< 50 siemens
✳	Swarm/wide anomaly
△	Weak conductivity associated with an EM magnetite response

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^{V} EM system measured inphase and quadrature components of the frequencies (co-vertical coaxial-coil pairs operated at 900 and 5000 Hz while three horizontal coplanar-coil pairs operated at 7200 and 56,000 Hz). EM data were sampled at 0.1 second intervals. The EM system responds to resistivity, conductivity, conductance and cultural sources. The power line monitor and the flight track video were examined to locate cultural sources. The EM anomalies that are indicated are classified by conductance.

SCALE 1:63,300

MAGNETIC CONTOUR INTERVAL

- 250 nT
- 50 nT
- 10 nT
- 5 nT
- magnetic low
- magnetic high

TOTAL MAGNETIC FIELD

The total magnetic field data were acquired into a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1985, updated to September 1995) was removed from the leveled magnetic data.

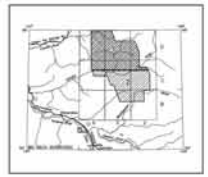
Akima, H.-1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

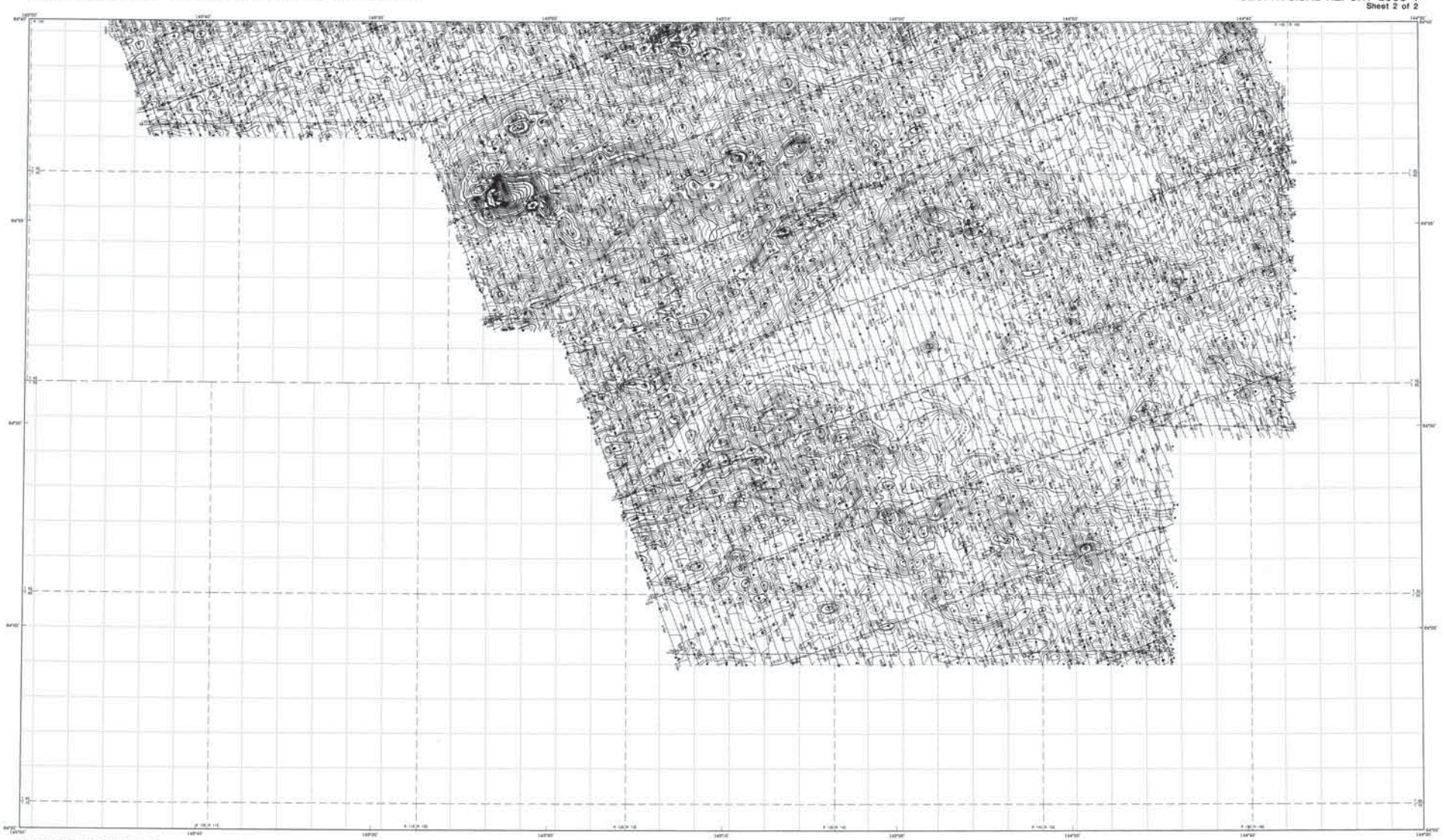
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the area were acquired by Geoterrex-Dighem, a division of CGG Canada Ltd., in 1995. Laurel Burns was the contract manager for DGGS.

This map and other products from this survey are available by mail order or in person from DGGS, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.

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TOTAL MAGNETIC FIELD AND ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

BIG DELTA QUADRANGLE

2000

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system, Exploranium GR-820 gamma-ray spectrometer and a Geometrics cesium magnetometer. The EM and magnetic sensors were flown on a height of 100 feet. The gamma-ray spectrometer was flown at a height of 200 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 60/60 Hz monitors and video camera. Flights were performed with an AS350B-2 bourner helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Aanderaa 0024 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) 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.

ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>30 siemens
○	<30 siemens
★	Questionable anomaly
△	Weak conductivity associated with an EM magnetic response

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM^V EM system measured inphase and quadrature components of five frequencies. Two vertical coaxial-coil pairs operated at 900 and 5520 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 power line monitor and the flight track video were examined to locate cultural sources. The EM anomalies that are indicated are classified by conductance.

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

MAGNETIC CONTOUR INTERVAL

200 nT

50 nT

10 nT

2 nT

magnetic low

magnetic high

TOTAL MAGNETIC FIELD

The total magnetic field data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1978) technique. The regional variation (an IGRF gradient, 1995, updated to September 1999) was removed from the leveled magnetic data.

Akima, H. (1978), A new method of interpolation and smooth curve fitting based on local procedures, Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

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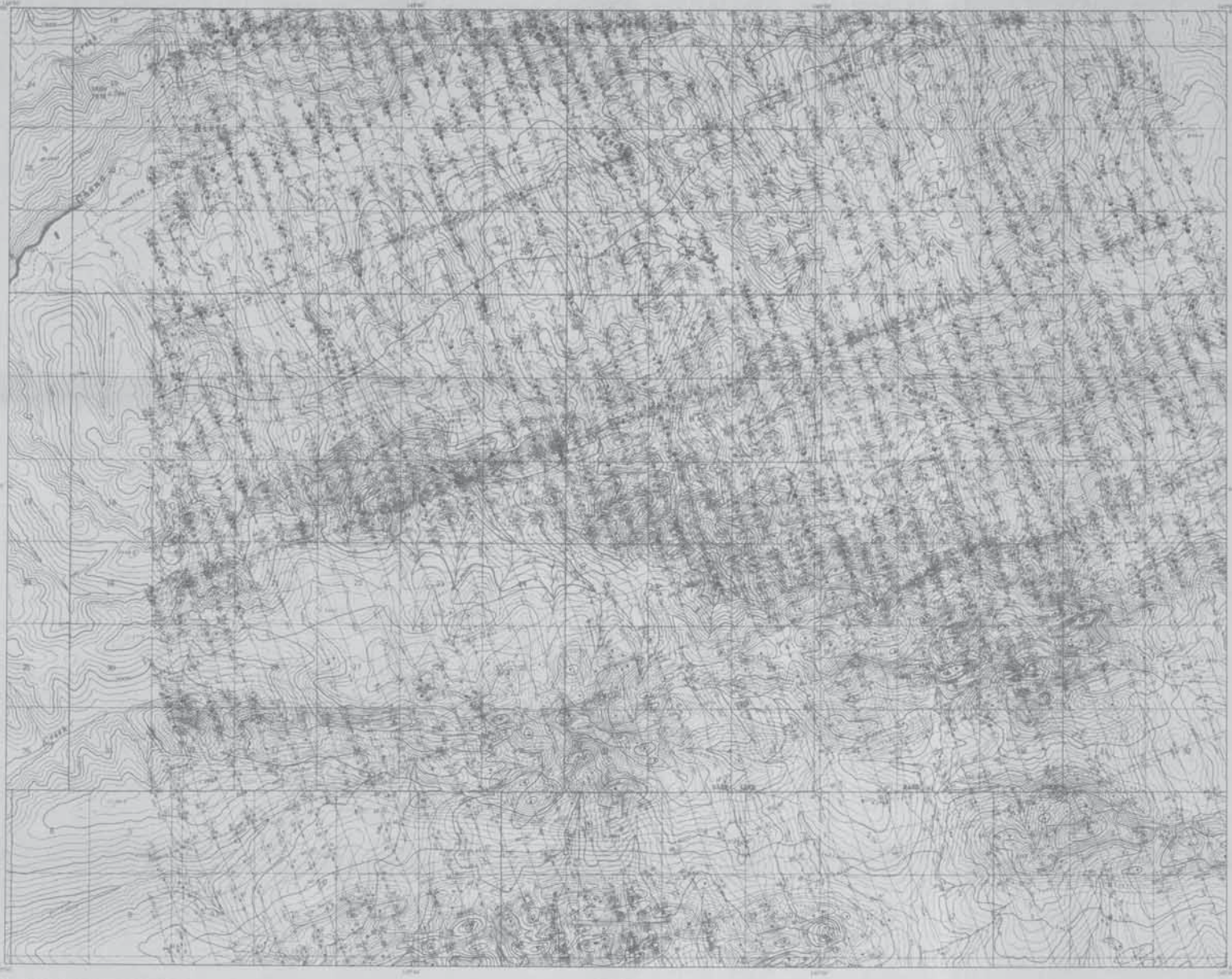
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Stevens Exploration Management Corp., Arborne geophysical data for the area were acquired by Geoterrex-Dighem, a division of CGG Canada Ltd., in 1999. Laurel Burns was the contract manager for DGGS.

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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2000-6A
PARTS of BIG DELTA D-3
and D-4 QUADRANGLES



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

PARTS of BIG DELTA D-3
and D-4 QUADRANGLES
2000

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TOTAL MAGNETIC FIELD

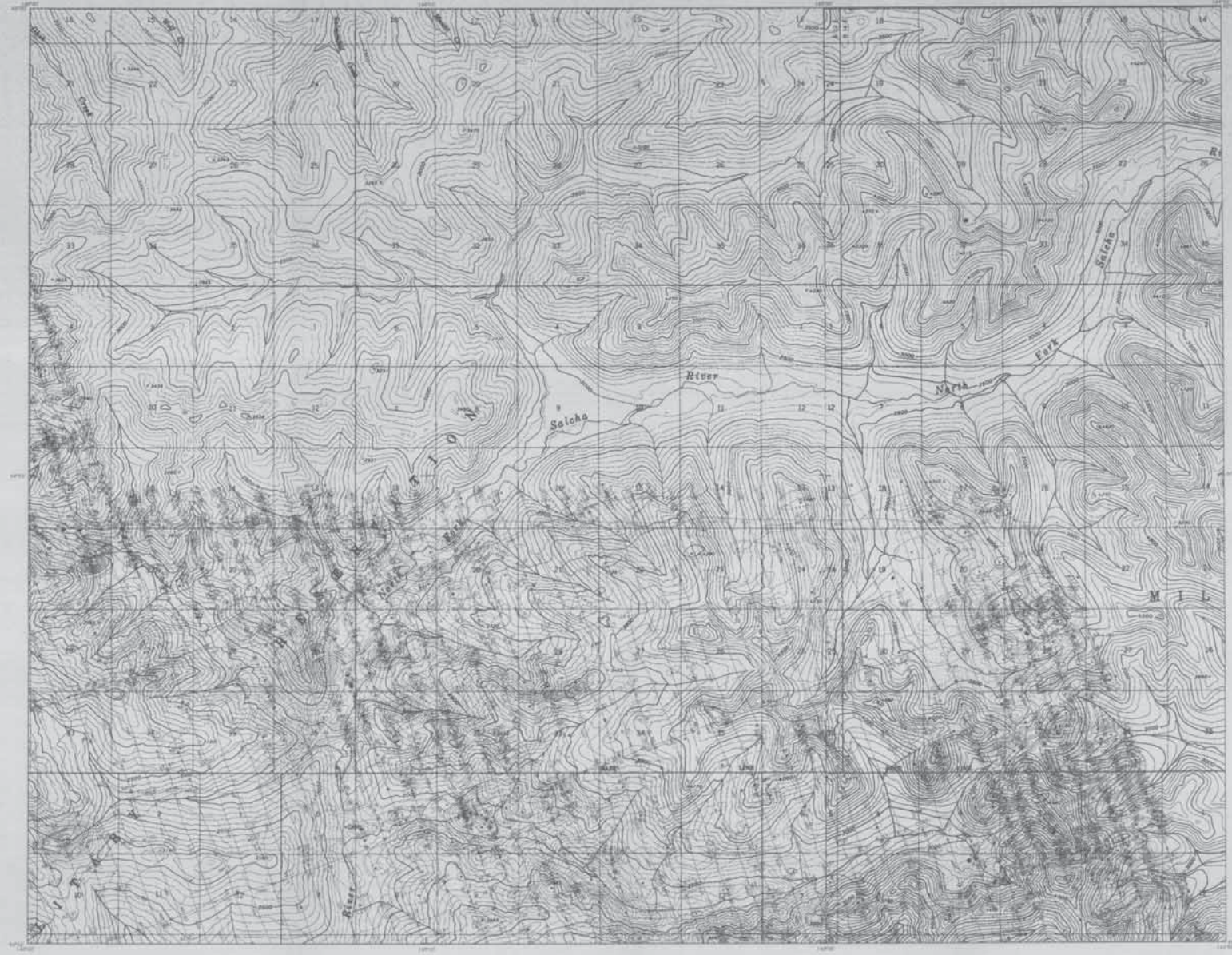
MAGNETIC CONTOUR INTERVAL

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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2000-6B
PARTS of BIG DELTA D-2
and D-3 QUADRANGLES



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

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2000

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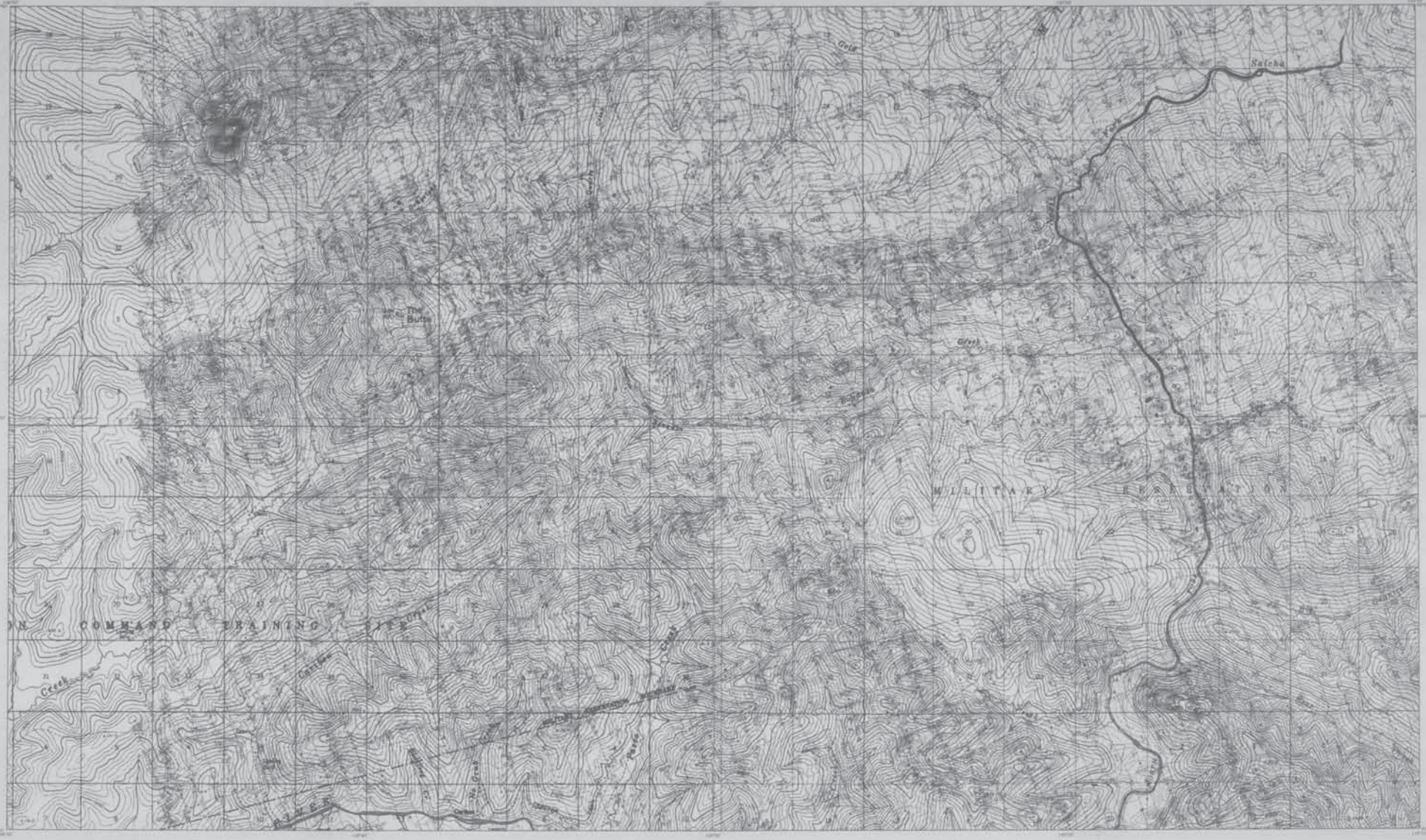
ELECTROMAGNETIC ANOMALIES

TOTAL MAGNETIC FIELD

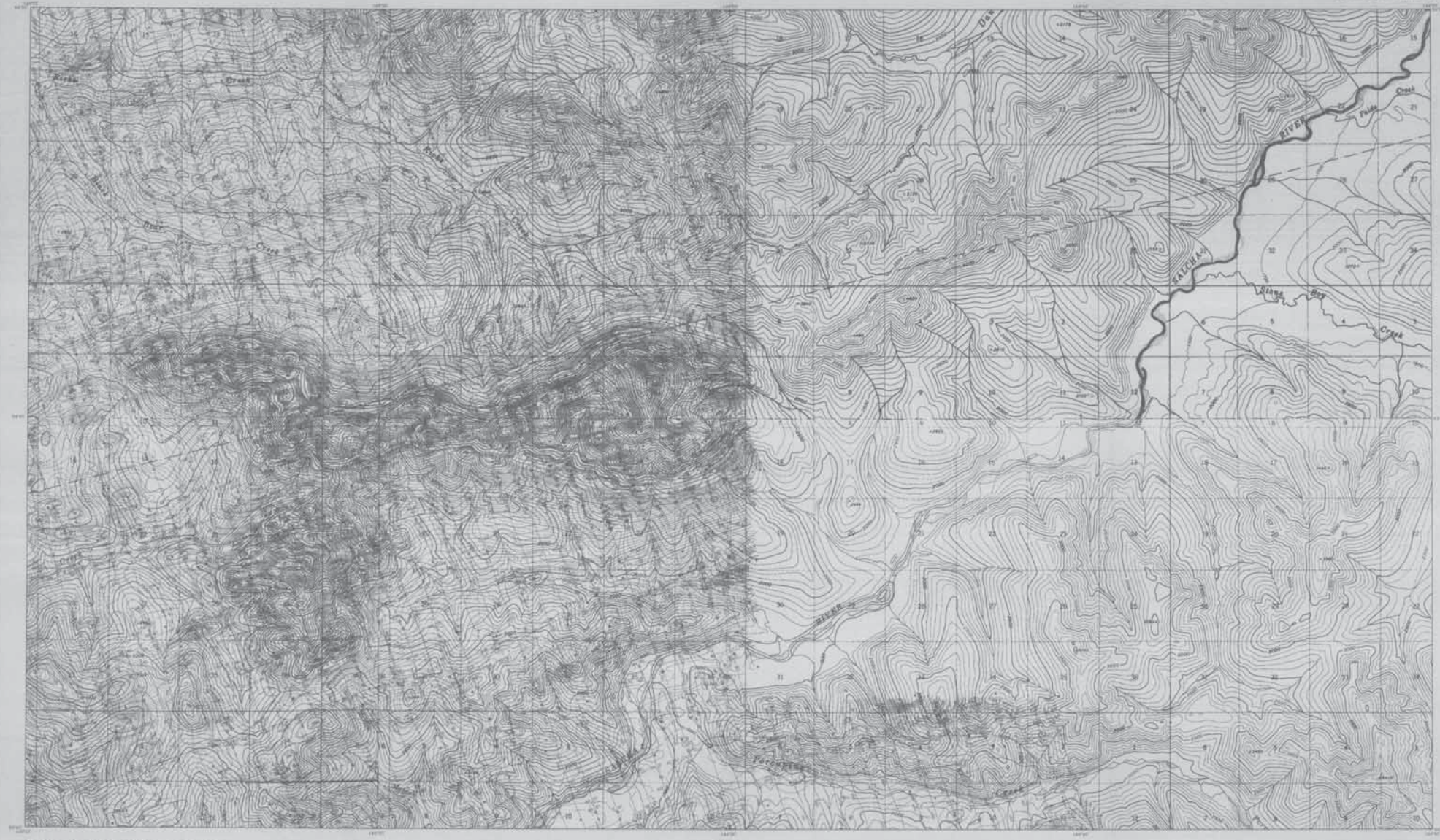
MAGNETIC CONTOUR INTERVAL

SURVEY HISTORY

GEOPHYSICAL REPORT 2000-6C
PARTS of BIG DELTA C-3, C-4,
D-3 and D-4 QUADRANGLES


Salcha
Creek
Gold
The Buttes
MILITARY
RESERVATION
COMMAND
TRAINING
SITE
Creek
Creek
Creek

GEOPHYSICAL REPORT 2000-6D
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TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

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TOTAL MAGNETIC FIELD

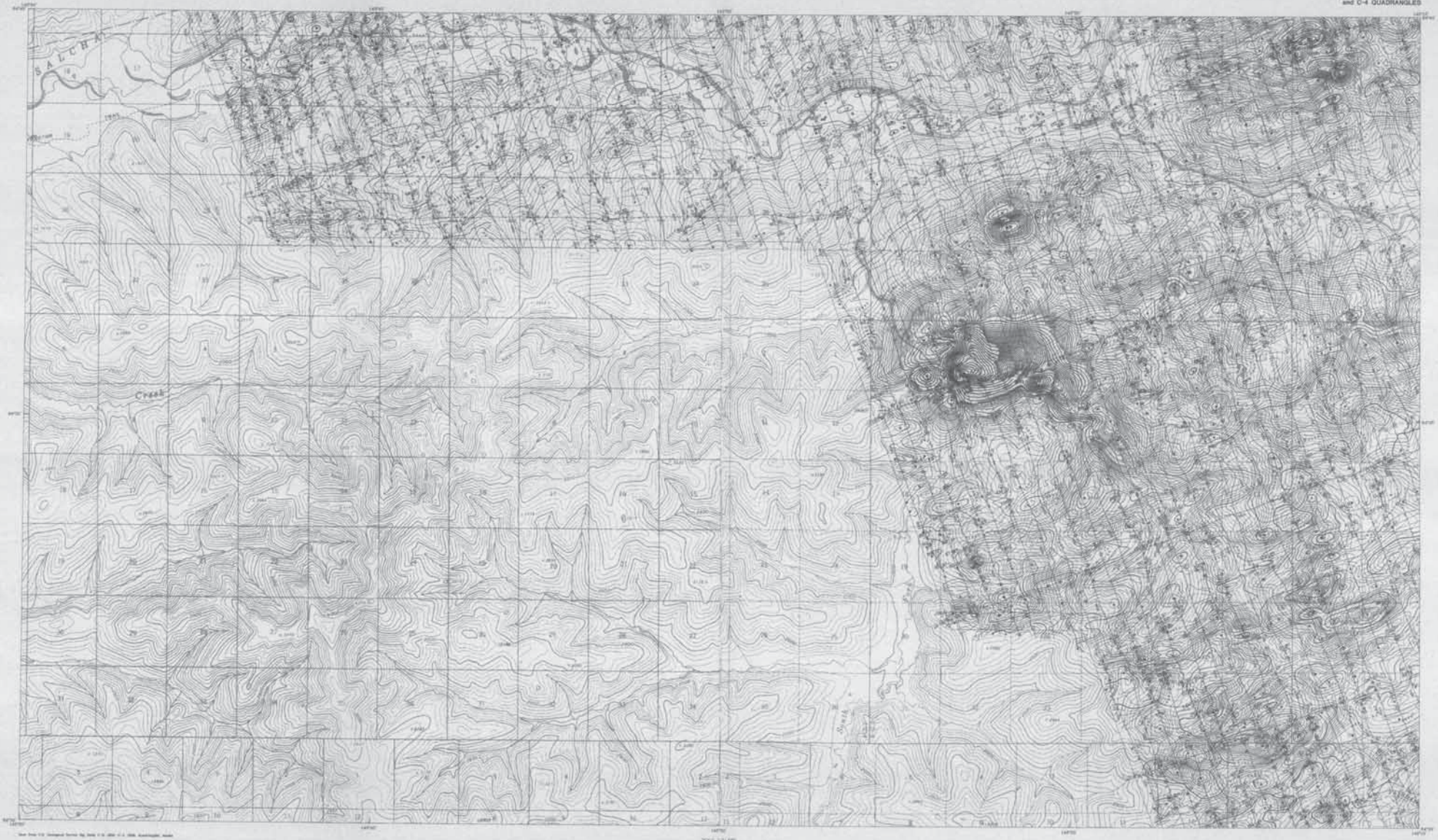
MAGNETIC CONTOUR INTERVAL

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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

PARTS of BIG DELTA C-3
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2000

DESCRIPTIVE NOTES

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ELECTROMAGNETIC ANOMALIES

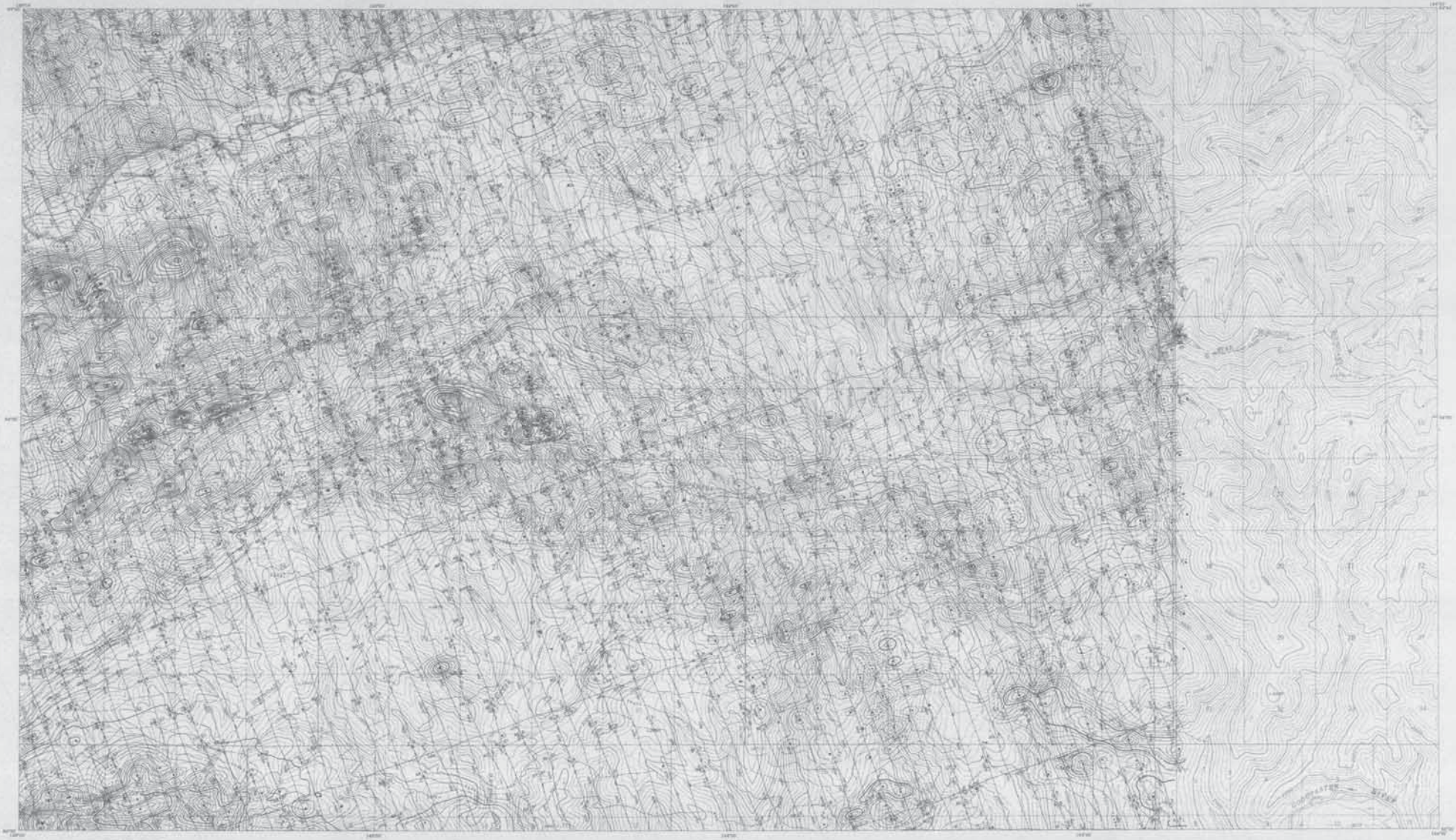
TOTAL MAGNETIC FIELD

MAGNETIC CONTOUR INTERVAL

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and C-3 QUADRANGLES



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

PARTS of BIG DELTA C-2
and C-3 QUADRANGLES
2000

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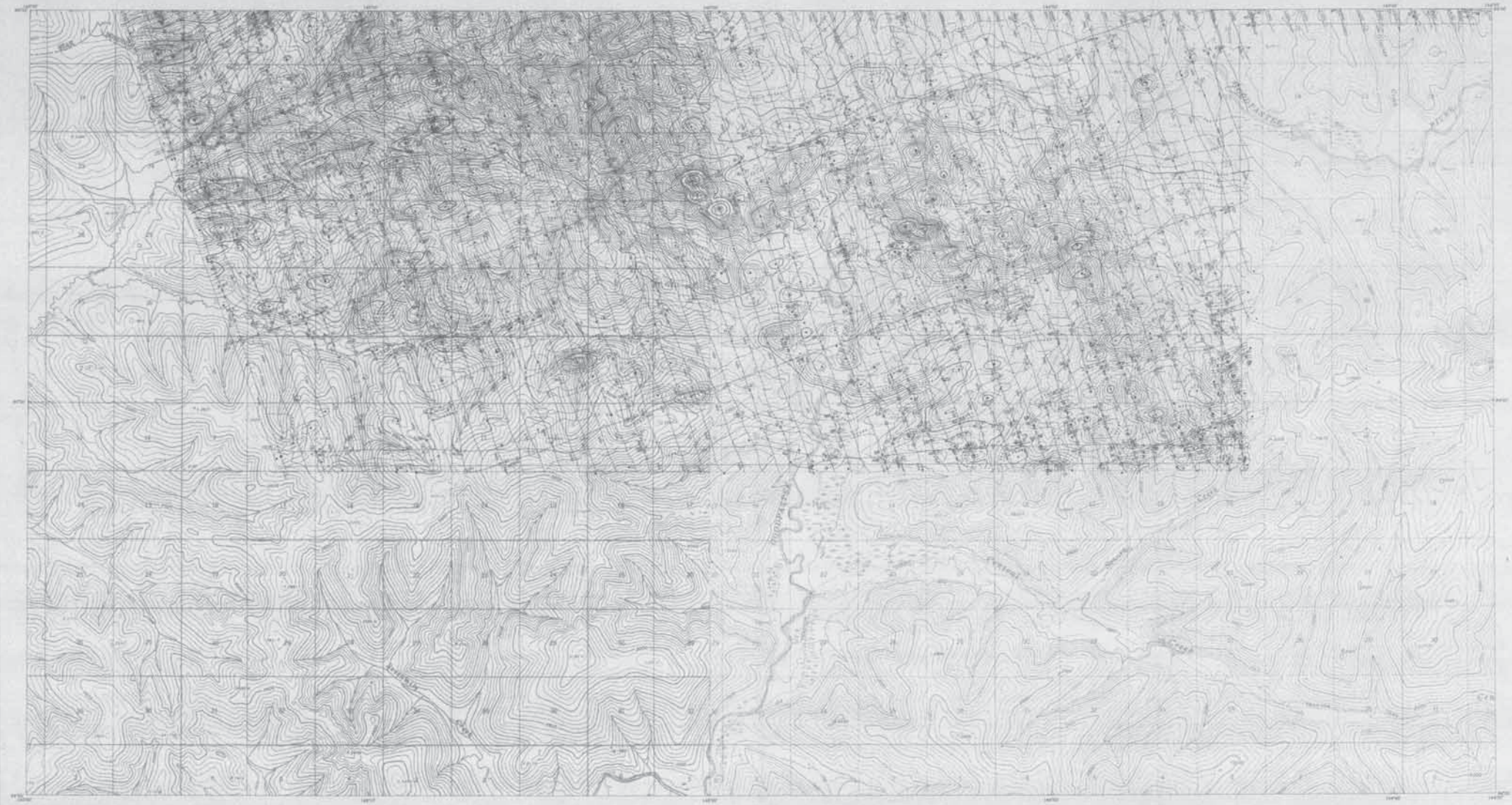
TOTAL MAGNETIC FIELD

MAGNETIC CONTOUR INTERVAL

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GEOPHYSICAL REPORT 2000-6G
PARTS of BIG DELTA B-2
and B-3 QUADRANGLES



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SALCHA RIVER - POGO MINING AREA, CENTRAL ALASKA

PARTS of BIG DELTA B-2
and B-3 QUADRANGLES
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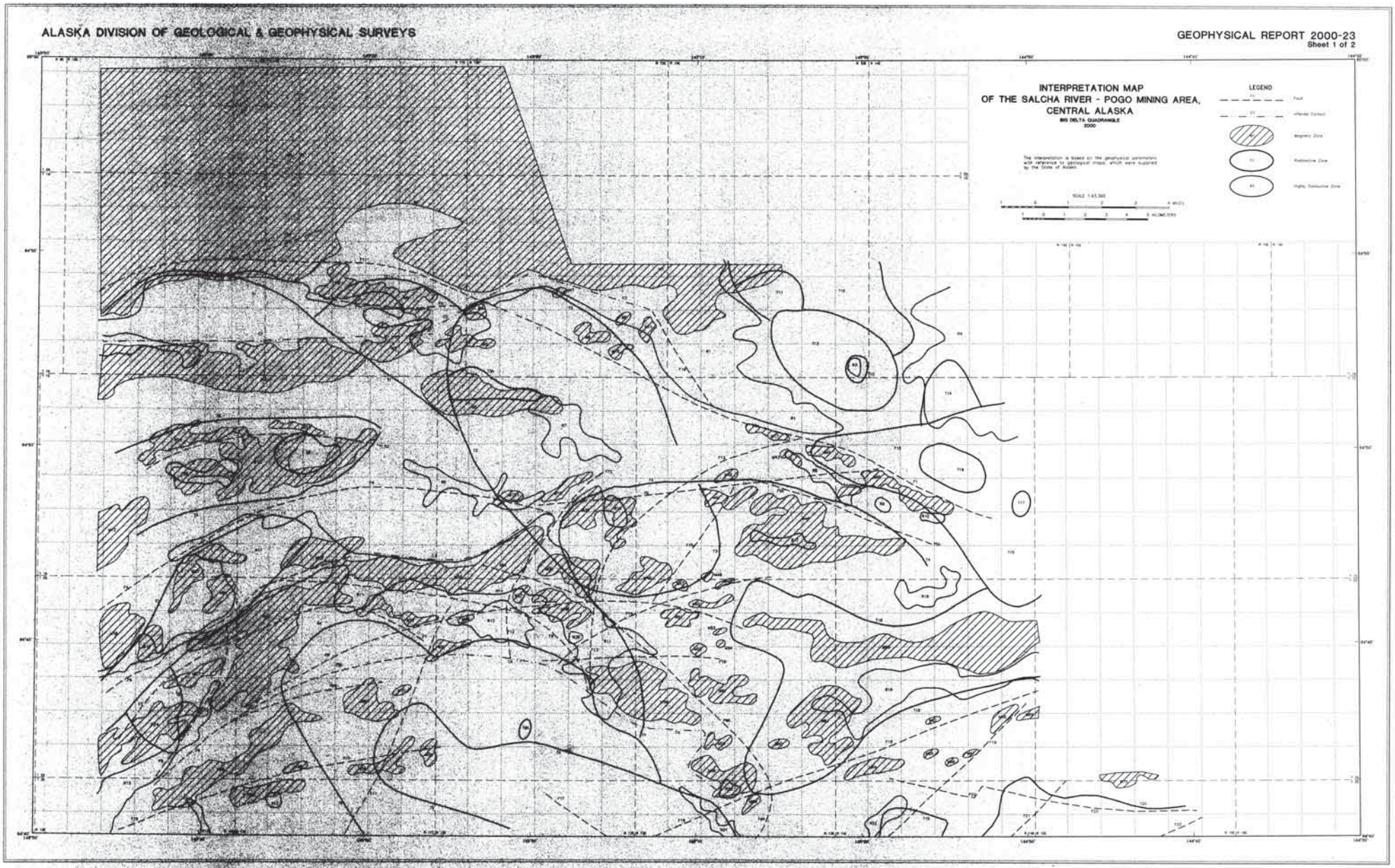
TOTAL MAGNETIC FIELD

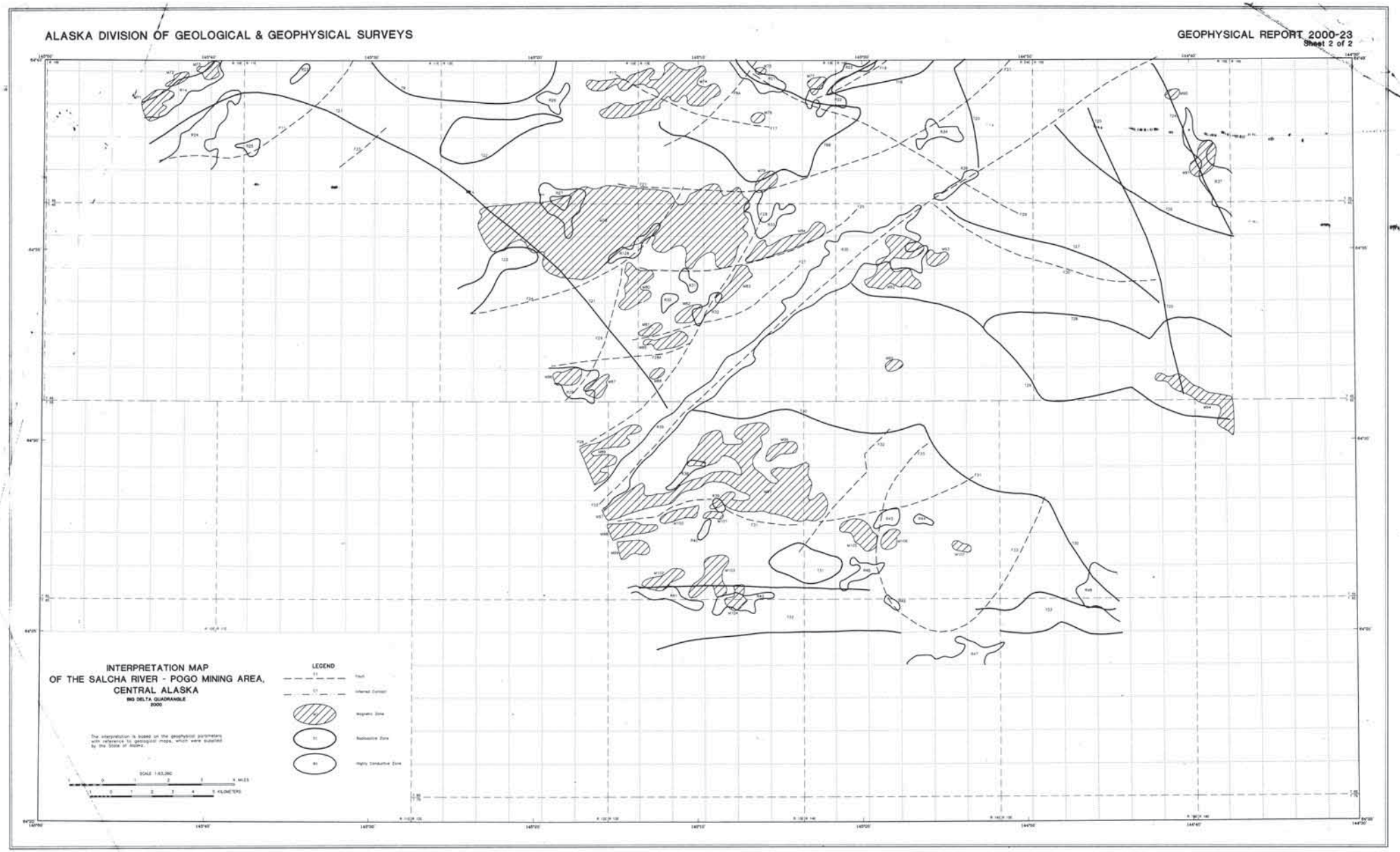
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ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2000-23
Sheet 1 of 2




INTERPRETATION MAP
OF THE SALCHA RIVER - POGO MINING AREA,
CENTRAL ALASKA
BIG DELTA QUADRANGLE
2000
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
MILES
KILOMETERS
LEGEND
Fault
Inferred Contact
Magnetic Zone
Radioactive Zone
Highly Conductive Zone