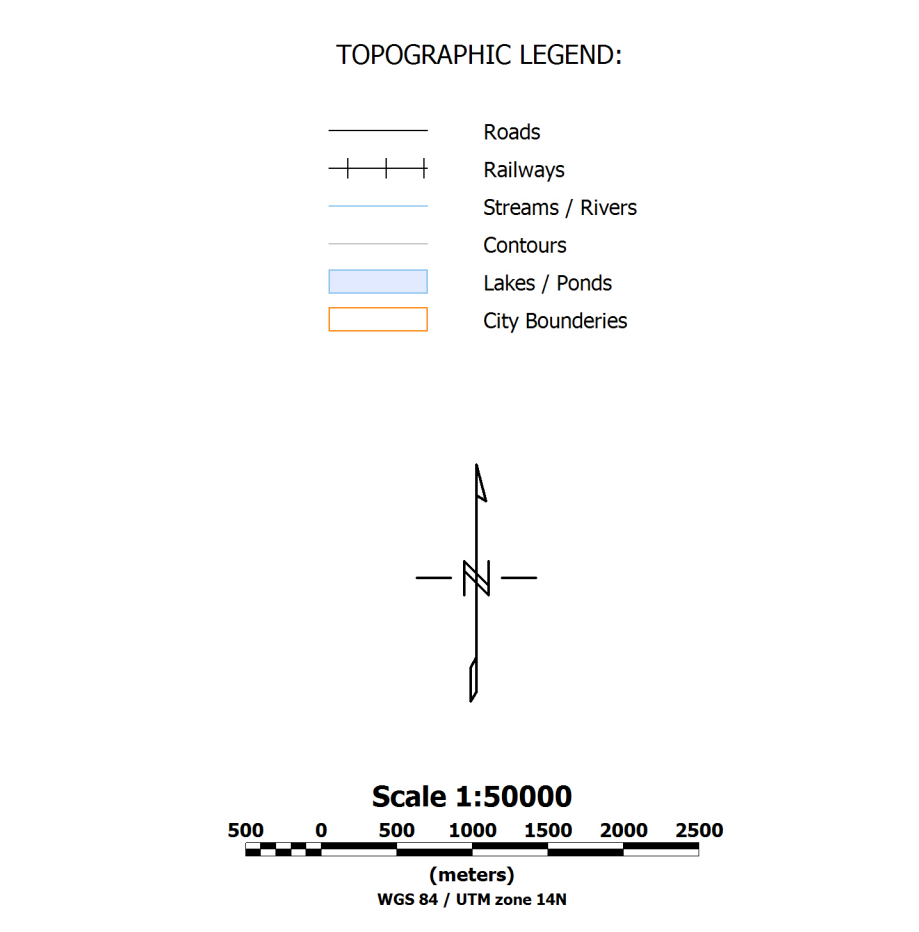
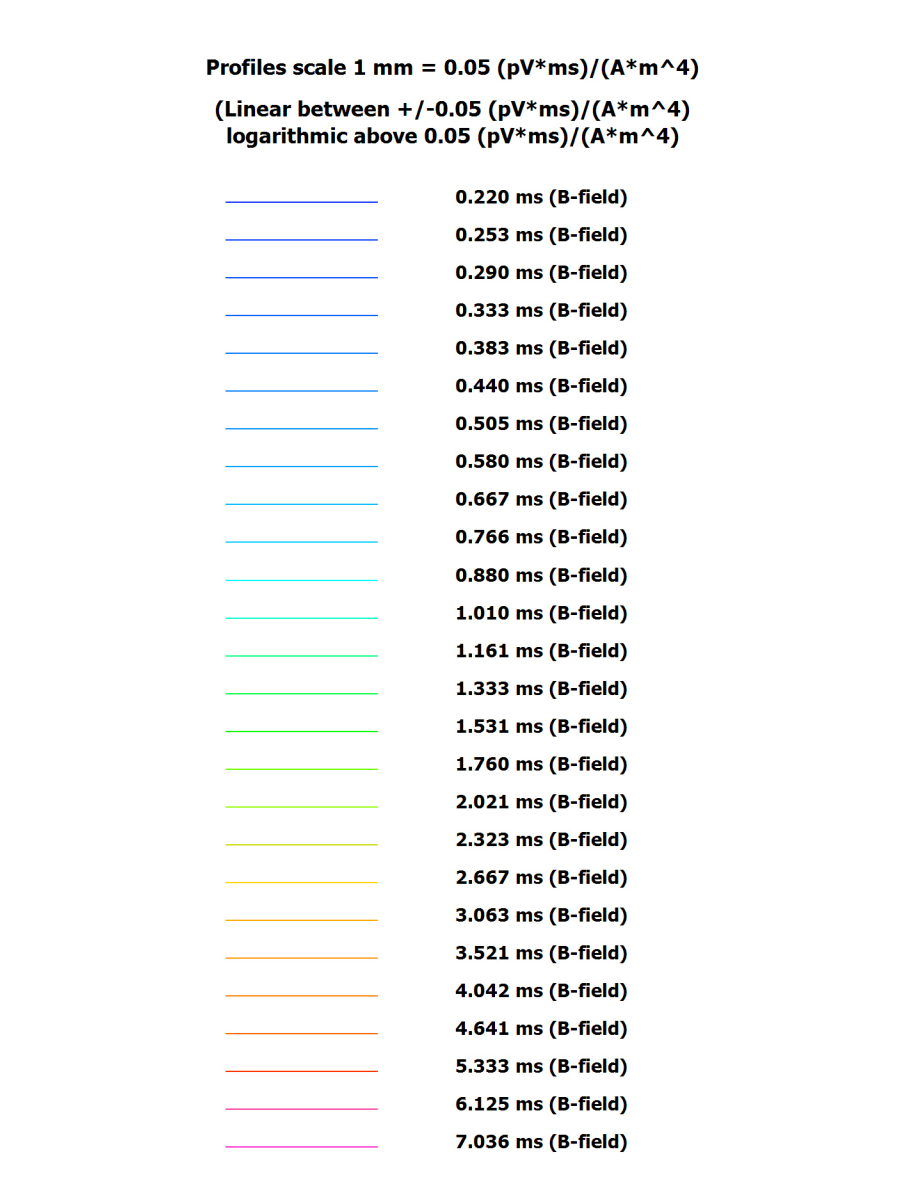
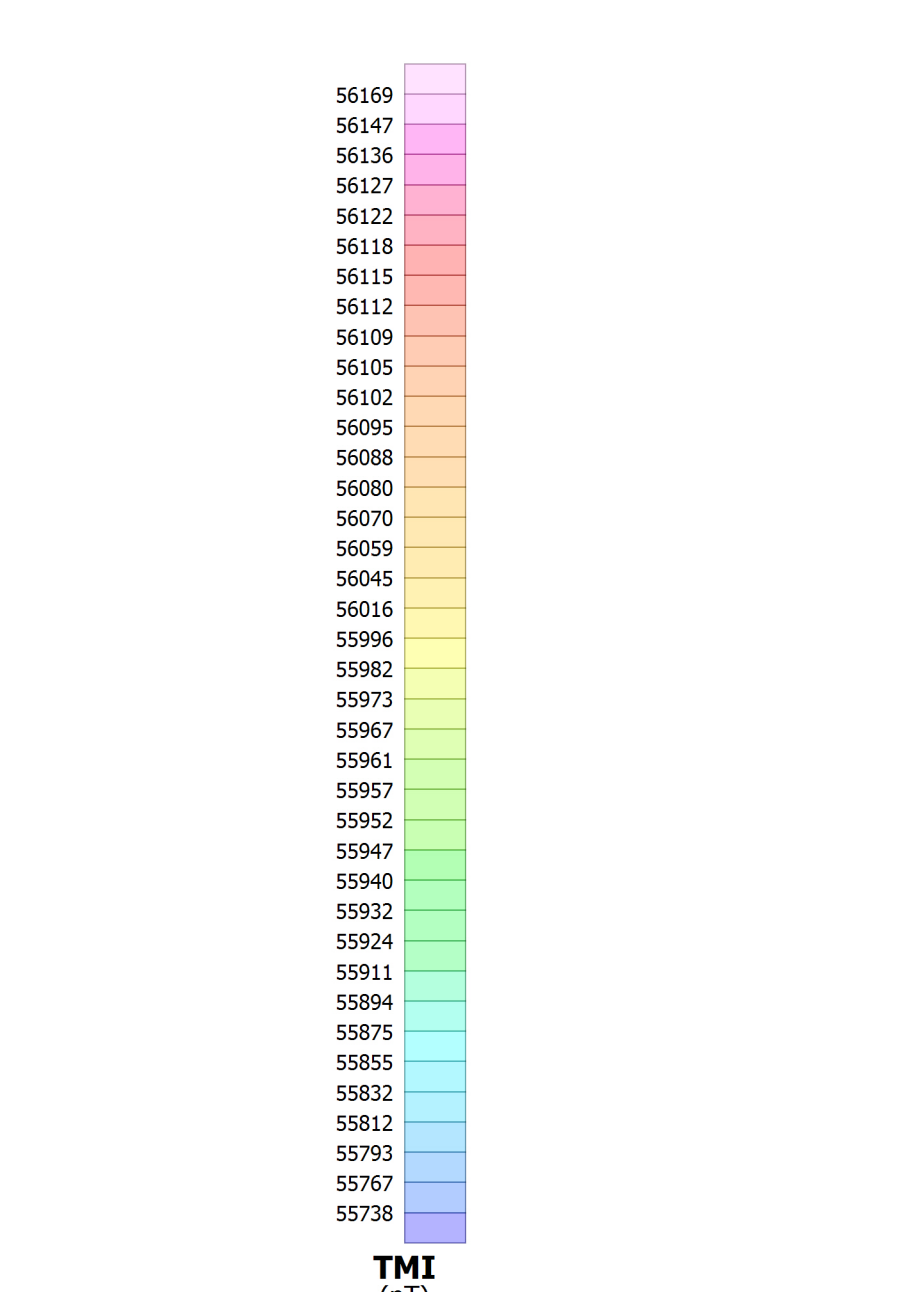
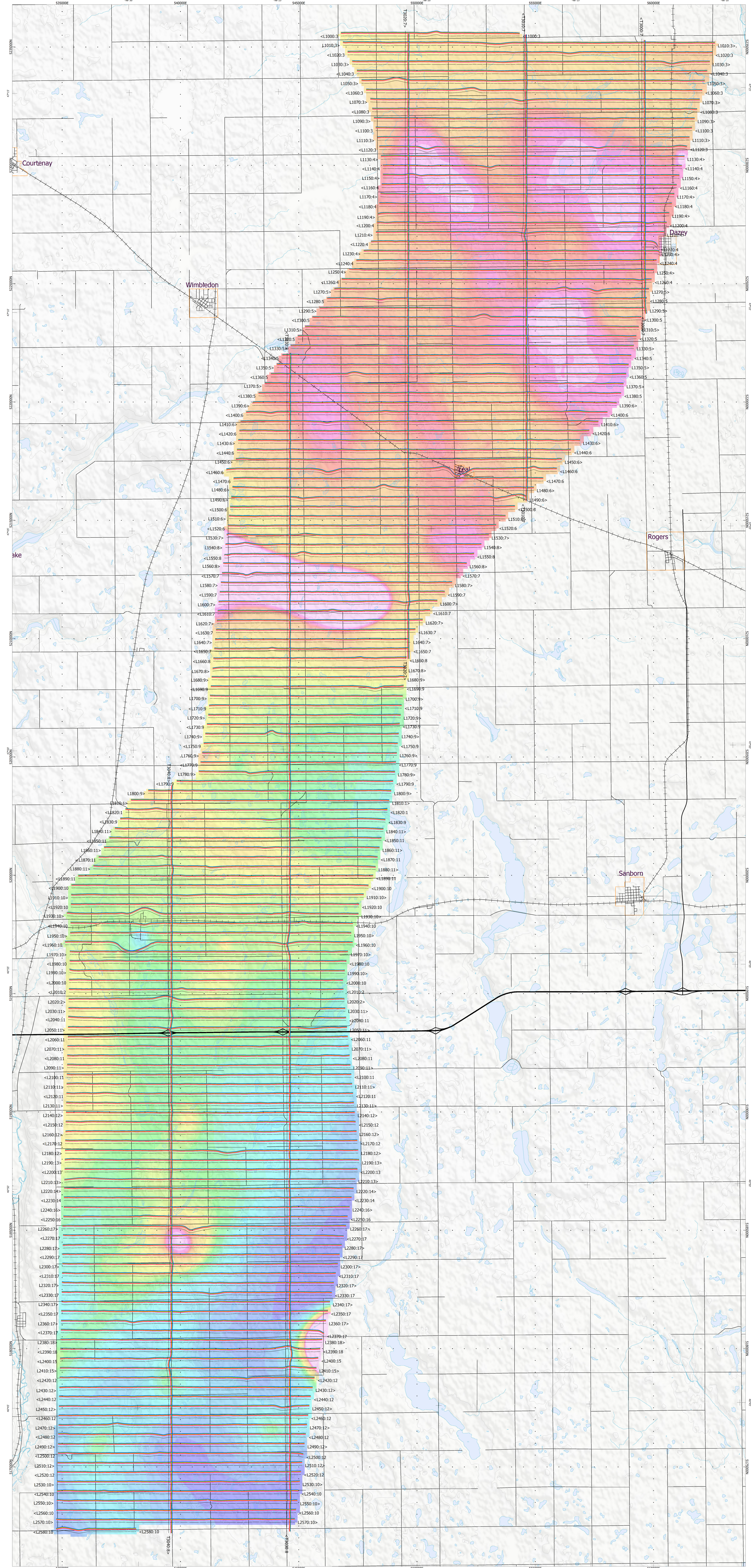




SURVEY SPECIFICATIONS:
 Survey Date: October 6th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerostar A-180C
 Survey Line Spacing: 400 meters
 Survey Line Direction: N 50° E / N 210° E
 The Line Spacing: 5000 Meters
 The Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 meters
 EM Transmitter Loop: Towed at an average terrain clearance of 31 meters below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 meters below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric 3m Coils
 X-Coil Diameter: 0.32m
 Y-Coil Diameter: 0.32m
 Transmitter Loop: Diameter: 50 Meters
 Dipole Moment: 365,278 A·m
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometric High Sensitivity Cassini-2 Magnetic Sensors
 Mag Resolution: 0.02 nT at 10 samples/sec

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Heighting: 500,000/0m
 Merit Area: 678137
 Inverse Flattening: 298.2572



The topographic data base was derived from the State Water Commission Data File
 Background imagery is derived from NAIP 0878 (Digital Number) Topography Feature Data
 Data was derived from USGS/USDA National Wetlands Inventory
 (www.geotech.com/ftp/ftp/geotech/naip/0878/)

North Dakota State Water Commission
Spiritwood-JT
Jamestown, North Dakota

Geotech VTEM System
 VTEM B-Field Z Component Profiles
 Time Gates 0.220 - 7.036 ms
 over Total Magnetic Intensity

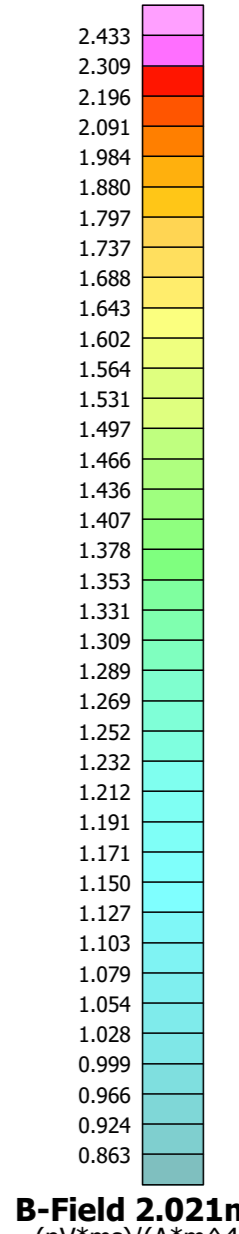
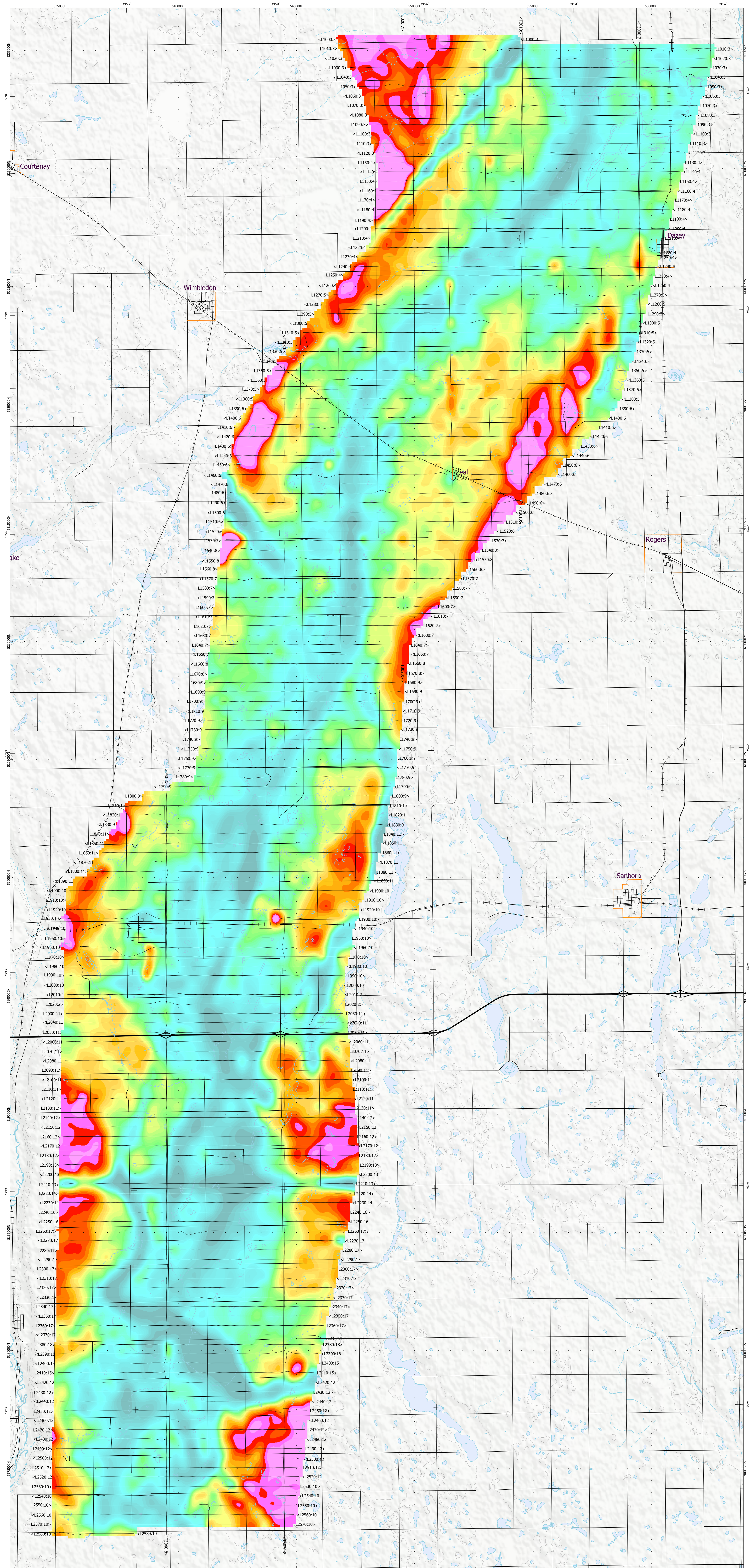
Flown and processed by Geotech Ltd.
 245 Industrial Parkway North,
 Aurora, Ontario, Canada L4G 4C4

November 2016

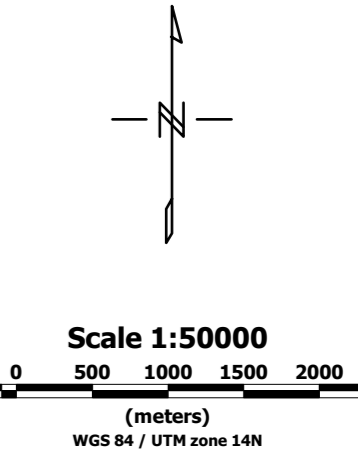


SURVEY SPECIFICATIONS:
 Survey Date: October 20th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerogeomatics A-Star 350 B3 CFVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric Rx/Tx Geometry
 X-Coil Diameter 0.32m
 Z-Coil Diameter 2.2m
 Y-Coil Diameter 0.32m
 Transmitter Loop Diameter 20 Metres
 Dipole Moment: 365,276 A/m²
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetic Sensors
 Mag Resolution: 0.02 nT at 10 samples/sec
 MAP PROJECTION
 Datum: WGS84
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14W)
 Central Scale Factor: 0.9996
 False Easting (Northing): 500,000m/0m
 Major Area: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:
 Roads
 Railways
 Streams / Rivers
 Contours
 Lakes / Ponds
 City Boundaries



The topographic data base was derived from ND State Water Commission Open Portal. Bathymetric data is derived from NOAA OPRN Coastal Radar Topographic Dataset. Inset data derived from Geometrics 1:250,000 Canadian National Topographic Database (<http://www.geometrics.com/NDTP/topographic/canada.asp>)

North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota
 Geotech VTEM System
 VTEM B-Field Z Component
 Channel 36, Time Gate 2.021 ms

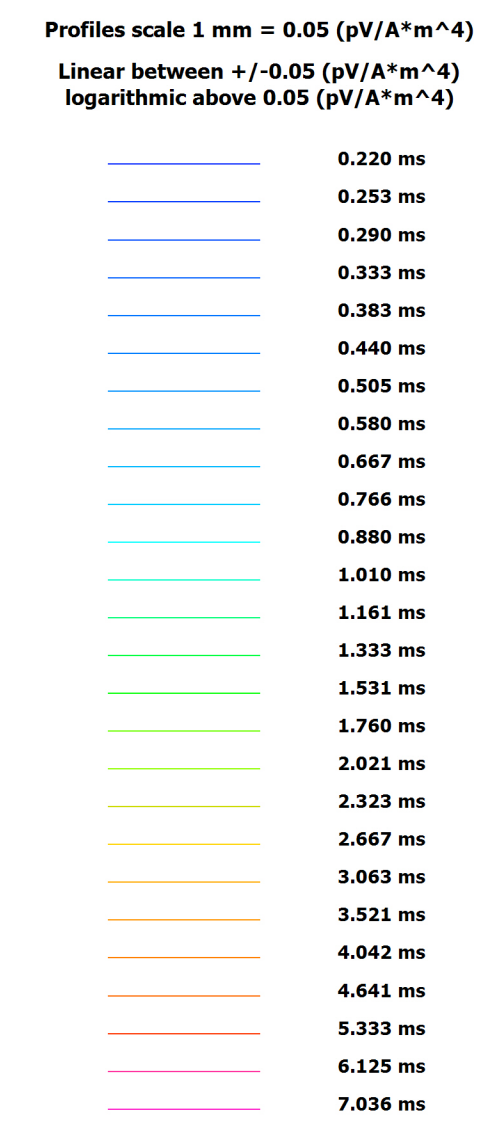
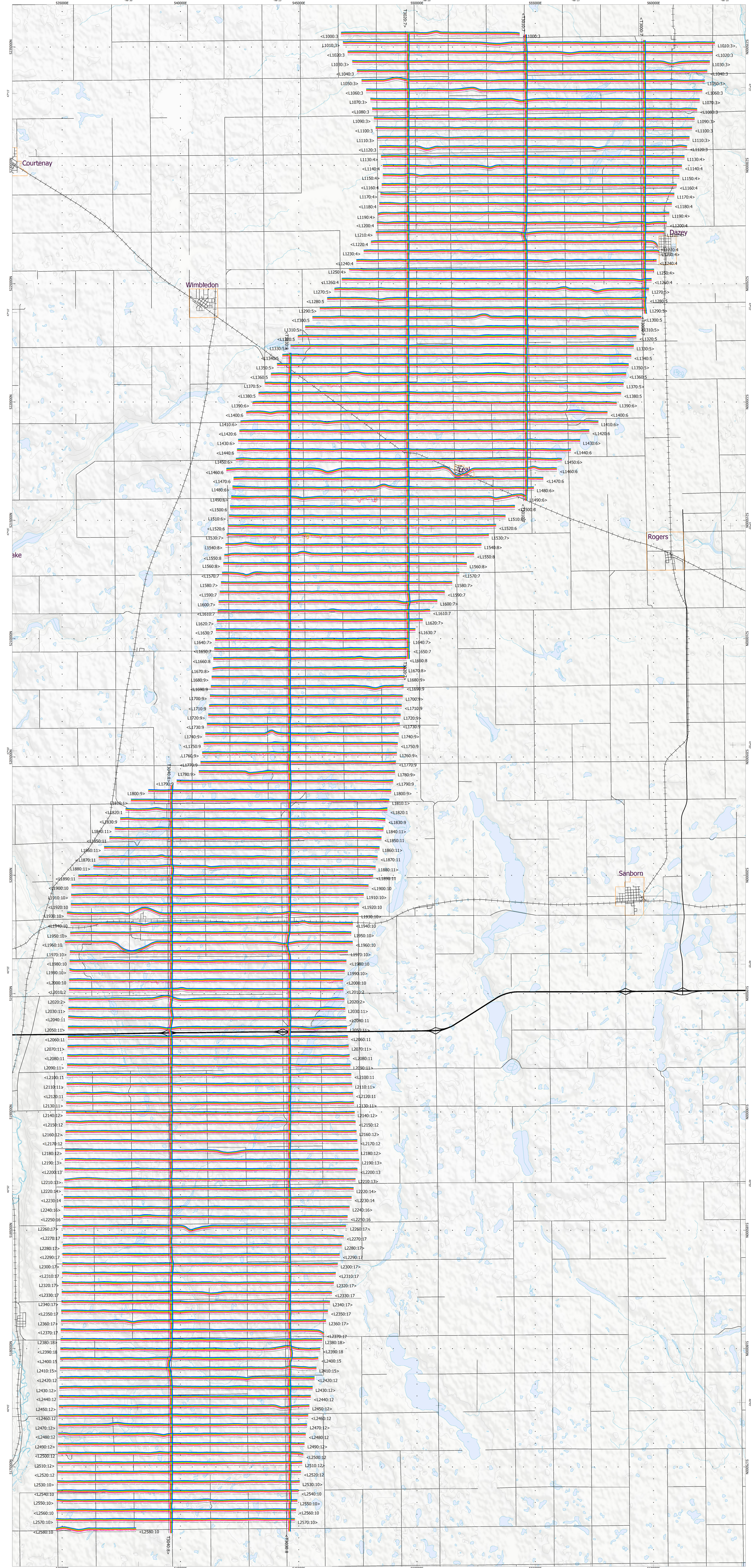
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 www.geotech.ca
 November 2016



SURVEY SPECIFICATIONS:
 Survey Date: October 6th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: AgCessors A-one 550 81 C-7TH
 Survey Line Spacing: 400 meters
 Survey Line Direction: N 50° E / N 210° E
 Tie Line Spacing: 5000 Meters
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 meters
 EM Transmitter Loop: Towed at an average terrain clearance of 31 meters below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 meters below the helicopter

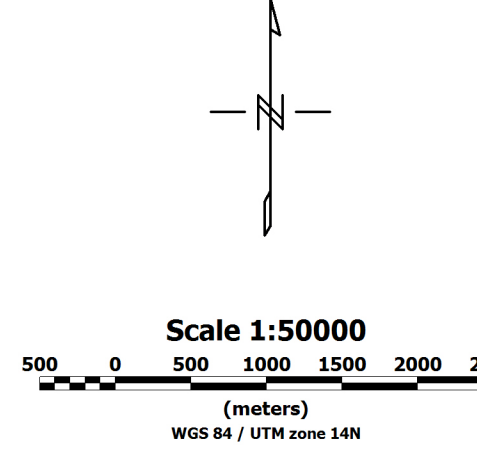
INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTM)
 Geotech 375 Electrometry
 X-Coil Diameter: 0.32m
 Z-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.32m
 Transmitter Loop: Diameter: 50 Meters
 Dipole Moment: 365,275 A·m²
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Cesium 2 Magnetic Sensors
 Mag Resolution: 0.02 nT at 10 samples/sec

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99W (Zone 14N)
 Central Scale Factor: 0.9998
 False Easting/Missing: 900,000/0m
 Major Axis: 678137
 Inverse Flattening: 298.2572



TOPOGRAPHIC LEGEND:

- Roads
- Railways
- Rivers
- Contours
- Lakes / Ponds
- City Boundaries



The topographic data base was derived from the State Water Commission Data File.
 Background imagery is derived from NAIP 1:25000 (Digital Vector Topography) Project Data.
 Data was derived from coordinates: 1205300 UTM East, 5393500 North (NAD83).
 (www.geotek.com/ftp/ftp/geotek/naip/naip.cfm)

North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota

Geotech VTEM System
 VTEM dB/dt Z Component Profiles
 Time Gates 0.220 - 7.036 ms

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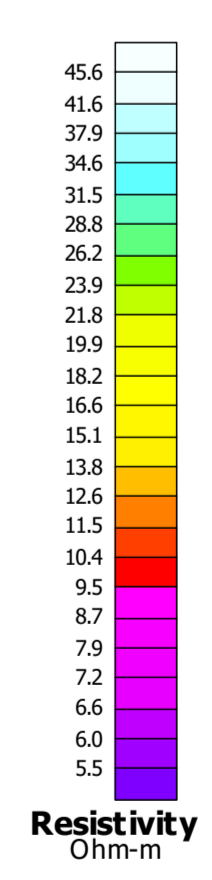
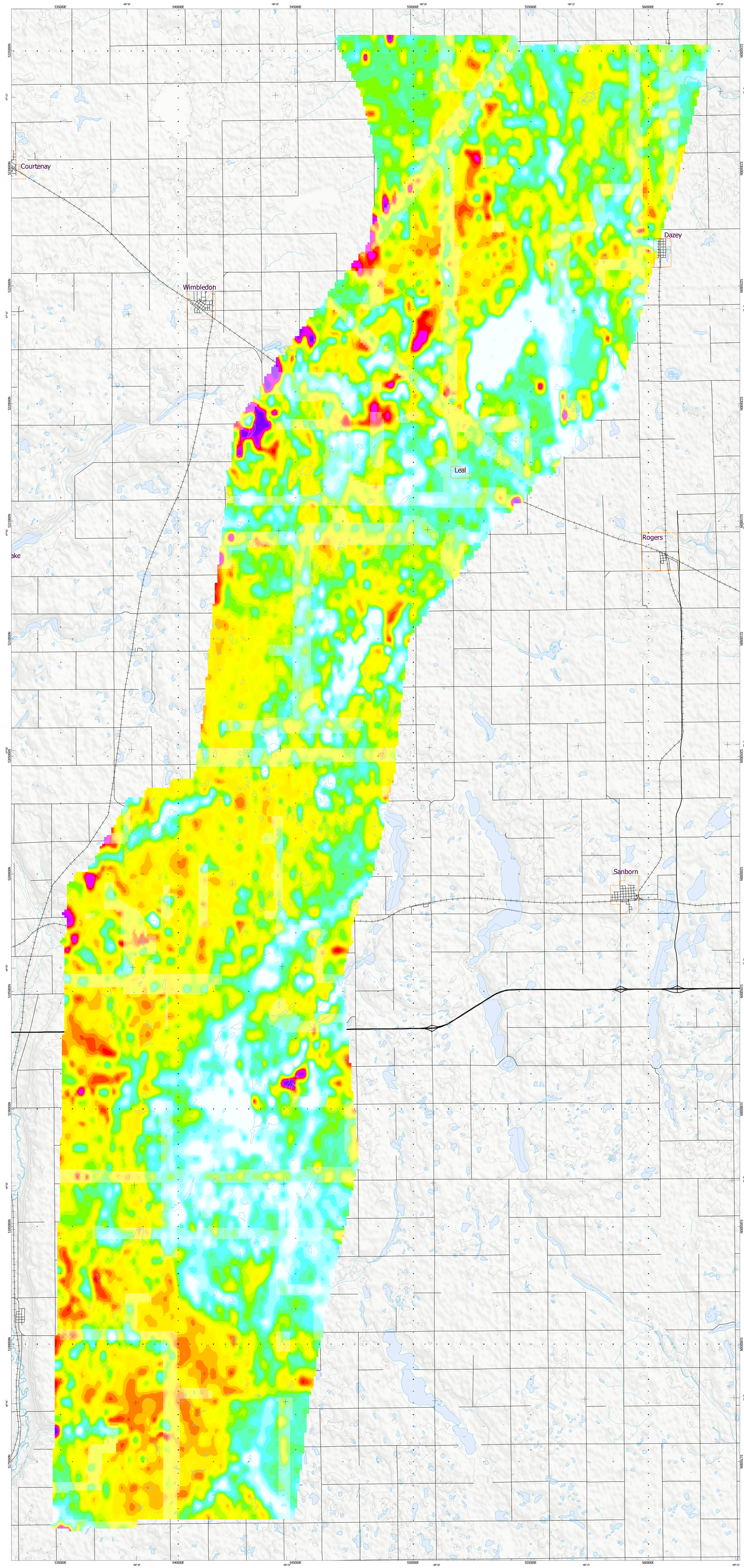
November 2016



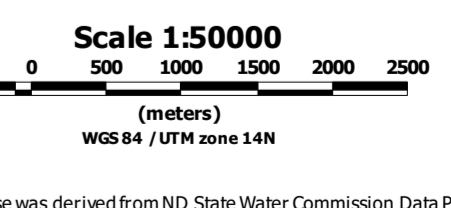
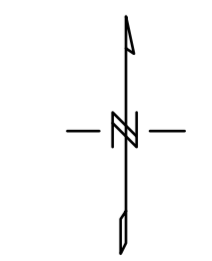
SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 23rd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: AeroSpectra Avstar 350 B3 C-PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 230° E
 Tie Line Spacing: 500 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetis: Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 CoreCoil: Rx/Tx Geometry
 X-Coil Diameter: 0.32m
 Z-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.32m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 365,276 mA
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetis Sensors
 Map Resolution: 0.02 m/ft @ 10 samples/sec

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:
 Roads
 Railways / Rivers
 Contours
 Lakes / Ponds
 City Boundaries



The topographic data base was derived from the ND State Water Commission Data Portal.
 Background shading is derived from the ND State Water Commission Topographic Data Portal.
 Line data is derived from GeoCommunity's 1:250,000 Canadian National Topographic Database.
 (www.geocommunity.com/nd/responses/water.html)

**North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota**

Geotech VTEM System
 Resistivity
 Depth Slice 40 metres

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 www.geotech.ca

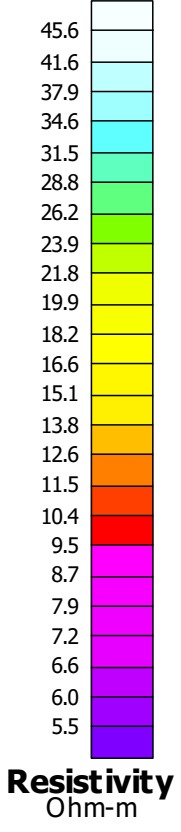
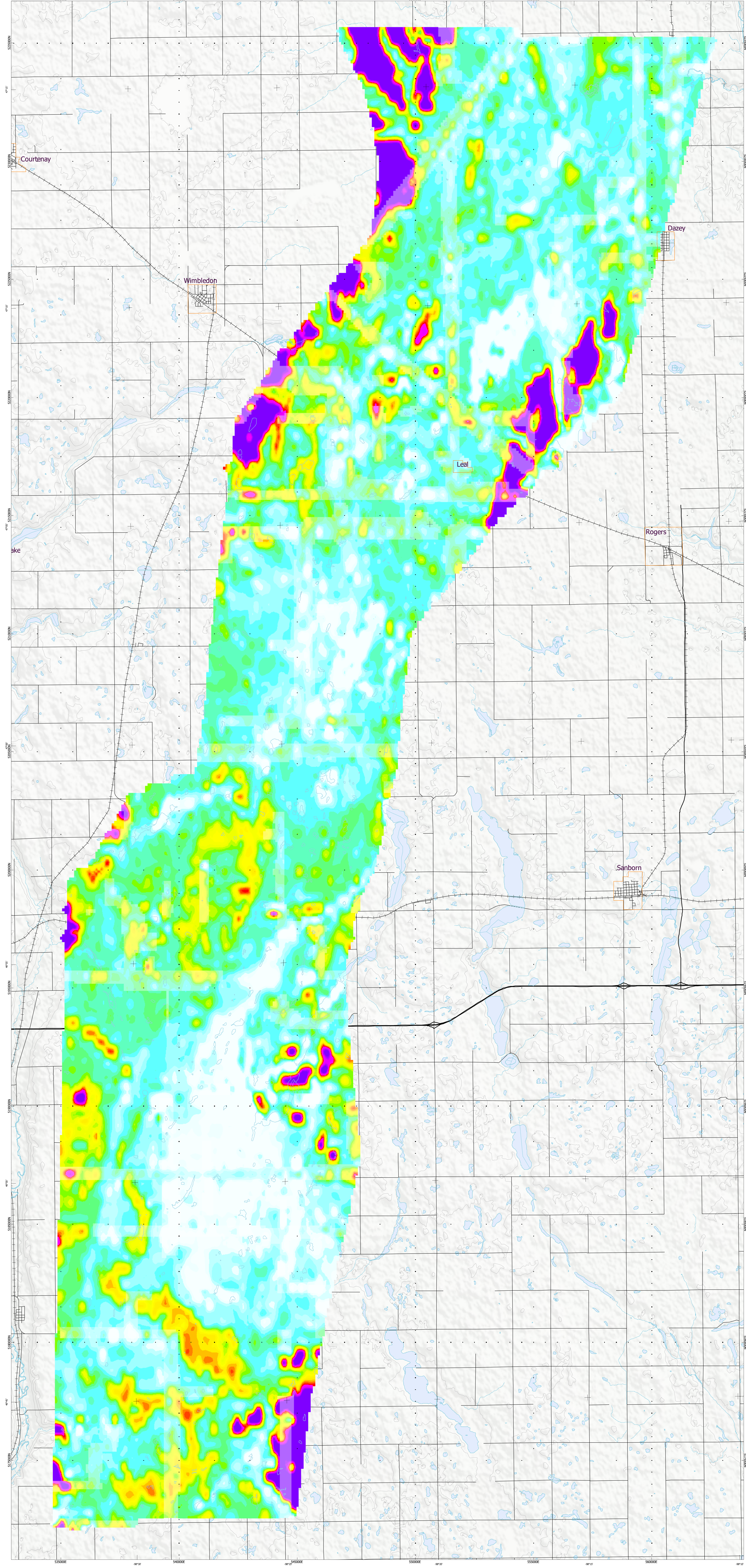
January 2017



SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aeromobile Avator 550 83 C-PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 500 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 BH Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetis Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

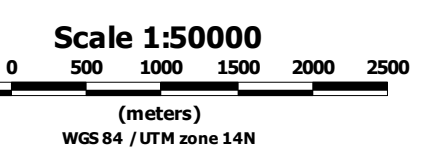
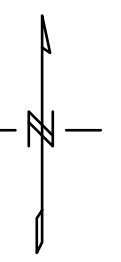
INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTM)
 Concretic 80/10 Geometry
 X-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.52m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 395,276 A·m²
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetis Sensors
 Map Resolution: 0.52 m at 10 samples/m

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Heighting: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:

- Roads
- Railways
- Streams / Rivers
- Contours
- Lakes / Ponds
- City Boundaries



North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota

Geotech VTEM System
 Resistivity
 Depth Slice 50 metres

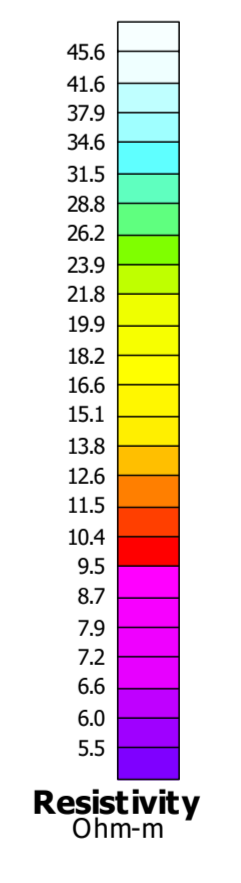
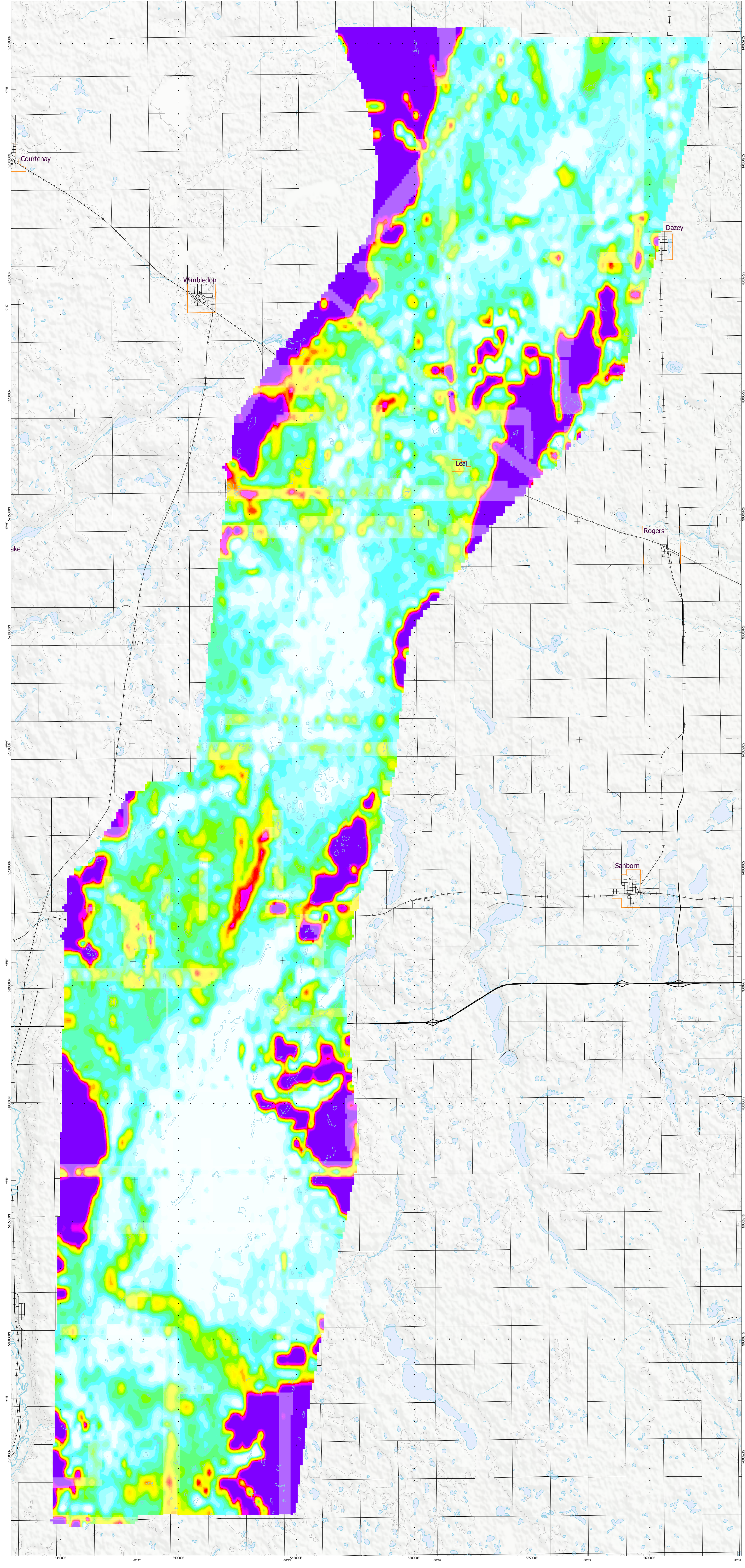
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 www.geotech.ca
 January 2017



SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerospaciale Aster 250 B3 C-PTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

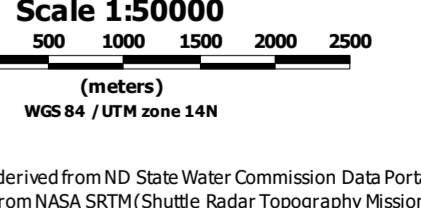
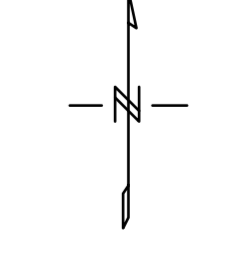
INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTDM)
 Concentric Rx/Tx Geometry
 2-Coil Diameter 1.2m
 4-Coil Diameter 0.32m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 363.276 kA
 EM Transmitter Wave Form: Tripposed, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics: High Sensitivity Caesium 2 Magnetic Sensors
 Map Resolution: 632 x 47 at 10 sample/m

MAP PROJECTION:
 Datum: WGS84
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14R)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Page Axis: E/N 17
 Inverse Heightening: 248.25722



TOPOGRAPHIC LEGEND:

- Roads
- Railways
- Streams / Rivers
- Contours
- Lakes / Ponds
- City Boundaries



The topographic data base has been derived from NDS State Water Commission Data Point
 Background shading is derived from NADA 527M Shuttle Radar Topography Mission data
 (available at <http://www.gpo.gov/products/1250,000-Canadian-National-Topographic-dataset>
 (www.gpo.gov/products/1250,000-Canadian-National-Topographic-dataset))

North Dakota State Water Commission
Spiritwood-JT
Jamestown, North Dakota

Geotech VTEM System
Resistivity
 Depth Slice 60 metres

Planned and processed by Geotech Ltd.
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www.geotech.ca

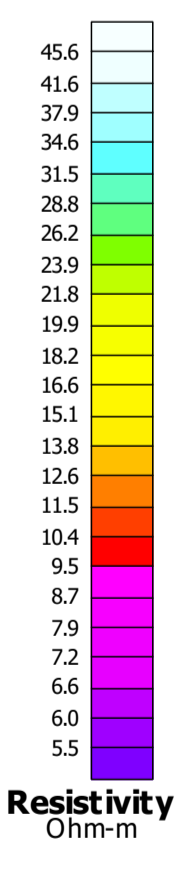
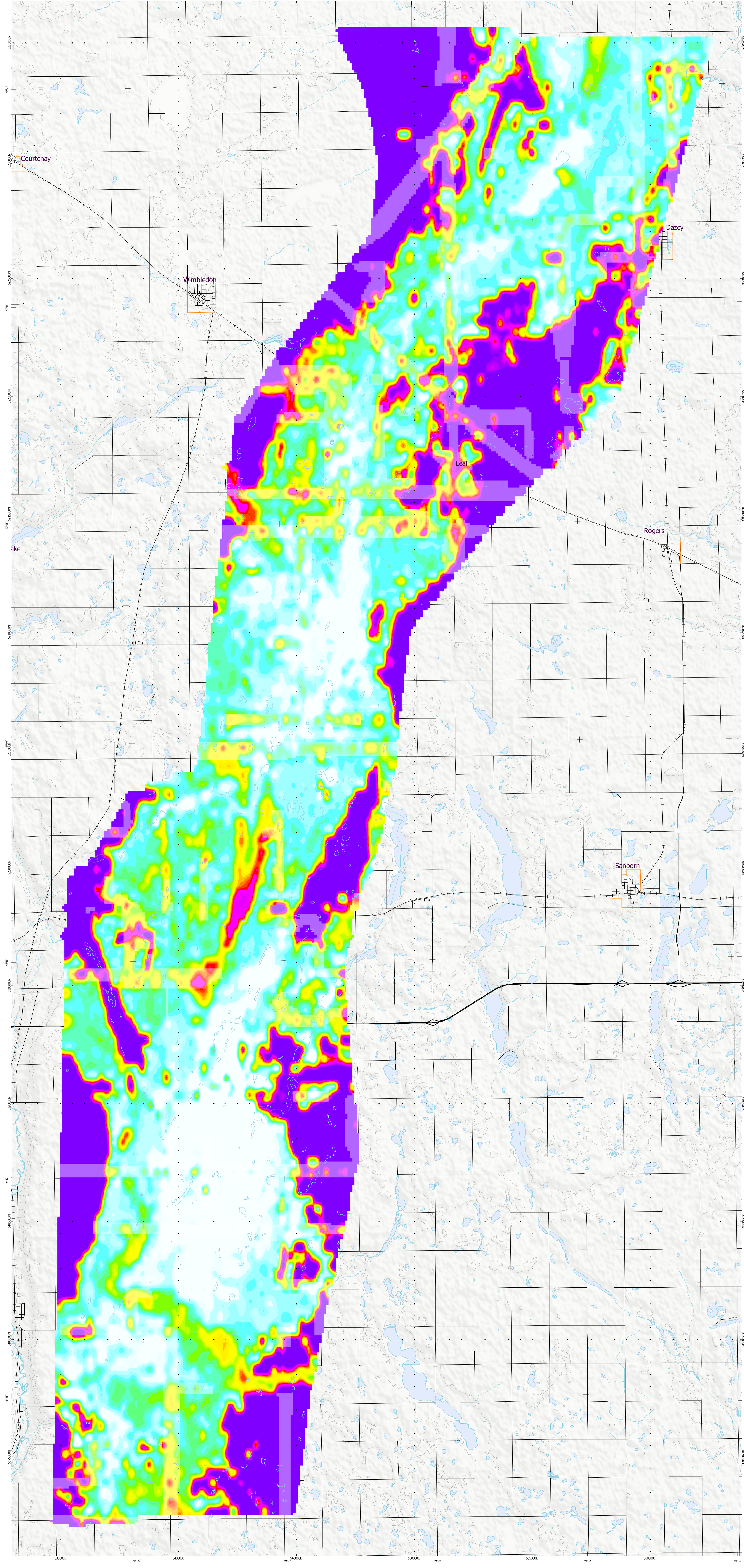
January 2017



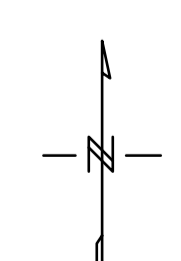
SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aeromaster A-Star 300 B3 C/P/T/H
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetometers: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric Bull's Geometry
 X-Coil Diameter: 0.32m
 Z-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.32m
 Transmitter Loop Diameter: 26 Metres
 Dipole Moment: 355,276 A·m²
 Transmitter Wave Form: Trapezoidal Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics: High Sensitivity Cassegrain 2 Magnetometers
 Mag Resolution: 0.02 nT at 10 samples/sec

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Origin: 500,000m/0m
 Map Scale: 63761.7
 False Northing: 268,257.22



TOPOGRAPHIC LEGEND:
 — Roads
 — Railways
 — Streams / Rivers
 — Contours
 — Lakes / Ponds
 — City Boundaries



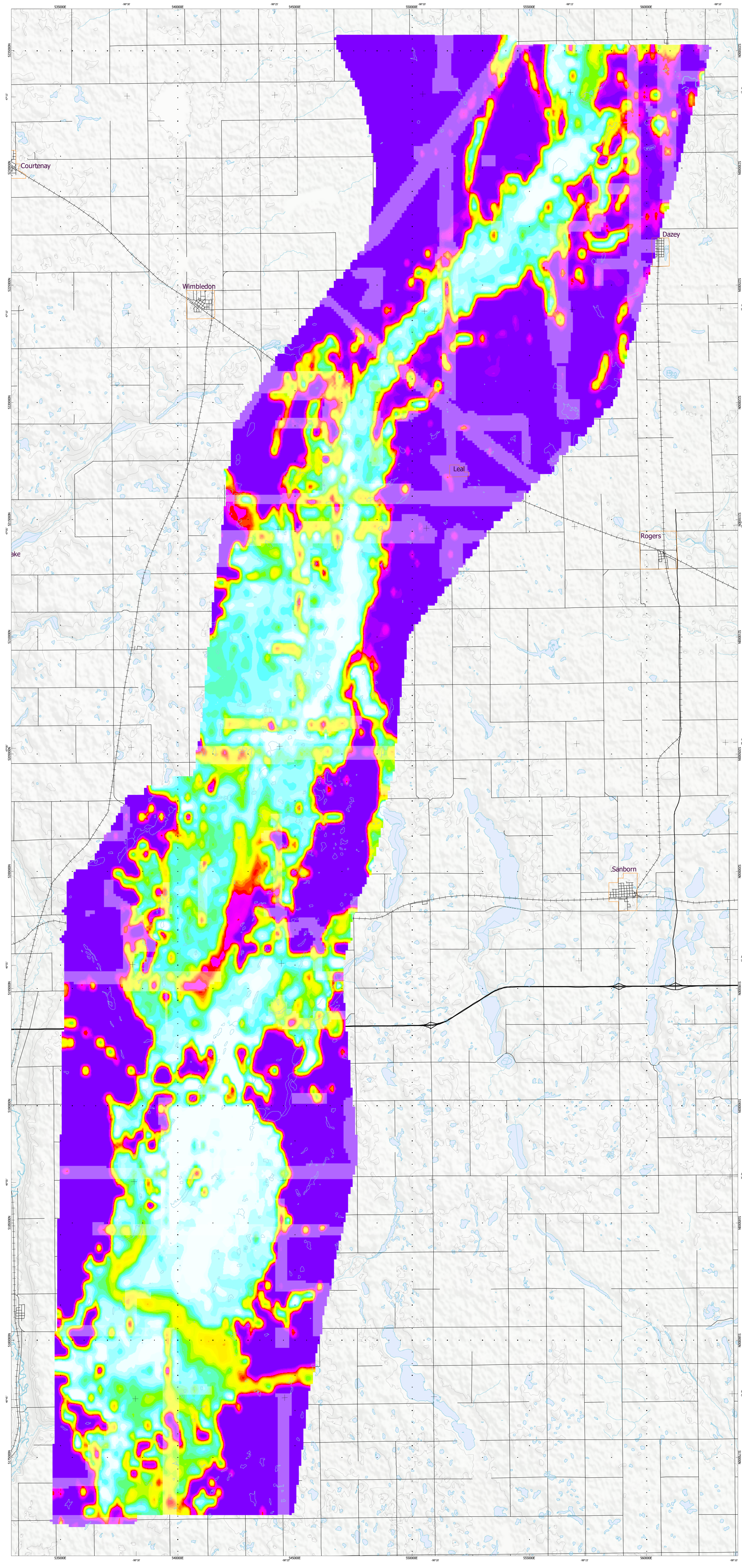
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The topographic data base was derived from 100-Contour Water Commission Data Portal
 Background shading is derived from NASA (SRTM30+) Shuttle Radar Topography Mission (SRTM30+) data
 Downloaded from the Government of Canada's National Topographic Data Bank
 (www.geocomm.com/2016/02/16/nasasrtm30plus.html)

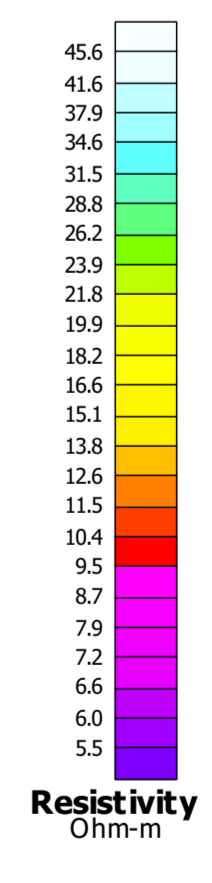
**North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota**

**Geotech VTEM System
 Resistivity
 Depth Slice 70 metres**

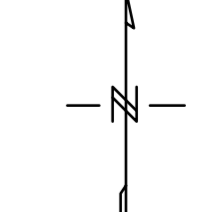
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 Aurora, Ontario, Canada L4G 4C4
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 January 2017



SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 23rd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerospacelab Avstar 300 B3 C-PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 500 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter
INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTDM)
 Coaxial: Ro/Tx Coaxial
 X-Coil Diameter: 0.2m
 Z-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.2m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 305,276 nA
 Transmitter Wave Form: Triangular Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetic Sensors
 Map Resolution: 0.02 m/pt at 10 samples/line
MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:
 Roads
 Railways / Rivers
 Shrubs / Forests
 Contours
 Lakes / Ponds
 City Boundaries



Scale 1:50000
 0 500 1000 1500 2000 2500
 Metres
 WGS 84 / UTM zone 14N

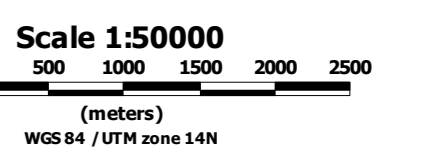
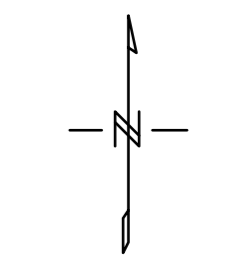
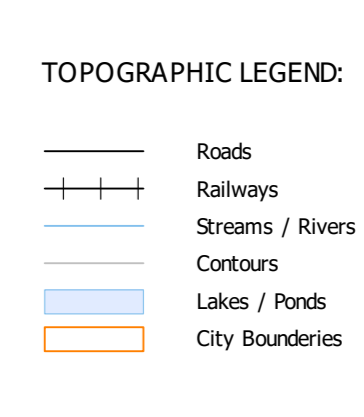
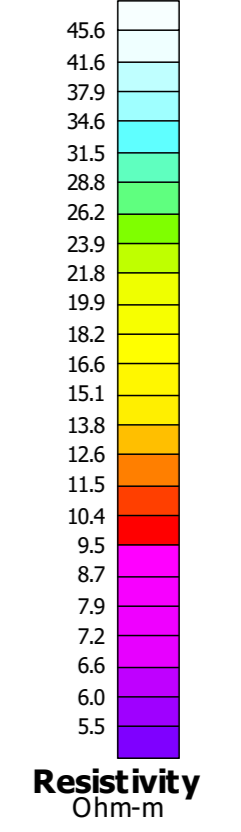
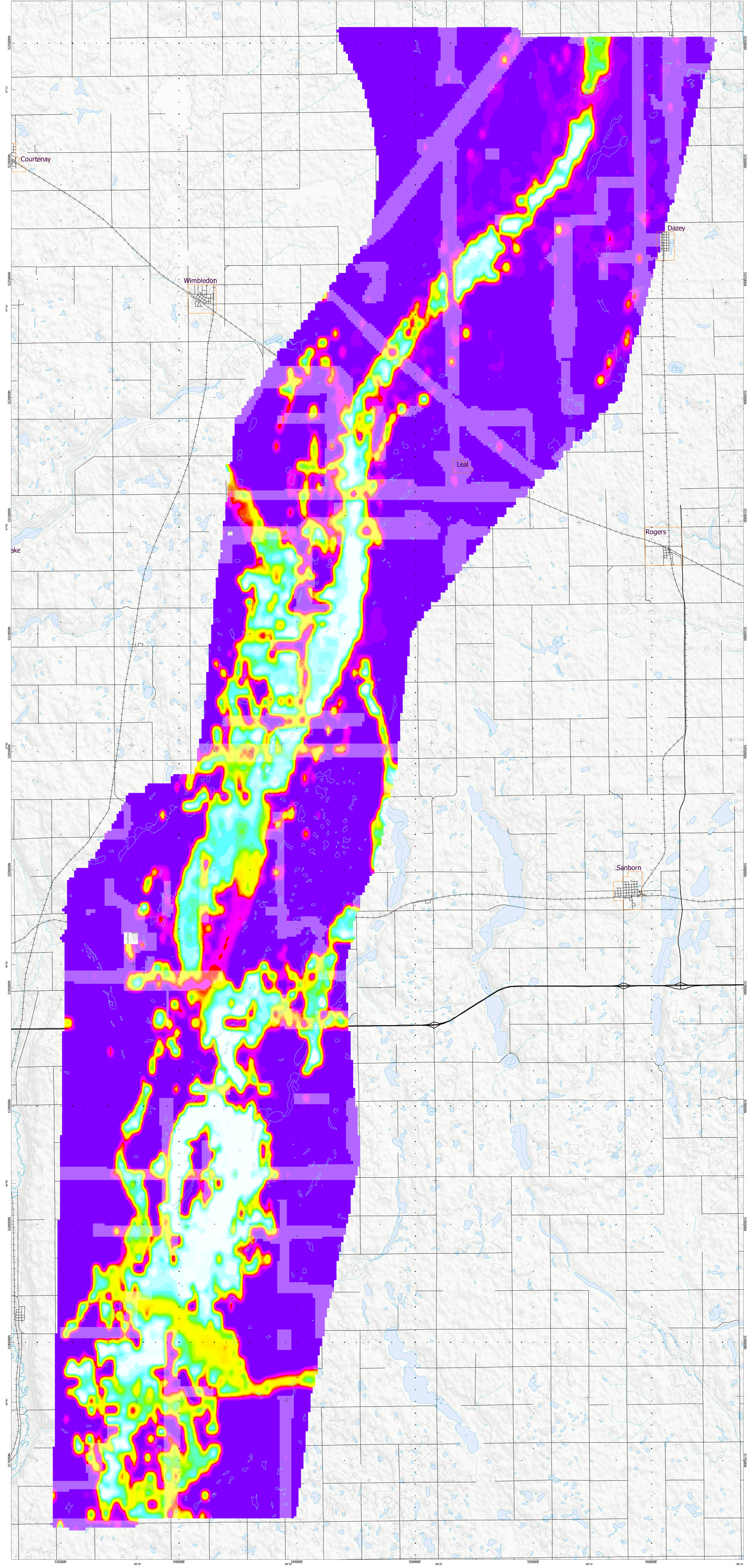
The topographic data have been derived from ND State Water Commission Data Portal
 Background shading is derived from NAD83 (2011) Digital Bathymetry (Hydro) data
 Downloaded from Geocommons 1:250,000 Canadian National Topographic Database
 (www.geocommons.com/http://mapserver.wcc.nd.gov)



SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 20th, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerotec A-100 300 BS C-171M
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 30 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 EM Magnetic Sensors: Towed at an average terrain clearance of 23 metres below the helicopter

INSTUMENTATION:
 Geotech Time Domain Electromagnetic System (VTEM)
 Concrete North Geometry
 X-Coil Diameter 0.32m
 Z-Coil Diameter 1.2m
 Y-Coil Diameter 0.32m
 Transmitter Loop Diameter 26 Metres
 Dipole Moment: 360.276 nA
 Transmitter Wave Form: Truncated Pulse Width 7.17 ms, Rise Frequency 30Hz
 Geometrics High Sensitivity Calcium 2 Magnetic Sensors
 Map Resolution: 0.02 m at 10 samples/m

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Heighting: 500,000m/0m
 Map Scale: 0.000127
 Inverse Flattening: 298.25722



The topographic data base was derived from ND State Water Commission Data for all 82nd and 83rd meridians and from the USGS 1:250,000 Digital Data Base Topographic Mission data. Data was derived from Geocommunities 1:250,000 Canadian National Topographic Database. (www.geocommunities.com/nd/resistivity.html)

**North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota**

**Geotech VTEM System
 Resistivity
 Depth Slice 90 metres**

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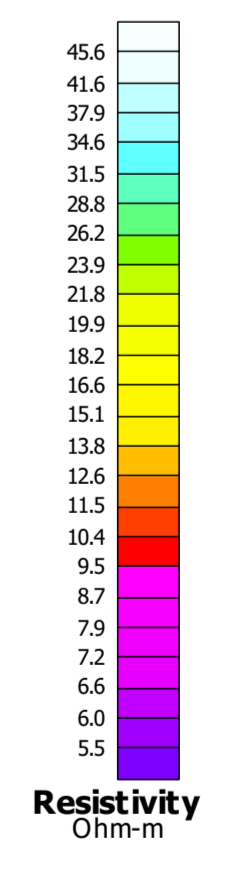
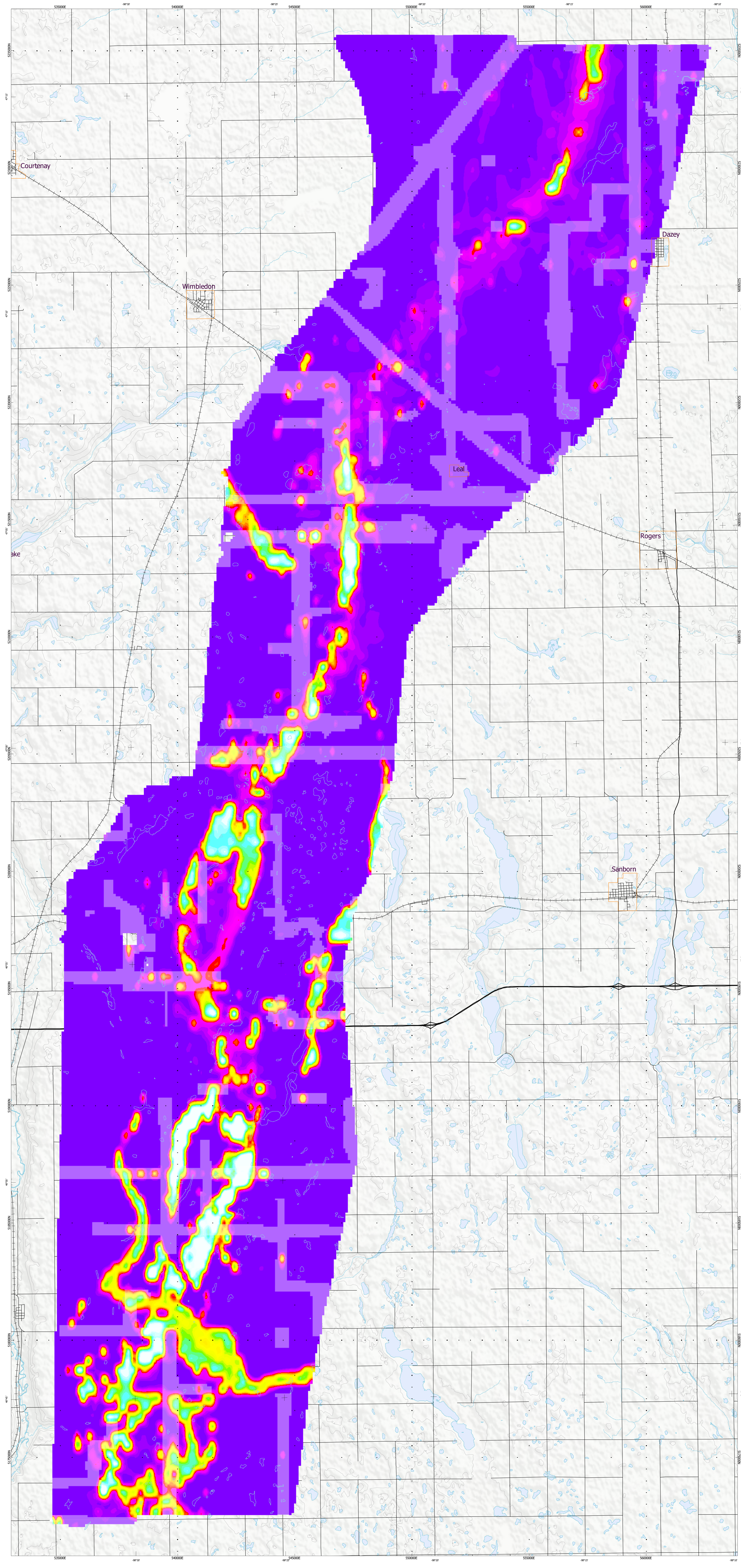
January 2017



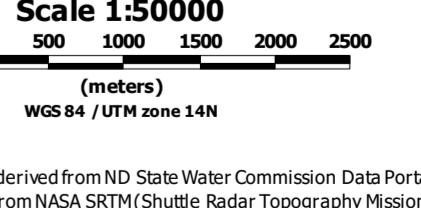
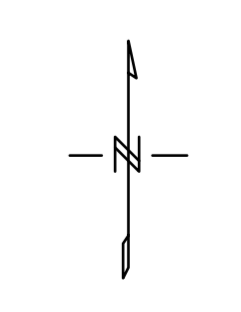
SURVEY SPECIFICATIONS
 Survey Date: October 4th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerospaciale Aster 250 B3 C-PTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 EM Receiver Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric Rx/Tx Geometry
 2-Coil Diameter 1.2m
 2-Coil Diameter 0.32m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 26,276 A·m
 EM Transmitter Wave Form: Trippered, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetic Sensors
 Map Resolution: 632 m at 10 sample/m

MAP PROJECTION
 Datum: WGS84
 Projection: Universal Transverse Mercator
 Central Meridian: 99° W (Zone 14R)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Page East: 6376137
 False Northing: 246,25232



TOPOGRAPHIC LEGEND:
 Roads
 Railways
 Streams / Rivers
 Contours
 Lakes / Ponds
 City Boundaries



This topographic data base was derived from ND State Water Commission Data Point
 Background mapping is derived from NADA 527M Shuttle Radar Topography Mission data
 Metadata derived from geocommons/1250,000 Canadian National Topographic database
 (www.geocommons.com/https://mapserver.wvu.edu/nd.gml)

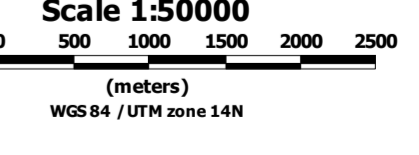
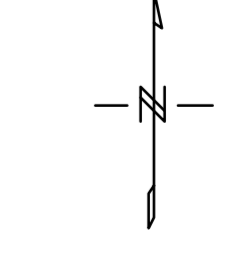
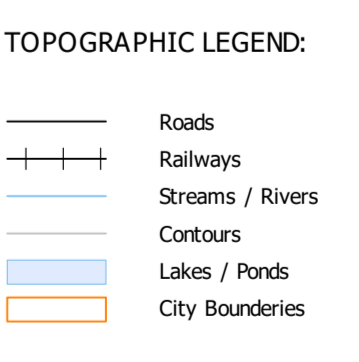
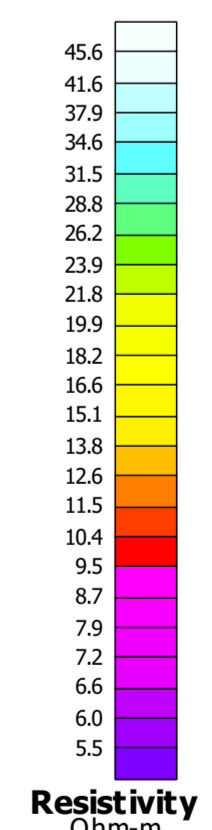
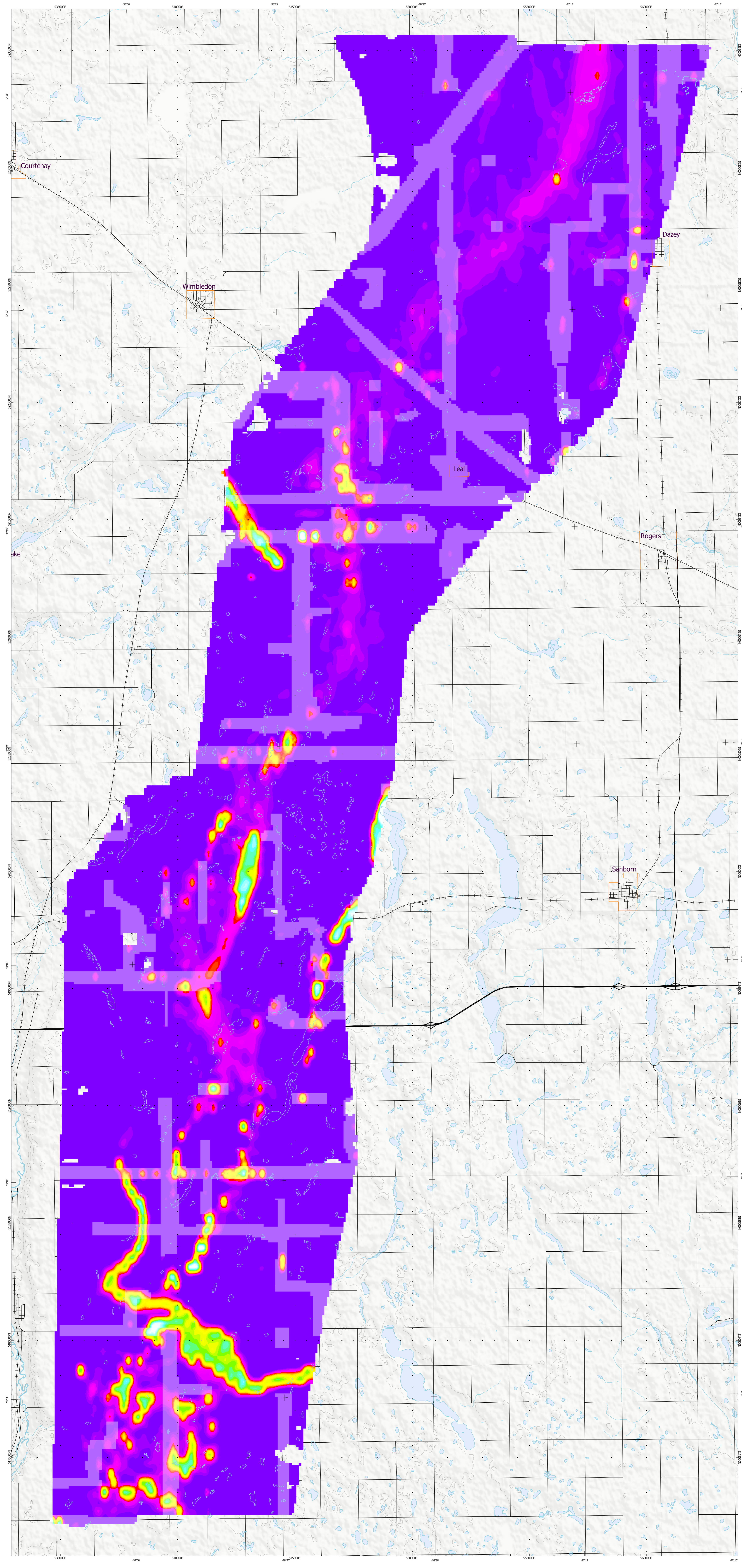
North Dakota State Water Commission
Spiritwood-JT
Jamestown, North Dakota
 Geotech VTEM System
Resistivity
Depth Slice 100 metres
 Flown and processed by Geotech Ltd.
 245 Industrial Parkway North,
 Aurora, Ontario, Canada L4G 4C4
 www.geotech.ca
 January 2017



SURVEY SPECIFICATIONS:
 Survey Date: October 4th - October 23rd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerospacelab Avator 300 B3 C-PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 500 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 Coaxial: Ro/Tx Coaxial
 X-Coil Diameter: 0.2m
 Z-Coil Diameter: 1.2m
 Y-Coil Diameter: 0.2m
 Transmitter Loop: Diameter 26 Metres
 Dipole Moment: 305,276 nA
 Transmitter Wave Form: Triangular Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Cesium 2 Magnetic Sensors
 Map Resolution: 0.02 m at 10 samples/m

MAP PROJECTION:
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722

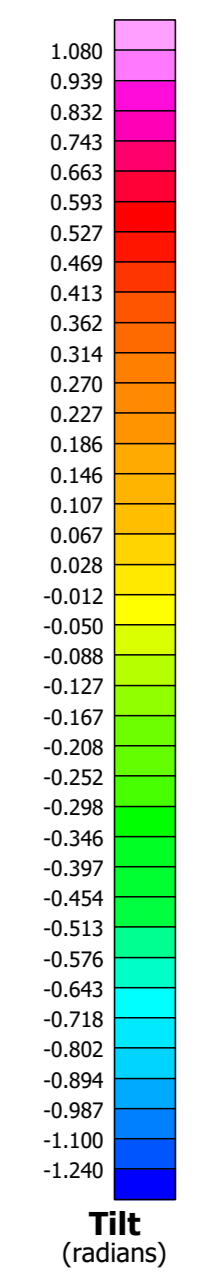
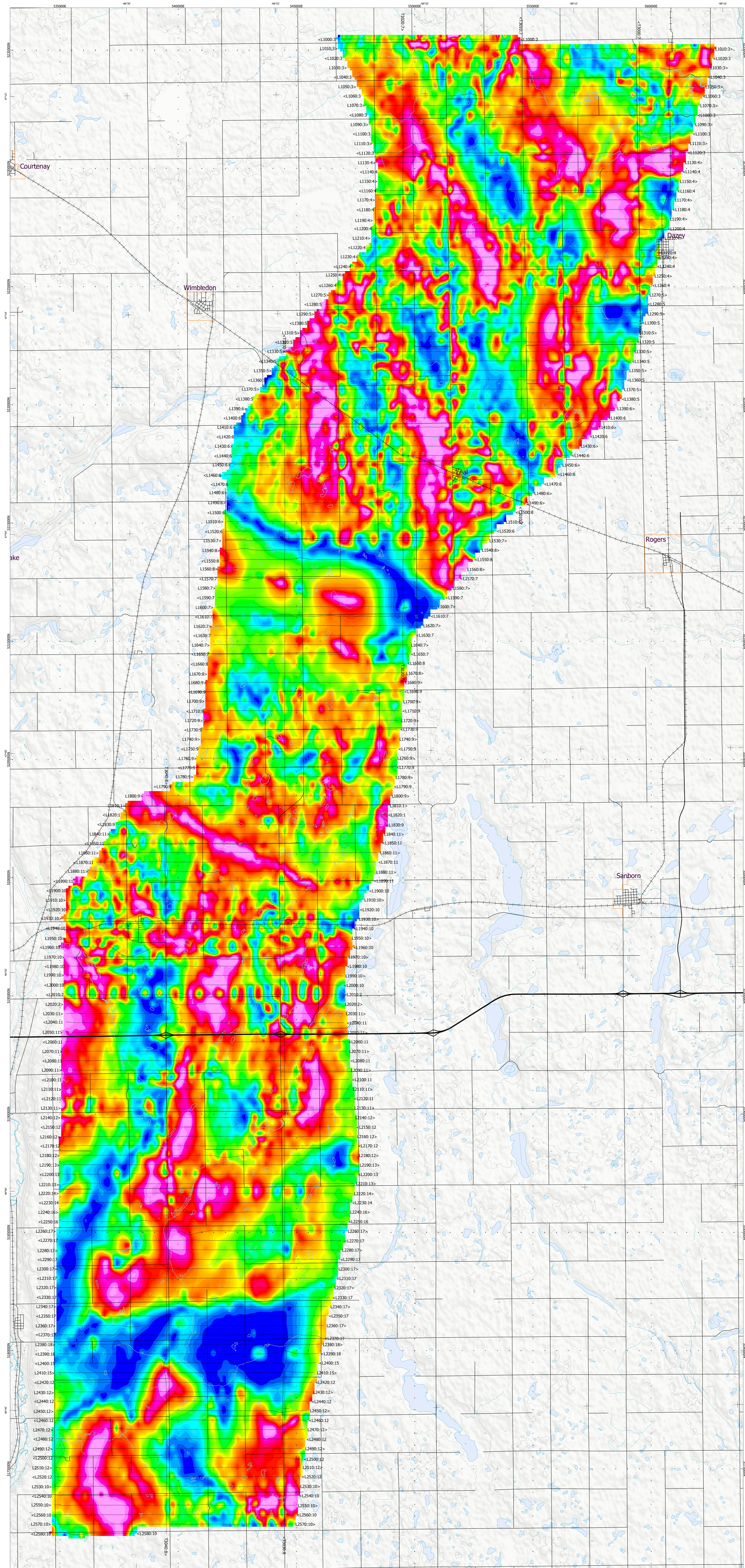


The topographic data have been derived from ND State Water Commission Data Portal
 Background shading derived from NADA 18791 (Digital Bathymetry Project) data
 Downloaded from Geocommons 1,250,000 Canadian National Topographic Database
 (www.geocommons.com/http://mapserver.osc.nd.gov)

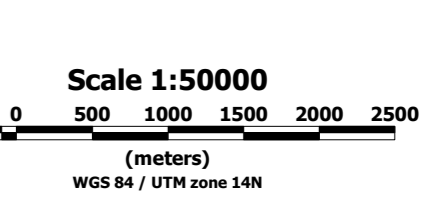
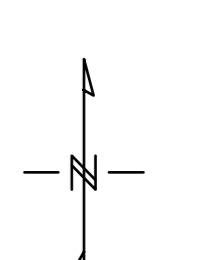


SURVEY SPECIFICATIONS
 Survey Date: October 18th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerogeoplate A-star 350 B3 C/PVTM
 Survey Line Spacing: 400 meters
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Meters
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 meters
 EM Transmitter Loop: Towed at an average terrain clearance of 31 meters below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 meters below the helicopter

INSTRUMENTS
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric Rx/Tx Geometry
 2-Coil Diameter 0.32m
 2-Coil Diameter 2.2m
 Y-Coil Diameter 0.32m
 Transmitter Loop Diameter 26 Meters
 Dipole Moment: 365,276 A/m²
 Transmitter Wave Form: Triangular, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geomatics High Sensitivity Cesium 2 Magnetic Sensors
 Map Resolution: 0.12 m at 10 sample/sec
MAP PROJECTION
 Datum: NAD83
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting Northing: 500,000/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:
 Roads
 Railways
 Streams / Rivers
 Contours
 Lakes / Ponds
 City Boundaries



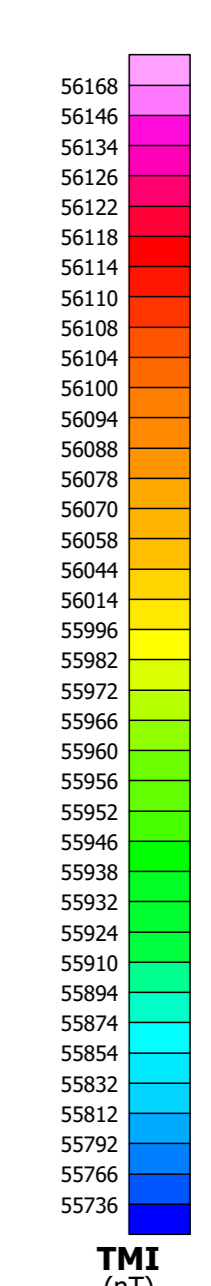
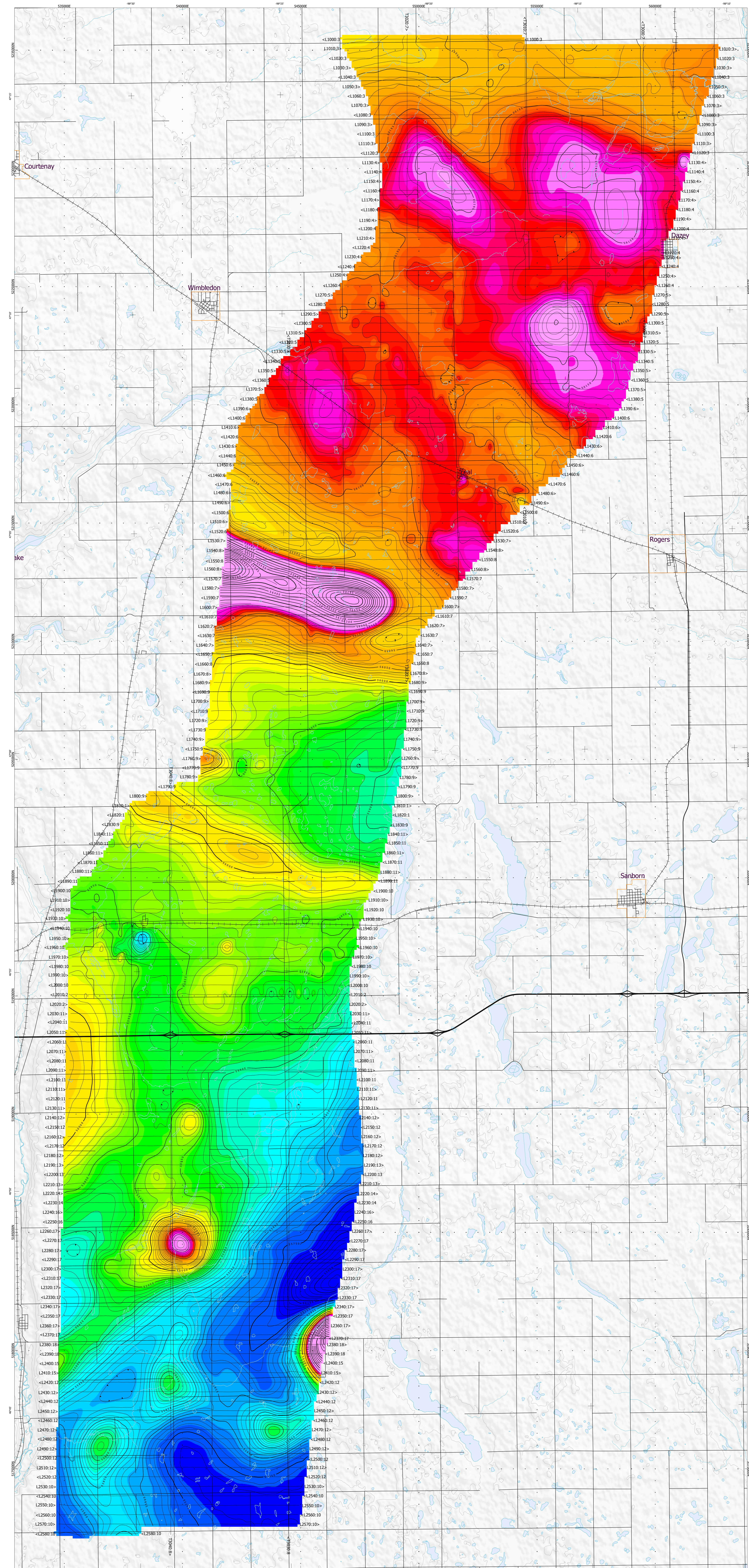
The topographic data base was derived from ND State Water Commission Data Portal. Bathymetric data is derived from NOAA/OPM Global Relief Topographic Feature data. Inset data derived from Geocommunities 1:250,000 Global Relief Topographic database (http://www.geocommunities.com/ftp/zip/geocomm_data.asp)

North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota
 Geotech VTEM System
 Magnetic Tilt-Angle Derivative
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 www.geotech.ca
 November 2016



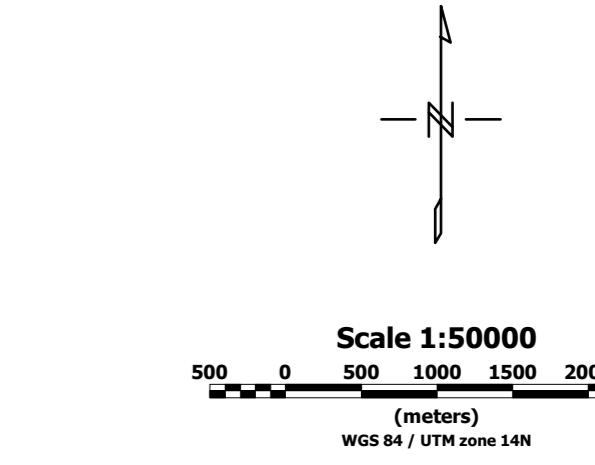
SURVEY SPECIFICATIONS:
 Survey Date: October 20th - October 22nd, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aerospaciale A-Star 350 B3 C/PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 31 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotech Time Domain Electromagnetic System (VTEM)
 Concentric Bu/Tx Geometry
 X-Coil Diameter 6.2m
 Z-Coil Diameter 2.2m
 Y-Coil Diameter 0.2m
 Transmitter Loop Diameter 26 Metres
 Dipole Moment: 365,276 A/m²
 Transmitter Wave Form: Triangoid, Pulse Width 7.17 ms, Base Frequency 30Hz
 Geometrics High Sensitivity Caesium 2 Magnetic Sensors
 Mag Resolution: 0.02 nT at 10 sample/sec
 MAP PROJECTION
 Datum: WGS84
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14W)
 Central Scale Factor: 0.9996
 False Easting/Starting: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TMI CONTOUR INTERVALS:
 10 nT
 50 nT
 250 nT

TOPOGRAPHIC LEGEND:
 Roads
 Railways
 Streams / Rivers
 Contours
 Lakes / Ponds
 City Boundaries



The topographic data base was derived from ND State Water Commission Open Portal Bathymetric and is derived from NOAA/USGS Hydrographic Survey data. Inset data derived from Geometrics 1:250,000 scale Canadian National Topographic database (www.geometrics.com/ftp/topographic/canada.asp)

North Dakota State Water Commission
 Spiritwood-JT
 Jamestown, North Dakota
 Geotech VTEM System
 Total Magnetic Intensity (TMI)

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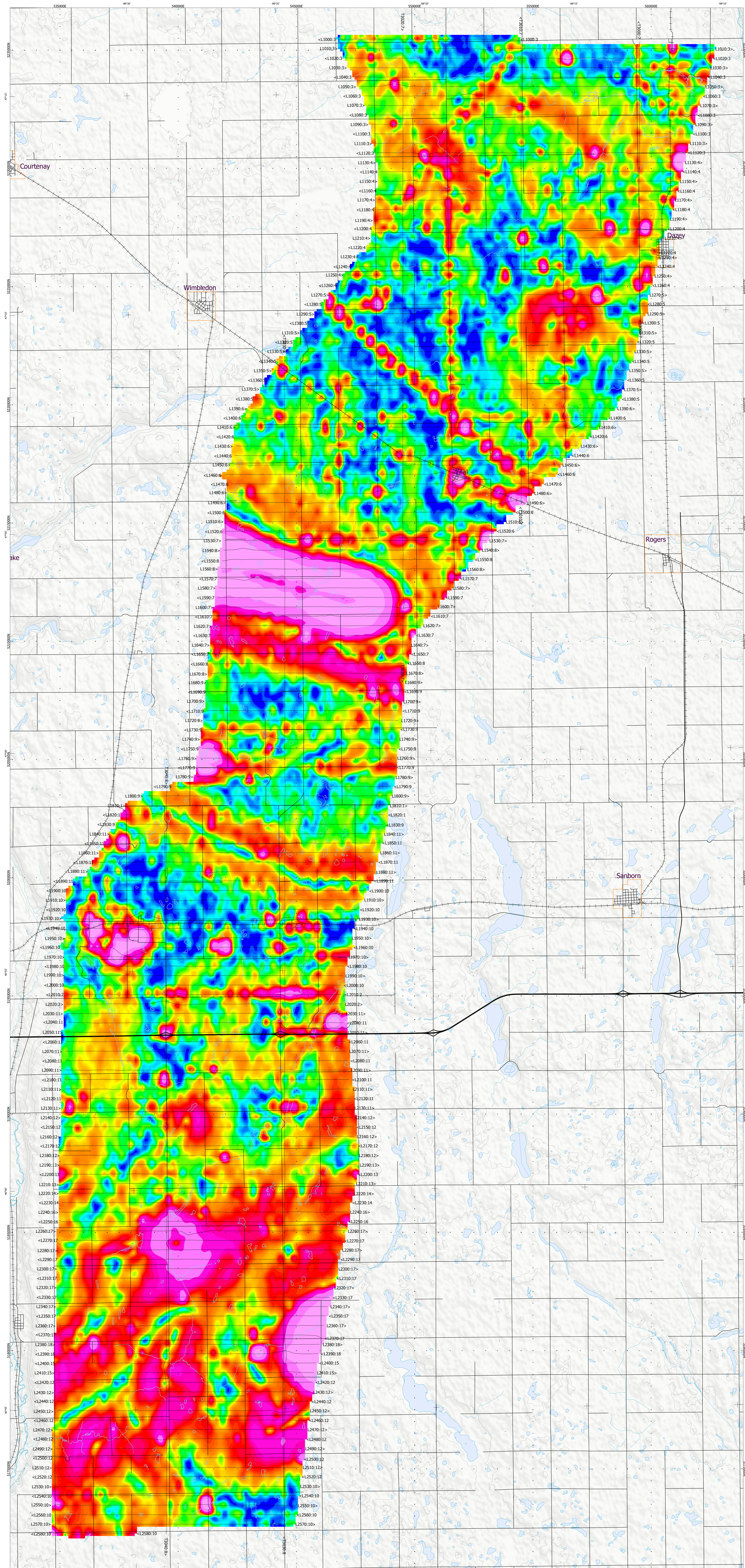
November 2016



SURVEY SPECIFICATIONS:
 Survey Date: October 24th - October 25th, 2016
 Survey Base: Jamestown, North Dakota
 Aircraft: Aeromagnetic A-Star 350 B3 C/PVTM
 Survey Line Spacing: 400 metres
 Survey Line Direction: N 90° E / N 270° E
 Tie Line Spacing: 5000 Metres
 Tie Line Direction: N 0° E / N 180° E
 Average Aircraft Terrain Clearance: 70 metres
 EM Transmitter Loop: Towed at an average terrain clearance of 21 metres below the helicopter
 2 Magnetic Sensors: Towed at an average terrain clearance of 21 metres below the helicopter

INSTRUMENTS:
 Geotek Time Domain Electromagnetic System (VTEM)
 Concentric Bu/Tx Geometry
 X-Coil Diameter 5.2m
 Z-Coil Diameter 1.2m
 Y-Coil Diameter 2.0m
 Transmitter Loop Diameter 26 Metres
 Dipole Moment: 365.276 nA
 Transmitter Wave Form: Trapezoid, Pulse Width 7.17 ms, Rise Frequency 30Hz
 Geomagnetics High Sensitivity Cesium 2 Magnetic Sensors
 Mag Resolution: 0.02 nT at 10 samples/sec

MAP PROJECTION:
 Datum: WGS84
 Projection: Universal Transverse Mercator
 Central Meridian: 99°W (Zone 14N)
 Central Scale Factor: 0.9996
 False Easting/Northing: 500,000m/0m
 Major Axis: 6378137
 Inverse Flattening: 298.25722



TOPOGRAPHIC LEGEND:

- Roads
- Railways
- Streams / Rivers
- Contours
- Lakes / Ponds
- City Boundaries



The topographic data base was derived from ND State Water Commission Open Portal Bathymetric data and is derived from the National Geographic Institute (NGI) data base. Inset data derived from Geotitles.com 1:250,000 Canadian National Topographic database (www.geotitles.com) (http://www.geotitles.com/eng/)

North Dakota State Water Commission
Spiritwood-JT
Jamestown, North Dakota
 Geotech VTEM System
Magnetic Total Gradient
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