

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Description of digital aeromagnetic data collected
north and west of Albuquerque, New Mexico

by

U. S. Geological Survey¹, with an Appendix by SIAL Geosciences, Inc.²

Open-File Report 97-286

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These data have been approved for release and publication by the Director of the USGS. Although these data have been subjected to rigorous review and are substantially complete, the USGS reserves the right to revise the data pursuant to further analysis and review. Furthermore, they are released on condition that neither the USGS nor the United States Government may be held liable for any damages resulting from its authorized or unauthorized use.

Digital files of the data (constructed for display purposes only) can be downloaded via 'anonymous ftp' from a USGS system named greenwood.cr.usgs.gov (136.177.21.122). The files are located in a directory named `/pub/open-file-reports/ofr-97-0286` and are described in an ASCII file named `readme.txt`. A web browser can access these files at <http://rmmcweb.cr.usgs.gov/public/mrgb/mrgbhome.html>. The original digital geophysical data (flight-line data and grids constructed by the contractor) can be obtained from the National Geophysical Data Center, Boulder, Colorado (http://www.ngdc.noaa.gov/seg/potfld/ad_sys.html).

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ABSTRACT

This report describes aeromagnetic data collected by SIAL Geosciences, Inc. for the U. S. Geological Survey north and west of Albuquerque, New Mexico. Aeromagnetic surveys were conducted in November and December, 1996 over two areas within the Middle Rio Grande Basin: (1) north and west of Albuquerque covering Rio Rancho and (2) west of Albuquerque. Digital files of the data (constructed for display purposes only) can be downloaded via 'anonymous ftp' from a USGS system named greenwood.cr.usgs.gov (136.177.21.122). The files are located in a directory named /pub/open-file-reports/ofr-97-0286 and are described in an ASCII file named [readme.txt](#). A web browser can access these files at <http://rmmcweb.cr.usgs.gov/public/mrgb/mrgbhome.html>. The original digital geophysical data (flight-line data and grids constructed by the contractor) can be obtained from the National Geophysical Data Center, Boulder, Colorado (http://www.ngdc.noaa.gov/seg/potfld/ad_sys.html).

DESCRIPTION OF DATA

This report describes aeromagnetic data collected by SIAL Geosciences, Inc. who were contracted by the U. S. Geological Survey to fly two areas within the Albuquerque Basin, which is contained within the Middle Rio Grande Basin: (1) north and west of Albuquerque, covering Rio Rancho (area A, fig. 1), and (2) west of Albuquerque (area B, fig. 1). Data acquisition for the surveys was completed in December, 1996; data were delivered April, 1997. The overall objective of these surveys, in conjunction with airborne electromagnetic surveys flown in March, 1997, is to improve the understanding of the geologic and hydrogeologic framework of the Middle Rio Grande Basin. This improved understanding will lead to refinements in the hydrologic model of the Basin.

The survey over the Rio Rancho area (area A, fig. 1) was flown along east-west lines spaced 100 m apart and at a nominal altitude of 100 m above ground level (AGL) except over urban areas, where altitudes increased to 150 m AGL. The survey over Albuquerque west (area B, fig. 1) was flown with lower resolution than the Rio Rancho survey, with 150-m spacing and heights 150 m AGL (300 m over urban areas). Further details of the flight surveys are included in Appendix A.

The flight-line data were projected from latitude/longitude coordinates to Universal Transverse Mercator coordinates (Zone 13; central meridian 105°W). The contractor leveled the flight-line data using four north-south tie lines spaced from 7 to 13 km apart (Appendix A). The leveled data were then gridded independently by the contractor and by the USGS using two somewhat different methods: the contractor used a bi-directional akima gridding algorithm and filtered the grid to reduce anomalies due to manmade structures (Appendix A), whereas the USGS used a minimum curvature algorithm (Webring, 1981) with no further filtering. All grids were constructed using a 50-m grid interval except for the contractor's grid for the Rio Rancho survey, which was constructed at 25-m interval. Color shaded-relief images of the USGS grids were generated by the computer program ERMMapper at both page size and at 1:100,000 scale. A

sun angle of 90° (east) and sun elevation of 35° above the horizon were used in the shaded-relief algorithm.

USGS grid files in Arc interchange format, digital images (constructed for display purposes only), and brief ASCII text (readme.txt) can be downloaded via 'anonymous ftp' from a USGS system named greenwood.cr.usgs.gov (136.177.21.122). The files are located in a directory named /pub/open-file-reports/ofr-97-0286 and are described in an ASCII file named readme.txt. A web browser can access these files at <http://rmmcweb.cr.usgs.gov/public/mrgb/mrgbhome.html>. The original digital geophysical data (flight-line data and grids constructed by the contractor) can be obtained from the National Geophysical Data Center, Boulder, Colorado (http://www.ngdc.noaa.gov/seg/potfld/ad_sys.html).

TABLE 1. FILE DESCRIPTIONS

FILE NAME	FILE TYPE	DESCRIPTION
-----grid files-----		
rrsmag.e00	Arc interchange file	ArcGrid of the Rio Rancho data (50-m grid interval) in interchange format for import to ArcInfo systems.
awsmag.e00	Arc interchange file	ArcGrid of the Albuquerque West data (50-m grid interval) in interchange format for import to ArcInfo systems.
---image files----		
rrsmag.tif	tagged image file format	Page size color shaded-relief image of the USGS Rio Rancho magnetic grid
awsmag.tif	tagged image file format	Page size color shaded-relief image of the USGS Albuquerque West magnetic grid
rrsmag.eps	encapsulated postscript file	1:100,000 scale color shaded-relief image of the USGS Rio Rancho magnetic grid.
awsmag.eps	encapsulated postscript file	1:100,000 scale color shaded-relief image of the USGS Albuquerque West magnetic grid.

rrsmag.pdf	portable document file (PDF) format	Color shaded-relief image of the USGS Rio Rancho magnetic grid at 100 dpi resolution
awsmag.pdf	portable document file (PDF) format	Color shaded-relief image of the USGS Albuquerque West magnetic grid at 100 dpi resolution
figure1.eps	encapsulated postscript file	Black and white image of figure 1 of the report (survey index map)
figure1.pdf	portable document file (PDF) format	Black and white image of figure 1 of the report (survey index map)
----text-----		
readme.txt	ASCII text	Text describing digital files (this table)
text.txt	ASCII text	A file containing the text of this report, without figure or Appendix A

ACKNOWLEDGEMENTS

We are very grateful to Sandia Pueblo for their permission to acquire data over their land and to Laguna Pueblo who allowed the plane to fly turns over their land. We are also thankful to the people of Albuquerque and surrounding communities for their tolerance during the low-level flying over their homes and businesses.

REFERENCES CITED

Webring, Michael, 1981, MINC: A gridding program based on minimum curvature: U. S. Geological Survey Open-File Report 81-1224, 41 p.

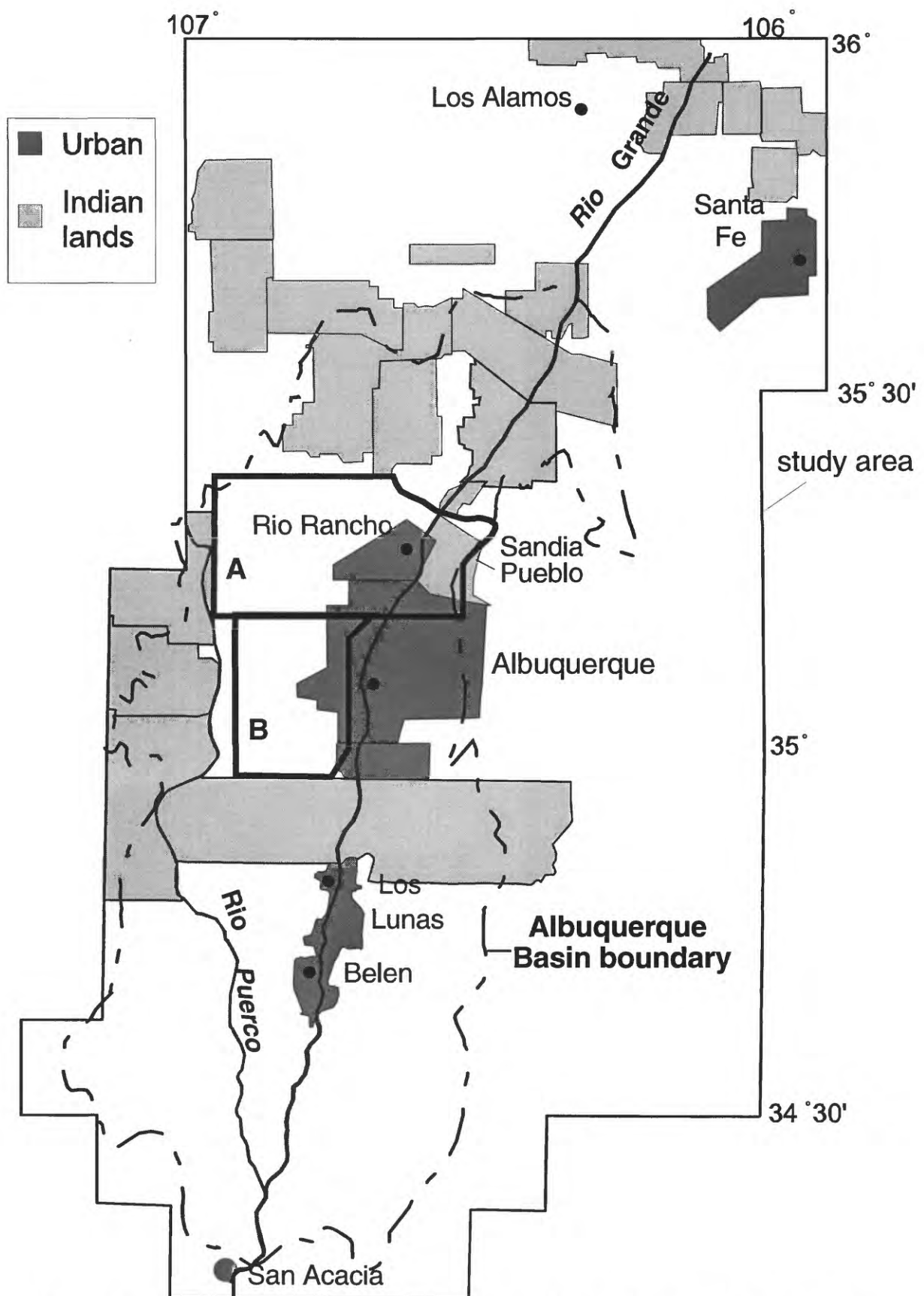


Figure 1. Location of Albuquerque Basin (part of Middle Rio Grande Basin) and airborne magnetic surveys flown in 1996: Rio Rancho area (A) and Albuquerque West area (B).

APPENDIX A
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

AEROMAGNETIC SURVEYS IN THE
ALBUQUERQUE AREA, NEW MEXICO
RFP 1434-CR-96-QQ-00390

OPERATIONAL REPORT

Project No. 96-A06-57

By

SIAL GEOSCIENCES INC.

April 1997



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**Figure 1: AEROMAGNETIC SURVEYS, ALBUQUERQUE AREA, NEW MEXICO,
BASE STATION LOCATION**

Annex A: Flight log - Area A - Rio Rancho

Annex B: Flight log - Area B - Albuquerque West

1.0 INTRODUCTION

This report describes the data acquisition and processing of a high sensitivity aeromagnetic airborne survey carried out for the United States Geological Survey (USGS) by SIAL Géosciences Inc, Montreal Canada. Survey flying commenced November 23, 1996 and was completed December 9, 1996. Final processed data, maps and the operational report were delivered at the beginning of April 1997.

The survey consisted of two areas in the vicinity of Albuquerque City, New Mexico:

Area A - Rio Rancho

- Line spacing: 100 m
- Line direction: east-west
- Control line direction: north-south
- Terrain clearance: 100 m
- Limits:

-106.9470°	35.1704°
-106.9470°	35.3775°
-106.6325°	35.3775°
-106.4798°	35.3023°
-106.5112°	35.2541°
-106.5112°	35.1704°

Highway 44 is the boundary between this point and the next.

Area B - Albuquerque West

- Line spacing: 150 m
- Line direction: east-west
- Control line direction: north-south
- Terrain clearance: 150 m
- Limits:

-106.8960°	34.9569°
-106.8960°	35.1796°
-106.6732°	35.1796°
-106.7100°	35.1411°
-106.7100°	34.9934°
-106.7483°	34.9569°

Indian Reservation boundary

2.0 RESULTS OF THE COMPENSATION TEST FLIGHTS

A compensation test flight was carried out, November 24, 1996.

		AMPLITUDE*	
DIRECTION	MANOEUVER	UNCOMPENSATED MAGNETIC FIELD	COMPENSATED MAGNETIC FIELD
North	Pitches	1.49	0.280
	Rolls	0.55	0.169
	Yaws	0.82	0.007
West	Pitches	0.33	0.105
	Rolls	0.13	0.079
	Yaws	0.30	0.059
South	Pitches	1.69	0.24
	Rolls	1.21	0.36
	Yaws	0.56	0.49
East	Pitches	0.63	0.326
	Rolls	1.14	0.09
	Yaws	0.65	0.07

- * The amplitude was calculated after applying a highpass filter with cutt off of 6 fiducials.

Uncompensated FOM = 9.5

Compensated FOM = 2.275

3.0 EQUIPMENT USED

3.1 Airplane

The survey aircraft was Piper Navajo 310, registration C-FYTT. The aircraft was equipped with a magnetometer stinger and was specifically modified to reduce noise due to magnetic components and electrical currents at the magnetic sensor located in the stinger.

3.2 Magnetometers

3.2.1 Aircraft magnetometer

GEOMETRICS G822A Cesium split-beam total field magnetic sensor was used, with the following specifications:

- Inflight Sensitivity: 0.001nT
- Heading error: 0.25 nT
- Gradient tolerance: 10000 nT/m
- Noise envelope: <0.5nT
- Sampling interval: 0.1 sec.

3.2.2 Ground magnetometer

A GEM GSM-19 overhauser portable magnetometer, located at the base station, was used to monitor the fluctuations in the earth's magnetic field. The earth's magnetic field was measured every 3 seconds to record the diurnal activity. Data were recovered daily and the diurnal corrections were computed and applied to the survey data on-site in order to produce preliminary maps for quality control. The base station was located within 40 km of all survey points in Areas A and B, in an area of low magnetic gradient and free of cultural interference. The base station location for areas A and B is shown on Figure 1.

AEROMAGNETIC SURVEYS
ALBUQUERQUE AREA, NEW MEXICO
BASE STATION LOCATION

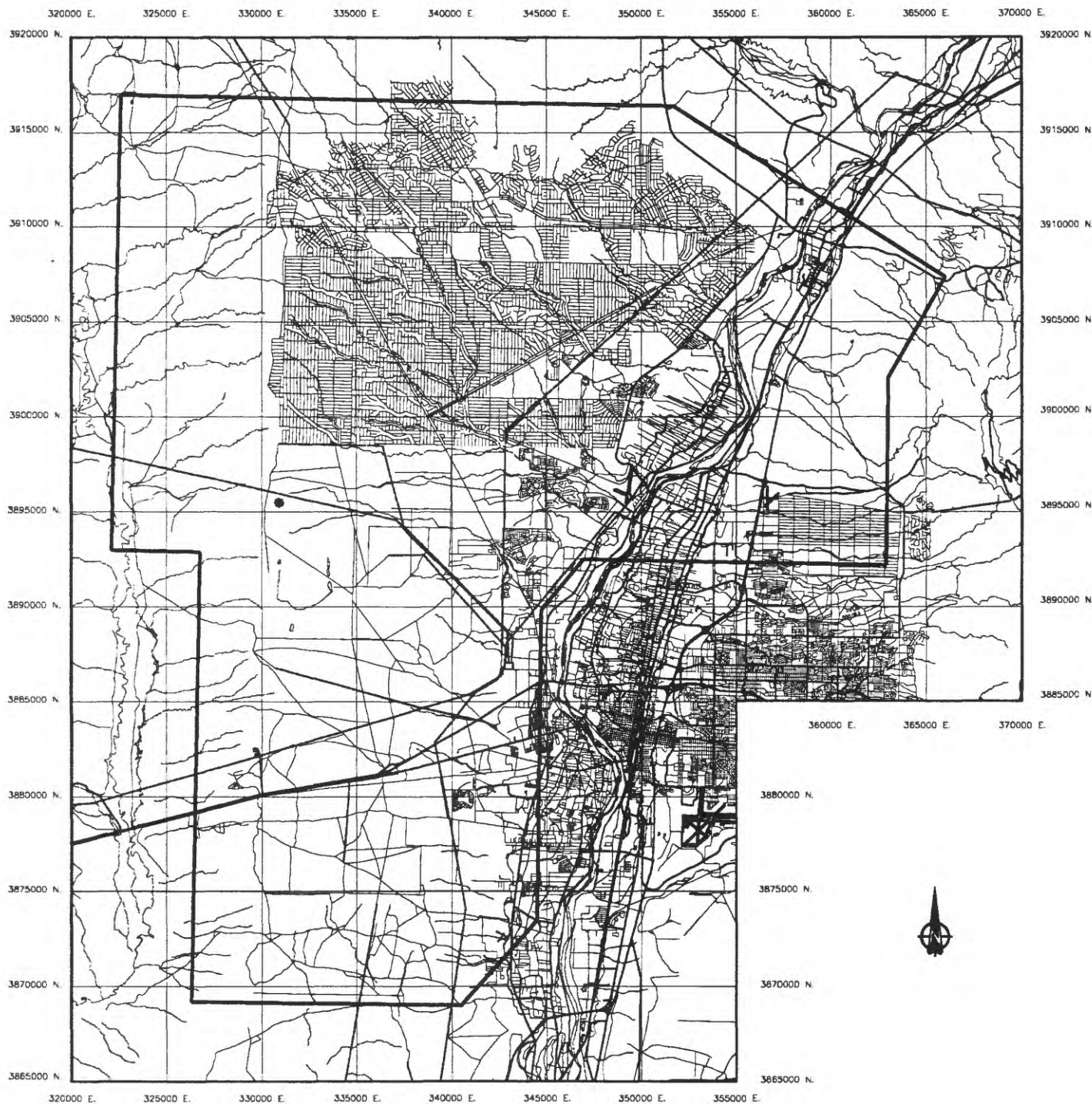


FIG - 1 -

The magnetic datum used for the ground station was: 51147.00 nT.

3.3 Positioning system

In flight positioning was sampled at a rate of 1 hertz using a TRIMBLE-4000SE real-time differential GPS system in conjunction with PICODAS PNAV-2001 navigation console. The system enables data to be positioned to an absolute accuracy better than 10 meters. The system used a mobile receiver in the airplane and a reference receiver, located at the base station.

Terrain clearance was sampled each second, using a King KRA 10A radar altimeter and a ROSEMOUNT barometric altimeter. The radar altimeter recorded the ground clearance to an accuracy of 1 meter.

3.4 Ancillary equipment

Digital data were acquired using a PDAS 1000 data acquisition system and were recorded on the hard-disk system every 0.1 second.

A Panasonic colour video camera and cassette recorder operating in NTSC format recorded the flight-path terrain beneath the airplane. Line numbers, fiducial and raw GPS X and Y were superimposed on the video recording.

4.0 DATA PROCESSING

4.1 Flightpath

Flight path was recovered from the differential GPS X and Y data. It was verified daily in the field to enable reflights to be called where needed.

4.2 Data compilation procedures

Both field and office systems use GEOSOFT software for data processing. In the field, the total magnetic field profiles were verified daily. Diurnal subtraction was carried out as a preliminary levelling stage, using an average base of 51147 nT. Lines flown when diurnal variations exceeded the contract specifications were automatically selected as reflights.

At the office, the lag error and the heading error were removed from the entire data set. Levelling was carried out by the standard process of fitting a low order curve to the control lines and traverses in an iterative fashion until no further improvement could be obtained. However the low altitude of flight and close line spacing, amplified errors due to small difference in altitude and position particularly over areas of cultural build up, thus, extensive manually edited adjustments were required at the intersections during the above control line corrections. To remove noise (less than 2 nT) in the area of low gradient the following procedure was used. A Hanning filter was applied to the grid to remove low amplitude noise (as seen in the calculated vertical gradient) and the difference between the original and the filtered grid was limited to 2 nT, interpolated, filtered with a low pass filter and subtracted from the total field profiles which were then regridded. This procedure had the desired effect of removing small amplitude noise due to culture, without truncation of geological anomalies.

The data were gridded using the bi-directional akima gridding algorithm supplied in the GEOSOFT software, with a grid spacing of 25 m and 50 m for the areas A and B respectively. This technique was used in order to avoid undesirable highs or lows in the final grid such as the minimum curvature technique may produce in areas of rapid changes in gradient. Due to the fact that the akima spline method tends to produce harper corners around actual data points and the resulting grid tends to be noisier, an additional hanning filter was applied to the final grid. Finally, the International

Geomagnetic Reference Field 1995 was remove from the total magnetic field. The igrf values was computed at the locations and elevations of the observed data points.

5.0 SURVEY PRODUCTS

The following products were delivered:

- Video tapes
- Operational report
- Flight path map (1:50000)
- Original digital recording of the diurnal magnetic field from the ground magnetometer, on CD-rom.
- Digital Grid Archives Geosoft format, on CD-Rom:
 - total magnetic field
 - residual magnetic field
 - radar altimeter
- Digital profiles in XYZ GEOSOFT format including:
 - Line: line numbers*
 - Fid: sample (fiducial) number
 - Flight: flight number
 - Date: year and julian date
 - Time: UTC time (HHMMSS)
 - GPSX: coordinates - UTM (m)
 - GPSY: coordinates - UTM (m)
 - Latitude: coordinates - latitude (degree)
 - Longitude: coordinates - longitude (degree)
 - GPSZ: barometric altimeter (m)

- Altrm: radar altimeter (m)
- Umago: uncompensated mag (nT)
- Mago: compensated original mag (nT)
- Baseb: diurnal recording (nT)
- Drift: diurnal correction (nT)
- Magf: levelled mag (nT)
- Magigrf: residual mag (nT)

* The following nomenclature was used to know the direction in which the line was flown:

	Lines and Control lines	Reflights
North	...10	...50
South	...20	...60
East	...30	...70
West	...40	...80


 Josée Potvin, P. Eng.
 geophysicist

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A1
CLIENT: USGS	DATE: 1996/11/30
SITE: Rio Rancho	START TIME: 14:16:00
AIRPORT: Double Eagle II	STOP TIME: 15:12:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem3011.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A2
CLIENT: USGS	DATE: 1996/12/01
SITE: Rio Rancho	START TIME: 8:24:00
AIRPORT: Double Eagle II	STOP TIME: 12:06:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0112.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
13530	1	477	L	Scrub
13440	500	1027	L	
13330	1057	1569	L	
13240	1588	2174	L	
13130	2192	2700	L	
13040	2723	3243	L	
12930	3264	3760	L	
12840	3782	4297	L	
12730	4331	4812	L	
12640	4824	5329	L	
12530	5386	5877	L	
12440	5900	6396	L	
12330	6420	6892	L	
12240	6928	7432	L	
12130	7455	7932	L	Cultural feature (≈ fid 7620)
12040	7980	8479	L	Included line 12041
11930	8519	9009	L	Turbulence (fids 8750 to 9006)
11840	9033	9539	L	
11730	9555	10037	L	
11640	10064	10564	L	
11530	10606	11095	L	
11440	11145	11637	L	

NOTES: - East end: mountain

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A3
CLIENT: USGS	DATE: 1996/12/01
SITE: Rio Rancho	START TIME: 13:27:00
AIRPORT: Double Eagle II	STOP TIME: 14:51:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0112.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A4
CLIENT: USGS	DATE: 1996/12/02
SITE: Rio Rancho	START TIME: 11:55:00
AIRPORT: Double Eagle II	STOP TIME: 16:16:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0212.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
13630	1	532	L	
13740	542	1113	L	
13830	1137	1645	L	Included line 13831
13940	1720	2313	L	
14030	2335	2863	L	
14140	2874	3487	L	
14230	3503	4023	L	
14340	4043	4632	L	
14430	4651	5164	L	
14540	5188	5781	L	
14630	5791	6326	L	
14740	6354	6946	L	
14830	6966	7493	L	
14940	7502	8108	L	
15030	8132	8653	L	
15140	8666	9235	L	
15230	9266	9780	L	
15340	9808	10390	L	
15430	10418	10906	L	
15540	10932	11496	L	
15630	11520	12006	L	
15740	12039	12600	L	
15830	12641	13162	L	
15940	13181	13784	L	

NOTES:



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico

FLIGHT: A5

CLIENT: USGS

DATE: 1996/12/03

SITE: Rio Rancho

START TIME: 10:27:00

AIRPORT: Double Eagle II

STOP TIME: 14:13:00

AIRCRAFT: Piper Navajo 310, C-FYTT

PILOTE: Ashley Hering

BASE STATION FILE: gem0312.dat

OPERATOR: Christian Barabas

LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
10530	1	503	L	
10440	556	1016	L	
10330	1060	1557	L	
10240	1570	2078	L	
10130	2121	2622	L	
10040	2643	3131	L	
9930	3143	3634	L	
9840	3683	4163	L	
9730	4183	4662	L	
9640	4676	5148	L	
9530	5167	5644	L	
9440	5656	6135	L	
9330	6169	6641	L	
9240	6651	7133	L	
9130	7162	7635	L	
9040	7655	8135	L	
8930	8144	8618	L	
8840	8631	9115	L	
8730	9142	9610	L	Cultural feature (≈ fid 9256)
8640	9678	10162	L	
8530	10193	10663	L	
8440	10681	11174	L	
8330	11199	11709	L	
8240	--	--	L	Scrub

NOTES: - East end : mountain

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A6
CLIENT: USGS	DATE: 1996/12/04
SITE: Rio Rancho	START TIME: 9:24:00
AIRPORT: Double Eagle II	STOP TIME: 13:19:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0412.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
140	1	540	L	
230	551	1078	L	
340	1092	1588	L	
430	1600	2099	L	
540	2107	2747	L	
630	2754	3257	L	
740	3266	3761	L	
830	3771	4292	L	
940	4303	4798	L	
1030	4807	5336	L	
1140	5347	5831	L	
1230	5838	6334	L	
1340	6347	6823	L	
1430	6855	7346	L	
1540	7360	7862	L	
1630	--	--	L	Scrub - offset
1630	7949	8455	L	
1740	8466	8968	L	
1830	8983	9643	L	Traffic (fids 9360 to 9480) Included line 1831
1940	9652	10175	L	
2030	10192	10877	L	Traffic (fids 10590 to 10740)
2140	10894	11459	L	

NOTES: - 500 ft over congested areas
- Spikes radio tower



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A7
CLIENT: USGS	DATE: 1996/12/04
SITE: Rio Rancho	START TIME: 14:22:00
AIRPORT: Double Eagle II	STOP TIME: 16:42:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0412.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A8
CLIENT: USGS	DATE: 1996/12/05
SITE: Rio Rancho	START TIME: 8:38:00
AIRPORT: Double Eagle II	STOP TIME: 12:41:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0512.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
3540	1	494	L	
3630	522	1005	L	
3740	1018	1493	L	
3830	1503	1982	L	
3940	1997	2470	L	
4030	2479	2960	L	
4140	2971	3446	L	
4230	3459	3947	L	
4340	3956	4428	L	
4430	4436	4914	L	
4540	4922	5395	L	
4630	5408	5895	L	
4740	5907	6380	L	
4830	6392	6880	L	
4940	6892	7371	L	
5030	7379	7863	L	
5140	7872	8343	L	
5230	8353	8821	L	
5340	8830	9307	L	
5430	9319	9806	L	
5540	9816	10298	L	
5630	10311	10800	L	
5740	10811	11288	L	
5830	11299	11798	L	
5940	11813	12288	L	

NOTES: - 500 ft over congested areas



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A9
CLIENT: USGS	DATE: 1996/12/05
SITE: Rio Rancho	START TIME: 13:35:00
AIRPORT: Double Eagle II	STOP TIME: 16:27:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0512.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

NOTES: - East end: mountain
- 500 ft over congested areas

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A10
CLIENT: USGS	DATE: 1996/12/06
SITE: Rio Rancho	START TIME: 8:08:00
AIRPORT: Double Eagle II	STOP TIME: 11:59:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0612.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
6630	1	471	L	Scrub
6540	--	--	L	Scrub
6540	532	1017	L	
6430	1039	1496	L	Cultural feature (≈ fid 1350)
6340	1509	2010	L	
6230	2024	2482	L	
6140	2491	2989	L	Scrub
6030	--	--	L	Scrub
6030	3082	3542	L	
16040	3596	4142	L	
16130	4172	4687	L	Included line 16131
16240	4710	5291	L	
16330	5305	5769	L	
16440	5786	6381	L	
16530	6395	6883	L	
16640	6900	7486	L	
16730	7514	7985	L	
16840	8007	8556	L	
16930	8567	9038	L	
17040	9049	9586	L	
17130	9613	10093	L	
17240	10104	10640	L	
17330	10662	11118	L	
17440	11131	11727	L	

NOTES: - East end: mountain
- 500 ft over congested areas



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A11
CLIENT: USGS	DATE: 1996/12/07
SITE: Rio Rancho	START TIME: 8:17:00
AIRPORT: Double Eagle II	STOP TIME: 11:57:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0712.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
17530	1	436	L	
17640	447	939	L	
17730	948	1398	L	
17840	1410	1901	L	
17930	1912	2385	L	
18040	2395	2900	L	
18130	2910	3350	L	
18240	3368	3860	L	
18330	3870	4301	L	
18440	4317	4797	L	
18530	4813	5242	L	
18640	5252	5735	L	
18730	5754	6198	L	
18840	6212	6683	L	
18930	6695	7126	L	
19040	7138	7620	L	
19130	7632	8075	L	
19240	8084	8590	L	
19330	8603	9034	L	
19440	9045	9559	L	
19530	9579	9985	L	
19640	10000	10485	L	
19730	10501	10914	L	
19840	10924	11417	L	

NOTES: - 500 ft over congested areas



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A12
CLIENT: USGS	DATE: 1996/12/08
SITE: Rio Rancho	START TIME: 8:28:00
AIRPORT: Double Eagle II	STOP TIME: 11:56:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0812.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
19930	1	386	L	
20040	396	815	L	
20130	834	1217	L	
20240	1228	1641	L	
20330	1654	2062	L	
20440	2075	2503	L	
20530	2516	2927	L	
20640	2937	3338	L	
20730	3349	3729	L	
20840	3739	4128	L	
20930	4150	4527	L	
21040	4546	4967	L	
21130	4977	5352	L	
21240	5370	5803	L	
21330	5826	6198	L	
21440	6248	6623	L	
21530	6637	7003	L	
21640	7014	7418	L	
21730	7429	7788	L	
21840	7800	8184	L	
21930	8210	8568	L	
22040	8581	8947	L	
22130	8961	9311	L	
22240	9326	9691	L	

NOTES:



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico

FLIGHT: A13

CLIENT: USGS

DATE: 1996/12/08

SITE: Rio Rancho

START TIME: 13:00:00

AIRPORT: Double Eagle II

STOP TIME: 16:18:00

AIRCRAFT: Piper Navajo 310, C-FYTT

PILOTE: Ashley Hering

BASE STATION FILE: gem0812.dat

OPERATOR: Christian Barabas

LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
22340	1	390	L	
22430	401	761	L	
22540	779	1147	L	
22630	1158	1514	L	
22740	1525	1890	L	
22830	1902	2251	L	
22940	2263	2640	L	
23030	2652	2993	L	
23140	3003	3353	L	
23230	3366	3705	L	
23340	3719	4066	L	
23430	4080	4425	L	
23540	4447	4794	L	
23630	4831	5166	L	
23580	5183	5535	L	Scrub (old line 23740)
23730	5548	5875	L	
8680	6057	6527	Reflight	
9470	6557	6803	Reflight	
8870	6815	7031	Reflight	
8480	7047	7202	Reflight	
8380	7205	7520	Reflight	
8230	7574	8033	L	
8180	8059	8524	Reflight	
8070	8537	8996	Reflight	
7780	9022	9493	Reflight	

NOTES: - 500 ft over congested areas (reflights)



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A14
CLIENT: USGS	DATE: 1996/12/09
SITE: Rio Rancho	START TIME: 8:40:00
AIRPORT: Double Eagle II	STOP TIME: 12:29:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0912.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
2080	1	488	Reflight	
370	509	1003	Reflight	
680	--	--	Reflight	Scrub - offset
680	1051	1533	Reflight	
870	1548	2045	Reflight	
1680	--	--	Reflight	Scrub - offset
1680	2149	2380	Reflight	
1770	2391	2675	Reflight	
2380	2687	2987	Reflight	Scrub
2180	2990	3165	Reflight	
3370	3174	3653	Reflight	Included line 3371
3580	3666	4130	Reflight	
4370	4141	4312	Reflight	
4670	4315	4623	Reflight	
4880	4633	5112	Reflight	
5570	5123	5612	Reflight	
5980	5626	5864	Reflight	
6570	5881	6137	Reflight	
6180	6150	6636	Reflight	
7470	6670	7148	Reflight	
8580	7176	7649	Reflight	Scrub
10870	7663	8168	Reflight	
10980	8173	8657	Reflight	
11170	8675	8936	Reflight	
11280	8944	9239	Reflight	
11470	9254	9628	Reflight	
11780	9642	9882	Reflight	
11880	9885	10042	Reflight	
11970	10054	10233	Reflight	
11870	10236	10545	Reflight	
12080	10558	11070	Reflight	

NOTES: - 500 ft over congested areas



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area A - Rio Rancho, New Mexico	FLIGHT: A15
CLIENT: USGS	DATE: 1996/12/09
SITE: Rio Rancho	START TIME: 13:37:00
AIRPORT: Double Eagle II	STOP TIME: 16:43:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0912.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
95110	1	334	CL	
95020	372	678	CL	
95410	704	985	CL	
95220	1028	1341	CL	
95310	1360	1561	CL	
95520	1601	1741	CL	
13580	--	--	Reflight	Scrub
13580	1802	2335	Reflight	
13870	2347	2710	Reflight	
16180	2779	3089	Reflight	
14780	3231	3422	Reflight	
13970	3445	3961	Reflight	
14680	3973	4502	Reflight	Included line 14681
18570	4525	4960	Reflight	
18680	4968	5197	Reflight	
18980	5200	5438	Reflight	
19170	5451	5891	Reflight	
21480	5927	6353	Reflight	Scrub
19870	6371	6595	Reflight	
20180	6612	6857	Reflight	
21570	6921	7298	Reflight	
22780	7311	7539	Reflight	
22970	7556	7759	Reflight	
22480	7775	8175	Reflight	
23870	8207	8391	Reflight	
22870	8413	8655	Reflight	

NOTES: - 500 ft over congested areas



FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B1
CLIENT: USGS	DATE: 1996/11/24
SITE: Rio Rancho	START TIME: 15:12:00
AIRPORT: Double Eagle II	STOP TIME: 16:52:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem2411.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

NOTES: - 1000 ft over congested areas
- Spikes radio tower

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B2
CLIENT: USGS	DATE: 1996/11/26
SITE: Rio Rancho	START TIME: 10:33:00
AIRPORT: Double Eagle II	STOP TIME: 11:42:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem2611.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

NOTES: - 1000 ft over congested areas
- Spikes radio tower

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B3
CLIENT: USGS	DATE: 1996/11/26
SITE: Rio Rancho	START TIME: 13:06:00
AIRPORT: Double Eagle II	STOP TIME: 14:41:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem2611.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

[illegible]

NOTES: - 1000 ft over congested areas
- Spikes radio tower

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B4
CLIENT: USGS	DATE: 1996/12/07
SITE: Rio Rancho	START TIME: 12:59:00
AIRPORT: Double Eagle II	STOP TIME: 16:47:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem0712.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
430	1	217	L	
540	237	451	L	
630	459	640	L	
740	650	844	L	
830	852	1041	L	
940	1051	1248	L	
1030	1261	1460	L	
1140	1468	1681	L	Scrub
1230	1689	1884	L	
1340	1899	2128	L	
1430	2142	2370	L	
1540	2383	2636	L	
1630	2660	2882	L	
1740	2892	3110	L	
1830	3120	3321	L	Scrub
1940	3329	3550	L	
2030	3563	3767	L	
2140	3777	4001	L	
2230	4015	4219	L	
2340	4229	4449	L	
2430	4459	4669	L	
2540	4680	4919	L	
2630	4950	5158	L	
2740	5169	5428	L	
2830	5450	5663	L	
2940	5672	5905	L	
3030	5919	6136	L	
3140	6147	6393	L	
3230	6406	6634	L	
3340	6647	6887	L	
3430	6905	7124	L	



3540	7137	7366	L	
3630	7380	7597	L	
3740	7631	7864	L	
3830	7881	8108	L	
3940	8126	8362	L	
4030	8375	8598	L	
4140	8613	8875	L	Scrub Cultural feature ($\approx$ fid 8808)
4230	8902	9115	L	Cultural feature ($\approx$ fid 8940)
4340	9134	9367	L	
4430	9380	9602	L	
4540	9615	9844	L	
4630	9857	10079	L	
4740	10093	10349	L	
NOTES: - Spikes radio tower				

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B5
CLIENT: USGS	DATE: 1996/12/10
SITE: Rio Rancho	START TIME: 8:29:00
AIRPORT: Double Eagle II	STOP TIME: 12:30:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem1012.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
14530	1	245	L	
14440	257	561	L	
14330	575	793	L	
14240	804	1104	L	
14130	--	--	L	Scrub - traffic
14130	1313	1526	L	
14040	1542	1840	L	
13930	1854	2057	L	
13840	2072	2502	L	Traffic (fids 2205 to 2300)
13730	2519	2725	L	
13640	2741	3040	L	
13530	3052	3263	L	
13440	3358	3635	L	
13330	3646	3872	L	
13240	3886	4198	L	
13130	--	--	L	Scrub
13130	4255	4454	L	
13040	4470	4761	L	
12930	4787	4991	L	
12840	5006	5318	L	
12730	5334	5538	L	Scrub
12640	5554	5905	L	
12530	5917	6120	L	
12440	6140	6489	L	
12330	6507	6724	L	
12240	6739	7124	L	
12130	7138	7335	L	
12040	7346	7691	L	
11930	7700	7918	L	
11840	7927	8269	L	
11730	8285	8495	L	



11640	8512	8844	L	
11530	8856	9071	L	
11440	9082	9409	L	
11330	9421	9610	L	
11240	9624	9922	L	
11130	9936	10140	L	
11040	10158	10469	L	
10930	10483	10684	L	
10840	10702	10996	L	
NOTES: - Spikes radio tower				

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B6
CLIENT: USGS	DATE: 1996/12/10
SITE: Rio Rancho	START TIME: 13:40:00
AIRPORT: Double Eagle II	STOP TIME: 16:41:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem1012.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
4830	1	210	L	
4940	223	517	L	
5030	525	747	L	
5140	760	1045	L	
5230	1059	1264	L	
5340	1273	1567	L	
5430	1577	1789	L	
5540	1797	2075	L	
5630	2089	2288	L	
5740	2300	2566	L	
5830	2581	2784	L	
5940	2799	3085	L	
6030	3097	3307	L	
6140	3318	3604	L	
6230	3620	3828	L	
6340	3838	4117	L	
6430	4138	4342	L	
6540	4351	4612	L	
6630	4622	4829	L	
6740	4842	5116	L	
6830	5129	5340	L	
6940	5354	5634	L	
7030	--	--	L	Scrub
7030	5760	5966	L	
7140	5978	6257	L	
7230	6274	6468	L	
7340	6482	6738	L	
7430	6752	6963	L	
7540	6982	7238	L	
7630	7265	7464	L	
7740	7482	7743	L	



7830	7758	7955	L	
7940	7968	8251	L	
NOTES: - Spikes radio tower				

FLIGHT LOG

SIAL GÉOSCIENCES INC.

PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B7
CLIENT: USGS	DATE: 1996/12/11
SITE: Rio Rancho	START TIME: 14:15:00
AIRPORT: Double Eagle II	STOP TIME: 16:41:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem1112.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
9230	1	214	L	
9340	223	485	L	
9430	496	711	L	
9540	719	982	L	
9630	994	1203	L	
9740	1213	1485	L	Scrub
9830	--	--	L	Scrub - offset
9830	1583	1777	L	
9940	1793	2044	L	
10030	2062	2265	L	
10140	2278	2514	L	
10230	2527	2743	L	
10340	2767	3004	L	
10430	3020	3226	L	
10540	3239	3475	L	
10630	3487	3708	L	
10740	3727	3970	L	
1170	--	--	Reflight	Scrub - offset
1170	4189	4371	Reflight	
780	4401	4514	Reflight	
1270	4528	4638	Reflight	
1380	4645	4872	Reflight	
1870	4884	5074	Reflight	
3080	5088	5347	Reflight	
95010	5472	5810	CL	
95120	5827	6122	CL	
95410	6136	6228	CL	
95310	6243	6516	CL	
NOTES: - Spikes radio tower				



FLIGHT LOG

SIAL GÉOSCIENCES INC.

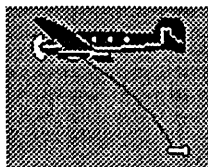
PROJECT: Area B - Albuquerque , New Mexico	FLIGHT: B8
CLIENT: USGS	DATE: 1996/12/12
SITE: Rio Rancho	START TIME: 10:56:00
AIRPORT: Double Eagle II	STOP TIME: 13:30:00
AIRCRAFT: Piper Navajo 310, C-FYTT	
PILOTE: Ashley Hering	BASE STATION FILE: gem1212.dat
OPERATOR: Christian Barabas	LOCATION: 35°11'11", -106°51'02"

LINE NUMBER	START FID	STOP FID	TYPE	COMMENTS
16870	1	462	Reflight	Scrub
16280	530	812	Reflight	
15170	832	954	Reflight	
15070	957	1079	Reflight	
15280	1123	1327	Reflight	
14970	1340	1527	Reflight	
14880	1535	1792	Reflight	
14770	1802	1939	Reflight	
14680	2008	2171	Reflight	
13570	2180	2477	Reflight	Included line 13571
13480	2487	2746	Reflight	
12870	2834	3064	Reflight	
12780	3070	3333	Reflight	
12670	3346	3464	Reflight	
11270	3478	3577	Reflight	Scrub
11080	3590	3770	Reflight	
10870	3784	3938	Reflight	Scrub
10480	3954	4214	Reflight	
9770	4309	4545	Reflight	
8880	4566	4838	Reflight	
7670	4902	5136	Reflight	
6280	5146	5403	Reflight	
5770	5476	5707	Reflight	
5080	—	—	Reflight	Scrub
4980	5761	6011	Reflight	
4170	6042	6284	Reflight	
95250	6454	6758	Reflight-CL	Scrub

NOTES:



National Geophysical Data Center / WDC-A for Solid Earth Geophysics Boulder, Colorado USA



Aeromagnetic Trackline Data System

NGDC's **GEO**physical **DA**ta System (**GEODAS**) Trackline Inventory System allows On-Line Searches of **Airborne Magnetic Data**. The GEODAS System can also Search for **Marine Trackline Geophysics** and **Hydrographic Surveys Data**.  **HELP**

MAIN PROGRAM MENU

- **SEARCH the Inventory**
 - **DISPLAY Search Results Summary**
 - **Generate LIST or FILE of Survey HEADERS**
 - **Generate POSTSCRIPT PLOT of Search Results**
 - **DELETE FILES resulting from a Search**
-

For content questions please contact:

Ronald Buhmann

URL: http://www.ngdc.noaa.gov/seg/potfld/ad_sys.shtml

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