FLIGHT SUMMARY REPORT

Flight Number: 97-009-07

Calendar/Julian Date: 24 September 1997 • 267

Sensor Package: Thermal Infrared Multispectral Scanner (TIMS)
DoE Multispectral Scanner (MSS)

Area(s) Covered: Lewis and Clark County, MT, Site 753
Yellowstone National Park, Site 752

Investigator(s): Rowan, USGS

Aircraft #: 799
Department of Energy
Cessna Citation

SENSOR DATA

Accession #:	-----	-----
Sensor ID #:	086	1268
Sensor Type:	TIMS	MSS
Focal Length:	-----	-----
Film Type:	-----	-----
Filtration:	-----	-----
Spectral Band:	-----	-----
f Stop:	-----	-----
Shutter Speed:	-----	-----
# of Frames:	-----	-----
% Overlap:	-----	-----
Quality:	Good	Good

Remarks:

Airborne Science and Applications Program

The Airborne Science Branch at NASA's Dryden Flight Research Center, Edwards, California, operates two ER-2 high altitude aircraft in support of NASA earth science research. The ER-2s are used as readily deployable high altitude sensor platforms to collect remote sensing and in situ data on earth resources, celestial phenomena, atmospheric dynamics, and oceanic processes. Additionally, these aircraft are used for electronic sensor research and development and satellite investigative support.

The ER-2s are flown from various deployment sites in support of scientific research sponsored by NASA and other federal, state, university, and industry investigators. Data are collected from deployment sites in Kansas, Texas, Virginia, Florida, and Alaska. Cooperative international scientific projects have deployed the aircraft to sites in Great Britain, Australia, Chile, and Norway.

Photographic and digital imaging sensors are flown aboard the ER-2s in support of research objectives defined by the sponsoring investigators. High resolution mapping cameras and digital multispectral imaging sensors are utilized in a variety of configurations in the ER-2s' four pressurized experiment compartments. The following provides a description of the digital multispectral sensor(s) and camera(s) used for data collection during this flight.

Department of Energy Remote Sensing Laboratory

The NASA Airborne Science and Applications Program at Ames Research Center contracted with the Department of Energy Remote Sensing Laboratory (RSL) in Las Vegas, Nevada to fly the RSL Multispectral Scanner (MSS) and the NASA Thermal Infrared Multispectral Scanner (TIMS) over the desert southwest. The scanners were flown on the DOE Cessna Citation.

The Cessna Citation is a low and medium altitude, moderate speed aircraft. It can operate from 4,000 to 35,000 feet above sea level at speeds between 135 and 225 knots. There are two instrument ports in the aircraft. The RSL 1268 Multispectral Scanner was mounted over the aft port and the NASA Thermal Infrared Multispectral Scanner was mounted over the forward port.

RSL Daedalus 1268 MSS

The DOE Multispectral Scanner simulates the spectral characteristics the Thematic Mapper (TM) multispectral scanners orbiting on Landsat 4 and Landsat 5. The seven TM bands are replicated with the MSS and four additional bands of discrete wavelengths are acquired. THE MSS acquires TM band six (thermal data) as two bands in low and high gain settings. The scanner is configured as follows:

Daedalus Channel	TM Band	Wavelength, mm
1	A	0.42 - 0.45
2	1	0.45 - 0.52
3	2	0.52 - 0.60
4	B	0.60 - 0.62
5	3	0.63 - 0.69
6	C	0.69 - 0.75
7	4	0.75 - 0.90

8	D	0.91 - 1.05
9	5	1.55 - 1.75
10	7	2.08 - 2.35
11	6	8.5 - 12.5 low gain
12	6	8.5 - 12.5 high gain

Sensor/aircraft parameters are as follows:

IFOV:	2.5 mrad
Total Scan Angle:	86°
Pixels/Scan Line:	716
Scan Rate:	12.5/25/50/100 scans/second

Thermal Infrared Multispectral Scanner

The Thermal Infrared Multispectral Scanner (TIMS) is a multispectral scanning system using a dispersive grating and a six element mercury cadmium telluride detector array to produce six discrete channels in the 8.2 *mm* to 12.2 *mm* region.

Channel	Wavelength, *mm*	NET
1	8.2 - 8.6	< 0.3° C
2	8.6 - 9.0	< 0.3° C
3	9.0 - 9.4	< 0.3° C
4	9.4 - 10.2	< 0.3° C
5	10.2 - 11.2	< 0.3° C
6	11.2 - 12.2	< 0.3° C

Sensor/aircraft parameters are as follows:

IFOV:	2.5 mrad
Ground Resolution:	163 feet (50 meters) at 65,000 feet
Total Scan Angle:	76.56°
Swath Width:	16.9 nmi (31.3 km) at 65,000 feet
Pixels/Scan Line:	638
Scan Rate:	7.3 (scans/second)
Ground Speed:	400 kts. (206 m/second)

Information on data tape format, logical record format, and scanner calibration data may be obtained from the Aircraft Data Facility, NASA-Ames Research Center, Mail Stop 240-6, Moffett Field, California 94035-1000 (Telephone: 650-604-6252).

TIMS FLIGHT DATA
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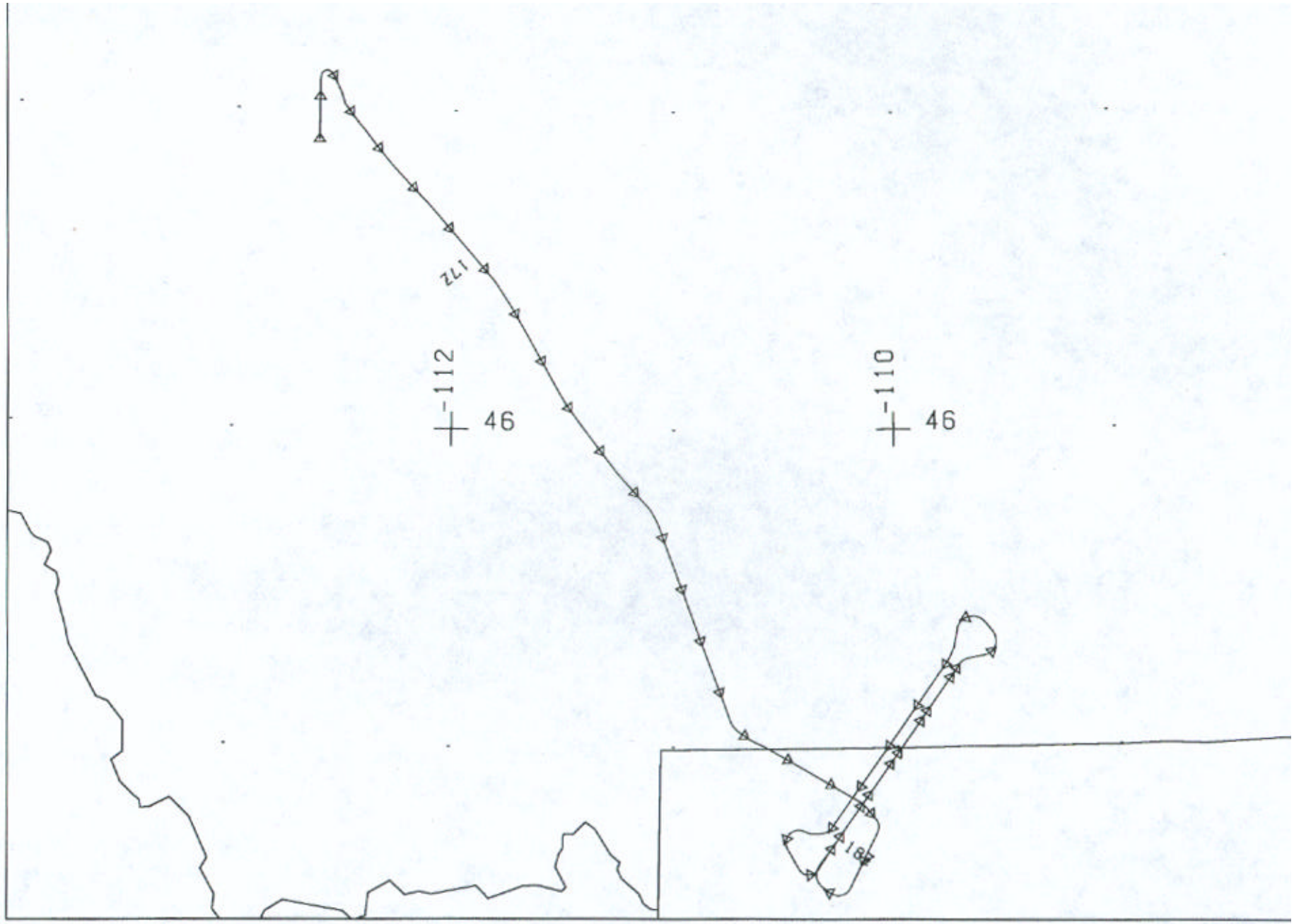
	Site	Line	Run	Actual time (GMT) begin	Actual time (GMT) end	Actual scanline begin	Actual scanline end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
1.	753	2	1	16:46:37.0	16:49:38.9	45405	49932	10500/ 3200	25.00	4528	0	0
2.	752	8	1	17:22:03.0	17:25:58.0	98291	104136	10500/ 3200	25.00	5846	0	0
3.	752	6	1	17:33:16.0	17:41:02.9	115032	126649	10500/ 3200	25.00	11618	0	0
4.	752	7	1	17:46:22.0	17:54:22.1	134585	146525	10500/ 3200	25.00	11941	0	0
5.	752	6	2	18:00:22.0	18:08:24.0	155480	167471	10500/ 3200	25.00	11992	0	0

Notes: Site 753 Lewis and Clark County Montana
Site 752 Yellowstone National Park

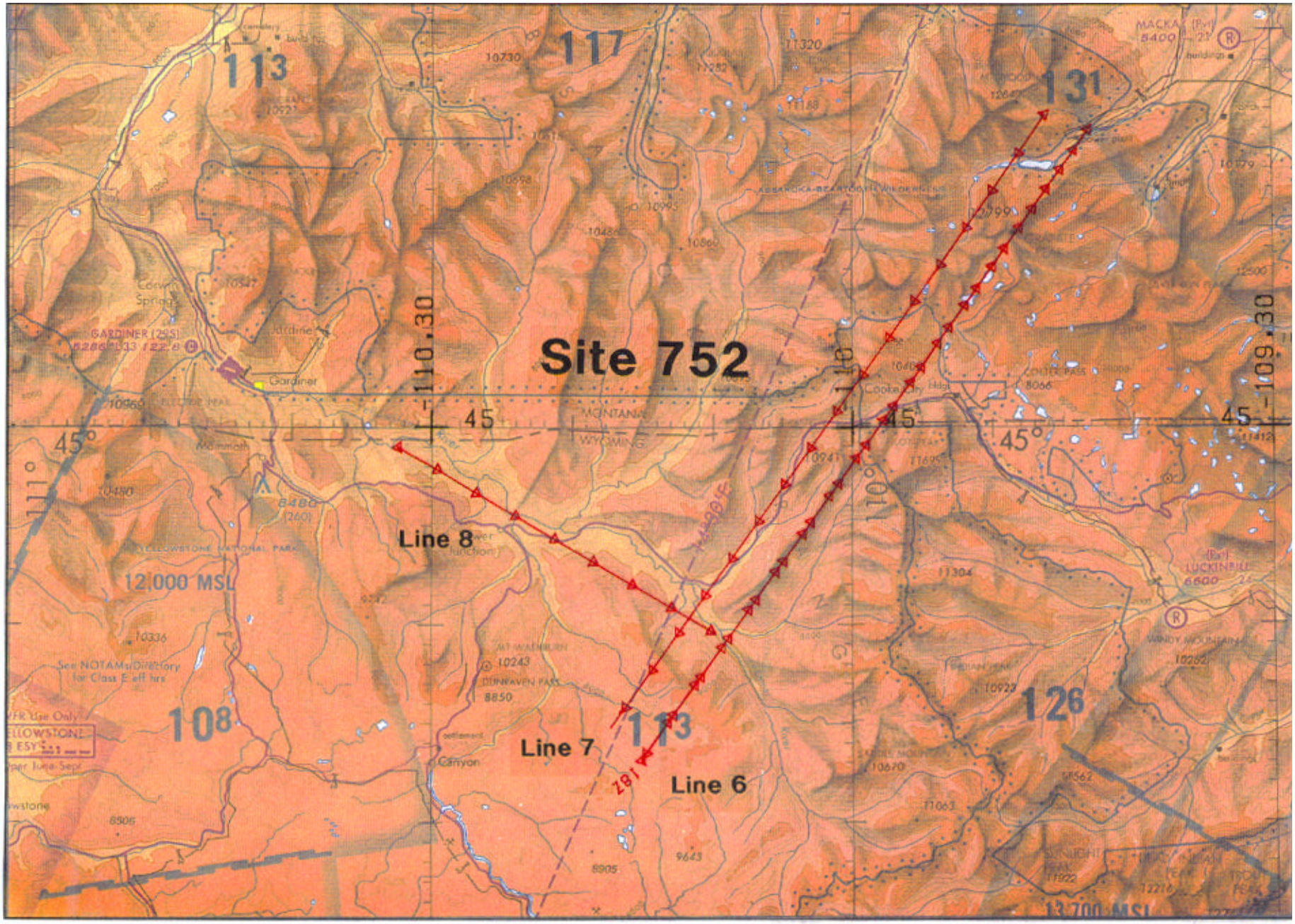
DoE DAEDALUS TMS FLIGHT DATA
FLIGHT NUMBER: 97-009-07

	Site	Line	Run	Actual time (GMT) begin	Actual time (GMT) end	Actual scanline begin	Actual scanline end	Altitude feet/meter	Scan Speed (rps)	total Good scanlines	total Interpolated scanlines	total Repeated scanlines
1.	753	2	1	16:46:37.0	16:49:38.9	45197	49740	10500/ 3200	25.00	4544	0	0
2.	752	8	1	17:22:03.0	17:25:57.9	98272	104137	10500/ 3200	25.00	5866	0	0
3.	752	6	1	17:33:16.0	17:41:02.9	115069	126724	10500/ 3200	25.00	11656	0	0
4.	752	7	1	17:46:22.0	17:54:22.0	134687	146662	10500/ 3200	25.00	11976	0	0
5.	752	6	2	18:00:22.0	18:08:23.9	155647	167674	10500/ 3200	25.00	12028	0	0

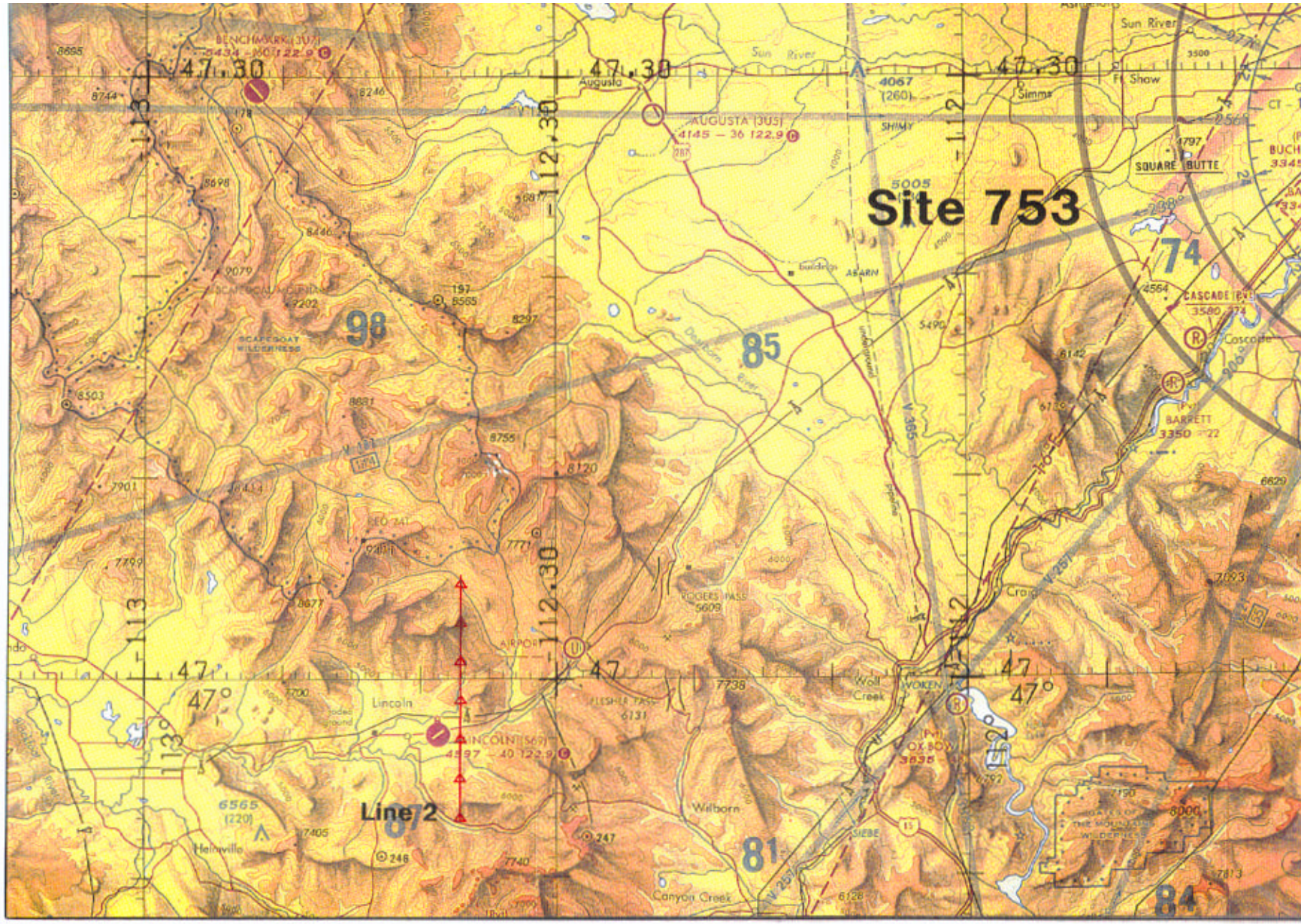
Notes: Site 753 Lewis and Clark County Montana
Site 752 Yellowstone National Park



FLIGHT 97-009-07 24 SEPTEMBER 1997 A/C 799 TIMS / DOE MSS 1268



FLIGHT 97-009-07 24 SEPTEMBER 1997 A/C 799 TIMS / DOE MSS 1268 GREAT FALLS SECTIONAL



FLIGHT 97-009-07 24 SEPTEMBER 1997 A/C 799 TIMS / DOE MSS 1268 GREAT FALLS SECTIONAL