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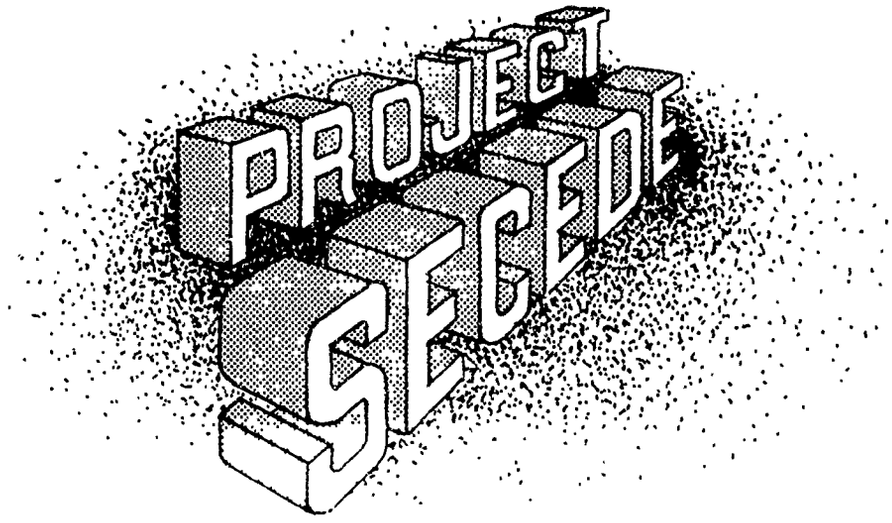

PRELIMINARY SUMMARY OF OPTICAL RECORDS OBTAINED FROM 1971 SECEDE II BARIUM RELEASE TEST SERIES

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13. ABSTRACT

Extensive optical measurements were made of the Phenomenological Development and Structural Characteristics of five primary and four secondary high altitude barium releases of the 1971 ARPA Project SECEDE II Test Program. The objectives of these measurements were to gather data on the morphological development, details on ion cloud striations, brightness profile vs time of the ion cloud emissions, and the development and motion history of the ion and neutral clouds.

To this end, a wide array of photographic instrumentation was deployed at six widely separated sites. The main content of this report is a compilation of data record summaries for each site and event. Also included are several selected black and white photographs of the different events.

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Phone: 617 275-8424

Project Engineer: Phone: Vincent J. Coyne
Phone: 315 330-3107

Contract Engineer: Robert Mather
Phone: 315 330-3451

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This technical report has been reviewed and is approved.

RADC Project Engineer

RADC Contract Engineer

PRELIMINARY SUMMARY OF
OPTICAL DATA RECORDS OBTAINED
FROM 1971 SECEDE II BARIUM
RELEASE TEST SERIES

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SECTION I

INTRODUCTION

Extensive optical measurements were made of the phenomenological development and structural characteristics of five primary and four secondary high altitude barium releases of the 1971 ARPA Project Secede II Test Program. The overall goals of the optical measurements were to provide photographic data on the morphological development of the barium clouds, the detailed characteristics of ion cloud striations, the brightness profile and time history of the ion cloud emissions, and the relative development and geographical separation of the ion and neutral clouds for both the primary and secondary releases as a function of release altitude. The first two objectives are of particular importance to the radar and related experiments, whereas the latter two are of more significance to the theorists concerned with the general phenomenology of the large releases and the relative interaction of the atmosphere with the large and small (secondary) release clouds. To this end a wide array of photographic instrumentation was deployed at three primary optical sites and three secondary optical sites for the five twilight releases of Secede II. This instrumentation included high resolution cameras, wide angle tracking cameras, ion morphology cameras, and a variety of documentary cine and pulse cameras. Almost complete success was achieved in the operation of this instrumentation throughout the Secede test series. Appendix A contains a compilation of instrumentation plans which detail the pertinent parameters of the instrumentation used.

The purpose of this preliminary data report is to identify, insofar as is possible, what useful data was obtained so that this information can be disseminated to the Secede community for reference as quickly as possible. The main content of this report is therefore a compilation of data record summaries for each optical site for each barium release

event. In order to help in the interpretation of this information, a table listing the operational parameters of each event is presented as Table 1. Table 2 lists the geographical location of each fixed optical station. The relative location of the primary sites at Eglin AFB, Tyndall AFB, and Barin Field with respect to a nominal sub-release point are shown in Figure 1. A mobile van with a small array of optical instrumentation was pre-positioned in different locations for each barium event. Table 3 summarizes these positions. Table 4 is in effect a resume of Section III containing the record summary data and should be useful as a guide to the more detailed data in that section.

TABLE 1

SECEDE II OPERATIONAL DATA

EVENT	RELEASE ALTITUDE (km)	SUB-RELEASE POSITION	YIELD (kgm)	DATE	RELEASE TIME	SOLAR ELEV./AZ.
NUTMEG I			48	16 Jan 71	17:34:40	6.0°/249.3
NUTMEG II			1	16 Jan 71		
PLUM I	185.9	29° 52.1' N 86° 21.0' W	48	20 Jan 71	17:47:06	7.9°/251.3
PLUM II	184.6	28° 47.3' N 85° 26.5' W	1	20 Jan 71		
REDWOOD I	258.6	29° 41.3' N 86° 37.9' W	48	26 Jan 71	17:52:08	7.7°/252.8
REDWOOD II	188.8	28° 55.7' N 86° 27.4' W	1	26 Jan 71		
OLIVE I	192.5	29° 49.0' N 86° 41.3' W	336	29 Jan 71	17:53:57	7.5°/253.6
OLIVE IV	187	29° 23 N 86° 38 W	16	29 Jan 71	17:55:57	7.9°/253.8
SPRUCE	192.6	29° 43:1' N	48	01 Feb 71	17:52:04	6.7°/254.2

TABLE 2

TIC OPTICAL SITE LOCATIONS

Site	Location
Eglin AFB, C-6	N30°34' W86°13'
Tyndall AFB, 9702	N29°58' W85°28'
Barin Field, Ala.	N30°24' W87°38'
Mobile Van	--
Sumatra, Fla.	N29°53' W84°59'
Ft. Meyers, Fla.	N26°39' W81°43'

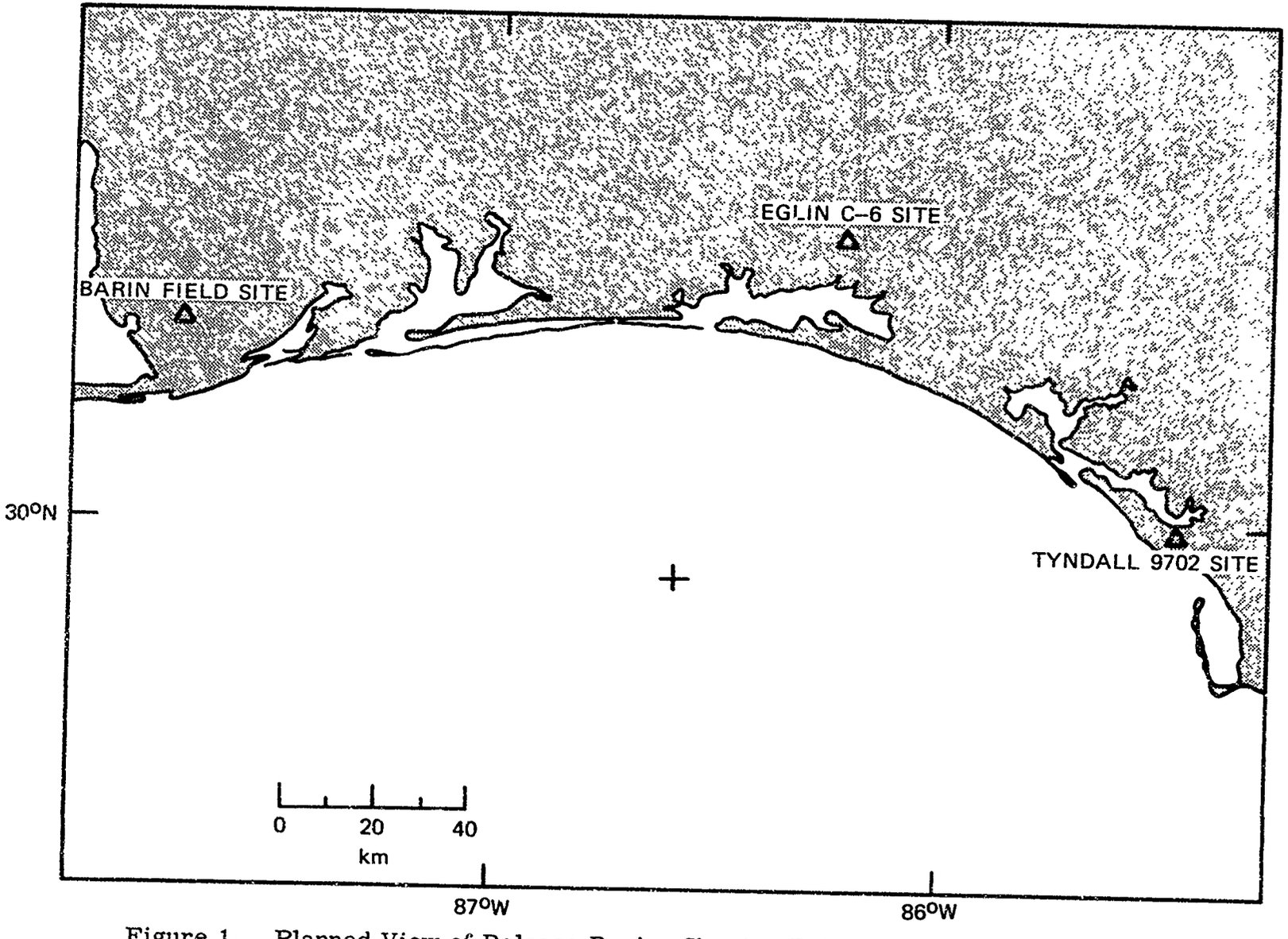

Figure 1. Planned View of Release Region Showing Primary Optical Site Locations.

TABLE 3

TIC MOBILE VAN LOCATION FOR SECEDE II

EVENT	DATE	GEOGRAPHICAL COORDINATES	
NUTMEG	16 January 1971	30° 23.2' N	86° 29.0' W
PLUM	20 January 1971	30° 44.0' N	86° 10.0' W
REDWOOD	26 January 1971	30° 58.2' N	86° 18.4' W
OLIVE	29 January 1971	30° 38.5' N	86° 23.8' W
SPRUCE	1 February 1971	30° 23.5' N	86° 28.5' W

TABLE 4

OPTICAL DATA VS. STATION SUMMARY

Event	High Resolution	Ion Filter	Morphology	Primary Triangluation	Puff Triangulation	Time Lapse	Cine
NUTMEG	E T	E T B	E T M	E T B	(E) T	S	M
PLUM	E T B	E T B	E T M	E T B	E T	E S (F)	E M
REDWOOD	E (B)	E B	E T M	E T B	E T (B)	S (F)	(M)
OLIVE	(E) T	E T B	E T (M)	E T B	E T B	S F	M S F
SPRUCE	E T B	E T	E T M	E T B	--	E (F)	E M S

E = Eglin (C-6)
T = Tyndall (9702)
B = Barin Field
M = Mobile Van
S = Sumatra
F = Ft. Meyers

( ) = Limited Data

SECTION II

GENERAL COMMENTS

The vast amount of optical data obtained on each of the five high altitude barium releases will clearly be of benefit to both experimenters and theorists alike. Degradation of data due to natural cloud cover or sky background was very minimal. The geographical positions of the primary optical sites were such as to provide good complementary perspectives of the releases. The C-6 site at Eglin AFB was in several instances such as to be looking nearly up the field lines at or shortly subsequent to the time of striation formation. Figures 2 and 3 show the Plum I event as seen from Tyndall AFB. Figure 2 shows the ion cloud as the first striated structure has appeared at R + 8 minutes. (The spherical neutral cloud appears above the ion cloud in the perspective shown). Figure 3 shows the proliferation of such structure at R + 16 minutes.

Figure 4 shows the Redwood I ion cloud in the process of developing striations at about R + 21 minutes as seen from Eglin AFB C-6 site. This perspective was looking essentially up the field lines through the ion cloud. The approximate projected dimensions of two representative aspects of the striated structure are called out on the photograph.

Figures 5 and 6 show the Spruce ion cloud at different stages of development, again looking essentially up the field lines from the C-6 site. The figures represent R + 17 minutes and R + 21 minutes, respectively. In these figures, some spatial dimensions are also shown including the so called fine structure of the order of a few tens of meters.

Figure 2. PLUM EVENT, Tyndall AFB, R + 8 min. 9 sec.

Figure 3. PLUM EVENT, Tyndall AFB, R + 16 min. 1 sec.

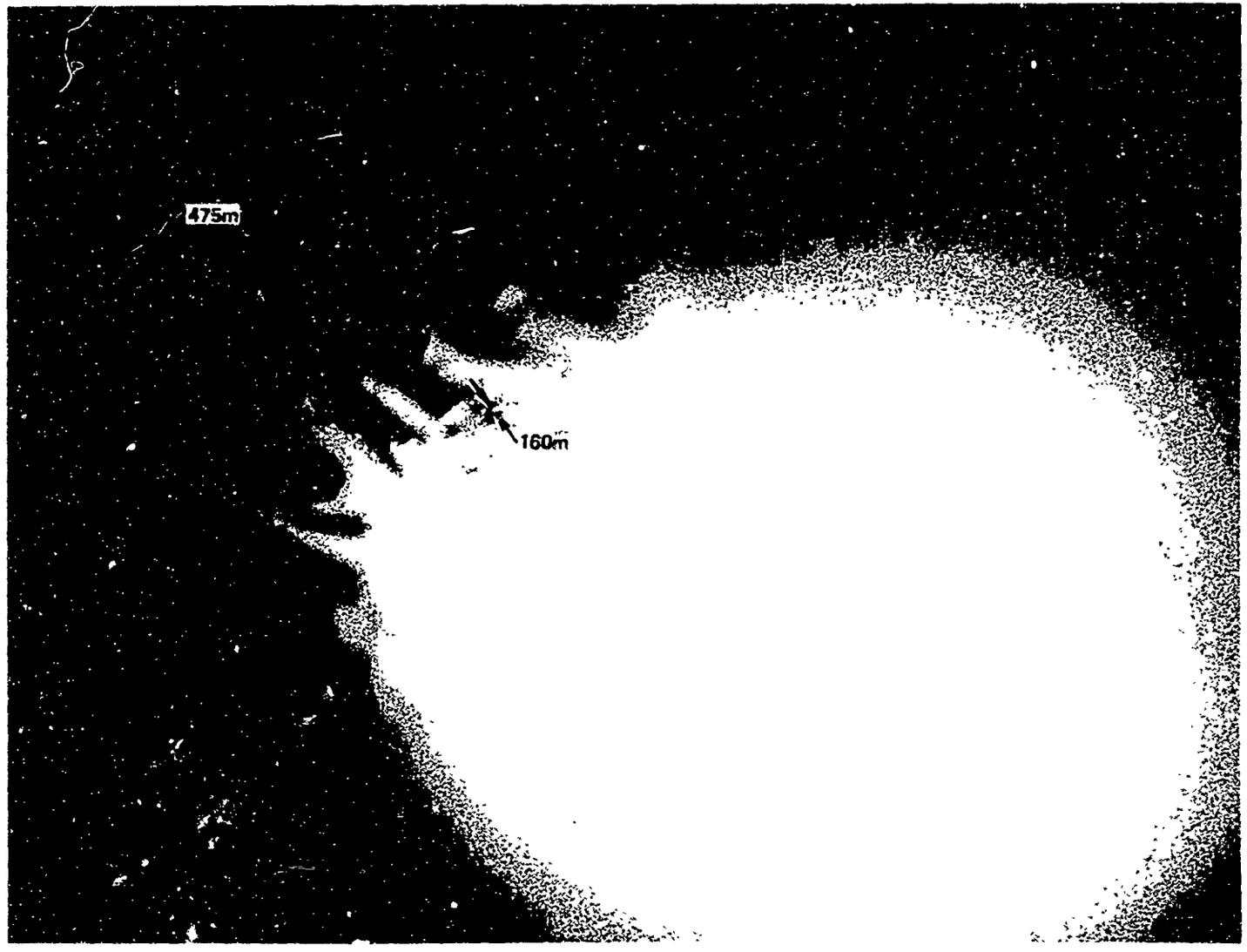

Figure 4. REDWOOD EVENT, Eglin C-6 Site, R + 21 min. 56 sec.

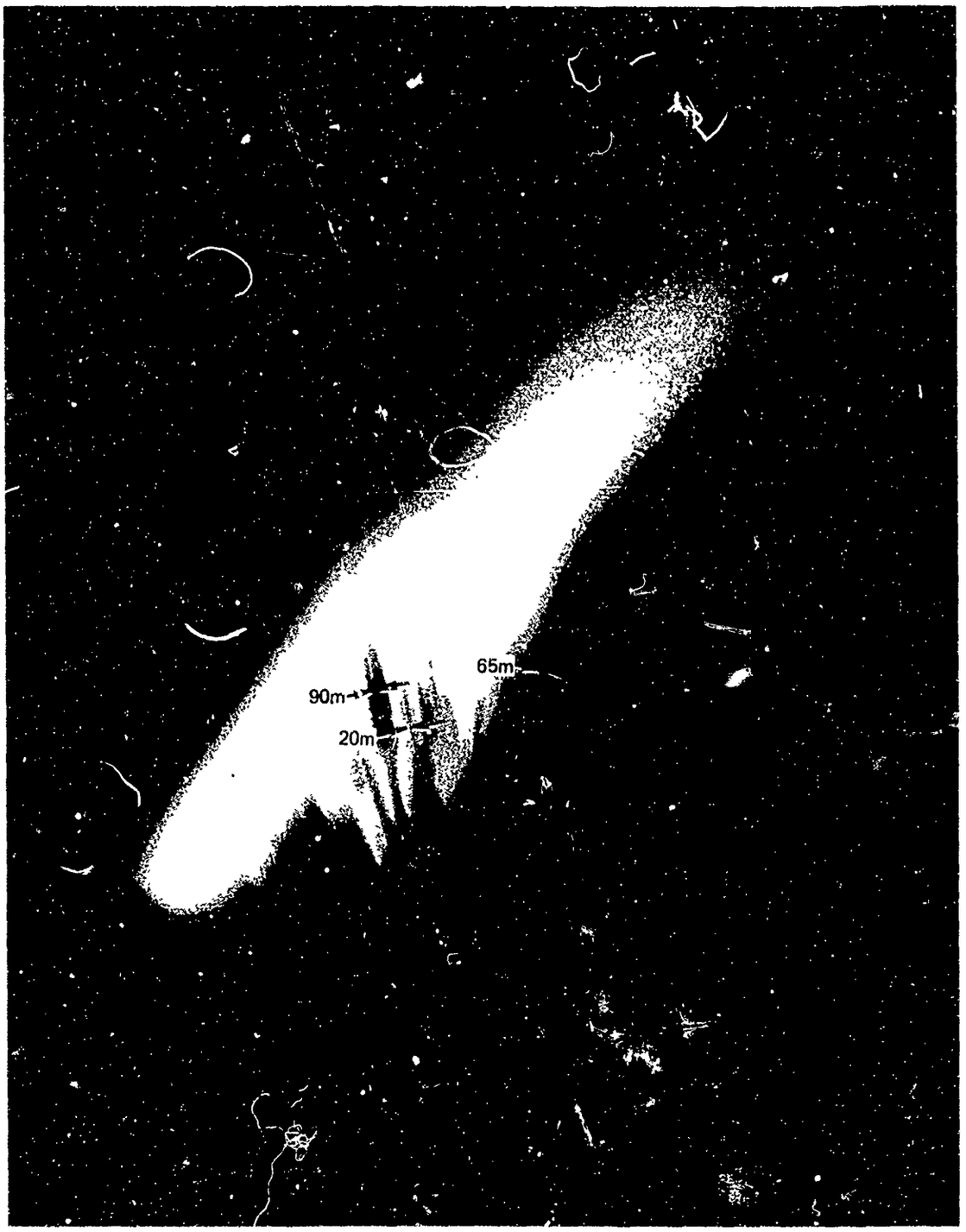

Figure 5. SPRUCE EVENT, Eglin C-6 Site, approx. R + 17 min. 30 sec.

Figure 6. SPRUCE EVENT, Eglin C-6 Site, approx. R + 21 min. 30 sec.

SECTION III

DATA RECORD SUMMARIES

TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 16 January 1971 STATION: C-6

EVENT: Nutmeg LOCATION: Eglin AFB, Fla. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71311-B	2484/70mm	300mm f.l.	Very good high resolution data, fine structure in striations.
71311-A	EF/70mm	300mm f.l.	Very good high resolution data, fine structure in striations.
71313	2484/70mm	105mm f.l.	Good filter record (4554A)
71314	EF/70mm	100mm f.l.	Good morphology record, some natural clouds evident.
71315	SO397/5"	178mm f.l.	Very good track data to end of record. Valuable as morphology record too.
71316	EF/70mm	50mm f.l.	Fair to poor data on small cloud due to natural cloud cover.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 16 January 1971 STATION: 9702

EVENT: Nutmeg LOCATION: Tyndall AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71321	EF/70mm	150mm f.l.	Very good record of neutral and ion cloud, fine structure in striations. Natural clouds during first portion of record.
71323	2484/70mm	75mm f.l.	Good filter record (4934A) with and without filter. Good structure.
71325	EF/70mm	50mm f.l.	Processing intermittently bad, but good track data of small cloud. Small cloud striation data good at late times.
71324	SO397/5"	178mm f.l.	Very good primary cloud track record. Fine detail of early striations.
71322	SO397/5"	308mm f.l.	Fine detail of striations throughout late times.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 16 January 1971 STATION:

EVENT: Nutmeg LOCATION: Barin Field, Ala. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71331	EF/70mm	254mm f.l.	Good record overall, some good striation data. Natural clouds at early times.
71332	2484/70mm	75mm f.l.	Good filter record; shows ion cloud structure before and after striations.
71333	SO397/5"	178mm f.l.	Very good track record in spite of extensive cloud obscuration throughout. Striations of about 100 meters evident.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 16 January 1971 STATION:

EVENT: Nutmeg LOCATION: See Below PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71341 (Mobile Van)	EF/70mm	75mm f.l.	Good color record at late times, over-exposed at early times, clouds during much of time but structural data good.
71342	2484/35mm	100mm f.l.	Good B/W record showing striation structure with good definition.
71343	MS/16mm	25mm f.l.	Fair cine record of early expansion.
71351 (Sumatra)	EF/35mm	50mm f.l.	Good documentary record of neutral and ion cloud formation.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 20 January 1971 STATION: C-6

EVENT: Plum LOCATION: Eglin AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71411-A	EF/70mm	300mm f.l.	Very good high resolution record. Probe track seen at very late time.
71411-B	PXN/70mm	300mm f.l.	Very good high resolution data of striations.
71413	2484/70mm	105mm f.l.	Very good filter record, shows striations in good detail (4554A)
71414	EF/70mm	100mm f.l.	Excellent morphology record throughout. Early time asymmetry especially good.
71415	SO397/5"	178mm f.l.	Excellent track record, excellent striation and morphology data.
71416	EF/70mm	50mm f.l.	Excellent track of puff release; shows development of puff striations very clearly.
71418	EF/35mm	50mm f.l.	Very good time lapse documentary, striated end of ion cloud falls off frame at late times.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 20 January 1971 STATION: 9702

EVENT: Plum I LOCAT' IN: Tyndall AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		'ECORD SUMMARY
71422	SO397/5"	308mm f.l.	Good track, very good striation data.
71421	EF/70mm	150mm f.l.	Excellent resolution of striations and ion cloud structure throughout.
71425	EF/70mm	50mm f.l.	Excellent puff cloud track, also shows development of striations.
71423	2484/70mm	75mm f.l.	Excellent filter record; very good striation data.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 20 January 1971 STATION:

EVENT: Plum LOCATION: Barin Field, Ala. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71433	SO397/5"	178mm f.l.	Very good track data, excellent striation data.
71431	EF/70mm	254mm f.l.	Very good striation data, some striations appear to be under 100 meters in width.
71432	2484/70mm	75mm f.l.	Good filter record; no obvious striations.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 20 January 1971 STATION:

EVENT: Plum LOCATION: See Below PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71441 (Mobile Van)	EF/70mm	75mm f.l.	Excellent morphology record, striation development extremely well documented.
71442	2484/35mm	100mm f.l.	Excellent B/W record of striation structure.
71443	MS/16mm	25mm f.l.	Good cine record, has zero time frame.
71451 (Sumatra)	EF/35mm	50mm f.l.	Very good documentary record throughout.
71461 (Ft. Meyers)	EF/35mm	100mm f.l.	Good documentary, shows late time striations, some natural cloud obscuration at times.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 26 January 1971 STATION: C-6

EVENT: Redwood LOCATION: Eglin AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71511-B	2484/70mm	300mm f.l.	Very good record, early series show striation ends well, late frames show some structure.
71513	2484/70mm	105mm f.l.	Good filter data, excellent record striation development.
71514	EF/70mm	100mm f.l.	Very good color morphology record throughout, shows initial sphere in good color, also horseshoe cloud, then striations. Satellite track seen.
71516	EF/70mm	50mm f.l.	Very good track and morphology of small cloud. Large cloud included in FOV. Satellite track seen.
71511-A	EF/70mm	300mm f.l.	Excellent high resolution coverage of striation development in color.
71515	SO397/5"	178mm f.l.	Very good track and morphology record. Striation development well documented.
71519	PXA/5"	178mm f.l.	Same as above in B/W.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 26 January 1971 STATION: 9702

EVENT: Redwood LOCATION: Tyndall AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE	RECORD SUMMARY
71522	SO397-5" 300mm f.l.	Excellent morphology record - ends before onset of striations since camera changed to 7" system.
71524	SO397-5" 178mm f.l.	Very good track record of ion cloud. Excellent early time neutral cloud images showing color.
71523	EF/70mm 75mm f.l.	Very good morphology record. Good early time images (A/C navigational lights seen).
71525	EF/70mm 50mm f.l.	Excellent track record of puff cloud and neutral and ion separation.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 26 January 1971 STATION:

EVENT: Redwood LOCATION: Barin Field, Ala. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71532	2484/70mm	75mm f.l.	Good filter record; some striations evident.
71533	SO397-5"	178mm f.l.	Very good track record, small cloud data at early and late (1 frame only) time.
71531	EF/70mm	254mm f.l.	Good color record, shows striation development, images affected by exposure times.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 26 January 1971 STATION:

EVENT: Redwood LOCATION: See Below PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71541 (Mobile Van)	EF/70mm.	75mm f.l.	Excellent color morphology record. Striation "separation" from ion cloud very clearly defined. Satellite track seen.
71542	2484/35mm	100mm f.l.	Very good B/W record of striation development.
71543	EF/16mm	25mm f.l.	Fair cine record of early expansion at 12 frames/sec.
71551 (Sumatra)	EF/35mm	50mm f.l.	Cine portion of record starts late. Remainder of record good documentary.
71561 (Ft. Meyers)	EF/35mm	100mm f.l.	Fair documentary record overall. Very good early cine data at 5 f.p.s. Unusually good color exposure of early stabilized neutral cloud.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 28 January 1971 STATION: C-6

EVENT: Olive LOCATION: Eglin AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71614	EF/70mm	100mm f.l.	Excellent morphology record showing contrast in development of different size releases. Late time development of large cloud striations shown well. Very strange shadow evident at lower (or southern) boundary of ion cloud. Vehicle track at early time.
71613	2484/70mm	105mm f.l.	Very good filter record of large ion cloud. Shadow effect very pronounced.
71616	EF/70mm	50mm f l.	Excellent morphology record obtained at constant intervals.
71611-A	EF/70mm	300mm f.l.	Excellent HR coverage of early time shows one or more vehicles leaving main burst (close to each other).
71611-B	PXN/70mm	300mm f.l.	Few frames - no outstanding data.
71611-C	EF/70mm	300mm f.l.	Few good frames of late time striations. Shadow very pronounced.
71615	SO397/5"	178mm f.l.	Probe seen entering and leaving at early times. Excellent early time images. Excellent track and overall morphology record of both releases. Shadow very distinct.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 28 January 1971 STATION: 9702

EVENT: Olive LOCATION: Tyndall AFB PROJ. ENGINEER:

Note: Some natural cloud obscuration during first 5-10 minutes.

RECORD NO.	FILM TYPE		RECORD SUMMARY
71621	EF/70mm	150mm f.l.	Very good record of primary event. Striations very distinct at late times. Excellent frames of small cloud striations interspersed.
71623	2484/70mm	75mm f.l.	Excellent filter record (4554A) of both events. Late time striations quite distinct.
71625	EF/70mm	50mm f.l.	Very good morphology record with constant intervals between frames. Development of small cloud striations well documented.
71624	SO397/5"	178mm f.l.	One vehicle (small release) evident. Good late time morphology. Good early time release images.
71622	PXA/5"	308mm f.l.	One vehicle track. Remaining record fair.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 28 January 1971 STATION:

EVENT: Olive LOCATION: Barin Field, Ala. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71631	EF/70mm	254mm f.l.	Two vehicles seen at 4 and 7 o'clock at early time. Generally good record, although no striations seen. (Small cloud not evident.)
71632	2484/70mm	75mm f.l.	Good overall filter record (4554 A) of both clouds. Striations evident in small cloud.
71633	SO397/5"	178mm f.l.	Main vehicle tracked before first detonation. Second vehicle with flashing light tracked into (?) main burst region, and out (?) of main burst. Excellent track and morphology record. Small cloud striations well documented.
71634	PXA/5"	306mm f.l.	Two vehicle tracks evident. Overall data:good coverage of small cloud striations, large cloud striations not evident.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 28 January 1971 STATION:

EVENT: Olive LOCATION: See Below PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71641 (Mobile Van)	EF/70mm	75mm f.l.	Good morphology record, natural cloud obscuration in mid-portion.
71642	2484/35mm	100mm f.l.	Good B/W record except for natural clouds, some striations at late times.
71644	SO397	500mm f.l.	Small field of view, long exposure, and clouds minimize data value.
71643	EF/16mm	25mm f.l.	Very good cine record of early release history, second and third releases documented clearly.
71651 (Sumatra)	EF/35mm	50mm f.l.	Good documentary record of primary release. Slightly overexposed throughout.
71661 (Ft. Meyers)	EF/35mm	100mm f.l.	Good cine record from beginning (5 fps.). Shows all 3 late releases. Good documentary coverage of morphology of main and fourth release although resolution only fair.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 1 February 1971 STATION: C-6

EVENT: Spruce LOCATION: Eglin AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE	RECORD SUMMARY
71714	EF/70mm 100mm f.l.	Excellent morphology record. Shows development of striations up field lines, shows rayed shadow of ion cloud against neutral cloud. Frames 176, 177, 178 show flashing light at R +25 min.
71711-A	EF/70mm 300mm f.l.	Good record of development and hardening of ion cloud
71711-B	PXN/70mm 300mm f.l.	Excellent B/W record of striation development, fine structure clearly evident
71711-C	EF/70mm 300mm f.l.	(Same as -B)(in color) Flashing light in late frame
71713	2484/70mm 105mm f.l.	4934A Filter - Excellent record throughout, shows multiple structure in ion cloud shadow
71716	EF/70mm 50mm f.l.	Very good morphology record of ion with neutral cloud at constant 5 sec. intervals. Flashing light trajectory shown. Moon evident
71715	SO-397/5" 178mm f.l.	Very good track record. Good track of flashing lights (red and blue)
71718	EF/35mm 50mm f.l.	Excellent time lapse documentary record

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 1 February 1971 STATION: 9702

EVENT: Spruce LOCATION: Tyndall AFB PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71721	EF/70mm	150mm f.l.	Excellent morphology of striation development. Very fine structure evident ~ 100 meters. Moon reflections in lens prominent but do not seem to degrade HR data. Good early frames also.
71723	2484/70mm	75mm f.l.	Very good filter record. Shows striations at 4554A, fine structure~200-400 meters.
71725	EF/70mm	50mm f.l.	Interesting record, good small scale, wide angle coverage of event. Effect of moon severe.
71722	SO397/5"	308mm f.l.	Excellent morphology record, good definition of striation effect particularly at late times. Effect of moon not very severe.
71724	SO397/5"	178mm f.l.	Very good track record. Also shows good definition of striation development.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 1 February 1971 STATION:

EVENT: Spruce LOCATION: Barin Field, Ala. PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71731	EF/70mm	254mm f.l.	Excellent late time high resolution data.
71733	SO397/5"	178mm f.l.	Excellent track and late time morphology record. Very good detail of striation formations.
71734	PXA/5"	307mm f.l.	Very good B/W record of striations at late times. Should densitometer well.

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TECHNOLOGY INTERNATIONAL CORPORATION

DATA RECORD SUMMARY

OPERATION: Secede II DATE: 1 February 1971 STATION:

EVENT: Spruce LOCATION: (See below) PROJ. ENGINEER:

RECORD NO.	FILM TYPE		RECORD SUMMARY
71741 (Mobile Van)	EF/70mm	75mm f.l.	Excellent morphology record showing both neutral and ion cloud. Ion cloud striation development very well recorded with very good resolution. No significant moon effect.
71742	2484/35	100mm f.l.	Good B/W total light record showing striation development very clearly. Good structure evident.
71744	SO397/5"	500mm f.l.	Good record. Long exposure time (15 sec) degrades sharpness of striations.
71743	EF/16mm	25mm f.l.	Good cine record of early expansion of release to about R +120 sec at about 12 frames per sec.
71751 (Sumatra)	EF/35mm	50mm f.l.	Good cine record of expansion, showing good color asymmetry at about 5 frames per sec.
71761 (Ft. Meyers)	EF/35mm	100mm f.l.	

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APPENDIX A

INSTRUMENT PLANS

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January-February 1971 STATION: C-6

EVENT: ALL LOCATION: Eglin AFB PROJ. ENGINEER:

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
11	H-B / Delft	300mm	--	EF-475 /2484 70mm x 15'	0.9	variable	FOV 12°
12	Canon 7s / Canon	50mm	--	2484 35mm x 50 exp.	0.95	variable	FOV 26° x 40°
13	B-C / Delft	105mm	4554Å	2484 Sp. 475 70mm x 150'	0.75	variable	FOV 21°
14	B-C / Deltamar	100mm	--	EF-475 70mm x 100'	1.4	variable	FOV 32° x 42°
15	K-46 / Ektar	178mm	--	SO 397 5" x 100'	2.5	5-10 sec.	FOV 36° x 36°
16	B-C / Canon	50mm	--	EF-475 70mm x 100'	.95	5-10 sec.	FOV 46°
18	FR IV-C/Canon	50mm	--	EF-5241	.95	cine- 2-5 sec.	FOV 20° x 26°
19	K-46/Ektar	178mm	--	PXA 5" x 100'	2.5	5-10 sec.	FOV 46°

ADDITIONAL INFORMATION:

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January-February 1971 STATION: 9702

EVENT: ALL LOCATION: Tyndall AFB PROJ. ENGINEER:

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
21	B-C / Delft	150mm	--	EF-475 70mm x 100'	0.75	variable	FOV 21°
22	K-46 / Ektar	300mm	--	SO 397 5" x 100'	2.5	5-10 sec.	FOV 21° x 21°
23	B-C / Farron	76mm	4934Å	2484 Sp 475 70mm x 150'	.87	variable	FOV 30°
24	K-46 / Ektar	152mm	--	SO 397 5" x 100'	2.5	5-10 sec.	FOV 36° x 36°
25	B-C / Canon	50mm	--	EF 475 70mm x 100'	.95	5-10 sec.	FOV 46°

ADDITIONAL INFORMATION:

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January-February 1971 STATION:

EVENT: ALL LOCATION: Barin Field, Ala. PROJ. ENGINEER:

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
31	B-C / Delft	254mm	--	EF-477 70mm x 100'	2.1	variable	FOV 13° x 18°
32	B-C / Farron	76mm	4554 Å	2484 Sp 475 70mm x 100'	0.87	variable	FOV 30°
33	K-46 / Ektar	178mm	--	SO 397 5" x 100'	2.5	5-10 sec.	FOV 36° x 36°
34	K-46/Ektar	306mm		PXA 5" x 100'	2.5	5-10 sec.	FOV 21° x 21°

ADDITIONAL INFORMATION:

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January 1971 STATION: Mobile Van

EVENT: ALL LOCATION: Eglin AFB Area PROJ. ENGINEER:

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
41	PS-10P/Deltamar	75mm	--	EF-477 70mm x 100'	1.7	5-10 sec.	FOV $42^{\circ} \times 42^{\circ}$
42	Canon 7s/Canon	100mm	--	2484 35mm x 50 exp.	2.0	variable	FOV $20^{\circ} \times 26^{\circ}$
43	AN-N6	25mm		EF 16mm x 50'	1.8	12 fps	FOV $9^{\circ} \times 12^{\circ}$
44	K-46/B & L	500mm		SO397 5" x 100'	5.6	15 sec.	FOV $12^{\circ} \times 12^{\circ}$

ADDITIONAL INFORMATION:

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January 1971 STATION: SRI X Site #4

EVENT: ALL LOCATION: Sumatra, Fla. PROJ. ENGINEER:

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
51	FR-IVC / Canon	50mm	--	EF 35mm x 100'	.95	Cine- 2-5-10 sec.	FOV 20° x 26°

ADDITIONAL INFORMATION:

INSTRUMENT PLAN

OPERATION: SECEDE II DATE: January 1971 STATION: S-2

EVENT: ALL LOCATION: Ft. Meyers PROJ. ENGINEER: Pitts

POSITION	INSTRUMENT	FOCAL LENGTH	FILTER	FILM	f/n	SHUTTER/RATE	REMARKS
61	FR-IVC / Canon	100mm	--	EF 35mm x 100'	2.0	Cine- 5-10 sec.	FOV $10^{\circ} \times 13^{\circ}$

ADDITIONAL INFORMATION: