



OP NERVOSE 85

PROJECT REPORT

4 FIELD SURVEY SQUADRON

ROYAL AUSTRALIAN SURVEY CORPS

000019

4 FIELD SURVEY SQUADRON

PROJECT REPORT

OPERATION NERVOSE 85

26 MAY - 18 SEPTEMBER 1985

DISTRIBUTION

Dept of Defence (Army Office) - DSVY-A	3
- DGOP-A	2
HQ FF Comd - Ops Br	2
- SO1 (SVY)	1
HQ 4 MD	2
HQ 7 MD	2
31 Sup bn	1
41 Sup Bn	1
Army Svy Regt	1
School of Mil Svy	1
1 Fd Svy Sqn	1
2 Fd Svy Sqn	1
5 Fd Svy Sqn	1
161 Recce Sqn	1
162 Recce Sqn	1
171 Comd & Liaison Sqn	1
173 Gen Spt Sqn	1
Syd Wksp Coy	1
Adl Wksp Coy	1
4 Tpt & Mov Gp	1
<u>Internal</u>	
OC	1
2IC	1
File	1
Library	1

4 FIELD SURVEY SQUADRONPROJECT REPORT - OPERATION NERVOSE 8526 MAY - 18 SEPTEMBER 1985

Title Page	
Distribution	ii
Contents	iii
Introduction	1
Mounting	2
Administration & Logistics	4
Conclusions	9

- Annexes:
- A. Area of Operations
 - B. Control Survey Technical Report
 - C. APR Technical Reconnaissance Report
 - D. APR Technical Report
 - E. APR Level Connection Report
 - F. Field Completion Report
 - G. Aerial Photography Report
 - H. Aircraft Usage Graphs
 - I. Summary of Mechanical Repairs
 - J. Nominal Roll
 - K. Stores Written Off in AO
 - L. Summary of Expenditure

PROJECT REPORT
OPERATION NERVOSE
1985

- References:
- A. COSC Minute 18/1981 dated 8 Apr 81
 - B. Dept of Defence (DGOP-A) Tasking Directive 6/84 dated 31 May 84
 - C. 4 Fd Svy Sqn Concept of Operations dated 26 Mar 85
 - D. HQ 4 MD Mounting Instruction 6/85 dated 14 May 85
 - E. 4 Fd Svy Sqn OPORD 2/85 dated 8 May 85
 - F. HQ FF Comd OPORD 5/85 dated 29 Mar 85
 - G. 4 Fd Svy Sqn Recon Report dated 16 May 85
 - H. Dept of Defence (DSVY-A) Tech Directive dated 20 May 85
 - I. 4 Fd Svy Sqn Mov Instr 1/85 dated 21 May 85

INTRODUCTION

General

1. Operation NERVOSE 85 was mounted by 4 Fd Svy Sqn in the EAST ARNHEM, VICTORIA RIVER and DALY WATERS areas of the Northern Territory from 26 May to 18 Sep 85. The operation included some technical tasks which were to be carried out as part of Operation NERVOSE 86.

Aim

2. The aim of Operation NERVOSE 85 was to finalize the horizontal and vertical control requirements for mapping at a scale of 1:50,000, to field check 40 x 1:50,000 preliminary Maps and to obtain mapping photography in support of the RAAF TINDAL redevelopment project.

Area of Operations

3. The AO covered approximately 270,000 square kilometres from Bathurst Island to Gove above the 13°S parallel of latitude and from the Stuart Highway to the WA border between the 15°S and 19°S parallels of latitude (see Annex A). The 1:250,000 map areas controlled were:

SC 52-15 BATHURST ISLAND	SD 53-3 ARNHAM BAY
SC 52-16 MELVILLE ISLAND	SD 53-4 GOVE
SC 53-13 COBURG PENINSULA	SD 53-5 MOUNT EVELYN
SC 53-14 JUNCTION BAY	SD 53-13 LARRIMAH
SC 53-15 WESSEL ISLANDS	SE 52-3 WATERLOO
SD 52-12 FERGUSSON RIVER	SE 52-4 VICTORIA RIVER DOWNS
SD 52-15 AUVERGNE	SE 52-7 LIMBUNYA
SD 52-16 DELAMERE	SE 52-8 WAVE HILL
SD 53-1 ALLIGATOR RIVER	SE 52-11 BIRRINDUDU
SD 53-2 MILINGIMBI	SE 53-1 DALY WATERS

OPERATIONS

Conduct of the Operation

4. The operation was conducted in four phases as follows:
- a. Phase One. This phase was conducted during the period 30 May to 25 Aug 85 using AN PRR14 and MX 1502 equipments to acquire horizontal control (See Annex B).
 - b. Phase Two. This phase was conducted in stages to acquire vertical control as follows:
 - (1) Reconnaissance. This involved a detailed reconnaissance and marking of existing vertical control points to be used as navigational aids for the APR team. The reconnaissance was conducted during the period 28 May to 15 Jul 85 (See Annex C).
 - (2) Profiling. Profiling using the APR commenced on 15 Jul and was completed on 14 Sep 85 (See Annex D).
 - (3) Level Connections. Connections of the APR profiles to existing vertical control was carried out during the period 15 Jul to 14 Sep 85 (See Annex E).
 - c. Phase Three. The field completion of the 40 x 1:250,000 line maps was conducted during the period 30 May to 22 Jul 85 (See Annex F).
 - d. Phase Four. Identification, supplementary and mapping photography was flown as required during the complete period of the operation. (See Annex G).

Tasks

5. The following tasks were completed:
- a. 52 horizontal control points were established using Doppler Simultaneous Point Positioning (SPP) techniques.
 - b. 74 new and existing horizontal control points were pannelled and absolute imagery obtained.
 - c. 6950 line kilometres vertical control were flown using the Airborne Profile Recorder (APR) covering eight 1:250,000 map areas.
 - d. The APR profiles were connected to the AHD at 97 points.
 - e. 1050 line kilometres or 54% of the mapping photography required in support of the RAAF TINDAL redevelopment project was flown.

Operational Support

6. Rotary Wing. Rotary wing support was provided from AAAvn and RAAF sources. The aircraft were utilized for the following tasks:
- a. reconnaissance of control points,
 - b. positioning of doppler survey parties,
 - c. panelling existing control points,
 - d. field completion, and
 - e. stores movement throughout the AO.
7. AAAvn LOH support was supplied by 161 Recce Sqn, 162 Recce Sqn and 171 Comd and Liaison Sqn. A total of 618.7 hours were flown from an allocation of 620 hours. The support commenced at TINDAL on 29 May 85 and the last aircraft was released from KATHERINE on 11 Sep 85. (See Annex H).
8. RAAF rotary wing support in the form of a Squirrel helicopter was supplied by the SAR flight, RAAF DARWIN. The aircraft flew a total of 25 hours in support of station movements on Bathurst and Melville Islands. (See Annex H).
9. Fixed Wing. Fixed wing support was provided from AAAvn, RAAF and civilian sources. The aircraft were utilized for the following tasks:
- a. stores movement,
 - b. personnel movement,
 - c. aerial photography,
 - d. field completion, and
 - e. APR profiling.

10. AAAvn fixed wing support was provided by 173 Gen Spt Sqn with the provision of a Pilatus Porter for a total of 100 task hours. The aircraft was fitted with an RC 10 aerial camera and was used during the period 29 May to 24 Jul 85 for supplementary and identification photography, field completion and personnel movement. (See Annex H).
11. RAAF fixed wing support was provided by the SAR flight, RAAF DARWIN with the provision of a Caribou for a total of 38.9 hours from an allocation of 40 hours. The aircraft was used for fuel prepositioning and recovery, and the insertion and extraction of Forward Base at MILINGIMBI. (See Annex H).
12. Civilian fixed wing support involved the use of a civil charter Beechcraft Queenair on contract from Airsearch Aviation for a total of 186.65 hours. The aircraft was fitted with an RC10 aerial camera and the APR. It was used to fly the APR profiles and the supplementary, identification and mapping photography. (See Annex H).
13. Vehicle Support. Vehicles were provided from the resources of 4 Fd Svy Sqn, 31 Sup Bn and 41 Sup Bn. Tasking included transportation to and from the AO, positioning of doppler parties, panelling, resupply and field completion within the AO. Each doppler team and each level team were allocated a Landrover and trailer for drive-on points.
14. The vehicles generally performed well with some major and minor repairs being carried out by the attached RAEME vehicle mechanic or local contractors. Two series 2A Landrovers were recovered to Darwin Wksp Pl with major engine failures. All vehicles have been returned to the relevant Supply Battalions. A summary of the mechanical repairs carried out on the vehicles involved on OP NERVOSE 85 is attached at Annex I.
15. Two tailgate loader equipped trucks proved an invaluable asset to the operation, giving flexibility when resupplying forward bases and prepositioning fuel.
16. A total of 209,750 kilometres were covered by the vehicles during the period of the operation.
17. Personnel Support. Personnel support was provided from Field Force Command and HQ 4 MD resources. Attached personnel worked well throughout the period of the operation and made a notable contribution to the successful completion of the operation.

ADMINISTRATION AND LOGISTICS

18. Manning. A total of 102 all ranks and one civilian pilot participated in OP NERVOSE 85. The high number of personnel was a result of the frequent changeover of AAAvn personnel (generally on a fortnightly basis). A nominal roll is provided at Annex J.
19. Visitors. Visitors to the AO were:
- a. GEN Sir Phillip Bennett AC, KBE, AO - CDF;
 - b. MAJ-GEN L.G. O'Donnell - GOC FF Comd;
 - c. COL A.W. Laing - DSVY-A;
 - d. LTCOL K. Murphy - SO1 (SVY) HQ FF Comd;

- e. MAJ W.J. Hatcher - HQ 4 MD Catering Officer;
- f. MAJ A.J. Vickers, RE - UK exchange officer, Army Survey Regiment;
- g. SQNLDR Bennett - OIC RAAF TINDAL redevelopment; and
- h. WO2 C. Hagenbach - HQ 4 MD Catering Supervisor.

20. Medical. Several minor health complaints ranging from infected insect bites to gastric trouble were treated through the local health centres and by use of the party first aid kits. One member was admitted to the Base Hospital, RAAF Darwin suffering from mumps. Another member was returned to Adelaide suffering from a broken ankle as a result of a fall at an organized PT parade.

21. No medical assistant was taken on the operation as personnel were at all times in close proximity to local hospitals or medical centres. All field parties and Forward Base locations had comprehensive first aid kits, prepared in consultation with the 4 MD RA. It should be noted for future operations in areas of sandflies, that the commercial repellent 'RID' is an extremely effective repellent and provided some relief from itching.

22. Pay and Allowances. All members received up to six pays in advance prior to deployment to the AO. Further pays were remitted on an as required basis from Adelaide by means of a cheque drawn in the member's favour. All members involved in the initial deployment to the AO were paid TA for the journey to the AO and the incidental element of TA at the review rate from the commencement of the operation until 15 Jul 85. All other allowances were paid retrospectively on return to parent unit after completion of the operation.

23. All unit members were required to make arrangements prior to the operation for sufficient monies to be allotted from their pay to provide for their dependants. Additionally, unit members were required to deposit sufficient cash in a bank account, capable of being operated in the AO, to cover intended weekly expenditure.

24. Rations. The rations procurement system operating during OP NERVOSE 85 worked well. A Survey Party Ration allowance of \$8.90 per man per day was forecast through 41 Sup Bn. Accounting procedures similar to the running of an imprest account were used with a monthly reconciliation being sent to RFO Adelaide. Purchases were made using a cheque account requiring two signatories to operate.

25. Total expenditure was \$28,420.65 (an amount of \$7.00 per man per day). The catering was of a very high standard. The professional approach of both the attached AACC members, coupled with their sense of humour, contributed to the high morale at all levels.

26. Accommodation.

- a. Tindal. Main base was accommodated in the transit accommodation supplied by RAAF Tindal located adjacent to the air strip during the period 28 May to 14 Aug 85. All domestic facilities were available, as were bulk AVTUR and AVGAS. Full darkroom facilities were established utilizing the old RAAF RAP building. An STD telephone and an HF radio system were established to provide communications both within and external to the AO.
- b. Katherine Show Grounds. Main base was moved to the Katherine Showgrounds on 14 Aug 85. Personnel were accommodated in a mixture of tentage and existing commercial facilities. Again, an STD telephone and an HF radio were established to provide communications. Problems were encountered with the distance from the airport; however, these were overcome by the judicious use of vehicles and ground to air communication.
- c. Oenpelli. The forward base was accommodated during the period 30 May to 10 Jun 85 in a house, hired from the local aboriginal community, and in tents. The house provided an operations area, ablutions and cooking facilities. The tents were used as sleeping quarters. As fuel sniffing was a problem in the local area, all but in-use fuel was stored in the police compound.
- d. Milingimbi. During the period 15 Jun to 30 Jun 85, the forward base was located at Milingimbi in tented accommodation adjacent to the airstrip. Power and water were supplied from local sources. Camp preparation was carried out by the local aboriginal community. Insertion to and extraction from Milingimbi was by RAAF Caribou. A vehicle was hired from the local community for the period as no military vehicle could be prepositioned economically.
- e. Wave Hill (Kalkaringi). Whilst at Wave Hill, forward base was located at the Police compound, using one of the cells as the operations room and the old trackers quarters and some tents as sleeping and dining facilities. An area adjacent to the police compound was made available for storage of AVTUR and for a helicopter landing area. The level of cooperation given by the OIC of the police station contributed to the success of this phase of the operation.
- f. Kununurra (WA). The APR flying and ground teams were accommodated in two houses hired from the WA Department of Agriculture. One house was used as a technical work area with a darkroom being set up in the bathroom, the other house was used for sleeping and dining facilities.

27. POL.

- a. AVTUR. Bulk AVTUR was purchased from Katherine, Narbarlek and Gove, using FST 18. Drummed AVTUR was prepositioned by HQ 7 MD at Oenpelli, Milingimbi, Elliott and Kalkaringi. Additional drummed AVTUR was purchased through SO2 LOG HQ 7 MD. Drums were positioned at other areas on an as required basis to satisfy operational requirements. Contamination of drummed AVTUR was almost nonexistent. A total of 25650 litres of bulk and 68200 litres of drummed AVTUR was used.
- b. AVGAS. Bulk AVGAS was purchased using FST18 from Katherine, Kununurra and Darwin. Drummed AVGAS was prepositioned at Milingimbi, Kalkaringi and Elliott by HQ 7 MD. A Total of 26074 litres of bulk and 19000 litres of drummed AVGAS was used.
- c. Callout Fees. Callout fees for refuelling aircraft at Katherine and Nhulunbuy were required to be paid during the operation. A total of \$1035 was spent on call out fees.
- d. MT Gas and Diesoline. Whilst based in the Katherine/Tindal area, bulk MT Gas supplies were obtained from RAAF Tindal. Bulk MT Gas was purchased using FST 18 for use by forward base at Oenpelli, Elliott, Wave Hill and Kununurra. Bulk and drummed Diesoline was purchased at Katherine and Wave Hill. A total of 41445 litres of bulk and 1800 litres of drummed MT gas, and 2335 litres of bulk and 2000 litres of drummed diesoline was used.
- e. Oils and Lubricants. Initial supplies were taken from Adelaide, and these were supplemented by Sup P1 HQ 7 MD on an as required basis. A total of 190 litres of Aero Oil was purchased using FST 18 and was used by the Queen Air for servicing and daily running.
- f. LPG. 315 kg of LPG in 45 kg bottles were taken to the AO from Adelaide. Further supplies were purchased in Katherine through HQ 7 MD. A total of 945 kg was used on the operation.
- g. Empty Drums. Where possible all drums were returned to an agent for credit. A total of 301 drums (\$30 per drum) were recovered and the credit notes despatched to HQ 7 MD.

28. Stores and Equipment. Logistic support for the operation was generally satisfactory and used a mixture of service means and overnight transport. However, in one case it took seven days to deliver an overnight despatch of an aircraft tyre from Townsville to Tindal.

29. The majority of stores and equipment were supplied from 4 Fd Svy Sqn resources. Any shortfalls were supplied as loan stores from 41 Sup Bn. Some stores were written off due to normal wear and tear, and operational damage. (see Annex K).

30. The following technical stores were loaned from other RASvy units/agencies:
- a. 4 x ANPRR 14 geocivers, 2 Fd Svy Sqn, 26 May to 14 Jul 85;
 - b. 2 x Magnavox MX1502, 2 Fd Svy Sqn, 26 May to 10 Aug 85;
 - c. 2 x Magnavox MX1502, ASO, Darwin, 12 Jul to 6 Aug 85;
 - d. 3 x Magnavox MX1502, SA Lands, 7 Aug to 30 Sep 85;
 - e. 2 x Astromast towers, 2 Fd Svy Sqn;
 - f. 2 x RC10 cameras, 2 Fd Svy Sqn;
 - g. 1 x APR, 2 Fd Svy Sqn; and
 - h. 2 x KERN GK1-A levels, 5 Fd Svy Sqn.
31. Morale. Morale was at a high level throughout the operation.
32. Discipline. There were no chargeable military offences during the operation.
33. Communications. Communications within the AO were maintained using ANPRC F1 and 47 radio sets, and Telecom Credit Cards. Although IPSO charts were consulted for frequency selection, substantial difficulties were experienced throughout the operation resulting in communications being normally usable only between the hours of 0800 and 1700 daily.
34. Mail. A private mail bag was established at the Katherine Post Office for official and private mail. Every opportunity was taken to deliver mail to personnel on remote stations.
35. Finance. A petty cash advance of \$500 was issued by RFO Adelaide. This advance was acquitted on a regular basis with RFO Darwin. All other financial expenditure on T&S, F&C and POL were handled through RFO Adelaide and RFO Darwin. The ration accounting procedure was similar to that used for an imprest account. A breakdown, of expenditure, by financial year, is given in Annex L.
36. Amenities. A video and TV set were provided as base camp entertainment by the 4 MD Amenities fund with the cost of the video hire being shared by members. This proved most successful and was excellent for morale.
37. Liquor Permits. Liquor Permits were obtained from the NT Liquor Commission covering the duration of the operation and for each area visited.

CONCLUSION

38. OP NERVOSE 85 was successfully carried out with all the major tasks being achieved within the proposed timeframe. The unit members and attached personnel worked well and contributed to this success.

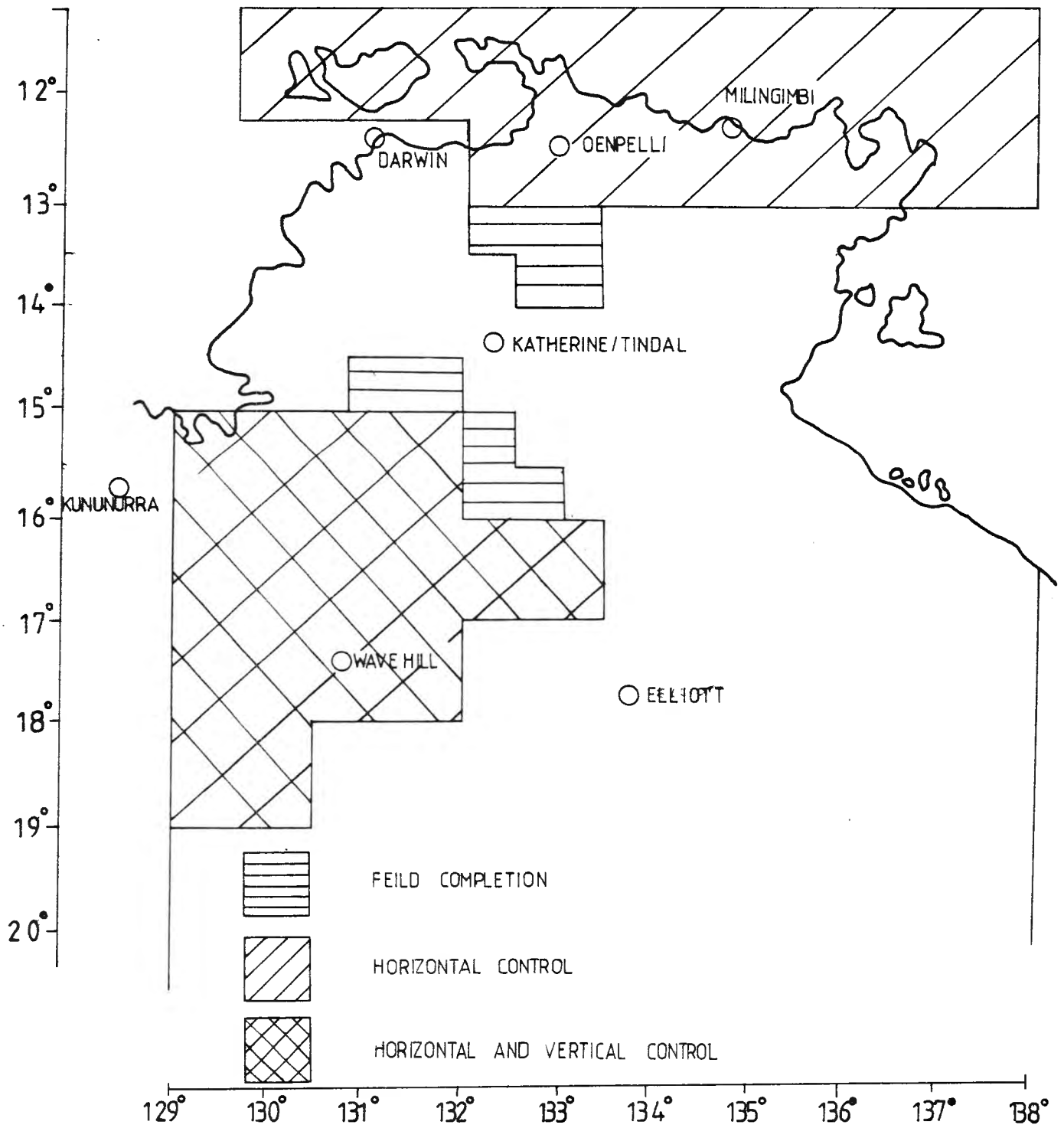
Feb 86



(D. TAYLOR)
Major
Officer Commanding

- Annexes:
- A. Operation NERVOSE 85 - Area of Operations
 - B. Control Survey Technical Report
 - C. APR Technical Reconnaissance Report
 - D. APR Technical Report
 - E. APR Level Connection Report
 - F. Field Completion Report
 - G. Aerial Photography Report
 - H. Aircraft Usage Graphs
 - I. Summary of Mechanical Repairs
 - J. Nominal Roll
 - K. Stores Written Off in AO
 - L. Summary of Expenditure

AREA OF OPERATIONS



CONTROL SURVEY TECHNICAL REPORT

INTRODUCTION

General

1. This report covers the technical aspects of the control survey phase of OP NERVOSE 85. It describes the planning prior to the operation and the methods used to achieve the required results.

Area of Interest

2. The topography changes from steep scarp plateaux to sand dunal desert and coastal swamps. The predominant vegetation ranges from Mangrove to open savannah and spinifex.

Objectives

3. The OP NERVOSE 85 Control Survey phase had the following objectives:

- a. Acquire control to 1:50,000 mapping specifications suitable for aerotriangulation on 1:65000 photography. *
- b. Panel all new stations and selected existing stations which satisfy the positional requirements for aerotriangulation.

** They are now going to use the existing recent 1:80000 photography!*

PLANNING

4. Technical planning commenced in 1984. The planning criteria used was aerotriangulation blocks of 1:250 000 map areas using the following perimeter control distribution:

- a. Horizontal control points every sixth model on the top and bottom of each area, and
- b. Horizontal control points located on every third run of mapping photography along the edges of each area.

All existing horizontal control was checked for suitability. New control points were proposed in areas not meeting the above criteria. The proposal was submitted to Army Survey Regiment (ASR) for appraisal by the aerotriangulation section.

1984

5. In Dec 85, ASR submitted a proposed horizontal control plan to DSVY-A. Previous survey operations in the Northern Territory had obtained horizontal control for 1:50 000 mapping and aerotriangulation on 1:80 000 photography. The proposed plan was based on an AO stretching across the top of the Northern Territory from Bathurst Island to Gove and then down to the Queensland border near Calvert Hills.

6. As a result of the RASvy planning conference in Mar 85, the AO was ammended to delete the horizontal control along the Eastern edge of the Northern Territory below 13°S to the Queensland border. The West Australian/Northern Territory border areas of Auvergne, Delamere, Waterloo, Limbunya and Birrindudu were added to the AO. These changes were as a result of changes in priority for acquisition of mapping photography by the RAAF.

7. The map areas of victoria River Downs, Daly Waters, New Castle Waters, Wave Hill and Beetaloo were later added as priority two area. The acquisition of control in these areas coicided with the vertical control programme and was only to proceed if time, manpower and equipment availability permitted.

8. This plan was accepted by DSVY-A on 20 May 85 and the operational acquisition programme commenced on 30 May 85. In Jun 85, the AO was ammended by DSVY-A after discussions with NATMAP. The map areas of New Castle waters and Beetaloo were removed from the AO.

9. Geoceiver Operations. Operation timings were established using the following criteria:

a. Arnhem Land area. One master station and three remote parties using four ANPRR14 Equipments.

b. AO to South West of Katherine.

(1) 1 Jul to 14 Jul 85. one master station and five remote parties using four ANPRR14 and two Magnavox MX1502.

(2) 15 Jul to end of programme. one master station and one remote party using two Magnavox MX1502.

Planning figures were based on an occupation rate of three days per station. With five satellites available to be tracked, this was assumed to be the worst possible case.

EXECUTION

Geoceiver Operations

10. Deployment rate. The normal mode of deployment was to arrive on station in the afternoon, set up and track until the second night and then move to the next station on the following day (i.e. one full day and two nights tracking). Where equipment serviceability and satellite distribution allowed, this gave ample time to acquire the required number of passes. Travelling time, equipment and satellite unserviceability, satellite distribution and rest time added to the overall time required to give an average of 4.25 days per station. The stations occupied are shown at Appendix 1.

11. Doppler Equipment. The following equipments were used:

- a. RASVY.
 - (1) Geociever ANPRR 14, Serial numbers 053, 056, 057 and 058.
 - (2) Magnavox MX1502. Serial numbers 307 and 335.
- b. Australian Survey Office, Darwin.
 - (1) Magnovox MX1502 Serial numbers 539 and 546.
- c. Lands Department, South Australia.
 - (1) Magnavox MX1502 Serial numbers 312, 341 and 343.

The use of equipments loaned from the Australian Survey office and the Lands Department of South Australia allowed observations to continue throughout the period of OP NERVOSE and allowed observation of all priority two stations.

12. Satellites observed. The serial numbers of satellites observed were:

- a. 30110/93,
- b. 30130/59,
- c. 30200/77,
- d. 30480/105, and
- e. 30500/115.

13. Number of Passes. The minimum requirement was for 18 common acceptable passes in each data set tracked by both the master and the remote stations. Each data set was to have:

- a. as many North going passes as south 2,
- b. as many East passes as West 2, and
- c. at least four passes above 60° elevation.

Each pass to be acceptable had to have at least four minutes of uninterrupted data either side of closest approach point and to have been tracked by both the master and the remote stations. To achieve this it was sometimes necessary to track over 40 good passes at some of the remote stations.

14. Quality Control. Quality control of data was achieved as follows:

- a. Pass Balance. As well as plotting the satellite paths graphically to check the balance of passes, remote parties were required to relay the pass details to the master station for checking. No observing party was moved until the satellite pass geometry at the station had been checked and approved by either forward or main base.

- b. Alternate Data Checks. Each party using ANPRR14 equipment was required to carry out alternate data checks on all observed passes.
- c. Station Documentation. Upon completion of occupation of each station, all station documentation and data were forwarded by safe hand to either Forward or Main Base. All station documentation was checked for completeness and accuracy, and all data duplicated.

15. Problems Encountered with Geociever Observations. In general, equipment serviceability was good, with the following exceptions:

- a. Satellites.
 - (1) Satellite 30480/105 experienced early problems with alternate data checks. Observations to this satellite were accepted upon advice from DSVY-A with alternate data checks with plus or minus 300 micro seconds. This satellite was removed from service during the period 011158Z to 021324Z Jul 85.
 - (2) Satellite 30500/115 was removed from service from 080850Z Jul 85 until 081730Z Jul 85.
- b. Generators. Although all generators were tested prior to deployment, many of the 500W generators gave problems.
- c. Geocievers. Numerous minor problems occurred with both ANPRR14 and MX1502 equipments. The problems encountered are given at Appendix 1 to this Annex.

16. Station Marking. In all cases, station marking consisted of an RASvy brass plaque stamped with station identification, set in concrete and poured in situ. Three recovery marks and a galvanised iron pipe witness post were positioned for station recovery. The witness post was painted white, capped and stamped with the station number.

17. Panelling/Reconnaissance. A reconnaissance party was responsible for panelling existing stations and for the reconnaissance either by LOH or vehicle of the majority of geociever stations. Where necessary other personnel from both forward and main bases were employed for panelling/reconnaissance tasks.

18. Forward Bases. Forward bases were established consecutively at Oenpelli, Milingimbi and Kalkaringi (Wave Hill).

19. Forward base was colacted with the main base for various periods between deployments to the designated forward base locations. The main base locations at Tindal, and later Katherine, were central to the AO and all areas of the AO were easily accessible by road or air.

20. LOH and Vehicle Deployment. From the forward base locations of Oenpelli and Milingimbi, field parties were deployed by LOH due to the nature of the terrain. Generally three loads were required to establish a station. From the forward base at Kalkaringi, composite moves by LOH and vehicle were carried out. To conserve aircraft hours, parties would drive to the closest homestead to their station and then insertion would continue by LOH from that location. Extraction in most cases was carried out in the same manner.

21. Operational Difficulties. The following problems hampered operational progress:

- a. High Temperatures. High temperatures and strong winds hampered some LOH movement. They caused a decrease in payload and cruising speed, resulting in an increase in fuel consumption.
- b. Entry to Aboriginal Lands. HQ 7 MD were advised of the AO and the requirement to enter upon proclaimed aboriginal lands in Mar 85. Final approval from the Northern Land Council was given on 13 Jun 85 after visits were made by the OC to the traditional land owners. The late notification of permission placed in jeopardy the planned deployment to Milingimbi on 16 Jun 85. The visits to the traditional owners scattered across the northern part of the AO resulted in unplanned use of LOH hours.

22. Landowners. Prior to the commencement of OP NERVOSE, HQ 4 MD had sent letters requesting permission to enter upon and survey private property to all land owners in the AO. It was squadron policy, where possible, for all observing parties to visit the station homesteads prior to entry upon private land. Generally, station staff were very hospitable and provided much assistance and useful information.

CONCLUSIONS

23. The horizontal control phase of OP NERVOSE 85 was a successfully planned and conducted phase. Whilst the majority of those involved in this phase of the operation had only minimum experience in survey control prior to deployment, the results and amount of work achieved can be attributed to their enthusiasm and determination and the cooperative spirit which existed between survey and support personnel.

Appendice: 1. RAEME Support Report

APPENDIX 1 TO
ANNEX B TO
PROJECT REPORT
OP NERVOSE 85
DATED FEB 86

RAEME SUPPORT REPORT

1. Equipment Failures MX1502

a. Equipment 001.

- (1) Lost Alert Data. When on Standby, power supply faulty. Replaced. Nil downtime.
- (2) Error 'C'. Unable to locate end of data. MFE Brand type was depositing residue on the read/write head. Recommended constant attention to heads (ie Keep clean at all times). 6 hrs downtime.
- (3) Ref OSC offset too high above 40 Hz replaced all cards and Ref OSC - fault still occurring. Set still obtains 3D passes. 6 hrs downtime.
- (4) No 3D passes. Residual limit exceeded. This occurred mainly in rocky and sandy conditions increased residual limit .4 to .7 No downtime.

(b) Equipment 002.

- (1) Error 'C'. Unable to rewind to find end of data. Replaced cassette transport control board. 20 hrs downtime, (16 hrs due to poor communications, 1 hr due to aircraft on other tasks 2 hrs flying time).
- (2) Error 'C'. No data being transferred to tapes. Replaced cassette transport.
- (3) No display, audible alarm. Battery Meter reading off scale. Changed Battery Set OK. No downtime.
- (4) Intermittent display. When switching from power save mode to power up, display would illuminate for 10-15 seconds. Dust in edge connector of alarm clock board. 2 hrs downtime (1 hr due to flight time).

2. Equipment Failures AN PRR 14

(a) Equipment 053

- (1) Mode 3,4,5 and 6 failed. No - 10 volt supply line. Replaced power supply. No downtime. Fault took approx 1.2 hrs to locate and repair.
- (2) Alternate data on Satellites 105 + 115 not acceptable. Satellites at fault. All sets had this problem. No downtime.
- (3) Paper-breaking punch-head too tight, loosened. Downtime 30 mins.

b. Equipment 056.

- (1) Ext batteries reading low even when generator running. One battery had cracked terminal, replaced battery. No downtime.
- (2) Losing clock sync. Low electrolyte level in one battery. Replaced battery 3 hrs downtime.
- (3) Punch failed to operate. Connector U/S. Pins not making contact with cable. 20 hrs downtime. 16 hrs due to lack of aircraft and light. 2 hours flying time.

c. Equipment 057.

- (1) Doppler count out replaced card 2001. No downtime.
- (2) Mode 3 and 4 failed. Replaced all related cards. 4 hrs downtime.

d. Equipment 058.

- (1) Mode 3 high adjusted Test Generator 4 hrs downtime.
- (2) Punch fell 7m from helicopter, 1st character punch pin bent - replaced. No downtime. Inspection only.
- (3) Top three punch pins sticking. Bailing solenoid loose. Tightened mounts. Downtime 4 hrs. (U/S attributed to fall from aircraft.)
- (4) Mode 3 and 4 failed. Replaced card 301. 3 hrs downtime.
- (5) Alternate Data failed on Satellites 59, 177. Faulty preamp. Changed preamp. 4 hrs downtime. Preamp repaired by S.W.C. and returned.

3. Recommendations

The following advice is recommended:

- a. A preventative maintenance sheet be placed in the geociever log book.
- b. The use of low maintenance batteries in place of the lead acid type in service at the present. A fully sealed marine battery would be ideal. This would save problems in acid level and weather conditions because the batteries are left in the weather whilst on station.
- c. RASVY investigate the purchase of better quality Data Recording Tape for the MX 1502, as the MFE brand caused problems on this operation.

- d. A new method of recording information from the PRR 14 should be introduced because of the effect humidity has on the paper tape causing many big problems which are:
- (1) Paper tearing during a pass.
 - (2) When the passes are recorded onto magnetic tape and there has been a problem with moisture as the holes in the tape become elongated so the tape reader rejects the passes. They have no way of editing or repairing the tape. Half the problem would be solved if a Teleprinter was taken on the operation then editing could be done.
 - (3) Miss punching of characters.
- e. All doppler equipments need complete overhauls.
- f. A small vacuum cleaner (12 Volt) would be very handy, so that the outside of the equipment can be properly cleaned before opening. This is even more important on the 1502's.

*Been done
many times
before!*

APR RECONNAISSANCE REPORT

Introduction

1. Experience from previous APR operations indicated a definite requirement to locate and in many cases target suitable vertical control points prior to the commencement of APR flying for the following reasons:

- a. To assist APR aircraft navigation in areas of sparse detail,
- b. To reduce the length of level traverses, and
- c. Provide sufficient planning time to establish new control in areas where existing control has been destroyed or cannot be located.

Resources

2. Resources allocated for the reconnaissance task were as follows:

- a. 1 x Truck, utility, light, GS fitted for radio;
- b. 1 x Trailer, cargo, light, $\frac{1}{2}$ ton, GS;
- c. 1 x Vehicle Orientation System FOA 25 (see Appendix 1); and
- d. Stores as required.

Personnel

3. The following personnel were involved:

- a. 6708956 SSGT B.J. Lutwyche, and
- b. 180949 SPR R.P. Beavis.

Timings

4. Reconnaissance of vehicle accessible vertical control points commenced on 28 May 85 and was completed on 13 Jul 85. Reconnaissance of the remaining points was by LOH and was completed on 16 Jul 85. By this time the requirement for several additional Doppler stations was known and these were established on intersecting profile lines after profiles were flown in Aug 85.

Methods employed

5. The reconnaissance team was self contained once deployed, purchasing fuel using FST 18's and rations using the unit rations account from the following resupply bases within the AO:

- a. Elliott,
- b. Kalkaringi, and
- c. Kununurra.

6. Reconnaissance was carried out in the field for periods of up to six days without resupply by carrying sufficient fuel, water and rations for the period.

7. As suitable vertical control points were located they were marked on both the ground and map and detailed access notes compiled for inclusion in levelling packages. Those points that were in areas considered difficult for air navigation were targetted in standard configurations with pre-cut 10 metre length panel arms.

Problems Encountered

8. No insurmountable problems were encountered however progress was impeded by the following:

- a. Damaged and Destroyed Vertical Control Points. A minority of benchmarks identified for use at the planning stage were found to have been damaged/destroyed during upgrading of roads by graders or bulldozers. Even more frustrating was the discovery of benchmarks consisting of steps cut into the base of blazed trees being so badly overgrown that the bench mark step was unusable even though the blazed identification shield was quite recognisable. In all cases the next closest vertical control station was located and used.
- b. Overgrown Access Tracks. Many of the vertical control points used were located on stock routes established in the 1950's and 1960's. Most of these stock routes are no longer used and many have had no use or maintenance for many years. Extreme difficulty was encountered in locating and following these overgrown tracks due to the extensive regrowth particularly in areas of recent bushfire. Progress was further impeded by the high incidence of staked tyres and the inability to sight navigation features due to the density of scrub regrowth. In most cases the points required in these areas were located by vehicle. The one exception was located by LOH.

Work completed

9. A total of 104 vertical control points were located of which 50 were targetted. Four of these were deleted from the South East section of the original project area early in the operation and an additional five were not used due partly to additional Doppler stations being established in closer proximity to profile lines.

Appendix: 1. User Evaluation of Vehicle Compass System

USER EVALUATION OF VEHICLE COMPASS SYSTEM

- References:
- A. Dept of Defence A463-18-192 of 12 Jul 84
 - B. 4 Fd Svy Sqn Operation Order 2/85 dated 8 May 85

Background

1. 4 Fd Svy Sqn obtained on loan from Materiel Branch, a vehicle compass system as a navigation aid during the vertical control reconnaissance phase of OP NERVOSE 85.

Aim

2. The aim of the evaluation was as stated in Ref A.

VCS Equipment

3. Teldix Vehicle Orientation System (VOS) FOA 25.

Evaluation Agency

4. 4 Fd Svy Sqn.

Support Agency

5. Adelaide Workshop Coy.

Tasks

6. Not stated in Reference A but generally as per Annex C to Reference A and as stated in para 1.

Evaluation Conducting Officer

7. 6708956 SSGT B.J. Lutwyche.

General Outline

8. Planning for the Airborne Profile Recorder (APR) phase of OP NERVOSE 85 identified the requirement for a ground navigation aid to assist in locating vertical control points mainly in substantially featureless terrain in the Northern Tanami Desert area of the Northern Territory.

9. 4 Fd Svy Sqn requested the loan of a Teldix VOS FOA 25 from Materiel Branch in Feb 85 and the equipment was made available in May 85.

10. The VOS FOA 25 arrived in Adelaide on 20 May 85 and was installed in a vehicle with a temporary 24V power supply on 21 May for purposes of testing, calibration and operator training.

11. The equipment was later installed in a Truck, utility, light, GS fitted for radio, by Adelaide Workshop Coy personnel and transported to Alice Springs by rail on 24 May 85.

12. The vehicle installed with the VOS FOA 25 arrived in Alice Springs on 26 May 85 and was then driven to Elliott (see Annex A to Reference B) arriving on 27 May 85.

13. The equipment was calibrated in the area of operations (AO) and remained in use in the vehicle until removed by support agency personnel on 8 Jun 85 due to a power supply problem.

Data Obtained

14. No data which could facilitate interpretation of results was obtained for the following reasons:

- a. Insufficient time available prior to the commencement of the operation,
- b. Priority on operational tasks, and
- c. Equipment removed in the field during the operation.

Method

15. The system calibration and operating methods were at all times as per the Operating Instructions provided with the equipment, however the usefulness of the system as far as application to the operational task was minimal and conclusive evaluation was limited for the following reasons:

- a. Much of the AO was substantially featureless and had only Series R502 1:250 000 map coverage,
- b. Some Series R502 1:250 000 maps did not have metric grid overprints resulting in the equipment not being able to function, and
- c. That area of the AO with 1:100 000 map coverage had insufficient features to enable the VOS to be positionally updated as regularly as required for optimum results.

Conclusions

16. Observations from using the VOS FOA 25 on a survey reconnaissance task have resulted in the following conclusions:

- a. The VOS FOA 25 was unsuitable for this particular survey task for reasons stated in para 15. In areas with sufficient detail available for regular positional updates the system would still not have any application, other than being a "handy extra", as unassisted visual navigation would be sufficient for the task.
- b. In those areas where testing was able to be carried out with reasonable time intervals between position updates (not necessarily as specified in the Operating Instructions) the system performed satisfactorily within stated specifications.

- c. The evaluation team is convinced that the system could be extremely effective in a vehicle with restricted vision (ie tank, APC etc) providing position updating criteria could be fulfilled.

17. It should be noted that the horizontal accuracy of class A1 mapping is 0.5 mm which puts some suspicion on the suitability of mapping scales smaller than 1:50,000 being used for determination of the Distance Adjustment Factor.

Recommendations

18. In order to obtain conclusive results it is recommended that future evaluations be conducted only in densely detailed areas and using larger scale maps.

APR TECHNICAL REPORT

GENERAL

1. The report details the execution of the APR phase of OPERATION NERVOSE 85. The APR team comprised members from both 4 and 2 Fd Svy Sqn with a civilian pilot. The aim was to obtain vertical control to 1:50 000 mapping specifications from 1:65 000 aerial photography. The APR phase of the operation was centred in the North West of the Northern Territory from 15 Jul to 14 Sep.

2. The area of operations covered the following 1:250,000 map sheets:

- a. SD 52-15 Auvergne,
- b. SD 52-16 Delamere,
- c. SE 52-3 Waterloo,
- d. SE 52-4 Victoria River Downs,
- e. SE 53-1 Daly Waters,
- f. SE 52-7 Limbunya,
- g. SE 52-8 Wave Hill, and
- h. SE 52-11 Birrindudu.

OPERATIONS

Planning Phase

3. Technical planning was conducted by 4 Fd Svy Sqn. The final technical plan is shown at Appendix 6.

Timings

4. The timings for the APR Phase of OP NERVOSE 85 were as follows:

- a. 10 Jul - APR team arrive in AO,
- b. 16 Jul - APR aircraft arrives Tindal,
- c. 17 Jul - APR ops commenced,
- d. 29 Aug - APR ops ceased,
- e. 10 Sep - aircraft released,
- f. 12 Sep - stores RTU, and
- g. 12 Sep - personnel RTU.

Operating Base

5. APR operations were conducted from RAAF base Tindal and the Kimberley Research Station, Kununurra. Both locations offered suitable operating facilities. At Tindal, whilst the facilities were suitable, they were extremely dusty and some dust worked its way into the electronic equipment.

Air Support

6. A Beechcraft Queenair, VH-MWK chartered from Airsearch Aviation of Essendon, Victoria was used for the operation. The aircraft was fitted with APR equipment, an RC10 camera and a Litton 3000 Omega navigation system. The success obtained from using the Litton 3000 varied on occasions (see Appendix 1).

7. The aircraft suffered two mechanical problems:

- a. The starter motor became unserviceable on 11 Aug 85 which resulted in a small delay to the flying programme, and
- b. The generator on the starboard engine failed in the air on 24 Aug 85. Flying recommenced on 28 Aug 85.

8. The total aircraft hours flown to obtain APR profiles was 165.65 hours, including ferry to and from the AO.

APR Equipment

9. Throughout the operation the equipments performance was very poor. However, the consequent disruption to the flying programme was kept to a minimum due to the efficient manner in which the RAEME technicians operated. The daily availability of APR equipment is at Appendix 2 and the details of equipment failures is given at Appendix 3.

10. Seven days were lost at the start of the APR phase due to various equipment problems. The first acceptable water-test results were obtained on the seventh day of flying. A combination of both minor and major APR problems continued throughout the operation. This hampered progress significantly. The problems encountered are put down to the age of the equipment and the length of time since its last service.

11. The APR was kept serviceable throughout most of the operation as a result of the large spares 'back up'. There were, however, problems experienced with the 70 mm camera for which there is no spare. The 70 mm camera slits were a problem as some had uneven slit widths which resulted in over-exposed 'lines' appearing over the length of the film.

12. The facilities at Tindal for RAEME to work and store their equipment and spares was good. The ATCO hut (located on the back of a MK5 truck) provided for storage/work space at Kununurra proved to be too small. RAEME were forced to use adjacent hanger space to house their stores. This was not a problem; however, on future operations it could be if additional space is unavailable.

13. On future operations, if the ATCO hut arrangement is used, a purpose built ladder with safety rails should be constructed prior to the hut's use. This would ensure the safety of both men and costly equipment. The APR team constructed a make-shift ladder but this did not provide the safety required when climbing up into the truck.

14. The software for the Hewlett Packard 9815A which is used as a backup to the Tektronix 4052 was found on two occasions to produce erroneous results. An example of such an occasion is shown Appendix 4. The results were computed using the same data tape.

Flying Conditions

15. Most of the flying conducted from Tindal was in cloud free sky. Turbulence was minimal. When operations were conducted from Kununurra, cloud and tubulence became a problem. Excessive turbulence often forced the profiling height to be in excess of 10,000, and on a few occasions 12,000 was the profiling attitude. Oxygen and masks were provided by Airsearch.

Achievements

16. A total of 32 profiles were flown successfully, covering approximately 6950 line kilometres. A further 42 profiles were aborted during the same period.

ADMINISTRATION AND LOGISTICS

Personnel

17. The APR team consisted of 10 personnel. The number of personnel allocated to the operation allowed two teams of APR and Air camera operators to be employed with a 'common' navigator. The pilot can fly a maximum of thirty hours per seven days. By flying approximately seven hours every second day this meant that each team would fly once in four days. Unfortunately the poor performance of the equipment did not always allow this to happen.

18. Three members of the APR team were extracted from the area of operations prior to the completion of the operation. One was RTU with a broken foot and two for personal family reasons. CAPT C. Mazur was RTU for his wife's confinement.

19. Throughout the operation the APR team benefitted from a dedicated photo-tech. A report on the APR photo equipment is included as Appendix 4. A number of benefits are gained by having a dedicated photo-tech. These are:

- a. all photographic products are of professional quality,
- b. extra time is available for the rest of the team to work on computations, and
- c. one possible source of error with the data is virtually eliminated.

20. Not all members of the APR team were able to drive the Landrovers. Two members had no licences at all. Due to the circumstance of distance between airport and quarters the movement of stores and personnel were hampered on occasion.

21. All members of the APR team worked hard to get the job done against poor equipment availability.

22. The assistance and understanding of the civilian pilot, Mr J. Millar, towards the operations helped immensely. That assistance both on the ground and in the air is much appreciated.

Vehicles

23. Two Landrovers series 3 and one Truck Cargo 5 ton were used during the period the APR team operated from Kununurra. Only a few minor problems were experienced and the vehicles remained serviceable for the duration of the operation.

Logistics

24. All logistical requirements for the APR phase of the operation were met by 4 Fd Svy Sqn.

MATERIAL AND SERVICES

25. POL.

- a. Bulk AVGAS was used from Tindal and Kununurra airports through contract resellers on SP27. Drummed fuel was used at Elliot, Wave Hill, and Kununurra. At Kununurra drummed fuel was only used when bulk stocks were unavailable.
- b. MT Spirit was obtained from RAAF base Tindal and was purchased from Kununurra Essential Services, Kununurra.
- c. Oils and lubricants were obtained from unit resources.
- d. Aero oil was procured by 4 Fd Svy Sqn from Katherine.

26. Rations. All members ate fresh rations at both Tindal and Kununurra. The fresh rations were supplemented by canned rations that were transported along with the stores from Tindal. Fresh rations at Kununurra were purchased from the Ord River Co-op as part of the 4 Fd Svy Sqn ration account.

27. Accommodation. On the reconnaissance suitable accommodation was difficult to secure at Kununurra, however two houses were rented at the Kimberley Research Station. One house was used for office space and the other for accommodation. The bathroom and laundry of one house was used as a darkroom. Periods of occupation in each location were:

- a. RAAF base Tindal 10 Jul - 8 Aug 85, and
- b. Kimberley Research Station 9 Aug 85 - 12 Sep 85.

28. Communications.

- a. A Telecom credit card was used for all business calls.
- b. Both the Katherine and Kununurra Post-Offices were used for mail requirements.
- c. Radio contact was established and maintained at Kununurra between RAAF base Tindal/Katherine Showgrounds and Wave Hill.

29. Medical. The local district hospitals at Kununurra and Katherine were available to members for medical treatment.

30. Pay. All members were paid in advance prior to the start of the operation.

CONCLUSIONS

31. Despite equipment problems the APR operation was successful.

32. The personnel allocated to the APR team both in numbers and employment category worked very well.

33. The office accommodation was good in both locations however the dusty environment at Tindal was a poor location for the electronic equipment. The ATCO hut alone was not sufficient for RAEME requirements.

34. The repeatability of results from the Hewlett Packard 9815A is in doubt and our method of using data cassette tapes should be examined.

RECOMMENDATIONS

35. It is recommended that:

- a. All the electronic equipment used by the APR team be thoroughly cleaned to remove any dust that has penetrated the equipment. (Paragraph 33)
- b. The APR equipment is given a service after each operation. (Paragraph 10) *Normal on past ops*
- c. The strength and composition of the APR team in future remains unchanged. (Paragraph 32)
- d. An examination of the APR software be conducted to improve the overall quality of current programs.
- e. The quality control of 70mm camera slits be examined. (Paragraph 11)

- Appendices:
1. LITTON 3000 Navigation System
 2. APR Daily Occurrence
 3. APR Equipment Failures
 4. HP 9815 A Printout
 5. APR Photographic Report
 6. APR Technical Plan

LITTON 3000 NAVIGATION SYSTEM

1. The Litton 3000 was installed in Airsearch's VH-MWK in the ferry-pack configuration. That is, it was designed to give the pilot direction information from one point to another. The Litton is installed between the front two seats in the aircraft. The controls are approximately 8" above the cockpit floor.
2. To operate the Litton, the pilot must manually enter into the equipment the aircraft's airspeed and heading. When used in the ferry-pack configuration very few airspeed and heading changes are made if flying from one point to another. Thus any error in the values entered for heading and airspeed are negligible.
3. When using the Litton 3000 in the navigation mode many heading changes need to be entered in flight. The equipment has a very crude system for inputting heading and airspeed values. It consists of two dials - one for heading, one for airspeed. Each dial has a cardboard scale (circular) which is rotated until the appropriate value is entered. These dials do not allow accurate values to be input into the Litton. They are also very easily turned accidentally in flight by either the pilot, navigator or air camera operator. This feature added to the machine's own error resulted in occasional errors in the aircrafts position.
4. The leading and true airspeed dials are located in a position, which for the pilot as he had to divert his gaze from the DRU meter to adjust the dials. It would be better if the Litton was coupled to the gyro-compass (autopilot) which would negate the need to set the heading and air speed on the instrument.
5. If the equipment is used on subsequent Ops it should be mounted on or in the instrument panel so that the pilot can operate the Litton and fly the aircraft simultaneously.
6. By using the Litton 3000, it was possible to navigate to within 5 km (approx) of a given point. It would have been very difficult to locate some points in the AO without the Omega system.

APR DAILY OCCURRENCE

Serial	Date	Lines flown *		Problems with Equipment/Occurrence
		NV	85	
(a)	(b)	(c)		(d)
1.	10 July 85			Set up office, compute existing intersection points from previous operations.
2.	11			
3.	12			
4.	13			
5.	14			
6.	15			
7.	16			
8.	17			On ground eqpt not receiving sufficient power. Water test results unacceptable.
9.	18			Laser failed. Water test results unacceptable.
10.	19			Data recorder stopped in flight. Laser 'dropping-out'.
11.	20			Data recorder problems.
12.	21			Problem with BRU and BAU.
13.	22			Water-test results rejected.
14.	23			Morning water test rejected. Afternoon water test OK.
15.	24			70mm film indicates 'ribbing'. Take-up is jerking film.
16.	25			Pilots day off.
17.	26		42,43,44A,44B, 45,46,47,49,50	First day of APR profiling.
18.	27			Office work 70mm slit replaced.
19.	28			70mm film drive speed (V/H) too fast, voltage drop to 15V.
20.	29		52,53,55,57,58, 59,60,71,72,73, 74,79,80,81A, 81B	Profiles flown slit plate replaced.
21.	30			Data recorder 'froze' after 4mms profiling. Iris control 70mm not working. Slit plate replaced.
22.	31			Aircraft flew to Darwin (100 hr).

* and accepted

(a)	(b)	(c)	(d)
23.	1 Aug		Rest day.
24.	2		Office work.
25.	3		Aircraft arrived from Darwin.
26.	4	22,23,27,28,29, 25,26,84,85,86, 91,92	Profiles flown.
27.	5	17,18,31,32,33, 39,40,41,66A, 66B,66C,99	Data recorder froze in flight. BRU step noticed.
28.	6		Office work.
29.	7		Office work.
30.	8		Pack stores for move.
31.	9		Move to Kununurra. Laser stopped in flight, all lines rejected.
32.	10		Pilots rest day.
33.	11		Starter motor on aircraft replaced. Data recorder timing stopped.
34.	12	75,76,77,78A 78B,82,83	Profiles flown. (BRU stepping).
35.	13	34,35,36,37,65, 66	Profiles flown. Considerable turbulence. (BRU stepping).
36.	14		Office work.
37.	15	67,68,69,70,71, 89,90	Intermittant data recorder problems. Profiles flown.
38.	16		Profiles flown. Turbulence too strong. Error in navigation.
39.	17		Office work.
40.	18	18,19,20,21	Occasional laser drop out.
41.	19	23,24,67,68,69	Laser failed. RAEME fixed. Profiles flown, 'ribbing' on 70mm.
42.	20	05,09,10,11	RC10 camera problem with film transporting. Profiles flown.
43.	21		Pilots rest day.
44.	22	15,16,40B,41,95, 96,97,98	Data recorder 'froze' 70mm 'ribbing' on film. Profiles flown.

(a)	(b)	(c)	(d)
45.	23		Profiles flown. Nil results. Laser, trigger system and power supply problems.
46.	24	12,13,14	Laser problems, star-board generator failed (MWK).
47.	25		Office work.
48.	26		Office work.
49.	27		New generator installed.
50.	28	6,7,8,93,94	Profiles flown. APR worked OK.

APR EQUIPMENT FAILURES

1. The table below lists the major equipment failures during OP Nervose 85 (APR):

Ser (a)	Equipment (b)	No (c)	Fault Indication (d)	Fault (e)	Action (f)
1	Laser	1	Laser dropout	Low power	Returned to Sydney
2	Laser	3	Laser dropout	Diffused beam	Replaced small field stop with large
3	Laser	2	Laser cut out	No output	Held until completion of operation
4	Data Rec	3	Displayed 'REC NOT READY' when tape loaded		Returned to Sydney
5	Data Rec (Note)	1	Suddenly stopped running	Intermittent	Tested but no fault located
6	Data Rec	4	Would not run continuously for more than one hour		Returned to Sydney
7	Data Rec	3	Would not recognise an unrecorded tape track		Used only completely blank tapes
8	Data Rec	1	Would not respond to computer control		Held until completion of operation
9	Bank Angle Unit (Note)	3	High altitude roll tests not working	Not giving linear output	Completely realigned unit
10	Barometric Reference Unit	2	No calibration flag to data recorder	Micro-switch not being activated	Adjusted micro switch on BRU
11	Barometric Reference Unit (Note)	2	Intermittent Calibration flag to data recorder	Dry solder joint on earth lead from calibration micro-switch	Reterminated lead
12	Barometric Reference Unit		Steps in BRU trace	Tube to BRU not connected	Reconnected tube
13	70 mm Camera	1	Film showed repetitive ribbing on negative	Dry bearings in film cartridge	Cleaned and lubricated bearings

Ser (a)	Equipment (b)	No (c)	Fault Indication (d)	Fault (e)	Action (f)
14	70 mm Camera	1	Iris control not functioning	Broken earth lead	Reterminated lead
15	70 mm Camera	1	Negative showing variations in exposure along length of film	Manufacturing fault in slit plate	Replaced faulty slit plate
16	Timing Unit	1	Caused an error in timing in the data recorder		Held until completion of operation
17	Flash Tube Power	1	No voltage reading meter	Output thyristor not operating	Replaced thyristor

HP 9815A PRINTOUT

AUTO START
 APR COMPUTATIONS

1=ANALOGUE UNADJ
 2=ANALOGUE ADJ
 3=DIGITAL ADJ

ANALOGUE UNADJ

ENTER

FINE STEP
 ROLL FACTOR
 BRU CAL PULSE HT
 OUTSIDE AIR TEMP

93.00

0.16

16.00

12.00

FINE
 COARSE
 ROLL
 BRU

-41.50

3000.00

5.50

8.50

3011.31

AUTO START
 APR COMPUTATIONS

1=ANALOGUE UNADJ
 2=ANALOGUE ADJ
 3=DIGITAL ADJ

ANALOGUE UNADJ

ENTER

FINE STEP
 ROLL FACTOR
 BRU CAL PULSE HT
 OUTSIDE AIR TEMP

93.00

0.16

16.00

12.00

FINE
 COARSE
 ROLL
 BRU

-41.50

3000.00

5.50

8.50

3055.93

1. These printouts from the HP 9815A show different height values being determined by the reduction program from identical input data.

Why?

APR PHOTOGRAPHIC EQUIPMENT REPORT

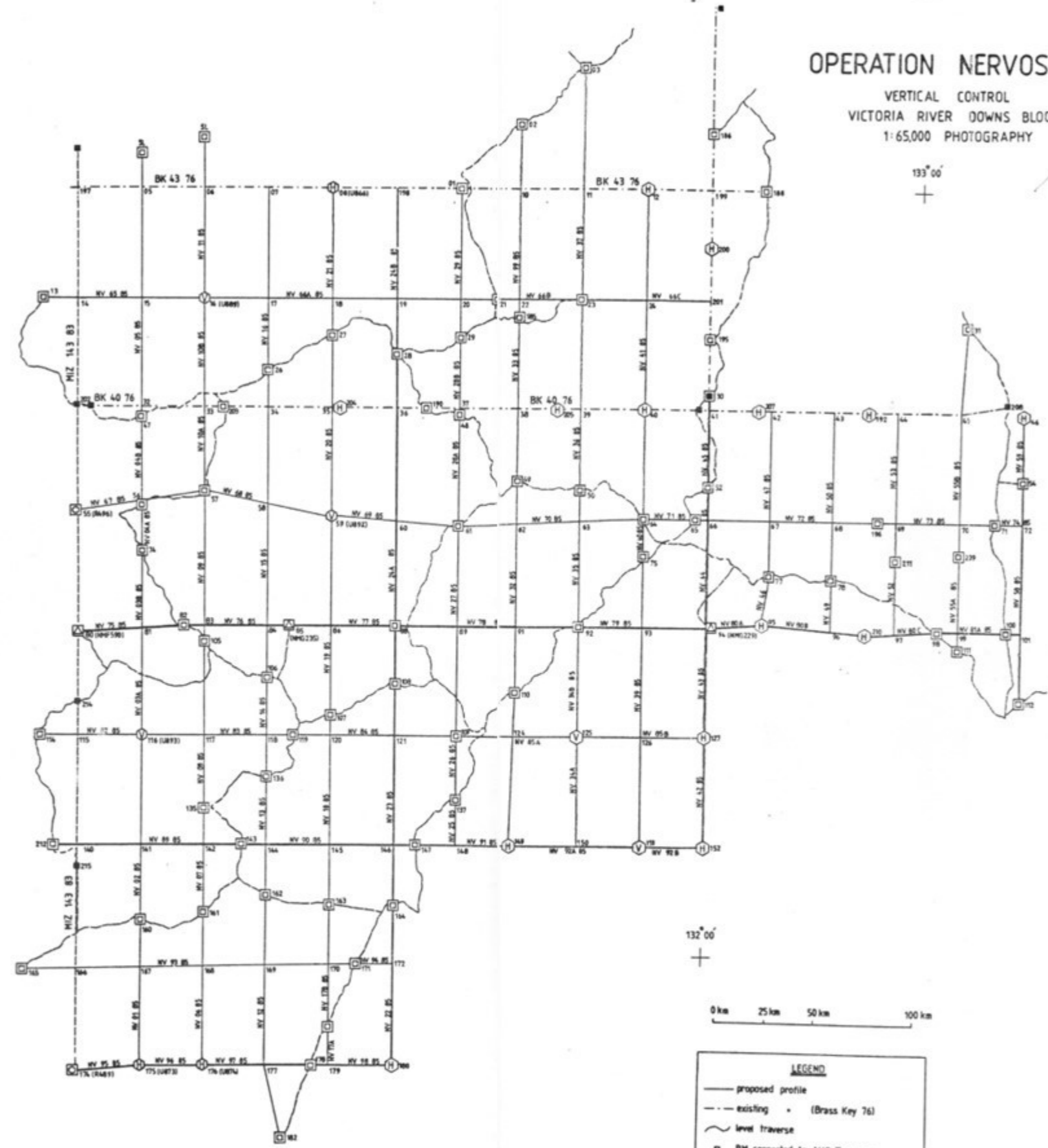
Photographic Equipment

1. Film Dryer. The film dryer's condition is poor, its performance unsatisfactory. The dryer does not transport film very well. When transporting 70 mm film through the dryer the emulsion becomes scratched. Even when it was working at its best, drying time was very long. It takes approximately 1 hour to dry 250 frames of RC10. RAEME spent 1½ days effecting repairs to the equipments wiring when it developed a short circuit. This wiring should be examined when the equipment is RTU.
2. ZEISS KG30 Contact Printer. This piece of equipment was found to have a few problems when it was first used on the job. They are:
 - a. The external surfaces of the printer were covered with surface rust in most places. The printer was cleaned on site but needs a thorough clean when it is RTU.
 - b. The film rollers were seized.
 - c. The globes fitted to the exposure system were incorreccted and the diffusion and light reduction fitters were not supplied.
3. Rollermat Universal Photo Enlarger. This equipment is not fully suited to the job of enlarging 70 mm strip film. An enlargement is only possible if the timing marks on one side of the film are left out. Both timing marks should be included in each 70 mm enlargement. The lens and condensor systems are surface damaged causing both a decrease in image sharpness and marks on the prints. The glass supplied for the negative carrier was unusable as it was badly scratched and had to be replaced.

OPERATION NERVOSE 85
 VERTICAL CONTROL
 VICTORIA RIVER DOWNS BLOCK
 1:65,000 PHOTOGRAPHY

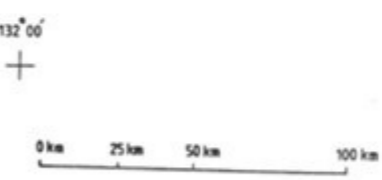
APPENDIX 6 TO
 ANNEX D
 PROJECT REPORT
 OP NERVOSE 85
 DATED FEB 86

128° 00' + 15° 00'
 + 16° 00'
 + 17° 00'
 + 18° 00'
 128° 00' + 19° 00'



129° 00' 130° 00' 131° 00'

133° 00' + 15° 00'



- LEGEND**
- proposed profile
 - - - existing (Brass Key 76)
 - ~ level traverse
 - BM connected to AHD Traverse
 - △ trig
 - Tloc Doppler
 - proposed CP
 - ⊙ Tloc Doppler (horiz & APR)
 - ⊙ (APR only)
 - ▲ existing Brass Key connection

134° 00' + 19° 00'

APR LEVEL CONNECTION REPORTIntroduction

1. The levelling requirement was for all APR profiles flown to be connected to AHD control by third order spirit levelling. Prior to the commencement of the operation packages were produced containing all available data relevant to the task. Detailed access notes were added to these packages at the completion of the APR reconnaissance phase and both 70 mm and RC10 photography added by the APR Section once profile lines were flown and accepted.

Resources

2. Resources allocated for the levelling task were as follows:

- a. 6 x Truck, utility, light, GS;
- b. 3 x Trailer, cargo, light, $\frac{1}{2}$ ton, GS;
- c. 4 x Kern GK1A automatic level with CES; and
- d. Stores as required.

3. A Bell 206B rotary wing aircraft from 161 Recce Sqn was allocated in support for 36.5 hours.

Personnel

4. Personnel involved were as follows:

- a. SSGT B.J. Lutwyche 4 Fd Svy Sqn
- b. SSGT G.E. Timmins 4 Fd Svy Sqn
- c. SGT S. Mumford RE (Ex Long Look UK Exchange)
- d. CPL A. Hawkins 4 Fd Svy Sqn
- e. CPL A. Lucas 4 Fd Svy Sqn
- f. LCPL C. Brown 4 Fd Svy Sqn
- g. LCPL S. McGuinness 4 Fd Svy Sqn
- h. SPR R.P. Beavis 4 Fd Svy Sqn
- i. SPR A. Rawcliffe 4 Fd Svy Sqn
- j. SPR S. Rundle 4 Fd Svy Sqn
- k. LT L. O'Reilly 162 Recce Sqn
- l. LT N. Turton 162 Recce Sqn

- m. CPL K. Blackman 162 Recce Sqn
- n. CFN S. Norenbergs 162 Recce Sqn

Timings

5. Levelling was commenced from Katherine by one ground party on 3 Aug 85 with an air party commencing on 15 Aug 85. Once geociever operations were completed two additional ground parties commenced levelling from Kalkaringi on 16 Aug 85. A forward base was established at Kalkaringi on 19 Aug 85 and remained there until all levelling tasks were completed on 5 Sep 85.

Methods Employed

- 6. Two man parties were tasked to acquire the CP connections.
- 7. Once deployed the ground parties were self sufficient in fuel, water, rations etc for periods which allowed all connections within a designated area to be completed without returning to base, thus negating the need to back track within an area.
- 8. The air party operated from its respective base at all times utilising the LOH pilot as a third levelling party member wherever possible.

Problems Encountered

- 9. The length of many level traverses was long even though:
 - a. Approximately half of the control points used were pre targetted.
 - b. The Litton 3000 Omega navigation system was fitted to the APR aircraft. ?
- 10. Those level traverses of considerable length resulting from either less than adequate APR navigation or design, were completed by two levelling parties working together.

Work Completed

11. A total of 135 level connections were made to 95 control points resulting in 370 km of traversing. In all cases spirit levelling was within third order specifications.

FIELD COMPLETION REPORT

Introduction

1. This task required the field completion of 40x1:50,000 preliminary maps prior to their cartographic completion and subsequent printing. It was carried out during the period 30 May to 23 Jul 85. Twenty of the preliminary maps were compiled by 4 Fd Svy Sqn from data collected using analogue stereoplotting techniques. The remainder were supplied by the Army Svy Regt from the AUTOMAP system.

Preparation of Field Completion Packages

2. Compilation sheets of the 20x1:50,000 of MOUNT EVELYN produced by 4 Fd Svy Sqn were used to print single colour and composite four colour preliminary maps using the silk screening process. The following were produced for each map area:

- a. composite four colour map to be used as a cultural field worksheet;
- b. two Ozafilm overlays, each colour coded for drainage and vegetation to be used as field worksheets;
- c. master correction sheet (four colour map);
- d. single colour map to be used as the final road guide; and
- e. two overlays to be used as the final drainage and vegetation guides.

3. The AUTOMAP packages were checked on receipt. Pastoral plan information was added to the cultural check worksheet. The following sheets were produced for each map area:

- a. composite colour map to be used as a cultural field worksheet,
- b. two composite colour maps colour coded for drainage and vegetation field worksheets,
- c. composite colour map (Cronaflex) to be used as a master correction overlay, and
- d. three overlays to be used as the final drainage, vegetation and colour guides.

4. Mapping photography flown by NT Lands Dept in 1984 was obtained and used to update detail already shown on printed 1:100,000 of 5366 BIRIMBA, 5367 DRY CREEK and 5466 WESTERN CREEK. This was carried out prior to the arrival of the AUTOMAP packages for FERGUSSON RIVER and LARRIMAH areas. The same photography was requested at a later date after field completion. Pastoral plans and details of Aboriginal Lands' boundaries were also obtained.

Description of the Area

5. Twelve sheets in the 1:250,000 LARRIMAH area covering the 1:100,000 map sheets 5366 BIRIMBA, 5367 DRY RIVER and 5466 WESTERN CREEK were field checked. The area is generally flat with mostly medium vegetation. One large river flowing in a northerly direction dominates the western part of BIRIMBA and the centre of DRY RIVER. Cultural development consists of five homesteads with three being occupied and two abandoned. Several abandoned bores are located along the river.

6. Eight sheets in the 1:250,000 FERGUSSON RIVER area covering the 1:100,000 map sheets 5168 FLORA and 5268 BOWMAN were field checked. The relief on FLORA and BOWMAN is generally hilly with flat top hills rising approximately 100 metres above the surrounding terrain. Well eroded creek and river systems cover the entire area with the Flora, Katherine and Daly Rivers being the major rivers in the area. Vegetation is mostly medium timber. Cultural development consists of numerous tracks, a CSIRO station and two homesteads. One homestead is extensively developed with fences and tracks.

7. Twenty sheets in the 1:350 00 MOUNT EVELYN area were field checked. The sheets covered the 1:100 000 map areas of 5371 MUNDOGIE, 5471 JIM JIM, 5571 GILRUTH, 5470 STOW and 5570 SNOW DROP. The entire area is characterised by broken, fault lined terrain with sharp drop offs and escarpments. The main river systems are the Alligator River and Jim Jim Creek in the North and the Katherine River in the South and East. The majority of the area falls within Aboriginal land and contains some of the area designated as the Kakadu National Park. There is very little cultural development in the area.

Field Completion Method

8. Maps were annotated from ground and air by a two man party based at Tindal. The ground check of areas was carried out on two to four day sorties from main base. Master correction overlays were drawn up after each ground check with difficult area not drawn up until after the aerial check or when supplementary photography was flown and then detail transferred to the master.

9. Aerial annotation of each 1:50,000 map sheet was carried out with two sorties per day to cover a 1:100,000 map sheet area. Checking was from LOH and Porter, with one man checking cultural and drainage, the other man checking vegetation. The following aircraft hours were used for field checking:

- a. LOH - 42.3 hours,
- b. Porter (field completion) - 10.8 hours,
- c. Porter (supplementary photography) - 17.9 hours, and
- d. QueenAir (supplementary photography) - 4.5 hours.

Personnel and Timings

10. The following personnel were involved in the field completion phase:

- a. SGT P. Smalley 30 May - 23 Jul 85,
- b. SPR D. Nolan 30 May - 23 Jul 85,
- c. SPR G. Kimber 6 Jun - 11 Jun 85,
- d. MAJ A. Vickers RE 11 Jun - 13 Jun 85,
- e. SGT A. Virtue 15 Jul - 17 Jul 85.

Resources Used

11. Rations and all POL requirements for the vehicle and aircraft support were supplied from main base. AVTUR was prepositioned at the following locations:

- a. Willeroo homestead - 4 drums,
- b. Old Birrimba homestead - 5 drums, and
- c. Gimbat station (Fisher Landing Ground) - 10 drums.

12. The following organisations and property owners were contacted during the field operations:

- a. NT Lands Department,
- b. National Parks and Wildlife service (Darwin),
- c. CSIRO (Katherine)
- d. Mr D. Laidlow - manager of Scott Creek station,
- e. Mr I. Watson - pilot (Scott Creek),
- f. Mr A. Harrower - joint owner of Dorisvale,
- g. Mr T. Tease - owner of Innisvale,
- h. Mr W. Boothby - new owner of Florina Station,
- i. Mr P. Dennis - owner of Dry River,
- j. Mr B. Rose - owner of Western Creek,
- k. Mr M. Sharples - owner of Gorrie,
- l. Mr B. Sellars - owner of Carbeen Park,
- m. Mr G. Adcock - owner of Goodparla, and
- n. Mr H. Schimmel - owner of Gimbat Station.

Comments on Changes

13. The only significant changes that occurred from the supplied field completion packages are as follows:

- a. 5367 4 SOUTH COLLINS - development of Dry River homestead with paddocks, fences and tracks;
- b. 5168 1, 2, 3, 4 - new tracks and fences;
- c. 5268 1, 2, 3, 4 - new tracks and fences with some clearing of vegetation;
- d. 5471 1 JIM JIM CREEK - new buildings; and
- e. 5470 4 EL SHARANA - new buildings and fences.

Supplementary Photography

14. See Annex G to the main report.

Comments

15. In the LARRIMAH block small areas plotted as dense vegetation proved to be a good navigational aid as these are in fact a different type of tree with a denser leaf pattern. It was noted that many of the tracks plotted were only cattle tracks. These were deleted from cultural overlays. ||

16. The printing of preliminary maps from compilation sheets using the silk screen method did not produce as good a field check document as the printed maps from the Army Svy Regt. The two main problems were:

- a. registration between colours is hard to achieve, and
- b. detail is sometimes obscured by thick lines caused by ink plotting.

17. Depiction of detail was good, however on the majority of AUTOMAP packages it was found that the field check note overprinted the detail to be checked.

18. AUTOMAP preliminary maps contained various combinations of cultural, drainage, relief and vegetation. The quantity of maps far exceeded the requirements to carryout field annotation. Single and two colour maps did not prove useable although some were used for field worksheet colour guides. ||

Recommendations

19. It is recommended that:

- a. Future AUTOMAP packages have the field check note to one side of the area to be checked.
- b. Cattle tracks that can be identified as such need not be plotted. *There was probably nothing else to plot on the LARRIMAH sheets!!*
- c. The following are maximum quantities and various combinations of preliminary maps required for each map sheet:

- (1) 10 x copies of cultural, drainage, relief and vegetation;
 - (2) 5 x copies of drainage, relief and vegetation; and
 - (3) 5 x copies of cultural, drainage and relief.
- d. If time allows, drainage, relief and vegetation compilation sheets be RASTER SCANNED and using the offset printing method, print preliminary maps with cultural and nomenclature details.

AERIAL PHOTOGRAPHY REPORT

1. General. Identification photography of horizontal control stations and the acquisition of supplementary photography was conducted during the period 8 Jun 85 to 13 Sep 85. Photography was acquired using a wild RC10 camera, No 1236 with a SWA lens, mounted in a Pilatus Porter aircraft, No A14-703, in the period 8 Jun - 23 Jul 85 and with wild RC10 No 2611 with a SWA lens, mounted in a beechcraft QueenAir aircraft, No VH-MWK, from 23 Jul to 13 Sep 85.

2. Results. The following results were achieved:

a. Identification Photography.

- (1) Seventy stations were photographed 20 of which were previously established stations. Two were not accepted as suitable idents and were not reflight because of limitations of access and aircraft hours. Details are contained in appendices 1 and 2. A total of 67 Porter task hours and 4.5 QueenAir hours were used for the ident photography.
- (2) Each survey station was covered by a least 3 exposures with 60% forward overlap and the flying altitude was 10,000 ft above ground level. Flight over the photographed points was in an east-west direction.

b. Supplementary Photography.

- (1) Supplementary photography was flown in areas as requested by the field completion team. 906 line km of supplementary photography were flown, using a total of 17.9 Porter task hours and 4.5 QueenAir hours. A diagram showing coverage is in appendix 3.
- (2) The scale of photography was 1:25,000 with a forward overlap of 60% plus or minus 3%. The tilt did not exceed 2°.

c. RAAF Training Area Photography.

- (1) 1047 line km of photography for DPES/DGAW-A were flown using 3.0 porter task hours and 12 QueenAir hours. Sites 1, 2 and 4 were completed to the required specifications.
- (2) Flying height for sites 1, 2 and 3 was 10,000 ft above ground level and the flying height for site 4 was 9,000 ft above ground level. Sites 1 and 4 had a forward overlap of 80% plus or minus 3%. Sites 2 and 3 had an overlap of 60% plus or minus 3%. Sites 1, 2

and 3 had 25% side overlap plus or minus 2%. Tilt did not exceed 2°. Sites 2 and 3 had a solar altitude of between 25°-45°. The sun was in the same aspect easterly or westerly for all runs at each site, and the photography was smoke and cloud free. A diagram showing sites 1, 2, 3 and 4 is in Appendix 4.

3. Personnel. The following personnel were involved:
 - a. Pilatus Porter.

CAPT P. Muir - Porter Pilot
LT D. Carroll - Porter Pilot
CPL P.D. Longbottom - Camera Operator.
 - b. Beechcraft QueenAir.

Mr J. Miller - Pilot
CAPT C. Mazur - APR Manager/Navigator
SGT J. Gill - Camera Operator
SGT A. Virtue - Litho Support
CPL A. Mallon - Camera Operator
CPL R. Clarke - Camera Operator
LCPL S. McGuiness - Navigator.
4. Processing. Processing was done by the camera operators using B5 tanks at the RAAF Base Tindal and in temporary facilities established at Kununurra and the Katherine showgrounds. Drying of the film was done initially on string lines, with the aerial film dryer being used after its arrival for the APR Op. After acceptance of the photography, stereo bromide prints were produced and annotated with station location and number.
5. Despatch. Developed RC10 film and accompanying A36 photographic reports were despatched to CPE Laverton for remedial processing as necessary.
6. Equipment Problems. The following problems were encountered:
 - a. The camera mounting frame, mounting blocks, wooden anti-vibration mount for NF2, NF2 mounting frame and cable No 1 connecting circuitry unit to the camera power supply were not supplied with the camera and CES when delivered from 2 Fd Svy Sqn.
 - b. On the 28th of May, a Pilatus Porter from 173 Gen Spt Sqn arrived. On the 4th of Jun when the camera was to be fitted in the aircraft it was revealed that the aircraft was not modified to fit the NF2 Nav sight.
 - c. The RC10 drive unit was malfunctioning causing continuous film transport without exposures. A replacement drive unit was despatched from 2 Fd Svy Sqn, arriving Tindal RAAF Base 2 Jul 85. The U/S drive unit was despatched to Syd Wksp Coy for repair.
 - d. The RC10 camera also suffered a problem associated with the release mechanism which caused difficulty in obtaining immediate exposures when the release button was depressed. The exposure time was also difficult to set and control; however this problem was intermittent and did not hamper the photography mission significantly.

- Appendices:
1. Identification Photography Summary
 2. Horizontal Control Stations Photographed
 3. Supplementary Photography Coverage
 4. RAAF Photography Sites 1, 2, 3 and 4

DATED FEB 86IDENT PHOTOGRAPHY SUMMARY

Serial (a)	Station Number/Name (b)	Lat/Long (c)	Date of Photography (d)	Flying Height (e)	Mission No (f)	Frame Nos (g)	Accepted (h)	Target Configuration (i)
1.	U663	12°45' 133°27'	8 Jun 85	10,000'	186	0001-0003	Yes	
2.	U817	12°10' 134°01'	8 Jun 85	10,000'	186	0007-0009	Yes	
3.	U816	12°15' 133°29'	8 Jun 85	10,000'	186	0010-0012	Yes	
4.	U812	11°48' 133°06'	8 Jun 85	10,000'	186	0013-0015	Yes	
5.	U813	11°47' 132°40'	9 Jun 85	10,000'	186	0016-0018	Yes	
6.	U567 Mogogout	11°37' 132°27'	9 Jun 85	10,000'	186	0019-0021	Yes	
7.	U566 Warldagawaji	11°34' 132°10'	9 Jun 85	10,000'	186	0022-0024	Yes	
8.	U236 Roe	11°30' 132°04'	9 Jun 85	10,000'	186	0025-0027	Yes	
9.	U810	11°25' 130°47'	9 Jun 85	10,000'	186	0028-0030	Yes	
10.	U809	11°44' 130°18'	9 Jun 85	10,000'	186	0031-0033	Yes	
11.	NTS017 Wildman East	12°39' 132°08'	9 Jun 85	10,000'	186	0037-0039	Yes	
12.	U572	13°00' 132°00'	9 Jun 85	10,000'	186	0040-0042	Yes	
13.	U662	12°57' 133°13'	11 Jun 85	10,000'	186	0043-0045	Yes	
14.	U573 Nourlangie Sth	12°52' 132°50'	11 Jun 85	10,000'	186	0046-0048	Yes	
15.	NTS419 Cahill	12°51' 132°42'	11 Jun 85	10,000'	186	0049-0051	Yes	

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
16.	U815	12°17' 132°13'	11 Jun 85	10,000'	186	0052-0054	Yes	
17.	U862	15°16' 132°01'	13 Jun 85	10,000'	186	0058-0060	Yes	
18.	U863	15°04' 130°33'	13 Jun 85	10,000'	186	0081-0063	Yes	
19.	U866	15°00' 130°12'	13 Jun 85	10,000'	186	0064-0066	Yes	
20.	U821	12°45' 135°00'	19 Jun 85	10,000'	188	0001-0003	Yes	
21.	U460 Arafura	12°29' 135°00'	19 Jun 85	10,000'	188	0004-0009	Yes	
22.	U820	12°26' 136°06'	19 Jun 85	10,000'	188	0010-0012	Yes	
23.	U858	12°04' 134°30'	19 Jun 85	10,000'	188	0013-0015	Yes	
24.	U822	13°21' 135°21'	25 Jun 85	10,000'	188	0016-0018	Yes	
25.	NTS509 Maidjunga Ridge	13°03' 135°43'	25 Jun 85	10,000'	188	0019-0021	No	
26.	U819	12°26' 136°06'	25 Jun 86	10,000	188	0022-0027	Yes	
27.	U221 Abbott Is	12°01' 135°30'	25 Jun 85	10,000'	188	0028-0030	Yes	
28.	U231 Braithwaite	11°45' 133°55'	25 Jun 85	10,000'	188	0031-0033	No	
29.	U813	11°44' 133°50'	25 Jun 85	10,000'	188	0034-0036	Yes	
30.	U818	13°00' 136°13'	04 Jul 85	10,000'	188	0051-0061	Yes	
31.	NMG231	16°00' 133°03'	05 Jul 85	10,000'	188	0062-0064	Yes	
32.	U897	16°00' 132°46'	05 Jul 85	10,000'	188	0065-0067	Yes	

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
33.	U896	16°00' 132°14'	05 Jul 85	10,000'	188	0068-0070	Yes	
34.	U861	15°44' 132°00'	05 Jul 85	10,000'	188	0071-0073	Yes	
35.	U864	16°01' 130°45'	05 Jul 85	10,000'	188	0074-0076	Yes	
36.	U865	16°00' 130°13'	05 Jul 85	10,000'	188	0077-0079	Yes	
37.	U867	16°00' 129°18'	05 Jul 85	10,000'	188	0080-0082	Yes	
38.	U889	15°32' 129°38'	05 Jul 85	10,000'	188	0083-0088	Yes	
39.	U869	16°59' 129°44'	11 Jul 85	10,000'	189	0115-0117	Yes	
40.	U868	17°00' 130°13'	11 Jul 85	10,000'	189	0118-0120	Yes	
41.	U898	17°00' 130°42'	11 Jul 85	10,000'	189	0121-0123	Yes	
42.	U899	17°00' 131°16'	11 Jul 85	10,000'	189	0124-0126	Yes	
43.	U900	17°00' 131°46'	11 Jul 85	10,000'	189	0127-0129	Yes	
44.	U901	17°00' 132°15'	11 Jul 85	10,000'	189	0130-0132	Yes	
45.	U902	17°00' 132°45'	11 Jul 85	10,000'	189	0133-0135	Yes	
46.	U584	14°59' 131°15'	13 Jul 85	10,000'	191	0156-0158	Yes	
47.	U883	15°00' 131°41'	20 Jul 85	10,000'	191	0001-0003	Yes	
48.	U895	16°00' 131°43'	20 Jul 85	10,000'	191	0004-0008	Yes	
49.	U977	18°43' 130°30'	21 Jul 85	10,000'	192	0001-0003	Yes	
50.	U876	18°54' 130°30'	21 Jul 85	10,000'	192	0004-0006	Yes	

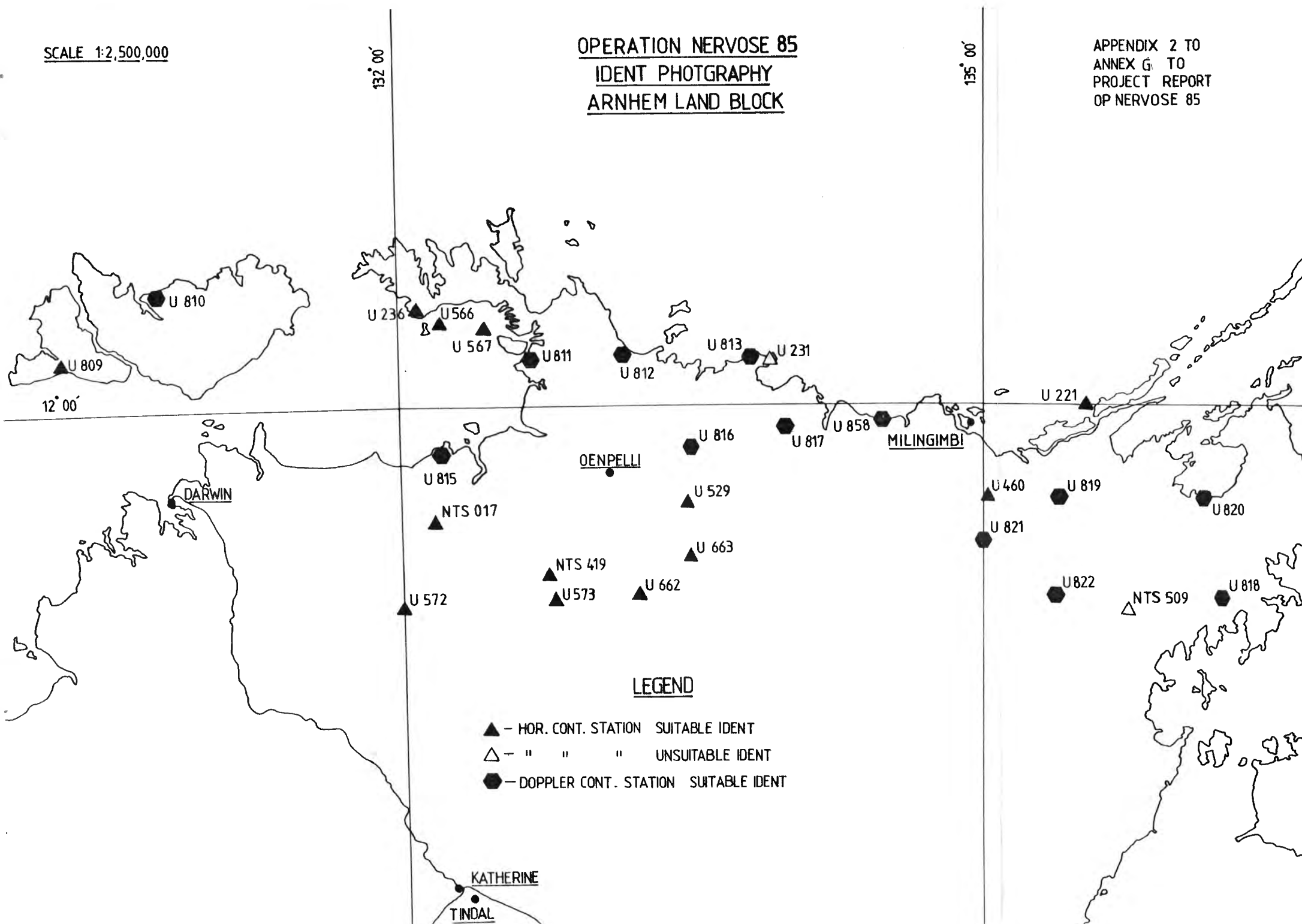
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(1)
51.	NMG210	18°59' 130°59'	21 Jul 85	10,000'	192	0007-0012	Yes	
52.	NMG234	19°00' 130°02'	21 Jul 85	10,000'	192	0013-0015	Yes	
53.	U875	18°59' 129°52'	21 Jul 85	10,000'	192	0016-0018	Yes	
54.	U874	19°00' 129°35'	21 Jul 85	10,000'	192	0019-0021	Yes	
55.	U871	18°00' 130°18'	21 Jul 85	10,000'	192	0022-0024	Yes	
56.	NMG202	18°00' 132°03'	21 Jul 85	10,000'	192	0030-0032	Yes	
57.	U881	18°00' 132°00'	21 Jul 85	10,000'	192	0033-0035	Yes	
58.	U904	18°00' 131°04'	21 Jul 85	10,000'	192	0036-0039	Yes	
59.	U872	18°00' 129°46'	22 Jul 85	10,000'	193	0001-0003	Yes	
60.	U893	17°29' 129°14'	22 Jul 85	10,000'	193	0007-0009	Yes	
61.	U861	15°44' 132°00'	22 Jul 85	10,000'	193	0010-0013	Yes	
62.	U529	12°30' 133°30'	03 Aug 85	10,000'	220	0006-0013	Yes	
63.	U891	17°31' 132°02'	04 Aug 85	10,000'	221	0167-0169	Yes	
64.	U894	16°00' 131°23'	13 Aug 85	11,000'	228	0097-0099	Yes	
65.	U873	19°00' 129°15'	22 Aug 85	11,500'	237	0152-0154	Yes	
66.	U885	18°00' 131°42'	28 Aug 85	10,000'	239	0151-0156	Yes	
67.	U884	17°28' 131°23'	28 Aug 85	10,000'	239	0157-0161	Yes	
68.	U892	16°31' 130°13'	28 Aug 85	10,000'	239	0164-0168	Yes	

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
69.	U870	17°00' 129°15'	28 Aug 85	10,000'	239	0169-0173	Yes	
70.	NMG165	18°00' 129°05'	28 Aug 85	10,000'	239	0178-0182	Yes	
71.	U882	16°00' 133°30'	11 Sep 85	10,000'	246	0001-0006	Yes	

SCALE 1:2,500,000

OPERATION NERVOSE 85
IDENT PHOTOGRAPHY
ARNHEM LAND BLOCK

APPENDIX 2 TO
ANNEX G TO
PROJECT REPORT
OP NERVOSE 85

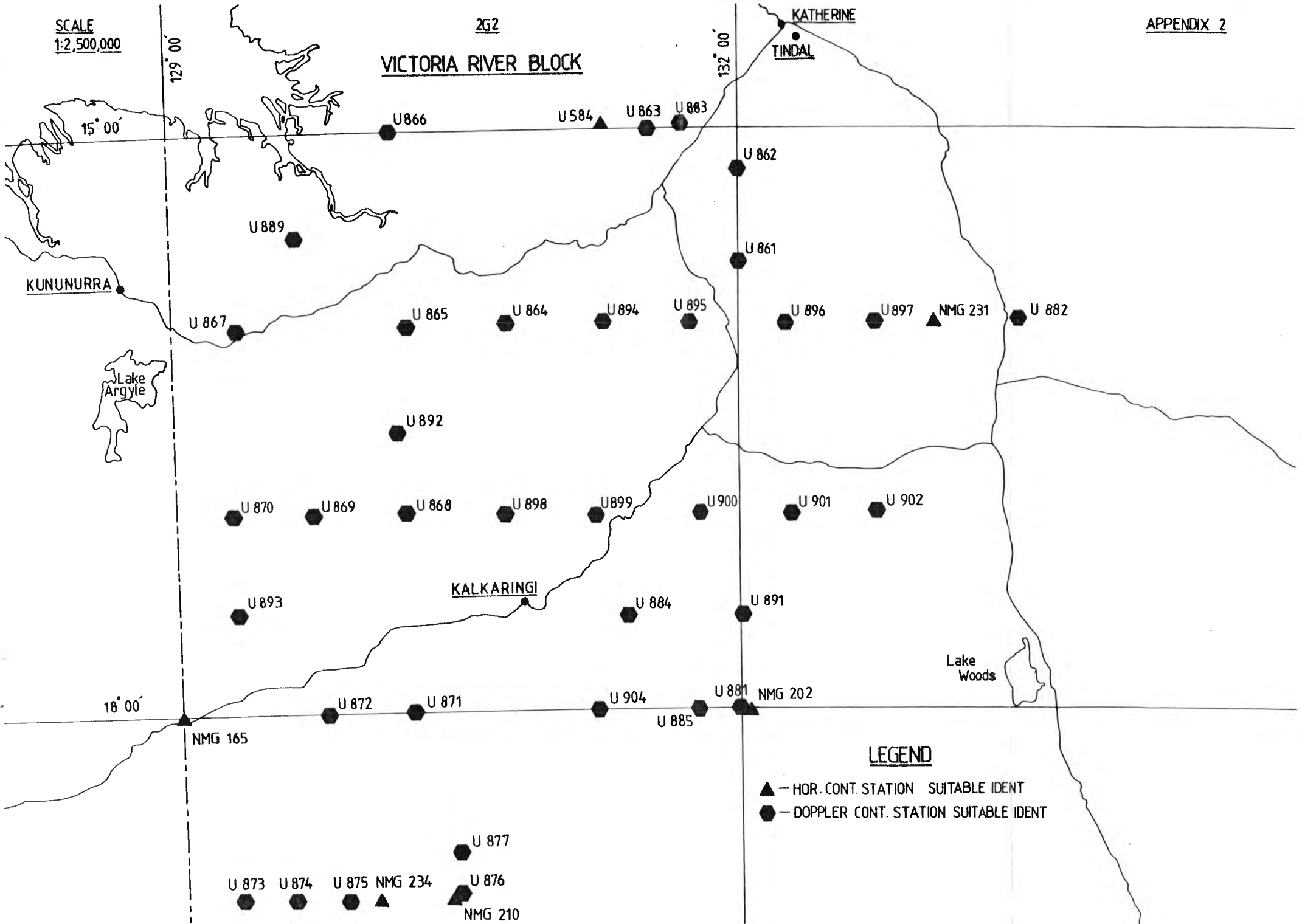


SCALE
1:2,500,000

262

APPENDIX 2

VICTORIA RIVER BLOCK



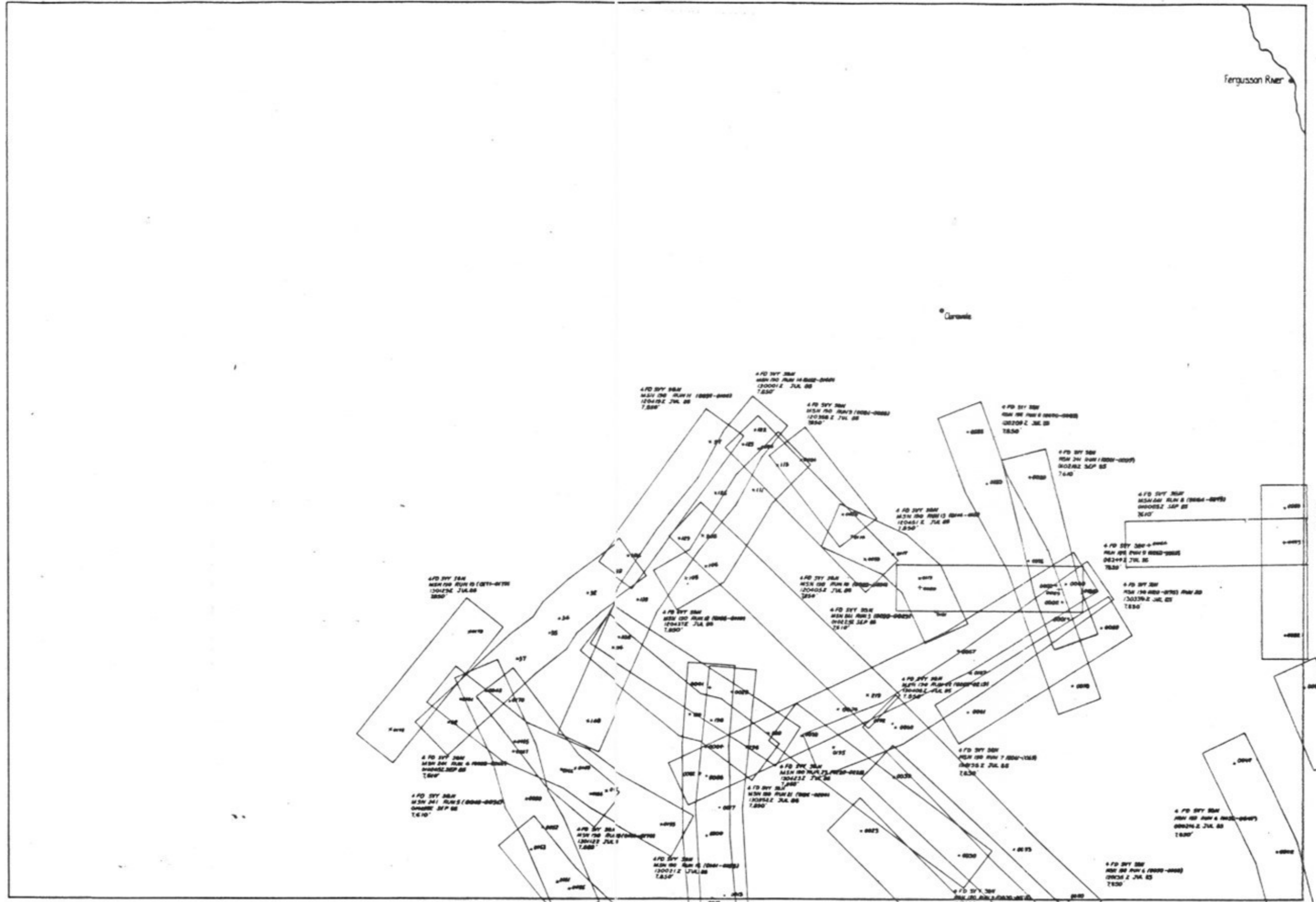
LEGEND

- ▲ - HOR. CONT. STATION SUITABLE IDENT
- - DOPPLER CONT. STATION SUITABLE IDENT

1:250,000

SUPPLEMENTARY PHOTOGRAPHY OVERLAY
FERGUSSON RIVER

SD 52-12

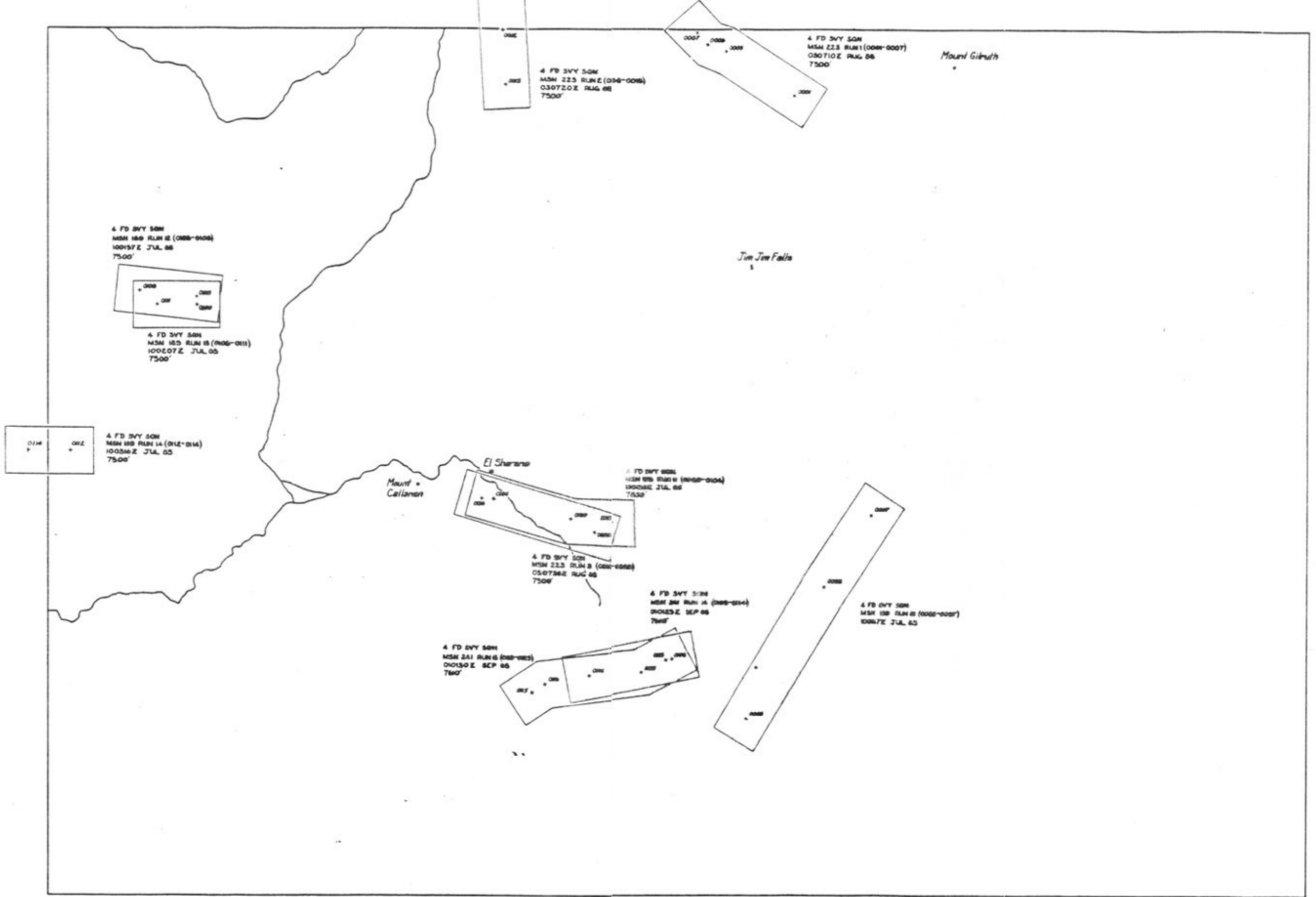


COMPILED: CPL CHOY *[Signature]* 1 Nov 85
 CHECKED: *[Signature]* 12 NOV 85

SUPPLEMENTARY PHOTOGRAPHY OVERLAY MOUNT EVELYN

1:250 000

SD 53-5

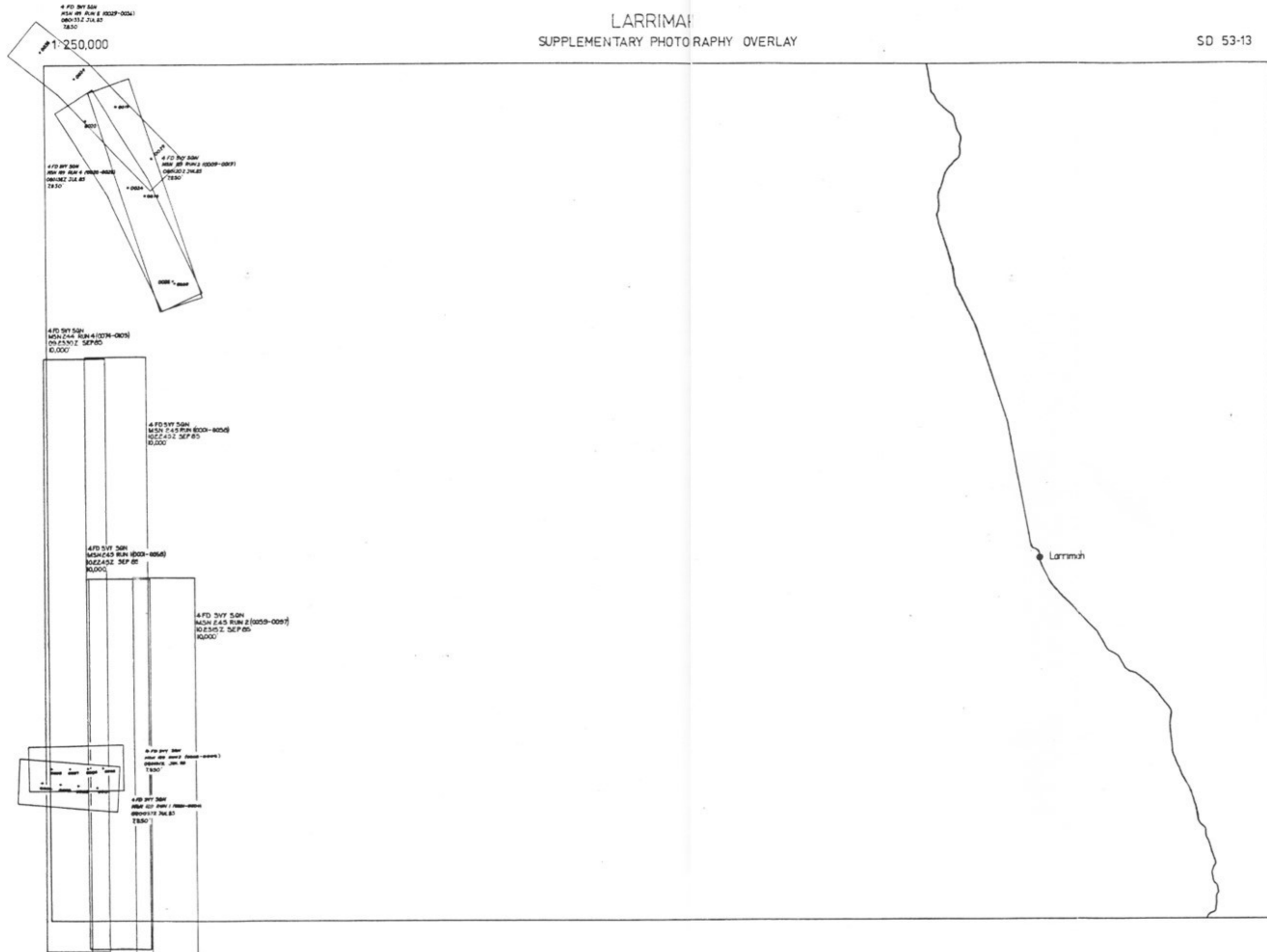


COMPILED: S.M. Guinness L/Cpl. 7 Nov 65 *[Signature]*

CHECKED: P.D. Langston Cpl. 21 Nov 65 *[Signature]*

LARRIMAH SUPPLEMENTARY PHOTOGRAPHY OVERLAY

SD 53-13

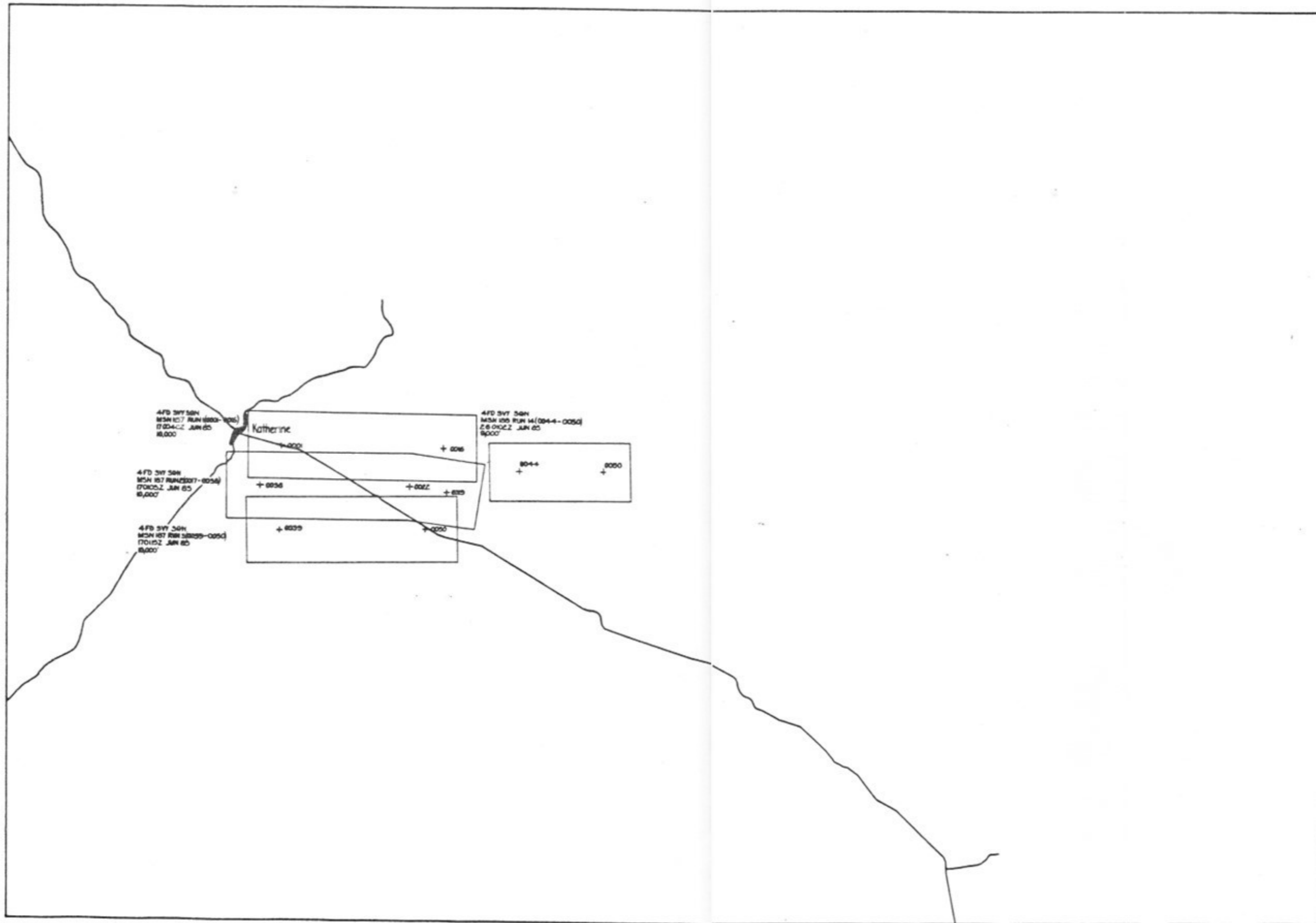


COMPILED: C. BROWN L/CPL 12 NOV 85 *C. Brown*
 CHECKED: P.D. LONGBOTTOM CPL 12 NOV 85 *P.D. Longbottom*

1:250,000

SUPPLEMENTARY PHOTOGRAPHY OVERLAY
KATHERINE

SD 53-9

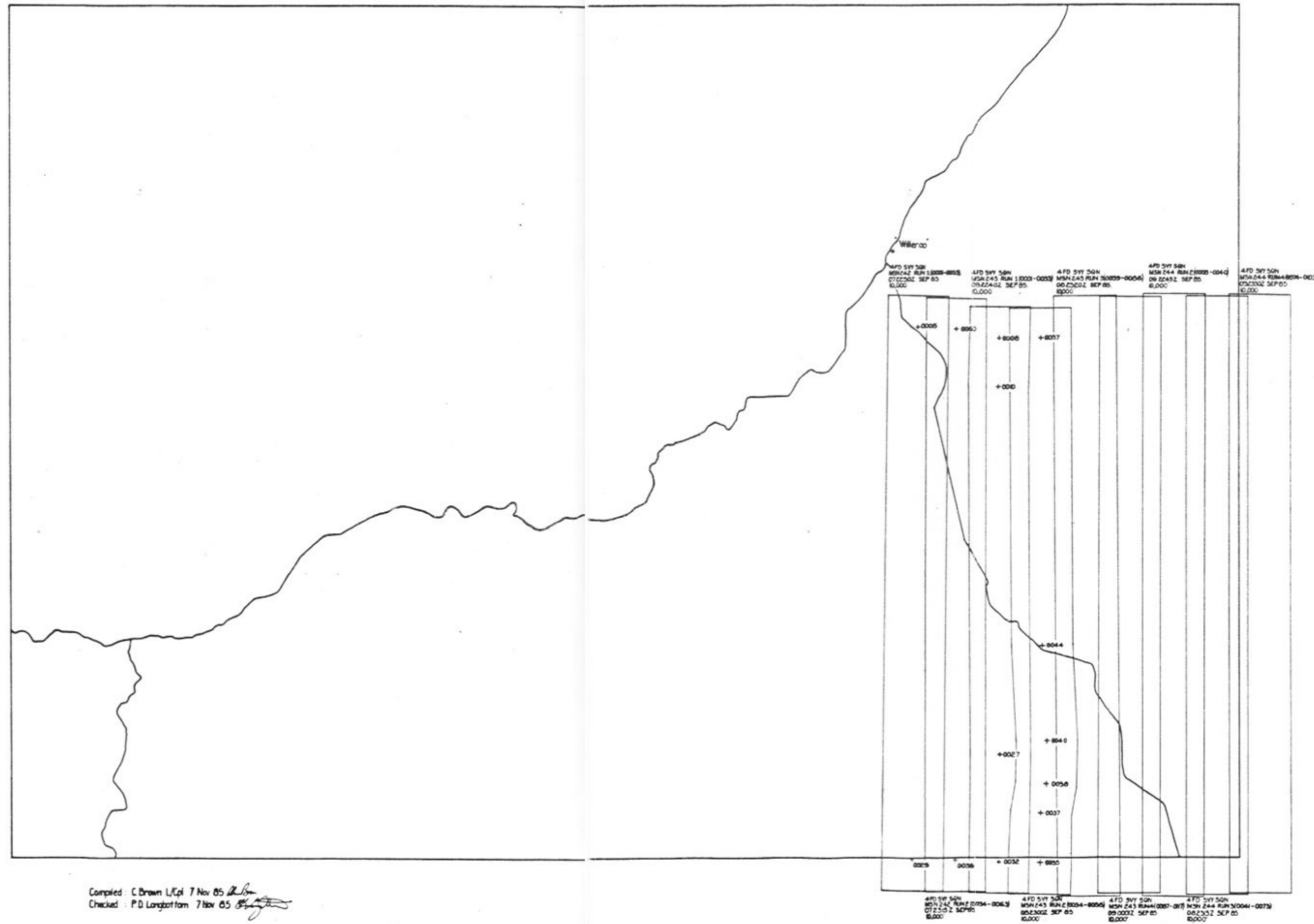


Compiled: C. Brown Lt/Cpl 7 Nov 65
Checked: P.D. Langstaff Cpl Nov 65

1:250,000

SUPPLEMENTARY PHOTOGRAPHY OVERLAY
ELAMERE

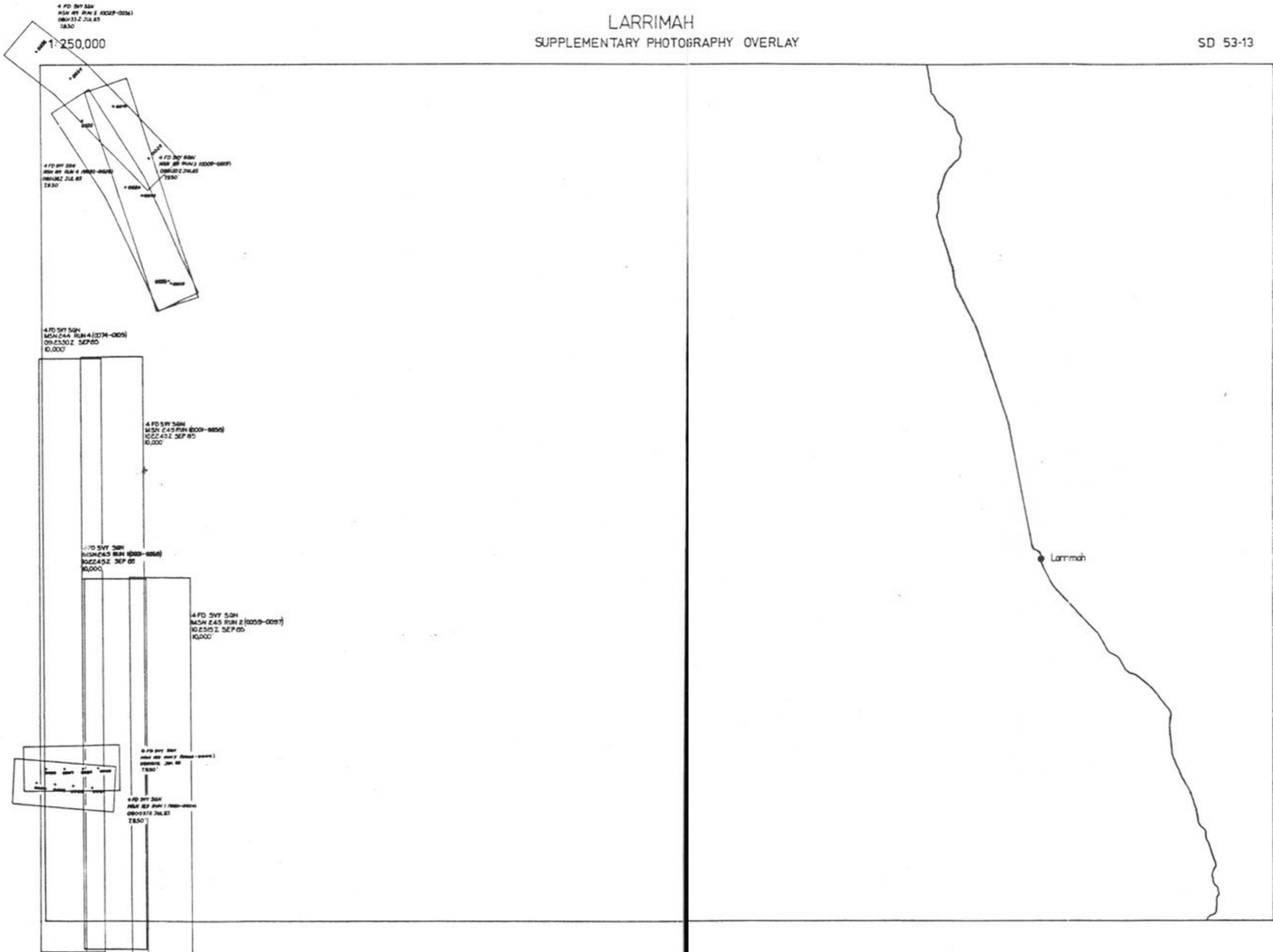
SD 52-16



Compiled: C. Brown Lt/Cpl 7 Nov 85
 Checked: P.D. Longbottom 7 Nov 85

LARRIMAH SUPPLEMENTARY PHOTOGRAPHY OVERLAY

SD 53-13



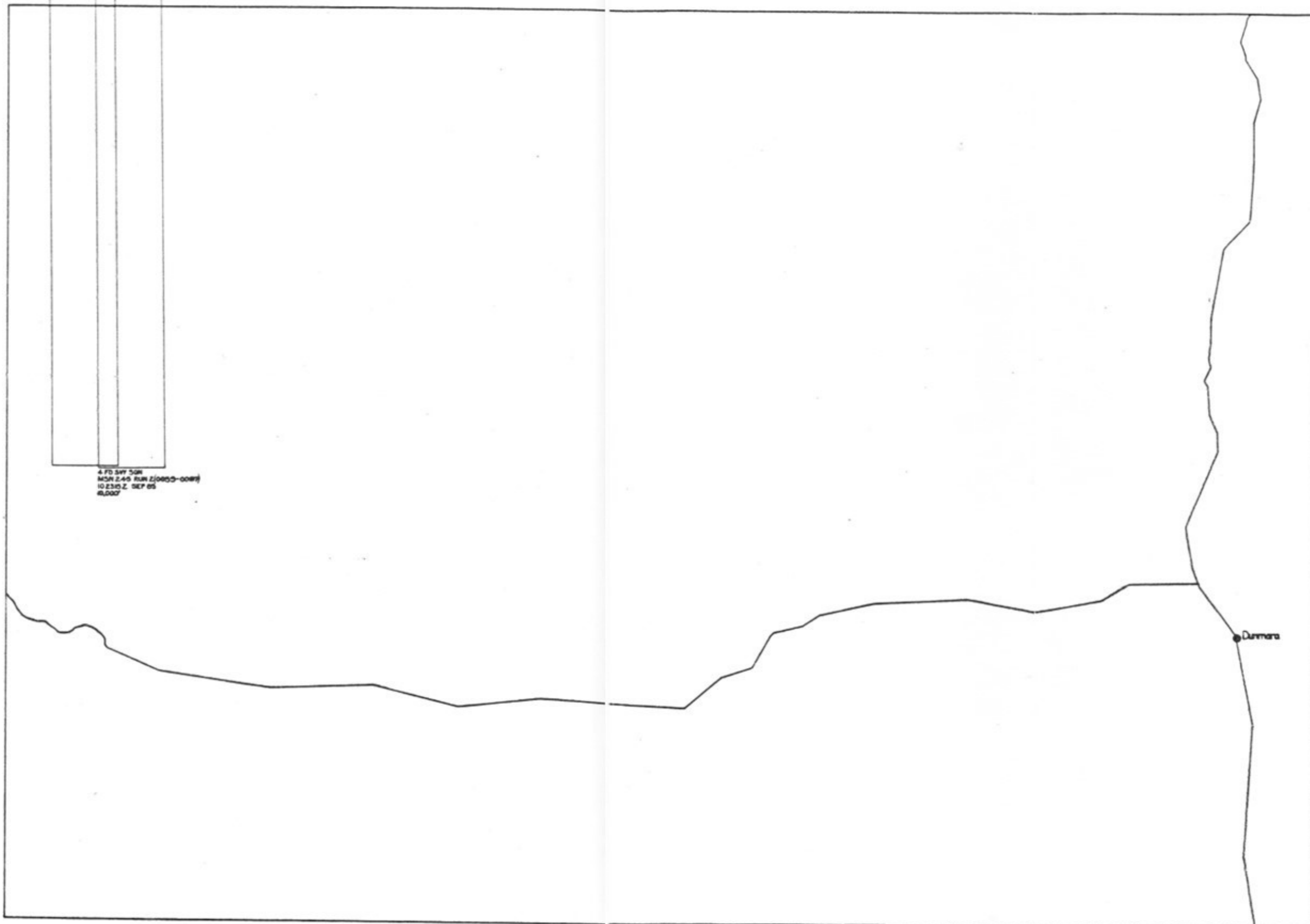
COMPILED C. BROWN L/CPL 12 NOV 85. *[Signature]*
 CHECKED P.D. LONGBOTTOM CPL 12 NOV 85 *[Signature]*

1 250,000

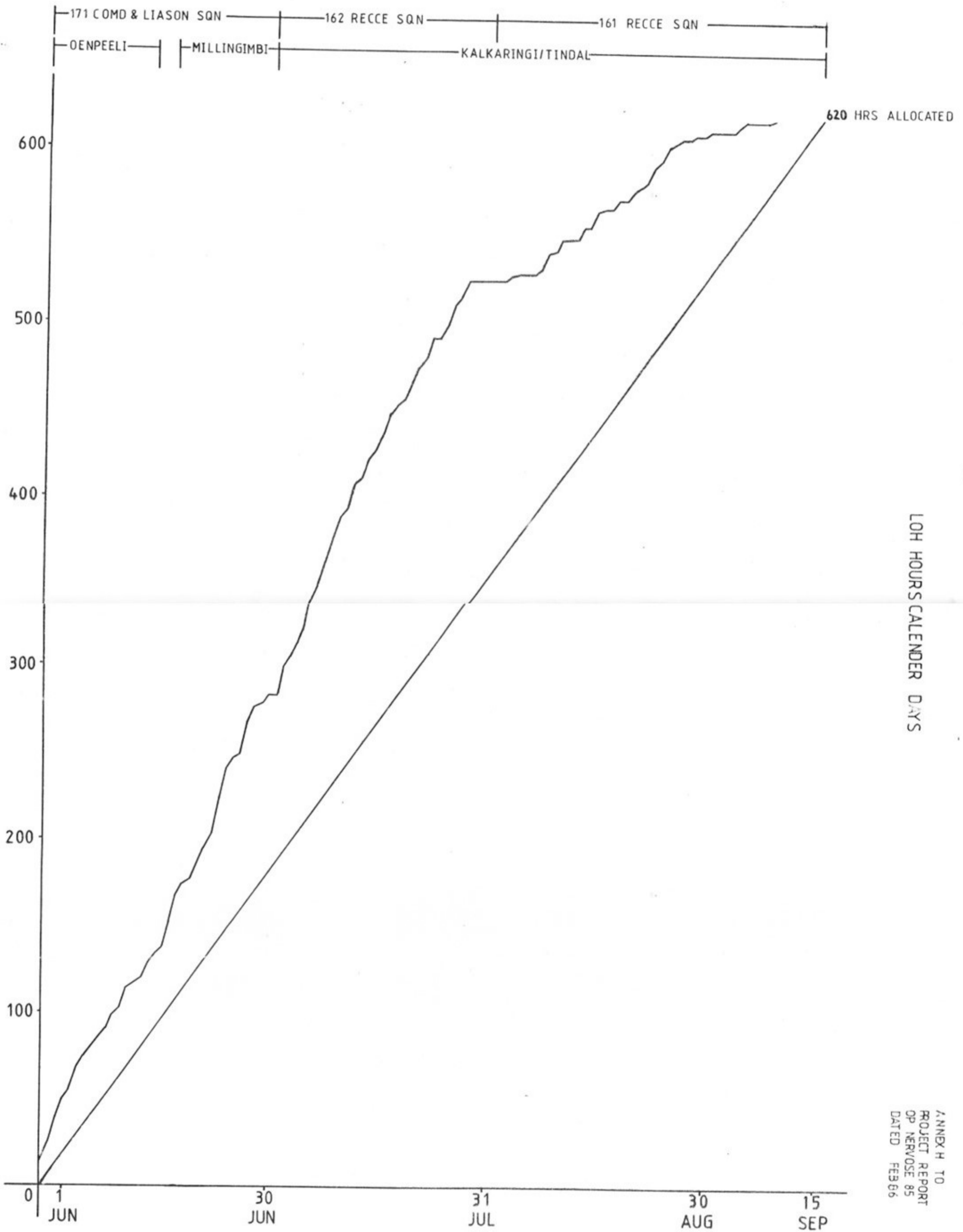
SUPPLEMENTARY PHOTOGRAPHY OVERLAY
DALY WATERS

SE 53-1

4FD 5V7 50W
MSN 245 RAN(0001-0004)
102249Z SEP 85
101007



4FD 5V7 50W
MSN 245 RAN(0001-0004)
10230Z SEP 85
101007

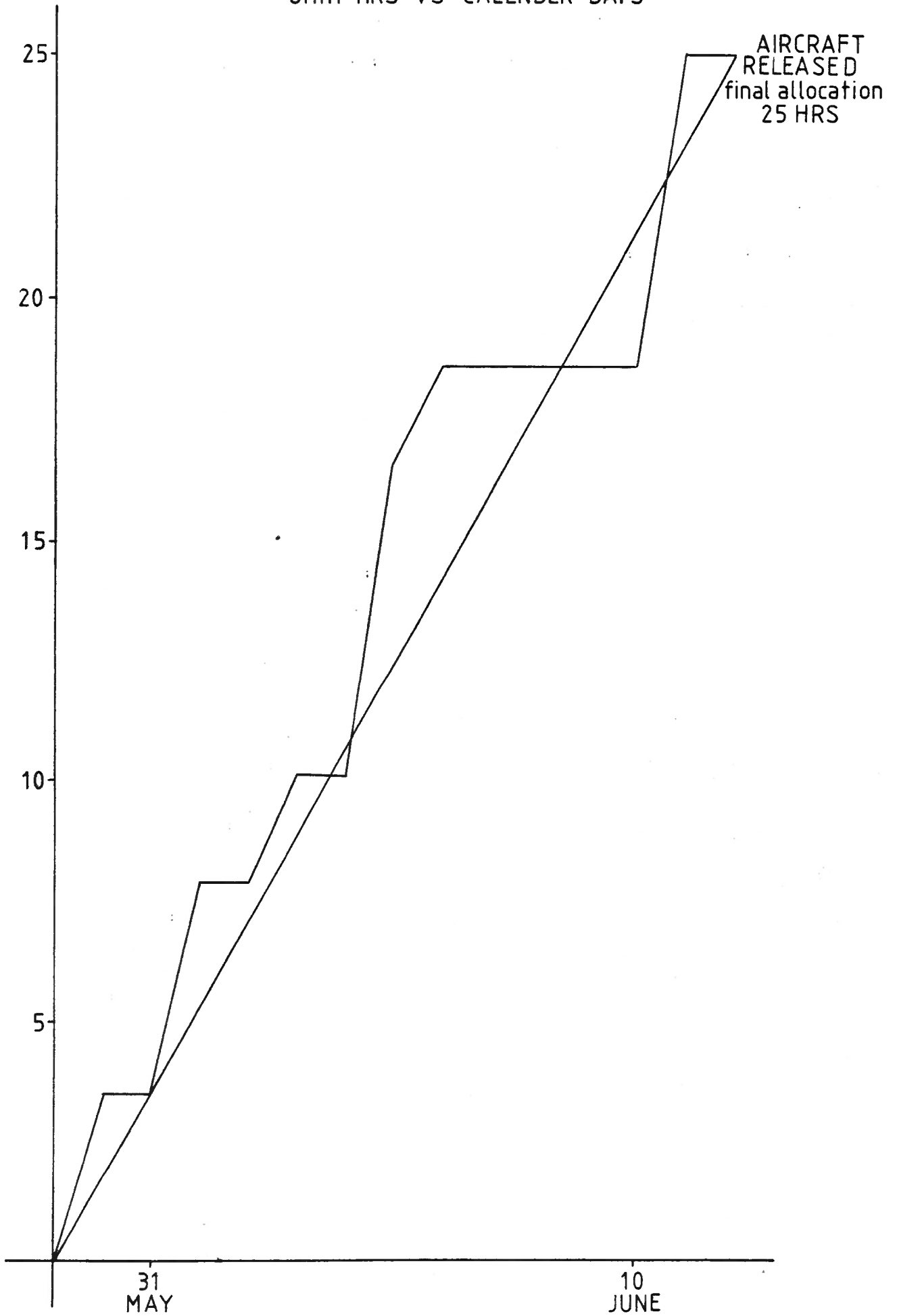


LOH HOURS CALENDER DAYS

ANNEX H TO
PROJECT REPORT
OP NERVOSE 85
DATED FEB 86

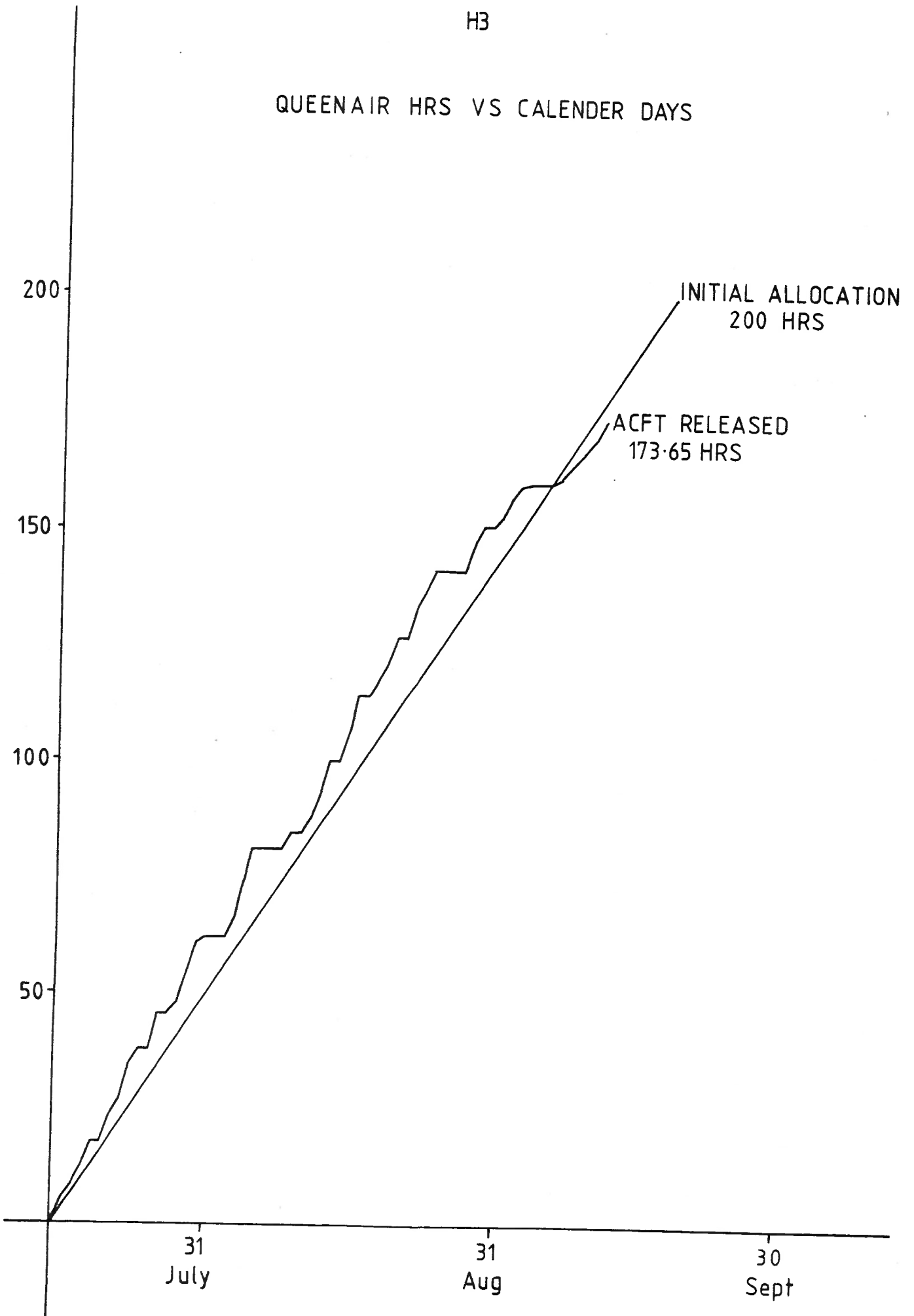
H2

UHIH HRS VS CALENDER DAYS

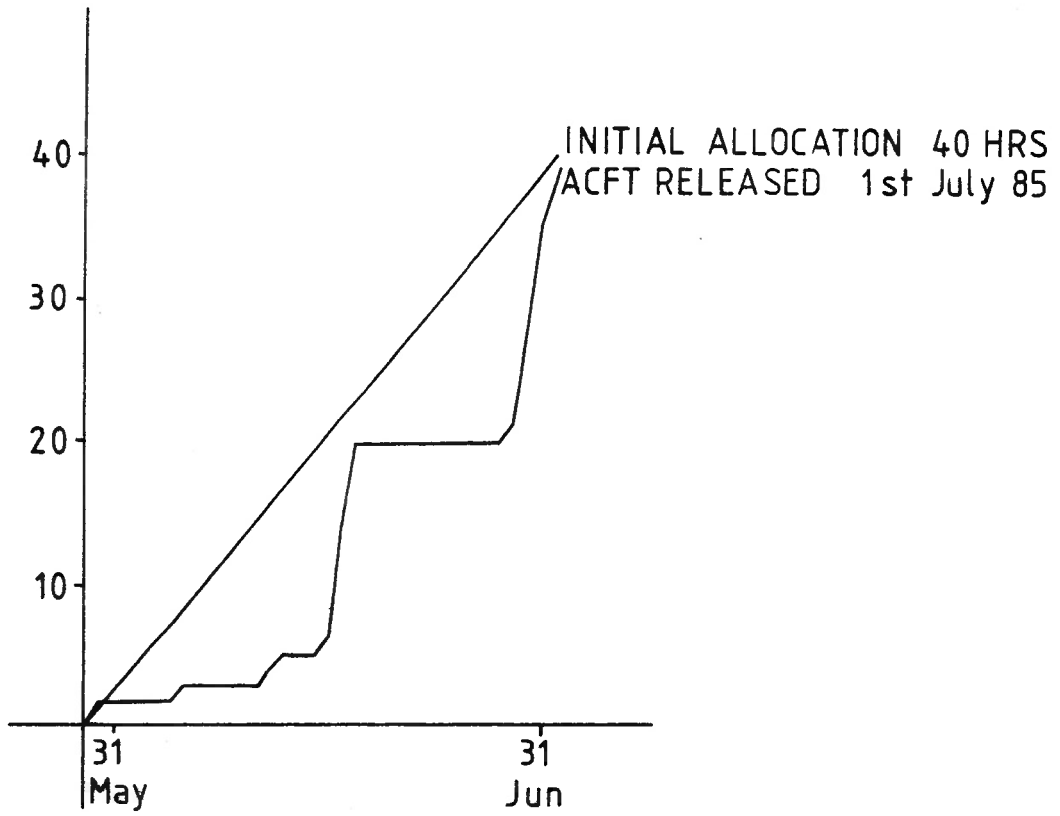


H3

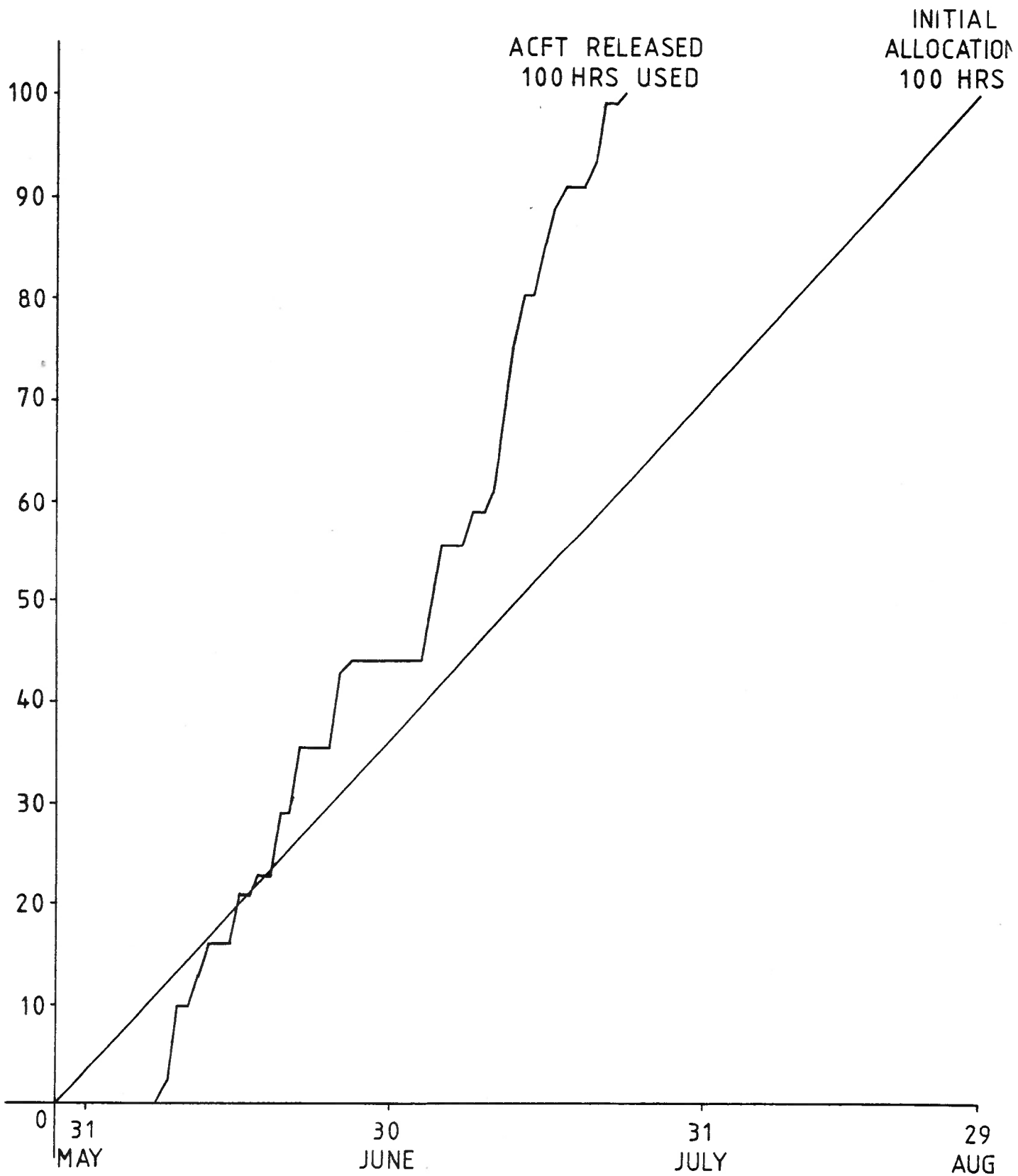
QUEENAIR HRS VS CALENDER DAYS



CARIBOU HRS VS CALENDER DAYS



PORTER HRS VS CALENDER DAYS



SUMMARY OF MECHANIC REPAIRS

<u>Serial</u> (a)	<u>Vehicle</u> (b)	<u>ARN</u> (c)	<u>Loan/Unit Veh</u> (d)	<u>Repair/Remarks</u> (e)	<u>Method (1)</u> (f)
1.	Station Wagon	41-684	Unit	Major Service Minor Service Fuel System	Contractor
2.	Hiace	33-449	41 Sup Bn	Major Service	Contractor
3.	Truck Cargo -4 Ton CL	31.356	31 Sup Bn	Clutch, Starter Motor Injector Fuel Lines Regulator for Spare Battery Engine Stop Cable Shock Absorbers	Contractor RAEME Mech
4.	-4 Ton CL	34.169	31 Sup Bn	Charging Circuit Fuel System	Contractor RAEME Mech
5.	Truck Cargo -5 Ton GS	171.624	41 Sup Bn	Gearbox Steering Box Front Brake Shoes Front Wheel Bearings	Contractor
6.	Landrover 3/4 Ton -S111 GS	29.701	Unit	Minor Service Rear Brake Shoes Manifold Gaskets Rear Wheel Bearings Winch Drive Tie rod and Drag Link	RAEME Mech
7.	-S111 GS	32.277	41 Sup bn	Rear Brake Shoes Head Gaskets Exhaust Gaskets	RAEME Mech
8.	-S111 GS	29.700	Unit	Major Service Handbrake Shoes Ignition Switch	RAEME Mech
9.	-S111 GS	29.664	Unit	Manifold Gaskets Exhaust Pipe Muffler Radiator and Fan Door Lock	RAEME Mech
10.	-S111 FFR	30.013	41 Sup Bn	Speedo Rewire of Instrument Electrical Circuit Rewire Ignition Switch Rear Brake Shoes LHF Wheel Cylinder Transfer Case Seal Minor Service Radiator and Fan Alternator Steering Damper	RAEME Mech

(a)	(b)	(c)	(d)	(e)	(f)
11.	-S111 GS	32.289	41 Sup bn	Head Gasket Minor Service Fuel Pump Coil Sump Gasket	RAEME Mech
12.	-S111 GS	29.670	Unit	Alternator Indicator Army Transfer Case Seal Handbrake Shoes Front Brake Shoes RHF Wheel Cylinder	RAEME Mech
13.	-S111 GS	29.287	41 Sup Bn	Front Axle Assembly Rear Brake Shoes Muffler	RAEME Mech
14.	-S111 GS	29.284	41 Sup Bn	Major Service Alternator	RAEME Mech
15.	-S11 A	179.529	41 Sup Bn	Exhaust Manifold Coil and Plugs Engine Rebuild	RAEME Mech Wksp P1 7 MD
16.	-S11 A	172.460	41 Sup Bn	Rear Differential Assembly Brake Shoes Overhaul Rear Wheel Assembly Engine Replaced	RAEME Mech Wksp P1 7 MD
17.	GEN SET 500 W	1213		Fuel Tank Pull Start	RAEME Mech
18.		800		Exhaust System	Contractor
19.		157		Pull Start Exhaust System	RAEME Mech Contractor
20.		808		Fuel Tank Fuel Bowl Carburettor	RAEME Mech
21.	Trailer $\frac{1}{2}$ Ton	All	Loan/Unit	Adjusted Wheel Bearings Minor Service Lights Towin Eyes Overhauled	RAEME Mech

Note: 1. Contractors included:

- a. Dee Jay Engineering, Katherine; and
- b. Terrace Autos, Katherine.

NOMINAL ROLL

<u>Serial</u> (a)	<u>Regt No</u> (b)	<u>Rank</u> (c)	<u>Name</u> (d)	<u>Unit</u> (e)	<u>Employment</u> (f)	<u>Period</u> (g)
1.	41444	MAJ	Bion P.M.	4 Fd Svy Sqn	OC	28 May-17 Jun 85 11 Jul-14 Aug 85
2.	63184	CAPT	Cooper S.A.	4 Fd Svy Sqn	OPS Offr	28 May-18 Sep 85
3.	41896	WO1	Munro W.A.	4 Fd Svy Sqn	Admin Offr	28 May-4 Aug 85
4.	45423	WO2	Hinic S.	4 Fd Svy Sqn	OIC Fwd Base Admin Offr	28 May-14 Jul 85 15 Jul-18 Sep 85
5.	6708956	SSGT	Lutwyche B.J.	4 Fd Svy Sqn	APR Recon OIC Levelling	27 May-11 Jul 85 12 Jul-18 Sep 85
6.	44157	SSGT	Scales M.J.	4 Fd Svy Sqn	QMS	28 May-12 Jul 85
7.	313339	SSGT	Timmins G.E.	4 Fd Svy Sqn	IC Svy Records	28 May-18 Sep 85
8.	222877	SGT	Jones N.W.	4 Fd Svy Sqn	Ident Photog	28 May-26 Jun 85
9.	314445	SGT	Rees R.J.	4 Fd Svy Sqn	ACUR	28 May-12 Jul 85
10.	47285	SGT	Ryan K.	4 Fd Svy Sqn	Chief Clerk	28 May-14 Aug 85 9 Sep-15 Sep 85
11.	315386	SGT	Smalley P.J.	4 Fd Svy Sqn	OIC Fd Check	28 May-24 Jul 85
12.	2792516	SGT	Virtue A.T.	4 Fd Svy Sqn	Tech Photo	11 Jul-28 Aug 85

(a)	(b)	(c)	(d)	(e)	(f)	(g)
13.	225529	CPL	Choy K.B.	4 Fd Svy Sqn	GCVR APR Op	28 May-9 Aug 85 10 Aug-11 Sep 85
14.	226450	CPL	Drury P.M.	4 Fd Svy Sqn	GCVR	28 May-18 Jun 85
15.	3176518	CPL	Hawkins A.R.	4 Fd Svy Sqn	GCUR	28 May-18 Sep 85
16.	49654	CPL	Longbottom P.D.	4 Fd Svy Sqn	Camera op	28 May-30 Jul 85
17.	63273	CPL	Lucas A.D.	4 Fd Svy Sqn	GCVR/Levelling	28 May-18 Sep 85
18.	226044	CPL	Irving D.J.	4 Fd Svy Sqn	GCVR	28 May-11 Aug 85
19.	552471	CPL	Clarke R.D.	4 Fd Svy Sqn	APR	11 Jul-18 Sep 85
20.	2791998	CPL	Kennedy P.J.	4 Fd Svy Sqn	CPL Stmn	11 Jul-18 Sep 85
21.	453672	CPL	Ratcliffe J.A.	4 Fd Svy Sqn	GCVR	21 Jun-31 Jul 85
22.	320106	CPL	Whitly K.W.	4 Fd Svy Sqn	GCVR	28 May-11 Aug 85
23.	511970	LCPL	Brown C.	4 Fd Svy Sqn	GCVR/Levelling	28 May-18 Sep 85
24.	321968	LCPL	McGuinness S.E.	4 Fd Svy Sqn	APR	11 Jul-18 Sep 85
25.	180949	SPR	Beavis R.P.	4 Fd Svy Sqn	APR Recon/Levelling	28 May-18 Sep 85
26.	453466	SPR	Kimber G.S.	4 Fd Svy Sqn	Records	28 May-14 Jun 85
27.	182138	SPR	Lambton-Young D.A.	4 Fd Svy Sqn	GCVR	28 May-16 Jul 85
28.	323295	SPR	McCurdy P.A.	4 Fd Svy Sqn	GCVR	28 May-11 Aug 85
29.	321813	SPR	Nolan D.G.	4 Fd Svy Sqn	Fd Check	28 May-23 Jul 85
30.	231173	PTE	Ragen D.W.	4 Fd Svy Sqn	Dvr/Stmn	28 May-18 Sep 85

(a)	(b)	(c)	(d)	(e)	(f)	(g)
31.	453672	SPR	Rawcliffe A.B.	4 Fd Svy Sqn	GCVR/Levelling	28 May-18 Sep 85
32.	228115	SPR	Rundle S.C.	4 Fd Svy Sqn	GCVR/Levelling	28 May-18 Sep 85
33.	416476	SPR	Tuddenham P.R.	4 Fd Svy Sqn	GCVR	28 May-10 Jul 85
34.	48426	CPL	Divito N.P.	HQ 4 MD	Cook	28 May-18 Sep 85
35.	4400527	PTE	Barber M.A.	16 AD Regt	Cook	28 May-16 Jul 85
36.	211609	CPL	Beecher S.	Syd Wksp Coy	GCVR Tech	28 May-17 Jul 85
37.	180904	CFN	Holland S.	Syd Wksp Coy	GCVR Tech	28 May-8 Aug 85
38.	222178	CPL	Gourley R.P.	Adel Wksp Coy	Veh Mech	11 Jul-18 Sep 85
39.	49946	CFN	Tilley D.J.	Adel Wksp Coy	Veh Mech	28 May-30 Jul 85
40.	4401029	SIG	Munro D.B.	122 Sig Tp	OP OKR	28 May-28 Jun 85 12 Jul-30 Jul 85
41.	324553	SIG	McDonald R.S.	122 Sig Tp	OP OKR	28 Jun-10 Jul 85
42.	63200	CAPT	Mazur C.	2 Fd Svy Sqn	APR Manager	11 Jul-11 Sep 85
43.	2133188	SGT	Gill J.R.	2 Fd Svy Sqn	APR OP	11 Jul-4 Sep 85
44.	225897	CPL	Thun W.A.	2 Fd Svy Sqn	APR OP	11 Jul-14 Aug 85
45.	180386	CPL	Mallon A.	2 Fd Svy Sqn	Camera Op APR	16 Aug-11 Sep 85
46.	227843	LCPL	Brown R.	Syd Wksp Coy	APR Tech	11 Jul-11 Sep 85
47.	227556	CFN	Bowie A.A.	Syd Wksp Coy	APR Tech	11 Jul-11 Sep 85
48.	323043	LT	White M.R.	173 Gen Spt Sqn	Pilot (Porter)	28 May-10 Jun 85
49.	1200785	CAPT	Muir P.A.	173 Gen Spt Sqn	Pilot (Porter)	8 Jun-27 Jun 85

(a)	(b)	(c)	(d)	(e)	(f)	(g)
50.	4401617	LT	Carroll D.	173 Gen Spt Sqn	Pilot (Porter)	3 Jul-23 Jul 85
51.	56260	CPL	Power W.	173 Gen Spt Sqn	RAEME Mech	3 Jul-23 Jul 85
52.	212194	LCPL	McPherson W.K.	173 Gen Spt Sqn	RAEME Mech	28 May-27 Jun 85
53.	219746	MAJ	Omerod S.	171 Comd & Liaison Sqn	Pilot (LOH)	30 May-2 Jun 85
54.	2412305	CAPT	Mackenzie I.N.	171 Comd & Liaison Sqn	OC RAEME Det	30 May-9 Jun 85
55.	320308	CAPT	Salan I.	171 Comd & Liaison Sqn	Pilot (LOH)	30 May-9 Jun 85 20 Jun-26 Jun 85
56.	57251	CAPT	Hendrick I.	171 Comd & Liaison Sqn	Pilot (LOH)	9 Jun-20 Jun 85
57.	1203596	CAPT	South D.	171 Comd & Liaison Sqn	Pilot (LOH)	9 Jun-20 Jun 85
58.	40-86-9136	CAPT	McKnight J.	171 Comd & Liaison Sqn	Pilot (LOH)	9 Jun-20 Jun 85
59.	226607	CAPT	Gornall P.	171 Comd & Liaison Sqn	Pilot (LOH)	20 Jun-30 Jun 85
60.	226821	LT	Bartells N.	171 Comd & Liaison Sqn	Pilot (LOH)	30 May-9 Jun 85
61.	3143049	LT	Jameson C.	171 Comd & Liaison Sqn	Pilot (LOH)	30 May-9 Jun 85
62.	182388	LT	McDonald R.	171 Comd & Liaison Sqn	Pilot (LOH)	30 May-9 Jun 85
63.	227640	LT	Hewitt P.S.	171 Comd & Liaison Sqn	Pilot (LOH)	9 Jun-20 Jun 85
64.	63486	LT	Pilcher S.	171 Comd & Liaison Sqn	Pilot (LOH)	9 Jun-20 Jun 85
65.	179535	LT	Morris H.	171 Comd & Liaison Sqn	Pilot (LOH)	20 Jun-30 Jun 85
66.	325840	LT	Rhund I.	171 Comd & Liaison Sqn	Pilot (LOH)	20 Jun-30 Jun 85
67.	182579	LT	Perren E.	171 Comd & Liaison Sqn	Pilot (LOH)	20 Jun-26 Jun 85
68.	325831	LT	Fox H.	171 Comd & Liaison Sqn	Pilot (LOH)	20 Jun-30 Jun 85

(a)	(b)	(c)	(d)	(e)	(f)	(g)
69.	315869	CPL	Baurd M.	171 Comd & Liaison Sqn	RAEME Mech	30 May-9 Jun 85
70.	46698	CPL	Curin S.	171 Comd & Liaison Sqn	RAEME Mech	30 May-9 Jun 85
71.	180941	CFN	Dean L.	171 Comd & Liaison Sqn	RAEME Mech	30 May-9 Jun 85
72.	241473	CFN	Hopwood K.	171 Comd & Liaison Sqn	RAEME Mech	30 May-9 Jun 85
73.	231279	PTE	Trood S.	171 Comd & Liaison Sqn	ACFT Handler	30 May-9 Jun 85
74.	312672	SSGT	Wilkins P.	171 Comd & Liaison Sqn	RAEME Mech	9 Jun-29 Jun 85
75.	220856	SGT	Campbell P.	171 Comd & Liaison Sqn	RAEME Mech	9 Jun-20 Jun 85
76.	180019	CPL	Darr P.	171 Comd & Liaison Sqn	RAEME Mech	9 Jun-20 Jun 85
77.	230204	CFN	Bowling P.	171 Comd & Liaison Sqn	RAEME Mech	9 Jun-20 Jun 85
78.	322538	PTE	McMaster M.	171 Comd & Liaison Sqn	ACFT Handler	9 Jun-20 Jun 85
79.	318577	CFN	Watson G.	171 Comd & Liaison Sqn	RAEME Mech	9 Jun-20 Jun 85
80.	313207	CPL	Treble W.	171 Comd & Liaison Sqn	RAEME Mech	20 Jun-30 Jun 85
81.	1206164	CFN	Fitz-Henry P.	171 Comd & Liaison Sqn	RAEME Mech	20 Jun-29 Jun 85
82.	2147687	CFN	Heagney P.	171 Comd & Liaison Sqn	RAEME Mech	20 Jun-29 Jun 85
83.	520226	CPL	Martyn I.	171 Comd & Liaison Sqn	RAEME Mech	20 Jun-29 Jun 85
84.	4401209	CFN	Rouse J.	171 Comd & Liaison Sqn	RAEME Mech	20 Jun-29 Jun 85
85.	232775	SGT	Bailey G.A.	5 Base Wksp Bn	RAEME Mech	9 Jun-20 Jun 85
86.	226772	CAPT	Evans C.I.	162 Recce Sqn	Pilot (LOH)	1 Jul-14 Jul 85
87.	39285	CAPT	Howe P.J.	162 Recce Sqn	Pilot (LOH)	1 Jul-14 Jul 85

(a)	(b)	(c)	(d)	(e)	(f)	(g)
88.	1204636	CAPT	Heathwood B.R.	162 Recce Sqn	Pilot (LOH)	1 Jul-8 Jul 85 13 Jul-14 Jul 85
89.	291358	LT	Smith P.S.	162 Recce Sqn	Pilot (LOH)	1 Jul-16 Jul 85
90.	416631	LT	Griffiths A.J.	162 Recce Sqn	Pilot (LOH)	17 Jul-29 Jul 85
91.	260332	LT	Rankin M.J.	162 Recce Sqn	Pilot (LOH)	16 Jul-29 Jul 85
92.	61881	SGT	Costelloe J.	162 Recce Sqn	RAEME Mech	1 Jul-15 Jul 85
93.	1202823	SGT	Lambert R.W.	162 Recce Sqn	ACFT Handler	1 Jul-16 Jul 85
94.	58483	CPL	Bannister B.	162 Recce Sqn	RAEME Mech	1 Jul-15 Jul 85
95.	316086	CPL	Girdlestone R.	162 Recce Sqn	RAEME Mech	19 Jul-29 Jul 85
96.	1102073	PTE	Graham D.	162 Recce Sqn	ACFT Handler	1 Jul-14 Jul 85
97.	227667	LT	Jones M.G.	161 Recce Sqn	Pilot (LOH)	1 Aug-12 Aug 85
98.	2241345	LT	O'Rielly L.	161 Recce Sqn	Pilot (LOH)	13 Aug-28 Aug 85
99.	181861	LT	Turton N.A.	161 Recce Sqn	Pilot (LOH)	29 Aug-11 Sep 85
100.	1205077	CPL	Farrow J.R.	161 Recce Sqn	RAEME Mech	1 Aug-12 Aug 85
101.	226574	CFN	Norenbergs S.P.	161 Recce Sqn	RAEME Mech	13 Aug-28 Aug 85
102.	219180	CPL	Blackman K.B.	161 Recce Sqn	RAEME Mech	29 Aug-11 Sep 85
103.		Mr	Millar J.	Airsearch Aviation	Pilot (QueenAir)	16 Jul-12 Sep 85

STORES WRITTEN OFF IN AO

<u>Serial</u> (a)	<u>Item</u> (b)	<u>Qty</u> (c)	<u>Replacement Cost</u> (d)
1.	Battery, storage 12V	12	\$ 325.92
2.	Boots GP	4	\$ 150.60
3.	Chairs arm folding, tubular frame	7	\$ 56.00
4.	Cot folding canvas	9	\$ 212.40
5.	Cover fitted vehicle body	1	\$ 399.60
6.	Cover fitted trailer body	1	\$ 23.51
7.	Cylinder compressed gas 1.9 kg	2	\$ 46.20
8.	Innner tube 750 x 16	19	\$ 121.41
9.	Inner tube 1200 x 20	1	\$ 19.90
10.	Nets mosquito	5	\$ 27.50
11.	Shirts man mil green	5	\$ 51.75
12.	Table folding legs	2	\$ 20.00
13.	Tent section, end outer	1	\$ 205.25
14.	Thermometer survey chaining	1	\$ 7.00
15.	Trousers DG PD	11	\$ 159.50
16.	Tyre 750 x 16	12	\$1293.00
17.	Tyre pneumatic (grouped)	10	<u>\$1023.80</u>
		TOTAL	\$4143.34

SUMMARY OF EXPENDITURE

<u>Serial</u> (a)	<u>Item</u> (b)	<u>FY 84/85</u> (c)	<u>FY 85/86</u> (d)	<u>Total</u> (e)
1.	POL	65 579.54	46 304.63	111 884.17
2.	Rations	9 958.17	18 462.48	28 420.65
3.	Travel & Subsistence	25 427.27 (1)	15 622.07	41 049.34
4.	Freight & Cartage	24 292.58	4 442.10	28 734.68
			TOTAL	\$210 088.85

NOTE: 1. Bus hire Alice Springs Airport to Alice Springs Rail Head 26 May 85 still outstanding. Awaiting details from DOLGAS.