

# Radiometric Calibration Report

for

## VH-WAM

Prepared by : J. Doedens .....

P Chambers .....

Authorised for release by : .....

.....

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by



*Fugro Airborne Surveys*  
65 Brockway Road, Floreat. WA 6014, Australia  
Tel: (61-8) 9273 6400 Fax: (61-8) 9273 6466

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## 1. INTRODUCTION

This report provides details and results of radiometric calibrations conducted by flying offshore tests, and the Carnamah test strip in Western Australia, as well as pad tests at Jandakot airport, from July 2006.

Data acquisition was by Fugro Airborne Surveys Pty Ltd, using a Rockwell Shrike Aerocommander 500S, VH-WAM. Total crystal volume was 33.56 L.

The calibration methods are generally as described by Grasty and Minty (1995).

A summary of all results is shown in Table 1.

<b>VH-WAM</b>	<b>Date</b>	<b>Window</b>	
<b>Aircraft Background</b>	11 July 2006	TC	57.80
		K	9.1
		U	2.7
		Th	0.55
<b>Cosmic Background</b>	11 July 2006	TC	0.8700
		K	0.0510
		U	0.401
		Th	0.0530
<b>Stripping</b>	5 Jan 2006	$\alpha$	0.2657
		$\beta$	0.4192
		$\gamma$	0.7963
		a	0.0621
		b	0.0016
		c	-0.0166
<b>Height Attenuation</b>	7 July 2006	TC	-0.0070
		K	-0.0090
		U	-0.0099
		Th	-0.0075
<b>Air/Ground @ 60 m</b>	7 July 2006	Dose	33.84
		K	129.72
		U	8.15
		Th	7.64
<b>Air/Ground @ 80 m</b>	7 July 2006	Dose	29.42
		K	108.35
		U	6.68
		Th	6.57

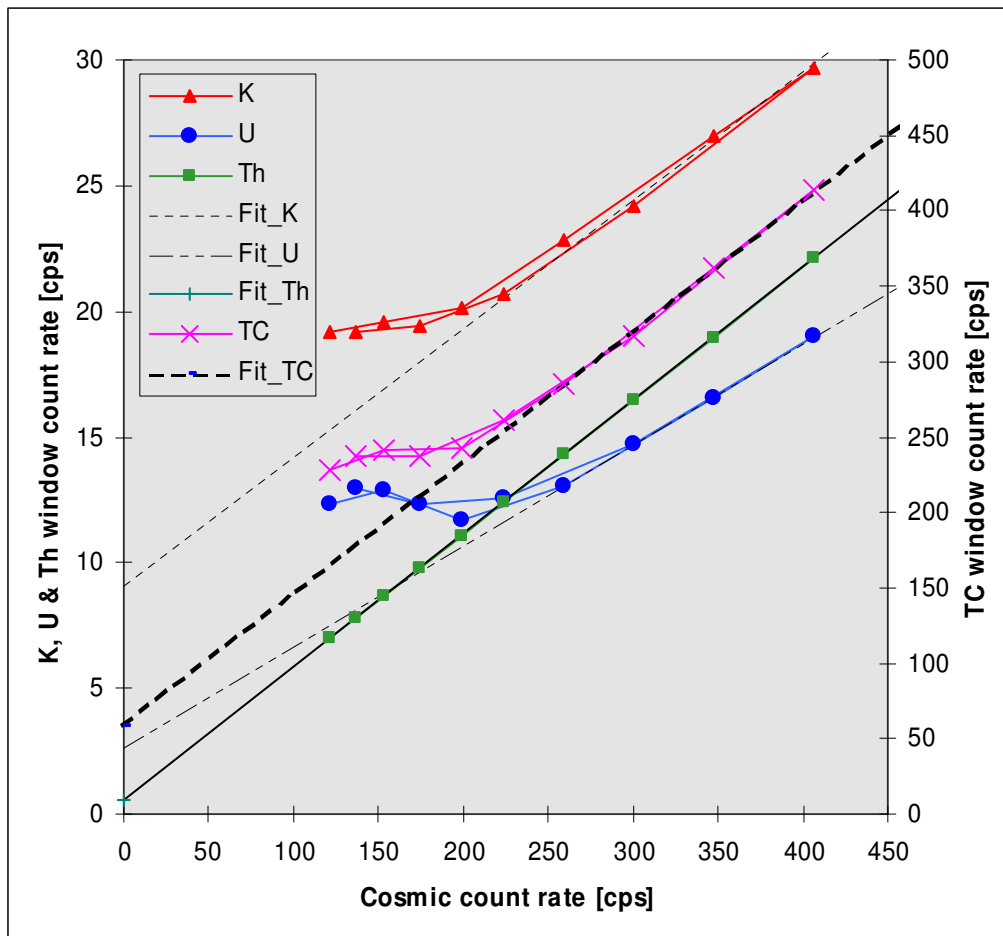
**Table 1: VH-WAM Radiometric Coefficients**

## 2. VH-WAM

### 2.1 COSMIC AND AIRCRAFT BACKGROUND COEFFICIENTS

Cosmic and aircraft background coefficients were obtained from a multi-level level flight over the ocean, flown on the 11<sup>th</sup> July 2006.

	Cosmic	Aircraft
TC	0.8700	57.80
K	0.0510	9.1
U	0.401	2.65
Th	0.0530	0.55



## 2.2 STRIPPING COEFFICIENTS

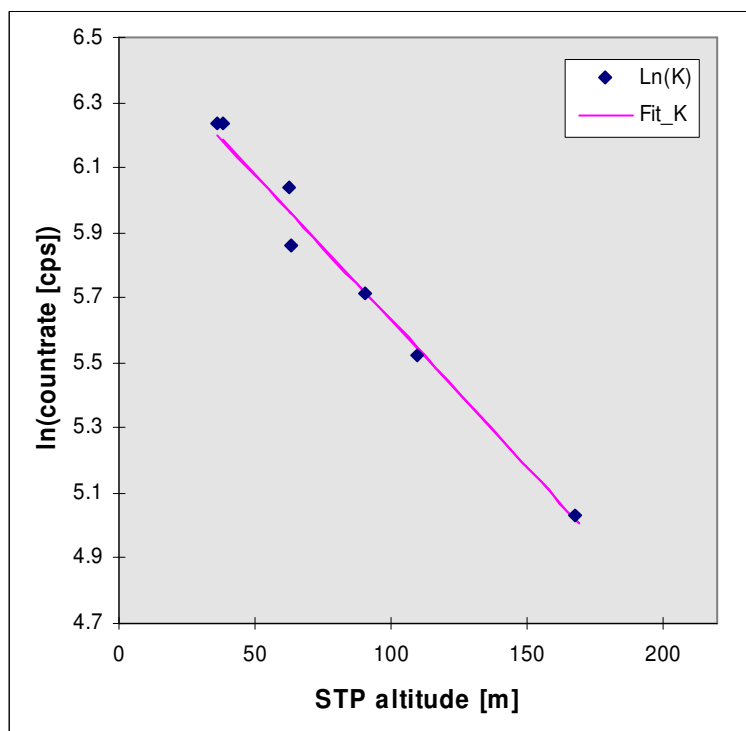
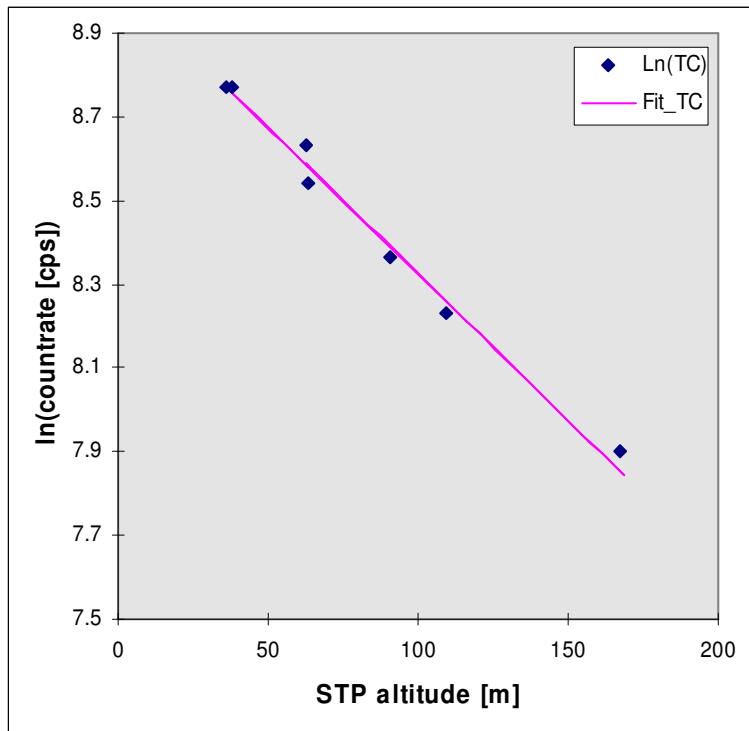
Stripping coefficients were obtained from pad tests carried out at Jandakot Airport, Western Australia, on the 5<sup>th</sup> January 2006.

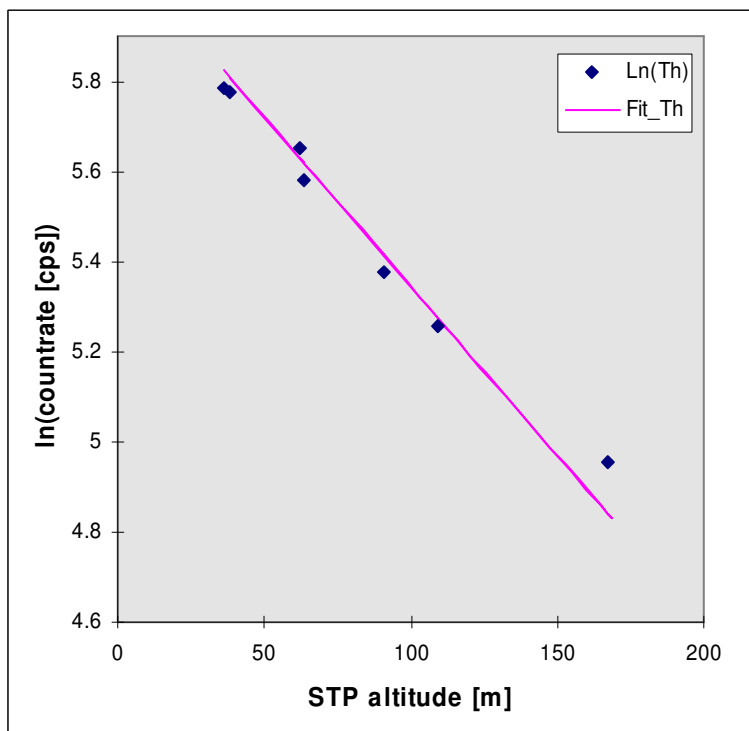
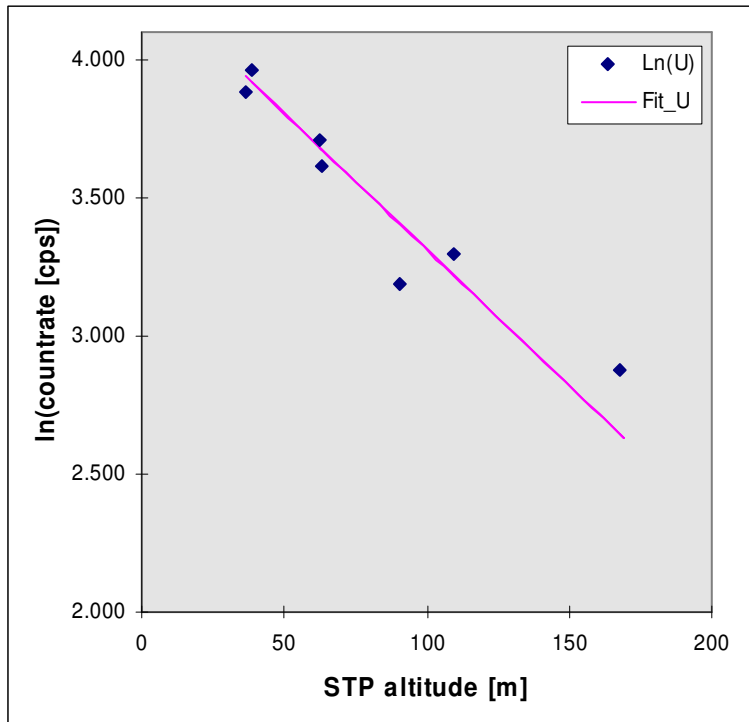
	Stripping
$\alpha$ (Th to U)	0.2657
$\beta$ (Th to K)	0.4192
$\gamma$ (U to K)	0.7963
A (U to Th)	0.0621
B (K to Th)	0.0016
C (K to U)	-0.0166

## 2.3 HEIGHT ATTENUATION COEFFICIENTS

Height attenuation coefficients were obtained from a low-level height stack over the Carnamah dynamic test range, Western Australia, flown on the 7<sup>th</sup> of July 2006.

Height Atten	
TC	-0.0070
K	-0.009
U	-0.0099
Th	-0.0075



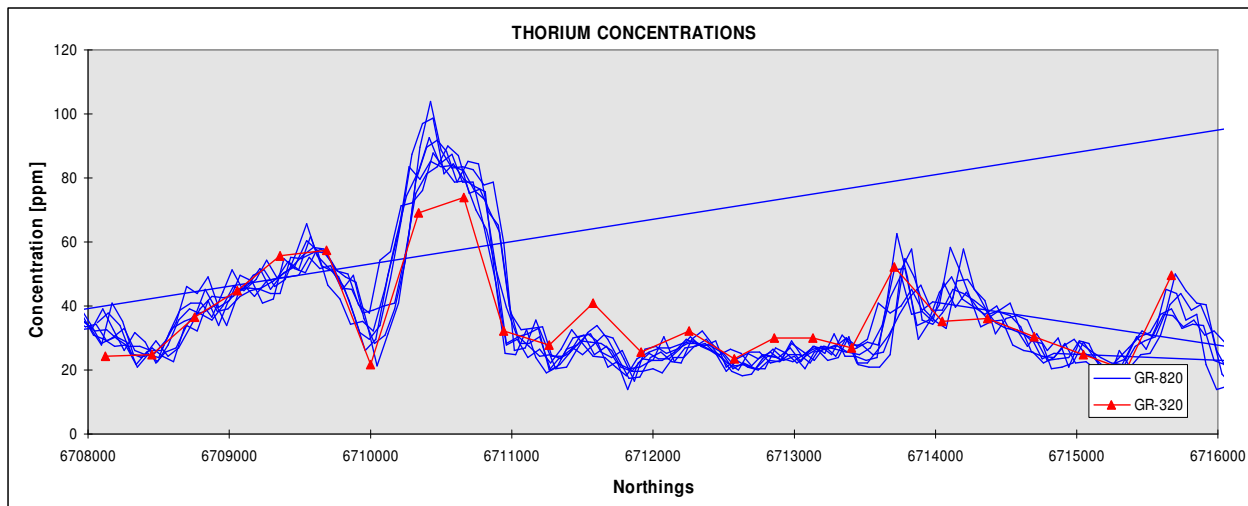
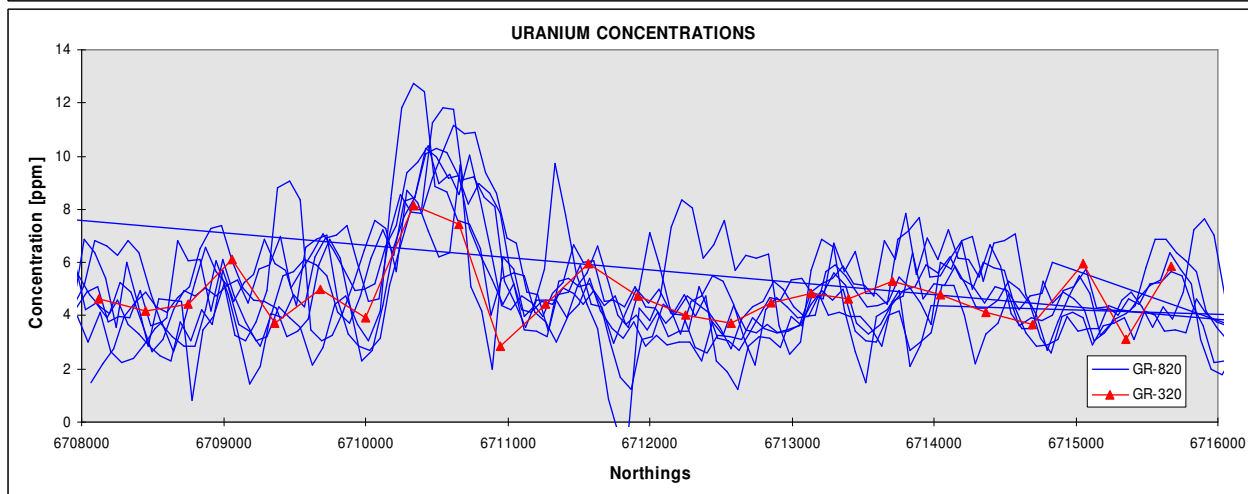
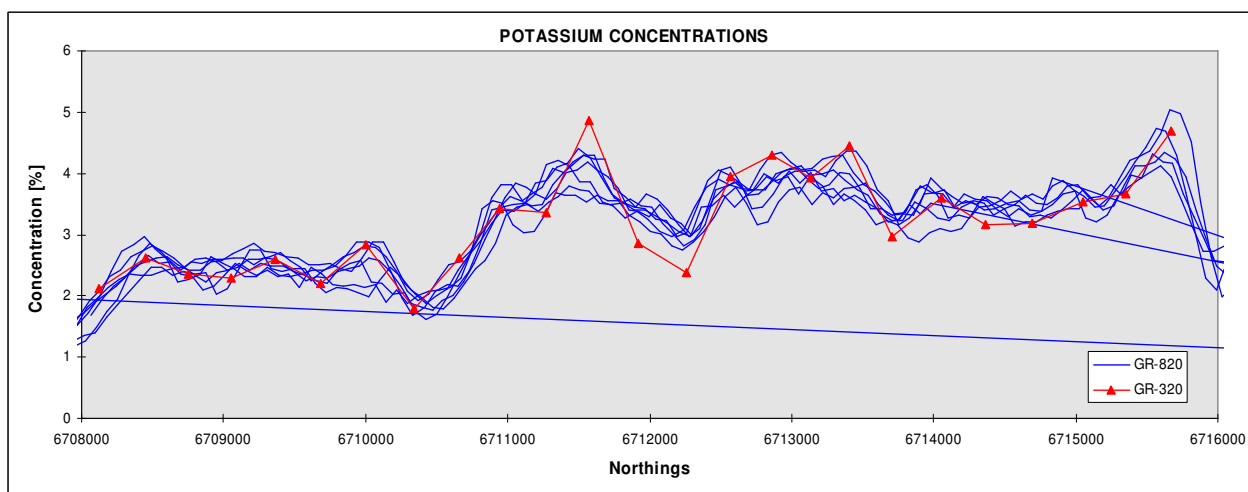


## 2.4 AIR TO GROUND RADIOELEMENT CONCENTRATIONS CONVERSION

Air to ground conversion factors were determined by comparison of the airborne and ground radiometric data acquired along the central line of the Carnamah dynamic test range, Western Australia, on the 7<sup>th</sup> July 2006.

The airborne data were corrected and clipped to the same length as the ground traverse. Ratios of the averages of the airborne window data, corrected to altitudes of 60 m and 80 m, and the ground traverse were then calculated.

	<b>K</b>	<b>U</b>	<b>Th</b>
Ground (% , ppm, ppm)	3.19	4.80	37.01
Airborne (cps) @ 60 m	413.9	39.1	282.7
Air/Ground @ 60 m	129.72	8.15	7.64
Airborne (cps) @ 80 m	345.7	32.0	243.3
Air/Ground @ 80 m	108.35	6.68	6.57





## 2.5 CONVERSION OF TOTAL COUNT TO DOSE RATE

An estimate of the air-absorbed dose rate (in nGy/h ie nanograys per hour) at ground level was determined from natural sources of radiation from the total count rate using the expression:

$$D = N / F$$

Where

- D = the air absorbed dose rate in nanograys per hour
- F = the conversion factor determined experimentally from flights over the Carnamah test range; and
- N = the fully corrected total count rate

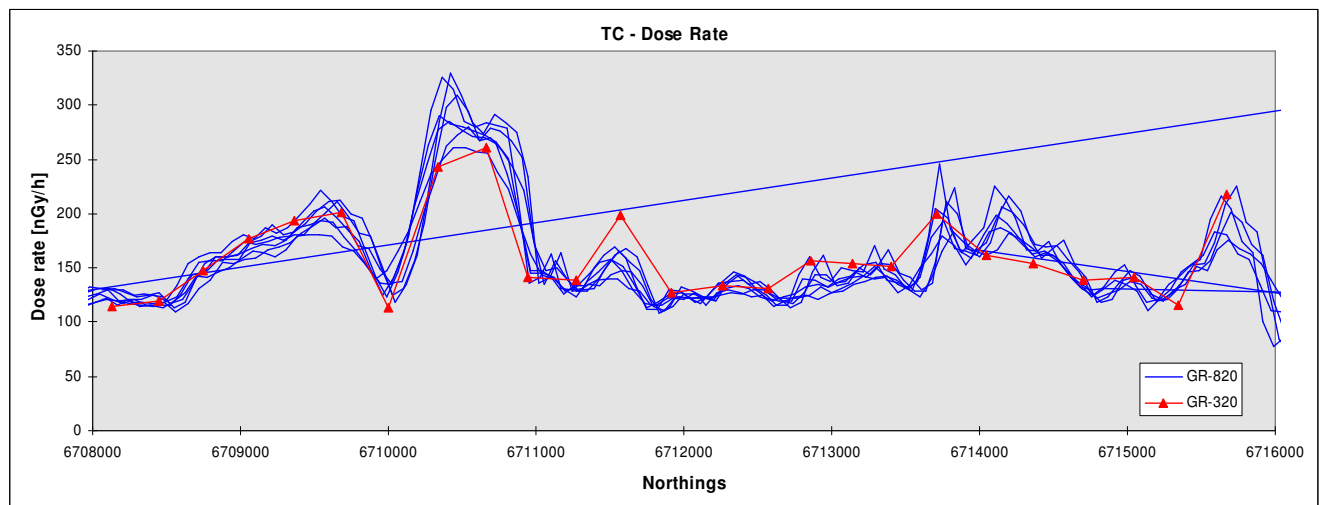
The average air-absorbed dose rate in nGy/h along the calibration range was calculated from the ground concentrations of K, U and Th using the relationship:

$$A = 13.078 \times K + 5.675 \times U + 2.494 \times Th$$

(Grasty and Minty, AGSO Record 1995/60)

The ratio of the averages of the airborne window data, corrected to altitudes of 60 m and 80 m, and the ground traverse were then calculated.

	TC
Ground (nGy/h)	161.24
Airborne (cps) @ 60 m	5456.7
Air/Ground @ 60 m	33.84
Airborne (cps) @ 80 m	4743.9
Air/Ground @ 80 m	29.42



### **3. REFERENCES**

Grasty, R.L. and Minty, B.R.S., 1995,  
*A guide to the technical specifications for airborne gamma-ray surveys.*  
Australian Geological Survey Organisation, Record 1995/60.