407/026/51
Pt II

Downgraded to.

L.H. 118B.

Tel. No. : SEVENOAKS 5211
Extn. 624.

Any communication on the subject of this letter should be addressed to :
THE DIRECTOR,
and the following reference quoted :

Your Ref.

DEPARTMENT OF ATOMIC ENERGY,

[redacted]

ATOMIC WEAPONS
RESEARCH ESTABLISHMENT,
FORT HALSTEAD,
SEVENOAKS, KI

28th May, 1955

Major D.E. Ballantine,
Room 6, First Floor,
Ministry of Defence.

25/4/65 (WWC) D/S

Dear Major Ballantine,

Operation Hurricane

I enclose three copies of two additional sections for the Operation Hurricane report which arise from a further radiological survey at Monte Bello performed after Operation Totem.

The attached Section 7.7 on the Ratio of the Beta to Gamma Dose should be inserted in the main report and the existing Section 7.7, the Top Secret one dealing with the contamination contours, should then become Section 7.8. I enclose an additional sub-section 7.8.5.

An amended version of Table 7.4 in the Top Secret portion is also forwarded and the following small amendments to other sections of the report should also be made:-

Section 3.3 - "a minor effect" should read "a secondary effect".
Section 4.1, paragraph 1; "over the range 1740 to 7520 feet" should read "over the range 1400 to 7520 feet"
Section 14.3, last sentence; after "at the other distances" insert "i.e. between 500 and 1000 yards".

Yours faithfully,

[redacted]

(C.L. FARROR)
for Director, Atomic Weapons Research Establishment.

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Table 7.4 in the Top Secret portion should be amended as follows:-

Dose-rate (r/hr) at one hour	Monte Bello Weapon		Low Air-Burst over Land. Equivalent Radius (Feet)
	Area (Sq.Miles)	Equivalent Radius (Feet)	
10,000	0.62	2350	-
6,000	0.85	2750	200
3,000	1.12	3150	450
2,000	1.62	3800	525
1,000	2.65	4850	575
600	3.2	5350	600
400	3.7	5750	700
200	4.8	6500	850

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7.5. A further radiological survey was made in November, 1953, 405 days after the explosion and the islands were found to be still highly radioactive.

Although in some places drifting sand had materially reduced the gamma radiation compared with that in places where the soil surface was held by vegetation, in general, despite some 16 inches of rain and a cyclone in early 1953, there was no apparent evidence of the accelerated decay of fission products due to weathering.

From readings taken at certain points immediately after the trial and again in November, 1953, the decay factor from 1 hour to 405 days after the explosion was found to be 200,000. By applying this factor to the various readings obtained during this second survey, gamma dose-rate contours at one hour were constructed. These were found to be very similar in shape and size to those shown in Fig. 7.2. which are based on observations made during the period immediately following the explosion.

407/026/51
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7.7. The Ratio of the Beta to Gamma Dose

7.7.1. Various estimates of the ratio of the beta rep. to gamma roentgens immediately after the explosion gave values lying between 12 and 200. They also suggested that the ratio would have a minimum value at about 14 days and would rise sharply after about 28 days.

It was, therefore, considered possible that personnel receiving gamma doses within the permitted emergency levels could receive serious skin burns from the beta radiation. Some investigation of the ratio was, therefore, undertaken at the time of the trial and at a later radiological survey in November, 1953.

7.7.2. Measurements at one metre above the ground were made 14 days after the explosion over a previously prepared flat impervious surface about 30 feet in radius, over sand and over a patch of scrub. These gave values for the ratio of 3.5, 1.1 to 2.1 and 2.8 respectively. These results indicate that relatively intense beta radiation may accompany the gamma radiation from fission products even where, as in scrub or sand drifts, there is likely to be some absorption of beta particles.

The measurements made late in 1953 showed that the ratio was much higher than it was 14 days after the explosion and the highest recorded value was about 20. Ratios measured over sand were about one-third of those recorded over dead spinifex.