[redacted]

SANDIA

UNCLASSIFIED

ALBUQUERQUE, NEW MEXICO; LIVERMORE, CALIFORNIA; TONOPAH, NEVADA

[redacted]

(1) CONTROL NUMBER	(2) SERIES	(3) PAGES	(4) CLASS	(5) DATE	(6) TOTAL NO. OF COPIES
5590/128	A	3	[redacted]	FEB 26 1968	5

(7) COPY	(8) DISTRIBUTION	(9) ORG. NUMBER OR MAIL CHANNEL CODE
1	C. S. Williams, Attn: D. A. Jelinek	1425
2	C. R. Mehl, Attn: J. H. Renken	5230
3	G. W. Rodgers	5620
4	S. D. Spray, Attn: L. K. Johnson	5621
5	C. C. Hudson	5590

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW

1st Review Date: 11/05/97
Authority: ☐ ADC ☒ ADD
Name: W. Layne
2nd Review Date: 11/12/97
Authority: ADD
Name: W. H. LAWRENCE

1 Classification Retained
2 Classification Changed to: U
3 Contains No DOE Classified Information
4 Coordinate Work
5 Contains UCAN
6 Comments: O.K. for INTERNET

RECD
JAN 13 1972
9150

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
CHANGING OR DECLASSIFICATION STAMP

CLASSIFICATION CHANGED TO: U
Emelda Sylph 1-12-98
CHANGING MARKING & DATE
William Layne 1-12-98
PERSON VERIFYING MARKING & DATE

AUTHORITY: W. H. Lawrence
RECORD ID: 98SN 0555
DATED: 11/12/97

5590
FEB 26 1968

DO NOT TYPE BELOW

[redacted]

[redacted]

[redacted]

[redacted]

UNCLASSIFIED

[redacted]

SC 2900-FB (9-66) [redacted] RECORD OF ORIGINATION & DISTRIBUTION

[redacted]

UNCLASSIFIED

February 26, 1968
RS 5590/128

To: C. S. Williams - 1425, Attn: D. A. Jelinek

Craig C. Hudson

From: C. C. Hudson - 5590

Re: Electron Densities in Fireballs (U)

I have recalculated the electron density n and the collision frequency ν for a 70 kt burst at 5000 feet altitude. The numerical results are given below. The collision frequencies differ somewhat inside the fireball from the values I gave previously because I included a term for ions. Those first graphs contained my intuitive interpretations to fill in where real points were absent. Here I give only the newly calculated points, essentially the same as the old.

Table I

Radius (km)	0.1	0.15	0.2	0.25	0.3	0.35	0.4
0.1 sec							
n(Elec/cm^3)	$>10^{16}$	$>10^{16}$	1×10^{16}	2×10^{6}	$<10^{6}$	$<10^{6}$	$<10^{6}$
ν(sec^{-1})			1.6×10^{10}	4×10^{10}			
0.36 sec							
n(Elec/cm^3)	3×10^{15}	2×10^{15}	1.3×10^{15}	6×10^{14}	5×10^{12}	$<10^{6}$	$<10^{6}$
ν(sec^{-1})	9×10^{9}	9×10^{9}	8×10^{9}	5×10^{9}	1×10^{10}	2×10^{10}	4×10^{10}
1.0 sec							
n(Elec/cm^3)	5.5×10^{14}	4×10^{14}	4×10^{14}	2.2×10^{14}	9×10^{12}	$<10^{6}$	$<10^{6}$
ν(sec^{-1})	7×10^{9}	6×10^{9}	6×10^{9}	5×10^{9}	4×10^{9}	6×10^{9}	
4.6 sec							
n(Elec/cm^3)	5.2×10^{13}	5.2×10^{13}	5.2×10^{13}	1.5×10^{13}	7×10^{8}	$<10^{6}$	$<10^{6}$
ν(sec^{-1})	3.6×10^{9}	3.6×10^{9}	3.6×10^{9}	3.6×10^{9}	1×10^{10}	2×10^{10}	

UNCLASSIFIED

[redacted]

The cut-off for $n=10^6$ is due to the lack of thermodynamic calculations for $T < 2000°K$; I arbitrarily cut off above $n=10^{16}$. Uncertainties like a factor of 2 must be expected, partly because of the inherent uncertainty of the complicated calculations, partly because of my errors in reading graphs and rounding off.

If you want more detail, I think more could be wrung out of the available calculations, but we would be kidding ourselves to think we could improve the accuracy appreciably. You should ask for specific regions of interest.

I have already expressed to you my grave doubts about the validity of this model of the fireball. It leaves the debris in a neat pile at the center of the explosion, which is contrary to our experience. Thus both in the smoothness of the gradient as well as in the very magnitude of radius-vs-time, this model probably underestimates the severity of your problem. But it is the only model we have.

CCH:5590:ccw