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W.F. LIBBY FROM N.M. Lulejian

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AUTHOR: N.M. Lulejian

Additional Information: PRE-BRAVO DISCUSSIONS
ON FALLOUT PREDICTIONS

Unclassified

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DOT 7238
MEMORANDUM FOR DR. W. F. LIBBY

DEC 10 1954

SUBJECT: (U) World-Wide Contamination

1. During the RAND-SUNSHINE conferences of June 1953 and January 1954, I discussed with you the possibility that 75 to 85% of the total residual activity of surface burst weapons would be deposited immediately downwind (within 200 to 300 miles downwind) 6 to 18 hours after bomb detonation. The events of 1 March 1954 (CASTLE-BRAVO Shot) have proved the existence of large concentrations of residual activity downwind. For this reason I have taken the trouble of analyzing in detail the percentage downwind fallout from CASTLE-BRAVO Shot in the first 24 hours. See inclosed ARDC report, C4-23676 for details.

2. I believe that this fact has a distinct bearing on the validity of SUNSHINE assumptions of the Strontium 90 burden imposed by explosions of nuclear weapons. In Table I, I have listed all of the known explosions of atomic weapons to date. Then I have assumed that for tower shots (15 to 50KT from 300 ft towers) 10 to 30% of the residual activity is scavenged out in several hours by the soil, and hence is not available for world wide distribution. Similarly, I have assumed that for 25KT exploded from a 100 ft tower, 50% of activity is scavenged out by the soil. For surface shots, it is assumed that 80% is soil-scavenged out and therefore unavailable for world wide contamination. (Proof of these assumptions are in the inclosed ARDC Report).

3. In the Chicago baby experiments (reported by you in the January 1954 conference) you showed that new born babies in the Chicago area have about 1/6 SUNSHINE Unit of Sr90 or about 1/6000 of tolerance. On the basis of the original SUNSHINE estimate of an even distribution of 25,000 MT of debris to bring the world population up to tolerance, 4MT would give the Chicago babies the observed deposition. Since these experiments were concluded in 1953, it is assumed that Joe 4 (or TN Joe I) detonated in August 1952 did not add to the Sr90 burden of the Chicago babies. Table I shows that although a total of [redacted] were detonated by 1952, only a maximum of [redacted] were available for world wide contamination. It is my contention that [redacted] were available for U.S. deposition (see last two columns of Table I). Even if this is not true, and only the maximum value [redacted] is used, it is still less than the 4MT found by your experiment in the Chicago babies. It should be further pointed out that by the end of 1953, only 50% of the available atmospheric atomic debris had reached the ground. If this is true then we only had [redacted] or even as low as [redacted] available for the Chicago babies. And yet their uptake was 4MT by SUNSHINE estimates. The conclusion is inevitable that the SUNSHINE estimates are not conservative as popularly believed in many quarters. On the contrary SUNSHINE underestimated the Sr90 hazard. Many people have assumed that the SUNSHINE overestimates the Sr90 uptake by factors of 10 or even 30. The statement is also made that the Chicago baby uptake of Sr90 was not through the plant-animal-man cycle, but that the fission products were picked up by the animal (cow) directly from fallout that externally covered plant life, and this was then passed on to the mothers of

See Table

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| DEPARTMENT OF ENERGY |
| CLASSIFICATION REVIEW |
| 1ST REVIEW DATE: 6/22/94 |
| AUTHORITY: 13AOC, ARDC, EADD |
| NAME: W.F. Libby |
| 2ND REVIEW DATE: 9/27/94 |
| AUTHORITY: W.F. Libby |
| NAME: W.F. Libby |

US DOE ARCHIVES
326 US ATOMIC ENERGY COMMISSION
Libby Files

Box 2741
Sunshine Hazard - Weapons Test Data

Deleted Version Only

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| DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW |
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Incl # 1

[REDACTED]

Memo, (U) World-Wide Contamination

the Chicago babies. It seems to me that regardless of the mode of introduction of Sr90 into the human biological cycle, that fact that the Chicago babies picked up 1/6 SUNSHINE unit from a total available debris which may have been as low as [REDACTED] or even [REDACTED] is quite significant. It would be interesting to repeat the Chicago baby experiment in 1955. If the babies show an uptake of 1/2 SUNSHINE unit or more in 1955 the original SUNSHINE estimate of 25,000MT allowable may have to be lowered to 10,000 or 15,000MT. Your attention is particularly invited to Figure 11 of the inclosed report. (~~SECRET-RO~~)

4. This document classified ~~SECRET~~ in accordance with paragraphs 23b and 56, AFR 205-1.

1 Incl
Table I

N. M. Lulejian

N. M. LULEJIAN
Lt Colonel, USAF
Atomic Operations Division

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[REDACTED]

Handwritten notes:
[unclear] [unclear]
[unclear] [unclear]

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TABLE I

| TEST OPERATION | DATE | TOTAL YIELD IN KT (Fission) | YIELD AVAIL-ABLE FOR WORLD-WIDE CONTAMINATION | YIELD AVAIL-ABLE FOR CONTAMINATION OF U.S. | YIELD AVAILABLE FOR CHI-CAGO AREA CONTAMIN-ATION |
|------------------------------|---------|-----------------------------|---|--|--|
| Trinity | Jul 45 | 24 | 12 | 12 | 10 |
| Hiroshima | Aug 45 | 14 | 14 | 7 | 1 |
| Nagasaki | Aug 45 | 22 | 22 | 11 | 2 |
| Crossroads | Jul 46 | 40 | 15 | 7 | 1 |
| Sandstone | May 48 | 105 | 50 | 25 | 5 |
| Joe I | Sept 49 | 20 | 20 | 10 | 5 |
| Ranger | Jan 51 | 40 | 40 | 40 | 30 |
| Greenhouse | May 51 | 400 | 300 | 150 | 75 |
| Buster | Nov 51 | 72 | 72 | 72 | 50 |
| Joe 2 and 3 | Nov 51 | 40 | 40 | 20 | 10 |
| Jangle | Nov 51 | 2 | 0.5 | 0.5 | 0 |
| Tumbler | Apr 52 | 55 | 55 | 55 | 30 |
| Snapper | May 52 | 57 | 45 | 45 | 20 |
| Ivy | Nov 52 | DELETED | DELETED | DELETED | DELETED |
| Mike | " | DELETED | DELETED | DELETED | DELETED |
| King | " | 550 | 550 | 300 | 300 |
| TOTAL THRU 1952 | | DELETED | DELETED | DELETED | DELETED |
| Joe 4 | Aug 53 | DELETED | DELETED | DELETED | DELETED |
| CASTLE | Mar 54 | DELETED | DELETED | DELETED | DELETED |
| Bravo | " | DELETED | DELETED | DELETED | DELETED |
| Romeo | " | DELETED | DELETED | DELETED | DELETED |
| Koon | " | DELETED | DELETED | DELETED | DELETED |
| Union | " | DELETED | DELETED | DELETED | DELETED |
| Yankee | " | DELETED | DELETED | DELETED | DELETED |
| Nectar | " | DELETED | DELETED | DELETED | DELETED |
| GRAND TOTALS UP TO JUNE 1954 | | DELETED | DELETED | DELETED | DELETED |

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