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CATION WEST MCLASHINE by authority of the U.S.D.O.E.,

N FORM CO. M. Pautras, TSM, PSS-16-6

FILE NO.

SUBJECT

(Sig of second reviewer, title, organization, gate)

1865

Weather Phenomena Resulting from Megaton Detonations

Staff Weather Officer DATE 4 March 53

THRU: ACofS, J-3

400412

1. Investigation of subject has continued along the following lines 1

- a. Dr. C.E. PAIMER has completed preliminary theoretical investigation including interpretation of certain photographs selected from Lookout Mountain Laboratory files. Dr. Palmer has indicated that he will complete a paper on the subject about 1 April.
- b. LCDR W.J. KOTSCH has completed a comprehensive atmospheric stability analysis for both MIKE and KING and his findings have been delivered to this headquarters.
- c. Mr. Francis PORZEL, of LASL, is examining evidence from continental tests. Available evidence supports our preliminary findings of the circulation we suspect is induced by a large explosion. Mr. Porzel has agreed to summarize his findings and forward them to this headquarters.
- d. CDR PATE is coordinating the entire effort (the scope of which has been greatly enlarged since original concept) and will edit and assemble final report. In addition, he will summarize operational considerations and make certain recommendations. It is expected that the final report will be completed by 1 June.
- 2. In the interim, because of serious implications with respect to CASTLE, the following conclusions are presented as a preliminary report:
- a. All available evidence, including weather logs and photographs, definitely shows that MIKE detonation induced atmospheric circulation which changed the weather over a wide area for about 6-8 hours. Weather before and after the shot was entirely different. Specifically:

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- (1) Cloud tops increased from relatively low levels to 30-35,000 feet.
- (2) Several layers of intermediate cloud were formed.
- (3) A high overcast (38-40,000 feet) was produced.
- (4) The circulation induced, as shown by photographs and sketches made at the time, closely resembles both the idealized textbook model of both the tornado and typhoon. Energy released through the condensation of entrained atmosphere was on an enormous scale, dwarfing the energy released by the MIKE device itself.

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DISPOSITION FORM

FILE NO.

SUBJECT

Weather Phenomena Resulting from Megaton Detonations

CJTF 7

Staff Weather Officer

DATE

COMMENT NO. 1 4 March 53

THRU: ACofS, J-3

- b. Operationally, the "home-made" weather complicated the sampler operation due to unfavorable cloud amount at "wrong" altitudes.
- c. All evidence indicates that NIKE cloud stem penetrated to a final altitude of about 125,000 feet and that by far the major portion of atomic debris was carried well into the stratosphere.
- 3. Because of all of the unknowns in the problem the following is recommended for all future detonations of devices in the megaton range:

That the primary weather consideration be the forecast of a definitely "dry" day (such as just after a fresh "trade" outbreak), with lower than usual atmospheric moisture and considerable vertical stability.

4. This recommendation, if adopted, will require de-emphasis of the radiological safety requirement for a southerly wind aloft, as such a wind structure is generally accompanied by increased moisture and decreased stability. While such a recommendation might be viewed with alarm at first glance, one important fact should be considered in weighing the recommendation:

With extremely high yields, most of the radioactive debris is carried into the stratosphere, where it is "trapped" and falls out very slowly, thus undergoing normal processes of decay, mixing and dispersal. All past sampling operations bear out this conclusion, as does the results of the world-wide fall-out program.

The recommendation, if adopted in whole or in part, could be made simpler from an operational standpoint if high yield devices were detonated earlier in CASTLE, leaving the lower yields for the latter part. This is true because of the probability of having a dry and stable atmosphere during February and March, with increasing moisture and more frequent southerly winds aloft during the latter part of karch and all of April.

E. W. PATE

EwPati

CDR, USN

Staff Weather Officer

DD 1 FORM 96 REPLACES NIME FORM 96, 1 OCT 46, WHICH MAY BE USED.

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Comment

FROMB S

Mary 88, 1957

JO-307

J. E. Bouves, Seat Manager Albuquerque Operations Office U. S. Atomic Energy Commission P. O. Box 5400 Albuquerque, New Mexico THIS DOCUMENT CONSISTS OF 2 PAGE(S)
NO 6 OF 6 COPIES, SERIES 4

Dear Mr. Beeves:

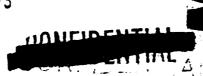
One of the prime requirements for firing a large device at the EPG is that the radiometive material falls out in unimabited areas close to the proving ground. In order to be sure that this condition will be satisfied, STF 7 and the ABC have set-up a weather observation set and a weather control to allow proper prediction of the wind vectors at all altitudes and points of interest. In addition to this, the ABC through its laboratories, has established a Fallout Prediction Unit responsible for determining to the best of their shillty where the fallout material will go under any wind condition.

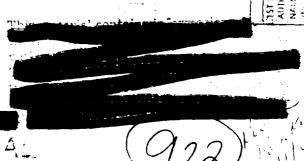
There are two large uncertainties in the present prediction system. The first and most important of these is simply the fact that the analysis of observed weather information to produce a wind map is a long and tedious hand operation performed by as many as thirty people. It normally takes from four to five hours to accomplish this analysis after the observations are taken. Since weather observations ever the whole Pacific weather system are taken every six hours, we quite often find ownerlves in the situation of using weather information as much as twelve hours old to decide whether a shot should be fired.

In an attempt to improve this situation, Meears. Stepinski and Israel of the LASE have developed a code to set weather information directly into an IBM 704 calculating machine which then, with the appropriate entre attachments, can produce a weather map in a few minutes. The presently developed system is not actisfactory; however, it is sufficiently promising that I believe by the time of Hardtack an edequate code will be developed. The safety of the Pacific operations will be greatly increased if we can properly use the latest observed winds before firing a large shot.

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escount the space and time variation of the wind pattern of the starial to Saliday. Posting in this variation into the sales too much time to be of any passional value. Resembly the fallow Prediction but one develop by the time of Resembly which will allow this valuabilities to be done by madeine on the sales of Saliday to be done by madeine on the sales of this type of calculation that led to pur difficulties on these of Spacetion Nation. eletion of the vist pattern A ALL emortly the Monetive

While I example guarantee that either of the above calculational methods will be ensembled by the time of Marchaet, I believe that the probability of their success and the tramendous value to the safety of the operation is such that we should bend every effort to accomplish these gains. As you know, it is messesary to order the 70t mow if we are to have it as Marchaek.

It is expected that the restal east of the 70t will be \$35,000 - \$15,000 per month. I would expect the machine will be medied for approximately six mention. I understand however, that the outright purchase price of a 70t is approximately three million dollars. The restal price includes engineers to eperate and maintain the machine - the purchase price does not. We do not have a source of people to maintain the 70t. It is not at all clear that a 70t will be desirable after Marchaek since other changer and simpler machines are now being built. Thus, it appears clear that we should not occasider the outright purchase of the 70t, but should only rest it for the furnition of the facilitack Operation.

the IM 704 machine. will be happy to estaupt to obtain the I trust the above is a sufficiently lengthy dissertation on the need of IBM 70% machine. If there are other questions economing this machine, it be happy to attempt to obtain the asswers you desire.

Managedly,

We. Ogle Alternate J Division Leader

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