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18 May 1946

To: File

From: L.H. Hempelmann

Subject: Hazards of 100 Ton Shot at Trinity

The hazards relative to the 100 ton shot containing fission products at Trinity on 7 May 1945 were slight. However, advantage was taken of the similarity of this test to the final shot to develop a system of monitoring the next test. Our problems in this first shot were three-fold: (1) Medical emergencies caused by pre-detonation and routine construction hazard, (2) Monitoring the chemical procedure of dissolving the "Hanford Slug" and pumping the solution into the explosive, (3) monitoring the area following the explosion, and (4) the cloud containing active material. Mr. Bainbridge and Lt. Bush took the responsibility of clearing the area immediately before the shot.

1. Concerning medical emergencies there was only one - an accident in which Milton Kahn was run over by a truck trailer. Although the truck wheels ran over his entire body and head, it was fortunate that because of the extremely soft dirt no bones were broken and only fairly superficial lacerations of the chin were suffered. Lt. J.H. Allen, who had been at Trinity since 25 April 1945, took care of the patient and sent him up to this site for recovery on 4 May 1945.

2. The radiation hazards relative to the chemical procedures turned out to be extremely slight even though the "slug" contained 400 gamma curies and about 1000 beta curies. The "slug" was transferred by Sugarman's group from a lead container to an underground chamber (by means of a remote control operation) behind a concrete wall. The "slug" was then dissolved in a nitric acid solution and the nitric acid fumes together with the radioactive xenon and iodine were discharged through a saran tube, the outlet of which was about 1000 feet from the chamber. The underground chamber was so well shielded that the radiation intensity in the working area was less than one-tenth r per eight hour day. Similarly, the amount of radioactive gases issuing from the chamber was not hazardous. It was found by means of air chambers built by Mr. Watts that if no nitric oxide could be smelt in the air there was no detectable activity in the air. The exposures of all personnel were considerably less than tolerance dose except for the final day on 6 May 1945 when samples amounting to about 1/2 curie were taken from the buffered nitric acid solution. Only one person, Sugarman, exceeded the daily dose while taking these samples and he only received approximately 1½ times tolerance. After the material was pumped up into the stack, the radiation intensity around the towers was fairly high. Mr. Buchanan, who was installing the detonator, probably received about three or four daily doese due to difficulties encountered during the installation which required him to stay in the vicinity for about four hours. This dosage was not measured but was not considered serious because he has had no other exposure to radiation.

3. Radiation hazard after the shot. This too proved negligible but arrangements were made so that no one except the people in the tanks could enter the contaminated area until it was surveyed by the medical group. Both medical personnel and Anderson's group in the tank were clothed with coveralls,

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booties, gloves and masks. Anderson's men used gas masks while the medical group used respirators. It turned out that there was measurable activity only within a radius of about 30 feet around the center of the tower. Even here the activity did not exceed 1/10 r per 8 hour day. In the center of the crater the activity was about 0.7 r per 24 hours. Measurement of the fine powdery dust around the crater showed extremely small amounts of activity estimated to be only a few microcuries per handful of earth. Nevertheless, it was recommended by the medical group that no one enter the powdery zone without booties and everyone was advised to wear respirators for all dusty operations. The system which was used proved quite successful and will undoubtedly be used again for the final shot. The only infraction of rules occurred when Mr. Oppenheimer entered the potentially contaminated zone immediately after the medical officers. However, he took full responsibility for his actions.

4. The cloud arising from the explosion contained approximately 98% of the active material. It was observed to rise to a height of between 13 and 15,000 feet where there was a westerly wind which carried it at a rate (according to Hubbard's observation) of 35 miles an hour in the direction between Carrizozo and Tularosa. It was still visible four hours later at which time it was somewhat south of Roswell. Although dilution had occurred, the cloud still hung together at this time. It is thought by Hubbard that the thermal air currents starting at about 9 o'clock in the morning resulted in a rapid dispersion of the cloud.

It is felt that there was very little likelihood of any contamination ever reaching the earth since there has been shown to be a dilution of 10,000 times for every 2,000 feet vertical descent of such clouds. It was impossible to detect the cloud by radar for more than six miles. The cloud was not followed or trailed except visually from the base camp.

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