D. Carlyle Thompson, M.D.
Director of Public Health

State Board of Health
Water Pollution Control Board
Hospital Advisory Council
Nursing Home Advisory Council
Mental Health Advisory Council

UTAH DEPARTMENT OF HEALTH
45 Fort Douglas Blvd.
SALT LAKE CITY 13, UTAH

March 28, 1963

C O P Y
Enclosure (1)

Harold Knapp, Ph.D.
Fall-out Studies Branch
Division of Biology and Medicine
U. S. Atomic Energy Commission
Washington 25, D.C.

Dear Doctor Knapp:

In reply to your inquiry the following is submitted to confirm the information submitted by telephone.

On August 13, 1962 a member of the Salt Lake City Board of Health picked up a one gallon sample of milk from a Federated Milk Producers tanker truck (Sample #14x620813, collected at 7:00 A.M. from the "Federated Composite Tanker") The source of the milk was indicated as Altonah, Utah. This sample was air-mailed to the U.S. Public Health Service, Southwestern Radiological Health Laboratory at Las Vegas the same day. (It should be pointed out that several weeks elapsed before it was learned that this tanker was from the Altonah area).

A telephone report from the Las Vegas Laboratory several days later indicated the I-131 content of this sample to be 2300 picocuries per liter. Obviously, if I-131 in this milk was a result of fall-out from the Sedan shot (actually information obtained subsequently indicated the Small Boy shot), the milk I-131 concentrations at some of the producers contributing to the tanker must have been exceptionally high. With this in mind, the Salt Lake City Health Department was asked to furnish us with a list of the producers from whom this milk was obtained and on the 21st of August, Mr. Vernon Andrews of the U.S. Public Health Service Offsite Laboratory and I visited each of these producers:

36G - M.J.V.	40G - L.B.
37G - R.S.	41G - W.B.
38G - K.L.S.	42G - E.M.
39G - L.R.	

Milk samples were collected from all but 37G, 39G, and 41G. Arrangements were made with these three people to send milk samples to Las Vegas on the following day.

According to our records, results from only two (42G - 30 pc/l and 40G - 150 pc/l) of these samples were received from the laboratory. It is not known for certain that 37G, 39G and 41G actually sent samples in. It has been assumed that the samples from 38G and 36G were lost in transit or in the laboratory.

The two results obtained, 30 mmc/l and 150 mmc/l obviously could not account for the I-131 level found in the tanker.

Subsequently, after receiving more information, it became apparent that the tanker in question probably did not pick up milk from the producers listed above but probably from those in the immediate vicinity of Altamont and Altonah. Only two of the producers on the Altonah and Altamont route had been sampled:

	Aug 6	Aug 7	Aug 9	Aug 10	Aug 12
35G - G.C.	5800	4640	3140	2360	1290
34G - G.F.	1800	900	1070		

As seen from these data, milk from these two producers, even though high could not account for a value of 2340 in the tanker on August 13.

Therefore it seems reasonable to assume that one or more of the thirteen other producers on this route was extremely high. Unfortunately we have no data to indicate what their levels were.

The tanker sample (14x620813) was collected by one of the Salt Lake City Health Department Sanitarians. The exact details for this particular sample are not available; however, the normal procedure would have been to either dip from the tanker or take it from the drain spigot. Samples were placed directly in one gallon polyethylene "Cubitainers" containing 10 ml of formaldehyde and sent via air-mail to the U.S. Public Health Service Laboratory in Las Vegas.

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Attached is a Utah road map with the locations of the producers marked on it ie. Kamas, Oakley and Snyderville, as well as the Vernal area and the Altonah area. Also included is a copy of the data on gamma readings for hay and forage.

Sincerely,

STATE DEPARTMENT OF HEALTH

Grant S. Winn, Ph.D., Head
Industrial Hygiene Section

APPROVED:

Lynn M. Thatcher, Director
Division of Sanitation
G.S.W./hh

ENCLOSURE (2)

Extracted from - Discussion of Radiological Safety Criteria and Procedures for Public Protection at the Nevada Test Site.

- prepared by -

Gordon M. Dunning, United States Atomic Energy Commission, Division of Biology and Medicine, Washington, D. C., February, 1955.

Pages 212 et. seq. of the Part 1 of the 1957 Hearings before the Joint Committee on Atomic Energy on The Nature of Radioactive Fallout and its Effects on Man.

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CRITERIA

Table I-a summarizes the radiological criteria to be used in evaluating the feasibility of evacuation.

TABLE I-a
RADIOLOGICAL CRITERIA FOR EVALUATING FEASIBILITY OF EVACUATION

Effective biological dose[1/] calculated to be delivered in a 1-year period following fallout	Minimum effective biological dose that must be saved by act of evacuation (otherwise evacuation will not be indicated)
Up to 30 roentgens - - - - - -	No evacuation indicated.
30 to 50 roentgens - - - - - -	15 roentgens
50 roentgens and higher - - -	Evacuation indicated without regard to quantity of dose that might be saved.

1/ The "effective biological dose" is an estimate of biological "damage" dose, taking into account the length of time for delivery of a given dose, and the reduction of dose due to (a) shielding afforded by buildings and (b) the process of weathering.

The rationale for Table I-a is as follows: The total effective biological dose that would be received if evacuation were not ordered is obviously a determining factor. Another consideration is the fact that such an action as evacuation could be dangerous to the individuals and could also possibly be detrimental to a very necessary national effort of weapons development. One must then ask, "Just how much will be gained (radiation dose saved) by evacuation?" Estimates of these two variables are indicated in Table I-a. Thus,

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a populace may receive up to a calculated 30 roentgen effective biological dose in 1 year without indicating evacuation; from 30 to 50 roentgens, evacuation would be considered only if at least 15 roentgens could be saved by such action; and at 50 roentgens or higher evacuation would be indicated without regard to the possible savings in radiation dose.

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CRITERIA V. CONTAMINATION OF WATER, AIR, AND FOODSTUFFS

In any area where the theoretical gamma infinity dose exceeds 10 roentgens, adequate sampling of the water, air, and footstuffs should be made to ascertain the conditions of possible contamination. Based on past data, however, it is not expected that under those conditions of fallout, where the radiation levels are below those stipulated for possible evacuation, that the degree of contamination will be a health hazard. (Nor is it implied here that any level above this does constitute a serious contamination of water, air, or foodstuffs.) Therefore, it is recommended that no action be taken in regard to limiting intake except to advise the washing off of such exposed foods as leafy vegetables when the action seems desirable.

DISCUSSION

Water--Table VI-A lists the six locations having the highest concentrations of fission products in water sources during Upshot-Knothole, and for comparative purposes the estimated external theoretical maximum gamma infinity doses.

TABLE VI-A

LOCALITY	Concentration (microcuries per milliter extrapolated to 3 days after detonation)	External theoretical maximum whole-body gamma infinity dose (roentgens)
Virgin River irrigation canal, Nevada - - - - - - - - - - - - - - -	8.7×10^{-5}	6.0
Irrigation ditch, 56 miles north of Pioche, Nevada - - - - - - - - -	4.5×10^{-5}	.15
Lower Pahranagat Lake, Nevada - -	3.2×10^{-6}	2.0
Virgin River at Mesquite, Nevada -	2.6×10^{-6}	2.5
Bunkerville, Nevada (tap water)- -	1.2×10^{-6}	7.0
Crystal Springs, Nevada (tap water	1.1×10^{-6}	.15

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Due to weather and to attenuation of the gamma rays by buildings, the wholebody gamma dose estimated to have been actually delivered was probably closer to one-half of the values shown.

The maximum permissible concentration of fission products in drinking water is 5×10^{-3} c/ml. extrapolated to 3 days after detonation. This is considered a safe concentration for continuous consumption.

- - - Notes based on Dunning's paper on the Effects of Nuclear War, JCAE 1959 Hearings on the Biological and Environmental Effects of Nuclear War, pages 436-471.

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$$1 \text{ kt/mi}^2 = 3.85 \times 10^4 \ \mu c \text{ I-131/meters}^2$$

$$3.85 \times 10^9 \ \mu\mu c \text{ I-131/liter milk}$$

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$$1 \text{ kt/mi}^2 = 2000 \text{ r/hr at H + 1 hr theoretical infinite flat plane}$$

$$= 44.4 \text{ r/hr at H+ 24 hrs infinite plane dose}$$

$$= 4.44 \times 10^4 \text{ mr/hr at H + 24 hrs infinite plane dose}$$

Whence 1 mr/hr at H+24 hrs infinite plane dose rate $= .866 \times 10^5$ $\mu\mu c$ I-131/liter of fresh milk

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Reduction factors in actual dose rate over theoretical dose rate up to a factor of 7, so that

1 mr/hr at H + 24 hrs open field lies between (0.8 and 6) $\times 10^5$ $\mu\mu c$ I-131 per liter.