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October 9, 1974

705902

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REPOSITORY DOE-FORRESTAL
COLLECTION MARKEY FILES
BOX No. 5 of 6
FOLDER 2.33 BANEBERRY

Buford Allen, Esq.
AEC
P. O. Box 14100
Las Vegas, Nevada 89114

Re: REECo, et al. adv. IGAN

Dear Mr. Allen:

Enclosed is a copy of a draft of the report of Plaintiff's expert, Dr. Shields Warren, along with medical data on [redacted] which was given me last week by Larry Johns. Mr. Anderson received a complete copy last Friday. Please provide a copy of the enclosed to Dr. Cavender and any others you deem applicable.

Very truly yours,

John L. Thorndal

JLT/ad

Enc.

cc: Dr. Savino Cavender - REECo - wo/enc.
David J. Anderson - Justice - wo/enc.

11/8/74

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ACTION
INFO
R. F.
AMA
[illegible]

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D R A F T

June 7, 1974

Re: [redacted]

Mr. Larry C. Johns
Johns & Johns
722 South Fourth Street
Las Vegas, Nevada 89101

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Dear Mr. Johns:

As basic information relative to the exposure to radiation of [redacted], we have the following clearly established facts.

1) The venting of the device into the atmosphere occurred at approximately 7:30 AM on December 18, 1970. [redacted] was ordered to evacuate Area 12 Camp, where site personnel were living, located approximately three miles west and north of the site. The wind at the time of venting of the device was three to four knots per hour. The radioactive cloud of dust was described as advancing in two portions which merged at Area 12 Camp and would have reached the Camp between 8:30 and 8:50 AM. Apparently, the wind died down and changed about 8 AM, and we have no reading after 8:02 AM. These wind readings were obtained at a tower 1500 ft. SSW of ground zero in a location that should give us reasonably accurate data as to the wind conditions for the general area of the test site including Area 12 Camp.

Query: Are there wind speeds and directions available between 8:02 AM and later, preferably to 4:30 PM?

The RadSafe monitor on the Paiute Mesa Road just outside and south of Area 12 Camp stated that the readings of radioactivity were fluctuating between 500 and 800 milliroentgen per hour for a period of approximately

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one hour apparently at about 11 o'clock. It is probable this dose was exceeded because the monitor was forced to change from a Geiger-Müller monitoring device when this counter became saturated. This would imply, if the instrument was in good working order, that the dose had exceeded the capabilities of the instrument. It is stated that the instrument to which he changed, a pic 6A, was recording a rate of 500 to 800 milliroentgen per hour when another monitor came by whose instrument, a cutie pie (ionization chamber), was reading 1200 milliroentgen per hour, which further suggests saturation of and too low a reading by the first two instruments. [redacted]' readings at 11 AM were not recorded properly by the RadSafe monitor. The permanent telemetry station at Area 12 Camp was sending in readings of approximately 700 milliroentgen for a period of one hour.

Query: At what time was the 700 milliroentgen per hour reading obtained by the permanent telemetry station at Area 12 Camp? Was this station equipped with a Geiger-Müller tube type counter or an ionization chamber?

In a memorandum dated February 10, 1971 from W. J. Brady to E. A. Bicker of Reynolds Electric and Engineering Company, Inc., it is stated (P. 3) that from the probe telemetered measurements during the time [redacted] was in the Camp, an estimate was made that he received a maximum dose of 300 milliroentgen or less. It is further estimated that the beta/gamma ratio was more than one and less than two, so that using a beta/gamma ratio of two it is estimated that [redacted]' skin would have received a total dose of 900 mrem from airborne beta and gamma emitters. A gamma estimate of 280 milliroentgen

[redacted] Draft

to the monitoring probe in Area 12 Camp is postulated. This is in contradiction to the estimate of 700 milliroentgen as stated on P. 2 of your letter of April 29, 1974. As you say, there is, therefore, question with regard to this reading; also, as mentioned above, of the readings obtained by the hand-carried measuring devices.

After 1' 15" at Area 12 Camp where [redacted] was continuously exposed to the radioactive cloud and recently deposited radioactive dust and where his clothing, skin and hair became contaminated with the air-borne radioactivity, he proceeded as instructed to the junction of Stockade Wash and Paiute Mesa Roads.

[redacted] stated (P. 2 of your letter) that he was told at 11 AM his readings were 300 mR and at 4:30 PM they were 90 mR. At 5:30 PM he was sent to the decontamination center.

Query: I am assuming that [redacted] entered Area 12 Camp between 8:30 and 9 AM December 18th and remained there one hour and 15 minutes. It is stated on the map you sent me that the RadSafe monitor on the Paiute Mesa Road just outside of Area 12 Camp obtained readings of radioactivity fluctuating between 500 and 800 milliroentgen per hour and that another monitor came by with a different type instrument which read 1200 milliroentgen per hour. This was at 11 AM. What was the precise location at which these measurements are made, and am I correct that the time was 11 AM? I am confused because on the chart you drew it is stated that he was stationed at Dead Horse Flats from 11 AM to 4:30 PM, and it is also stated on the map where the Area 12 Camp Road leaves the merged Rainier Mesa Road and Orange Road that the radiation monitor was located at that point.

Another uncertain point--you state in your note that [redacted] came into Area 12 Camp from the east; the inked red line would indicate that he came in from the west.

These times and distances are important because on Page 3 of the dose estimate revision referred to it is stated that upon leaving Area 12 Camp he drove his vehicle at high speed arriving at the junction of Stockade Wash and Paiute Mesa Roads, 9 miles away, at 9:30 AM. This would mean that the meeting with the radiation monitors and their readings stated to have occurred at 11 AM must have been made at Dead Horse Flat rather than at Area 12 Camp.

If so, this would mean that [redacted]' exposure in the Camp would have been higher than is recorded either by these readings or by the telemeter probe at Camp 12.

On P. 4 of the dose estimate revision referred to it is stated that [redacted]' clothing gave a value of 200 mR/hour at 11 AM and 90 mR/hr. at 1330 hours. At 1800 hours contact readings on the clothing were 50 mR/hr., on [redacted]' hair 1.5 mR/hr., on his nose 10 mR/hr., and hands 5 mR/hr.

As it is stated (P. 4 of this same dose estimate revision) "It is probable that some of the clothing contamination fell from the clothing for a variety of possible reasons during the period from 900 to 1800 hours."

There is apparently only one film badge reading available for [redacted] in spite of the fact that there is testimony that more than one film badge were used consecutively. It is also stated that the one film badge developed and read could not be read accurately because of contamination due to direct contact of contaminated radioactive particles with the film. Of course,

particles like these would have been in contact with exposed areas of [redacted] skin and with his clothes. It is difficult to understand why a contractor experienced in radiation experiments had not specified the use for monitoring of film badges properly protected against radioactive dust during a test in which particulate contamination should have been anticipated. The film badge reading recorded is clearly erroneous and represents only an unknown fraction of the dose received.

It is stated in this same attempt to revise and determine the dose he received "A reasonable estimate of the maximum dose to the lens of the eye received by [redacted] is 2420 mR."

June 19, 1973 at Loma Linda it was stated in his clinical history approximately 100 rads of total-body radiation had been received at the test. Studies of the blood showed WBC 4.1, RBC 2.75, Hgb 8.2 grams with some giant platelets. Bone marrow 100% cellular. Megakaryocytes increased. ME ratio 1:1. All white and red cell forms were seen. Their maturation was abnormal. Diagnosis: Myeloproliferative syndrome with marked erythroid hyperplasia and some megakaryocytic hyperplasia.

At Loma Linda under date of July 24, 1973 anemia and a low white blood count were still present. The history stated that the patient had received 5 rads of atomic radiation 18 months ago. A bone marrow biopsy showed 60% cellularity and active erythropoiesis with slight megaloblastic change. Granulopoiesis was normal, consistent with marrow recovering from injury or with a myeloproliferative disorder.

The patient was studied beginning August 16, 1973 at the Oak Ridge Hospital in addition to the studies made at Loma Linda. While at Oak Ridge

sit was noted that "polyploidy and karyorrhexis of the red cell series were seen. Cytogenetics performed on the bone marrow showed a definitely abnormal stem cell line in 18 out of 20 metaphases scored. The stem cell line was hypodiploid (45 - C)." This deletion of a C chromosome has been associated with a preleukemic state. C-group chromosomes are believed to be concerned with hematopoiesis (blood cell formation). Diagnosis also of pancytopenia with hyperplastic bone marrow especially of erythroid series of unknown etiology. This could be related to the condition reported by Valentine--BLOOD 41:857, 1973 (Dyserythropoiesis, Refractory Anemia, and Preleukemia).

Nowell--CANCER 28:513, 1971 reported on 51 patients with preleukemic conditions. He found chromosomally abnormal stem lines in 5 of 16 patients with idiopathic pancytopenia.

Humbert et al.--BRIT J. HEMATOL. 21:705, 1971 reports a new myeloproliferative disorder associated with absent group C chromosome in blood cells.

As you have seen from the foregoing, I have attempted to calculate on the basis of the contamination measured on his clothing the total dose of radiation received by [redacted] during this episode in terms of the skin dose most probably received. In terms of the standards of the International Commission on Radiation Protection, such a skin dose is the equivalent of a whole-body dose. Using Figure 9.8 from "Effects of Nuclear Weapons," Samuel Glasstone, editor, U. S. Atomic Energy Commission, June 1957, p. 393, and taking the readings given as obtained from [redacted]' contaminated clothing at 1100, 1330 and 1800 hours, I calculate a skin dose of 1850 millirads or thereabouts. It should be noted that further analysis of exposures that would be based on answers to the queries that I have raised may lead to a

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somewhat higher estimate. This is in general agreement with the revised dose estimate given by the Reynolds Electrical and Engineering Company, Inc., dated February 10, 1971 that "the maximum dose to the lens of the eye received by [redacted] is 2420 mrad." If one assumes the accuracy of the radiation safety monitor's cutie pie reading of 1200 millircentgen per hour my dose estimate could be doubled.

On the basis of the standard recommendations of the National Council on Radiation Protection and the Federal Radiation Council this dose even doubled would be within the permissible range, assuming that he had had no further radiation in that year's time (the occupational standard is 5 rem/year). It is important to note, therefore, that he did not receive excessive radiation during this test period under ordinary operational standards.

However, there were a number of instances of poor practices relating to radiation safety in the history of his case, among which are 1) a type of film badge totally unsuited to the circumstances under which it was used; 2) failure to provide monitors with monitoring devices that could not be saturated by reasonably anticipated contamination; 3) breakdown and confusion in monitoring procedures; 4) [redacted] clothes were not changed nor was he decontaminated until 6.5 or 7 hours after the discovery by monitors of gross radioactive contamination of them (he should have been decontaminated immediately); and 5) failure of maintenance of adequate records by monitors.

According to the same Reynolds' report (P. 2) "some changed their contaminated clothing sooner than others with the result that optical densities of the film worn by some personnel was considerably less than optical densities of films worn by [redacted] and others."

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In spite of these procedural errors and irregularities [redacted] did not receive enough radiation to induce leukemia had he been a normal individual. However, the medical examination at Oak Ridge in the summer of 1973 showed him to be not a normal individual but to be a person with an abnormal number of chromosomes (45 rather than the standard 46). This missing chromosome was determined to be a member of group C. Humbert has described, as mentioned above, a "new myeloproliferative disorder" that is associated with absence of a C group chromosome and with other blood abnormalities some of which match the changes found in [redacted]. Two thirds of these patients developed leukemia within 3.5 years after the chromosomal deficiency was found. The finding of this chromosomal deficiency in [redacted] together with abnormalities of blood cell proliferation shown by laboratory studies during his hospitalizations would indicate that [redacted] belonged to this special group with high risk of leukemia. There is evidence that the C group of chromosomes are concerned with regulation of blood cell formation and hence, the maintenance of normal blood counts.

There are two alternatives to explain the presence of this chromosomal deficiency of [redacted]. Either he had had it all his life and hence was a member of a very small group with a very high risk of leukemia, perhaps as much as 10,000 times the risk of a normal individual, so that a relatively slight amount of radiation to him could induce leukemia or else he had been without this chromosomal change all his previous life, and this chromosomal change was brought about through random damage to chromosomes by the small dose of radiation which he received as a result of the test. It is established that chromosomal abnormalities can be produced by as little as

800 millirads, appreciably less than the dose [redacted] received. One may therefore assume a) that [redacted] was long a member of a group especially susceptible to the development of leukemia because of his chromosomal makeup and that a small dose of radiation, safe for most persons, could therefore induce leukemia in him, or that b) his exposure to radiation changed his chromosomal makeup, converting him from a person with a normal risk of leukemia to one highly susceptible to the disease. In this circumstance, even a small dose of radiation could cause leukemia.

Sincerely yours,

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