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UNITED STATES  
ATOMIC ENERGY COMMISSION

NND 982027  
SDT/LAD 7/14/98

April 9, 1954

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MEMORANDUM

TO : John C. Bugher, MD.  
FROM : Merril Eisenbud  
SUBJECT: CONTAMINATION OF THE FUKURYU MARU AND ASSOCIATED PROBLEMS IN JAPAN: PRELIMINARY REPORT

I have recorded some of the observations made during my visit to Japan to assist in the various problems arising out of the mishap to the Fukuryu Maru. I am sending this along to you at this time because you will no doubt want a preliminary report prior to my return to the States in about 2 weeks.

This memorandum is intended to augment the report that Dr. Morton will submit to you. I have attempted to limit myself to factors other than those associated with the clinical phases of the problem, with which Dr. Morton's group are concerned.

THE INCIDENT

The mishap which befell the Fukuryu Maru became known to the Embassy and the world on March 16 through reports in the Japanese press. This was two days after the 100-ton fishing vessel had returned to its home port of Yaizu. The facts of the incident, as determined by the Japanese Foreign Office and communicated (1) to the Ambassador, are as follows:

(1) The course of the vessel from its departure on January 27 to its return to Yaizu on March 14 is plotted in Figure No. 1. At 0412 hours on March 1 a streak of light reported by the crew is believed to identify the time of detonation. The vessel's position was approximately 11° 53-1/4' north and 166° 34-1/4' east. This position is only a few miles from the easternmost limit of the Marshall Islands danger area in effect at that time.

(1) Aide Memoire of March 27.

This material contains information affecting the national defense of the United States within the meaning of the espionage laws, Title 18, U.S.C., Sec. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

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course toward its home port of Yaizu, where it arrived at 0600 on March 14.

(5) In the following two or three days, all the crew reported slight headaches and some of them were nauseous. In 7 or 8 days, evidence of burns on exposed parts of the body began to appear.

In response to certain questions which the Ambassador asked the Foreign Service, the following information was received. It sheds some light on the sequence of events during the 2 days following the return of the Fukuryu Maru to Yaizu, but before the mishap had come to the attention of the Embassy.

(1) The crew first contacted the ship's owner, and the director of the Fisherman's Union. On the day of their return crew members who were seriously affected consulted a physician of the Kyoritsu Hospital.

(2) Two of the fishermen, \_\_\_\_\_ and \_\_\_\_\_, who were in more serious condition left the Kyoritsu on March 15 for Tokyo where they visited Doctor Shimizu at the Tokyo University Hospital.

(3) Professor Shiokawa made radiation measurements of the ship on March 16 and on the basis of his findings all of the crew members consulted a physician who recommended that the men be hospitalized.

#### THE ROLE OF THE JAPANESE SCIENTISTS

During the latter half of March the Japanese press was fed continually with sensational statements from Japanese Scientists. The motivations of the Japanese were never quite understood by us but the following factors may be enumerated as pertinent to our lack of progress in dealing with them:

(1) In a long private conversation that I had with Dr. Tsuzuki at his home on the evening of March 24, he was frank in stating his apprehension that the American scientists would deny him and his associates professional recognition due them for their accomplishments in the diagnosis and treatment of the fishermen. He referred frequently to his experience in 1945 when he

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led the teams of Japanese investigators into Hiroshima and Nagasaki only to have his work interrupted by the Occupation investigators who undertook their own studies. Dr. Tsuzuki seemed to accept my assurances that in the present situation, it was the intent of the American scientists to assist the Japanese and that all of our findings would be available to them and could be used as they saw fit in their own publications.

Dr. Tsuzuki was outwardly friendly to both Dr. Morton and myself until the time of his departure for Geneva on March 31. Despite this, the lack of cooperation continued to be manifest on the part of the Japanese investigators. I do not know whether this was because we misjudged Dr. Tsuzuki's friendliness, or because he lacked influence on his Japanese colleagues.

(2) There was much evidence of rivalry among various Japanese medical groups. In particular, the staff at Tokyo University, headed by Dr. Tsuzuki, were initially at odds with the group at the National Institute of Health, headed by Dr. Kobayashi. Moreover, the local physicians at Yaizu, where all but two of the patients were hospitalized until March 29, were anxious for various reasons that the patients remain there. Their lack of cooperation with the American scientists may have been motivated by their knowledge that the Americans advised that the patients be transferred to Tokyo.

(3) Many of the accepted procedures of modern American medical practice seemed strange to the Japanese, and their concepts are strange to us. For example, access to patients by any physicians was denied for several days because the Japanese physicians found their patients to be in a highly excited state and preferred not to disturb them. Japanese physicians indicated on several occasions that the taking of duplicate blood smears by Japanese and American investigators was an unnecessary duplication, and an ordeal that the patients should not be expected to undergo.

In my initial conference with the Japanese scientists I was forced to the conclusion that they were not well equipped to deal properly with the radiological aspects of the problem. For example:

(1) Some of the top scientists took the position that because a new kind of bomb was involved, the problem itself was a new one, and that unless they knew all about the bomb, they could evaluate neither the injury to the fishermen nor the aspect of long-range contamination of Japan and its fishing crews throughout the Pacific.

(2) They were quick to identify qualitatively some of the radioactive isotopes in the ash and immediately concluded that deposition of these radioisotopes in the tissues of the men was the prime factor in their medical status. This decision was reached without benefit of radiochemical urine analyses of the patients. This procedure which was beyond the capability of their laboratories is of course a prerequisite to understanding the amount and kind of fission product absorption that actually occurred.

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(3) The University of Tokyo group administered parentally a massive dose of ash to one mouse, and, following sacrifice 12 hours later, determined by radiography that radioactivity was present in the mouse skeleton. The activity of the dose was not measured. The fact that the radioactivity was detected by the scientists in the skeleton of the mouse was widely publicized as evidence for their conclusion that the patients were carrying dangerous internal deposits of radioactive isotopes.

As individuals, the scientists seemed anxious to cooperate. In my initial conversations with them they freely asked for help and seemed gratified at some of the things that we could do for them. My participation on the American team was limited to the radiological aspects of the case and only incidentally to the patients themselves. Unfortunately the nature of Dr. Morton's participation required that he be given direct access to the patients and this the Japanese consistently refused to grant. As the days went by and the Japanese became more resolute in their decision to deny access to the patients, other areas of the problem became infected by the uncooperative atmosphere. This will become apparent in subsequent portions of the report.

#### OFFERS OF ASSISTANCE TO THE JAPANESE

When I arrived in Tokyo on March 22 Dr. Morton had already offered to the Japanese the full facilities of the Atomic Bomb Casualty Commission. General Hull had likewise offered the facilities of the Far East Command. These offers were accompanied by a spirit of sympathy and the desire to assist the Japanese investigators in their efforts to evaluate the incident and to restore the health of the fishermen. At a meeting with top Japanese scientists and government officials on March 24, I made a further offer, in behalf of the Atomic Energy Commission, to provide whatever facilities were available for evaluation of the radiological factors involved in the incident. I repeated the assurances repeated earlier by Dr. Morton that we wished sincerely to be of assistance, that our participation was not motivated (as some Japanese suggested) by the opportunities for scientific studies, and that whatever data we obtained would be turned over to the Japanese investigators to be used by them in any way they saw fit.

At this point it would be desirable to list the radiological studies which had been already made by the Japanese. These studies are of interest because they indicate the extent of Japanese capabilities in this field, and define the extent to which our facilities would be helpful to the Japanese.

(1) Using a Cutie Pie, they measured the radioactivity of the Fukuryu Maru. These data appear completely satisfactory and prove to be in good agreement with measurements made with American calibrated equipment.

(2) They measured radioactivity of the fish and fishermen, using portable survey equipment. However, their equipment was not calibrated and their data were given in counts per minute as determined by the original factory calibration.

of the ash and reported the following: Sr89, Y91, Zr95, Nb95m, Nb95, Ru103, Ru106, Rh106, Sb127, Te132, I131, I132, Ba140, La130, Ce141, Ce144. (More recently they have completed a semi-quantitative analysis for a few isotopes.)

(5) They had scanned the bodies of the fishermen with a GM probe.

(6) They had administered a dose of ash to 1 mouse, as described earlier.

(7) Using an immersion type GM tube, they had demonstrated radioactivity in the urine of 3 fishermen. As before, their equipment was not calibrated and the absolute activity could not be determined.

With this as the status of their investigation at the time of my arrival, and following several hours during which I acquainted the Japanese with our experience in this field, I offered the following services to them:

(1) Complete radiochemical analysis of 24 hour urine collections from all patients. In view of the importance of this analysis in evaluating the status of the patients, I urged that these samples be furnished immediately and assured them that in one week it would be possible to give them a report for the constituents of principal biological importance. I explained the need for serial samples and suggested that collections be made at weekly intervals. They seemed anxious to accept this service.

ACTION: This offer was made on March 24. On March 26 we obtained urine from two patients. On April 1 we obtained urine from 5 more. We have not obtained urine from the remaining 16 patients despite our repeated attempts to do so.

(2) I offered to scan the fishermen for radiation, using two Scintimeters that I had available.

ACTION: I have been unable to do this because they have not permitted the American team to have access to the patients.

(3) In response to the Japanese request I offered to provide a report on the biologically significant radioisotopes present in the ash.

ACTION: Dr. Nakaizumi gave me a small amount of deck sweepings from the Fukuryu Maru. This I have sent to the Health and Safety Laboratory for future study. The composition of the ash was actually known to the Commission from analyses performed by the Air Force on the material obtained from the Fukuryu Maru prior to my visit. Authorization for transmission of this information to the Japanese was communicated to me in telegram No. 2199

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from the Secretary of State to the Ambassador. I transmitted this information to Dr. Kobayoshi on April 7.

(4) I offered to arrange for animal studies which would provide useful information on absorption and metabolism of the various radiochemical components of the ash.

ACTION: The Japanese reported the extent of the total amount of ash recovered as 50 millicuries. They now deny that this much is available and have no inventory of the material. Except for the small amount of ash turned over to me by Dr. Nakaizumi and a similar amount which I recovered on a subsequent visit to the Fukuryu Maru, no ash has been made available to us.

(5) In response to Japanese requests, I agreed to recommend monitoring procedures for the tuna inspectors.

ACTION: Monitoring procedure was devised but I deferred the question of maximum permissible contamination until more information became available on the extent and type of contamination. I agreed to stand by until the first contaminated tuna were found by inspection, at which time I would go to the scene of inspection and recommend specifically on the basis of my own observations whether the catch should be accepted or rejected. As noted elsewhere in some detail, the Japanese never permitted me to examine tuna which was allegedly contaminated.

#### SPECIAL PROBLEMS ARISING OUT OF THE INCIDENT

The mishap to the Fukuryu Maru created a number of separate, but interrelated problems. Of these, the most urgent was the clinical status of the 23 fishermen, a subject with which Dr. Morton is exclusively concerned and about which he will report separately. Other problems which require attention were:

- (1) Contaminated Tuna.
- (2) Apprehension of long-range contamination of Japan and its fishing grounds.
- (3) Radiological factors affecting the fishermen:
  - (a) Estimating the whole body dose.

(b) Estimated dose from internal emitters.

#### Contaminated Tuna

Some of the Japanese Government officials are already referring to the latter half of March as the "great tuna panic." The origin of this panic both in the United States and Japan is worthy of careful study. The extent to which the tuna consumption in the United States and Japan declined during the second half of March is not known to me at this time. For a day prior to my departure from New York on March 19, and for 2 weeks following my arrival in Tokyo on March 22 the subject of radioactive tuna was a subject of popular conversation. When one considers

tuna loading operations scheduled for the following day. Thereupon it was arranged that I should accompany Japanese officials to Yokohama where the Batan was being loaded with frozen albacor.

L/ An excellent report of technical information about the Japanese tuna fisheries in Japan is Report No. 104 issued by the Natural Resources Section of SCAP in March 1948.

Would be available to fly me to the two ports. The Foreign Office was requested to arrange for access to the vessels and was invited to send whoever they wished to designate with me on this trip. A flight was scheduled for early on the morning of April 2.

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(3) Around noon on April 1 the Foreign Ministry called the Embassy and advised that the Myojim Maru had left Shiogone that morning, that its destination was not known, and that the fish had been disposed of in an unknown manner. The Embassy informed the Foreign Ministry that, this being the case, we would limit our trip to Misaki.

(4) At 4 PM on the afternoon of April 1 the Foreign Ministry again called to inform the Embassy that the Koei Maru had left the port of Misaki one hour before to dump its contaminated catch at sea. The Embassy asked the Foreign Ministry to call the vessel back inasmuch as it was only one hour off port but the Japanese stated this could not be accomplished.

To summarize the tuna situation, it is my belief that no significantly contaminated tuna have arrived in Japan except for the catch from the Fukuryu Maru. Rigorous inspections procedures will undoubtedly disclose certain amounts of low level radioactivity on the surface of the tuna but the significance of this is minimized by the practice of skinning tuna prior to canning. In the meantime the tuna market has stabilized and tuna representatives of American tuna interests have informed me that their companies are no longer concerned over the problem.

#### Apprehension of Long Range Contamination of Japan and its Fishing Grounds

Japanese apprehensions over the possibility of long range radiological contamination were very similar to those we encountered in the United States as a result of NPG operations.

A difference in Japan is due to the fact that none, if any, of the counting equipment is calibrated, GM tubes are used without shields, and under conditions where the background count is apt to be highly variable. This, coupled with the fact that they do not know the background activities of such things as soil and biological materials, makes it very difficult to evaluate the reports. Many of the reports of "ash" falling in various parts of Japan are undoubtedly dust or soot falls that occur normally in any industrial area from time to time. Reputable scientists have examined samples of potassium-rich soil and have reported their data in gross counts without any reference to normal soil background. For this reason I find it very difficult to take serious the frequent public report of 50 to 100 counts per minute for the unspecified size of samples, reported from time to time.

At my conference with the Japan scientists and government officials on March 24, I explained the procedures we use in the States for measuring fallout. I urged them to use similar procedures for the sake of uniformity and offered to loan them the equipment we used. They seemed eager to accept and I requested 4 sets of equipment which has since arrived from the States. However, since the arrival of this equipment, I have delayed giving it to the Japanese because in their present state of mind little good could come of it. I do believe, however, that when the present confusion subsides, it will be useful for the Japanese to maintain a fall out monitoring network and I think we should cooperate with them to the fullest extent.

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still on the ship when the first measurements were made. The actual dose could have been 2, 10, or even 100 times higher depending on how much ash was washed off the ship and at what time.

We have made a number of discreet inquiries in the hopes that photographic film might have been available aboard the ship and might possibly be used as a dosimeter. All efforts to date have been negative.

#### Deposition of Internal Emitters

There was an urgent requirement to evaluate the extent to which fission products had been absorbed into the tissues of the fishermen. As mentioned earlier, Dr. Nakaidzumi had concluded from his mouse experiment that the prognosis for the fishermen was adversely affected by the probability of excessive deposition of long-lived bone-seeking isotopes. The Japanese scientists were desperately looking for an agent to mobilize these isotopes and

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Dr. Lewis believes that they had administered EDTA to the patients, despite the fact that urine analysis was beyond their capability and they were therefore unable to determine either the need for EDTA or the effect produced by it. Apart from the fact that they were unable to undertake urine analysis at that time, it is also evident that they did not understand the dynamics of fission product metabolism and were not used to thinking in terms of urinary excretion levels as an index of absorption and deposition.

They were anxious to provide me with samples of urine for State-side analysis. Two samples were delivered on March 26 and five more on March 30. As yet we have not received samples from the remaining 16 patients. The samples received were properly forwarded to the Health and Safety Laboratory and I have had the results of gross analysis of the first two samples. I communicated these results to Dr. Kobayashi in the attached letter which is self-explanatory.

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I regret that I am unable to give you the results of analyses of urine from the 21 other patients. Knowing that these data would be highly important to your committee in its evaluations of the medical status of these patients, we have offered to undertake radiochemical urine analysis of all 23 patients. The urine from only two patients has been delivered to us in time to permit shipment to the States and analysis by this date. More recently, samples from five additional patients from the Tokyo University Hospital were delivered to us, but we have not as yet received samples from the 16 patients now hospitalized at the Daiichi Hospital.

Respectfully yours,

Merril Eisenbud  
Director, Health and Safety  
Laboratory  
United States Atomic Energy  
Commission

