

SAFETY EVALUATION PANEL FOR THULE INCIDENT

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THE CHAIRMAN'S ACCOUNT OF THE PRELIMINARY VIEW OF THE SAFETY EVALUATION PANEL
FOR THULE INCIDENT FOLLOWING DOD-AEC BRIEFING, FEBRUARY 5, 1968

Dr. M. Carl Walske, Assistant to the Secretary of Defense for Atomic Energy,
assigned three tasks to the Panel as follows:

- (1) To evaluate the radiological situation
- (2) To consider necessary clean-up, if any, posing to the Panel the question, "Are we leaving a hazard to any biological species?"
- (3) Following the main operation, to define an appropriate program for monitoring the biosphere.

Dr. Walske reminded the Panel that relations with the Danes are important although it is the primary function of the Panel to offer its best technical opinion on the various questions. The immediate task of the Panel is to identify what is known and what needs to be known.

The Panel wishes to thank all those present who contributed to the excellent briefing. The general substance is not documented here except with respect to a few points on which the Panel felt action might be taken fairly promptly. We are told that 38% of the total plutonium burden has been located on the snow and ice around the site of the crash; 36% of the burden is within the

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available instrumentation. This curve defines an area approximately 500 feet by 2,000 feet, or approximately 20 acres in extent. The Panel emphasizes that 95% of the known radioactive debris is within this area.

No monitoring of water below the ice has been done although it is possible that some debris may have penetrated in the immediate events at the time of the crash. It was reported that a substantial problem arose from the blowing of debris in the strong surface winds. In particular, as much as 500 pounds of presumably contaminated chaff may have blown several miles. The attractiveness of bright pieces of metal such as this to the Greenlanders was particularly mentioned. Dr. Wright Langham reported that the known amount of plutonium debris diluted in one cubic kilometer of water would reach the conventional drinking water tolerance. If diluted in the entire contents of North Star Bay there would be an additional safety factor of 60,000. However, the currents in the Bay are not at all well known and there is no reliable description of the probable extent of mixing. Meteorology at the time of the crash is fairly well known and there is a good description of the initial fire plume.

Hunting on the ice by Greenlanders is temporarily restricted. Dr. H. D. Bruner, Division of Biology and Medicine, AEC, stated that this affects 60 to 70 people directly and up to 200 families in part. There is no problem concerning substitute food supplies to this population.

Dr. J. N. Wolfe, Division of Biology and Medicine, AEC, said that the biota of this general area are fairly well known and there should be no particular problem with rare or unusual forms. It was noted that the ice will be completely gone by July and will begin to break up in April. If recommendations for removal of debris, ice or snow are made, time is of the essence. The work must be completed, say by April 1, 1968. Any requiring heavy equipment should be completed at the earliest possible opportunity to minimize risk of life in those operations.

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During the meeting, Dr. Walske introduced a memorandum from Gen. R. O. Hunziker requesting comments on a proposed sampling program by the Danes. The first section referred to collection of snow, ice, water, plankton, bottom solid and soil samples. The Panel's reaction was that these samples would be extremely useful. In the second portion a program to examine three ring seals, three bearded seals, two walruses, ravens and a white fox, as well as shellfish and the bottom samples, was proposed for the Danes with duplication by the U.S. It was the opinion of the Panel that examination of these large animals would not be constructive at this time. As will be seen later, the monitoring program that might be developed from Panel recommendations would concentrate on the other end of the food chains. We would anticipate that cooperation with the Danes might be offered in their intended sampling program without duplication by our scientists. It was noted that the Danish program

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may, in fact, be useful in the public relations sense of allowing the Danish scientists to assure people of the present edibility of game.

The memorandum also referred to measurements of site bay currents. The Panel strongly recommends that these measurements be carried out to the fullest possible extent.

The Panel's preliminary considerations of Dr. Walske's three questions will be given below in terms of the Chairman's recollection. The Chairman hopes that Panel members will proffer corrections to any points which appear to be misrepresented and will mention any significant items that have been inadvertently omitted.

Question 1. EVALUATION OF THE RADIOLOGICAL SITUATION.

The Panel considers that perhaps one to two kilograms of plutonium in the form of oxide smoke could have gone into the initial fire plume along with the total load of tritium presumably converted to tritiated water. The Panel strongly recommends that the best available calculation of the probable dispersion of this should be put on the record. If it can be shown that the cloud intercepted land, especially any portion of Greenland or adjacent islands, an attempt should be made to correlate ground contamination with the model calculation.

The Panel considers the risk of inhalation of plutonium oxide particles to be very much greater than that expected to arise from ingestion of plutonium from the water medium. Deposition of plutonium oxide particles in the lungs of animals will definitely cause lung cancer and presumably this may also occur in man. In the light of present knowledge it is impossible to deny that this may occur from a single radioactive particle. The Panel therefore hopes that the responsible persons on the site will both take reasonable steps to reduce the possibility of plutonium oxide debris becoming airborne and will, as far as possible, obtain factual measurements of the air contamination. As indicated to the Panel the available plutonium oxide is mostly well fixed on other material, but present evidence is quite unsatisfactory in terms of this Panel expressing an opinion on the safety from air contamination point of view. In general, in the absence of any specific agents leading to air contamination, it would appear that the radiological situation is quiescent. It is very probably quite safe to allow the whole residual contamination on the ice to drop into the water and be dispersed as the ice melts.

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Before any firmer conclusion is made core samples of the ice which, we understand, are currently being obtained, should be kept in the frozen condition and submitted to such organizations as AFTAC and other appropriate

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organizations for detailed analyses of distribution of the plutonium throughout the depth of the ice and more specifically to determine the actual particle size for comparison with the sizes which have been used in the calculation called for above. Panel members pointed out that we shall very probably wish we had more of these samples than have been taken. We urge that plans be made to augment this program although it may realistically be necessary to allow more of the samples to melt. We urge that efforts be made to maximize the number that can be transported in the frozen condition.

Question 2. CLEAN-UP

It seems to be agreed that clean-up of casual pieces on the surface of the ice should be as complete as possible. This is primarily because of the risk of its further spread in the strong winds and of the attractive nuisance of such pieces as the radar chaff. The current proposal appears to be to plow the debris and snow into windrows and to further stabilize these with foam. The Panel agrees that this is better than leaving the material randomly spread but some members wonder whether it is prudent to leave the windrows on the ice so that they eventually fall through or whether to arrange to collect the debris on land after the snow and ice have melted. No useful guidance was developed on this point at this stage.

Although the Panel expects that it may agree with the preliminary calculations that the whole of the debris could safely fall into the Bay it does point out that 95% of the known contamination is contained within a manageable area of 20 acres. The Panel requests that a prompt engineering study be made of the feasibility and operational safety of removing most of this contamination. This will involve getting prompt information on the depth within the ice of the main plutonium contamination, as found from the core samples, and the consideration of scraping, melting, towing ice fragments or more ingenious methods of getting this portion to a safe storage point. It appears to be the view of the Panel that a vigorous attempt to remove this main contamination would be well received by the Danes and would be so received if it were not possible to complete the attempt before the time of ice break-up. The Panel is not wholly charmed by calculations which might suggest permissible contamination of the sea water. There has been a fairly vigorous difference of opinion between U.S. and Russian scientists, for example, on the fate of radioactive materials dispersed in the ocean. Some members of the Panel, at least, believe that the Russian position has been substantiated in many aspects. It would, therefore, seem prudent to make a strong effort to remove the main focus of potential contamination at the crash site.

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If it is found necessary to leave most of the debris at the scene the Panel recommends that a U.S. expert knowledgeable in the structure and behavior of arctic ice cooperate closely with the Danish scientists at the site. It

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appeared to be a general opinion of the Panel that the provision of a larger body of U.S. scientists resident at the Base throughout the next study would prove of great value, especially in reconciling possibly divergent views with the Danish scientists at a later date.

Question 3. DEFINITION OF A MONITORING PROGRAM

It would seem premature to this Panel to define a rational monitoring program at this time; however, some general leads can be put forward. In any case in which the plutonium contamination is in a water medium the uptake and retention by any organism tested is believed to be low. The Panel requests, however, that a complete bibliography of past research in this area be assembled for reference. Until the day that it can be looked at in more detail the Panel believes that plutonium will neither pass to larger animals or man without being first observable in detritus, algae, plankton, or a few specific animals such as the mussel. The Panel would recommend that a monitoring program would emphasize these aspects rather than the extensive collection and examination of larger animals. There may be some changes in this recommendation later. One notes that because plutonium is assimilated in the animal to such a small degree any plutonium intake normally leads to easily measurable contamination in the feces. It may well be that these indicators both from mammals and from the aquatic birds may eventually provide an economical check on the possibility of long-term contamination around the site.

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