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Files
THRU: John R. Totter, Director
Division of Biology and Medicine
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February 19, 1968

CONFERENCES AT KØBENHAVN, DENMARK, FEBRUARY 14-16, 1968, WITH DANISH OFFICIALS ON PLANS FOR DEALING WITH THE CONTAMINATION PROBLEM AT THULE, GREENLAND

ADMHR:HDB

The following group left Tuesday evening, February 13, at the request of Dr. Carl Walske, Assistant to the Secretary of Defense for Atomic Energy: Dr. Walske; H. Parker, BNWL; W. Langham, LASL; J. Shreve, Sandia Corp.; O. Glasser, M. Gen., USAF; O. Sundstrom, Staff, USAF; J. Wolfe, DBM, and myself. B. Ketchum, Woods Hole Oceanographic Institute, arrived separately from Boston.

We arrived Wednesday morning about 10:45, local time, rested until 1:30 p.m. and went to the U. S. Embassy. There, Dr. Walske discussed the general situation based on latest dispatches from General Hunziker and invited Wright Langham to present his latest data. Langham first gave the most recent isopleth data based on the readings using the 17 kv and 60 kv gate-meters provided by Tenney and Bennett of Livermore. There are two very high level areas along the center line of the scar area within which the meter pegs out at 2×10^6 c/m. The other isopleths roughly surround the scar except for a bulge toward the northwest where the wind would be expected to blow fine debris. [redacted] but the number depends on how well the calibration of the survey meter reproduces the actual dispersion beneath or within the snow and ice.

Langham's more important data concerned his attempts to determine the Pu in the black crust of the scar area. He found that the black is a combination of JP-4 kerosene fuel, carbon, very fine debris, and organic matter in which is entrapped about 80% of the Pu of the total sample, presumably on the oil water interfaces or on the debris floating in the emulsion. Some larger black pieces on the bottom of the flask were also radioactive, while the more or less clear water contained the least. The sample also gave a positive test for tritium.

MEDICINE, HEALTH & SAFETY — 3-9- Thule Inci...

[redacted] RESTRICTED DATA
OFFICE [redacted] contains restricted data
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Langham had also made micrographs and autoradiographs of the debris left from samples of melted snow. A surprisingly large amount of vegetable and other detritus was seen upon which plutonium particles had stuck. The detritus varied widely in size but generally was 10 to 50 microns; the plutonium particles as determined by track counts were much smaller, less than 10 μ. Cylindrical cores of the ice from locations along the burn streak showed radioactivity corresponding to the black parts of the core, but activity was found at times at the air and/or water interfaces of the cores.

This mixture comprising the blackened area complicates the tentative conclusions of the Parker Committee and it was decided after some discussion not to refer specifically to the findings of that Committee. However, it was clear that Langham's data would have to be reported factually, including the tritium.

Jim Shreve had rerun his calculations on the characteristics of the fire cloud without finding reason to change his view that the inversion had not been penetrated on the night of the accident and that there would not be the dispersion of Pu over the several hundreds of kilometers predicted by Kofoed-Hansen.

I briefly reported that we anticipated that the Danes would want to carry out an extensive biosurveillance monitoring program to assure that the Greenlanders would not be contaminated by Pu. I noted that we were prepared to support such studies financially, assuming that the Air Force would provide logistic and other on-site support, but we should not offer such financial assistance unless it was requested. In any case we hoped the surveillance studies would be carried out in a systematic fashion such that the data would be useful for developing a precise ecological study of the biosystems of this far north bay; that we were interested in the ecology of the bay for sound scientific reasons as well as for monitoring.

I reiterated the view of Mr. Linglersen that the Greenlander was an inveterate "collector" and would salvage metal, etc. if it washed to shore. /This was being considered by General Hunziker who has shoulder to shoulder picker-uppers on the ice now that there is a bit of daylight at Thule./ Several more ideas were considered but nothing firm resulted. This meeting ended with the decision to urge the Danes first to state what they thought should be done.

That evening we had dinner at the home of Mr. Blankinship, the consular of the Embassy, together with five Danes--my partner was Dr. C. F. Jacobsen, the Assistant Director of Risø. He was a "biochemical engineer" but is now interested in the large-scale chemical extraction of uranium from phosphate and other sedimentary deposits (Greenland?). (See attachments 1 and 2. The Embassy took very excellent care of the team.)

Mr. Hans Koch opened the Plenary Session Thursday morning at the Danish AEC building and after a short informal exchange suggested that we talk about new data and new ideas and then break up into three groups (Dr. Walske's idea) in order to make decisions on what should be our position relative to a) the situation in general; 2) the probable (possible) aerial dispersion; and 3) the monitoring surveillance of the biota of North Star Bay and the surrounding area.

As indicated on attachments 3 and 4 the Danish participants were a mixture of top level professional administrators and scientists. I was able to talk personally at one time or another with those checked on attachment 3.

Langham reviewed the latest radiation monitoring data as noted above and mentioned the 10 meter grid to be set up now that there is light enough to use a transit and chain. The figures used were: 80% of the activity in the ice is within the inner "red" area with 17% within the next contour line. The above data regarding the JP-4 fuel emulsions were repeated and given full consideration. There was general agreement as to the need for many more ice cores since activity has been noted by the Danes on the tops, bottoms and intermediate regions of cores they had taken. (Ice freezes at the rate of 8-10 cm/day at these temperatures.)

Shreve showed a photo of exploding Pu metal and its intrinsic pyrophoric activity. Reasoning from Roller Coaster, he assumed that much would adhere to parts of the plane and to anything that it contacted. Beyond that the aerosol will form a circular area 40 to 60 meters in diameter and have particles 50 to 70 microns aerodynamic median diameter, equal to 4.6 to 6.0 if straight mass median diameter. He had to agree that the fire column from the burning JP-4 and air frame could make these numbers meaningless.

Langham suggested that the biological hazards should be minimal due to the dilution of the Pu and the discrimination of the biota against it. There should be no harm to anything if Pu were kept out of the systemic circulation of animals. It was agreed that plankton, because of its surface, could have a concentration factor of up to 10^3 but fish and mammals have a 10^3 to 10^4 discrimination against it.

Jacobsen then pointed out that released JP-4 ought to form a slick, and since oil slicks will move at 5% of the wind velocity, the film should pile up largely on the shores of Saunders Island where there are birds, walrus, and seals in summer. The Danes evidently look on this as a major problem. It was agreed that this situation was not equivalent to a bunker oil slick and therefore unpredictable.

It was left with the hope that there would be no oil to form a slick. /This seemed to be another way of saying: "We want you to scrape up all the contaminated ice and do something with it." --This has been their position all along from the earliest days at Thule. To remove the eggshell depressed break and the black area would be a 5,000 to 10,000 ton job requiring much equipment and many more men to be airlifted to Thule very quickly but this did not seem to cause General Glasser dismay./

Kofoed-Hansen asked how much metal and Pu are now on the bottom and will come to the surface when the ice melts? And how much Pu is trapped at the undersurface of the ice? No one would guess. There might be some trapped in the eggshell area if some JP-4 were put in when there was open water, 10-15 meters in diameter, immediately after the explosion.

Shreve estimated that the only land that might see particulates or aerosol carried aloft by the fire column would be Wolstenholme Island. He calculated in contrast to Kofoed-Hansen that the column did not break through the inversion layer and therefore the surface winds would be the major determinant of where the contamination would be found. He got an argument from M. Busch which Mr. Koch cut off.

Parker noted that the special panel is taking a conservative view of the situation as a whole although they feel that the dispersion of Pu in the water was negligible. Nevertheless, the new data relative to the JP-4 and the problem of aerosol dispersion might require re-evaluation.

After lunch we broke into three groups for detailed discussions of our special areas. I went with the surveillance biologic group chaired by Professor Rehberg. The rest of the group consisted of Hermann, Vibe, Grande, Marinus Hansen, Wolfe, Ketchum, and myself. It was agreed that tritium on the land and on the surface of the ice was not a hazard since it would be diluted by the spring melt and glacial runoff.

The animals of concern were the food animals. a) The little auk arrive in April in large numbers, eat shrimp and plankton, nest on Wolstenholme Island, and on the adjacent land behind Cap Athol. The Greenlanders eat the eggs and all of the birds, except the feathers. (Can there be a dust problem in this Cap Athol area when the natives do their bird catching, in view of the 17-35 pCi/cm^2 on nearby snow? The general answer was "Unlikely," but Dr. Rehberg felt that the dust hazard ought to be checked. I agreed as it seemed not worth arguing about; nasal swabs, dust collection or an aerosol sampler ought to be sufficient for this purpose.) b) The blue arctic fox eats auks, shrimp, mussels, snails, and anything else. It is not eaten much but may be a hazard because of the mouth to mouth method of skinning employed by the Greenlanders.

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c) Mussels may concentrate Pu particulates or contaminated plankton in their mantle apparatus. The walrus eats only the foot of a mussel and hence is not at risk but people eat them directly as does the eider duck. d) Three species of seals are killed here:

1) The ring seal inhabits the bay continuously moving up the Fjord close to the glaciers in summer and out to the open leads in the Straits in winter. They eat the polar cod, shrimp, detritus, and scavenge.

2) The harp seal is present from June to September, migrating in from Newfoundland.

3) The bearded seal stays out in open water during most of the year but may come in when the bay opens up. The latter two species are not important food sources, and Dr. Rehberg offered the opinion that "animals and men who migrate in and out of the area are not dangerous," meaning they are not at risk. Thus, only the ring seal is a matter of concern.

4) The polar cod is the chief fish in the bay. It does not migrate, but people don't eat it; it lives chiefly on plankton.

5) The plankton is a basic food for the intermediates in the food chain but is sparse at present. When the ice begins to thin out the plankton begins to bloom, and by June is the main route by which solar energy is stored as food materials for the bay.

6) The Danish Bureau of Fisheries is hoping to promote a halibut fishing industry operating from ports in southern Greenland. They do not know where the halibut spawn and/or where the larval forms and fingerlings mature. It is suspected that this may happen in the north, so they propose to try to catch halibut in the bay or strait for checking purposes. Dr. Marinus-Hansen will try to do this during his coming expedition northward in the Fisheries boat.

7) They are very interested in getting data on the currents in the bay and were pleased to know these studies have begun. It will be necessary to ensure that the findings are supplied to the Danes.

8) They have taken six bottom samples on a line running from [redacted] to the north and west of the point of impact. The positions are shown on attachment 5 provided by Dr. Hermann.

9) The question again was asked: "How fast will Pu adherent to airplane metal come loose or dissolve in bay water?" I promised to get experimental data on this point.

Following this session, some of us went to the Embassy and composed the Urgent TWX from København received at 1406 p.m., Thursday, February 15, summarizing the discussions to that point and the probable tacks that would be taken next day at the closing Plenary Meeting. The day ended with a sumptuous dinner at the Yacht Club hosted by Mr. Hans Koch. I took this opportunity to tell Professor Rehberg that I was A. J. Carlson's last graduate student and had done postgraduate renal physiology under A. N. Richards at Penn, whereupon he practically adopted me--the evening was most pleasant.

The next morning we met in plenary session for the purpose of agreeing on future programs and needs. There was still active disagreement on whether the fire column had lifted debris high enough to disperse it appreciably beyond the limits of the bay itself. When it became clear that they had found Pu in snow samples taken at Narssarsuk (20 pCi/cm^2), the ice north of Narssarsuk (40 pCi/cm^2), and Saunders Island (37 pCi/cm^2), the argument became academic. Thus, it was decided to take some 50 or so 1 m^2 samples of the overlying snow, 4 to 6 km downwind, on a rough arc from the point of burst. In addition to measuring quantity of Pu per unit volume or surface area, an effort will be made to determine particle sizes so as to decide whether these Pu particles offer a pulmonary hazard; it was agreed that the Pu was probably adherent to particles of sizes larger than themselves. In addition, about 10 samples will be taken from Saunders Island, a couple from Eider Duck Island and 6 from Wolstenholme Island. In one sense, this is just a lick and a promise and hardly what one would want for comprehensive information.

As to the biological observations, Dr. Rehberg indicated that Risø would do the analyses of the Pu in the food chains. Exactly what and how much will be done will be determined by what is found (see below). Their concern about debris on the shore line was reaffirmed. They hoped the Greenlanders would be cooperative (Mr. Lassen agreed they would be), but it may be necessary to have Mr. Zinglersen keep repeating the warning. Also, it might be useful to have airmen patrol the shore line by foot, kayak, or motor boat.

The components of the surveillance program which the Danes propose carrying out are:

a) Seals: Examine the intestinal contents for activity; if present check polar cod, shrimp and plankton. Collect mostly ring seals from the bay.

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b) Birds: Droppings, chiefly from the eider duck and little auk, but others as available, from the rookeries on Saunders Island and Eider Duck Island and from the nests on the bare headlands behind Narssarsuk and Cap Athol, will be collected and analyzed; if active, the birds themselves and eggs will be analyzed.

c) Mussels: Mussels will be collected from the shallows and analyzed in terms of foot parts and membraneous structures as soon as the ice permits.

d) Plankton: Plankton will be collected as soon as it begins to bloom at ice edges. (Locations and quantitation techniques not defined.)

e) Foxes: Foxes will be collected as randomly available for study of gut contents. Being wide-ranging omnivores--fish, crustaceans, birds, mussels, offal--they may be indicators of general contamination.

f) Dust: Stirred up artificially to simulate bird collection will be collected from the areas in b above by conventional dust collectors.

These plans were condensed into the two news releases shown in attachments 6 and 7 and printed in the Washington Post, attachment 8.

Nothing was said at any time about who would pay for the costs of the monitoring-surveillance work. It seemed to be one of those understood things that they would take care of their own interests. Later, in talking to Dr. Gjerrøp, Chief Analytical Chemist, Risø, and a member of the original Thule team, I offered to provide some ^{236}Pu for analytical control purposes. This offer was accepted and the solution is nearly ready for shipment. There seems to be nothing more we can do at present.

The Danes are clearly not interested in mixing research with surveillance. Dr. Hans Koch expressed the thought that it would not be politically acceptable for them to use the accident for research purposes. He added that if a research program were to be considered in the future, it should be a joint effort between Denmark, Canada, the U. S., and possibly the USSR! The research concept was not brought up again.

The group then went to an elegant lunch at the home of Ambassador White and Mr. White. My seat partner was Dr. Juel Henningsen, M.D., Deputy Director General of the National Health Service. As described

by him, the Health Service is a pretty fine system for keeping the practice of medicine and hospital care at a high level and introducing new medical ideas on a national basis, but it probably could not work in the U. S.

Dr. Hans Koch provided tickets for our group to attend the Danish Royal Ballet Company, and on Saturday came to the Kastrup Airport to see us off. Dr. Jørgen Koch and Mrs. Koch came to our hotel to have coffee and talk (or help us shop--declined) Saturday morning. He proudly gave me, and I gratefully accepted, a copy of a letter Hans Christian Andersen wrote his grandfather.

It is clear that Dr. Seaborg's phone call to Dr. Hans Koch soon after the accident is responsible for the cooperative, genial attitude of the Danes at Thule and København. They appreciated his sincerity and responded in kind. It is worth noting how fine friendships can grow out of unhappy events such as Palomares and Thule.

Attachments:
As stated (8)

* * *

Some calculations used in dealing with the Thule situation are below:

1. Dr. Gjerrøp reported values of Pu in snow--

   a) South of site near shore and original collection (ice): 40 pCi/cm^2

   b) At Narssarsuk (land): 20 pCi/cm^2

   c) On Saunders Island (land): 37 pCi/cm

   Take 40 pCi/cm^2 (100 x 100 = 10^4)
   = 0.4 uCi/m^2 (@ 16 ug/uc)
   6.4 ugm/m^2
   Compare to 1000 ugm/m^2.

   For calculation of totals per square kilometer
   0.4 uCi/m^2 (1000 x 1000 = 10^6)
   = 0.4 Ci/km^2
   6.4 $grams/km^2$

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[redacted]

2. MPC for ^{3}H = 0.03 uCi/cc_w/168 hrs.

0.03 uCi/cc = 0.03 mCi/liter = 0.03 Ci/m^3
= 3×10^7 Ci/km^3

a) assume an area 6 km x 2 km x 20 cm = (6x2x.0002) km
= 0.0024 km^3
72,000 Ci in this area equals the MPC as above!

b) assume 150,000 Ci are being considered
$\frac{3 \times 10^7 \text{ Ci/km}^3}{1.5 \times 10^5 \text{ Ci}}$ of water

= 200 factor of safety in a km^3 for a radiation worker drinking this water continuously.

or 20 factor of safety for public.

and 6.6 factor of safety for "selected sample."

c) assume 50 mCi/m^2 of ^{3}H in a 20 cm depth of ice
= 50 mCi/$10^4 cm^2$ x 20 cm
= 50 mCi/2×10^5 cm^3
= 0.025 uCi/cc or about the MPC for 168 hrs. for radiation worker

3. MPC for ^{239}Pu = 3×10^{-4} uCi/cc_w for 168 hr./week consumption of water by radiation worker.

3×10^{-4} uCi/cc
3×10^{-1} uCi/liter

[illegible] 1 m^3

IC
~~DR~~ - James Ammons D/H

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Attachment 1

GUEST LIST

Dinner, February 14, 1968 - 7:30 P.M.

Host: Mr. B. E. Blankinship

Mr. Erik Hesselbjerg
Permanent Under Secretary
Ministry of Greenland

Mr. Hans Lassen
Secretary to Minister of Greenland

Dr. Jørgen Koch, Danish AEC

Dr. Hans Koch, Danish AEC

Dr. C. F. Jacobson, Danish AEC (Risø)

American Scientists

Dr. Carl Walske

Mr. Herbert Parker, Biophysicist, Battelle Memorial Institute

Dr. Bostwick Ketchum, Woods Hole Oceanographic Institute

Dr. Wright Langham, Los Alamos Scientific Laboratory

Dr. H. D. Bruner, Atomic Energy Commission (Biology and Medicine)

Dr. John Wolfe, Atomic Energy Commission (Ecology)

Dr. James Shreve, Physics and Mathamatical Research (Sandia Corp.)

Major General Otto Glasser

Colonel Oscar Sundstrom (Air Force: Staff Officer accompanying)

Embassy Personnel

Col. Ridgely D. Kemp, Air Attache
Mr. Brady G. Barr, Political Section

Attachment 2

Schedule of American Scientific Group in Copenhagen

February 14 and 15, 1968

106900

February 14

10:45 Arrive Kastrup Airport

11:45 Check-in at Royal Hotel

7:10 Embassy vehicles pick up group at Royal Hotel

7:30 Informal dinner at residence of Byron E. Blankinship, Counselor of American Embassy. (Guest list enclosed in packet.)

Address: 190 Strandvejen, Charlottenlund, Copenhagen

February 15

9:40 Embassy vehicles depart from Royal Hotel for Danish AEC with group

9:55 Group arrives Danish AEC Headquarters

10:00 Meeting with Danish Scientists begins

7:20 Embassy vehicles will pick up group at Royal Hotel

7:30 Informal dinner at Langelinie Pavillian, hosted by Danish AEC

DANISH ATOMIC ENERGY COMMISSION 13 February 1968.

106901

List of Danish Participants
in the meeting at the Danish AEC Headquarters
on Thursday 15 February 1968

Professor P. Brandt Rehberg	Chairman, Danish AEC
Mr. H.H. Koch	Permanent Under-Secretary of State, Chairman, Executive Committee, Danish AEC
Professor Jørgen Koch	University of Copenhagen, Concultant to National Health Service
Mr. E. Juel Henningsen, M.D.	Deputy Director General National Health Service
Mr. P. Grande	Head, Radiation Hygiene Laboratory National Health Service
Mr. E. Hesselbjerg	Permanent Under-Secretary of State Ministry for Greenland
Mr. H. Lassen	Head of Division, Ministry for Greenland
Mr. W. Friis-Møller	Head of Section, Ministry of Foreign Affairs
Dr. Paul Marinus Hansen	Head of the Greenland Fisheries Research Department
Dr. Christian Vibe	Assistant Professor, Zoological Museum, University of Copenhagen
Mr. B.N. Fristrup	Head of Department, Geographical Institute
Mr. Frede Hermann	Hydrographer, Ministry of Fisheries
Professor Mogens Faber, M.D.	Medical Adviser to the Danish AEC
Professor T. Bjerge	Director, Research Establishment Risö
Dr. C.F. Jacobsen	Assistant Director, Risö
Professor O. Kofoed-Hansen	Technical University of Denmark Head, Physics Department, Risö
Mr. P.L. Ølgaard, M.Sc.	Head, Reactor Physics Department, Risö
Mr. N.E. Busch, M.Sc.	Head, Meteorological Section, Physics Department, Risö
Mr. Hans von Bülow	Secretary General, Danish AEC
Mr. G. Vigh	Head of Section, Danish AEC

bü/t

attachment 4.

DANISH ATOMIC ENERGY COMMISSION 13 February 1968

Biographic Sketch for Danes Participating in Meeting at the Danish AEC Headquarters Thursday 15 February 1968

Note: The Embassy has no readily available information on several of the participants. There may be errors in titles of organizations, translated from Danish.

Professor P. Brandt Rehberg — Chairman, Danish AEC

Born Ph.D. in 1921 (Studies on Kidney Function) - Lecturer Copenhagen University 1936, Professor animal physiology 1945-65 (Copenhagen University). Vice President Association of World Federalists in 1956. Member AEC from 1956; Chairman in 1962. Denmark's representative to NATO Science Committee 1958-61.

Mr. Hans H. Koch — Permanent Under-Secretary of State, Chairman, Executive Committee, Danish AEC

Born In Ministry for Labor and Social Affairs, 1940-42. Chairman of several labor organizations in 1940's; member AEC in 1953. Represented Denmark in several Nordic and international conferences since 1957; Chairman of Denmark's delegation to IAEA in 1958, 1962-63, 1966-67. In 1958 member of Executive Board for Dragon Project. Member of Academy for Technical Sciences (1960) and of Foreign Ministry's delegation on Disarmament in 1960-65. Member Greenland Council 1964. Recipient of Admiral Carl Hammerich award in 1963.

Professor Jørgen Koch — University of Copenhagen, Consultant to National Health Service

Born (Brother of Hans H. Koch). Ph.D. in 1942 (Copenhagen University's Institute for Theoretical Physics with thesis on isotope splitting). In 1954 Professor of Physics and in 1957 Director of University's Biophysical Laboratory. In 1963 Director of Physics Laboratory II. Scientific Assistant at Massachusetts Institute of Technology (Laboratory for Nuclear Science) 1951-52. Member of various Danish organizations, including Defense Research Council (1952-55). Consultant to CERN (1953-54). Member of Academy for Technical Sciences (1959). Member of American Physical Society (1947); of New York Academy of Science (1961) and Health Physics Society (1963), and of Committee for the International Organization for Pure and Applied Biophysics (1961).

Dr. (M.D.) E. Juel Henningsen — Deputy Director General
National Health Service

Born . Educated at Metropolitan School. Research in Danish hospitals (1931-34). Member of Council for Red Cross (1945-50). Member of Danish Committee on effects of radioactivity (1956). Chairman of WHO Expert Committee on Radiation (1962). Chairman of Danish committee on dangers of cigarette smoking (1963); of European Nuclear Energy Agency's Health and Safety Committee (1965).

Mr. Per Grande — Head, Radiation Hygiene Laboratory
National Health Service

Mr. Erik Hesselbjerg — Permanent Under-Secretary of State
Ministry for Greenland

Born . . Degree in law 1947 (Frederiksborg). Worked with affairs on Greenland since 1947, including Chairman of Cryolite Association Øresund A/S (1964) and Deputy Chairman for Scientific Investigations of Greenland (1965).

Mr. Hans Jacob Lassen — Head of Division, Ministry for Greenland

Mr. W. Friis-Møller — Head of Section, Ministry of Foreign Affairs

Born - Massachusetts Institute of Technology in 1966.

Dr. Paul Marinus Hansen — Head of the Greenland Fisheries Research Department

Dr. Christian Vibe — Assistant Professor, Zoological Museum, University of Copenhagen

(Has direct interest in polar bears)

Mr. B. N. Fristrup — Head of Department, Geographical Institute

Mr. Frede Hermann — Hydrographer, Ministry of Fisheries

Born University of Aalborg (BS in 1941). Assistant to Denmark's Fisheries and Investigations for Exploration of the Sea (1941). Director of Hydrographic Laboratory (1953). Hydrographer since 1959.

Professor Mogens Faber, M.D. — Medical Adviser to the Danish AEC

12/20/1911. Medical exam in 1936. (Metropolitan School) Doctor's degree in 1941. Professor in radio-biology at Copenhagen University since 1961. Medical consultant to AEC since 1956.

Professor T. Bjerge — Director, Research Establishment Risø.

Born Master of Science (1931); Ph.D. in 1938. Since 1956 Administrative Director of AEC Research Establishment at Risø.