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DESIRABLE CHANGES IN THE WAY INTERNATIONAL RADIATION PROTECTION STANDARDS ARE ESTABLISHED

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Introduction :

The International Commission on Radiological Protection, ICRP, is the only organisation that has ever effectively set standards at the international level for protection from exposure to ionizing radiation. Thus, this paper deals primarily with the ICRP, its shortcomings and changes that should be made in ICRP and in its operations. This raises the question of whether the present ICRP can be sufficiently restructured and reorganized to meet minimum requirements of public and occupational safety or whether a new organizsation should be established. This is the major question this Global Radiation Victims Conference is assembled here in Berlin to address, and hopefully to answer.

I as a former member of ICRP for two decades recognize some of the successes and failures of ICRP and will point out briefly a few major changes or corrections that should be made, in order that the international community of nations can have a competent and trustworhy source of radiation protection standards.

ICRP and its forerunner, the International X-Ray and Radium Protection Committee, IXRPC, have been in existance since 1928. The seven members of IXRCP operated from 1928 until 1937, but erosed to finition during the Second World War years, but it was reorganised with 13 members on the main ICRP Commission in 1950. I had the privilege of being one of the 13 until 1971.

During the period from 1951 to 1960, ICRP made many mistakes but I believe they were for the most part honest mistakes, due to th lack of information on the chronic effects of low level exposure. In 1950 most of our concern was with acute radiation injury such as skin erythem, and preventing the acute radiation syndrome and radiation death, which we believed required many hundreds of Sieverts (Rem).

By 1960, all of us were concerned regarding genetic damage and some of us, including myself, were becoming very concerned about radiation induced cancer at relatively low doses. Publications of Alice Stewart & al. (1956) on cancer induction in children, following diagnostic in

utero X ray exposure, and studies such as those of H.C. March (1950), on increased incidence of cancer deaths among radiologists, caused concern that even relatively low doses might cause radiation damage that is not fully repaired and result in cancer death many years after the exposure. I was concerned about the high exposures delivered during diagnostic procedures and published many papers (1959 -71) urging the use of better X-ray procedures. I was greatly alarmed when some of my employees at Oak Ridge National Laboratory, where I was Director of the Health Physics Division, made a study of the radiation dose delivered to school children, each year, in the mass chest X-ray programmes. We found that using the photo-fluorometric equipment, the children were receiving skin doses of 20 to 30 mSv (2000-3000 mRem), at a time where, in my laboratory, the average dose in a chest X-ray was only 0,15 mSv (15 mRem). After years of fighting, and with the help of a few concerned scientists, like H Blutz, IDJ Bross and Rosalie Bertell, we finally outlawed the mass chest X-ray programs in the US.

One of the highlights in my life was when I was invited to the White House to witness Pres. Johnson sign a bill to reduce unnecessary medical exposure, and do away with such programs as the mass chest X-ray program.

A few years earlier, following publication of C. Williams, indicating high doses to the feet of children using the shoe fitting X-ray machines, we caused them to suddenly disappear from the shoe stores. It is interesting that they were not outlawed directly by the states, but by passage of laws that required they be operate only by radiologists. Even before 1950, the annual income of a radiologist was more than ten times that of a shoe salesman. ICRP ignored these problems.

ICRP faults of omission

All organizations as well as individual persons are guilty of sins of omission, but unfortunately ICRP has had a measure much greater than can be justified. I will mention only a few. Already, three have been mentioned : medical exposure, mass chest X-ray exposures and shoe fitting machines.

I was very uneasy and provoked with the silence "expressed" by ICRP, concerning these high radiation exposures. ICRP's lack of concern with exposure from shoe fitting machines, was probably due to the fact

that in 1950 we were overwhelmed and completely preoccupied with the many severe problems of dangerous occupational exposure potential at the atomic weapons plants, such as Hanford and Los Alamos in the US, Windscale in the UK, and at national laboratories such as Oak Ridge National Laboratory (where I was employed) and Harwell in th UK.

However, it was like running into a brick wall every time I brought up the question of excessive and unnecessary X-ray diagnostic exposure. I soon became convinced that the subject of excessive medical exposure was a "no, no" with ICRP, because ICRP was founded and run under the auspices of the International Congress of Radiology, ICR, and radiologists did not want any restraints or interference in their use of diagnostic X-ray. I had the unconfortable feeling that there was a serious conflict of interests with ICR sponsorship of ICRP. I was receiving letters from radiologists and beeing criticized in their publications for my efforts, and what they considered a growing campaign to restrict their use of X-rays.

It was only after a long struggle over a period of years and after the publications of Alice Stewart on the increased incidence of cancer in children, before the age of ten, among those who had received X-ray exposure during in utero examinations, that H.J. Muller (the world famous geneticist), John Loutit (a radiologist from Harwell) and I were able to get enough votes among the 13 members of ICRP, to adopt the Ten-Day-Rule.

The rule stated that dianostic X-rays to the pelvic and abdominal region of women in the child-bearing age, should be delayed in most cases, and given during the 10-day interval following the beginning of menstruation, unless such delay would be harmful to the woman. Our delight in the passage of this rule was somewhat impaired however, when a week later, the Radiological Bulletin carried an article in which two members of ICR deplored ICRP's adoption of this Rule. The two were R.S. Stone, a radiologist from San Francisco, who had been the Associate Director of Health for the US Plutonium Project during the war, and L.S. Taylor, the long time chairman of the US National Council on Radiation Protection, NCRP, the organization that sets the radiation protection standards in the US. It has always seemed ironical and very incongruous that the chairman of NCRP and most of its members through their publications, have consistently depreciated the risk of exposure to low level radiation. This may be a carry-over from the situation with ICRP and I hope this is not a problem in other

countries. Conflict of interest seems to be a contagious and virile disease.

During the war years and for the decade that followed, there was intensive mining of uranium in the US and later in the USSR and in other countries. Most of the underground mines were very dusty and poorly ventilated. Lung cancer among these miners from inhalation of radon and its daughter products, was shown to be very high. Many of the mines were operated at working levels above 30. The matter became on of major concern in the US, and one would have thought the NCRP and the ICRP would take a major role in publicizing this hazard, and in bringing about corrections, but sadly they were quiet as a mouse. As member of both NCRP ad ICPR, I was very disturbed, but again, I seemed to see the handwriting on the wall "Conflict of Interest". During this period, 1961-64, the membership of ICRP was mostly from the US, Canada, UK and France and a number of these ICRP members were associated with the weapon industry. They dared no slow down this race with the USSR in building stockpiles of uranium.

The period of atmospheric testing of nuclear weapons by the US, UK, France and the USSR is a sad page in the history of civilized man. Without question, it was the cause of hundreds of thousands of cancer deaths. Yet, there was complete silence on the part of ICRP. In this period (1960-65) most members of ICRP either worked directly with the nuclear weapons industry, or indirectly, received most of the funding for their research from this industry. Perhaps they reasoned, "We must not slow down this race with the USSR" or maybe some were reluctant to bite the hand that feeded them ?

I will conclude this sampling of faults of omission on the part of ICRP with mention of one of recent date. Recently the US sent up a space satellite on its way to Jupiter. In order to reach Jupiter, it hat to obtain swingshot" energy by first swinging around Venus, and again swinging around planed Earth. I strongly objected to this flight, because, in order to operate its navigation and transmission instruments, it carried a large PU-238 thermoelectric heat source. One that if aborted in the earth's atmosphere could double the fallout plutonium from all weapons testing. I sent a letter to our Department of Energy, the prime US agency supporting our nuclear weapons program, objecting to this use of Pu-238 and pointing out that the serious risks were that some of the navigation instruments for guidance, overheated in the flight around Venus (nearer to the sun) causing it to abort in the earth's atmosphere. This could spray

microscopic Pu-238 dust over the earth. Again ICRP took no note of this risk that over time could cause thousands of cancer deaths. In fact, at the request of our Department of Energy, W.K. Sinclair, a member of the ICRP main Commission, and chairman of the NCRP, defended without criticism the satellite mission with its large Pu-238 source and took issue with my questioning the safety of the use of Pu-238. Fortunately for millions of people, this satellite has completed its second orbit around the earth, and it is on its course of no return to Jupiter. But it probably is a useless mission, because its main antenna cannot be extended so it can broacast its observations back to earth.

Unfortunately we had not this chance in 1964, when a US satellite aborted over the Indian Ocean, spraying 17.000 curies of Pu-238 into the atmosphere, such that thousands of people now carry Pu-238 particles in their lungs. But the ICRP dared not object to this use of Pu-238, because this might offend influential persons in government.

The radiation showers the US delivered to the people of the islands of the South Pacific, and the contamination of their homeland, was a great travesty of justice and a shameful act of the US military, but again, it was not worthy of the ICRP.

I called attention to the large X-ray dose leaking from so many of the early TV sets, but this also was not worthy of ICRP warnings, even though our Public Health Service, in its investigation, found a set that was leaking at 650 mrem per hour at floor level. Neither were they concerned that some pasengers in airplanes, were receiving large doses of radiation from radiographic and medical sources of Co-60 and Co 137, that were packaged improperly and shipped by air in the baggage section.

ICRP faults of Commission

Sins of commission may not be more wrong than those of omission, but they certainly are more irrefutable. I will list a few that are to the discredit of ICRP as follows :

- it weakened the 10-day rule
- it increased values of maximum permissible concentration of radionucleides in air, water and food, at a time when data indicated they should be decreased

- it ignored studies of Alice Stewart showing an increase of statistical significance in childhood cancer from in utero doses of about 8 msv (800 mRem)
- it ignored the study of Mancuso, Stewart and Kneale, that showed a statistically significant increase of cancer of the pancreas and multiple myeloma, among Hanford radiation workers at an average dose of about 0,03 Sv (3 mrem)
- it gave only passing notice to the study of B. Modan & al. of statistically significant increase in head and neck tumors in children receiving only an average dose of 0,09 Sv (9 mrem) during treatment of ringworm
- Now I am writing (uselessly) to hear of the ICRP response to the recent follow-up study of Modan & al, showing a statistically significant increase in breast cancer at an average dose of 0,0016 Sv (160mrem)
- ICRP has never responded to the studies of J.W. Gofman and R. Nussbaum, showing a 20% excess death rate, among thE lowest exposure categories of survivors of thE Hiroshima and Nagasaki bombings
- S. Wing & al. studieD thE film badge data of ORNL employees (where I was Health Physics Director) and found significant dose response effects for mortalitY from all causes and for cancer in 8318 radiation workers, whose median dose was only 140 mSV (140 mRem). If ICRP takes notice of this finding, we can be assure it will be to try to find a weakness in the study.
- the evaluation of the Chernobyl disaster by the IAEA was a disgrace of thE highest order. No one with any scientifi knowledge and integrity can accept its perverted conclusions. By its silence, I can only conclude ICRP does not dare question a report of an arm of the United Nations.

Required ICRP Organisational Changes

I claim to b a scientist, a physicist or a health physicist and not a social scientist or one with expertness in human behaviour and organization, so I would rather listen to others, the experts at this conference. From the above, I believe some of the required corrections of the ICRP are obvious.

Most of all, we must, as far as possible, avoiD problems of conflict of interest. I believe most, if not all members of ICRP are honest, but they believe they must go out their way to help the floundering nuclear industry survive, and while the cold war was waging, they did

not want to hamper the military. I believe it goes without saying, that the operation of ICRP under the auspices of th ICR is a poor arrangement, even though ICR has always tried not to interfere with ICRP operations. However, ICRP is always on the alert not to offend the ICR radiologists.

The serious weakness of ICRP has been its rules for turnover of membership of the thirteen member ICRP Main Commission. Their rules specify that not less than two, or more than four members shall be changed at each meeting of ICR, every three years, and there is no restriction regarding the time of duty on the Main Commission: Several members have been on this Commission for a quarter of a century and the average member turnover has been 3.07 members every three years.

I question the advisability of any person having membership over ten years and I don't believe membership on ICRP should ever be a life-long occupation, as it is for two of its present members. I believe the turnover should not be less than four or more than five every three years. ICRP has bcome a self-perpetuating body, and the outgoing and incoming members are voted in or out of office every three years. Surely members should not exclusively vote themselves in or out of office.

The sixty four dollar question is who should be the sponsoring organization for ICRP, and this organization should vote ICRP members in or out at appropriate intervals. Maybe WHO would be an appropriate sponsoring organization, but I question its appropriatedness because of the part it played or failed to play in the IAEA evaluation of the consequences of the Chernobyl reactor accident.

Maybe the Nobel Prize winning International Physicians for the Prevention of Nuclear War (IPPNW) would be a wise choice as the sponsor of a new ICRP.

Now that the cold war has ended, some of the urgency of the mandate of IPPNW has lessened, and maybe this would be good timing for it, to assume responsibility for sponsorship of a new ICRP.

Maybe also some confusion could be avoided were the new OCRP to be renamed as "The Iternational Radiation Protection Council" (IRPC). Truly, the victims of radiation damage present us with a serious

global problem, which has been shamefully neglected, and I hope and pray we can establish a IRPC that is equal to the task.

In conclusion, I would like to emphasize that, in this presentation, I have mentioned only the shortcomings of the ICRP to indicate what changes I believe should be made, either in the present ICRP or incorporated in a new parallel organization. ICRP in many respects has been an extremely useful organization and it is difficult to see how the world could have gone without it. The big problem is one of conflict of interest. I see the problem, but am unsure of the solution, because, almost by definition, the most knowledgeable and competent persons in matters relating to ionizing radiations, have strong ties with the military or industrial uses of nuclear energy and its products. There have been many great scientists on the ICRP, such as A.M. Cipriani of Canada, R.M. Sievert of Sweden, M.V. Mayneord and W. Binks of the UK, and H.J. Muller and J. Failla of the US. Had they been members of ICRP the past two decades, this subject would not be under discussion today. They too made mistakes, but not because of a conflict of interest on their part. They made mistakes but their mistakes were due to the period of history in which they lived.