

JUN 20 1979

MEMORANDUM FOR: M. Parsont, Chief, RHSB/SD
F. Swanberg, Chief, EERB/RES

FROM: S. Whitfield, RHSB/SD
J. Foulke, EERB/RES

SUBJECT: TRIP REPORT - IAEA SYMPOSIUM ON BIOLOGICAL IMPLICATIONS OF
RADIONUCLIDES RELEASED FROM NUCLEAR INDUSTRIES

On March 26-30, we attended an IAEA Symposium on the Biological Implications of Radionuclides Released From Nuclear Industries. The current research findings presented covered a broad spectrum of topics. Enclosed are copies of the program and the list of participants. We have preprints of most of the presentations for those who are interested.

The majority of the papers presented dealt with the basic radiobiology of incorporated radionuclides. Effects studied included carcinogenesis and genetic disorders as well as distribution and clearance patterns of incorporated radionuclides. There were also a number of papers dealing with environmental transport of radionuclides. The emphasis was primarily on transfer factors for food chain modelling and on dietary concentrations of radionuclides.

Of particular interest was the result of an experiment performed by Y. Moskalev of the USSR. This study of the late effects in rats and dogs following intravenous injection of Am-241 or Cf-252 showed increased survival over the controls of animals receiving low doses. The question arose as to whether this indicated a beneficial effect of low dose radiation. D. Grahn of Argonne National Laboratory pointed out that this effect had been noted in early experiments involving external irradiation. It was later found to be a consequence of a reduced incidence of infection in these animals over that in the controls. When the experiment was repeated using germ-free animals kept in an axenic environment (free of other organisms), this effect was eliminated. Moskalev replied that experiments should be conducted under conditions comparable to normal life. Others countered that the use of antibiotics by modern man is comparable to living in an axenic environment.

A number of papers were devoted to the study of the transmutation effect of incorporation of radionuclides; that is, the effect resulting from substitution of a new atom within a molecule, rather than the ionization and excitation produced by a charged particle. The consensus was that transmutation was not significant from a health standpoint relative to ionization.

Another important concept discussed was synergism. The paper that stimulated this discussion was by H. Metivier of the French Institute for Radioprotection, who studied the effects of exposure to plutonium oxide in combination with benzopyrene or dimethylnitrosamine in rats; previous work looked at plutonium inhaled in combination with sodium. Based on the discussion, it appears that further

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studies in this area should be sponsored by NRC. Synergism is of particular significance for two reasons: Firstly, it represents exposures in the real world where populations and individuals are simultaneously exposed to chemical carcinogens and air pollution as well as to ionizing radiation. Secondly, with proper experimental design and sufficient population size, the use of statistical techniques can permit extraction of the effect of low doses of radiation, which cannot be seen when radiation is the only initiating or potentiating agent present.

Other excellent papers presented were those dealing with bone dosimetry. The autoradiographic studies by the U.K. National Radiological Protection Board and the bone remodelling studies by the F.R.G. Institute for Genetic and Toxicologic Studies were outstanding. NRC's dosimetry programs at ORNL will benefit from the biological data presented here.

While no presentations were made of work being sponsored by NRC/RES, several of our principal investigators did present other papers. These included R. Cuddihy (ITRI), D. Grahn (ANL), and R. Rowland (ANL). Through them we met with other scientists doing research in areas potentially useful to NRC.

Of interest for our radiation dose calculations was a paper presented by Y. C. Ng et. al., in which updated environmental transfer coefficients for reactor effluent radionuclides were presented. Ng's previous transfer coefficient values were utilized in dose calculation procedures in Regulatory Guide 1.109.

Because of the current interest in low level radiation health effects, we attempted to focus in particular on this issue. We met Dr. R. H. Clarke and Dr. Pamela Bryant of the NRPB to discuss epidemiology-related efforts underway in the U.K. The NRPB is funding a study of occupationally exposed ex-employees of British Nuclear Fuels Limited (BNFL). The BNFL study cohort consists of approximately 14,000 ex-workers with a mean annual exposure of about 1 rem. There is some degree of optimism on the part of NRPB regarding the potential of the study because of the relatively high mean exposure level.

In a parallel effort, the NRPB has established a national registry for radiation workers (NRRW) with the long-term objective of investigating the effects of exposure on the causes and ages at death of occupationally exposed radiation workers. The potential size of the registry is about 30,000 current radiation workers in the U.K., and will be greater when the entry of data on ex-radiation workers begins. The registry is voluntary; however, there has been a high rate of cooperation on the part of the individuals approached. Although there are some concerns about confidentiality, there is no apparent legal block to obtaining information. Information gathering is basically a matter of gaining the voluntary cooperation of medical institutions, physicians, and families. Interestingly enough, although a U.K. regulation requires that all licensee exposure records be accompanied by medical records, apparently these do not include medical radiation exposures, and neither will these be included in the registry. We consider this to be a drawback. A recent NRPB document (R-77) reflects two recent U.K. radiation exposure surveys and contains a breakdown of both occupational

and medical exposures. Dr. R. H. Clark of the NRPB will be forwarding a copy of this report to us. We have been referred to Dr. Reissland of NRPB for more detailed information on the registry, and we plan to contact him shortly because this may be of potential value to the NRC/EPA Feasibility Planning Study.

We were also able to meet briefly with Dr. G. Uzzan of the Department of Radiation Protection of the France Commissariat a l'Energie Atomique, to discuss an epidemiological effort being set up in conjunction with Euratom. One phase of the effort will be to study the feasibility of developing a European radiation worker registry. According to Dr. Uzzan, there are about 250,000 European radiation workers for whom excellent records are available, but the record formats differ among countries. The task of the feasibility study will be to assess the likelihood that these records can be usefully abstracted in a form suitable for a large scale epidemiology study. Dr. Uzzan also indicated that they will be conducting dose-effect studies with experimental animals and also reviewing additional human data. He expressed an interest in our feasibility study, and we agreed to an exchange of information on the progress of the respective programs.

In general, it appeared that the low level health effects issue is of less concern in the European community than it is in this country. In addition, there appeared to be a significant degree of skepticism among NRPB representatives regarding the Mancuso et al., study.

We made the following additional contacts and collected information which is of some interest to our current efforts:

1. Dr. Douglas Grahn, Director of Biological and Medical Research, Argonne.

- X A) Dr. Grahn advised us that his division expects to have access to the original tri-state leukemia data in the near future and will be in need of financial support to conduct a complete re-analysis of the data. This is the data base upon which the original tri-state analysis was conducted. According to Dr. Grahn, some significant problems with the original analysis warrant further definitive investigation.
- B) Bob Alexander, OHSB/SD, had contacted Dr. Grahn earlier about coming to SD for a short series of lectures regarding the genetic aspects of low level radiation--Dr. Grahn re-emphasized his interest in coming to NRC and said that he would probably be available some time early this summer.

2. William F. Brandom, Cytogeneticist, Dept. of Biological Sciences, University of Denver.

We met with Dr. Brandom to discuss at some length the feasibility of employing cytogenetic techniques to implement a complementary radiation monitoring and dosimetry system for occupationally exposed workers and/or the general population. Under contract to DOE, Dr. Brandom has been conducting

M. Parsont
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4

studies of peripheral chromosomal abnormalities in uranium miners and plutonium workers (Rocky Flats). Dr. Brandom has developed a rather extensive capability in this area, including a mobile cytogenetics unit capable of responding to isolated incidences of overexposure. Brandom has invited us to visit his operation in Denver to become more familiar with the methodologies employed and to further discuss the feasibility of employing these techniques as part of an occupational health program.

This symposium was most valuable in gaining broad perspective of international efforts in areas of interest to NRC. We are available to respond to questions about the presentations and the individual contacts which we made.

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Job B Disc
6/15/79

RHSB:SD
SWhitfield
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EERB:RES
JFoulke
6/18/79

Distribution:

Central files
SD RDG
SD ALPHA
RHSB RDG
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Minogue
Smith
Goller
Purple
Parsont
Whitfield
JFoulke, RES

Task No. N/A

~~Sept 13~~

Gruber - met in Vienna - March '79

called ~ June '79

July 13 - Received informant 189

Aug 28 - sent out 173

Sept 14 - no record of Prop.

Sept 17 - 173 arrived

Sept 25 - no record - not logged in

Sept 26 - Giverson - Mr. Gruby, the
financial mgr - informed him that Argonne
had the money - progress - will have
stratified data (cross tabulations) - wants
to have verbal description of data (prior to
relative risk final analysis) - will use this as
backbone - after this will perform discriminant
analysis on all possible interacting variables -
- at this point he wants to pay particular
attention to "high risk" or "susceptible"
subgroups - sees only 10 persons have so
far - are discussed - visit is on 10/1/79?
will begin work ~ Oct 1

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