Also, in the case of flammable gases or vapours, there was no clear correlation between the amount of chemical involved and the number of fatalities.

Moreover, well-known mathematical models used for accident risk assessment appear to indicate that the radii of the areas potentially involved by "fireballs" or by "unconfined vapor explosive clouds." In general, hazardous clouds released into the air generally are described by a mathematical function whose first derivative decreases for increasing amounts of the material released. Lastly, a simple non-parametric, statistical analysis of the OECD data (1988) concerning more than 360 major accidents involving hazardous chemicals and materials recorded in member countries in the period 1971–1987, appear to indicate that the mortality rate attributable to accidents in ship transport (about 1% of the reported accidents and 10% of the reported fatalities) is higher than the one attributable to the categories (which do not appear significantly different) represented by road transport (about 10% of accidents and 20%, of fatalities), processing-use-production (about 30% of accidents and 1/3 of fatalities), and trans-shipment and pipeline transport (about 10% and 8% of accidents and 10% and 8% of fatalities, respectively). Storage and rail transport of hazardous chemicals (about of 18% of accidents in both cases and 8% and 5% of deaths respectively, seem to be characterized by a mortality rate which is lower that the previous ones.

Some tentative conclusions may be drawn from these data. First, the simple reference to a quantity threshold of hazardous chemicals cannot provide an exhaustive criterion for the identification of major risk plants; and evidently, the consideration of the possible human exposure patterns always is necessary. Second, well-known mathematical models and simple criteria indicate that in many cases, the radii of the areas possibly involved by clouds of hazardous chemicals may decrease slightly even if the quantity of hazardous substances involved decreases substantially. Lastly, many data indicate that the transport of hazardous chemicals may represent an important source of risk, at least similar to the one attributable to industrial activity involving the same chemicals.

147.
Medical Management of Environmental Emergencies: Whose Job Is It?

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Technological emergencies affecting public health include acute urban air-pollution episodes, major fires, releases of chemicals from industrial plant or during transportation, and nuclear accidents. The main, but not necessarily exclusive route of human exposure to the injurious agents involved is airborne, and so the issues surrounding the public-health risks of exposure and the medical management of those exposed or injured in these different types of incidents of the possible acute and chronic physical and mental health effects; provision of advice to the emergency services on the health risks to emergency workers and the public; supplying information to the affected community and their medical attendants; and, in particular, advising on evacuation measures when the incident permits timely evacuation to take place. At present, training in emergency or public-health medicine does not equip physicians to undertake this role, but the need for expertise in the medical management of such technological incidents, and in environmental medicine in general (including developments in the UK on who should be doing it), will be shown by describing the lessons learned at a major plastics fire in Thetford, England. A simple model for predicting exposure, and hence the evacuation criteria on which to base decisions on evacuation of nearby communities in future fires of this type, also will be given.

033.
Chemical Disarmament in Iraq: Notes on the Medical Support

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One of the conditions for a cease fire between Iraq and the coalition forces was the elimination of Iraq's weapons of mass destruction. For the chemical weapons, this meant a three stage process: Phase I—inspection and survey; Phase II—the disposal of weapons, facilities, and other related items through destruction, removal or rendering harmless; and Phase III—long-term monitoring to ensure ongoing verification.

The medical support of the small team of experts required a combination of general environmental and industrial medicine, toxicology, and emergency medicine. Due to the experimental character of the task, a lot of problems were identified only on the field. Lonely and a long way from home, the medical officer had to deal with those problems by staying calm, being supported by his knowledge of chemical warfare, clinical experience, and, not at least, by a good "home team" with access to the world's medical literature. To avoid dramatic situations, most of the time was spend on preventive actions and safe standard operational procedures.

079.
Transportation of Dangerous Substances: Consequences of an Accident

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A simulated accident due to a fireball of liquid propane gas that developed from a 30-ton road tanker is described, and the stricken area is described.

Simulation models have been employed in order to assess the effects of the fireball. The models have been taken as a basis for determining the distances, for fixed values of thresh-

old, at which injuries to persons would be observed.

According to these derived distances, it is assumed that a first area extending for 220 m is characterized by lethal effects of an irradiance (>7 Kw/mq). A second area extending from 220 m to 285 m, shows non-reversible damages for an irradiance (>5 Kw/mq), while a third area from 285 m to 385 m presents reversible damages for irradiance (>3 Kw/mq).

As a result, we can draft a "map of the consequences" which can greatly help experts and responsible authorities to deal with the occurrence of such an emergency.

060.
Medical Economic and Environmental Justification for Remediation of Functioning Rbmk (Chernobyl) Reactors

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The 1986 Chernobyl nuclear disaster near Kiev, Ukraine led to the mobilization of enormous resources across Ukraine, Russia, and Europe. Acutely, the loss of life was minimized, in part, because of the actions taken to limit exposure to ionizing radiation. The potential long-term health effects of the Chernobyl nuclear disaster are yet to be determined. Meanwhile, reactors sharing the design features of Chernobyl, in particular graphite cores with similar shielding (RBMK reactors), remain a hazard to the environment. As long as these reactors operate, the possible recurrence of a catastrophe like Chernobyl can not be ignored as a threat to environmental protection, particularly in Europe.

Remediation of functioning reactors sharing the design features of Chernobyl is justified in this presentation based on an analysis of the potential [U.S.]$19.2 billion medical economic impact of another disaster. These costs were determined by considering medical staffing, health facilities operations, and public health actions for 10 million people, relocation costs, and energy estimates based on the reported Chernobyl experience. A $2 billion reactor cost for remediation of the functioning RBMK reactors was based on information from engineering sources. Thus, replacing the RBMK reactors maybe the most cost-effective strategy.

048.
Considerations for Medical Long-Term Monitoring following a Nuclear Accident

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Medical aspects of Chernobyl-type nuclear incidents may be classified into three main categories: 1) illness and physical damage; 2) dietary-related effects; and 3) mental consequences to the individuals exposed and to their relatives. There are several aspects to be considered regarding the long-term medical follow-up of those who had been exposed to radiation resulting from Chernobyl-type accidents, such as the possible medical benefit to the individuals exposed, sociological and psychological effects of the monitoring procedures, the interest in carrying out epidemiological studies, moral and ethical issues, the existing medical infrastructure, and cost and administrative considerations. Experience based on the consequences of the Chernobyl accident indicates that these aspects must be weighted and evaluated by the decision-making authorities before a special long-term medical monitoring program is conducted. Based on a discussion of all the aspects, it is suggested to establish "follow-up criteria" for medical long-term monitoring.

051.
Estimation of Exotoxicant Influence on Children's Health

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Introduction: The Republic of Bashkortastan is the largest chemical industry center in the Confederation of Independent States and one of the major world providers of herbicides, chloric and sulfuric organic compounds, and products for synthesis. Imperfections in the technology processes causes close contact of workers with highly toxic substances and dissemination of the atmosphere of nearby territory with exotoxicants.
Objective and Methods: This study was undertaken to understand better the biochemical and hormonal mechanisms of air pollution and their influence on health status of children (their pro-oxidant defense and endocrine system) whose parents (one or both) deal with highly toxic substances in unhealthy working conditions.
Results: The status examination demonstrated negative dynamics in the basic indices. Considerable decreases of pro-oxidant defences were especially marked in those children whose parents both had occupational injury. The most pronounced changes in hormonal regulations, in concentrations of insulin, estradiol (E2), and cortisol in particular were observed in the children from air-polluted regions.
Conclusions: The biochemical and hormonal indices used may be adopted widely as quite sensitive bio-indicators for estimations of the anthropogenic influences of exotoxicants on children's health. They can be applied to select children with high risk possibility of different somatic pathology.

061.
Surfactant Induced Sealing of Radiopermeabilized Mammalian Cell Membranes

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