

## TECHNOLOGY TRANSFER FROM NUCLEAR AND RADIOLOGICAL TO INDUSTRIAL SAFETY

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The term technology transfer usually means the supply of equipment, information and techniques from a more developed supplier country to a less developed recipient country, together with an educational, human developmental package. In the ideal case, these enable the recipient to use the acquired technology independently and to develop it further.

Technology transfer in a broader sense includes situations in which the transfer occurs between previously not interconnected fields, in which the subject of the transfer is the philosophical, scientific, technical or managerial approach to a set of problems or in which the educational package is replaced by transit of individuals or groups from one activity to another. There are many such examples.

During the last decade another technology transfer process has developed, from the nuclear and radiological to the occupational safety and hygiene fields.

The responsible governmental organs in many developed countries realized that their efforts result in significantly lower levels of safety and health at work than desirable, reasonably achievable and socially acceptable.

The recommendations of governmental review committees on the subject (1) and the legislative actions taken upon their acceptance (2) show the marked influence of approaches well known and widely practised in nuclear and radiological safety, recognizing that the level of occupational safety achieved in these activities - by using specially developed approaches - is significantly better than in comparable non-nuclear ones.

In August 1978 the Minister of Labour and Social Affairs of Israel appointed a committee - under the chairmanship of the author - to review the state of safety at work in Israel. The committee had a broad mandate but rather limited time to present its recommendations. These were submitted to the Minister in March 1979. The final report (3) was published in August 1979 in Hebrew.

The following basic findings of the committee may well have general relevance, as similar conditions existed, exist or may exist in many developed and other countries.

(1) The organs responsible for the control of safety at work are fragmented and scattered between different authorities. The level of interaction between these organs is low and there is no integral approach to safety at any given facility. Coordination between these organs is ineffective and hazards of different nature are handled independently by the different authorities.

(2) The major responsibility for controlling safety at work is that of the work safety inspectorate. It acts on outdated and inadequate legislation, with limited manpower, and is unable to cope with the growing complexity of the industry, with the increasing concentrations of potential energy, hazardous materials at single locations and

mainly with the less obvious and apparent nature of some modern hazards. Actual and potential off-site effects (on populations or on the ecology) are unfortunately outside the jurisdiction of the inspectorate.

(3) The penalties in the law and the actual sentences imposed by the Courts for safety violations and for maintaining unsafe conditions in facilities are not an effective deterrent.

(4) Present legal, taxation and insurance practices enable employers to transfer the burden of economic losses due to unsafe operational conditions including accidents to the State or in general to the public. There is no economic incentive to employers to invest in the safety of their operations.

(5) There is no suitable data base for priority/policy decisions on matters of safety. Courses of action are chosen on intuitive basis. The marginal investment in risk reduction - where it exists - varies by orders of magnitude between different industries and work places both in monetary terms and in inspection effort.

(6) R&D projects are carried out without the establishment of a general plan, as no such plan or priority system could be developed in the absence of a suitable data base. There is no reliable system for the transfer of R&D results into general practice.

(7) There is no systematic and timely approach to hazards of stochastic nature and there is no systematic control of them. The information base on these hazards is insufficient.

(8) Improvements are made on a patchwork basis, usually following severe accidents or the detection of grossly unsafe situations.

(9) Training opportunities are scarce and generally non-specific in quantity and relevance.

(10) In general, there is no emergency planning - not at the off-site level nor at the on-site, intervention level.

(11) The professional level of many engaged in safety related activities (in the work places and in the active governmental organs) needs improvement. This is especially valid with respect to safety personnel at the facility level.

(12) Workers' participation is ineffective due to reasons similar to those already mentioned, little or no influence and deterrent, lack of professional ability and information.

Some of the specific findings of the committee, regarding the Israeli situation were:

(1) the rate of reportable work accidents (absence of three or more days from work) is approximately 80 per year per 1000 employed persons in all types of employment and about twice this rate among the employed in construction and industry.

(2) the rate of fatal accidents is approximately 0.2 per year per 1000 employed (of which ~50% are traffic accidents on the way to or from work - considered as work accidents for compensation).

(3) the rate of accidents causing permanent disability above 20% is approximately 0.7 per year per 1000 employed and of those causing temporary disability, about four times higher.

(4) the estimated financial loss to the economy due to accidents at work is in the range of \$300-500 million, i.e., ~3÷5% of the GNP. The public expenditure on safety is less than one percent of this sum.

(5) there has been no trend of improvement during the past 5-10 years.

The major recommendations of the committee were:

## I. AT THE FACILITY LEVEL

(1) Approach the safety of work places on integrative basis. Aim for safety as a built-in aspect of every activity, not an extra, add-on type one.

For new facilities the consideration of the desirability of an obligatory safety assessment was recommended, as a condition for a licence. For existing facilities the recommendations call for written safety policy statements and improvement programmes based on a thorough review of the existing hazards.

Both types of document should contain a description of the potential hazards of the operation and the appropriate countermeasures employed.

(2) Encouragement of worker-management co-operation in facility safety committees required by law on a more objective and professional basis, with the help of outside specialists if needed. All the potential hazards should be openly discussed - the workers should be properly informed about the risks they are exposed to.

(3) Safety should be part of management's responsibility at all levels. Duties and responsibilities and the authority of the different managerial levels with regard to safety should be clearly defined.

## II. AT THE NATIONAL LEVEL

(4) Reorganization of the functions presently dispersed between the different authorities, ministries, etc., into one coherent unit, preferably in a unified national occupational safety, hygiene and health service.

(5) Establishment of research coordination and engineering development units within the unified service. This will also contribute towards the increase of the professional capability of the service as a whole.

(6) Establishment of coordinating functions within the unified service with other, presently not-interacting services fully or marginally relevant to safety at work.

(7) Encouragement of voluntary organizations in the field (professional societies, unions, associations of employers, etc.).

## IN SPECIFIC FIELDS

(8) Modernization and updating of the legislation

(a) to reflect the recommended changes;

(b) to re-establish the deterrent force of the law by severely increasing the penalties on safety violations and by speeding up Court procedures; and empowering the safety inspectorate to impose administrative fines.

(c) to widen the coverage of hazardous situations by regulations, including the promulgation of satisfactory, technically acceptable solutions. (Codes of practice).

(9) Establishment of inspection priorities according to the hazard level, safety record and safety arrangements in the inspected facilities. Introduction of obligatory investigation of every serious work accident.

(10) Establishment of a satisfactory data base and of a specialized safety information centre.

(11) Improvements in safety-related R&D management, in occupational hygiene and health control, in training activities at all levels, according to a priority system to be developed.

(12) Encouragement of research and publication on the economic aspects of work safety. Promotion of a cost benefit approach as a tool for priority assessment and investment evaluations.

As said above many of the recommendations, including part of those mentioned above, are based on practices which evolved and are used in the nuclear field. Basically the report calls for the introduction of a similarly organized, systematic approach to the different industrial hazards.

#### REFERENCES

1. Safety and Health at Work. Report of the Committee 1970-1972 (Robens report) H.M.S.O.
2. Health and Safety at Work Act, 1974. H.M.S.O.
3. Report of the Review Committee on Safety at Work in Israel (1979) Ministry of Labour and Social Affairs (in Hebrew)