SAFETY SCIENCE Monitor

ISSUE 2 1997 VOL 1

Article 6

IMPEDIMENTS TO THE UTILIZATION OF THE AVAILABLE INFORMATION FOR REDUCING OR ELIMINATING OCCUPATIONAL RISKS

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ABSTRACT

This paper discusses some obstacles and uncertainties regarding the use of available information for the purpose of risk reduction or elimination. The author stresses that, in order to reduce or eliminate the risk, it is necessary to determine whether the risk is currently existing, or anticipated as a result of implementing new technological processes or starting new services; determination of the level of acceptable risk level is also required. Difficulties inherent in preparing a credible risk analysis have been discussed. The paper comprises several parts. Availability and reliability of the information indispensable for hazard identification have been analyzed. The system of collecting information on occupational exposure in Poland has been discussed, and its value and applicability for risk reduction or elimination has been assessed. Application of hygienic standards as the basis for occupational risk reduction has been critically evaluated. Conditions and requirements for undertaking preventive measures and actions resulting from the collected information on the effects of exposure to harmful occupational agents have been analyzed. The most important conclusions of the paper are as follows:

1. Complete and possibly most reliable information on hazard identification, magnitude and type of exposure, and on personnel qualifications is necessary to arrive at correct decisions.
2. Decisions on risk reduction should be preceded by an assessment of its magnitude.
3. Hygienic standards, used extensively as the basis for undertaking preventive measures, fail to comprise all the occupational risk factors and usually constitute a compromise between the requirements for the workers health protection and technical or economic abilities to meet them. Usually, the risk magnitudes are specified which were adopted as reasonable in setting up the standard.
4. The progress in collecting information on the biological effects of work-related factors is much faster than the progress in the activities intended to reduce the risk. However, the available information is usually not suitably prepared for use by the personnel responsible for work safety or by the employers and employees of industrial plants.
5. Even when full and reliable information on the effects of an agent posing occupational risk as well as on the magnitude of workers' exposure is readily available, it is very difficult to take steps intended to reduce or eliminate the risk because of the existing significant obstacles. Such obstacles include, for example, imperfect legal system or failure to observe the existing legal regulations, unfavourable economic conditions or insufficient economic motivation for promoting work safety.

INTRODUCTION

There is no doubt that the problem of utilizing the available information to reduce or eliminate occupational risks has numerous aspects; some of them of high complexity. Most of the questions arising in this respect are associated with the sources of the information as well as its quality and applicability for the assessment of hazards to workers health and well-being in workplace. Disregarding, for the time being, the question of the availability of information to the concerned professionals, it is worth noting that collecting information on occupational hazards requires time and money, and must be preceded by an assay of the hygienic conditions in the plant. It should also enable assessment of the existing or expected occupational risk. Therefore, to ensure the usefulness of available information, it is necessary that all the elements of†risk assessment referring to manufacture techniques and processes employed in the plant be considered. Risk assessment should also allow monitoring the effectiveness of the intended or actually undertaken preventive measures, which often requires major intervention. It is generally recognized that the risk assessment continues to be a matter of controversy, as it makes one adopt numerous assumptions based on scientific hypotheses as well as use mathematical models whose applicability has not been proven, especially in the cases where the magnitude of risk has not been evidenced by adequate epidemiological data. And finally, it is also generally known that the efficient use of available information for reducing or eliminating occupational risk usually requires undertaking activities in accordance with the existing legislation. Moreover, the companies or individuals responsible for monitoring the conditions of work and their impact on workers health need appropriate economical motivation.

Surprisingly, one can observe a remarkable contrast between the rapid increase of the volume of information on the biological effects of harmful industrial agents and the relatively slow progress in activities for workers health protection. Four categories of factors seem to be responsible for that difference. Firstly, the progress in research and methodology is faster than the progress in the application of scientific results to the prevention of diseases. Secondly, there may sometimes be a lack of a continuation of the research activities up to the stage of the practical implementation of their results. The third-category factors are associated with the professional skills of the work supervision and occupational health services and their motivation for obtaining essential progress in disease prevention. The fourth category includes economic factors. A true and steady improvement of the working conditions requires considerable financial resources which must be allocated for the implementation of new, safer technologies and equipment and for providing individual protection measures to the workers.

Careful observation leads to the conclusion that there is still another obstacle in the application of information for the purpose of reducing occupational risk. Although relevant information may be available in a country, it often fails to reach interested receivers in the form appropriate for practical preventive activities. Therefore, it may be concluded that both the training and relevant information, including also the details of methodology, should be adapted to the specific needs of the receiver. The task is not an easy one, but it is indispensable for the effective utilization of the available data.

RISK ASSESSMENT AS THE STARTING POINT FOR PREVENTIVE ACTIVITIES

According to the commonly accepted view, the undertaking of preventive activities should be preceded by the assessment of risk related to workers' health loss, work capability or sometimes even lifespan reduction. The risk is most often defined as **the probability of a defined adverse effect occurring in a defined group in defined circumstances.** However, the approaches to the concept and definition of risk assessment vary. Sometimes the risk may correspond to the instance of hazard, which can be noted in the European Union legislation concerning the use of chemicals. The risk assessment is performed for three slightly different purposes. Firstly, risk assessment may refer to the existing risk of the effects of the actual past exposure. Secondly, it may concern the expected risk connected with an introduction of a new technology or planned changes of the conditions of work. Thirdly, the risk assessment procedures may be applied to estimate the level of risk which could be socially acceptable; the latter referring mainly to the setting of hygienic standards for a given agent. The classical risk assessment, sometimes termed risk analysis, comprises four consecutive procedures and is most frequently undertaken to determine the risk related to occupational or communal exposure to the non-threshold agents, or to exposures, concentrations or doses much below the experimental range level. The latter requires application of mathematical models the theory on which is in progress and subject to discussion [2].

MAJOR STAGES OF THE CLASSICAL RISK ASSESSMENT COMPRISE [5]:

- hazard identification
- dose-response assessment
- exposure assessment
- risk characterization.

The risk assessment procedures have been described in publications of different kind: guidelines, manuals and monographs. However, it should be stressed that their proper performance is dependent on the quality and credibility of data for hazard identification and exposure assessment as well as on the skills and experience of the conducting staff.

It has been well recognized that risk can be assessed on the basis of epidemiological data. The conditions for and design of these studies are commonly known. Nonetheless, there are few epidemiological studies which could provide grounds for risk assessment and allow determining the level of risk with high degree of credibility. Even if such data are available they make it possible to estimate the magnitude of the existing risk only. The preventive activity aimed at reducing risk makes one raise a question what level the risk should be reduced to in order to facilitate effective prevention based on the cost-effect analysis. It is very seldom that the epidemiological studies allow this kind of assessment. Usually, it needs to be supplemented with the results of experimental studies and mathematical modelling.

One may of course encounter the reports on epidemiological and experimental studies indicating that a certain exposure level may not lead to health effects during exposure period or that the NOEL (No effect level) and NOAEL (No adverse effect level) values allow forecasting no adverse health effects. However, one should not base his opinion on these data only as the progress in science and the growing empirical evidence require constant verification of one's views and experience.

The setting of hygienic standards is meant as the starting point for preventive activities. It has been confirmed that compliance with the established hygienic standards in industry leads to the reduction or even elimination of unjustified risk. The administration or institutions responsible for standard setting do not introduce them as legally-binding regulations until they have been reviewed by relevant expert group. This procedure is commonly applied in the countries with a high level of the socioeconomic development. While setting hygienic standards the expert groups in different countries usually adopt two similar assumptions. According to the first one, the proposed value of the hygienic standard should prevent all the workers from the occurrence of any adverse health effect. The second assumption reads that the proposed hygienic standard protects most of the exposed workers against the adverse effect of a given agent, except for those who may for various reasons be more sensitive to the harmful activity of the agent. While determining the legally-binding hygienic standards one should consider the technical and economic capacities of complying with them in a given plant and of their enforcement. Despite earlier announcements, so far no international recommendations regarding methodology of standard setting for occupational hazards have been developed. However, such guidelines have been published for the communal environment [4]. Moreover, the EU Commission has put forward the criteria of developing documentation for occupational exposure limits [1].

The circumstances discussed above account for the varying values of the legally-binding or recommended hygienic standards in different countries. Regardless of these differences the values of established hygienic standards are treated as rigid, particularly by the work supervision services. The postulate that the hygienic standards should be considered in terms of a range of values rather than a definite value has as yet been disregarded. In the case when the hygienic standard has been established as a compromise between health effects and the technical and economic capacities of complying with its value and when the standard does not ensure safe working conditions for all the workers, the levels of related risk

are not revealed. From our own observations we may draw a conclusion that the standards developed according to the health-based criteria should be considered the target values which may, however, not necessarily be complied with. The available information provides evidence that even in highly developed countries the exposure levels may exceed the legally-binding hygienic standards; this referring chiefly to small enterprises.

TYPES AND SOURCES OF INFORMATION

Various information types and sources are used to identify hazard and occupational risk. There is no doubt that the data obtained from epidemiological studies and clinical observations on the effects of work-related factors on workers health are of primary importance. When such data are not available or not applicable for some reason, the results of experimental animal studies may be used as an alternative source. The analysis of chemical structure or the assessment of a relationship between the structure and biological activity of a given chemical can also be employed. Computer software can be used to perform such analyses and assessments, although the method is usually rather expensive.

Individuals and teams responsible for risk assessment usually make use of the relevant information obtained worldwide. The information, in the form of databases, is available on various media, such as CD-ROM, hard disk, on-line system. Table I specifies major factographic databases on toxicology, occupational medicine and work hygiene. The factographic databases listed in Table I are useful for preparing quick assessments of health effects of exposure to toxic substances. The method is disadvantageous in that the databases are not updated continuously. Table II displays major bibliographic databases. They usually contain recent information which is updated on a monthly (MEDLINE) or a three-month (TOXLINE) basis, thus making it possible to keep up with the current world trends.

Apart from the computer databases, the data contained in monographs and other publications, such as documents used for setting hygienic standards which usually contain selected specific information, are used to assess the health effects of exposure to harmful agents. Table III gives some examples of these publications. They constitute the least expensive source of information which usually refers to selected harmful agents with known biological properties.

The short review above reveals a variety of the information types and sources, while the growing number of scientific journals contributes to a rapid increase in the volume of the available information. The sources and media of the information have also been improving. It can be presumed that some part of the information which could be used for the reduction of health risk, especially that referring to new technologies, is not published; it is kept secret, for some time at least, in the files of the chemical companies.

One cannot fail to notice that in order to be applied for risk assessment the information on the biological activity of a given agent should be transferred to the same location where all the other information on working conditions, worker exposure levels and, possibly, on health effects of the exposure is stored. Developing the recommendations for risk reduction or elimination usually requires a thorough expert examination, including an analysis and interpretation of at least two categories of information: the data on the activity of the agent and the level of workers' exposure, along with the information on the observed or expected health effects.

There are two fundamental questions relating to the sources and types of information on the biological properties of the agent under study:

- Who are the existing sources of information accessible to?
- Who can collect and have access to the information to be used for a specific purpose if it has not been prepared in the form of monographs and other publications?

It is generally recognized that, in most instances, the information is easily accessible to research centres and large industrial companies. In some countries it may also be also collected by experts in the setting and verification of the hygienic standards. However, the activities of the expert groups are usually supported by the personnel and information facilities of the research centres. It is also known that, in order to collect information for a specific purpose, the staff responsible for data collection need to have special skills and abilities. Hence, the task remains with the research centres which, however, usually receive inadequate resources for its accomplishment. Apart from being money- and time-consuming the data collection, analysis and evaluation requires also advanced skills and responsibility. The author (Garg E.R. Hook) of No.2 1996 Environmental Health Perspectives' editorial was quite right when he remarked: "Decisions are only as good as the information considered" [3]. From what has been described above it becomes evident that scientific research centres dealing with occupational health should be better financed and capable to offer the services of data collection and processing to interested companies who should participate in the costs related to these activities.

INFORMATION ON OCCUPATIONAL EXPOSURE

The data on the type and magnitude of workers exposure to various occupational hazards and the size of the population exposed are essential both for the decision-making regarding health policy and setting priorities for preventive activities on the part of the occupational health institutions. One cannot fail to notice that even in the countries where legislation regarding work safety and hygienic standards has been in force, the data on occupational exposure in the national economy as a whole and in particular sectors, are often incomplete and their reliability may be disputable. The incompleteness of such information may be due to the fact that exposure management is a costly process which requires a highly-qualified personnel and appropriate equipment. Small enterprises are not usually covered by any system of surveillance over the conditions of work. Thus the data regarding the type and level of exposure refer only to large and medium-sized enterprises. The information gaps may also be associated with the fact that in combined exposure to many different agents, exposure monitoring refers only to some of them. It is not infrequent that the factors posing considerable risk for workers health are omitted this way. We presume the reason for the incomplete data on the type and level of exposure can either be an inadequate information about workplace hazards or the lack of access of the institutions responsible for the measurements to relevant methodology. It can also be noted that the scope of the workplace measurements is constricted only to those hazards for which occupational exposure limits have been determined. Rapidly changing technological processes and the growing number of chemicals introduced into manufacture and use bring new hazards for the workers and pose a risk which often goes uncontrolled.

For the occupational exposure data to be applied for reducing or eliminating the risk, they not only have to be complete but also based on reliable results of workplace measurements. The credibility of the latter has been the subject of concern for two reasons. Firstly, the assessment of exposure carried out by the institutions with different methodologies, equipment, staff qualifications and motivation turned out to bring inconsistent results. Secondly, the findings do not always correspond to the actual health effects observed in workers. The latter may indicate an underestimation of exposure, which may mean a real health hazard for the exposed. The reliability of environmental studies has become an international problem and many countries have undertaken steps for the accreditation of laboratories, according to ISO Guide 25 (1990) and ISO/IEC-25 recommendations. No matter how far these activities have been advanced the proper exposure assessment depends not only on the analytical procedure but also on the specific measuring strategy, which is very difficult to control. Consequently, the actual application of the measuring strategy according to an exposure scenario is determined by the qualifications and motivation of those who conduct it and by the availability of equipment. For instance, in exposure to toxic chemicals the most appropriate strategy is the individual dosimetry (active or passive). However, it cannot be applied in every case and it is also less accessible for the laboratories with a lower-standard equipment. Many of the laboratories measuring toxic chemicals concentration still apply the non-specific methods for the determinations, which yields a large percentage of incorrect results.

In view of the problems discussed above, the data regarding the type and level of workers exposure to hazardous agents cannot always be regarded as a reliable source of information, and hence be used as a reference for the decision-making in order to reduce or eliminate the occupational risk in a given enterprise. The solutions to this problem vary across countries. It may be interesting to trace the situation in Poland as a country undergoing socioeconomic transformations which refer also to other countries of the Central and Eastern European region.

DATA ON THE WORKING CONDITIONS AND OCCUPATIONAL EXPOSURE IN POLAND

In 1994 the population of Poland amounted to 38.5 million. According to the official statistics the number of people at the age of working capacity in 1994 was ca. 22.3 million, of whom 14,920 thousand were employed in different sectors of the national economy [7, 8]. Out of this number 9,675.4 thousand were employees, and 5,114 thousand were employers and self-employed workers. The industry employed 3,717 thousand people, construction 853 thousand, transportation and telecommunication 844.2 thousand, and the individual agriculture 3,716.9 thousand people. The number of the registered unemployed workers in 1994 reached 2,950 thousand [6]. Table IV presents the statistics for workers employed in selected industries and, for comparison, for workers employed in commerce, health care and welfare.

As it is commonly known, since 1990 Poland has been undergoing essential political and economical transformations. The ongoing privatization of small- and medium-scale enterprises and the application of free market principles has at first brought about such effects as significant decrease in the production volume, bankruptcy of many enterprises, breaking up of large state-owned factories, unemployment at the rate not encountered before and a growing number of small companies with varying scope of production or service activities. This was accompanied by a severe economic crisis and a decrease in the level of personal income. Although the official data on working conditions in Poland may be reassuring it is estimated that since 1990 workplace hygiene has somewhat deteriorated as compared to the previous period. This assumption has been grounded on the increasing number of the diagnosed cases of occupational diseases which has reached 11,320 in 1995, and the number of workplace injuries - with 112,505 injured and 621 fatal cases. The structure of occupational diseases and most essential data for workplace injuries have been presented in Tables V and VI.

These data need detailed commentary. We will, however, confine ourselves to the most essential remarks:

- the chronic vocal organ diseases due to excessive vocal effort refer to teachers only. The fact that this group has been incorporated into the official register of occupational diseases is associated with the concession of the Polish government to trade unions demands

- it should be stressed that the largest number of workplace injuries have been noted in the food industry (9,110), in production of the means of transport (4,997), in metallurgy and metal ware industry (6,420) and in the machine industry (6,306).

In Poland the data on working conditions and occupational exposure derive mainly from two sources:

- information collected on a three-year basis by the work hygiene sections of the Sanitary and Epidemiological Stations regarding (a) the number of workers exposed to particular harmful agents at the levels exceeding the occupational exposure limits; (b) the number of workers under strenuous conditions of work

- data from the Central Statistical Office based on the annual reports of the work safety and hygiene services in medium and large enterprises.

In 1994 the number of workers covered by the supervision of the State Sanitary Inspectorate amounted to 4.4 million (out of 9.68 million formally employed), which stood for 45% of the total number of workers. The central statistics concerned the enterprises with in-plant work safety and hygiene services. In view of the above, the data referred only to the plants employing more than 50 workers in which the field studies were carried out. One should also note that the number of plants supervised by the State Sanitary Inspectorate amounted to 77,000 while according to inofficial estimates the number of enterprises may approach 1.7 million.

Considering the remarks which have been presented above, we may assume that the information on working conditions in the national economy is limited to the data on large and medium-size industrial plants. However, not only the specific factors do account for the fact that the information on the type of exposure and the number of workers exposed to harmful agents at levels exceeding the hygienic standards is still sparse. The results of the environmental studies performed by research institutions as part of their normal research projects or contracted by commercial organizations revealed that no laboratory whether subordinate to the State Sanitary Inspectorate, operated by large companies or a private one can ensure full-scope environmental monitoring. This finding has been supported by the outcomes of the supervision conducted by the Nofer Institute of Occupational Medicine, Lodz, Poland, over the activities of the work hygiene services. The reason for this situation may be an inadequate training of the staff and insufficient measuring equipment. Consequently, the tests are limited only to a few health risk factors, whereby the values for combined exposure are underestimated. Up to the present, none of the State Sanitary Inspectorate's laboratories has been provided with a mass spectrometer which would enable identification of chemicals used in the paint and lacquer, plastics, or rubber industries. Sometimes the personnel responsible for measurements of workplace hazards fail to determine the concentration of some chemicals without even being aware of the necessity to do so, and instead the measurements of agents less essential to workers health are performed. It also happens that in-plant laboratories in charge of environmental monitoring deliberately limit the scope of this activity without informing their clients about that. In addition, the reliability of the results of determining concentrations of harmful agents has been for a long time a matter of concern. The systems for the quality assurance of these determinations have been operated in many countries; in most cases these systems are limited to the chemical agents only.

In 1993, the "Act on the Testing and Certification" has been passed by the Polish Parliament, and in 1994 the Polish Centre for Testing and Certification was set up, with the purpose of accrediting laboratories and institutions which perform chemical testing and determinations. Moreover, in 1993, the Polish Standard PN-EN 45001 was issued which demanded that a laboratory applying for accreditation should confirm its expertise by participating in the interlaboratory quality control projects. Currently in Poland there are some 650 laboratories that perform testing of the work environment, the results of which serve as a basis for the assessment of workers' exposure. About 200 of these laboratories are located at the Sanitary and Epidemiological Stations. About 250 laboratories are involved in the determinations of biochemical indicators in the biological material collected from workers exposed to chemical agents. Such laboratories are usually affiliated to occupational health centres and other research institutions. Ten years ago the Nofer Institute of Occupational Medicine, Lodz, Poland initiated the project on interlaboratory system of quality control of chemical determinations. The number of laboratories participating in the projects for different workplace hazards has been growing continuously to reach 340 in 1995. The largest project involves 230 laboratories and concerns determinations of 11 substances (manganese, iron, chromium, cadmium, copper, benzene, ethyl acetate, phenol, butanol, methanol, ammonia) in the received material. Another project referring to the determination of some biochemical indicators (trichloroacetic acid - TCA, delta-aminolevuline acid - ALA, in urine), is engaging 70 laboratories.

The projects for asbestos and silica determinations have also been implemented. Despite the fact that the interlaboratory quality control systems have been in operation for many years, and that there has been a considerable improvement in the quality of the determinations performed by the participating laboratories, none of them has been accredited so far. One of the reasons may be that no section for quality control of environmental testing has been set up within the framework of the Centre for Testing and Certification. The Centre for Health Care Quality Monitoring established in 1994 by the Ministry of Health and Welfare which

could have served this function has failed to do so. The case is similar with the certification of an institution authorized to accredit laboratories performing toxicometric tests, although much progress has been made at the Nofer Institute of Occupational Medicine, Lodz, Poland, in the implementation of good laboratory practice (GLP) according to OECD requirements.

The problem of accreditation of laboratories performing determinations of agents of the working environment harmful to human health remains unsolved, but it has to be settled in future. According to the new Ordinance by the Minister of Health and Welfare of July 1996, on the methods of performing such determinations they may be conducted by the laboratories of: a) the State Sanitary Inspectorate, b) scientific research & development institutions dealing with occupational health, and of the Central Institute of Labour Protection, c) laboratories accredited according to the regulations on testing and certification, and d) laboratories authorized by the Regional Sanitary Inspector. This seems to be a temporary state resulting from current needs.

The critical remarks relating to the information on the occupational exposure of Polish workers indicate that the information is far from being complete or reliable. In spite of these disadvantages, however, the information has been made use of for limiting the occupational risk.

SOCIOECONOMIC IMPEDIMENTS TO THE USE OF INFORMATION ON THE OCCUPATIONAL EXPOSURE TO REDUCE OR ELIMINATE HEALTH RISKS

Genuine interest, at all management levels, in obtaining a true picture of the actual working conditions is a prerequisite for the effective use of the information on occupational exposure; unfortunately, this is not always the case. While the intention to obtain true information on the health condition of the general population, this including also the workers population, is expressed both by the state and local authorities, the commercial companies are not necessarily interested in eliciting such data. The managers interest in the health condition of their employees is related to the provisions of the legal regulations which may or may not impose the company's responsibility for providing health care for workers.

This is particularly important in Poland and probably also in some other countries in transition. Under the former political system where the economic self-dependence of the companies was severely limited, the company management was much more interested in the compliance of field measurement results with the hygienic standards in force. Obtaining the complete and reliable data on the working conditions and their effects on workers health was a matter of lesser importance. There is no doubt that a considerable percentage of measurement results must have produced a distorted picture of the situation with respect to the working conditions in Poland. From the available information it is difficult to deduce the extent of the discrepancy. To illustrate the problem let us say that the systematic studies on occupational exposure and its health effects concerning the paint and lacquer industry which were carried out by the Nofer Institute of Occupational Medicine have revealed that the determinations performed by in-plant laboratories covered only several out of 40 solvents used, and that even those few compound determinations failed to reflect the actual exposure level [9]. One may presume that in other industries the findings may be similar.

It should be also added that, as a result of introducing compensation for working under hazardous conditions, the workers themselves were often interested in demonstrating that the admissible exposure levels had been exceeded. The opposite interests of employers and employees by no means contributed to reducing the inconsistencies. On the contrary, the picture of the hygienic conditions became even more blurred.

Although the results of the determinations performed at industrial plants continue to be used as the basis for the statistical data, it is still impossible to assess the extent to which the data on exposure to harmful agents collected at the local and nation-wide level differ from the true ones. We may suspect, however, that the data are not fully reliable.

Currently in Poland the situation is being changed. The Code of Labour, amended in February 1996, in Article 207, Paragraph 1, which reads: "The employer is responsible for work hygiene and safety in industrial plant" and Paragraph 2, which reads: "The employer is obliged to protect employee's life and health by ensuring safe and hygienic conditions of work using relevant scientific and technological developments ..." explicitly makes the employer responsible for adverse effects resulting from his failure to comply with the principles of and legal regulations on work safety and hygiene. The principles are usually perceived as the rules or requirements deriving from the results of scientific studies and everyday experience, including those not enacted, which must be observed to ensure the protection of the worker's health and life. The short period during which those regulations have been in force (since June 1 1996) makes it impossible to assess their influence on the reliability of the exposure data. Considering that a certain period of time will pass before the managers and employees will recognize the significance of the regulations and start to observe them, one may expect a more reliable information in this respect on the company level in the years to come.

Good economic condition of the plant, in addition to the legal regulations imposing over the company the responsibility for undertaking appropriate measures to reduce risks is another necessity. It should be borne in mind that the relatively high rate of unemployment in Poland (almost 15% of the total workforce) and poor economic conditions of many enterprises, both the state-owned and private one and the related public demand to preserve all the existing workplaces make the administration refrain from closing those industrial plants where the working conditions are unsatisfactory and the plants cannot afford taking steps for risk reduction.

Under the present conditions of the systemic transformations it is difficult to assess the significance of the individual risk factors, both in terms of the technological (such as insufficient number of personnel, improper accessibility of the information, deficient instrumentation) and socioeconomic factors. The trends of the individual factors are diverse, and the social and economic transformations progress rapidly. While the transformations and the trends of the free-market economy continue, the countries in transition will be forced to re-evaluate the scope of the exposure information required by administration at different levels (national, local and company management), taking into consideration different tasks, the costs of obtaining the information and activities aimed at risk reduction as well as the economic potential of the companies and administration. In my opinion, this could be one of the promising fields of extensive international cooperation in our region.

It seems also that it is necessary to continue international efforts intended to:

- make the processed and evaluated information on health hazards due to harmful agents present in the working environment widely accessible,
- prepare international recommendations on the methodology for setting occupational exposure limits,
- develop international recommendations determining the approach to measuring strategies.

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Table I **Major factographic databases**

CCINFOdisc (MSDS and CHEM Source)
TOMES PLUS
POISINDEX
CHEM BANK
IRPTC
US NTP

Table II **Major bibliographic databases**

MEDLINE
CANCER-CD
OSH-ROM
TOXLINE
ANALYTICAL ABSTRACTS

Table III **Sources of information contained in monographs and other publications**

IPCS - Health and Safety Guides
IPCS EC - International Chemical Safety Cards
US NTP - Technical Report Series
US NIOSH publications
US Toxicological Profiles
US EPA Health Assessment Documents
ECETOX Technical Reports
The Nordic Expert Group for Criteria Documentation of Health Risk from Chemicals
Other publications contained in professional journals

Table IV **Industries employing the largest number of workers and the number of people employed in commerce, health care and welfare in 1994.**

Industry	Number of workers (thousands)
Food	517.5
Mining	376.8
Machinery	306.4
Textile & dyeing	297.6
Utilities (electric power, gas and water supply)	288.8
Commerce	1092.2
Health care and welfare	445.7

Table V **Most prevalent occupational diseases in Poland in 1995. Data from the Nofer Institute of Occupational Medicine.**

Type of occupational disease		No. of cases
	Total no. of cases	11,320
1.	Noise-induced hearing impairment	3,273
2.	Chronic vocal cord diseases caused by excessive vocal effort	3,000
3.	Communicable and invasive diseases	1,187
4.	Pneumoconioses	868
5.	Skin diseases	698
6.	Acute and chronic chemical poisonings and their consequences	414
7.	Vibration syndrome	408
8.	Chronic bronchitis with diagnosed respiratory failure	341
9.	Chronic musculoskeletal diseseas related to the mode of work performance and overload	315
10.	Chronic atrophic and allergic inflammation of the nasal, oral laryngeal and tracheal mucosa induced by irritant and allergenic agents	274
11.	Malignant neoplasms induced by exposure to occupational carcinogens, except for ionizing radiation	127
12.	Chronic peripheral nervous system diseases resulting from nerve compression	122
13.	Vision organ diseases induced by physical or chemical agents	31

Table VI **Number of people injured at work in particular sectors of the national economy in 1995 (source: Central Statistical Office)**

No	Specification	Total	In accidents resulting in:		
			death	heavy injury	minor injury
1.	TOTAL	112 205	621	2 115	109 469
2.	Agriculture, hunting and forestry	3 810	32	89	3 689
3.	Fishing and pisciculture	107	1	2	104
4.	Mining	12 951	61	106	12 784
5.	Manufacture	47 475	154	826	46 495
6.	Utilities (electric power, gas and water supply)	2 459	29	46	2 384
7.	Construction	12 767	114	338	12 315
8.	Wholesale and retail trade; car and motorcycle mechanics, household & personal use products	5 338	50	166	5 122
9.	Hotels and restaurants	411	4	11	396
10.	Transportation, warehousing and telecommunication	7 420	76	161	7 183
11.	Financial agencies	623	7	15	601
12.	Real estate agencies, business consulting	3 556	27	88	3 441
13.	Public administration and national defense, legally-binding welfare	2 043	15	42	1 986
14.	Education	1 926	12	39	1 875
15.	Health care and welfare	9 538	23	120	9 395
16.	Other services	11 781	16	66	1 699