

COLLECTION OF OCCUPATIONAL EMF EXPOSURE DATA IN POLAND. CONCEPT OF THE STRUCTURE AND FUNCTIONING

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Abstract. An outline of the structure and operation principles of the database on EMF-producing devices used in Poland at frequencies ranging between 0.1 MHz and 300 000 MHz have been developed at the Nofer Institute of Occupational Medicine, Lodz.

The primary objective of developing the EMF DATABASE is to ensure continuous and systematic collection of data on: quantities and types of devices and their specifications, EMF intensities produced, number of people exposed, exposure levels in absolute terms or according to specified criteria (gradation) or standards currently in force, etc.

The EMF DATABASE structure is based on such a method of data collection which ensures that information searching is effected according to specified lists of parameters essential for a given main entry. The EMF DATABASE has been designed so as to ensure that it is possible to obtain as quickly as possible the desired information covering desired scope (for example cities, regions, whole country, field of application, device type, etc.). The information is presented in the form of a report, and the content of the report may differ, according to the requirements of the user. The structure of the EMF DATABASE is open to permit its extension. The DATABASE, therefore, provides the possibility of adding new data, and verifying the criteria adopted to assess exposures to EMFs. At the same time it constitutes a fundamental tool for the SYSTEM OF EMF EXPOSURE MONITORING, and a rich source of information about the subject.

At the present stage of its development, the DATABASE structure and its functioning are being tested on a pilot scale.

The paper presents the diagram of the DATABASE operation and some examples of information received in the form of reports.

INTRODUCTION

The late 1980's saw numerous reports on the implementation of various DATABASE systems on exposure to harmful agents in the work environment. In Germany, it was the OMEGA system containing data on human exposure to 260 harmful agents, and in France, the COLCHIC system containing data on human

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exposure to chemical agents (4). Similar systems were developed in England, Denmark and Norway (1,3,4). In Poland, a FACTOR — 2, 3 system is being currently developed at the Nofer Institute of Occupational Medicine, Lodz (4). There are several aims of the development of DATABASES: scientific — to learn cause-effect relationships, promotional — legal and non-legal steps to limit harmful effects, and utilitarian — to assess the significance of the problem.

Recently, there has been a rapid growth in the number of devices producing high frequency electromagnetic fields (EMF). This is true in particular about broadcasting radiocommunication.

While identification and registration of devices which are used in those spheres are covered by relevant legal regulations, it is difficult to obtain reliable information on the number and characteristics of EMF-producing devices applied in industry, medical or scientific research. Electromagnetic field is one of the environmental "pollutants", and its intensity levels in the human environment should be limited. That is why, a system for monitoring exposures to EMF has been developed. Unfortunately, admissible EMF exposure limits differ significantly between various countries, mainly because of different criteria in evaluating the harmful effect of EMF on human health. Research continues worldwide to investigate health effects of EMF exposure and to determine the threshold values which would make it possible to assess a true risk to human health. In view of wide and ever-increasing popularity of such devices as cellular phone, computer, CB radio or microwave oven, there is ever-growing interest among people in safe use of those devices.

Much time and money is required to assess the seriousness of the problem in terms of the number and types of devices and EMF intensities produced by them.

A project of EMDEX database on the exposure to electromagnetic fields has been prepared in the U.S.A. (2).

Studies of this problem have been also started in Poland. An outline of the structure and operation principles of the EMF DATABASE, which contains information on devices operated in Poland at frequencies ranging between 0.1 and 300 000 MHz, has been developed at the Nofer Institute of Occupational Medicine, Lodz, Poland. The outline of the DATABASE structure provides the possibility of assessing occupational exposure to EMF. This work presents a concept of its structure and functioning.

OUTLINE OF THE STRUCTURE AND FUNCTIONING OF THE DATABASE ON HIGH FREQUENCY EMF SOURCES IN POLAND

To develop the EMF DATABASE, it is necessary to ensure continuous and systematic collection of data on:

- a) the number and types of high frequency devices (hereafter referred to as HF devices) operated in Poland, and on their specifications;
- b) the EMF levels in close vicinity of basic functional elements of HF devices (generator, feeder, load);
- c) the EMF levels at workplaces associated with HF device operation;
- d) the levels of workers' exposure to EMF (in absolute terms as well as according to selected criteria);



- e) the type and range of protective zones in the vicinity of devices and at workplaces (according to the specificity of Polish hygiene regulations);
- f) the number of people employed at workplaces involving HF device operation.

The EMF DATABASE is intended to:

- enable the use of information, for example, to analyze hazards resulting from exposure to EMF, to determine admissible working conditions when using particular HF device type, to verify the EMF exposure monitoring system in technical or medical preventive measures, etc.;
- enable the retrieval of desired information relating to a specified city, region or the whole country, arranged according to any combinations drawn up from the list of the included data on EMF sources.

These objectives are intended to be achieved by providing such DATABASE structure which would make it possible to retrieve complete set of data required to obtain a desired information. The DATABASE structure involves such data collection organization as to ensure that their retrieval could be carried out using predetermined lists of parameters essential for a specified main entry.

These entries are: field of application, device name, engineering and physical characteristics of HF devices, hygienic characteristics of HF devices, assessment of measurement results, data on the user.

Here is an example of a list of parameters essential for the entry "engineering and physical characteristics of HF devices": device name, manufacturer, device type, year of manufacture, year of installation, operation frequency, modulation, output power, feeder, load type, greatest load dimension, radiation characteristics, character of produced field, the list can be extended.

The functioning of the DATABASE is outlined graphically in Fig. 1.

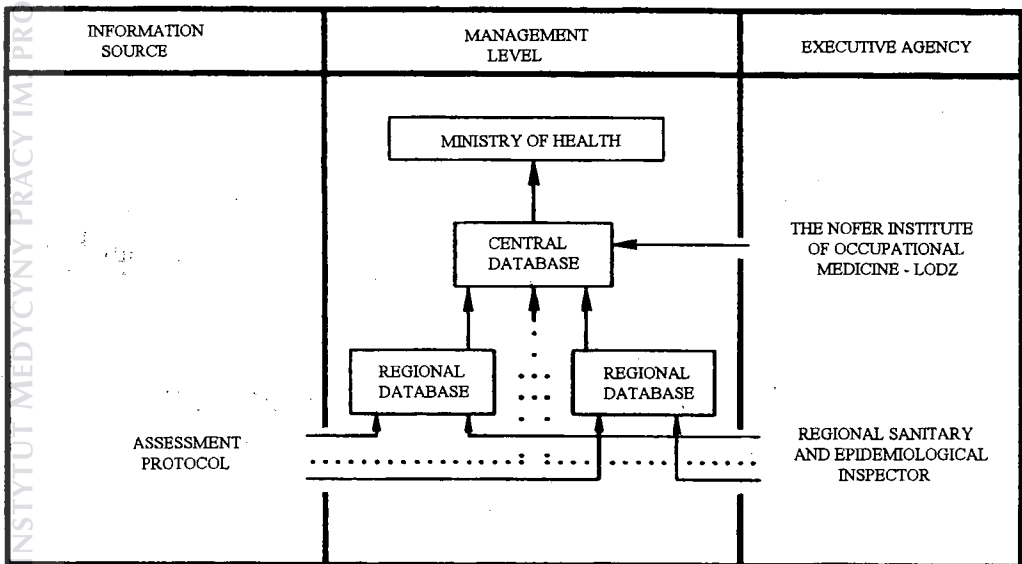


Fig. 1. Functioning of the DATABASE on HF sources of EMF in Poland.

The required information will be supplied to the REGIONAL DATABASE by institutions authorized by the Minister of Health and Social Welfare in order to assess EMF strengths and microwave power densities. The staff involved in assessment is trained at the Nofer Institute of Occupational Medicine, Lodz, Poland, responsible for the implementation of the CENTRAL DATABASE system. ASSESSMENT PROTOCOL shall be the direct source of information. The institution performing the assessment shall be obliged to send a copy of the ASSESSMENT PROTOCOL to a relevant Regional Sanitary Epidemiological Inspector.

The data on EMF sources (assessment protocols or floppy disks) shall be passed over to 8 selected Sanitary and Epidemiological Stations assigned to run REGIONAL DATABASES. Employees of the Sanitary and Epidemiological Stations responsible for running and updating DATABASES at the regional level have been already trained. The data collected at the regional level shall be recorded on floppy disks and sent to the Nofer Institute of Occupational Medicine. The Institute shall manage the CENTRAL DATABASE on behalf of the Ministry of Health and Social Welfare.

The DATABASE information could be made available to the governmental bodies, national administration agencies, scientific research institutions, engineering development centres, manufactures of EMF-producing devices, as well as to other institutions or persons interested.

The structure of EMF DATABASE is open to permit its extension. Accordingly, the DATABASE provides the possibility of adding new data, and verifying the criteria adopted to assess exposures to EMF. At the same time the DATABASE constitutes a fundamental tool for the SYSTEM OF EMF EXPOSURE MONITORING and a rich source of information to be used elsewhere.

The EMF DATABASE has been designed so as to ensure that the required information (concerning for example cities, regions, the whole territory of Poland, field of application, device type, etc.) can be obtained very quickly. The information is presented in the form of a report produced according to the requirements of the user. The information covering the whole country (for example information on hygienic assessment of the operated HF devices, level of exposure to EMF during their operation, number of exposed people, etc.) is essential for developing consistent policy, for example, in the health sector. It can also be used by bodies which: issue homologation certificates for devices imported from abroad; decide on time interval after which further inspection of devices is required; schedule studies on EMF health effects; monitor the quality of EMF assessments and test the quality of EMF measuring devices; control whether hygienic regulations are observed by the user, etc.

COMPUTER HARDWARE REQUIRED TO MANAGE EFFICIENTLY THE EMF DATABASE PROGRAM

The proposed DATABASE program can be effectively managed on a computer with minimum 4 MB (RAM) and a processor speed above 33 MHz. The preferred disk operating systems include: MS DOS v. 5 or v. 6; DR DOS v. 6; OS/2 v. 2.0 or v. 2.1; Windows NT; Unix System V Release 4.2 with DOS Merge. However, DOS v. 3.1 and higher can also be used successfully.



Report 1

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Report about AM Broadcast Stations (P > 20 kW)

Device type	Frequency (MHz)	Output power (W)
** RON KRAKOW, UL. MALCZEWSKIEGO 54		
* Number of workers: 13		
SRV 30B	1.482000	20000.0
** RON BOGUCHWALA k. RZESZOWA, 36-040 BOGUCHWALA		
* Number of workers: 16		
SRV 30	1.305000	30000.0
SRV 30	1.305000	30000.0
** RON TUSZYN, GORKI DUZE k. TUSZYNA		
* Number of workers: 24		
NRS-30-5	1.305000	30000.0
NRS-30-5	1.305000	30000.0
** RON WOLA RASZTOWSKA, 05-253 WOLA RASZTOWSKA		
* Number of workers: 32		
CB 150	0.819000	150000.0
CB 150	0.819000	150000.0
** RCN TYCHOWO, 73-100 STARGARD SZCZ.		
* Number of workers: 24		
SRV 150/300	1.503000	150000.0
SRV 150/300	1.503000	150000.0
** RON ZORAWINA		
* Number of workers: 23		
SRV 201	1.206000	200000.0
SRV 201	1.206000	200000.0

At the present stage of its development, the DATABASE structure and its functioning are being tested on a pilot scale. It is expected that about 3 years are required to complete the DATABASE. The paper presents a graph of the DATABASE operation and provides some examples of information reports. Report no 1 includes a list of AM Broadcast Stations with power output of transmitters above 20 kW, and Report no 2 a list of Stations with warning zones (i.e. values of electric field strength range from 70 V/m to 1000 V/m). The DATABASE can be used only by the lincenced Sanitary and Epidemiological Stations.

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Report 2

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Report about protection zones (warning zone)

Device type	E-generator [V/m]	Range of zone (generator) [m]	E-feeder [V/m]	Range of zone (feeder) [m]	E-antenna [V/m]	Range of zone (antenna) [m]	E-workplace [V/m]
** RON KRAKOW, UL. MALCZEWSKIEGO 45							
* Number of workers:	13						
SRV 30B	176.0	0.5	0.0	0.0	27.5	0.0	33.0
** RON BOGUCHWALA k. RZESZOWA, 36-040 BOGUCHWALA							
* Number of workers:	16						
SRV 30	74.0	0.5	0.0	0.0	50.0	0.0	10.0
SRV 30	74.0	0.5	0.0	0.0	50.0	0.0	10.0
** RON WOLA RASZTOWSKA, 05-253 WOLA RASZTOWSKA							
* Number of workers:	32						
CB150	150.0	0.5	0.0	0.0	0.0	0.0	0.0
CB150	150.0	0.5	0.0	0.0	0.0	0.0	0.0
** RCN TYCHOWO, 73-100 STARGARD SZCZ.							
* Number of workers:	24						
SRV 150/300	550.0	0.5	80.0	10.0	230.0	50.0	90.0
** RON KRAKOW, UL. MALCZEWSKIEGO 45							
* Number of workers:	13						
SRV 30A	176.0	0.5	0.0	0.0	27.5	0.0	33.0

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