



AN EXPERIENCE OF INFORMATION SUPPORT OF THE RUSSIAN FEDERAL PROGRAMS OF THE OVERCOMING OF CONSEQUENCES OF THE ACCIDENT AT THE CHERNOBYL NPP

I.I. LINGE, I.A. OSSIPANTS, I.I. ILUSHKIN, E.Ī. MELIHOVA
Nuclear Safety Institute, Moscow, Russian Federation

B.K. BLINOV, T.A. MARCHENKO
Ministry for Emergencies of the Russian Federation, Moscow, Russian Federation

Abstract

Since 1992, by a number of paragraphs of the federal programs on overcoming consequences of accident on Chernobyl NPP, the measures on informational -analytic support of the federal programs were provided. Within the framework of this activity for the solution of various aspects of Chernobyl's problem central bank of generalized data and numerous information systems were created. In the report the brief description of some of them is presented. In particular the databank on radioactive situation includes the information on 12 thousand settlements of Russia which have been exposed to radioactive contamination as a result of the accident. The medico-demographic section of a databank includes information on death rate for the reasons for all subjects of Russian Federation since 1982 till the present time. The developed information systems are available to all participants of work on overcoming of consequences of the accident. There are given the examples of integral estimates in short- and long-term forecasts of development of a situation in territories suffered by the accident at the Chernobyl NPP.

INFORMATION SUPPORT OF THE FEDERAL PROGRAMS

Since 1991 the work on making administrative information system (AIS) "Chernobyl" has been conducted. Initially the works were carried out by the ordering of Committee on liquidation of consequences of accident at the Chernobyl NPP at the Commission on Extraordinary situations of the Council of Ministers of USSR, and further-within the framework of the federal programs of Russia. In 1992-1993 the job was carried out by the ordering of Goscomchernobyl of the Russian Federation, and from 1994 until the present time -by the ordering of Ministry for Emergencies (EMERCOM) of the Russian Federation.

The creation of AIS "Chernobyl" has allowed in essence to change a level of information-analytical support of the federal programs and to put on a uniform methodological and methodical basis, to unify an information basis used, to ensure a coherence of the administrative resolutions of federal and regional levels, to consolidate information spaces of federal and regional levels, and also to increase efficiency of introduction of new computer technologies in practice of the stuffs and experts of EMERCOM of Russia [1]. The work on the creation, development and application of AIS "Chernobyl" was conducted on the following directions:

- (1)Creating of a central bank of generalized data (CBGD) on consequences of radiation catastrophes as source of the systematized information for authority and system analysis of problems [2];
- (2)Development, application and support of computer information systems AIS "Chernobyl" for federal authorities on overcoming of consequences of radiation catastrophes [3].

- (3) Integration of experience of liquidation of consequences of radiation accidents in computer systems including research of problems of decision making on protection of the population and on the rehabilitation of territories as well as adjustment of methods of training of experts and specialists of local administrations.

The complexity of problems appearing during the liquidation of consequences of the Chernobyl accident has demanded considering not only radiation-hygienic aspects of consequences of accident but also solving of a social and economic problem of rehabilitation of territories, health protection and social protection of the population, softening of social-psychological and other consequences. At the same time it was required to overcome the interdepartmental dissociation of specialized databases that were created by then.

The major tasks solved within the framework of creation of the Central Bank of Generalized Data on support of the federal programs were stated as follows:

- assembly and systematization of the information on all aspects of liquidation of consequences of the Chernobyl and other radiation accidents;
- interdepartmental integration within the framework of a unified system including the join of specialized databases, verification and mutual coordination of the information;
- processing and analysis of the incoming information with the purpose of obtaining of integrated complex post accidental estimations of consequences.

The forming of sections of Central Bank of Generalized Data and filling of databases was carried on during 1992-1995. The collected and classified information has allowed realizing an effective and on-line information service of federal authorities, of administrations of regions, ministries, departments and their subdivisions in regions, scientific institutions and population. To the present time the Central Bank of Generalized Data includes more than 20 sections including such as:

- data bank on radiation-hygienic situation (conditions) in the settlements contaminated with radionuclides;
- data bank on a demography (age/sex structures and age death rate caused by different reasons since 1982 till the current time on the majority of areas of Russia and other parameters);
- data bank on population migration in zones of radioactive contamination;
- data bank of the legislative acts, directive and regulatory documents connected with the problem of overcoming of consequences of radiation accidents and catastrophes;
- data bank of electronic maps;
- data bank on the personified registration of persons injured as a result of the Chernobyl and other radiation catastrophes.

Briefly we shall describe a number of sections of Central Bank of Generalized Data.

The data bank on radiation-hygienic situation contains information on all settlements included in the "List of the settlements relating to the territories of radiocontamination" approved by the Government of the Russian Federation and on neighboring to them 23 regions of Russia. To the present time the information on more than 12 thousand settlements of Russia since 1986 till the current time is included in it. For the most contaminated settlements the data base contains up to 250 parameters.

The data bank on demographic situation contains the information about age/sex structure of the urban and rural population of all regions of Russia, and also of cities of Moscow and St. Petersburg for 1982-1999. The data bank contains also information on death rate caused by different reasons for regions of Russia that has suffered by radioactive contamination after the accident at the Chernobyl NPP, and also on Russia as a whole for 1982-1999. The information on number of the people died of miscellaneous reasons with 5-year's layout on years of life is brought into databases.

In the Central Bank of Generalized Data the information collected by tens of organizations participating in operations on liquidation of consequences of the accident at the Chernobyl NPP is contained. The created Central Bank of Generalized Data has original significance and is opened for wide usage by the experts of organizations participating in works on the Chernobyl problem.

The wide number of computer software of miscellaneous types created in frameworks of the "Chernobyl" Administrative Information System (AIS) including I&R and geographic information systems allows to support decision making at federal and local levels of administration. AIS "Chernobyl" includes the following program shells and subsystems:

- information storage and retrieval system;
- administrative-organizing systems;
- I&R and bibliographic systems;
- stock of algorithms and programs including the programs of calculation of radiation doses, relative and absolute radiation risks, migrations and transfer of radionuclides;
- specialized geographic information system and databases (practically for all areas of Russia) on regions of elevated ecological risk (Fig. 1);
- systems on informing of the population.

Briefly we shall describe a number of subsystems.

The information storage and retrieval systems (ISRS) are based on factographic section of the Central Bank of Generalized Data and ensure data access on radiation-hygienic situation in the settlements, on radiation and chemical contamination of agricultural lands and manufactured production, on population migration on the contaminated territories etc. Program shells and the databases AIS "Chernobyl" are widely distributed and are adapted for usage in regional organization of EMERCOM of Russia and in administrations of regions. The components of AIS "Chernobyl" were repeatedly utilized for obtaining of integral estimates of short- and long-term forecasting of development of situation on territories affected by Chernobyl accident.

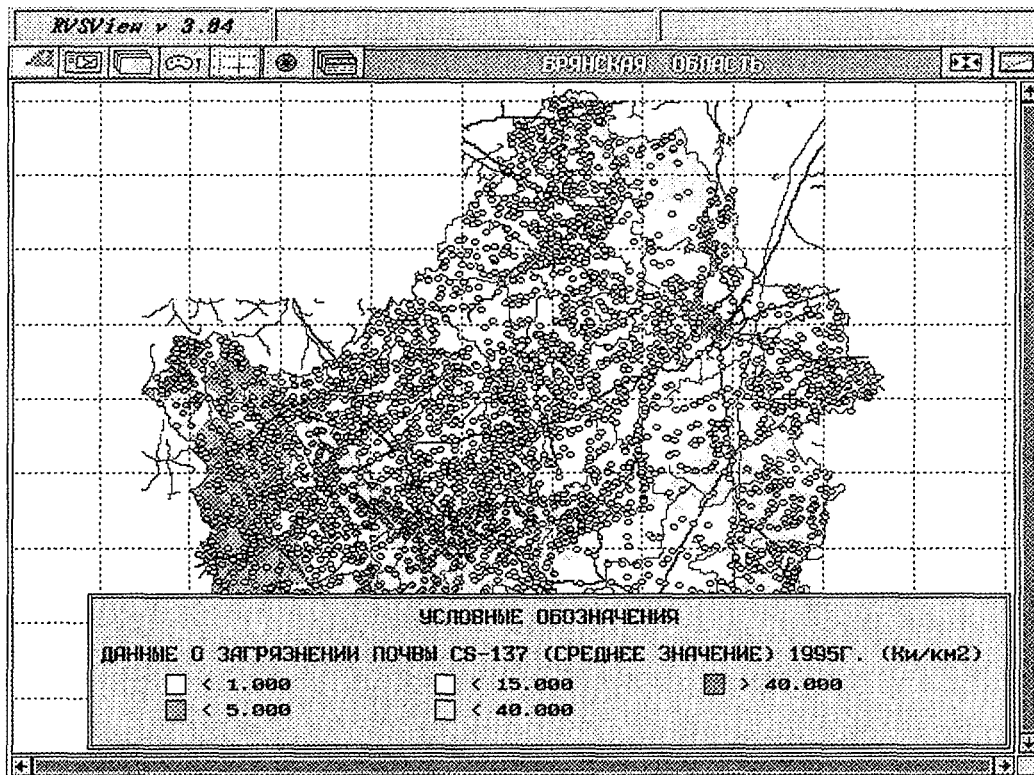


FIG 1. The computer map of radioactive contamination of the Western part of the Bryansk region, Russia.

As a result of research conducted on the basis of accumulated data the number of the documents was prepared. In these documents a modern situation in territories affected by the accident is reflected, and also totals and perspectives of realization of the state programs on overcoming of the consequences of the accident on Chernobyl NPP were observed. The basic outcomes of these researches are concentrated in the national reports of EMERCOM of Russia in 1996-1999, brochures for local authorities and population. In them the retrospective analysis of the conducted protective measures, strategy of after wreck works within the framework of the state programs is conducted. At the assessment of a modern situation on the contaminated territories the radiation-hygienic, radioecological, demographic, social-psychological and socio-economic aspects of consequences of accident are considered. The special attention is given to forecast of radiation-hygienic situation in the settlements related to zones of radiocontamination. The forecasts are carried out taking into account a current situation in terms of different variants of realization of the federal programs. Below as an example one of variants of the forecast of doses of external irradiation of the population is cited.

In the Table 1 the outcomes of the forecast of an effective external dose of the population of 7 regions of Bryansk region with the settlements placed to zones with the miscellaneous socio-economic status are cited. The estimations were conducted for all districts of Bryansk region in consideration of the settlements in each district with this or that privileged zone, a value of an average density of a land contamination by caesium, soil-climatic features of districts and vertical migration of caesium in soil [4].

Table 1. The forecast of effective external dose of the population of 7 districts of the Bryansk region divided by zones according to current Russian legislation

Districts and Zones for social protection	External dose, mSv/year		
	2000	2005	2010
GORDEEVSKY			
Right to resettlement	0.97	0.76	0.60
Resettlement	2.24	1.76	1.39
ZLYNKOVSKY			
Privileged status	0.18	0.13	0.10
Right to resettlement	1.02	0.75	0.56
Resettlement	2.10	1.55	1.16
KLIMOVSKY			
Privileged status	0.32	0.23	0.17
Right to resettlement	0.62	0.45	0.34
Resettlement	1.39	1.02	0.77
KLINTZOVSKY			
Privileged status	0.17	0.12	0.09
Right to resettlement	0.71	0.52	0.39
Resettlement	1.61	1.18	0.89
KRASNOGORSKY			
Right to resettlement	1.06	0.92	0.80
Resettlement	4.01	3.49	3.05
NOVOZYVKOVSKY			
Right to resettlement	0.81	0.59	0.44
Resettlement	2.04	1.50	1.12
STARODUBSKY			
Privileged status	0.31	0.27	0.23
Right to resettlement			

The estimations and forecasts conducted within the framework of information-analytical support of the federal programs were utilized as founding and reference materials at preparing the projects of the laws, government documents and implemented federal programs relevant to the Chernobyl problem.

REFERENCES

- [1] Arutunjan R.V., Bolshov L.A., Linge I.I. " Experience of information - analytical support of programs aimed at the elimination of consequences of emergency at the Chernobyl NPP ". The report on the All-Russia conference " Radioecological, medical and socio-economic consequences of the accident at the Chernobyl NPP. Rehabilitation of territories and population ". Golitsino, May 21-25, 1995. Moscow, 1995.
- [2] Linge I.I., Ilushkin A.I., Ossipiants I.A., etc. Central Bank of Generalized Data AIS "Chernobyl". Ibid, p. 202.

- [3] Bolshov L.A. Linge I.I. Kanevskiy M.F. Kiselev V.P. et al. Information System "Chernobyl" of EMERCOM of Russia. In: The radiological consequences of the Chernobyl accident. Ed. by A. Karaoglou, G. Desmet, G.N. Kelly and H.G. Menzel. Report EUR 16544 EN, pp. 535-538.
- [4] Linge I.I., Panchenko S.V., Merkushev V.P., Shikin A.V. The forecast of a radiation dose of the population of the Bryansk region in 2000-2010. The report on the All-Russia scientific-practical conference "Chernobyl: 10 years later. The totals and perspectives", Bryansk, 1996.

DISCUSSION AFTER THE PRESENTATION OF I.I. LINGE

Y.S. STEPANOV (Russian Federation): In your comparisons, how did you take into account the medical support (for example, free medicine) being received by the liquidators?

I.I. LINGE (Russian Federation): We did not work in detail with primary data relating to the liquidators since the "Russian medical-Dosimetric register" in Obninsk follows up on the liquidators on the basis of individual medical records. For arriving at our conclusions, we used final data indicating that there has been no increase in mortality among the liquidators.

Y.S. STEPANOV (Russian Federation): Does your database contain primary data in addition to evaluated data?

I.I. LINGE (Russian Federation): At the IBRAE (Nuclear Safety Institute of the Russian Academy of Sciences) we collected primary data in cases where they were necessary for understanding the correlated data. Thus, we have a large set of primary data relating to foodstuff samples. We use it in performing our own correlation's.

V.I. KHOLOSHA (Ukraine): I have several times heard from representatives of the IBRAE that no increase in mortality has been observed among the liquidators as compared with a control group. What is the control group?

I.I. LINGE (Russian Federation): It is a cohort of males aged 30 to 60 years.

There have been other - still more impressive - studies indicating that the mortality among Minatom employees who worked as liquidators is well below that of the control group. Epidemiologists have certified it, and we think that we can believe them.

V.A. KUTKOV (Russian Federation): Were the data relating to mortality among the rural population in the Bryansk region standardized or not?

I.I. LINGE (Russian Federation): The data, obtained from Goskomstat (the State statistical office), were standardized on the basis of a European standard.