

Some approaches to conceptual and practical decision of the remediation problems of Chernobyl NPP exclusion zone and the zone of absolute resettlement

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Abstract. The problems of the substantiation and implementation of a complex rehabilitation of territory of the exclusion zone and the zone of absolute resettlement (EZ&ZAR), as a process of implementation of the countermeasures system, directed to recovery of its normal economic operation, are considered. Normative-legal base, principles, criterion, methods and scenarios of rehabilitation, concept of a full and partial rehabilitation, direction of rehabilitation activity both without change of the territory status and directed on return of territories under the jurisdiction of local government bodies, re-evacuation of the population and maintenance of normal conditions of its residing and habitability are discussed. The preliminary estimations of a capability of practical implementation of different directions of rehabilitation activity on EZ&ZAR territory, obtained with usage of GIS-technologies with taking into account of dynamics of a radioecological situation in natural and semi-natural ecosystems, state of the art of natural and technogenic objects on territory of EZ&ZAR are discussed. The priority kinds of the practical activity, which has been rendered concrete in the normative-legal acts, in EZ&ZAR concepts, namely, - activity on environmental protection, maintenance in a normal condition of phyto- and zoo-sanitary situation; forestry activity, activation of landscape-recovery processes etc. are considered.

1. INTRODUCTION

The rehabilitation of the Chernobyl Exclusion Zone (ChEZ) – is not only the number of measures, which are directed to use these areas for the economic activity and the residence of population. The specificity of the exclusion zone is absence of population and professional personnel here are only temporal. Rehabilitation of such territories has to be local, selective in most essential objects and directions. At that territory, where rehabilitation actions is conducted, is under jurisdiction of the state department – The Administration of the EZ&ZAR [1-4]. The ChEZ is the adjacent territory to ChNPP, from where evacuation of the population was carrying out in the 1986.

The total area of the ChEZ contaminated by the radiocesium more than 555 kBq/m² and radistrontium more than 111 kBq/m² is 1856 km². The level of contamination of the rest part of the area is not exceeded the mentioned levels. The zone of absolute resettlement in the Kiev's region is 284 km². Total areas contaminated by radiocesium higher than 555 kBq/m² is 195 km².

2. REMEDIATION PROBLEMS OF CHERNOBYL EZ&ZAR

It is necessary to make the preliminary complex basis for the realization of the Exclusion Zone rehabilitation. As a rule, existed evaluation based on the one-side point of view, which take into account only radiation-hygienic criterion without of landscape-ecological conditions, potential directions of activity, radioecological features [5-6]. In other side, active normative-lawful documents based on the old-fashioned evaluations of natural and artificial object's conditions of the Zone. But while the landscape structure just territory conditions and their objects have changed.

The aim of this paper is to propose some new approaches to conceptual and practical decision of the remediation problems of Chernobyl NPP exclusion zone and the zone of absolute resettlement.

3. METHODOLOGY AND PRINCIPLES

The Exclusion Zone rehabilitation directions have to be based on common methodology and principles: the exception of any ungrounded irradiation; interconnecting, on the base which all sides of contaminated areas vital activity examining; the consistent planning of the features and economic realization on the base of them priority; the individual and collective radiation doses prediction;

agricultural development government program correlation with the radioecological and social-economic problems of contaminated territories, possibility determination of the government financial support of the rehabilitation.

The normal territory condition recovery is able to appreciate by definite totally characteristics: territory radiation conditions (possible dose load and receiving the "pure" production possibility). The most of the acceptable and effective instrument for getting the given territory characteristic is mapping by current and probable effective radiation dose values of population, and by radiological indexes complex; territory economic potential (advisability and efficaciousness of economical activity), legal status (supplemented legal limitations activity absence and economic rehabilitation instruments legal ensuring).

The radionuclides migration limitation and decrease of the radio contamination influence on environment, science investigations carrying out and so on are in the number of reference directions of the activity in the Zone according with normative-legal documents.

Some environmental activity types can be accrediting to rehabilitation activity. For example, the prevention of the beginnings and expansion of epizootic and epiphytootic, forestation in water meadows and flood territories, territory meadowing for energization of the landscape restoration and so on.

The main aim the forestry direction of rehabilitation of the Zone territory is stable forest restoration with taking account natural conditions, which need minimum care and have maximum radioecology capacity, ravine afforestation carrying out, forest recreation on the ashes and forest site of fire.

Present time exploitable water guard works keeping, extra water guard arrangements, which will be decrease the migration of the radionuclides outside the Zone to Dniper river and so on is in the number of priority types of water guard activities.

The analysis of the regulatory and legislative base which is exist in Ukraine for the questions of the Chernobyl disaster consequences minimization and ensuring of the human antirad defense is allow to established that the functioning legislation have "prohibitive character" concerning population dwelling possibility and human activity inside Exclusion Zone and not create the sufficient legal base for carrying out the Exclusion Zone rehabilitation. Legislative and lawful base adjustment of the Exclusion Zone rehabilitation one should elaborate starting from human health protection priority taking into account social and economic aspects.

With the GIS technology help was realized electronic maps matching, which reflect Exclusion Zone condition from district points of view: biocenosis ecological condition (grounds types, pest; vermin defeat level and so on), water guard types arrangements, ecological-forestry management levels, environmental guard territories, so on, that was allow to get following image.

The biggest area constitutes the plots where reforestation measures will advisable – about 800 km² (40-45%). Inside the territory about 300 km² (15-20%) will necessary to conduct water guard actions, including reconstruction of reclamation projects.

The first order plots of rehabilitation were occupy separate place, i.e. those lands, where is possible to begin economic activity without limitation just now (agricultural activity –27 km², forestry activity – 183 km²).

Were generated vermin and disease pestholes on sizeable areas (about 150 km²). This situation needs efficient interference for the purpose of quantitative assessment and working up of pesthole development prevention measures and their suppression [7].

4. CONCLUSIONS

Mentioned earlier that during valuation not all criterion and indexes was take into account, which define possibility and advisability of the different activities realization (auto rehabilitation processes activity and direction, industrial objects allocation inside Exclusion Zone, burial places and temporary radioactive waste disposal points, economic relevancy carrying out of activity valuation.

Besides, in many cases on the same territories raised the possibility to carry out any activities, for example, water guard and pest control.

Therefore, during modeling in a real situation it is necessary to determine specific priority of activity.

Nevertheless, even though the valuations such as these obviously show overpriced “optimistic estimation” of the conclusions about fast resumption possibility of Exclusion Zone sizeable part to economic activity use with the re-evacuation of population.

References

- [1] The Law of the Ukraine "The legal status of the territory which was radioactively contaminated due to the Chernobyl catastrophe" dated 27.02.91, №791a-XII.
- [2] The Law of the Ukraine "About changes and additions to the Law of the Ukraine "The legal status of the territory which was radioactively contaminated due to the Chernobyl catastrophe" dated 17.12.91, №1991-XII.
- [3] The Law of the Ukraine "About changes and additions to the Law of the Ukraine The legal status of the territory which was radioactively contaminated due to the Chernobyl catastrophe" dated 01.07.92, №2530 - XII.
- [4] The Law of the Ukraine "About changes and additions to the Law of the Ukraine The legal status of the territory which was radioactively contaminated due to the Chernobyl catastrophe" dated 28.04.95, №157/95-BP.
- [5] Decree of the Cabinet of Ministers of Ukrainian SSR dated 23rd of June 1991, № 106. Kiev, 1991
- [6] Conception of the Chernobyl Exclusion Zone at the territory of the Ukraine, Kiev, 1995.
- [7] Report of the State Enterprise Chernobyl Scientific and Technical Center for International Research on the Theme 147 "The assessment of the entomofauna and pathogenic diseases of the plants of the phytocenosis of the Exclusion Zone and in the ecotopes of the abandoned settlements". Chernobyl, 1998.