DISPOSAL OF LOW AND MEDIUM LEVEL RADIOACTIVE WASTE IN THE CHERNOBYL EXCLUSION ZONE

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The peculiarity of Chernobyl exclusion zone is the existence of constant and a lot of temporary points of radioactive waste of Chernobyl origin disposals in it. Chernobyl zone (exclusion zone) is the territory round Chernobyl NPP restricted in the result of Chernobyl accident with no inhabitants in it and where the economic activity was almost stopped.

The exclusion zone is characterized by the irregular (spotted) distribution of radionuclides and large range of physico-chemical and radioactive composition variations, that is connected with specific radioactive releases and meteorological circumstances in the period of throwing of radionuclides from the destroyed reactor to the environment. The distinction of the zone radioactive contamination is the existence of large quantity of "hot particles", and also fuel fellings in the zone adjacent to the ChNPP [1].

Reference assessments of the RAW volumes that are situated in the exclusion zone are shown at Pic. 1 [2]. In the process of territory decontamination during 1986 - 1995 substantial part of RAW which was concentrated at the most contaminated separate plots was localized and placed to different disposals[3]. At the same time in the zone there still is large enough quantity of RAW distributed round the zone the localization of which requires more developed technologies and equipment.

In Chernobyl exclusion zone there are two types of disposals. They are as follows: points of radioactive waste disposal (PRAWD) and points of temporary localization of radioactive waste (PTLRAW), that were founded in 1986-1987 during the liquidation of the consequences of the Chernobyl accident.

Nowadays the main point of low and middle activity radioactive waste disposal (with the levels of $\gamma$-contamination up to 1 R/h) in the zone, to which the RAW generated from the decontamination of territory and equipment are put up is PRAWD "Buryakovka".

PRAWD "Buryakovka" started its operation in 1987 and is situated in 12 km from ChNPP. PRAWD is consists of 30 disposal trenches with clay screen on the foundation and slopes. In addition on the bottom and entrances the iron and concrete slabs are laid. The scheme of PRAWD "Buryakovka" is shown at Pic.2. The project capacity of the PRAWD "Buryakovka" is 450 thousand $m^3$. At present time there are 22 filled up trenches in PRAWD in which about 65 thousand Cu of activity is placed.

At Pic.3 the volumes of RAW disposal in PRAWD "Buryakovka" are shown. The shortcoming of the RAW disposal in PRAWD "Buryakovka" is that the buryings were loaded mainly in bulk, and then were rammed by the hard machinery (bulldozers, tractors, etc.). The special compaction equipment was not used, because of that the trenches were filled up very quickly. In the nearest future the disposals of PRAWD "Buryakovka" will be filled up completely.

The radiation dosimetric control is carried out by the dosimetrist by hand with the help of portable devises.

Nowadays the apparatus is developed, the test and assembling of the automatic radiometric control system are conducted. All the results of the radioactive waste mass measurement brought to the PRAWD by car automatically put into the PC. The devises of radiation control are moving above the RAW surface with the help of robot-manipulator. The data is registered and processed by the PC with next transmission to the controller's office for documentation. The special enterprise that provides the RAW management and decontamination in the exclusion zone is "Komplex" a region center for calculating the movement of RAW within the Chernobyl zone.

The delivery of RAW to the PRAWD is produced by special cars in circulating or single containers or loaded in bulk in the body of lorries with the closed roofs.
Pic.1. Distribution of Radioactive Waste in Exclusion Zone (Data of STCCMRAW and STC RIA "Pripyat")

Total Square: 1km²
Project Volume: 450 000 m³
Term of Exploitation: 30 years

Picture.2. Scheme of PRAWD "Buryakovka"

1. Filled up with RAW and laid up trench
2. Filling up trench
3. Prepared for Filling trench
4. Tank for sewage
5. Ground for temporary disposal of metal RAW
6. OFFICIAL PREMISES
Picture 3. Volumes and total activity of RAW in PRAWD "Buryakovka"

Picture 4. Total Volumes of RAW in investigated PTLRAW
Along the roads and at the places of unloading the RAW dust-neutralization is providing regularly. At the adjacent places to the roads, at other dust places the dust-fastening is providing periodically.

Unloaded specific autotransport and circulating containers are decontaminated before leaving the PRAWD and are checked out.

Preservation of filled up trenches is carried out by the clay screen 0,5 m of thickness packed with the special technology. Clay screen is covered with the protective local ground layer 1 m of thickness, after that they plant perennial grass.

The disposal of RAW is prescribed to last not less than 30 years.

There are more than 800 PTLRAW in the exclusion zone. Most of them were created in the places of accumulation of RAW during the liquidation of the consequences of Chernobyl accident in 1986-1987 aiming the decreasing of the radioactive contamination levels at the working places Pic.4.

PTLRAW is a simple-in-construction engineering building containing RAW implemented as the trench or on surface rampart without any hydroisolation and with the soil on its surface. The project, executive documents and topographic tie are absent. Construction of the RAW disposal tanks in PTLRAW is not appropriate to the Sanitary rules on the RAW management STRAWM-85.

At present investigation is being carried out of the PTLRAW plots "Red forest", "Stroibaza", "Yanov station", "Peschanoe plato (Sand plateau)", "Kopachi", "Neftebaza", "Pripyat".

Especially large RAW supply is situated now in PTLRAW "Red forest", the same time the most inauspicious PTLRAW from the point of view of the possibility for radionuclides to occur in the Pripyat river are PTLRAW "Neftebaza", "Pripyat", "Peschanoe plato" which are close to the river. During the flood-time in 1991 the concentration of $\text{Sr}^{90}$ increased in 10 times because of close to river PTLRAW. This circumstance determines the priority of the works on the localization of PTLRAW or necessity to take measures aiming decreasing of the radionuclide distribution danger from the exclusion zone.

Nowadays the project of PTLRAW "Neftebaza" conservation is developing and they provide the investigation of other plots.

While working on revealing and specifying the situation of PTLRAW the outlines of RAW concentrations are defined by special radio wave device. The measurements of radioactivity of the district and preparation for the following investigation are provided. Then the soil samples are taken from enough depth for the spectrum analysis. $\gamma$-exploration of the ground is providing on the 1 m depth at the 10 x 10 m net. STC CMRAW together with State enterprise "Komplex" fulfil all the work on PTLRAW investigation.

When PTLRAW is revealed the radionuclide content of RAW, total radionuclide activities of RAW disposal plots are calculated. The lithological cuts and sections of RAW disposal plots are constructed. The lithograms of available contamination are completed and radionuclide activity supply in 5 cm surface layer is calculated, disposal heating and the cases of partial blooding of RAW are evaluated. All the radionuclide contamination has been investigated, prognosis of radionuclide migration and of ground water contamination was completed.

After the results of investigation the cards of inventory were worked out, data was input into the PC and on the figure maps of the exclusion zone.

Data received is the basis material for ecological assessment of RAW disposal effects on the environmental objects and for developing the measures of making them safe.

The ground water radioactive contamination control is carried out with the help of control and observe slits which are situated on the directions of underground water floating out of the districts of PRAWD and PTLRAW. There are about 250 control and observe slits for taking samples in the zone.

The results of analysis of operation of PRAWD are used for correcting the work on the creating of the enterprises for RAW processing and long term (up to 300 years) controlled RAW disposal (project "Vector"). On the basis of enterprise complex "Vector" it is proposed to create the Center for processing and disposal of the low and middle radioactive waste of different types [4].
LITERATURE


LIST OF ACCEPTED ABBREVIATIONS

RAW - Radioactive Waste
PRAWD - Point of Radioactive Waste Disposal
PTLRAW - Point of Temporary Localization of Radioactive Waste
STC CMRAW - Scientific and Technical Center on Complex Management of Radioactive Waste
NPP - Nuclear Power Plant
PC - Personal Computer
ChNPP - Chernobyl Nuclear Power Plant
RIA PRIPYAT - Research and Industrial Association Pripyat
CAP - Control Admission Point
RCP - Radiation Checking Point
OP - Official Premises