Information on the levels of radiation contamination in Chernobyl, Pripyat and Slavutych

August 16, 1987
Secret

Regarding the situation at the Chernobyl Nuclear Power Plant and its surroundings

From August 1 to 15, 1987, the operational situation at the Chernobyl Nuclear Power Plant and its surroundings remained unchanged. The efforts of organisations involved in the accident response were primarily focused on decontamination and preparation for the start-up of Unit 3, clean-up of the contaminated area, the safe operation of the existing units and the Shelter, and the construction of the new power industry city of Slavutych.

The radiation situation in the accident zone stabilized during the reporting period and improved slightly compared to the previous period. Overall, over the six months, the dose rate in Units I and II decreased by approximately half, in Unit III by 2 to 70 times, and throughout the entire area by 7 to 10 times.

The average radiation dose to personnel over the six months was 11 mSv at the Chernobyl Nuclear Power Plant and 4 mSv within the 30-km zone.

The level of atmospheric emissions from the operating Units I and II is 50% of the maximum permissible emissions. Aerosol emissions into the ventilation stack from the Shelter facility for the period from May to July 1987 were in the range of 4,070,000 to 2,072,000,000 Bq/day (the standard is 555,000,000 Bq/day).

The radionuclide content in the water discharge from the Chernobyl Nuclear Power Plant is at a level of 74-259 Bq/L, with the water activity in the cooling pond being 37-259 Bq/L.

The radiation situation in the Chernobyl Nuclear Power Plant zone is currently determined by radionuclides cerium-144, cesium-137, ruthenium-106, strontium-90, and plutonium-239.

During the summer, dust transfer causes a redistribution of radioactive contamination, necessitating a thorough analysis of the situation. The most contaminated areas remain the territory of the old construction base (up to 50,000 µSv/hr), the Red Forest (up to 5,000 µSv/hr) and the adjacent territory; in the remaining areas of the 5-km zone, the gamma radiation dose rate is 5-50 µSv/hr.

On the side of the Pripyat-ABK Road, gamma radiation dose rates range from 300 to 3,000 µSv/hr, Kopachi-Pripyat from 12 to 280 µSv/hr, and Kopachi-ABK from 16 to 75 µSv/hr.
In Chernobyl, gamma radiation dose rates range from 2 to 8 µSv/hr.

Contamination is within temporarily permissible limits, and radionuclide concentrations in the air and water are close to natural background levels.

In the city of Pripyat, the most contaminated areas are the hospital complex, the city executive committee, the beginning of Lenin and L. Ukrainka streets, and school No. 3.

Gamma radiation dose rates are 5-50 µSv/hr, soil contamination for cesium-137 is 25,900,000,000-4,070,000,000,000 Bq/km^2, [25.9-4,070.0 GBq/km^2], strontium-90 148,000,000,000-481,000,000,000 Bq/km^2 [148-481 GBq/km^2], and plutonium 1,110,000,000-2,960,000,000 Bq/km^2 [1.11-2.96 GBq/km^2].

Above-background contamination is observed in forested areas on the outskirts of Slavutych: gamma background of 0.6-2.0 µSv/hr, beta contamination of 1000-2000 particles/cm^2/min.

In construction sites where the topsoil has been removed, dose rates are 0.2-0.3 µSv/hr — close to the natural background level, and beta contamination is up to 70 particles/cm^2/min. Radionuclide concentrations in the air and water remained at the natural background level.

Contamination levels in water bodies and wastewater discharges remain fairly stable. Water activity in the cooling pond is 37-259 Bq/L, in the Pripyat River 5.55-27.01 Bq/L (1.5–7.3 in the Chernobyl Nuclear Power Plant area, and 2.59-5.92 Bq/L in the Chernobyl area. Radionuclide content in fish in the cooling pond is 162,800-196,100 Bq/kg.

The radiation situation at sites within the 30-km zone is characterized by:

1. CHERNOBYL		
1.1. Gamma radiation dose rate	3-8 µSv/hr	standard – 2 µSv/hr
1.2. Concentration of radionuclides in the air	0.237 Bq/m^3	standard — 0.252 Bq/m^3
1.3. Soil contamination in the city	Cs-137 – 654,900,000,000 Bq/km^2 Sr-90 – 124,320,000,000 Bq/km^2 Pu-239 – 3,700,000,000 Bq/km^2	standard — 555,000,000,000 Bq/km^2 standard — 111,000,000,000 Bq/km^2 standard — 3,700,000,000 Bq/km^2
1.4. Water activity - in the Pripyat River - in drinking water	 16.65 Bq/L 0.37 Bq/L	
2. PRIPYAT		
2.1. Gamma radiation dose rate	5-300 µSv/hr	standard – 2 µSv/hr
2.2. Concentration of radionuclides in the air	2.035 Bq/m^3	standard – 222-296 Bq/m^3
2.3. Soil contamination in the city	Cs-137 – 33,300,000,000,000 Bq/km^2 Sr-90 – 39,590,000,000,000 Bq/km^2 Pu-239 – 27,750,000,000 Bq/km^2	standard — 555,000,000,000 Bq/km^2 standard — 111,000,000,000 Bq/km^2 standard — 3,700,000,000 Bq/km^2
2.4. Contamination of roofs in the city	Cs-137 – 11,100,000,000,000 – 33,300,000,000,000 Bq/km^2 Sr-90 – 38850000000000 Bq/km^2 Pu-239 – 13394000000000 Bq/km^2	standard — 555,000,000,000 Bq/km^2 standard — 111,000,000,000 Bq/km^2 standard — 3,700,000,000 Bq/km^2
2.5. Gamma radiation dose rate in the 4th district	2-6 µSv/hr	standard – 2 µSv/hr

2.6. Concentration of radionuclides in the air of the 4th district	0.129 Bq/m³	standard – 222-296 Bq/m³
2.7. Soil contamination in the 4th district	Cs-137 – 66,600,000,000 Bq/km² Sr-90 – 7,770,000,000 Bq/km² Pu-239 – 666,000,000 Bq/km²	standard — 555,000,000,000 Bq/km² standard — 111,000,000,000 Bq/km² standard — 3,700,000,000 Bq/km²
2.8. Specific activity of water - in the river Pripyat, = in drinking water	 22.20 Bq/L 0.37 Bq/L	
3. ZELENYJ MYS		
3.1. Gamma radiation dose rate in the village	0.15-0.50 µSv/hr	standard – 0.2 µSv/hr
3.2. Gamma radiation dose rate in the forest	1.5-2.0 µSv/hr	standard – 0.2 µSv/hr
3.3. Concentration of radionuclides in the air of the village	0.011 Bq/m³	standard – 222-296 Bq/m³
3.4. Soil contamination in the village	Cs-137 – 44,400,000,000 - 85,100,000,000 Bq/km² Sr-90 – 5,180,000,000 - 7,030,000,000 Bq/km² Pu-239 – 555,000,000 - 1,850,000,000 Bq/km²	standard — 555,000,000,000 Bq/km² standard — 111,000,000,000 Bq/km² standard — 3,700,000,000 Bq/km²
3.5. Activity in drinking water	0.814 Bq/L	
3.6. Water activity of the Kyiv Reservoir	2.072 Bq/L	
Some increase is observed due to contamination carried by motor vehicles, as evidenced by elevated background levels on the roadway and adjacent sections of the road. The soil in the temporary worker's camp has a surface contamination of cesium-137 of an average of 44,400,000,000 Bq/km², which is approximately 10 times lower than the temporary maximum permissible level (TPL) (555,000,000,000 Bq/km²). Data on the gamma level of soil and water contamination change little over time. Only the radiation level in the air changes, which is associated with changing weather conditions. The concentration of radionuclides in the air is below the permissible concentration of radionuclides in the atmosphere and water for a limited portion of the population (1.295 Bq/m³).		
4. SLAVUTICH		
4.1. Gamma radiation dose rate in the city	0.3-0.8 µSv/hr	standard – 0.2 µSv/hr
4.2. Gamma radiation dose rate in the forest	15-3.5 µSv/hr	standard – 0.2 µSv/hr
4.3. Concentration of radionuclides in the air	0.007 Bq/m³	standard – 222 Bq/m³
4.4. Soil contamination in the city	Cs-137 – 3,700,000,000 – 74,000,000,000 Bq/km² Sr-90 – 3,700,000,000 – 11,100,000,000 Bq/km² Pu-239 – 37,000,000 – 111,000,000 Bq/km²	standard — 555,000,000,000 Bq/km² standard — 111,000,000,000 Bq/km² standard — 3,700,000,000 Bq/km²
4.5. Water activity - in the Dnieper River (Yakor area) - in drinking water	 0.37 Bq/L 0.37 Bq/L	

5. "RED FOREST"		
5.1. Gamma radiation dose rate of the sand-covered northern part	50-200 µSv/hr	standard – 2 µSv/hr
5.2. Gamma radiation dose rate of the sand-covered southern part	100-300 µSv/hr	standard – 2 µSv/hr
5.3. Gamma radiation dose rate directly into the forest	up to 5,000 µSv/hr	standard – 2 µSv/hr
5.4. The dried-up area is 96.6 hectares. The total radionuclide inventory for gamma emitters is 2,146,000,000,000,000 Bq [2,146 TBq], for beta emitters 236,800,000,000,000 Bq [236.8 TBq].		
6. RADIOACTIVE WASTE DISPOSAL SITES (RWDS)		
By the summer of 1986, 15 RRWDS were established within the 30-kilometer zone. By order of the Chief of the Special Operations Directorate of the USSR Ministry of Defence dated July 25, 1986, two RWDS were closed at the end of July 1986: Kryuki and Zhelibor (property and waste). Three waste disposal sites are operational: Podlesny, Burakovka, and Stage III.		
6.1. Podlesny waste disposal site - Gamma radiation dose rate at the waste disposal site - Gamma radiation dose rate in the surrounding area	up to 2,500,000 µSv/hr 200-1,000 µSv/hr	
6.2. Burakovka waste disposal site - Gamma dose rate at the waste disposal site - Gamma dose rate in the surrounding area - Soil contamination with Cs-137 radionuclide	up to 50,000 µSv/hr 2-4 µSv/hr 666,000,000,000 – 2,257,000,000,000 Bq/km^2	standard — 555,000,000,000 Bq/km^2
6.3. Chernobyl Nuclear Power Plant Phase III - Gamma dose rate at the waste disposal site - Gamma dose rate in the surrounding area	up to 50,000 µSv/hr up to 1,500 µSv/hr	
7. STROIBAZA (old)		
7.1. Gamma dose rate in the area	up to 70,000 µSv/hr	standard – 2 µSv/hr
8. STROIBAZA (new)		
8.1. Gamma radiation dose rate in the area	1-40 µSv/hr	standard – 2 µSv/hr
8.2. Gamma radiation dose rate at storage piles	up to 200 µSv/hr	standard – 2 µSv/hr
8.3. Soil contamination with Cs-137 [area 1]	6,290,000,000,000 – 10,249,000,000,000 Bq/km^2;	standard — 555,000,000,000 Bq/km^2
8.3. Soil contamination with Cs-137 [area 2]	18,500,000,000,000 – 25,900,000,000,000 Bq/km^2;	standard — 555,000,000,000 Bq/km^2

Shelter Facility

According to agent "Kolotov" and recruitment candidate "GVT," a comprehensive survey of the Shelter Facility by specialists from the Kurchatov Institute of Atomic Energy, VNIIPIET, and VNIIAES has been completed, and they have also revised the "Temporary Technological Regulations for Facility Monitoring." In addition, representatives of the scientific and technical centre GAEN conducted a thorough analysis of the state of nuclear safety of the Shelter at the current time.

As a result of the work conducted, no definitive conclusion has been reached regarding the nuclear safety of the facility.

In this regard, special measures to ensure the nuclear safety of the Shelter have been developed and are currently being approved by the Kurchatov Institute of Nuclear Energy, the Ministry of Atomic Energy, and the State Nuclear Safety Inspectorate.
These special measures include the following main objectives:
1. Determining the subcriticality of residual fuel.
2. Monitoring the condition of the reactor metal structures and the facility's roof.
3. Identifying the most informative points for monitoring the facility's condition and organizing continuous computer monitoring of them.

Measures to ensure the solution of the problem outlined in the first paragraph are in the conceptual development stage; the contractor is the Kurchatov Institute of Atomic Energy, with the calculations scheduled for the second quarter of 1988 and the planned completion date being 1989. Work on the second paragraph is in the implementation stage; design documentation is being prepared by US-605, measuring deviations of the ceiling's metal structures.

– VPO Inzhgeodeziya (Novosibirsk): the measurement analysis is being conducted by the design engineer VNIPIET (Leningrad); work on the third point has been assigned to the Kurchatov Institute of Atomic Energy, with work scheduled to begin in September of this year.

Currently, the parameters of the Shelter have not undergone any significant changes, in particular:
– the maximum temperature at one of the monitored points is plus 90 degrees Celsius;
– the gamma radiation level above the collapse is 15,000,000 µSv/hr;
– the neutron flux at different measurement points fluctuates between 0 and 250 n/cm^2 sec.
The decrease in parameters is consistent with the decay time of the main radioactive elements. For example, on August 4, 1987, a fire broke out at the Kharkov ZhTO site as a result of welding work performed by E.A. Alyasov, a welder at Section 10, without proper preparation of the workplace and cleaning of combustible materials.
The VSRO building is permitted to store paints and varnishes, flammable liquids, and combustible liquids in open containers; smoking is also permitted in the same premises.

In the Romashka building, unauthorised remodelling of the premises was permitted, reducing the building's fire resistance rating; electrical wiring was installed in violation of the Electrical Installation Code; and the storage of paints, protective clothing, and tools was not properly organized.
All of these deficiencies could also lead to a fire.

To address these deficiencies and improve fire safety at the Chernobyl Nuclear Power Plant, we, together with the State Fire Supervision Authority, conducted a meeting with the management of US-605. During the meeting, recommendations were made regarding the need to punish those responsible and the development of specific measures to improve fire safety during construction and installation work at the Chernobyl Nuclear Power Plant.

To carry out counterintelligence tasks, the Ukrainian SSR KGB Department for the City of Kiev and the Kiev Region for the Chernobyl Nuclear Power Plant uses 83 agents, 3 residents, and 115 trusted individuals; "Genrikh" is being investigated by the KGB.

Head of the Ukrainian SSR KGB Department for the City of Kiev and the Kiev Region for the Chernobyl Nuclear Power Plant
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