

Presentation to be made by

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on

**"Long Term Environmental Consequences of Chornobyl  
Catastrophe and Relevant Rehabilitation Programs".**

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Dear Mr. President!

Dear ladies and gentlemen!

To begin with, let me express my heart-felt gratitude to the United Nations Organization and International Agency for Atomic Energy for making this meeting possible within the framework of the Chornobyl forum. The forum will, no doubt, provide another impetus for further international collaboration in overcoming the aftermath of the Chornobyl disaster.

With our time frame in view, I would like to speak now about the aspects related to the Chornobyl catastrophe's long-term effect on the environment, and to corresponding rehabilitation programs. Ms. Bobyleva, on her part, will address the health status of individuals affected by the Chornobyl disaster and relevant health care programs.

Nearly seventeen years have passed since the day of the Chornobyl Nuclear Plant accident that had marked a sad and tragic date in the history of our civilization. Mankind had not known a technogenic catastrophe of such a scale before, and Ukraine was destined to have its epicenter in its territory.

It is our duty to do our best to eliminate or, at least, alleviate the consequences of the catastrophe, as well as to bring its lessons home to the global community. The tragic experience amassed by us has to become known to the humanity; it has to serve the purpose of precluding the possibility of having more Chornobyls anywhere else on the planet. This could, to an extent, expiate our guilt before the victims of the disaster.

The explosion on the fourth Chornobyl NPP power unit resulted in the instantaneous reactor crash and was followed, over the next ten days, with considerable radioactive substances' discharge into the environment. About four percent of fuel, up to 100% of inert gases and up to

60% of various volatile radionuclides has been discharged into the areas beyond the operation site. Radiologically speaking, radioactive isotopes of iodine and cesium are of supreme importance. Radioactive substances have got dispersed nearly all over the territory of the Northern Hemisphere. Ukraine, in particular, had up to 95 percent of its total area affected by radioactive contamination varying in its strength.

Since radiation is one of the major factors in estimating potential danger both for residents of radioactively contaminated areas, and for Ukrainian population as a whole, subsequent comprehensive study of the directions taken by radionuclides migration and redistribution processes is among the most important tasks tackled by our country.

What is the current state of affairs?

Up to 40% of radioactive substances' fallout on European territory as a result of the Chernobyl catastrophe have fallen out on Ukrainian territory.

Ukraine's total area constituting 603.7 thousand square kilometers, the area with ground cesium-137 contamination exceeding 40 kBq per square kilometer amounts to approximately 40 thousand square kilometers.

The area with ground contamination level with strontium-90 exceeding 4 kBq per square kilometer is about 35 thousand square kilometers.

The area with plutonium contamination level over 0.4 kBq per square kilometer constitutes 2.4 thousand square kilometers.

Alienation zone around the Chernobyl Nuclear Power Plant encompasses the area most strongly contaminated by the catastrophe. In 1986 all the residents were removed from there, and all the economic activities unrelated to the Nuclear Plant operation were terminated. The area of the most strongly contaminated alienation zone in Ukraine is about 2,044 square kilometers.

As of the present moment, the principal radionuclides determining contamination level in the alienation zone are cesium-137, strontium-90 and  $\alpha$  - emitting transuranium elements plutonium and americium.

Ground surface contamination level with cesium-137 on Western trace in the alienation zone reaches 32,000 kBq per square kilometer.

Ground surface contamination level with strontium-90 correlate, on the whole, with cesium-137 contamination level. Maximum contamination density two-five km away from Chronobyl NPP reach 40MBq per square meter, while the corresponding value for the most alienation zone periphery ranging between 40 and 180 kBq per square meter, along the Northern boundary - between 180 and 370 kBq per square meter.

Contamination of this area with plutonium and americium isotopes is analogous to contamination with strontium-90.

The highest concentration of trans-uranium elements is detected on the same sites as strontium-90 reaching 500 kBq per square meter for two plutonium isotopes and approximately 700 kBq per square meter for americium.

On the periphery of the alienation zone the values drop to 2 kBq per square meter and lower.

Alienation zone serves as a protective barrier on the path of radionuclides' expansion to inhabited areas. The importance of alienation zone as the barrier is borne out by the assessment of annual radionuclides' penetration beyond its boundaries against their sum total (without factoring in the Shelter). Even according to fairly conservative estimates, this penetration, generally, does not exceed 0.002 percent, and taking into account radionuclides' stock in the Shelter its value decreases to  $2 \cdot 10^{-5}$  percent a year. Taking into consideration a steady trend towards decreasing radionuclides' penetration beyond the alienation zone in time, it can be argued that the natural landscape complex enhanced with technological protection systems (dams, forest fire-protection strips, and the like) provide an efficient barrier preventing radionuclides from spreading and calling for continuous supervision and fortification.

Today, contamination in the alienation zone differs from the way it was in May 1986 mainly in radionuclides' having migrated deeper into the ground, as well as in their lowered activity due to radioactive disintegration process.

Radioactive contamination of water bodies was caused, mostly, by direct fall-out of radioactive aerosols upon water reservoirs' surface and by radioactivity washed off the water intakes' surfaces.

The most significant water resources' radioactive contamination affected the basins of Dnipro and Prypiat rivers. Maximum surface water contamination occurred within the first years following the catastrophe.

Currently, rivers act as principal radionuclides' transfer route, including transboundary transfer. Up to 70 percent of cesium-137 taken by surface water beyond radioactive contamination zones' limits is formed within water in-taking basins of the Dnipro and Prypiat rivers beyond Ukraine's borders. Alienation zone is the main source of strontium-90 getting into the river water.

Between years 1987 and 2002 a general tendency has been observed for lowered cesium-137 concentration in water and smaller amounts of this radionuclide getting into the Dnipro cascade system through rivers flowing upon contaminated areas.

Agricultural lands in Ukraine have the area of 407.1 thousand square kilometers, or 67 percent of the country's total area. These lands' contamination with cesium-137 on the area equal to 11 thousand square kilometers exceeds 37 kBq per square meter.

Our having soils with high factors of radionuclides' transition from ground to plants resulted in the emergence of the so-called «critical» regions on the territory of Ukraine. Though their ground radioactive contamination levels were relatively low, population received substantial radiation doses due to their consumption of plant and animal products.

As of today, natural processes and agricultural countermeasures carried out in radioactively contaminated areas have resulted in lowered contamination level in food produce. Thus, agricultural produce contamination level has decreased several times over the period 1998-2002 against 1987 data.

The food produced in collective farms relying upon state-of-the-art agricultural technologies for contaminated areas virtually (92- 97 percent) complies with national sanitary norms for cesium-137 and strontium-90 radionuclides' contents in food products and drinking water adopted in 1997.

However, getting agricultural produce meeting sanitary norms in the private sector still remains a problem. In some regions contamination levels in private sector food produce, especially milk and meat, exceed acceptable levels two and five times, respectively. In 1997 farms like that were recorded in 638 towns and villages, in 2001 - in 487 towns and villages.

To sum up, today private farms are problematic sector of food production. Special agricultural programs for private farms have been developed to address this issue.

Another important problem pertaining to agriculture in radioactively contaminated areas concerns further activities aimed at rehabilitating these areas and recovering them for economic uses.

Forests cover almost half of the territory marked as radioactive contamination zones.

Their current radiation status remains unsatisfactory. Monitoring surveys register substantial radionuclides' accumulation in timber, berries, fungi, curative herbs, wild animal meat that is in considerable excess of admissible levels. Thus, forest products in Northern regions of Volhynia, Rivne and Zhitomyr oblasts feature cesium-137 radionuclides' contents equal to 2,000 – 10,000 Bq per kilogram of raw produce. One case was registered with 20,000 Bq per kilogram of wild animal meat.

In some regions forest produce is a substantial source of residents' radiation doses. The dose received constituted 5-6 mZv per year, reaching in some cases 10-15 mZv per year.

In 1991 the Supreme Soviet of the Ukrainian SSR passed two basic Laws of Ukraine - "On Legal Status of the Areas Affected by Radioactive Contamination due to Chornobyl Catastrophe" and "On Status and Social Protection of Individuals Affected by the Chornobyl Catastrophe".

The first law established normative requirements defining areas as radioactive contamination zones and the ways life activities should be conducted there. The second identified groups of affected individuals, as well as types and amounts of assistance to be provided to them by the state.

The territory of Ukraine defined by the law as contaminated due to the Chornobyl disaster makes up 50.5 thousand square kilometers. It includes 74 rayons in 12 oblasts.

The table you can see on the screen gives a general idea of the total area of contaminated zones and the number of cities, towns and villages included into them by Governmental decrees.

Currently, about 2.3 million people reside in contaminated areas, including 1.6 million people inhabiting special radioecological control zone.

Radioecological monitoring and dosimetric inventory data obtained between 1996 and 2001 evidence a stable trend towards decreasing radiation doses in population residing in contaminated areas.

The table we can see now shows the temporal dynamics of populated areas number within certain dose intervals.

The graph presents the distribution of populated areas where population radiation dose may exceed 1 mZw per year according to annual dosimetric inventory data.

According to expert evaluation by the Academy of Medical Sciences of Ukraine, during sixteen years elapsed after the catastrophe the bulk of the population residing in radioactive contamination zones have already formed 60 to 80 percent of the life expected dose. Cesium-137 will act as the principal dose forming radionuclide in these zones over the next 10-20 years. Over 95 percent of the expected dose will be formed by cesium-137, the remaining five percent – by strontium-90, and one hundredth of a percent – by plutonium isotopes.

The radiation dose accumulated over 70 years of life can exceed 70 mZw only for residents of 33 towns and villages in Zhitomyr, Rivne and Chernihiv oblasts. Calculations of accumulated doses disregarded the radiation dose for thyroid gland.

Individuals who have received considerable thyroid gland radiation doses fall into three categories: resettled individuals, rural population and large city residents.

Children make up a critical group in all the categories.

Thyroid gland radiation doses are distributed in the following way in residents of Ukraine:

- about 85 percent of children under three years of age received doses ranging from 0.1 to 1 Gr,
- over 60 percent of children aged four to fifteen and about 50 percent of adolescents received doses ranging from 50 to 300 mGr.

In order to identify risk groups by radiation factor for children and adults aimed at preventing diseases and planning required intervention years 1992-1999 saw thyreodosimetric inventory conducted for Ukraine's populated areas.

So, what is Ukraine doing now to change the present situation?

Her activities are based, primarily, on the conclusions made by the International Conference "Fifteen Years of Chernobyl Catastrophe. Experience in Overcoming" that took place in April 2001 in the city of Kiev.

As you know, in addition to representatives from three most strongly affected countries – the Republic of Belarus, Russia and Ukraine – among the conference organizers were also the United Nations Organization Office for Humanitarian Issues Coordination (mister Kenzo Oshima), the International Agency for Atomic Energy (Deputy General Director Zygmunt Domaracky), the European Council in European Commission, as well as other international and scientific agencies.

Representatives from seventeen countries took part in the conference work. The conference adopted "Conference's Basic Conclusions" agreed upon by all the participants and organizers. It is these conclusions that will, together with fifteen commissioned presentations and other conference materials, underlie the documents developed by our forum.

I would like to remind you that the "Conference's Basic Conclusions" and the commissioned presentations prepared by international bodies of authors relate to all the aspects of Chernobyl catastrophe. Some of these are as follows.

1. The assessment of Chernobyl alienation zone barrier role, of its reliability, of natural rehabilitation processes and update of possible additional protective measures, as well as their implementation should constitute an important comprehensive task to be dealt with by national and international scientific research and applied programs both now and in future.

2. The rehabilitation of Chernobyl alienation zone contaminated areas should to the highest possible degree take into consideration natural rehabilitation processes with limited and targeted human intervention. The areas' recovery for economic uses shall stipulate setting up an environmentally safe and economically efficient rehabilitation system.

3. The system for radioecological control in Chernobyl alienation zone and other contaminated areas should be improved in terms of enhancing its prognosticating function necessary for implementing efficient management solutions.

4. While planning activities aimed at rehabilitating contaminated agricultural areas, the first step should consist in identifying practical zones with leading radiation danger factor for population of the Republic of Belarus, Russia and Ukraine being cesium-137 in contaminated food products, primarily, milk. This problem should retain its first-priority status. Its resolution calls for intensified countermeasures to be taken in fodder production and animal farming.

5. The complexity, importance and diversity of problems generated by the catastrophe and existing over a considerable period of time make it necessary to keep up the high level of scientific research now and in future. It would be advisable to increase national and international coordination between the studies conducted.

The above-mentioned and other conclusions underpin the developed draft National Program for Minimizing Chernobyl Catastrophe Consequences for the Period until Year 2010. The Draft Program has been approved by the Government of Ukraine. Late in the last year it was adopted by the Parliament of Ukraine in the first hearing. It is noteworthy that the draft is frame-like in its nature.

In order to realize it without waiting for the draft to be passed as a whole, the Government of Ukraine adopted the Concept for Radiation Protection for Ukraine's Population.

The Draft Program and the approved Concept reflect new approaches to overcoming the consequences of Chernobyl catastrophe and are fully in line with conclusions and recommendations made by the United Nations mission and presented in the report "Humanitarian Consequences of the Chernobyl Nuclear Power Plant Catastrophe. Strategy for Rebirth".

Besides, following the above-discussed documents, a group of Ministries and research institutions have been trusted by the Government of Ukraine with developing the national program for comprehensive socio-economic development of the areas affected by radioactive contamination due to Chernobyl disaster for the period until year 2010.

The documents I have enumerated are crucial, and their implementation will, no doubt, have a positive effect on social, moral and psychological condition of individuals affected by the catastrophe and on rehabilitation of radioactively contaminated areas.

There is another aspect to be mentioned, and it concerns keeping up scientific research on a high level. I spoke about it already quoting the conclusions made by the International Conference.

It is worth mentioning that Ukraine gives a lot of attention to scientific study of Chernobyl's consequences. Much serious and reliable research has been conducted in this field. At the same time, the lion's share of research is being carried out by national research institutions in accordance with national plans and only partially tied-up with similar research outcomes in other countries and international organizations. It is obvious that the task of setting up a unified Chernobyl research data bank is on the agenda. We also need one single coordination center.

In this context we have been delighted to hear about the United Nations initiative aimed at setting up International Research Network that would make it possible to bring together science resources available not only in affected countries, but also in the world community as a whole.

There is no doubt that it would enable us to avoid duplication in research subjects, as well as to redistribute financial resources channeling them into the right areas.

And now my final point, which is of supreme importance. Whatever we are doing in the field of research, and not only research, should be put to human service, to the service of those affected by the Chernobyl catastrophe. However, the bulk of the designed radiological, medical preventive, agrotechnical ways and methods enabling a human being to enhance his/her self-protection from radiation, have so far been accomplished by the experts in specific "Chernobyl" multi-branch science.

We believe that the international research network and national science should yield practical outcomes accessible and understandable to the affected population.

Let me finish here.

We are hopeful that new strategies in collaboration mechanisms resulting from research carried out by the United Nations and combined with national research conducted by the affected countries will intensify the activities aimed at overcoming the consequences of Chernobyl catastrophe.

We strongly believe that our meeting will contribute to making daring and noble decisions, will promote determined actions and bring about tangible results, unity and mutual understanding.

Thank you for your attention.