

Striking Factors of a Nuclear Explosion – Awareness Training from Ukraine

The enclosed Ukrainian presentation provides a detailed framework for understanding, responding to, and recovering from the effects of nuclear explosions. The deck begins by defining the types of nuclear detonations and their primary destructive factors, including shock waves, light radiation, penetrating radiation, radioactive contamination, and electromagnetic pulses. Each factor is analyzed in terms of its operational impact, biological effects, and necessary protective measures. The presentation emphasizes immediate actions for personnel safety during exposure to these threats, such as seeking shelter, using protective equipment, and following command protocols. It also addresses critical infrastructure vulnerabilities, particularly from electromagnetic pulses, and provides strategies for maintaining operational continuity.



The content expands beyond immediate response to include long-term recovery and environmental monitoring, highlighting the importance of decontamination, radiation control, and collaboration with civil authorities. Training, drills, and equipment maintenance are presented as essential components of preparedness. The presentation also

incorporates the psychological support required for personnel operating in high-stress environments and stresses the importance of thorough reporting and lessons learned to enhance future readiness. Together, these elements create a comprehensive guide for managing the multifaceted challenges of nuclear events while prioritizing safety, resilience, and recovery.

The Ukrainian presentation, framed against the backdrop of Russia's repeated threats of nuclear war and the potential use of dirty bombs in Ukraine, serves as a practical and symbolic response to these threats. Russia's nuclear rhetoric, coupled with its history of employing hybrid warfare tactics, has amplified the sense of urgency for Ukraine to prepare militarily and civilly for potential escalation. Ukraine demonstrates its readiness to counter these threats while projecting a message of resilience to domestic and international audiences.

The inclusion of detailed protocols for mitigating nuclear explosion effects underscores Ukraine's awareness of the diverse scenarios it may face. Russia's threats encompass not only large-scale nuclear strikes but also localized dirty bomb attacks intended to spread fear and contaminate critical areas. The presentation's emphasis on radiation control, protective measures, and decontamination directly addresses the plausible scenarios involving dirty bombs, where the psychological impact and environmental disruption are key elements of the threat. These measures, paired with clear instructions on protecting personnel and managing civilian safety, reflect Ukraine's focus on minimizing casualties and maintaining stability under duress.

Furthermore, the presentation's integration of long-term recovery strategies and collaboration with civil authorities signals Ukraine's acknowledgment of the enduring impact of such incidents. Russia's threats, while aiming to destabilize and demoralize, are met with a systematic method that prioritizes resilience. The document also highlights Ukraine's reliance on international norms and coordination, subtly reinforcing its alignment with global efforts to deter the use of weapons of mass destruction.

Ukraine enhances its defensive posture and denies Russia's strategic intent of instilling fear and chaos. Their readiness reinforces Ukraine's credibility as a state capable of withstanding existential threats, bolstering internal morale and external support. The presentation, therefore, stands as a tactical guide and a strategic narrative of defiance against Russian nuclear coercion.

Slide- -Slide Translation and Analysis

Slide 1

Translation- "Destructive factors of a nuclear explosion. Actions of personnel in the event of a nuclear explosion."

Analysis- The slide introduces the primary focus on nuclear explosion impacts and provides an outline of survival measures for personnel. It serves as a title page, setting expectations for subsequent detailed discussions. This slide suggests an operational or training context aimed at understanding nuclear explosion consequences and appropriate response strategies.

Slide 2

Translation- "Depending on the tasks resolved nuclear weapons, the type and location of targets planned for nuclear strikes, and the nature of combat operations, nuclear explosions may occur- in the air, on the surface of the ground (or water), or underground (or underwater).

Accordingly, the following types of nuclear explosions are distinguished-

- Airborne (high and low altitude).
- Ground-based (on land or water).
- Underground (or underwater)."

Analysis- This slide categorizes nuclear explosions and their detonation environment, highlighting operational variability in their application. The detailed segmentation allows for contextual analysis of damage patterns and tactical considerations for military and civilian planning. The distinction also reflects the differential impacts on infrastructure, terrain, and biological targets.

Slide 3

Translation- "The main factors of a nuclear explosion are-

- Shock wave.
- Light radiation.
- Penetrating radiation.

- Radioactive contamination.
- Electromagnetic pulse (EMP).

Nuclear weapons significantly differ from conventional weapons. While conventional explosives are based on chemical reactions, nuclear explosions have exponentially greater power. For example, the energy released due to a nuclear explosion can be thousands of times greater than the largest conventional explosive device."

This slide introduces the five primary effects of nuclear detonation and contrasts their scale with conventional explosives. The emphasis on shock waves, light radiation, and radioactive contamination sets a foundation for subsequent tactical or survival guidance. The reference to EMP indicates a focus on technological vulnerabilities. This information supports strategic preparedness, risk assessment, and impact modeling for military and civil defense planners.

Slide 4

Translation- Shock Wave "In most cases, the shock wave is the primary destructive factor in a nuclear explosion. It can cause significant harm to personnel, destroy structures, and damage equipment even at considerable distances from the explosion's center.

The shock wave represents a zone of intense air compression spreading outward rapidly. Its propagation speed depends on air pressure at the wavefront; near the explosion's center, it can exceed the speed of sound but decreases sharply with distance. Within the first two seconds, the shock wave travels approximately 1,000 meters; within five seconds, 2,000 meters; and within eight seconds, about 3,000 meters."

Analysis- This slide explains the shock wave's mechanics and emphasizes its dominant role in destroying a nuclear explosion. The details on propagation speed and range provide critical data for predicting the extent of damage. The analysis shows the importance of protective measures against this factor, including structural reinforcements and rapid response protocols.

The first four slides establish a comprehensive understanding of nuclear explosions, their types, and the core destructive elements. The content is structured for educational or training use, emphasizing clarity and operational relevance. Foundational information sets the stage for detailed strategies in mitigating the effects of nuclear incidents.

Slide- -Slide Translation and Analysis (Slides 5-9)-

Slide 5

Translation- Example of a Shock Wave in a Nuclear Explosion The slide likely provides a visual or graphical representation of the range and impact of a shock wave during a nuclear explosion, illustrating its destructive potential at varying distances.

Analysis- A graphical example enhances comprehension, visually demonstrating theoretical concepts discussed previously. This visual would support operational planning and help trainees understand the practical implications of shock waves. The representation likely includes quantitative data to aid in predicting and mitigating potential damage.

Slide 6

Translation- Light Radiation "Light radiation from a nuclear explosion is a stream of radiant energy, including ultraviolet, visible, and infrared radiation.

Absorbed light radiation converts to heat, causing the surface layer of materials to heat up. Human skin absorbs this energy, leading to burns, especially on exposed areas facing the explosion. Viewing the explosion directly with unprotected eyes can result in severe eye injuries, including blindness."

Analysis- This slide focuses on the thermal and optical impacts of light radiation from nuclear detonation. The emphasis on burns and blindness illustrates its biological effects, reinforcing the necessity of protective measures. Operational guidance, such as shielding and avoiding direct visual exposure, would logically follow this explanation.

Slide 7

Translation- Example of Light Radiation in a Nuclear Explosion This slide likely showcases the spatial and temporal distribution of light radiation during a nuclear event, along with examples of its destructive and injurious effects.

Analysis- A graphical or visual example would contextualize the theoretical explanations of light radiation's effects, illustrating zones of thermal impact and highlighting the importance of immediate protective actions. It supports the preceding slide's focus on understanding light radiation's hazards.

Slide 8

Translation- Penetrating Radiation "Penetrating radiation consists of an invisible flow of gamma rays and neutrons emitted from the nuclear explosion. These particles travel in all directions from the explosion center, spanning hundreds of meters.

Gamma rays and neutrons ionize atoms and molecules within living tissue, disrupting the function of individual organs and systems. For devices with low explosive yields (1,000 tons or less), the zones affected by penetrating radiation exceed those impacted by the shock wave or light radiation."

Analysis- The slide highlights the dangers of penetrating radiation, emphasizing its biological impact through ionization. The note on lower-yield devices is particularly significant for operational scenarios where such weapons may be employed. The technical nature of this information aids in understanding radiation effects on personnel and infrastructure, informing protective measures and medical response protocols.

Slide 9

Translation- Example of Penetrating Radiation in a Nuclear Explosion The slide likely depicts the distribution and intensity of gamma radiation and neutron fluxes around a nuclear detonation, including their biological and material effects.

Analysis- A visual or graphical representation provides a clearer understanding of the range and effects of penetrating radiation. This illustration likely complements the previous slide demonstrating practical scenarios supporting training on protective measures and risk assessment for affected zones.

Summary of Analysis-

Slides 5–9 build on the foundational knowledge presented in the first set, delving into specific destructive factors like light radiation and penetrating radiation. The content effectively conveys the scale and nuances of nuclear explosion effects, combining textual information with graphical elements.

Slide- -Slide Translation and Analysis (Slides 10–15)-

Slide 10

Translation- Radioactive Contamination "Radioactive contamination refers to the pollution of territory nuclear reaction products, resulting from the fallout of radioactive

substances from the nuclear explosion cloud. It is caused by the formation of radioactive isotopes in the environment under the influence of the instantaneous neutron and gamma radiation of a nuclear explosion. This contamination affects humans and animals, primarily through external gamma and, to a lesser extent, beta radiation, as well as internal exposure from ingesting radioactive isotopes via air, water, and food."

Analysis- This slide introduces the concept of radioactive contamination, emphasizing its environmental and biological impacts. The distinction between external and internal exposure highlights different routes of harm. The explanation is critical for planning decontamination efforts, safety measures, and medical interventions to minimize long-term consequences for personnel and the environment.

Slide 11

Translation- Electromagnetic Pulse (EMP) "EMP primarily affects electronic and electrical equipment. EMP generates electrical fields and voltages within such equipment, which can lead to insulation breakdowns, transformer damage, burnout of spark gaps, destruction of semiconductor devices, and failure of protective fuses and other components. Communication, signaling, and control lines are particularly vulnerable to EMP effects."

Analysis- This slide focuses on the technological vulnerabilities EMP poses and a significant secondary effect of nuclear explosions. The detailed mention of specific failures shows the operational risks to communication and infrastructure. This information supports the need for EMP-resistant designs and protocols to protect critical systems during potential nuclear scenarios.

Slide 12

Translation- Example of EMP in a Nuclear Explosion The slide likely depicts the impact of EMP on various systems, showing the extent of equipment damage and operational disruption.

Analysis- A visual representation of EMP effects complements the textual explanation illustrating real or modeled scenarios, reinforcing the need for preemptive shielding and resilience planning, especially for critical military and civilian infrastructure.

Slide 13

Translation- Example of Decreasing Radiation Power Over Time The slide likely presents a graph or chart demonstrating the decay rate of radiation intensity following a nuclear explosion.

Analysis- This visual would be essential for understanding the temporal dynamics of radiation exposure, aiding in the calculation of safe reentry times into contaminated areas. The graph likely supports planning evacuation, decontamination, and reoccupation efforts, ensuring personnel safety during recovery operations.

Slide 14

Translation- Example of Damage Caused by Nuclear Weapons- The slide likely showcases images or diagrams of structural, environmental, and biological damage from a nuclear explosion.

Analysis- A visual example of damage contextualizes the destructive factors discussed earlier, providing a practical understanding of the range of effects reinforcing the importance of preparedness, structural reinforcement, and immediate response measures.

Slide 15

Translation- Actions of Personnel During a Shock Wave Personnel must-

- Immediately move to shelter (trenches, communication passages, dugouts, or other covered spaces).
- Lie on the ground and cover the head and neck with any available object to protect against debris and the blast wave if no shelter is available.
- Wear a gas mask or, if unavailable, cover the mouth and nose with fabric or clothing and breathe through it until reaching shelter.
- If inside an armored vehicle, close all hatches and vents and remain inside."

Analysis- This slide provides clear, actionable steps for personnel during a shock wave event, emphasizing rapid movement to shelter and protective measures. The instructions address scenarios with and without access to adequate shelter, showing adaptability to varying conditions. This guidance is critical for reducing immediate casualties during nuclear incidents.

Summary of Analysis-

Slides 10–15 expand on nuclear explosion effects, including radioactive contamination and EMP, while providing specific action steps for personnel during a shock wave. The inclusion of visual examples and temporal data reinforces the practical application of the information, ensuring personnel can understand and respond effectively.

Slide- -Slide Translation and Analysis (Slides 16–20)-

Slide 16

Translation- Actions of Personnel During Light Radiation Personnel must-

- Immediately move to shelter (trenches, communication passages, dugouts, or other covered spaces).
- Put on protective goggles at once and avoid looking at the explosion epicenter with unprotected eyes.
- Stay inside vehicles with closed hatches if possible.
- Follow instructions from the commander received via communication channels."

Analysis- The slide outlines protective measures to counteract the immediate effects of light radiation, such as burns and eye injuries. The emphasis on protective goggles and avoiding direct exposure highlights the severity of light radiation's impact on vision and skin. The guidance supports operational survival during nuclear events, stressing preparedness and adherence to commands.

Slide 17

Translation- Actions of Personnel During Penetrating Radiation Personnel must-

- Immediately move to shelter (trenches, communication passages, dugouts, or other covered spaces).
- Put on personal protective equipment at once.
- If inside an armored vehicle, close hatches, activate filters and remain inside.
- Follow instructions received via communication channels from the commander."

Analysis- This slide focuses on mitigating exposure to penetrating radiation emphasizing the importance of protective equipment and sealed environments. The inclusion of vehicle-specific measures ensures that personnel in armored units can reduce radiation exposure effectively. The instructions promote swift action to minimize immediate and long-term radiation effects on health.

Slide 18

Translation- Actions of Personnel During Radioactive Contamination Personnel must-

- Move to shelter or protected areas (such as hills, trenches, ravines, or bunkers).
- Immediately put on personal protective equipment.
- If inside an armored vehicle, close hatches, activate radiation control devices (if available), and turn on filtration systems.
- Exit the contamination zone to a safe area and undergo decontamination procedures if possible.
- Follow instructions received via communication channels from the commander."

Analysis- This slide provides detailed instructions for managing radioactive contamination, stressing the use of personal protective equipment and immediate evacuation. The emphasis on decontamination procedures highlights the importance of minimizing internal and external radiation exposure. The instructions are practical for field operations, ensuring personnel safety during contamination events.

Slide 19

Translation- Electromagnetic Pulse (EMP) Protection Measures The slide describes operational strategies to mitigate EMP effects, such as shielding communication systems, isolating circuits, and using hardened electronic equipment.

Analysis- EMP protection is critical for maintaining operational capability in a nuclear event. The slide likely offers practical measures for safeguarding electronic and communication systems, reducing the vulnerability of critical infrastructure. The guidance supports resilience planning and ensures the continuation of command-and-control functions during disruptions.

Slide 20

Translation- Example of Personnel Actions During Radiation Exposure The slide likely provides a visual or step- -step illustration of personnel implementing protective measures during exposure to radiation.

Analysis- A practical example of personnel actions reinforces the textual guidance provided in earlier slides. The visual likely depicts scenarios such as sheltering, decontamination, and use of protective equipment.

Summary of Analysis-

Slides 16–20 provide a mix of detailed instructions and practical examples for personnel safety during light radiation, penetrating radiation, and radioactive contamination. EMP protection measures add a strategic layer to infrastructure resilience, while visual examples reinforce training on protective actions.

Slide- -Slide Translation and Analysis (Slides 21–25)-

Slide 21

Translation- Actions of Personnel During Electromagnetic Pulse (EMP) Personnel must-

- Protect and shield critical communication and electrical systems from EMP exposure.
- Use backup systems designed to withstand EMP effects.
- Disconnect unnecessary equipment during an EMP event to prevent damage.
- Follow operational protocols for maintaining communication and electronic functionality after EMP impact."

Analysis- The slide focuses on minimizing the operational impact of EMP through proactive protection and mitigation strategies. The content ensures that personnel can safeguard essential systems during and after nuclear detonation. Guidance is crucial for keeping operational continuity in a high-stakes scenario.

Slide 22

Translation- Decontamination Measures for Personnel must-

- Exit contaminated areas as quickly as possible while minimizing exposure.
- Remove outer clothing and equipment that may have been exposed to radioactive material.
- Wash the exposed skin thoroughly with water and soap if available.
- Undergo full decontamination procedures at designated stations, including washing and changing into uncontaminated clothing."

Analysis- This slide outlines immediate and thorough decontamination protocols to reduce radiation exposure risks. The emphasis on personal hygiene and contamination control reflects the necessity of preventing external and internal radiation effects. The instructions are applicable for field operations and organized evacuation scenarios.

Slide 23

Translation- Radiation Control Procedures Personnel must-

- Regularly measure radiation levels in the area using dosimeters and other radiation detection devices.
- Report radiation levels to command structures for situational awareness.
- Mark contaminated zones clearly to warn others and prevent accidental exposure.
- Use protective gear consistently in areas with elevated radiation levels."

Analysis- Radiation control procedures ensure continuous monitoring and management of contamination risks. The instructions support operational safety, promoting situational awareness and adherence to protective measures. This slide shows the importance of communication and coordination during radiation monitoring and response activities.

Slide 24

Translation- Communication During Nuclear Events Personnel must-

- Use secure communication channels to coordinate movements and relay critical information.
- Follow command protocols for reporting observations and receiving orders.

- Ensure redundancy in communication systems to maintain contact in case of equipment failure.
- Regularly evaluate communication systems for functionality, especially under EMP or radiation exposure conditions."

Analysis- Effective communication is a cornerstone of operational success during nuclear events. The slide addresses the challenges EMP poses and other factors, emphasizing system redundancy and adherence to protocols. These measures are vital for supporting coordination and minimizing confusion during emergencies.

Slide 25

Translation- Post-Incident Recovery Actions Personnel must-

- Help in the evacuation and medical treatment of affected individuals.
- Conduct thorough assessments of affected areas to determine safety for reentry.
- Begin repair and restoration of critical infrastructure, prioritizing communication, transportation, and shelter facilities.
- Follow decontamination and recovery protocols to ensure safe working conditions."

Analysis- The slide focuses on recovery and restoration after a nuclear event. Outlining steps for evacuation, assessment, and infrastructure repair provides a framework for transitioning from emergency response to stabilization. These instructions are a well-designed post-incident recovery, minimizing long-term disruptions.

Summary of Analysis-

Slides 21–25 emphasize proactive and reactive strategies for handling nuclear explosion effects, focusing on EMP mitigation, decontamination, radiation control, and post-incident recovery. These slides highlight the operational importance of structured protocols, effective communication, and safety measures to minimize casualties and restore functionality.

Slide- -Slide Translation and Analysis (Slides 26–30)-

Slide 26

Translation- Personnel Actions During Prolonged Radiation Exposure Personnel must-

- Rotate shifts to limit individual exposure time in radiation-contaminated areas.
- Regularly check personal dosimeters to track accumulated radiation doses.
- Stay in designated safe zones when not actively engaged in operations.
- Follow medical protocols for radiation sickness prevention, including taking prescribed medications or treatments."

Analysis- This slide addresses long-term operational scenarios in radiation-contaminated environments. Emphasizing rotation, monitoring, and medical protocols ensures personnel safety while maintaining operational continuity. The slide balances the need for mission effectiveness with health preservation in high-risk areas.

Slide 27

Translation- Maintenance of Protective Equipment Personnel must-

- Inspect personal protective gear regularly for damage or wear.
- Replace or repair damaged equipment immediately to maintain its effectiveness.
- Ensure proper storage of protective gear in clean, dry, and secure locations.
- Follow all maintenance protocols for radiation monitoring devices and filtration systems."

Analysis- This slide highlights the importance of maintaining the integrity of protective equipment. Regular inspections and adherence to maintenance protocols reduce the risk of equipment failure during critical operations. The guidance reflects an understanding of the operational reliance on these tools in nuclear scenarios.

Slide 28

Translation- Training and Drills Personnel must-

- Participate in regular training exercises focused on nuclear incident response.
- Familiarize themselves with shelter locations, decontamination procedures, and communication protocols.
- Practice rapid deployment and response strategies under simulated nuclear conditions.

- Review and update response plans based on lessons learned during drills."

Analysis- Training and drills are essential for ensuring personnel readiness during nuclear events. This slide emphasizes the practical application of response plans through regular exercises. Simulations and reviews help show weaknesses in protocols, enhancing overall preparedness and operational resilience.

Slide 29

Translation- Emergency Medical Response Personnel must-

- Find and assist individuals showing signs of radiation sickness or injuries.
- Administer first aid for burns, fractures, and other physical injuries caused by the explosion.
- Evacuate casualties to medical facilities equipped to manage radiation exposure cases.
- Follow contamination control procedures to prevent secondary exposure during treatment."

Analysis- This slide provides a clear framework for medical response during nuclear events. Addressing immediate injuries and radiation sickness ensures comprehensive care. The inclusion of contamination control highlights the dual priority of treating casualties while preventing further exposure to medical personnel and facilities.

Slide 30

Translation- Long-Term Recovery and Environmental Monitoring Personnel must-

- Establish systems for continuous monitoring of radiation levels in affected areas.
- Coordinate with civil authorities and experts for decontamination and reclamation efforts.
- Evaluate the long-term health effects on affected populations and provide necessary medical support.
- Restore critical infrastructure and assess its safety for reoccupation."

Analysis- The focus on long-term recovery shows the importance of sustained efforts to mitigate the impact of nuclear events. The slide emphasizes collaboration with civil

authorities and experts, reflecting the need for decontamination, health monitoring, and infrastructure restoration.

Summary of Analysis-

Slides 26–30 expand on operational readiness and recovery strategies. The emphasis on training, equipment maintenance, medical response, and environmental monitoring ensures comprehensive preparedness and long-term mitigation of nuclear event impacts. These slides provide actionable steps for maintaining personnel safety and restoring normalcy in affected areas.

Slide- -Slide Translation and Analysis (Slides 31–36)-

Slide 31

Translation- Coordination with Civil Authorities Personnel must-

- Establish communication channels with civil defense and local authorities.
- Share information about contamination zones, evacuation routes, and safe shelters.
- Aid in organizing civilian evacuations and ensuring their safety.
- Work closely with civilian infrastructure teams to restore essential services."

Analysis- This slide emphasizes the importance of military and civilian coordination during nuclear events. Effective communication and collaboration ensure efficient evacuation, resource allocation, and recovery efforts. The guidance highlights the need for integrated planning between military and civil authorities.

Slide 32

Translation- Use of Protective Barriers and Fortifications Personnel must-

- Construct protective barriers and fortifications to shield against blast waves, radiation, and fallout.
- Use natural terrain features, such as hills and ravines, to enhance protection.
- Maintain fortifications to ensure they stay effective over time.

- Evaluate the structural integrity of shelters after an explosion to determine continued usability."

Analysis- This slide focuses on using physical protection to mitigate the effects of nuclear explosions. The guidance on constructing and maintaining fortifications aligns with operational needs for sustained safety in high-risk environments. The inclusion of terrain features shows practical adaptability in different scenarios.

Slide 33

Translation- Psychological Support for Personnel

- Monitor the mental health of team members during and after nuclear events.
- Provide counseling and support to those affected by trauma or stress.
- Encourage team cohesion and mutual support to boost morale.
- Establish communication with mental health professionals for long-term psychological recovery."

Analysis- This slide addresses the psychological toll of operating in nuclear environments. The focus on mental health ensures personal welfare, emphasizing the importance of emotional resilience and team cohesion. Access to professional support ensures long-term recovery and readiness.

Slide 34

Translation- Environmental Reclamation Personnel must-

- Collaborate with environmental specialists to assess the extent of contamination.
- Develop plans to remove or neutralize radioactive materials safely.
- Reintroduce vegetation and wildlife to restore ecological balance over time.
- Monitor the long-term effects of radiation on soil, water, and air quality."

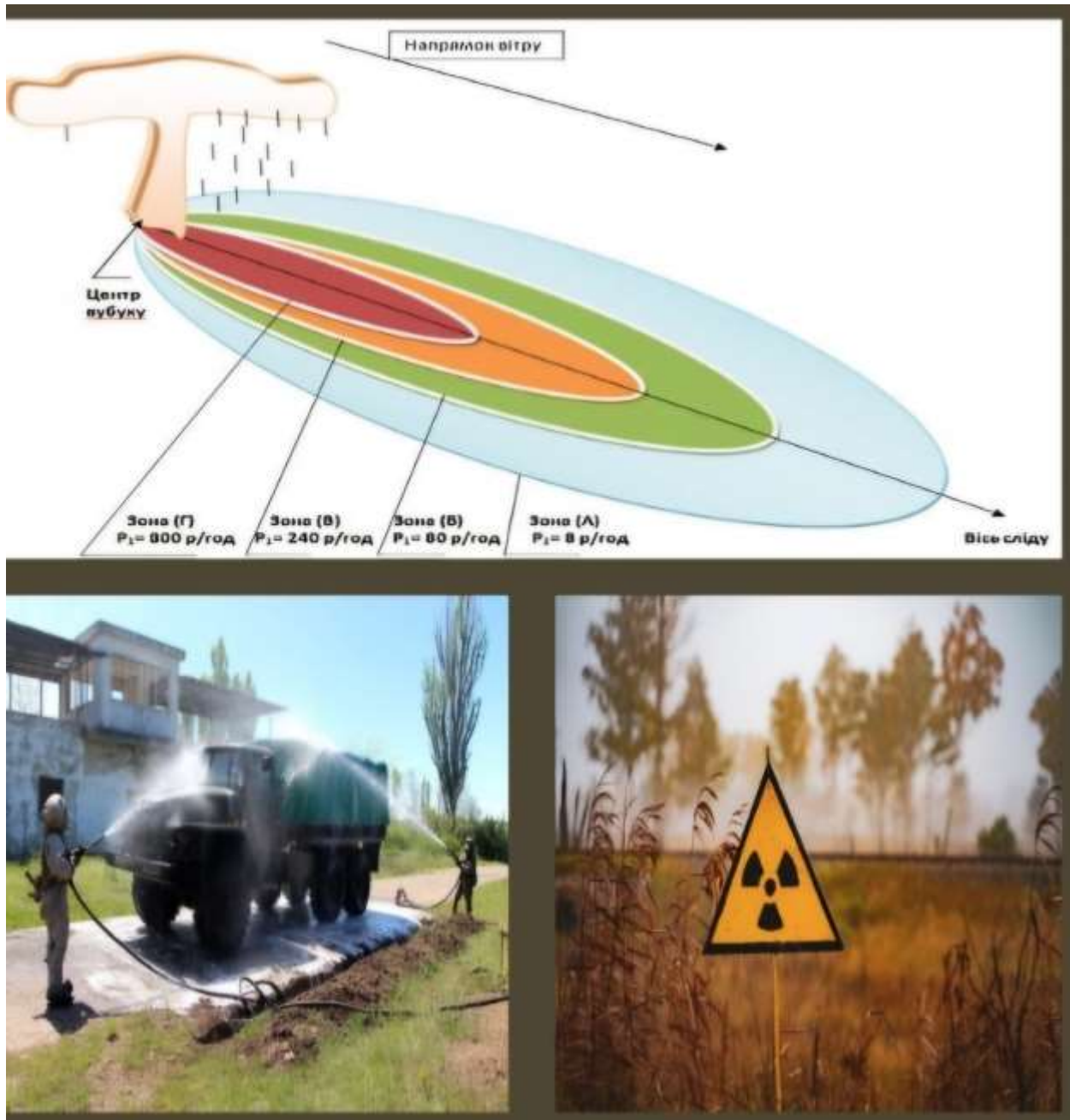
Analysis- The slide highlights the environmental impact of nuclear events and the need for reclamation efforts. Collaboration with specialists ensures scientifically sound methods for decontamination and restoration. Long-term monitoring shows commitment to ecological recovery and public safety.

Slide 35

Translation- Post-Incident Reporting Personnel must-

- Compile detailed reports on the nuclear event, including causes, impacts, and response actions.
- Analyze response effectiveness and identify areas for improvement.
- Share findings with relevant authorities and agencies to enhance future preparedness.
- Maintain accurate records for long-term analysis and historical documentation."

Analysis- This slide focuses on the importance of thorough documentation and analysis after a nuclear event. The emphasis on reporting supports continuous improvement in response strategies and ensures accountability. The information gathered also contributes to training and preparation for future scenarios.



Slide 36

Translation- Conclusion The final slide likely summarizes the main points discussed throughout the presentation, reinforcing key messages about preparedness, response, and recovery during nuclear events.

Analysis- A concluding slide serves to tie together all earlier content, leaving the audience with a clear understanding of the critical elements of nuclear event management. This

summary reinforces learning goals and ensures a cohesive narrative for the training or briefing.

Slides 31–36 conclude the presentation addressing coordination, protection strategies, psychological support, environmental recovery, and documentation. These slides highlight what is needed for effective nuclear event management, covering immediate response, long-term recovery, and lessons learned for future preparedness. The conclusion ties together all aspects, ensuring clarity and retention of critical information.

The presentation shows Ukraine's continued preparations for potential nuclear threats posed by Russia. Detailing the destructive factors of nuclear explosions and outlining specific actions for response and recovery reflects a commitment to safeguarding military personnel and civilian populations. The focus on immediate protective measures, infrastructure resilience, and long-term recovery shows a comprehensive strategy to mitigate the consequences of such an attack. Ukraine's emphasis on collaboration with civil authorities, environmental reclamation, and psychological support highlights the recognition of the broad and lasting impact of nuclear incidents. This effort serves as a warning to adversaries and a reassurance to its people that Ukraine stays prepared to confront and recover from the threats it faces. The presentation is not just a guide but a signal of resilience and determination in the face of aggression.

"Уражаючі фактори ядерного вибуху.
Дії особового складу у разі ядерного
вибуху."





У залежності від задач, розв'язуваних ядерною зброєю, від виду і розташування об'єктів, по яких плануються ядерні удари, а також від характеру бойових дій ядерні вибухи можуть бути здійснені в повітрі, у поверхні землі (води) і під землею (водою).

Відповідно до цього розрізняють наступні види ядерних вибухів:

- повітряний (високий і низький);
- наземний (надводний);
- підземний (підводний).





Ядерна зброя за своїми бойовими властивостями значно відрізняється від звичайної зброї, уражаюча дія якої ґрунтується на вибуху заряду звичайної вибухової речовини. Це відмінність полягає в тому, що потужність ядерного вибуху може бути в кілька тисяч разів більшою за потужність вибуху заряду найбільшої фугасної авіаційної бомби.

Основними факторами ядерного вибуху є:

- ударна хвиля;
- світлове випромінювання;
- проникна радіація;
- радіоактивне зараження;
- електромагнітний імпульс (ЕМІ).



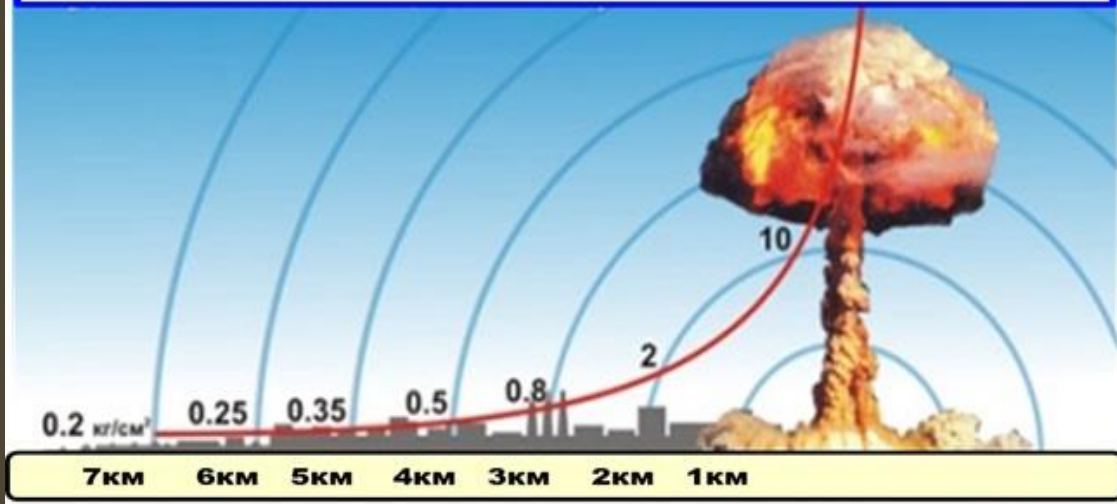
УДАРНА ХВИЛЯ

Ударна хвиля в більшості випадків є основним вражаючим фактором ядерного вибуху. Вона може на значній відстані від центра вибуху наносити поразки людям, руйнувати спорудження й ушкоджувати бойову техніку.

Ударна хвиля являє собою область сильного стиску повітря, що поширюється з великою швидкістю в усі сторони від центра вибуху. Швидкість поширення її залежить від тиску повітря у фронті ударної хвилі; поблизу центра вибуху вона в кілька разів перевищує швидкість звуку, але зі збільшенням відстані від місця вибуху різко падає. За перші 2 сек. ударна хвиля проходить близько 1000 м, за 5 сек.-2000 м, за 8 сек. близько 3000 м.



**ЗМІНА ТИСКУ УДАРНОЇ ХВИЛІ ІЗ ЗБІЛЬШЕННЯМ
ВІДСТАНІ ВІД ЦЕНТРУ ВИБУХУ (для наземного ЯВ 1Мт)**





ПРИКЛАД УДАРНОЇ ХВИЛІ ЯВ



Щ СВІТЛОВЕ ВИПРОМІНЮВАННЯ

Світлове випромінювання ядерного вибуху являє собою потік променистої енергії, що включає ультрафіолетове, видиме й інфрачервоне випромінювання.

Поглинена енергія світлового випромінювання переходить у теплову, що приводить до розігріву поверхневого шару матеріалу. Шкірний покрив людини поглинає енергію світлового випромінювання, за рахунок чого може нагріватися до високої температури й одержувати опіки. У першу чергу опіки виникають на відкритих ділянках тіла, повернених убік вибуху. Якщо дивитися убік вибуху незахищеними очима, то можливе ураження очей, що приводить до повної втрати зору.





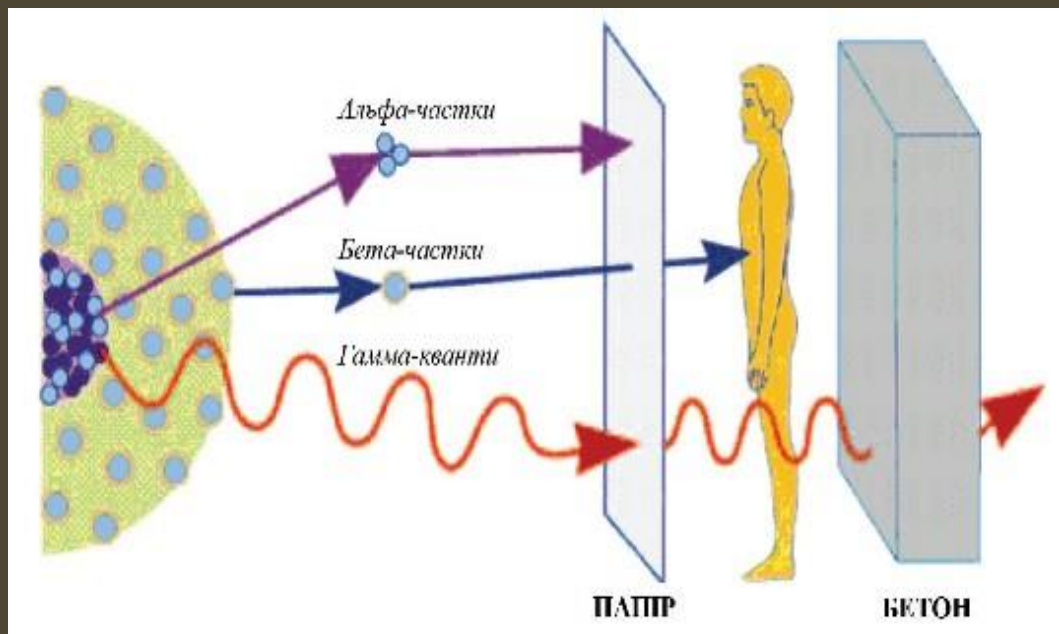
ПРИКЛАД СВІТЛОВОГО ВИПРОМІНЮВАННЯ ЯВ





ПРОНИКАЮЧА РАДІАЦІЯ

Проникаюча радіація являє собою невидимий потік гама квантів і нейтронів, що випускаються з зони ядерного вибуху. Вони поширюються в усі сторони від центра вибуху на сотні метрів. Зі збільшенням відстані від вибуху кількість гама квантів і нейтронів, що проходить через одиницю поверхні зменшується.



Для боєприпасів з невеликим тротилловим еквівалентом (1000 тон і менш) навпаки, зони вражаючої дії проникаючою радіацією перевершують зони поразки ударною хвилею і світловим випромінюванням. Проходячи через живу тканину, гама кванти і нейтрони іонізують атоми і молекули, що входять до складу кліток, що приводять до порушення життєвих функцій окремих органів і систем.



ПРИКЛАД ПРОНИКАЮЧОЇ РАДІАЦІЇ ЯВ



UV

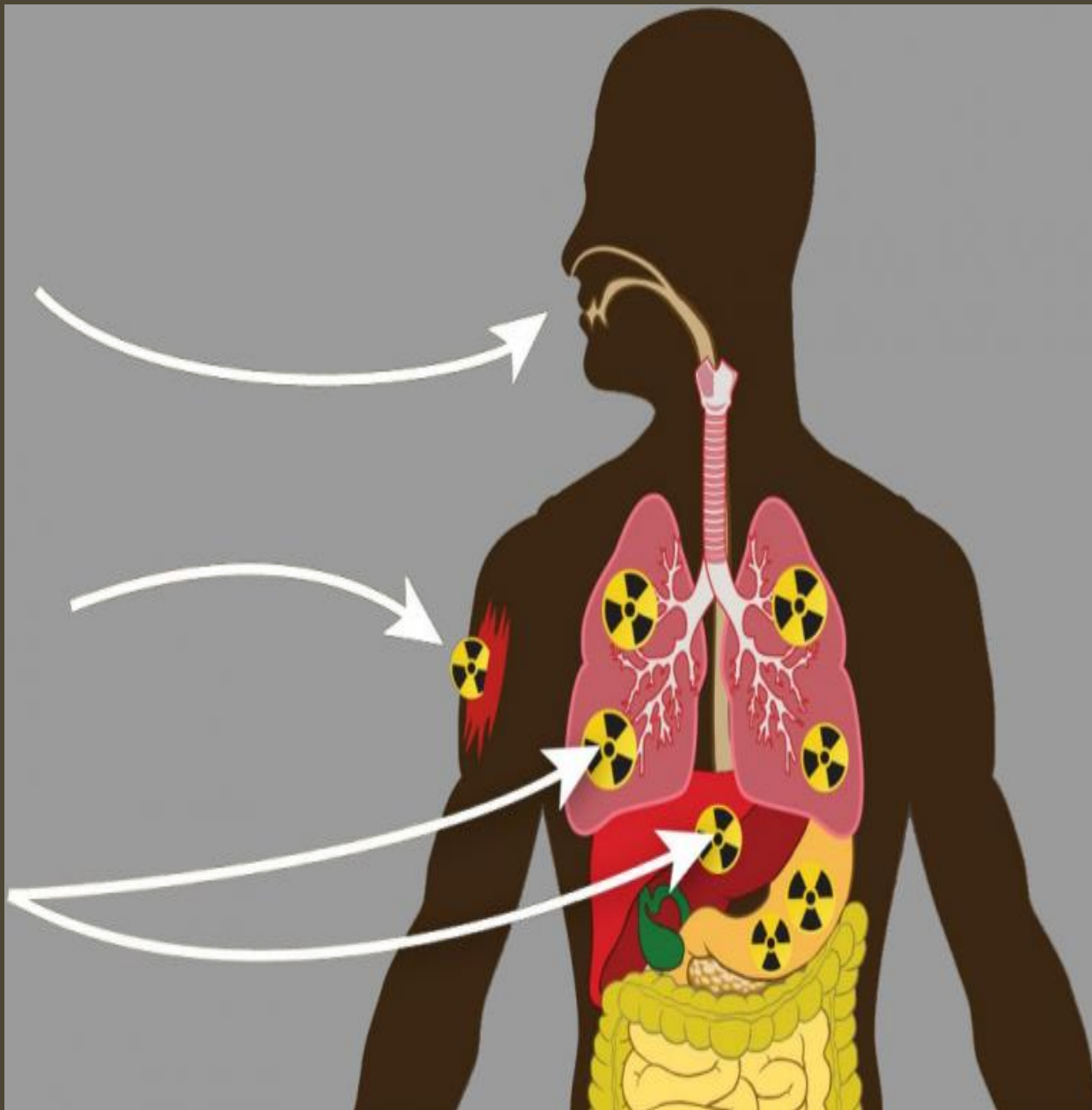
A hand-drawn diagram of a wavy line representing electromagnetic radiation, with an arrow at the end pointing upwards and to the left.

X-Ray

A hand-drawn diagram of a wavy line representing electromagnetic radiation, with an arrow at the end pointing upwards.

Gamm

A hand-drawn diagram of a wavy line representing electromagnetic radiation, with an arrow at the end pointing upwards and to the right.



РАДІОАКТИВНЕ ЗАРАЖЕННЯ

Радіоактивне зараження – це забруднення території продуктами ядерної реакції, як наслідок випадання радіоактивних речовин із хмари ядерного вибуху, зумовленої утворенням радіоактивних ізотопів у довкіллі під впливом миттєвого нейтронного і гамма-випромінювання ядерного вибуху, що вражає людей і тварин, головним чином, у наслідок зовнішнього гамма -і (в меншому ступені) бета-опромінення, а також унаслідок внутрішнього опромінення при попаданні радіоізотопів в організм з повітрям, водою та їжею.



ЕЛЕКТРОМАГНІТНИЙ ІМПУЛЬС (ЕМІ)

ЕМІ впливає перш за все на радіоелектронну і електротехнічну апаратуру. Під дією ЕМІ у вказаній апаратурі наводяться електричні поля і напруги, які можуть викликати пробій ізоляції, ушкодження трансформаторів, згорання розрядників, псування напівпровідникових приладів, перегорання плавких вставок й інших елементів радіотехнічних пристроїв. Найбільш уразливі для впливу ЕМІ лінії зв'язку, сигналізації і управління.



ПРИКЛАД ЕЛЕКТРОМАГНІТНОГО ІМПУЛЬСУ ЯВ

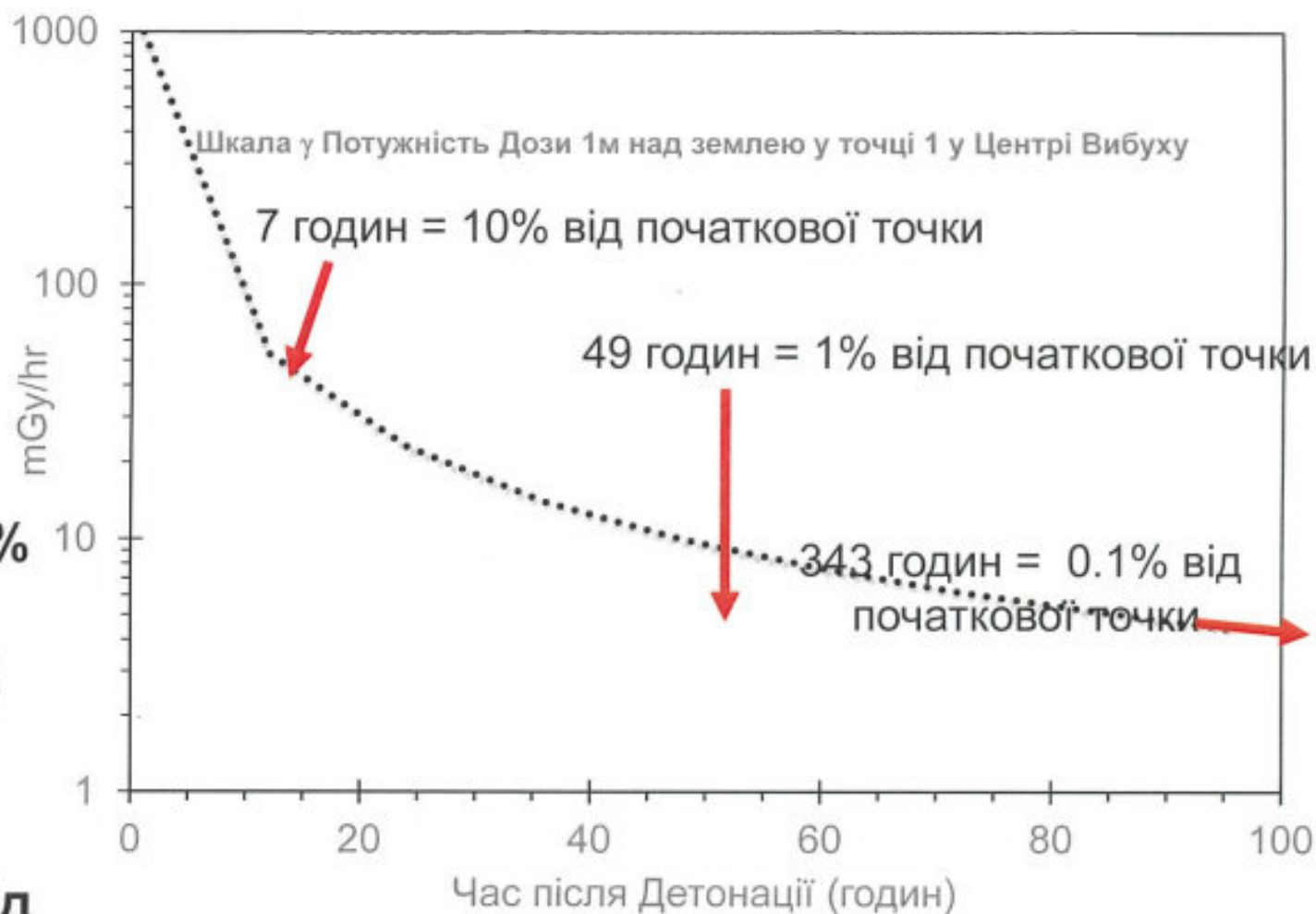
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ПРИКЛАД ЗМЕНШЕННЯ ПОТУЖНОСТІ ВИПРОМІНЮВАННЯ З ЧАСОМ

- При збільшенні часу після вибуху у сім разів, спостерігається зменшення радіації вдесятеро.
- Приклад:
 - Після 7 годин, рівень радіації зменшується до 10%
 - Після 49 годин, рівень радіації зменшується до 1%
- Актуально тільки для загальної кількості радіації від ядерного вибуху (не за окремими ізотопами)





ПРИКЛАД УРАЖЕННЯ ВІД ЯДЕРНОЇ ЗБРОЇ

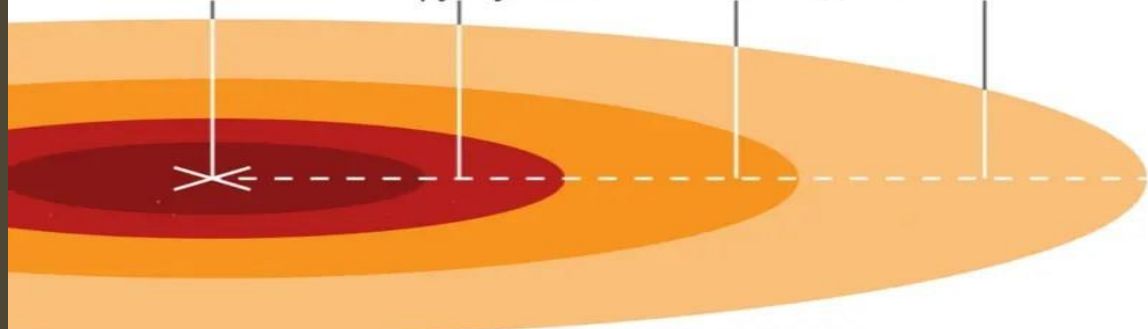
Зони ураження від ядерної зброї 100 кТ

до 1,8 км
повне руйнування

до 3 км
сильне
руйнування

до 5 км
важкі
пошкодження

до 8 км
пошкодження



Вогняна куля

Знищує будівлі, об'єкти та людей



Ударна хвиля

Смерть, травми, руйнування



Радіація

Пошкодження клітин організму може викликати променеву хворобу



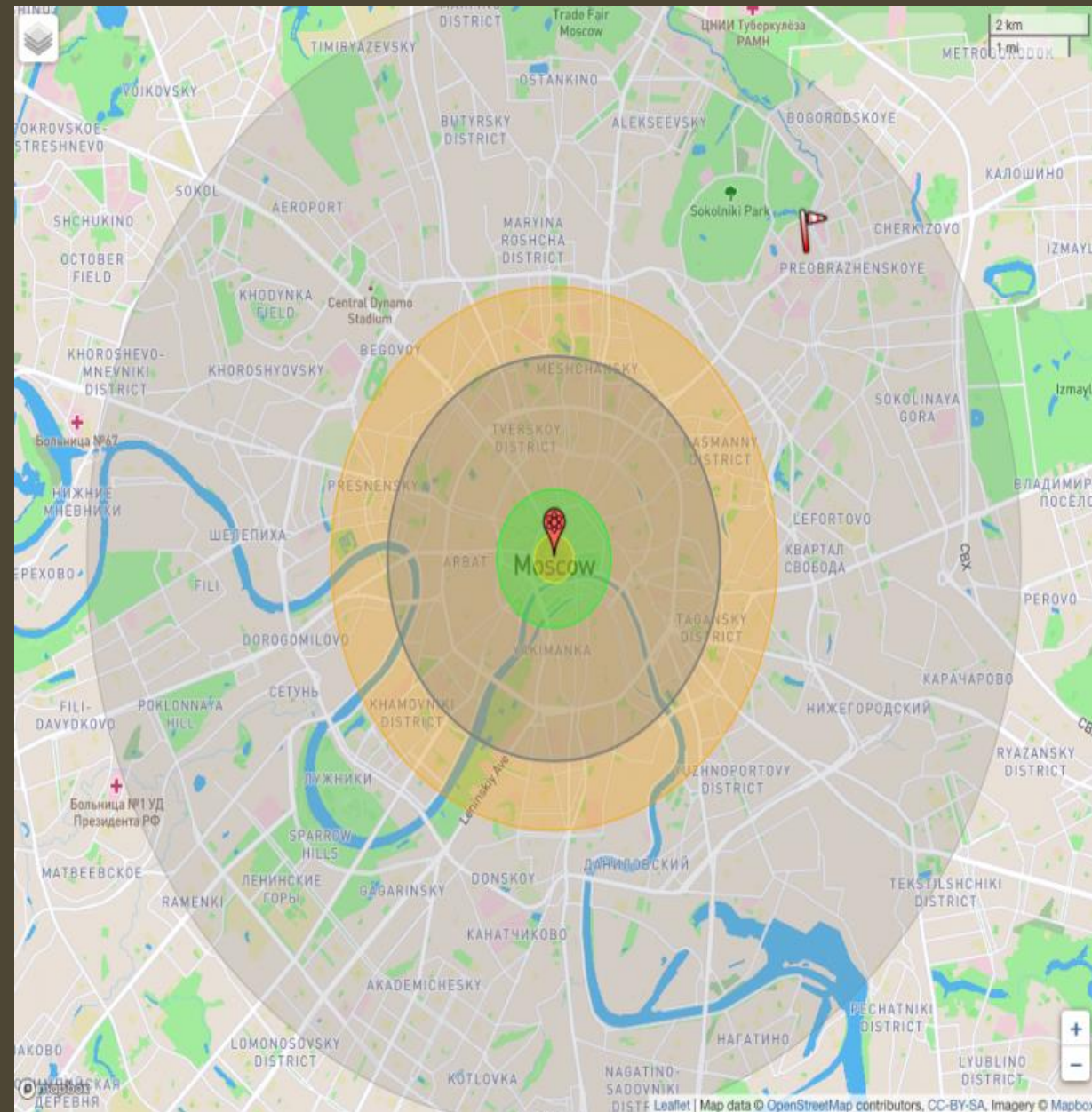
Електромагнітний імпульс

Пошкоджує електронні прилади за кілька кілометрів від детонації



Ядерні опади

Радіоактивний пил і уламки, які падають на землю приблизно через 15 хвилин після вибуху, можуть викликати захворювання





ДІЇ ОСОБОВОГО СКЛАДУ ПРИ УДАРНІЙ ХВИЛІ ЯВ

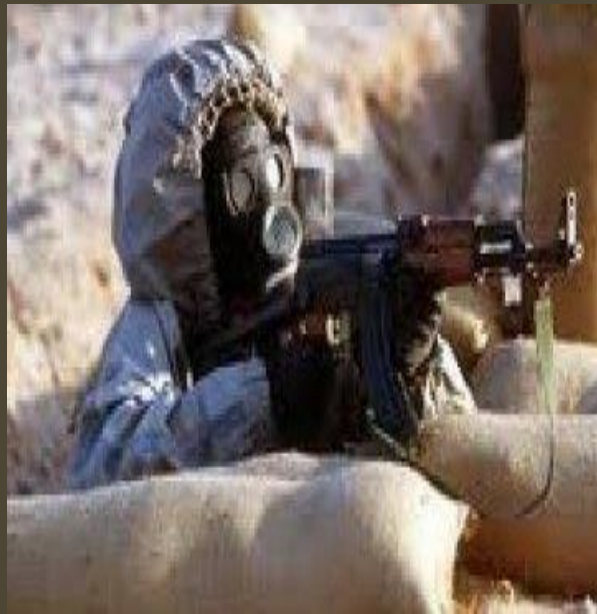


Особовий склад повинен:

- негайно переміститися до укриття (окопи, траншеї, ходи сполучення, бліндажі та інші укриття);
- лягти на землю та покрити голову та шию будь-яким предметом, що може захистити від уламків і вибухових хвиль, якщо немає можливості знайти укриття;
- одягти протигаз, а в разі відсутності, прикрити рот і ніс маскою, тканиною одягу та дихати через них поки не потрапите в укриття;
- при перебуванні у БМ закрити люки та жалюзі та не покидати їх.



ДІЇ ОСОБОВОГО СКЛАДУ ПРИ СВІТЛОВОМУ ВИПРОМІНЮВАННІ ЯВ



Особовий склад повинен:

- негайно переміститися до укриття (окопи, траншеї, ходи сполучення, бліндажі та інші укриття);
- негайно надіти захисні окуляри та ні в якому разі не дивитися в напрямку епіцентру викиду незахищеними очима;
- по можливості знаходитися в техніці із закритими люками;
- в подальшому діяти за отриманими по засобах зв'язку вказівками командира.



ДІЇ ОСОБОВОГО СКЛАДУ ПРИ ПРОНИКАЮЧІЙ РАДІАЦІЇ ЯВ

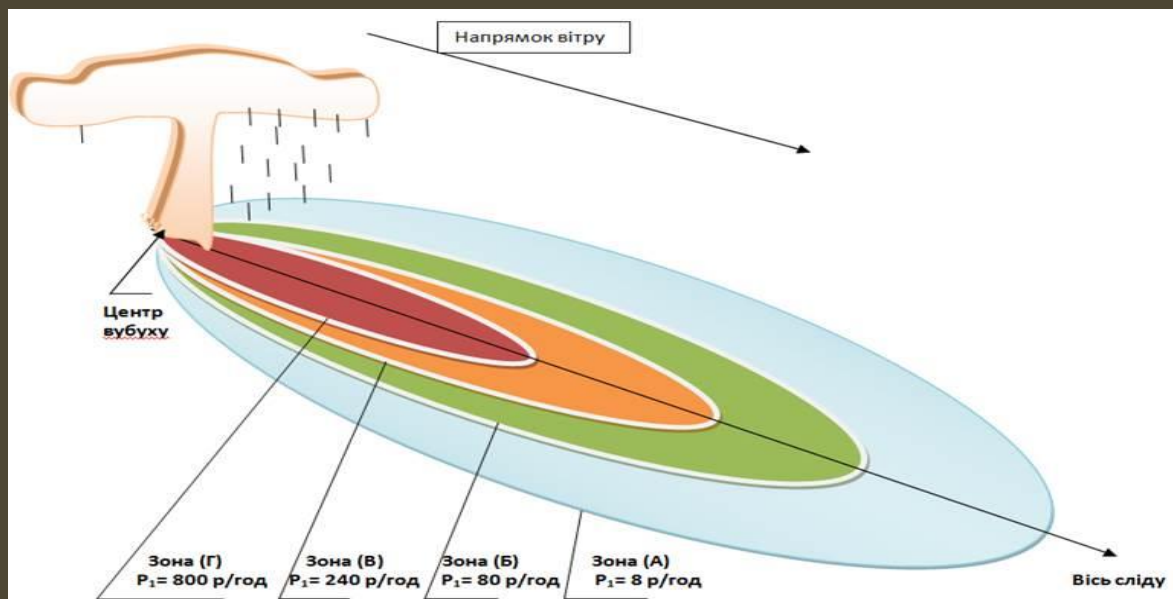


Особовий склад повинен:

- негайно переміститися до укриття (окопи, траншеї, ходи сполучення, бліндажі та інші укриття);
- негайно одягти засоби індивідуального захисту;
- при перебуванні у БМ закрити люки та жалюзі, одягти засоби індивідуального захисту та не покидати їх.
- включити фільтровентиляційні установки;
- в подальшому діяти за отриманими по засобах зв'язку вказівками командира.



ДІЇ ОСОБОВОГО СКЛАДУ ПРИ РАДІАКТИВНОМУ ЗАРАЖЕНІ ЯВ



- Особовий склад повинен:
- негайно переміститися до укриття (або за пагорбами, насипом, в ярах, кюветі, бліндажі, перекритій щілині);
 - негайно одягти засоби індивідуального захисту;
 - при перебуванні у БМ закрити люки та жалюзі, включити прилади радіаційного контролю (при наявності);
 - включити фільтровентиляційні установки;
 - вийти (виїхати) з зони зараження у безпечну зону та пройти спеціальну обробку (при можливості);
 - в подальшому діяти за отриманими по засобах зв'язку вказівками командира.