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IAEA



STUDY GUIDE

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Letter from the Dias:

It is our great pleasure to welcome you to the International Atomic Energy Agency (IAEA). It is an honour to serve as your Dais, and we look forward to the insightful discussions, constructive debates, and innovative ideas you will bring to the committee. The purpose of this study guide is to provide you with a strong foundation for understanding the agenda and beginning your preparation. However, we encourage you to explore the topic further, conduct independent research, and come prepared with well-informed arguments and thoughtful perspectives. We look forward to meeting you in committee, hearing your contributions, and witnessing the meaningful discussions you bring to the floor. We wish you the very best of luck with your preparation.

The Committee:

The International Atomic Energy Agency (IAEA) is an international organization within the United Nations system that serves as the world's central intergovernmental forum for scientific and technical cooperation in the peaceful use of nuclear energy. Established in 1957 and headquartered in Vienna, Austria, the IAEA works with its Member States to promote the safe, secure, and peaceful use of nuclear technology while preventing the proliferation of nuclear weapons. The Agency operates under the principle of "Atoms for Peace and Development" and supports the use of nuclear science in areas including energy, medicine, agriculture, industry, and environmental protection. One of the IAEA's primary responsibilities is implementing safeguards to verify that nuclear material and technology are not diverted toward nuclear weapons or other military purposes. Under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the IAEA plays a central role in verifying states' compliance with their nonproliferation obligations through inspections, monitoring, and verification measures. The IAEA also develops international safety standards and assists Member States in strengthening nuclear safety, emergency preparedness, radiation protection, and nuclear security. Unlike the United Nations Security Council, the IAEA does not have the authority to deploy military forces or impose sanctions itself; however, its Board of Governors can address cases of non-compliance and, where appropriate, report them to the UN Security Council and General Assembly. The Agency is governed by a General Conference consisting of all Member States and a 35-member Board of Governors, which oversees the IAEA's policies, programmes, and activities.

The Topic:

The Chernobyl catastrophe occurred on 26 April 1986 at Unit 4 of the Chernobyl Nuclear Power Plant in the Ukrainian SSR, then part of the Soviet Union. During a safety test, a combination of reactor design deficiencies, inadequate operating procedures, human and organizational failures, and weaknesses in safety oversight contributed to the accident. The disaster demonstrated that nuclear safety cannot depend solely on the technical design of a reactor, but must also include strong regulation, effective communication, operator training, emergency preparedness, and a sustained safety culture. The IAEA's investigations identified shortcomings including inadequate communication between designers, engineers, operators, and regulators, insufficient feedback from operating experience, and unclear lines of responsibility. The accident therefore shifted international attention toward systematic failure modes, meaning failures that arise from the interaction of technical, human, organizational, and regulatory weaknesses rather than from a single mistake. The concept of safety culture became particularly important after Chernobyl, emphasizing that nuclear safety must remain a fundamental priority at every level of an organization. Operational safety also requires reliable monitoring systems, clear procedures, competent and adequately trained personnel, independent regulatory oversight, regular safety assessments, and mechanisms for learning from previous incidents. Emergency preparedness is equally important because a nuclear accident can have consequences extending beyond the boundaries of the facility and potentially across national borders. The agenda therefore focuses on strengthening nuclear facilities against both technical failures and human or organizational weaknesses, improving containment and emergency-response standards, ensuring effective regulatory oversight, and establishing systems that identify and correct safety weaknesses before they develop into major accidents.

Historical Background:

The peaceful use of nuclear energy expanded significantly during the second half of the 20th century, with nuclear power plants becoming an important source of electricity in many countries. Initially, the safety of nuclear facilities was largely considered a national responsibility, with countries developing and regulating their own nuclear safety systems. However, the Chernobyl accident on 26 April 1986 fundamentally changed this approach. A reactor at the Chernobyl Nuclear Power Plant in the Ukrainian SSR was destroyed, releasing large quantities of radioactive material into the environment and affecting areas far beyond the Soviet Union. Chernobyl demonstrated that a nuclear accident could have transboundary consequences, meaning that weaknesses in one country's nuclear facility could affect other countries as well. This created greater pressure for international cooperation on nuclear safety, emergency notification, information sharing, and assistance. In the months following the accident, the IAEA expanded its work on nuclear safety, while two important international agreements— the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency —were developed in 1986. The accident also encouraged the international community to examine why nuclear accidents occur, rather than focusing only on the immediate technical failure. Investigations increasingly considered reactor design, human error, management, regulation, safety culture, communication, and emergency preparedness as interconnected factors. This broader understanding is important to the current agenda because the term "systematic failure modes" refers to failures that can exist across several levels of a nuclear safety system rather than a single mistake considered reactor design, human error, management, regulation, safety culture, communication, and emergency preparedness as interconnected factors. This broader understanding is important to the current agenda because the term "systematic failure

modes” refers to failures that can exist across several levels of a nuclear safety system rather than a single mistake. The international nuclear safety framework continued to develop after Chernobyl. The Convention on Nuclear Safety (CNS) was negotiated in the 1990s and entered into force in 1996, establishing legally binding commitments concerning the safety of civilian nuclear power plants. The later Fukushima Daiichi accident in 2011, caused by a major earthquake and tsunami, again demonstrated the importance of examining whether existing safety assumptions, emergency arrangements, and containment measures were adequate for severe and unexpected events. Following the development of these international mechanisms, the IAEA and other international bodies continued to promote cooperation between nuclear operators, regulators, and governments. Greater emphasis was placed on sharing safety information, conducting safety assessments, improving emergency preparedness, and strengthening regulatory oversight. The international community also began to recognize that nuclear safety depended not only on the physical design of a reactor, but also on the effectiveness of the organizations and people responsible for operating and regulating it. The importance of these measures was reinforced by the Fukushima Daiichi accident in 2011. The accident demonstrated that severe natural disasters could challenge existing assumptions about reactor safety, emergency preparedness, and containment systems. In response, the international nuclear community undertook further safety reviews and reassessed existing standards and practices. These developments are directly relevant to the present agenda because they show that nuclear safety standards must be continuously evaluated and improved based on lessons from previous accidents, rather than being treated as permanently sufficient.

Key Terms and Definitions:

Nuclear safety, nuclear security and safeguards

Nuclear safety means preventing accidents and limiting their consequences. It is about protecting people and the environment from radiation risks that come from the plant's own design, operation or failures. Nuclear security means protecting nuclear material and facilities from deliberate acts such as theft, sabotage or attack. Safeguards are the IAEA's verification activities, based on legally binding agreements, that check nuclear material is not diverted to weapons. This topic is mainly about safety, but armed conflict and sabotage now blur the line with security.

Defense in depth

Defense in depth is the core safety idea behind modern reactor design. It places several independent layers of protection between a fault and a release of radioactivity: a robust design, reliable normal operation, safety systems that act automatically, accident management procedures, and off-site emergency response. If one layer fails, the next should still hold. Chernobyl-4 failed because several layers were weak or absent at once.

Containment and confinement

Containment is the final physical barrier, usually a strong, leak-tight building around the reactor that holds in radioactive material if fuel and the cooling circuit fail. Chernobyl's RBMK design had no fullpressure containment of this kind over the reactor core, so the explosion released material straight into the atmosphere. Confinement is a looser term for any structure that keeps radioactive material in place, such as the New Safe Confinement now built over the destroyed Unit 4.

Safety culture

The IAEA's advisory group INSAG defined safety culture in 1991 as the attitudes and characteristics of organizations and individuals that make nuclear safety the overriding priority. In practice it means a questioning attitude, honest reporting of problems, clear lines of responsibility and a refusal to trade safety for schedule. The post-accident investigation of Chernobyl treated its absence as a central cause.

Systematic failure and common-cause failure

A systematic failure comes from a flaw in design, procedure, management or regulation, so it can recur wherever the same flaw exists. A common-cause failure is one event, such as flooding, fire, loss of power or an organizational habit, that disables several safety systems at the same moment. Both defeat the redundancy that engineers rely on, which is why this committee's topic focuses on them.

Reactor physics terms from Chernobyl

The positive void coefficient describes a reactor in which steam bubbles in the coolant make the chain reaction speed up instead of slow down. The RBMK had this property at low power. A scram is an emergency shutdown by rapid insertion of control rods. At Chernobyl, a design flaw in the rods meant insertion could briefly add reactivity before reducing it. The operatingreactivity margin is the reserve of control capacity the operators must keep; the reactor was

Emergency preparedness and response

This covers planning, drills, communication and protective actions (sheltering, iodine tablets, evacuation) that apply if a release occurs. It also covers the source term, the amount and type of radioactive material released, which drives how large an exclusion zone and response area must be.

Design basis, beyond-design-basis and severe accidents

A design basis accident is one the plant is explicitly engineered to withstand. A beyond-design-basis event exceeds those assumptions, and a severe accident involves significant core damage. After Fukushima, regulators began asking plants to show they can cope with events beyond the original design, such as extreme floods and extended loss of power.

Assessment and oversight tools

Probabilistic safety assessment estimates how likely different accident sequences are. A periodic safety review is a systematic reassessment of a plant against current standards, usually every ten years. Longterm operation means running a reactor beyond its original design lifetime, which requires ageing management. A peer review is an invited international team assessing a plant or regulator against IAEA standards. The International Nuclear and Radiological Event Scale (INES) rates events from level 1 to 7; Chernobyl and Fukushima Daiichi are both level 7.

Standards hierarchy

The IAEA Safety Standards Series has three tiers: Safety Fundamentals (the principles), Safety Requirements (what must be met) and Safety Guides (how to meet them). None is legally binding on member states, but they bind the IAEA in its own work and apply to states receiving IAEA assistance.

Past UN Actions:

1. Immediate International Response to the Chernobyl Accident — 1986

Following the Chernobyl accident on 26 April 1986, the international community increased cooperation on nuclear safety and emergency response. The IAEA Board of Governors called for greater international cooperation, improved information exchange, and stronger nuclear-safety activities. The IAEA also worked with WHO, WMO, UNSCEAR, FAO, ILO and UNEP to improve the international response to accidental releases of radioactive material.

2. Convention on Early Notification of a Nuclear Accident — 1986

In response to the need for rapid international communication after Chernobyl, the IAEA adopted the Convention on Early Notification of a Nuclear Accident in 1986. The Convention established an international framework for states to promptly notify potentially affected countries and the IAEA when a nuclear accident could result in a release of radioactive material with possible transboundary consequences.

3. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency — 1986

The IAEA also developed the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency in 1986. It established a framework through which states can cooperate and provide assistance, expertise and resources during nuclear or radiological emergencies. These two 1986 conventions became important parts of the international emergencyresponse framework following Chernobyl.

4. UN General Assembly Resolution 41/212 — 1986

The General Assembly adopted Resolution 41/212, “United Nations Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy.” The resolution supported international cooperation concerning the peaceful use and safety of nuclear energy and recognized the role of the IAEA as the central organization for peaceful nuclear cooperation.

5. UN General Assembly Resolution 42/24 — 1987

In 1987, the General Assembly adopted Resolution 42/24, which encouraged continued international cooperation concerning peaceful nuclear energy. It recognized that the technical work of the UN conference could contribute to programmes concerning the development, use and safety of nuclear energy, and requested the IAEA to continue its work in cooperation with relevant UN organizations.

6. Strengthening International Nuclear Safety Standards

Following Chernobyl, the UN system and the IAEA significantly expanded international nuclear-safety cooperation. The UN notes that four international safety conventions, two Codes of Conduct, fundamental safety principles and internationally recognized IAEA Safety Standards were subsequently developed. These measures strengthened international cooperation concerning reactor safety, emergency preparedness, radiation protection and the protection of people and the environment.

7. Convention on Nuclear Safety — 1994– 1996

The Convention on Nuclear Safety (CNS) was adopted in 1994 and entered into force in 1996. It established legally binding commitments for participating states concerning the safety of civilian nuclear power plants. Its framework covers areas including legislation and regulation, regulatory bodies, safety assessment, emergency preparedness and the responsibilities of nuclear-facility operators. This represented a major development in the international nuclear-safety framework following Chernobyl.

8. UN General Assembly Action on the Chernobyl Consequences — 1990–2005

The General Assembly adopted a continuing series of resolutions addressing the consequences of Chernobyl, beginning with Resolution 45/190 (1990) and followed by 46/150 (1991), 47/165 (1992), 48/206 (1993), 50/134 (1995), 52/172 (1997), 54/97 (1999), 56/109 (2001), 58/119 (2003), and 60/14 (2005). These actions focused on international cooperation and coordination to study, mitigate and minimize the health, environmental, social and economic consequences of the disaster. Resolution 55/171 (2000) additionally addressed the closure of the Chernobyl nuclear power plant.

9. UN General Assembly Resolution 62/9 — 2007

The General Assembly adopted Resolution 62/9, “Strengthening of international cooperation and coordination of efforts to study, mitigate and minimize the consequences of the Chernobyl disaster.” It called for continued coordination through the UN system, further research into the health, environmental and socio-economic consequences of Chernobyl, and continued cooperation with Belarus, the Russian Federation and Ukraine. It also designated 2006–2016 as the Decade of Recovery and Sustainable Development of the Affected Regions.

10. UN Secretary-General's Follow-Up Report — 2010

In accordance with Resolution 62/9, the UN Secretary-General issued A/65/341, "Optimizing the international effort to study, mitigate and minimize the consequences of the Chernobyl disaster." The report reviewed international efforts and included information from Belarus, the Russian Federation and Ukraine concerning their work to address the consequences of the accident.

11. Fukushima Daiichi and the Continued Review of Nuclear Safety — 2011

The Fukushima Daiichi accident in March 2011 prompted renewed international attention to nuclear safety. The accident demonstrated the importance of reassessing reactor safety, emergency preparedness, severe-accident management and the ability of safety systems to withstand extreme external events. The UN system and IAEA subsequently continued work on strengthening nuclear-safety practices and applying lessons learned from the accident. Overall UN Involvement The international response to Chernobyl therefore developed from emergency notification and international assistance into a broader nuclear-safety framework involving international conventions, safety standards, regulatory cooperation, emergency preparedness, scientific assessment and long-term recovery programmes. The experience of Chernobyl, followed by later accidents such as Fukushima, established the basis for continuously evaluating whether operational safety systems, safety culture and containment measures are adequate to prevent or limit the consequences of major nuclear accidents.

Important international organizations and actors:

IAEA advisory and review bodies

The International Nuclear Safety Advisory Group (INSAG) is an independent expert panel created by the IAEA in the mid-1980s. It produced the Chernobyl analyses INSAG-1 (1986) and INSAG-7 (1992) and the safety culture concept in INSAG-4. Its work is the main intellectual source for this topic. The IAEA also runs OSART (Operational Safety Review Team) missions to individual plants and IRRS (Integrated Regulatory Review Service) missions to national regulators. Both are only carried out at a state's invitation.

The OECD Nuclear Energy Agency

The NEA, based in Paris, brings together mainly industrialized countries and runs technical committees on reactor safety, regulation and accident research. It codeveloped INES with the IAEA and supports shared research on severe accidents and ageing.

The World Association of Nuclear Operators

WANO was founded in 1989, three years after Chernobyl, as an association of every nuclear plant operator in the world. It works through peer reviews and exchange of operating experience among operators, not through governments. Its strength is that operators will accept criticism from peers who share their jobs; its weakness is that results are largely confidential and carry no legal force. Check the current status of Russian participation before citing WANO membership figures, since participation has been contested since 2022.

European institutions

The European Union's Euratom framework requires member states to maintain a national nuclear safety framework under directive 2009. ENSREG (the European Nuclear Safety Regulators Group) coordinates EU regulators, and WENRA (the Western European Nuclear Regulators Association) publishes safety reference levels that many regulators adopt. These bodies show how a group of states can make safety expectations much firmer than the IAEA's global voluntary system.

Financial institutions and donor groups

The European Bank for Reconstruction and Development (EBRD) created the nuclear safety account in 1993 for urgent upgrades of Soviet-type reactors, and in 1997 it began managing the Chernobyl Shelter Fund at the request of the G7 and the European Commission. The G7 has been the political engine behind much of the funding. These actors matter because safety improvement often depends on money as much as on rules.

Scientific and professional bodies

The International Commission on Radiological Protection (ICRP) issues recommendations on dose limits that national laws draw on. UNSCEAR is a UN scientific committee that assesses radiation levels and effects, and its Chernobyl findings are the reference health data in this debate (see section 8). The World Health Organization and the Food and Agriculture Organization also contributed to postaccident health and food safety work.

Industry and civil society

The World Nuclear Association represents the industry and promotes expansion of nuclear power. Groups such as Greenpeace and IPPNW (International Physicians for the Prevention of Nuclear War) criticize nuclear power and often dispute official casualty estimates. Delegates should expect both viewpoints in sources and treat each with care.

Key national bodies

Ukraine's regulator is the State Nuclear Regulatory Inspectorate (SNRIU), and its operator is Energoatom. Russia's state corporation Rosatom operates reactors at home and builds them abroad. These actors are central to the current Zaporizhzhia and Chornobyl debates.

Major Stakeholders:

States with large operating fleets

Countries such as the United States, France, China, Russia, South Korea, Japan and India run most of the world's reactors. They want safety rules that are credible but that do not impose new costs or give outsiders power over national regulators. Their regulators usually already exceed IAEA standards, so they prefer to export their own models of oversight rather than accept new mandatory ones.

Newcomer and expanding nuclear states

States building or planning their first plants, such as Bangladesh, Egypt, Türkiye, Poland and several African and Gulf states, need regulators, trained staff, emergency plans and financing at the same time. Their main interest is technical cooperation and affordable assistance. They often fear that strict new conditions could slow development or favor established suppliers.

States directly affected by Chernobyl

Ukraine, Belarus and Russia received the heaviest contamination in 1986. Ukraine carries the legacy of the site, the exclusion zone and ongoing cleanup, now under war conditions. Belarus has contaminated land and has since built its own plant at Ostrovets. Their interest is continued funding for remediation, health care and monitoring.

Neighbouring states exposed to crossborder risk

Accidents ignore borders. Lithuania, Poland, the Baltic and Nordic states, Moldova and others in Europe worry about reactors close to their territory, especially Zaporizhzhia and Ostrovets. They push for early notification, independent inspections and a voice in decisions about foreign plants near their borders.

Non-nuclear and anti-nuclear states

Austria is the best-known example, with a long-standing opposition to nuclear power, but many states without reactors also take part in the Convention on Nuclear Safety. They tend to support binding rules, transparency and liability provisions, and they often argue that those who benefit from nuclear power must bear its risks.

Reactor vendors and exporters

Companies and state corporations such as Rosatom, Westinghouse, EDF, KEPCO and China's CNNC compete to build plants abroad. Safety standards affect their costs and their reputation. Russia's export model includes fuel supply and often financing, which gives it large influence over newcomer states' safety practices.

Operators, utilities and regulators

Operators bear the day-to-day responsibility for safety, and their profit pressures can work against it, which is why independent regulators matter. Regulators want independence, resources and legal authority. The IAEA's Statute and standards both assume that the national regulator, not the IAEA, holds primary responsibility for safety.

Financing states and development banks

Donor governments and institutions such as the EBRD fund much of the safety upgrading in poorer or post-Soviet states. Their interest is measurable results, accountability for how money is spent, and avoiding open-ended commitments.

Workers and affected communities

Plant staff, emergency workers and nearby residents carry the physical risk. After Chernobyl, the evacuated populations and liquidators also faced lasting health, psychological and economic harm. Their interests include honest information, health monitoring, compensation and a real say in emergency planning.

Scientific and public-health community

Scientists and health agencies want reliable data and long-term monitoring. Their disagreements over casualty numbers (see section 8) show why consistent, transparent reporting is itself a safety topic.

Country Positions and Nuclear Profiles:

Ukraine

Ukraine operates 15 reactors and drew about 55 percent of its electricity from nuclear power in 2021. Its position is that Russia must leave the Zaporizhzhia plant, that the IAEA must have full access, and that all parties must respect the Seven Pillars. It also stresses that Chornobyl's New Safe Confinement was damaged by a drone in February 2025, which shows that even protected sites are vulnerable.

Russian Federation

Russia has 36 operating reactors, exports plants through Rosatom, and its forces have controlled Zaporizhzhia since March 2022. Russia says it follows the IAEA Director General's principles and blames Ukraine for attacks near the plant. It prefers technical discussion with the IAEA over political resolutions at the Board, and it is likely to object to texts that name it. It still operates RBMK-type reactors, which have been modified since 1986 but share the same basic design.

Belarus

Belarus received heavy contamination in 1986 and now runs two Russian-built units at Ostrovets, which began operation in 2020 and 2023. Neighbours including Lithuania have criticized the siting and safety record. Belarus defends the plant as meeting IAEA standards and views criticism as political.

United States

The United States has the world's largest fleet and an independent regulator, the Nuclear Regulatory Commission. It supports IAEA peer reviews and Ukrainian sovereignty, favoursvoluntary standards over binding ones, and promotes advanced and small modular reactors. It is cautious about any measure that would let an international body override a national regulator.

France

France has 57 reactors and a very high nuclear share of electricity. Its safety regulator is now the ASNR, created by merging the former ASN and IRSN in 2025. France supports strong peer review and European-style regulation, and it exports technology and expertise, so it tends to support measures that raise global standards without sacrificing industrial competitiveness.

China

China operates 58 reactors with about 57 GWe and was building 29 more in late 2025. It emphasizes sovereignty, voluntary cooperation and technical assistance, and it supports the IAEA's role as a technical body. It will likely resist anything that looks like intrusive inspection of safety.

Japan

Japan's experience at Fukushima Daiichi gives it strong standing in this topic. It created an independent regulator in 2012, has restarted reactors one by one, and supports transparency and sharing of lessons. It will usually back stronger peer review, emergency preparedness and funding for training.

India and Pakistan

Both operate growing fleets and are outside the NPT. India made a declaration at signing that the Convention on Nuclear Safety should cover military as well as civil plants, and it wants access to international cooperation. Both states value voluntary standards and technical cooperation and will resist conditions tied to nonproliferation status.

South Korea and the United Arab Emirates

South Korea and the UAE are linked by the Barakah project, which South Korean industry built. The UAE is often presented as a model newcomer, with a regulator and training in place before operation. Both favour IAEA-supported capacity-building and are candidates to lead on newcomer assistance.

Germany and Austria

Germany has no operating reactors but, as the Federal Environment Ministry notes, it worked to anchor the Vienna Declaration in the Convention's review process. Austria has long opposed nuclear power and supports binding rules, transparency and liability. Both are likely sponsors of stronger reporting and independent oversight.

Lithuania, Poland and other neighbours of Ukraine and Belarus

These states press for early notification, independent assessment of nearby plants and strong support for Ukraine. Lithuania in particular criticizes Ostrovets and supports measures on border-area plants.

Iran and other states with sites exposed to attack

Iran has one operating reactor at Bushehr, and the IAEA has raised concern about military action affecting nuclear facilities in Iran as well as in Ukraine. Iran is likely to support language protecting peaceful nuclear facilities from attack and to resist language that links safety to compliance with safeguards.

Newcomer and developing states

Bangladesh, Egypt, Türkiye, Saudi Arabia, Kenya and others building or planning programmes want assistance, financing and training. They support IAEA technical cooperation and voluntary peer review, and they resist strict preconditions.

Case Studies:

1. Three Mile Island Accident — United States, 1979

The Three Mile Island accident occurred on 28 March 1979 at Unit 2 of the Three Mile Island Nuclear Generating Station in Pennsylvania, United States. The accident began with a combination of equipment malfunction, problems with the reactor cooling system, and misleading information provided to operators by the control-room instruments. As the situation developed, the reactor core experienced a partial meltdown. A major feature of the accident was the interaction between technical failures and human factors. Operators were faced with confusing information about the condition of the reactor and made decisions based on their understanding of the available indications. The accident therefore demonstrated that nuclear safety cannot depend only on having technically sophisticated equipment; operators must also receive clear information, appropriate training and effective procedures. Unlike Chernobyl, the accident did not result in a large-scale release of radioactive material into the surrounding environment. The reactor's containment structure played an important role in limiting the consequences of the accident. The accident nevertheless became a major turning point in nuclear safety because investigations identified weaknesses in operator training, emergency procedures, human-machine interfaces, regulatory oversight and safety management. The accident also influenced the development of the concept of safety culture. The U.S. investigations concluded that preventing serious nuclear accidents required fundamental improvements in organizational practices, procedures and attitudes toward safety. The IAEA has subsequently identified weaknesses in design, operating practices, training and management processes as important lessons from Three Mile Island.

2. Chernobyl Nuclear Accident — Ukrainian SSR, Soviet Union, 1986

The Chernobyl accident occurred on 26 April 1986 at Unit 4 of the Chernobyl Nuclear Power Plant in what was then the Ukrainian SSR of the Soviet Union. During a safety test, the reactor entered an unstable condition and suffered a catastrophic accident that destroyed the reactor and caused a major release of radioactive material into the environment.The accident involved weaknesses in reactor design, deficiencies in safety systems, operating practices, inadequate understanding of the reactor's characteristics, management failures and weaknesses in the regulatory system. The IAEA's later INSAG-7 assessment revised the emphasis placed on the causes of the accident. While the original investigation placed considerable emphasis on operator actions, later information highlighted serious deficiencies in the reactor's design and safety systems, together with weaknesses in the regulation and management of nuclear safety. Another important issue was the lack of an effective containment structure comparable to those used in many Western reactor designs. The destruction of the reactor therefore allowed radioactive material to escape extensively into the environment. The accident resulted in evacuations, longterm restrictions on habitation in the affected area and extensive environmental remediation. Chernobyl also demonstrated the importance of international notification and transparency. Because radioactive material crossed national borders, the accident showed that nuclear safety could not be treated exclusively as a domestic matter. This contributed to the development of stronger international cooperation, including the 1986 Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

3. Fukushima Daiichi Nuclear Accident — Japan, 2011

The Fukushima Daiichi accident began on 11 March 2011, following a massive earthquake and tsunami that struck Japan. The earthquake caused the reactors that were operating to shut down automatically. However, the subsequent tsunami disabled important electrical and cooling systems, creating conditions that eventually led to severe damage to reactor cores at multiple units. The accident raised questions about whether existing assumptions concerning the probability and severity of natural hazards were sufficiently conservative. The accident also highlighted the importance of backup power, cooling systems, emergency preparedness, severeaccident management and containment. The IAEA's subsequent analysis emphasized that nuclear safety must consider interactions between human, technical and organizational factors rather than examining each component separately. Fukushima also led to extensive international reassessment of nuclear safety. The IAEA developed an Action Plan on Nuclear Safety and subsequently produced a comprehensive report involving approximately 180 experts from 42 Member States and several international organizations. The IAEA continues to maintain a structured database of lessons from Fukushima covering areas such as safety assessment, emergency preparedness, radiological consequences and post-accident recovery. One important lesson concerned the assessment of extreme natural hazards. The IAEA's Fukushima lessons emphasize that relying primarily on historical data may be insufficient when establishing the design basis for extreme natural events, because rare events can have very significant consequences.

4. Windscale Fire — United Kingdom, 1957

The Windscale accident occurred in October 1957 at the Windscale nuclear facility in Cumbria, United Kingdom. A fire developed in one of the reactor piles during an operation intended to release stored energy within the reactor. The fire resulted in the release of radioactive material into the environment. The accident also demonstrated the importance of monitoring radioactive releases and establishing effective procedures for protecting the public. Unlike Chernobyl and Fukushima, the consequences were comparatively localized, and the event did not require the largescale evacuation associated with those accidents. The IAEA identifies Windscale alongside Three Mile Island, Chernobyl and Fukushima as an important historical accident from which lessons can be drawn, particularly concerning accident consequences and radioactive-waste management.

5. Tokaimura Nuclear Accident — Japan, 1999

The Tokaimura accident occurred on 30 September 1999 at a nuclear fuelprocessing facility in Tokaimura, Japan. Unlike Chernobyl and Fukushima, this was not a nuclear-power-reactor accident. It occurred during the handling and processing of nuclear fuel and involved an uncontrolled nuclear chain reaction. The accident is particularly significant for studying procedural and organizational failures. Workers were exposed to high levels of radiation, and authorities evacuated people close to the facility and advised people within a wider area to remain indoors. An IAEA fact-finding mission found that the event was a serious industrial and radiological accident, although it did not result in the widespread environmental contamination associated with Chernobyl. The IAEA also noted the importance of the accident's lessons for other countries and industries. The incident demonstrated that nuclear safety concerns extend beyond nuclear power reactors. Fuel-cycle facilities, workers, operating procedures and regulatory oversight can also be sources of serious safety risks.

6. Goiânia Radiological Accident — Brazil, 1987

The Goiânia accident occurred in 1987 in Brazil and involved a radioactive source from an abandoned medical facility. The source was removed from its original location and subsequently handled by people who did not understand the danger posed by the material. Radioactive contamination subsequently spread to people, property and parts of the surrounding community. The accident highlighted the importance of regulatory control, secure management of radioactive sources, radiation monitoring, public awareness and emergency response. The IAEA subsequently published a detailed report on the accident and its lessons.

Past International Actions:

This section covers action by the IAEA, regional bodies, financial institutions, industry and groups of states. UN General Assembly and Security Council resolutions and UN inter-agency programmes (such as the Chernobyl Forum) are left out on purpose, as requested. The treaties adopted at the IAEA are covered separately in section 5.

The immediate response, 1986 to 1991

The Soviet government's first public acknowledgement came only after radiation alarms were set off at a Swedish nuclear plant, which showed how little early warning the world had. In August 1986 the IAEA held a Post-Accident Review Meeting in Vienna where Soviet experts presented their account, and the IAEA's advisory group INSAG issued its first report, INSAG-1, which put most of the blame on operator violations. In 1991 the IAEA coordinated the International Chernobyl Project, an assessment of radiological consequences and protective measures in the affected regions, with other international organizations taking part. The same period saw an expansion of IAEA review missions, including OSART visits to operating plants, which had begun in 1982.

Building the safety institutions, 1989 to 1992

Operators created WANO in 1989 so that plants worldwide could review each other. The IAEA and the OECD Nuclear Energy Agency introduced INES in 1990 to give the public and officials a common scale for explaining events. In 1991, INSAG-4 set out the idea of safety culture. In 1992, INSAG-7 revised the earlier account of the accident and moved the main emphasis from operator error to reactor design, weak regulation, poor information flow and a deficient safety culture. Its conclusions led to the upgrading of all remaining RBMK reactors.

The G7 and development-bank programmes, 1992 to 2000

At its 1992 Munich summit the G7 launched a multilateral programme to improve the safety of Soviet-designed reactors in Central and Eastern Europe and the former Soviet Union. The EU funded related technical assistance through its Phare and Tacis programmes. In 1993 the EBRD set up the nuclear safety account for urgent upgrades in Bulgaria, Lithuania and Russia. In December 1995 the G7, the European Commission and Ukraine agreed a Memorandum of Understanding to close the Chernobyl plant, and the last operating unit was shut down on 15 December 2000. A nuclear safety summit in Moscow in April 1996 also placed the accident's lessons on the leaders' agenda.

The shelter and the New Safe Confinement, 1997 to 2019

The original 1986 shelter over Unit 4 was never meant to be permanent. In 1997 experts finalized the Shelter Implementation Plan, and the G7, the European Commission and other donors asked the EBRD to create the Chernobyl shelter fund. The plan's total cost reached about 2.1 billion pounds with the new safe confinement alone close to 1.5 billion pounds. The arch-shaped confinement was built beside the reactor and slid into place in 2016, with handover to Ukraine in 2019 (confirm the exact dates in the EBRD record before citing them). Separate funding through the Nuclear Safety Account paid for the Interim Spent Fuel Storage Facility 2, at a total cost of 400 million pounds.

After Fukushima, 2011 to 2015

The 2011 Fukushima Daiichi accident showed that safety lessons had not been applied everywhere. In September 2011 the IAEA General Conference endorsed an IAEA Action Plan on Nuclear Safety, which expanded peer reviews, strengthened emergency preparedness and called for stronger national regulators. The European Union carried out stress tests on all its reactors in 2011 and 2012 under ENSREG and WENRA. In 2014 the Convention on Nuclear Safety's parties convened a diplomatic conference, which produced the Vienna Declarartionon nuclear safety on 9 February 2015, binding states politically to report on how they apply its technical principles.

Wartime safety frameworks, 2022 to 2026

After Russian forces took control of Zaporizhzhia in March 2022, Director General Grossi set out seven indispensable pillars for nuclear safety and security during armed conflict, later supplemented by five principles for protecting the Zaporizhzhia plant. The IAEA has kept experts at the plant since September 2022 and at all Ukrainian sites. At the Board of Governors in September 2026 the EU reported that some pillars remained compromised at all five Ukrainian plants.

Convention on Early Notification of a Nuclear Accident (1986)

Adopted in September 1986 under IAEA auspices, within months of Chernobyl, and in force the following month. It obliges a state to notify the IAEA and any state that could be affected without delay when an accident causes a release of radioactive material that could have transboundary safety significance, and to provide relevant information. It was a direct answer to the delayed Soviet disclosure. The gaps are that it does not set a clear threshold for what counts as an accident and does not penalize a late or incomplete notification.

Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986)

Adopted alongside the Early Notification Convention and in force from early 1987. It creates a framework through which a state in an emergency can request help, with the IAEA acting as the channel and coordinator. Assistance is voluntary on the part of the providing state, and the requesting state remains in charge of the response. The IAEA's Response and Assistance Network (RANET) is the practical tool built around it.

Convention on Nuclear Safety (adopted 1994, in force 1996)

The CNS is the central safety treaty. It applies to land-based civil nuclear power plants and sets out fundamental principles on the legislative and regulatory framework, an independent regulator, priority to safety, safety assessment, emergency preparedness, siting, design, construction and operation. Its method is a triennial peer review: each party submits a national report and the others examine it at a review meeting in Vienna. The IAEA reports that 91 states are party to it out of 176 member states (as of 2023), and a joint eighth and ninth review meeting in March 2023 identified shared priorities such as strengthening regulators, covering new technologies, peer review missions and emergency response. A further review meeting took place in April 2026. Its limits are that it contains no inspection or penalty mechanism, it does not cover military reactors (India made a declaration that it should), and it does not directly address new designs or reactors in conflict zones.

Vienna Declaration on Nuclear Safety (2015)

Adopted on 9 February 2015 at a diplomatic conference after Switzerland proposed amending the Convention. Parties could not agree to amend the text, so they adopted a declaration instead. It sets technical principles, including that new plants should be designed to prevent accidents and, if one occurs, to mitigate its consequences and avoid releases that require long-term offsite protective action, and that existing plants should have regular safety reviews and timely improvements. The declarartion requires parties to report on how they apply these principles in national regulations, which makes it the strongest postFukushima commitment, although it is not a treaty obligation.

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997)

In force since 2001, it applies the same peer review approach to spent fuel and waste. It matters because many safety failures involve storage, such as spent fuel pools, and because Chernobyl's cleanup left large amounts of waste. About 89 states were party in early 2023, according to an academic review of that year's meetings; confirm the current number on the IAEA website before citing it.

Convention on the Physical Protection of Nuclear Material and its 2005 Amendment

This is mainly a security instrument, requiring protection of nuclear material and facilities against theft and sabotage. The 2005 amendment extended it to domestic use and to protection against sabotage of facilities and entered into force in 2016. It is relevant because security and safety overlap in attacks on plants.

Civil liability and compensation regimes

The Paris Convention (1960) and the Vienna Convention on Civil Liability for Nuclear Damage (1963) both place liability on the plant operator and cap it. A joint protocol links them, a 1997 protocol raised the Vienna limits, and the Convention on Supplementary Compensation (1997) creates an international fund. Chernobyl exposed their weakness: many affected states were outside the system, and victims abroad had no clear claim. Many delegates will raise compensation as part of a safety package.

European Union law

The Euratom Nuclear Safety Directive of 2009, amended in 20143 is the most binding regional framework. It requires independent regulators, periodic safety reviews, and peer reviews among member states. Delegates from EU states often cite it as a model for global rules.

International humanitarian law and transboundary treaties

Article 56 of the 1977 Additional Protocol I to the Geneva Conventions protects works and installations containing dangerous forces, including nuclear power stations, from attack where this could cause severe losses among civilians. It is the main legal basis for objections to strikes near Zaporizhzhia. The Espoo Convention on environmental impact assessment in a transboundary context, adopted under a UN regional commission, has been used in disputes over plants near borders, such as Ostrovets.

Current challenges:

Armed conflict at nuclear sites

This is the most urgent challenge, and one Chernobyl's designers never imagined. The Zaporizhzhia plant, Europe's largest, has been under Russian military control since March 2022. The IAEA Director General has said that six of the seven pillars were compromised there , and that three remained compromised at Chornobyl after a drone damaged the New Safe Confinement in February 2025. A drone was also reported to have struck the turbine building at Zaporizhazhia(a secondary source, so verify against IAEA statements). At the September 2026 Board of Governors, the EU said the defense in depth layers at the site were eroding and that some pillars were compromised at all five Ukrainian plants. The key difficulty is that no binding rule protects plants in war and the IAEA has no enforcement power to compel access or withdrawal.

Ageing reactors and long-term operation

The average reactor is now about 32 to 33 years old , and reactors that were permanently shut down in 2025 had run for an average of 48.7 years. At the end of 2024 36 reactors were at least 50 years old. Lifetime extensions are economical, but they depend on honest ageing management, replacement of components that cannot be replaced easily (such as pressure vessels) and regular safety reviews against current standards. The risk is that an old plant meets its own licence but not today's expectations, which is a systematic failure mode in the sense used in this topic.

Climate and natural hazards

Floods, extreme heat, drought, storms and earthquakes can disable cooling or off-site power at several units at once. Fukushima was a common-cause failure of exactly this kind. Standards must now assume more severe hazards than those used in original designs.

Cyber and hybrid threats

Attacks on control systems, supply chains or the power grid can threaten safety without any physical damage to a plant. The Seven Pillars include reliable off-site power and communications, both of which are targets in modern conflict.

Spent fuel, waste and decommissioning

As plants close, safe storage of spent fuel and decommissioning waste becomes a growing safety task, especially for countries without a final repository. Chornobyl itself still holds a damaged reactor, and the New Safe Confinement requires continuing maintenance and repair.

The enforcement and transparency gap

The Convention on Nuclear Safety depends on honest self-reporting and peer pressure, and WANO reviews are confidential. Chernobyl began with concealment, and the disagreement over casualties shows how contested information remains. Proposals for mandatory reporting, public summaries of peer reviews or stronger incident databases are likely to be debated here.

Funding

Safety assistance depends on voluntary donor money, which is uneven. The Chernobyl effort took decades and billions of euros, yet new demands (Ukraine, newcomers, ageing plants) compete for the same donors.

QARMA (Questions a resolution must answer)

1. How can Member States identify and address systematic failures in nuclear power plants before they develop into major accidents?

2. How can nuclear operators strengthen operational safety procedures and ensure that established safety protocols are consistently followed?

3. How can human error, inadequate training, poor decision-making and communication failures be reduced within nuclear facilities?

4. How can nuclear safety culture be strengthened among operators, regulators, management and government authorities?

5. How can nuclear facilities ensure that their reactor designs and safety systems are capable of preventing or limiting the consequences of severe accidents?

6. How can containment structures and other protective systems be strengthened to prevent or minimize the release of radioactive material during severe accidents?

7. How can Member States identify weaknesses in existing containment and safety systems through regular safety assessments and inspections?

8. How can nuclear facilities prepare for events that exceed their original design assumptions, including extreme natural hazards and multiple simultaneous failures?

9. How can emergency preparedness and response mechanisms be improved to ensure rapid and coordinated action following a nuclear or radiological accident?

10. How can information about nuclear accidents and abnormal events be communicated rapidly and transparently between affected states, the IAEA and other relevant international organizations?

11. How can international cooperation help Member States learn from previous nuclear accidents, including Three Mile Island, Chernobyl and Fukushima?

12. How can lessons identified from previous accidents be incorporated into national nuclear-safety regulations and operational practices?

13. How can the IAEA assist Member States in evaluating their existing nuclear-safety and containment standards while respecting national regulatory responsibilities?

14. How can regulatory authorities maintain effective and independent oversight of nuclear operators and ensure compliance with established safety requirements?

15. How can Member States improve the reporting and investigation of nuclear incidents and near-misses so that potential systematic failures are identified before a major accident occurs?

16. How can developing nuclear-energy programmes obtain the necessary technical knowledge, expertise and capacity to maintain high operational-safety standards?