Illinois Emergency Management Agency

Press Release

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December 20, 2022

*****MEDIA ADVISORY*****

CLINTON NUCLEAR POWER STATION

EMERGENCY PREPAREDNESS

SPRINGFIELD – Enclosed is information regarding emergency preparedness for the Clinton Nuclear Power Station (NPS). This information is being provided so that the media may become familiar with the Illinois Plan for Radiological Accidents (IPRA) and the Constellation emergency plan. In the event of an incident at the Clinton NPS, the media would play an important role in providing emergency information to the public.

The next exercise of the IPRA involving state and local emergency personnel in the vicinity of the Clinton NPS is scheduled to be conducted in November 2023. The media will receive advance notice of the next Clinton NPS Exercise and an opportunity to participate in the exercise.

Please call the number listed above if you have any questions or wish to schedule a training session for your staff, especially any new personnel, to discuss the emergency plans.

Please post this notice to ensure that all media personnel are advised of the exercise and training opportunity.

Illinois Emergency Management Agency (IEMA): www.Ready.Illinois.gov

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THE ILLINOIS PLAN FOR RADIOLOGICAL ACCIDENTS

(IPRA) FACT SHEET

The IPRA provides a framework for the response of state and local governments in the event of an Illinois nuclear power station radiological accident or any incident involving the actual or potential release of radiation to the environment. Maintenance of the IPRA is an ongoing and cooperative effort between state agencies, local governments and private organizations. The IPRA is designed to ensure that any radiological accident is quickly and accurately assessed resulting in an effective and coordinated response and recovery.

PURPOSE

The purpose of the IPRA is to protect the citizens of Illinois in the event of a radiological accident. The IPRA was developed to meet the following objectives:

* Protect the citizens residing, working or visiting near nuclear power stations within Illinois and those potentially affected by an accident that involves manufacturing, handling, storage or transportation of radioactive materials, or radiation-producing machines.

* Ensure that the response and recovery activities are well organized, coordinated and expedient.

* Ensure that resources and personnel are used efficiently.

FORMAT

The IPRA is comprised of a Core Plan and six site-specific editions. The Core Plan provides a general overview of the IPRA. The Core Plan describes the concept of operations, chain of command, communications network and general program administrative functions. It also specifically addresses the responsibilities of state agencies involved in the response to an accident.

The site-specific editions of the IPRA specifically address the concept of operations for the local governments within the 10-mile Emergency Planning Zones (EPZ). They provide detailed procedures for the response activities of the local governments. These procedures define the implementation of the following activities: initial notification, emergency facility activation, sheltering, evacuation, traffic and access control, public notification, public information, radiological exposure control and routine public services.

PLANNING BASES

The IPRA is based on federal regulations and Radiological Emergency Preparedness (REP) program planning standards as developed and evaluated by the Federal Emergency Management Agency (FEMA).

DIRECTION AND CONTROL

The governor of the state of Illinois has the ultimate authority for the command and coordination of the implementation of the IPRA at the state level. The principal executive officer of each local jurisdiction is responsible for implementing the IPRA at the local level. The state and local governments coordinate their activities to ensure an effective response.

ACCIDENT CLASSIFICATION AND NOTIFICATION

The nuclear utilities are responsible for notifying offsite authorities in the event of an accident. The level of offsite response depends on the onsite accident classification. The following outlines the four accident classifications used by the utilities and the offsite response associated with each classification.

UNUSUAL EVENT: Notification of IEMA and local governments.

ALERT: Notification of IEMA and local governments. Emergency operation centers (EOCs) may be activated. Key state and local officials are notified per procedure.

SITE AREA EMERGENCY: Same response as for an Alert, with expanded notifications to additional state and local agencies. EOCs will be activated. Public notification may be implemented. Protective actions for the public may be recommended.

GENERAL EMERGENCY: Full notification and activation of personnel, resources and EOCs as outlined in the IPRA. Public notification will be implemented. Protective actions for the public will be recommended.

Each of these response levels may be altered based on the changing circumstances of the situation.

PUBLIC INFORMATION

The governor's office is the official source of public information for the state of Illinois. The nuclear utilities and the local governments are also sources of public information related to their response and recovery activities. The news media will receive information from the following sources:

* Joint Information Center (JIC): The utility, state and federal agencies, and in some cases, the EPZ counties, will issue information through the JIC. The JIC is located in Warrenville and/or near the impacted nuclear power station.

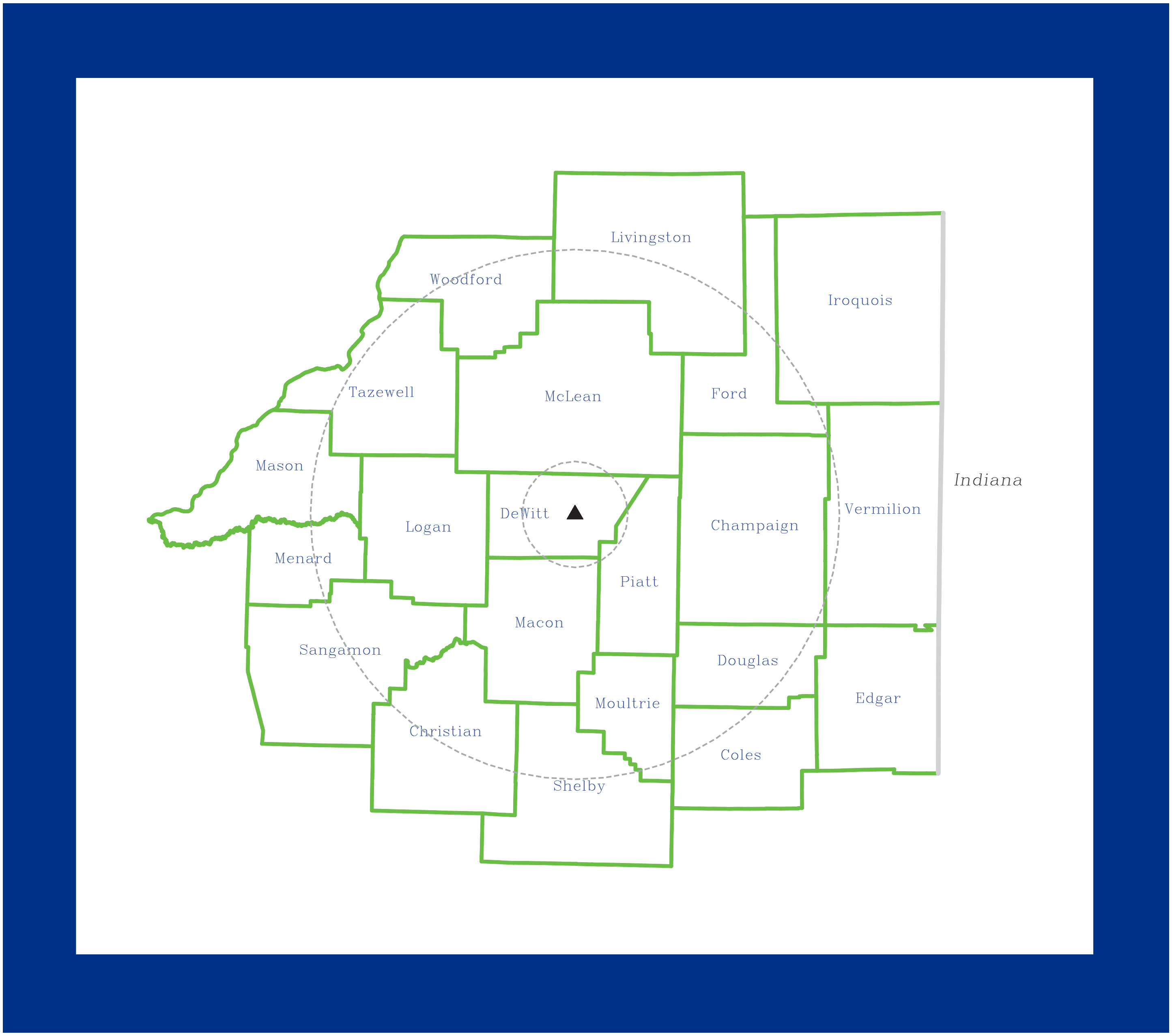
* News conference room in the state capitol in Springfield, Illinois: The governor and state agencies may provide information to the media from this location.

* County media briefing rooms: county governments establish media briefing rooms near their EOC.

IPRA EXERCISES

The utilities, the state of Illinois and local governments in the 10-mile EPZs participate in exercises of the IPRA. These exercises are conducted biennially per nuclear power station EPZ in compliance with federal regulation. The purpose of exercising the IPRA is to assess capabilities, provide practice and training for state and local officials and test the implementation of the IPRA. The major elements of the IPRA that are demonstrated and evaluated include personnel mobilization, facility activation, direction and control and protective action decision making.

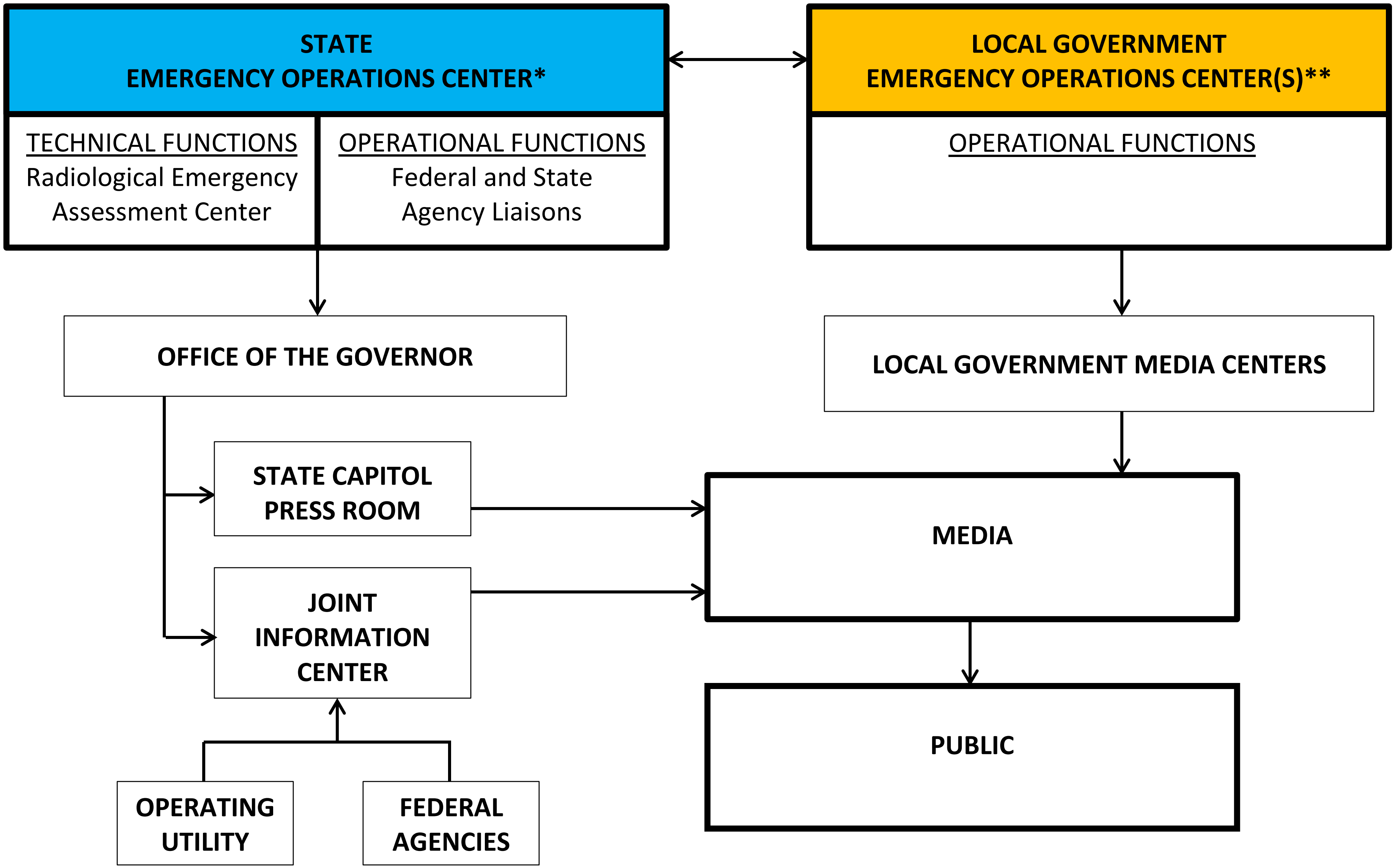
CLINTON STATION
10-MILE PLUME and 50-MILE INGESTION PATHWAY EPZs



DESIGNATED RADIO STATIONS FOR CLINTON STATION ARE:

WBNQ 101.5 FM
WJBC 1230 AM
WBWN 104.1 FM
WHOW 1520 AM
WEZC 95.9 FM
WHOW 92.3 FM

FLOW OF RADIOLOGICAL EVENT INFORMATION TO THE MEDIA



* State government response activities.
(The status of the nuclear power station or state activities will only be addressed at the JIC or the State Capitol Press Room unless otherwise announced.)

** Local government response activities.

Constellation®

Media Kit

About Constellation

We are the nation's largest producer of carbon-free energy and the leading competitive retail supplier of power and energy products and services for homes and businesses across the United States. Headquartered in Baltimore, our generation fleet powers more than 20 million homes and is helping to accelerate the nation's transition to clean energy with more than 32,400 megawatts of capacity and annual output that is 90 percent carbon-free.

Already the lowest carbon emitter of any major investor-owned U.S. generator, we have set a goal to eliminate 100 percent of our greenhouse gas emissions by leveraging innovative technology and enhancing our diverse mix of hydro, wind and solar resources, paired with the nation's largest carbon-free nuclear fleet.

Our family of retail businesses serves approximately 2 million residential, public sector and business customers, including three-fourths of the Fortune 100. We are helping these customers reach their own climate goals through innovative clean energy solutions, including an upcoming, new 24/7 carbon-free energy matching product.

To further advance the fight against the climate crisis and accelerate the transition to a carbon-free future, we have set own ambitious climate goals, including:

- 95% carbon-free electricity by 2030
- 100% carbon-free electricity by 2040
- 100% reduction of operations-driven emissions by 2040
- Providing 100 percent of our business customers with customized data to help them reduce their own carbon footprints.

As we work towards these goals, we will continue to serve as a leading supporter of our communities through workforce development programs; philanthropy; volunteerism; and diversity, equity and inclusion initiatives, while maintaining the highest standards of corporate governance. Click here to learn more about our values and our deep commitment to Environmental, Social, and Governance (ESG) principles.

Constellation

Joint Information Center

Information Packet

Contents

Constellation

Constellation Energy's Joint Information Center Introduction

Welcome to the Constellation Energy Joint Information Center (JIC), the primary source of information concerning the event at one of Constellation Energy's Midwest generating stations.

During an emergency, command and control of the event will be transferred to Constellation senior management at the Emergency Operations Facility (EOF) in 4300 Winfield Road, Warrenville, IL 60555. The information provided to you here at the JIC will come from the EOF.

We will schedule news briefings to keep you informed of the status of the event, and will have technical experts available to answer questions throughout the event. In addition to Constellation officials, representatives from the state and federal governments will be available.

There are several Constellation representatives who will be assisting you while at the JIC:

- The JIC coordinator is responsible for overseeing JIC operations – making sure the facilities support your needs.
- The company spokesperson will be a Constellation senior manager and will be the lead Constellation representative.
- The technical spokesperson will be an individual with in-depth knowledge of plant systems and operations.
- The radiation protection spokesperson will be an individual with in-depth knowledge of radiation.

Prior to the activation of the JIC, the primary source of Constellation nuclear station information is provided by Constellation Energy's Nuclear Communications group. You may contact the Communications director at (630) 657- 3602.

Constellation Energy Nuclear Emergency Plan

Constellation Energy's Nuclear Emergency Plan provides clear procedures and guidelines for use during an emergency. It is also used to ensure that the necessary emergency response personnel, equipment, supplies, and essential services are available to meet the needs of an emergency.

The emergency plan applies to all Constellation Energy Nuclear generating stations and encompasses the response to radiological and non-radiological emergencies. The goal is to provide for the health and safety of the public and employees to minimize damage to facilities and property and to restore such facilities in the event of an emergency.

The emergency plan defines the emergency response organization, the authority, and the responsibilities. The emergency plan provides identification and evaluation of emergency situations; protective measures; communications; state, federal and local notifications, document review and control, emergency preparedness assessment, and training of all emergency response personnel.

Support Centers

Four emergency support centers are activated to provide assistance during an emergency.

1. The Technical Support Center (TSC) is the site's onsite emergency response organization. It is the location where station management, technical and engineering support personnel provide plant status and potential offsite assessment and implement emergency actions.
2. The Operational Support Center (OSC) is the site's onsite location where support personnel report to be dispatched for assignments or duties in support of emergency operations.
3. The Emergency Operations Facility (EOF) located in Warrenville, IL, is activated when additional resources are required to address the emergency. When it is activated, it directs the overall emergency response, coordination of radiological assessments and recovery.
4. The Joint Information Center (JIC) is located in Warrenville, IL. The JIC is staffed with Constellation, state and federal officials to provide up-to-date information to the news media.

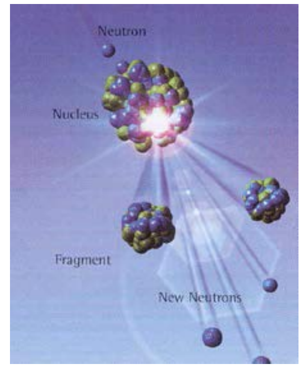
Classifications of Emergency Conditions

The Constellation Energy Nuclear Emergency Plan describes five classifications for emergency conditions. Four of the five nuclear plant emergency classifications are characterized by specific "Emergency Actions Levels" or "event initiating conditions."

1. Unusual Event – The first and lowest classification level. It is characterized by an increase in plant surveillance following events that have a potential to or have reduced plant safety.
2. Alert – The second classification level. It is declared when events are in progess or have occurred that actually or have a potential to substantially reduce plant safety.
3. Site Area Emergency – The third classification level. It is declared when events are in progess or have occurred that involved actual or potential major failures of plant functions needed for public protection.
4. General Emergency – The highest emergency classification level. It is declared when events are in progess or have occurred that involves actual or imminent reactor fuel core damage.
5. Recovery – The period after the emergency phase when the plant is under control. There is no potential for further degradation in plant status and activities are being taken to return the plant to a normal state.

Providing Clean, Safe and Reliable Electricity

Electricity is vital to our lives – powering everything from computers to air conditioners, lighting homes and running factories. Electricity generation and distribution is one of the greatest achievements of the 20th Century and is an indispensable part of our nation's economy.



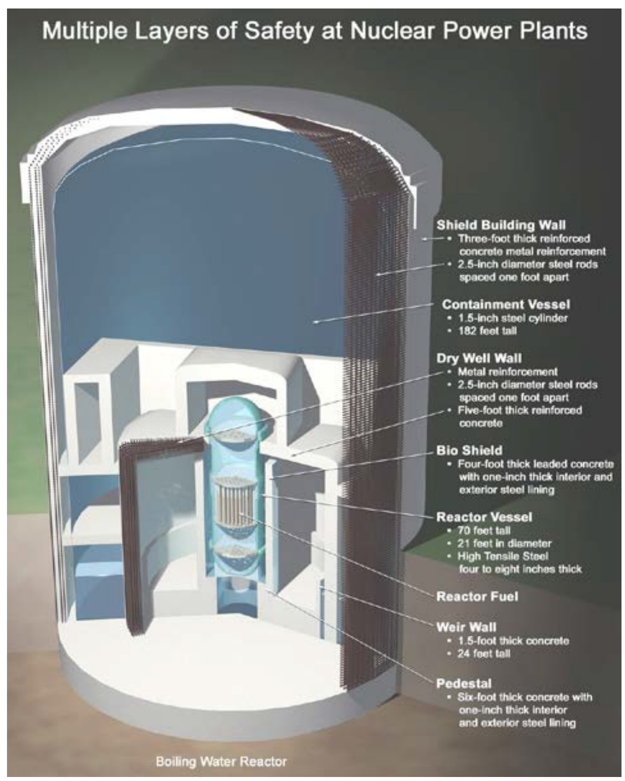
Nuclear energy produces about 20 percent of the nation's electricity and about half of the electricity in Illinois. It is America's largest source of carbon-free electricity, accounting for about 70 percent of all emission-free electricity generated. America's 104 nuclear reactors operate around the clock to stabilize the nation's electricity distribution system and electricity marketplace.

How Nuclear Power Plants Work

Almost all power plants use steam-driven turbines to generate electricity. However, instead of coal or natural gas, nuclear reactors make steam from the heat generated when enriched uranium atoms split – or fission. Atomic particles – called neutrons – strike each other, splitting the uranium atoms into fragments. These fragments then split other atoms and the process continues in what is known as a chain reaction.

The uranium at nuclear power plants is in the form of small, ceramic coated pellets that have been inserted and sealed into long vertical metal alloy tubes or fuel rods.

The fuel rods are bundled into assemblies that measure about 14 feet in length and weigh about 1,600 pounds. Inside the reactor, the nuclear fission process creates steam which is piped under intense pressure to spin the turbine. The spinning turbine turns a generator which produces the electricity that is sent to the distribution system (or grid).



Robust Barriers and Backup Safety Systems Keep Nuclear Plants Safe

The fission process inside the nuclear reactor creates radiation which is contained safely inside the plant.

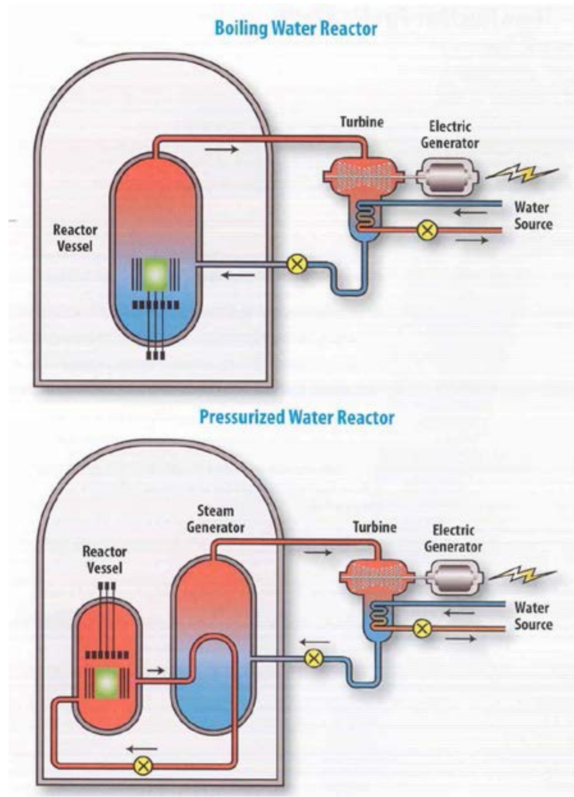
An 8-inch thick steel container – the reactor vessel – surrounds the fuel in the plant. Sealing the reactor vessel is a steel cap weighing several tons. Outside the vessel is a 3-foot thick concrete shield. Protecting all of this is a leak-proof steel-reinforced concrete containment structure with walls about 4 feet thick. These features keep the radiation inside the plant.

Every U.S. nuclear power reactor has layer upon layer of safety systems – an approach known as safety in depth. The industry's commitment to safety is demonstrated by multiple actions and safety systems. Virtually everything that needs to be done to keep a nuclear power plant safe – such as keeping the fuel cool enough – can be accomplished in two or more different ways through the use of primary and secondary safety systems.

The nuclear energy industry has an excellent safety record. Quality plant construction, high standards of excellence, continuous maintenance and ongoing reactor operator training all contribute to the industry's safety performance.

Types of Nuclear Power Plants

There are two types of nuclear power plants in the United States – boiling water reactors and pressurized water reactors. Ordinary water, usually from a river or lake, provides cooling for both types. Water is essential to the process that converts fission energy to electrical energy.



Of the nations 104 nuclear power reactors, 69 are pressurized water reactors and 35 are boiling water reactors.

Boiling water reactors heat the water surrounding the nuclear fuel assemblies directly into steam within the reactor vessel. Pipes carry the steam to the turbine which drives the electrical generator to produce electricity. Constellation's Clinton, Dresden, LaSalle and Quad Cities Nuclear Generating Stations are Boiling Water Reactors.

Pressurized water reactors heat the water surrounding the fuel in the reactor vessel but keep it under pressure to prevent it from boiling. Pumps move the hot water from the reactor vessel to a steam generator. There the water pumped from the reactor heats a second supply of water which boils to make the steam that spins the turbine. Constellation's Byron and Braidwood Nuclear Generating Stations are Pressurized Water Reactors.

Training Fact Sheet

Nuclear power plant workers are among the best trained employees in the United States. Following the 1979 accident at Three Mile Island, the industry formed the Institute of Nuclear Power Operations (INPO) to promote excellence in nuclear power plant operations, including the training of personnel.

The industry established a comprehensive system of personnel training and qualification. It created the National Academy for Nuclear Training to integrate INPO's training programs, the training efforts of all U.S. nuclear energy companies and the independent activities of the National Nuclear Accrediting Board.

Since 1979, the number of professional training staff and the space dedicated to training activities have increased. These investments in training have yielded significant improvements in nuclear power plant safety and reliability.

Following are the initial training curriculums provided to various types of employees before they are authorized to perform work in the plant.

Operations

Equipment Operators

- Qualified to operate and take readings on all plant equipment outside of the Main Control Room after a vigorous 10-month classroom and on-the-job training program.
- Monitor all plant personnel and reinforce all standards and expectations.
- Each Equipment Operator must also pass an annual requalification exam administered by the Training Department.

Reactor Operators

- Licensed by the Nuclear Regulatory Commission (NRC) after completing an 18-month classroom and on-the-job training program and passing a rigorous exam.
- Licensed Reactor Operators are the only ones allowed to operate the reactor.
- Each Reactor Operator must attend approximately 200 hours of continuing training and pass an annual requalification exam.

Senior Reactor Operators

- Licensed by the NRC after completing an 18-month classroom and on-the-job training program and passing a rigorous exam.
- Senior Reactor Operators direct Reactor Operators in the operation of Nuclear Power Plants.
- Each Senior Reactor Operator must attend approximately 200 hours of continuing training and pass an annual requalification exam.

Nuclear plant operators spend one week out of every 6 in training (control room simulator and classroom). As such, they receive more initial training than space shuttle pilots and more continuing training than physicians.

Maintenance Technicians

- Qualified to operate and take readings on all plant equipment outside of the Main Control Room after a rigorous 10-month classroom and on-the-job training program.
- Monitor all plant personnel and reinforce all standards and expectations.
- Each Equipment Operator must also pass an annual requalification exam administered by the Training Department.

Radiation Protection Personnel

- 3 weeks of basic fundamentals (physics, math, science).
- 3 weeks of orientation training (work packages, pre-job briefs, etc.).
- 3 weeks of plant systems training.
- 16 weeks of technical discipline-related training (sampling, radiation monitoring, etc.).
- 6 – 12 months of on-the-job training.

Chemistry Technicians

- 3 weeks of basic fundamentals (physics, math, science).
- 2 weeks of orientation training (work packages, pre-job briefs, etc.).
- 3 weeks of plant systems training.
- 8 weeks of technical discipline-related training (sampling, radiation monitoring, etc.).
- 6 – 12 months of on-the-job training.

Engineers

- 4 weeks of orientation training (physics, civil engineering, computer applications, etc.).
- 3 weeks of plant systems training.
- 6 – 12 months of mentoring.
- More than 100 Constellation Nuclear employees are on call seven days a week, 24 hours a day to support the emergency plan.

Every 4 years, INPO's National Academy of Nuclear Training reviews a station's Operations and its Mechanical and Technical Training programs to ensure that they are providing employees with the training needed to operate and maintain the station in a manner that protects the health and safety of our workforce and the public.

All workers with unescorted access to the site's Protected Area must complete Nuclear General Employee Training which encompasses information on security, fitness for duty and radiation protection topics. They must also pass a test on this material before they are "badged" for unescorted access. Workers are tested annually on this material to requalify for their badges.

Nuclear Radiation

An operating nuclear power plant produces radiation that is no different from naturally occurring radiation; energy in the form of rays and particles. Radiation occurs in a nuclear reactor, for example, when uranium or plutonium atoms are split in the fission process. The resulting fission fragments are typically unstable. Unstable atoms cannot exist in nature forever. They become stable again by emitting energy in the form of radiation over a period of time. The time can vary from fractions of a second to thousands of years, depending on the atom.

The potential harm that can come from radiation depends on several factors, many of which can be controlled. The probability of occurrence and the severity of harmful effects from radiation depend on the nature of the incident rays and particles, and the length of time of exposure to the body and its organs.

A large dose of radiation to a given area of the body is more damaging than a small one; and the same dose over a short period of time is more damaging that if it is received over a longer period. Unborn babies and very young children are more sensitive than older children and adults to radiation because of their rapid cell growth.

Types of Radiation

Radiation cannot be seen, heard, felt, smelled or tasted. There are four types of radiation:

1. Alpha – An alpha particle is a positively charged helium nucleus. It has a very low penetrating ability and is stopped by a very thin sheet of paper or even the layer of dead cells on a person's skin. For this reason alpha radiation is considered for radiation protection purposes only when inside the body where unprotected live cells can be damaged by alpha particles.
2. Beta – A beta particle is a small negatively charged particle. It has a low penetrating ability and can be shielded by thin sheets of metal or plastic. Water and clothing are also good shields from beta radiation. Beta radiation is both an internal and external (skin) source of radiation dose.
3. Gamma – Gamma radiation is electromagnetic waves, which have no charge and no mass. Lead, steel, concrete, and water are commonly used to attenuate this type of radiation, as it will pass through air, thin metal, and clothing easily. Gamma radiation is considered a highly penetrating, whole body source of radiation exposure.
4. Neutron – A neutron is a relatively large uncharged particle, also with high penetrating ability. Water, plastic or paraffin are commonly used to attenuate this type of radiation. Neutron radiation is considered a whole body source of radiation exposure.

Effects of Radiation Exposure

Potential effects of radiation are determined by the amount of exposure received and the area of the body or organ irradiated. Stringent exposure dose limits have been established to assure minimal potential risk. However, accidental exposure to high levels of radiation well beyond the established limits could be potentially harmful. These levels of exposure are not expected to occur in the general public under any routine scenario, nor have they ever occurred as the result of the operation of any nuclear power plant in the United States. The following section, Questions and Answers, should provide some general answers to typical questions about radiation and radiation exposure.

Questions and Answers

Q. What units are used to measure radiation?

A. Roentgen, rad, rem; where 1 rem = 1000 millirem (mrem); 1 roentgen/hour (1 R/h) = 1000 milliroentgens/hour(mr/h)

Roentgen (R): Relates to the quantity of ionization produced by x-ray or gamma radiation in air. This quantity is called exposure.

Rad (radiation absorbed dose): The unit of absorbed dose and expresses the energy absorbed per gram of material from any ionizing radiation.

Rem (roentgen equivalent man): The unit of dose of any ionizing radiation that produces the same biological effect as a unit of absorbed dose of ordinary x-rays.

Q. What happens to me when I'm exposed to radiation?

A. No matter how little radiation exposure we receive, whether it's from cosmic radiation or from a nuclear plant, it may have some effect upon our bodies. The effect is the result of a process called ionization whereby a neutral atom or molecule acquires a positive or negative charge as the result of a collision with a radiation particle or ray. When this occurs, the forces holding molecules or atoms together breakdown.

The effect that radiation has on the body depends upon how much exposure a given area of the body receives and how quickly it is received. If we receive a large amount of radiation exposure within a short period of time (usually within a 24-hour period) it is called an acute dose and the effects upon the body will be actual physical symptoms. The lowest unit dose where an individual would begin to observe any symptoms is approximately 100,000 mrem.

The second type of exposure that may be received from radiation is called chronic exposure. This occurs when small amounts of radiation are absorbed over a long period of time. Persons working at a nuclear plant may experience chronic exposure if they work inside the radiologically posted areas. The effects upon the body from chronic exposure over a very long period of time may result in an increased risk of cancer, a shortening of life span or hereditary effects. However, the radiation doses normally received by workers in a nuclear facility are held so low that the risk of any detectable long-term effects is much less than that from many other factors in our modern environment (smoking, obesity, etc.). A dose of 50,000 mrem received over a lifetime is expected to be biologically much less significant that smoking one pack of cigarettes a day. In a lifetime of working at a nuclear plant the average worker will receive an occupational dose of less than 10,000 mrem.

Q. What is the average occupational exposure to nuclear power plant workers?

A. The commercial nuclear power industry collects and maintains extensive data related to the radiation exposure of its workers. The data of course vary from year to year but monitored workers with measurable exposure currently receive on the average about 300 mrem per year.

Q. Compared to other jobs or daily activities we participate in, how much risk is involved in radiation realted work?

A. The following table shows some statistics demonstrating various everyday risks compared to radiation risks.

Constellation

Occupational Radiation Dose Limits
Sources and Average Annual Dose Estimates for Individuals of the U.S. population:

Natural Radiation Sources		Man-Made Sources	
Source	Dose* (mrem/year)	Source	Dose* (mrem/year)
Cosmic rays	30	Medical diagnostic x-rays	39
Terrestrial	30	Nuclear Medicine	14
Internal	40	Consumer Products	5 – 13
Radon	200	All Others**	<1
Subtotal	= 300	Subtotal	= 60

Source – National Council on Radiation Protection and Measurements (NCRP87b); Health Effects of Exposure to Low Levels of Ionizing Radiation; Biological Effects of Ionizing Radiation (BEIR) V Report).

* All radiation exposures are expressed in terms of effective dose equivalent.
** All Others sources include nuclear power, nuclear fuel cycle and weapons fallout.

Nuclear Waste

As in nuclear medicine, medical research, mining, oil drilling and a host of other beneficial industries, the generation of nuclear power results in the production of nuclear byproducts, or "waste". While Constellation operates well within all regulatory requirements and limits in the management of its waste, we at Constellation are committed to ensure the safety of the public and to continually reduce our waste where practicable. To this end, Constellation has adopted comprehensive nuclear plant monitoring and aggressive nuclear waste volume reduction programs.

Monitoring and Controlling Radioactive Discharges

Constellation is dedicated to minimizing its impact on the environment in every facet of its operations. This is true whether it is by recycling copier paper in our offices, employing the use of electric vehicles, or ensuring that the minimum permissible release of radioactive materials from our sites is not exceeded. The amounts released are controlled by procedures, careful plant operations and an extensive monitoring program.

Plant quality verification personnel constantly audit any and all practices that could affect the safety and well being of the public. Full-time state Illinois Emergency Management Agency (IEMA) and U.S. Nuclear Regulatory Commission, (NRC) personnel, reside at Constellation's nuclear stations, monitor plant procedures and operations to ensure compliance. This full-time independent assessment of our safety program ensures safety practices beyond those of any other industry.

An elaborate series of local and remote monitoring devices maintained by the station and the state of Illinois surround each site in concentric rings. The devices include up to 16 radiation monitors per site, Gaseous Effluent Monitoring Systems and Liquid Effluent Monitoring Systems. They perform a variety of functions from sampling the air and water from the local rivers, to detecting any radiation level above that naturally occurring that is emitted from the sites. Though aberrant operations are unlikely due to the redundant safeguards in place, action plans have been established in the event that any problem is detected. As a result of this monitoring and the inherent safe operation of the plants, the amount of radiation that a person would receive living next to a nuclear station would be far less than one percent of the total radiation that the average person receives annually from other radiation sources such as the sun and elements in the earth's crust.

Constellation also believes it can help minimize the impact on the environment through public involvement and input. The Company participates in a variety of local projects and is a member of several local organizations.

Low Level Radioactive Waste

Recycling or reuse of materials, a decrease in the volume of waste generated and advanced processing techniques have reduced the volume of waste disposed by over 75 percent in the last decade. And the trend is continuing. Items such as coveralls, bags, rags, tool and metal, contaminated with low levels of radioactivity from normal maintenance operations in the plants make up a large percentage of a nuclear station's waste. These items were once packaged and buried in a disposal facility. Many of these items are now laundered or otherwise recycled resulting in a major reduction in volume of this type of waste. Advanced processing techniques are being used to eliminate or reduce the amount of water filtration products which constitute the bulk of the remaining low level waste. In addition to reducing waste volume, the new water processing techniques are helping to eliminate certain equipment that is less efficient and more costly to operate. Regardless of the process that produced the waste, the waste will be packaged and disposed of in a manner to protect health and the safety of the environment.

While this dramatic reduction in low-level waste is a direct result of improved processes and recycling of materials, the success can also be attributed in great part to employee commitment and a "can do" attitude. Every nuclear station has several environmental professionals devoted to the reduction of nuclear waste. Proactive dedicated professionals and experts in the environmental industry glean the latest concepts and technology to achieve continuous volume reduction goals and also to reaffirm the Company's commitment to maintain itself as a world class environmental organization. Not only will this benefit our customers by holding down costs, it will also preserve large amounts of limited space in the remaining low-level waste disposal facility to which Constellation has access.

High-Level Radioactive Waste

High-level waste consists of used ('"spent") nuclear fuel and related metal reactor components. This type of waste is currently being stored at the nuclear plants in "fuel pools".

Waste operations are closely monitored. Constellation has strategies and policies in place where needed for the management waste. The NRC regulates the storage, transportation and disposal of all high-level radioactive waste, both during operations and storage at nuclear sites, and during final disposal. The U.S. Department of Energy (DOE) is responsible for the construction and operation of a repository to dispose of high-level waste, the majority of which is produced by the DOE itself.

Constellation also practices volume reduction of high-level waste in keeping with its philosophy of minimizing the impact on the environment. By maximizing the life of the fuel in the reactor, less fuel is discharged during each "fuel cycle" and subsequently less new fuel is used. This is accomplished primarily through purchasing higher enriched fuel and by performing a complex set of calculations that determine how the fuel storage space will be needed and subsequently less waste will have to be disposed.

Spent Nuclear Fuel

Congress passed the Nuclear Waste Policy Act in 1982 making the Department of Energy responsible for the construction and operation of a permanent storage facility for spent nuclear fuel. Under the law, the Department of Energy (DOE) was required to begin accepting spent fuel by January 31, 1998. The law was amended in 1987 to mitigate delays, rising program costs and named Yucca Mountain in Nevada as a possible nuclear storage site.

Currently, Constellation spent fuel is stored underwater on site in concrete, steel-lined concrete pools and above ground in metal dry storage casks. Like other nuclear utilities, Constellation designed and subsequently increased the storage capacity of the spent fuel pools based on Constellation's contracts with the DOE and their (DOE) obligation to begin accepting spent fuel in 1998. In light of the DOE's' failure to fulfill its obligation to begin accepting spent fuel, Constellation is one of many utilities now faced with the need for supplemental spent fuel storage.

Constellation

Glossary of Nuclear Terms

ALARA – The policy of Constellation is to maintain the occupational dose equivalent to the individual and the sum of dose equivalents received by all workers As Low As Reasonably Achievable.

ALERT – The second step in the emergency classification system. An Alert is declared when natural or man-made situation could result in the degradation of plant safety systems.

ALPHA PARTICLE – A charged particle emitted from an atomic nucleus, with mass and charge equal to those of helium nucleus: two protons and two neutrons.

ASSESSMENT ACTIONS – Those actions taken during or after an emergency to obtain and process information that is necessary to make decisions to implement specific emergency procedures.

ATOM – The smallest particle of an element, which consists of a nucleus and a less dense outer area of electrons in motion.

AUXILIARY BUILDING – This houses the safety-related services equipment, e.g., feedwater pumps, control room and emergency cooling systems, necessary for the operation of the plant.

BACKGROUND RADIATION – The radioactivity in the environment including cosmic rays from space and radiation that exists everywhere - in the air, the earth, and in man-made materials.

BETA PARTICLE – A charged particle emitted from the nucleus of an atom with mass and charge equal to those of an electron.

BOILING WATER REACTOR (BWR) – A nuclear power reactor in which steam is generated within the reactor and passed through a series of separators and dryers in the turbine.

CHAIN REACTION – A reaction that stimulates its own repetition. In fission chain reactions, a fissionable nucleus absorbs a neutron and splits apart releasing additional neutrons, which in turn are absorbed by other fissionable nuclei releasing still more neutrons. A fission chain reaction is self-sustaining when the number of neutrons produced is greater than the number of neutrons absorbed or lost by escape from the system.

CLADDING – The outer covering, typically made of a zirconium alloy, of a nuclear fuel element. The cladding serves as a barrier by preventing the release of radioactivity into the coolant.

COLD SHUTDOWN – A reactor condition in which the coolant temperature has been reduced to 200 degrees Farenhiet or below and the pressure has essentially been reduced to atmospheric pressure.

CONTAINMENT BUILDING – This houses the reactor, pressurizer, coolant pumps, steam generator and other equipment or piping containing reactor coolant. The Containment Building is an airtight structure that typically is made of steel-reinforced concrete three feet thick.

CONTAINMENT ISOLATION SYSTEM – A system of valves that automatically isolates all system lines that penetrate the primary containment walls.

CONTAMINATION – Any radioactive material where it does not belong.

CONTROLLED AREA – Any area where access is controlled to protect from radiation or radioactive materials.

CONTROL ROD – A device within the reactor which absorbs neutrons. When a control rod assembly or group of control rods is placed in the core, neutrons are absorbed and the nuclear chain reaction stops. When the control rod assembly is removed from the core, neutrons are free to sustain a chain reaction and heat is produced.

CONTROL ROOM – The operation center from which the plant is monitored and controlled.

COOLANT – A fluid typically water, used to cool a nuclear reactor and transfer heat energy. The water moderates or slows down the fission process.

CORE – The central part of the reactor containing the fuel elements.

CORE SPRAY SYSTEM – In BWRs, an automatic or manually operated system to supply cooling water to the reactor vessel if large amounts of water are lost from the primary system during operation.

COUNT PER MINUTE (CPM) – The number of emitted radioactive particles or rays counted per unit time by a detector.

CRITICALITY – The point at which the reactor is just capable of sustaining a chain reaction.

CRITICAL MASS – The smallest amount of fuel necessary to sustain a chain reaction.

CURIE (Ci) – A unit of activity = 3.7×10^{10} nuclear transformations per second (dps). Common fractions are:

- millicurie – one thousandth of a curie (mCi)
- microcurie – one millionth of a curie (uCi)
- nanocurie – one billionth of a curie (nCi)
- picocurie – one millionth of a microcurie (pCi)

DECAY HEAT – The heat produced by radioactive atoms in a reactor after it has been shut down.

DIESEL GENERATORS – A system of diesel motor-driven generators which can supply electrical power to emergency safety systems in case normal or alternate power supplies are unavailable.

DOSE – A general term denoting the quantity of radiation or energy absorbed; for radiation protection purposes, must be qualified; if unqualified, refers to absorbed dose.

DOSE EQUIVALENT – A quantity that expresses all radiation on a common scale for calculating the effective absorbed dose. It is defined as the product of the absorbed dose in rads and certain modifying factors. The unit dose equivalent is the rem.

DOSE RATE – The absorbed dose times a quality factor delivered per unit time.

DOSIMETER – A device which can be worn and used to measure the radiation dosage a person receives over a period of time, e.g., TLD, film badge.

DRYWELL - A metal enclosure with three-foot thick, steel-reinforced concrete shield walls. Considered part of containment.

ELECTRON – A negatively charged particle that forms part of the atom outside the nucleus. Electrons surround the positively charged nucleus and determine the chemical properties of the atom.

EMERGENCY ACTION LEVELS (EALS) – The radiological dose rates, specific concentration levels of airborne, or surface deposited radioactive materials, or specific instrument indications that may be used as thresholds for initiating such specific emergency measures as designating a particular class of emergency; initiating a notification procedure or initiating a particular protective action recommendation (PAR).

EMERGENCY CORE COOLING SYSTEM – A series of backup safety systems designed to place thousands of gallons of cooling water into the reactor preventing a core meltdown in the event the normal core cooling system fails.

EMERGENCY RESPONSE PERSONNEL – Organizational groups that perform a functional role during an emergency condition classification. Emergency response groups include the directors of the organization, accident assessment personnel, radiological monitoring teams, fire brigades, first aid teams, and security personnel.

EMERGENCY PLANNING ZONE (EPZ) – The area surrounding a nuclear station in which emergency planning is conducted for the protection of the public. The EPZ is an area with a radius of 10 miles surrounding the facility.

ENRICHED FUEL – Any uranium fuel that has been modified by increasing the concentration of the fissionable isotope, U-235. Enriched fuel is more able to sustain a chain reaction and is normally used as the fuel for a nuclear power plant.

ESSENTIAL PERSONNEL – Those personnel needed to achieve the emergency plan. Personnel identified as essential will vary with time, emergency classification and circumstances at each generating station or emergency response facility.

EXPOSURE – A measure of the ionization produced in air by X-rays or gamma radiation. The unit of exposure in air is the roentgen 0.

FISSION – The splitting of a heavy nucleus into approximately two equals part (which are nuclei of lighter elements). The process is accompanied by the release of a relatively large amount of energy. Fission can occur spontaneously but usually is caused by nuclear absorption of gamma rays, neutrons or other particles.

FISSION PRODUCTS – Any elements or compounds resulting from fission.

FOSSIL FUELS – Any of the following: coal, oil or natural gas. These fuels are referred to as fossil fuels since they are the remains of plants and animals that lived on earth hundreds of millions of years ago.

FUEL REPROCESSING – The processing of used reactor fuel to chemically separate the fuel into waste products, plutonium, and reusable uranium.

FUEL ROD – A cylindrical rod, 12 to 14 feet long made up of fuel pellets containing enriched uranium.

GAMMA RAY – Any short-wavelength electromagnetic radiation of nuclear origin (range of energy, 10 keV to 9 MeV).

GEIGER COUNTER – An instrument for detecting and measuring beta and gamma radiation.

GENERAL EMERGENCY – The highest of a four-step emergency classification system. A General Emergency is declared when reactor fuel core damage has occurred or is imminent.
HALF-LIFE, RADIOACTIVE – The time required for a radioactive substance to lose fifty percent of its activity by decay.

HEAT EXCHANGER – A device that transfers heat from one material, such as water or gas, to another substance with no direct contact between the two materials.

HPCI – High Pressure Coolant Injection System, a system in BWRs used to supply water to reactor vessel if small amounts of water are being lost from the primary system while reactor pressure is high.

HYDROGEN RECOMBINER – A device which combines hydrogen with oxygen producing water. In this manner, a hydrogen recombines is able to separate hydrogen from other gases.

IODINES – Those gaseous elements which are absorbed by the body and concentrated by the thyroid. Radioactive isotopes of iodine are created by the fission process.

ION – An atomic particle, atom, or chemical radical bearing an electric charge, either negative or positive.

IONIZATION – The process by which a neutral atom or molecule acquires a positive or negative charge.

ISOTOPE – The different forms of the same chemical element which are distinguished by having different number of neutrons in the nucleus. A single element may have many isotopes. For example, the three isotopes of hydrogen are protium, deuterium, and tritium.

LPCI – The Low Pressure Coolant Injection System, a system in BWRs to provide water to the reactor if water is being lost from the primary system and system pressure is reduced.

MAXIMUM PERMISSIBLE DOSE – An established limit on the radiation exposure a member of the general public can legally receive from a nuclear power plant.

MEGAWATT – A measure of electrical power equal to one million watts.

MELTDOWN – A buildup of heat in the core caused by insufficient cooling, which causes the fuel to melt.

NEUTRON – An electrically neutral particle whose mass is approximately equal to that of a proton and is present in all atomic nuclei except an ordinary hydrogen ion.

NOBLE GASES – Those gases which do not combine chemically with other materials. The noble gases are helium, neon, argon, krypton, xenon and radon. The fission process creates radioactive isotopes of noble gases.

NONESSENTIAL SITE PERSONNEL – Those personnel not needed for the continuing existence or functioning of the emergency response organization. They are personnel not required to fill certain positions in the emergency response organization. Identification of nonessential personnel is circumstance-oriented.

<u>Example of nonessential personnel might be</u>:

- Non-station company personnel
- Contractor personnel
- Vendor (Sales) personnel
- Delivery persons – Public

NUCLEAR POWER REACTOR – A device in which a fission chain reaction can be initiated, maintained and controlled. Its essential component is the reactor core, which contains fissionable fuel. In addition to the core, it usually has a moderator, a reflector, shielding, coolant, and control mechanisms. Energy produced by a nuclear power reactor is generally used to make steam to drive a turbine that in turn drives an electric generator.

NUCLEAR WASTE – The equipment and materials from nuclear operations that are radioactive and for which there is no further use. Includes that material which is radioactive such that it must be handled and disposed of by special methods such as land burial or tank storage in order to protect the general public.

NUCLEUS, NUCLEI – The small positively charged core of an atom. It is only about 1/10,000 the diameter of the atom (determined by the position of the electrons), but contains nearly all the atom's mass. All nuclei contain both protons and neutrons, except the nucleus of ordinary hydrogen which consists of a single proton.

OCCUPATIONAL DOSE – Any dose received while working at a nuclear power station.

OFFSITE – The area around a nuclear generating station which lies outside the station's "site boundary".

PARTICULATES – Any microscopic particles that may be radioactive.

PERSON-REM (Synonym, MAN-REM) – A unit of population exposure obtained by summing individual dose-equivalent values for all people in the population. Thus, the number of person-rem contributed by 1 person exposed to 100 rem is equal to that contributed by 100,000 people each exposed to .001 rem.

POWER GRID – A network of electrical power lines and associated equipment used to transmit and distribute electric power.

PRESSURIZED WATER REACTOR (PWR) – A nuclear power reactor in which heat is transferred from the core to the coolant by water kept under high pressure to achieve high temperature without boiling in the primary system. Steam is generated in the heat exchanger of the secondary system far use in the turbine.

PRESSURIZER – A high-strength tank containing steam and water used to control the pressure of the reactor coolant, or primary loop.

PRIMARY CONTAINMENT – The third fission product barrier, primary containment, is specifically designed to hold in energy from the steam and radioactive materials if the first and second fission product barriers fail.

PRIMARY LOOP – A closed system of piping which provides cooling water to the reactor and transfers heat energy to the secondary loop.

PROTON – A subatomic particle with a positive electric charge and a mass 1,837 times that of an electron.

QUALITY FACTOR – A factor by which the absorbed dose (rad) is to be multiplied to obtain a quantity that expresses, on a common scale for all ionizing radiation, the biological damage to exposed persons.

RAD – Radiation Absorbed Dose, a measure of radiation effect in any medium from any type of radiation.

RADIATION – The emission and propagation of energy through space or through matter in the form of waves, such as electromagnetic waves or sound waves.

- BACKGROUND RADIATION – The radiation in man's natural environment, including cosmic rays and radiation from naturally radioactive elements, both outside and insure the bodies of humans and animals.
- COSMIC RADIATION – The naturally occurring radioactivity from outer space.
- EXTERNAL RADIATION – Any radiation from a source within the body (as a result of deposition of radionuclides in tissue).
- IONIZING RADIATION – Any electromagnetic or particulate radiation capable of producing ions, directly or indirectly, in its passage through matter.
- TERRESTRIAL RADIATION – The naturally occurring radioactivity in soil, minerals and rocks which make up the earth's crust.

RADIOACTIVE DECAY – The disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles, photons, or both.

RADIOACTIVITY – The property of some nuclides of spontaneously emitting particles, gamma radiation, emitting X-rays after orbital electron capture or undergoing spontaneous fission.

RADIOLOGICALLY CONTROLLED AREA – Any area that requires radiological posting.

RADIOSENSITIVITY – The relative susceptibility of cells, tissues, organs and organisms to the injurious action of radiation.

RCIC – The Reactor Core Isolation Cooling, a steam driven turbine pump system in BWRs which provides make-up water lost through relief valves during reactor isolation.

REACTOR CORE – The central part of a reactor containing the fuel elements.

REACTOR COOLANT PUMP – A piece of equipment designed to move the coolant through the primary loop so that the heat generated in the core can be transferred to the steam generator.

REACTOR TRIP – An automatic procedure by which control rods are rapidly inserted into the core of a reactor to stop the chain reaction.

REACTOR VESSEL – A cylindrical, steel vessel that contains the core, control rods, coolant and structures that support the core. The Reactor is constructed of steel approximately 8 inches thick.

RECOVERY – The period after the emergency phases. The plant is under control. There is no potential for further reduction in plant status and activities are being taken to return the plant to a normal state.

RELIEF TANK – A tank designed to condense and store excess steam and water discharged through the pressurizer relief valves.

RELIEF VALVE – A valve that automatically opens to release steam and prevent excessive buildup.

REM – Roentgen Equivalent Man, a measure of absorbed dose equivalent in body tissue, i.e., and biological damage. 1 rem = 1000 millirem. A rem is a special unit for measuring dose equivalence, obtained by multiplying absorbed dose in body tissue by a quality factor. The quality factor is dependent on the type of radiation.

RHR – Residual Heat Removal System, a system designed to remove the small quantity of heat that continues to be produced by the core after the reactor is shut down and the fission process is terminated. The Residual Heat Removal System normally operates during core cool-down and refueling operations.
RESTRICTED AREA – Any area in which a person may receive an occupational dose.

ROENTGEN® - a measurement of radiation effect in air from X-ray or gamma radiation. 1R = 1000 milliR.

SECONDARY CONTAINMENT – The reactor building surrounding the primary containment. The primary purpose of secondary containment is to confine the leakage of airborne radioactive materials from the primary containment.

SECONDARY LOOP – A system of piping that carries non-radioactive water. Water in the secondary loop absorbs heat from water in the primary loop through the steam generator tubes, is boiled and, as steam, is used to spin the turbine.

SHIELDING – A material, such as lead or concrete, around a nuclear reactor used to prevent the escape of radiation and to protect workers and equipment.

SITE AREA EMERGENCY – The third step of a four step emergency classification system. A Site Area Emergency is declared when major failures of the plants safety systems have occurred or are likely to occur.

SPENT FUEL – the nuclear fuel, containing fission products that can no longer economically sustain a chain reaction.

SPENT FUEL PIT – A pit constructed of reinforced concrete used for the underwater storage of spent fuel assemblies after their removal from the reactor.

STANDBY GAS TREATMENT SYSTEM – A system to treat all air from the reactor building to prevent large releases of radioactive particulate and iodines.

STANDBY LIQUID CONTROL SYSTEM – A system that can inject borated water into the reactor vessel if control rods are inoperative or ineffective.

STEAM GENERATOR – A piece of equipment within which heat is transferred from the primary loop to the secondary loop without the water of the two systems actually touching.

SUPPRESSION POOL – In BWR, a large pool of water that will condense steam if it is released in the drywell.

TRANSPORTATION ACCIDENT – An incident involving the transportation of radioactive or other hazardous material from a nuclear station or other location.

UNUSUAL EVENT – The first step in a four step emergency classification system. It is characterized by increased plant surveillance following any occurrence that could reduce plant safety whether it has or not.

URANIUM – A radioactive element, the basic fuel of a nuclear reactor.

WASTE STORAGE TANK – A holding for liquid or gas wastes, which may be radioactive, prior to reprocessing or disposal.

X-RAY – Any penetrating electromagnetic radiation with a wavelength shorter than that of visible light; usually produced by bombarding a metallic target with fast electrons in a high vacuum; in nuclear reactions, it is customary to refer to photons originating in the nucleus as gamma rays, and those originating in the extra-nuclear part of the atom as X-rays.

Useful Emergency Plan Acronyms

A/E	Architect/Engineer
ALARA	As Low As Reasonably Achievable
ANI	American Nuclear Insurers
BWR	Boiling Water Reactor
CFR	Code of Federal Regulations
DEG	Division of Emergency Government (Wisconsin)
DOE	Department of Energy (U.S.)
EAL	Emergency Action Level
EBS (EAS)	Emergency Broadcast (Alert) System
ECCS	Emergency Core Cooling System
ENC	Emergency News Center
ENS	Emergency Notification System (NRC)
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERDS	Emergency Response Date System (NRC)
FEMA	Federal Emergency Management Agency
FDA	Food and Drug Administration (U.S.)
FRMAC	Federal Radiological Monitoring and Assessment Center
FRMAP	Federal Radiological Monitoring and Assessment Plan
HPN	Health Physics Network (NRC)
IEMA	Illinois Emergency Management Agency
INPO	Institute of Nuclear Power Operations
IPRA	Illinois Plan for Radiological Accidents
JIC	Joint Information Center
KI	Potassium Iodide
NARS	Nuclear Accident Reporting System
NDO	Nuclear Duty Officer
NRC	Nuclear Regulatory Commission
OSC	Operational Support Center
PA	Public Address
PAG	Protective Action Guide

PAR	Protective Action Recommendation
PIO	Public Information Officer
PNS	Prompt Notification System
PWR	Pressurized Water Reactor
RAC	Regional Advisory Committee (FEMA)
RAFT	Radiological Assistance Field Team (ILLINOIS)
REAC	Radiological Emergency Assessment Center (ILLINOIS)
SEOC	State Emergency Operations Center
SRO	Senior Reactor Operator (NRC Licensed)
TLD	Thermoluminescent Dosimeter
TS	Technical Specification
TSC	Technical Support Center
UHL	University Hygienic Laboratory (IOWA)

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4300 Winfield Rd
Warrenville, IL 60555-4012

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EAL	Emergency Action Level
EBS (EAS)	Emergency Broadcast (Alert) System
ECCS	Emergency Core Cooling System
ENC	Emergency News Center
ENS	Emergency Notification System (NRC)
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERDS	Emergency Response Date System (NRC)
FEMA	Federal Emergency Management Agency
FDA	Food and Drug Administration (U.S.)
FRMAC	Federal Radiological Monitoring and Assessment Center
FRMAP	Federal Radiological Monitoring and Assessment Plan
HPN	Health Physics Network (NRC)
IEMA	Illinois Emergency Management Agency
INPO	Institute of Nuclear Power Operations
IPRA	Illinois Plan for Radiological Accidents
JIC	Joint Information Center
KI	Potassium Iodide
NARS	Nuclear Accident Reporting System
NDO	Nuclear Duty Officer
NRC	Nuclear Regulatory Commission
OSC	Operational Support Center
PA	Public Address
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