Current Topics

Current or recent nuclear power related topics of interest to the general public include:

- Industry Consolidation
- Design Basis Reconstruction
- License Renewal
- Recent Terrorism Events
- Recent Events at Nuclear Plants
- Department of Energy and Private Spent Fuel Storage Facilities
- Privatization of the US Nuclear Fuel Enrichment and Use of Russian Highly Enriched Materials
- Effects of Low Levels of Radiation Exposure
- Transportation of Nuclear Waste
- Decommissioning of Nuclear Power Plants

The purpose of this page is to provide some background on the issues and provide links to sites discussing the issues in greater detail.

Industry Consolidation

Over the past 5-10 years, the trend has been toward sale, or operating management transfer, of nuclear plants by smaller utilities to larger utilities. In addition, similar sized utilities have merged. The net effect of these actions has been to increase the engineering and technical support resources available for the management of nuclear plants. Also, the trend has been to standardize procedures and operating practices across the various fleets of nuclear plants.

Design Basis Reconstruction

Over the years, a number of architect-engineering organizations that designed the early large scale nuclear plants have either gone out of business or merged with others. As a result, the burden has fallen on the individual utilities to locally control the plant design. This has forced a significant workload on the engineering support staffs to keep the plant design and calculations current.

License Renewal

The original licenses for plant operation were issued for 40 years. Many plants will reach the end of the allowed license in the next 5 to 15 years. A number of plants have applied for extensions to allow continued operation. These applications are often filed 5 or more years before the end of the existing license. Such early requests allow time for the NRC to review the applications, related documentation, and ask questions and resolve any issues before the end of the current license term. The NRC has allowed a number of

extensions. Concurrent with the approvals, NUREG-1437 Environmental impact statements and safety evaluations are issued. To date, safety evaluations and key NUREG documents issued include:

- NUREG-1705 Safety Evaluation Report Related to the License Renewal of Calvert Cliffs Nuclear Power Plant, Units 1 and 2
- NUREG-1723 Safety Evaluation Report Related to the License Renewal of Oconee Nuclear Station, Units 1, 2 and 3
- NUREG-1739 Analysis of Public Comments on the Improved License Renewal Guidance Documents
- NUREG-1743 Safety Evaluation Report Related to the License Renewal of Arkansas Nuclear One, Unit 1
- NUREG-1759 Safety Evaluation Report Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4, Supplement 1
- NUREG-1800 Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants
- NUREG-1803 Safety Evaluation Report Related to the License Renewal of the Edwin I. Hatch Nuclear Plant, Units 1 and 2

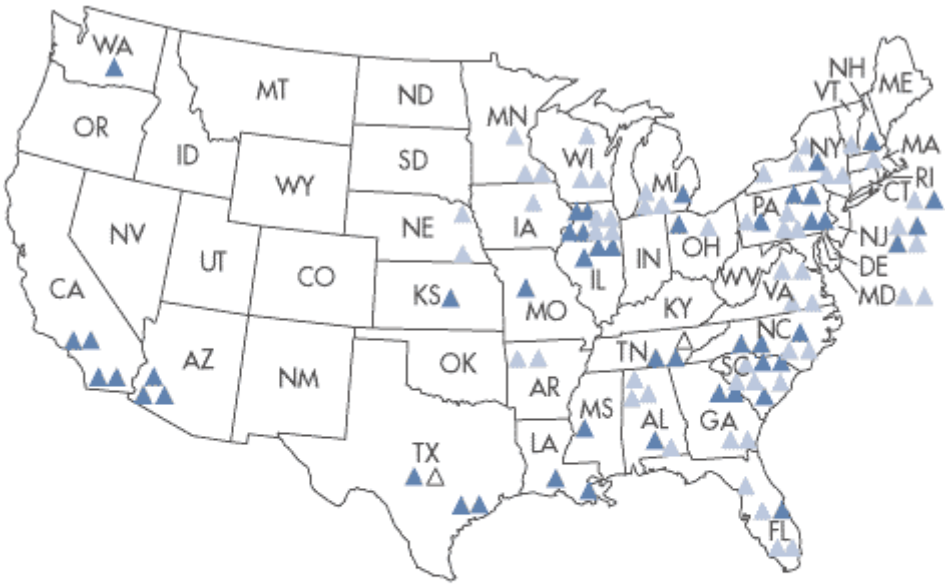
More recent safety evaluation reports may be found in the NRC Staff NUREG report index.

Recent Terrorism Events

The World Trade Center and Pentagon plane attacks have raised concern as to how nuclear plants are protected from such events. Suicidal attacks using airplanes fully loaded with fuel were not considered in the design basis. However, airliner crashes, nearby explosions, and fires have been considered in the design of most plants. The plant safety analysis and the Appendix R regulations govern these design requirements.

In the 4 years since the 9/11 event, the US Nuclear Regulatory Commission (NRC) has hardened the security of US civilian nuclear plants to greatly reduce the likelihood of them being a terrorist target. Each plant has multiple barriers to prevent intrusion. Guards are stationed throughout the plants. Roving guards patrol the plants with automatic weapons. Many visitor centers located on plant sites have been shutdown. However, interested school and industry groups can still schedule tours. The NRC has deleted a lot of plant-specific information from their website. However, they still have educational materials available in the students and teachers part of their site.

A number of visitors to this website have expressed concern about where the US nuclear plants are located. The NRC map and table below identify the locations of all plants. In addition, the table identifies the plant licensing docket number, plant type (BWR or PWR), plant owner (or operator), and NRC region that monitors the plant.



YEARS OF COMMERCIAL OPERATION	NUMBER OF REACTORS	AVERAGE CAPACITY (MDC)
△ 0–9	2	1134
▲ 10–19	47	1092
▲ 20–29	55	779

Note: There are no commercial reactors in Alaska or Hawaii. Calculated data as of 12/00.

The page United States Reactor Information provides a more detaiiled imagemap. In addition, more detailed maps (e.g. with aerial views) are available under certain circumstances.

Plant Name	Docket Number	Reactor Type	Location	Owner/
Beaver Valley 1	50-334	PWR	17 MI W of McCandless, PA	FirstEnergy Nuclea
Beaver Valley 2	50-412	PWR	17 MI W of McCandless, PA	FirstEnergy Nuclea
Calvert Cliffs 1	50-317	PWR	40 MI S of Annapolis, MD	Calvert Cliffs Nucle
Calvert Cliffs 2	50-318	PWR	40 MI S of Annapolis, MD	Calvert Cliffs Nucle
FitzPatrick	50-333	BWR	8 MI NE of Oswego, NY	New York Power A
Ginna	50-244	PWR	20 MI NE of Rochester, NY	Rochester Gas & E
Hope Creek 1	50-354	BWR	18 MI SE of Wilmington, NJ	PSEG Nuclear, LL
Indian Point 2	50-247	PWR	24 MI N of New York City, NY	Entergy Nuclear Op
Indian Point 3	50-286	PWR	24 MI N of New York City, NY	Entergy Nuclear Op
Limerick 1	50-352	BWR	21 MI NW of Philadelphia, PA	Exelon Generating
Limerick 2	50-353	BWR	21 MI NW of Philadelphia, PA	Exelon Generating
Millstone 2	50-336	PWR	3.2 MI WSW of New London, CT	Dominion Nuclear C
Millstone 3	50-423	PWR	3.2 MI WSW of New London, CT	Dominion Nuclear C
Nine Mile Point 1	50-220	BWR	6 MI NE of Oswego, NY	Niagara Mohawk P
Nine Mile Point 2	50-410	BWR	6 MI NE of Oswego, NY	Niagara Mohawk P

Oyster Creek	50-219	BWR	9 MI S of Toms River, NJ	AmerGen Energy C
Peach Bottom 2	50-277	BWR	17.9 MI S of Lancaster, PA	Exelon Generating
Peach Bottom 3	50-278	BWR	17.9 MI S of Lancaster, PA	Exelon Generating
Pilgrim 1	50-293	BWR	4 MI SE of Plymouth, MA	Entergy Nuclear Ge
Salem 1	50-272	PWR	18 MI S of Wilmington, DE	PSEG Nuclear, LLC
Salem 2	50-311	PWR	18 MI S of Wilmington, DE	Public Service Elec
Seabrook 1	50-443	PWR	13 MI S of Portsmouth, NH	North Atlantic Ener
Susquehanna 1	50-387	BWR	7 MI NE of Berwick, PA	PPL Susquehanna,
Susquehanna 2	50-388	BWR	7 MI NE of Berwick, PA	PPL Susquehanna,
Three Mile Island 1	50-289	PWR	10 MI SE of Harrisburg, PA	AmerGen Energy C
Vermont Yankee	50-271	BWR	5 MI S of Battleboro, VT	Vermont Yankee N
Browns Ferry 1	50-259	BWR	10 MI NW of Decatur, AL	Tennessee Valley A
Browns Ferry 2	50-260	BWR	10 MI NW of Decatur, AL	Tennessee Valley A
Browns Ferry 3	50-296	BWR	10 MI NW of Decatur, AL	Tennessee Valley A
Brunswick 1	50-325	BWR	2 MI N of Southport, NC	Carolina Power & L
Brunswick 2	50-324	BWR	2 MI N of Southport, NC	Carolina Power & L
Catawba 1	50-413	PWR	6 MI NW of Rock Hill, SC	Duke Energy Corp.
Catawba 2	50-414	PWR	6 MI NW of Rock Hill, SC	Duke Energy Corp.
Crystal River 3	50-302	PWR	7 MI NW of Crystal River, FL	Florida Power Corp
Farley 1	50-348	PWR	18 MI SE of Dothan, AL	South Nuclear Ope
Farley 2	50-364	PWR	18 MI SE of Dothan, AL	South Nuclear Ope
Harris 1	50-400	PWR	20 MI SW of Raleigh, NC	Progress Energy
Hatch 1	50-321	BWR	11 MI N of Baxley, GA	South Nuclear Ope
Hatch 2	50-366	BWR	11 MI N of Baxley, GA	South Nuclear Ope
McGuire 1	50-369	PWR	17 MI S of Charlotte, NC	Duke Energy Corp.
McGuire 2	50-370	PWR	17 MI S of Charlotte, NC	Duke Energy Corp.
North Anna 1	50-338	PWR	40 MI NW of Richmond, VA	Virginia Electric & P
North Anna 2	50-339	PWR	40 MI NW of Richmond, VA	Virginia Electric & P
Oconee 1	50-269	PWR	30 MI W of Greenville, SC	Duke Energy Corp.
Oconee 2	50-270	PWR	30 MI W of Greenville, SC	Duke Energy Corp.
Oconee 3	50-287	PWR	30 MI W of Greenville, SC	Duke Energy Corp.
Robinson 2	50-261	PWR	26 MI from Florence, SC	Carolina Power & L
Saint Lucie 1	50-335	PWR	12 MI SE of Ft. Pierce, FL	Florida Power & Lig
Saint Lucie 2	50-389	PWR	12 MI SE of Ft. Pierce, FL	Florida Power & Lig
Sequoyah 1	50-327	PWR	9.5 MI NE of Chattanooga, TN	Tennessee Valley A
Sequoyah 2	50-328	PWR	9.5 MI NE of Chattanooga, TN	Tennessee Valley A
Summer	50-395	PWR	26 MI NW of Columbia, SC	South Carolina Elec
Surry 1	50-280	PWR	17 MI NW of Newport News, VA	Virginia Electric & P
Surry 2	50-281	PWR	17 MI NW of Newport News, VA	Virginia Electric & P
Turkey Point 3	50-250	PWR	25 MI S of Miami, FL	Florida Power & Lig
Turkey Point 4	50-251	PWR	25 MI S of Miami, FL	Florida Power & Lig
Vogtle 1	50-424	PWR	26 MI SE of Augusta, GA	South Nuclear Ope
Vogtle 2	50-425	PWR	26 MI SE of Augusta, GA	South Nuclear Ope

Watts Bar 1	50-390	PWR	10 MI S of Spring City, TN	Tennessee Valley A
Braidwood 1	50-456	PWR	24 MI SSW of Joilet, IL	Exelon Generating
Braidwood 2	50-457	PWR	24 MI SSW of Joilet, IL	Exelon Generating
Byron 1	50-454	PWR	17 MI SW of Rockford, IL	Exelon Generating
Byron 2	50-455	PWR	17 MI SW of Rockford, IL	Exelon Generating
Clinton	50-461	BWR	6 MI E of Clinton, IL	AmerGen Energy C
D.C. Cook 1	50-315	PWR	11 MI S of Benton Harbor, MI	Indiana Michigan P
D.C. Cook 2	50-316	PWR	11 MI S of Benton Harbor, MI	Indiana Michigan P
Davis-Besse	50-346	PWR	21 MI ESE of Toledo, OH	FirstEnergy Nuclea
Dresden 2	50-237	BWR	9 MI E of Morris, IL	Exelon Generating
Dresden 3	50-249	BWR	9 MI E of Morris, IL	Exelon Generating
Duane Arnold	50-331	BWR	8 MI NW of Cedar Rapids, IA	Nuclear Manageme
Fermi 2	50-341	BWR	25 MI NE of Toledo, MI	Detriot Edison Co.
Kewaunee	50-305	PWR	27 MI E of Green Bay, WI	Nuclear Manageme
La Salle 1	50-373	BWR	11 MI SE of Ottawa, IL	Exelon Generating
La Salle 2	50-374	BWR	11 MI SE of Ottawa, IL	Exelon Generating
Monticello	50-263	BWR	30 MI NW of Minneapolis, MN	Nuclear Manageme
Palisades	50-255	PWR	5 MI S of South Haven, MI	Consumers Energy
Perry 1	50-440	BWR	7 MI NE of Painesville, OH	FirstEnergy Nuclea
Point Beach 1	50-266	PWR	13 MI NNW of Manitowoc, WI	Nuclear Manageme
Point Beach 2	50-301	PWR	13 MI NNW of Manitowoc, WI	Nuclear Manageme
Prairie Island 1	50-282	PWR	28 MI SE of Minneapolis, MN	Nuclear Manageme
Prairie Island 2	50-306	PWR	28 MI SE of Minneapolis, MN	Nuclear Manageme
Quad Cities 1	50-254	BWR	20 MI NE of Moline, IL	Exelon Generating
Quad Cities 2	50-265	BWR	20 MI NE of Moline, IL	Exelon Generating
Arkansas Nuclear 1	50-313	PWR	6 MI WNW of Russellville, AR	Entergy Operations
Arkansas Nuclear 2	50-368	PWR	6 MI WNW of Russellville, AR	Entergy Operations
Callaway	50-483	PWR	10 MI SE of Fulton, MO	Union Electric Co.
Columbia	50-397	BWR	12 MI NW of Richland, WA	Energy Northwest
Comanche Peak 1	50-445	PWR	4 MI N of Glen Rose, TX	TXU Electric & Gas
Comanche Peak 2	50-446	PWR	4 MI N of Glen Rose, TX	TXU Electric & Gas
Cooper	50-298	BWR	23 MI S of Nebraska City, NE	Nebraska Public Po
Diablo Canyon 1	50-275	PWR	12 MI WSW of San Luis Obispo, CA	Pacific Gas & Elect
Diablo Canyon 2	50-323	PWR	12 MI WSW of San Luis Obispo, CA	Pacific Gas & Elect
Fort Calhoun	50-285	PWR	19 MI N of Omaha, NE	Omaha Public Pow
Grand Gulf 1	50-416	BWR	25 MI S of Vicksburg, MS	Entergy Operations
Palo Verde 1	50-528	PWR	36 MI W of Phoenix, AZ	Arizona Public Serv
Palo Verde 2	50-529	PWR	36 MI W of Phoenix, AZ	Arizona Public Serv
Palo Verde 3	50-530	PWR	36 MI W of Phoenix, AZ	Arizona Public Serv
River Bend 1	50-458	BWR	24 MI NNW of Baton Rouge, LA	Entergy Operations
San Onofre 2	50-361	PWR	4 MI SE of San Clemente, CA	South California Ed
San Onofre 3	50-362	PWR	4 MI SE of San Clemente, CA	South California Ed
South Texas 1	50-498	PWR	12 MI SSW of Bay City, TX	STP Nuclear Opera

South Texas 2	50-499	PWR	12 MI SSW of Bay City, TX	STP Nuclear Opera
Waterford 3	50-382	PWR	20 MI W of New Orleans, LA	Entergy Operations
Wolf Creek 1	50-482	PWR	3.5 MI NE of Burlington, KS	Wolf Creek Nuclear

The page United States Reactor Information provides a more detaiiled imagemap. In addition, more detailed maps (e.g. with aerial views) are available under certain circumstances.

Recent Events at Nuclear Plants

The NRC maintains several pages on recent events.

- Daily Event Reports
- Latest News

Recent significant events and hot topics addressed by the NRC include:

- Safety Culture
- Nuclear Security
- Emergency Preparedness
- High-Level Waste Disposal
- Reactor License Renewal
- New Reactor Licensing
- Significant Enforcement Actions
- Davis-Besse Reactor Vessel Head Degradation
- Potassium Iodide in Emergency Planning
- Reactor Oversight Process (ROP)
- Reactor Safety Focus Areas
- PWR Sump Performance
- Use of Risk in Nuclear Regulation

The NRC biennially periodically updates NUREG-1350, Information Digest.

Department of Energy and Private Spent Fuel Storage Facilities

By law, the spent fuel and the plutonium in the fuel has always belonged to the US government. In the 60's and 70's, utilities expected to be able to send the spent fuel to a reprocessing facility after about 1.5 to 2 years storage in the cooling pools onsite. President Carter restricted this option because of concern about plutonium proliferation. As a result, in the 80's utilities were forced to expand the storage space onsite by "re-racking" their storage racks in the storage pools. Subsequently in the 90's, a number of plants started using large metal spent fuel storage casks onsite.

In 1982, Congress charged the Department of Energy (DOE) to start accepting spent fuel for long term storage starting in January 31, 1998. This law required the utilities to collect a fee for the government. Throughout the various government administrations since that time, DOE has continued to move back the projected date when they can accept spent fuel.. At the same time, DOE has been using the "waste fund" money for purposes not directly related to spent fuel storage. As a result, a number of utilities sued DOE to require them to take the spent fuel as a contractual obligation.

In the 90's, the utilities realized that DOE would be unable to meet their needs with re-racking and onsite storage . Some have initiated projects with Indian communities, as sovereign entities, to allow interim storage until the DOE waste repository is available. Current projects are progressing in Utah. The following sites provide background on the issue:

- Waste Policy Act of 1982
- Skull Valley Goshutes
- Private Fuel Storage
- Prehearing on Skull Valley Private Spent Fuel Storage
- Civilian Spent Nuclear Fuel Temporary Storage Options
- NRC page on Radioactive Waste Management
- Nuclear Waste in Canada - *type in **nuclear waste** or **waste** on the search page (Canadian Nuclear Safety Commission)*
- High Level Radioactive Waste Management (Google-search results)

Congress approved Yucca Mountain, Nevada for the final storage of the spent nuclear fuel.

Privatization of US Nuclear Fuel Enrichment Program and Use of Russian Highly Enriched Materials

Fuel used in commercial nuclear reactors, usually in the uranium dioxide form, contains 3 to 5% uranium-235. The remainder of the uranium is U-238. Since the 1940's, the U.S. government has controlled the enrichment process. Plants in Tennessee, Kentucky, and Ohio used gaseous diffusion to concentrate the U-235. In Europe, the newer gas centrifuge process is used. In the 90's, the U.S. government decided to privatize the enrichment facilities through formation of the United States Enrichment Corporation. In addition, the United States entered into an agreement with Russia to purchase highly enriched uranium (greater than 20% U-235) from material removed from disassembled weapons. As a result of these purchases, the U.S. will require less use of the enrichment facilities. In the 2008-2010 timeframe, the Russian materials should account for ~ 50% of the U.S. enriched uranium needs.

Sites providing information on this issue are:

- Commercial Nuclear Fuel from U.S. and Russian Surplus Defense Inventories: Materials, Polices, and Market Effects (*Energy Information Administration)*
- Nuclear and Uranium Industry Publications (*Energy Information Administration)*
- About USEC *(US Enrichment Corporation)*
- Missiles to Fuel: Step-by-Step *(US Enrichment Corporation)*

Effects of Low Levels of Radiation Exposure

For many years, the US has typically considered radiation, even at low levels, to present some harm. This model is referred to as the "linear, no-threshold (LNT)" hypothesis.

Over the years, successive scientific studies have been done resulting in publication of the *Biological Effects of Ionizing Radiation* (BEIR) reports. Recent versions have been published by the National Academies Press, whose documents may be viewed on-line for free; in some cases, the documents may be downloaded for free.

Recent studies have led to increasing debate about whether the LNT model is appropriate. Sites and searches providing information on this contentious issue are:

- Biological Effects of Ionizing Radiation (BEIR) VI Report: "The Health Effects of Exposure to Indoor Radon" *Public Summary* - *Report* *(US Environmental Protection Administration; National Academy of Science)*
- Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR VII, Phase 1 (1998) and Phase 2 (2005) *(National Academy of Science)*
- Radiation in Everyday Life *(IAEA website search results)*
- Radiation and Health Physics Information *(Univ of Michigan)*
- Dose Standards and Methods for Protection Against Radiation and Contamination *(USNRC)*
- Biological Effects of Radiation *(US NRC)*
- Advisory Committee on Nuclear Waste , *December 16, 1997, Meeting Minutes*
- Atomic Split: Data Recharge Debate on Low-Level Radiation Risk, *Joby Warrick, Washington Post, April 14, 1997*
- Effects of Low Level Radiation Exposure (Google search results)

Transportation of Nuclear Waste

Since the 1960's, radioactive waste has been shipped by train or truck within the United States. In earlier days, spent naval and military reactors were shipped to the Idaho Chemical Processing Plant near Idaho Falls, Idaho. Commercial spent fuel was shipped to West Valley, NY and Morris, Illinois. Throughout the period, low level waste shipments (e.g. spent resin) have gone to Barnwell, SC, Hanford, WA and Beatty, NV. Some groups have expressed concern about anticipated shipments of spent fuel assemblies to Yucca Mountain, Nevada. These concerns focus on transportation accidents. Prior to any major change in shipments (from the current 2400), public protection should be assured by addressing the issues - (1) what is the anticipated frequency and major routes for these shipments, (2) what is the anticipated frequency of accidents involving these shipments, (3) if accidents occur, is there sufficient containment to ensure there will not be radioactive release affecting the public or the environment due to expected causes - rollover, fire, crash, (4) are local agencies familiar enough with emergency plans addressing radioactive materials. If these questions can be satisfactorily addressed, then shipments could be expected to occur.

Sites addressing this issue are:

- US and state maps showing likely transportation routes for spent fuel shipments to Yucca Mountain *(State of Nevada)*
- Nuclear Waste Technical Review Board

- Transportation in Canada - *type in **transport** on the search page (Canadian Nuclear Safety Commission)*
- Clark County Nuclear Waste Panning Activities *(Clark County, Nevada)*
- Nuclear Waste *(Eureka County, Nevada)*
- Transuranic Waste Transportation *(SSEB)*
- Spent Fuel and High-Level Radioactive Waste Transportation Handbook. January, 1995 *(SSEB)*
- Transportation Statistics *(Dept. of Transportation)*
- Transportation of Spent Fuel *(Nuclear Regulatory Commission)*
- WIPP Transportation Safety Program - *type in **wipp transportation safety** to get pages (State of New Mexico)*
- German Federal Office for Radiation Protection (BFS) - *information in German - you can use Babelfish to aid in translation.*

Decommissioning of Nuclear Power Plants

Since the 1940's when the original government production reactors were built, nuclear plants have been built, shutdown, and decommissioned. Older commercial plants decommissioned have included Elk River (MN), Pathfinder (SD), Shippingport (PA), Shoreham (NY). More recently, plants undergoing decommissioning include - Yankee-Rowe (MA), Connecticut Yankee (CT), Maine Yankee (ME), Trojan (OR), Humboldt Bay and Rancho Seco (CA), and Zion (IL).

Pages that address how decommissioning is conducted and the issues that must be addressed include:

- Sites Undergoing Decommissioning, *(U.S. Nuclear Regulatory Commission)*
- Fact Sheet on Decommissioning Nuclear Power Plants, *(U.S. Nuclear Regulatory Commission)*
- NUREG-1628, Staff Responses to Questions Concerning Decommissioning, *(U.S. Nuclear Regulatory Commission)*
- The Decommissioning qnd Dismantling of Nuclear Facilities: Status, Approaches, Challenges, *(OECD Nuclear Energy Agency)*
- The Decommissioning and Dismantling of Nuclear Facilities in OECD/NEA member countries: A compilation of national fact sheets, *(OECD Nuclear Energy Agency)*
- Decommissioning a Nuclear Power Plant, *(Student Corner, US Nuclear Regulatory Commission)*
- Decommissioning of Nuclear Power Plants, *(Nuclear Energy Institute)*
- Decommissioning of Nuclear Power Plants, *(Google search result)*