

Diablo Canyon Used Fuel Management

VIDEO SCRIPT

- [Narrator] Diablo Canyon is owned and operated by Pacific Gas and Electric Company. The plant has an excellent operational record that spans more than 30 years and provides carbon free electricity for more than three million people. While Diablo Canyon has played a key role in supplying California with greenhouse gas free electricity for decades. State policies that focus on renewables and energy efficiency coupled with projected lower customer electricity demand in the future are resulting in a significant reduction in the need for the electricity produced by Diablo Canyon beyond 2025. In response to these dramatic changes in California's energy landscape, PG&E partnered with labor community and leading environmental organizations in 2016 on a joint proposal that would increase investment in energy efficiency and renewables while retiring Diablo Canyon at the end of its current Nuclear Regulatory Commission operating licenses in 2024 and 2025. This proposal was approved by the California Public Utilities Commission and then modified by the California Legislature and governor in 2018 to ensure a successful transition from nuclear power to other greenhouse gas free resources. PG&E remains focused on safely operating Diablo Canyon through 2025 while at the same time preparing to decommission the facility in a fashion that is consistent with all laws and regulations, respectful of the environment and considerate of the input from neighboring communities. Diablo Canyon generates electricity by using nuclear fuel which is made into small pellets and placed into long tubes called fuel rods. The rods are placed together into a fuel assembly. The fission process takes place after a fuel assembly is placed into the reactor. This produces heat to create steam which turns a turbine to generate electricity. Fuel inside the reactor must be replaced periodically, a process that is completed during Diablo Canyon's scheduled refueling outages. New fuel is benign when it arrives at Diablo Canyon because it is not yet activated by the fission process inside the reactor core. Before it is placed into the reactor it needs to be inspected. Workers use gloves and handle it with care maintaining a high level of cleanliness to protect the integrity of the fuel before it is transferred to one of Diablo Canyon's spent fuel pools for storage. The spent fuel pools store new fuel as well as the used fuel that has been removed from the reactor core. When new fuel is placed into the reactor it generates power for three to five years. When its cycle is complete it is moved to wet storage for cooling before it is transferred to dry storage. Until 2009, all the fuel used to power Diablo Canyon was stored in the sites spent fuel pools, a storage method that is safe and used in the US and around the world. The spent fuel pools are designed to be seismically safe. Built into bedrock the walls are constructed with reinforced concrete that are approximately six feet thick and lined with stainless steel. Inside the 40-foot deep pools used fuel is stored in a grid structure called a rack. Since the fuel assemblies are 14 feet tall, the top of every assembly is submerged under more than 20 feet of water which keeps the used fuel cool until it is ready to be transferred to dry storage. This deep barrier of water provides shielding from the radiation emitted from the used fuel which is not strong enough to generate electricity but still emits heat and radiation. Diablo Canyon uses Holtec International's HI-STORM 100SA system to transfer used fuel from the pools and place it into long-term dry storage. The entire process

from the pool to the pad meets the Nuclear Regulatory Commission's site-specific criteria and was designed with seismic safety in mind. This method is trusted worldwide and was selected by PG&E following an in-depth regulatory oversight and public participation process.

Transferring used fuel from the pools to dry storage begins with a 15-foot tall stainless steel alloy storage canister. The canister is placed inside a separate multi walled lead and steel transfer cask that is used to transport the internal canister to the used fuel storage pad after it is loaded. Together they are placed into a designated location at the bottom of the spent fuel pool where workers load use fuel assemblies into the storage canisters internal grid structure. After the canister is filled with up to 32 fuel assemblies, a heavy stainless steel lid is lowered into the pool and secured to the top of the canister which is then lifted out of the pool by an overhead crane. After the lid is welded to the top of the canister shell and moisture is removed from inside the cask is moved to Diablo Canyon's independent spent fuel storage installation often referred to in the industry as an ISFSI. Workers use a vertical cask transporter specifically designed to safely transfer used fuel to the ISFSI which is equipped with seismic restraints and bumpers. In 2005, Diablo Canyon began construction on its ISFSI. The completed installation is comprised of seven individual pads that are built on solid bedrock and have a collective capacity to hold all the fuel used during the life of the plant in an area smaller than a football field. Each of the seven ISFSI pads are approximately eight feet thick constructed with 2,000 cubic yards of concrete and 206 tons of reinforcing steel. The ISFSI was also designed to anchor each cask into the pad for strength and seismic safety. Each cask is fastened to a steel plate on the pad's surface with 16 bolts. Below the surface, 16 two and a half inch thick steel bars connect this top plate to a corresponding plate at the base of the eight foot thick pad. Diablo Canyon began the process of transferring used fuel to the ISFSI in 2009. The ISFSI operates under a site-specific license that is issued by the Nuclear Regulatory Commission and is separate from Diablo Canyon's operating licenses. PG&E and the Nuclear Regulatory Commission routinely conduct inspections of the casks to ensure that they are fully compliant with stringent guidelines and that they fulfill their safety function as required by the materials license. Before the transfer cask arrives at the ISFSI workers prepare what is called an overpack which encases the inner canister for long-term storage. The overpack is prepared by filling its inner and outer cylindrical steel shells with concrete. As the inner canister is lowered into the overpack seismic restraints are used, the cask is then bolted shut with the seal lid and bolted to the pad. A loaded Holtec cask is 11 feet in diameter, 20 feet high and weighs about 360,000 pounds. It is engineered to withstand extreme natural hazards and seismic events. In addition to cask's strength, the ISFSI pad is located 300 feet above sea level protecting it from a severe wave event as well as from rising sea levels that are a result of climate change. The Electric Power Research Institute or EPRI is an independent non-profit organization that conducts research on the health, safety and environmental effects on energy generation. EPRI conducted inspections of Diablo Canyon's Holtec canisters and issued a report in 2016, indicating that no signs of stress, corrosion, cracking were found. You can access EPRI's report by visiting EPRI.com, clicking on research, then typing Diablo Canyon into the search field. The Nuclear Regulatory Commission requires that recurring inspections for stress corrosion cracking be conducted as part of ISFSI license renewal aging management. PG&E operates a second ISFSI in California at the decommissioned Humboldt Bay Nuclear Power Plant. Seen here is an ISFSI inspection conducted at Humboldt Bay Power Plant to meet Nuclear Regulatory Commission requirements. Dry cask storage

systems are widely used throughout the world at nuclear power plants and are demonstrated to be safe. Diablo Canyon's dry cask storage does not inhibit potential future public access to the Diablo Canyon site and surrounding lands. Diablo Canyon facilities repurposing options have been discussed by the Diablo Canyon decommissioning engagement panel and by members of the communities surrounding Diablo Canyon. PG&E's ISFSI at the decommissioned Humboldt Bay Power Plant is situated on the coast of Humboldt Bay and adjacent to the community of King Salmon. A public trail runs only 53 feet from the installation. Another ISFSI is located at San Onofre Nuclear Generating Station near San Diego California. This installation is located just 128 feet from San Onofre State Beach which receives approximately 2.5 million visitors per year and is one of the top five most visited state parks in California. Similar configurations can be found in other areas of the country. For example, the Exelon Corporation's decommissioned Zion Nuclear Power Station securely houses its ISFSI less than a mile from the community of Zion, Illinois and is surrounded by Illinois Beach State Park. Entergy's Vermont Yankee Power Station is one of several other examples. Permanently shut down in 2014 and located on the Connecticut River, it's ISFSI is in the community of Vernon, Vermont, with two public schools located within a half mile. Like Diablo Canyon's ISFSI these facilities must pass the Nuclear Regulatory Commission's rigorous licensing process that addresses security, safety, emergency response and worker protection on an ongoing basis. While Diablo Canyon storage of used fuel is safe, robust and designed to withstand extreme events, PG&E strongly supports policies and legislation requiring the federal government to fulfill its commitment to take possession of used nuclear fuel. In 1982, Congress enacted The Nuclear Waste Policy Act which formally established a comprehensive nuclear waste management strategy and provided the framework for a permanent geologic repository for used nuclear fuel and nuclear waste. The Act assigned the Department of Energy to establish a funding model in which customers who benefited from nuclear energy paid the federal government to finance its disposal. Customers have paid more than 40 billion dollars to the Department of Energy, yet used nuclear fuel currently sits idle across 39 states. PG&E joined with other utilities to sue the federal government over failing to take responsibility for the used fuel. To date PG&E has recovered essentially all costs associated with storage of fuel at both Diablo Canyon and Humboldt Bay Power Plant. And as of May 2018, has returned approximately 435 million dollars in funds to customers. PG&E will continue to safely store used fuel on-site and expects to continue to file claims seeking reimbursement of used fuel management costs until a permanent repository is established by the Department of Energy. PG&E invites you to visit Diablo Canyon where you will have the opportunity to see firsthand the safe operation of the ISFSI which is included in all plant tours. Visit pge.com/DiabloCanyonTours to learn more and to sign up. PG&E will retire Diablo Canyon when its current Nuclear Regulatory Commission operating licenses expire in 2024 and 2025 and is seeking public input on the potential future uses of Diablo Canyon lands and facilities. While there is no permanent repository for used fuel at this time, Diablo Canyon's ISFSI will not inhibit potential post operational uses of the site. If you would like to learn more about the Diablo Canyon decommissioning process or join the conversation on potential future uses of Diablo Canyon lands and facilities, visit the Diablo Canyon decommissioning engagement panels website at pge.com/EngagementPanel. You can also contact PG&E's Diablo Canyon decommissioning group directly by emailing decommissioning@pge.com.