The Effect of the Turkey Point Cooling Canal Leakage

The nuclear power industry has continued to grow and offers many advantages; however, if proper safety measures are not taken, the benefits can be overshadowed by the drawbacks. Nuclear plants regulate waste control and disposal using various nuclear reactor technologies. One such nuclear power plant is the Turkey Point Nuclear Generating Station in Miami, Florida, which utilizes a cooling canal system (CCS) that uses water from the Biscayne Bay to cool the overheated nuclear plant water before being circulated back for reuse. Florida Power & Light (FPL) claims this cooling canal is a closed system, but scientific studies have proven that the Turkey Point CCS is leaking polluted water into the Biscayne Bay, contaminating the drinking water supply and harming the maine life. Even though FPL claims it is acting responsibly, current scientific evidence shows that the severe issues surrounding the inadequate design of the cooling canal system at the Turkey Point Nuclear Generating Station have caused lasting problems that continue to plague the surrounding area.

The cooling canal leakage at Turkey Point has had a negative impact and has the potential to lead to devastating consequences if not properly addressed. Even though FPL claims to have addressed the leakage issues, there is undeniable evidence that more effective steps are necessary to prevent additional environmental damage. In “FPL Ordered to Fix Turkey Point Plant’s Salty Plume” from *The Palm Beach Post*, veteran reporter Susan Salisbury (2016) states that the Biscayne Aquifer “supplies drinking water to roughly 3 million people from Boca Raton to Broward and Miami-Dade counties, and FPL has insisted the water supply is not in danger” (para. 11). The leakage at Turkey Point has increased the salinity of surrounding waters, creating a massive underground saltwater plume that must be dealt with. The saltwater plume continues to move towards the Biscayne Bay, a substantial source of drinking water for Florida

residents. Continued movement of the saltwater plume clearly indicates that the water supply is in danger, suggesting that FPL's claim is incorrect. Supposing that the saltwater plume managed to advance to the point that it reaches the well waters and the Biscayne Bay, the drinking water supply would be contaminated. If there's contamination in the water supply, it could cause dehydration, ingestion of radioactive isotope tracers, long and costly water treatment, and health problems for animals and humans. To control the rising salinity, FPL plans to pump supplementary cooling water from the Biscayne Aquifer into the CCS in hopes that it'll decrease the rate of saltwater intrusion. In the study "The Cooling-Canal System at the FPL Turkey Point Power Station," David Chin (2016), a professor of Civil and Environmental Engineering at the University of Miami, explains that the problem with the pumping system is that adding lower salinity water into the CCS "exacerbate[s] the inland intrusion of saltwater originating from the CCS" (p. 2). Rather than solving the problem, FPL's pumping solution will only raise the CCS's water level and cause a greater saltwater leak from the Turkey Point CCS, harming the environment and endangering the water supply. The effect of the pumping operation on saltwater intrusion in the Biscayne Aquifer are issues that have been yet to be addressed.

Scientific evidence and studies have shown that Turkey Point's outdated CCS is leaking polluted water into Biscayne Bay. In "Canal Leaks Threaten Miami Water" from *Engineering News-Record*, Thomas Armistead (2016), a veteran engineering industry news reporter, quotes officials and researchers on the Turkey Point canal leak who have concluded that the CCS at Turkey Point is most likely "the major contributing cause of the continuing westward movement of the saline water interface" (p. 8-9). The CCS functions as a radiator by lowering the water temperature using convective heat transfer and radiated heat loss. The cooling water is then moved to the CCS after receiving heat and pumped throughout many canals. Because the CCS is

unlined, it is directly connected to groundwater, contributing to water pollution. In the previously mentioned study titled “The Cooling-Canal System at the FPL Turkey Point Power Station,” Chin (2016) examines issues that need to be addressed regarding salinity and temperature levels, and the issues with the “migration of the plume of cooling canal water into the groundwater” (p. 1). The temperature and salinity of the cooling canal water has been increasing and it is leaking out of the canal, causing an increase in algae blooms, which can harm wildlife and the ecosystem. For instance, a profusion of algae can suffocate the marine life in the Biscayne Bay by blocking sunlight, which in turn blocks underwater photosynthesis. The attempt to solve this issue through the pumping operation only exacerbates the problem by adding to the leakage. Scientific studies have shown that the flawed cooling canal system at Turkey Point is causing problems that harm the surrounding ecosystems.

Due to the harmful effects of the nuclear leakage, engineers should implement new technology to solve and control the cooling canal leakage at Turkey Point. The CCS at Turkey Point has caused unnecessary leakages that could be fixed by using other methods of cooling. In the article “Cooling Power Plants,” the World Nuclear Association (2015), an international organization that promotes nuclear power, describes cooling towers, which are a more efficient cooling method that could be used at Turkey Point. One way of using cooling towers is dry cooling, where “high forced draft air flow through a finned assembly like a car radiator” is used to cool the plant (para. 7). Even though keeping the current CCS at Turkey Point is convenient, it risks leakage since it is unlined. Currently, the CCS uses water from Biscayne Bay to run through the condensers. During the cooling process the hyper-saline water from the nuclear plant leaks into the Biscayne Bay water and when the cooling water is sent back out into the environment it has the potential to contaminate the drinking water in the Biscayne Bay. It is

imperative that the leaking CCS is replaced. Ultimately, using cooling towers would be less harmful to the environment. Instead of using an outside water source to cool water from the nuclear plant, cooling towers run a high airflow across the water to remove heat through evaporation. By eliminating the use of Biscayne Bay water, cooling towers prevent further leakages of polluted water into the drinking water supply. Therefore, the most effective way to prevent further leakage of contaminated water into the Biscayne Bay is to replace the CCS with current technology, like cooling towers. Bill Powers (2016), an engineer with degrees in environmental sciences and mechanical engineering, mentions another solution in his recent technical report entitled "Closed Cycle Cooling Tower Feasibility Assessment for Turkey Point Nuclear Units 3 and 4." Powers proposed implementing cooling towers that use indirect cooling, where pushing an upward current of air through water droplets cool the air. Instead of using the water from the Biscayne Bay for cooling, a more sustainable water source like "reclaimed water from the Miami-Dade Water and Sewer Department Miami-Dade County Reuse Water" could be used (p. 1). Implementing this new technology for the infrastructure is much more efficient. Installing cooling towers would protect the area around Turkey Point from continued aquifer contamination, increased saltwater intrusion, and polluted water leakages into the Biscayne Bay.

As of now, the cooling canal leakage at the Turkey Point Nuclear Generating Station is an urgent issue that can lead to detrimental effects on the people and the environment. Even though FPL claims it is addressing the leakage, the proposed solutions aren't addressing the source of the problem: the flawed cooling canal design. If the cooling canal system isn't changed or replaced, problems can build up and cause harmful effects that are difficult to solve. Notably, the build-up of polluted water from the leak can create disasters like the saltwater plume in

Miami. Without implementation of cooling towers, the Turkey Point cooling canal leakage could result in large-scale, lasting problems.

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