**The West Michigan Section IEEE Toured the Palisades Nuclear Plant Run by Entergy Inc. on Friday August 18, 2017 from 3-7 P.M.**

Altogether 19 West Michigan Section members and 13 guests were visitors that day along with 4-5 Entergy staff members who gave up time on a late summer afternoon to be our guides. Special thanks to IEEE PES member Mike Cannady for arranging this tour working with IEEE members George Sleeper and Brian Shaler from Entergy.

The tour lasted from 3 to ~7 PM counting badging-in and out time and a lengthy demonstration of the (full-fidelity) Control Room Simulator back at the Training Building where we had originally assembled earlier. A simulated emergency was run for us.

I should note we toured the plant back in the early 80’s. However, there was no-where near the security then like we had to go through this time. The security process took ~1 hour with at least three major stops going in and one coming out of the secure area including full-body pat downs. Guards armed with assault rifles were always present. Without Mike Cannady’s consulting connection to Entergy and having IEEE members working there we would never have been able to set foot in Palisades. The public has been forbidden to tour there since 9/11.

As the plant is scheduled to close in October 2018 this may have been the last chance we have to tour again. However, we will try to arrange one more tour in early 2018 to accommodate the 14 people who were still on the waiting list. I am sure we will have several more members who would be interested as well.

Afterwards most of us caravanned up to downtown South Haven for some liquid refreshment and a good meal at a popular local bar. The Section bought for members and Entergy hosts.

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The Entergy Palisades Nuclear Power Plant is a single pressurized water reactor (using some 45 control rods to moderate the UO2 filled fuel rods. The pressurized water flows through a heat exchanger and heats water in a second closed loop to drive a Westinghouse 900MW steam turbine (actually 2 turbines operating in series I believe). The inner loop pressure is maintained by a pressurizer at ~ 2000 psi and ~ 630 degrees F. The outer loop is where the steam forms at 900 psi and 530 degrees F in the heat exchanger and drives the turbines. The spent steam is condensed by cooling water in a third (almost) closed loop and reused. Only evaporation losses from the two cooling towers need to be replaced by drawing water from Lake Michigan.

The generator output is 22.3 KV and is stepped up to 345 kV on the outgoing delta transmission line. Grid input comes from a parallel 345 KV line and is used for synchronization and normal station power operations. Emergency start-up diesel generators (2) are also on site, of course.

 The plant’s commercial operation date was December 1971 with full power obtained in 1973. Consumers sold Palisades to Entergy out of New Orleans LA about 10 years ago. The original operating license was extended until 2031, but Entergy plans to close the facility in October 2018. This is still not definite however pending State approval. If so most of the non-contaminated equipment will probably be moved elsewhere but the economic impact to the area will be severe. Approximately 600 people work there currently with ~ 90 in Engineering.

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**Pressurized water reactors constitute the large majority of the world's nuclear power plants and are one of three types of light water reactor, the other types being boiling water reactors and supercritical water reactors. In a PWR, the primary coolant is pumped under high pressure to the reactor core where it is heated by the energy released by the fission of atoms. The heated water then flows to a steam generator where it transfers its thermal energy to a secondary system where steam is generated and flows to turbines which, in turn, spin an electric generator. In contrast to a boiling water reactor, pressure in the primary coolant loop prevents the water from boiling within the reactor. All LWRs use ordinary water as both coolant and neutron moderator.**