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Daniel Dorman, Regional Administrator
U.S. Nuclear Regulatory Commission Region I
2100 Renaissance Blvd, Suite 100
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SUBJECT: Unanalyzed and Unapproved Operation of James A. FitzPatrick

Dear Mr. Dorman:

Via licensee event report dated June 29, 2015 (ML15180A207), the owner of the James A. FitzPatrick nuclear plant informed the NRC of a problem that workers introduced during a refueling outage last fall. This report stated:

- "The fuel support piece [in fuel cell 38-39] became elevated during last refueling outage (September 2014)."
- "The 38-39 FSP was elevated by approximately 1.5 inches and rotated counterclockwise by approximately 6 degrees."
- "The coolant flow into each fuel assembly in cell 38-39 is partially obstructed by the elevated and offset FSP. A Thermal-Hydraulic evaluation by General Electric Hitach Nuclear Energy (GEH) for this condition estimated a flow reduction of 23.63%.
- "When the elevated FSP on cell 38-39 was identified the station enacted compensatory measures to maintain MCPR values within OLMCPR."
- "Correction factor of 0.22 is applied to calculated MCPR vales at fuel cell location 38-39."
- "The position of the FSP and fuel assemblies cannot interfere with control rod insertion."

It seems clear that FitzPatrick is operating in unanalyzed and unapproved territory.

Unanalyzed and Unapproved Operation

The NRC has approved the reactor's operation with the fuel support piece properly seated and aligned, not with it elevated 1.5 inches and mis-aligned six degrees.

The NRC has approved the reactor's operation with unobstructed flow through the fuel support piece's orifices, not with flow reduced by an alleged 23.63 percent.

By letter dated September 30, 2014 (ML14258B189), the NRC approved the reactor's operation with a Minimum Critical Power Ratio (MCPR) of 1.10 or greater for two recirculation loop operation and 1.13 or greater for single loop operation, not with a "correction factor" of 0.22 applied to cover the misplaced fuel support piece's consequences.

Partially Obstructed, Totally Unreviewed, Orifices

As illustrated in Figure 1, the fuel support piece has orifices that allow water to enter and flow through the four fuel bundles in the fuel cell. The orifices are specifically sized to provide a larger pressure drop than can be encountered by two-phase flow through the fuel cells. This design assures sufficient flow rate through even the highest power (and highest two-phase flow resistance) fuel bundles. The NRC has reviewed and approved the fuel design topical reports and the associated thermal-hydraulic computer codes that ensure adequate cooling is maintained cycle to cycle for different core configurations.

But the NRC has neither reviewed nor approved anything about partially obstructed orifices. The NRC has not reviewed and approved whatever method was used to estimate that the flow rate through the four fuel bundles in cell 38-39 is reduced by 23.63 percent. What if the actual flow reduction is greater? Could the fuel support piece misposition more so as to further reduce the flow rate? Is the 0.22 "correction factor" appropriate and bounding for all conditions during the remainder of operating cycle 22?

Apparently, President Clinton's "don't ask, don't tell" policy has been applied to these nuclear safety issues.

Helicopters Are Designed to Hover, Not Fuel Support Pieces

The licensee's report states that the fuel support piece became elevated and rotated when the control rod being inserted in that fuel cell. Now, with the fuel support piece hovering 1.5 inches above its analyzed and approved position and with its alignment fingers not around the alignment pin as analyzed and approved, the licensee claims that this unanalyzed and unapproved configuration "cannot interfere with control rod insertion." This certainly is a very convenient conclusion for someone wanting to continue operating a reactor without fixing this problem, but is there any solid science to support it? Could the mispositioned and misaligned fuel support piece become even more mispositioned or misaligned, causing interference with the insertion of control rod 38-39? In that case, the shutdown margin requirements in the technical specifications would seem to be undermined by a pre-existing control rod that may not fully insert when required to do so.

Section 3.3.4.2 of the Updated Final Safety Analysis Report for FitzPatrick (ML15104A084) describes the design and safety function of the fuel support pieces. Properly seated and properly aligned fuel support pieces are described. Elevated and rotated fuel support pieces are not mentioned.

If an elevated and rotated fuel support piece really and truly cannot interfere with control rod insertion as claimed by the licensee, what is the purpose of the alignment pins on the lower core plate and the associated fingers on the fuel support piece? It's highly doubtful that they were installed just to amuse the workers installing the fuel support pieces.

Extent of Condition – Is 38-39 Unique, or Just First?

The licensee's report is silent about possible extent of condition. Was the work performed in or around fuel cell 38-39 that used a double blade guide also conducted in other fuel cells? If so, have workers reviewed the videotape from the core verification performed during the end of refueling outage 21 to verify that no other fuel support pieces are out of position? The mispositoned fuel support piece in cell 38-39 was only identified after that control rod alarmed on high temperature after being fully withdrawn. At this point in operating cycle 22, it's possible that not every control rod has been fully withdrawn to as to alert workers to other mispositioned fuel support pieces.

Regarding the "correction factor" applied by the licensee towards the MCPR limit, this seems similar to a situation that arose in 1998 at Nine Mile Point Unit 1 next door to FitzPatrick. Workers identified extensive cracking in the core shroud. An analysis by GE concluded that the crack growth rate would not

be large enough to pose a safety hazard. That analysis relied on water chemistry limits more strict than those contained in the technical specifications. That licensee had to obtain NRC's formal approval to credit the "correction factor" applied to the water chemistry limits to compensate for the cracked core shroud (see amendment 163 dated September 18, 1998, ML011030259).

The estimated flow reduction through the four fuel bundles in cell 38-39 due to the mispositioned fuel support piece seems crucial in determining whether the 0.22 "correction factor" is sufficient or not. Has the NRC reviewed the method used to derive this estimate? Has the thermal-hydraulics model been validated and verified for properly modeling mispositioned fuel support pieces?

NRC Intervention Needed

FitzPatrick is operating in a configuration unreviewed and unapproved by the NRC. Its owner seems intent on continuing to operate in this configuration until the next refueling outage (reprising the leaking condenser tube limp to refueling outage 21).

This is neither an allegation nor a 2.206 petition. It's merely a request that the NRC discharge its regulatory responsibilities to protect the public and intervene in this safety matter.

The NRC could require the licensee to seek and obtain NRC's approve to continue operating the reactor with a wayward fuel support piece.

Or, the NRC could require the licensee to shut down the reactor and restore the fuel support piece to the configuration that has been reviewed and approved by the NRC.

We respectfully urge the NRC to opt for either of these options that would end the ongoing science experiment at FitzPatrick.

Sincerely,

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Figure 1 – Fuel Support Piece

Picture of a fuel support piece with a mock fuel bundle loaded into one of four fuel bundle locations. The x-shaped region in the middle is where the control rod inserts the fuel cell from below. The two "fingers" that are supposed to rest on either side of the alignment pin on the lower core plate appear on the left side. Two of the holes in the lower portion of the fuel support piece that allow cooling water flow through the fuel bundles are shown.