

UNPO Decision Documentation for Reactive Inspection

Facility: Purdue	Event Date: Condition discovered 10/9/20, condition reported 10/20/20	Evaluation Date: 10/21/20
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Brief Description of Event:
 In 2019, after receiving license amendments for a power uprate from 1 kw to 12 kw and for an I&C upgrade to digital, Purdue restarted their reactor after an extended shutdown. The digital I&C upgrade included replacing the NI instrumentation and NI detectors. While operating at low power after the startup, Purdue calibrated the NIs using their normal procedure for NI calibration. This calibration procedure utilizes gold foil irradiation to determine reactor power. During power ascension, abnormally high radiation levels were noted above the reactor pool and the licensee halted power ascension to investigate. The licensee did not conclusively determine the cause of the abnormal radiation levels.

On October 9, 2020, after irradiating a gold foil for a reactor experiment, the Reactor Manager determined that the foil indicated neutron flux level was approximately 3 times higher than expected. Based on this, Purdue determined that actual reactor power was approximately 3 times higher than indicated reactor power and shut down the reactor. Since the highest reading NI before shutdown indicated 74% (7.4kw since Purdue uses 10 kw as 100% operating power), the highest actual reactor power reached was approximately 222% (22.2 kw). Purdue's maximum licensed power level, their TS Limiting Safety System Setpoint, and their TS required safety channel setpoint are all 12 kw.

No	IIT Criteria Met? If yes, then state which criteria is met below and proceed to MD 8.3.
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No	AIT Criteria Met? If yes, then state which criteria is met below and proceed to MD 8.3
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Yes	SIT Criteria Met? If yes, then state which criteria is met below and continue.
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Reactor Safety Criterion a., "unplanned degraded conditions (including degradations caused by external events) that result in loss of function to a system(s) meant to mitigate accidents."

The reactor protection system would not have been able to scram the reactor until actual reactor power was 3 times the TS required setpoint, or $12 \times 3 = 36$ kw.

Yes	Final decision to perform SI? Provide explanation below.
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Recommend performing a special inspection.

Note: A special inspection was performed. The inspection report ADAMS accession number is ML20332A083.

Person performing evaluation: Phil O'Bryan