

Pilgrim Nuclear and Entergy Safety Performance Records

January 18, 2017 by William Maurer and Brian E. Boyle, Ph.D.

This brief analysis reviews the safety performance record of Pilgrim Nuclear. Entergy Corp. is an experienced nuclear operator with ten nuclear reactors, including Pilgrim, under its ownership control so we start with an examination of Entergy's performance record. This is done to determine if Pilgrim's safety issues are isolated problems or are symptomatic of broader safety issues among Entergy-owned reactors.

ENTERGY'S 10 NUCLEAR REACTORS

TABLE 1, *Action Matrix of the NRC Reactor Oversight Process (ROP)* and CHART 1, *Comparative Owner/Operator Performance (Q4/2016)*, describe, measure and evaluate Entergy's safety performance against its peers in the US Commercial Nuclear Energy Industry. All data were obtained from the Reactor Oversight Process sections of the Nuclear Regulatory Commission's (NRC) website.¹

Entergy's safety performance is considerably less than the industry's average

Entergy is the owner/operator of ten operating nuclear reactors. At this point in time (4Q/2016) only six (60%) are operating at the highest (best) level of safety performance in Column 1: *"Licensee Response"*. One of Entergy's reactors (10%) operates one performance level down in Column 2: *"Regulatory Response"*. Entergy currently has no reactors in the third level, Column 3: *"Degraded Cornerstone"*. The remaining three Entergy reactors (30%) are operating at the lowest acceptable level of safety in Column 4: *"Multiple/Repetitive Degraded Cornerstone"*. The next step is an NRC closure order.

In terms of the highest level of safety performance 91 of the 100 nuclear reactors in the US fleet (91%) are operating in Column 1. Comparatively, Entergy has only six (60%) of its fleet of ten reactors ranked in Column 1. It is reasonable to conclude that Entergy's safety record is dramatically below the industry's average.²

¹ <https://www.nrc.gov/NRR/OVERSIGHT/ASSESS/> Table 1 contains the actual data shown in Chart 1.

² This is an understatement. It assumes only two measurement categories, best and other than best (Col1 against Col 2,3,4) The three levels of other than best need to be incorporated into weighted calculations. This would likely push Entergy's safety performance measurement even farther below the average of its peers. This is a simple example of the kind of sophistication the NRC analyses is/could be employing.

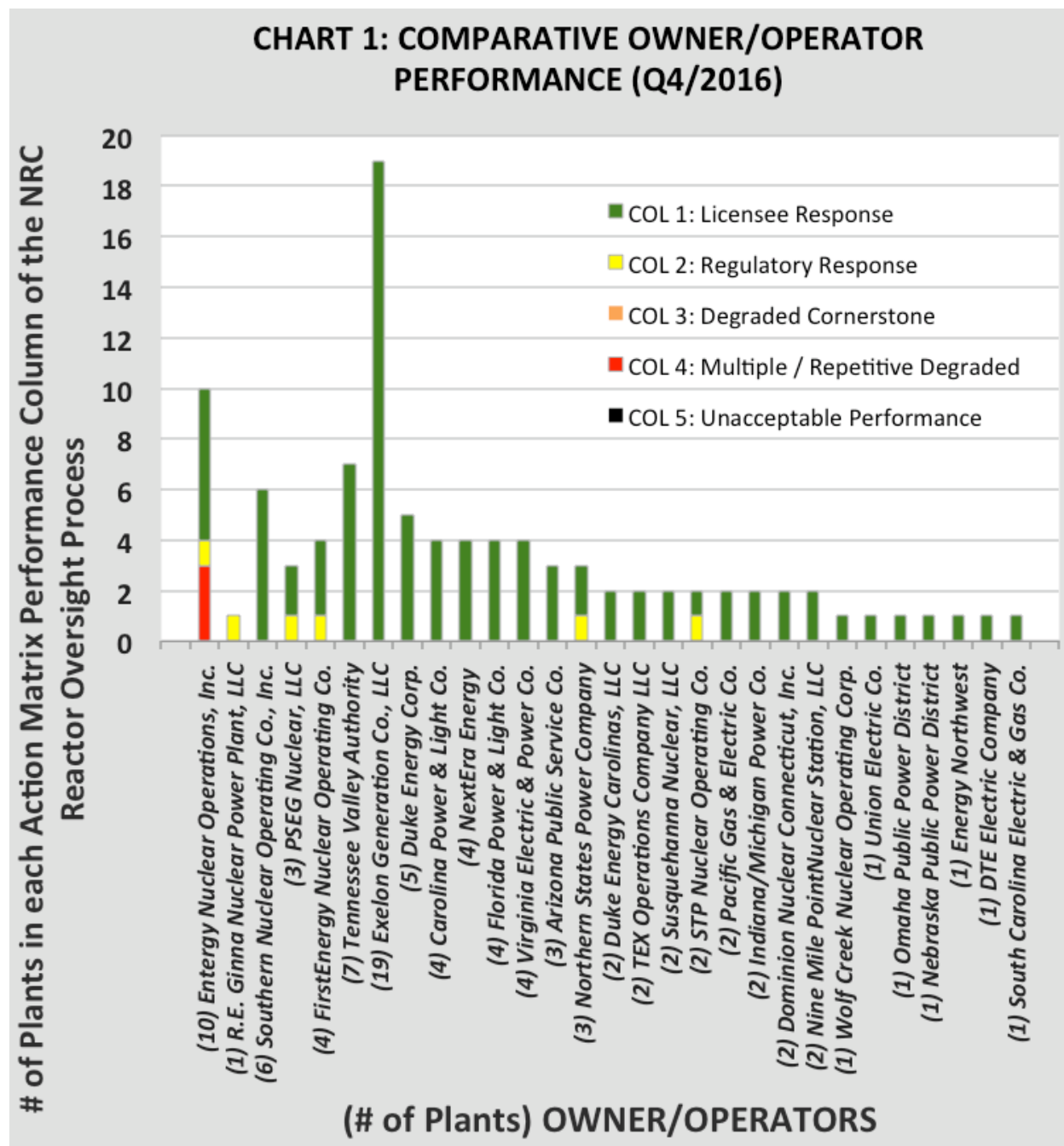
TABLE 1: ACTION MATRIX OF THE NRC REACTOR OVERSIGHT PROCESS (ROP)

TOTAL PLANTS	OWNER/OPERATOR	NUMBER OF PLANTS in PERFORMANCE COLUMNS				
		COL 5: Unacceptable Performance	COL 4: Multiple / Repetitive Degraded Cornerstone	COL 3: Degraded Cornerstone	COL 2: Regulatory Response	COL 1: Licensee Response
10	Entergy Nuclear Operations, Inc.	-	3	-	1	6
1	R.E. Ginna Nuclear Power Plant, LLC	-	-	-	1	-
6	Southern Nuclear Operating Co., Inc.	-	-	-	-	6
3	PSEG Nuclear, LLC	-	-	-	1	2
4	FirstEnergy Nuclear Operating Co.	-	-	-	1	3
7	Tennessee Valley Authority	-	-	-	-	7
19	Exelon Generation Co., LLC	-	-	-	-	19
5	Duke Energy Corp.	-	-	-	-	5
4	Carolina Power & Light Co.	-	-	-	-	4
4	NextEra Energy	-	-	-	-	4
4	Florida Power & Light Co.	-	-	-	-	4
4	Virginia Electric & Power Co.	-	-	-	-	4
3	Arizona Public Service Co.	-	-	-	-	3
3	Northern States Power Company	-	-	-	1	2
2	Duke Energy Carolinas, LLC	-	-	-	-	2
2	TEX Operations Company LLC	-	-	-	-	2
2	Susquehanna Nuclear, LLC	-	-	-	-	2
2	STP Nuclear Operating Co.	-	-	-	1	1
2	Pacific Gas & Electric Co.	-	-	-	-	2
2	Indiana/Michigan Power Co.	-	-	-	-	2
2	Dominion Nuclear Connecticut, Inc.	-	-	-	-	2
2	Nine Mile Point Nuclear Station, LLC	-	-	-	-	2
1	Wolf Creek Nuclear Operating Corp.	-	-	-	-	1
1	Union Electric Co.	-	-	-	-	1
1	Omaha Public Power District	-	-	-	-	1
1	Nebraska Public Power District	-	-	-	-	1
1	Energy Northwest	-	-	-	-	1
1	DTE Electric Company	-	-	-	-	1
1	South Carolina Electric & Gas Co.	-	-	-	-	1
100	totals as of Q4 2016	0	3	0	6	91
100	INDUSTRY AVERAGE	0%	3%	0%	6%	91%
10	ENTERGY AVERAGE	0%	30%	0%	10%	60%
	DIFFERENCE	0%	27%	0%	4%	-31%

The data point to a systemic problem

In terms of the lowest level of safety performance, Entergy is the only owner/operator in the country with a nuclear reactor operating at the lowest operational level of safety, the Multiple/Repetitive Degraded Cornerstone Column. Even worse, Entergy operates all three reactors in the country performing at the lowest acceptable level of safety: Pilgrim Nuclear, Arkansas One and Arkansas Two. This is an alarming distinction to have achieved in the US Commercial Nuclear Industry comprised of 29 owner/operators, operating a total of 100 reactors. It is statistically sound to conclude Entergy's troubling safety performance record is representative of an inherent systemic problem and

deficiency peculiar to Entergy, with troubling severity and persistence at Pilgrim, Arkansas One and Arkansas Two. There is a less than 1-in-10,000 chance that one operator would have all three worst reactors if drawn at random.

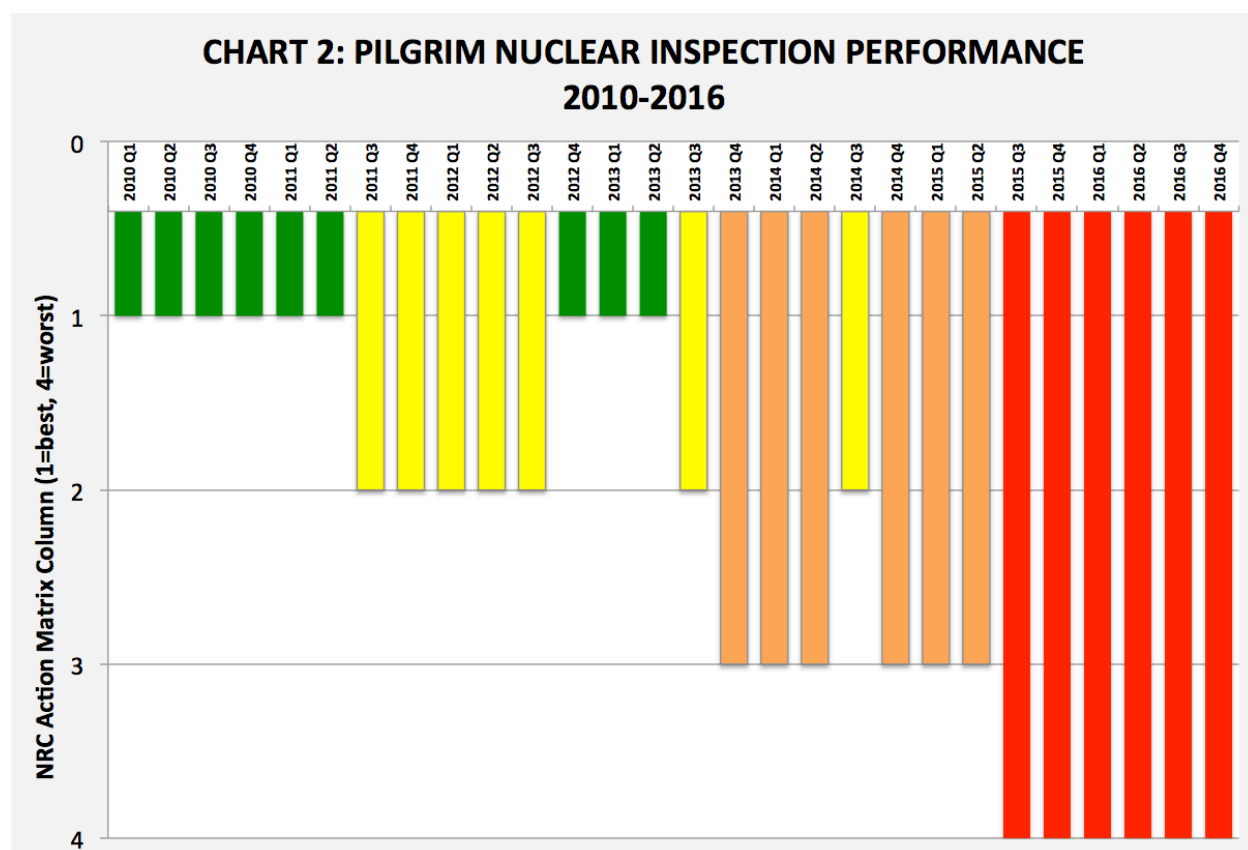


In contrast, Exelon Generation Co. has all 19 of its reactors in Column 1, the highest level of performance.

PILGRIM NUCLEAR

Pilgrim safety performance is in a nose-dive

CHART 2, *Pilgrim Nuclear Inspection Performance from 2010 to 2016* depicts Pilgrim's slide into disrepair over the past four years. The trend is obviously persistently downward and appears to be unique to Entergy's three reactors operating in Column 4: "Multiple/Repetitive Degraded Cornerstone." It is safe to assume the NRC has done similar analyses, presumably more sophisticated and regularly on a quarterly basis as standard practice to track, weight and forecast safety performance problems and trends. The timing of Pilgrim's safety performance nose-dive begins not too long after achieving re-licensure in 2012.



The NRC and other insiders are aware of most of these safety issues

Pilgrim's safety culture deficiencies are not news to Pilgrim, Entergy, industry insiders, or the experts at the NRC. The leaked email the NRC is attempting to spin as less than fully developed initial observations is not preliminary at all. Inspections, analysis and diagnostics about the problems specific to Pilgrim and to Entergy as a whole (i.e., Arkansas One and Arkansas Two) were initiated long before the rarely occurring IP 95003 Supplemental Inspection Process was instituted at Pilgrim.

Not surprisingly, the leaked email revealed nothing new to the informed and concerned public. Pilgrim's problems have long been reported in different inspection, event, and reactor status reports that are a matter of public record. With so many recurrent failures, it was apparent to even an untrained observer that a pattern was emerging. These charts illustrate that Pilgrim Nuclear and Entergy's safety performance record is not just vaguely weak and obviously disturbing, it is starkly alarming.

Pilgrim has a serious safety culture problem

Pilgrim's website Pledges "A Commitment to Safety" and boasts about "Maintaining the Highest Safety Standards at Pilgrim Nuclear Power Station."³ Exactly the opposite is shown to be the Pilgrim experience in the analyses above. Similarly, the leaked NRC email candidly describes Pilgrim's safety culture problems this way:

- *"Overall, we are beginning to see a picture where the people seem to be willing and happy/excited about change, but actions seem to be marginalized during implementation. Some of this marginalization seems to be due to not understanding what the end state should look like, and frankly some of it seems to be due to a lack of resources across many groups. We will be probing this further, as it is a key to making a recommendation whether or not the plan will be effective/sustainable."*
- *"We are observing current indications of a safety culture problem that a bunch of talking probably won't fix."*
- *"The Pilgrim Systems Engineering Manager stated to the team that the site did not want to remove the EDG from service to investigate this concern as it would result in unavailability time that could place the EDG in Maintenance Rule A.1. Later in the day the Engineering Director and Site VP tried to backtrack on this statement, but the team believes that it was a genuine thought by this senior station manager and is an insight on Safety Culture."* (underline added; EDG = Emergency Diesel Generator)

Entergy is a lame-duck nuclear operator outside its Southeast US home market

In addition to the downward trend in safety performance, Entergy recently revealed a trend not seen before in the US Commercial Nuclear Industry. Entergy has closed, announced closure or sold more than half its fleet of nuclear reactors: Vermont Yankee, Pilgrim, Fitzpatrick, Palisades, Indian Point One and Two. Entergy's incentive during divestment will include spending as little money as possible at these sites. Cost-cutting operations at nuclear reactors can put the public at heightened and avoidable risk.

³ <http://www.pilgrimpower.com/safe-secure-vital/safety.html>

Eastern Massachusetts residents face exponentially greater risk

People living close enough to Pilgrim to be at risk are undeniably at greater risk than residents living close to the safest (97% of all) US nuclear reactors. The unvarnished truth is that Pilgrim is:

- a 44-year-old reactor dangerously showing the signs of age;
- one step away from an NRC closure order due to recurrent safety violations;
- trending irreversibly in the increasingly unsafe direction with no signs of meaningful immediate nor future improvement;
- owned and operated by the company with the worst NRC performance ranking, and who is now a lame duck owner/operator at Pilgrim.

Must we wait for a nuclear “mishap” to occur before appropriate action is taken?