GenConn Energy LLC **Witness: Brandon Shatraw**
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Docket No. 26-06-02

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LFE-010 Q:

Provide 2018 for SCR Catalyst testing results. (Requested of GenConn)

LFE-010 A:

Please refer to LFE-010 Attachment 1, which provides test reports for units tested in 2017, 2018 and 2019. Results are provided in the table below, based on review of the test results provided in LFE-010 Attachment 1:

GenConn Unit	Removal Efficiency (NOX/SCR)	Destruction Removal Efficiency (CO)	Destruction Removal Efficiency (VOC)	Date of Test	Reference
Devon Unit 15	91.8%			10/2017	Test results in LFE-010 Attachment 1
Devon Unit 16	92.1%	97.6%	92.2%	04/2019	
Devon Unit 17	93.9%			11/2017	
Devon Unit 18	94.0%	97.8%	93.7%	04/2019	
Middletown Unit 12	92.9%	96.5%	97.9%	10/2019	Test results in LFE-010 Attachment 1
Middletown Unit 13	93.8%	96.1%	97.1%	10/2019	
Middletown Unit 14	92.8%	96.3%	97.6%	10/2019	
Middletown Unit 15	93.2%	96.3%	97.8%	10/2019	

SCR Catalyst Testing provides the ability to statistically trend its effectiveness over time. This trending analysis is then always compared to results of exhaust stack testing, which provides a view to overall effectiveness of the system to satisfy environmental permits. It is important to recognize that test results would reflect testing variability associated with:

- Stack test operating conditions (load and temperature)
- Ammonia injection tuning changes
- Catalyst cleaning/replacement events
- Turbine combustion tuning changes
- Measurement uncertainty (uncertainty of the stack testing process)

For LM6000s that use ULSD versus Natural Gas and operate relatively few hours per year, differences in ambient temperature, humidity, turbine load, firing temperature, and fuel composition can produce measurable emissions changes even with identical catalysts.

From an asset management perspective, a gradual increase in measured destruction efficiency is often evidence of operational optimization rather than catalyst aging. In fact, if a 15-20 year old

catalyst is showing increasing performance, this would likely relate to annual inlet/outlet concentrations, exhaust temperature, turbine load, ammonia flow, and catalyst differential pressure to determine whether the change is truly catalyst-related or simply a result of improved operating conditions during testing.

With natural gas-fired LM6000s, catalyst aging is generally very slow because the fuel is exceptionally clean. With ULSD, while sulfur is much lower than legacy diesel fuels, the catalyst is still exposed to a more challenging exhaust stream.

ULSD combustion can introduce:

- Sulfate compounds
- Ash-forming contaminants
- Trace metals
- Lubricating oil-derived compounds
- Unburned hydrocarbons

These can temporarily deactivate catalyst surfaces.
A catalyst that has been:

- cleaned,
- thermally regenerated,
- exposed to higher operating temperatures,

may appear to "improve" between test periods.

Oxidation catalyst performance for CO and VOC reduction is generally more sensitive to ULSD contaminants than SCR performance.
Over time the catalyst can experience:

- Sulfur poisoning
- Thermal aging
- Surface masking