

**From:** [Jim McLucas](#)  
**To:** [Kathleen Truesdell](#);  
**CC:** ["Greg Darvin"](#); ["Bryan Bertacchi"](#); ["Greg Lamberg"](#); ["Craig Matis"](#); ["Ty Remington"](#); ["Jose Xavier"](#); [Pete Bukunt](#);  
**Subject:** RE: shutdown limits  
**Date:** Tuesday, July 27, 2010 3:39:58 PM  
**Attachments:**

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Kathleen -

1. Without "Purge Credit", a typical startup would include at least a 5-minute purge cycle prior to lighting the combustors. By moving the purge cycle to the end of the shutdown sequence, we are cutting this time out of the start sequence. Unfortunately, the purge time that we are eliminating has no emissions so there is no associated reduction in the startup emissions. The benefit of cutting the purge time from the startup sequence is that the plant will be capable of generating a considerable amount of output within 10 minutes. This is an important capability from a grid perspective as it allows the plant to offer an ancillary service called "non-spinning reserve".
2. I don't have an exact quantity for the shutdown emissions attributed to the purge credit feature but I would guess its about 1/2 of the total shutdown emissions since the additional shutdown time associated with the low load hold approximately doubled GE's projected shutdown duration.
3. I believe that "purge credit" will be an optional selection upon shutdown (Pete - please correct me if I'm wrong). That said, it would be sensible to provide it for most shutdowns in order to provide non-spinning reserve.
4. GE intends to limit the amount of downtime for which the purge credit can be used. If the plant is offline for a longer period, it will be possible to re-establish the purge credit by performing an additional purge cycle. Thus, purge credit could effectively eliminate the purge cycle at the beginning of hot, warm, and cold startups.
5. Radback was not the developer of the Gateway project so we can't speak for why Gateway's startup and shutdown emissions are what they are. That said, we do know that there are spikes in NOx and CO emissions at various low load points. Thus, there is a potential for a trade-off in NOx and CO depending upon how fast the combustion turbine is ramped through various

load ranges, but these trade-offs need to be considered along with a number of non-emissions-related criteria. I suspect that any data that GE has assembled with respect to these tradeoffs would be considered proprietary and confidential.

Thanks!

- Jim

-----Original Message-----

From: Kathleen Truesdell [mailto:ktruesdell@baaqmd.gov]

Sent: Tuesday, July 27, 2010 1:48 PM

To: Jim McLucas

Cc: Greg Darvin; Bryan Bertacchi; Greg Lamberg; Craig Matis; Ty Remington; Jose Xavier

Subject: RE: shutdown limits

Jim,

Can you please further explain the benefits of purge credit? If it allows the system to startup faster, approximately how much faster? Would there be emissions reductions from the startup sequence due to moving the purge cycle to shutdown? Are there other benefits?

Approximately what percentage of shutdown emissions can be attributed to the purge credit feature?

Will the turbines go through a purge cycle for every shutdown? Will this eliminate the need for a purge cycle at the beginning of warm and cold startups also?

Does GE have information about the trade-off between NOx and CO/POC during startup and shutdown? Gateway Generating Station (7FA) has lower CO/POC limits, but higher NOx for shutdown (73 lb CO, 6 lb POC, 59 lb NOx).

Thanks,

Kathleen

-----Original Message-----

From: Jim McLucas [mailto:jim.mclucas@radback.com]

Sent: Tuesday, July 27, 2010 11:36 AM

To: Kathleen Truesdell

Cc: Greg Darvin; Bryan Bertacchi; Greg Lamberg; Craig Matis; Ty Remington; Jose Xavier

Subject: FW: shutdown limits

Kathleen -

It appears that our proposed shutdown emissions limits for Oakley are

greater than those indicated below for Los Medanos. I can't really speak as to the basis for the Los Medanos values, but can offer the following reasons that might explain the difference:

1. The shutdown duration for Los Medanos is likely much less than that proposed for Oakley. As you'll recall, Oakley will have a feature GE calls "purge credit" which places the purge cycle at the end of the shutdown sequence instead of the beginning of the start sequence. Because the purge cycle will be blowing cool purge air through a hot HRSG, GE has determined that it may be necessary to include a low load hold during the shutdown sequence in order to allow the HRSG to cool down more slowly. This is the reason that the longer shutdown duration is necessary and likely explains the majority of the difference in shutdown emissions.
2. Los Medanos has the older generation of 7FA's. Oakley will be using the 7FA.05, which will generate much more output using about 15% more fuel. All things being equal, this would explain a 15% difference in shutdown emissions (i.e. even if the shutdown durations were identical).
3. Los Medanos was a project that Calpine acquired from Enron. One could assume that the shutdown emissions provided by Enron are more aggressive than those provided by GE for Oakley. This is obviously conjecture on my part, but I can say that GE tends to be conservative in their representation of the capabilities of their equipment.

I hope this helps!

- Jim

-----Original Message-----

From: Gregory Darvin [mailto:darvin@atmosphericdynamics.com]

Sent: Friday, July 23, 2010 5:26 PM

To: jim.mclucas@radback.com

Subject: FW: shutdown limits

Gregory Darvin

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-----Original Message-----

From: Kathleen Truesdell [mailto:ktruesdell@baaqmd.gov]

Sent: Friday, July 23, 2010 5:20 PM

To: Gregory Darwin

Subject: shutdown limits

Hi Greg,

Currently Los Medanos combined cycle 7FA (2,2251.1 MMBtu/hr per turbine including duct burners) shutdown emission limits per event are as follows:

NOx 20 lb

CO 44.1 lb

POC 8 lb

Please review the limits for OGS and explain why they are as proposed.

Thanks,

Kathleen Truesdell

Air Quality Engineer

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