ATTACHMENT G
UNIT STARTUP & SHUTDOWN EMISSIONS REDUCTION PROCEDURE & GUIDELINES PLAN

	New Covert Generating Company, LLC Covert Generating Facility		
Number: **OPS-902** *(Formerly CGC 6.3.2)*	Subject: **Unit Startup & Shutdown Emissions Reduction Procedure & Guidelines**		
Approved by: **C. Head**	Current Issue: **Revision 4**	Issue Date: **April 10, 2013**	Last Review Date: **August 22, 2017**
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RECORD OF CHANGES

Rev	Date	Description of Changes
0	11/14/02	Original Document
1	6/2/03	Section 2.2 added reference to CGC 6.3.1 *(Note: Approved by MDEQ on 8/19/03.)*
2	4/10/13	Update to new procedure format. Revised responsibilities section to be consistent with plant organizational title changes. Corrected editorials and verified consistent with current plant operations. Updated references. (Note that in 2005, revisions were generated out of sequence to earlier versions that were not approved by the DEQ. This resulted in duplicate revision numbers with different information contained in them. The 2005 version was identified to have been to "responsibilities" only and these changes were appropriately incorporated into this revision.)
3	1/26/15	Update to reflect approved change to Start-Up Requirement
4	8/22/2017	Update to remove NAES

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1.0 BACKGROUND

1.1 In accordance with the requirements of the Michigan Department of Environmental Quality (MDEQ) Air Permit To Install, No 325-00, approved procedures are required when plant startup and shutdown may result in excess emissions. Current Renewable Operating Permit Number is, MI-ROP-N6767-20090. Approval by MDEQ is based on their determination that our procedures are consistent with good pollution prevention practices, minimizing emissions generated, and that no adverse health effects result. Emissions occurring as a result of scheduled maintenance or upset and breakdown conditions have specific reporting requirements as specified in the air permit.

1.2 Operator logs recording the start and finish time of each startup or shutdown are required under the air permit. This information may be provided to MDEQ upon request.

1.3 Equipment affecting plant emissions during startup and shutdown are the Gas Turbine's (GT's) Dry Low NO_x (DLN) burners, the CMCO (Carbon Monoxide Catalytic Oxidation) catalyst, the Selective Catalytic Reduction (SCR) catalyst system installed in the Heat Recovery Steam Generator (HRSG), the Auxiliary Boiler (AB), and the Steam Turbine (ST). Both the DLN burners and SCR require that manufacturer operational parameters be met before they are placed in service or are operating optimally. The DLN must be in stable Premix Mode before minimum emissions are achieved. Stable Premix Mode (proper fuel distribution and flame pattern for each gas burner) occurs at approximately 50% load. The required HRSG warm-up time is a major factor controlling when the CT load can be raised to reach Premix Mode. SCR operation requires that a minimum catalyst temperature of 550 °F is achieved. This is necessary to prevent sulfate and nitrate compound depositions on the catalyst surface and to ensure proper catalyst performance resulting in the best possible NO_x reduction reaction. The AB provides the cooling steam utilized in the GT until enough steam is produced by the HRSG. Shortly after the cooling steam has been transferred to the HRSG, the AB will be secured, provided that no other Units are in startup or soon to be in startup (it can take additional time for the first started Unit to have sufficient steam supply to support other Unit starts). Although the ST does not emit pollutants directly, steam production in the HRSG and therefore, the GT firing rate, must be held at ~ 25% until the ST and the associated piping is sufficiently preheated. The Continuous Emissions Monitoring System (CEMS) samples the flue gas and provides all emissions data.

1.4 The Distributed Control System (DCS) allows the Control Room Operator (CRO) to control all aspects of the plant startup and shutdown from the Control Room. The DCS automatically controls the startup and shutdown of the combustion and steam turbine sequences unless selected to manual operation by the CRO. The DCS also provides the means to monitor and trend all vital plant parameters.

2.0 REFERENCES

2.1 SCR Catalyst Operations and Maintenance Manual, Issued by Cormetech, Inc. to Deltak LLC for Covert, MI; Job # G01001-6830-680, Issue 2.1, 3/23/01

2.2 Catalyst Handling and Maintenance Procedures for an Engelhard Carbon Monoxide Converter System, Issued by Engelhard to Deltak LLC for Covert, MI; Job # 1203141, Rev 0, 8/22/01

2.3 Emissions Equipment Malfunction Plan, OPS-901 *(Formerly Procedure Number CGC 6.3.1)*

2.4 SCR & CMCO Operations & Maintenance Manual, OPS-903 *(Formerly Procedure Number CGC 6.3.3)*

2.5 MHI MPS Operations and Maintenance Manual, NJ-02014

2.6 Unit Startup / Shutdown Procedure, OPS-616

2.7 CISCO CEMS Operations & Maintenance Manual, No. 17583

3.0 SCOPE

This procedure outlines the operator actions taken during normal startup and shutdown evolutions that are significant to minimizing excess emissions.

This procedure does not apply to startups and shutdowns in which any component of the plant emission control and monitoring equipment is in breakdown condition. Startups and shutdowns that occur during a period when the CEMS, CMCO, SCR, or DLN Burners are in breakdown must be reported to MDEQ in accordance with our permit. Required actions during upset and breakdown conditions are addressed in Reference 2.3, Emissions Equipment Malfunction Plan, OPS-901.

This procedure is not intended to supersede or replace any detailed plant equipment operating procedures of the Covert Generating Facility or the Manufacturer's O&M Manuals.

The objective of this procedure is to minimize air emissions during startup and shutdown. Minimal startup emissions are achieved by operating equipment in accordance with the procedures and by placing emissions control equipment in operation as soon as it is safe and prudent to do so during startup.

4.0 RESPONSIBILITIES

4.1 The **Plant Manager** is responsible for procedure approval and implementation.

4.2 The **Operations Manager** has the responsibility of ensuring that this procedure is fully utilized and followed by appropriate employees of Covert Generating Facility. Additionally, the Operations Manager is responsible for ensuring that proper notifications are made to the State & relevant authorities in accordance with air permit directions AND for reporting any variances related to the malfunction of emissions reduction equipment to proper authorities.

4.3 The **Control Room Operator** is responsible for execution of the procedure.

4.4 **Operations Staff (On-Shift Operators)**:

Key responsibilities of the on-shift operators include the following:

a. Operate the units in compliance with air permit emission limits.
b. Record in the Logbook, all startup and shutdowns and other operations activities.
c. Perform required operational steps necessary to make the SCR system available as soon as possible during the startup sequence.
d. Perform required operational steps necessary to ensure that the Auxiliary Boiler is secured as soon as possible during the startup process.

5.0 UNIT STARTUP SEQUENCE

A unit startup is defined as the starting of the GT, HRSG, and ST as a single power block. Each startup is classified as "hot," "warm," or "cold" based on the ***Steam Turbine's*** high pressure turbine casing metal temperature. The duration of these startups will be approximately 2 hrs, 3 – 4 hrs, or 4 – 5 hrs, respectively. A unit start is not complete until the GT is in stable premix combustion mode, above 60%, and the SCR system is in automatic mode. (There are no required actions to place the CMCO system into operation. It is a completely passive system dependent only on exhaust gas temperature.)

NOTE: Prior to initiating a Unit start, all ancillary systems for the Unit will be in service to the extent possible.

5.1 Start the Auxiliary Boiler to supply GT Warming Steam to the Gas Turbine (later to be GT Cooling Steam when GT is "flame on"). Log the start time in the CRO Logbook.

5.2 Prepare the ST for operation by aligning AB Steam to the Gland Seal and Air Ejector Systems.

5.3 Initiate automatic startup of the GT in accordance with OPS-616 and hold at minimum load (25%) to allow ST warm-up (if start is a "hot start", GT Ramp may be necessary to match Steam Turbine metal to steam temperature differentials). Log the start time in the CRO Logbook.

5.4 In accordance with OPS-616, place the ammonia dilution fan in operation so that the ammonia system is ready for service as soon as the SCR reaches its minimum operating temperature of 550 °F.

5.5 In accordance with OPS-616, the SCR system is to be placed in "AUTO" so that it will begin operating when SCR gas inlet temperature reaches 550 °F. OPS-616 further requires that the CRO verify the proper start of the SCR system at 550 °F.

5.6 Initiate automatic startup of the ST.

5.7 When the ST is ready for loading and ST Load Hold is completed, increase the GT load in accordance with OPS-616.

5.8 Ramp the GT to final > 60% load and place Unit in Automatic Generator Control (AGC) or control in manual as coordinated with the dispatching entity and power marketer.

5.9 Verify emissions are within limits and that all emission control equipment is functioning correctly. If emissions are not controlled within permit limits, immediately begin corrective actions including reporting and response actions described in Reference 2.3, Emissions Equipment Malfunction Plan, OPS-901.

5.10 Verify CEMS data is tagged with status showing Unit is in operating status with no emission warning data flags.

5.11 Declare startup complete and record time and emission status in CRO Logbook.

6.0 UNIT SHUTDOWN SEQUENCE

A Unit shutdown occurs as a result of a pre-scheduled shutdown for maintenance or per dispatcher request / direction. Shutdowns also occur as a result of equipment trips. Unit shutdowns are controlled by the DCS in automatic normally, but may be performed in manual if necessary. During a planned shutdown, the SCR is generally in operation during the entire period when combustion is occurring in the GT. The key factor in a planned shutdown is the required cool down rate of the GT and the HRSG. During a shutdown due to a Unit trip, GT combustion is immediately stopped. In a routine plant shutdown, the following sequence of events occurs:

6.1 Log the beginning of the plant shutdown in the CRO Logbook.

6.2 Ramp the GT to minimum load in accordance with OPS-616. During the ramp down, the SCR will remain in operation until inlet air temperature to the SCR is below 550 °F, which is generally after the GT is secured (GT Flame Out).

6.3 Initiate a shutdown of the GT and ST. Log the completion of the shut down in the CRO Logbook (completed when "GT Flame Out").

6.4 Verify CEMS data with status showing Unit is shutdown.