

**Northwest Clean Air Agency (NWCAA) hereby issues
Order of Approval to Construct (OAC) 1236a**

Project Summary: Replacement of existing refrigeration compressors and engines with new larger compressors and natural gas-fired engines to meet the colder temperatures necessary to refrigerate propane for storage at the terminal. Retain limited use of existing refrigeration compressors and engines for emergency and back up.

Approved Emission Units:

- Two (2) new Caterpillar G3606LE Natural Gas-fired Compressor Engines (2010 and 211) with a maximum rating of 1835 bhp, each equipped with Ultra Lean Burn (ULB) Technology with Caterpillar ADEM III control system, and SileNOx oxidation catalysts.
- Two (2) existing Waukesha Natural Gas-fired Lean Burn Compressor Engines (205 and 206), each with a maximum rating of 1108 bhp for use as emergency and back up to the (2) Caterpillar Engines.
- One (1) existing 400,000 barrel refrigerated liquefied petroleum gas (LPG) storage tank (Tank T2).

Owner/Operator	Facility Name and Location
Petrogas West LLC 205 5 th Ave SW, Suite 3900 Calgary AB T2P 2V7 Contact: Gary McSpadden	Ferndale Storage Terminal 4100 Unick Road Ferndale, WA 98248

Permit History

- The effective date of this Order is the startup date of the Caterpillar G3606LE compressor engines. Upon the effective date, this Order supersedes NWCAA Notice of Construction 452 issued May 5, 1994, its revisions dated January 19, 1995 and October 10, 1997, and OAC 1236 issued May 4, 2016.

Note that in addition to other applicable rules and regulations, the approved emission units are subject to applicable portions of the following federal regulations:

New Source Performance Standards (NSPS)

- 40 CFR 60 Subpart A - General Provisions
- 40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

National Emission Standards for Hazardous Air Pollutants (NESHAP)/Maximum Achievable Control Technology Standards (MACT)

- 40 CFR 63 Subpart A – General Provisions

- 40 CFR 63 Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants: Reciprocating Internal Combustion Engines (RICE)

As authorized by Northwest Clean Air Agency Regulation Section 300, this Order is issued subject to the following restrictions and conditions¹:

- (1) Visible emissions from each compressor engine exhaust stack (205, 206, 210 and 211) shall not exceed an average of 5 percent opacity for more than an aggregate of 3 minutes in any consecutive 60-minute period as determined by Washington Department of Ecology Method 9A.
- (2) Only natural gas and process fuel gas consisting of a mixture of methane, ethane, and LPG with traces of other hydrocarbons and sulfur not to exceed 2 gr/mscf shall be combusted in the Caterpillar G3606LE compressor engines.
- (3) The ULB technology, ADEM III control system and SileNOx oxidation catalyst shall be operated at all times each Caterpillar G3606LE compressor engine is in operation. Exhaust from each Caterpillar G3606LE compressor engine shall be routed through the SileNOx oxidation catalyst at all times.
- (4) The Caterpillar G3606LE compressor engines equipped with Ultra Lean Burn (ULB) technology with ADEM III control system and SileNOx oxidation catalyst shall be operated and maintained in accordance with the manufacturer's emission-related written instructions, specifications, schedules and associated operation and maintenance manuals such that the engines are operated and maintained in a certified manner for the life of the engines. Records of engine certification and records of operations and all maintenance activities performed on the engines and controls shall be available for inspection by NWCAA personnel.
- (5) The following operating parameters shall be monitored continuously and recorded on a monthly basis for each Caterpillar G3606LE engine:
 - (A) SileNOx oxidation catalyst outlet temperature.
 - (B) Back pressure across the SileNOx oxidation catalyst bed.
 - (C) Operating hours from each non-resettable hour meter.
 - (D) Fuel combusted, in million cubic feet, from gas meter.
- (6) The following parameter ranges shall be determined during commissioning of the Caterpillar G3606LE engines and oxidation catalysts and posted near the location they are measured:

¹ Nothing in this permit is intended to, or shall, alter or waive any applicable law [including but not limited to defenses, entitlements, challenges or clarifications related to the Credible Evidence Rule, 62 FR 8315 (Feb. 27, 1997)] concerning the use of data for any purpose under the Act, generated by the reference method specified herein or otherwise.

Pursuant to Section 300.10 of the NWCAA Regulation and ch 43.21B RCW, this Order may be appealed to the Pollution Control Hearings Board (PCHB). To appeal to the PCHB, a written notice of appeal must be filed with the PCHB and a copy served upon the NWCAA within 30 days of the date the applicant receives this Order. Additional information regarding appeal procedures can be found at: <http://www.eluho.wa.gov/> under PCHB.

- (A) Maximum continuous service temperature and acceptable operating temperature range of the catalyst. A thermocouple shall be installed on the outlet of each oxidation catalyst to continually monitor temperature at all times the Caterpillar G3606LE engines are operating. The thermocouples shall be maintained in good operating condition and calibrated for accuracy at least every 24 months. Records of calibration/accuracy checks and maintenance performed shall be retained on site and readily available to NWCAA staff.
 - (B) Maximum acceptable back pressure across the catalyst bed for proper catalyst operation. A monitor capable of continuously measuring the back pressure on the oxidation catalyst shall be installed and operated at all times the Caterpillar G3606LE engines are operating. The monitor must be maintained in good operating condition and records of any maintenance performed shall be retained on site and readily available to NWCAA staff.
- (7) If the operating parameter monitoring described in Condition (5)(A) or (B) shows operation outside the specified ranges determined per Condition (6), corrective action (below) shall be required:
- (A) If the oxidation catalyst outlet temperature is not within the range specified in Condition 6(A), the oxidation catalyst visual inspection described in Condition (8) shall be immediately triggered and performed within 21 days after the end of the month in which catalyst temperature was outside of the specified range. As an alternative, the visual inspection can be skipped if the testing described in Condition (10) is performed as soon as practicable but no later than 45 days after the end of the month when the outlet temperature was found to be out of range.
 - (B) If the back pressure across the catalyst bed exceeds the maximum acceptable back pressure specified in Condition 6(B), the Caterpillar G3606LE engine shall be scheduled for a maintenance shutdown and corrective action taken to return the oxidation catalyst to proper operation within 45 days after the end of the month in which catalyst back pressure was outside of the specified range. If back pressure continues to exceed the maximum acceptable back pressure after corrective action has been taken, the testing described in Condition (10) shall be immediately triggered and performed within 45 days after the end of the month in which the maintenance shutdown was performed.
- (8) At least every 24 months, a visual inspection of the SileNOx oxidation catalyst monolith core will be performed according to manufacturer recommendations. If the visual inspection reveals the catalyst may be poisoned or in poor condition, testing in accordance with Condition (10) shall be performed as soon as practicable but no later than 45 after the end of the month when the visual inspection was performed. Records of visual inspections shall be maintained on site and available for review by NWCAA staff.
- (9) At all times, each G3606LE Caterpillar engine equipped ULB technology with ADEM III control system and SileNOx oxidation catalyst shall meet the following limits:
- (A) 40 ppm NOx on a dry volumetric basis corrected to 15% O₂, averaged over (3) two-minute runs during the "test data phase", as described in Condition (10).
 - (B) 10 ppm CO on a dry volumetric basis corrected to 15% O₂, averaged over (3) two-minute runs during the "test data phase", as described in Condition (10).

- (C) 39 ppm total VOC (VOC) measured as propane, on a dry volumetric basis corrected to 15% O₂, averaged over (3) two-minute runs during the "test data phase", as described in Condition (10).
- (10) At least every two years from startup of the new Caterpillar G3606LE engines, concentrations of NO_x, CO and VOC from each compressor engine oxidation catalyst exhaust shall be measured when operating within 10% of 100% of the engine manufacturer's rated horsepower as listed on the equipment nameplate, according to the following parameters:
- A. Measurements may be conducted using a portable emissions analyzer capable of adjustment to the 15% O₂ concentration basis and verified as accurate in accordance with the process outlined in (10) B.(below).
 - B. A portable emission analyzer periodic testing protocol shall be developed incorporating the specifications of USEPA Designated Conditional Test Method 34, proposing a portable analyzer method to be used to measure VOC that accounts for moisture and measures carbon as propane, and be submitted to NWCAA 60 days prior to the first monitoring event for approval. The protocol shall identify the portable emission analyzer to be used, the location of sampling ports to be used for emission measurements, the quality assurance/quality control (QA/QC) procedures to be followed before, during and following testing, the concentrations of calibration gases used to verify the accuracy of the analyzer, the sampling procedures to be used, and emission calculations to be performed.
 - C. After receiving approval for the protocol, the protocol shall be followed for all future measurement of pollutant concentrations. Any changes to the approved protocol must be submitted and approved in writing by NWCAA in advance of implementing the changes.
 - D. If the average of the (3) runs indicate noncompliance with any of the emission limits in Condition (9), the engine(s) shall be shutdown as soon as practicable and corrective action taken. Exceedance of any of the limits in Condition (9) as indicated by the average of (3) runs shall be prima facie evidence of a violation of Condition (9).
 - E. Notification of the exceedance shall be reported to NWCAA as promptly as possible, and in no event later than seven (7) days after it is discovered.
 - F. Records of portable analyzer accuracy verification, pollutant concentration measurements, destruction efficiency, and operating parameters (at a minimum, those specified in Condition (7)), including parameters that demonstrate testing was performed within 10% of 100% of the engine manufacturer's rated horsepower as listed on the equipment nameplate, shall be retained onsite and be readily available for review by NWCAA personnel.
- (11) All records required by the Order shall be maintained onsite for no less than 3 years from the date of generation and shall be readily available for review by NWCAA personnel.
- (12) NWCAA shall be provided with written notification of the startup date of the Caterpillar G3606LE ULB engines with ADEM III control system and SileNO_x oxidation catalyst. The notice shall be postmarked no later than 15 days after startup and shall include a reference to OAC 1236a.
- (13) Maintain annual records of throughput for Tank T2.

- (14) Do not operate (2) Waukesha engines for more than 1,000 hours combined, in any consecutive 12-month rolling period.
- (15) Operate Waukesha engines for testing, emergency, or back up only. Keep records documenting the purpose of operation of each engine (testing, emergency, back up).
- (16) Do not exceed any of the following emission limits for the Waukesha engines:

Pollutant	Emission Limits	Hourly Emission Limits (lb/hr)
Nitrogen Oxides (NO_x)	1.5 (g/bhp-hr)	3.66
Carbon Monoxide (CO)	2.65(g/bhp-hr)	6.47
Volatile Organic Compounds (VOC)	1.0 (g/bhp-hr)	2.44
Sulfur Dioxide (SO₂)	20 (grains/100scf)	1.06
Formaldehyde	0.0058 (g/sec)	0.046

- (17) Conduct source tests on both Waukesha engines to demonstrate compliance with the hourly emission limits listed in Condition 16.) no later than 90 days after issuance of the OAC. Submit a test plan for review at least 30 days prior to testing. Submit the final test report to NWCAA no later than 45 days following completion of the tests.
 - (A) Conduct EPA Method 7, 7A, or 7D to demonstrate compliance with the NO_x limit. Collect 4 samples during a one hour sampling period.
 - (B) Conduct EPA Method 10 or 10B shall be conducted to demonstrate compliance with the CO limit. A 60 minute sampling period is required.
 - (C) Source testing is not required for VOCs.
 - (D) Conduct EPA Method 6, 6A or 6C shall be conducted to demonstrate compliance with the SO₂ limit. One 20-minute sample may be used as representative of an hourly sample. An alternate test plan may be approved by the Control Officer.
 - (E) Conduct EPA Compendium Method TO-11 "The Determination of Formaldehyde in Ambient Air Using Absorbent Cartridge Followed by High Performance Liquid Chromatography" or an alternate method approved by the Control Officer to demonstrate compliance with the formaldehyde limit.
- (18) Maintain records of annual fuel consumption and hours of operation for each Waukesha engine during each consecutive 12-month rolling period.
- (19) Maintain an Operation and Maintenance plan for Tank T2 and the two (2) Waukesha compressor engines that reflects good industrial practices and includes maintenance procedures including leak detection and repair policies for sources of VOC emissions.
- (20) Burn only pipeline quality natural gas in Waukesha compressor engines.

Crystal Rau
Air Quality Scientist

Agata McIntyre, P.E.
Engineering Manager

Revision a: Establish 1,000 hour per consecutive 12-month period limitation on operation of the Waukesha engines (combined) for the purpose of testing, emergency, and back up of Caterpillar G3606LE engines. Incorporate appropriate on-going applicable conditions from superseded OAC 452 for existing tank T2 and Waukesha engines (conditions 1, 2, 3, 4, 7, 8 and 9).