

STATE OF COLORADO

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
AIR POLLUTION CONTROL DIVISION
TELEPHONE: (303) 692-3150



CONSTRUCTION PERMIT

PERMIT NO: **12DE2647**

Issuance 1

DATE ISSUED: December 15, 2014

ISSUED TO: **Denver Zoological Foundation**

THE SOURCE TO WHICH THIS PERMIT APPLIES IS DESCRIBED AND LOCATED AS FOLLOWS:

A waste to energy system for gasification of zoo wastes, located at 2300 23rd St, Denver, Denver County, Colorado.

THE SPECIFIC EQUIPMENT OR ACTIVITY SUBJECT TO THIS PERMIT INCLUDES THE FOLLOWING:

Facility Equipment ID	AIRS Point	Description
Dryer	010	One (1) First American Scientific, mechanical dryer and custom air filter system (DZF), Model KDS-S3/MX3510, sn: TBD
Pellet Cooler	011	One (1) Colorado Mill Equipment pellet cooler and Microair filter system, model CF3/MX3510, sn: TBD
Synthesis gas generator, Thermal oxidizer control (TOC) and scrubber	012	One (1) custom made, synthesis gas generator converts fuel pellets to CO and H ₂ in a reduced oxygen process. During testing of the synthetic gas generator, startup and process upsets, the syn gas is controlled by combusting it in Thermal oxidizer control (TOC) and passing the exhaust through a scrubber to remove acid gases. The TOC / scrubber are subject to the requirements of NSPS Subpart EEEE.(Other Solid Waste Incinerator – OSWI)
Synthesis gas generator, scrubber Gas fired Engine with NSCR Electric Generator	013	One (1) custom made, synthesis gas generator converts fuel pellets to CO and H ₂ in a reduced oxygen process. During normal operations the syn gas is scrubbed and then burned in the engine/generator to produce electricity for the Zoo. One (1) NG Engines generator, model D219(221ng), sn TBD, equipped with NSCR for emission control. Engine design rated at 650 HP (sea level) and 553 HP site rating. The engine burns a mixture of synthetic gas and natural gas. The engine is subject to NSPS Subpart JJJJ. Engine emissions are controlled by non selective catalytic reduction (NSCR).

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Facility Equipment ID	AIRS Point	Description
Synthesis gas generator, scrubber Gas fired micro turbine Electric Generator	014	One (1) custom made, synthesis gas generator converts fuel pellets to CO and H2 in a reduced oxygen process. During normal operations the syn gas is scrubbed and then burned microturbine to produce electricity for the Zoo. One (1) Capstone C60 Micro Turbine, sn TBD, Turbine design rated at 804,000 BTU per hour The micro turbine burns a mixture of synthetic gas and natural gas.

Note: There is only one synthetic gas generator. The generated gas can be burned in any one of the three devices in emission points 012, 013, and 014 as specified in condition number 10 below.

THIS PERMIT IS GRANTED SUBJECT TO ALL RULES AND REGULATIONS OF THE COLORADO AIR QUALITY CONTROL COMMISSION AND THE COLORADO AIR POLLUTION PREVENTION AND CONTROL ACT C.R.S. (25-7-101 et seq), TO THOSE GENERAL TERMS AND CONDITIONS INCLUDED IN THIS DOCUMENT AND THE FOLLOWING SPECIFIC TERMS AND CONDITIONS:

REQUIREMENTS TO SELF-CERTIFY FOR FINAL APPROVAL

1. **YOU MUST notify the Air Pollution Control Division (Division) no later than fifteen days after commencement of operation under this permit by submitting a Notice of Startup (NOS) form to the Division.** The Notice of Startup (NOS) form may be downloaded online at <https://www.colorado.gov/pacific/cdphe/other-air-permitting-notice>. Failure to notify the Division of startup of the permitted source is a violation of AQCC Regulation No. 3, Part B, Section III.G.1 and can result in the revocation of the permit.

2. Within one hundred and eighty days (180) after commencement of operation of each permitted AIRS point, compliance with the conditions contained on this permit shall be demonstrated to the Division. It is the permittee's responsibility to self certify compliance with the conditions. Failure to demonstrate compliance within 180 days may result in revocation of the permit or enforcement action by the Division. Information on how to certify compliance was mailed with the permit or can be obtained from the Division's website at <https://www.colorado.gov/pacific/cdphe/air-permit-self-certification>. (Reference: Regulation No. 3, Part B, II.G.2)

3. This permit shall expire if the owner or operator of the source for which this permit was issued: (i) does not commence construction/modification or operation of this source within 18 months after either, the date of issuance of this construction permit or the date on which such construction or activity was scheduled to commence as set forth in the permit application associated with this permit; (ii) discontinues construction for a period of eighteen months or more; (iii) does not complete construction within a reasonable time of the estimated completion date. The Division may grant extensions of the deadline per Regulation No. 3, Part B, III.F.4.b. (Reference: Regulation No. 3, Part B, III.F.4.)

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4. Within one hundred and eighty days (180) after commencement of operation of each permitted AIRS point, the operator shall complete all initial compliance testing and sampling as required in this permit for that activity and submit the results to the Division as part of the self-certification process. (Reference: Regulation No. 3, Part B, Section III.E.)
5. The owner or operator shall develop an operating and maintenance (O&M) plan, along with a recordkeeping format, that outlines how the applicant will maintain compliance on an ongoing basis with the requirements of this permit. **Compliance with the O&M plan shall commence at startup.** Within one hundred and eighty days (180) after commencement of operation, the owner or operator shall submit the O&M plan to the Division. Failure to submit an acceptable operating and maintenance plan could result in revocation of the permit. (Reference: Regulation No. 3, Part B, III.E.)
6. Within thirty days (30) after commencement of operation of each permitted AIRS point, the permit number and AIRS ID number shall be marked on the subject equipment for ease of identification. (Reference: Regulation No. 3, Part B, III.E.) (State only enforceable)
7. The manufacturer, model number and serial number of the subject equipment shall be provided to the Division within fifteen days (15) after commencement of operation of each permitted AIRS point. This information shall be included on the Notice of Startup (NOS) submitted for the equipment. (Reference: Regulation No. 3, Part B, III.E.)

EMISSION LIMITATIONS AND RECORDS

8. Emissions of air pollutants shall not exceed the following limitations (as calculated using the emission factors included in the Notes to Permit Holder section of this permit). Monthly records of the actual emission rates shall be maintained by the applicant and made available to the Division for inspection upon request. (Reference: Regulation No. 3, Part B, Section II.A.4).

AIRS Points 012 (Thermal Oxidizer Control / Scrubber)

TABLE 1 - Short term emission limits summary

(See Regulation 6 Part A Subpart EEEE §60.2915 and Table 1)

Compound	Emission limitation	Averaging time	Test method
1. Cadmium	18 micrograms per dry standard cubic meter	3-run average (1 hour minimum sample time per run)	Method 29 of appendix A-8 to 40CFR part 60.
2. Carbon monoxide	40 parts per million by dry volume	3-run average (1 hour minimum sample time per run during performance test), and 12-hour rolling averages measured using CEMS. ^b	Method 10, 10A, or 10B of appendix A-4 to 40CFR part 60. and CEMS.
3. Dioxins/furans (total basis)	33 nanograms per dry standard cubic meter	3-run average (1 hour minimum sample meter time per run)	Method 23 of appendix A-7 to 40CFR part 60.
4. Hydrogen chloride	15 parts per million by dry volume	3-run average (1 hour minimum sample time per run)	Method 26A of appendix A 8 to 40CFR part 60.
5. Lead	226 micrograms per dry standard cubic meter	3-run average (1 hour minimum sample time per run)	Method 29 of appendix A 8 to 40CFR part 60.
6. Mercury	74 micrograms per dry standard cubic meter	3-run average (1 hour minimum sample time per run)	Method 29 of appendix A 8 to 40CFR part 60.
7. Opacity	10 percent	6-minute average (observe over three 1-hour test runs; i.e., thirty 6-	Method 9 of appendix A-4 to 40CFR part 60.

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		minute averages)	
8. Oxides of nitrogen	103 parts per million by dry volume	3-run average (1 hour minimum sample time per run)	Method 7, 7A, 7C, 7D, or 7E of appendix A -4 to 40CFR part 60, or ANSI/ASME PTC 19.10-1981 (IBR, see §60.17(h)) in lieu of Methods 7 and 7C only.
9. Particulate matter	0.013 grains per dry standard cubic foot	3-run average (1 hour minimum sample time per run)	Method 5 of Appendix A-3 or method 29 of appendix A- 8 to 40CFR part 60.
10. Sulfur dioxide	3.1 parts per million by dry volume	3-run average (1 hour minimum sample time per run)	Method 6 or 6C of appendix A-48 to 40CFR part 60, or ANSI/ASME PTC 19.10-1981 (IBR, see §60.17(h)) in lieu of Method 6 only.
^a All emission limitations (except for opacity) are measured at 7 percent oxygen, dry basis at standard conditions. ^b Calculated each hour as the average of the previous 12 operating hours.			

Note: The table above is only a summary of the requirements in Subpart EEEE, see section §60.2915 of the rule for the complete requirements

Monthly Limits:

Facility Equipment ID	AIRS Point	Tons per Month							Emission Type
		PM	PM ₁₀	PM _{2.5}	NO _x	SO ₂	VOC	CO	
Dryer	010	0.45	0.45	0.45	----	----	0.2	----	Point
Pellet Cooler	011	0.04	0.04	0.04	----	----	----	----	Point
Synthesis gas generator, TOC and scrubber	012	0.02	0.02	0.02	0.07	0.014	0.25	0.02	Point
Synthesis gas generator/ scrubber/ Engine	013	0.02	0.02	0.02	1.05	0.01	0.53	2.63	Point

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Synthesis gas generator, scrubber	014	0.002	0.002	0.002	0.1	0.01	0.001	0.02	
Gas fired micro turbine Electric Generator									
TOTAL	Point	0.53	0.53	0.53	1.05	0.03	0.98	2.65	

The monthly limits included in this permit were derived from the annual limits based on a 31-day month. The owner or operator shall calculate monthly emissions based on the calendar month.

Annual Limits:

Facility Equipment ID	AIRS Point	Tons per Year							Emission Type
		PM	PM ₁₀	PM _{2.5}	NO _x	SO ₂	VOC	CO	
Dryer	010	5.3	5.3	5.3	----	----	2.4	----	Point
Pellet Cooler	011	0.53	0.53	0.53	----	----	----	----	Point
Synthesis gas generator, TOC and scrubber	012	0.24	0.24	0.24	0.8	0.06	3.0	0.2	Point
Synthesis gas generator/scrubber/Engine	013	0.2	0.2	0.2	12.6	0.13	6.3	31.5	Point
Synthesis gas generator, scrubber Gas fired micro turbine Electric Generator	014	0.02	0.02	0.02	1.2	0.03	0.01	0.29	Point
TOTAL	Point	6.3	6.3	6.3	14.6	0.22	9.3	31.8	Point

See "Notes to Permit Holder #4" for information on emission factors and methods used to calculate limits.

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During the first twelve (12) months of operation, compliance with both the monthly and yearly emission limitations shall be required. After the first twelve (12) months of operation, compliance with only the yearly limitation shall be required.

Compliance with the annual limits shall be determined by recording the facility's annual emissions for the pollutants listed in the table above and all HAPs above the de-minimis reporting level on a rolling (12) month total. By the end of each month a new twelve-month total shall be calculated based on the previous twelve months' data. The permit holder shall calculate monthly emissions and keep a compliance record on site, or at a local field office with site responsibility, for Division review. This rolling twelve-month total shall apply to all emission units, requiring an APEN, at this facility.

9. The following control equipment shall be maintained and operated to ensure satisfactory performance. The owner or operator shall monitor compliance with this condition through the results of approved compliance tests (when required), compliance with the Operating and Maintenance Plan, compliance records, and other methods as approved by the Division. (Reference: Regulation No. 3, Part B, Section III.E.)

Facility Equipment ID	AIRS Point	Control Device	Controlled Pollutants
Dryer	010	Custom Air filter (DZF) and Cyclone	PM
Pellet Cooler	011	Micro Air Filter/cyclone	PM
Synthesis gas generator, TOC / scrubber	012	TOC and scrubber	See condition 8 Table 1
Synthesis gas generator, Engine / Generator	013	Non Selective Catalytic Reduction (NSCR)	CO, NOx, VOC

PROCESS LIMITATIONS AND RECORDS

10. This source shall be limited to the following maximum consumption, processing and/or operational rates as listed below. Monthly records of the actual process rate shall be maintained by the applicant and made available to the Division for inspection upon request. (Reference: Regulation 3, Part B, II.A.4)

Process/Consumption Limits

Facility Equipment ID	AIRS Point	Process Parameter	Annual Limit	Monthly Limit (31 days)
Dryer	010	Zoo waste shredded and dried	1,916 tons	162.7 tons
Pellet Cooler	011	Zoo fuel pellets	1,610 tons	136.8 tons

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TOC	012	Syn Gas Nat Gas	65.94 million scf 7.1 million scf	5.6 million scf 0.61 million scf
Engine	013	Syn gas Nat. gas	156.3 million scf 18.74 million scf	13.3 million scf 1.59 million scf
Turbine	014	Syn gas Nat. gas	30.7 million scf 3.3 million scf	2.61 million scf 0.28 million scf

The monthly limits included in this permit were derived from the annual limits based on a 31-day month. The owner or operator shall calculate monthly emissions based on the calendar month.

During the first twelve (12) months of operation, compliance with both the monthly and yearly process limitations shall be required. After the first twelve (12) months of operation, compliance with only the yearly limitation shall be required.

Compliance with the yearly process limits shall be determined on a rolling twelve (12) month total. By the end of each month a new twelve-month total is calculated based on the previous twelve months' data. The permit holder shall calculate monthly process rate and keep a compliance record on site or at a local field office with site responsibility, for Division review.

STATE AND FEDERAL REGULATORY REQUIREMENTS

11. Visible emissions shall not exceed twenty percent (20%) opacity during normal operation of the source. During periods of startup, process modification, or adjustment of control equipment visible emissions shall not exceed 30% opacity for more than six minutes in any sixty consecutive minutes. Opacity shall be determined using EPA Method 9. (Reference: Regulation No. 1, Section II.A.1. & 4.)
12. This source is subject to the odor requirements of Regulation No. 2. (State only enforceable).
13. This source is located in an ozone non-attainment or attainment-maintenance area and subject to the Reasonably Available Control Technology (RACT) requirements of Regulation Number 3, Part B, III.D.2.b. For the Thermal Oxidizer/scrubber (AIRS ID 012) RACT was determined to be the NOx emission limitations from condition 8, table 1. For the gas fired engine (AIRS ID 013) use of non selective catalytic reduction (NSCR) was determined to be RACT. For the synthetic gas generator RACT was determined to be burning the gas in either the thermal oxidizer, engine, or turbine.
14. This source is subject to the New Source Performance Standards requirements of Regulation No. 6, Part A, Subpart EEEE, "Standards of Performance for Other Solid Waste Incineration Units for Which Construction is Commenced After December 9, 2004, or for which Modification or Reconstruction is Commenced on or after June 16, 2006" including, but not limited to, the following:

[The requirements below reflect the rule language of 40 CFR Part 60 Subpart EEEE published in the Federal Register on 12/16/2005 and amended on 11/24/2006. However, if revisions to this Subpart are published at a later date, the owner or operator is subject to the requirements contained in the revised version of 40 CFR Part 60, Subpart EEEE]

 - a. Preconstruction siting analysis
 - §60.2894 – Who must prepare a siting analysis
 - §60.2895 – What is a siting analysis

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- b. Waste management plan
 - §60.2899 – What is a waste management plan
 - §60.2900 – When must I submit my waste management plan
 - §60.2901 - What should I include in my waste management plan

- c. Operator training and qualification
 - §60.2905 – What are the operator training and qualification requirements
 - §60.2906 - When must the operator training course be completed
 - §60.2907 - How do I obtain my operator qualification
 - §60.2908 – How do I maintain my operator qualification
 - §60.2909 How do I renew my lapsed operator qualification
 - §60.2910 - What site specific documentation is required
 - §60.2911 – What if all the qualified operators are temporarily not accessible

- d. Emission limitations and operating limits
 - §60.2915 What emission limitations must I meet and by when
 - §60.2916 – What operating limits must I meet and by when

As stated in §60.2916, you must comply with the following:

Table 2 to Subpart EEEE of Part 60—Operating Limits for Incinerators and Wet Scrubbers

Operating parameters	determine operating limits	Data measurement	Data recording	Averaging time
1. Charge rate	Maximum charge rate	Continuous	Every hour	Daily for batch units. 3-hour rolling for continuous and intermittent units ^a .
2. Pressure drop across the wet scrubber or amperage to wet scrubber	Minimum pressure drop or amperage	Continuous	Every 15 minutes	3-hour rolling ^a .
3. Scrubber liquor flow rate	Minimum flow rate	Continuous	Every 15 minutes	3-hour rolling ^a .
4. Scrubber liquor pH	Minimum pH	Continuous	Every 15 minutes	3-hour rolling ^a .

^aCalculated each hour as the average of the previous 3 operating hours.

Note: This table is only a summary, see the referenced sections of the rule for the complete requirements

- §60.2917 – What if I do not use a wet scrubber to comply with the emission limitations
- §60.2918 – What happens during periods of startup, shutdown and malfunction

- e. Performance testing
 - §60.2922 – How do I conduct the initial and annual performance test

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§60.2923 – How are the performance data used

f. Initial compliance requirements

§60.2927 – How do I demonstrate initial compliance with the emission limitations and establish the operating limits

§60.2928 – By what date must I conduct the initial performance test

g. Continuous compliance requirements

§60.2932- How do I demonstrate continuous compliance with the emission limitation and the operating limits

§60.2933 – By what date must I conduct the annual performance test

§60.2934 – May I conduct performance testing less often

§60.2935 – May I conduct a repeat performance test to establish new operating limits

h. Monitoring

§60.2939 – What continuous emission monitoring systems must I install

§60.2940 – How do I make sure my continuous emission monitoring systems are operating Correctly

As stated in §60.2940, you must comply with the following:

Table 3 to Subpart EEEE of Regulation 6 of Part 60—Requirements for Continuous Emission Monitoring Systems (CEMS)

For the following pollutants	Use the following span values for your CEMS	Use the following performance specifications (P.S.) in appendix B of this part for your CEMS	If needed to meet minimum data requirements, use the following alternate methods in appendix A of this part to collect data
1. Carbon Monoxide	125 percent of the maximum hourly potential carbon monoxide emissions of the waste combustion unit	P.S.4A	Method 10.
2. Oxygen	25 percent oxygen	P.S.3	Method 3A or 3B, or ANSI/ASME PTC 19.10-1981 (IBR, see §60.17(h)) in lieu of Method 3B only.

Note: This table is only a summary, see the referenced sections of the rule for the complete requirements

§60.2941 – What is my schedule for evaluating continuous emission monitoring systems

§60.2942 – What is the minimum amount of monitoring data I must collect with my continuous emission monitoring systems, and is the data collection requirement enforceable

§60.2943 – How do I convert my 1-hour arithmetic averages into the appropriate averaging times and units

§60.2944 – What operating parameter monitoring equipment must I install, and what operating parameters must I monitor

§60.2945 – Is there a minimum amount of operating parameter monitoring data I must obtain

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i. Recordkeeping and Reporting

§60.2949 – What records must I keep

§60.2950 – Where and in what format must I keep my records

§60.2951 – What reports must I submit

As stated in §60.2951, you must comply with the following:

Table 4 to Subpart EEEE of Part 60—Summary of Reporting Requirements

Report	Due date	Contents	Reference
1. Preconstruction report	a. Prior to commencing construction	i. Statement of intent to construct;	§60.2952.
		ii. Anticipated date of commencement of construction;	§60.2952.
		iii. Documentation for siting requirements;	§60.2952.
		iv. Waste management plan; and	§60.2952.
		v. Anticipated date of initial startup.	§60.2952.
2. Startup notification	a. Prior to initial startup	i. Types of waste to be burned;	§60.2953.
		ii. Maximum design waste burning capacity;	§60.2953.
		iii. Anticipated maximum charge rate;	§60.2953.
		iv. If applicable, the petition for site-specific operating limits; and	§60.2953.
		v. Anticipated date of initial startup.	§60.2953.
3. Initial test report	a. No later than 60 days following the initial performance test	i. Complete test report for the initial performance test; and	§60.2954.
		ii. The values for the site-specific operating limits	§60.2954.
4. Annual report	a. No later than 12 months following the submission of the initial test report. Subsequent reports are to be submitted no more than 12 months following the previous report	i. Company Name and address;	§§60.2955 and 60.2956.
		ii. Statement and signature by the owner or operator;	§§60.2955 and 60.2956.
		iii. Date of report;	§§60.2955 and 60.2956.
		iv. Values for the operating limits;	§§60.2955 and 60.2956.
		v. If no deviations or malfunctions were reported, a statement that no deviations occurred during the reporting period;	§§60.2955 and 60.2956.
			§§60.2955 and 60.2956.

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		vi. Highest and lowest recorded 12-hour averages, as applicable, for carbon monoxide emissions and highest and lowest recorded 3-hour averages, as applicable, for each operating parameter recorded for the calendar year being reported;	§§60.2955 and 60.2956.
		vii. Information for deviations or malfunctions recorded under §60.2949(b)(6) and (c) through (e);	§§60.2955 and 60.2956.
		viii. If a performance test was conducted during the reporting period, the results of the test;	§§60.2955 and 60.2956.
		ix. If a performance test was not conducted during the reporting period, a statement that the requirements of §60.2934 (a) or (b) were met; and	§§60.2955 and 60.2956.
		x. Documentation of periods when all qualified OSWI unit operators were unavailable for more than 12 hours but less than 2 weeks.	§§60.2955 and 60.2956.
5. Emission limitation or operating limit deviation report	a. By August 1 of that year for data collected during the first half of the calendar year. By February 1 of the following year for data collected during the second half of the calendar year	i. Dates and times of deviation; ii. Averaged and recorded data for those dates; iii. Duration and causes of each deviation and the corrective actions taken; iv. Copy of operating limit monitoring data and any test reports; v. Dates, times, and causes for monitor downtimes incidents; vi. Whether each deviation occurred during a period of startup, shutdown, or malfunction; and	§§60.2957 and 60.2958. §§60.2957 and 60.2958. §§60.2957 and 60.2958. §§60.2957 and 60.2958. §§60.2957 and 60.2958. §§60.2957 and 60.2958.
		vii. Dates, times, and durations of any bypass of the control device.	§§60.2957 and 60.2958.
6. Qualified operator deviation notification	a. Within 10 days of deviation	i. Statement of cause of deviation; ii. Description of efforts to have an accessible qualified operator; and	§60.2959(a)(1). §60.2959(a)(1)
		iii. The date a qualified operator will be accessible	§60.2959(a)(1).

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7. Qualified operation deviation status report	a. Every 4 weeks following deviation	i. Description of efforts to have an accessible qualified operator;	§60.2959(a)(2).
		ii. The date a qualified operator will be accessible; and	§60.2959(a)(2).
		iii. Request to continue operation	§60.2959(a)(2).
8. Qualified operator deviation notification of resumed operation	a. Prior to resuming operation	i. Notification that you are resuming operation	§60.2959(b).

Note: This table is only a summary, see the referenced sections of the rule for the complete requirements

- §60.2952 – What must I obtain prior to commencing construction
- §60.2953 – What information must I submit prior to initial startup
- §60.2954 – What information must I submit following my initial performance test
- §60.2955 – When must I submit my annual report
- §60.2926 – What information must I include in my annual report
- §60.2957 – What else must I report if I have a deviation from the operating limits or the emission limitations
- §60.2958 – What must I include in the deviation report
- §60.2959 – What else must I report if I have a deviation from the requirement to have a qualified operator accessible
- §60.2960 – Are there any other notifications or reports that I must submit
- §60.2961 – Can reporting dates be changed

J. Title V operating permits

- §60.2966 – Am I required to apply for and obtain a title V operating permit for my unit
- §60.2967 – When must I submit a title V permit application for my new unit

The Title V application is due one (1) year after the startup of the TOC..

15. The following requirements of Regulation No. 6, Part A, Subpart A, General Provisions, apply.
- a. At all times, including periods of start-up, shutdown, and malfunction, the facility and control equipment shall, to the extent practicable, be maintained and operated in a manner consistent with good air pollution control practices for minimizing emissions. Determination of whether or not acceptable operating and maintenance procedures are being used will be based on information available to the Division, which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. (Reference: Regulation No. 6, Part A. General Provisions from 40 CFR 60.11
 - b. No article, machine, equipment or process shall be used to conceal an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere. (§ 60.12)

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- c. Written notification of construction and initial startup dates shall be submitted to the Division as required under § 60.7.
- d. Records of startups, shutdowns, and malfunctions shall be maintained, as required under § 60.7.
- e. Written notification of continuous monitoring system demonstrations shall be submitted to the Division as required under § 60.7.
- f. Written notification of opacity observation or monitor demonstrations shall be submitted to the Division as required under § 60.7.
- g. Excess Emission and Monitoring System Performance Reports shall be submitted as required under § 60.7.
- h. Performance tests shall be conducted as required under § 60.8.
- i. Compliance with opacity standards shall be demonstrated according to § 60.11.
- j. Continuous monitoring systems shall be maintained and operated as required under § 60.13.

OPERATING & MAINTENANCE REQUIREMENTS

16. The owner or operator shall develop an operating and maintenance (O&M) plan, along with a recordkeeping format, that outlines how the applicant will maintain compliance on an ongoing basis with the requirements of this permit. **Compliance with the O&M plan shall commence at startup.** Within one hundred and eighty days (180) after commencement of operation, the owner or operator shall submit the O&M plan to the Division. Failure to submit an acceptable operating and maintenance plan could result in revocation of the permit. (Reference: Regulation No. 3, Part B, III.E.)

COMPLIANCE TESTING AND SAMPLING

Initial Testing Requirements

17. Within 180 days of startup of the permitted activity, the owner or operator shall demonstrate compliance with Condition 11, using EPA Method 9 to measure opacity from the dryer (AIRS ID 010) and pellet cooler (AIRS ID 011). This measurement shall consist of a minimum twenty-four consecutive readings taken at fifteen second intervals over a six minute period. (Reference: Regulation No. 1, Section II.A.1 & 4).
18. Within 180 days of startup of the TOC/scrubber (AIRS ID 012), the owner or operator shall demonstrate compliance with Condition 11, using EPA Method 9 to measure opacity from the TOC/scrubber (AIRS ID 012). The observation period shall be 1 hour in duration. (Reference: Regulation 1, Section II.A.5)

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19. Source initial compliance testing shall be conducted on the following equipment Dryer (AIRS ID 010), Pellet cooler (AIRS ID 011), and the Engine (AIRS ID 013) to measure the emission rate(s) for the pollutants listed below in order to demonstrate compliance with the emission limits listed in condition 8 for those individual points. The test protocol must be in accordance with the requirements of the Air Pollution Control Division Compliance Test Manual and shall be submitted to the Division for review and approval at least thirty (30) days prior to testing. No compliance test shall be conducted without prior approval from the Division. Any compliance test conducted to show compliance with a monthly or annual emission limitation shall have the results projected up to the monthly or annual averaging time by multiplying the test results by the allowable number of operating hours for that averaging time (Reference: Regulation No. 3, Part B., Section III.G.3)

Dryer (Point 010) Particulate Matter using EPA approved methods.

Pellet Cooler (Point 011) Particulate Matter using EPA approved methods.

Engine/Generator (Point 013) Particulate Matter using EPA approved methods.

Sulfur Dioxide using EPA approved methods.

Oxides of Nitrogen using EPA approved methods.

Volatile Organic Compounds using EPA approved methods.

Carbon Monoxide using EPA approved methods.

Hydrogen Chloride (HCl) using EPA approved methods.

Initial testing requirements (OSWI)

20. An initial compliance test shall be conducted on the synthesis gas generator TOC and scrubber (AIRS ID 012) to measure the emission rate(s) for the pollutants listed in condition 8, table 1 in order to demonstrate compliance with the emission limitations listed in condition 8, Table 1.
21. The initial performance test must be conducted within 60 days after the OSWI unit (TOC/scrubber) reaches the processing rate at which it will operate, but no later than 180 days after its initial startup. (Reference Regulation 6. Part A, Subpart EEEE, §60.2928)

The test protocol must be in accordance with the requirements of the Air Pollution Control Division Compliance Test Manual and the requirements listed in condition 8, Table 1 in this permit and shall be submitted to the Division for review and approval at least thirty (30) days prior to testing. No compliance test shall be conducted without prior approval from the Division. Any compliance test conducted to show compliance with a monthly or annual emission limitation shall have the results projected up to the monthly or annual averaging time by multiplying the test results by the allowable number of operating hours for that averaging time (Reference: Regulation No. 3, Part B., Section III.G.3)

Annual testing requirements (OSWI)

22. The owner or operator shall conduct an annual performance test for all of the pollutants listed in (condition 8, table 1 for the OSWI unit (AIRS point 012 – TOC and scrubber) to determine compliance with the emission limitations. The annual performance test must be conducted using the test methods listed in Condition 8, table 1 and the procedures in 60.2922. (Reference Regulation 6, Part A subpart EEEE, §60.2932)

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23. The annual performance tests shall be conducted within 12 months following the initial performance test. Conduct subsequent annual performance tests within 12 months following the previous one. (Reference Regulation 6. Part A, Subpart EEEE, §60.2933)
24. A given pollutant may be tested less often if there is test data for at least three consecutive annual tests, and all performance tests for the pollutant over that period show compliance with the emission limitation. In this case, a performance test for that pollutant is not required for the next 2 years. A performance test must be conducted during the 3rd year and no more than 36 months following the previous performance test. (Reference Regulation 6. Part A, Subpart EEEE, §60.2934(a))
25. If the OSWI unit continues to meet the emission limitation for the pollutant, you may choose to conduct performance tests for that pollutant every 3rd year, but each test must be within 36 months of the previous performance test. (Reference Regulation 6. Part A, Subpart EEEE, §60.2934(b))
26. If a performance test shows a deviation from an emission limitation for any pollutant, you must conduct annual performance tests for that pollutant until three consecutive annual performance tests for that pollutant all show compliance. (Reference Regulation 6. Part A, Subpart EEEE, §60.2934(c))

MONITORING REQUIREMENTS

27. The owner or operator shall install, calibrate, maintain, and operate continuous emission monitoring systems for carbon monoxide and for oxygen. Oxygen concentration shall be monitored at each location where carbon monoxide is monitored. (Reference Regulation 6. Part A, Subpart EEEE, §60.2939(a)).
28. The owner or operator shall continuously monitor carbon monoxide emissions to determine compliance with the carbon monoxide emissions limitation. Twelve-hour rolling average values are used to determine compliance. A 12-hour rolling average value above the carbon monoxide emission limit in table 1 of this subpart constitutes a deviation from the emission limitation. . (Reference Regulation 6. Part A, Subpart EEEE, §60.2932(b)).
29. The owner or operator shall continuously monitor the operating parameters specified in §60.2916 or established under §60.2917. Three-hour rolling average values are used to determine compliance with the operating limits unless a different averaging period is established under §60.2917. A 3-hour rolling average value (unless a different averaging period is established under §60.2917) above the established maximum or below the established minimum operating limits constitutes a deviation from the established operating limits. Operating limits do not apply during performance tests. (Reference Regulation 6. Part A, Subpart EEEE, §60.2932(c)).

ADDITIONAL REQUIREMENTS

30. If multiple provisions apply, compliance with the less stringent provisions shall not excuse compliance with more stringent provisions.
31. The permit number and AIRS ID number shall be marked on the subject equipment for ease of identification. (Reference: Regulation No. 3, Part B, III.E.) (State only enforceable).

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32. A Revised Air Pollutant Emission Notice (APEN) shall be filed: (Reference: Regulation No. 3, Part A, Section II.C.)

a. Annually whenever a significant increase in emissions occurs as follows:

For any criteria pollutant:

For sources emitting **less than 100 tons per year**, a change in actual emissions of five tons per year or more, above the level reported on the last APEN submitted; or

For volatile organic compounds (VOC) and nitrogen oxide (NO_x) sources in an ozone non-attainment area emitting **less than 100 tons of VOC or nitrogen oxide per year**, a change in actual emissions of one ton per year or more or five percent, whichever is greater, above the level reported on the last APEN submitted; or

For sources emitting **100 tons per year or more of a criteria pollutant**, a change in actual emissions of five percent or 50 tons per year or more, whichever is less, above the level reported on the last APEN submitted; or

For sources emitting **any amount of lead**, a change in actual emissions, above the level reported on the last APEN submitted, of fifty (50) pounds of lead

For any non-criteria reportable pollutant:

If the emissions increase by 50% or five (5) tons per year, whichever is less, above the level reported on the last APEN submitted to the Division.

b. Whenever there is a change in the owner or operator of any facility, process, or activity; or

c. Whenever new control equipment is installed, or whenever a different type of control equipment replaces an existing type of control equipment; or

d. Whenever a permit limitation must be modified; or

e. No later than 30 days before the existing APEN expires.

33. The requirements of Colorado Regulation No. 3, Part D shall apply at such time that any stationary source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation that was established after August 7, 1980, on the capacity of the source or modification to otherwise emit a pollutant such as a restriction on hours of operation (Colorado Regulation No. 3, Part D, Section V.A.7.B).

With respect to this Condition, Part D requirements may apply to future modifications if emission limits are modified to equal or exceed the following threshold levels:

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AIRS Point	Equipment Description	Pollutant	Emissions - tons per year	
			Threshold	current permit limit
010	Dryer	Particulate	250	5.3
		VOC	100	2.4
011	Pellet cooler	Particulate	250	0.53
012	Synthesis gas generator, TOC and scrubber	NOx	100	3.72
		SO2	250	0.16
		VOC	100	3.0
		CO	250	0.88
		Particulate	250	0.52
013	Engine/Generator	Particulate	250	0.2
		NOx	100	5.4
		SO2	250	0.14
		VOC	100	3.75
		CO	250	10.7

34. This source is subject to the provisions of Regulation No. 3, Part C, Operating Permits (Title V of the 1990 Federal Clean Air Act Amendments). The application for the Operating Permit is due within one year of commencement of operation of the Thermal oxidizer control. (Note the Title V permit is a requirement of NSPS Subpart EEEE (OSWI) §60.2966)

GENERAL TERMS AND CONDITIONS:

35. This permit and any attachments must be retained and made available for inspection upon request. The permit may be reissued to a new owner by the Division as provided in Regulation No. 3, Part B, Section II.B upon a request for transfer of ownership and the submittal of a revised APEN and the required fee.
36. If this permit specifically states that final approval has been granted, then the remainder of this condition is not applicable. Otherwise, the issuance of this construction permit is considered initial approval and does not provide "final" approval for this activity or operation of this source. Final approval of the permit must be secured from the APCD in writing in accordance with the provisions of 25-7-114.5(12)(a) C.R.S. and AQCC Regulation No. 3, Part B, Section III.G. Final approval cannot be granted until the operation or activity commences and has been verified by the APCD as conforming in all respects with the conditions of the permit. Once self-certification of all points has been reviewed and approved by the Division, it will provide written documentation of such final approval. **Details for obtaining final approval to operate are located in the**

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Requirements to Self-Certify for Final Approval section of this permit. The operator shall retain the permit final approval letter issued by the Division after completion of self-certification with the most current construction permit.

37. This permit is issued in reliance upon the accuracy and completeness of information supplied by the applicant and is conditioned upon conduct of the activity, or construction, installation and operation of the source, in accordance with this information and with representations made by the applicant or applicant's agents. It is valid only for the equipment and operations or activity specifically identified on the permit.



Michael Harris, P. E.
Permit Review Engineer



R K Hancock III, P.E.
Construction Permits Unit Leader

Permit History

Issuance	Date	Description
Initial Approval	This Issuance	Issued to Denver Zoological Foundation

Notes to Permit Holder (as of date of permit issuance):

- 1) The production or raw material processing limits and emission limits contained in this permit are based on the production/processing rates requested in the permit application. These limits may be revised upon request of the permittee providing there is no exceedence of any specific emission control regulation or any ambient air quality standard. A revised air pollution emission notice (APEN) and application form must be submitted with a request for a permit revision.
- 2) This source is subject to the Common Provisions Regulation Part II, Subpart E, Affirmative Defense Provision for Excess Emissions During Malfunctions. The permittee shall notify the Division of any malfunction condition which causes a violation of any emission limit or limits stated in this permit as soon as possible, but no later than noon of the next working day, followed by written notice to the Division addressing all of the criteria set forth in Part II.E.1. of the Common Provisions Regulation. See: <https://www.colorado.gov/pacific/cdphe/aqcc-regs>.
- 3) The following emissions of non-criteria reportable air pollutants (NCRPs) are estimated based upon the process limits as indicated in this permit. This information is listed to inform the operator of the Division's analysis of the specific compounds emitted if the source(s) operate at the permitted limitations.

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AIRS Point	Pollutant	CAS #	Uncontrolled Emission Rate (lb/yr) (1)	Are the emissions reportable? (1)	Controlled Emission Rate (lb/yr) (1)
012	Hydrogen Chloride	7647010	17,000	YES	364
013	Hydrogen Chloride	7647010	747	YES	747
013	Formaldehyde	50000	1600	YES	800
013	Acetaldehyde	75070	200	NO	100
013	Acrolein	107028	200	NO	100
013	Benzene	71432	200	NO	200

(1) Emissions of NCRPs are reportable if the uncontrolled emission exceeds 250 lb per year.

- 4) The emission levels contained in this permit are based on the following emission factors:

Point 010: Dryer and Micro Air Filter/Cyclone

CAS	Pollutant	Emission Factors - Uncontrolled		Emission Factors - Controlled*	
		lb/hr	Source	lb/hr	Source
	PM10/PM2.5	12.1	Eng calculation	1.21	testing
	VOC	0.55	Eng calculation	0.548	testing

Point 011: Pellet cooler

CAS	Pollutant	Emission Factors - Uncontrolled		Emission Factors - Controlled*	
		lb/hr	Source	lb/hr	Source
	PM10/PM2.5	1.2	Mfr + 25% buffer	0.12	Mfr + 25% buffer

Point 012: Synthesis gas generator, TOC/scrubber

CAS	Pollutant	Emission Limitations NSPS EEEE Table 1 Limit	Annual Emissions Tons per year (1)
7440-43-9	Cadmium	18 ug/m3	3.15e-4
630-09-0	CO	40 ppm	0.88
-----	Dioxin/Furans	33 ng/m3	5.79e-7

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CAS	Pollutant	Emission Limitations NSPS EEEE Table 1 Limit	Annual Emissions Tons per year (1)
7647-01-0	HCl	15 ppm	0.43
7439-92-1	Pb	226 ug/m ³	3.96e-3
7439-97-6	Hg	74 ug/m ³	1.30e-3
	Opacity	10%	-----
	NO _x	103 ppm	3.71
	PM	0.013 grains/scf	0.52
	SO ₂	3.1 ppm	0.16

(1) TOC throughput 64,000 scf per hour and 8784 hours per year

Point 013: Syn gas generator and NG Engine + NSCR

CAS	Pollutant	Emission Standards	
		gm/hp-hr	
	NO _x	2	NSPS JJJJ Table 1
	CO	5	NSPS JJJJ Table 1
	VOC	1	NSPS JJJJ Table 1
		lb/MM scf	
	PM10/PM2.5	2.28	Eng calc
	NO _x (1)	616.9	Eng calc
	CO (1)	1222	Eng calc
	VOC (1)	85.68	Eng calc
	SO ₂	1.6	Eng calc
	formaldehyde	2.06 e-2	AP 42
	acetaldehyde	2.76 e-3	AP 42
	acrolein	2.78 e-3	AP 42

NSCR = 90% control efficiency for NO_x and CO and 50% for VOC
Throughput = 2,995 scf/minute

- 5) The generator engine (AIRS ID 013) is subject to 40 CFR, Part 63, Subpart ZZZZ – **National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (Federally enforceable only)**.. (See January 18, 2008 Federal Register posting – effective March 18, 2008). The January 18, 2008 amendments to include requirements for area sources and engines ≤ 500 hp located at major sources have not yet been incorporated into Colorado Air Quality Control Commission’s Regulation No. 8. A copy of the complete subpart is available on the EPA website at: <http://www.epa.gov/ttn/atw/rice/ricepg.html>. All initial notifications, compliance demonstrations, and required documentation should be submitted directly to U.S. EPA Region 8 and copies sent to the Colorado Air Pollution Control Division

Note that as per 40 CFR 63.6590(c)(1), new or reconstructed stationary RICE located at an

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area source, meet the requirements of Subpart ZZZZ by meeting the requirements of NSPS Subpart JJJJ. No further requirements apply for such engines under Subpart ZZZZ

- 6) This engine is subject to 40 CFR, Part 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (See January 18, 2008 Federal Register posting – effective March 18, 2008). This rule has not yet been incorporated into Colorado Air Quality Control Commission’s Regulation No. 6. All initial notifications, compliance demonstrations, and required documentation should be submitted directly to U.S. EPA Region 8 and copies sent to the Colorado Air Pollution Control Division, .
- 7) In accordance with C.R.S. 25-7-114.1, each Air Pollutant Emission Notice (APEN) associated with this permit is valid for a term of five years from the date it was received by the Division. A revised APEN shall be submitted no later than 30 days before the five-year term expires. Please refer to the most recent annual fee invoice to determine the APEN expiration date for each emissions point associated with this permit. For any questions regarding a specific expiration date call the Division at (303)-692-3150.
- 8) This facility is classified as follows:

Applicable Requirement	Status
Operating Permit	Major for HCl and NSPS EEEE
NANSR	Synthetic Minor Source NOx
PSD	Synthetic Minor Source for CO

- 9) Full text of the Title 40, Protection of Environment Electronic Code of Federal Regulations can be found at the website listed below:

<http://ecfr.gpoaccess.gov/>

Part 60: Standards of Performance for New Stationary Sources		
NSPS	60.2880 – 60.2977	Subpart EEEE
NSPS	Part 60, Appendixes	Appendix A – Appendix I
MACT	63.6580-63.6675	Subpart ZZZZ

- 10) The permit holder is required to pay fees for the processing time for this permit. An invoice for these fees will be issued after the permit is issued. The permit holder shall pay the invoice within 30 days of receipt of the invoice. Failure to pay the invoice will result in revocation of this permit (Reference: Regulation No. 3, Part A, Section VI.B.)
- 11) Unless specifically stated otherwise, the general and specific conditions contained in this permit have been determined by the Division to be necessary to assure compliance with the provisions of Section 25-7-114.5(7)(a), C.R.S
- 12) Each and every condition of this permit is a material part hereof and is not severable. Any

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challenge to or appeal of a condition hereof shall constitute a rejection of the entire permit and upon such occurrence, this permit shall be deemed denied *ab initio*. This permit may be revoked at any time prior to self-certification and final authorization by the Division on grounds set forth in the Colorado Air Pollution Prevention and Control Act and regulations of the AQCC including failure to meet any express term or condition of the permit. If the Division denies a permit, conditions imposed upon a permit are contested by the applicant, or the Division revokes a permit, the applicant or owner or operator of a source may request a hearing before the AQCC for review of the Division's action

- 13) Section 25-7-114.7(2)(a), C.R.S. requires that all sources required to file an Air Pollution Emission Notice (APEN) must **pay an annual fee** to cover the costs of inspections and administration. If a source or activity is to be discontinued, the owner must notify the Division in writing requesting a cancellation of the permit. Upon notification, annual fee billing will terminate
- 14) Violation of the terms of a permit or of the provisions of the Colorado Air Pollution Prevention and Control Act or the regulations of the AQCC may result in administrative, civil or criminal enforcement actions under Sections 25-7-115 (enforcement), -121 (injunctions), -122 (civil penalties), -122.1 (criminal penalties), C.R.S.