

**TECHNICAL REVIEW AND EVALUATION
FOR
YUMA COGENERATION ASSOCIATES
AIR QUALITY PERMIT NO. 51193**

I. COMPANY INFORMATION

Yuma Cogeneration Associates (YCA) owns and operates a 55 MW (nominal) combined cycle gas turbine cogeneration facility in Yuma, AZ. The facility is located at 280 North 27th Drive, Yuma, AZ. YCA is a major source for emissions of nitrogen oxide (NO_x), carbon monoxide (CO), and sulfur dioxide (SO₂).

A. Company Information

Facility Name: Yuma Cogeneration Associates
Mailing Address: 280 North 27th Drive, Yuma, AZ 85364
Facility Address: 280 North 27th Drive, Yuma, AZ 85364

B. Attainment Classification

This source is located in a non-attainment area for particulate matter below 10 micron size (PM₁₀). The area is designated attainment or unclassified for all other criteria pollutants.

C. Learning Sites Evaluation

In accordance with ADEQ's Environmental Permits and Approvals near Learning Sites Policy, the Department conducted an evaluation to determine if any nearby learning sites would be adversely impacted by the facility. Learning sites consist of all existing public schools, charter schools and private schools the K-12 level, and all planned sites for schools approved by the Arizona School Facilities Board. The learning sites policy was established to ensure that the protection of children at learning sites is considered before a permit approval is issued by ADEQ.

The Department identified eleven learning sites within a two mile radius of the YCA's combined cycle gas turbine cogeneration facility, located at 280 North 27th Drive, Yuma, AZ 85364. The impacted schools are Immaculate Conception Elementary, Salida Del Sol Elementary, George Washington Carver Elementary, Mary E Post Elementary, O C Johnson, Pecan Grove Elementary, Roosevelt, Fourth Avenue Junior High, Rancho Viejo Elementary, Ronald Reagan Fundamental, and Yuma high School.

The Department has reviewed the emission sources at the facility and has determined that the operation of the facility will not adversely affect the learning sites.

II. PROCESS DESCRIPTION

YCA's main operation consists of generating electricity for sale to San Diego Gas & Electric. YCA also provides low-pressure steam and intermediate-pressure steam to an industrial customer in the vicinity. The maximum process rates at YCA are summarized in Table 1.

Table 1: Maximum Process Rates

Unit	Capacity
GE Frame 6 gas turbine	36.7 MW
Condensing steam turbine generator	18.3 MW
Duct Burner	45 MMBtu/hr
Auxiliary Boiler	20 MMBtu/hr
Cooling Tower	18,000 gpm
Fuel oil storage tank	525,000 gallons

The General Electric Frame 6 turbine is fired by natural gas containing less than 0.8% sulfur by weight and operates all through the year. Arrangement for using #2 fuel oil is available in the unlikely event of a curtailment of the natural gas supply. To date, from the start of operations of power generation, there has been no need to use #2 fuel oil.

A Heat Recovery Steam Generator (HRSG) uses waste heat from the gas turbine exhaust to generate -high, -intermediate, and -low pressure steam. High-pressure steam from HRSG is sent to the steam turbine generator, which generates additional electricity. Low-pressure steam from the HRSG is either condensed and returned to the HRSG or is sent to the nearby industrial customer for process heating. Intermediate-pressure steam from the HRSG is also sent to the industrial customer for process heating.

A gas-fired duct burner, fueled by natural gas, increases the temperature of the combustion turbine's exhaust thereby increasing the efficiency of steam generation in the HRSG. One 20 million Btu/hour gas fired standby boiler generates intermediate-pressure steam for the industrial customer in the event of shut down of the gas turbine.

The gas turbine and duct burner emissions along with the combustion products are exhausted into the atmosphere through an 85-foot high stack. A forced air draft cooling tower is used to complete the steam generator/condenser closed cycle by rejecting waste heat from the steam condenser to the atmosphere.

III. EMISSIONS

YCA has a potential to emit significant amounts of criteria pollutants including NO_x, CO, and SO₂.

There are two scenarios of operation. The gas turbine is designed to use natural gas or #2 fuel. The duct burner and the auxiliary boiler use only natural gas. Facility wide emissions as limited by the permit, from the YCA using natural gas or #2 fuel as the fuel are summarized in Table 2 and Table 3 below.

Table 2: Facility wide Emissions with Gas Turbine using Natural Gas

Item	NO _x	CO	SO ₂	VOC	PM	PM ₁₀	PM _{2.5}	HAPs
	Tons per year							
Turbine	230.00	188.34	2.19	21.90	13.36	13.36	13.36	2.26
Duct burner		16.34	0.12	1.07	1.48	1.48	1.48	0.36
Boiler	12.10	7.26	0.05	0.48	0.66	0.66	0.66	0.16
Cooling Tower						0.15	0.15	
TOTAL	242.10	211.94	2.36	23.45	15.50	15.65	15.65	2.78

Table 3: Facility wide Emissions with Gas Turbine using Fuel Oil

Item	NO _x	CO	SO ₂	VOC	PM	PM ₁₀	PM _{2.5}	HAPs
	Tons per year							
Turbine	230.00	48.18	109.5	21.90	74.46	74.46	74.46	2.26
Duct burner		16.34	0.12	1.07	1.48	1.48	1.48	0.36
Boiler	12.10	7.26	0.05	0.48	0.66	0.66	0.66	0.16
Cooling Tower	-	-	-	-	-	0.15	0.15	-
TOTAL	242.10	71.78	109.7	23.45	76.59	76.74	76.74	2.78

It should be noted that the facility was permitted as a PSD minor source in 1991 because they accepted limitations to stay below 250 tpy for NO_x and their PTE for other criteria pollutants was below 250 tpy. At that time, there was extensive national debate and uncertainty about the PSD threshold for cogeneration plants. ADEQ made the determination that YCA was a non-categorical source with a PSD threshold of 250 tpy. Several other states made similar determinations during that time.

At the time of the last permitting action, based on EPA guidance and recent ADEQ permitting actions, the Department determined that cogeneration plants (like YCA) with an input heat capacity greater than 250 million Btu/hour are fossil-fuel fired steam electric plants and should be identified as categorical sources with a 100 tpy threshold for PSD purposes. In light of this, YCA will be considered as a PSD major source for NO_x, CO, and SO₂. Any future modification to the facility which will cause a net emissions increase above significant levels for these pollutants will trigger PSD review.

IV. COMPLIANCE HISTORY

Inspections are being regularly conducted at the YCA to ensure compliance with its applicable permit conditions. One Notice of Opportunity to Correct Deficiencies was issued to the source on July 19, 2007 for failure to maintain a log of all emissions related maintenance activities performed at the facility. The facility returned to compliance on September 11, 2007, and the NOC was closed. No further cases or violations have been developed as a result of inspections.

V. APPLICABLE REGULATIONS

The Permittee has identified the applicable regulations that apply to each unit in its permit application. Table 4 summarizes the findings of the Department with respect to applicability or non-applicability of applicable regulations that apply to each unit.

Table 4: Applicable Regulations

Unit ID	Start-up date	Control Equipment	Applicable Regulations	Verification
GE Frame 6 gas turbine 37.3 MW	3/10/1994	Steam Injection System	New Source Performance Standards (NSPS) Subpart GG National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart YYYYY	Subpart GG is applicable to stationary gas turbines that started after October 3, 1977, and with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired. The unit commenced construction after October 3, 1977 and is greater than 10 MMBtu/hr capacity. Therefore NSPS Subpart GG is applicable. Subpart YYYYY is applicable to stationary combustion turbines located at a major source of HAPs emissions. YCA is not a major source of HAPs and therefore NESHAP Subpart YYYYY is not applicable.
Duct Burner 45 MMBtu/hr Auxiliary Boiler 20 MMBtu/hr	1998 1993	None	NSPS Subpart Dc	This subpart is applicable to steam generating units that commenced construction, modification, or reconstruction after June 9, 1989, and have heat capacity between 10 and 100 MMBtu/hr. The Duct burner and auxiliary boiler, were manufactured in the year 1998 and 1993, have heat capacities fall in the range of 10 to 100 MMbtu/hr Therefore NSPS Subpart Dc is applicable.
Reciprocating Internal Combustion Engine	1993	None	A.A.C. R18-2-719	These regulations are applicable to internal combustion engines. Applicability date for NSPS Subpart IIII for compression ignition engines is April 11, 2006. NSPS Subpart IIII is not applicable for this engine.

Unit ID	Start-up date	Control Equipment	Applicable Regulations	Verification
			National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart ZZZZ	YCA is an area source for HAPs. Since the construction of the RICE commenced before June 12, 2006, this is classified as an 'existing'. {40 CFR 63.6590 (a) (1) (iii)}. Since this is an emergency engine, requirements of NESHAP Subpart ZZZZ are applicable.
Cooling Tower		None	A.A.C. R18-2-702.B.1 R18-2-730.A.1 R18-2-730.D R18-2-730.G	These regulations are applicable to all unspecified sources.
Fuel Oil Storage Tank	1993	None	A.A.C. R18-2-730.D R18-2-730.G	The fuel oil storage tank is potentially subject to Subpart Kb because its capacity is greater than 40 cubic meters and it was constructed after July 23, 1984. However, 40 CFR 60.110b(c) exempts the tank from Subpart A and Kb because the maximum true vapor pressure is less than 3.5 kPa (0.11 kPa as shown in Section III.G). A.A.C. R18-2-710 is not applicable because fuel oil #2 is not a petroleum liquid as defined in A.A.C. R18-2-701.21.
Mobile Sources	Not Applicable	Control Measures	A.A.C. R 18-2 Article 8	These regulations are applicable to all mobile sources.
Fugitive Sources	Not Applicable	Control Measures	A.A.C. R 18-2 Article 6	These regulations are applicable to non point sources.
Abrasive Blasting	Not Applicable	Wet blasting, enclosures or equivalent approved by Director	A.A.C. R-18-2-726	This standard is applicable to any abrasive blasting operation.
Spray painting operations	-	Enclosed area	A.A.C. R-18-2-727	This standard is applicable to any spray painting operation.
Demolition/renovation operations	-		A.A.C. R18-2-1101.A.8, Subpart M	This standard is applicable to any asbestos related demolition or renovation operations.

VI. PREVIOUS PERMIT AND PERMIT CONDITIONS

A. Previous Permits

Operating permit #31433 was issued to YCA on June 6, 2005 for the operation of a 55 MW (nominal) combined cycle gas turbine Cogeneration facility in Yuma. There were no revisions to the operating permit.

B. Previous Permit Conditions

Table 5: Previous Permit Conditions

Condition No.	Determination				Comments
	Revise	Keep	Delete	Stream-line	
Att. "A"	x				General Provisions- Revised to represent most recent permitting language.
Attachment "B"					
I		x			Facility wide requirements
II.A		x			Fuel limitation only for GE Frame 6 Turbine. Fuel limitation for duct burner placed with auxiliary boiler.
II.B.1.a, b, and c		x			NO _x emission limitation for GE Frame 6 Turbine.
II.B.1.d			x		Arizona SIP requirement for nitrogen oxide emission limitation from the duct burner deleted since this is applicable to only existing units. This unit is considered as a 'new' unit under both the Arizona SIP and current state regulations.
II.B.2		x			Air Pollution Control equipment for GE Frame 6 turbine.
II.B.3.a, b, d, and e		x			Monitoring, reporting, and recordkeeping requirements for GE Frame 6 turbine renumbered as II.B.3.a, b, c, and d.
II.B.3.c		x			Requirement of keeping record of the natural gas burned in duct burner are covered with auxiliary boiler.

Condition No.	Determination				Comments
	Revise	Keep	Delete	Stream-line	
II.B.4	x				Permit shield for GE Frame 6 turbine revised because of deleting Arizona SIP requirements.
II.C	x				Sulfur dioxide emission from GE Frame 6 turbine has been revised by removing the citation of operating permit #1000103.
II.D		x			Carbon monoxide requirements for GE Frame 6 turbine.
II.E			x		Particulate matter emission limitation requirements for the duct burner deleted since this is applicable to only existing units. This unit is considered as a 'new' unit under both the Arizona SIP and current state regulations.
III.A	x				Fuel limitation requirements for auxiliary boiler revised to the extent that this includes duct burner as well.
III.B			x		Arizona SIP requirement for nitrogen oxide emission limitation from the auxiliary boiler deleted since this is applicable to only existing units. This unit is considered as a 'new' unit under both the Arizona SIP and current state regulations.
IV		x			Requirements for Cooling Tower
V	x				Non Point Source requirements changed to Fugitive Dust Requirements. Most recent language has been used in the renewal permit.
VI	x				Requirements for Other Periodic Activities renumbered as Condition VI and most recent language has been used in the renewal permit.
VII	x				Requirement for Mobile Sources renumbered as Condition VII and most recent language has been used in the renewal permit.

VII. EMISSION LIMITS AND PERIODIC MONITORING

A. GE Frame 6 Turbine

NO_x: The unit is subject to the NO_x standard of 40 CFR Subpart GG. The emission limit calculated by the equation is 98 ppm. However, the unit will be limited to the guaranteed performance emission rate provided by the manufacturer. This limit is 25 parts per million, at 15% oxygen.

Monitoring requirements include recording on a monthly basis the amount of NO_x emissions in tons per year (on a twelve month rolling total basis) and the amount of fuel fired. This condition will ensure that NO_x emissions are below 230 tpy. The facility has CEMS for monitoring of NO_x emissions.

SO₂: 40 CFR Subpart GG stipulates combustion of fuels containing sulfur below 0.8% by weight in the gas turbine. The facility has further accepted the option of burning fuel oil containing less than 0.05 percent sulfur.

Monitoring for the sulfur content requirement includes maintaining the contractual agreement with the vendor limiting the sulfur content of the fuel. In addition, the Permittee must notify the Director within 30 days of any changes to the contractual agreement.

B. Auxiliary Boiler & Duct Burner

The NSPS standards of 40 CFR 60 Subpart Dc apply to this duct burner and auxiliary boiler, because the heat rate of 45 and 20 MMBtu/hr is greater than 10 MMBtu/hr but less than 100 MMBtu/hr, and these were installed after June 9, 1989. Since these equipment burn only natural gas, the only applicable requirement from this subpart is 40 CFR 60.48.c(g) requiring them to keep records of the amounts of the natural gas combusted.

The duct burner and the auxiliary boiler were, in Operating Permit #31433, subject to emission limitations for PM and NO_x from the Arizona SIP. Arizona SIP requirements for PM and NO_x are applicable to 'existing sources' as defined in the SIP document. The auxiliary boiler and duct burner were installed in the year 1993 and 1998 respectively. These are considered as 'new' units under both the Arizona SIP and current state regulations.

VIII. TESTING

This operating permit does not contain emission limitations for CO. Performance testing for CO will be required if CO emission exceeds 100 tons per year, in accordance with Arizona Testing Manual. The performance test will be conducted within 180 days after the rolling twelve month total hours of operation exceeds 4,650 hours.

The number of hours after which 100 tons per year of CO is emitted is calculated as follows:

$$\text{Number of hours: } (100 \text{ tpy} * 8,760 \text{ hrs/yr}) / 188.34 \text{ tpy} = 4,650 \text{ hrs/yr}$$

IX. CONTINUOUS EMISSIONS MONITORS (CEMS)

The NO_x CEMS at YCA are considered “Compliance CEMS” in accordance with the installation permit. Therefore, excess emissions indicated by the CEM system shall be considered violations of the applicable emission limit.

X. COMPLIANCE ASSURANCE MONITORING

CAM applies only to emission units that emit more than 100 ton per year, are equipped with air pollution controls, and have an emission limit. This facility has three pollutants namely, NO_x, CO, and SO₂ that have potential to emit above 100 ton per year. No controls are installed for controlling CO and SO₂. Therefore CAM does not apply to CO and SO₂.

The facility utilizes steam injection systems for NO_x emission control on the GE Frame 6 turbine, making CAM potentially applicable to this pollutant-specific emission unit. The source utilizes CEMS for continuous emission monitoring for the NO_x emission limit. In accordance with 40 CFR 64.2(b)(1)(vi), a source is exempt from CAM if a continuous compliance determination method is specified in the permit. Consequently the GE Frame 6 turbine is exempt from CAM requirements for NO_x.

XI. INSIGNIFICANT ACTIVITIES

The following activities were proposed to be insignificant in the permit application.

S. No.	Activity	Determination	Comment
1.	Piping of natural gas	Yes	A.A.C. R18-2-101.57.j
2.	Water treatment and cooling systems for process water	Yes	A.A.C. R18-2-101.57.j
3	Storage of sodium hydroxide (50%)	Yes	A.A.C. R18-2-101.57.j
4	Storage of sulfuric acid	Yes	A.A.C. R18-2-101.57.j
5	Storage of sodium hypochlorite	Yes	A.A.C. R18-2-101.57.j
6	Storage of Nalco 8103 coagulant (Polyquaternary Amine)	Yes	A.A.C. R18-2-101.57.j
7	Storage of Nalco 356 Corrosion Inhibitor (Cyclohexylamine & Morpholine)	Yes	A.A.C. R18-2-101.57.j
8	Storage of Nalco 7208 feed water treatment Tri-Sodium Phosphate	Yes	A.A.C. R18-2-101.57.j
9	Storage of Nalco 7210 feed water treatment Di-	Yes	A.A.C. R18-2-

S. No.	Activity	Determination	Comment
	Sodium Phosphate		101.57.j
10	Eliminox oxygen scavenger (modified amino compounds)	Yes	A.A.C. R18-2-101.57.j
11	Nalco 90005 microbiocide	Yes	A.A.C. R18-2-101.57.j
12	Nalco 73550 Bio-Detergent	Yes	A.A.C. R18-2-101.57.j
13	General office activities and maintenance	Yes	A.A.C. R18-2-101.57.a
14	Restroom facilities and associated cleanup operations	Yes	A.A.C. R18-2-101.57.a
15	Air conditioning in office	Yes	A.A.C. R18-2-101.57.j
16	Maintenance & repair of emission units & equipment	Yes	A.A.C. R18-2-101.57.j
17	Circuit breakers	Yes	A.A.C. R18-2-101.57.j
18	IC engine driven fire water pumps for emergency service	No	Applicable requirements in A.A.C. R18-2-719
19	Nalco 7384 Corrosion Inhibitor	Yes	A.A.C. R18-2-101.57.j
20	Nalco N-1801 (corrosion inhibitor)	Yes	A.A.C. R18-2-101.57.j
21.	Nalco PC-191 Anti-Scalant	Yes	A.A.C. R18-2-101.57.j
22	Nalco 73199 (corrosion inhibitor)	Yes	A.A.C. R18-2-101.57.j

XII. LIST OF ABBREVIATIONS

A.A.C.Arizona Administrative Code
ADEQ..... Arizona Department of Environmental Quality
CAM.....Compliance Assurance Monitoring
CEMS Continuous Emission Monitoring system

CFR	Code of Federal regulations
CO	Carbon Monoxide
EPA	Environmental Protection Agency
HRSG	Heat Recovery Steam Generator
lb.....	Pound
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	Nitrogen Oxide
NSPS.....	New Source Performance Standards
PM	Particulate Matter
PSD.....	Prevention of Significant Deterioration
SO ₂	Sulfur Dioxide
TPY	Tons per Year
VOC	Volatile Organic Compound
YCA	Yuma Cogeneration Associates