Northrop Grumman
500 – 800 N. Douglas St.
El Segundo, CA 90245
ID No.: 18294

EQUIPMENT DESCRIPTION:

Equipment	ID No.	Connected To	Source Type/ Monitoring Unit	Emissions	Conditions
Process 4: EXTERNAL COMBUSTION					
System 1: BOILER, BLDG. WC 905					
BOILER, NATURAL GAS, SUPERIOR, MODEL SUPER SEMINOLE, WATERTUBE, WITH LOW NOX BURNER, 4.2 MMBTU/HR WITH BURNER, NATURAL GAS, JOHNSON, MODEL NOXMATIC – A TYPE, WITH LOW NOX BURNER, 4.2 MMBTU/HR A/N 513511	D232		NOX: Process Unit	CO: 2000 PPMV [RULE 407], CO: 400 PPMV [RULE 1146.1], CO: 100 PPMV [RULE 1303(a)(1)], NOX: 9 PPMV [RULE 2005, 2012], PM: 0.1 GRAINS/SCF [RULE 409]	D28.4 D332.2

A/N 513510: Title V/RECLAIM facility permit revision

CONDITIONS:

D28.4: THE OPERATOR SHALL CONDUCT SOURCE TEST(S) IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

THE TEST SHALL BE CONDUCTED WITHIN 90 DAYS AFTER ACHIEVING MAXIMUM PRODUCTION RATE, BUT NO LATER THAN 180 DAYS AFTER INITIAL START-UP.

THE TEST SHALL BE CONDUCTED PURSUANT TO A SOURCE TEST PROTOCOL THAT SHALL BE SUBMITTED TO THE DISTRICT NO LATER THAN 60 DAYS AFTER THE INITIAL START-UP OF THIS EQUIPMENT UNLESS OTHERWISE APPROVED BY THE DISTRICT. THE PROTOCOL SHALL BE APPROVED IN WRITING BY THE DISTRICT BEFORE THE TEST COMMENCES, INCLUDE COMPLETED DISTRICT FORMS ST-1 AND ST-2, IDENTIFY THE TESTING LAB, INCLUDE A STATEMENT FROM THE LAB CERTIFYING IT MEETS DISTRICT RULE 304(K) AND INCLUDE A DESCRIPTION OF THE SAMPLING AND ANALYTICAL PROCEDURES TO BE USED.

THE TEST SHALL BE CONDUCTED TO DETERMINE OXIDES OF NITROGEN, CARBON MONOXIDE, OXYGEN CONTENT, MOISTURE CONTENT, FLOW RATE AND TEMPERATURE AT THE EXHAUST OF THE BOILER.

THE DISTRICT SHALL BE NOTIFIED OF THE DATE AND TIME OF THE TEST AT LEAST 14 DAYS PRIOR TO THE TEST.

THE TEST SHALL BE CONDUCTED BY A TESTING LAB CERTIFIED BY THE CALIFORNIA AIR RESOURCES BOARD IN THE REQUIRED TEST METHODS FOR CRITERIA POLLUTANTS TO BE MEASURED AND IN COMPLIANCE WITH DISTRICT RULE 304 (NO CONFLICT OF INTEREST).

THE TEST SHALL BE CONDUCTED USING SAMPLING FACILITIES THAT COMPLY WITH THE DISTRICT GUIDELINES FOR CONSTRUCTION OF SAMPLING AND TESTING FACILITIES, PURSUANT TO RULE 217.

D332.2: THE OPERATOR SHALL DETERMINE COMPLIANCE WITH THE CO EMISSION LIMIT(S) BY CONDUCTING A TEST AT LEAST ONCE EVERY FIVE YEARS USING A PORTABLE ANALYZER AND AQMD-APPROVED TEST METHOD OR, IF NOT AVAILABLE, A NON-AQMD APPROVED TEST METHOD. THE TEST SHALL BE CONDUCTED WHEN THE EQUIPMENT IS OPERATING UNDER NORMAL CONDITIONS TO DEMONSTRATE COMPLIANCE WITH RULE 1146.1 CONCENTRATION LIMIT. THE OPERATOR SHALL COMPLY WITH ALL GENERAL TESTING, REPORTING, AND RECORDKEEPING REQUIREMENTS IN SECTIONS E AND K OF THIS PERMIT.

BACKGROUND:

Northrop Grumman submitted application no. 513511 for a permit to construct a new water-tube boiler. The boiler will replace an existing boiler (device no. D36). The new boiler fires only on natural gas and is fitted with a low-NOx burner. Once the new boiler is constructed and fully operational, D36 will be inactivated.

Northrop Grumman is a Title V Group A facility. A Title V renewal permit was issued to this facility on July 8, 2010. Northrop Grumman has proposed to revise their Title V renewal permit with application no. 513510. This permit revision is considered as a "de minimis significant permit revision" to the Title V renewal permit, as described in the Regulation XXX evaluation.

PROCESS DESCRIPTION:

Northrop Grumman is an aircraft manufacturing facility. They primarily design and build the F/A-18's center and aft fuselages. They will also be involved in the future production of the new F-35 Joint Strike Fighter. The new F-35 Joint Strike Fighter is the next generation strike fighter that has been designed using cutting-edge technologies. It will replace a wide range of aging fighter and strike aircraft, such as the F16, F/A18, A-6 and A-10, used by the U.S. Air Force, Navy, Marine Corps and allied defense forces worldwide.

The boiler will be used to supply steam to various heating and humidity control units in Building 905. The boiler will operate a full schedule of 24 hrs/day, 7 days/wk and 52 wks/yr.

EMISSION CALCULATIONS:

New Emissions:
NOx and CO emission estimates are based on 9 ppmv and 100 ppmv, respectively. ROG, PM10 and SOx emissions are based on AER default emission factors.

Heat input: 4,200,000 Btu/hr
Gross heating value: 1,050 Btu/ft^3
Max daily gas usage = 4,200,000 Btu/hr x 1 ft^3/1,050 Btu = 4,000 ft^3/hr

NOx concentration = 9 ppmv
NOx emission factor = 9 ppmv x 1.28 (conversion factor) = 11.52 lbs/$MMft^3$

NOx hourly emissions = 4,000 ft^3/hr x 11.52 lb/$MMft^3$ x 1/1,000,000 = 0.046 lb/hr
NOx daily emissions = 0.046 x 24 hr/day = 1.1 lb/day

PM10 emission factor = 7.6 lb/$MMft^3$
PM10 hourly emissions = 4,000 ft^3/hr x 7.6 lb/$MMft^3$ x 1/1,000,000 = 0.03 lb/hr
PM10 daily emissions = 0.03 x 24 hr/day = 0.7 lb/day

ROG emission factor = 5.5 lb/$MMft^3$
ROG hourly emissions = 4,000 ft^3/hr x 5.5 lb/$MMft^3$ x 1/1,000,000 = 0.022 lb/hr
ROG daily emissions = 0.022 x 24 hr/day = 0.53 lb/day

SOx emission factor = 0.6 lb/$MMft^3$
SOx hourly emissions = 4,000 ft^3/hr * 0.6 lb/$MMft^3$ x 1/1,000,000 = 0.002 lb/hr
SOx daily emissions = 0.002 x24 hr/day = 0.05 lb/day

CO concentration = 100 ppmv
Convert CO ppm to lb/hr and then to lb/$MMft^3$:

$$\text{lb/hr} = \frac{(\text{ppm})\,(\text{Btu/hr})\,(\text{MW})\,(\text{N})}{(\text{HV})\,(1 \times 10^6)}$$

HV = Higher heating value of natural gas (23,440)
MW = Molecular weight
N = Moles of 3% O_2 per lb of natural gas (0.618)

$$\text{lb/hr} = \frac{(100)\,(4.2 \times 10^6)\,(28)\,(0.618)}{(23{,}440)\,(1 \times 10^6)} = 0.31 \text{ lb/hr}$$

$$\text{lb/MMft}^3 = \frac{(\text{lb/hr})\,(1 \times 10^6)\,(\text{hr/day})}{(\text{ft}^3/\text{day})}$$

$lb/MMft^3 = \frac{(0.31)\ (1x10^6)\ (24)}{(4{,}000\ ft^3/hr)(24\ hr/day)} = 77.5\ lb/MMft^3$

CO hourly emissions = 4,000 ft^3/hr x 77.5 lb/$MMft^3$ x 1/1,000,000 = 0.31 lb/hr
CO daily emissions = 0.31 x 24 hr/day = 7.4 lb/day

	NOx	CO	PM10	ROG	SOx
Hourly	0.046	0.31	0.03	0.022	0.002
Daily	1.1	7.4	0.7	0.53	0.05

Previous Emissions:
The previous boiler operating on natural gas and diesel oil. Worst-case scenario emissions were based on diesel oil. These emissions are compared with emission from the new boiler. With the new boiler, there will emission decreases with all criteria pollutants except for CO.

	NOx	CO	PM10	ROG	SOx
Hourly	0.7	0.02	0.27	0.1	2.91
Daily	16.8	0.48	6.48	2.4	69.8

Emissions Summary:

	NOx	CO	PM10	ROG	SOx
Daily	-15.7	+6.9	-5.7	-1.8	-69.7

RISK ASSESSMENT

The combustion of natural gas results in toxic air contaminant emissions. A Rule 1401 Risk Assessment was performed to determine the health risk from operating the boiler. The assessment indicates a potential cancer risk of 0.02 and 0.003 in a million at the residential and commercial receptors, respectively. The potential acute and chronic health hazard risks are both well below one. Risk assessment spreadsheets are included in the application folder.

RULE ANALYSIS:

RULE 212 (c)(1): A public notice is not required for this project since the emission source is not located within 1,000 feet from the outer boundary of a school.

RULE 212 (c)(2) & 212(g): A public notice is not required for this project since the emissions increase does not exceed any of the daily maximums as specified in Rule 212(g).

	Maximum Daily Emissions (lb/day)					
	ROG	**NO_x**	**PM_{10}**	**SO_2**	**CO**	**Pb**
Emission increase	0	0	0	0	7	0
Max Limit	**30**	**40**	**30**	**60**	**220**	**3**
Compliance Status	Yes	Yes	Yes	Yes	Yes	Yes

RULE 212(c)(3): A public notice is not required for this project since there will not be an increase in emissions of toxic air contaminants listed in Table I of Rule 1401 that will result in a cancer risk equal or greater than one in a million.

RULES 401 & 402: AQMD database has no records of visible emissions or nuisance complaints against this facility. Compliance with these requirements is expected with the proper operation of the equipment.

RULE 1146.1: The boiler is expected to operate at a CO concentration less than 400 ppmv. A source test will determine compliance.

REGULATION XIII: Though Northrop Grumman is a NOx RECLAIM facility, compliance with Reg. XIII is still required for other criteria pollutants.

RULE 1303(a): The boiler will be fitted with a low NOx burner that is designed to operate at 9 ppmv or less of NOx and 100 ppmv or less of CO. A source test will determine compliance.

RULE 1303(b)(1): Modeling for NOx, CO or PM10 is not required since the hourly emissions are less than the allowable limits.

Modeling Analysis	NOx (lb/hr)	CO (lb/hr)	PM10 (lb/hr)
Hourly Emissions	0.046	0.31	0.03
Allowable Limit	0.31	17.1	1.9

RULE 1303(b)(2): There will be an increase in CO emissions of 7 lb/day. The potential-to-emit for the facility becomes 42 lb/day. Since emissions are less than 220 lb/day, offsets are not required. There will not be an emission increase of any other criteria pollutant.

RULE 1303(b)(4): The facility is expected to be in full compliance with all applicable rules and regulations of the District.

RULES 1303(b)(5)(A) & 1303(b)(5)(D): The proposed project is exempt from CEQA according to the responses Northrop Grumman provided on Form 400-CEQA for this project. Their responses in "Review of Impacts Which May Trigger CEQA" on Form 400-CEQA were all marked "No".

RULE 1303(b)(5)(C): A modeling analysis for plume visibility is not required since the net emission increase from the proposed project does not exceed 15 ton/yr of PM10 or 40 ton/yr of NOx.

RULE 1401: There will not be a cancer risk equal or greater than one in a million or an acute or chronic health risk from the intended operation of the boiler. See above RISK ASSESSMENT section for details. Compliance is expected.

RULE 2005: Northrop Grumman is a NOx RECLAIM facility. The proposed modification will not result in NOx emissions increase.

RULE 2005(c)(1)(A): The boiler will be fitted with a low NOx burner that is designed to operate at 12 ppmv or less of NOx. A source test will determine compliance.

RULE 2005(c)(1)(B): Modeling is not required since the estimated hourly NOx emissions of 0.046 lb/hr is below the allowable limit of 0.31 lb/hr.

RULES 2005(g)(2) & 2005(g)(3): The proposed project is exempt from CEQA according to the responses Northrop Grumman provided on Form 400-CEQA for this project. Their responses in "Review of Impacts Which May Trigger CEQA" on Form 400-CEQA were all marked "No".

REGULATION XXX:

This facility is in the RECLAIM program. The proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or hazardous air pollutants (HAPs), and a "minor permit revision" for RECLAIM pollutants to the RECLAIM/Title V permit for this facility.

Non-RECLAIM Pollutants or HAPs:
Rule 3000(b)(6) defines a "de minimis significant permit revision" as any Title V permit revision where the cumulative emission increases of non-RECLAIM pollutants or HAPs from these permit revisions during the term of the permit are not greater than any of the following emission threshold levels:

Air Contaminant	Daily Maximum (lbs/day)
HAP	30
VOC	30
NOx*	40
PM_{10}	30
SOx*	60
CO	220

* Not applicable if this is a RECLAIM pollutant

To determine if a project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or HAPs, emission increases for non-RECLAIM pollutants or HAPs resulting from all permit revisions that are made after the issuance of the Title V renewal permit shall be accumulated and compared to the above threshold levels. This proposed project is the 2nd permit revision to the Title V renewal permit issued to this facility on July 8, 2010. The following table summarizes the cumulative emission increases resulting from all permit revisions since the Title V renewal permit was issued:

Revision	HAP	VOC	NOx*	PM10	SOx	CO
Previous Permit Revision Total	0	2	0	7	0	35
2nd Permit Revision: Add new boiler (device no. D232)	0	-2	-16	-6	-70	7
Cumulative Emissions Total	0	0	-16	1	-70	42
Maximum Daily	30	30	40*	30	60	220

*RECLAIM pollutant, not subject to emission accumulation requirements

Since the cumulative emission increases resulting from all permit revisions are not greater than any of the emission threshold levels, this proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or HAPs.

RECOMMENDATION

The proposed project is expected to comply with all applicable District Rules and Regulations. Since the proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants or hazardous air pollutants (HAPs), it is exempt from the public participation requirements under Rule 3006(b). A proposed permit incorporating this permit revision will be submitted to EPA for a 45-day review pursuant to Rule 3003(j). If EPA does not have any objections within the review period, a revised Title V/RECLAIM permit will be issued to this facility.