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|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 1 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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 2: BOILER, BLDG. WC 902 | | | | | |
| BOILER, NATURAL GAS, CLEAVER BROOKS, MODEL NO. 4WI700-125-15ST, FIRE TUBE, WITH LOW NOX BURNER, 5.102 MMBTU/HR WITH BURNER, NATURAL GAS, CLEAVER BROOKS, WITH LOW NOX BURNER, 5.102 MMBTU/HR A/N 526639 | D234 | | NOX: Process Unit | CO: 2000 PPMV [RULE 407], CO: 400 PPMV [RULE 1146], CO: 50 PPMV [RULE 2005], NOX: 9 PPMV [RULE 2005], PM: 0.1 GRAINS/SCF [RULE 409] | D28.4 D332.1 |

A/N 526640: 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.

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 2 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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.

D332.1: 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 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. 526639 for a permit to construct a new 5.102 MMBtu/hr fire-tube boiler. The boiler will replace an existing 5.0 MMBtu/hr boiler (device no. D74, A/N 259256). 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, D74 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. 526640. 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. This is the 5th revision since the last renewal.

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 902. The boiler will operate a full schedule of 24 hrs/day, 7 days/wk and 52 wks/yr.

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 3 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

EMISSION CALCULATIONS:

New Emissions:

NOx and CO emission estimates are based on 9 ppmv and 50 ppmv, respectively. ROG, PM10 and SOx emissions are based on AER default emission factors.

Heat input: 5,102,000 Btu/hr

Gross heating value: 1,050 Btu/ft³

Max daily gas usage = 5,102,000 Btu/hr x 1 ft³/1,050 Btu = 4,859 ft³/hr

NOx concentration = 9 ppmv

NOx emission factor = 9 ppmv x 1.28 (conversion factor) = 11.52 lbs/MMft³

NOx hourly emissions = 4,859 ft³/hr x 11.52 lb/MMft³ x 1/1,000,000 = 0.056 lb/hr

NOx daily emissions = 0.056 x 24 hr/day = 1.34 lb/day

PM10 emission factor = 7.6 lb/MMft³

PM10 hourly emissions = 4,859 ft³/hr x 7.6 lb/MMft³ x 1/1,000,000 = 0.037 lb/hr

PM10 daily emissions = 0.037 x 24 hr/day = 0.89 lb/day

ROG emission factor = 5.5 lb/MMft³

ROG hourly emissions = 4,859 ft³/hr x 5.5 lb/MMft³ x 1/1,000,000 = 0.027 lb/hr

ROG daily emissions = 0.027 x 24 hr/day = 0.65 lb/day

SOx emission factor = 0.6 lb/MMft³

SOx hourly emissions = 4,859 ft³/hr x 0.6 lb/MMft³ x 1/1,000,000 = 0.003 lb/hr

SOx daily emissions = 0.003 x 24 hr/day = 0.07 lb/day

CO concentration = 50 ppmv

Convert CO ppm to lb/hr and then to lb/MMft³:

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

HV = Higher heating value of natural gas (23,440)

MW = Molecular weight

N = Moles of 3% O₂ per lb of natural gas (0.618)

$$\text{lb/hr} = \frac{(50) (5.102 \times 10^6) (28) (0.618)}{(23,440) (1 \times 10^6)} = 0.19 \text{ lb/hr}$$

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

$$\text{lb/MMft}^3 = \frac{(0.19) (1 \times 10^6) (24)}{(4,859 \text{ ft}^3/\text{hr})(24 \text{ hr/day})} = 39.1 \text{ lb/MMft}^3$$

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 4 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

CO hourly emissions = 0.19 lb/hr

CO daily emissions = 0.19 x 24 hr/day = 4.6 lb/day

New Boiler Emissions

| | NOx | CO | PM10 | ROG | SOx |
|--------|------------|-----------|-------------|------------|------------|
| Hourly | 0.056 | 0.19 | 0.037 | 0.027 | 0.003 |
| Daily | 1.34 | 4.6 | 0.89 | 0.65 | 0.07 |

Previous Boiler Emissions:

Heat input: 5,000,000 Btu/hr

Gross heating value: 1,050 Btu/ft³

Max daily gas usage = 5,000,000 Btu/hr x 1 ft³/1,050 Btu = 4,762 ft³/hr

NOx emission factor = 47.75 lb/MMft³

NOx hourly emissions = 4,762 ft³/hr x 47.75 lb/MMft³ x 1/1,000,000 = 0.23 lb/hr

NOx daily emissions = 0.23 x 24 hr/day = 5.52 lb/day

CO emission factor = 84 lb/MMft³

CO hourly emissions = 4,762 ft³/hr x 84 lb/MMft³ x 1/1,000,000 = 0.4 lb/hr

CO daily emissions = 0.4 x 24 hr/day = 9.6 lb/day

PM10 emission factor = 7.6 lb/MMft³

PM10 hourly emissions = 4,762 ft³/hr x 7.6 lb/MMft³ x 1/1,000,000 = 0.036 lb/hr

PM10 daily emissions = 0.036 x 24 hr/day = 0.86 lb/day

ROG emission factor = 5.5 lb/MMft³

ROG hourly emissions = 4,762 ft³/hr x 5.5 lb/MMft³ x 1/1,000,000 = 0.026 lb/hr

ROG daily emissions = 0.026 x 24 hr/day = 0.62 lb/day

SOx emission factor = 0.6 lb/MMft³

SOx hourly emissions = 4,762 ft³/hr x 0.6 lb/MMft³ x 1/1,000,000 = 0.003 lb/hr

SOx daily emissions = 0.003 x 24 hr/day = 0.07 lb/day

Previous Boiler Emissions

| | NOx | CO | PM10 | ROG | SOx |
|--------|------------|-----------|-------------|------------|------------|
| Hourly | 0.23 | 0.4 | 0.036 | 0.026 | 0.003 |
| Daily | 5.52 | 9.6 | 0.86 | 0.62 | 0.07 |

Emissions Summary

| | NOx | CO | PM10 | ROG | SOx |
|---------------------|------------|-----------|-------------|------------|------------|
| Previous (lb/day) | 5.52 | 9.6 | 0.86 | 0.62 | 0.07 |
| New (lb/day) | 1.34 | 4.6 | 0.89 | 0.65 | 0.07 |
| Difference (lb/day) | -4.18 | -5.0 | 0.03 | 0.03 | 0 |

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 5 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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 new boiler. The assessment indicates a potential cancer risk of 0.0191 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): A public notice is not required for this project since the emissions increase from this facility does not exceed any of the daily maximums as specified in Rule 212(g). The facility increase will be 0.03 lb/day of PM₁₀ and ROG emissions.

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.

RULE 212(g): The proposed project will result in an emission increase from the equipment since it is new, but a public notice is not required since the emissions are below the thresholds. The following summarizes emissions from the boiler:

| | Maximum Daily Emissions (lb/day) | | | | | |
|-------------------|----------------------------------|-----------------------|------------------------|-----------------------|------------|-----------|
| | ROG | NO_x | PM₁₀ | SO₂ | CO | Pb |
| Emission increase | 0.65 | 1.34 | 0.89 | 0 | 4.60 | 0 |
| Max Limit | 30 | 40 | 30 | 60 | 220 | 3 |
| Compliance Status | Yes | Yes | Yes | Yes | Yes | Yes |

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: The boiler is expected to operate at a CO concentration less than 400 ppmv (50 ppmv expected). A source test will verify compliance.

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

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 6 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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 50 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) | PM ₁₀ (lb/hr) |
|-----------------------------------|-------------|------------|--------------------------|
| Hourly Emissions | 0.056 | 0.19 | 0.037 |
| Allowable Limit for > 5 mm Btu/hr | 0.47 | 25.9 | 2.8 |

RULE 1303(b)(2): Emission offsets are not required. There will only be a slight increase in ROG and PM₁₀ emissions of 0.03 lb/day since the new boiler has a slightly higher Btu/hr rating than the old boiler. There will a decrease in NOx and CO emissions.

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

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 verify compliance.

RULE 2005(c)(1)(B): Modeling is not required since the estimated hourly NOx emissions of 0.056 lb/hr is below the allowable limit of 0.47 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:

| | | |
|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 7 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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 |
| NO _x * | 40 |
| PM ₁₀ | 30 |
| SO _x * | 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 5th 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 | NO _x * | PM ₁₀ | SO _x | CO |
|--|-----|-----|-------------------|------------------|-----------------|-----|
| 1 st Permit Revision: change of conditions (ICEs device nos. D125 & D126), change facility condition no. F58.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 nd Permit Revision: Add new boiler (device no. D232) | 0 | -2 | -16 | -6 | -70 | 7 |
| 3 rd Permit Revision: Convert P/Cs for two baghouses C227 & C228 to P/O (move from Section H to Section D). Remove replaced baghouses C101 and C213 from Section D. | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 th Permit Revision: Convert P/C for an autoclave D225 to P/O (move from Section H to Section D). | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 th Permit Revision: Add new boiler D234 to replace boiler D74. | 0 | 0 | -4 | 0 | 0 | -5 |
| Cumulative Emissions Total | 0 | -2 | -20 | -6 | -70 | 2 |
| Maximum Daily | 30 | 30 | 40* | 30 | 60 | 220 |

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

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|---|--------------------------|------------------|
| SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT <i>ENGINEERING DIVISION</i> APPLICATION PROCESSING AND CALCULATIONS | PAGES 8 | PAGE 8 |
| | APPL. NO. Below | DATE 5/1/2012 |
| | PROCESSED BY T. Iwata | CHECKED BY |

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 with a Permit to Construct in Section H for this boiler.

ng 5th rev 526639 boiler