

ANTELOPE VALLEY AIR QUALITY MANAGEMENT DISTRICT

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**New Source Review/Federal Operating Permit Evaluation
Document**

*for
Paint Booth
Boiler*

Preliminary Determination/Decision - Statement of Basis

*for
Significant Modification to and Renewal of*

FOP Number: 97001754

For

Lockheed Martin Aeronautics Company

Facility

Lockheed Martin Aeronautics Company Palmdale

Facility Address:

1011 Lockheed Way, Palmdale CA 93599

Document Date: February 24, 2021

Submittal date to EPA/CARB for review: February 24, 2021

EPA/CARB 45-day Commenting Period ends: April 10th 2021

Public Notice Posted: March 1, 2021

Public Commenting Period ends: April 1, 2021

Permit Issue date: On or about April 12, 2021

Permitting Engineer: Chris Anderson

A. Introduction

1. Application and Setting

Federal Operating Permit, (FOP number: 097001754) for Lockheed Martin Aeronautics Company, located at 1011 Lockheed Way Palmdale, CA 93599. The facility is designed to assemble, maintain, and modify military aircraft

The Antelope Valley Air Quality Management District (AVAQMD or District) received an application on July 14, 2020 for the construction of the following at the Lockheed Martin Palmdale Facility (Lockheed or Facility);

1. Robotic Spray Booth and Low Temp Curing Oven at B637A Location
2. Boiler 4 at B603 Location

The application for construction was accompanied by an application for Significant Modification to Lockheed Martin FOP. In addition, the District is combining this permit action with the Lockheed FOP Renewal in order to streamline the Title V permitting process.

A copy of this application material can be viewed in Appendix D. The District determined the application materials to be complete.

The proposed permitting action is not a Federal Major Modification as defined in District Rule 1310.

Pursuant to District Rule 1301 – *New Source Review Definitions*, Lockheed Martin Palmdale is an existing Major Facility for NO_x, VOC, and PM₁₀. Lockheed is proposing to accept a facilitywide PM₁₀ emission limit less than the NSR Major Facility threshold as a component of this permitting action. The AVAQMD has been designated non-attainment for the Federal 8-hour ozone ambient air quality standard (NAAQS) and non-attainment for the California ozone and PM₁₀ standards (CAAQS). The area is attainment or unclassified for all other standards and averaging times, therefore, pursuant to District Rule 1303 – *New Source Review Requirements*, the proposed equipment is subject to both BACT and Offset requirements for the Nonattainment Air Pollutant/Precursors of NO_x and VOC. The applicant proposes to offset any increase in the Facility's Potential Emissions as follows;

NO_x emission reduction credits to offset NO_x at a ratio of 1.3:1, and proposes to continue to operate under a previously offset facilitywide VOC emission limitation.

In addition, Lockheed Martin Palmdale is defined as a federal Major Facility (based on NO_x and VOC PTE) pursuant to District Rule 3001 – *Federal Operating Permit Definitions*. The proposed modification classifies as a Significant Modification to Lockheed Martin Palmdale Federal Operating Permit (FOP). To streamline the Title V permitting renewal process, the District will process the renewal of Lockheed FOP concurrent with the Significant Modification. Pursuant to District Rule 3005 – *Modifications of Federal Operating Permits*, section (B)(2), District Rule 3003 – *Federal Operating Permits*, and District Rule 1302(D)(1)(d), this document serves as the

Preliminary Determination/Decision and Statement of Legal and Factual Basis.

2. Description of Project

Lockheed proposes the following:

1. Add one new robotic paint spray booth equipped with NESHAP dry filter and low temp curing oven in Plant 10. This spray booth and oven will operate to support the additional production needs of B637A.
2. Add one new water tube hot water boiler manufactured by Cleaver Brooks, model NB-100D-40, rated at 36,500,00 Btu per hour with one Cleaver Brooks model LNE-378-30 natural gas fired low NO_x (30 ppmvd) burner, a 50 hp forced draft fan flue gas re-circulation system, and an anhydrous ammonia selective catalytic reduction (SCR) NO_x emission control system at Building 603 in Plant 10. This boiler will operate along with the existing three boilers to support hot water and heating for the entire site.

B. Analysis

1. Presentation of Emissions

Emission summaries prepared pursuant to District Regulation XIII are presented below.

As described above, criteria and hazardous air pollutant emissions will result from;

- Robotic application of coatings to aerospace parts inside of a paint booth equipped with dry filter. Particulate matter (including HAPs) will be effectively controlled by the use HVLP spray gun or equivalent vented through particulate filters with Aerospace NESHAP 3-stage compliant filters. VOC emissions will be controlled by use of District Rule 1124 coating limits and a daily VOC limit not to exceed 25 lbs/day.
- Use of 300 kW electrically heated (no combustion) low temperature curing oven. Curing oven emissions are accounted for in the coating VOC emission calculations.
- Natural gas fired boiler equipped with anhydrous ammonia selective catalytic reduction for control of NO_x emissions.

To ensure that there is no net increase in NO_x and VOC, Lockheed proposes to use emission reduction credits to offset NO_x and operate under a previously offset facility VOC emission limitation (“facility cap”) to ensure VOC emissions are not increased. In addition, Lockheed proposes to accept a facilitywide PM₁₀ emission limit less than NSR and Title V major source thresholds (<15 tpy); therefore, categorizing this Facility as a non-major source of PM₁₀.

As described above and demonstrated in Table 3 below, there will be no net increase in NO_x emissions from the addition of these emission units.

As described in Table 2 below, the Emissions Change, Pursuant to District Rule 1304, for a new or modified Facility or Emissions Unit(s) is calculated, by subtracting Historic

Actual Emission from Proposed Emissions (section (B)(1)(a)) of District Rule 1304.

Emissions Change = (Proposed Emissions) – (Historic Actual Emissions)

Table 2 presents the required offsets for the new and modified emission sources. Detailed emission calculations are presented in Appendix B.

Table 1 - Potential to Emit (PTE) of New Emission Units

Emissions Unit	Permit #	Control Type	Control Permit #	PM10	SO2	NOx	CO	VOC
				(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
BOILER NO. 4 (PLT 10, BLDG 603)	B013914	SELECTIVE CATALYTIC REDUCTION, (BOILER NO. 4, PLT 10, BLDG 603)	C013915	1.19	0.09	0.965	5.83	0.86
ROBOTIC PAINT SPRAY BOOTH	S013999	na	na	0.92	--	--	--	4.48
CURING OVEN, ELECTRIC	B014000	na	C013675	--	--	--	--	**
Total PTE				2.11	0.09	0.965	5.83	5.34

**emissions included with paint booth

Table 2 – Emission Offsets¹

Emissions	NO _x (lbs/yr)
Proposed Emissions ²	1931
Historical Actual Emissions ³	0.00
Emission Change ⁴	1931
Pollutant Offset Ratio	1.3
Amount of Offsets Required⁵	2510
ERC Certificate AV0016⁶	7090
ERC balance	4580

1. Per AVAQMD Rule 1303(B), offsets are required for nonattainment air pollutants and their precursors. As such, only those relevant pollutants are listed in this table.

2. Proposed Emissions = PTE of New Emission Sources (Including paint booth paint overspray and boiler emissions). 0.965 tons/yr x 2000 lb/ton=1931 lb/yr

3. Historical Actual Emissions (HAE) = based on facility daily VOC limit.

4. Per AVAQMD Rule 1304(B), Emissions Change = Proposed Emissions - Historical Actual Emission

5. Amount of Offsets Required = Emissions Change * pollutant offset ratio.

6. Lockheed Martin will surrender the required portion of NO_x ERCs as issued by AVAQMD under ERC Certificate Number 0016 prior to ATC permit issuance.

2. Determination of Nonattainment NSR Requirements

a. BACT Evaluation

[District Rule 1302(C)(2)(a)]

Best Available Control Technology (BACT) is required for each Nonattainment Air Pollutant or its Precursors with potential to emit (PTE);

a) new or modified permit unit; 25 pounds per day or more

b) new or modified facility; 25 tons per year or more (15 tpy in the case of PM₁₀).

[District Rule 1303(A)]

BACT is defined as the most stringent emission limit or control technique which has been achieved in practice, for such Permit Unit class or category of source [District Rule 1301].

Because Lockheed has a NO_x and VOC PTE both greater than 25 ton per year, VOC BACT is required for NO_x and VOC for each new or Modified emission unit. LM is not major for PM₁₀ and the PTE for each new emission unit is less than 25 lbs/day; therefore, BACT is not required for PM₁₀. BACT for this project is described below.

ROBOTIC PAINT BOOTH

VOC BACT

Lockheed proposes to install and operate one new robotic paint booth with low temp electric curing oven to apply and cure coatings to aircraft parts and assemblies and proposes to accept a daily VOC limit less than 25 lbs/day. The District determines VOC BACT for the proposed equipment as application of coating w/ VOC content and transfer efficiency complying w/ District Rule 1124 and a daily VOC limit less than 25 lbs/day.

BOILER 4

NO_x and VOC BACT

The applicant has proposed a natural gas fired boiler equipped with selective catalytic reduction (add-on control technology that catalytically promotes the reaction between ammonia (which is injected into the flue gas) and NO_x to form nitrogen (N₂) and water for control of NO_x emissions) at concentration not to exceed 5ppmvd as BACT. The District has reviewed published BACT determinations (SCAQMD A/N 562449, 3/22/2016) and concludes for this source class and category that a NG boiler (with SCR add-on control for NO_x) meeting the proposed 5ppmvd limit is determined as BACT. VOC BACT is determined as use of natural gas and proper operation of the equipment. Additionally, the District has determined that ammonia slip shall not exceed a limit of 5 ppmvd.

The applicant proposes to monitor for NO_x emissions continuous compliance using a Predictive Emission Monitoring system. The PEM program will ensure continuous compliance by establishing a correlation between emission rates and process parameters over the entire operating range of the boiler. An annual RATA/source test will be performed to validate this relationship. The PEMS could include monitoring the following parameters:

- Excess oxygen

- Fuel flow
- Catalyst temperature
- Ammonia injection rate

The specifications for the NOx PEMS will be submitted to AVAQMD for approval prior to installation.

b. Offsets Evaluation

[District Rule 1302(C)(3)]

Offsets are required for any new or modified Facility which has the Potential to Emit a Regulated Air Pollutant in an amount greater than or equal to the thresholds for the Nonattainment Air Pollutants and their Precursors specified in District Rule 1303 (B)(1). There is a net increase in NOx emissions from the proposed new emission units, therefore emission offsets are required for NOx. Lockheed currently operates with a permit unit based PTE PM₁₀ greater than 15 ton per year (actual emissions are far less based on historic emission inventory reports), however Lockheed has proposed to accept a facilitywide annual PTE PM₁₀ of less than 15 ton per year. With this facilitywide PM₁₀ PTE update, Lockheed is no longer considered a major source for PM₁₀ and PM₁₀ emission offsets are not required. VOC emissions offsets are not required as Lockheed operates under a previously offset VOC limit.

The applicant proposes to offset NO_x emissions increases using emission reduction credits to offset NO_x at a ratio of 1.3:1. The District accepts the proposed offset package. Emission offsets are to be surrendered contemporaneously with this permit action and prior to ATC permit issuance.

c. Determination of Additional Federal Requirements

[District Rule 1302(C)(4)]

Pursuant to the requirements in District Rule 1302 B(1)(a)(ii), an analysis of Alternate Siting is not required as the proposed equipment is not a Major Modification as defined in District Rule 1301 (DDD).

Pursuant to the requirements in District Rule 1302 B(1)(a)(iii), an analysis of any anticipated impacts on visibility is not required as the proposed equipment does not qualify as an application for a new Major Facility, nor is it a Major Modification for NSR purposes.

3. Determination of Requirements for Toxic Air Contaminants

[District Rule 1401]]

a. District Rule 1401:

Pursuant to District Rule 1401 – *New Source Review for Toxic Air Contaminants*, LM is subject to both State and Federal Toxic New Source Review, as LM is a New or Modified Facility (or Emissions Units) which has the potential to emit a Toxic Air Contaminant. Pursuant to the requirements of District Rule 1401, an applicability analysis of state and federal air toxic

regulations was conducted for the proposed equipment (State T-NSR and Federal T-NSR, respectively). The State T-NSR and Federal T-NSR analyses are described below:

1. State T-NSR:

Section (E)(1)(b) of District Rule 1401 requires that if any Airborne Toxic Control Measure (ATCM) applies to the proposed equipment, the requirements of that ATCM shall be added to the District permit. Under State law, a federal National Emission Standards for Hazardous Air Pollutants (NESHAP) becomes the State ATCM, unless the Air Resources Board (ARB) has already adopted an ATCM for the source category and associated hazardous air pollutant(s). There are currently no State adopted ATCM or federal NESHAP's applicable to the proposed sources.

Pursuant to District Rule 1401, section (E)(2), State T-NSR also requires an EU Prioritization Score (PS) for each New or Modified Emission Unit. A Prioritization Score (PS) considers potency, toxicity and amount of toxics released into the air, as well as the distance to workers, residents and sensitive receptors (such as hospitals, schools, and day care centers). Section (E)(2) requires PS to be calculated utilizing the most recently approved CAPCOA Facility Prioritization Guidelines, the most recently approved OEHHA Unit Risk Factor for cancer potency factors, and the most recently approved OEHHA Reference Exposure Levels for non-cancer acute factors, and non-cancer chronic factors. A PS for the proposed boiler is shown below in Table 3. A PS was not required for the paint booth as facilitywide VOC emissions are not increasing and the toxics profile of VOCs will not change.

Table 3- Prioritization Score

Proposed New/Modified Project Components	Cancer Priority	Acute Noncancer Priority	Chronic Noncancer Priority
Boiler 4, B/603, Plant 10	0.005579	0.00238	0.00422

As shown in the table above, the PS for of the Boiler is less than 10. Therefore, the Boiler is categorized as “Low Priority” and T-BACT analysis is not required for the any of the emission units. State T-NSR is satisfied.

2. Federal T-NSR:

Pursuant to section (F)(1) of District Rule 1401, the proposed Emission Units were analyzed to determine if any current, enforceable National Emission Standards for Hazardous Air Pollutants/Maximum Achievable Control Technology (NESHAP/MACT) standards apply. The proposed equipment is not subject to a NESHAP or MACT (Aerospace NESHAP is not applicable as Lockheed is an area source of HAPs). Federal T-NSR is satisfied.

b. District Rule 1402 – Control of Toxic Air Contaminants from Existing Sources applies to Lockheed, as they are an existing facility that has a facility PTE a TAC (Section (B)(1)(c)). Lockheed is currently categorized as “Intermediate Priority” based on Lockheed’s 2019 Comprehensive Emission Inventory Report (CEIR). Based on this categorization and pursuant to 1402(E) Toxic “Hot Spots” Program Analysis and the District’s *Comprehensive Emissions Inventory Guidelines*, the District will annually monitor the release of air toxics emitted by

Lockheed and carry out an analysis of these toxic emissions, in accordance with this rule. The requirements of District Rule 1402 are satisfied.

4. Determination of Requirements for Prevention of Significant Deterioration

[District Rule 1302(C)(6)]

a. PSD Analysis

The federal PSD regulations are provided in 40 CFR 52.21. Per 40 CFR 52.21(a)(2), these regulations apply to any new major stationary source or any existing major stationary source where a project results in a significant net emissions increase located in an unclassifiable or attainment area. The Facility is an existing major PSD stationary source of CO. The PSD regulations only apply to federal attainment or unclassifiable pollutants which, for this Facility, are PM, PM₁₀, PM_{2.5}, NO₂, SO₂, and CO. As such, Lockheed must evaluate if the emission increases associated with each Project is significant. Lockheed did not identify multiple projects and thus the District conservatively evaluated all proposed equipment as one project.

The District evaluated the emissions from the project and determined that the project emission increases do not exceed the significant emission rates (SERs); therefore, the requirements of 40 CFR 52.21 do not apply to the project.

b. NAAQS Impact Analysis

District Rule 1302, section (D)(5)(b)(iv) requires that any new or Modified Facility located in an area classified by USEPA as attainment or unclassifiable shall determine if the Facility will cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS). The proposed permit action, constructed and operated in accordance with the permits will not contribute to a violation of the NAAQS.

5. Rules and Regulations Applicable to the Proposed Project

District Rules

Rule 201/203 – *Permits to Construct/Permit to Operate*. Any equipment which may cause the issuance of air contaminants must obtain authorization for such construction from the Air Pollution Control Officer. Lockheed is in compliance with this rule as they appropriately applied for a District permit for all new equipment and maintains District permits for all residing equipment.

Rule 204 – *Permit Conditions*. To assure compliance with all applicable regulations, the Air Pollution Control Officer (Executive Director) may impose written conditions on any permit. The District has imposed permit conditions to ensure Lockheed complies with all applicable regulations.

Rule 206 – *Posting of Permit to Operate*. Equipment shall not operate unless the entire permit is affixed upon the equipment or kept at a location for which it is issued and will be made available to the District upon request.

Rule 207 – *Altering or Falsifying of Permit*. A person shall not willfully deface, alter, forge, or falsify any issued permit.

Rule 209 – *Transfer and Voiding of Permits*. Lockheed shall not transfer, whether by operation of law or otherwise, either from one location to another, from one piece of equipment to another, or from one person to another. When equipment which has been granted a permit is altered, changes location, or no longer will be operated, the permit shall become void.

Rule 210 – *Applications*. Lockheed provided all the required information to correctly address the proposed equipment pursuant to this rule, although there were instances in which additional information were required, in which the thirty (30) day clock was restarted.

Rule 212 – *Standards for Approving Permits*. This rule establishes baseline criteria for approving permits by the District for certain projects.

The proposed equipment has been found to meet the criteria for approving permits as follows;

The proposed equipment is determined to meet all applicable District rules and regulations and is expected to be installed and operated thereto. Further, this is not a Significant Project based upon the following:

- 1) This facility is not located within 1000 feet of a school; and
- 2) The proposed equipment does not have the potential to emit air pollutants in excess of the daily maximums specified within AV Rule 212(G); and
- 3) In accordance with District PS procedures, the proposed equipment is categorized as Low Priority and pursuant to CARB Hot Spots requirements a determination of cancer risk is not required.

Rule 225 – *Federal Operating Permit Requirement*. Lockheed is compliant with this rule, as they currently hold and maintain a Federal Operating Permit.

Rule 301 – *Permit Fees*. The proposed equipment will increase Lockheed’s annual permit fees by the applicable amounts described in section (E) of this rule.

Rule 312 – *Supplemental Annual Fees for Federal Operating Permits*. The supplemental annual fee for Title V will not change.

Rule 401 – *Visible Emissions*. This rule limits visible emissions opacity to less than 20 percent (or Ringlemann No. 1). In normal operating mode, visible emissions are not expected to occur nor exceed 20 percent opacity.

Rule 402 – *Nuisance*. This rule prohibits facility emissions that cause a public nuisance. The proposed modifications and associated equipment is required by permit condition to employ good engineering and operational principles in order to minimize emissions and the possibility of a nuisance.

Rule 404 – *Particulate Matter Concentration*. This rule requires that no person exceed the particulate matter concentration provided in Table 404(a). Sole use natural gas in the boiler and use of EPA method 319 dry filters will ensure that the proposed equipment will comply with the requirements of this rule.

Rule 405 – *Solid Particulate Matter – Weight*. This rule requires that no person exceed the particulate matter process weights provided in Table 405(a). Sole use of natural gas in the boiler and use of EPA method 319 dry filters will ensure that the proposed equipment will comply with the requirements of this rule.

Rule 408 – *Circumvention*. This rule prohibits hidden or secondary rule violations. The proposed modifications as described is not expected to violate Rule 408.

Rule 430 – *Breakdown Provisions*. Any Breakdown which results in a violation to any rule or regulation as defined by Rule 430 shall be properly addressed pursuant to this rule.

Rule 900 – *Standards of Performance for New Stationary Sources (NSPS)*. Rule 900 adopts all applicable provisions regarding standards of performance for new stationary sources as set forth in 40 CFR 60. There are currently no NSPS applicable to the proposed equipment.

Regulation X – *National Emission Standards for Hazardous Air Pollutants*. Pursuant to Regulation X, Lockheed is required to comply with all applicable ATCMs and under state law, a federal National Emission Standards for Hazardous Air Pollutants (NESHAP) becomes the State ATCM, unless the Air Resources Board (ARB) has already adopted an ATCM for the source category and associated hazardous air pollutant(s). In the case of the proposed new equipment 40 CFR 63 subpart HHHHHH is an applicable NESHAP to the robotic paint booth. Applicable requirements are specified in Part II A.38 of the FOP.

Rule 1124 – *Aerospace Assembly and Component Manufacturing Operations*

Lockheed has demonstrated in Applicants Table 3, the Coating or Regulatory VOC for the FP-86 material meets the VOC limit for Electric- or Radiation-Effect Coatings. Any and all other coatings and solvents applied in this equipment will also be compliant. Rule 1124 compliance will be achieved.

Rule 1146 - *Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters*

Rule 1146 limits boilers equal to or greater than 5 million Btu per hour and greater than 25% capacity factor to 30 ppm NO_x and 400 ppm CO. Emissions from the unit are guaranteed to meet the following emission rates:

- NO_x – 5 ppm
- CO – 50 ppm

Compliance with the NO_x and CO emission requirements will be determined according to procedures specified in Rule 1146 and/or by permit condition. Records of all source tests will be maintained for a period of five years and made available to District personnel upon request.

Regulation XXX – Title V Permits

This regulation contains requirements for sources which must have a FOP. Lockheed currently has a FOP and is expected to comply with all applicable rules and regulations.

Rule 3001 – Federal Operating Permit Definitions. Lockheed is defined as a federal Major Facility pursuant to this rule.

Rule 3003 – Federal Operating Permits. The proposed Significant Permit Modification/Renewal is being issued in accordance with the provisions of this rule including notification to public, State, and EPA pursuant to Rule 3007.

Rule 3005 – Modifications of Federal Operating Permits. The proposed equipment classifies as a Significant Permit Modification to Lockheed's Federal Operating Permit (FOP), and subsequently, this permit modification is being issued in accordance with the provisions of District Rule 3003.

Rule 3007 – Notice and Comment. This NSR permitting action is being noticed concurrent with the Significant Modification of Lockheed Federal Operating Permit. Notably, this affords the public the right to petition USEPA to reconsider the decision to not object to the permit action.

Rule 3008 – Certification. Lockheed included a Certification of Responsible Official as required with the submitted application for the proposed equipment.

Rule 3011 – Greenhouse Gas Provisions of Federal Operating Permits. Lockheed is a Major GHG Facility pursuant to Rule 3011. Lockheed's FOP includes all the requirements of this rule.

Regulation XIII – New Source Review

This regulation implements pre-construction review of and requirements for a proposed project.

Rule 1302 – Procedure. This rule applies to all new or Modified Facilities and requires certain requirements to be fulfilled when submitting an application. All applicable requirements of this rule are discussed in this NSR document as part of the Analysis procedure. Certification of compliance with the Federal Clean Air Act, applicable implementation plans, and all applicable District rules and regulations have been addressed. The Authority to Construct (ATC) application package for the proposed equipment includes sufficient documentation to comply with Rule 1302(D)(5)(b)(ii). Permit conditions for the proposed project will require compliance with Rule 1302(D)(5)(b)(iii).

Rule 1303 – Requirements. This rule requires BACT and offsets for selected facility modifications and new equipment. All new equipment installed shall meet BACT (see Section B(2)(a)). The proposed new paint booth is limited to less than 25 lbs/day of VOCs, determined as BACT. The proposed boiler will be equipped with an add-on control device facilitating a reduction in NO_x and ensuring the emitted emissions meet BACT level performance. Offsets

are necessary to be obtained as the project PTE is demonstrated to be a net increase in emissions of NO_x (see Section B(2)(a)). Lockheed proposes use of NO_x ERCs to offset the Project. The District approves of the emission offset package proposal. VOC offsets are not required as the facility operates under a previously offset emission limit.

Rule 1304 – *Emissions Calculations*. The Proposed Emissions from the proposed modifications were calculated pursuant to section (B)(1)(a) of this rule.

Rule 1305 – *Emission Offsets*. The proposed actual emission reductions associated with ERC certificate 0016 were obtained from a prior banking action. A review of the proposed ERCs determined that the proposed ERC were originally transferred into the AVAQMD in 2009 from SJVAPCD. The value of the ERC has been adjusted several times since this transfer due to partial consumption by the facility. The ERC were reviewed and determined to meet current RACT and no RACT adjustments are necessary.

Rule 1310 – *Federal Major Facilities and Modifications*. The Projects are *not* determined to be a Federal Major Modifications as calculated in accordance with Rule 1310(E)(1)(a) as the Projected Actual Emissions, calculated pursuant to section Rule 1310 (E)(3)(c) do not exceed the Federal Major Modification Thresholds.

Rule 1401 – *New Source Review for Toxic Air Contaminants*. Pursuant to the requirements of District Rule 1401, an applicability analysis of state and federal air toxic regulations was conducted for the proposed modifications (State T-NSR and Federal T-NSR, respectively) which shows the new or modified equipment is compliant with this rule.

Rule 1402 – *Control of Toxic Air Contaminants from Existing Sources*. This permit action is subject to Rule 1402, as Lockheed is an existing Major Facility and has a facility PTE greater than ten (10) tons per year for NO_x, PM, and TOG, as well as has a PTE to emit a TAC (Section (B)(1)(a) and (c)). A Toxic ‘Hot Spots’ Program Analysis was previously conducted by the District pursuant to section (E) of District Rule 1402, concluding with production of a HRA. The addition of the new paint booth and boiler will not result in a significant contribution to the existing facility risk, nor would the facility risk categorization change. A public notice or risk reduction is not required as a result of the emissions change from this permit action. Lockheed is compliant with this rule.

Regulation XVII – *Prevention of Significant Deterioration*

The purpose of this regulation is to set forth requirements for all new Major PSD Facilities and Major PSD Modifications which emit or have the potential to emit a PSD Air Pollutant pursuant to the requirements of 40 CFR 52.21. The proposed projects do not constitute a new Major PSD Facility or a Major PSD Modification; therefore, PSD does not apply to the proposed projects.

State Regulations

There are no project specific applicable state regulations.

Federal Regulations

40 CFR 63 Subpart DDDDD - *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters*
§63.7480 specifies that this subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. Lockheed Martin is a synthetic minor source of HAP. Subpart DDDDD does not apply.

40 CFR 63 Subpart JJJJJ - *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources*
Pursuant to §63.11195 (e) gas-fired boilers are not subject to this requirement. Gas fired boilers are defined in §63.11237 as “any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or for periodic testing, maintenance, or operator training on liquid fuel. Periodic testing, maintenance, or operator training on liquid fuel shall not exceed a combined total of 48 hours during any calendar year.” Subpart JJJJJ does not apply.

40 CFR 64, *Compliance Assurance Monitoring*. The Compliance Assurance Monitoring (CAM) rule (40 CFR 64) applies to each Pollutant Specific Emissions Unit (PSEU) when it is located at a Major Facility that is required to obtain Title V, Part 70 or 71 permit and it meets all of the following criteria. “PSEU” means an emissions unit considered separately with respect to each regulated air pollutant.

The PSEU must:

- a. Be subject to an emission limitation or standard [40 CFR 64; AND,
- b. Use a control device to achieve compliance [40 CFR 64.2(a)(2)]; AND,
- c. Have the **potential pre-control** emissions that exceed or are equivalent to the major source threshold. [40 CFR 64.2(a)(3)]

The proposed PSEU were evaluated for applicability. The proposed boiler meets criteria “a” and “b”, however does not meet criteria “c”, therefore a CAM plan is not required for the proposed equipment.

6. NSR Preliminary Decision - Conclusion

The District has reviewed the proposed new and modified emission unit applications for Lockheed and conducted a succinct written analysis as required by District Rule 1302, section (D)(1)(b) and District Rule 1203, section (B)(1)(a). The District has determined that the proposed equipment is in compliance with all applicable District, state, and federal rules and regulations as proposed and when operated in terms of the permit conditions stated below.

7. Operating Conditions

Operating conditions will be assigned to each individual permit unit. Operating conditions for each of these permit units are included in Part III of Lockheed’s FOP and on the District Authorities to Construct (ATC).

C. Title V Permit/FOP – Significant Permit Modification

1. Proposed Changes to FOP

Lockheed applied for Significant Permit Modification and Renewal of FOP in parallel with the application for District Permit modification. The District is processing the proposed FOP changes in accordance with procedures specified in District Rule 3003(B). This preliminary decision also serves as the statement of basis. A draft FOP is attached.

2. Title V/FOP – Conclusion

The District has reviewed the applications for Significant Modification and Renewal and the proposed modifications to CalPortland's FOP. The District has determined that the proposed modification and renewal is compliant with all applicable District, state, and federal rules and regulations as proposed when operated in the terms of the operating conditions given herein.

D. Comment Period and Notifications

1. Public Comment

This preliminary determination/decision will be publicly noticed on or about December October 15, 2020, allowing for public comment until November 16, 2020 (or 30 days after publish date). Please see Appendix A for noticing details.

2. Notifications

The preliminary decision will be submitted to USEPA and CARB pursuant to District Rule 1302 for an EPA forty-five (45) day review period on October 8, 2020. The final modified FOP shall be issued on or about November 23, 2020.

All correspondence as required by District Rules 1302 will be forwarded electronically to the following recipients:

Director, Office of Air Division
United States EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105
Submitted electronically to USEPA's
Central Data Exchange – Electronic
Permitting System
<https://cdx.epa.gov/>

Chief, Stationary Source Division
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812
emailed to permits@arb.ca.gov

Reenu Ko
Lockheed Martin
1011 Lockheed Way
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Reenu.m.ko@lmco.com

E. Federal Operation Permit (FOP) Content:

The legal and factual basis for the FOP follows. The permit parts (Parts I through VI) are described below in the order presented in the permit. A reference to the origin and authority of each term and condition is contained in the FOP; the origin is listed after the applicable term or condition while the authority is listed in table format in Section VI E. of the FOP. A permit revision page is included in the FOP to provide a resource to the permit user about historical revisions for the current term of the permit.

General formatting changes were made throughout the FOP to improve the visual cohesiveness of the permit.

PART I: INTRODUCTORY INFORMATION

This section of the FOP contains general information about Lockheed Martin Palmdale's facility, including facility identifying information (section A), a description of the facility (section B), and a description of the facility's equipment (section C).

Changes that were made to this section of the FOP:

Section A

- Facility Name changed to add Air Force Plant 42 Site 7 (partial)
- Facility "Site" Contacts changed.

Section C

- Part II condition identifiers in the equipment table were changed from numbers to letters to help avoid any miscommunication when citing conditions.
- The following equipment was removed from the facility:
 - T006465 - Storage Tank Waste Oil (Plant 10, Bldg 629)
 - T008033 - Flow Coater Dip Tank (Plant 10, Bldg 637A)
 - T006381 - Storage Tank, Photographic Chemical Waste (Site 2, Bldg 234)
 - E006446 - Diesel Emergency IC Engine driving firewater pump #151 (Plant 10 Bldg 615)
 - E006522 - Portable Diesel IC Engine
 - B006812 – Portable engine/generator set– replaced by PERP No.
 - B008122 – Curing oven (Plant 10, Bldg 646)
 - B006360, B006365 and B006376 – Boilers 1, 2, 3 (Site 2, Bldg 210)
 - E006510 – Tier 0 fire pump replaced with E013484 below
 - B010253 – Polyurethane foam processing system (Plant 10, Bldg 645)

- T007374 – Strip tank (Plant 10, Bldg 636A)
- The following equipment was added to the facility:
 - E012381 – Diesel IC Engine Emergency Generator (Plant 10, Bldg 601)
 - B012658/B012851 – Boilers 1 and 2 (Site 2, Bldg 211)
 - E012993 – Diesel IC Engine Emergency Generator (Site 7, Bldg 780)
 - E013053 – Diesel IC Engine Emergency Generator (Plant 10 Bldg 611)
 - B013025 –Foam Coating Line (Plant 10 Bldg 644)
 - B013213 and B013214 – Boilers 1 and 2 (Site 2, Bldg 210)
 - E013484 – Diesel IC Engine Fire Pump #3 (Plant 10 Bldg 616) to replace E006516 – Diesel Emergency IC Engine driving firewater pump #162 (Plant 10 Bldg 616) when that unit is removed
 - C007375 relocated back to Plant 10 from Helendale facility (MDAQMD)
 - S006476 was modified include the upgrade to USEPA Method 319 approved filtration
 - Removed 200 hour per year limitation for all emergency IC engines pursuant to AVAQMD Rule 1110.1
 - B013025 daily VOC limit was replaced with an annual limit per AVAQMD BACT decision

ADDED DURING SIGNIFICANT MOD SEPTEMBER 2020

- S013999 – Robotic Spray Booth (Plant 10 B/637A)
- B014000 – Curing Oven (Plant 10 B/637A)
- B013914 – Boiler No.4 (Plant 10, Building 603)
- C013915 – SCR for Boiler 4 (Plant 10, Building 603)

PART II: FACILITYWIDE APPLICABLE REQUIREMENTS; EMISSIONS LIMITATIONS; MONITORING, RECORDKEEPING, REPORTING AND TESTING REQUIREMENTS; COMPLIANCE CONDITIONS; COMPLIANCE PLANS

This section of the FOP contains requirements applicable to the entire facility and equipment (section A), facility-wide monitoring, recordkeeping, and reporting requirements (section B), and facility-wide compliance conditions (section C).

Changes made to this section of the FOP:

- Part II, Condition A.33 was updated to revise the facility limit from pounds per day to pounds per 30-day period based on a 30-day rolling average. This is consistent with AVAQMD Rule 442 and other facility-wide applicable requirements. This modification

does not result in an annual emissions increase; therefore, emission offsets are not required. To ensure that there were no negative health effects due to the possibility of an hourly emissions increase, LM provided an acute risk review which was accepted by the District and demonstrates that any potential acute risk was within the boundaries established by District toxics rules.

- LM proposed to accept a facilitywide PM₁₀ emissions cap of less than 15 ton per year. This facilitywide PM₁₀ emission limit has been added to Part II.A.35.
- Part II, Condition C.9 was deleted. This condition required the facility to submit on an annual basis, a predictive asbestos removal report for the upcoming year. In discussions with EPA Region 9 and per the Asbestos NESHAP, this requirement was purely discretionary and not mandated by regulation. The facility is mandated by FOP permit condition to continue to comply with all applicable requirements of the Asbestos NESHAP.

PART III: EQUIPMENT SPECIFIC APPLICABLE REQUIREMENTS; EMISSIONS LIMITATIONS; MONITORING, RECORDKEEPING, REPORTING AND TESTING REQUIREMENTS; COMPLIANCE CONDITIONS; COMPLIANCE PLANS

This section of the Federal Operating Permit contains equipment-specific applicable requirements including emission limitations, monitoring and recordkeeping, reporting and testing, and compliance plans.

Changes made to this section of the FOP:

- Changed equipment section identifiers from number to letter format to help avoid any miscommunication.

CONDITION A.5 AND B.6: ABRASIVE BLASTING UNITS A006367, A006500, AND A007054.

- Updated the frequency of pressure differential recordings from quarterly to daily as required per 40 CFR Part 64 (CAM), requirements for daily monitoring for other emission units. [64.3(b)(iii)]

CONDITION 5: THREE (3) EMERGENCY FIRE PUMP INTERNAL COMBUSTION ENGINES, AVAQMD PERMIT #E006420, #E006499, #E006511, AND ELEVEN (11) EMERGENCY INTERNAL COMBUSTION ENGINES, AVAQMD PERMIT #E006124; #E006370; #E006371, #E006427, #E006453, #E006454, #E006470, #E006496, #E006498, #E006811, #E007092:

- Updated the number of engines to which these requirements are applicable

CONDITION 6, FOUR (4) EMERGENCY FIRE PUMP INTERNAL COMBUSTION ENGINES, AVAQMD PERMIT # E012036, #E012262, #E012263 and #E012264 AND NINE (9) EMERGENCY INTERNAL COMBUSTION ENGINES, AVAQMD PERMIT #E010468, #E11076, #E011311, #E011312, #E011477, #E012182, #E012381, #E012993 AND #E013053:

- Updated the number of engines to which these requirements are applicable

CONDITION 13: SPRAY BOOTH (SOUTH SIDE OF B/610), AVAQMD PERMIT #S006448:

- Clarified the language for where spray painting occurs. Historically the north side of this building was used for abrasive blasting; however, the entire hangar is now used for painting.

CONDITION 20: SPRAY BOOTH, AVAQMD PERMIT #S008564:

- Revised the requirement to observe the VOC monitor and sensor system to once per shift from once per quarter.

CONDITION 22: SPRAY BOOTH, AVAQMD PERMIT #S009629:

- Revised the requirement to observe the VOC monitor and sensor system to once per shift from once per quarter.

CONDITION 23: SPRAY BOOTH, AVAQMD PERMIT #S010188:

- Revised the requirement to observe the VOC monitor and sensor system to once per shift from once per quarter.

CONDITION 31: UVOX, AVAQMD PERMIT #C006118:

- Deleted the requirement to demonstrate compliance with the daily mass emission limit as it no longer applies

CONDITION 33: FACILITYWIDE VOC LIMIT:

- Lockheed has requested that its current daily VOC limit be changed to a monthly average limit in order to increase operational flexibility. The District approves of this request based upon the following;
 - AVAQMD emission offset requirements are based on annual emission rates. Annual emissions will not increase; therefore, the proposed change does not constitute a criteria pollutant emission increase and is not Modification.
 - As the daily emissions can potentially be considerably higher (30 fold), the District requested LM perform an acute (hourly) risk review. See Attachment 3. The results of the acute risk review demonstrate that although the emission

increase is significant, acute risk to offsite receptors is within District air toxics risk thresholds.

CONDITION 35: TWO (2) OVENS, AVAQMD PERMIT #B008123, #B008124:

- Revised the requirement to applicable to two engines only as the third was removed from service.

CONDITION 39: GASOLINE DISPENSING FACILITY (non-retail); AVAQMD PERMIT #N006375:

- Revised the throughput limit to 60,000 gallons per year.

PART IV: STANDARD FEDERAL OPERATING PERMIT CONDITIONS

Changes made to this section of the FOP:

- No changes were made to this section.

PART V: OPERATIONAL FLEXIBILITY

Changes made to this section of the FOP:

- No changes were made to this section.

PART VI: CONVENTIONS, ABBREVIATIONS, DEFINITIONS, SIP TABLE

Changes made to this section of the FOP:

- Added SIP Table. Updated SIP Table references as applicable

G. SUMMARY OF APPLICABLE REQUIREMENTS

District Rules

Rules 201/203 – Permits to Construct/Permit to Operate. Any equipment which may cause the issuance of air contaminants must obtain authorization for such construction from the Air Pollution Control Officer. Lockheed Martin Palmdale is in compliance with this rule as they have appropriately applied for a District permit for all new equipment and maintains District permits for all residing equipment per Part II, section A.1 and A.2 of their FOP.

Rule 204 – Permit Conditions. To assure compliance with all applicable regulations, the Air Pollution Control Officer (Executive Director) may impose written conditions on any permit. Lockheed Martin Palmdale complies with all applicable regulations per Part II, section A.3 and A.4 of their FOP.

Rule 206 – Posting of Permit to Operate. Equipment shall not operate unless the entire permit is affixed upon the equipment or kept at a location for which it is issued and will be made available to the District upon request. Lockheed Martin Palmdale complies with this regulation per Part II, section A.5 of their FOP.

Rule 207 – Altering or Falsifying of Permit. A person shall not willfully deface, alter, forge, or falsify any issued permit. Lockheed Martin Palmdale complies with this regulation per Part II, section A.6 of their FOP.

Rule 209 – Transfer and Voiding of Permits. Lockheed Martin Palmdale shall not transfer, whether by operation of law or otherwise, either from one location to another, from one piece of equipment to another, or from one person to another. When equipment which has been granted a permit is altered, changes location, or no longer will be operated, the permit shall become void. Lockheed Martin Palmdale complies with this regulation per Part II, section A.7 of their FOP.

Rule 210 – Applications. Lockheed Martin Palmdale provided all the required information to correctly address the renewal pursuant to this rule.

Rule 212 – Standards for Approving Permits. This rule establishes baseline criteria for approving permits by the District for certain projects. In accordance with these criteria, the proposed modifications and application does not cause issuance of air contaminants in violation of Sections 41700 or 41701 of the State Health and Safety code.

Rule 217 – Provisions for Sampling and Testing Facilities. This rule requires the applicant to provide and maintain requirements for sampling and testing. Lockheed Martin Palmdale is in compliance with this rule per Part II, section A.8 of their FOP.

Rule 219 – Equipment not Requiring a Permit. This rule exempts certain equipment from District Permit. Lockheed Martin Palmdale is in compliance with this rule per Part II, section A.9.

Rule 221 – Federal Operating Permit Requirement. Lockheed Martin Palmdale is in compliance with this rule, as they currently hold and maintain a Federal Operating Permit.

Rule 301/312 – Permit Fees/Fees for Federal Operating Permits. Lockheed Martin Palmdale's annual permit fees are due by the applicable amounts.

Rule 401 – Visible Emissions. This rule limits visible emissions opacity to less than 20 percent (or Ringlemann No. 1). In normal operating mode, visible emissions are not expected to exceed 20 percent opacity. Lockheed Martin Palmdale has specific operating conditions that enforce compliance with this rule, specifically Part II, section A.15.

Rule 403 – Fugitive Dust. This rule prohibits fugitive dust beyond the property line of any emission source. Lockheed Martin Palmdale has specific operating conditions to ensure compliance with this condition, specifically Part II, section A.18.

Rule 404 – Particulate Matter Concentration. Lockheed Martin Palmdale shall not discharge into the atmosphere from this facility, particulate matter (PM) except liquid sulfur compounds, in excess of the concentration at standard conditions, shown in Rule 404, Table 404 (a). (a) Where the volume discharged is between figures listed in the table the exact concentration permitted to be discharged shall be determined by linear interpolation. (b) This condition shall not apply to emissions resulting from the combustion of liquid or gaseous fuels in steam generators or gas turbines. (c) For the purposes of this condition, emissions shall be averaged over one complete cycle of operation or one hour, whichever is the lesser time period. Lockheed Martin Palmdale adheres to this rule per Part II, section A.19 of their FOP.

Rule 405 – Solid Particulate Matter, Weight. Lockheed Martin Palmdale shall not discharge into the atmosphere from this facility, solid PM including lead and lead compounds in excess of the rate shown in Rule 405, Table 405(a): (a) Where the process weight per hour is between figures listed in the table, the exact weight of permitted discharge shall be determined by linear interpolation. (b) For the purposes of this condition, emissions shall be averaged over one complete cycle of operation or one hour, whichever is the lesser time period. Lockheed Martin Palmdale adheres to this rule per Part II, section A.20 of their FOP.

Rule 407 – Liquid and Gaseous Air Contaminants. This rule limits sulfur compound and CO emissions from facilities. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.21 of their FOP. A demonstration of compliance for boilers is presented in Appendix E.

Rule 408 – Circumvention. This rule prohibits hidden or secondary rule violations. The proposed renewal as described is not expected to violate Rule 408. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.22 of their FOP.

Rule 409 – Combustion Contaminants. This rule limits the emissions of combustion contaminants exceeding 0.23 gram per cubic meter (0.1 grain per cubic foot) of gas calculated to 12 percent of carbon dioxide (CO₂) at standard conditions averaged over a minimum of 25 consecutive minutes. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.23 of their FOP. A demonstration of compliance for IC engines fired on diesel fuel is presented in Appendix E.

Rule 430 – Breakdown Provisions. Any Breakdown which results in a violation to any rule or regulation as defined by Rule 430 shall be properly addressed pursuant to this rule. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.13 of their FOP.

Rule 431 – Sulfur Content of Fuels. Lockheed Martin Palmdale is limited to use of the following quality fuels for fuel types specified elsewhere in this permit: PUC quality natural gas fuel - sulfur compounds shall not exceed 800 parts per million (ppm) calculated as hydrogen sulfide at standard conditions; diesel fuel - sulfur content shall not exceed 0.5 percent by weight. Compliance with Rule 431 fuel sulfur limits is assumed for PUC quality natural gas fuel and CARB certified diesel fuel. Records shall be kept on-site and available for review by District, state, or federal personnel at any time. The sulfur content of non-CARB certified diesel fuel shall be determined by use of American Society for Testing and Materials (ASTM) method D 2622-82 or ASTM method D 2880-71, or equivalent. Lockheed Martin Palmdale is required to adhere to this rule per Part II, section A.16.

Rule 442 – Usage of Solvents. This rule reduces VOC emissions from VOC containing materials or equipment that is not subject to any other rule in Regulation XI. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.24 of their FOP.

Rule 1000 – National Emission Standards for Hazardous Air Pollutants (NESHAP). Rule 1000 adopts all applicable provisions regarding standards of performance for new stationary sources as set forth in 40 CFR 61. Lockheed Martin Palmdale complies with 40 CFR 61, Subpart M – NESHAP for Asbestos per conditions in Part II, section C.7, C.8, and C.9.

Rule 1113 – Architectural Coatings. This rule limits the quantity of VOC in Architectural Coatings. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.25 of their FOP.

Rule 1124 – Aerospace Assembly and Component Manufacturing Operations. This rule limits the emission of VOC from coatings associated with 12.26. Aerospace Assembly and Component Manufacturing. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.26 of their FOP.

Rule 1107 – Metal Parts and Products Coatings. This rule limits the emission of VOC from coatings associated with Metal Parts and Products. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.27 of their FOP.

Rule 1136 – Wood Products Coatings. This rule limits the emission of VOC from coatings associated with Wood Products. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.28 of their FOP.

Rule 1145 – Plastic, Rubber and Glass Coatings. This rule limits the emission of VOC from coatings associated with Plastic, Rubber and Glass Operations. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.29 of their FOP.

Rule 1168 – Adhesive Applications. This rule limits the emission of VOC from coatings associated with Adhesive Application Operations. Lockheed Martin Palmdale meets the requirements of this rule by complying with operating condition listed in Part II, section A.30 of their FOP.

Rule 1171 – Organic Solvent Degreasing Operations. This rule limits the emission of VOCs from wipe cleaning and degreasing operations using organic solvents. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.31 of their FOP.

Rule 1162 - Polyester Resin Operations. This rule limits the emission of VOCs from Polyester Resin Operations using organic solvents. Lockheed Martin Palmdale meets this requirement by complying with operating condition listed in Part II, section A.34 of their FOP.

Rule 1110.2 – Internal Combustion Engines. The purpose of this rule is to establish limits for emissions associated with emergency, portable, standby, or stationary internal combustion

engines. Lockheed Martin Palmdale complies with this rule by operating conditions listed in Part III for each applicable IC engine.

Rule 1140 - The purpose of this rule is to establish limits for emissions associated with Abrasive Blasting operations. Lockheed Martin Palmdale complies with this rule by operating conditions listed in Part III for each abrasive blasting unit.

Rule 1146 - Industrial, Institutional And Commercial Boilers, Steam Generators, And Process Heaters. The purpose of this rule is to establish limits for emissions associated with Industrial, Institutional and Commercial Boilers, Steam Generators, And Process Heaters. Lockheed Martin Palmdale complies with this rule by operating conditions listed in Part III for each applicable boiler.

Regulation X – National Emission Standards for Hazardous Air Pollutants. Pursuant to Regulation X, Lockheed Martin Palmdale is required to comply with all applicable ATCMs.

Regulation XXX – Federal Operating Permits. This regulation contains requirements for sources which must have a FOP. Lockheed Martin Palmdale currently has a FOP and is expected to comply with all applicable rules and regulations.

Rule 3001 – Federal Operating Permit Definitions. Lockheed Martin Palmdale is defined as a federal Major Facility pursuant to this rule.

Rule 3003 – Federal Operating Permits. This rule outlines the permit term, issuance, restrictions, content, operational flexibility, compliance certification, permit shield, and violations of Federal Operating Permits. Lockheed Martin Palmdale complies with this rule per Part II, sections B and C, and Part IV and V of their FOP.

Rule 3005 – Modifications of Federal Operating Permits. This action to Lockheed Martin Palmdale’s FOP does not constitute a modification; therefore, this rule is not subject to this action.

Rule 3006 – Reopening, Reissuance and Termination of Federal Operating Permits. This action to Lockheed Martin Palmdale’s FOP does not constitute a Reopening, Reissuance or Termination of Federal Operating Permits; therefore, this rule is not subject to this action.

Rule 3007 – Notice and Comment. This rule outlines the noticing requirements for Notice and Comment. Lockheed Martin Palmdale will properly notice their renewal pursuant to this rule.

Rule 3008 – Certification. Lockheed Martin Palmdale included a Certification of Responsible Official as required with the submitted application for the Renewal.

Rule 3011 – Greenhouse Gas Provisions of Federal Operating Permits. Lockheed Martin Palmdale is a Major GHG Facility pursuant to Rule 3011. Lockheed Martin Palmdale is required to submit GHG data with any application per Part II, section A. 38.

Regulation XIII – New Source Review. This regulation sets forth requirements for the preconstruction review of all new or modified facilities. Lockheed Martin Palmdale is not a new facility nor is it currently a modified facility; therefore, this regulation does not apply.

Rule 1401 – Control of Toxic Air Contaminants from Existing Sources. This rule controls the emission of toxic air contaminants from existing source. Lockheed Martin Palmdale is in compliance with this rule.

Regulation XVII – Prevention of Significant Deterioration Please take notice that this regulation is not currently used within the AVAQMD because the USEPA has not delegated authority for the PSD Program to the AVAQMD at this time.

Federal Regulations

40 CFR 60, Subpart A – NSPS General Provisions. Lockheed Martin Palmdale complies with this regulation per Part III section I.

40 CFR 61, Subpart M – NESHAP for Asbestos. Lockheed Martin Palmdale complies with 40 CFR 61, Subpart M – NESHAP for Asbestos per conditions in Part II, section C.7, C.8, and C.9.

40 CFR 63, Subpart A – NESHAP General Provisions. Lockheed Martin Palmdale complies with this regulation per Part II Section A Condition 37 and Part III Conditions 5, 39, 40, and 41.

40 CFR 63, Subpart ZZZZ – NESHAP for Stationary Reciprocating Internal Combustion Engines. Lockheed Martin Palmdale complies with this regulation per Part III Condition 6.

40 CFR 63, Subpart HHHHHH – NESHAP for Paint Stripping and Miscellaneous Surface

Coating Operations at Area Sources. Lockheed Martin Palmdale complies with this regulation per Part II Section A Condition 37.

40 CFR 63, Subpart WWWW – NESHAP for Area Source Standards for Plating and Polishing Operations. Lockheed Martin Palmdale complies with this regulation per Part III Condition 39.

40 CFR 63, Subpart CCCCC – NESHAP for Gasoline Dispensing Facilities. Lockheed Martin Palmdale complies with this regulation per Part III Condition 40 and 41.

40 CFR 64 - Compliance Assurance Monitoring. The CAM rule aims to have owners and operators maintain their control devices at the levels that assure compliance. The rule allows owners and operators to design CAM plans on current requirements and operating practices, to select representative parameters upon which compliance can be assured, to establish indicator ranges - or procedures for setting the indicator ranges - for the parameters, to use performance testing and other information to verify the parameters and ranges, and to correct control device performance problems as expeditiously as practicable.

The Lockheed Martin Palmdale facility currently has five PSEU applicable to CAM. Please refer to the CAM PSEU Emission Unit Evaluation and Analysis on the following pages. The corresponding CAM plans can be found in Appendix C.

40 CFR 82, Protection of Stratospheric Ozone. Lockheed Martin Palmdale complies with this regulation per Part IV (21).

H. CONCLUSIONS AND RECOMMENDATION:

The District has reviewed the application for the renewal of Lockheed Martin Palmdale Federal Operating Permit. The District has determined that the renewal is in compliance with all applicable District, state, and federal rules and regulations as proposed when operated in the terms of the permit conditions given herein, and the attached revised FOP. The proposed permit and corresponding statement of legal and factual basis will be released for public comment and publicly noticed pursuant to District Rule 3007. To view the public notice please refer to Appendix A of this document.

Appendix A Public Notice

Noticing Methods include the following, per District Rules 1302(D)(2) and (3) and District Rule 3007(A) and (B):

- Published in newspapers of general circulation – *Antelope Valley Press* on or about March 1, 2021.
- Mailed and/or emailed to AVAQMD contact list of persons requesting notice of actions (see the contact list following the Public Notice in this Appendix).
- Posted on the AVAQMD Website at the following link: <https://avaqmd.ca.gov/public-notices-advisories>

NOTICE of TITLE V PERMIT MODIFICATION & RENEWAL

NOTICE IS HEREBY GIVEN THAT *Lockheed Martin-Palmdale* - located at 1011 Lockheed Way, Palmdale; CA, has submitted applications for four new permit units and to modify their Federal Operating Permit (FOP) pursuant to the provisions of the Antelope Valley Air Quality Management District (AVAQMD) Regulations XIII and XXX. The facility is designed to assemble, maintain, and modify military aircraft. The facility is a major source for NO_x and VOC. The proposed action results in an increase of NO_x emissions and constitutes a significant modification of the FOP. All new permit units are subject to the requirements of New Source Review. Emissions increases for NO_x are required to be offset pursuant to Rule 1303 and shall be met utilizing Emission Reductions Credits. Concurrent with the significant modification, the facility FOP is being processed for renewal.

REQUEST FOR COMMENTS: Interested persons are invited to submit written comments and/or other documents regarding the terms and conditions of the proposed Federal Operating Permit. If you submit written comments, you may also request a public hearing on the proposed Significant Modification and Renewal of the FOP. To be considered, comments, documents and requests for public hearing must be submitted no later than 5:00 P.M. on April 1, 2021 (or 30 days after this publication date, whichever is later) to the AVAQMD, Attention: Chris Anderson at the address listed below.

PETITION FOR REVIEW: Federal Operating Permits are also subject to review and approval by the United States Environmental Protection Agency (USEPA). If the USEPA finds no objection to the proposed permit, the final permit will be issued. In the event of public objection to the issuance of a specific permit, a Title V petition may be submitted to the USEPA Administrator electronically through the Central Data Exchange at: <https://cdx.epa.gov/> or in writing to USEPA at 1200 Pennsylvania Ave, N.W., Washington, D.C. 20460. In order to file a Title V petition, issues must be raised with reasonable specificity during the public comment period, and filed within 60 days of the close of the USEPA review period.

AVAILABILITY OF DOCUMENTS: The proposed Federal Operating Permit, as well as the application and other supporting documentation are available for review at the AVAQMD offices, 43301 Division Street, Lancaster, CA 93535. In addition, these documents are available on the AVAQMD website and can be viewed at following link: <https://avaqmd.ca.gov/public-notices-advisories>. Please contact Chris Anderson, Air Quality Engineer, at the above address or (760) 245-1661, extension 1846 or at canderson@mdaqmd.ca.gov for additional questions pertaining to this action and/or corresponding documents.

*Traducción en español esta disponible por solicitud. Por favor llame: (760) 245-1661

SHERI HAGGARD
Engineering Supervisor II
Antelope Valley Air Quality Management District
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Appendix B Emission Calculations

Lockheed Martin BOILER 4							TACs from combustion of natural gas	AP-42/CATEF Emission factor	Emission factor	Annual emission rate	Hourly emission rate	
Normal Operation												
Criteria												
Pollutant from												
Natural Gas			Emission factor				Benzene	2.10E-03	2.1E-06	6.6E-01	7.5E-05	
Combustion	Emission Factor		factor	Annual emission rate			Formaldehyde	7.50E-02	7.4E-05	2.3E+01	2.7E-03	
	lb/MM cu. ft.	Source	lb/MMBtu	max lb/day	lb/yr	tons/yr	Toluene	3.40E-03	3.3E-06	1.1E+00		
NOx	0.7	B	0.006	5.25	1912.71	0.96	NH3			5.2E+03	6.0E-01	
CO	4.2	B	0.036	31.95	11642.58	5.82	*NH3 emission factor source RF MacDonald.					
VOC	5.5	A	0.005	4.72	1721.33	0.86						
PM10	7.6	A	0.007	6.53	2378.57	1.19						
SO2	0.6	A	0.001	0.52	187.78	0.09						
Source:	A	AP-42, 5th Edition, Table 1.4-2										
	B	*Applicant, vendor ppm spec shown below										
Notes:	Emission factor in lb/MMBtu derived either by dividing Emission factor in lb/MM cu. Ft. by Fuel Heat Value below or by using Fd (see cell note) depending on if the MMCF is fuel gas or combustion gas (which is ppm basis)											
Application Data:												
	Max Fuel rate:	36.5 MMBtu/hr										
		35784 SCFH										
	Operation:	24 Hours/day										
		7 days/week										
		52 weeks/yr										
	Total:	8746 hrs/yr										
	Fd	8600 DSCF exhaust per MMBtu in					lb/MM cu.ft.					
NOx	*BACT	5 ppm @		3%	% O2		0.6967042					
CO	*BACT	50 ppm @		3%	% O2		4.2408079					
Calculated Values:												
	Fuel Heat Value:	1020 BTU/SCF		*avg gross heating value of NG from EPA AP 42								
	Fuel Usage:	876 MMBtu/Day										
		319229 MMBtu/yr										
		858823.53 SCFD										
		313.0 MMSCFY										
		218400 Therms/Year										

Lockheed Martin BOILER 4														
Startup Emissions				TACS from combustion of natural gas		AP-42/CATEF Emission factor		Emission factor		Annual emission rate		Hourly emission rate		
Criteria	Pollutant from			Emission factor			lb/MM cu. ft.		lb/MMBtu		lb/yr		lb/hr	
Natural Gas	Emission Factor			factor			Benzene		Formaldehyde		Toluene			
Combustion	lb/MM cu. ft.			lb/MMBtu			max lb/day		lb/yr		tons/yr			
	4.2	B	0.036	2.62	18.37	0.01								
	4.2	B	0.036	2.66	18.64	0.01								
	5.5	A	0.005	0.39	2.76	0.00								
	7.6	A	0.007	0.54	3.81	0.00								
	0.6	A	0.001	0.04	0.30	0.00								
Source:	A		AP-42, 5th Edition, Table 1.4-2											
	B		*Applicant, vendor ppm spec shown below											
Notes:	Emission factor in lb/MMBtu derived either by dividing Emission factor in lb/MM cu. Ft. by Fuel Heat Value below or by using Fd (see cell note) depending on if the MMCF is fuel gas or combustion gas (which is ppm basis)													
Application Data:														
	Max Fuel rate:	36.5 MMBtu/hr												
		35784 SCFH												
	Operation:	2 Hours/day												
		1 days/week												
		7 weeks/yr												
	Total:	14 hrs/yr												
	Fd	8600 DSCF exhaust per MMBtu in lb/MM cu.ft.												
	NOx	low Nox	30 ppm@	3%	% O2	4.1802249								
	CO	*BACT	50 ppm@	3%	% O2	4.2408079								
Calculated Values:														
	Fuel Heat Value:	1020 BTU/SCF *avg gross heating value of NG from EPA AP 42												
	Fuel Usage:	73 MMBtu/Day												
		511 MMBtu/yr												
		71568.627 SCFD												
		0.5 MMSCFY												
		218400 Therms/Year												

COATING PM Calculations													
Coating	Density lb/gal	Coating Used		Solids	Solids Used lb	App Method	Transfer Eff	Fallout Factor	Filter Type	Control Eff	PM Emissions		
		gal/day	lb/day								lb/day	lb/yr	ton/yr
CAAPCOAT FP-836 Mixture	15.23	42	639.46578	63.72%	407.50	HV/LP	0.65	0	Method 319	98.1	5.0326	1836.89	0.92
notes LM proposed a 0.5 fall out factor as 99.8% control efficiency. District used a 0.0 fall out factor and 98.1 percent capture efficiency.													

APPENDIX C

COMPLIANCE ASSURANCE MONITORING (CAM)

Evaluation, Applicability Analysis, and CAM Plan:

The Compliance Assurance Monitoring (CAM) rule (40 CFR 64) applies to each Pollutant Specific Emissions Unit (PSEU) when it is located at a Major Facility that is required to obtain Title V, Part 70 or 71 permit and it meets all of the following criteria. “PSEU” means an emissions unit considered separately with respect to each regulated air pollutant.

The PSEU must:

- a. Be subject to an emission limitation or standard [40 CFR 64; and,
- b. Use a control device to achieve compliance [40 CFR 64.2(a)(2)]; and,
- c. Have the potential pre-control emissions that exceed or are equivalent to the major source threshold. [40 CFR 64.2(a)(3)]

Emission limitations or standards proposed by EPA after November 15, 1990 under the New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 64.2(b)(1)(i)) are exempt from the CAM applicability process. Sources subject to a continuous compliance demonstration method are also exempt from CAM. NO_x emissions from Boiler #3, B006436 are controlled using a Selective Catalytic Reduction (SCR) unit (C006459); however, this unit is subject to a requirement for a continuous compliance determination method and so it exempt from CAM.

VOC emissions from some operations at Buildings 636 and 637 are controlled using two Regenerative Thermal Oxidizers (RTOs) and a UV Oxidation control device (UVOX), respectively. PM₁₀ emissions abrasive blasting and painting operations are controlled using fabric filters. Carbon adsorption controls emissions from three spray booths: S008564, S009629 and S010188.

Table 1 indicates the units and pollutants that meet two of the three CAM applicability criteria: (1) subject to an emission limit that is not an NSPS/NESHAP requirement or otherwise exempt from CAM, (2) uses a control device to meet such limit.

Table 1. Units and Pollutants Subject to CAM Applicability Determination

Permit Number	Description	Pollutant	Emission Limit 1	Emission Limit 2	Regulatory Basis
C006118	UVOX	VOC	600 lb/month		Rule 204, Rule 1303
C010991	TOS	VOC	1500 lb/month		Rule 204, Rule 1303
S008564	Spray Booth	VOC	25 lb/day		Rule 204, Rule 1303
S010188	Spray Booth	VOC	25 lb/day		Rule 204, Rule 1303
A006389	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A006408	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A006421	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A006500	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A007054	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A007056	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A006367	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
A006416	Abrasive Blasting	PM10	Ringlemann 2 for more than three minutes in any one hour		Rule 1140
B013914	Boiler 4	NOx	5 ppm at 3% O2		Rule 204, Rule 1303

Lockheed Martin prepared uncontrolled emission calculations for the units and pollutants

outlined in Table 1 above to determine if the PSEU triggers CAM. The calculations for each facility are found in Attachment 1. Emission calculations for Lockheed Martin PSEUs indicate that the annual uncontrolled VOC for the UVOX and TOS are greater than 25 tons/year; therefore, CAM requirements are triggered for these PSEUs. ***Lockheed Martin submitted the CAM plans, included as Attachment 2, that are intended to demonstrate compliance with the monitoring requirement. The District determined that a daily pressure differential recording when the equipment is in use is require to address the requirements of CAM for the abrasive blast booths; therefore, with this District update, the District accepts the Lockheed Martin CAM proposals and updated permits C006118, C010991, A006367, A006500 and A007054 with CAM requirements (including daily PD recordings when in use).***

Annual uncontrolled emissions for all other PSEUs were found to be below the Title V major source thresholds.

APPENDIX D
NSR and FOP APPLICATIONS

Lockheed Martin Aeronautics Company
1011 Lockheed Way, Mail Zone -6454
Palmdale, CA 93599



Kevin Dykema
ESH Senior Manager

In reply, please refer to ENV 0713/022

Antelope Valley Air Quality Management District
43301 Division Street, Suite 206
Lancaster, CA 93535-4649

July 13, 2020

SUBJECT: Permit Application – Boiler 4 at B603 Location

To Whom it May Concern:

Lockheed Martin Aeronautics Company is submitting a permit application to add a new boiler at B603 in Plant 10. This boiler will operate along with the existing 3 boilers to support hot water and heating for the entire site.

If you have any questions, please contact Reenu Ko at (661) 572-3326.

Respectfully,

A handwritten signature in blue ink, appearing to read "KD", with a long horizontal line extending to the right.

Kevin Dykema
ESH Senior Manager

cc. R. Ko



PERMIT APPLICATION
B603 BOILER 4

JULY 2020

Prepared for:
LOCKHEED MARTIN CORPORATION
Palmdale, California

Prepared by:
**LOCKHEED MARTIN CORPORATION AND
VERDANT ENVIRONMENTAL**
Palmdale, California

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Emission Calculations.....3
Criteria Pollutant Emissions3
HAP Emissions.....3

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Rule Compliance Evaluation4

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Fee Evaluation.....10

TABLES

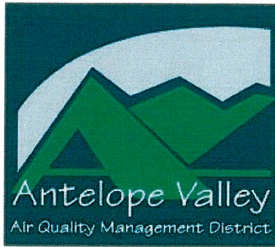
Table 1 Potential to Emit criteria pollutants for Plant 10 Boiler 4
Table 2 Potential to Emit CO₂ for Plant 10 Boiler 4
Table 3 Potential to Emit HAPs for Plant 10 Boiler 4
Table 4 ERCs Required for Plant 10 Boiler 4
Table 5 Calculation of Uncontrolled PTE for Boiler 4

APPENDICES

Appendix A Manufacturer's Data
Appendix B Engineering Design Tech Specifications
Appendix C Supplier Proposal
Appendix D HARP Facility Prioritization Report

1

PERMIT APPLICATION FORMS



Antelope Valley Air Quality Management District

43301 Division Street, Suite 206, Lancaster, CA 93535-4649

Phone 661.723.8070

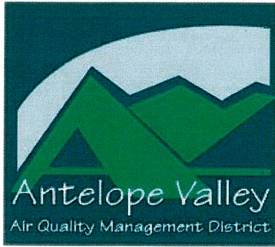
www.avaqmd.ca.gov

Application for External Combustion Engine (boiler, etc.) Only

Please type or print.

Please refer to Rule 301 for Application Filing Fee.

1. Permit to be issued to (name of company to receive permit): Lockheed Martin Aeronautics Company		1a. Federal Tax ID #: 52-1893632	
2. Mailing/Billing Address (for the above company name): 1011 Lockheed Martin Way Mailzone 6454, Palmdale CA 93599			
3. Facility or Business Name on License (for equipment location): Lockheed Martin Aeronautics Company B603A			
4. Facility Address/Location of Equipment (if same as company, enter "Same"): Same		Facility UTM or Lat/Long: 398.0E 3830.9N	
5. Contact Name and Title: Reenu M Ko		E-mail Address: reenu.m.ko@lmco.com	Phone and Fax #: 661/572-3326 661/572-4315
6. Application is hereby made for the Authority to Construct (ATC) and Permit to Operate (PTO) the following equipment: Clever Brooks Boiler			
7. Application is for: <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Modification* <input type="checkbox"/> Change of Owner*		*For modification or change of owner: Current permit #: _____	
8. Type of Organization (check one): <input type="checkbox"/> Individual Owner <input type="checkbox"/> Partnership <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Utility <input type="checkbox"/> Local Agency <input type="checkbox"/> State Agency <input type="checkbox"/> Federal Agency			
9. Distances (feet and direction to closest): Fenceline _____ Residence _____ Business _____ School _____			
10. General Nature of Business: Aerospace Manufacturing		11. Principal Product: Aircraft	
12. Facility Annual Throughput by Quarters (percent): 37.5 % 25 % 0 % 37.5 % Jan-Mar Apr-Jun Jul-Sep Oct-Dec		13. Expected Facility Operating Hours: 24 7 52 8760 Hrs/Day Days/Wk Wks/Yr Total Hrs/Yr	
14. Do you claim Confidentiality of Data? (If yes, state nature of data in an attachment.) <input type="checkbox"/> Yes <input type="checkbox"/> No			
15. Machine Information: Check One: <input checked="" type="checkbox"/> Boiler <input type="checkbox"/> Dryer <input type="checkbox"/> Furnace <input type="checkbox"/> Heater <input type="checkbox"/> Kiln <input type="checkbox"/> Oven <input type="checkbox"/> Other _____ (specify): Manufacturer: CLEAVER BROOKS Model #: NB-100D-40 Serial #: TBD Maximum heat input rating (use Higher Heating Value): 36.5 MMBTU/HR MMBtu/hr or kW Burner Manufacturer: CLEAVER BROOKS Burner Model #: LNE-378-30 # of Burners: 1 Burner max heat input rating: 36.5 MMBTU/HR MMBtu/hr or kW Percent excess air (or n/a): 3 % Operating temps (C or F): Av. _____ Max. _____ Specify Primary Fuel (attach fuel analysis for these fuels, specifying HHV and sulfur content): <input checked="" type="checkbox"/> Natural Gas <input type="checkbox"/> LPG (Propane) <input type="checkbox"/> CARB Diesel <input type="checkbox"/> Coal* <input type="checkbox"/> Petroleum Coke* <input type="checkbox"/> Digester Gas* <input type="checkbox"/> Landfill Gas* <input type="checkbox"/> Refinery Gas* <input type="checkbox"/> Other* (specify): _____ Max hourly primary fuel usage: 0.03596059 Fuel units (ft ³ , gal, etc.) mmscf/hr If secondary fuel is proposed, specify: _____ Max hourly usage: _____ Feedstock type and max process rate (specify units): _____			



Antelope Valley Air Quality Management District

43301 Division Street, Suite 206, Lancaster, CA 93535-4649

Phone 661.723.8070

www.avaqmd.ca.gov

Application for External Combustion Engine (boiler, etc.) Only

Unit lat/long or UTM coordinates: _____

Max annual hours: 8760 Exhaust stack height (feet): _____ Inside diameter (inches) 36

16. Emissions Controls:
 Check all that apply:
 Low NOx Burner Oxygen Trim Flue or Exhaust Gas Recirculation (FGR or EGR) Oxidation Catalyst Selective Catalytic Reduction (SCR) Selective Non-Catalytic Reduction (SNCR) Afterburner ESP Baghouse
 Other (specify): _____

17. Max Emissions Rates (controlled):


Pollutant	Concentration (ppmvd or gr/dscf)	Mass (pounds/hr)
1. Oxides of Nitrogen (NOx)	5 ppm	0.3650 lb/hr
2. Oxides of Sulfur (SOx)	0.5 ppm	0.0365 lb/hr
3. Carbon Monoxide (CO)	50 ppm	2.7375 lb/hr
4. Total Particulates (TSP or PM30)		0.3650 lb/hr
5. Coarse Respirable Particulates (PM2.5)		
6. Total Organics (TOG)		
7. Volatile Organic Compounds (VOC, ROG, or NMOG)	3.5 ppm	0.1460 lb/hr

18. Dryers Only:
 Check one:
 Centrifugal Chip Fluidized Bed Rotary Spray Other (specify): _____

19. Furnace Only:
 Check one:
 Annealing Burnoff Calcining Crucible Cupola Diffusion Electric Forge Pot Holding
 Heat Treating Melting Reverberatory Rotary Sweating Oxide Growth

20. Oven Only:
 Check one:
 Bakery Baking Curing Drying Fluidized Bed Stripping Solder Reflow
 Roasting, specify type: _____

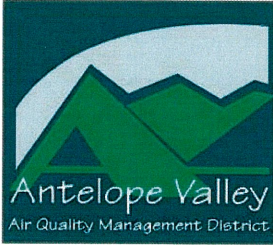
Firing Method: Direct Indirect

Signature of Responsible Official:  **Official Title:** ESH Sr MANAGER

Typed or Printed Name of Responsible Official: KEVIN DYKEMA **Phone Number:** 661-572-4300 **Date Signed:** 7/13/20

For District Use Only

Application #:	Invoice #:	Permit #:	Company/Facility #:
-----------------------	-------------------	------------------	----------------------------



Antelope Valley Air Quality Management District

43301 Division Street, Suite 206, Lancaster, CA 93535-4649

Phone 661.723.8070

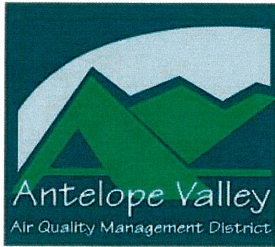
www.avaqmd.ca.gov

Application for Authority to Construct and Permit to Operate

Please type or print.

Please refer to Rule 301 for Application Filing Fee.

1. Permit to be Issued to (name of company to receive permit): Lockheed Martin Aeronautics Company		1a. Federal Tax ID #: 52-1893632	
2. Mailing/Billing Address (for the above company name): 1011 Lockheed Martin Way Mailzone 6454, Palmdale CA 93599			
3. Facility or Business Name on License (for equipment location): Lockheed Martin Aeronautics Company B603A			
4. Facility Address/Location of Equipment (if same as company, enter "Same"): Same		Facility UTM or Lat/Long: 398.0E 3830.9N	
5. Contact Name and Title: Reenu M Ko	E-mail Address: reenu.m.ko@lmco.com	Phone and Fax # ^s : 661/572-3326 661/572-4315	
6. Application is hereby made for the Authority to Construct (ATC) and Permit to Operate (PTO) the following equipment: Boiler 4 - Anhydrous Ammonia Selective Catalytic Reduction (SCR) System			
7. Air Pollution Control Equipment, if any*: S Anhydrous Ammonia SCR System			
(*Note that most APCEs require a separate application.)			
8. Application is for: <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Modification* <input type="checkbox"/> Change of Owner*		*For modification or change of owner: Current permit #: _____	
9. Type of Organization (check one): <input type="checkbox"/> Individual Owner <input type="checkbox"/> Partnership <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Utility <input type="checkbox"/> Local Agency <input type="checkbox"/> State Agency <input type="checkbox"/> Federal Agency			
10. Distances (feet and direction to closest): Fenceline _____ Residence _____ Business _____ School _____			
11. General Nature of Business: Aerospace Manufacturing		12. Principal Product: Aircraft	13. SIC Code (if known):
14. Facility Annual Throughput by Quarters (percent): 37.5 % 25 % 0 % 37.5 % Jan-Mar Apr-Jun Jul-Sep Oct-Dec		15. Expected Facility Operating Hours: 24 7 52 8760 Hrs/Day Days/Wk Wks/Yr Total Hrs/Yr	
16. Do you claim Confidentiality of Data? (If yes, state nature of data in an attachment.) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			



Antelope Valley Air Quality Management District

43301 Division Street, Suite 206, Lancaster, CA 93535-4649

Phone 661.723.8070

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Application for Authority to Construct and Permit to Operate

17. Stack Emissions Information

Stack #	Stack Height ¹	Stack Diameter ²	Exhaust Temp. ³	Exhaust Flow Rate ⁴	Exhaust Velocity ⁵
1					
2					
3					

**List additional stacks on a separate sheet as needed.

Measurements Key:

1. Stack height is the distance in feet above ground level to discharge point.
2. Stack diameter is the diameter (or equivalent circular diameter) of discharge point (nearest tenth foot). If using cross-sectional area (A in square feet), equivalent diameter is $D = (1.273A)^{0.5}$
3. Exhaust temp. in degrees F, actual or estimated to nearest 50 degree F.
4. Exhaust flow rate at discharge point in actual cubic feet per minute (ACFM).
5. Exhaust velocity in feet per second, design or measured.

18. Remarks

This section may include your basis for confidentiality, process description, modification description, and so forth. If you wish to specify process information as proprietary or confidential, use this space. Note that the kinds and rates of emissions cannot be held confidential and that emissions are subject to public disclosure. Attach additional sheets as needed.

Potential Supplier Proposed System Design- RFM SCR

The design strategy will include new equipment is as follows:

A Low NOx burner will be applied with induced flue gas recirculation (FGR)

Combustion controls will incorporate O2 trim

SCR to reduce NOx to 5 ppm

The SCR will utilize anhydrous ammonia

A control skid will be provided with an air system to supply diluted ammonia to the AIG

Ammonia flow control will be dictated by a fuel flow signal

SCR System will be designed as an integral assembly with appropriate inlet/outlet transitions, AIG and catalyst bed. Construction is carbon steel with insulation and aluminum corrugated lagging.

Signature of Responsible Official:

Official Title:

ESH Sr MANAGER

Typed or Printed Name of Responsible Official:

KEVIN Dykema

Phone Number:

661-572-4300

Date Signed:

7/13/20

For District Use Only

Application #:

Invoice #:

Permit #:

Company/Facility #:

2

PROCESS DESCRIPTION

INTRODUCTION

The Lockheed Martin Corporation (Lockheed) is planning to install a 36.5mmBtu total packaged boiler at Plant 10, AVAQMD Facility ID No. 01754. The unit will be dedicated to serve existing hot water and heating for Plant 10 campus and will be installed adjacent to existing Boiler 3 in B603A.

EQUIPMENT DESCRIPTION

Lockheed plans to install a 36.5mmBtu package boiler. The proposed equipment is a Cleaver Brooks Model NB-100D-40, a packaged water tube hot water boiler equipped with a Cleaver Brooks, Model LNE-378-30 burner. The units will be fueled with natural gas at a total rate of approximately 315 mmscf annually. Manufacturer's information is included with this application.

OPERATING SCHEDULE

The unit is a hot water boiler and will be operated for comfort heating and to provide hot water.

3

EMISSION CALCULATIONS

CRITERIA POLLUTANT EMISSIONS

Proposed equipment potential to emit, as defined by District Rule 3001(W), is the maximum capacity of the emission unit to emit any regulated air pollutant under its physical and operational design. The unit will be operated for comfort heating and to provide hot water. Maximum potential to emit based on emissions data provided by the Architecture & Engineering Firm and calculated based on 8760 hours per year of operation are included as Table 1. Maximum potential to emit based on AVAQMD emission factors for CO₂ assuming 8760 hours per year of operation are included as Table 2.

HAP EMISSIONS

HAP emissions, also calculated based on maximum potential to emit, are included in Table 3.

4

RULE COMPLIANCE EVALUATION

Rule 401 – Visible Emissions

Rule 401 limits visible emissions opacity to less than 20 percent (or Ringelmann No. 1). During start up, visible emissions may exceed 20 percent opacity. However, emissions of this opacity are not expected to last three minutes or longer. In normal operating mode, visible emissions are not expected to exceed 20 percent opacity.

Rule 404 – Particulate Matter – Concentration

Rule 404 specifies standards of emissions for particulate matter concentrations. The use of a boiler fueled with natural gas achieves compliance with Rule 404.

Rule 405 – Solid Particulate Matter - Weight

Rule 405 limits particulate matter emissions from fuel combustion on a mass per unit combusted basis. The use of a boiler fueled with natural gas achieves compliance with Rule 404.

Rule 431.1– Sulfur Content in Fuels

Rule 431.1 limits the sulfur content in gaseous fuel. The provisions of the rule limit the selling or burning of gaseous fuels containing sulfur compounds in excess of 16 ppmv, calculated as H₂S.

Only pipeline quality natural gas will be used for fueling the boiler. The sole use of pipeline quality natural gas complies with Rule 431.1.

Rule 1146 - Emissions of Oxides of Nitrogen from Industrial, Institutional and Commercial Boilers, Steam Generators, and Process Heaters

Rule 1146 limits boilers equal to or greater than 5 million Btu per hour and greater than 25% capacity factor to 30 ppm NO_x and 400 ppm CO. Emissions from the unit are guaranteed to meet the following emission rates:

- NO_x – 5 ppm
- CO – 50 ppm

Compliance with the NO_x and CO emission requirements will be determined according to procedures in District Source Test Method 100.1 - Instrumental Analyzer Procedures for Continuous Gaseous Emission Sampling (March 1989), or Method 7.1 - Determination of Nitrogen Oxide Emissions from Stationary Sources (March 1989) and Method 10.1 - Carbon Monoxide and Carbon Dioxide by Gas Chromatograph/Non-Dispersive Infrared Detector (GC/NDIR) - Oxygen by Gas Chromatograph-Thermal Conductivity (GC/TCD) (March 1989), or any other test method determined to be equivalent and approved before the test in writing by the Executive Officer of the District. Records of all source tests will be maintained for a period of five years and made available to District personnel upon request.

The rule further requires that the unit be tuned at least twice per year, at intervals from 4 to 8 months apart, in accordance with the procedure described in Attachment 1 of the rule or the unit manufacturer's specified tuning procedure. If the manufacturer's tuning procedure is used a copy of this procedure will be kept on site. If the unit does not operate throughout a continuous six-month period within a calendar year, only one tuneup is required for that calendar year.

Source testing and tuneups will be conducted as required. Compliance with Rule 1146 will be achieved.

Lockheed Martin is investigating compliance demonstration methods and requests approval for a predictive emissions monitoring (PEMS) approach rather than a standard continuous emissions monitoring system (CEMS). The PEMS could include monitoring the following:

- Excess oxygen
- Fuel flow
- Catalyst temperature
- Ammonia injection rate

The specifications for the PEMS will be submitted to AVAQMD for approval prior to installation.

We believe a CEMS is not required based on the following analysis:

CEMS not required to meet Rule 1146

Rule 1146 (c)(4) states:

Any unit(s) with a rated heat input capacity greater than or equal to 40 million Btu per hour and an annual heat input greater than 200 x 10⁹ Btu per year shall have a continuous in-stack nitrogen oxides monitor or equivalent verification system in compliance with 40 CFR part 60 Appendix B Specification 2. Maintenance and emission records shall be maintained and made accessible for a period of two years as to the Executive Officer.

As stated above, Lockheed Martin plans to install a less than 40 million BTU per hour unit.

CEMS not required to meet Title V CAM requirements

The purpose of Compliance assurance monitoring (CAM) is to provide a demonstration of compliance with applicable requirements under the Clean Air Act (CAA) for large emission units that rely on pollution control device equipment to achieve compliance. CAM is applicable to emission units that meet the following applicability criteria:

§ 64.2 Applicability.

(a) *General applicability.* Except for backup utility units that are exempt under paragraph (b)(2) of this section, the requirements of this part shall apply to a pollutant-specific emissions unit at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:

- (1) The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof), other than an emission limitation or standard that is exempt under paragraph (b)(1) of this section;
- (2) The unit uses a control device to achieve compliance with any such emission limitation or standard; and
- (3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source.

For purposes of this paragraph, “potential pre-control device emissions” shall have the same meaning as “potential to emit,” as defined in § 64.1, except that emission reductions achieved by the applicable control device shall not be taken into account.

While the Lockheed Martin boiler installation meets criteria 1 and 2 (using SCR to meet a 5 ppm NO_x limit), #3 is not met. As demonstrated in Table 5, uncontrolled emissions

(assuming a 30 ppm NOx limit at 3% O2) do not exceed 6 tons/year, well below the 25 ton/year level at which as source is classified as major.

CEMS not required to meet 40 CFR 60 Subpart Dc Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

40 CFR 60 Subpart Dc applies to boilers in the 10 to 100 MMBtu/hr range and can require such sources to install CEMS to monitor SO2 and/or PM. Monitoring is only required for sources combusting coal or fuel oil, however.

While the boiler Lockheed Martin is procuring will be fuel-oil capable, this permit application is for the combustion of natural gas only. A CEMS is not required to meet 40 CFR 60 Subpart Dc.

Regulation XIII – New Source Review

Rule 1303 – BACT

Rule 1303 (A) mandates BACT for:

- Any new Permit Unit which emits, or has the Potential to Emit, 25 pounds per day or more of any Nonattainment Air Pollutant; or
- Any new or Modified Facility which emits, or has the Potential to Emit, 25 tons per year or more of any Nonattainment Air Pollutant

The use of the Cleaver Brooks, Model LNE 378-30 low NOx burner, SCR and fueled with natural gas meets the requirement for BACT. Compliance with Rule 1303 (A) is achieved.

Rule 1303– Offsets

Rule 1303 (B) requires offsets for any new or modified facility which emits or has the potential to emit a regulated air pollutant in an amount greater than or equal to the following offset threshold amounts:

Pollutant	Threshold (TPY)
Carbon Monoxide (CO)	100
Hydrogen Sulfide (H2S)	10
Lead (Pb)	0.6
PM ₁₀	15
Oxides of Nitrogen (NO _x)	25
Oxides of Sulfur (SO _x)	25
Reactive Organic Compounds (ROC)	25

Per Rule 1305, for a new emissions unit, the Proposed Emissions shall be equal to the Potential to Emit for that emission unit. Therefore, the Offsets totaling 4157 pounds per year of NOx and 3197 pounds per year of PM10 are required to permit the new boiler as demonstrated in Table 4. VOC offsets are not required as the facility operates under a permitted cap of 625 pounds per day. SO2 offsets are not required as the facility is not a major source and CO offsets are not required as the AVAQMD is attainment for CO.

40 CFR 63 Subpart DDDDD - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

§63.7480 specifies that this subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. Lockheed Martin is a synthetic minor source of HAP. Subpart DDDDD does not apply.

40 CFR 63 Subpart JJJJJ - National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources

Pursuant to §63.11195 (e) gas-fired boilers are not subject to this requirement. Gas fired boilers are defined in §63.11237 as “any boiler that burns gaseous fuels not combined with any solid fuels and burns liquid fuel only during periods of gas curtailment, gas supply interruption, startups, or for periodic testing, maintenance, or operator training on liquid fuel. Periodic testing, maintenance, or operator training on liquid fuel shall not exceed a combined total of 48 hours during any calendar year.” Subpart JJJJJ does not apply.

AVAQMD Rule 1401 - New Source Review for Toxic Air Contaminants (TACs)

Pursuant to District Rule 1401, section (E)(2), State T-NSR also requires an Emission Unit Prioritization Score. Section (E)(2) requires prioritization scores to be calculated utilizing the most recently approved CAPCOA Facility Prioritization Guidelines, the most recently approved OEHHA Unit Risk Factor for cancer potency factors, and the most recently approved OEHHA Reference Exposure Levels for non-cancer acute factors, and non-cancer chronic factors.

Emission Unit Prioritization Scores were prepared using the most recent version of the HARP Emission Inventory Module (V2.1.1). The prioritization score was calculated assuming a receptor proximity of 1380 m. The HARP Facility Prioritization Report is

provided as Appendix B

The total Emission Unit Prioritization Scores for the proposed Emission Units are as follows:

Proposed New/Modified Emission Units	Cancer Priority	Chronic Noncancer Priority	Acute Noncancer Priority
New Boiler, B/603, Plant 10	0.05579	0.00422	0.00238
Total Emission Units Prioritization Score	0.05579	0.00422	0.00238

As shown in the table above, the total Emission Unit Prioritization Scores for the proposed new and modified Emission Units are less than 1; therefore, categorized as “Low Priority.” Pursuant to District Rule 1401, section (E)(2)(b), no further action is required. Compliance with Rule 1401 is achieved.

5

FEE EVALUATION

Pursuant to Rule 301, Permit Fees – (D)(1)(a)(i) Equipment in a Reg XXX (Title V) facility an application fee of \$831.00 per equipment and (D)(2)(b) Complex Source Fee of \$6,500

The project evaluation fee for complex sources shall be based on the District's total actual and reasonable labor time and other reasonable expenses for the evaluation required to develop a permit to construct and/or permit to operate. This fee shall be calculated at a labor rate of \$173.00 per hour plus actual expenses. The fee shall accrue and be applied against the deposit. Should the District's costs as calculated pursuant to subsection above not exceed the deposit; the remainder of the deposit will be returned to the applicant.

Total fee:

Two permit applications:

Boiler = \$ 831.00

SCR = \$ 831.00

Total = \$1662.00

(Complex Source Fee of \$6,500 included in B637A Permit Application)

TABLES

Table 1: Potential to Emit Criteria Pollutants for new Plant 10 Boiler 4

No of Unit	Heat Input (mmBtu/hr)	Hours per year	Emission Factor (lb /million BTU of heat input)*					Emissions (lb/ year)				
			NOx	CO	SOx	VOC	PM10	NOx	CO	SOx	VOC	PM10
1	36.5	8760	0.010	0.075	0.001	0.004	0.010	3197	23981	320	1279	3197

* Source - 90% Design Spec by Burns & McDonnells
 mmBtu = million BTU

Emissions (lb/hr)				
NOx	CO	SOx	VOC	PM10
0.3650	2.7375	0.0365	0.1460	0.3650

Table 2: Potential to Emit CO2 for new Plant 10 Boiler 4

HHV Heat Input (mBtu/hr/unit)	No of Unit	Natural Gas Conversion (btu/cf)	Max Fuel Use mmscf/hr	Max Operation hr/yr	Max Fuel Use mmscf	Pollutant	Emission Factor lb/mmscf	Emissions (pounds)	
								Max Hourly	Max Annual
36.5	1	1015	0.03596059	8760	315.01	CO2	120000	4315	37801773

mmBtu / mbtu = million BTU

mmscf = million standard cubic feet

1 mmBtu = 1000000 btu

1 cf = 1015 btu

1 mmscf = 1000000 cf

Table 3: Potential to Emit TACs for new Plant 10 Boiler 4

Max Fuel Use mmscf/hr	Max Operation hr/yr	Max Fuel Use mmscf/yr	Pollutant	CAS Number	Emission Factor lb/mmscf	Emissions (pounds)	
						Max Hourly	Max Annual
0.03596059	8760	315.01	Acenaphthene	83329	1.80E-06	6.47E-08	5.67E-04
			Acenaphthylene	208968	1.80E-06	6.47E-08	5.67E-04
			Acetaldehyde	75070	3.10E-03	1.11E-04	9.77E-01
			Acrolein	107028	2.70E-03	9.71E-05	8.51E-01
			Ammonia	42604			
			Anthracene	120127	2.40E-06	8.63E-08	7.56E-04
			Arsenic	7440382	2.00E-04	7.19E-06	6.30E-02
			Barium	7440393	4.40E-03	1.58E-04	1.39E+00
			Benzaldehyde	100527	1.64E-02	5.90E-04	5.17E+00
			Benzene	71432	5.80E-03	2.09E-04	1.83E+00
			Benzo(a)anthracene	56553	1.80E-06	6.47E-08	5.67E-04
			Benzo(a)pyrene	50328	1.60E-06	5.75E-08	5.04E-04
			Benzo(b)fluoranthene	205992	1.80E-06	6.47E-08	5.67E-04
			Benzo(b,k)fluoranthene				
			Benzo(e)pyrene	192972			
			Benzo(g,h,i)perylene	191242	1.60E-06	5.75E-08	5.04E-04
			Benzo(k)fluoranthene	205823	1.80E-06	6.47E-08	5.67E-04
			Beryllium	7440417	1.20E-05	4.32E-07	3.78E-03
			1,3-Butadiene	106990			
			Butane	106978	2.10E+00	7.55E-02	6.62E+02
			Cadmium	7440439	1.10E-03	3.96E-05	3.47E-01
			Chlorine	7782505			
			Chlorobenzene	108907			
			2-Chloronaphthalene	91587			
			Chromium (total)	7440473	1.40E-03	5.03E-05	4.41E-01
			Chromium (hexavalent)	18540299			
			Chrysene	218019	1.80E-06	6.47E-08	5.67E-04
			Cobalt	7440484	8.40E-05	3.02E-06	2.65E-02
			Copper	7440508	8.50E-04	3.06E-05	2.68E-01
			Dibenzo(a,h)anthracene	53703	1.60E-06	5.75E-08	5.04E-04
			Dichlorobenzene	25321226	1.20E-03	4.32E-05	3.78E-01
			7,12-Dimethylbenz(a)anthracene	57976	1.60E-05	5.75E-07	5.04E-03
			Dioxins	1085			
			Ethane	74840	3.10E+00	1.11E-01	9.77E+02
			Ethyl Benzene	100414	6.90E-03	2.48E-04	2.17E+00
			Fluoranthene	206440	3.00E-06	1.08E-07	9.45E-04
			Fluorene	86737	2.80E-06	1.01E-07	8.82E-04
			Formaldehyde	50000	7.50E-02	2.70E-03	2.36E+01
			Furans	1080			
			Hexane	110543	4.60E-03	1.65E-04	1.45E+00

Table 3: Potential to Emit TACs for new Plant 10 Boiler 4

Max Fuel Use mmscf/hr	Max Operation hr/yr	Max Fuel Use mmscf/yr	Pollutant	CAS Number	Emission Factor lb/mmscf	Emissions (pounds)	
						Max Hourly	Max Annual
0.03596059	8760	315.01	Hydrogen Chloride	42302			
			Hydrogen Sulfide	7783064			
			Indeno(1,2,3-cd)pyrene	193395	1.80E-06	6.47E-08	5.67E-04
			Isopropanol	67630			
			Lead	7439921	5.00E-04	1.80E-05	1.58E-01
			Manganese	7439965	3.80E-04	1.37E-05	1.20E-01
			Mercury	7439976	2.60E-04	9.35E-06	8.19E-02
			3-methylchloranthrene	56495	1.80E-06	6.47E-08	5.67E-04
			Methyl chloroform	71556			
			2-Methylnaphthalene	91576	2.40E-05	8.63E-07	7.56E-03
			Molybdenum	7439987	1.10E-03	3.96E-05	3.47E-01
			Naphthalene	91203	3.00E-04	1.08E-05	9.45E-02
			Nickel	7440020	2.10E-03	7.55E-05	6.62E-01
			PAH's	1150	4.00E-04	1.44E-05	1.26E-01
			Pentane	109660	2.60E+00	9.35E-02	8.19E+02
			Perylene	198550			
			Phenanathrene	85018	1.70E-05	6.11E-07	5.36E-03
			Propane	74986	1.60E+00	5.75E-02	5.04E+02
			Propylene	115071	5.30E-01	1.91E-02	1.67E+02
			Pyrene	129000	5.00E-06	1.80E-07	1.58E-03
			OCDD	3268879			
			Selenium	7782492	2.40E-05	8.63E-07	7.56E-03
			Toluene	108883	2.65E-02	9.53E-04	8.35E+00
			Vanadium	7440622	2.30E-03	8.27E-05	7.25E-01
			Xylenes	1210	1.97E-02	7.08E-04	6.21E+00
			Zinc	7440666	2.90E-02	1.04E-03	9.14E+00

Table 4: ERCs Required for Plant 10 Boiler 4

Pollutant	Emission Increase (lbs/yr)	Offset Factor	ERCs Required (lbs)
NOx	3197	1.3	4157
PM	3197	1.1	3517

PM Offset Factor = 2:1 if interpollutant offsets are used

Table 5: Uncontrolled Emission calculation for Boiler 4

Heat Input	36.5 mmBtu/hr
F-Factor	8710 dscf/mmBtu
Flue Gas Volume	317915 dscf/hr at 0% O2
O2	3 %
Flue Gas Volume	371197 dscf at 5% O2 10511125 l/hr at 68 Deg F 9793642 l/hr at 0 Deg C
Concentration	30 ppm at 3% O2
NOx Volume	293.8093 l/hr at 0 Deg C
Molar Volume	22.414 l/mole 13.10829 moles
MW	46 g/mole
Emissions	602.9815 g/hr 1.328 lb/hr 11635 lb/yr 0.036 lb/mmBtu 5.8173 tons/yr

A

MANUFACTURERS DATA



INDUSTRIAL WATERTUBE BOILERS

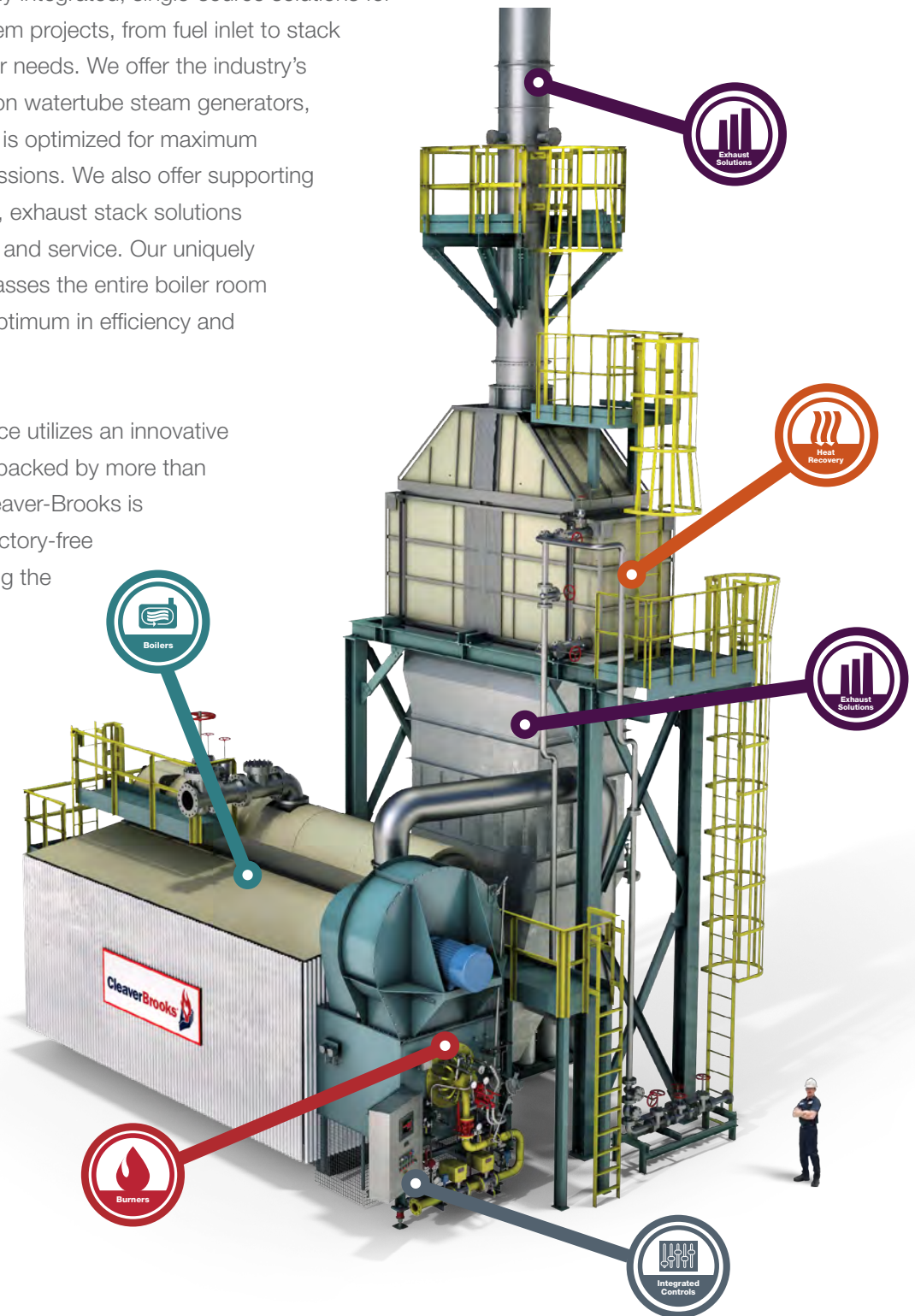
Innovative solutions for maximum efficiency

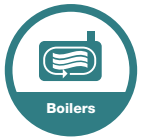
Industrial Watertube Boilers

Total Integration from the Company that Pioneered It

Only Cleaver-Brooks offers totally integrated, single-source solutions for every aspect of your boiler system projects, from fuel inlet to stack outlet, custom built to meet your needs. We offer the industry's widest range of natural circulation watertube steam generators, and every aspect of our system is optimized for maximum efficiency, reliability and low emissions. We also offer supporting controls systems, heat recovery, exhaust stack solutions and complete aftermarket parts and service. Our uniquely engineered integration encompasses the entire boiler room and is designed to deliver the optimum in efficiency and environmental sustainability.

Every industrial watertube furnace utilizes an innovative welded-membrane wall design backed by more than 80 years of experience. And Cleaver-Brooks is the only manufacturer with refractory-free boiler wall construction, including the burner throat.





Engineered Boiler Systems Product Overview

	Capacity	Fuel Type	Design Pressure	Application	Emissions
D-Style	10,000 to 500,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 1,800 psig	Steam, temperatures to 1,050°F	Available to <7ppm NOx* Ultra-low CO
A-Style	10,000 to 500,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 1,800 psig	Steam, temperatures to 1,050°F	Available to <7ppm NOx* Ultra-low CO
O-Style	10,000 to 500,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 1,800 psig	Steam, temperatures to 1,050°F	Available to <7ppm NOx* Ultra-low CO
Elevated Drum & Modular	200,000 to 1,000,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 1,800 psig	Steam, temperatures to 1,050°F	Available to <7ppm NOx* Ultra-low CO
FC-OSSG	150,000 to 500,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 2,500 psig	Saturated or superheated steam	Available to <7ppm NOx* Ultra-low CO
HRSGs	10,000 to 500,000 lb/hr Steam	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 2,300 psig	Steam, temperatures to 1,050°F	Available to <2ppm NOx* Ultra-low CO
High Temperature Hot Water & Thermal Fluid Heater	20 to 200 MMBTU/hr Water	Natural gas, refinery gas, #2 and #6 oil, alternative fuels, combination	Up to 2,300 psig	Hot water Fluid heater	Available to <7ppm NOx* Ultra-low CO

*available to <2ppm NOx with SCR

Watertube Boilers

10,000 to 500,000 lb/hr

Cleaver-Brooks uses our experience and expertise to ensure every watertube boiler we manufacture is the highest quality in the industry and offers the lowest operational costs possible for that style of boiler. We leverage our specialized engineering expertise to deliver fully customized steam solutions that meet your specific needs. Our extensive range of watertube products, delivering from 10,000 to 500,000 lb/hr of steam, are available in D-, A- and O-style configurations.

Both single- and dual-stage integral convective superheaters are available, and can accommodate Selective Catalytic Reduction (SCR) and CO catalyst. And you have your choice of firing natural gas, #2 and #6 oil, alternative fuels or a combination, available to <7ppm NOx.

FEATURES

- Membrane wall constructions are 100% water-cooled and refractory-free
- Grooved tube seats for improved tube-to-drum attachment
- Large, water-cooled furnace areas feature refractory-free burner throat to optimize emissions performance and longevity and reduce maintenance
- Fully welded gas seals are used throughout to ensure gas-tight operation

Capacities

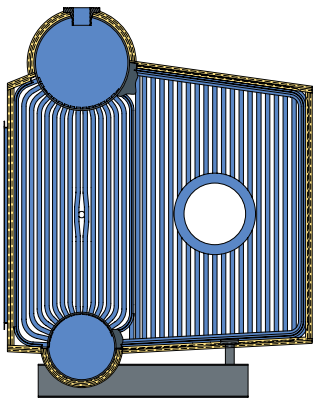
10,000 to 500,000 lb/hr

Design Pressure

Up to 1,800 psig

Steam Temperature

Up to 1,050°F



D-STYLE

The D-style is a 100% membrane water-cooled furnace, reducing costly, time-consuming, annual maintenance. The burner throat and the front and rear walls are welded and refractory-free, utilizing our burner design. D-style boilers can be customized to provide superheated steam. We offer both single- and dual-stage integral superheater systems with optional temperature control over turndown.



CBCW

It's never been easier to specify, purchase and install an Industrial Watertube Boiler.

Cleaver-Brooks has pre-engineered 17 different configurations based on the most popular customer needs and applications. All you need to do is identify key performance parameters and choose options on your CBCW boiler system, and because of the work we've already done, we can deliver a solution tailored to your specifications easier and faster than ever before.

The CBCW utilizes Cleaver-Brooks proven D-style boiler, burner, and state-of-the-art HAWK control system. Cleaver-Brooks can provide truly customized Industrial Watertube boiler solutions faster than ever without the costs typically associated with a fast-track customized order.

FEATURES

- 17 pre-engineered options that make it easy to specify, purchase and install an industrial watertube boiler
- Complete set of technical documents for unmatched equipment and project delivery
- Each component can be customized to meet project and application needs
- Complete package includes boiler, system matched burner, controls, economizer and exhaust stack



Capacities
10,000 to 225,000 lb/hr
Design Pressure
Up to 600 psig
Steam Temperature
Saturated Steam



Cleaver-Brooks Burners

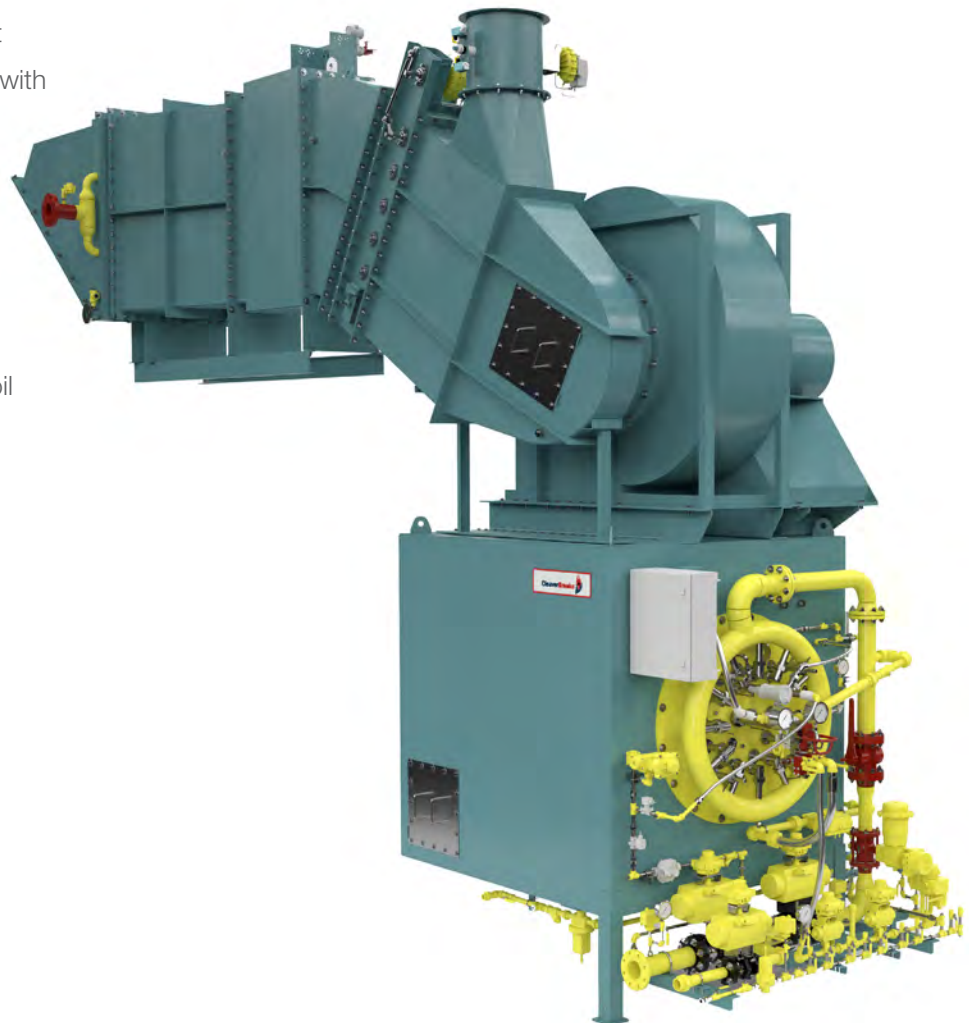
Unsurpassed engineering and testing

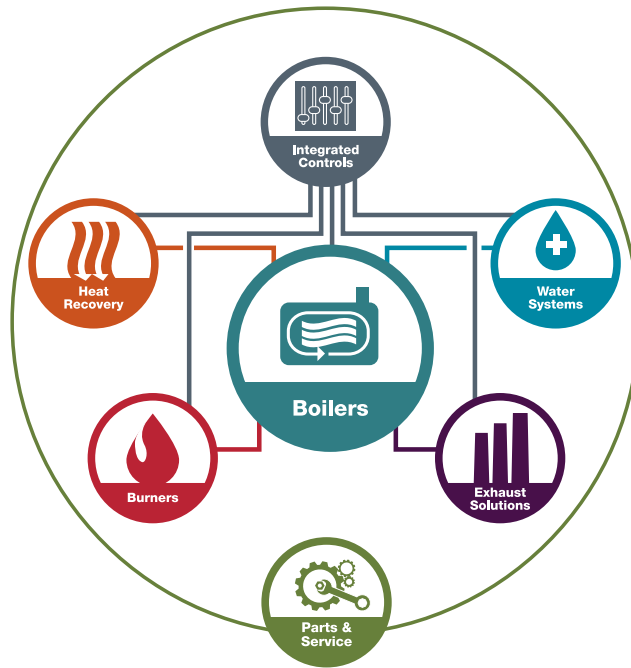
Every Cleaver-Brooks industrial watertube boiler is integrated with our burners, which are custom-built to exacting specifications to meet each application and furnace configuration, ensuring seamless integration and unmatched fit and finish.

Our advanced, in-house Computational Fluid Dynamics (CFD) modeling is the key to our revolutionary burner technology. Matching burner flame and furnace aerodynamics optimizes efficiency and lowers emissions without costly field tests. Simulations in a virtual environment provide calculations for fuel and air distribution in any furnace configuration. Our design provides ultra-low NO_x, ultra-low CO and minimal particulate matter (PM) emissions.

FEATURES

- Multi-fuels applications including natural gas, refinery gas, landfill gas (LFG) and other processed waste gases, light to heavy fuel oils, and liquid waste streams
- On-line adjustability and possible removal of individual gas injectors
- No refractory burner throat
- Unmatched flame stability with Center-Core technology
- NO_x levels available to <7ppm with FGR and <30ppm without FGR
- Ultra-low excess air for high efficiency
- High turndown ratio of 40:1 on gas and 10:1 on oil





Providing energy-efficient, environmentally friendly boiler room solutions

Cleaver-Brooks is one of only a few boiler room solution providers in the world to operate a dedicated research and development facility. Having pioneered several industry-leading technologies, we remain just as committed today to introducing technology and products that enable a more energy-efficient and environmentally friendly generation of steam and hot water.

We distribute our products through the Cleaver-Brooks Representatives Association, or CBRA, an alliance of independently owned and operated companies that provide boiler room products and service. CBRA companies can be counted on to provide Cleaver-Brooks products and parts, engineering support, customer training, technical service and system maintenance. To find a CBRA representative near you, please visit cleaverbrooks.com/reps.



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cleaverbrooks.com

B

ENGINEERING DESIGN TECH SPECIFICATIONS

SECTION 15515 - PACKAGED BOILER AND ACCESSORIESPART 1 - GENERAL1.01 SUMMARY:

- A. Furnish one (1) water-tube boiler complete with all auxiliaries and accessories including, but not limited to, the following:
1. Water-cooled furnace.
 2. Refractory, casing, insulation, and lagging.
 3. Fuel supply train with associated valves and instrumentation.
 4. Boiler trim.
 5. Burner, lighters, and accessories.
 6. Steam drum platform and handrails.
 7. Forced draft (FD) fan, motor, and VFD.
 8. Forced draft (FD) inlet duct.
 9. Forced draft (FD) inlet louvered penthouse.
 10. Safety and blow off valves.
 11. Combustion air preheater.
 12. Combustion air and flue gas ductwork.
 13. Burner management system (BMS).
 14. Combustion control system (CCS).
 15. Economizer.
 16. Base supported Stack.
 17. Dampers and Expansion Joints.
- B. Items Provided by Others:
1. Boiler foundations.

1.02 DESIGN PARAMETERS:

- A. Boiler Performance Gurantees:
1. Steaming Rate: 25,000 lbs/hr at drum outlet.
 2. Outlet Steam Pressure: 100 psig. (Downstream of stop valve)
 3. Outlet Steam Temperature: 338 °F.
 4. Maximum Heat Release: 85,000 Btu/hr/cu ft.
 5. Design Feedwater Conditions: 228 F and 150 psi.
 6. The volume heat release (total heat in fuel used / furnace volume) shall not exceed 85,000 Btu / hr / cu ft. Furnace volume shall not extend beyond the first row of water screen tubes at the inlet to the convection bank .
 7. Burner Turndown Ratios:
 - a. 5:1 when firing natural gas.
 - b. 3:1 when firing fuel oil.
 8. Emissions (guaranteed from 25% - 100% load):
 - a. Natural Gas
 - (1) Nitrogen Oxide (NO_x): Less than or equal to 0.010 lb/million Btu of heat input.
 - (2) Sulfur Oxide (SO_x): Less than or equal to 0.001 lb/million Btu of heat input.
 - (3) Carbon Monoxide (CO): Less than or equal to 0.075 lb/million Btu of heat input.
 - (4) Volatile Organic Compounds (VOC): Less than or equal to 0.004 lb/million Btu of heat input.

- (5) Particulate Matter (PM): Less than or equal to 0.01 lb/million Btu of heat input (condensables).
 - (6) Particulate Matter (PM₁₀): Less than or equal to 0.01 lb/million Btu of heat input (filterable plus condensables).
 - (7) Particulate Matter (PM_{2.5}): Less than or equal to 0.01 lb/million Btu of heat input (filterable plus condensables).
 - (8) Provide the expected rate for: Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrogen Chloride (HCL), and Mercury (Hg).
- b. Number 2 Fuel Oil
- (1) Nitrogen Oxide (NO_x): Less than or equal to 0.13 lb/million Btu of heat input.
 - (2) Sulfur Oxide (SO_x): Less than or equal to 0.205 lb/million Btu of heat input.
 - (3) Carbon Monoxide (CO): Less than or equal to 0.04 lb/million Btu of heat input.
 - (4) Volatile Organic Compounds (VOC): Less than or equal to 0.004 lb/million Btu of heat input.
 - (5) Particulate Matter (PM): Less than or equal to 0.03 lb/million Btu of heat input (condensables).
 - (6) Particulate Matter (PM₁₀): Less than or equal to 0.03 lb/million Btu of heat input (filterable plus condensables).
 - (7) Particulate Matter (PM_{2.5}): Less than or equal to 0.03 lb/million Btu of heat input (filterable plus condensables).
 - (8) Provide the expected rate for: Carbon Dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrogen Chloride (HCL), and Mercury (Hg).
- c. Refer to the appendix for fuel oil analysis
- B. Fuel Supply:
1. Primary:
 - a. Natural gas
 - b. Higher Heating Value: 1,000 Btu/cubic feet dry at 60°F and 30 in Hg
 - c. Pressure: 50 psig nominal, 40 psig minimum
 2. Secondary:
 - a. Number 2 Fuel Oil
 - b. Higher Heating Value: 140,000 Btu/gal
 - c. Pressure: 175 psig nominal, 150 psig minimum
- C. Boiler Operating Conditions:
1. Inlet Air Design Temperature: 0 °F – 120 °F.
 - a. Ambient air will be drawn from the roof. Fan shall be provided with necessary auxiliary equipment for proper operation with ambient air.
 2. Continuous Blowdown: 3.0%.
 3. Maximum Feedwater inlet design temperature of 228 °F and pressure of 150 psi from the deaerator.
 4. Maximum Excess Air:
 - a. Natural Gas: 15%.
 - b. Fuel oil: 15%
- D. General Operating Scope:
1. Boilers will be operated according to the following scope:
 - a. Primary – Gas Fired
 - b. Backup – Oil Fired (limited to less than 200 hours).
 - c. Hot Standby shall operate once per day

1.03 REFERENCES:

- A. Applicable Codes and Standards:
1. Design, construct, and test Equipment in accordance with applicable codes and standards including, but not limited to the following:
 - a. American Boiler Manufacturers Association (ABMA).
 - b. American Institute of Steel Construction (AISC).
 - c. American Society of Civil Engineers (ASCE).
 - d. American National Standards Institute (ANSI).
 - e. American Society of Mechanical Engineers (ASME):
 - (1) Boiler and Pressure Vessel Code Section 1 and B31.1. (Hereinafter referred to as the ASME Code).
 - f. American Society for Testing and Materials (ASTM).
 - g. American Welding Society Code (AWS).
 - h. Factory Mutual (FM).
 - i. International Society of Automation (ISA).
 - j. National Electrical Manufacturers Association (NEMA).
 - k. National Fire Protection Association (NFPA).
 - l. Society for Protective Coatings (SSPC).
 - m. Iowa State Department of Labor Division of Safety:
 2. All Work shall comply with the requirements of the federal government and the State of Iowa.

1.04 QUALITY ASSURANCE:

- A. Manufacturer shall have a minimum of ten years' operating experience under operating conditions and construction methods similar to those proposed and shall document experience.
- B. Tests:
1. The units shall be assembled in the factory and hydrostatically tested. Hydrostatic testing shall be at 150% of maximum working pressure on all pressure parts including piping.
 2. All controls shall be tested for electrical continuity.
 3. Furnace air test.
 4. Complete all required ASME Code testing.
 5. Notify Owner and Engineer at least two weeks in advance of all factory tests so that a representative may witness the tests, if desired. Test procedures shall be provided for review if requested.

1.05 SUBMITTALS:

- A. Submit as specified.
- B. Drawings showing additional detail if requested by Engineer or if otherwise required for installation and maintenance.
- C. Manufacturer's ASME Data Report.
- D. TECHNICAL SUBMITTALS: Items shall include, but not be limited to, the following:
1. Supplier's specifications.
 2. Catalogs, or parts thereof, of manufactured Equipment.
 3. Shop fabrication and erection drawings.
 4. General outline drawings of Equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates.
 5. Detailed Equipment installation drawings, showing foundation details, anchor bolt sizes and locations, base plate sizes, relative location of Purchaser's connections, and all clearances required for erection, operation, and disassembly for maintenance.

6. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, and one-line diagrams.
7. Bills of material and spare parts list.
8. Instruction books and operating manuals.
9. Material lists or schedules.
10. Performance tests on Equipment by Supplier(s).
11. P&IDs
12. All drawings, catalogs, or parts thereof, Supplier's specifications and data, samples, instructions, and other information specified or necessary:
 - a. For Purchaser to determine that the Equipment and Materials conform with the design concept and comply with the intent of the Contract Documents.
 - b. For the proper erection, installation, operation, and maintenance of the Equipment and Materials which Purchaser will review for general content but not for basic details.
 - c. For Purchaser to determine what supports, anchorages, structural details, connections, and services are required for the Equipment and Materials, and the effects on contiguous or related structures, Equipment, and Materials.

1.06 START-UP, INITIAL OPERATION AND TESTING:

- A. See Division 1 for Manufacturer's Field Services.

PART 2 - PRODUCTS

2.01 BOILER:

- A. Drums:
1. Boiler shall have one upper steam drum and one lower drum extending the full length of the furnace.
 2. The upper drums shall be complete with all necessary openings, internal steam separating devices, and internal chemical feed and blowdown piping.
 3. No part of a boiler drum shall be directly exposed to furnace radiation.
 4. Upper drum shall be provided with suitable connections for the following:
 - a. N-1 - Steam outlet (for superheater).
 - b. N-2 - Feedwater.
 - c. N-3 - Vent.
 - d. N-4 - Safety valves - number and size in accordance with the ASME Code.
 - e. N-5 - Pressure gauge.
 - f. N-6 - Pressure transmitter.
 - g. N-7 - Drum level Switches (4)/transmitters.
 - h. N-8 - Drum level Switches (4)/transmitters.
 - i. N-9 - Continuous Blowdown / Water Sampling.
 - j. N-10 - Water column with drum level alarms and high and low water cutouts.
 - k. N-10 - Drum level Switches (4)/transmitters.
 - l. N-11 - Chemical feed.
 - m. N-12 - Test.
 5. Lower drum(s) shall be provided with suitable connections for the following:
 - a. N-13 - Drains.
 - b. N-14 - Intermittent Blowdown / Blowoff.
 - c. N-15 - Hot standby steam.
 - d. N-16 - Hot standby condensate.

6. Drums shall be fusion-welded throughout with all welds made, tested, radiographed, and stress relieved in strict accordance with the ASME Code.
 7. Steam drum internals shall have the following:
 - a. Means to assure even distribution of feedwater to downcomers.
 - b. Alloy steel chemical feed pipe.
 - c. Continuous blowdown piping.
 - d. Steam and water sample piping.
 - e. Steam deflecting baffles.
 - f. Sized so that they can be removed through manholes.
 - g. Maximum moisture content from the drum outlet shall be limited to 0.5%.
 8. Steam drums shall have two manholes located at opposite ends of the drum. Minimum size of each manhole to be 12 inches by 16 inches with machined seat and steel cover to swing inward. Manholes shall be complete with all gaskets and bolts.
 9. Furnish for contractor to install high temperature blanket insulation for upper and lower drums and cover with steel or aluminum alloy jacketing with minimum thickness of 0.024 inch. Furnish removable end insulation covers.
 10. Lower drum(s) shall be equipped with steam coils to maintain boiler in a hot standby condition. Lower drum shall have access to remove and install the coils from outside the drum.
- B. Tubes:
1. Boiler and water wall tubes shall be not less than 2 inches in diameter and of hot drawn seamless steel and a thickness in accordance with the ASME Code for the specified design pressure.
 2. The tubes shall be designed and arranged to provide for natural circulation in the proper direction at all loads.
 3. All tubes shall be designed to allow scale removal from both ends and shall be welded to the drums. No tube shall enter the lower drum below the horizontal drum centerline or enter the steam drum above the minimum water level.
 4. Tubes shall not have any reverse bends or pockets which would prevent complete drainage of the boiler.
 5. Tube entrance to drums and headers shall be normal (perpendicular) to drum or header surface where feasible.
- C. Superheater:
1. Provide a two stage, inverted loop type drainable convection pass superheater designed for full steam flow.
 2. Superheater elements shall consist of seamless steel T-22 tubes arranged in multiple passes as required to provide proper performance with regard to temperature control and pressure drop.
 3. Provide and install all required braces, hangers and supports suitable for the operating conditions and temperatures to properly support the superheater elements and headers. Support shall be internal or integral to the steam generator.
 4. Superheater shall be provided with suitable connections for the following:
 - a. Steam inlet connection.
 - b. Steam outlet connection.
 - c. Superheater safety valve.
 - d. Superheater startup vent.
 - e. Superheater drain.
 - f. Attenuator.
 - g. Superheater vent (if required).
 - h. Temperature indicator.

- i. Provide crossover piping from steam drum to superheater. Provide with vent/sampling and thermowell connections.
- D. Walls and Casings:
 1. Outer furnace walls shall be fully welded, membrane type construction. Refractory corners are acceptable.
 2. Wall construction shall be backed with high temperature blanket insulation to minimize the outer casing temperature to a nominal 130°F at maximum furnace temperature.
 3. Convection pass walls shall be fully welded, membrane wall construction.
 4. The front walls shall be water cooled and shall be constructed of tube and membrane seal welded design. Vendor to provide associated refractory, insulation, and lagging to complete the front wall.
 5. The rear walls shall be water cooled and shall be constructed of tube and membrane seal welded design. Vendor to provide associated refractory, insulation, and lagging to complete the rear wall.
 6. All water-cooled surfaces covered by refractory or fire brick are not to be used in the calculation of radiant heat transfer surface.
 7. The distance from the centerline of the burner(s) to the centerline of the walls and roof tubes shall be sufficient to preclude flame impingement on tubes.
 8. All insulating and refractory materials shall be certified asbestos free.
 9. The binder used in the insulation shall show no deterioration at 100°F higher operating temperature than the actual operating temperature where the material is applied. Binders shall be water repellent and not produce noxious or toxic off gas when heated.
 10. Provide single airtight casing design system. Where not provided by membrane wall construction, a minimum 10-gage steel shall be used. An outer lagging of steel not lighter than 12-gage shall also be provided.
 11. The inner casing or pressure envelope shall be field air tested at the furnace design pressure or a minimum of 10 inches W.G. Allowable leakage shall be zero. All leaks shall be repaired and the casing retested.
- E. Access and Observation Ports:
 1. Observation ports:
 - a. Provide at least three ports located at strategic points in the furnace wall.
 - b. Ports shall be minimum 3-inch diameter.
 - c. The observation ports shall afford complete vision of burner throat and flame.
 2. Furnace Access: An access opening in addition to the burner opening shall be provided to the boiler furnace area. The opening shall be sized to allow access for maintenance. The opening shall be secured properly for a gastight seal.
 3. Convection Access: Access openings shall be provided for inspection and water washing of the convection tube bank. . The opening shall be sized to allow access for maintenance. The openings shall be secured properly for a gastight seal.
- F. Structures and Bases:
 1. The steam generator shall be built on a rigid steel frame ready for setting on Owner's foundation.
 2. The economizer, stack, and ductwork shall be supported on a rigid steel frames which will be mounted on the Owner's foundation.
 3. Lifting and jacking lugs shall be furnished with the unit.
 4. The design of the setting shall assure freedom of expansion or contraction of the unit during operation at the normal operating temperatures.
 5. Provide anchor lugs at the zero point(s) of base expansion.
 6. Provide supports for and provide a 3 foot wide platform with handrails that extends the entire length of the upper drum, and stair and platform at the burner face for access to all

safety valves, instrumentation, and control/operating devices. All other platforms will be built around the boiler by the Owner.

- G. Boiler Trim: The boilers as specified herein, shall be provided with the following boiler trim Equipment. This Equipment shall be identified on drawings, tagged, and inventoried for field mounting where factory mounting is not possible, complete with integral connecting piping, valves, and fittings. All valves and control apparatus are to be designed for the specific application which it is used. All control valves shall be as manufactured by Fisher. All valves shall be as manufactured by Crane, Swagelock, Parker, Rockwell-Edwards, or Yarway unless specified otherwise. Wherever appropriate, gaskets shall be 0.175-inch spiral-wound Type 304 stainless steel with non-asbestos filler, 1/8-inch-thick carbon steel gauge rings, Flexitallic Style CG - Flexite Super or approved equal.
1. Safety Valves:
 - a. Provide safety valves of the quantity and size as required by the ASME Code.
 - b. Valves shall be manufactured by Consolidated or Crosby.
 - c. Ship loose with bolts and gaskets for field assembly.
 - d. Provide adequately sized and supported vent lines.
 2. Vent and Drain Valves:
 - a. Provide all ASME Code required vents and drains on boiler and furnished accessories.
 - b. Provide all vents and drains with OS&Y gate valves.
 - c. Provide double drain valves for all lower drum drains.
 - d. Provide drum vents, as required.
 3. Water Columns and Gauge Glasses:
 - a. Shall be as manufactured by Diamond, Yarway, or Reliance with high and low water alarm switches, necessary blowdown piping, and valves.
 - b. Low-Low and High-High Water Cutoff: In addition to the drum low and high water level alarms, redundant low-low and high-high water cutouts shall be provided to affect a safety shutdown of the burner when water level in the drum reaches a predetermined level.
 - c. Provide gauge glasses with chainwheel operated isolation valves, drain cock, and piping in accordance with the ASME Code. Provide sufficient chain to facilitate operation from ground floor.
 4. Drum level switches.
 - a. Shall be as manufactured with necessary valves and blowdown piping.
 - b. Indicator shall be mounted on the combustion control panel.
 5. Continuous Blowdown Stop and Control Valves:
 - a. Furnish one stop valve and one continuous blowdown control valve shipped loose for field assembly.
 - b. Stop valves shall be as follows:
 - (1) Forged steel Y-pattern body.
 - (2) Valve body shall be 600-pound carbon steel.
 - (3) Bolted or welded bonnet.
 - (4) Loose back seat.
 - (5) Hardened-type 420 stainless steel seats and disc rings.
 - (6) Full-port design.
 - c. Control valves shall be as follows:
 - (1) Valve body shall be 600-pound carbon steel ASTM A105, Grade 2, angle type with socket weld end connections.
 - (2) Stem shall be of stainless steel AISI 416 H.T. 600 provided with a micrometer position indicator.

- (3) Supply with blowdown curve indicating blowdown flow versus handwheel turns open.
6. Stainless steel chemical feed block and check valves for each unit mounted on drum chemical feed connection.
7. Boiler outlet Stop-Check and Isolation Valves(Manual and Automatic). Valves shall be standard buttweld ends.
8. Boiler feedwater inlet stop valve and check valves. Valves shall be standard buttweld ends.
9. Feedwater Piping:
 - (1) Provide Fisher ETCAVIII control valve with isolation valves and globe body bypass valve.
 - (2) Valve body shall be 600-pound carbon steel ASTM A105, Grade 2, with butt weld end connections.
 - (3) Stem shall be of stainless steel provided with a micrometer position indicator.
 - (4) Cage and seat shall be stainless steel.
 - (5) Accessories shall include digital positioner and HART communication capability.
10. Provide root valves for all instrument taps and pressure gauges.

2.02 ECONOMIZER:

- A. The economizer shall be rectangular, designed for full flue gas flow, and manufactured and tested in accordance with the requirements of Section VIII, Division I of the ASME Boiler and Pressure Vessel Code
- B. Economizer shall be a vertical counterflow heat transfer design.
- C. Economizer shall have hinged, gas-tight inspection panels, providing complete access to the entire heating surface for inspection, tube removal, and cleaning.
- D. Economizer shall be provided with 1" or 2-inch continuously welded finned tubes with a maximum of six fins per inch and a minimum of four fins per inch.
- E. Tubes shall have a minimum wall thickness based upon tube material selected.
- F. Fins shall be carbon steel or Engineer approved material.
- G. Provide one 4" flanged inlet and one 4" flanged outlet feedwater connection.
- H. Economizer shall be fully ventable and drainable. Provide capped vent and drain connections with double valves.
- I. Provide with minimum 10-gage reinforced steel casing with flanged connections for flue-gas ductwork connections.
- J. The maximum economizer outlet water temperature is 400 °F to prevent boiling in the economizer.
- K. Economizer flue gas exit temperature shall not be less than 300 °F.
- L. Maximum flue gas pressure drop shall be two (2) inches of water and maximum feedwater pressure drop shall be ten (10) psi.
- M. Temperature drop at full load shall be designed to maximize packaged boiler performance while meeting the inlet and outlet pressure and temperatures limitations of the system.
- N. Design economizer for loading imposed by flue gas ductwork.
- O. Provide with safety valve.
- P. Provide economizer with factory installed insulation and lagging system. Design insulation to achieve a nominal surface temperature not exceeding 130 °F.

2.03 STACK

- A. Design and fabricate one (1) flue stack.
- B. Stack shall be mounted on structural steel provided by this contract.
- C. Stack shall be mounted on and supported by the floor.
- D. The boiler house roof can take 8 Kips horizontal force from each of the 3 stacks under wind load. The top steel elevation for the roof is 950'-0".
- E. Provide breeching from the economizer outlet to the stack.
- F. Top of stack shall extend eighty six feet above the operating floor.
- G. Each stack shall have two (2) – 4" flanged CEMs ports located 6' above the roof. Final port locations shall be verified with the engineer.
- H. Each stack shall have two (2) – 4" flanged RATA ports located 4' above the roof. Final port locations shall be verified with the engineer.
- I. Design stack to conform to ASME/ANSI STS-1-2011 - Steel Stacks.
 - 1. The stack shall be designed to resist stresses resulting from the weight of the stack, the effects of temperature both vertically and circumferentially, and the effect of wind or earthquake, whichever is greater. See DIVISION 1 for structural criteria.
 - 2. The structural shell shall be designed for both static and dynamic conditions under wind and seismic loading. The structural design shall consider loading due to circumferential wind moments, resonant wind, and vortex shedding.
 - 3. The stack shall be analyzed for static wind load in accordance with DIVISION 1 of this specification.
 - 4. Seismic design shall be in accordance with DIVISION 1 of this specification.
 - 5. Design for vortex shedding considerations shall be in accordance with ASME/ANSI STS-1-2011.
 - a. The stack design shall conform to minimum calculated m^1 criteria as specified herein. The intent of this criteria shall be for Contractor to provide a stack with small vortex shedding deflections such that the equations in Appendix 5C of ASTM/ANSI STS-1-2011 apply.
 - 6. Critical wind speeds shall be:
 - a. Calculated in accordance with equation 8 of ASTM/ANSI STS-1-2011 using $S=0.2$ and the natural frequencies of the shell.
 - b. Considered for the fundamental mode and for all higher modes where the calculated $V_C < 1.3V_D$.
 - c. Equivalent static load, stack stresses, and foundation loads due to vortex shedding shall be determined for all cases where $V_C < 1.3V_D$ in accordance with Appendix 5C of ASTM/ANSI STS-1-2011 and as follows:
 - (1) Equivalent static load for vibrations in the fundamental mode shall be determined in accordance with Method 1 - Case B.
 - d. Hanging chain damping methods shall not be used.
 - e. Guying will not be allowed.
 - f. Fins will not be allowed.
 - 7. Maximum allowable stress in plates shall conform to the standards previously referenced and shall not exceed 15,000 psi. Allowable stresses shall be consistent with fabrication and erection tolerances, plate imperfection, and misalignment.
 - 8. The stack deflection, assuming 100% loss of the specified corrosion allowance, shall not exceed 2 inches per 33 feet of stack height.
- J. Shell and Breeching Materials of Construction:
 - 1. The shell shall be constructed of ASTM A36 steel.
 - 2. The plate thickness of the stack and breeching shall be as required by structural design plus 1/16-inch provision for corrosion with a minimum total thickness of 1/4-inch.

3. The stack and breeching welding, shop and field, shall be complete penetration welds only and shall be subject to spot radiographic testing. The shop welding shall be tested by Contractor. The frequency of testing shall conform to the more stringent of the following criteria:
 - a. One spot radiograph shall be taken in the first 10 feet of completed butt joint of each type and thickness welded by each welder or welding operator.
 - b. A minimum of one spot radiograph shall be taken in each 100 feet of joint of the same type and thickness.
 - c. A minimum of four spot radiographs (one for each 90° quadrant) shall be taken from each horizontal butt joint.
 - d. A minimum of two spot radiographs shall be taken from each horizontal butt joint (taken from opposite faces of the shell).
 - e. At least 25% of selected spots shall be at junctions of vertical and horizontal joints.
 4. The stack shall be supplied with extensions as required at breeching to interface with ducting to economizer.
 5. All openings in the shell shall be continuously reinforced with rigid frame construction. The head, sill, and jamb reinforcing shall be designed to replace the shell of the section removed.
 6. Tolerances:
 - a. The diametrical out of roundness of any section shall not exceed 1% of the diameter of the section.
 - b. Maximum vertical deviation in 10-foot length shall not exceed 1/4-inch.
 - c. The maximum misalignment of plates at any joint shall not exceed 1/8-inch or 25% of the plate thickness, whichever is less. Local dents shall not be deeper than half the nominal plate thickness.
 - d. The base ring shall be perpendicular to the centerline axis of the stack, with maximum allowable deviation of 1 inch in 100 feet.
 7. The stack shall be shop fabricated in maximum size sections practical.
- K. Base Ring:
1. Provide 360° base ring.
 2. Shall provide full laterally and vertically restraint of stack to the foundation.
- L. Welding:
1. All welding shall be shielded metal arc, submerged arc, or flux cored arc.
 2. For ASTM A36 steel, use E70 electrodes for shielded metal arc welding, F7 series electrodes for submerged arc, and E70T series electrodes or flux-cored arc welding.
 3. Conform to AWS Code, AISC Manual Part 4, and the AISC Quality Criteria and Inspection Standards.
 4. In addition to the nondestructive weld testing specified, Contractor shall perform inspection of shop welds in accordance with AWS code to determine the acceptability of welds. The inspector shall be an AWS Certified Welding Inspector. Correct defective welds in accordance with AWS D1.1.
 5. Backing plates at each section of the stack shall be provided for alignment for shop and field welding of each can section.

2.04 DUCTS, DAMPERS, AND EXPANSION JOINTS:

A. Ducts:

1. The boiler shall be complete with all ducts from the louvered intake penthouse to the FD fan inlet, from the FD fan to the boiler, boiler to the economizer, FGR duct from the economizer outlet to the FD fan inlet, and from the economizer outlet to the stack.

2. All duct work shall be of stiffened 3/16-inch ASTM A36 plate, welded construction with a minimum of flanged connections.
 3. Ducts shall be provided with access doors and drains. Access doors shall be a minimum of 14"x18".
 4. Provide minimum 2-inch flanged drain connection at low point of all ducts.
 5. Duct turns greater than 60° shall have turning vanes.
 6. Duct work shall be designed such that air velocity does not exceed 3,600 fpm at any point at maximum rating of the steam generators.
- B. Dampers, if used:
1. Dampers shall be rectangular opposed blade type designed to control flow from 10% of design flow to full design flow.
 2. Frames shall be constructed of heavy carbon steel structural members, ASTM A36.
 3. Damper shafts shall be provided with self-lubricated sleeve bearings. Bearings shall be mounted outside of duct or flue insulation. Provide with dust tight stuffing boxes.
 4. Damper control shall be by Beck actuators or Engineer approved equal.
- C. Expansion Joints:
1. Materials in all expansion joints shall be fabric type, asbestos free and suitable for continuous operation at the maximum operating pressures and temperatures encountered in each application.
 2. Expansion joints shall consist of fabric belt with clamping bars, bolts, nuts, washers, and angle frames.
 3. Design belt joints for replacement from outside of the ductwork.
 4. Expansion joints shall have weld end connections.
- D. Furnish the following ducts. Provide a minimum of one expansion joint for each of the following duct segments.
1. From the louvered intake penthouse to the FD Fan inlet
 2. From FD fan to windbox.
 3. From boiler to economizer.
 4. Flue Gas Recirculation Duct:

- a. Size for required recirculation flow to achieve specified emission limits. b. Provide with flow regulating damper.
 - c. Damper shall include manual operation
 - 5. From economizer to the stack.
 - E. Insulation and Lagging: Duct insulation and lagging will be by others.
- 2.05 AIR PREHEATER COILS:
- A. Provide fan inlet coils mounted in combustion air duct designed to heat boiler combustion air. B. Performance of the fan inlet coils shall :
 - 1. Inlet Steam: 90 psig, 450 degrees F
 - 2. Air inlet: -9 Degrees F
 - 3. Air outlet: 55 Degrees F C.
 Coils shall be as follows:
 - 1. Arranged so each element can be completely drained in place.
 - 2. Provided with structural angle frame designed for coil removal from building interior.
 - 3. Equipped with 5/8-inch od or larger steel tubes with steel fins and steel headers. Fin spacing shall not be closer than 6 fins per inch.
 - 4. Provide with Class 300 raised face flanges on each inlet and outlet connection.
- 2.06 LOUVERED INTAKE PENTHOUSE
- A. Fixed blade drainable aluminum louvers, with birdscreen.. B. Integral downspouts
 - C. Sloped Sill
 - D. 12" Curb
 - E. Aluminum frame and roof
 - F. AMCA Rated.
- 2.07 AIR INTAKE SILENCERS A.
- Manufacturer:
 - 1. VAW Systems Model/Type:33 VRIB-63 Inlet Silencer
 - 2. Or approved equal
 - B. Function
 - 1. The combustion air intake silencer reduces noise resulting from combustion air intake flow into the FD fans.
 - C. Design Data
 - 1. Max. Design Pressure Drop: 2.0 in. w.g.
 - 2. Design Noise Level: 85 dBA
- 2.08 FUEL BURNING EQUIPMENT: A.
- General:
 - 1. The boiler shall be equipped with an integrated burner, consisting of burner, pilot burner, electric ignition electrode, flame safeguard controls, and instrumentation.
 - 2. The boiler shall also be equipped with forced draft fan described in 2.06.B.
 - 3. The boiler shall be furnished with a natural gas piping train.
 - 4. The boiler shall be furnished with a fuel oil piping train.
 - 5. The burner, flame safeguard, BMS, CCS and fuel piping are to be designed in accordance with NFPA 85 - Boiler and Combustion Systems Hazard Code. All Equipment shall be Factory Mutual approved.
 - B. Burner:

1. Burner and accessories shall be as manufactured by Coen, Todd, Natcom or Engineer approved equal.
 2. The burner shall be forced-draft register type suitable for firing natural gas or fuel oil
 3. Burner register shall have manual externally operated air inlet vanes which can be adjusted during operation.
 4. Burner shall be mounted in a steel plate windbox arranged to ensure an even flow of combustion air to the furnace.
 5. Burner shall be provided with a minimum of one Pyrex observation port.
 6. Burner throat shall be designed to shape the flame to the furnace cross section and shall be formed by refractory shapes as supplied by the burner manufacturer. It shall be backed by a firebox quality refractory material to minimize the possibility of wall failure, and the wall shall be completely supported by a refractory bull ring of super-duty arch brick.
 7. Fuel oil Guns:
 - a. Fuel oil guns shall be fitted to permit easy removal and cleaning during unit operation.
 - b. Incorporate a blowout device which will use the atomization media for purging of the atomizer into the furnace during boiler operation so that the fuel oil gun may be removed without dripping or leaking.
 - c. Furnish piping, isolation valves, and flexible hoses for the atomization media and fuel oil supply to each gun.
 - d. Furnish rack for gun and hoses.
 8. Pilot Systems:
 - a. Provide with electric ignition electrode with transformer and pilot burner for each burner.
 - b. Pilot burners shall be designed for interrupted control in which the pilot burns during light off and is shut off automatically during normal operation of the main burners.
 - c. Pilot burner shall be operated with natural gas.
 9. Scanners:
 - a. Acceptable Flame Detector Manufacturers: Flame detectors shall be supplied by one of the following manufacturers and shall be as required for flame safeguard system:
 - (1) Honeywell Controls Co.
 - (2) Fireye Co.
 - (3) Coen Co
 - b. Provide flame scanner(s), with signal(s) to each burner safeguard system as required by code, for supervision of main burner flame and pilot.
 - c. Flame scanner(s) shall be designed for easy removal and maintenance.
 - d. Flame scanner(s) shall be infrared type which also monitors the frequency of the flame to be detected.
 - e. Flame scanner shall be suitable for use with both natural gas and ULSD.
- C. Pilot Gas Supply Systems:
1. Provide pilot gas supply system complete with all piping, valves and instruments connected to the burner gas supply system piping, including, but not limited to, the following:
 - a. Pilot gas isolation valves.
 - b. Pilot gas strainer.
 - c. Pilot gas pressure-regulating valve sized for forty (40) psig inlet gas pressure, if required.
 - d. Two solenoid-operated pilot gas safety shut-off valves (automatic opening, spring to close).

- e. Solenoid operated vent valve (automatic closing, spring to open). f. Power operated vent valve (Automatic opening, spring to close). g. Pilot gas supply at windbox pressure gauge.
 - h. Pilot gas pressure switch.
 - 2. All piping shall be ASTM A53, Grade B steel pipe with Class 150 malleable iron fittings and Class 150 steel-threaded valves.
- D. Burner Gas Supply System:
- 1. Gas supply system shall be provided complete with all piping, valves, instruments and accessories from single burner/pilot gas connection including, but not limited to, the following:
 - a. Gas supply pressure regulator sized for forty (40) psig inlet gas pressure. b. Gas strainer.
 - c. Inlet gas supply pressure gauge.
 - d. Burner gas supply at windbox pressure gauge. e. Gas supply high-pressure switch.
 - f. Gas supply low-pressure switch.
 - g. Gas fuel flow control valve with adjustable characteristic.
 - h. Two power operated safety shutoff valves (Automatic opening, spring to close). Shutoff valves are to be provided with closed limit switches.
 - i. Power operated vent valve (Automatic opening, spring to close).
 - j. Leakage test connections with manual shutoff valves near burner and on gas vent line. k. Manual burner gas supply isolation valve.
 - 2. All piping shall be ASTM A53, Grade B steel pipe with Class 150 malleable iron fittings and Class 150 steel-threaded valves. E.
- Burner Fuel Oil Supply Systems:
- 1. Boiler fuel oil supply system shall be provided complete with all piping, valves, and instruments from a single supply termination point including, but not limited to, the following:
 - a. Low fuel oil supply pressure switch.
 - b. High fuel oil supply pressure switch. c. Fuel oil strainer.
 - d. Fuel oil flow control valve with adjustable characteristic.
 - e. Two power-operated fuel oil safety shutoff valves (automatic opening, spring to close). Provide closed position limit switches for each shutoff valve.
 - f. Inlet supply pressure gauge.
 - g. Inlet pressure regulator valve.
 - h. Burner fuel oil supply at windbox pressure gauge. i. Manual isolation plug valve at burner.
 - 2. All piping shall be ASTM A53, Grade B steel pipe with Class 150 malleable iron fittings and Class 150 steel-threaded valves. F.
- Atomizing Media Supply Systems:
- 1. Provide a steam supply system for atomizing media complete with all piping, valves and instruments to point designated on Drawing M002P.
 - 2. All atomization, and aspirating requirements and shall be connected to Owner's 400 psi steam system. The atomization system shall include, but shall not be limited to, the following:
 - a. Atomizing air shutoff valve. b. Atomizing media strainer.
 - c. Atomizing media/ fuel oil pressure regulating valve. d. Atomizing media manual shutoff valve.
 - e. Atomizing media pressure interlock switch.

- f. Burner atomization media pressure gauge with root valve. g. Atomizing media/ fuel oil differential pressure switch.
 - 3. All piping shall be ASTM A53, Grade B steel pipe with Class 600 malleable from fittings and Class 600 steel-threaded valves.
 - G. Instrument Air
 - 1. Provide Instrument air from a common boiler termination point. This single termination point shall serve all boiler instrument air requirements and shall be connected to Owner's (80 to 90 psi) plant air system operating at 70psi.
 - 2. All piping shall be ASTM A53, Grade B steel pipe with Class 300 malleable from fittings and Class 150 steel-threaded valves.
- 2.09 COMBUSTION AIR SYSTEM:
- A. Windbox:
 - 1. Windbox shall be manufactured of A36 or Engineer approved steel plate with sides of windbox a minimum of 1/4-inch thick, and shall be designed to provide even and uniform air entrance into the burner register.
 - 2. Windbox shall be seal welded to the boiler front plate, and shall be of sufficient size to provide air cooling of a major portion of the boiler front plate.
 - 3. Provide a windbox damper if required, for air flow control including control linkage.
 - B. Forced Draft Fan:
 - 1. Provide one forced draft fan (per boiler).
 - 2. Forced draft fan shall be of the non-overloading backwardly-inclined air-foil blade type.
 - 3. Fan speed shall not exceed 1,800 rpm.
 - 4. Fan shall operate without excessive vibration when operating from 10% to 120% of design capacity. Excessive shall be defined as a vibration velocity greater than 0.100-inch per second measured at the bearing cap.
 - 5. Fan shall be equipped with inlet vanes, complete with Static locking mechanism..
 - 6. Design capacity shall be the flow rate of all air required for the maximum heat input stated herein with 80 °F ambient air, including 15% excess air plus a safety factor of 15%.
 - 7. The fan static pressure shall be the pressure required for the above flow conditions plus a safety factor of 20%. The required static pressure shall include the pressure drop through the fan silencer (which may be required to reduce noise to the allowable levels), boiler, economizer, plus 5 in w.c. for outlet ductwork and stack.
 - 8. Provide flexible gear or grid type coupling as manufactured by Fast or Falk. Overhung fan is not allowed.
 - 9. Furnish with OSHA-approved coupling guard.
 - 10. Fan shall be driven with an electric motor, sized so that its nameplate rating will not be exceeded when operating at the conditions as specified above including a 1.15 safety factor. Motor shall be designed in accordance with Division 16 - MOTORS, ACCESSORIES, VARIABLE SPEED, AND FREQUENCY DRIVES. .
 - 11. The motor will be inverter duty for use with a Variable Frequency Drive (VFD), to be provided under this contract.
 - 12. Fans shall be designed so that the first critical speed will not be less than 125% of the maximum operating speed.
 - 13. Fan wheel and shaft shall be dynamically balanced in the fan housing.
 - 14. Fan housing shall be provided with one access door.
 - 15. Fan bearings shall meet the following:
 - a. The bearings shall be located on both sides of the housing (non-overhung design) and shall be supported on structural steel pedestals with separate soleplates and shall be independent of the housings. Bearings shall be outside the inlet vanes or boxes.

Thrust bearings shall be provided to withstand the load resulting from operation with the inlet vanes closed.

- b. The bearings shall be of the air-cooled, ring oiled self-aligning sleeve type. Bearing housings shall be provided with oil level sight glasses.
- 16. Fan shall be selected, tested, and furnished to meet sound attenuation requirements as follows:
 - a. Provide complete with all material as required to limit fan sound power level to the maximum allowable specified, including but not limited to inlet and outlet silencers complete with inlet screens and transition pieces, acoustical insulation and/or entire fan-drive motor enclosure.
 - b. Fan sound power levels shall not exceed that specified below:

	<u>Octave Band Center Frequency, Hz</u>							
	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1K</u>	<u>2K</u>	<u>4K</u>	<u>8K</u>
Maximum Allowable (dBA)	82	72	64	59	55	52	49	47

A-weighted Sound Power Level 64 dBA at 30 feet or 85 dBA at 3 feet.

- c. Fan sound power level shall be determined by the fan manufacturer for the fan when operating at its rated gas volume flow and total pressure. Testing shall be according to the conditions of AMCA (Air Moving and Conditioning Association, Inc.) Standard 300-67, "Test Code for Sound Rating". Data shall be reported as sound power levels referenced to 10⁻¹² watt in eight octave bands with center frequencies from 63 Hz to 8000 Hz.
- d. Fan sound power data shall be furnished with the proposal and shall include inlet and outlet power levels.

2.10 BURNER MANAGMENT SYSTEM:

- A. The Burner Management System (BMS) shall be provided and programmed by the Supplier. B. The Supplier shall provide the following:
 - 1. Control logic narrative.
 - 2. Cause and effect diagrams.
 - 3. HMI graphics.
 - 4. Other submittals, as specified.
- C. The BMS, burner management system shall supervise the boiler and assure safe burner light- off and firing conditions at all times for the boiler.
- D. The BMS shall perform the following functions:
 - 1. Establish interlocks to prove the following:
 - a. Purge.
 - b. Ignition.
 - c. Shutdown.
 - d. Trip permissives.
 - 2. Monitor flame stability for safe operation and automatically initiate shutdown if dangerous conditions develop.
 - 3. Accept, display and transmit signal measurements from fan vibration monitoring and motor bearing temperature monitoring systems.
- E. The BMS shall be a complete system including, but not limited to, the following equipment:
 - 1. Local BMS panel with 15” touch screen operator interface, Schneider Electric Magelis XBTGT7340 or Allen-Bradley equivalent, mounted at the burner front.
 - 2. Flame scanners.
 - 3. Allen-Bradley ControlLogix or Modicon Quantum PLC as follows:

- a. Communication hardware capable of communicating with the Owner's DCS through redundant Modbus TCP/IP protocol.
 - b. Redundant 24V I/O power supplies.
 - c. All I/O 24 V individually fused.
 - d. BMS panel/ HMI supplied under this contract will be located at the burner front.
 - e. See SECTION 253100
- F. The BMS logic and design shall comply with Factory Mutual and the requirements of latest version of NFPA-85 with the more stringent standard taking precedence in the event of any conflict.
- G. The functional operation of the BMS shall be Automatic Nonrecycling as defined by the latest version of NFPA-85 and as follows:
- 1. Nonrecycling: high steam pressure shall be treated as a safety shutdown condition.
 - 2. Operator shall be required to initiate a restart after either an operator initiated shutdown or a safety shutdown occurs.
- H. The BMS shall perform in accordance with the requirements of NFPA-85 and at least the following additional functions and/or definitions:
- 1. Prefiring:
 - a. Manually select boiler load destination and control mode (manual or automatic load control).
 - 2. Light-off:
 - a. Provide for intermittent gas igniter.
 - b. Modulation shall be accomplished by the combustion control system.
 - 3. Normal Shutdown:
 - a. Operator initiated.
 - b. High steam pressure initiated. Shutdown fan in 0-5 minutes following post purge.
 - 4. Safety Shutdown:
 - a. Following post purge, the forced draft fan can be shutdown.
 - b. The following shall initiate a safety shutdown.
 - (1) High or low burner fuel gas supply pressure.
 - (2) Loss of combustion air supply.
 - (3) Loss or failure to establish flame.
 - (4) Loss of control system actuating energy.
 - (5) Power failure.
 - (6) Low water level.
 - (7) High steam pressure.
 - (8) Forced draft fan trip.
 - (9) Excessive furnace pressure.
 - (10) Manual trip actuated.
- I. Provide the necessary programming to enable full remote lightoff of the boiler from the Owner's DCS operator interface through communication with the BMS panel.
- J. A BMS enclosure panel shall be provided as follows:
- 1. See SECTION 251400 for panel specification.
 - 2. Supplied with System Reset Button
 - 3. Supplied with Circuit Breaker
 - 4. Supplied with Mushroom head red emergency trip button (hardwired).
 - 5. Supplied with Audible Alarm.

2.11 COMBUSTION CONTROL SYSTEM: (Full Metered Control Arrangement): A.

General:

- 1. The Combustion Control System (CCS) will be provided, programmed and executed by the Supplier.

2. The Supplier shall provide the following as relates to the CCS:
 - a. Control logic conforming to the requirements of this Article. b. ISA drawings defining control logic for the boiler control.
 - c. Any and all instrumentation required for full metered control of boiler.
 - d. Any and all instrumentation required to accomplish the system described below. e. Allen-Bradley Control Logix or Modicon Quantum PLC as follows:
 - (1) Communication hardware capable of communicating with the Owner's DCS through redundant Modbus TCP/IP protocol.
 - (2) Redundant 24V I/O power supplies.
 - (3) All I/O 24 V individually fused.
3. HMI graphics on BMS HMI.
4. The CCS will provide full metered logic control.
5. Provide the necessary programming to enable full remote lightoff of the boiler. B.

Boiler Master Control:

1. A boiler master controller will be configured by the manufacturer in the CCS as follows:
 - a. In automatic, the signal provided by the plant master loop will control the boiler load. The owner's DCS will provide the steam header pressure.
 - b. In manual, the boiler load will be controlled by the operator.
 - c. The boiler master will provide bias capability. C.

Fuel-Air Ratio Control:

1. The fuel-air ratio control shall be of parallel cross-limited type.
2. The cross-limited feature shall ensure that the fuel flow does not exceed measured air flow.
3. The cross-limit shall also prohibit the airflow demand from dropping below the measured fuel flow.

D. Fuel Control:

1. The fuel flow demand from the boiler master will be high-limited by the measured air flow to ensure that fuel flow demand does not exceed the air available for combustion.
2. The fuel controller demand shall be compared to the actual fuel flow signal. Any error shall be applied to the fuel controller which will produce a change in fuel demand in a direction that will reduce the error to zero.
3. Interlocks shall position the fuel valve automatically to a light-off position when commanded to do so by the BMS system. E.

Air Control:

1. The air flow demand from the boiler master (via the ratio control) shall be low-limited by the measured total fuel flow to ensure that the airflow demand will be sufficient for the amount of the fuel being fired.
2. The air flow demand shall be limited to a minimum air flow of no less than 25% of the maximum continuous rated load air flow.
3. The air flow demand shall be compared to the measured air flow and any existing error applied to the air flow controller which will position the fan inlet vanes and/or windbox damper to reduce the error to zero.
4. Interlocks shall automatically position the burner control dampers to light off and purge positions when commanded to do so by the BMS.
5. The operator shall be able to manually adjust the flue gas oxygen by biasing the air flow controller set point.
6. The system shall control gas recirculation flow as required to provide operation meeting flue gas emissions limitations. F.

Feedwater Control:

1. The boiler feedwater control system shall be of the three-element type, using the following signals:
 - a. Steam flow.

- b. Feedwater flow.
 - c. Boiler drum level.
 - 2. The boiler steam flow signal shall be the primary demand for feedwater flow.
 - 3. The steam flow signal shall be modified by the boiler drum level controller working on the error between the measured boiler drum level and its desired set point.
 - 4. The modified steam flow signal shall be the final feedwater demand.
 - 5. An adjustable set point for boiler drum level shall also be furnished as part of the operating station switchable between 3 element and single element control.
 - B. O₂ Trim Control:
 - 1. The O₂ trim controller shall be integrated into the overall control scheme such that excess O₂ can be controlled within a safe range.
 - 2. The fuel-air ratio control shall override O₂ trim control during load swings such that the cross-limiting control allows safe operation of the boiler's fuel-air mixture controls.
- 2.12 INSTRUMENTS AND CONTROL DEVICES:
- A. Furnish and install all instruments and control devices as required to accomplish the burner safeguard and analog control system and monitoring functions as specified in this Section, including, but not limited to, the specific devices listed below. All transmitters requiring calibration shall be factory calibrated. Calibration sheets shall be submitted to Owner. Instruments shall include a stainless steel nameplate stamped with the instrument tag. Transmitters shall be SMART w/ HART protocol.
 - B. Furnish and install the following devices on the boiler assembly. Installation shall include all mounting hardware and accessories, all process sensing tubing, all air filters and pressure regulators, and air supply tubing to the common boiler compressed air termination point. All wiring from each applicable device shall be factory wired to the associated control panel or system to the maximum extent practical. Where complete shop wiring is not practical, wire to a junction box at the point of installation on the boiler. For Equipment located off of the boiler, provide a terminal strip in the control cabinet for field wiring to the device by others. If any freestanding cabinet(s) are provided, provide terminal strips in boiler mounted junction box and freestanding cabinets to facilitate interconnecting field wiring by others.
 - 1. Flow Measuring Elements:
 - a. Provide multi-variable vortex steam flow transmitter specified below.
 - b. Provide vortex feedwater flow element with the feedwater flow transmitter specified below.
 - c. Provide vortex attemperator water flow element with the attemperator water flow transmitter specified below.
 - d. Provide thermal mass flow meters for the natural gas coordinated with transmitter specified below.
 - e. Provide Coriolis fuel oil mass flow meter.
 - f. Provide annubar-type coordinated with transmitter for air flow transmitter specified below.
 - g. Provide other flow measuring elements as required. Steam, Feedwater, Fuel Gas and Fuel oil flow elements shall be provided to be installed outside of Supplier's piping.
 - 2. Flow Transmitters:
 - a. Provide the following flow transmitters, by manufacturers as noted (or Engineer-approved equal)
 - (1) Air flow: Rosemount or Yokogawa
 - (2) Steam flow (Located off of the boiler): Rosemount or Yokogawa 8800 MultiVariable Vortex Mass Flow Transmitter

- (3) Feedwater flow (Located off of the boiler): Rosemount or Yokogawa Vortex
 - (4) Attenuator water flow (Located off of the boiler): Rosemount or Yokogawa Vortex
 - (5) Natural gas flow (Located off of the boiler): Fox FT3 Thermal Mass Meter
 - (6) Fuel oil flow: Micromotion
 - (7) Others as required.
- b. D/P type flow transmitters shall be furnished with 3-valve manifold.
3. Pressure Transmitters:
- a. Provide the following pressure transmitters:
 - (1) Steam drum pressure. Rosemount or Yokogawa
 - (2) Fan inlet pressure. Rosemount or Yokogawa
 - (3) Economizer inlet feedwater pressure. Rosemount or Yokogawa (4) Economizer outlet feedwater pressure. Rosemount or Yokogawa (5) Windbox / Furnace differential pressure. Rosemount or Yokogawa (6) Other transmitters as required. Rosemount or Yokogawa
 - (7) Superheater outlet pressure. Rosemount or Yokogawa
 - (8) Furnace pressure. Rosemount or Yokogawa
 - (9) Economizer outlet flue gas pressure. Rosemount or Yokogawa
 - (10) Gas supply pressure. Rosemount or Yokogawa (11) Gas to burner pressure. Rosemount or Yokogawa (12) Oil supply pressure. Rosemount or Yokogawa (13) Oil to burner pressure. Rosemount or Yokogawa
 - (14) Atomizing steam pressure. Rosemount or Yokogawa
 - b. Type and model shall be as required, subject to approval by Engineer.
 - c. Pressure transmitters shall be furnished with block and bleed valves. D/P meters shall be furnished with 3 valve manifold
4. Pressure Switches:
- a. Provide the following pressure transmitters: (1) Furnace pressure high. (2) Windbox pressure high. (3) Gas supply pressure high. (4) Gas supply pressure low. (5) Fuel oil supply pressure high. (6) Fuel oil supply pressure low. (7) Pilot fuel low pressure. (8) Instrument air pressure low. (9) Burner combustion air flow. (10) Burner purge air flow (11) Other switches as required.
 - b. High pressure (psig) switches shall be Ashcroft or United Electric. c. Low pressure (inches WC) switches shall be Dwyer.
 - d. Type and model shall be as required, subject to approval by Engineer.
 - e. Pressure switches shall be furnished with block and bleed valves. D/P switches shall be furnished with 3 valve manifold
5. Temperature Transmitters:
- a. Temperature transmitters shall be Rosemount or Yokogawa
 - b. Transmitters shall contain all signal conditioning such that the output is linear with temperature.
 - c. Transmitter shall be integral with thermowell, element, and nipple/union.
 - d. Element shall be RTD type.

- e. Make and model shall be subject to the approval of Engineer. f. Provide the following temperature transmitters:
 - (1) Boiler Economizer outlet flue gas temperature. (2) Boiler Economizer inlet flue gas temperature.
 - (3) Boiler Economizer inlet water temperature. (4) Boiler Economizer outlet water temperature. (5) Steam temperature at superheater 1 outlet.
 - (6) Steam temperature at superheater 2 outlet. (7) Air temperature after preheat coil.
 - (8) Air temperature to windbox. (9) Oil supply temperature.
- g. Provide protection tubes for flue gas elements and tapered thermowells for pipeline elements.
- 6. Flue Gas Oxygen Analyzer:
 - a. Furnish a flue gas oxygen analyzer system with remote calibration system.
 - b. Probe assembly shall be designed for mounting in flue gas duct. Electronics and gas system control shall be mounted on or adjacent to combustion control panel.
 - c. Furnish a complete operating system.
 - d. Furnish and install a flange in flue gas duct to accommodate oxygen analyzer probe. e. Include flame arrestor for zirconium oxide elements.
 - f. Provide power supply internal but separately fused with cabinet power.
 - g. Provide output to trip burner safeguard system on low oxygen level.
- 7. Level Transmitters:
 - a. Provide level transmitters for the boiler drum as follows.
 - (1) Three Differential Pressure Type: SMART differential pressure type with HART and constant head chamber, manufactured by Rosemount or Yokogawa. D/P level transmitters shall be furnished with a 3-valve manifold. Differential pressure shall be primary means to control drum level. (2) One Electrode Column Type: Electrode column level transmitter shall provide primary means to alarm on high and low water levels. Clark Reliance preferred.
- 8. Gauges:
 - a. For each gauge, provide a root valve at the process connection, an instrument shutoff valve, a plugged test tee, a pulsation dampener, double blowdown valves, and connecting tubing except where noted.
 - b. Drum pressure gauge shall be supplied with an 8-1/2-inch dial. Select scale range so that normal operating pressure does not exceed 60% of full scale. Include gauge siphon. Gauge shall be mounted above windbox and be viewable from grade at the burner front.
 - c. Provide a steam temperature gauge at the boiler outlet with a 5-in dial. Select scale range so that normal operating temperature does not exceed 60% of full scale. Include gauge siphon.
 - d. Provide engraved plastic nameplate for each gauge, white with black characters.
- 9. Instrument Air Accessories:
 - a. Furnish self-contained, spring-loaded diaphragm type combination filter-regulators with integral relief valve, outlet gauge, and drain cock upstream of each air operated control drive.
 - b. Scope of supply shall include, but is not limited to, the following: (1) Feedwater regulating valve controller. (2) Natural Gas control valve controller. (3) Fuel oil control valve controller

- (4) All other required control drives.
10. Digital Positioners (I/P):
- a. Furnish positioners on all pneumatically actuated control valves and drives. Fisher
 - b. Positioner input shall be 4 – 20 mA and output shall be as required for actuator or drive.
 - c. Positioners should have HART communications capability.
11. Tubing shall be shop installed on the burner and shall be as follows:
- a. For each instrument or control device installed by this Contract, furnish the following where applicable:
 - (1) Instrument shutoff valve in sensing line.
 - (2) Plugged test tee in sensing line.
 - (3) Pulsation dampener.
 - (4) Blowback valve for each combustion air and flue gas sensing line.
 - (5) Blowdown valve for each steam and fuel.
 - (6) Air supply line filter and pressure regulating valve.
 - b. Use stainless steel tubing for the following:
 - (1) Pneumatic signal lines (1/4-inch).
 - (2) Combustion air pressure (3/8-inch minimum).
 - (3) Flue gas pressure (3/8-inch minimum).
 - (4) Steam pressure (1/2-inch minimum).
 - (5) Gas pressure (3/8-inch minimum).
 - c. Tubing: provide ASTM A312 stainless steel with the following accessories:
 - (1) Instrument shutoff valves: Class 3000 316 stainless steel.
 - (2) Blowdown valves: Class 6000, ASTM 182 Grade F6 or 316 stainless steel.
12. Wiring:
- a. All wiring shall be color coded, and each wire termination shall be numbered in accordance with the applicable wiring diagram.
 - b. All electrical wiring on the unit shall be of moisture-resistant and special heat resistant material where used in high temperature zones.
 - c. All other wiring shall be installed in rigid galvanized steel conduit and shall conform to the requirements of the National Electrical Code.
 - d. Flexible steel conduit shall be allowed for installations of less than 6 feet.
 - (1) Provide liquid-tight conduit with flexible galvanized steel core and a synthetic rubber or thermoplastic covering.
 - (2) Furnish with 200°F PVC jacket such as "Hi-Temp Liqueatite Type H.T. Electri-Flex" manufactured by Electri Flex Company Roselle, Illinois or approved equal.
- C. All instruments, electrical equipment and panels shall be rated to be compliant with Class I - Division II, Group C & D area classification.

2.13 PAINING:

- A. Surface Preparation: SSPC-SP10 commercial blast and 1.5 to 2.0 mils profile depth.
- B. Apply manufacturer's standard primer and finish coats to 8 mils minimum dry film thickness on all steel items except no paint within 3 inches of edges to be welded. Interior and exterior of stack shall be coated with 3 mils of high temperature paint, Ameron 892 HS siloxane silicone-alkyd aluminum or Engineer-approved equal. Surface preparation and painting shall be in accordance with coating manufacturer's recommendation. Color of paint to be chosen by Owner.

PART 3 - EXECUTION – Not Applicable
END OF SECTION 485196

Appendix
X Grade Ultra Low Sulfur Diesel Fuel Specifications

Product Property	Test Method	Origin Test Results		Deliveries ¹
		Minimum	Maximum	
Gravity, °API	D287	Report		
Color	D1500		2.5	3.0
Distillation	D86			
50% Recovered, °F		Report		
90% Recovered, °F		540	640	
OR				
Simulated Distillation	D2887			
50% Recovered, °F		Report		
90% Recovered, °F		572	672	
Copper Corrosion	D130		1	
Cetane				
(1) Cetane Number	D613	40.0		
OR (2) Cetane Index, Procedure A	D4737	40.0		
Cetane Index ²	D976	40		
Flash Point, °F	D93	140		130
Stability				
(1) Thermal, % reflectance	D6468 (W)	75		
	D6468 (Y)	82		
Aging Period (Minutes)	D6468	90		
OR (2) Potential Color ³ and	MPL P. Color		6	
Potential Gum, mg/100 ml ⁴	MPL P. Gum		50	
OR (3) Oxidation, mg/100 ml	D2274		2.5	
Carbon Residue on 10% Bottoms, %	D524		0.35	
Cloud Point, °F	D2500		⁵	
Pour Point, °F	D976		⁵	
Viscosity, cSt at 104°F	D445	1.9	4.1	
Ash, wt%	D482		0.01	
Haze Rating ⁶	D4176		2	3
NACE Corrosion	TM0172	B+		
Sulfur, ppm ⁷	D2622		*10	

¹ Delivered products meets all applicable requirements at time and place of delivery.

² ASTM D976 data is required for low sulfur fuel oils to demonstrate aromatics compliance per the EPA.

- ³ The Potential Color will be determined by ASTM method D1500 on a filtered sample after a 16 hour induction period by ASTM method D525 modified. Contact Magellan QC to request a copy of this method.

- 4 The Potential Gum will be determined by ASTM method D381 modified (Steam Jet Evaporation at 485°F) after a 16 hour induction period by ASTM method D525 modified. Contact Magellan QC to request a copy of this method.

5

<u>Month</u>	<u>Pour Point °F, max.</u>	<u>Cloud Point °F, max.</u>
January	0	+14
February	0	+14
March	0	+14
April	+10	+20
May	+10	+20
June	+10	+20
July	+10	+20
August	0	+14
September	0	+14
October	0	+14
November	0	+14
December	0	+14

- 6 Compliance with ASTM D4176 will be determined using Procedure 2 at 77°F or tank temperature at the time of sampling, whichever is lower.
- 7 All results provided must use an EPA qualified instrument.
- *Sulfur limit, 11ppm for interconnecting pipelines.

SECTION 15525 - DEAERATORSPART 1 - GENERAL1.01 SUMMARY:

- A. This Section includes packaged, factory-assembled deaerators complete with all required feedwater pumps with VFDs, valves, piping and instrumentation

1.02 REFERENCES:

- A. Applicable References (Latest Edition):
 - 1. ASME International (ASME):
 - a. B16.5 - Pipe Flanges and Flanged Fittings, NPS 1/2 to NPS 24.
 - b. B16.9 - Factory-Made Wrought Steel Buttwelding Fittings.
 - c. B16.11 - Forged Fittings, Socket-Welding and Threaded.
 - d. B31.1 - Power Piping.
 - e. B31.9 - Building Services Piping.
 - f. PTC 12.3 - Deaerators.
 - g. ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
 - 2. ASTM International (ASTM):
 - a. A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - b. A106 - Seamless Carbon Steel Pipe for High-Temperature Service.
 - 3. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
 - a. SP-83 - Class 3000 Steel Pipe Union, Socket Welding and Threaded.
 - 4. National Electrical Manufacturers Association (NEMA):
 - a. 250 - Enclosures for Electrical Equipment (1,000 Volts Maximum).
 - 5. NFPA:
 - a. 70 - National Electrical Code.

1.03 DEFINITIONS:

- A. Feedwater Pump: Pump that moves feedwater from the deaerator to the boiler.
- B. NPSH: Net-positive suction head.

1.04 SUBMITTALS:

- A. General: Submit each item in the Article in accordance with SECTION 01330 Submittals.
- B. Product Data: For each type of product indicated. Include rated makeup water, feedwater, and steam flow rates; working pressure; tank capacities; storage capacity in minutes; temperature and NPSH required; pump performance curves with selection points clearly indicated; furnished specialties; and accessories.

SECTION 15525 - DEAERATORS: continued

- C. Shop Drawings: For deaerators, signed and sealed by a qualified professional engineer; include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, and attachments to other work.
 - 1. P&IDs with limits of all work (i.e. mechanical, electrical, controls)
 - 2. For installed products indicated to comply with design loads, include structural analysis data.
 - 3. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints as applicable and for designing deaerator stand.
 - 4. Wiring Diagrams: Power, signal, and control wiring.
- D. Field quality-control test and startup reports.
- E. Operation and Maintenance Data: For deaerators to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE:

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: ASME B31.1 for systems more than 15 psig and ASME B31.9 for systems equal to or less than 15 psig. Safety valves and pressure vessels shall bear the appropriate ASME label.

1.06 DELIVERY, STORAGE, AND HANDLING:

- A. Protect flanges, pipe openings, nozzles, bearings, and couplings from damage during shipping and storage.
- B. Comply with manufacturer's written rigging instructions.
- C. Deliver deaerator as a factory-assembled unit with protective crating and covering. Indicate and deliver, if necessary, separately shipped components complete in proper crating with installation instructions for the Subcontractor.
- D. Unloading will be the responsibility of the Subcontractor.
- E. Transporting the deaerator from its temporary location to permanent location will be the responsibility of the Subcontractor.

1.07 COORDINATION (BY SUBCONTRACTOR):

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in DIVISION 3.

1.08 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Gaskets: Furnish one replacement gasket for each gasketed opening.

C

SUPPLIER PROPOSAL



10261 Matern Place
Santa Fe Springs, CA, 90670
Phone: (714) 257-0900
Fax: 714-257-1176
www.rfmacdonald.com

BAKERSFIELD
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SAN FRANCISCO
SONOMA/NAPA

June 22, 2020

Melynda Steward
Burns & McDonnell - MO
9400 Ward Parkway
Kansas City, MO, 64114-3319

Re: Lockheed Martin Building 603 Utility Infrastructure Expansion
Quotation: QUO-99577-N0P9Q6
Revision: 3

Dear Melynda,

In response to your request we are pleased to offer our proposal for the equipment described in the attachments. The following changes have been made:

- Included instrumentation requested per C&E comment #160
- Added combustion air ducting (structural support and installation by others)
- Added FGR piping (Structural support, insulation and installation by others)
- Included Air and FGR damper positioner feedback
- Included lockable root isolation valves

Thank you for the opportunity to quote on your requirements. We trust that we will be able to review this proposal with you at your convenience. In the meantime if you have any questions or require additional information please let me know.

Sincerely,

David Lawson

David Lawson
Boiler Sales Engineer
R.F. MacDonald Co.
Phone (562) 447-7487
David.Lawson@RFMacDonald.com

AJ Feliz
Director of Engineering
RF MacDonald Co.
Phone 714-412-4055
Anthony.Feliz@RFMacdonald.com

INTRODUCTION

Only **Cleaver-Brooks' Engineered Boiler Systems** offers single source responsibility for every aspect of your industrial steam system projects, from burner to stack, custom built to fulfill your exact needs. Our **NEBRASKA boilers** and **CLEAVER BROOKS burners** have long been the industry benchmarks for quality and engineering. When they're incorporated into a complete system, built and maintained by us, you are getting the best solution, the highest efficiency, and the lowest emissions possible.



For your unique application, we are offering a packaged system with the following design features:

- **OUTLET STEAM CONDITIONS:**

Gross Steam Capacity:	25,000 Lb/hr
Operating Pressure:	100 psig (at exit of non-return valve)
Steam Temperature:	Saturated
Steam Quality:	99.5% dry steam

- **BOILER DESIGN:**

Type:	D-Type Industrial Watertube
Model:	NB-400D-75
Vessel Design Pressure:	250 psig

- **BURNER DESIGN:**

Type:	Cleaver Brooks Low NOx Burner
Main Fuel:	Natural Gas
Backup Fuel:	None

- **SCR DESIGN:**

Reagent:	Anhydrous Ammonia
Arrangement:	Horizontal Gas Flow
Outlet NOx:	<5 PPM
NH ₃ Slip:	<5 PPM
Estimated NH ₃ Consumption:	0.6 lbs/hr (main fuel)

- **ECONOMIZER DESIGN:**

Type:	Rectangular Finned-Tube
Arrangement:	Vertical Gas Flow; Counter-Current Water Flow
Design Pressure:	300 psig
Inlet Feedwater Temp:	228°F

- **STACK DESIGN:**

Type:	Freestanding - Grade Mounted
Diameter (at exit):	36 inches
Height (from grade):	30 feet

BOILER DESIGN FEATURES

- **D-Type BOILER**

Our proven NEBRASKA D-Type boiler series is an ideal solution to almost any steam need. Our unique design incorporates a 100% membrane watercooled furnace with minimal refractory. This feature greatly eliminates the costly & time consuming annual maintenance associated with older refractory boiler designs. In fact, the membrane front & rear walls (including all of the corner gas seals) are completely refractory-free, including the burner throat when paired with our exclusive CLEAVER BROOKS burner.

- **DESIGN STANDARDS**

The design, material, and workmanship of all pressure parts is in strict conformance with the rules and regulations in effect at the date of contract as required by:

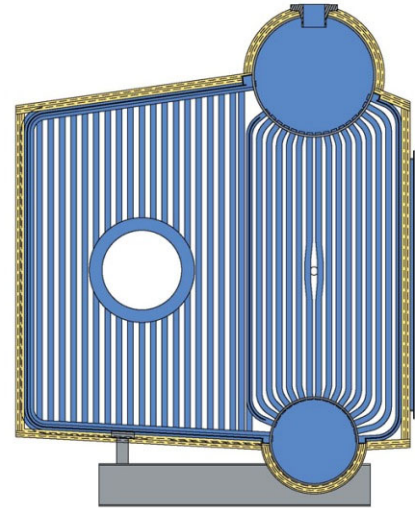
1. THE ASME BOILER AND PRESSURE VESSEL CODE.
2. The Laws of the State in which the equipment is to be installed (as applicable).
3. Requirements of the Hartford Steam Boiler Inspection and Insurance Company, under whose inspection the pressure parts of each unit shall be constructed.

- **FACTORY TESTS**

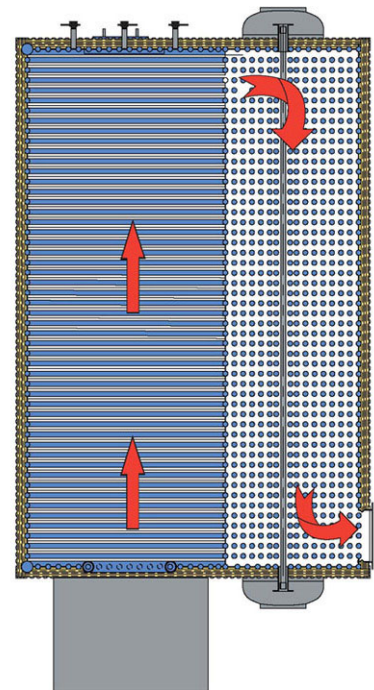
A hydrostatic test at one and one-half times the design pressure is applied to the pressure parts in accordance with the ASME Code. For most applications, a factory casing pressure test is also performed to ensure gas-tight design.

- **DATA REPORTS & BOILER REGISTRATION**

Two (2) copies of the Manufacturer's Data Report are provided. Each boiler is registered with the National Board of Boiler & Pressure Vessel Inspectors and with the State Boiler Inspection Department in the State in which the boiler will be installed (as applicable).



Cross-section view



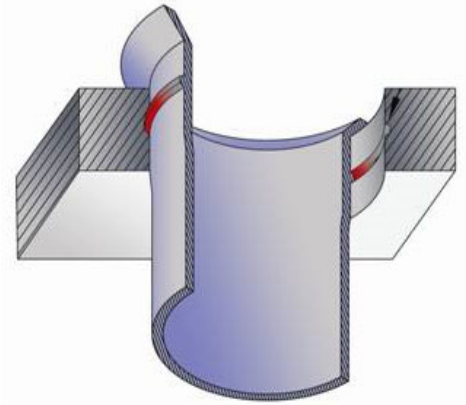
Plan view showing gas flow

- **BOILER DRUMS**

Our in-house drum rolling equipment ensures tight manufacturing tolerances and superior quality control.

Boiler drums are fusion welded in accordance with the latest ASME Boiler and Pressure Vessel Code Section I covering power boilers, including X-raying and stress-relieving as required and under the inspection of Hartford Steam Boiler Inspection and Insurance Company.

All tubes holes are drilled true and radially, to afford full parallel bearing of tubes through the drum plate. Each tube hole is serrated with single or multiple grooves, as required by the design pressure. This insures a seal that is tight when expanded and stays leak-free when in operation. For some severe-duty applications, the tube-to-drum connections are also seal-welded. All drums have an elliptical manway with cover in each head. Lifting lugs are provided on the drums to facilitate rigging.



Serrated and rolled tube-to-drum connection

- **LOWER DRUM BLOW OFF**

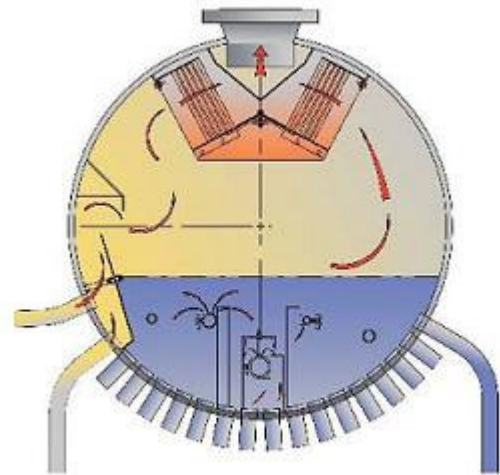
The lower drum is provided with one or two connections at the lowest point for draining and discharge of precipitates. A slotted collector angle of proper proportion is provided for blowing the unit down. These blow-off valves also serve as boiler drains.

- **STEAM BAFFLE SYSTEM**

All boiler tubes shall discharge into the upper steam drum inside a baffled compartment designed to act as a primary steam-water separator system. Steam discharge from the baffle outlet shall be horizontal above the normal water level.

Secondary steam separation shall be effected by use of a chevron or labyrinth steam drier from which dry steam is delivered to the steam outlet connection.

The steam after the boiler outlet shall contain no more than 0.5% moisture if saturated steam or < 1.0 ppm TDS if superheated steam. The solids concentration of the boiler water shall not exceed the recommended values as recommended by ASME. Higher steam purity is available for certain applications.



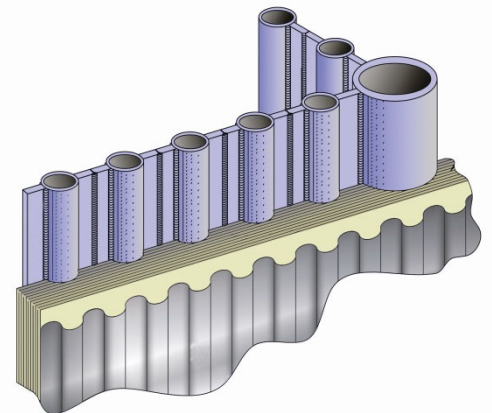
Steam drum cross-section showing typical internals

- **BOILER TUBES**

Cleaver-Brooks' in-house tube mill ensures tight manufacturing tolerances and superior quality control. Tube bends shall be made on an 8" radius with mandrel inserted during bending to prevent distortion at the bend. Tube arrangement shall be in line. Tubes shall be in proper alignment with tube holes and shall be exact length for proper expanding and flaring. All tubes shall be on 4" centers.

- **BOILER WELDED WALLS**

All tubes in the furnace shall be membrane (watercooled) tubes except those where the gases leave the furnace and enter the convection section. The last row in the convection section shall be membrane (watercooled) tubes except in the area where the flue gases leave the boiler. The adjacent membrane fins of each outboard furnace and convection tube wall shall be continuously seal-welded together, forming a water-cooled, gas tight inner seal. The inboard row of membrane wall tubes between the furnace and convection zone shall also be seal-welded together to prevent short-circuiting of flue gas from the furnace to the boiler flue gas outlet. Membrane fins shall be ¼" by 1" steel, fused continuously to opposite sides of the tubes by electric welding. Super plastic refractory shall be installed to protect the entire length of water and steam drums from radiant heat where exposed to the furnace between the two rows of furnace tubes.



Membrane wall construction

- **BOILER FRONT & REAR WALLS**

The front & rear walls of the boilers are of membrane tube construction. The watercooled burner throat shall be of the ring header design. The walls will be backed with mineral wool and ceramic fiber blanket. Corner gas seals are welded and refractory-free.

- **BOILER CASING**

Most boilers are available with 2 types of outer casings. The aluminum casing uses 0.04" pebble grain lagging. The welded steel outer casing is constructed of 12-gauge SA36 steel that is primed & painted. Refer to the scope of supply contained herein for details on the proposed casing.

Our standard offering guarantees an average casing surface temperature of 140°F in an ambient temperature of 90°F and a surface wind velocity of two (2) feet per second while the boiler is operated continuously at full load.

- **BURNER THROAT**

CLEAVER BROOKS burners do not require a traditional refractory burner throat. Instead, a cylindrical stainless steel sleeve is installed into the watercooled membrane furnace frontwall in an effort to reduce the costly & time-consuming maintenance and repair associated with refractory burner throats. The burner unit is then inserted into this sleeve as part of a fully integrated boiler/burner package. The burner throat is refractory-free.

- **BOILER BASE**

The boiler base is constructed of heavy I-beams or welded heavy beams & channels. The boiler weight shall be uniformly distributed over the entire area of the boiler base. Material is SA-36.

- **BOILER PAINT FINISH**

All non-aluminum portions of the outer casing shall be finished as follows:

Surface Preparation: SSPC-SP3 or as specified

Casings: One (1) coat primer
One (1) coat of industrial water-based, color: Boiler Blue or customer preference.

Drum Heads: One (1) coat high-temp paint, color: Boiler Black, Silver or equal.

- **OBSERVATION PORTS**

Each boiler includes three (3), air-cooled observation port assemblies, located in the furnace target wall. Additional observation ports are included in the windbox register area.

INCLUDED EQUIPMENT:

- **BURNER**
Burner Model: NCB-130-G1-01-30
Burner Location: Indoor
Combustion Air Intake: Flanged (ducting by others)
Gas Supply Pressure [psig]: 50
Fuel Train Code: NFPA 85
Area Classification: Non-hazardous
- **ECONOMIZER**
Economizer Type: Staggered Serrated
Economizer Model: E4-ST-SER-5
Economizer Tube Material: SA178 Gr A
Economizer Tube Thickness [in.]: 0.105
- **SCR System**
Reagent: Anhydrous Ammonia
Inlet NOx: <5 PPM
Ammonia Slip: <5 PPM
- **FREE STANDING STACK**
Termination 30' ABOVE GRADE
Includes offset ducting from economizer
Four (4) EPA testport with access platform

INCLUDED TRIM:

Qty.	Description
1	Air Preheater
1	Steam Line Reducer Spool between Steam Nozzle and Non-Return Valve - 6in x 5in (Flanged 300lb R.F. Long Neck)
1	Non Return Valve - Edwards Angle 5in Flanged 300lb. R.F. mounted in Vertical (Ship Loose)
1	Spool Piece Between Non-Return Valve and Steam Header Valve - 5in x 8in (Flanged 300lb R.F. Long Neck)
1	Steam Header Valve - 8in Flanged 300lb. R.F. mounted in Horizontal (Factory Piped)
1	Steam Line Free Blow Drain - 1in Socket Weld mount to Steam Header Piping (Ship Loose)
2	Feedwater Gate Valve - Vogt 2in. Socket Weld (Factory Piped)
1	Feedwater Check Valve - Crane 2in. Flanged 300lb R.F. (Factory Piped)
1	Feedwater Control Valve: Fisher w/DVC6200 Positioner
2	Feedwater Control Drain Valve - Vogt 0.5in (FP)
1	Feedwater Economizer Bypass (Gate) Valve - Vogt 2in. Socket Weld (Factory Piped)
1	Feedwater Economizer Bypass (Globe) Valve - Vogt 2 Socket Weld (Factory Piped)
1	Economizer Vent Valve - Vogt 1in NPT (Factory Piped)
1	Economizer Drain Valve - Vogt 1in NPT (Factory Piped)
1	Economizer Safety Valve - Kunkle
1	After Economizer Drain Valve - Vogt 1in NPT (Factory Piped)
1	Intermittent Blowdown Valve Setup - Everlasting 1.5 (1 Quick / 1 Slow / per line)
1	Continuous Blow Down Manual Stop Valve - Edward 849-Y 1in Socket Weld
1	Continuous Blow Down Piping: Boiler Drum Socket Weld connection, Stop Valve Socket Weld, Metering Valve .
1	Continuous Blow Down Conductivity Controller:
1	Chemical Feed Stop Valve - Edwards 838Y 1in Factory Piped (Factory Piped)
1	Chemical Feed Non Return Valve - Edward 849Y 1in Socket Weld (Ship Loose)
1	Lower Drum Heating Coil External Piping, 1in
1	Furnace Access Door
1	Furnace Wash Drains Connection - 1in
1	Convection Inspection Door
1	Steam Drum Manway - 14" x 18"
1	Target End Manway - 12" x 16"
1	Water Drum Manway - 12" x 16"
1	Hard Case Boiler Casing
1	Boiler Outlet Expansion Joint
1	Boiler to SCR Transition
1	Economizer to Stack Transition duct work. Includes Outlet and FGR connections.
2	FGR Expansion Joint
1	Furnace Pressure Switch, Dwyer
1	Natural Gas Train, Control Valve: FISHER, Safety Valve: Maxon w/POC, Regulator Outlet Range: 26 - 30 psig.
1	Pilot Train: Design Code: NFPA 85, Minimum Temp: 32°F, Fisher Gas Regulator, Asco/VCI Safety Shutoff Valve, IFC Y Strainer, Apollo Valves ball valve, Ashcroft Pressure Switch, Standard Ashcroft Pressure Gauge.
1	Full Metering Burner Control Package for Gas&Oil
1	Auxiliary Low Water Cutoff (LWCO): Magnetrol, On/Off, Manual Reset, Sch 80 Carbon Steel
1	Drum Access Ladder and Platform
1	Target End Ladder and Platform
1	Burner End Ladder and Platform
1	Stack Test Platform

RFM – Selective Catalytic Reduction System

SCR, or Selective Catalytic Reduction, is a flue gas treatment method for the removal of oxides of nitrogen. The by-products of this reaction are nitrogen and water. However, even in a well-designed system there is a small amount of ammonia that does not react with NOx. This is referred to as ammonia slip and is allowed under air permits in California and elsewhere. Ammonia slip should never exceed 10 ppm, and in most systems is less than 5 ppm.

Ammonia Flow Control Unit (AFCU) – The anhydrous ammonia is released in the required amount using a flow control valve in conjunction with the burner controls on the boiler. The flow required is determined during startup using a gas analyzer to measure NOx and NH3. During normal operation ammonia is controlled via the signal from the boiler fuel gas flow meter.

Ammonia Injection Grid (AIG) – A series of stainless steel pipes strategically placed across the discharge of the boiler and having a series of holes drilled ensuring the ammonia is evenly dispersed into the flue gas stream to maximize catalyst performance.

Catalyst – Designed for 40,000hrs of service. The reduction of NOx to N2 occurs on the catalyst surface.

Safety

To help ensure the safe handling of Ammonia our system will include the following:

- Skid will include an ambient Ammonia detection sensor, audible alarm and beacon alarm. Additional contacts for remote indication can be provided upon request. The sensor will be mounted 8-10 ft above grade.
- A detailed instruction O&M manual will be provided.

The following other recommended safety items should be considered by the facility:

- Utilize Nitrogen purge and proper PPE while changing Ammonia bottles.
- Locate an eye wash station and safety shower near each Ammonia source.

System Design

The design strategy will include new equipment is as follows:

- A Low NOx burner will be applied with induced flue gas recirculation (FGR)
- Combustion controls will incorporate O2 trim
- SCR to reduce NOx to 5 ppm
- The SCR will utilize anhydrous ammonia
- A control skid will be provided with an air system to supply diluted ammonia to the AIG
- Ammonia flow control will be dictated by a fuel flow signal

Scope of Supply – Equipment

SCR System will be designed as an integral assembly with appropriate inlet/outlet transitions, AIG and catalyst bed. Construction is carbon steel with insulation and aluminum corrugated lagging designed for 600° F operating temperature and 20" WC static pressure.

SCR Housing will include the following:

- Two (2) access doors
- Three (3) inlet pitot traverse test ports
- Three (3) outlet pitot traverse test ports

SCR Catalyst: Corrugated Type – Umicore Catalyst or equal

Ammonia Injection Grid (AIG): System consisting of multi-zone injection.

Materials: Ammonia Piping – 304SS

Installation: Field piping by others. Not included in RFM scope.

Air Dilution and Ammonia Flow Control Unit (AFCU)

One (1) ammonia flow control unit with all hardware mounted on a freestanding skid and all electrical items wired to the main control panel. The following components are included:

- One (1) NEMA 4 control panel
- One (1) ammonia strainer DP pressure gauge
- One (1) ammonia PRV
- One (1) Coriolis flow meter
- One (1) mass flow controller valve, 4-20 mA input
- One (1) low ammonia pressure switch
- One (1) inlet supply pressure gauge
- One (1) ammonia SSO Valve
- One (1) dilution air blower c/w TEFC motor and inlet screen filter
- One (1) motor starter
- One (1) low dilution air pressure switch
- One (1) dilution air pressure gauge
- One (1) butterfly valve for flow control to AIG
- One (1) ammonia detection sensor and alarm
- One (1) pressure gage with siphon and isolation valve for manifold pressure

RFM Instrumentation and Controls – Boiler Control Panel

The Boiler Control Panel integrates a programmable logic controller, touch screen graphical human-machine interface (HMI), and burner management control, used to control and monitor the complete boiler system.

The 10" HMI shall provide graphic displays of the boiler systems, pop-up control stations for all control loops, trending for all process variables, password protected screens for tuning of the control loops and commissioning the combustion control system.

All Allen-Bradley CompactLogix communication process variables, status, and control information may be communicated via Ethernet interface. This shall include information necessary for the monitoring of the unit, startup and shutdown commands, running and alarm indicators.

The BMS shall be a Fireye BurnerLogix microprocessor type with expansion module for "First-out" annunciation of a safety limit trip. Alarm indications will be provided on the local panel mounted Fireye display.

Control Trim

- **Fully Metered Control System**
- **O₂ Trim – Rosemount Probe (Air Trim)**
- Automatic Sequencing – standby, re-purge, pilot flame, main flame, run and post purge.
- Flame proving and lockout on flame failure during pilot flame proving, main flame proving, or run.
- **Touch Screen Interface**
 - 10" Panel View Plus Color HMI
 - On screen real-time display of all connected process parameters.
 - On screen commissioning of boiler set points and configurable alarms
 - On screen display of system alarms and faults.
- Tamper resistant control logic and password protection.
- Alarm Silencer via touch screen HMI



A summary of the key Boiler Control Panel hardware:

QTY	Manufacturer	DESCRIPTION
1	Allen Bradley	Power Supply 120/240 VAC Input 4A @ 5VDC, 2A @ 24VDC
2	Allen Bradley	8 Channel Analog Current Output Module
2	Allen Bradley	16 Point 120 VAC Individually Isolated Input Module
2	Allen Bradley	8 Point VAC/VDC Indiv. Isolated Relay Output Module
1	Allen Bradley	Right End Cap/Terminator
1	Allen Bradley	CompactLogix 5370 L3 Controllers, Dual Ethernet w/DLR capability, 1MB Memory, 8 I/O Expansion, 16 Ethernet IP Nodes. Controllers are shipped with 1GB SD card and can support up to 2GB SD card.
1	Allen Bradley	Compact I/O to DSI Module
3	Allen Bradley	8 Channel Analog Current/Voltage Input Module
1	Allen Bradley	Compact I/O to DSI Module
4	Allen Bradley	Essential Power Supply, 24-48V DC, 80 W, 120/240V AC Input Voltage
1	STRIDE	industrial unmanaged Ethernet switch, 5 ports, (5) RJ45 10/100 port(s), -10 to +60 deg C, metal housing, IP30, 35mm DIN rail mount,
1	Automation Direct	Cat5E straight-through patch cable, STP (overall foil shield), (2) RJ45 male connectors, 3ft cable length, blue.
1	Allen Bradley	PANELVIEW PLUS TERMINAL 2711 PanelView Plus 6 Terminal, 1000 Color Model, Touch Screen, Standard Communication - Ethernet & RS-232, DC Input, Windows CE 6.0
1	IFM	IO-Link master with EtherNet/IP interface
1	Fireye	Chassis, 120 VAC, 50/60 Hz with UV self-check amplifier. UL, FM, CE Approved.
1	Fireye	Keypad/Display, 2 line X 16 characters, VACUUM FLUORESCENT DISPLAY (VFD), with cable. Operates -40F (-40C) to 140F
1	Fireye	Keypad selectable parameters, non-recycle operation, modulation, open/closed damper proving, 4 second FFRT
1	Fireye	Open base with terminal block. 4"W x 7"H UL Recognized.
1	Fireye	Kit, remote mounting, BurnerLogix display, 8 ft. cable, provides NEMA 4 protection
1	Fireye	Interlock annunciator, provides first out annunciation. 120 VAC operation.
1	Fireye	YB110 or ZB110 to YZ
1	Fireye	YZ300 wiring base, term
1	Fireye	UV SELF CHECK SCANNER
1	Fireye	display RJ12 connector cable - 8 feet.
1	Fireye	RS-485 cable from YZ300 to ED612
1	Fireye	terminal converter
3	Cleaver Brooks	Warrick 16DCM1MO level relay
1	Gammill	Saginaw N4 enclosure (SCE-723618FS) with one standard Fireye/ AB controls with relays and terminal blocks. Terminal blocks for customer to wire his BMS to. Wire and wire duct as needed UL508 approved
1	Saginaw	Control panel Air Conditioner, 1870 BTU/Hr. 120 Volt
1	Cleaver Brooks	O2 SAMPLING SENSOR ASSEMBLY
1	Cleaver Brooks	CONTROLLER, O2 MONITORING, ECM PART NUMBER XCM113-1 CB LABELED
1	Cleaver Brooks	CABLE, HARNESS, O2 MONITORING, 4 FT ECM PART NUMBER XCM113-2; CABLE FROM PANEL TERMINAL STRIP TO STACK SENSOR CB LABELED

Base bid flow meters:

PROCESS VARIABLE	MEASUREMENT DEVICE(S)
Boiler Feedwater Flow	Vortex Meter
Boiler Steam Flow	McCrometer V-Cone Primary Element with Multivariable Flow Transmitter (Density compensation to be done with static pressure as steam is saturated)
Combustion Air Flow	Flow Averaging Primary Element (e.g., piezo-tube, annubar) with Multivariable Flow Transmitter and 3-Wire RTD for Density Compensation
Recirculating Air Flow	Thermal Mass Flow Meter
Gas Flow	Coriolis Meter
Oil Flow	Coriolis Meter

A summary of the key Field Equipment:

QTY	Manufacturer	DESCRIPTION
1		Windbox Pressure Switch
4	Dwyer	Diff Pressure Transmitter Steam flow, Water Flow, Gas Flow
4	Dwyer	Flanged 5-valve block manifold.
1	O'Brien	8" PIPE ORIFICE, 304 SS, 300#, Bore =X.XXX Steam flow
1	O'Brien	3" PIPE ORIFICE, 304 SS, 300#, Bore =X.XXX Gas flow
1	O'Brien	3" PIPE ORIFICE FLANGE SET, 300# weld neck, includes bolts, jack screws, and gaskets Gas Flow
1	O'Brien	3" PIPE ORIFICE, 304 SS, 300#, Bore =X.XXX Feedwater flow
3	Rosemount	RTD 1) Air Temperature 2) Flue Gas inlet temperature 3) Flue Gas outletTemperature
3	Rosemount	Thermowell 1) Air Temperature 2) Flue Gas inlet Temperature 3) Flue Gas outlet Temperature
3	Rosemount	3144P Temperature Transmitter
2	Rosemount	RTD 1) Feedwater inlet temperature 2) Feedwater outlet Temperature
2	Rosemount	Thermowell 1) Feedwater inlet temperature 2) Feedwater outlet Temperature
2	Rosemount	3144P Temperature Transmitter
2	ABB	UP1 SERIES PNEUMATIC ROTARY ACTUATOR FAIL-SAFE (OPEN/CLOSED) INCLUDES 4 SPDT ADJUSTABLE TRAVEL SWITCHES Flue Damper Drive Combustion Air Damper Drive
1	ENDRESS+HAUSER	Chamber for guided wave radar
1	ALLEN BRADLEY	PowerFlex 753 AC Drive, with Embedded I/O, Air Cooled, AC Input with DC Terminals, Flange Type, 65 Amps, 50HP ND, 40HP HD, 480 VAC, 3 PH, Frame 4, Filtered, CM Jumper Installed, DB Transistor

A summary of the SCR Hardware:

QTY	Manufacturer	DESCRIPTION
1	Dwyer	Differential Pressure Transmitter 3100D-5-M11-F1-1-S-1-M1-RFM Smart DP Transmitter, 100:1 turn-down ratio, 0-750" w.c. 4-20 mA output along with HART communication, 2-button configurable Catalyst bed DP
1	Dwyer	Flanged 5-valve block manifold.
1		BF SS Flat Mounting Bracket Package
1	Emmerson	Micro Motion Elite Coriolis Meter / Micro Mition 5700 Field-Mount Transmitter
1	Masoneilan	NH3 flow control valve 0.5", 150# Rf Flanges, Stainless Steel (316L) Body, Stellite/SS Trim, Cv=0.1 Adj, Linear, Flow to Open, Class V, PTFE Packing, Model 28 (Size 2) Spring Diaphragm Actuator (Fail Closed), Integral 7700E Electropneumatic Positioner, 78-40 Airset
1	AB	Dilution blower panel
1	IFM	Thermal flow switch
2	IFM	Pressure sensor with display
3	IFM	Female cordset 2M
4	IFM	Screw-in adapter for process sensors ADTR, G1/4, 1/4", F/M, W/GSK
2	IFM	Progressive ring fitting COMPRESSION FITTING 1/4 NPT

RFM Service – Start-Up

The quoted price includes the services of a service engineer to supervise starting, adjusting and testing the boiler and to instruct operating personnel in the proper operation and maintenance of the equipment. This service is to be performed when the equipment is completely installed and ready to operate with the operator available to fire the equipment and receive the instructions. Boiler insurance is to be provided by you before the start-up is ordered. **Start-up services must be scheduled 2-weeks prior to the requested date for start-up.**



Equipment Pricing

Total for Equipment as Described Above \$1,507,095.00
Estimate for spare parts.....\$39,720.00**
****This is just an estimate for spare parts for bidding purposes. A firm spare parts list to be developed by Purchaser based on end user preferred items noted in submittal trim lists and will be requoted accordingly.**

Deducts

Deduct to remove Physical Flow modeling for SCR..... \$46,670.00
Change meters to orifice type in lieu of specified type \$61,125.00

Taxes

No sales tax included.

Warranty

Standard manufacturer’s warranty to include parts only, labor is not included. Standard manufacturer’s warranty to cover twelve (12) month from date of startup or eighteen (18) months from date of shipment, whichever occurs first.

Shipment

Based on current production schedules, shipment can be made 17 weeks after approval of factory drawings or after receipt of order with waiver of drawing approval plus the transit time from the factory to destination.

Notes

1. The proposal is for equipment only. Field installation by others.
 2. The required air pollution **permit is to be obtained by others.** The boiler will be furnished to meet the emission limit while firing natural gas as indicated above. However, specific requirements will not be known until a permit application is submitted and an Authority to Construct is obtained from the local Air Quality Management District. The necessary application should be submitted as soon as possible. We will assist in this process and provide the necessary information for filing the permit at your request.
 3. Full boiler load as necessary to perform required emissions source test to comply with Air Quality District regulations and operating personnel during tune up and emissions testing shall be provided by the owner.
 4. Proposal is for equipment only. Installation is not included.
 5. Start-up quoted based on M-F, 6:00 am to 4:30 pm.
- Catalyst Storage and Operating Guidelines:**
6. Exposure to extreme weather can significantly lower catalyst life; therefore, the catalyst should be stored inside a dry, well-ventilated room. Keep the modules in their original packaging to avoid contact with rain and/or seawater, heavy humidity, and other moisture, oil, and solvents.
 7. Exposure to excessive temperature significantly lowers catalyst life; therefore, operation of the catalytic reactor at outlet temperatures in excess of 825 deg F on a continuous basis shall void the warranty.
 8. End user will operate and maintain the catalyst modules such that no reagent drainage or other liquid comes in contact with the catalyst.
 9. End user, if needed, will clean catalyst masked or plugged by the firing of particulate producing fuel discovered by means of periodic visual inspections.
 10. End user must provide catalyst samples if requested during the warranty period, in order to maintain warranties. The catalyst OEM will provide an advance written request of a need to

obtain catalyst samples, construction and sampling method that permits ease of extraction and replacement of samples, and schedule coordination for the operating plant's convenience.

11. End user will provide a copy of all procedures and methods of analysis to be employed in catalyst evaluation for acceptance and anytime throughout the warranty period.

Exceptions and Clarification

Terms and Conditions – As Documented between Burns & McDonald and RF MacDonald.

Liquidated Damages – As Documented between Burns & McDonald and RF MacDonald.

Specifications – As Documented between Burns & McDonald and RF MacDonald.

SALE AND PAYMENT TERMS AND CONDITIONS

The following sets forth the sale and payment terms and condition policies of R.F. MacDonald Co. It constitutes the general agreement between R.F. MacDonald Co. (“R.F. MacDonald Co.”, the “Company” or “we”) and you, its customer, under which products, service and parts are sold, credit is extended and payments are expected.

This policy supersedes all previous sales and credit, payment terms and conditions, and finance policies issued by R.F. MacDonald Co. and shall remain in effect until further notice. The company reserves the right to change this policy and agreement at any time.

EXTENSION OF CREDIT

Credit is one of the most important services R.F. MacDonald Co. offers to you as a customer. An open line of credit is established for you based upon your needs, financial strength, and history of meeting your credit obligations.

In order to insure you the best possible prices and service, we must enforce a credit and collections policy based upon sound business principals and good judgment.

INVOICING AND PAYMENT TERMS

Payment Terms are 25% down payment, balance Net 30 (upon approval of credit) on all invoices unless other arrangements are made in advance of shipment. When opening a new account with an order, the Company may require payment with the initial order so as not to delay shipments while credit references and financial information are being reviewed. We reserve the right to suspend or terminate any further performance under this agreement or otherwise in the event payment is not made when due. **Quotes are valid for 30 days. Equipment will not be started up unless 90% of the purchase price of the equipment has been paid.**

Shipment Terms Unless otherwise specified in writing signed by an authorized representative of the Company, all shipments are Ex Works the manufacturer’s factory or R.F. MacDonald Co. warehouse as applicable. Title to the merchandise shall pass to the buyer upon delivery to the carrier and thereafter all risk of loss or damage shall be the buyer’s.

Service Charges We reserve the right to take action to collect any invoice which is not paid when due. We also assess a late payment SERVICE CHARGE on the day following the due date and monthly thereafter against all amounts remaining unpaid on each such date. Subject to any limitations that may be imposed by applicable law, the amount of this charge is 1½% of the amount remaining unpaid on each such date.

This policy will be applied to customers who permit their account to become delinquent. It is your responsibility to notify R.F. MacDonald Co. of any extenuating circumstances that may affect your payment and work out a solution. Please know that our interest lies not in collecting a service charge, but in receiving timely payments of your invoice.

Warranty on Equipment and Material Provided by Manufacturer:

You will rely solely on the warranty provided by the manufacturer. Your sole and exclusive remedy for breach of warranty shall be as provided in the manufacturer’s standard warranty.

R.F. MacDonald Co. makes no warranty express or implied of any kind. We make no claim of fitness or merchantability or any other warranty, express or implied, nor is anyone else, whether employed by R.F. MacDonald Co., or not, authorized to do so on our behalf. We specifically disclaim the warranty of merchantability and the warranty of fitness.

You will be invoiced in the regular manner for all materials and parts even though it may be an in-warranty transaction. Credit will be issued promptly on our receipt of proof of return, and, as long as the return is within the prescribed time limit and has been properly authorized. Please note that withholding payment of any invoice in anticipation of an in-warranty credit is not allowed with our terms of sale.

For any items or components proposed as a substitute to specified items, it is understood that seller makes no guarantee that the products submitted will be accepted by the approving authority.

In no event shall R.F. MacDonald Co. be liable to you or any person, corporation or other type of legal entity for any special, direct, indirect, incidental, liquidated or consequential damage of any kind, including but not limited to, loss of products, loss of time, loss of use, loss of production, loss of savings or revenues, cost of replacement goods, labor costs or other charges in connection with product use or malfunction, the repair or replacement of defective parts whether such claims are alleged in strict liability, negligence, tort, contract or otherwise and even if R.F. MacDonald Co. is informed in advance of the possibility of such damages.



June 22, 2020
QUO-99577-N0P9Q6

Limited Warranty on R.F. MacDonald Labor (If Applicable):

If you are retaining the services of R.F. MacDonald Co.'s service department, R.F. MacDonald Co. warrants that labor performed will be free from defect for a period of one year from the completion of work. This limited warranty excludes remedy for damage or defect caused by accident, misuse, abuse, modifications not executed by R.F. MacDonald Co., improper or insufficient maintenance, or improper operation. Installation, operation, and maintenance shall be in accordance with the product manuals provided by the equipment manufacturer. R.F. MacDonald Co. shall be notified within ten (10) business days of first knowledge of defect by owner or its agent. R.F. MacDonald Co. shall be given first opportunity to make any repairs, replacements, or corrections to the defect within a reasonable period of time. R.F. MacDonald Co. makes no implied warranty of any kind. In no event shall R.F. MacDonald Co. be liable by virtue of this limited warranty or otherwise to you or any person, corporation or other type of legal entity for any special, indirect, incidental, liquidated or consequential damage of any kind.

CLAIMS

You are responsible for inspecting merchandise on receipt and for filing claims with the carriers for damage or loss. All claims for shortages and damages must be made in writing to the carriers within ten (10) days of receipt. We suggest you call the carrier immediately upon noticing any possible freight related damage and arrange for inspection before proceeding with unpacking. Photographs taken while the delivery truck is still on sight are recommended if possible.

Under no circumstances may you withhold payment or charge the Company for freight or warranty related claims.

No claim for expenses incurred for corrective work done on merchandise provided by the Company will be considered or accepted unless specifically agreed to in writing, in advance of the work being done, by an authorized manager of the Company.

INFORMATION AND ASSISTANCE

If at any time you have a question on an invoice from the Company, a call or note to our accounting department will bring prompt action toward getting the problem resolved.

If it becomes necessary, at R.F. MacDonald Co.'s discretion, to take legal action in order to collect your account, R.F. MacDonald Co. shall be entitled to recover, in addition to any other recovery, its court costs, reasonable attorney's fees and all other collection expenses.

If you have any questions regarding this policy, please contact our office.

We appreciate your business and look forward to providing you with reliable equipment, parts and service.

Please acknowledge below your receipt and agreement to the provisions of this policy statement.

Return the original to:

**R.F. MacDonald Co.
10261 Matern Place
Santa Fe Springs
Phone (562) 447-7487
Fax 714-257-1176**

APPLICABLE LAW: This agreement shall be governed by the substantive laws of the State of California

Acknowledged and Agreed To:

Company Name: _____
Signature: _____
Name/Title: _____
Date: _____

D

HARP FACILITY PRIORITIZATION REPORT

HARP Facility Prioritization Report

HARP EIM Version: 2.1.1

Reporting Year: 2020

Project Path: I:\Lockheed\2020 Projects\Boiler 4 Permit

Project Database: I:\Lockheed\2020 Projects\Boiler 4 Permit\S4_Boiler.mdb

CEIDARS Utility Database: C:\HARP2\Tables\CEIDARSTables022016.mdb

HARP Health Talbe: HEALTH201708

Sorting Order: DIS, AB, CO, TS, FACID

Date Created: 7/10/2020 1:32:33 PM

Operator: JCP

POLLUTANT HEALTH VALUES FROM HARP HEALTH DATABASE:

POLLUTANT ID	POLLUTANT	CANCERURF (INH) (ug/m^3)^-1	ACUTEREL ug/m^3	CHRONICREL (INH) ug/m^3
91576	2MeNaphthalene	N/A	N/A	N/A
56495	3-MeCholanthren	6.30E-03	N/A	N/A
57976	7,12-DB[a]anthr	7.10E-02	N/A	N/A
83329	Acenaphthene	N/A	N/A	N/A
208968	Acenaphthylene	N/A	N/A	N/A
75070	Acetaldehyde	2.70E-06	4.70E+02	1.40E+02
107028	Acrolein	N/A	2.50E+00	3.50E-01
120127	Anthracene	N/A	N/A	N/A
7440382	Arsenic	3.30E-03	2.00E-01	1.50E-02
56553	B[a]anthracene	1.10E-04	N/A	N/A
50328	B[a]P	1.10E-03	N/A	N/A
205992	B[b]fluoranthen	1.10E-04	N/A	N/A
191242	B[g,h,i]perylen	N/A	N/A	N/A
207089	B[k]fluoranthen	1.10E-04	N/A	N/A
7440393	Barium	N/A	N/A	N/A
71432	Benzene	2.90E-05	2.70E+01	3.00E+00
7440417	Beryllium	2.40E-03	N/A	7.00E-03
7440439	Cadmium	4.20E-03	N/A	2.00E-02
7440473	Chromium	N/A	N/A	N/A
218019	Chrysene	1.10E-05	N/A	N/A
7440484	Cobalt	N/A	N/A	N/A
7440508	Copper	N/A	1.00E+02	N/A
53703	D[a,h]anthracen	1.20E-03	N/A	N/A
25321226	DiClBenzenes	N/A	N/A	N/A
100414	Ethyl Benzene	2.50E-06	N/A	2.00E+03
206440	Fluoranthene	N/A	N/A	N/A
86737	Fluorene	N/A	N/A	N/A
50000	Formaldehyde	6.00E-06	5.50E+01	9.00E+00
110543	Hexane	N/A	N/A	7.00E+03
193395	In[1,2,3-cd]pyr	1.10E-04	N/A	N/A
7439921	Lead	1.20E-05	N/A	N/A
7439965	Manganese	N/A	N/A	9.00E-02
7439976	Mercury	N/A	6.00E-01	3.00E-02
91203	Naphthalene	3.40E-05	N/A	9.00E+00
7440020	Nickel	2.60E-04	2.00E-01	1.40E-02
1150	PAHs-w/	N/A	N/A	N/A
85018	Phenanthrene	N/A	N/A	N/A
115071	Propylene	N/A	N/A	3.00E+03
129000	Pyrene	N/A	N/A	N/A
7782492	Selenium	N/A	N/A	2.00E+01
108883	Toluene	N/A	3.70E+04	3.00E+02
7440622	Vanadium	N/A	3.00E+01	N/A
1330207	Xylenes	N/A	2.20E+04	7.00E+02
7440666	Zinc	N/A	N/A	N/A

PRIORITIZATION SCORE SUMMARY:

Facility Name
Proximity Method
Optional Factors

Emission and Potency Procedure

Dispersion Adjustment Procedure

Highest
FACID CO AB DIS Cancer Acute Chronic NonCancer Cancer Acute Chronic NonCancer
Score

Lockheed Martin Aeronautics Company

Proximity Method: Proximity manually edited by user as 1380

Annual Operating Hours 8760
1754 19 MD AV 5.58E-02 2.38E-03 4.07E-03 4.22E-03 5.56E-02 2.38E-03 4.07E-03 4.22E-03
5.58E-02

TITLE V APPLICATION CHECKLIST

Initial Title V application	
3002-A Submission Certification Form	<input type="checkbox"/> Completed
3002-B1 Facility Summary Form	<input type="checkbox"/> Completed
3002-B2 Facility Emissions Summary Form	<input type="checkbox"/> Completed
3002-C Combustion Emissions Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-D Piston Engine Emissions Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-E Coating/Solvent Emissions Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-F Organic Liquid Storage Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-G General Emissions Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-H Emissions Control Unit Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
3002-I Exempt Equipment listing Form	<input type="checkbox"/> Completed
3002-J Compliance Plan Form	<input type="checkbox"/> Completed
3002-K Compliance Certification Form	<input type="checkbox"/> Completed
3002-L Monitoring Report Form	<input type="checkbox"/> Completed
3002-M Alternative Operating Scenario(s) Form	<input type="checkbox"/> Completed <input type="checkbox"/> Not Applicable
Title V Permit Modification	
3002-N Permit Application for Administrative Amendment or Minor/Significant Modification	<input type="checkbox"/> Completed
Title V Permit Renewal	
3002E2-A General Facility Information form	<input checked="" type="checkbox"/> Completed
3002E2-B Application Certification form	<input checked="" type="checkbox"/> Completed
3002E2-C Non-Compliant Operations Report	<input type="checkbox"/> Completed <input checked="" type="checkbox"/> Not Applicable
3002E2-D List of Exempt Equipment	<input checked="" type="checkbox"/> Completed
3002E2-E Potential Emissions Report	<input checked="" type="checkbox"/> Completed
3002E2-F Compliance Assurance Monitoring	<input checked="" type="checkbox"/> Completed
3002E2-G Permit Shield Request	<input type="checkbox"/> Completed <input checked="" type="checkbox"/> Not Applicable
3002E2-H Alternate Operating Scenarios form	<input type="checkbox"/> Completed <input checked="" type="checkbox"/> Not Applicable
Title V Compliance Reports	
TV Form 19A – Annual Compliance Certification	<input type="checkbox"/> Completed
TV Form 19B – Semi-Annual Monitoring Report	<input type="checkbox"/> Completed
TV Form 19C – Deviation Report	<input type="checkbox"/> Completed

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION INSTRUCTIONS

Introduction:

Antelope Valley Air Pollution Control District (AVAQMD) Rule 3002 requires Title V permit holders to submit an application for renewal of the Title V permit no more than 18 months prior to the expiration date and no less than 6 months prior to the expiration date of the permit. A complete renewal application will consist of the following forms and documents, together with appropriate supplemental information, as described in these instructions:

1. A General Facility Information form and all required attachments.
2. An Application Certification form
 - The Application Certification Form is used to certify that the facility is currently operating and will continue to operate in compliance with all applicable requirements of the Title V permit and applicable rules and regulations.
 - If the facility is not operating in compliance with current requirements, the facility must submit a compliance plan using the Title V Non-Compliant Operations Report
 - The Application Certification form is also used to certify that the facility has reviewed the current Title V permit for errors.
 - If the facility finds any errors in the current Title V permit, or if there are any necessary additions or new requirements that have become applicable since the previous Title V permit was issued, a redlined copy of the permit must be attached to the permit renewal application, along with any necessary permit application/modification forms.
3. A Title V Non-Compliant Operations report, if applicable
4. A Title V List of Exempt Equipment, pursuant to Rule 219
5. A Title V Potential Emissions Report for criteria pollutants, HAPs, and greenhouse gases.
6. A Compliance Assurance Monitoring (CAM) Applicability Determination form, along with CAM Plans for all emission units at the facility for which CAM Plans are required.
7. A Permit Shield Request, if applicable.
8. An Alternative Operating Scenarios form, if applicable.

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – GENERAL FACILITY INFORMATION

1. FACILITY ID: <u>01754</u>		FACILITY SIC CODE: <u>3720</u>	
TITLE V PERMIT NUMBER: <u>097001754</u>		PERMIT EXPIRATION DATE: <u>July 20, 2020</u>	
2. COMPANY NAME: : <u>Lockheed Martin Aeronautics Company</u>			
3. COMPANY MAILING ADDRESS:			
STREET/P.O. BOX: <u>1011 Lockheed Way</u>		9-DIGIT	
CITY: <u>Palmdale</u>	STATE: <u>CA</u>	ZIP CODE: <u>93599</u>	
4. FACILITY NAME: : <u>Plant 10 and Air Force Plant 42 Site 2 and Site 7</u>			
5. FACILITY MAILING ADDRESS:			
STREET/P.O. BOX: <u>1011 Lockheed Way</u>		9-DIGIT	
CITY: <u>Palmdale</u>	STATE: <u>CA</u>	ZIP CODE: <u>93599</u>	
6. RESPONSIBLE OFFICIAL (AS DEFINED IN 40 CFR 70.2 AND AVAQMD RULE 3001)			
NAME: <u>Melani Austin</u>		TITLE: <u>Program Management VP</u>	PHONE NUMBER: <u>(661) 572-7734</u>
7. TITLE V PERMIT CONTACT PERSON			
NAME: <u>Reenu Ko</u>		TITLE: <u>Environment, Safety & Health Engineer Senior</u>	PHONE NUMBER: <u>(661) 572-3326</u>
8. TYPE OF ORGANIZATION:			
<input checked="" type="checkbox"/> CORPORATION <input type="checkbox"/> SOLE OWNERSHIP <input type="checkbox"/> GOVERNMENT <input type="checkbox"/> PARTNERSHIP <input type="checkbox"/> UTILITY			
9. CAM (COMPLIANCE ASSURANCE MONITORING) PLANS			
Are you required to submit a CAM plan for any emissions unit at this facility? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, submit a CAM plan for each emissions unit as an attachment to the application. See attached CAM plan instructions for more detail.			

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10. ALTERNATE OPERATING SCENARIOS

Does this application request alternative operating scenarios pursuant to Rule 3003(E)? Yes No

If yes, submit an Alternate Operating Scenarios form, as applicable.

11. RISK MANAGEMENT PLAN

Has this facility been required to prepare a federal Risk Management Plan pursuant to Section 112(r) of the federal Clean Air Act and 40 CFR Part 68? Yes No

If yes, has the federal Risk Management Plan been submitted to the implementing agency? Yes No

If a federal Risk Management Plan is required but has not been submitted to the implementing agency, provide a detailed explanation as an attachment to the application.

12. STRATOSPHERIC OZONE

Does the facility conduct any activities that are regulated by the federal protection of stratospheric ozone requirements in 40 CFR Part 82? Yes No

13. ACID RAIN

Is this facility subject to the acid rain requirement in 40 CFR Part 72 through 40 CFR Part 78? Yes No

14. MAJOR SOURCE STATUS

Is this facility a major source of greenhouse gases, as defined in AVAQMD Rule 3011? Yes No

Is this facility a major source of any of the following pollutants:

VOCs Particulate Matter Carbon Monoxide Nitrogen Oxides Sulfur Dioxides
 Lead HAP

15. PERMIT SHIELDS

Does the current Title V permit for this facility include any permit shields? Yes No

If yes, is the basis for each permit shield still correct? Yes No

If the current Title V permit contains any permit shield for which the basis is no longer correct, provide a detailed explanation as an attachment to the application. If you are requesting an additional permit shield, complete the attached Permit Shield Request form.

16. CERTIFICATION BY RESPONSIBLE OFFICIAL

Based on information and belief formed after reasonable inquiry, information and statements in the submitted application package, including all accompanying reports, and required certifications are true accurate and complete. I declare, under penalty of perjury under the laws of the state of California, that the forgoing is correct and true:

Signature: 

Date: 10/16/19

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – GENERAL FACILITY INFORMATION INSTRUCTIONS

The General Facility Information form requests general information identifying the stationary source. As indicated on the form and discussed in more detail below, an applicant is required to include supplemental information in addition to the form.

- Line 1. Please enter
- The AVAQMD Facility ID number
 - The Facility SIC code
 - The Title V Permit to Operate number
 - The Title V Permit expiration date
- Line 2. Enter the name of the company that owns the business
- Line 3. Enter the company mailing address
- Line 4. Enter the name of the facility
- Line 5. Enter the facility mailing address
- Line 6. Enter the name and title of the responsible official. The name of the person identified on this line must meet the qualifications of a “Responsible Official”, as defined in 40 CFR 70.2 and AVAQMD Rule 3001.

For a corporation, the responsible official shall be a president, secretary, treasurer, or vice president in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation. The responsible official may be a duly authorized representative rather than any of the above if the representative is responsible for the overall operation of one or more manufacturing, production or operating facilities which are applying for or subject to a permit; and:

1. The facility employs more than 250 persons or has gross annual sales or expenditures exceeding \$25 million in 1980 dollars; or
2. The delegation of the authority is approved in advance by the APCO.

For a partnership or sole proprietorship, the responsible official is a general partner or the sole proprietor, respectively.

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For a municipality, state, federal, or other public agency, the responsible official shall be either the principal executive officer or a ranking elected official. The principle executive officer, in the case of a federal agency, may be the executive officer having responsibility for a geographical unit.

For an Acid Rain Facility, the responsible official is a designated representative as defined in 40 CFR 72.20.

- Line 7. The name of the person identified on this line should be the appropriate contact for questions regarding the application.
- Line 8. Indicate the organizational structure of the facility
- Line 9. Complete a Compliance Assurance Monitoring Applicability Determination Form, and indicate whether you are required to submit a CAM plan for any emissions unit at the facility.
- Line 10. Please complete the Alternate Operating Scenario form, if applicable. Ensure that descriptions that contain sufficient emission information for the District to develop reasonable permit conditions for each alternative operating scenario anticipated at the facility.
- Line 11. Enter requested risk management plan information.
- Line 12. Enter requested information regarding the stratospheric ozone requirements.
- Line 13. Enter requested information regarding the acid rain requirements.
- Line 14. Enter requested information regarding the major source status of the facility.
- Line 15. Enter information indicating whether the current facility permit contains any Permit Shields. Indicate whether the basis for the permit shield is still correct. If you are requesting any additional permit shields, complete the attached Permit Shield Request form.
- Line 16. The name of the person's signature provided on this line must meet the qualifications of a "Responsible Official", as defined in 40 CFR 70.2 and AVAQMD Rule 3001. This definition is described in detail under Line 6. Please also specify the title of the Responsible Official at your facility.

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – APPLICATION CERTIFICATION

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. TITLE V PERMIT CERTIFICATION (Read each statement carefully and check one):

- The current Title V permit has been reviewed and it has been determined that equipment descriptions are correct, and all requirements are still applicable.
- The current Title V permit has been reviewed and errors have been found in equipment descriptions and/or permit requirements. A copy of the Title V permit is attached with redline changes. Permit application and/or modification forms are enclosed, as applicable.

III. COMPLIANCE CERTIFICATION (Read each statement carefully and check all for confirmation):

- Based on information and belief formed after reasonable inquiry, the equipment identified in this application will continue to comply with the applicable federal requirement(s), except for those requirements listed in the "Title V Non-Compliant Operations Report".
- Based on information and belief formed after reasonable inquiry, the equipment identified in this application will comply with applicable federal requirement(s) that will become effective during the permit term, on a timely basis, except for those requirements listed in the "Title V Non-Compliant Operations Report".
- Corrected information will be provided to the District when I become aware that incorrect or incomplete information has been submitted.

Based on information and belief formed after reasonable inquiry, information and statements in the submitted application package, including all accompanying reports, and required certifications are true accurate and complete. I declare, under penalty of perjury under the laws of the state of California, that the forgoing is correct and true.



Signature of Responsible Official

10/16/19

Date

KEVIN DYKEMA

Name of Responsible Official (please print)

ESH SR MANAGER

Title of Responsible Official (please print)

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL - APPLICATION CERTIFICATION INSTRUCTIONS

Complete a Title V Renewal - Application Certification Form by providing the following information:

I. Facility Information

- Line 1. Enter the name of the facility.
- Line 2. Enter the AVAQMD Facility ID number.
- Line 3. Enter the current Title V permit number.

II. Title V Permit Certification

Review the current Title V permit to operate to determine whether equipment descriptions are correct, and whether all requirements are still applicable to the equipment. If any errors are found, provide a redlined copy of the permit to operate, along with any applicable permit modification forms.

III. Compliance Certification

A compliance certification is a certification by the Responsible Official that each of the listed statements are true, accurate, and complete. The Responsible Official must check off that the statements that are true, sign and date, and print his/her name and title.

For a corporation, the responsible official shall be a president, secretary, treasurer, or vice president in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation. The responsible official may be a duly authorized representative rather than any of the above if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit; and

1. the facilities employ more than 250 persons or have gross annual sales or expenditures exceeding \$25 million in 1980 dollars; or
2. the District has approved a petition from the original responsible person to delegate authority.

For a public agency the responsible official shall be either the principal executive officer or the ranking elected official. The principal executive officer, in the case of a federal agency, may be the executive officer having responsibility for a geographical unit.

For a partnership or sole proprietorship, the responsible official is a general partner or the proprietor, respectively

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – LIST OF EXEMPT EQUIPMENT

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. SUMMARY OF EQUIPMENT EXEMPT FROM PERMIT REQUIREMENTS (INCLUDING PORTABLE)

4. EXEMPT EQUIPMENT DESCRIPTION	5. VENTING TO CONTROL (PERMIT #)	6. CONTROL DEVICE DESCRIPTION	7. BASIS FOR EXEMPTION (e.g. Rule 219(D)(2)(b))
MOBILE EQUIPMENT	N/A	N/A	RULE 219 (E) (1) (a)
COMBUSTION and HEAT TRANSFER EQUIPMENT	N/A	N/A	RULE 219 (E) (2) (a), (b), (f)
STRUCTURES AND EQUIPMENT	N/A	N/A	RULE 219 (E) (3) (a), (b), (c), (f), (g), (h), (i)
UTILITY EQUIPMENT	N/A	N/A	RULE 219 (E) (4) (a), (b), (c), (e), (f), (j)
GLASS, CERAMIC, METALLURGICAL, PROCESSING & FABRICATION EQUIPMENT	N/A	N/A	RULE 219 (E) (5) (d), (e), (f), (h), (k), (l), (n)
ABRASIVE BLASTING EQUIPMENT	N/A	N/A	RULE 219 (E) (6) (b), (d), (e)
MACHINING EQUIPMENT	N/A	N/A	RULE 219 (E) (7) (a), (b), (c)
PRINTING AND REPRODUCTION EQUIPMENT	N/A	N/A	RULE 219 (E) (8) (a)
FOOD PROCESSING AND PREPARATION EQUIPMENT	N/A	N/A	RULE 219 (E) (9) (e)
PLASTICS, COMPOSITE AND RUBBER PROCESSING EQUIPMENT	N/A	N/A	RULE 219 (E) (10) (a), (b), (c), (d), (e), (f), (g), (h), (i), (j)
MIXING AND BLENDING EQUIPMENT	N/A	N/A	RULE 219 (E) (11) (a), (b), (d), (e)

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – LIST OF EXEMPT EQUIPMENT INSTRUCTIONS

Introduction

Use the List of Exempt Equipment form for all Title 5 permit renewal applications. This form is designed to summarize all of the equipment at a facility that is exempt per AVAQMD Rule 219 from AVAQMD permit requirements (e.g., IC Engines \leq 50 BHP, Boilers $<$ 2 MMBTU/hr, etc.). This equipment can be listed according to category. However, if there is a specific device that is vented to control equipment, then the equipment must be listed separately. Trivial activities listed on the next page do not have to be listed on this form.

I. Facility Information

1. Enter the name of the facility.
2. Enter the AVAQMD Facility ID number.
3. Enter the current Title V permit number.

II. Summary of Equipment Exempt from Permit Requirements

4. Enter a description of the exempt equipment. Categories can be used (e.g., small boilers (75,000 BTU/hr – 2,000,000 BTU/hr)).
5. If the exempt equipment is connected to a control device, enter the control device permit number.
6. If the exempt equipment is connected to a control device, enter a description of the control device.
7. Provide the basis for exemption by referencing the appropriate section of Rule 219.

Antelope Valley Air Quality Management District

TRIVIAL ACTIVITIES

- Combustion emissions from propulsion of mobile sources
- Air-conditioning units used for human comfort that do not have applicable requirements under Title VI of the Act.
- Ventilating units used for human comfort that do not exhaust air pollutant into the ambient air from any manufacturing/industrial or commercial process
- Non-commercial food preparation
- Consumer use of office equipment and products, not including printers or businesses primarily involved in photographic reproduction
- Janitorial services and consumer use of janitorial products
- Internal combustion engines used for landscaping purposes
- Laundry activities, except for dry-cleaning and steam boilers
- Bathroom/toilet vent emissions
- Emergency (backup) electrical generators at residential locations
- Tobacco smoking rooms and areas
- Blacksmith forges
- Plant maintenance and upkeep activities (e.g., grounds-keeping, general repairs, welding, plumbing, re-tarring roofs, installing insulation, and paving parking lots) provided these activities are not conducted as part of a manufacturing process, are not related to the source's primary business activity, and not otherwise triggering a permit modification. Asphalt batch plant owners/operators must still get a permit if otherwise required.
- Repair or maintenance shop activities not related to the source's primary business activity, not including emissions from surface coating or de-greasing (solvent metal cleaning) activities, and not otherwise triggering a permit modification.
- Portable electrical generators <50 HP that can be moved by hand from one location to another. Moved by hand means it can be moved without the assistance of any motorized or non-motorized vehicle, conveyance or device
- Hand-held equipment for buffing, polishing, cutting, drilling, sawing, grinding, turning or machining wood, metal, or plastic
- Brazing, soldering and welding equipment, and cutting torches related to manufacturing and construction activities that do not result in emission of HAP metals.
- Bench-scale laboratory equipment used for physical or chemical analysis, but not lab fume hoods or vents. Many lab fume hoods or vents might qualify for treatment as unpermitted equipment.
- Routine calibration and maintenance of laboratory equipment or other analytical instruments.
- Equipment used for quality control/assurance or inspection purposes, including sampling equipment used to withdraw materials for analysis
- Hydraulic and hydrostatic testing equipment
- Environmental chambers not using HAP gases
- Shock chambers
- Humidity chambers

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- Solar simulators
- Fugitive emission related to movement of passenger vehicles, provided any required fugitive dust control plan or its equivalent is submitted
- Process water filtration systems and demineralizers
- Demineralized water tanks and demineralizer vents, air compressors and pneumatically operated equipment, including hand tools
- Batteries and battery charging stations, except at battery manufacturing plants
- Storage tanks, vessels and containers holding or storing liquid substances that will not emit any VOC or HAP
- Storage tanks, reservoirs, and pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized
- Equipment used to mix and package soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions, provided appropriate lids and covers are utilized.
- Drop hammers or hydraulic presses for forging or metalworking
- Equipment used exclusively to slaughter animals, but not including other equipment at slaughterhouses, such as rendering cookers, boilers, heating plants, incinerators, and electrical power generating equipment
- Vents from continuous emissions monitors and other analyzers
- Natural gas pressure regulator vents, excluding venting at oil and gas production facilities
- Hand-held applicator equipment for hot melt adhesives with no VOC in the adhesive formulation
- Equipment used for surface coating, painting, dipping or spraying operations, except those that will emit VOC or HAP
- CO2 lasers, used only on metals and other materials which do not emit HAP in the process
- Consumer use of paper trimmers/binders
- Electric or steam-heated drying ovens and autoclaves, but not the emissions from the articles or substance being processed in the ovens or autoclaves or the boilers delivering the steam
- Salt baths using nonvolatile salts that do not result in emissions of any regulated air pollutants
- Laser trimmers using dust collection to prevent fugitive emissions
- Boiler water treatment operations, not including cooling towers
- Oxygen scavenging (de-aeration) of water
- Ozone generators
- Fire suppression systems
- Emergency road flares
- Steam vents and safety relief valves
- Steam leaks
- Steam cleaning operations
- Steam sterilizers

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL – POTENTIAL EMISSIONS REPORT Criteria Pollutants, HAPs, and Greenhouse Gases

INSTRUCTIONS

Describe potential emissions of all regulated air pollutants emitted from each emissions source permitted by the District. Potential to emit is the maximum capacity of an emissions unit to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant shall be treated as part of its design only if the limitation, or the effect it would have on emissions, is incorporated into the applicable permit as a federally enforceable permit condition or is contained in an EPA approved State Implementation Plan (SIP). Any physical or operational limitation includes pollution control equipment, restrictions on hours of operation, and restrictions on the type or amount of material combusted, stored, or processed.

I. Facility Information

1. Enter the name of the facility.
2. Enter the AVAQMD Facility ID number.
3. Enter the current Title V permit number.

II. Potential Annual Emissions

4. List all new and existing emission units either by AVAQMD application or permit number. When the emission unit is new and has not yet been assigned an application number, leave this column blank.
5. Provide a brief equipment description of the emission unit.
6. Potential Annual Emissions: Report potential emissions of pollutants. Quantify emissions from permitted sources, in tons per year, for pollutants for which:
 - 1) A facility is a major source. Fugitive emissions need only be included with reported emissions for source categories listed in 40 CFR Part 70.2(2); or
 - 2) Emissions data are required to show the applicability of, or compliance with, a requirement. Fugitive emissions must be included in the reported emissions.

When quantification is not required by one of the above two criteria, merely check the box in the column associated with all the pollutants emitted from a permitted source (e.g. for a boiler check the boxes in the columns for NO_x, CO, SO_x, VOC, and write in 'HAPS' in the column titled 'Other' and check that box, too).

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL EMISSIONS REPORT, CRITERIA POLLUTANTS & HAPs

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS										
		NOX (TPY)	VOC (TPY)	PM10 (TPY)	PM2.5 (TPY)	SOX (TPY)	CO (TPY)	HAP: (TPY)	HAP: (TPY)			
Facility	Facility limit		114.06	2.05							<25 (agg)	<10 (ind)
C006118	B/637/UVOX		3.60								x	x
C010991	B636 Concentrator/RTO	0.53	9.16	0.22	0.22	0.02	4.38				x	x
B006116	B637A Oven PA05	0.68	x	0.05	0.05	0.004	0.57				x	x
B006162	Jet Engine Test Stand	0.68	x	0.05	0.05	0.12	2.75				x	x
B006491	P10 Boiler No. 1	14.49	x	2.95	2.95	0.233	117.62				x	x
B006488	P10 Boiler No. 2	14.49	x	2.95	2.95	0.233	117.62				x	x
B006436	P10 Boiler No. 3	4.59	x	3.11	3.11	0.245	62.04				x	x
B012651	S2 B211 Boiler 1	0.67	x	0.45	0.45	0.04	2.26				x	x
B012658	S2 B211 Boiler 2											
B013025	Flow Coater B644		x									

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL EMISSIONS REPORT, CRITERIA POLLUTANTS & HAPs

I. FACILITY INFORMATION

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3. TITLE V PERMIT #: 097001754

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		NOX (TPY)	VOC (TPY)	PM10 (TPY)	PM2.5 (TPY)	SOX (TPY)	CO (TPY)	HAP: (TPY)	HAP: (TPY)			
B013213	S2 B210 Boiler 1	0.80	X	0.54	0.54	0.04	2.70	X				X
B013214	S2 B210 Boiler 2											
E006124	IC Engine B610	0.027	X	0.003	0.003	0.00001	0.006	X				X
E006370	IC Engine B253B	0.042	X	0.004	0.004	0.00002	0.009	X				X
E006371	IC Engine B210	0.071	X	0.007	0.007	0.00003	0.015	X				X
E006420	Firewater Pump #2 B615	0.088	X	0.009	0.009	0.00004	0.019	X				X
E006427	IC Engine B611	0.096	X	0.010	0.010	0.00004	0.021	X				X
E006453	IC Engine B601	0.136	X	0.014	0.014	0.00006	0.030	X				X
E006454	IC Engine B601	0.136	X	0.014	0.014	0.00006	0.030	X				X
E006470	IC Engine B602	0.058	X	0.006	0.006	0.00003	0.013	X				X
E006496	IC Engine B612	0.017	X	0.002	0.002	0.00001	0.004	X				X

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL EMISSIONS REPORT, CRITERIA POLLUTANTS & HAPS

I. FACILITY INFORMATION

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		NOx (TPY)	VOC (TPY)	PM10 (TPY)	PM2.5 (TPY)	SOx (TPY)	CO (TPY)	HAP: (TPY)	HAP: (TPY)		
E006498	IC Engine B603	0.150	X	0.015	0.015	0.00006	0.033	X	X		
E006499	Firewater Pump #1 B615	0.088	X	0.009	0.009	0.00004	0.019	X	X		
E006511	Firewater Pump #4 B615	0.088	X	0.009	0.009	0.00004	0.019	X	X		
E006516 (old)	Firewater Pump #3 B615	0.088	X	0.009	0.009	0.00004	0.019	X	X		
E006811	IC Engine B604	0.016	X	0.002	0.002	0.00001	0.003	X	X		
E007092	IC Engine B214	0.042	X	0.004	0.004	0.00002	0.009	X	X		
E007217	IC Engine B604	0.040	X	0.004	0.004	0.00002	0.009	X	X		
E010468	IC Engine B611	0.356	X	0.010	0.010	0.00041	0.098	X	X		
E011076	IC Engine B608	0.029	X	0.001	0.001	0.00005	0.007	X	X		
E011311	IC Engine Site 2	0.043	X	0.003	0.003	0.00010	0.015	X	X		
E013112	IC Engine Site 2	0.043	X	0.003	0.003	0.00010	0.015	X	X		

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL EMISSIONS REPORT, CRITERIA POLLUTANTS & HAPS

I. FACILITY INFORMATION

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2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS									
		NOX (TPY)	VOC (TPY)	PM10 (TPY)	PM2.5 (TPY)	SOX (TPY)	CO (TPY)	HAP: (TPY)	HAP: (TPY)		
E011477	IC Engine Site 7	0.055	x	0.001	0.001	0.00011	0.007	x	x		
E012036	Firewater Pump #3 B616	0.037	x	0.002	0.002	0.0008	0.024		x		
E012182	IC Engine B611	0.344	x	0.002	0.002	0.00041	0.030		x		
E012262	Firewater Pump #2 B616	0.037	x	0.002	0.002	0.00008	0.024		x		
E012263	Firewater Pump #1 B616	0.037	x	0.002	0.002	0.00008	0.024		x		
E012264	Firewater Pump #4 B616	0.037	x	0.002	0.002	0.00008	0.024		x		
E012381	IC Engine B601	0.019	x	0.001	0.001	0.00004	0.005		x		
E012993	IC Engine Site 7	0.257	x	0.001	0.001	0.00033	0.015		x		
E013053	IC Engine B611	0.377	x	0.004	0.004	0.00042	0.030		x		
E013484 (new)	Firewater Pump #3 B615	0.037	x	0.002	0.002	0.00008	0.024		x		
A006389	Abrasive Blasting B601			0.227	0.023						
A006408	Abrasive Blasting B601			0.251	0.025						

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL EMISSIONS REPORT, CRITERIA POLLUTANTS & HAPS

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3. TITLE V PERMIT #: 097001754

II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS										
		NOX (TPY)	VOC (TPY)	PM10 (TPY)	PM2.5 (TPY)	SOX (TPY)	CO (TPY)	HAP: (TPY)	HAP: (TPY)			
A006421	Abrasive Blasting B601			0.970	0.097				X			X
A006500	Abrasive Blasting B636			1.193	0.119				X			X
A007054	Abrasive Blasting B610			6.778	0.678				X			X
A007056	Abrasive Blasting B610			0.513	0.051				X			X
A006367	Abrasive Blasting B211			2.711	0.271				X			X
A006416	Abrasive Blasting B211			0.513	0.051				X			X
T008422	Process Tank Line			0.894	0.894				X			X
N006376	Gasoline Dispensing		X						X			X
N006513	Gasoline Dispensing		X						X			X
None	Cooling Tower			0.99	0.99							

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL GREENHOUSE GAS EMISSIONS REPORT

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS									
		CO ₂ (MTPY)	N ₂ O (MTPY)	CH ₄ (MTPY)	HFCs (MTPY)	PFCs (MTPY)	SF ₆ (MTPY)	Other: (MTPY)	CO ₂ (e) (MTPY)		
C010991	B636 Concentrator/RTO	3158.30	0.0060	0.0596							3161
B006116	B637A Oven PA05	738.48	0.0014	0.0139							739
B006162	Jet Engine Test Stand	348.40	0.0028	0.0139							350
B006491	P10 Boiler No. 1	42265.42	0.0797	0.7972							42307
B006488	P10 Boiler No. 2	42265.42	0.0797	0.7972							42307
B006436	P10 Boiler No. 3	44587.70	0.0841	0.8410							44631
B012651	S2 B211 Boiler 1										
B012658	S2 B211 Boiler 2	6484.35	0.0122	0.1223							6491
B013213	S2 B210 Boiler 1										
B013214	S2 B210 Boiler 2	7774.85	0.0147	0.1466							7782
E006124	IC Engine B610	1.27	0.00001	0.00005							1
E006370	IC Engine B253B	1.61	0.00001	0.00007							2

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL GREENHOUSE GAS EMISSIONS REPORT

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS									
		CO ₂ (MTPY)	N ₂ O (MTPY)	CH ₄ (MTPY)	HFCs (MTPY)	PFCs (MTPY)	SF ₆ (MTPY)	Other: (MTPY)	CO ₂ (e) (MTPY)		
E006371	IC Engine B210	2.78	0.00002	0.00011							3
E006420	Firewater Pump #2 B615	3.82	0.00003	0.00015							4
E006427	IC Engine B611	3.84	0.00003	0.00016							4
E006453	IC Engine B601	6.27	0.00005	0.00025							6
E006454	IC Engine B601	6.27	0.00005	0.00025							6
E006470	IC Engine B602	2.45	0.00002	0.00010							2
E006496	IC Engine B612	0.67	0.00001	0.00003							1
E006498	IC Engine B603	5.92	0.00005	0.00024							6
E006499	Firewater Pump #1 B615	3.82	0.00003	0.00015							4
E006511	Firewater Pump #4 B615	3.82	0.00003	0.00015							4
E006516 (old)	Firewater Pump #4 B615	3.82	0.00003	0.00015							4
E006811	IC Engine B604	0.87	0.00001	0.00004							1

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL GREENHOUSE GAS EMISSIONS REPORT

I. FACILITY INFORMATION

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II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS									
		CO ₂ (MTPY)	N ₂ O (MTPY)	CH ₄ (MTPY)	HFCs (MTPY)	PFCs (MTPY)	SF ₆ (MTPY)	Other: (MTPY)	CO ₂ (e) (MTPY)		
E007092	IC Engine B214	3.84	0.00003	0.00016							4
E007217	IC Engine B604	1.70	0.00001	0.00007							2
E010468	IC Engine B611	30.61	0.00025	0.00124							31
E011076	IC Engine B608	2.86	0.00002	0.00012							3
E011311	IC Engine Site 2	9.70	0.00008	0.00039							10
E013112	IC Engine Site 2	9.70	0.00008	0.00039							10
E011477	IC Engine Site 7	3.88	0.00003	0.00016							4
E012036	Firewater Pump #3 B616	8.06	0.00007	0.00033							8
E012182	IC Engine B611	32.81	0.00027	0.00133							33
E012262	Firewater Pump #2 B616	8.06	0.00007	0.00033							8
E012263	Firewater Pump #1 B616	8.06	0.00007	0.00033							8
E012264	Firewater Pump #4 B616	8.06	0.00007	0.00033							8

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – POTENTIAL GREENHOUSE GAS EMISSIONS REPORT

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
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II. POTENTIAL ANNUAL EMISSIONS

4. EMISSION UNIT (APPLICATION OR PERMIT #)	5. EQUIPMENT DESCRIPTION	6. POTENTIAL ANNUAL EMISSIONS										
		CO ₂ (MTPY)	N ₂ O (MTPY)	CH ₄ (MTPY)	HFCs (MTPY)	PFCs (MTPY)	SF ₆ (MTPY)	Other: (MTPY)	CO ₂ (e) (MTPY)			
E012381	IC Engine B601	3.49	0.00003	0.00014							4	
E012993	IC Engine Site 7	29.24	0.00024	0.00119							29	
E013053	IC Engine B611	38.27	0.00031	0.00155							38	
E013484 (new)	Firewater Pump #3 B615	8.06	0.00007	0.00033							8	

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – COMPLIANCE ASSURANCE MONITORING INSTRUCTIONS FOR DETERMINING APPLICABILITY

Introduction

With the exception of emission units that are municipally-owned backup utility power units, as described by 40 CFR Part 64, Section 64.1(b)(2)¹, the CAM rule is applicable to each emission unit (existing and new construction) at a Title V facility that meets ALL of the following criteria²:

1. The emission unit is subject to an emission limitation or standard³;
2. The emission unit uses a control device to achieve compliance with a federally enforceable emission limitation or standard; and,
3. The emission unit has a pre-control potential to emit (PTE) that exceeds or is equivalent to any of Title V major source thresholds shown in the following table:

Pollutant	PTE Emission Threshold ⁴ (tons per year)
VOC	25
NOx	25
1 HAP ⁵	10
2+ HAPs	25
Any other air pollutant	100

¹ The facility must attach the documentation required by 40 CFR Part 64, Section 64.2(b)(2) to demonstrate that the backup utility power unit only operates during periods of peak demand or emergency situations; and has actual emissions, averaged over the last three calendar years of operation, less than 50% of the major source emission thresholds.

² Additional information about the CAM rule can be found on EPA's website at <http://www.epa.gov/ttnemc01/cam.html>

³ Only emission limitations and standards from an "applicable requirement" for emission units with control devices are subject to the CAM rule. Emission limitation or standard is defined in 40 CFR 64.1 and includes emission limitations, emission standards, capture efficiencies, destruction efficiencies, work practices, and process or control device parameters. Applicable requirement has the same meaning as in 40 CFR part 70 and, generally, includes federally enforceable requirements from AVAQMD and State rules that are approved into the California State Implementation Plan (SIP), New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, and New Source Review permits. Certain emission limits or standards may be exempt from the CAM rule under 40 CFR 64.2(b).

⁴ The PTE emission threshold is based on AVAQMD Rule 3001 definition of a "Major Source Facility" (Amended 4/19/05). Please be advised that the threshold values are subject to change based on rule amendments.

⁵ Hazardous Air Pollutant

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – COMPLIANCE ASSURANCE MONITORING APPLICABILITY DETERMINATION FORM

I. FACILITY INFORMATION

1. FACILITY NAME: Lockheed Martin Aeronautics Company
2. FACILITY ID: 01754
3. TITLE V PERMIT #: 097001754

II. CAM STATUS SUMMARY FOR EMISSION UNITS

4. Based on the criteria in the instructions (check one and attach additional pages as necessary):
- a. There are no emission units with control devices at this Title V facility.
- b. There are emission units with control devices at this Title V facility, and the CAM applicability is shown below for each unit. A CAM plan is attached for each affected emissions unit.

5. EMISSION UNIT (APPLICATION OR PERMIT #)	6. EQUIPMENT DESCRIPTION	UNCONTROLLED EMISSIONS		9. UNCONTROLLED POTENTIAL EMISSIONS EXCEED THE MAJOR SOURCE THRESHOLD AND USE A CONTROL DEVICE?	10. EXEMPT FROM CAM BY 40 CFR 64.2(b)(1)? (ENTER YES OR NO. IF YES, STATE THE REASON FOR EXEMPTION)	11. IS A CAM PLAN REQUIRED?
		7. POLLUTANT TYPE	8. PTE (tons/year)			
C006118	UVOX	VOC	36	Yes	No	Yes
C010991	Concentrator/RTO	VOC	300	Yes	No	Yes
S008564	Spray Booth/Carbon	VOC	4.56	No		No
S009629	Spray Booth/Carbon	VOC	4.56	No		No
S010188	Spray Booth/Carbon	VOC	4.56	No		No
All	Spray Booth	PM	27.28	No		No

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Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL APPLICATION – COMPLIANCE ASSURANCE MONITORING APPLICABILITY DETERMINATION FORM

I. FACILITY INFORMATION

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4. Based on the criteria in the instructions (check one and attach additional pages as necessary):

a. There are no emission units with control devices at this Title V facility.

b. There are emission units with control devices at this Title V facility, and the CAM applicability is shown below for each unit. A CAM plan is attached for each affected emissions unit.

5. EMISSION UNIT (APPLICATION OR PERMIT #)	6. EQUIPMENT DESCRIPTION	UNCONTROLLED EMISSIONS		9. UNCONTROLLED POTENTIAL EMISSIONS EXCEED THE MAJOR SOURCE THRESHOLD AND USE A CONTROL DEVICE?	10. EXEMPT FROM CAM BY 40 CFR 64.2(b)(1)? (ENTER YES OR NO. IF YES, STATE THE REASON FOR EXEMPTION)	11. IS A CAM PLAN REQUIRED?
		7. POLLUTANT TYPE	8. PTE (tons/year)			
B006436/ C006459	Boiler/SCR	NOx	15.29	No	Yes – Continuous compliance determination method	No
N006375	Gasoline Dispensing	VOC	1.63	No		No
N006513	Gasoline Dispensing	VOC	0.41	No		No
A006389	Abrasive Blasting B601	PM10	22.65	No		No
A006408	Abrasive Blasting B601	PM10	25.13	No		No
A006421	Abrasive Blasting B637A	PM10	96.98	No		No

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TITLE V PERMIT RENEWAL APPLICATION – COMPLIANCE ASSURANCE MONITORING APPLICABILITY DETERMINATION FORM

I. FACILITY INFORMATION

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- a. There are no emission units with control devices at this Title V facility.
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5. EMISSION UNIT (APPLICATION OR PERMIT #	6. EQUIPMENT DESCRIPTION	UNCONTROLLED EMISSIONS		9. UNCONTROLLED POTENTIAL EMISSIONS EXCEED THE MAJOR SOURCE THRESHOLD AND USE A CONTROL DEVICE?	10. EXEMPT FROM CAM BY 40 CFR 64.2(b)(1)? (ENTER YES OR NO. IF YES, STATE THE REASON FOR EXEMPTION)	11. IS A CAM PLAN REQUIRED?
		7. POLLUTANT TYPE	8. PTE (tons/year)			
A006500	Abrasive Blasting B636	PM10	119.35	Yes		Yes
A007054	Abrasive Blasting B610	PM10	677.79	Yes	No	No – out of service
A007056	Abrasive Blasting B610	PM10	51.32	No		No
A006367	Abrasive Blasting B211	PM10	271.12	Yes		Yes
A006416	Abrasive Blasting B211	PM10	51.32	No		No

43301 Division Street, Suite 206, Lancaster, CA 93535 | Tel: (661)723-8070

Antelope Valley Air Quality Management District

TITLE V PERMIT RENEWAL – CAM APPLICABILITY DETERMINATION FORM INSTRUCTIONS

I. Facility Information

1. Enter the name of the facility.
2. Enter the AVAQMD Facility ID number.
3. Enter the current Title V permit number.

II. CAM Status Summary for Emission Units

4. Check box (a) or (b) to indicate whether there are emission units with control devices that are subject to the CAM rule. For more detailed information regarding CAM rule applicability, refer to 40 CFR Part 64, Section 64.1. Note that only one CAM plan is required for a control device that is common to more than one emissions unit, or if an emissions unit is controlled by more than one control device similar in design and operation. If the control devices are not similar in design and operation, one plan is required for each control device.
5. List all new and existing emission units either by AVAQMD application or permit number. When the emission unit is new and has not yet been assigned an application number, leave this column blank.
6. Provide a brief equipment description of the emission unit by indicating the equipment type, make, and model and serial numbers as appropriate.
7. List each pollutant that is subject to an emission limitation or standard, as defined in 40 CFR 64.1.
8. Provide the uncontrolled emissions potential to emit for the pollutant.
9. State whether the uncontrolled potential emissions exceed the major source threshold and use a control device (yes/no).
10. State whether each emission limitation or standard is exempt from CAM. If it is exempt, provide a reason.
11. State whether a CAM plan is required.



Government Payment Service
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 Indianapolis, IN 46268
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Fines & Fees Payment Confirmation (Ref #: 27017262)

PLC: Antelope Valley Air Quality Management District
8077
 43301 Division Street
 Lancaster, California 93535
For: Fines & Fees

Date: 10/16/2019 16:01 EDT

TRANSACTION INFORMATION

Name:	Kierah Leverton	Transaction Reference #:	27017262
Db: Company Name:	Lockheed Martin Aeronautics	Transaction Date/Time:	10/16/2019 16:01 EDT
Street Address:	1011 Lockheed Way Palmdale, Ca 93599		
Telephone #:	(661)572-7854		
Type Of Payment:	Permit Renewal		
Notes:	Title V Permit Rnewal		
Reference #:	Fac 01754 Title V 097001754		

BILLING INFORMATION

Name:	Kierah Leverton
Address:	1011 Lockheed Way
City, State Zip:	Palmdale, Ca 93599
Phone #:	(661)572-7854
Card #:	xxxx-xxxx-xxxx-4283

PAYMENT INFORMATION

Approval #:	073493
Payment Amount:	\$759.00
Service Fee:	\$31.25
Total Amount:	\$790.25

The service fee is not refundable.

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Form #: EUR

Antelope Valley Air Quality Management District

TITLE V – PERMIT AMENDMENT / MODIFICATION

I. PERMIT ACTION (Check appropriate box)

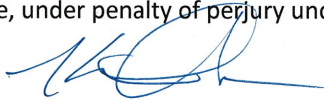
- ADMINISTRATIVE AMENDMENT MINOR MODIFICATION SIGNIFICANT MODIFICATION
 OFF-PERMIT CHANGE

1. FACILITY NAME: Lockheed Martin Aeronautics Company	
2. FACILITY ID: 01754	
3. TITLE V PERMIT NO: 097001754	
4. TYPE OF ORGANIZATION: <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Sole Ownership <input type="checkbox"/> Government <input type="checkbox"/> Partnership <input type="checkbox"/> Utility	
5. COMPANY NAME: Lockheed Martin Aeronautics Company	
6. COMPANY MAILING/BILLING ADDRESS: STREET/P.O. BOX: <u>1011 Lockheed Way Mail Zone 6454</u> CITY: <u>Palmdale</u> STATE: <u>CA</u> ZIP CODE: <u>93599</u>	
7. FACILITY ADDRESS: STREET: <u>1011 Lockheed Way Mail Zone 6454</u> CITY: <u>Palmdale</u> STATE: <u>CA</u> ZIP CODE: <u>93599</u>	PROPOSED DATE OF INSTALLATION <u>9/1/2020</u>
8. DISTANCES (FEET AND DIRECTION) TO CLOSEST: FENCELINE: _____ RESIDENCE: _____ BUSINESS: _____ SCHOOL: _____	
9. GENERAL NATURE OF BUSINESS: Aircraft manufacturing	
10. DESCRIPTION OF EQUIPMENT OR MODIFICATION FOR WHICH APPLICATION IS MADE (include Permit #'s if known, and use additional sheets if necessary) 1. Added a robotic spray booth and electrically heated curing oven at B/637A 2. Added a less than 40 MMBtu boiler equipped with an SCR control device at B/603A	
11. PERSON TO CONTACT FOR INFORMATION ON THIS APPLICATION: NAME: <u>Reenu Ko</u> PHONE NUMBER: <u>661/572-3326</u> TITLE: <u>Environmental Health & Safety Engineer</u> EMAIL: <u>reenu.m.ko@lmco.com</u>	

II. COMPLIANCE CERTIFICATION (Read each statement carefully and check all for confirmation):

- Based on information and belief formed after reasonable inquiry, the equipment identified in this application will continue to comply with the applicable federal requirement(s).
- Based on information and belief formed after reasonable inquiry, the equipment identified in this application will comply with applicable federal requirement(s) that will become effective during the permit term, on a timely basis.
- Corrected information will be provided to the District when I become aware that incorrect or incomplete information has been submitted.
- Based on information and belief formed after reasonable inquiry, information and statements in the submitted application package, including all accompanying reports, and required certifications are true accurate and complete.

I declare, under penalty of perjury under the laws of the state of California, that the forgoing is correct and true:



Signature of Responsible Official

Kevin J. Dykema

Name of Responsible Official (please print)

Envron Hlth & Sfty Eng Mgr Sr.

Title of Responsible Official (please print)

7/13/20

Date

For AQMD Use Only:

DATE STAMP	DISTRICT PERMIT APPLICATION NO: _____	COMPANY /FACILITY ID: _____
------------	--	-----------------------------------

APPENDIX E

DISTRICT / SIP RULE COMPLIANCE DEMONSTRATIONS:

- A. Rule 407: Owner/Operator shall not discharge into the atmosphere from this facility, from any single source of emissions whatsoever, Sulfur compounds, which would exist as a liquid or gas at standard conditions, calculated as sulfur dioxide (SO₂) greater than or equal to 500 ppm by volume. [40 CFR 70.6 (a)(1) - Periodic Monitoring Requirements] (for Periodic Monitoring Requirements, see: Part II, section A, condition 22; Part III, section C, conditions 11 and 22; Part V, section C, condition 4; Part V, section D, condition 3; Part V, section I, condition 3)
[Rule 407 – Liquid and Gaseous Air Contaminants; Version in SIP = 04/02/1982, 40 CFR 52.220(c)(124)(iv)(A) - 11/10/1982, 47 FR 50864; Current Rule Version = 04/02/1982]

Rule 407 specifies standard conditions, but not dry. Standard conditions for Rule 407 will be calculated as wet.

Calculate the SO₂ concentration in the diesel fueled IC engine exhaust gas using the following assumptions/calculations:

1. Maximum sulfur content of the diesel fuel is by permit condition: 0.05 % by weight.
2. Specific gravity of diesel fuel is 0.84: weight of one gallon of diesel fuel is: 8.33 lb/gal x 0.84 = 7 lb/gal.
3. Heating value of diesel fuel from U.S. EPA AP-42, Section 3.3: 19,300 Btu/lb.
4. Gallons of fuel required for 10⁶ Btu: 1 lb/19,300 Btu = x lb/ 10⁶ Btu: x = 51.8 lb: (51.8 lb)(1 gal/7 lb) = 7.4 gallons per 10⁶ Btu.
5. Pounds of sulfur per 10⁶ Btu (7.4 gallons): (7.4 gal)(7 lb/gal)(0.0005) = 0.0259 pounds.
6. Mols of sulfur per 10⁶ Btu: 0.0259 lb/ 32 lb/mol = 8.09 x 10⁻⁴ mols.
7. Volume of SO₂ produced; assuming that one mol of sulfur produces one mol of SO₂; 8.09 x 10⁻⁴ mols of SO₂ are produced per 10⁶ Btu of diesel burned: (385 ft³ / mol)(8.09 x 10⁻⁴ mols) = 0.312 ft³: (385 ft³/mol is at 68 degrees Fahrenheit).
8. From 40 CFR 60, Appendix A, Method 19 the F_w factor for diesel is 10,320 wscf / 10⁶ Btu (68 degrees Fahrenheit, 0 % excess O₂). Rule 407 specifies the SO₂ concentration at standard conditions, wet, not dry.

For purposes of this calculation, excess air from the combustion process will not be considered in calculating the SO₂ concentration & is the most conservative assumption:

Concentration of SO₂ at zero percent oxygen:

$$0.312 \text{ ft}^3 / (0.010320 \times 10^6 \text{ wscf}) = 30.2 \text{ ppmv}$$

Conclusion: Diesel fueled IC Engine exhaust SO₂ concentration of 30.2 ppmv complies with Rule 407 SO₂ limit of 500 ppmv.

It is assumed that the SO₂ concentration in natural gas fueled IC engine exhaust gas will be conservatively less than that demonstrated above for diesel combustion:

Calculate the CO concentration in boiler exhaust gas using the following assumptions/calculations:

1. Based on U.S. EPA AP-42; Section 1.4, Table 1.4-2, lists the CO emission factor for natural gas combustion in boilers to be 35 lb CO per 10⁶ ft³ of natural gas burned. Assume 1000 Btu / ft³ of natural gas.
2. From 40 CFR 60 Appendix A, Method 19, the F_d factor for natural gas is 8710 dscf/10⁶ Btu (68 degrees Fahrenheit). Rule 407 specifies the CO concentration on a dry basis.
3. For the purposes of this calculation, excess air will not be considered in calculating the CO concentration (most conservative):

Cubic feet of CO produced per 10⁶ ft³ of natural gas burned:

$$(35 \text{ lb}) (1 \text{ lb mol} / 28 \text{ lb}) (385 \text{ ft}^3 / \text{mol}) = 481 \text{ ft}^3 \text{ CO} (385 \text{ ft}^3 / \text{mol at 68 degrees Fahrenheit})$$

Dry cubic feet of combustion gas formed from 10⁶ ft³ of natural gas burned:

$$(10^6 \text{ ft}^3 \text{ gas}) (1000 \text{ Btu} / \text{ft}^3) (8710 \text{ dscf} / 10^6 \text{ Btu}) = 8,710,000 \text{ dscf}$$

$$\text{CO concentration} = 481 \text{ ft}^3 / 8.71 \times 10^6 \text{ ft}^3 = 55.2 \text{ ppm (most conservative)}$$

Conclusion: Boiler exhaust CO concentration of 55.2 ppmv complies with Rule 407 CO limit of 2000 ppmv.

- B.** Rule 409: Owner/Operator shall not discharge into the atmosphere from this facility from the burning of fuel, combustion contaminants exceeding 0.23 gram per cubic meter (0.1 grain per cubic foot) of gas calculated to 12 percent of carbon dioxide (CO₂) at standard conditions averaged over a minimum of 25 consecutive minutes.

[Rule 409 - *Combustion Contaminants*; Version in SIP = 8/7/1981, 40 CFR 52.220(c)(103)(xviii)(A) - 7/6/1982, 47 FR 29231; Current Rule Version = 8/7/1981]

Calculate the Total Particulate Concentration in the diesel fueled IC engine exhaust gas using

the following assumptions/calculations:

1. Based on U.S. EPA AP-42, Section 3.4, Table 3.4-5, the emission factor for total particulate is 0.0697 lb/10⁶ Btu. (= 487.9 grains/10⁶ Btu)
2. From 40 CFR 60, Appendix A, Method 19 the F_w factor for diesel is 10,320 wscf/10⁶ Btu (68 degrees Fahrenheit, 0 % excess O₂). Rule 409 specifies the Particulate concentration at standard conditions, wet, not dry.

For purposes of this calculation, excess air from the combustion process will not be considered in calculating the Particulate concentration & is the most conservative assumption:

Concentration of Particulate at zero percent oxygen:

$$(487.9 \text{ grains}/10^6 \text{ Btu}) / (10,320 \text{ wscf}/10^6 \text{ Btu}) = 0.047 \text{ grain}/\text{ft}^3$$

Conclusion: Diesel fueled IC Engine exhaust Total Particulate concentration of 0.047 grain per cubic foot complies with Rule 409 limit of 0.1 grain per cubic foot.

It is assumed that the Total Particulate concentration in natural gas fueled IC engine exhaust gas will be conservatively less than that demonstrated above for diesel combustion.

**Attachment 1 –
PSEU Uncontrolled Emission Calculations**

VOC Emission Sources:

Permit No.	Pollutant	Emission Limit	Averaging Period	Required	Uncontrolled Emissions	
				Control Efficiency	lb/yr	TPY
C006118	VOC	20	Day	90%	73000	36.5
C010991	VOC	1500	Month	97%	600000	300
S008564	VOC	25	Day	0	9125	4.56
S010188	VOC	25	Day	0	9125	4.56

Abrasive Blasting Equipment:

Category	Permit No.	Control Device No.	No. of nozzles	Nozzle ID (inches)	Nozzle Pressure (psig)	Type of Abrasive Material	Density of AIO3 lb/cu ft	Density of Sand lb/cu ft	Flow rate (lb of sand/hr) ¹	Flow rate (lb of AIO3/hr) ²	PM Emission Factor (lb/lb abrasive) ²	PM10 Emission Factor (lb/lb abrasive) ³	PM10 Uncontrolled Emission Rate (lb/hr)	PM10 Uncontrolled Emission Rate (TPY)
Abrasive Blasting	A006389	C006388	1	3/8	35	AIO3	160	99	320	517	0.01	0.01	5.17	22.65
	A006408	C006400	1	3/8	40	AIO3	160	99	355	574	0.01	0.01	5.74	25.13
	A006421	C012228	1	1/2	110	AIO3	160	99	1370	2214	0.01	0.01	22.14	96.98
	A006500	C012227	1	1	22	AIO3	160	99	1686	2725	0.01	0.01	27.25	119.35
	A007054	C007055	5	3/4	60	AIO3	160	99	9575	15475	0.01	0.01	154.75	677.79
	A007056	C007651	1	1/2	50	AIO3	160	99	725	1172	0.01	0.01	11.72	51.32
	A006367	C006383	2	3/4	60	AIO3	160	99	3830	6190	0.01	0.01	61.90	271.12
	A006416	C006422	1	1/2	50	AIO3	160	99	725	1172	0.01	0.01	11.72	51.32
Total													300.38	1315.66

Based on:

Emission Factor Documentation For AP-42 Section 13.2.6, Abrasive Blasting, Final Report, Midwest Research Institute, Cary, NC, September 1997
 STAPPA/ALAPCO Abrasive Blasting guidance (5/91)

¹ Abrasive flow rate from SCAQMD Permit Processing Manual (8/89) Table 3-4

² PM emissions from SCAQMD Permit Processing Manual (8/89) Table 3-2: Other

³ PM10 emissions derived from STAPPA/ALAPCO PM10 factors which were based on the amount of PM generated:
 sand = 0.7 lbs PM10 per lb of PM; grit = 0.7 lb PM10 per lb of PM; Steel shot = 0.86 lb PM10 per lb of PM
 For "Other", assume PM10=PM

Attachment 2 – CAM Plans

Compliance Assurance Monitoring Plan Abrasive Blasting A006367

Emissions Unit

- Process/Emissions unit: Abrasive Blasting Room A006367
- Pollutant: PM, Opacity
- Emissions Control Technique: Baghouse C006383

Applicable Requirements

- Opacity: Unit shall not discharge into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is:
 - As dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the U.S. Bureau of Mines, or
 - Of such opacity as to obscure an observer’s view to a degree equal to or greater than does smoke described in above section.

Monitoring Approach

Indicators Monitored	Pressure Drop
Rational for Monitoring Approach	Pressure drop through the baghouse is monitored using a differential pressure gauge
Monitoring location	Fabric filter(s)
Analytical Devices Required	Pressure gauge
Monitoring frequency	Once daily when in use Continuous
Reporting units	Inches of water
Recordkeeping	Datalogger
QA/QC	Excursions trigger corrective action and a reporting requirement

Basis

Increase in pressure drop can indicate that the bags are becoming blinded. Decrease in pressure drop can indicate holes, tears, or missing bags. If pressure drop does not meet specifications, the unit will be taken out of service for repair.

Compliance Assurance Monitoring Plan Abrasive Blasting A006500

Emissions Unit

- Process/Emissions unit: Abrasive Blasting Room A006500
- Pollutant: PM, Opacity
- Emissions Control Technique: Baghouse C012227

Applicable Requirements

- Opacity: Unit shall not discharge into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is:
 - As dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the U.S. Bureau of Mines, or
 - Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in above section.

Monitoring Approach

Indicators Monitored	Pressure Drop
Rational for Monitoring Approach	Pressure drop through the baghouse is monitored using a differential pressure gauge
Monitoring location	Fabric filter(s)
Analytical Devices Required	Pressure gauge
Monitoring frequency	Once daily when in use Continuous
Reporting units	Inches of water
Recordkeeping	Datalogger
QA/QC	Excursions trigger corrective action and a reporting requirement

Basis

Increase in pressure drop can indicate that the bags are becoming blinded. Decrease in pressure drop can indicate holes, tears, or missing bags. If pressure drop does not meet specifications, the unit will be taken out of service for repair.

Compliance Assurance Monitoring Plan Abrasive Blasting A007054

Emissions Unit

- Process/Emissions unit: Abrasive Blasting Room A007054
- Pollutant: PM, Opacity
- Emissions Control Technique: Baghouse C007055

Applicable Requirements

- Opacity: Unit shall not discharge into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is:
 - As dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the U.S. Bureau of Mines, or
 - Of such opacity as to obscure an observer’s view to a degree equal to or greater than does smoke described in above section.

Monitoring Approach

Indicators Monitored	Pressure Drop
Rational for Monitoring Approach	Pressure drop through the baghouse is monitored using a differential pressure gauge
Monitoring Location	Fabric filter(s)
Analytical Devices Required	Pressure gauge
Monitoring Frequency	Once daily when in use Continuous
Reporting Units	Inches of water
Recordkeeping	Datalogger
QA/QC	Excursions trigger corrective action and a reporting requirement

Basis

Increase in pressure drop can indicate that the bags are becoming blinded. Decrease in pressure drop can indicate holes, tears, or missing bags. If the pressure drop does not meet specifications, the unit will be taken out of service for repair.

Compliance Assurance Monitoring Plan

Thermal Oxidizer C010991

Emissions Unit

- Process/Emissions units:
 - Silk screening equipment B006423
 - Coating and curing oven line B009972
 - Paint Booth in Room T122 Silicones
 - Oven B006435
 - Spray Paint booths (3) in Room T118 Paint Shop
- Pollutants: VOC, NOx, CO
- Emissions Control Technique: Concentrator/Thermal oxidizer

Applicable Requirements

- VOC: <1500 lb/month
- VOC: Control efficiency of not less than 97% or emissions of <10 ppmv (as methane)
- NOx as NO2: 0.12 lb/hr operating at 100% load
- CO: 1.0 lb/hr operating at 100% load

Monitoring Approach

Indicators Monitored	Usage Records	Reaction Chamber Temperature	Control Efficiency Tests for VOC	Initial Compliance Test for CO & NOx Emissions
Rational for Monitoring Approach	Recording usage of coatings and solvents ensures compliance with daily emission limits.	Monitoring the reaction chamber temperature ensures proper destruction of VOC.	Accurate testing will demonstrate compliance with VOC control efficiency.	An initial compliance test demonstrated compliance with NOx and CO emission limits upon startup of the unit.
Monitoring Location	None	Sensor is located in vapor space above the two reaction chambers.	Concentrator inlet and oxidizer outlet	Determined per the test method.
Analytical Devices Required	None	Thermocouple. – A thermocouple produces a voltage output that can be correlated to the temperature that the thermocouple is measuring. Thermocouples cannot be calibrated. Accuracy is assured using QA/QC program described below.	Determined per the appropriate test method.	Determined per the test method.

Indicators Monitored	Usage Records	Reaction Chamber Temperature	Control Efficiency Tests for VOC	Initial Compliance Test for CO & NOx Emissions
Monitoring Frequency	Daily records of usage are maintained	Instantaneous measurement taken once every 15 minutes.	Annually, or once every 3 years after the operator has demonstrated compliance for two consecutive tests	Initially upon startup of the unit.
Reporting Units	lb/day VOC	Degrees Farenheit. Minimum operating temperature is 1400 °F	Control efficiency in percent or ppmv	lb/hr NOx lb/hr CO
Recordkeeping	The amount and VOC content of each coating and solvent is recorded daily. Records include cleanup solvent used.	Temperature is recorded every 15 minutes using a data logger. Records will be made available upon request.	The owner/operator shall perform and report these tests in accordance with the District Compliance Test Procedural manual. Source test results will be maintained on site.	Test results are maintained on-site.
QA/QC	Training of equipment operators in proper recordkeeping practices.	Thermocouples will be replaced annually or upon failure.	Trained source testers will be used.	Trained source testers were used.

Basis

Records are maintained of coating and solvent use and coating and solvent VOC/HAP content. The amount used and the VOC and HAP content of each coating material and solvent used is recorded daily. Therefore a recordkeeping approach provides a reasonable assurance of compliance with monthly VOC limits.

Control efficiency achieved by thermal oxidizer is a function of its operating temperature. Therefore reaction chamber temperature was selected as an indicator to be monitored. If the chamber temperature decreases significantly, complete combustion may not occur. By maintaining the operating temperature at or above a 1400 °F minimum, a level of control efficiency of 97% is expected to be achieved.

The facility performed a VOC control efficiency source test within 90 days of initial operation. Compliance tests are conducted at the concentrator inlet and oxidizer outlet to determine VOC concentrations at high VOC loading and corresponding destruction efficiency (over three separate complete concentrator cycles). Compliance tests are conducted in accordance with the AVAQMD Compliance Test Procedural Manual. VOC concentrations are determined in accordance with and U.S. EPA Test Methods 25, 25A or 25B, with U.S. EPA Test Method 18 or CARB Method 422 used to determine exempt compound concentrations. Performing the above tests in accordance with the required guidelines and methods ensures that accurate results are obtained in order to demonstrate compliance with the permit requirement.

The facility has demonstrated compliance with NO_x and CO emission limits by performing an initial compliance test, in accordance with permit conditions. Test results are maintained on site.

The thermal oxidizers run continuously while the concentrators can be on or off. Because there are two identical thermal oxidizer/concentrator units, facility operations may continue in the event of a single unit failure.

Compliance Assurance Monitoring Plan Ultraviolet Oxidizer C006118

Emissions Unit

- Process/Emissions units:
 - Spray booth PA02
 - Spray Booth MR01
 - Flow Coater B006456
 - Coating/Drying Line/Oven B008132
 - Coating/Drying Line/Oven B008133
 - Oven B006116
- Pollutant: VOC
- Emissions Control Technique: Ultraviolet Oxidizer

Applicable Requirements

- VOC < 600 lb/month;
- VOC overall control efficiency of 90% by weight

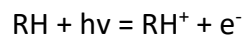
Monitoring Approach

Indicators Monitored	Usage Records	UVOX Carbon filter VOC monitor	Source tests
Rational for Monitoring Approach	Recording usage of coatings and solvents ensures compliance with daily and monthly emission limits.	VOC concentration, flow and temperature monitored continuously	Testing will demonstrate compliance with VOC capture and destruction efficiency.
Monitoring location	N/A	Carbon bed outlet stack	Determined per the test method.
Analytical Devices Required	None	PID Analyzers Model 201-C PID (or equivalent) photo ionization detection (PID)	Determined per the test method.
Monitoring frequency	Daily records of usage are maintained	15 minute intervals	Upon request
Reporting units	lb/day VOC	ppm VOC	Percentage by weight

Indicators Monitored	Usage Records	UVOX Carbon filter VOC monitor	Source tests
Recordkeeping	The amount and VOC content of each coating and solvent is recorded daily. Records include cleanup solvent used.	Records demonstrating emissions in lb/day and all backup documentation (concentration, flow, temperature) will be made available upon request	The owner/operator will perform and report these tests in accordance with the District Compliance Test Procedural manual. Source test results will be maintained on site.
QA/QC	Training of equipment operators in proper recordkeeping practices	Calibration frequency– Zero drift - Automatic compensation; <1% per month Span drift - Auto calibration each 24 hours (with contact closure), may require manual set of span: less than 1% every 24 hours	Trained source testers will be used.

Basis

The outlet concentration of hydrocarbons in the exhaust stack will be monitored every 15 minutes using a PID. The process of photoionization is initiated by the absorption of a photon of ultraviolet radiation energetic enough to ionize a molecule (RH) by the process shown below:



where hv represents a photon with an energy > the ionization potential of species RH.

The ions are collected in an ionization chamber which is adjacent to the lamp and contains an accelerating electrode (biased positively) and a collection electrode where the current is measured. After amplification, the current measured is proportional to concentration. The response measured will be a summation (total) of the hydrocarbons ionized.

Flow and temperature will also be monitored in the same location.

The 15 minute hydrocarbon concentration reading will be converted to pounds of emissions for the period using the following formula:

$$M = F \times \frac{273}{273+T} \times \frac{29.92+P}{29.92} \times C \times MW \times 4.17408 \times 10^{-8}$$

where:

- M = mass flow in lb/period (15 minutes)
- F = Flow (acfm)
- T = Temperature (Deg C)
- P = Pressure in mmHg
- C = Concentration (ppm as methane)
- MW = Molecular Weight of methane (16 lb/lb-mole)

Example assuming a concentration of 3 ppm, and flow of 110,000 CFM measured at 20 Deg C and a pressure of 1 mmHg

$$Mass = 110000 \text{ cfm} \times \frac{273}{273 + 20} \times \frac{29.92 + 1}{29.92} \times 3.0 \text{ ppm} \times 16 \times 4.1741 \times 10^{-8}$$

$$Mass = 0.05659 \text{ lb/period}$$

The 96 values representing emissions for the 24 hour period midnight to midnight will be totaled at the end of each day. Records demonstrating emissions in lb/day used to demonstrate compliance with the daily and monthly VOC emission limits. The records and all backup documentation (concentration, flow, temperature) will be made available upon request

The facility performed a VOC control efficiency source test in August of 1995. That testing demonstrated an overall control efficiency in excess of 99.6%. This demonstrates compliance with the control efficiency requirements. Additional source testing will be performed upon request.

Records are maintained of coating and solvent use and coating and solvent VOC/HAP content. The amount used and the VOC and HAP content of each coating material and solvent used is recorded daily. Recordkeeping provides a reasonable second check for compliance with operating conditions.

Compliance Assurance Monitoring Plan Boiler #4 B01XXXX

Emissions Unit

- ~~Process/Emissions unit: Boiler B01XXXX~~
- ~~Pollutant: NOx~~
- ~~Emissions Control Technique: SCR C01XXXX~~

Applicable Requirements

- ~~NOx 5 ppm of NOx, calculated as NO2, measured by volume on a dry basis at 3% O2 and averaged over 15 minutes~~
- ~~CO 50 ppm of CO, measured by volume on a dry basis at 3% O2 and averaged over 15 minutes. [AVAQMD Rule 1303(A)]~~

Monitoring Approach

Indicators Monitored	Predictive Emissions Monitoring System (PEMS)
Rational for Monitoring Approach	PEMS using a predictive model to accurately assess emissions across the full load range of the unit including all normal operating conditions and during transitional states such as startup and shutdown
Monitoring parameters	Could include fuel flow rate, unit load (MW or heat output), ammonia injection rate, and other parameters determined to be critical to emissions determinations
Analytical Devices Required	Base PEMS hardware, Data acquisition system software/hardware
Monitoring frequency	15-minute average
Reporting units	ppm
Recordkeeping	Emissions alarms, emissions reports
QA/QC	Zero and Span checks—Daily Relative Accuracy Test Audit: Annually Source Test—Every 5 years

Basis

Inputs with strong correlation to emissions are used to develop the model. The model is then be validated against site specific test data by collecting process and emission data for a period of several hours under several load points. The unit is then certified and performance tested with periodic testing demonstrating ongoing compliance.

Attachment 3 - ACUTE RISK SCREENING ANALYSIS