



State of Utah

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DIVISION OF AIR QUALITY
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Director

RN101520031

January 24, 2024

Jeff Schmidt
Northrop Grumman Systems Corporation
2211 West North Temple
Salt Lake City, UT 84116
j.schmidt@ngc.com

Dear Jeff Schmidt,

Re: Engineer Review:
Modification to Approval Order DAQE-AN101520030-24 to Add Equipment
Project Number: N101520031

The DAQ requests a company representative review and sign the attached Engineer Review (ER). This ER identifies all applicable elements of the New Source Review permitting program. Northrop Grumman Systems Corporation should complete this review within **10 business days** of receipt.

Northrop Grumman Systems Corporation should contact **Christine Bodell** at (385) 290-2690 if there are questions or concerns with the review of the draft permit conditions. Upon resolution of your concerns, please email **Christine Bodell** at **cbodell@utah.gov** the signed cover letter. Upon receipt of the signed cover letter, the DAQ will prepare an ITA for a 30-day public comment period. At the completion of the comment period, the DAQ will address any comments and will prepare an Approval Order (AO) for signature by the DAQ Director.

If Northrop Grumman Systems Corporation does not respond to this letter within **10 business days**, the project will move forward without source concurrence. If Northrop Grumman Systems Corporation has concerns that cannot be resolved and the project becomes stagnant, the DAQ Director may issue an Order prohibiting construction.

Approval Signature _____

(Signature & Date)

UTAH DIVISION OF AIR QUALITY ENGINEER REVIEW

SOURCE INFORMATION

Project Number	N101520031
Owner Name	Northrop Grumman Systems Corporation
Mailing Address	2211 West North Temple Salt Lake City, UT, 84116
Source Name	Northrop Grumman Systems Corp. - Clearfield Freeport Center
Source Location	Freeport Center 13th Street Clearfield, UT 84016
UTM Projection	414,000 m Easting, 4,550,000 m Northing
UTM Datum	NAD83
UTM Zone	UTM Zone 12
SIC Code	3728 (Aircraft Parts & Auxiliary Equipment, NEC)
Source Contact	Jeff Schmidt
Phone Number	(801) 774-4171
Email	j.schmidt@ngc.com
Billing Contact	Jeff Schmidt
Phone Number	801-774-4171
Email	j.schmidt@ngc.com
Project Engineer	Christine Bodell, Engineer
Phone Number	(385) 290-2690
Email	cbodell@utah.gov
Notice of Intent (NOI) Submitted	December 15, 2023
Date of Accepted Application	January 1, 2024

SOURCE DESCRIPTION

General Description

Northrop Grumman Systems Corp. (Northrop) manufactures aerospace composite structures, specifically for commercial and defense contractors, at their Freeport Center plant located in Clearfield, Davis County. General steps in the manufacturing process include the following: raw material receipt and storage, material and tool preparation, fabrication, curing, finishing, testing, and packaging and shipping. As part of these steps, Northrop uses natural gas-fired equipment including curing ovens, boilers, burners, hot rooms, autoclaves, and heated paint booths; operates dust collectors for control of various machining processes; has painting and welding operations; has various natural gas-fired and diesel-fired emergency generators; and has various laboratory and chemical mixing operations.

NSR Classification:

Minor Modification at Minor Source

Source Classification

Located in Northern Wasatch Front O3 NAA, Salt Lake City UT PM_{2.5} NAA
Davis County
Airs Source Size: B

Applicable Federal Standards

NSPS (Part 60), A: General Provisions
NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
NSPS (Part 60), JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
MACT (Part 63), A: General Provisions
MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
MACT (Part 63), WWWW: National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Plating and Polishing Operations

Project Proposal

Modification to Approval Order DAQE-AN101520030-24 to Add Equipment

Project Description

Northrop Grumman Systems Corp. (Northrop) has requested a modification to AO DAQE-AN101520030-24 to add one (1) electric kiln, one (1) electric oven, one (1) natural gas-fired oven rated at 1 MMBtu/hr, one (1) spray booth, and one (1) EPM receiving exhaust hood. Northrop has also proposed the removal of the HR-3 hot room, the SB-2 laboratory hood, the E-145 exhaust hood, and the DC-28 dust collector due to decommissioning. The Equipment IDs of the removed equipment are II.A.4, II.A.9, II.A.10, and II.A.17 (respectively) in AO DAQE-AN101520030-24.

EMISSION IMPACT ANALYSIS

The criteria pollutant and HAP emission increases do not exceed any modeling thresholds as defined by Utah Administrative Code (UAC) R307-410. Therefore, modeling is not required for this modification. [Last updated December 21, 2023]

SUMMARY OF EMISSIONS

The emissions listed below are an estimate of the total potential emissions from the source. Some rounding of emissions is possible.

Criteria Pollutant	Change (TPY)	Total (TPY)
CO ₂ Equivalent	464	24709.00
Carbon Monoxide	0.34	16.72
Nitrogen Oxides	0.39	19.88
Particulate Matter - PM ₁₀	-0.26	13.16
Particulate Matter - PM _{2.5}	-0.26	12.95
Sulfur Dioxide	0	0.15
Volatile Organic Compounds	0	69.00

Hazardous Air Pollutant	Change (lbs/yr)	Total (lbs/yr)
1,1,2-Trichloroethane (CAS #79005)	0	4000
2-(2-Butoxyethoxy)-Ethanol (CAS #112345)	0	4000
Chromium Compounds (CAS #CMJ500)	0	27
Cumene (CAS #98828)	0	4000
Ethyl Acrylate (CAS #140885)	0	4000
Ethyl Benzene (CAS #100414)	0	4000
Ethylene Glycol (CAS #107211)	0	4000
Formaldehyde (CAS #50000)	0	1000
Generic HAPs (CAS #GHAPS)	0	2000
Glycol Ethers (CAS #EDF109)	0	4000
Hexamethylene-1,6-Diisocyanate (CAS #822060)	0	14
Hexane (CAS #110543)	0	4000
Hydrogen Fluoride (Hydrofluoric Acid) (CAS #7664393)	0	20
Methanol (CAS #67561)	0	4000
Methyl Chloroform (1,1,1-Trichloroethane) (CAS #71556)	0	19000
Methyl Isobutyl Ketone (Hexone) (CAS #108101)	0	4000
Methyl Isocyanate (CAS #624839)	0	20
Methyl Methacrylate (CAS #80626)	0	200
Methylene Chloride (Dichloromethane) (CAS #75092)	0	4000
Methylene Diphenyl Diisocyanate (MDI) (CAS #101688)	0	20
Naphthalene (CAS #91203)	0	4000
Nickel Compounds (CAS #NDB000)	0	40
Phenol (CAS #108952)	0	4000
Styrene (CAS #100425)	0	200
Tetrachloroethylene (Perchloroethylene) (CAS #127184)	0	4000
Toluene (CAS #108883)	0	4000
Trichloroethylene (CAS #79016)	0	4000
Xylenes (Isomers And Mixture) (CAS #1330207)	0	4000
	Change (TPY)	Total (TPY)
Total HAPs	0	45.27

Note: Change in emissions indicates the difference between previous AO and proposed modification.

Review of BACT for New/Modified Emission Units

1. BACT review regarding New Equipment

New Electric Kiln

The kiln will be used to vitrify ceramics by burning off organic matter in the ceramic and removing all water embedded in the atomic structure. The kiln is electric and will have ductwork designed to remove off-gassing products through a stack. The new electric kiln will emit VOC, NO_x, PM_{2.5}, PM₁₀, CO, and HAPs emissions in negligible levels (<0.1 tpy, each). Therefore, additional controls to reduce emissions from the electric kiln are not cost-effective. BACT to control emissions from the electric kiln is best management practices, including proper maintenance and operation of the equipment.

New Electric Oven

The new electric oven will be used to cure a thermoset resin in order to make the product infusible, insoluble, and unable to return to its uncured state. There will be ductwork designed to remove off-gassing products through a stack. Less than 0.1 tpy of VOC and less than 0.01 tpy of HAPs will be emitted from the process. Therefore, additional controls to reduce emissions from the electric oven are not cost-effective. BACT to control emissions from the electric oven is best management practices, including proper maintenance and operation of the equipment.

New Natural Gas-fired Oven (O-52)

Northrop proposes to install one natural gas-fired oven (O-52) with a maximum rated capacity of 1.0 MMBtu/hr. The oven will be used to cure thermoset resin, similar to the new electric oven. The natural gas-fired oven will emit VOCs, PM_{2.5}, PM₁₀, SO₂, and HAPs in negligible levels (<0.1 tpy, each). The oven will emit 0.42 tpy of NO_x and 0.35 tpy of CO. Additional controls to reduce emissions from the electric oven are not cost effective. Therefore, BACT to control emissions from the electric oven is best management practices, including proper maintenance and operation of the equipment.

New Spray Booth

Northrop proposes to install one spray booth designed to remove overspray and vapors produced during paint spraying operation. The new spray booth will emit 1.2 tpy of VOCs and 0.13 tpy each of PM₁₀ and PM_{2.5}.

Technologies to controls VOCs include a regenerative thermal oxidizer (RTO), a carbon adsorption system, and best management practices. RTOs are considered technically infeasible for the spray booth as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas. In a 2019 BACT analysis, Northrop found that a carbon adsorber for a spray booth with a PTE of 0.54 TPY had a cost effectiveness of \$2.6 million/ton of VOC for canister replacement and \$187,565/ton of VOC for carbon replacement. While the PTE of VOCs from the spray booth is double that of the study, the cost effectiveness still exceeds \$1 million/ ton of VOC reduced. The DAQ does not consider this economically feasible. Therefore, BACT to control VOC emissions from the spray booth is best management practices.

Technologies to control PM₁₀/PM_{2.5} include electrostatic precipitators (ESP), fabric filters, and high-volume low-pressure (HVLP) spray guns. ESPs are considered technically infeasible for the spray booth as they are most effective on metals and items of high resistivity. Baghouses are dust collectors made of fabric filters that remove particulate matter via filtration. HVLP spray guns reduce PM emissions from paint application by increasing paint application efficiency. HVLP spray guns result in better coverage and less material loss. The use of a 3-stage fabric filter and HVLP spray guns are considered to be technically feasible. Therefore, BACT to control

PM₁₀/PM_{2.5} emissions from the spray booths is use of a 3-stage fabric filter and HVLP spray guns.
[Last updated January 24, 2024]

3. **BACT review regarding New Equipment (Continued)**
New Receiving Exhaust Hood

Northrop proposes to install a receiving hood above a platen press that will capture emissions resulting from peroxide-curing of rubber. VOC and HAPs emissions will be the only emissions exhausted through the receiving hood and are based on the mass of rubber cured per year. VOC and HAPs emissions will be less than 0.001 tpy, each. Therefore, additional add-on control technologies are not cost-effective. BACT is best management practices.

In addition to the above BACT determinations, the source is subject to UAC R307-325 (Ozone Nonattainment and Maintenance Areas: General Requirements). These are general provisions that require sources in an ozone nonattainment area not to spill, discard, or store any VOC containing materials in any other manner that could result in greater VOC emissions.

The source is also subject to UAC R307-355 (Control of Emissions from Aerospace Manufacture and Rework Facilities) as the facility is an aerospace manufacture and rework facility that has the potential to emit 10 tons or more per year of VOCs. The rule includes provisions for VOC content limits, application methods, work practices, and solvent cleaning.

[Last updated January 24, 2024]

SECTION I: GENERAL PROVISIONS

The intent is to issue an air quality AO authorizing the project with the following recommended conditions and that failure to comply with any of the conditions may constitute a violation of the AO. **(New or Modified conditions are indicated as “New” in the Outline Label):**

I.1	All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]
I.2	The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]
I.3	Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]
I.4	All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two (2) years. [R307-401-8]

I.5	At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]
I.6	The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]
I.7	The owner/operator shall comply with UAC R307-150 Series. Emission Inventories. [R307-150]
I.8	The owner/operator shall submit documentation of the status of construction or modification to the Director within 18 months from the date of this AO. This AO may become invalid if construction is not commenced within 18 months from the date of this AO or if construction is discontinued for 18 months or more. To ensure proper credit when notifying the Director, send the documentation to the Director, attn.: NSR Section. [R307-401-18]

SECTION II: PERMITTED EQUIPMENT

The intent is to issue an air quality AO authorizing the project with the following recommended conditions and that failure to comply with any of the conditions may constitute a violation of the AO. (New or Modified conditions are indicated as “New” in the Outline Label):

II.A THE APPROVED EQUIPMENT

II.A.1	Northrop Grumman Systems Corp Aerospace composite components manufacturing facility
II.A.2	Six Electric Curing Ovens Ovens: O-21; O-36; O-48; O-159; O-160, IR&D Oven (New)
II.A.3 NEW	One IR&D Electric Kiln New

II.A.4	<p>Twelve (12) Natural Gas-Fired Ovens</p> <p>Oven: Rating:</p> <p>O-26 1.2 MMBtu/hr O-27 4.0 MMBtu/hr COV1 2.8 MMBtu/hr COV2 4.0 MMBtu/hr O-30 3.5 MMBtu/hr O-22 2.0 MMBtu/hr O-24 0.6 MMBtu/hr O-37 3.0 MMBtu/hr O-39 6.4 MMBtu/hr O-41 1.0 MMBtu/hr O-47 3.0 MMBtu/hr O-52 1 MMBtu/hr (New)</p>
II.A.5	<p>Six Hot Rooms</p> <p>Rooms: ACU253, AHU1, AHU2, AHU3, AHU4, HR1</p> <p>Fuel: Natural Gas Maximum Rating: < 5.0 MMBtu/hr (each)</p>
II.A.6	<p>One Boiler- BO1</p> <p>Fuel: Natural Gas Rating: 8.37 MMBtu/hr</p>
II.A.7	<p>Three Autoclaves</p> <p>Autoclave: Rating:</p> <p>AC1 12.0 MMBtu/hr AC6 24.3 MMBtu/hr AC12 15.0 MMBtu/hr</p> <p>Fuel: Natural Gas</p>
II.A.8	<p>Five Autoclaves</p> <p>Autoclaves: CAC1, CAC2, CAC3, CAC4, CAC5</p> <p>Fuel: Natural Gas Rating: 15.8 MMBtu/hr (each)</p>
II.A.9	<p>Twelve Ventilation Rooms</p> <p>Ten Mandrel Prep Rooms; FX-141; Paint Touchup Room</p>
II.A.10	<p>Ten Laboratory Hoods</p> <p>FUH-3; FUH-7; AT-401073; FUH-5; FUH-2; AT-401706; FE-200; FE-222; FUH-1; 2228</p>

II.A.11	<p>Thirteen Exhaust Hoods</p> <ol style="list-style-type: none"> 1,2. Two Welding fume exhausters 3. RMS-6 4. Battery Charging area exhaust hood 5. MX-85 6. M-5 7. 83310J00475 8. FX-105 9. FX-106 10. FE-655 11, 12. Two Paint mixing fume hoods 13. EPM Receiving (New) 								
II.A.12	<p>Four Heated Paint Booths</p> <p>Paint Booth: Heater Rating:</p> <table data-bbox="345 699 688 831"> <tr> <td>SB10</td> <td>750 KBtu/hr</td> </tr> <tr> <td>SB11</td> <td>950 KBtu/hr</td> </tr> <tr> <td>SB12</td> <td>950 KBtu/hr</td> </tr> <tr> <td>SB13</td> <td>950 KBtu/hr</td> </tr> </table> <p>Fuel: Natural Gas</p>	SB10	750 KBtu/hr	SB11	950 KBtu/hr	SB12	950 KBtu/hr	SB13	950 KBtu/hr
SB10	750 KBtu/hr								
SB11	950 KBtu/hr								
SB12	950 KBtu/hr								
SB13	950 KBtu/hr								
II.A.13	<p>Seven Spray Booths</p> <p>SB7, SB9, SB5, SB14, IFE SB, Topcoat SB, SB (New)</p> <p>Control: Fabric Filters (each)</p>								
II.A.14	<p>One Ceramics Spray Booth</p> <p>Control: High efficiency 3-stage fabric filters</p>								
II.A.15	<p>One Thermal Spray Booth</p> <p>Control: Pulse jet baghouse (DC-58)</p> <p>Baghouse Maximum Flow Rate: 25,300 acfm</p> <p>MACT Applicability: Subpart WWWW</p>								

II.A.16	<p>Eight Natural Gas-Fired Emergency Generators</p> <p>Engine: Rating: GE 3 7 kW GE 4 35 kW GE 5 100 kW GE 8 80 kW GE 9 240 kW</p> <p>NSPS Applicability: None MACT Applicability: Subpart ZZZZ</p> <p>Engine: Rating: GE 10 45 kW GE 11 45 kW GE 12 85 kW</p> <p>NSPS Applicability: Subpart JJJJ MACT Applicability: Subpart ZZZZ</p>
II.A.17	<p>Two Diesel-Fired Emergency Generators</p> <p>Engine: GE 7 Rating: 225 kW</p> <p>Engine: GE 13 Rating: 268 hp</p> <p>NSPS Applicability: Subpart IIII MACT Applicability: Subpart ZZZZ</p>
II.A.18	<p>Seven Dust Collectors DC-16, DC-27, DC-29, DC-30, DC-36, DC-37, DC-38</p>
II.A.19	<p>Miscellaneous Equipment Miscellaneous vacuum pumps Miscellaneous Air compressors</p>
II.A.20	<p>Miscellaneous Combustion Equipment Various Boilers and Heaters Maximum Rating: <5.0 MMBtu/hr Fuel: Natural Gas</p>
II.A.21	<p>Eighteen Wet Cooling Towers CT-6, CT-7, CT-9, CT-13, CT-14, CT-15, CT-16, CT-17, CT-18, CT-19, CT-20, CT-21, CT-22, CT-23, CT-24, CT-25, CT-26, CT-27</p> <p>Controls: High Efficiency Drift Eliminators (each)</p>

II.A.22	<p>Informational-Only Equipment* Nineteen electrical sample curing ovens One electrical Hot room Eight electrical autoclaves One Buffer room Miscellaneous Dust Collectors, including portable and orifice scrubbers Miscellaneous Machining Centers / Lathes / Cork Cutting Equipment One Spray Gun Cleaning Station Miscellaneous Grit Blast and Abrading Equipment 3D Printers</p> <p>*This equipment vents internally and is listed for informational purposes only</p>
II.A.23	<p>Informational-Only Equipment* (Continued) Three Hot Drape Forming Machines One Ductless Fume Hood Two Reticulators Two Dry Cooling Towers</p> <p>*This equipment vents internally and is listed for informational purposes only</p>
II.A.24	<p>Grandfathered Equipment* Pit exhaust system Indirect gas fired curing oven - #20 Rating: 6 MMBtu/hr</p> <p>*This equipment was installed before 1969 and is listed for informational purposes only</p>

SECTION II: SPECIAL PROVISIONS

The intent is to issue an air quality AO authorizing the project with the following recommended conditions and that failure to comply with any of the conditions may constitute a violation of the AO. (New or Modified conditions are indicated as “New” in the Outline Label):

II.B REQUIREMENTS AND LIMITATIONS

II.B.1	<p>Site-Wide Requirements</p>
II.B.1.a	<p>The owner/operator shall not allow visible emissions from the following emission points to exceed the following values:</p> <ul style="list-style-type: none"> A. Diesel-fired emergency engines - 20% opacity B. All other emission points - 10% opacity <p>[R307-401-8]</p>
II.B.1.a.1	<p>Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-401-8]</p>

II.B.1.b	The owner/operator shall not exceed a plant-wide natural gas consumption limit of 406,624 Decatherms per rolling 12-month period. [R307-401-8]
II.B.1.b.1	<p>The owner/operator shall:</p> <ul style="list-style-type: none"> A. Determine consumption by gas billing records B. Record consumption on a monthly basis C. Use the consumption records to calculate a new rolling 12-month total by the 20th day of each month using data from the previous 12 months D. Keep consumption records for all periods the plant is in operation. <p>[R307-401-8]</p>
II.B.1.c	The owner/operator shall comply with all applicable requirements of UAC R307-325 (Ozone Nonattainment and Maintenance Areas: General Requirements) and UAC R307-355 (Control of Emissions from Aerospace Manufacture and Rework Facilities), [R307-355]
II.B.2	VOC & HAP Requirements

<p>II.B.2.a NEW</p>	<p>The owner/operator shall not emit more than the following from all sources on site:</p> <ul style="list-style-type: none"> A. 69.00 tons per rolling 12-month period of VOCs B. 19.00 tons per rolling 12-month period of all HAPs combined C. 2.00 tons per rolling 12-month period of 2-Butoxyethanol D. 0.014 tons per rolling 12-month period of Chromium Compounds E. 2.00 tons per rolling 12-month period of Cumene F. 2.00 tons per rolling 12-month period of Ethyl Acrylate G. 2.00 tons per rolling 12-month period of Ethylbenzene H. 2.00 tons per rolling 12-month period of Ethylene Glycol I. 0.50 tons per rolling 12-month period of Formaldehyde J. 2.00 tons per rolling 12-month period of Glycol Ethers K. 0.007 tons per rolling 12-month period of Hexamethylene-1,6-Diisocyanate L. 2.00 tons per rolling 12-month period of Hexane M. 0.010 tons per rolling 12-month period of Hydrogen Fluoride M. 2.00 tons per rolling 12-month period of Methyl Alcohol O. 0.010 tons per rolling 12-month period of Methyl Isocyanate P. 2.00 tons per rolling 12-month period of Methylene Chloride Q. 0.10 tons per rolling 12-month period of Methylenedianiline R. 0.010 tons per rolling 12-month period of Methylene Diphenyl Diisocyanate S. 2.00 tons per rolling 12-month period of Methyl Isobutyl Ketone (MIBK) T. 2.00 tons per rolling 12-month period of Naphthalene
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<p>II.B.2.a NEW</p>	<p>The owner/operator shall not emit more than the following from all sources on site continued:</p> <ul style="list-style-type: none"> U. 0.02 tons per rolling 12-month period of Nickel Compounds V. 2.00 tons per rolling 12-month period of Phenol W. 2.00 tons per rolling 12-month period of Tetrachloroethylene X. 2.00 tons per rolling 12-month period of Toluene Y. 9.50 tons per rolling 12-month period of 1,1,1-Trichloroethane Z. 2.00 tons per rolling 12-month period of 1,1,2-Trichloroethane AA. 2.00 tons per rolling 12-month period of Trichloroethylene BB. 2.00 tons per rolling 12-month period of Xylene CC. 1.20 tons per rolling 12-month period of all other HAPs <p>[R307-401-8]</p>
<p>II.B.2.a.1 NEW</p>	<p>The owner/operator shall calculate a new 12-month total by the 20th day of each month using data from the previous 12 months. The owner/operator shall use a mass-balance method to calculate emissions from evaporative sources. The owner/operator may use the following equations with applicable units to comply with the mass-balance method:</p> <p>VOCs = [% VOCs by Weight/100] x [Density] x [Volume Consumed]</p> <p>Non-Metal HAP = [% HAP by Weight/100] x [Density] x [Volume Consumed]</p> <p>Metal HAP = [% HAP by Weight/100] x [Density] x [Volume Consumed] x [filter control efficiency]</p> <p>[R307-401-8]</p>
<p>II.B.2.a.2</p>	<p>The owner/operator shall use a mass-balance method to quantify any amount of VOCs and HAPs reclaimed. The owner/operator shall subtract the amount of VOCs and HAPs reclaimed from the quantities calculated above to provide the monthly total emissions of VOCs and HAPs. [R307-401-8]</p>

II.B.2.a.3	<p>The owner/operator shall keep records each month of the following:</p> <ul style="list-style-type: none"> A. The name (as per SDS) of the VOC- and HAP-emitting material B. The maximum percent by weight of VOCs and each HAP in each material used C. The density of each material used D. The volume of each VOC- and HAP-emitting material used E. The amount of VOCs and the amount of each HAP emitted from each material F. The amount of VOCs and the amount of each HAP reclaimed and/or controlled from each material G. The total amount of VOCs, the total amount of each HAP, and the total amount of all HAPs combined emitted from all materials (in tons) <p>[R307-401-8]</p>
II.B.3	Paint Booth Requirements
II.B.3.a	The owner/operator shall equip each paint booth with paint arrestor particulate filters to control particulate emissions. All exhaust air from the paint booths shall be routed through the filters before venting to the atmosphere. [R307-401-8]
II.B.3.b	The paint booths shall be equipped with HVLP spray guns, or an equivalent method, to control VOC emissions. [R307-355-6]
II.B.3.c	The owner/operator shall control the thermal spray booth with a baghouse. [R307-401-8]
II.B.3.d NEW	The owner/operator shall install a manometer or magnehelic pressure gauge to measure the differential pressure across the thermal spray booth baghouse. The baghouse shall operate within the static pressure range recommended by the manufacturer for normal operations. [R307-401-8]
II.B.3.d.1	<p>Pressure drop readings shall be recorded at least once during each day of operation while the baghouse is operating. Records documenting the pressure drop shall be kept in a log and shall include the following:</p> <ul style="list-style-type: none"> A. Unit identification B. Manufacturer-recommended pressure drop for the unit C. Daily pressure drop readings D. Date of reading <p>[R307-401-8]</p>
II.B.3.d.2 NEW	The pressure gauge shall be located such that an inspector/operator can safely read the indicator at any time. [R307-401-8]

II.B.3.d.3	The instrument shall be calibrated in accordance with the manufacturer's instructions or recommendations or replaced at least once every 12 months. Documentation of calibrations and replacements shall be maintained. [R307-401-8]
II.B.4	Emergency Engine Requirements
II.B.4.a	The owner/operator shall not operate each emergency engine on site for more than 100 hours per calendar year during non-emergency situations. There is no time limit on the use of the engines during emergencies. [40 CFR 63 Subpart ZZZZ, R307-401-8]
II.B.4.a.1	To determine compliance with a calendar year total, the owner/operator shall calculate a new yearly total by January 31st using data from the previous calendar year. Records documenting the operation of each emergency engine shall be kept in a log and shall include the following: <ul style="list-style-type: none"> A. The date the emergency engine was used B. The duration of operation in hours C. The reason for the emergency engine usage [40 CFR 63 Subpart ZZZZ, R307-401-8]
II.B.4.a.2	To determine the duration of operation, the owner/operator shall install a non-resettable hour meter for each emergency engine. [40 CFR 63 Subpart ZZZZ, R307-401-8]
II.B.5	Fuel Requirements
II.B.5.a	The owner/operator shall use only natural gas as a fuel in all fuel-burning furnaces, ovens, boilers, heaters, and natural gas-fired emergency engines. [R307-401-8]
II.B.5.b	The owner/operator shall only use diesel fuel (fuel oil #1, #2 or diesel fuel oil additives) in the diesel-fired emergency engines. All diesel burned shall meet the definition of ultra-low sulfur diesel (ULSD) and contain no more than 15 ppm sulfur. [R307-401-8]
II.B.5.b.1	To demonstrate compliance with the diesel fuel requirements for any diesel fuel purchased, the owner/operator shall keep and maintain fuel purchase invoices. The fuel purchase invoices shall indicate that the diesel fuel meets the ULSD requirements, or the owner/operator shall obtain certification of sulfur content from the fuel supplier. [R307-401-8]

PERMIT HISTORY

When issued, the approval order shall supersede (if a modification) or will be based on the following documents:

Is Derived From	NOI dated December 15, 2023
Supersedes	AO DAQE-AN101520030-24 dated January 18, 2024

REVIEWER COMMENTS

1. **Comment regarding HAP Emissions:**

Condition II.B.2.a contains a 19.00 TPY rolling 12-month limit for all HAPs combined. Additionally, Condition II.B.2.a also includes individual HAP limits. If added up, these individual limits exceed the total HAP limit. Northrop has been given individual limits to add greater flexibility in their operations, with an established combined HAP limit which prevents Northrop from becoming a major source of HAP emissions. The generic HAP limit was established to provide Northrop flexibility in their operations for when minor processes use HAPs other than those listed.

As requested by Northrop, total VOC and HAP emission limitations will not be changing with this modification.

[Last updated December 20, 2023]

2. **Comment regarding Modification:**

In addition to the one (1) electric kiln, one (1) electric oven, one (1) natural gas-fired oven, one (1) spray booth, and one (1) receiving hood exhaust installation request, Northrop has proposed the removal of the HR-3 hot room, the SB-2 laboratory hood, the E-145 exhaust hood, and the DC-28 dust collector due to decommissioning. The Equipment IDs are II.A.4, II.A.9, II.A.10, and II.A.17 (respectively) in AO DAQE-AN101520030-24.

Removing the HR-3 hot room results in an emissions decrease of 0.0020 tpy of VOCs, 0.036 tpy of NO_x, 0.0027 tpy each of PM₁₀ and PM_{2.5}, 0.030 tpy of CO, and less than 0.001 tpy of HAPs. The removal of the D-28 dust collector. results in an emissions decrease of 0.42 tpy each of PM₁₀ and PM_{2.5}. The reduction in emissions from the removal of the SB-2 laboratory hood and E-145 exhaust hood were not quantified as Northrop is not proposing a limit change for VOC/HAPs.

[Last updated January 12, 2024]

3. **Comment regarding Source Emission Calculations and DAO Acceptance:**

Added Equipment

Electric Kiln

PM emission factors from AP-42 Chapter 11.7, Table 11.7-1. All other emission factors are from AP-42 Chapter 11.7, Table 11.7-2

Electric Oven

HAP and VOC off-gas emissions rates were determined from on-site sample data. A 15-minute sample was taken from the exhaust stream of an oven when the oven reached the maximum cure temperature. Emission rates are calculated based on the pollutant concentration and the maximum rated flow rate of the oven fan (310 acfm). Annual emissions are conservatively based on continuous operation for 8,760 hours per year (hr/yr).

Natural Gas-Fired Oven

Emission factors are from AP-42, Section 1.4 Natural Gas Combustion for an uncontrolled boiler <100 MMBtu/hr. Hourly emissions are based on operation of the 1 MMBtu/hr natural gas-fired oven at full capacity and assuming a fuel heat content of 1044 Btu/scf. Annual emissions were calculated assuming 8760 hrs/yr of operation.

Spray Booth

Emissions of VOCs and HAPs are calculated using the VOC or HAP content (volume percent), the density, and the expected gallons of the respective paint used per year. Emissions are conservatively based on all VOC and HAP being emitted via the stack. Controlled PM emissions account for the control efficiency of the HVLP spray gun (65%) and the fabric filter efficiency (97.5%). Annual emissions were calculated assuming 8760 hrs/yr of operation and maximum paint usage.

Receiving Hood Exhaust

The receiving hood exhaust emissions are estimated using emissions factors for VOC and HAPs from Section 4.12 of the EPA's AP-42 emission factor document. Emissions are calculated based on a maximum of 11 shipsets per year, assuming 913 feet (ft) of rubber per set, at a mass of 167 lb rubber per 300 ft roll (5,591 lb rubber per year).

Removed Equipment

H-3 Hot Room

Emission factors are from AP-42 Section 1.4: Natural Gas Combustion. Table 1.4-1, and 1.4-2. Emissions are based on operation of the 0.084 MMBtu/hr burner at full capacity. Annual emissions were calculated assuming 8760 hrs/yr of operation.

DC-28 Dust Collector

Emissions are based on operation of the 702 scfm baghouse at full capacity. Annual emissions were calculated assuming 8,760 hrs/yr of operation. A grain loading rate of 0.016 gr/scf was used, as listed in Northrops 2022 emissions inventory. [Last updated December 21, 2023]

4. **Comment regarding NSPS and MACT Applicability:**

40 CFR 60 NSPS Subpart IIII - Standards of Performance or Stationary Compression Ignition Internal Combustion Engines

The provisions of this subpart apply to owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are manufactured after April 1, 2006. The two (2) diesel-fired emergency stationary engines at this facility were constructed after this date and are therefore subject to NSPS Subpart IIII.

40 CFR 60 NSPS Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The provisions of this subpart apply to owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured on or after July 1, 2008, for engines with a maximum engine power less than 500 HP. The eight (8) natural gas-fired emergency stationary engines on site were constructed after this data and are therefore subject to NSPS Subpart JJJJ.

40 CFR 63 Subpart ZZZZ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The provisions of this subpart are applicable to owners/operators of stationary RICE at a major or area sources of HAP emissions. The facility includes (2) diesel-fired emergency stationary engines and eight (8) natural gas-fired emergency stationary engines. The provisions of MACT Subpart

ZZZZ apply as the stationary reciprocating internal combustion engine (RICE) is at an area source of HAP emissions. The engines are not designated as nonroad and are not exempt are affected sources under this regulation. Therefore, MACT Subpart ZZZZ applies to this facility.

40 CFR 63 Subpart WWWW - National Emissions Standards for Hazardous Air Pollutants: Area Source Standards for Plating and Polishing Operations

This subpart applies to owners and operators of affected sources at plating and polishing facilities that are area sources of HAPs. This subpart specifically applies to plating and polishing facilities that use one or more plating and polishing metal HAPs, including compounds of nickel, in affected sources, including thermal spraying. This source is considered an area source of HAPs and has a thermal spraying operation using nickel compounds; therefore, MACT Subpart WWWW applies to this source. MACT Subpart WWWW contains capture system requirements for thermal spraying operations. Northrop has chosen to comply with the capture system requirements with a pulse jet baghouse to control the thermal spraying operations. In addition to this requirement, MACT Subpart WWWW contains other management practices, equipment and operating standards, and notification, reporting, and recordkeeping requirements for thermal spraying operations. [Last updated December 21, 2023]

5. Comment regarding Title V Applicability:

Title V of the 1990 CAA (Title V) applies to the following:

A. Any major source

B. Any source subject to a standard, limitation, or other requirement under Section 111 of the Act, Standards of Performance for New Stationary Sources

C. Any source subject to a standard or other requirement under Section 112 of the Act, Hazardous Air Pollutants

D. Any Title IV-affected source

This facility is not a major source and is not a Title IV source, but is subject to 40 CFR 60 NSPS Subparts A, IIII, and JJJJ, and 40 CFR 63 MACT Subparts A, ZZZZ, and WWWW regulations. However, Title V does not apply because NSPS Subparts IIII and JJJJ and MACT Subparts ZZZZ and WWWW exempt sources from the obligation to obtain a permit under 40 CFR part 70 (Title V permit) if the source is not otherwise required by law to obtain a permit. There are no other reasons why this source would be required to obtain a part 70 permit; therefore, Title V does not apply to this facility.

[Last updated December 21, 2023]

ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

40 CFR	Title 40 of the Code of Federal Regulations
AO	Approval Order
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDS	Classification Data System (used by EPA to classify sources by size/type)
CEM	Continuous emissions monitor
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1
COM	Continuous opacity monitor
DAQ/UDAQ	Division of Air Quality
DAQE	This is a document tracking code for internal UDAQ use
EPA	Environmental Protection Agency
FDCP	Fugitive dust control plan
GHG	Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i)
GWP	Global Warming Potential - 40 CFR Part 86.1818-12(a)
HAP or HAPs	Hazardous air pollutant(s)
ITA	Intent to Approve
LB/HR	Pounds per hour
LB/YR	Pounds per year
MACT	Maximum Achievable Control Technology
MMBTU	Million British Thermal Units
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO _x	Oxides of nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
PM ₁₀	Particulate matter less than 10 microns in size
PM _{2.5}	Particulate matter less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
R307	Rules Series 307
R307-401	Rules Series 307 - Section 401
SO ₂	Sulfur dioxide
Title IV	Title IV of the Clean Air Act
Title V	Title V of the Clean Air Act
TPY	Tons per year
UAC	Utah Administrative Code
VOC	Volatile organic compounds

ay booth, and a receiving hood exhaust to its permit. The Facility will remove a hot room, a laboratory
 n reductions were not quantified as VOC and HAP limits are proposed to stay the same.

Electric Oven (addition)					O-52 NG Boile	
Pollutant	EF (ug/m3)		tpy	lb/hr	Pollutant	
Dichlorodif	2.6	VOC	1.32E-05	3.02E-06	NOX	
Chloromet	1.8	VOC	9.15E-06	2.09E-06	CO	
Acetone	250	VOC	1.27E-03	2.90E-04	PM10	
2-Butanon	17	VOC	8.65E-05	1.97E-05	PM2.5	
Ethanol	339	VOC	1.72E-03	3.94E-04	SO2	
Isopropyl A	1,991	VOC	1.01E-02	2.31E-03	VOC	
Heptane	2.8	VOC	1.42E-05	3.25E-06	Lead	
4-Methyl-2	4.2	VOC	2.14E-05	4.88E-06	HAP	
Toluene	12	VOC	6.10E-05	1.39E-05		
2-Pentano	23	VOC	1.17E-04	2.67E-05		
VOC total			0.01344	0.00307		
HAP total			0.00007	0.00002		
310 ft3/min						
8.778218 m3/min						

ector (Removed)

EF gr/scf	(lbs/hr)	(tons/year)
0.016	0.10	0.42
0.016	0.10	0.42

702 scfm
 8760 hour/yr

Difference

- 0.01
- 0.01
- 0.13 All < 0.25 tpy
- 0.00
- 0.00
- 0.04

r (1MMBtu/hr) (addition)

EF	(lbs/hr)	(tons/year)
100	0.10	0.43
84	0.08	0.36
7.6	0.01	0.03
7.6	0.01	0.03
0.6	0.00	0.00
5.5	0.01	0.02
0.0005	0.00	0.00
	0.00	0.01

Spray Booth (addition)

Pollutant	tpy	lb/hr
VOCs	1.2	0.273972603
PM	0.13	0.029680365
Methyl Isobu	0.1	0.02283105
Formaldehyd	0.04	0.00913242
Hexamethyl	0.4	0.091324201
HAP total	0.54	0.123287671

*HVLP nozzel - 65%

*fabric filter - 97.5%

pm10

-0.388
-0.26

pm2.5

-0.258
-0.26

Hood (addition)

Pollutant	tpy	lb/hr
VOC total	0.00490	9.80000
HAP total	0.00140	2.80000

Natural Gas-fired Boilers & Heaters

Equipment Details	
Rating	0 MMBtu/hour
Operational Hours	8,760 hours/year
Firing	Normal

Criteria Pollutant	Concentration (ppm)	Emission Factor (lb/10 ⁶ scf)	Emission Rate (lbs/hr)	Emission Total (tons/year)	Reference
NO _x		100	0.01	0.04	Manufacturer Data
CO		84	0.01	0.03	or AP-42 Table 1.4-1
PM ₁₀		7.6	0.00	0.00	AP-42 Table 1.4-2
PM _{2.5}		7.6	0.00	0.00	
SO ₂		0.6	0.00	0.00	
VOC		5.5	0.00	0.00	
Lead		0.0005	0.00	0.00	
HAP			0.00	0.00	See Below

Green House Gas Pollutant	Global Warming Potential	Emission Factor (lb/10 ⁶ scf)	Emission Rate (lbs/hr)	Emission Total (tons/year)	Reference
CO ₂ (mass basis)		120,000	10	43	AP-42 Table 1.4-2 & Table A-1 to Subpart A of Part 98
Methane (mass basis)	25	2.3	0.00	0.00	
N ₂ O (mass basis)	298	2.2	0.00	0.00	
CO ₂ e				44	

Hazardous Air Pollutant	Emission Factor (lb/10 ⁶ scf)	Emission Rate (lbs/hr)	Emission Total (tons/year)	Reference	
2-Methylnaphthalene	2.40E-05	1.98E-09	8.66E-09	AP-42 Table 1.4-3	
3-Methylchloranthrene	1.80E-06	1.48E-10	6.49E-10		
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.32E-09	5.77E-09		
Acenaphthene	1.80E-06	1.48E-10	6.49E-10		
Acenaphthylene	1.80E-06	1.48E-10	6.49E-10		
Anthracene	2.40E-06	1.98E-10	8.66E-10		
Benz(a)anthracene	1.80E-06	1.48E-10	6.49E-10		
Benzene	2.10E-03	1.73E-07	7.57E-07		
Benzo(a)pyrene	1.20E-06	9.88E-11	4.33E-10		
Benzo(b)fluoranthene	1.80E-06	1.48E-10	6.49E-10		
Benzo(g,h,i)perylene	1.20E-06	9.88E-11	4.33E-10		
Benzo(k)fluoranthene	1.80E-06	1.48E-10	6.49E-10		
Chrysene	1.80E-06	1.48E-10	6.49E-10		
Dibenzo(a,h)anthracene	1.20E-06	9.88E-11	4.33E-10		
Dichlorobenzene	1.20E-03	9.88E-08	4.33E-07		
Fluoranthene	3.00E-06	2.47E-10	1.08E-09		
Fluorene	2.80E-06	2.31E-10	1.01E-09		
Formaldehyde	7.50E-02	6.18E-06	2.71E-05		
Hexane	1.80E+00	1.48E-04	6.49E-04		
Indeno(1,2,3-cd)pyrene	1.80E-06	1.48E-10	6.49E-10		
Naphthalene	6.10E-04	5.02E-08	2.20E-07		
Phenanthrene	1.70E-05	1.40E-09	6.13E-09		
Pyrene	5.00E-06	4.12E-10	1.80E-09		
Toluene	3.40E-03	2.80E-07	1.23E-06		
Arsenic	2.00E-04	1.65E-08	7.21E-08		AP-42 Table 1.4-4
Beryllium	1.20E-05	9.88E-10	4.33E-09		
Cadmium	1.10E-03	9.06E-08	3.97E-07		
Chromium	1.40E-03	1.15E-07	5.05E-07		
Cobalt	8.40E-05	6.92E-09	3.03E-08		
Manganese	3.80E-04	3.13E-08	1.37E-07		
Mercury	2.60E-04	2.14E-08	9.38E-08		
Nickel	2.10E-03	1.73E-07	7.57E-07		
Selenium	2.40E-05	1.98E-09	8.66E-09		

Heating Value of Natural Gas 1020 BTU/scf or MMBtu/MMscf

NOx	Size	Table 1.4-1	lb/10 ⁶ scf	lb/MMBtu	lb/hr	Ton/year	Check
>100 MMBtu/hr	Uncontrolled - Pre NSPS (Subparts D & Db)		280	0.2745	0.02	0.10	
>100 MMBtu/hr	Uncontrolled - Post NSPS (Subparts D & Db)		190	0.1863	0.02	0.07	
>100 MMBtu/hr	Controlled - Low Nox burners		140	0.1373	0.01	0.05	

>100 MMBtu/hr	Controlled - Flue gas recirculation (FGR)		100	0.0980	0.01	0.04	Match
<100 MMBtu/hr	Uncontrolled		100	0.0980	0.01	0.04	Match
<100 MMBtu/hr	Controlled - Low Nox burners		50	0.0490	0.00	0.02	
<100 MMBtu/hr	Controlled - Low Nox burners/FGR		32	0.0314	0.00	0.01	
Tangential-Fired	Uncontrolled		170	0.1687	0.01	0.06	
Tangential-Fired	Controlled - FGR		76	0.0745	0.01	0.03	

CO	Size	Table 1.4-1	lb/10 ⁶ scf	lb/MMBtu	lb/hr	Ton/year	Check
>100 MMBtu/hr	Uncontrolled - Pre NSPS (Subparts D & Db)		84	0.0824	0.01	0.03	Match
>100 MMBtu/hr	Uncontrolled - Post NSPS (Subparts D & Db)		84	0.0824	0.01	0.03	Match
>100 MMBtu/hr	Controlled - Low Nox burners		84	0.0824	0.01	0.03	Match
>100 MMBtu/hr	Controlled - Flue gas recirculation (FGR)		84	0.0824	0.01	0.03	Match
<100 MMBtu/hr	Uncontrolled		84	0.0824	0.01	0.03	Match
<100 MMBtu/hr	Controlled - Low Nox burners		84	0.0824	0.01	0.03	Match
<100 MMBtu/hr	Controlled - Low Nox burners/FGR		84	0.0824	0.01	0.03	Match
Tangential-Fired	Uncontrolled		24	0.0235	0.00	0.01	
Tangential-Fired	Controlled - FGR		98	0.0961	0.01	0.04	

Any Size	Table 1.4-2	lb/10 ⁶ scf	lb/MMBtu	lb/hr	Ton/year	Check
CO ₂		120,000	117.6471	10	43	Match
Lead		0.0005	0.0000	0.00	0.00	Match
N ₂ O	Uncontrolled	2.2	0.0022	0.00	0.00	Match
	Controlled - Low Nox burners	0.64	0.0006	0.00	0.00	
PM (total)		7.6	0.0075	0.00	0.00	Match
PM (cond)		5.7	0.0056	0.00	0.00	
PM (filter)		1.9	0.0019	0.00	0.00	
SO ₂		0.6	0.0006	0.00	0.00	Match
TOC		11	0.0108	0.00	0.00	
Methane		2.3	0.0023	0.00	0.00	Match
VOC		5.5	0.0054	0.00	0.00	Match
Global Warming Potential				lb/hr	Ton/year	
CO ₂		1		10	43	
Methane		25		0	0	
N ₂ O		298		0	0	
CO ₂ e	Total CO ₂ e			10	44	Match

HAP - Organic	Table 1.4-3	lb/10 ⁶ scf	lb/MMBtu	lb/hr	Ton/year	Check
2-Methylnaphthalene	2.40E-05	2.35E-08	1.98E-09	8.66E-09	Match	
3-Methylchloranthrene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
7,12-Dimethylbenz(a)anthracene	1.60E-05	1.57E-08	1.32E-09	5.77E-09	Match	
Acenaphthene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Acenaphthylene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Anthracene	2.40E-06	2.35E-09	1.98E-10	8.66E-10	Match	
Benz(a)anthracene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Benzene	2.10E-03	2.06E-06	1.73E-07	7.57E-07	Match	
Benzo(a)pyrene	1.20E-06	1.18E-09	9.88E-11	4.33E-10	Match	
Benzo(b)fluoranthene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Benzo(g,h,i)perylene	1.20E-06	1.18E-09	9.88E-11	4.33E-10	Match	
Benzo(k)fluoranthene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Chrysene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Dibenzo(a,h)anthracene	1.20E-06	1.18E-09	9.88E-11	4.33E-10	Match	
Dichlorobenzene	1.20E-03	1.18E-06	9.88E-08	4.33E-07	Match	
Fluoranthene	3.00E-06	2.94E-09	2.47E-10	1.08E-09	Match	
Fluorene	2.80E-06	2.75E-09	2.31E-10	1.01E-09	Match	
Formaldehyde	7.50E-02	7.35E-05	6.18E-06	2.71E-05	Match	
Hexane	1.80E+00	1.76E-03	1.48E-04	6.49E-04	Match	
Indeno(1,2,3-cd)pyrene	1.80E-06	1.76E-09	1.48E-10	6.49E-10	Match	
Naphthalene	6.10E-04	5.98E-07	5.02E-08	2.20E-07	Match	
Phenanthrene	1.70E-05	1.67E-08	1.40E-09	6.13E-09	Match	
Pyrene	5.00E-06	4.90E-09	4.12E-10	1.80E-09	Match	
Toluene	3.40E-03	3.33E-06	2.80E-07	1.23E-06	Match	

HAP - Metal	Table 1.4-4	lb/10 ⁶ scf	lb/MMBtu	lb/hr	Ton/year	Check
Arsenic	2.00E-04	1.96E-07	1.65E-08	7.21E-08	Match	
Beryllium	1.20E-05	1.18E-08	9.88E-10	4.33E-09	Match	
Cadmium	1.10E-03	1.08E-06	9.06E-08	3.97E-07	Match	
Chromium	1.40E-03	1.37E-06	1.15E-07	5.05E-07	Match	
Cobalt	8.40E-05	8.24E-08	6.92E-09	3.03E-08	Match	
Manganese	3.80E-04	3.73E-07	3.13E-08	1.37E-07	Match	
Mercury	2.60E-04	2.55E-07	2.14E-08	9.38E-08	Match	
Nickel	2.10E-03	2.06E-06	1.73E-07	7.57E-07	Match	
Selenium	2.40E-05	2.35E-08	1.98E-09	8.66E-09	Match	

Total HAP	Total HAP	lb/hr	Ton/year	Check
		0.00	0.00	Match

ppm to lb/MMBtu Conversion.

Source: AQMD Permit Sample Evaluation Natural Gas Fired Boiler 5-20 MMBTU/HR, 2007

Concentration	lb/MMBtu	lb/hr	Ton/year	Check
Nox	0	0	0.00	0.00
CO	0	0	0.00	0.00

Prepared for
Northrop Grumman Systems Corp.
Freeport Center 14th Street
Clearfield, Utah

Prepared by
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Salt Lake City, Utah

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NORTHROP GRUMMAN SYSTEMS CORP.
CLEARFIELD FACILITY
NOTICE OF INTENT
UTAH DIVISION OF AIR QUALITY
CLEARFIELD, UTAH

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TABLES

Table 1: Maximum Annual Controlled Facility Emissions

APPENDICES

- Appendix A: Facility Maps and Diagrams
- Appendix B: UDAQ NOI Forms
- Appendix C: Potential Emissions Calculations
- Appendix D: Detailed Process Flow Diagrams

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
acfm	Actual Cubic Feet per Minute
AP-42	Compilation of Air Pollutant Emission Factors
AO	Approval Order
BACT	Best Available Control Technology
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
EPA	Environmental Protection Agency
ESP	Electrostatic Precipitator
FGR	Flue Gas Recirculation
ft ³	Cubic Feet
g	Gram
GCP	Good Combustion Practices
GHGs	Greenhouse Gases
GMP	Good management practices
HAPs	Hazardous Air Pollutants
HVLP	High-Volume, Low-Pressure
IR&D	Independent Research and Development
LNB	Low-NO _x Burner
µm	Micrometer
MMBtu/hr	Million British Thermal Unit Per Hour
MT/y	Megatons per Year
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NGSC	Northrop Grumman Systems Corporation
NH ₃	Ammonia
NNSR	Nonattainment New Source Review
NOI	Notice of Intent
NO _x	Nitrogen Oxides (NO + NO ₂)
NSPS	New Source Performance Standards
Contents	

NSR	New Source Review
O ₃	Ozone
PM	Particulate Matter
PM _{2.5}	Particulate Matter Less Than 2.5 Micrometers in Aerodynamic Diameter
PM ₁₀	Particulate Matter Less Than 10 Micrometers in Aerodynamic Diameter
ppmv	Parts Per Million by Volume
PSD	Prevention of Significant Deterioration
PTE	Potential To Emit
RBLC	RACT/BACT/LAER Clearinghouse
RTO	Regenerative Thermal Oxidizer
SCR	Selective Catalytic Reduction
SO ₂	Sulfur Dioxide
TPY	Tons Per Year
UAC	Utah Administrative Code
UDAQ	Utah Department of Air Quality
ULNB	Ultra Low-NO _x Burner
VOC	Volatile Organic Compounds

1. INTRODUCTION

The Northrop Grumman Systems Corp. (NGSC) owns and operates an aerospace structures manufacturing facility (referred to as "Facility") located at Freeport Center 14th Street, Clearfield, Utah. The general operations include raw material receipt and storage, material and tool preparation, fabrication, curing, finishing, testing, packing, and shipping. Facility operation is currently authorized by Utah Department of Environmental Quality – Division of Air Quality (UDAQ) Approval Order DAQE-AN101520028-22 (AO), most recently issued on September 26, 2022. The Facility is classified as a minor source of air emissions under both the Title V and federal New Source Review (NSR) permitting programs.

NGSC is submitting this Notice of Intent (NOI) to UDAQ to request approval to install an electric kiln (Independent Research & Development (IR&D) Kiln), an electric oven (IR&D Oven), a natural gas-fired oven (O-52), a spray booth, and a receiving hood exhaust. NGSC also proposes to remove the following equipment from their AO due to decommissioning: the HR-3 hot room, the SB-2 laboratory hood, the E-145 exhaust hood, and the DC-28 dust collector. NGSC would also like to change the identification of two pieces of equipment. A site map with the location of equipment added to the Facility is provided in **Appendix A**. NGSC is not proposing to modify its existing facility-wide volatile organic compound (VOC) and hazardous air pollutant (HAP) emission limits. The presented VOC and HAP emissions from added equipment will be folded into its existing 69.00 tons per year (TPY) VOC and 19.00 TPY HAP limits in the current AO. Therefore, in accordance with under R307-403-1, NGSC will remain under the VOC major source threshold of 70 TPY for facilities located within the nonattainment area for particulate matter with a diameter of 2.5 microns (PM_{2.5}) or less.¹

NGSC is submitting this NOI to request an AO in accordance with the requirements of the Utah Administrative Code (UAC) Rule R307-401-5.² The NOI application forms are included in **Appendix B** of this report.

¹ Utah Admin. Code R307-403-1. <https://adminrules.utah.gov/public/rule/R307-403/Current%20Rules>

² Utah Admin. Code R307-401-5. <https://rules.utah.gov/publicat/code/r307/r307-401.htm#T8>

2. PROCESS DESCRIPTION

To support manufacturing processes, NGSC currently operates natural gas-fired ovens, hot rooms, autoclaves, paint booths, boilers, and heaters; ventilation rooms, laboratory hoods, and exhaust hoods to vent various processes; electric curing ovens; dust collectors for control of various machining processes; painting and welding activities; and wet cooling towers with high efficiency drift eliminators.

Approval Order Additions:

NGSC proposes to install one (1) electric kiln, one (1) electric oven, one (1) natural gas-fired oven, one (1) spray booth, and one (1) receiving hood exhaust at the Facility. The IR&D Kiln is an electric kiln with a capacity of 99 cubic feet (ft³). The IR&D Oven is an electric oven with an exhaust rate of 310 actual cubic feet per minute (acfm). The O-52 oven is a natural gas-fired oven with a firing rate of 1.0 million British thermal units per hour (MMBtu/hr). The spray booth will be installed with a high volume low pressure (HVLP) spray gun and vented using a vacuum flow rate of 1,462 acfm through a high flow filtration system. Emissions from the Receiving Hood Exhaust are based on the mass of rubber cured per year.

Approval Order Changes:

NGSC proposes to remove of the HR-3 hot room, the SB-2 laboratory hood, the E-145 exhaust hood, and the DC-28 dust collector due to decommissioning. NGSC has also previously requested (November 2022) to change the identification of BO-7 (old) to BO-9 (new) and BO-8 (old) to BO-10 (new).

3. SOURCES AND EMISSIONS CALCULATIONS

Pollutants emitted from the Facility's operations include carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO₂), VOCs, particulate matter (PM), greenhouse gases (GHGs), and HAPs. The following sections provide background on the methodology used to estimate potential emissions from the Facility's proposed modifications to operations. Detailed potential emissions calculations are included in **Appendix C**.

3.1 Kiln

NGSC proposes to install one electric kiln (IR&D Kiln) which will be used to vitrify ceramics at a high temperature. The firing process burns off organic matter in the ceramic and removes all water embedded in the atomic structure. The kiln is electric and will have ductwork designed to remove off-gassing products through a stack.

Kiln emission rates are based engineering design data and Section 11.7 of the Environmental Protection Agency's (EPA's) AP-42 emission factor document.³ AP-42 does not contain any emission factors for electric kilns; however we conservatively used the natural gas-fired kiln emission factors for PM, NO_x, CO, and VOC. AP-42 also presents emissions factors for CO₂, SO₂, hydrogen fluoride, and fluorides. However, these were determined not to be applicable. The CO₂ and SO₂ emission factors are fuel based emission factors based on natural gas combustion and are not reflective of the electric-fired kiln. Additionally, the process will not generate fluoride emissions based on engineering design data. The AP-42 emission factors are provided in units of pound of pollutant per ton of ceramic product (lb/ton). Emissions are calculated based on 184 lb of ceramic parts loaded in the kiln per run. Annual emissions are calculated based on continuous operation of the kiln, with each run lasting 3 days (no downtime for loading and unloading).

The process will have the potential to generate ammonia (NH₃) and some CO₂. Emissions of these pollutants are calculated using mass-balance assuming 10 percent mass loss during each 3-day run. The total mass lost during each run is calculated and the emissions of the other pollutants subtracted (those calculated using the AP-42). As there is no speciation information for the process, it is conservatively assumed that the remaining mass could be either all NH₃ or all CO₂.

The only HAP expected to be off-gassed is phenol, based on engineering design data. As there is not an AP-42 emission rate provided for phenol, it was conservatively assumed that all emitted VOC is phenol.

3.2 Electric Oven

NGSC proposes to install one electric oven (IR&D Oven) which will be used to cure a thermoset resin in order to make the product infusible, insoluble, and unable to return to its uncured state. There will be ductwork designed to remove off-gassing products through a stack.

HAP and VOC off-gas emissions rates were determined from on-site sample data. A 15-minute sample was taken from the exhaust stream of an oven when the oven reached the maximum cure temperature. In calculating emissions, it is assumed these emission rates are constant throughout the cure cycle which provides a conservative estimate of the amount of off-gassed product as VOC emission rates will decrease throughout the curing process. Emission rates are calculated based on the pollutant concentration and the maximum rated flow rate of the oven fan (310 acfm). Annual emissions are conservatively based on continuous operation for 8,760 hours per year (hr/yr).

³ AP-42, Chapter 11.7: Ceramic Clay Manufacturing. Available online at:
<https://www.epa.gov/sites/default/files/2020-10/documents/c11s07.pdf>

3.3 Natural Gas-Fired Oven

NGSC proposes to install one natural gas-fired oven (O-52) with a maximum rated capacity of 1.0 MMBtu/hr. The oven will be used to cure thermoset resin in order to make the product infusible, insoluble, and unable to return to its uncured state.

Oven emission rates are based Section 1.4 of the EPA's AP-42 emission factor document.⁴ Hourly emissions were calculated using the maximum rated capacity of the oven, and annual emissions are conservatively based on continuous operation for 8,760 hr/yr.

Additionally, off-gassing may occur during unbagged cures, less than 5 percent of cures performed in the oven. Off-gassing of the film adhesive could result in 1 lb VOC emissions calculated based on the total weight lost as VOCs (accounting for water vapor regained) multiplied by the total mass cured for the year. From the SDS for the film adhesive, no HAPs are off-gassed.⁵

3.4 Spray Booth

NGSC proposes to install one spray booth designed to remove overspray and vapors produced during paint spraying operations. The spray booth is a "tent and vent" configuration where a tent is temporarily set up and emissions from the operation will be vented to the outside of the building. VOC and PM emissions are the only emissions from the spray booth. Usage is calculated as a per day volume used and pounds used are based on the density of the respective paint.

Emissions of VOCs and HAPs are calculated using the VOC or HAP content (volume percent), the density, and the expected gallons of the respective paint used per year. Emissions are conservatively based on all VOC and HAP being emitted via the stack.

Emissions of PM are calculated using the solids content (volume percent) and multiplying this by the density and gallons used per year for each respective paint. Both controlled and uncontrolled emissions are calculated. Controlled PM emissions account for the control efficiency of the HVLP spray gun (65%) and the fabric filter efficiency (97.5%). Also, due to spraying, all PM emissions are assumed to be PM_{2.5}.

3.5 Receiving Hood Exhaust

NGSC proposes to install a receiving hood above a platen press that will capture emissions resulting from peroxide-curing of rubber. VOC emissions will be the only emissions exhausted through the receiving hood and are based on the mass of rubber cured per year.

The receiving hood exhaust emissions are estimated using emissions factors for VOC and HAPs from Section 4.12 of the EPA's AP-42 emission factor document.⁶ Emissions are calculated based on a maximum of 11 shipsets per year, assuming 913 feet (ft) of rubber per shipset, at a mass of 167 lb rubber per 300 ft roll (5,591 lb rubber per year).

Although AP-42 Chapter 4.12 emission factors are proposed and not yet finalized, the emission factors for the use of the Platen Press with curing compound #9 (an unextruded peroxide cure) best represents the processes that will be used by NGSC.

3.6 Equipment Removal

NGSC proposes to remove the SB-2 Laboratory Hood, E-145 Exhaust Hood, HR-3 Hot Room, and DC-28 Dust Collector. The SB-2 Laboratory Hood and E-145 Exhaust Hood only

⁴ AP-42, Chapter 1.4: Natural Gas Combustion. Available online at:
<https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf>

⁵ SDS for FM 300

⁶ AP-42, Chapter 4.12: Manufacture of Rubber Products. Available online at:
<https://www.epa.gov/sites/default/files/2020-10/documents/d04s12.pdf>

contribute to VOC and HAP emissions which are permitted as a facility-wide limit, therefore emission reductions due to their removal were not calculated. The removal of the HR-3 Hot Room will result in emission reductions for NO_x, CO, PM (total), SO₂, VOC, NH₃, CO₂, NH₄, and N₂O. These emission reductions were calculated using AP-42 Chapter 1.4 emission factors for natural gas combustion as well as ammonia emission factors for natural gas combustion from the EPA Development and Selection of Ammonia Emission Factors.^{7,8} Additionally, the removal of the DC-28 Dust Collector will result in emission reduction for PM₁₀ and PM_{2.5}. To evaluate emission reductions, a grain loading emission rate of 0.016 grains per cubic foot was used which is consistent with previous emission calculations for DC-28.

3.7 Emissions Summary

Table 1 summarizes the Facility's maximum annual controlled emissions for each pollutant. Documentation of uncontrolled and controlled emissions are provided in **Appendix C**. As discussed in Sections 4.1 and 4.2, the total emissions are compared to the federal NSR and Title V major source thresholds, and project emissions are compared to UDAQ modeling thresholds.

As provided in Table 1, emissions are below all regulatory thresholds and modeling is not required for the project. Note that NGCS is not proposing to modify the existing facility-wide VOC and HAP permit limits.

⁷ AP-42, Chapter 1.4: Natural Gas Combustion. Available online at:

https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf

⁸ Development and Selection of Ammonia Emission Factors, Section 5: Ammonia Emissions from Combustion.

Available online at: <https://www3.epa.gov/ttnchie1/old/efdocs/ammonia.pdf>

Table 1: Maximum Annual Controlled Facility Emissions (PTE)									
Emission Source Category	CO	NO_x	PM₁₀	PM_{2.5}	SO₂	VOC¹	Total HAP¹	Max HAP	CO_{2e}
	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)	(TPY)
Currently Permitted Facility-Wide Potential Emissions	16.38	19.49	13.42	13.21	0.15	69.00	19.00	--	24,245.00
IR&D Kiln	0.0185	3.0E-03	2.7E-03	2.7E-03	--	2.4E-03	5.5E-04	5.5E-04	1.09
IR&D Oven	--	--	--	--	--	0.01	1.6E-05	1.4E-05	--
O-52 Oven	0.35	0.42	0.032	0.032	0.0025	0.024	0.0018	0.0017	506.26
Spray Booth	--	--	--	0.13	--	1.2	0.025	0.016	--
Receiving Hood Exhaust	--	--	--	--	--	0.0049	3.2E-04	2.8E-04	--
Removed HR-3 Hot Room	-0.030	-0.036	-2.7E-03	-2.7E-03	-2.2E-04	-2.0E-03	-1.6E-04	-1.5E-04	-43.53
Removed DC-28 Dust Collector	--	--	-0.42	-0.42	--	--	--	--	--
Total Emissions	16.72	19.88	13.03	12.95	0.15	69.00	19.00	--	24,708.82
Modeling Thresholds	100	40	15	--	40	--	--	See App. C	--
NSR Thresholds	250	70/100	250	70	70	70/100	--	--	--
Title V Thresholds	100	70	100	70	70	70	25	10	--
Exceeds Any Threshold?	No	No	No	No	No	No	No	No	--

¹ NGSC is not requesting to modify its existing facility-wide VOC and HAP limits in Approval Order DAQE-AN101520028-22. Equipment specific emissions are presented here for reference but will operated within the existing limits.

4. FEDERAL AND STATE REGULATORY APPLICABILITY

The following sections outline applicability of certain federal and state air regulations to the Facility's proposed operations. Specifically, potentially applicable requirements under federal NSR, Title V of the Clean Air Act Amendments, New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), Chemical Accident Prevention Provisions, and Title R307 of the UAC are discussed herein.

4.1 New Source Review

The federal NSR permitting program applies to major stationary sources of regulated air pollutants. The federal NSR program is comprised of two elements: Nonattainment NSR (NNSR) and Prevention of Significant Deterioration (PSD). NNSR permitting is applicable in areas that have been designated as nonattainment for a regulated pollutant under the National Ambient Air Quality Standards (NAAQS). PSD permitting applies in areas that have been designated as attainment or unclassifiable. The Facility is located 10 miles south of Ogden and 28 miles north of Salt Lake City, in Davis County. Davis County is a serious nonattainment for PM_{2.5} and moderate nonattainment for ozone (O₃). As such, NNSR is the applicable program for ground-level ozone formation (VOCs and NO_x) and PM_{2.5}. PSD is the relevant NSR permitting program for all other criteria pollutants.

Under the PM_{2.5} nonattainment designation, the NNSR major source threshold for PM_{2.5} and its precursors (NO_x, VOC, SO₂, and NH₃) is 70 TPY. The NNSR major source threshold for NO_x and VOC under the ozone nonattainment designation is 100 TPY. The major source threshold for all other regulated criteria pollutants is the PSD threshold of 250 TPY. The Facility will be classified as a minor source with respect to NNSR and PSD, as the facility-wide potential emissions will not exceed the major source thresholds. UDAQ is anticipating the reclassification of Northern Wasatch Front (NWF) ozone nonattainment from moderate to serious in February 2025. This means that stationary sources with the potential to emit (PTE) of greater than 50 TPY of NO_x or VOCs will be designated a major source. These changes will make the Facility a major source with respect to VOC emissions following the reclassification of the ozone nonattainment to serious.

4.2 Title V Operating Permits

The Title V operating permit program, promulgated in 40 CFR 70 and implemented in R307-415 of the UAC, requires a facility to obtain a Title V operating permit if it has potential emissions of a regulated criteria pollutant exceeding 100 TPY (or 70 TPY for PM_{2.5} and its precursors), any single HAP exceeding 10 TPY, or total combined HAP emissions in excess of 25 TPY. Emissions from fugitive sources are not counted toward the Title V major source thresholds as aerospace structures manufacturing is not on the list of 28 source categories for which fugitive emissions must be included.

The facility-wide potential emissions from non-fugitive emission sources do not exceed the Title V emission limits, therefore, the Facility is a minor source with respect to Title V.

4.3 New Source Performance Standards

NSPS, promulgated in 40 CFR 60 and incorporated by reference in R307-210-1 of the UAC, provide emissions standards for criteria pollutant emissions from new, modified, and reconstructed sources. There are no potentially applicable NSPS standards that apply to the proposed operations at the Facility.

4.4 National Emission Standards for Hazardous Air Pollutants

NESHAP, promulgated in 40 CFR 63 and incorporated by reference in R307-214-1 of the UAC, regulate emissions of HAP from specific source categories. A facility that has potential emissions exceeding 10 TPY for any individual HAP and/or emissions exceeding 25 TPY for

the sum of all HAP is classified as a major source of HAP emissions. A facility that is not a major source of HAP is classified as an area source.

Annual HAP emissions for the Facility are presented in **Appendix C**. The Facility is an area source for HAPs as they are below the 10 and 25 TPY limits. There are no potentially applicable NESHAP standards that apply to the proposed operations at the Facility.

4.5 Utah Administrative Code, Title R307 – Environmental Quality, Air Quality

In addition to the federal regulations, Title R307 of the UAC establishes regulations applicable at the emission unit level and at the facility level. The state regulations also include general requirements for facilities, such as the requirement to obtain construction and operating permits. Source specific standards in R307 that are potentially applicable to the Facility's proposed operations are discussed in the following sections.

4.5.1 R307-201 – Emission Standards: General Emission Standards

This regulation sets general emission standards for opacity. Visible emissions from installations constructed after 1971 are limited to no more than 20% opacity for sources that are not diesel engines and no more than 40% for diesel engines.⁹ These standards cannot be exceeded except for short time periods during startup or shutdown, installation or operation, or unavoidable combustion irregularities which do not exceed three minutes in length. NGSC is required to minimize emissions during startup or shutdown, installation, or operation through the use of adequate controls and proper procedures.¹⁰

4.5.2 R307-410 – Emissions Impact Analysis

The provisions of R307-410 establish the procedures and requirements for evaluating the emissions impact of new and modified sources that require an approval order under R307-401 to ensure that the source will not interfere with the attainment or maintenance of any NAAQS in the state of Utah. As discussed in Chapter 3, project emissions are below modeling thresholds and no emissions impact analysis is required.

⁹ R307-201-3(2) & (6)

¹⁰ R307-201-3(7)

Federal and State Regulatory Applicability

5. EVALUATION OF BEST AVAILABLE CONTROL TECHNOLOGY

New and modified sources of air emissions in an attainment area in Utah are required to implement Best Available Control Technology (BACT) for control of emissions when applying for an AO.¹¹ Determination of BACT accounts for the technical feasibility of potential air pollution control technologies, as well as factors such as the energy, environmental, and economic impacts of the technology. This section evaluates BACT for emissions of criteria pollutants from the Facility's operations, specifically NO_x, CO, VOC, PM₁₀, PM_{2.5}, and SO₂.

5.1 BACT Analysis Process

Utah air regulations [R307-401-5(2)(d)] require that BACT be used to minimize the emissions of pollutants from proposed new emission sources or modifications to existing emissions sources requiring an AO. BACT is defined as follows:¹²

[BACT] means an emissions limitation ... based on the maximum degree of reduction for each air pollutant which would be emitted from any proposed stationary source or modification which the director, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61.

If the director determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.

The BACT analysis is performed on a pollutant-specific, case-by-case basis for each new or modified emission unit. The following emission units and pollutants were considered in the BACT analysis:

- IR&D Kiln: NO_x, CO, VOC, PM₁₀, PM_{2.5}
- IR&D Oven: VOC
- O-52 Oven: NO_x, CO, VOC, PM₁₀, PM_{2.5}, SO₂
- Spray Booth: VOC, PM_{2.5}
- Receiving Hood Exhaust: VOC

¹¹ R307-401-5(2)(d)

¹² R307-401-2

5.1.1 “Top-Down” BACT Approach

This BACT analysis generally follows the “top-down” BACT approach outlined by EPA in a 1987 memorandum designed to improve the effectiveness of the federal PSD program.^{13,14} The top-down BACT approach starts with consideration of the technology that would achieve the maximum degree of emissions limitations, i.e. the lowest emission rate, which can be or has been applied to the specific source type under review or to other similar source types. The top-ranked technology may be eliminated based on costs, economics, environmental or energy impacts. If the top control option is eliminated, the BACT analysis then proceeds to the next most stringent technology and the analysis continues until a BACT conclusion is reached. The following steps provide a general outline of the top-down BACT process. In practice, each step may not apply to each BACT analysis, and the steps may be overlapping, combined, or undertaken in a different order depending on the specific emission units and considerations involved.

5.1.1.1 Step 1 – Identify Available Control Technologies

The first step in the top-down procedure is to identify all available control technologies and emission reduction options for the emissions unit and pollutant undergoing the BACT analysis. Available control technologies are those with a practical potential for application to the pollutant and emission unit under review, which have been demonstrated in practice on full scale operations and are commercially available. Pollutant emission reduction options can be grouped into two categories:

- Inherently lower-emitting processes, practices, or designs; and
- Add-on control technologies.

In addition, emission reduction options can sometimes be used in combination.

5.1.1.2 Step 2 – Eliminate Technically Infeasible Options

The second step is to evaluate the technical feasibility of the control options identified in Step 1 and to eliminate any options that are technically infeasible based on engineering evaluation or due to chemical or physical principles. Criteria such as the following may be considered in determining technical feasibility: previous commercial scale demonstrations, precedents based on previous permits, and technology transfer from similar emission units. Technologies which have not yet been applied to full scale operations need not be considered available; an applicant should be able to purchase or construct a process or control device that has already been demonstrated in practice.

When evaluating the technical feasibility of a technology that has been operated successfully on a type of source different than the source type under review, EPA has indicated that the “availability” and “applicability” of the technology to the source type under review should be considered to eliminate the technology as technically infeasible. EPA has stated that it “considers a technology to be ‘available’ where it can be obtained through commercial channels or is otherwise available within the common meaning of the term.”¹⁵ Further, EPA “considers an available technology to be ‘applicable’ if it can reasonably be installed and operated on the source type under consideration.”¹⁶

¹³ Memo dated December 1, 1987, from J. Craig Potter (U.S. EPA Headquarters) to U.S. EPA Regional Administrators, titled “Improving New Source Review Implementation.”

¹⁴ US EPA, Office of Air Quality Planning and Standards. 1989. June 3. “Transmittal of Background Statement on Top-Down Best Available Control Technologies”. Available online: <https://www.epa.gov/sites/production/files/2015-07/documents/topdawn.pdf>

¹⁵ U.S. EPA. PSD and Title V Permitting Guidance for Greenhouse Gases, March 2011. <https://www.epa.gov/sites/production/files/2015-07/documents/ghgguid.pdf>

¹⁶ Ibid.

If any of the control techniques cannot be successfully used on the emission units due to technical difficulties, this finding should be documented, and such control techniques are not considered further in the BACT analysis.

5.1.1.3 Step 3 – Rank Remaining Control Technologies

In Step 3, the remaining control technologies are rank-ordered into a control hierarchy from most to least stringent. To the extent practical, this involves an assessment and documentation of the emissions control level or emissions limit achievable with each technically feasible alternative, considering the specific operating constraints of the emission units undergoing review. Generally accepted control efficiencies or ranges of control efficiencies are presented where control efficiencies vary and/or detailed information for the specific emission unit is not available.

5.1.1.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

A top-ranked control option may be rejected as BACT based on a consideration of cost, economic, environmental, and energy impacts. If the top-ranked option is not selected as BACT, the applicant should document the evaluation of the cost, economic, environmental, and/or energy impacts that leads to its rejection. If a control technology is determined to be infeasible based on high cost effectiveness, or to cause adverse economic, energy, or environmental impacts that would outweigh the benefits of the additional emissions reduction as compared to a lower ranked control, then the control technology is rejected as BACT, and the next most stringent control technique is considered in turn.

Both average cost effectiveness and incremental cost effectiveness may be considered for the control options. Cost effectiveness is the annualized cost of control [in dollars (\$)] divided by the mass of emissions (in tons) reduced or eliminated by that control. For a specific control technology, average cost effectiveness is the cost (\$ per ton) that would be incurred compared with baseline conditions. Incremental cost effectiveness is the difference in cost per ton of emissions reduced at the next most stringent level of control when comparing two control options. A control cost analysis has not been provided since the baghouse selected is widely acceptable as BACT.

5.1.1.5 Step 5 – Select BACT

BACT is identified as the option with the highest control effectiveness from Step 3 that is not eliminated in Step 4 based on consideration of cost, economic, energy or environmental impacts. Once the control technology, process or work practice is selected, a BACT emission limit is established, if appropriate, considering what is achievable over the range of operating conditions anticipated.

5.1.2 Information Relied Upon

In general, the spectrum of BACT control options identified in Step 1 for consideration as potential control options is based on the following:

- An assessment of recently issued BACT determinations and permits for similar sources;
- EPA Air Pollution Control Technology Fact Sheets and other EPA guidance and technical reports were relied upon as a reference for the likely achievable range of control for control equipment and/or for guidance regarding the BACT process;
- Vendor data; and
- Professional engineering judgement and experience.

5.2 NO_x BACT Analysis for IR&D Kiln

5.2.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for NO_x include:

- Selective Catalytic Reduction (SCR); and
- Good Management Practices (GMP).

Selective Catalytic Reduction (SCR)

SCR is a method of NO_x control that utilizes a catalyst and reagent to reduce NO_x emissions. SCR is typically implemented on stationary source combustion units which require a high level of NO_x reduction¹⁷. Urea is generally used as the reduction reagent. NO_x removal efficiencies for SCR are high, at 90 percent.¹⁸ SCR is considered technically infeasible on the IR&D kiln as SCR is generally applied to large combustion units (>100 MMBtu/hr), and SCR is most effective for exhaust streams with high temperatures and NO_x concentrations.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.2.2 Step 2 – Eliminate Technically Infeasible Options

GMP is the only technically feasible control option.

5.2.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

5.2.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.2.5 Step 5 – Select BACT

NGSC proposes GMP as BACT for NO_x emissions from the IR&D kiln. GMP is widely accepted as BACT for similar source types.

5.3 CO BACT Analysis for IR&D Kiln

5.3.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for CO include:

- Good Management Practices (GMP).

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.3.2 Step 2 – Eliminate Technically Infeasible Options

The CO control option identified in Step 1 is considered technically feasible for the IR&D kiln.

5.3.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

¹⁷ EPA (2017). Air Pollution Control Cost Manual, Section 4 – Chapter 2.

https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf

¹⁸ EPA. Air Pollution Control Technology Fact Sheet – SCR. <https://www3.epa.gov/ttn/catc1/dir1/fscr.pdf>
Evaluation of Best Available Control Technology

5.3.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.3.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for CO emissions from the IR&D kiln. GMP is widely accepted as BACT for similar source types.

5.4 VOC BACT Analysis for IR&D Kiln

5.4.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for VOC include:

- Regenerative Thermal Oxidizer (RTO);
- Carbon Adsorption System; and
- Good Management Practices (GMP).

Regenerative Thermal Oxidizer (RTO)

RTOs are the most common type of thermal oxidizer technology. RTOs typically use ceramic direct contact heat exchangers to achieve temperatures high enough to ignite the waste stream and destroy VOCs/HAPs. RTOs are considered technically infeasible for the IR&D kiln as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Carbon Adsorption System

Carbon adsorption generally involves the adsorption of organic compounds on activated carbon. Adsorption is most effective at lower temperatures and is affected by ambient humidity. Periodic replacement of the activated carbon is required as buildup of compounds on the filter media will occur. Carbon adsorption is considered technically infeasible for the IR&D kiln as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.4.2 Step 2 – Eliminate Technically Infeasible Options

GMP is the only technically feasible control technology remaining.

5.4.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

5.4.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.4.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for VOC emissions from the IR&D kiln. GMP is widely accepted as BACT for similar source types.

5.5 PM BACT Analysis for IR&D Kiln

5.5.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for PM include:

Evaluation of Best Available Control Technology

- Electrostatic Precipitator (ESP);
- Wet Scrubber;
- Baghouse; and
- Good Management Practices (GMP).

Electrostatic Precipitator (ESP)

ESPs remove PM from exhaust by applying a high-voltage electrostatic charge and collecting the particles on charged plates. ESPs are filterless devices that can remove fine particles. Dry ESPs involve the removal of collected particles as dry material while wet ESPs remove collected particles by washing the charged plates with water. ESPs are considered technically infeasible for the IR&D kiln as they are most effective on metals and items of high resistivity. Additionally, there is concern from NGSC about the high voltage required by ESPs.

Wet Scrubber

Wet scrubbers remove liquid or solid particles from a gas stream by transferring them to a liquid, which is often water. All wet scrubbers include mist eliminators or entrainment separators to remove entrained droplets. Wet scrubbers are considered technically infeasible for use on the IR&D kiln as they are generally not used for fine particles, which is the majority of the PM that will be emitted from the kiln.

Baghouse

Baghouses are dust collectors made of fabric filters that remove particulate matter via filtration. There are different configurations for baghouses, which vary based on the method of cleaning out inundate fabric filters. There are reverse air, pulse jet, and shaker baghouses. Baghouses are considered technically infeasible for the IR&D kiln as they are generally not used in practice for similarly sized equipment.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.5.2 Step 2 – Eliminate Technically Infeasible Options

GMP is the only technically feasible control technology remaining.

5.5.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

5.5.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.5.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for PM emissions from the IR&D kiln. GMP is widely accepted as BACT for similar source types.

5.6 VOC BACT Analysis for IR&D Oven

5.6.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for VOC include:

- Regenerative Thermal Oxidizer (RTO);
- Carbon Adsorption System;

- Good Management Practices (GMP).

Regenerative Thermal Oxidizer (RTO)

RTOs are the most common type of thermal oxidizer technology. RTOs typically use ceramic direct contact heat exchangers to achieve temperatures high enough to ignite the waste stream and destroy VOCs/HAPs. RTOs are considered technically infeasible for the IR&D oven as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Carbon Adsorption System

Carbon adsorption generally involves the adsorption of organic compounds on activated carbon. Adsorption is most effective at lower temperatures and is affected by ambient humidity. Periodic replacement of the activated carbon is required as buildup of compounds on the filter media will occur. Carbon adsorption is considered technically infeasible for the IR&D oven as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.6.2 Step 2 – Eliminate Technically Infeasible Options

GMP is the only technically feasible control technology remaining.

5.6.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

5.6.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.6.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for VOC emissions from the IR&D oven. GMP is widely accepted as BACT for similar source types.

5.7 NO_x BACT Analysis for O-52 Oven

5.7.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for NO_x include:

- Flue Gas Recirculation (FGR);
- Selective Catalytic Reduction (SCR);
- Combustion Controls (Low-NO_x and ultra-low NO_x burners, LNB/ULNB); and
- Good Combustion Practices (GCP).

Flue Gas Recirculation (FGR)

FGR is a NO_x control technology wherein the exhaust gas is routed into the inlet with the addition of a forced hot gas fan.¹⁹ FGR is most effective for natural gas and low-nitrogen fuels because it lowers the available oxygen which reduces the formation of NO_x. The NO_x capture efficiency of FGR is 30-60 percent.²⁰ FGR is considered technically infeasible on the

¹⁹ Power Engineering (2003). NO_x Control on a Budget: Induced Flue Gas Recirculation. <https://www.power-eng.com/news/nosubx-sub-control-on-a-budget-induced-flue-gas-recirculation/#gref>

²⁰ Pollution Online (2000). NO_x Emission Reduction Strategies. <https://www.pollutiononline.com/doc/nox-emission-reduction-strategies-0001>

O-52 oven as flue gas recirculation adds an inconsistent heat output element to the fuel, which is unsuitable for NGSC as tight temperature tolerances for the process require the gas stream to maintain a constant heat output value.

Selective Catalytic Reduction (SCR)

SCR is a method of NO_x control that utilizes a catalyst and reagent to reduce NO_x emissions. SCR is typically implemented on stationary source combustion units which require a high level of NO_x reduction²¹. Urea is generally used as the reduction reagent. NO_x removal efficiencies for SCR are high, at 90 percent.²² SCR is considered technically infeasible on the O-52 oven as SCR is generally applied to large combustion units (>100 MMBtu/hr), and SCR is most effective for exhaust streams with high temperatures and NO_x concentrations.

Combustion Controls (Low-NO_x and ultra-low NO_x burners, LNB/ULNB)

NO_x formation can be reduced through the restriction of oxygen, flame temperature, or residence time, which is the principle of LNB technology. Staged fuel and staged air burners are both intended to reduce the formation of thermal NO_x. When LNB technology is implemented, emissions of NO_x can be reduced by 50 percent compared to standard burners.²³ An ULNB is a type of LNB that can reduce NO_x emissions to very low levels, usually below 30 ppmv, corrected to 3 percent oxygen.²⁴ ULNB technology has been shown to achieve NO_x emissions of 9 ppmv.²⁵ LNB/ULNB technology is considered technically infeasible as controls are not demonstrated in practice for natural-gas fired equipment with firing rates less than 10 MMBtu/hr.

Good Combustion Practices (GCP)

GMP is a method of emissions control involving proper maintenance and operations of combustion equipment. Some GMPs are the use of natural gas as fuel, proper air ratios, and routine tune-ups.

5.7.2 Step 2 – Eliminate Technically Infeasible Options

GCP is the only technically feasible control option.

5.7.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GCP was the only control technology identified.

5.7.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GCP was not further analyzed as it was the only control technology identified.

²¹ EPA (2017). Air Pollution Control Cost Manual, Section 4 – Chapter 2.

https://www.epa.gov/sites/default/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf

²² EPA. Air Pollution Control Technology Fact Sheet – SCR. <https://www3.epa.gov/ttnatc1/dir1/fscr.pdf>

²³ AP-42 Table 1.4-1 – Emission Factors for Nitrogen Oxides (NO_x) and Carbon Monoxide (CO) from Natural Gas Combustion. <https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf>

²⁴ Oak Ridge National Laboratory (2002). Guide to Low-Emission Boiler and Combustion Equipment Selection. <https://www.energy.gov/eere/amo/articles/guide-low-emission-boiler-and-combustion-equipment-selection>

²⁵ Power Flame. Nova

Low NO_x Burners. https://www.powerflame.com/index.php?option=com_content&view=article&id=110&Itemid=57;

5.7.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for NO_x emissions from the O-52 oven. GMP is widely accepted as BACT for similar source types.

5.8 CO BACT Analysis for O-52 Oven

5.8.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for CO include:

- Good Combustion Practices (GCP).

Good Combustion Practices (GCP)

GCP is a method of emissions control involving proper maintenance and operations of combustion equipment. Some GCPs are the use of natural gas as fuel, proper air ratios, and routine tune-ups.

5.8.2 Step 2 – Eliminate Technically Infeasible Options

The CO control option identified in Step 1 is considered technically feasible for the IR&D kiln.

5.8.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GCP was the only control technology identified.

5.8.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GCP was not further analyzed as it was the only control technology identified.

5.8.5 Step 5 – Select BACT

NGSC has selected GCP as BACT for CO emissions from the IR&D kiln. GCP is widely accepted as BACT for similar source types.

5.9 VOC BACT Analysis for O-52 Oven

5.9.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for VOC include:

- Regenerative Thermal Oxidizer (RTO);
- Carbon Adsorption System;
- Good Combustion Practices (GCP).

Regenerative Thermal Oxidizer (RTO)

RTOs are the most common type of thermal oxidizer technology. RTOs typically use ceramic direct contact heat exchangers to achieve temperatures high enough to ignite the waste stream and destroy VOCs/HAPs. RTOs are considered technically infeasible for the O-52 oven as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Carbon Adsorption System

Carbon adsorption generally involves the adsorption of organic compounds on activated carbon. Adsorption is most effective at lower temperatures and is affected by ambient humidity. Periodic replacement of the activated carbon is required as buildup of compounds on the filter media will occur. Carbon adsorption is considered technically infeasible for the O-52 oven as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Good Combustion Practices (GCP)

GCP is a method of emissions control involving proper maintenance and operations of the equipment. Some GCPs are the use of natural gas as fuel, proper air ratios, and routine tune-ups.

5.9.2 Step 2 – Eliminate Technically Infeasible Options

GCP is the only technically feasible control technology remaining.

5.9.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GCP was the only control technology identified.

5.9.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GCP was not further analyzed as it was the only control technology identified.

5.9.5 Step 5 – Select BACT

NGSC has selected GCP as BACT for VOC emissions from the IR&D oven. GCP is widely accepted as BACT for similar source types.

5.10 PM BACT Analysis for O-52 Oven

5.10.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for PM include:

- Electrostatic Precipitator (ESP);
- Wet Scrubber;
- Baghouse; and
- Good Combustion Practices (GCP).

Electrostatic Precipitator (ESP)

ESPs remove PM from exhaust by applying a high-voltage electrostatic charge and collecting the particles on charged plates. ESPs are filterless devices that can remove fine particles. Dry ESPs involve the removal of collected particles as dry material while wet ESPs remove collected particles by washing the charged plates with water. ESPs are considered technically infeasible for the O-52 oven as they are most effective on metals and items of high resistivity. Additionally, there is concern from NGSC about the high voltage required by ESPs.

Wet Scrubber

Wet scrubbers remove liquid or solid particles from a gas stream by transferring them to a liquid, which is often water. All wet scrubbers include mist eliminators or entrainment separators to remove entrained droplets. Wet scrubbers are considered technically infeasible for use on the O-52 oven as they are generally not used for fine particles, which is the majority of the PM that will be emitted from the kiln.

Baghouse

Baghouses are dust collectors made of fabric filters that remove particulate matter via filtration. There are different configurations for baghouses, which vary based on the method of cleaning out inundate fabric filters. There are reverse air, pulse jet, and shaker baghouses. Baghouses are considered technically infeasible for the O-52 oven as they are generally not used in practice for similarly sized equipment.

Good Combustion Practices (GCP)

GCP is a method of emissions control involving proper maintenance and operations of the equipment. Some GCPs are the use of natural gas as fuel, proper air ratios, and routine tune-ups.

5.10.2 Step 2 – Eliminate Technically Infeasible Options

GCP is the only technically feasible control technology remaining.

5.10.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GCP was the only control technology identified.

5.10.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GCP was not further analyzed as it was the only control technology identified.

5.10.5 Step 5 – Select BACT

NGSC has selected GCP as BACT for PM emissions from the O-52 oven. GCP is widely accepted as BACT for similar source types.

5.11 SO₂ BACT Analysis for O-52 Oven

5.11.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for SO₂ include:

- Wet Scrubber;
- Low Sulfur Fuels; and
- Good Combustion Practices (GCP).

Wet Scrubber

Wet scrubbers remove liquid or solid particles from a gas stream by transferring them to a liquid, which is often water. All wet scrubbers include mist eliminators or entrainment separators to remove entrained droplets. Wet scrubbers are considered technically infeasible for use on the O-52 oven as they are generally used for streams with high SO₂ concentrations, which NGSC's O-52 oven does not have.

Low Sulfur Fuels

Low sulfur fuels such as natural gas reduce SO₂ emissions compared to high sulfur fuels such as coal. Use of natural gas is considered technically feasible for use on the O-52 oven.

Good Combustion Practices (GCP)

GCP is a method of emissions control involving proper maintenance and operations of the equipment. Some GCPs are the use of natural gas as fuel, proper air ratios, and routine tune-ups.

5.11.2 Step 2 – Eliminate Technically Infeasible Options

Low sulfur fuels and GCP are the only technically feasible control technology remaining.

5.11.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed for low sulfur fuels and GCP.

5.11.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

Low sulfur fuels and GCP were not further analyzed as they will both be considered in the next step.

5.11.5 Step 5 – Select BACT

NGSC has selected the use of low sulfur fuels and GCP as BACT for PM emissions from the O-52 oven. Natural gas as fuel and GCP is widely accepted as BACT for similar source types.

5.12 VOC BACT Analysis for Spray Booth

5.12.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for VOC include:

- Regenerative Thermal Oxidizer (RTO);
- Carbon Adsorption System;
- Compliance with Utah R307-355 Aerospace Coatings Rule; and
- Good Management Practices (GMP).

Regenerative Thermal Oxidizer (RTO)

RTOs are the most common type of thermal oxidizer technology. RTOs typically use ceramic direct contact heat exchangers to achieve temperatures high enough to ignite the waste stream and destroy VOCs/HAPs. RTOs are considered technically infeasible for the spray booth as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the flue gas.

Carbon Adsorption System

Carbon adsorption generally involves the adsorption of organic compounds on activated carbon. Adsorption is most effective at lower temperatures and is affected by ambient humidity. Periodic replacement of the activated carbon is required as buildup of compounds on the filter media will occur. Carbon adsorption is considered technically feasible for the spray booth.

Compliance with Utah R307-355 Aerospace Coatings Rule

The R307-355 Aerospace Coatings Rule outlines regulations to limit emissions of VOCs from aerospace coatings and adhesives, from organic solvent cleaning and from the storage and disposal of solvents and waste solvent material. The rule includes VOC content limits for different coating types. Compliance with R307-355 is considered technically feasible for the spray booth.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment. GMP for a spray booth involves closing containers when they are not in use and promptly cleaning up spills, among other techniques.

5.12.2 Step 2 – Eliminate Technically Infeasible Options

Carbon adsorption, compliance with R307-355, and GMP are the only technically feasible control technologies remaining.

5.12.3 Step 3 – Rank Remaining Control Technologies

A carbon adsorption system is the highest ranked control option, followed by compliance with R307-355 and GMP.

5.12.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

As emissions of VOC from the spray booth are only 1.2 TPY, the cost of any add-on control system such as a carbon adsorption system is economically infeasible. In a 2019 BACT analysis, NGSC found that a carbon adsorber for a spray booth with a PTE of 0.54 TPY had a cost effectiveness of \$2.6 million/ton of VOC for canister replacement and \$187,565/ton of VOC for carbon replacement. As costs for these systems have not changed drastically, this is considered economically infeasible.

Compliance with R307-355 and GMP were not further analyzed.

5.12.5 Step 5 – Select BACT

NGSC has selected compliance with R307-355 and GMP as BACT for VOC emissions from the spray booth. These measures are widely accepted as BACT for similar source types.

5.13 PM BACT Analysis for Spray Booth

5.13.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for PM include:

- Electrostatic Precipitator (ESP);
- Baghouse; and
- HVLP Spray Guns.

Electrostatic Precipitator (ESP)

ESPs remove PM from exhaust by applying a high-voltage electrostatic charge and collecting the particles on charged plates. ESPs are filterless devices that can remove fine particles. Dry ESPs involve the removal of collected particles as dry material while wet ESPs remove collected particles by washing the charged plates with water. ESPs are considered technically infeasible for the spray booth as they are most effective on metals and items of high resistivity. Additionally, there is concern from NGSC about the high voltage required by ESPs.

Baghouse

Baghouses are dust collectors made of fabric filters that remove particulate matter via filtration. There are different configurations for baghouses, which vary based on the method of cleaning out inundate fabric filters. There are reverse air, pulse jet, and shaker baghouses. Baghouses are considered technically feasible for the spray booth as a tent-and-vent 3-stage fabric filter will be installed with the spray booth.

HVLP Spray Guns

HVLP spray guns are high-volume, low-pressure spray guns which reduce PM emissions from paint application. HVLP spray guns result in better coverage and less material loss. They are considered technically feasible for the spray booth as they are already in place on another of NGSC's spray booths.

5.13.2 Step 2 – Eliminate Technically Infeasible Options

Baghouses and HVLP spray guns are the only technically feasible control technologies remaining.

5.13.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed for the remaining control technologies

5.13.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

Baghouses and HVLP spray guns were not further analyzed as they were the only control technologies identified.

5.13.5 Step 5 – Select BACT

NGSC has selected a baghouse (or 3-stage fabric filter) and HVLP spray guns as BACT for PM emissions from the spray booth. These are widely accepted as BACT for similar source types.

5.14 VOC BACT Analysis for Receiving Hood Exhaust

5.14.1 Step 1 – Identify Available Control Technologies

Potentially available control technologies for VOC include:

- Regenerative Thermal Oxidizer (RTO);
- Carbon Adsorption System; and
- Good Management Practices (GMP).

Regenerative Thermal Oxidizer (RTO)

RTOs are the most common type of thermal oxidizer technology. RTOs typically use ceramic direct contact heat exchangers to achieve temperatures high enough to ignite the waste stream and destroy VOCs/HAPs. RTOs are considered technically infeasible for the receiving hood exhaust as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the exhaust gas.

Carbon Adsorption System

Carbon adsorption generally involves the adsorption of organic compounds on activated carbon. Adsorption is most effective at lower temperatures and is affected by ambient humidity. Periodic replacement of the activated carbon is required as buildup of compounds on the filter media will occur. Carbon adsorption is considered technically infeasible for the receiving hood exhaust as thermal oxidizers are not effective to control VOCs when there are low VOC concentrations in the exhaust gas.

Good Management Practices (GMP)

GMP is a method of emissions control involving proper maintenance and operations of the equipment.

5.14.2 Step 2 – Eliminate Technically Infeasible Options

GMP is the only technically feasible control technology remaining.

5.14.3 Step 3 – Rank Remaining Control Technologies

No ranking was performed as GMP was the only control technology identified.

5.14.4 Step 4 – Evaluate Energy, Environmental, and Economic Impacts and Other Costs

GMP was not further analyzed as it was the only control technology identified.

5.14.5 Step 5 – Select BACT

NGSC has selected GMP as BACT for VOC emissions from the receiving hood exhaust. GMP is widely accepted as BACT for similar source types.

APPENDIX A

FACILITY MAPS AND DIAGRAMS

APPENDIX B
UDAQ NOI FORMS

APPENDIX C

POTENTIAL EMISSIONS CALCULATIONS

APPENDIX D
DETAILED PROCESS FLOW DIAGRAM

Table 1
Facility Potential to Emit - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Current Potential to Emit (PTE) ¹	Proposed Reduction ²	Proposed Addition ³	Proposed Potential to Emit (PTE)
	TPY	TPY	TPY	TPY
PM ₁₀	13	-0.42	0.035	13.0
PM _{2.5}	13	-0.42	0.16	12.9
SO ₂	0.15	-2.2E-04	0.0025	0.15
NO _x	19.5	-0.036	0.42	19.88
VOC	69	--	--	69
CO	16	-0.030	0.37	16.7
CO ₂ e	24,245	-44	507	24,709
HAPs	19	--	--	19

Notes:

- ¹. Current PTE are based on emissions listed in AO Summary of Emissions and Permit Condition II.B.2, DAQE-AN101520028-22. Total VOC and HAP emission limitations will not be changing with this modification.
- ². Reduction in emissions from removal of the HR-3 hot room and DC-28 dust collector. Removed ventilation and fume hood reduction in emissions were not quantified as NGSC is not proposing a limit change for VOC/HAPs.
- ³. Increase in emissions due to the installation of an IR&D kiln, IR&D oven, O-52 oven, spray booth, and a receiving hood exhaust.

Table 2
CAP Evaluation - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Category	Proposed/ Permitted Name	Emissions (TPY)							
		VOC	NO _x	PM _{2.5}	PM ₁₀	CO	CO ₂	SO _x	NH ₃
Kiln	IR&D Kiln	2.4E-03	3.0E-03	2.7E-03	2.7E-03	0.0185	1.09	--	1.09
Ovens	IR&D Oven	0.01	--	--	--	--	--	--	--
	O-52	0.024	0.42	0.032	0.032	0.35	503	0.0025	0.013
Spray Booth	Spray Booth	1.2	--	0.13	--	--	--	--	--
Receiving Hood Exhaust	Receiving Hood Exhaust	0.0049	--	--	--	--	--	--	--
Hot Room	HR-3	-0.0020	-0.036	-0.0027	-0.0027	-0.030	-43	-2.2E-04	-0.0012
Dust Collector	DC-28	--	--	-0.42	-0.42	--	--	--	--

**Table 3
HAP Evaluation - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah**

Pollutant	Emissions by Source (lb/hr)							Total Facility Emissions (lb/hr)
	IR&D Kiln	IR&D Oven	O-52 Oven	Spray Booth	Receiving Hood Exhaust	HR-3 Hot Room	DC-28 Dust Collector	
1,1,1-Trichloroethane	--	--	--	--	2.7E-06	--	--	2.7E-06
1,3-Butadiene	--	--	--	--	4.8E-06	--	--	4.8E-06
1,4-Dichlorobenzene(p)	--	--	1.1E-06	--	--	--	--	1.1E-06
2-Butanone	--	--	--	--	1.9E-06	--	--	1.9E-06
Acetaldehyde	--	--	--	--	4.9E-06	--	--	4.9E-06
Acetophenone	--	--	--	--	2.8E-04	--	--	2.8E-04
Arsenic	--	--	1.9E-07	--	--	-1.6E-08	--	1.8E-07
Benzene	--	--	2.0E-06	--	--	-1.7E-07	--	1.8E-06
Beryllium	--	--	--	--	--	-9.9E-10	--	-9.9E-10
bis(2-Ethylhexyl)phthalate	--	--	--	--	1.7E-06	--	--	1.7E-06
Cadmium	--	--	1.1E-06	--	--	-9.1E-08	--	9.6E-07
Carbon Disulfide	--	--	--	--	2.7E-06	--	--	2.7E-06
Chloromethane	--	2.1E-06	--	--	--	--	--	2.1E-06
Chromium	--	--	1.3E-06	--	--	-1.2E-07	--	1.2E-06
Cobalt	--	--	8.0E-08	--	--	-6.9E-09	--	7.4E-08
Cumene	--	--	--	--	1.8E-06	--	--	1.8E-06
Dimethylphthalate	--	--	--	--	4.3E-08	--	--	4.3E-08
Di-n-butylphthalate	--	--	--	--	4.6E-06	--	--	4.6E-06
Formaldehyde	--	--	7.2E-05	9.0E-03	--	-6.2E-06	--	9.1E-03
Hexachlorobutadiene	--	--	--	--	2.5E-07	--	--	2.5E-07
Hexane	--	--	1.7E-03	--	1.0E-05	-1.5E-04	--	1.6E-03
Lead	--	--	4.8E-07	--	--	-4.1E-08	--	4.4E-07
Manganese	--	--	3.6E-07	--	--	-3.1E-08	--	3.3E-07
Mercury	--	--	2.5E-07	--	--	-2.1E-08	--	2.3E-07
Methyl isobutyl ketone	--	--	--	1.6E-02	--	--	--	1.6E-02
Methylene Chloride	--	--	--	--	1.2E-06	--	--	1.2E-06
Naphthalene	--	--	5.8E-07	--	2.6E-06	-5.0E-08	--	3.1E-06
Nickel	--	--	2.0E-06	--	--	-1.7E-07	--	1.8E-06
Phenol	5.5E-04	--	--	--	8.2E-07	--	--	5.5E-04
Polycyclic Organic Matter	--	--	--	--	--	-7.3E-09	--	-7.3E-09
Selenium	--	--	--	--	--	-2.0E-09	--	-2.0E-09
Toluene	--	1.4E-05	3.3E-06	--	1.7E-06	-2.8E-07	--	1.9E-05
TOTAL	5.5E-04	1.6E-05	1.8E-03	2.5E-02	3.2E-04	-1.6E-04	0.0E+00	2.7E-02

**Table 4
GHG Evaluation
Northrop Grumman Systems Corp.
Clearfield, UT**

Category	Proposed/ Permitted Name	Source Name	Emissions (TPY)						GHG Emissions (CO ₂ e TPY) ²
			CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	
Kiln ¹	IR&D Kiln	--	1.09	--	--	--	--	--	1.09
Oven	IR&D Oven	--	--	--	--	--	--	--	--
	O-52	O-52	503	0.010	0.0092	--	--	--	506
Spray Booth	Spray Booth	--	--	--	--	--	--	--	--
Receiving Hood Exhaust	Receiving Hood Exhaust	--	--	--	--	--	--	--	--
Hot Room	HR-3 Hot Room	HR-3	-43	-8.3E-04	-7.9E-04	--	--	--	-44
Dust Collector	DC-28 Dust Collector	DC-28	--	--	--	--	--	--	--

Notes:

- ¹ CH₄ and N₂O emissions were not accounted for by AP-42 emission factors, and are considered de minimis.
- ² GWPs from the 6th Assessment Report from the IPCC, https://report.ipcc.ch/ar6/wg1/IPCC_AR6_WGI_FullReport.pdf pg. 1017; using CH₄-fossil and 100-yr GWP.

Table 5
HAP Air Dispersion Modeling Applicability
Northrop Grumman Systems Corp.
Clearfield, Utah

HAP	Emissions Increase	ETV ¹	Modeling Required?
	lbs/hr	lb/hr	
1,1,1-Trichloroethane	0	NA	NA
1,1,2-Trichloroethane	0	NA	NA
1,3-Butadiene	2.10E-05	7.52E-02	NO
1,4-Dichlorobenzene(p)	5.03E-06	3.07E+00	NO
2-(2-Butoxyethoxy)-Ethanol	0	NA	NA
2-Butanone	8.44E-06	3.01E+01	NO
Acetaldehyde	2.14E-05	1.71E+00	NO
Acetophenone	1.23E-03	2.51E+00	NO
Arsenic	7.67E-07	5.00E-04	NO
Benzene	8.05E-06	8.15E-02	NO
Beryllium	0.00E+00	3.00E-06	NO
bis(2-Ethylhexyl)phthalate	7.27E-06	2.55E-01	NO
Cadmium	4.22E-06	3.40E-05	NO
Carbon Disulfide	1.17E-05	1.59E-01	NO
Chloromethane	9.14E-06	5.27E+00	NO
Chromium	0	NA	NA
Cobalt	3.22E-07	1.00E-03	NO
Cumene	0	NA	NA
Dimethylphthalate	1.88E-07	2.55E-01	NO
Di-n-butylphthalate	2.00E-05	2.55E-01	NO
Ethyl Acrylate	0	NA	NA
Ethyl Benzene	0	NA	NA
Ethylene Glycol	0	NA	NA
Formaldehyde	0	NA	NA
Generic HAPs	0	NA	NA
Glycol Ethers	0	NA	NA
Hexachlorobutadiene	1.10E-06	1.10E-02	NO
Hexamethylene-1,6-Diisocyanate	0	NA	NA
Hexane	0	NA	NA
Hydrogen Fluoride (Hydrofluoric Acid)	0	NA	NA
Lead	1.92E-06	NA	NA
Manganese	1.46E-06	1.00E-02	NO
Mercury	9.97E-07	1.00E-03	NO
Methanol	0	NA	NA
Methyl Isobutyl Ketone	0	NA	NA
Methyl Isocyanate	0	NA	NA
Methyl Methacrylate	0	NA	NA
Methylene Chloride (Dichloromethane)	0	NA	NA
Methylenedianiline	0	NA	NA
Methylene Diphenyl Diisocyanate (MDI)	0	NA	NA
Naphthalene	0	NA	NA
Nickel	0	NA	NA
Phenol	0	NA	NA
Polycyclic Organic Matter	0.00E+00	NA	NA
Selenium	0.00E+00	NA	NA
Styrene	0	NA	NA
Tetrachloroethylene (Perchloroethylene)	0	NA	NA
Toluene	0	NA	NA
Trichloroethylene	0	NA	NA
Xylenes (Isomers and Mixture)	0	NA	NA
TOTAL HAP	0.000	NA	NA

¹ ETV are calculated as a worst case, using ETFs for vertically restricted release points 20 meters or less from ambient air in accordance with R307-410-5.

Table 6
IR&D Kiln Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor (lb/ton)^{1,2}	Footnotes	Emissions (lb/yr)	Emissions (TPY)⁷
PM	0.49	--	5.49	2.7E-03
SO ₂	44*S	3	N/A	N/A
NO _x	0.54	--	6.05	3.0E-03
CO	3.3	--	37.00	1.8E-02
CO ₂	--	--	2186.6	1.09
VOC	0.43	--	4.82	2.4E-03
HF	0.46	4	N/A	N/A
Fluorides	0.56	5	N/A	N/A
NH ₃ (Utah)	--	6	2186.6	1.09

Notes:

1. PM emission factors from AP-42 Chapter 11.7, Table 11.7-1.
2. All other emission factors, except CO₂ and NH₃, from AP-42 Chapter 11.7, Table 11.7-2.
3. S represents the raw material sulfur content (percent). There is no sulfur in the raw material, so S was taken as zero.
4. HF emissions were omitted as fluorides are not present in the fired ceramic.
5. Fluoride emissions were omitted as fluorides are not present in the fired ceramic.
6. CO₂ and NH₃ emissions were conservatively estimated by subtracting all other pollutant emissions (in tpy) from the annual mass lost assuming a 10% mass loss during each run (1.12 TPY). As there is no speciation information for the process, it is conservatively assumed that the remaining mass could be either all CO₂ or all NH₃.
7. Emissions were calculated assuming 184 lb of ceramic parts are loaded in the kiln per run and each run lasts 3 day. Annual emissions are based on continuous operation of the kiln, for a total of 11.2 tons of ceramic parts loaded per year.

**Table 7
IR&D Oven Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah**

Chemical	Emission Rate ($\mu\text{g}/\text{m}^3$)	VOC?	HAP?
Dichlorodifluoromethane	2.6	VOC	
Chloromethane	1.8	VOC	HAP
Acetone	250	VOC	
2-Butanone	17	VOC	
Ethanol	339	VOC	
Isopropyl Alcohol	1,991	VOC	
Heptane	2.8	VOC	
4-Methyl-2-pentanone	4.2	VOC	
Toluene	12	VOC	HAP
2-Pentanone	23	VOC	

Chemical	Emission Rate (lb/hr)	Emissions (TPY)
Chloromethane	2.09E-06	9.13E-06
Toluene	1.39E-05	6.09E-05
VOC	3.06E-03	1.34E-02

Notes:

1. Emission rates based on a 15-minute exposure test sample. Short-term and annual emissions were estimated using a fan maximum rated flow rate of 310 acfm.
2. Annual emissions were conservatively based on continuous operation for 8,760 hr/yr.

Table 8
O-52 Oven CAP Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor ¹	Emission Rate ²	Emissions ²
	lb/MMcf	lb/yr	tpy
PM ₁₀ (total)	7.6	64	0.032
PM _{2.5} (total)	7.6	64	0.032
SO ₂	0.60	5.0	0.003
NO _x	100	839.1	0.420
VOC	5.5	46.1	0.023
CO	84	704.8	0.352
Carbon Dioxide	120,000	1,006,897	0,503
NH ₃ (Utah)	3.2	27	0.013

Notes:

1. Emission factors from AP-42, Section 1.4 Natural Gas Combustion, emission factors are for an uncontrolled boiler <100 MMBtu/hr.
2. Hourly emissions are based on operation of the 1 MMBtu/hr natural gas-fired oven at full capacity and assuming a fuel heat content of 1044 Btu/scf. Annual emissions were calculated assuming 8760 hrs/yr of operation.

**Table 9
O-52 Oven HAP Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah**

Pollutant	Emission Factor	Emission Rate	Potential to Emit
	lb/MMcf	lb/yr	tpy
Lead	5.0E-04	0.0042	2.10E-06
N ₂ O (Uncontrolled)	2.2	18	9.23E-03
SO ₂	0.60	5.03	2.52E-03
TOC	11	92.30	4.61E-02
Methane	2.3	19.30	9.65E-03
VOC	5.5	46.15	2.31E-02
2-Methylnaphthalene	2.4E-05	0.0002	1.01E-07
Benzene	0.0021	0.02	8.81E-06
Butane	2.1	17.62	8.81E-03
Dichlorobenzene	0.0012	0.01	5.03E-06
Ethane	3.1	26.01	1.30E-02
Fluoranthene	3.0E-06	0.00003	1.26E-08
Fluorene	2.8E-06	0.00002	1.17E-08
Formaldehyde	0.075	0.63	3.15E-04
Hexane	1.8	15.10	7.55E-03
Naphthalene	6.1E-04	0.0051	2.56E-06
Pentane	2.6	21.82	1.09E-02
Phenanathrene	1.7E-05	0.0001	7.13E-08
Propane	1.6	13.4	6.71E-03
Pyrene	5.0E-06	0.00004	2.10E-08
Toluene	0.0034	0.029	1.43E-05
Arsenic	2.0E-04	0.002	8.39E-07
Barium	0.0044	0.037	1.85E-05
Cadmium	0.0011	0.009	4.61E-06
Chromium	0.0014	0.0117	5.87E-06
Cobalt	8.4E-05	0.0007	3.52E-07
Copper	8.5E-04	0.007	3.57E-06
Manganese	3.8E-04	0.003	1.59E-06
Mercury	2.6E-04	0.002	1.09E-06
Molybdenum	0.0011	0.009	4.61E-06
Nickel	0.0021	0.02	8.81E-06
Vanadium	0.0023	0.02	9.65E-06
Zinc	0.029	0.24	1.22E-04

Notes:

- Emission factors from AP-42, Section 1.4 Natural Gas Combustion, emission factors are for an uncontrolled boiler <100 MMBtu/hr.
- Hourly emissions are based on operation of the 1 MMBtu/hr natural gas-fired oven at full capacity and assuming a fuel heat content of 1044 Btu/scf. Annual emissions were calculated assuming 8760 hrs/yr of operation.

Abbreviations:

HAP - hazardous air pollutant	PM - particulate matter
hr - hours	SO ₂ - sulfur dioxide
lb - pounds	TOC - total organic compounds
MMBtu - million British thermal units	tpy - tons per year
MMcf - million cubic feet	VOC - volatile organic compounds
N ₂ O - nitrous oxide	yr - years

Table 10
Spray Booth Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Paint	Density	VOC content	Usage	VOC Emissions ¹		HAP Content	HAP Emissions		HAP Content	HAP Emissions		% Solids	PM Emissions ² (uncontrolled)		PM Emissions ² (controlled)					
						Methyl Isobutyl Ketone ¹	Formaldehyde ¹		Hexamethylene Diisocyanate ¹		(%)		(lb/yr)	(tpy)	(%)	(lb/yr)	(tpy)	(lb/yr)	(tpy)	
Units	(lb/gal)	(Vol %)	(gal/yr)	(lb/yr)	(tpy)	(%)	(lb/yr)	(tpy)	(%)	(lb/yr)	(tpy)	(%)	(lb/yr)	(tpy)	(lb/yr)	(tpy)				
03W127A Catalyst	8.0	0.6	182.5	808.7	0.4	4%	64.3	0.032	0%	0.0	0.0	48%	701.8	0.35	45%	652.4	0.3	5.71	0.003	
03W127 Base	13.0	0.2	182.5	408.3	0.2	1%	23.8	0.012	0%	0.0	0.0	0%	0.0	0.0	82%	1956.1	1.0	17.12	0.01	
020GN084	12.0	0.3	273.8	973.2	0.5	1%	32.9	0.016	2%	79.0	0.039	0%	0.0	0.0	52%	1710.7	0.9	14.97	0.01	
020GN084 Catalyst	9.0	0.2	91.3	144.7	0.1	2%	16.4	0.008	0%	0.0	0.0	0%	0.0	0.0	81%	668.7	0.3	5.85	0.003	
Contego	10.0	0.0	4015.0	0.3	0.0	0%	0.0	0.0	0%	0.0	0.0	0%	0.0	0.0	60%	24123.7	12.1	211.08	0.11	
Total (tpy)		--			1.2	--		0.1	--		0.04	--		0.4	--		14.6	--		0.13

Notes:

- ¹ VOC and HAP emissions assume all VOC or HAP content is emitted.
- ² HVLP transfer efficiency is 65%, fabric filter efficiency is 97.5%, and it is assumed that all PM emissions are PM_{2.5}.
- ³ Annual emissions were calculated assuming 8760 hrs/yr of operation and maximum paint usage.

Table 11
Receiving Hood Exhaust - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor	Emission Rate	Potential to Emit
	lb/lb rubber	lb/yr	TPY
Total VOC	1.8E-03	9.8	4.9E-03
Total HAPs	5.1E-04	2.8	1.4E-03
1,1,1-Trichloroethane	4.2E-06	0.023	1.2E-05
1,3-Butadiene	7.5E-06	0.042	2.1E-05
2-Butanone	3.0E-06	0.017	8.4E-06
Acetaldehyde	7.6E-06	0.043	2.1E-05
Acetophenone	4.4E-04	2.5	1.2E-03
bis(2-Ethylhexyl)phthalate	2.6E-06	0.015	7.3E-06
Carbon Disulfide	4.2E-06	0.023	1.2E-05
Cumene	2.8E-06	0.015	7.7E-06
Di-n-butylphthalate	7.2E-06	0.040	2.0E-05
Dimethylphthalate	6.7E-08	3.8E-04	1.9E-07
Hexachlorobutadiene	3.9E-07	2.2E-03	1.1E-06
Hexane	1.6E-05	0.092	4.6E-05
Methylene Chloride	1.8E-06	0.010	5.1E-06
Naphthalene	4.0E-06	0.023	1.1E-05
Phenol	1.3E-06	7.16E-03	3.6E-06
Toluene	2.7E-06	0.015	7.6E-06

Notes:

1. Emission factors from AP-42, Section 4.12 Manufacture of Rubber Productions (draft version), emission factors are for curing and cooling processes.
2. Annual emissions were calculated assuming maximum production of 11 shipsets per year, with 913 ft rubber per shipset and 167 lb per 300 ft rubber.

Table 12
Removed Hot Room CAP and GHG Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor^{1,2} (lb/10⁶ scf)	Emission Rate (lb/hr)	Potential to Emit³ (tpy)
NO _x	100	-8.2E-03	-3.6E-02
CO	84	-6.9E-03	-3.0E-02
PM (total)	7.6	-6.3E-04	-2.7E-03
SO ₂	0.6	-4.9E-05	-2.2E-04
VOC	5.5	-4.5E-04	-2.0E-03
NH ₃ (Utah)	3.2	-2.6E-04	-1.2E-03
CO ₂	120,000	-9.9E+00	-43.3
CH ₄	2.3	-1.9E-04	-8.3E-04
N ₂ O (uncontrolled)	2.2	-1.8E-04	-7.9E-04

Notes:

1. Emission factors from AP-42 Section 1.4: Natural Gas Combustion. Table 1.4-1, NO_x and CO emission factors for uncontrolled small units (<100 MMBtu/hr). Table 1.4-2, all other pollutants except NH₃. https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf.
2. NH₃ emission factor from EPA, Development and Selection of Ammonia Emission Factors. <https://www3.epa.gov/ttnchie1/old/efdocs/ammonia.pdf>.
3. Short-term emissions are based on operation of the 0.084 MMBtu/hr burner at full capacity. Annual emissions were calculated assuming 8760 hrs/yr of operation.

Table 13
Removed Hot Room HAP Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor^{1,2} (lb/10⁶ scf)	Emission Rate (lb/hr)	Potential to Emit³ (tpy)
Arsenic	2.0E-04	-1.6E-08	-7.2E-08
Benzene	2.1E-03	-1.7E-07	-7.6E-07
Beryllium	1.2E-05	-9.9E-10	-4.3E-09
Cadmium	1.1E-03	-9.1E-08	-4.0E-07
Chromium	1.4E-03	-1.2E-07	-5.0E-07
Cobalt	8.4E-05	-6.9E-09	-3.0E-08
Formaldehyde	7.5E-02	-6.2E-06	-2.7E-05
Hexane	1.8E+00	-1.5E-04	-6.5E-04
Lead	5.0E-04	-4.1E-08	-1.8E-07
Manganese	3.8E-04	-3.1E-08	-1.4E-07
Mercury	2.6E-04	-2.1E-08	-9.4E-08
Naphthalene	6.1E-04	-5.0E-08	-2.2E-07
Nickel	2.1E-03	-1.7E-07	-7.6E-07
Polycyclic Organic Matter	8.8E-05	-7.3E-09	-3.2E-08
Selenium	2.4E-05	-2.0E-09	-8.7E-09
Toluene	3.4E-03	-2.8E-07	-1.2E-06

Notes:

- ¹. Emission factors from AP-42 Section 1.4: Natural Gas Combustion.
https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf.
- ². HAPs determined using EPA's Initial List of Hazardous Air Pollutants with Modifications.
<https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications>.
- ³. Short-term emissions are based on operation of the 0.084 MMBtu/hr burner at full capacity. Annual emissions were calculated assuming 8760 hrs/yr of operation.

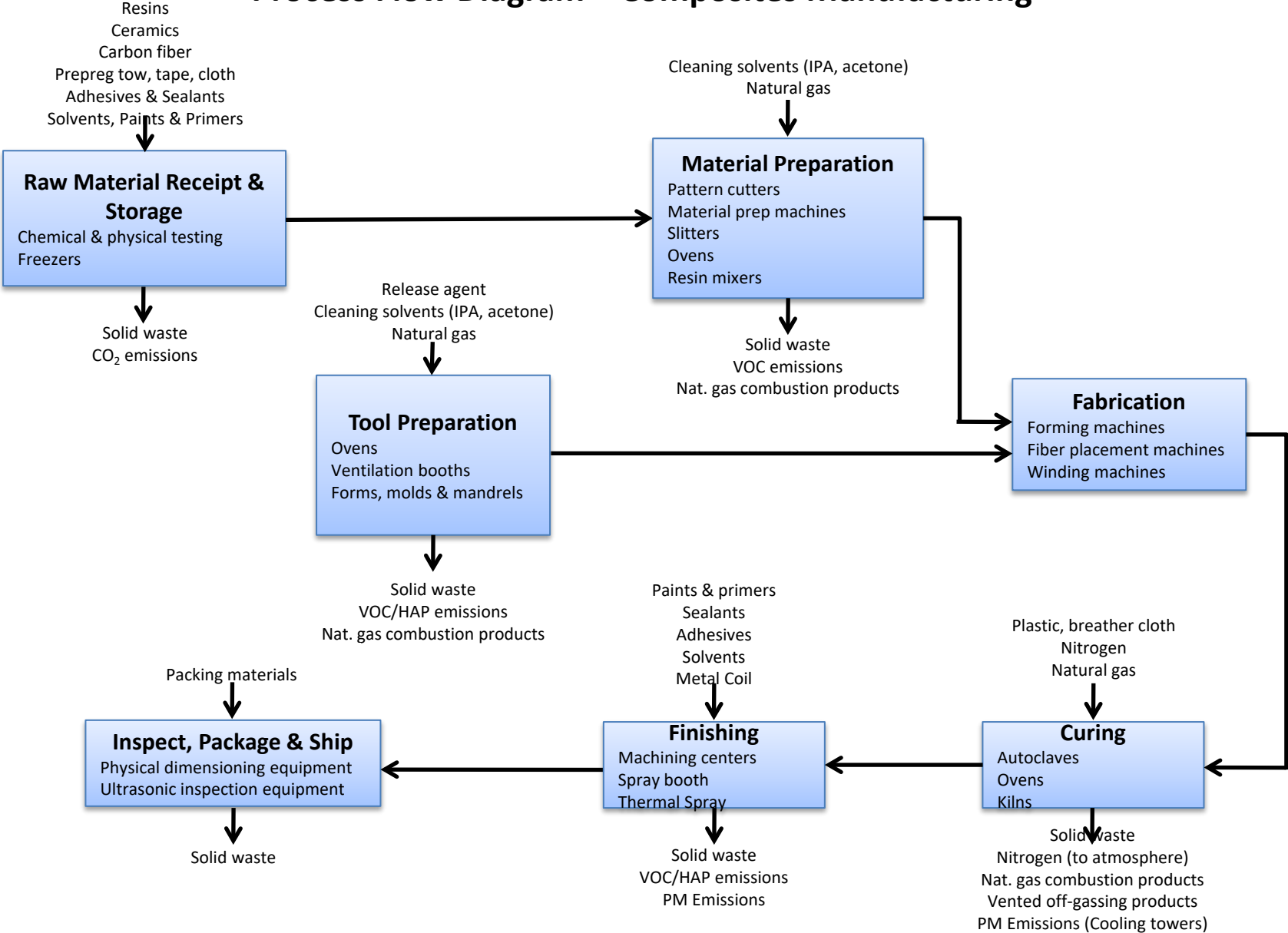
Table 14
DC-28 Dust Collector CAP Emissions - 2023 Air Permitting
Northrop Grumman Systems Corp.
Clearfield, Utah

Pollutant	Emission Factor ¹	Emission Rate	Potential to Emit
	gr/scf	lb/yr	tpy
PM ₁₀ (total)	0.016	-843	-0.42
PM _{2.5} (total)	0.016	-843	-0.42
SO ₂	--	--	--
NO _x	--	--	--
VOC	--	--	--
CO	--	--	--
NH ₃ (Utah)	--	--	--

Notes:

1. Grain loading rate listed in NGSC's 2022 emissions inventory.
2. Short-term emissions are based on operation of the 702 scfm baghouse at full capacity. Annual emissions were calculated assuming 8760 hrs/yr of operation.

Process Flow Diagram – Composites Manufacturing





Form 2
Company Information/Notice of Intent (NOI)

Date 11/21/2023

Utah Division of Air Quality
New Source Review Section

AIR QUALITY

Application for: Initial Approval Order Approval Order Modification

General Owner and Source Information

<p>1. Company name and mailing address: <u>Northrop Grumman Systems Corp.</u> <hr/> <u>PO Box 160433</u> <hr/> <u>Clearfield, UT 84016-0433</u> <hr/> Phone No.: <u>((801) 825-9741</u> Fax No.: <u>()</u></p>	<p>2. Company** contact for environmental matters: <u>Jeff Schmidt</u> <hr/> Phone no.: <u>((801) 774-4171</u> Email: <u>j.schmidt@ngc.com</u> <hr/> <i>** Company contact only; consultant or independent contractor contact information can be provided in a cover letter</i></p>
<p>3. Source name and physical address (if different from above): <u>Freeport Center 14th St.</u> <hr/> <u>Clearfield, UT 84016</u> <hr/> Phone no.: <u>()</u> Fax no.: <u>()</u></p>	<p>4. Source Property Universal Transverse Mercator coordinates (UTM), including System and Datum: <u>UTM: 12</u> <hr/> <u>X: 414,000 m</u> <hr/> <u>Y: 4,550,000 m</u> <hr/></p>
<p>5. The Source is located in: <u>Davis</u> County</p>	<p>6. <u>Standard Industrial Classification Code (SIC)</u> <u>3728</u></p>
<p>7. If request for modification, AO# to be modified: DAQE # <u>AN101520028-22</u> DATED: <u>09 / 26 / 22</u></p>	
<p>8. Brief (50 words or less) description of process. Northrop Grumman Systems Corp. (NGSC) manufactures aerospace composite structures at their Freeport Center plant. NGSC manufactures composite components for commercial and defense contractors in the aerospace industry. This AO modification would update the equipment on the permit to add and remove some emissions-generating units.</p>	

Electronic NOI

9. A complete and accurate electronic NOI submitted to DAQ Permitting Mangers Jon Black (jblack@utah.gov) or Alan Humpherys (ahumpherys@utah.gov) can expedite review process. Please mark application type.

Hard Copy Submittal Electronic Copy Submittal Both

Authorization/Signature

I hereby certify that the information and data submitted in and with this application is completely true, accurate and complete, based on reasonable inquiry made by me and to the best of my knowledge and belief.

Signature: Jeffrey S. Schmidt Title: EH&S Engineer

<p><u>Jeff Schmidt</u> Name (Type or print)</p>	<p>Telephone Number: <u>((801) 774-4171</u> Email: <u>j.schmidt@ngc.com</u></p>	<p>Date: <u>12/14/2023</u></p>
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**Form 1
Notice of Intent (NOI) Application Checklist**

Date _____

Company _____

**Utah Division of Air Quality
New Source Review Section**

AIR QUALITY

Source Identification Information [R307-401-5]

- 1. Company name, mailing address, physical address and telephone number
- 2. Company contact (Name, mailing address, and telephone number)
- 3. Name and contact of person submitting NOI application (if different than 2)
- 4. Source Universal Transverse Mercator (UTM) coordinates
- 5. Source Standard Industrial Classification (SIC) code
- 6. Area designation (attainment, maintenance, or nonattainment)
- 7. Federal/State requirement applicability (NAAQS, NSPS, MACT, SIP, etc.)
- 8. Source size determination (Major, Minor, PSD)
- 9. Current Approval Order(s) and/or Title V Permit numbers

NOI Application Information: [R307-401]

- 1. Detailed description of the project and source process
- 2. Discussion of fuels, raw materials, and products consumed/produced
- 3. Description of equipment used in the process and operating schedule
- 4. Description of changes to the process, production rates, etc.
- 5. Site plan of source with building dimensions, stack parameters, etc.
- 6. Best Available Control Technology (BACT) Analysis [R307-401-8]
 - A. BACT analysis for all new and modified equipment
- 7. Emissions Related Information: [R307-401-2(b)]
 - A. Emission calculations for each new/modified unit and site-wide (Include PM₁₀, PM_{2.5}, NO_x, SO₂, CO, VOCs, HAPs, and GHGs)
 - B. References/assumptions, SDS, for each calculation and pollutant
 - C. All speciated HAP emissions (list in lbs/hr)
- 8. Emissions Impact Analysis – Approved Modeling Protocol [R307-410]
 - A. Composition and physical characteristics of effluent (emission rates, temperature, volume, pollutant types and concentrations)
- 9. Nonattainment/Maintenance Areas – Major NSR/Minor (offsetting only) [R307-403]
 - A. NAAQS demonstration, Lowest Achievable Emission Rate, Offset requirements N/A
 - B. Alternative site analysis, Major source ownership compliance certification N/A
- 10. Major Sources in Attainment or Unclassified Areas (PSD) [R307-405, R307-406]
 - A. Air quality analysis (air model, met data, background data, source impact analysis) N/A
 - B. Visibility impact analysis, Class I area impact N/A
- 11. Signature on Application

Note: The Division of Air Quality will not accept documents containing confidential information or data. Documents containing confidential information will be returned to the Source submitting the application.



AIR QUALITY

Form 2
Company Information/Notice of Intent (NOI)

Date _____

Utah Division of Air Quality
New Source Review Section

Application for: [] Initial Approval Order [] Approval Order Modification

General Owner and Source Information

1. Company name and mailing address:

Phone No.: ()
Fax No.: ()

2. Company** contact for environmental matters:

Phone no.: ()
Email: _____

** Company contact only; consultant or independent contractor contact information can be provided in a cover letter

3. Source name and physical address (if different from above):

Phone no.: ()
Fax no.: ()

4. Source Property Universal Transverse Mercator coordinates (UTM), including System and Datum:

UTM: _____
X: _____
Y: _____

5. The Source is located in: _____ County

6. Standard Industrial Classification Code (SIC)

7. If request for modification, AO# to be modified: DAQE # _____ DATED: ___/___/___

8. Brief (50 words or less) description of process.

Electronic NOI

9. A complete and accurate electronic NOI submitted to DAQ Permitting Mangers Jon Black (jblack@utah.gov) or Alan Humpherys (ahumpherys@utah.gov) can expedite review process. Please mark application type.

Hard Copy Submittal Electronic Copy Submittal [] Both

Authorization/Signature

I hereby certify that the information and data submitted in and with this application is completely true, accurate and complete, based on reasonable inquiry made by me and to the best of my knowledge and belief.

Signature:

Title:

Name (Type or print)

Telephone Number:
()
Email:

Date:



Form 3

Company _____

Process Information

Site _____

**Utah Division of Air Quality
New Source Review Section**

Process Information - For New Permit ONLY		
1. Name of process:	2. End product of this process:	
3. Process Description*:		
Operating Data		
4. Maximum operating schedule: _____ hrs/day _____ days/week _____ weeks/year	5. Percent annual production by quarter: Winter _____ Spring _____ Summer _____ Fall _____	
6. Maximum Hourly production (indicate units.): _____	7. Maximum annual production (indicate units): _____	
8. Type of operation: Continuous Batch Intermittent	9. If batch, indicate minutes per cycle _____ Minutes between cycles _____	
10. Materials and quantities used in process.*		
Material	Maximum Annual Quantity (indicate units)	
11. Process-Emitting Units with pollution control equipment*		
Emitting Unit(s)	Capacity(s)	Manufacture Date(s)

**If additional space is required, please create a spreadsheet or Word processing document and attach to form.*



AIR QUALITY

**Form 4
Project Information**

Company _____

Site _____

**Utah Division of Air Quality
New Source Review Section**

Process Data - For Modification/Amendment ONLY

1. Permit Number _____

If submitting a new permit, then use Form 3

Requested Changes

<p>2. Name of process to be modified/added: _____</p> <p>End product of this process: _____</p>	<p>3. Permit Change Type: New Increase*</p> <p>Equipment _____</p> <p>Process _____</p> <p>Condition Change _____</p> <p>Other _____</p> <p>Other _____</p> <p>Other _____</p>
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<p>4. Does new emission unit affect existing permitted process limits?</p> <p style="text-align: center;">Yes No</p>	<p>5. Condition(s) Changing:</p>
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6. Description of Permit/Process Change**

7. New or modified materials and quantities used in process. **

Material	Quantity Annually

8. New or modified process emitting units **

Emitting Unit(s)	Capacity(s)	Manufacture Date(s)

**If the permit being modified does not include CO₂e or PM_{2.5}, the emissions need to be calculated and submitted to DAQ, which may result in an emissions increase and a public comment period.*

***If additional space is required, please generate a document to accommodate and attach to form.*

HAP	Permitted Emissions	Emissions Increase	Proposed Emissions	Emissions Increase
	tons/yr	tons/yr	tons/yr	lbs/hr
1,1,1-Trichloroethane	9.5	0	9.5	0
1,1,2-Trichloroethane	2	0	2	0
1,3-Butadiene	0	Generic HAP	0	0
1,4-Dichlorobenzene(p)	0	Generic HAP	0	0
2-(2-Butoxyethoxy)-Ethanol	2	0	2	0
2-Butanone	0	Generic HAP	0	0
Acetaldehyde	0	Generic HAP	0	0
Acetophenone	0	Generic HAP	0	0
Arsenic	0	Generic HAP	0	0
Benzene	0	Generic HAP	0	0
Beryllium	0	Generic HAP	0	0
bis(2-Ethylhexyl)phthalate	0	Generic HAP	0	0
Cadmium	0	Generic HAP	0	0
Carbon Disulfide	0	Generic HAP	0	0
Chloromethane	0	Generic HAP	0	0
Chromium	0.014	0	0.014	0
Cobalt	0	Generic HAP	0	0
Cumene	2	0	2	0
Dimethylphthalate	0	Generic HAP	0	0
Di-n-butylphthalate	0	Generic HAP	0	0
Ethyl Acrylate	2	0	2	0
Ethyl Benzene	2	0	2	0
Ethylene Glycol	2	0	2	0
Formaldehyde	0.5	0	0.5	0
Generic HAPs	1.2	0	1.2	0
Glycol Ethers	2	0	2	0
Hexachlorobutadiene	0	Generic HAP	0	0
Hexamethylene-1,6-Diisocyanate	0.007	0	0.007	0
Hexane	2	0	2	0
Hydrogen Fluoride (Hydrofluoric Acid)	0.01	0	0.01	0
Lead	0	Generic HAP	0	0
Manganese	0	Generic HAP	0	0
Mercury	0	Generic HAP	0	0
Methanol	2	0	2	0
Methyl Isobutyl Ketone	2	0	2	0
Methyl Isocyanate	0.01	0	0.01	0
Methyl Methacrylate	0	0	0	0
Methylene Chloride (Dichloromethane)	2	0	2	0
Methylenedianiline	0.01	0	0.01	0
Methylene Diphenyl Diisocyanate (MDI)	0.01	0	0.01	0
Naphthalene	2	0	2	0
Nickel	0.02	0	0.02	0
Phenol	2	0	2	0
Polycyclic Organic Matter	0	Generic HAP	0	0
Selenium	0	Generic HAP	0	0
Styrene	0	0	0	0
Tetrachloroethylene (Perchloroethylene)	2	0	2	0
Toluene	2	0	2	0
Trichloroethylene	2	0	2	0
Xylenes (Isomers and Mixture)	2	0	2	0
TOTAL HAP	19.00	0.00	19.00	0

Document Date: 02/28/2018



DAQ-2018-002267