

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

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APPLICANT'S NAME: NORTHROP GRUMMAN SPACE AND MISSION SYSTEMS CORP.

FACILITY PERMIT ID# 800409

CONTACT PERSON: ANTONIO S. LIU

MAILING ADDRESS: ONE SPACE PARK
BUILDING R11/2000
REDONDO BEACH, CA 90278

EQUIPMENT ADDRESS: One Space Park, Bldg R9/1483
Redondo Beach, CA 90278

Title V Revision:
Application No. 484386

PERMIT TO CONSTRUCT**Equipment Description:**

PROCESS 10: AIR POLLUTION CONTROL DEVICES					
System 1: FUME HOOD					
Equipment	Device ID	Connected To	Source Type/ Monitoring Unit	Emissions	Equipment Specific Conditions
CARBON FILTER, PORTABLE FUME HOOD, MISONEX, MODEL NO. AU-250E HEPA, WITH ONE PRE-FILTER, ONE MAIN CARBON FILTER AND ONE SAFETY CARBON FILTER. Reference A/N 457884 468744	C243	D274, D275 D332 ADD		VOC: (9) RULE 1124, 9-21-2001; RULE 1171, 11-7-2003; RULE 1171, 5-6-2005	C1.21, D12.3, H23.1

Conditions:

C1.21 The operator shall limit the operating time to no more than 358 hour(s)

For the purpose of this condition, operating time shall be defined as the time elapsed between filter changes.

The operator shall not use this equipment unless the exhaust fan is turned on

The operator shall not operate this equipment near open doorways, open windows, air conditioning, or any areas where is likely to be effected by any other equipment

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The operator shall not use this equipment unless the main carbon filter door and sash door are completely closed

The operator shall set the alarm to warn the operator when the total elapsed operating hour for the main and safety carbon filters reaches 357 hours or less of operation

The operator shall replace the main and safety carbon filters with a new one whenever the total elapsed operating hours from the last time the main and safety carbon filters were replaced is 358 hours or less

The operator shall replace the main and safety carbon filters with a new one whenever the hydrocarbon sensor detects breakthrough which is indicated as "Approaching Saturation" on the instrument panel for this equipment. The breakthrough shall be set at a TLV between 0 to 50 ppm

The operator shall dispose of the spent carbon filters properly

The operator shall keep a log to indicate the date pre-filter, the main and safety carbon filters are replaced. The records shall be kept for a period of at least five years and made available to District personnel upon request

The operator shall replace the pre-filter whenever the check filter light on panel comes on, or at least when the main carbon filters and safety filters are replaced

The operator shall not use halogenated solvents to conduct rule 1122 operations in this equipment

D12.3 The operator shall install and maintain a(n) non-resettable elapsed time meter to accurately indicate the elapsed operating time of the exhaust fan.

H23.1 This equipment is subject to the applicable requirements of the following rules or regulations.

VOC District Rule 1122

Equipment Description:

PROCESS 6: COATINGS					
Equipment	Device ID	Connected To	Source Type/ Monitoring Unit	Emissions	Equipment Specific Conditions

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OVEN, ELECTRIC, SOLVENT CLEANING AND DRYING, GEORGIA OVEN CO, MODEL NO. 12STX, 20" W. X 23" D. X 28" H. Reference A/N 457882 468746	D274	C243			B59.4, B59.5, C6.4, E71.5 , E80.4, E448.4, H23.1
OVEN, ELECTRIC, SOLVENT CLEANING AND DRYING, VWR INTERNATIONAL, MODEL NO. 1430S, 25" W. X 25" D. X 21" H., 0.8 KW Reference A/N 457883 468748	D275	C243			B59.4, B59.5, C6.3, E71.5 , E80.3, E448.4, H23.1
OVEN, ELECTRIC, SOLVENT CLEANING AND DRYING, VWR INTERNATIONAL, MODEL NO. 1430, 25.5" W. X 25" D. X 21" H., 0.55 KW Reference A/N 483363	D332	C243		ADD	B59.4, B59.5, C6.4, E71.5, E80.5, E448.4, H23.1

Conditions:

B59.4 THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIAL(S) IN THIS DEVICE:

Halogenated solvent to conduct Rule 1122 solvent cleaning.

B59.5 THE OPERATOR SHALL NOT USE THE FOLLOWING MATERIAL(S) IN THIS DEVICE:

Materials containing any toxic air contaminants identified in the SCAQMD Rule 1401, as amended 3/4/2005, except for the following compounds listed below:

Methanol

Isopropanol (IPA)

C6.4 The operator shall use this equipment in such a manner that the temperature being monitored, as indicated below, does not exceed ~~150~~ 165 deg F.

To comply with this condition, the operator shall install and maintain a(n) temperature gauge to accurately indicate the temperature of the vacuum oven.

E71.5 The operator shall not use this equipment for cleaning operations unless it is at ambient room temperature.

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E80.3 The operator shall not use this equipment when any of the following equipment are operating

Device ID: D274 [is vented to fume hood C243]

Device ID: D332 [is vented to fume hood C243]

E80.4 The operator shall not use this equipment when any of the following equipment are operating

Device ID: D275 [is vented to fume hood C243]

Device ID: D332 [is vented to fume hood C243]

E80.5 The operator shall not use this equipment when any of the following equipment are operating

Device ID: D274 [is vented to fume hood C243]

Device ID: D275 [is vented to fume hood C243]

E448.4 The operator shall comply with the following requirements::

The operator shall not conduct heated solvent cleaning in this oven.

Whenever solvent cleaning is conducted in this equipment, the oven shall be vented to a fume hood/carbon filter (C243) which has been issued a permit to operate and which is in full operation.

The operator shall either install a non removable venting hose to vent the emission discharge from the vacuum oven into the fume hood/carbon filter (C243) or the point of emission discharge shall be placed inside of the fume hood/carbon filter (C243).

H23.1 This equipment is subject to the applicable requirements of the following rules or regulations.

VOC District Rule 1122

Background:

Northrop Grumman Space and Missions Systems is engaged in the development and manufacture of advanced semiconductors including fabrication and assembly of electronic components and hard wares for integration into satellite and space vehicle.

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The company also performs research and development relating to chemical lasers, rocket engine thrusters and energy related programs for commercial and non-commercial applications. These operations are currently performed at three major sites within the South Coast Air Basin and they are: Capistrano Test Site(CTS), Redondo Beach and Manhattan Beach.

Northrop filed applications 468744 (previous a/n 457881), 468746 (previous a/n 457882), & 468748 (previous a/n 457883) on 5-03-07 as a change of condition to change the operating temperature of the ovens operating under device D274 & D275 from 150 deg. F. to 165 deg. F. In order to avoid an excessive emission from boiling the cleaning solvent in a preheated vacuum oven, condition E71.5 will be added to require Northrop to perform all cleaning operations (soaking parts) under vacuum at ambient temperature.

Application no. 483363 was submitted to the District on 5/30/08 as a new construction of a similar oven vented by the same carbon fume hood C243. The operation of this oven is identical to the existing ovens under D274 and D275. The maximum drying temperature will be 165 degrees Fahrenheit while the cleaning operations will be performed at ambient room temperature.

The District records indicate that during the last five years Northrop Grumman was issued one Notice of Violation (NOV). This notice was issued on 6/18/2004 for failure to keep adequate records for the NOx emissions from Rule 219 equipment. The facility complied with these requirements by 8/04/2004. This issue has been resolved and Northrop is now in full compliance. There are no other Notices of Violation, Notices to Comply or Complaints issued against this facility as of 7/23/08.

Process Description:

The ovens are used in solvent cleaning operations where metallic bearings and non-metallic parts are submerged in a beaker of methanol or isopropanol (IPA) which is placed inside the oven. The oven is evacuated to a reduced pressure between 50 and 250 mmhg. This part of the cleaning cycle will last from 1 to 5 minutes. Next, the parts are allowed to soak in the cleaning solution for 2-3 hours inside the oven at ambient temperature and pressure. After this, the parts are removed from the cleaning solution/beaker, placed in another container and returned to the oven for drying. The oven is heated to 165⁰ F. The pressure is reduced to 50 mmhg and the parts are dried for 1 - 24 hours. It is expected that 1 to 2 batches will be cleaned per week using about 3/4 gallons of methanol or IPA per batch with approximately 90% being recovered as waste which is a conservative estimate since the solvent is not heated. During the entire cleaning and drying process, the oven is vented through the vacuum pump, and the exhaust from the vacuum pump will be vented through a hose directly to the fume hood associated with the carbon filter C243, or the vacuum pump itself is placed inside the

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fume hood. The vacuum exhaust cfm is less than 1 cubic feet per minute whereas the inlet cfm to the hood is about 300 cubic feet per minute. The mixed air flows will reduce the vacuum exhaust air temperature to a little above ambient during the drying process. The fume hood is designed and has been evaluated with smoke tubes and an organic vapor analyzer (OVA) and was found to achieve at least 90% capture efficiency and 95% destruction efficiency.

Emissions Calculations:Application 468746, 468748 & 483363

Assumptions:

Maximum Methanol/IPA to be used	3/4 gallons/batch
Maximum batches per week	2
Maximum oven operation	5 day/week, 50 week/yr
Maximum Operating time per batch	27 hrs/batch (2700 hrs/yr)
VOC content of Methanol	6.58 lbs/gal
VOC content of IPA	6.58 lbs/gal
Solvent Recovery as waste	90%
Collection Efficiency	90%
Control Efficiency	95%
Carbon Filter Absorbtion Capacity	20%

Uncontrolled VOC emissions:

$$R1 = (3/4\text{gal})(6.58 \text{ lbs VOC/gal})(1-0.9)/27 \text{ hrs/batch}$$

$$R1 = 0.0182 \text{ lbs/hr, } 49.10 \text{ lbs/yr}$$

VOC emission adsorbed onto carbon:

$$= (0.0182 \text{ lbs/hr})(0.9)(0.95) = 0.0156 \text{ lbs/hr}$$

Hours to Breakthrough

$$(28 \text{ lbs Carbon})(0.2)/(0.0156\text{lbs/hr}) = 358 \text{ hrs}$$

Uncontrolled VOC 30 day average

$$R1 = 0.0182 \text{ lb/hr (54 hr/week)}(4.17 \text{ wk/month})(1\text{month}/30\text{days})$$

$$= 0.137 \text{ lbs/day}$$

Controlled VOC 30 day average

$$R2 = (0.0182 - 0.0156)(54 \text{ hr/wk})(4.17 \text{ wk/month})(1 \text{ month}/30\text{days})$$

$$= 0.02 \text{ lbs/day}$$

Risk Assessment:

The methanol or IPA to be used in the new vacuum cleaning and drying oven will be vented to existing carbon fume hood C243. Methanol and IPA are listed as an acute and chronic TAC compounds with tier 1 Screening Emission Levels. The following table shows the Tier 1 Screening Emission Levels for methanol and IPA at 25 meters:

Toxic Air	Screening Emission	Screening Emission
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Contaminant	Level (25meters) Acute (lbs /hr)	Level (25meters) Chronic (lbs/yr)
Methanol	14.0	132,000
IPA	1.60	231,000

The following table shows the maximum controlled calculated methanol or IPA emission:

Toxic Air Contaminant	Maximum lbs /hr	Maximum lbs /yr
Methanol	0.002	7.2
IPA	0.002	7.2

Comparison of the above two tables indicates that the maximum calculated TAC emissions of methanol or IPA are much less than the Screening Emission Levels of Tier 1 and compliance with Rule 1401 is expected.

The proposed 15 degree increase in the operating temperature of the existing ovens under Device numbers D274 and D275 will not cause a net toxic emission increase. The emissions were previously accounted for and found to be in compliance with Tier 1 Screening Levels.

Evaluation & Rule Review

Rule 212 (c)(1):This section requires a public notice for all new or modified permit units that emit air contaminants located within 1,000 feet from the outer boundary of a school.

No public notice is required since no school is located within 1,000 ft from the above site.

Rule 212 (c)(2):This section requires a public notice for all new or modified facilities that have on-site emission increases exceeding any of the daily maximums as specified by Rule 212(g).

The proposed project will not result in an emission increase. A Rule 212(c) (2) notice will not be triggered since the emission increase is below the daily maximum specified in Rule 212(g).

Rule 212(c)(3):This section requires a public notice for all new or modified permit unit with increases in emissions of toxic air contaminants listed in Table I of Rule 1401 resulting in MICR greater than 1E-6 per permit unit or greater than 10E-6 per facility.

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The proposed project will not result in an emission increase of toxic emissions associated with the operation. Public notice is not required under this section of the rule.

Rule 212(g): This section requires a public notice for all new or modified sources that result in emission increases exceeding any of the daily maximums as specified by Rule 212(g).

The emission increase due to the modification is negligible and the following summarizes the emission increase:

	Maximum Daily Emissions					
	<u>ROG</u>	<u>NO_x</u>	<u>PM₁₀</u>	<u>SO₂</u>	<u>CO</u>	<u>Pb</u>
Emission increase	0	0	0	0	0	0
MAX Limit (lb/day)	30	40	30	60	220	3
Compliance Status	Yes	Yes	Yes	Yes	Yes	Yes

No public notice is required since the emissions are below the thresholds.

Rule 401: With proper operation and maintenance compliance with this rule is expected.

Rule 402: With proper operation and maintenance compliance with this rule is expected.

Rule 1122: These solvent cleaning operation are subject to Rule 1122(k)(1)(D). They will be conducted in various containers, i.e. beakers, trays and Petri dishes, with open-top surface areas of less than 1.0 square foot or with a capacity of less than 2.0 gallons. The containers are placed in the safety vacuum oven and are unheated during the cleaning operation. The VOC emissions emitted from the cleaning operation will be vented to a fume hood which is designed to provide at least 90% capture efficiency and at least 95% removal efficiency by the use of activated carbon filters. The fume hood is equipped with a microprocessor which controls and displays the face velocity and removal efficiency. Compliance with this rule is expected.

REGULATION XIII: Though Northrop Grumman is a NO_x RECLAIM facility, compliance with Reg. XIII is still required. The controlled VOC emission from the new oven is estimated at 0.02 lb/day and therefore, no emission

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offset is required. The fume hood with 90 % collection and 95 % destruction efficiency is considered BACT to control VOC emissions from the oven. Modeling is not required for the VOC emissions.

The proposed change of condition to raise the temperature during the drying phase of the operation will not result in an emission increase. Therefore, New Source Review requirements will not be triggered.

Rule 1401: Toxics: Rule 1401 contains the following requirements:

- 1) *(d)(1) MICR and Cancer Burden* - The cumulative increase in MICR which is the sum of the calculated MICR values for all toxic air contaminants emitted from the new, relocated or modified permit unit will not result in any of the following:
 - (A) an increased MICR greater than one in one million (1.0×10^{-6}) at any receptor location, if the permit unit is constructed without T-BACT;
 - (B) an increased MICR greater than ten in one million (1.0×10^{-5}) at any receptor location, if the permit unit is constructed with T-BACT;
 - (C) a cancer burden greater than 0.5.
- 2) *(d)(2) Chronic Hazard Index* - The cumulative increase in total chronic HI for any target organ system due to total emissions from the new, relocated or modified permit unit will not exceed 1.0 at any receptor location.
- 3) *(d)(3) Acute Hazard Index* - The cumulative increase in total acute HI for any target organ system due to total emissions from the new, relocated or modified permit unit will not exceed 1.0 at any receptor location.

For the new oven, the maximum calculated TAC emissions is much less than the Acute and Chronic Screening Emission Levels of Tier 1. The proposed change of condition will not result in a toxic emission increase. Compliance with this rule is expected.

REG. XX: This change of condition has no impact on NOx. Compliance with this Regulation is expected.

REGULATION XXX:

This facility is in the RECLAIM program. The proposed project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or hazardous air pollutants (HAPs).

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Non-RECLAIM Pollutants or HAPs

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

Air Contaminant	Daily Maximum (lbs/day)
HAP	30
VOC	30
NO _x *	40
PM ₁₀	30
SO _x *	60
CO	220

* Not applicable if this is a RECLAIM pollutant

To determine if a project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or HAPs, emission increases for non-RECLAIM pollutants or HAPs resulting from all permit revisions that are made after the issuance of the Title V renewal permit shall be accumulated and compared to the above threshold levels. This proposed project is the 10th permit revision to the Title V renewal permit issued to this facility on May 9, 2005. The following table summarizes the cumulative emission increases resulting from all permit revisions since the Title V renewal permit was issued:

Revision	HAP	VOC	NO _x *	PM ₁₀	SO _x	CO
Previous Permit Revision Total Cumulative to date. Title V permit renewed May 9, 2005	0	0	2*	1	0	1
10 th Permit Revision; change of condition to increase temperature to 165 deg. F. D274, D275 D332 & C243, a/n 468746, 468748, 468744, & 483363	0	0	0	0	0	0
Cumulative Total	0	0	2*	1	0	1
Maximum Daily	30	30	40*	30	60	220

* RECLAIM pollutant, not subject to emission accumulation requirements

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

RECOMMENDATION

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