Draft Engineering Evaluation

Facility/Plant ID: 13602
Deposition Sciences Inc
3300 Coffey Lane, Santa Rosa, CA 95403
Application No: 31601

BACKGROUND

Deposition Sciences Inc (Deposition Sciences) has submitted this application to modify the following source:

S-2 Semiconductor Fabrication Area
Three (3) Solvent Holding Station Hoods, 100 Gallon Aggregate Holding Capacity
One (1) Photolithography Consisting of One (1) Negative Applicator, One (1) Negative Developer, One (1) Positive Applicator, and One (1) Positive Developer

The Semiconductor Fabrication Area (S-2) applies solvents on semiconductor components using solvent sinks and photolithography. The proposed material changes and throughputs will result in an emission increase of precursor organic compounds (POC) and non-precursor organic compounds (NPOC). The modification will result in a potential increase in methanol, a toxic air contaminant (TAC). Since the project is located within 1,000 feet of a school, this will require public notices of the for schools within a quarter mile of the project. The daily and annual emission increases will result in a modification as defined in Regulation 2-1-234.

EMISSIONS CALCULATIONS

Table 1. Organic Compound Annual Emissions Review for S-2

Material	Organic Content		Proposed Annual Usage (gals/yr)	Emission Factor (%)	Annual Emission Rate	
	NPOC Content (lbs/gal)	POC Content (lbs/gal)			NPOC (lbs/yr)	POC (lbs/yr)
Acetone	6.55	0.00	300	30	589.50	0.00
NMP Microposit 1165	0.00	8.60	500	30	0.00	1290.00
HMDS	0.00	6.45	50	30	0.00	96.71
Negative Photoresist Maskant (JSR NFR016D2)	0.00	9.17	35	90	0.00	288.86
Organic Photoresist Developer (PD523)	0.00	0.25	1000	90	0.00	225.00
Positive Photoresist Maskant AZ P4620	0.00	5.45	25	90	0.00	122.63
Potassium Hydroxide	0.00	0.00	200	100	0.00	0.00
Potassium Carbonate	0.00	0.00	200	100	0.00	0.00
Asahi AQ59	0.00	9.59	2.45	100	0.00	23.50
			Source Total		589.50	2046.68

Table 2. Potential to Emit Emissions Summary for S-2

Pollutant	Hourly Emission Rate (lbs/hr)	Average Daily Emission Rate (lbs/day)[1]	Annual Emission Rate (lbs/yr)[2]	Annual Emission Rate (tons/yr)[2]
POC	0.79	7.87	2046.68	1.023
NPOC	0.23	2.27	589.50	0.295

[1] As per the applicant, in the supplemental forms submitted, the source will operate 260 days per year.
[2] Based on proposed material usage limits.

BEST AVAILABLE CONTROL TECHNOLOGY

Pursuant to Regulation 2-2-301, Best Available Control Technology (BACT) applies to new or modified sources with a potential to emit (PTE) 10.0 pounds per day or greater. As shown in Table 2, the PTE of S-2 will be less than 10.0 pounds per day for POC and NPOC. Therefore, S-2 is not subject to BACT. A condition will be maintained in the modified permit that limits the operation to below 10.0 pounds per day of all regulated pollutants.

NEW SOURCE REVIEW OF TOXIC AIR CONTAMINANTS

Pursuant to Regulation 2-5-110, a project shall not be subject to this regulation if, for each TAC, the total project emissions are below the acute and chronic trigger levels listed in Table 2-5-1 of this regulation. A project includes all new or modified sources of TACs within a 3-year period. The project will only include emissions from the modified source within this application, since no other new or modified source was permitted within the previous 3-year period. The following table provides a review of the project TAC emission rates. The values listed below reflect the PTE of cresol and methanol emissions. This modification will result in an increased usage of JSR NFR016D2; the only material containing the following TACs in this operation. The existing permit allowed for 20 gallons per year of negative photoresist (JSR NFR016D2) and 20 gallons per year of positive photoresist. The new permit will only allow for up to 35 gallons per year of negative photoresist (JSR NFR016D2). Additionally, the JSR NFR016D2 material, has not changed in composition, including with respect to TACs.

Table 3. TAC Emissions and New Source Review of Toxic Air Contaminants

Toxic Air Contaminant	Max Hourly Emissions (lbs/hr)	Max Annual Emissions (lbs/yr)	Acute Trigger Level (lbs/hr)	Chronic Trigger Level (lbs/yr)	Exceeds Acute or Chronic Trigger Level?
Cresol (CAS: 1319-77-3)	3.2E-03	3.2E+00	-	2.3E+04	No
Methanol (CAS: 67-56-1)	3.2E-03	3.2E+00	6.2E+01	1.5E+05	No

*See *"31601-EM Calcs"* for detailed emission calculations found in the above tables.

The project does not exceed listed Table 2-5-1 acute and chronic trigger levels. The project is not subject to the requirements of this regulation.

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OFFSETS

Pursuant to Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits, or is permitted to emit, more than 10 tons per year of POC or nitrogen oxides (NO_X). Furthermore, pursuant to Regulation 2-2-303 offsets must be provided for any new or modified source at a major facility with a cumulative increase that exceeds 1.0 ton per year of particulate matter 10 microns in size (PM_{10}), particulate matter 2.5 microns in size ($PM_{2.5}$), or sulfur dioxide (SO_2). For purposes of Regulation 2-2-303, a major facility is defined as a facility that is permitted to emit 100 tons per year or more of PM_{10}, $PM_{2.5}$, or SO_2.

Table 4. Facility Potential to Emit Review

Pollutant	Existing Potential to Emit (tons/yr)	Application Emission Increase (tons/yr)	Application Emission Decrease (tons/yr)	New Potential to Emit (tons/yr)
POC	1.435	0.246	(0.000)	1.681

The facility has a PTE less than 10 tons per year of POC and NO_X. Therefore, the facility is not subject to the offset requirements of Regulation 2-2-302. Furthermore, the facility is not a major facility for PM_{10}, $PM_{2.5}$, or SO_2. Therefore, the facility is not subject to the offset requirements of Regulation 2-2-303.

Table 5. Facility Cumulative Increase Review

Pollutant	Existing Cumulative Increase (tons/yr)	Application Emission Increase (tons/yr)	Application Emission Decrease (tons/yr)	New Cumulative Increase (tons/yr)
POC	1.435	0.246	(0.000)	1.681

STATEMENT OF COMPLIANCE

Regulation 8 (Organic Compounds), Rule 30 (Semiconductor Wafer Fabrication Operations)

As a semiconductor wafer fabrication operation, S-2 is subject to the provisions of Regulation 8-30.

This operation qualifies for an exemption under Regulation 8-30-110 as it meets the definition of a Small Semiconductor Operation. This exemption states that the provisions of Section 8-30-302 shall not apply to any facility whose total combined net consumption of solvent-based photoresist and solvent-based photoresist developer is less than 24 gallons per month on a facility wide basis and provided the petition requirement of Section 8-30-402 and recordkeeping requirement of Section 8-30-502 are met.

BAAQMD Regulation 8-30-219 defines a Solvent-Based Photoresist Developer as a photoresist developer containing 10% or more volatile organic compound (VOC) by weight if unheated, or 2.5% or more VOC by weight if heated. VOC is any organic compound which would be emitted during semiconductor wafer fabrication operations and related cleaning operations, excluding the following: methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate. Moses Lake PD523 Developer is unheated (occurs at 23 degrees C) and, as demonstrated in the safety data sheet (SDS), contains less than 10% VOC.

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Therefore, only the Positive Photoresist Maskant AZ P4620 and the JSR NFR016D2 (Negative Photoresist Maskant) count toward the solvent-based applicability limits specified above. The combined annual usage of these two solvent-based photoresist developers is 60 gallons per year or an average of 5 gallons per month. Therefore, this operation qualifies as a Small Semiconductor Operation as defined in Regulation 8-30-110 and is not subject to regulation 8-30-302. This operation will be subject to the requirements in regulation 8-30-402 and regulation 8-30-502. Compliance with these requirements is expected.

This operation will operate solvent sinks. All sinks will have a cover as required by regulation 8-30-304.1. The capacity of each sink will be labeled on the sink as required by regulation 8-30-304.2. Materials will be disposed of in a manner as to minimize evaporation into the atmosphere as required by regulation 8-30-304.3. Liquid solvent leaks will immediately be addressed via repair or equipment shutdown as required by regulation 8-30-304.5.

This operation will not operate a solvent vapor station. Therefore, it is not subject to regulation 8-30-306.

This operation is subject to the cleaning requirements specified in regulation 8-30-307. The operation will use cleaning materials containing 10% or less of VOC by weight content to perform wipe cleaning of the fab area. Compliance with this regulation is expected as stated on the submitted application material.

This operation is subject to the record keeping requirements of 8-30-501 and 8-30-502. Compliance is expected and conditions will be included in the permit to ensure this.

California Environmental Quality Act
Pursuant to Regulation 2-1-311, an application for a proposed new or modified source will be classified as ministerial and will accordingly be exempt from the California Environmental Quality Act (CEQA) requirement of Regulation 2-1-310 if the District's engineering evaluation and basis for approval or denial of the permit application for the project is limited to the criteria set forth in Regulation 2-1-428 and to the specific procedures, fixed standards, and objective measurements set forth in the District's Permit Handbook and BACT/TBACT Workbook. The evaluation of the proposed project was performed in accordance with comparable criteria set forth in Chapter 7.4 of the Permit Handbook and is considered ministerial.

New Source Performance Standards
There are no New Source Performance Standards (NSPS) applicable to source S-2.

National Emission Standards for Hazardous Air Pollutants
40 CFR Part 63, Subpart BBBBB – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Semiconductor Manufacturing, specifies emissions standards for hazardous air pollutant (HAP) emissions from facilities that emit more than 10 tons per year of any one HAP or 25 tons per year of any combination of HAPs. This facility will not emit any HAP in the quantities mentioned above. Therefore, S-2 is not subject to the emission standards of this subpart.

Prevention of Significant Deterioration
Per Regulations 2-2-304 through 2-2-306, Prevention of Significant Deterioration (PSD) applies to projects with a significant increase as defined in Regulation 2-2-227.1. The project will not result in a significant increase. Therefore, the PSD requirements of Regulations 2-2-304 through 2-2-306 do not apply.

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School Notification
Pursuant to Regulation 2-1-412 and California Health & Safety Code §42301.6(a), prior to approving an application for a permit to construct or modification of a source, which is located within 1,000 feet from the outer boundary of a school site, the District shall prepare a public notice as detailed in §42301.6. §42301.9(a) defines a "school" as any public or private school used for the purposes of the education of more than 12 children in kindergarten or any grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in private homes.

The modification of S-2 will result in an increase of TAC emissions. The only material containing TACs, JSR NFR016D2, was previously permitted for 20 gallons of usage per year. The new permit will allow 35 gallons of usage per year. Therefore, there will be an increase in TAC emissions and a public notice is required.

Table 6. List of Schools Subject to Public Noticing

School Name	Address	Distance
North Valley School	3164 Condo Court, Santa Rosa	<1,000 ft
Schaefer Charter School	1370 San Miguel Avenue, Santa Rosa	<0.25 miles

PERMIT CONDITIONS

Permit Condition # 25304

Conditions for S-2 Photolithography

This condition, as initially adopted in New Source Review Application #23618 on July 19, 2012, is further amended to include proposed throughput modifications in New Source Review Application #31601.

1. Gross throughput of solvents at S2 shall not exceed the following amounts in any consecutive twelve month period:

Material	Gallons
Acetone	300
NMP	500
HMDS	50

   [Basis: Cumulative Increase]

2. Gross throughput at any photoresist spinner shall not exceed the following amounts in any consecutive twelve month period:

Material	Gallons
Positive Photoresist Maskant	25

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(AZ P4620)	
Negative Photoresist Maskant (JSR NFR016D2)	35
Organic Photoresist Developer (PD 523)	1000

[Basis: Cumulative Increase]

3. Gross throughput of other solvent materials at S2 shall not exceed the following amounts in any consecutive twelve month period:

Material	Gallons
Dry Film Resist (Asahi AQ59)	2.5

[Basis: Cumulative Increase]

4. S2 shall not emit 10.0 pounds or more per highest day of precursor organic compounds (POC) or non-precursor organic compounds (NPOC). The following emission factors shall be used in the calculation of emissions:

Category	Emission factor
Solvent Station	30% of net solvent usage
Photoresist Spinners	90% of net solvent usage
Other	100% of net solvent usage

[Basis: Best Available Control Technology]

5. Solvents and solvent containing materials other than the materials specified in Parts 1, 2 and 3 and/or usages in excess of those specified in Parts 1, 2 and 3 may be used at S2, provided that the owner/operator can demonstrate that all of the following are satisfied:

   a. Total POC emissions from S2 do not exceed 2,047 pounds in any consecutive twelve month period; and
   b. Total NPOC emissions from S-2 do not exceed 590 pounds in any consecutive twelve month period; and
   c. The use of these materials does not increase toxic emissions above any risk screening trigger level of Table 2-5-1 in Regulation 2-5.

   [Basis Cumulative Increase and Toxics]

6. To determine compliance with the above parts, the owner/operator shall maintain the following records and provide all of the data necessary to evaluate compliance with the above parts, including the following information:

   a. Quantities of each type of coating and solvent used at this source on a monthly basis.
   b. If a material other than those specified in Parts 1 through 3 are used, POC/NPOC and toxic component contents of each material used; and mass emission calculations to demonstrate compliance with Part 5, on a monthly basis;
   c. Monthly usage and/or emission calculations shall be totaled for each consecutive twelve month period.

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All records shall be retained on site for two (2) years, from the date of entry, and made available for inspection by District staff upon request. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable District Regulations. [Basis: Cumulative Increase and Toxics]

End of Conditions

RECOMMENDATION

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality related regulations. The preliminary recommendation is to issue an Authority to Construct for the proposal of the new, modified, and altered sources listed below. However, the proposed source will be located within 1,000 feet of a school, which triggers the public notification requirement of District Regulation 2-1-412. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on the issuance of an Authority to Construct or Permit to Operate for the following equipment:

S-2 Semiconductor Fabrication Area
Three (3) Solvent Holding Station Hoods, 100 Gallon Aggregate Holding Capacity
One (1) Photolithography Consisting of One (1) Negative Applicator, One (1) Negative Developer, One (1) Positive Applicator, and One (1) Positive Developer

Prepared by: ____
Kevin Creaven, Air Quality Engineer

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