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	A/N	483796-7 & 460724
ENGINEERING & COMPLIANCE	Processed By	KH
	Checked By	
APPLICATION PROCESSING AND CALCULATIONS	Date	11/18/08

Applicant's Name: International Rectifier

Mailing Address: 41915 Business Park Dr.
Temecula, CA 92590

Equipment Location: Same

Equipment Description:

APPLICATION NO. 483796: (Previous A/Ns 460724 & 414005)
ALTERATION TO AIR POLLUTION CONTROL SYSTEM BY:
THE ADDITION OF THE FOLLOWING VENTING POINT
- ONE WAFER ETCHING AND STRIPPING LINE

APPLICATION NO. 483797: Control: 483796 Scrubbers/Adsorbers
WAFER ETCHING AND STRIPPING LINE, AKRION GAMA SERIES, CONSISTING OF:
1. TANK NO. 1, ETCHING/MILLING, HYDROGEN FLUORIDE/AMMONIUM FLUORIDE, 0' - 10"W. x 1' - 5"L. x 0' - 10"H., 3 KW ELECTRICALLY HEATED.
2. TANK NO. 4, STRIPPING, SULFURIC ACID/HYDROGEN PEROXIDE, 0' - 10"W. x 1' - 5"L. x 0' - 10"H., 8 KW ELECTRICALLY HEATED.
3. TANK NO. 6, RINSING, DEIONIZED WATER WITH ISOPROPYL ALCOHOL, 0' - 10"W. x 1' - 5"L. x 0' - 10"H., 3 KW ELECTRICALLY HEATED.
4. ASSOCIATED RINSE TANKS.

HISTORY:

Application(s) received on: 6/11/08

Equipment installed/modified: Control system has partially been modified.

Violations recorded: 1 Notice to Comply has been issued in the last 2 years. All concerns pertaining to the notice have been resolved.

	RECLAIM	Title V
Facility type:	No	Yes

Application 483797 was filed for Permit to Construct a wafer etching and stripping line. The exhaust from each tank of the line vents to the existing Scrubbers 101 or 102 (current A/N 483796). Scrubbers 101 and 102 have been operated since 1995. Scrubber 102 has always been a standby to Scrubber 101. Each scrubber was designed to vent all venting points with a blower flow rate of 60,000 cfm. The standby scrubber was installed to insure continuous plant operation when Scrubber 101 is down for maintenance.

Application 483796 was filed to modify the Air Pollution Control System permit to operate F60395 (A/N 414005) to add the venting of the above wafer etching and stripping line. Actually, the air pollution control system has partially been modified, since it was last permitted, with the addition of five resin adsorbers and one small point of use wet scrubber . Applications for other equipment vented to the control are processed in a separate evaluation

Air Pollution Control System A/N 483796 Modification:

- To be able to raise the amount of arsine above the facility existing arsine limit, 4.1 pounds in any 12 consecutive month period, the company has installed five resin adsorbers to control arsine coming from five ion implanters that use arsine as process gas. The effluent from these resin adsorbers vents to Scrubber 101 or Scrubber 102.
- A Metron Vector 6000 scrubber has been added to control emissions from Novellus PECVD furnace. The reason for this POU (Point of Use) scrubber installation is to easily control the emissions at the source. Additional control, if needed, will be at Scrubber 101 or Scrubber 102.

Air Pollution Control System A/N 483796 Venting:

In addition to the proposed wafer etching and stripping line, the scrubbers vent eleven diffusion furnaces, four PECVD furnaces, twenty-seven gas cabinet purge lines, five ion implanters, thirty-six plasma etchers, two etchers, one wafer grinder, three waste acid storage tanks and one waste ammonium hydroxide storage tank.

PROCESS DESCRIPTION

The equipment is for etching and stripping photoresist from wafers. Inorganic chemicals are used in the etching and stripping. In the last rinse tank (Tank No. 6), however, a small amount of isopropyl alcohol is added to the deionized water (0.11 g/L). The equipment vents to Scrubber 101 or Scrubber 102.

CALCULATIONS

Given:

Chemical rates:			
IPA	Applicant's data	7.14E-04	Lpm
BOE Etchant	Applicant's data	7.01E-03	Lpm
Water density		8.3372	lb/gal
Sp. Gr.			
IPA		0.79	
BOE Etchant		1.2	
HF in BOE Etchant, wt%		11%	
Operating schedule:			
hrs/day		24	hrs/day
days/wk		7	days/wk
wks/yr		52	wks/yr
VOC control efficiency:		0%	
Acid control efficiency:		95%	
Conversion factor from L to gallons:		0.264	gal/L
Cushion factor:		1.25	

Note: Cushion factor is based on permit engineer's judgments and used to give the applicant a cushion to the permit limit(s) to insure compliance.

Computations:

IPA	(VOC)			
	Uncontrolled	0.000714 Lpm*60 minutes/hr*0.264 gal/L*8.3372 lb/gal*0.79*1.25 =	0.093	lb/hr
	Controlled	0.093 lb/hr*(1-0) =	0.093	lb/hr
	Uncontrolled	0.093 lb/hr*24 hrs/day =	2	lb/day
	Controlled	2 lb/day*(1-0) =	2	lb/day
	Controlled	2 lb/day*7 days/wk*52 wks/yr =	814.05	lb/yr
H_2SO_4				
	Uncontrolled	From Table 2 - H_2SO_4 Emissions	0.06	lb/hr
	Controlled	0.063 lb/hr*(1-0.95) =	0.003	lb/hr
	With triple flow rate	0.003*3 =	0.0095	lb/hr
	Uncontrolled	0.06 lb/hr*24 hrs/day =	1.52	lb/day
	Controlled	1.52 lb/day*(1-0.95) =	0.076	lb/day
	Controlled	0.076 lb/day*7 days/wk*52 wks/yr =	27.59	lb/yr

BOE Etchant

Uncontrolled	0.0070093 Lpm*60 minutes/hr*0.264 gal/L*8.3372 lb/gal*1.2*1.25 =	1.112	lb/hr
Controlled	1.112 lb/day*(1-0.95) =	0.056	lb/hr
Uncontrolled	1.112 lb/hr*24 hrs/day =	26.679	lb/day
Controlled	26.679 lb/day*(1-0.95) =	1.334	lb/day
Controlled	1.334 lb/day*7 days/wk*52 wks/yr =	485.56	lb/yr

HF (in BOE Etchant) 11% BOE Etchant

Uncontrolled	1.112 lb/hr*0.11 =	0.12	lb/hr
Controlled	0.056 lb/hr*0.11 =	0.0061	lb/hr
Uncontrolled	26.679 lb/day*0.11 =	2.93	lb/day
Controlled	1.334 lb/day*0.11 =	0.15	lb/day
Controlled	485.56 lb/yr*0.11 =	53.41	lb/yr

PM/PM10 H_2SO_4 + HF

Uncontrolled	(0.063+0.12) lb/hr =	0.19	lb/hr
Controlled	(0.0032+0.00611) lb/hr =	0.009	lb/hr
Uncontrolled	(1.516+2.93) lb/day =	4.45	lb/day
Controlled	(0.076+0.15) lb/day =	0.22	lb/day
Controlled	(27.59+53.41) lb/yr =	81.00	lb/yr

	PM/PM10	VOC/IPA	H_2SO_4	HF
lb/hr				
Uncontr.	0.19	0.09	0.06	0.12
Contr.	0.01	0.09	0.0032	0.0061
lb/day				
Uncontr.	4.45	2	1.52	2.93
Contr.	0.22	2	0	0
lb/yr	81.00	814.05	27.59	53.41

*Note: This facility has a VOC cap of 1,800 lbs in any one calendar month. VOC emissions are calculated using the amount of solvent used (excluding salvage solvent).

Rule 1401 Analysis:

	Emissions		50 meters Screening Levels		HIs Contributions		Compliance
	lb/hr	lb/yr	lb/hr	lb/yr	Acute	Chronic	
H_2SO_4	0.003	27.59	0.12	86.70	0.03	0.32	
IPA	0.09	814.05	3.20	6.07E+05	0.03	0.001	
HF	0.0061	53.41	2.40E-01	-	0.03	-	Yes
-	-	-	-	-	-	-	
Total					0.08	0.32	

Limits:

IPA	0.000714 Lpm*60 minutes/hr*0.264 gal/L*24 hrs/day*30 days/month*1.25 =	10.19	gals/month
BOE	0.00701 Lpm*60 minutes/hr*0.264 gal/L*24 hrs/day*30 days/month*1.25 =	100.00	gals/month

RULE EVALUATION

Rule 212:

(c) (1): Emissions near a school

The equipment is not located within 1000 feet from the outer boundary of a school. (The nearest school is 3168 feet from the facility). The equipment is not subject to the public notice requirements of subdivision (c).

(c) (2): On-site emission increases exceeding the daily maximums

The emission increases do not exceed any of the daily maximums specified in subdivision (g) of this rule. The equipment is not subject to the public notice requirements of subdivision (c).

(c) (3): Emissions of toxic air contaminants

The emission increases are less than the screening levels: MICR is less than 1 in a million. The equipment is not subject to the public notice requirements of subdivision (c).

(g) Emission increases exceeding the daily maximums

The emission increases do not exceed any of the daily maximums specified in subdivision (g) of this rule. The equipment is not subject to the public notice requirements specified in subdivision (g).

Rule 401:

Based on experience with this type of equipment, compliance with this rule is expected.

Rule 402:

Nuisance problems due to the equipment operation are unlikely.

Rule 1164 - Semiconductor Manufacturing

Isopropyl alcohol is used in Rinsing Tank No. 6 of the wafer etching and stripping line. A small amount of alcohol is added to the tank (0.11 g/L) to reduce the surface tension of water to prevent it from adhering to the wafer surface. The operation is not a solvent cleaning, and therefore, is not subject to the requirements of Rule 1164.

Regulation XIII:

BACT:

PM:

The scrubber is BACT for the equipment.

VOC:

Deionized water with isopropyl alcohol rinse tank (Tank No. 6): Only a small amount of alcohol is added to the rinse water (0.11 g/L) to reduce the surface tension of water to prevent water from adhering to the wafer and creating water spots on the wafer surface when dry. No Achieved in Practice BACT for this operation.

Modeling:

Currently, no modeling is required for VOC. The PM10 emissions are lower than the limit in Table A-1 of Rule 1303. No further evaluation is necessary.

Offsets:

PM10:

The emission increase is less than 0.5 lb/day. No external offsets are required.

VOC:

The facility has a VOC facility limit of 1830 pounds in one calendar month. This limit is not expected to be exceeded with the addition of the proposed equipment. Reported VOC emissions from July 07 to August 08 show that VOC emissions from this facility were less than 1400 lbs/month and the proposed equipment will only add a maximum of 60 lbs VOC/month. In addition, this facility currently has 5 lbs/day of VOC ERCs which can be used if necessary

Rule 1401:

The emissions are less than the Screening Emission Levels of Rule 1401. Complies.

DISCUSSIONS

The venting rate for Tank No. 4 containing H2SO4 is 400 cfm. With that flow rate, PM10 emission from the permit unit is 0.22 lb/day, 34.1% of which, 0.076 lb/day, is from H2SO4 emission. Even if the flow rate is triple to 1,200 cfm, which is unlikely, PM10 emission is 0.37 (=0.076*3 + 0.15), still under 0.5 lb/day and the unit still passes Rule 1401 (Tier 1). Therefore, a limit on the flow rate is not necessary.

Based on information submitted with the applications and the above evaluation, it is determined that the equipment will operate in compliance with all the applicable rules and regulations of the District.

RECOMMENDATIONS:

APPLICATION NOS. 483796-7:

Issue Permits to Construct subject to the permit conditions as stated in Section D.

IPA Concentration
Tank No. 6

IPA		10	mL
Water		70	L
Sp. Gr. of IPA		0.79	
Density of water		1	g/mL
IPA in mixture	10 mL*0.79*1 g/mL =	7.9	g
Mixture volume	10 mL*10^-3 L/mL+70 L =	70.01	L
IPA content	7.9 g/70.01 L =	0.11	g/L
	0.11 g/L/119.83 [g/L]/[lb/gal]=	0.0009417	lb/gal