SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	Page	1 of 10
	A/N	491984
ENGINEERING & COMPLIANCE	Processed By	KH
	Checked By	
APPLICATION PROCESSING AND CALCULATIONS	Date	6/8/09

Applicant's Name: International Rectifier

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

Equipment Location: Same

Equipment Descriptions:

APPLICATION NO. 491984: Control: G1982/492808 (Current A/N 498038) P/O no P/C

STORAGE TANK T-506, WASTE WATER, 4' - 0"W. x 7' - 3"L. x 1' - 11"H., 375 GALLON CAPACITY.

APPLICATION NO. 491985: Control: G1982/492808 (Current A/N 498038) P/O no P/C

STORAGE TANK T-517, WASTE ACIDS, 4' - 0"DIA. x 5' - 7"L., 500 GALLON CAPACITY.

APPLICATION NO. 498032: Control: 498038/498039 P/C

WAFER ETCHING AND STRIPPING LINE NO. 2, AKRION GAMA SERIES, CONSISTING OF:

1. TANK NO. 1, ETCHING/MILLING, AMMONIUM HYDROXIDE/HYDROGEN PEROXIDE, 0' - 10.82"W. x 1' - 4.38"L. x 0' - 7.15"H., WITH ONE 400-W MEGASONIC CLEANER, AND ONE 3-KW HEATER.
2. TANK NO. 3, HYDROGEN FLUORIDE, 0' - 11.38"W. x 1' - 4.38"L. x 0' - 11.2"H., WITH ONE 8-KW HEATER.
3. TANK NO. 4, STRIPPING, HYDROGEN CHLORIDE, 0' - 9.5"W. x 1' - 4.37"L. x 0' - 11.13"H., UNHEATED.
4. TANK NO. 5, RINSING/DRYING, DEIONIZED WATER WITH ISOPROPYL ALCOHOL, 0' - 10"W. x 1' - 5"L. x 0' - 10"H., UNHEATED.
5. ASSOCIATED RINSE TANKS.

APPLICATION NO. 498033: Control: 498038 P/O

WAFER ETCHING AND STRIPPING LINE NO. 1, AKRION GAMA SERIES, CONSISTING OF:

1. TANK NO. 1, ETCHING/MILLING, HYDROGEN FLUORIDE/AMMONIUM FLUORIDE, 0' - 9.5"W. x 1' - 4.5"L. x 0' - 11.5"H., WITH ONE 3-KW HEATER.
2. TANK NO. 4, STRIPPING, SULFURIC ACID/HYDROGEN PEROXIDE, 0' - 9.5"W. x 1' - 4.5"L. x 0' - 11.5"H., WITH ONE 8-KW HEATER.
3. TANK NO. 6, RINSING/DRYING, DEIONIZED WATER WITH ISOPROPYL ALCOHOL, 0' - 9.5"W. x 1' - 4.5"L. x 0' - 11.5"H., WITH ONE 3-KW HEATER.
4. ASSOCIATED RINSE TANKS.

APPLICATION NO. 498034: Control: 498037 P/C

ALTERATION TO INTEGRATED CIRCUIT FABRICATION SYSTEM PERMIT TO OPERATE G1977 (A/N 492802) BY:

THE ADDITION OF:

- ONE PLASMA ETCHER, APPLIED MATERIALS.
- ONE PLASMA ETCHER, GASONICS.
- ONE PECVD MACHINE.

AND THE REMOVAL OF:

- SIX ATMOSPHEREIC DIFFUSION FURNACE BANKS.
- THREE LPCVD FURNACES.
- FOUR PLASMA ETCHERS, BRANSON.

- THREE ION IMPLANTERS, VARIAN.
- TWO ION IMPLANTERS, EATON.

APPLICATION NO. 498035: Control: 498037 P/C

ALTERATION TO WET CHEMICAL/SOLVENT CLEANING SYSTEM PERMIT TO OPERATE G1985 (A/N 492803) BY:
THE ADDITION OF:
- ONE WET PROCESS STATION, SPEC.
- ONE WET NITRIDE ETCH BENCH, SUBMICRPON SYSTEMS

THE REMOVAL OF:
- FIFTEEN ACID ETCH/CLEAN MACHINES, FSI MODEL SATURN & ZEUS.
- TWO QUARTZ CLEANING MACHINES.
- ONE SOLVENT BENCH

APPLICATION NO. 498036: Control: 498039 P/C

ALTERATION TO PHOTOLITHOGRAPHIC SYSTEM PERMIT TO OPERATE G1979 (A/N 492805) BY:
THE ADDITION OF:
- ONE PHOTORESIST MACHINE, RHETECH, MODEL CLASS 1
- ONE PHOTORESIST MACHINE, RHETECH, MODEL SST-260

AND THE REMOVAL OF:
- TWELVE PHOTOLITHOGRAPHIC TRACKS, SVG, MODEL 86 SERIES

APPLICATION NO. 498037: Srubbers 1 & 2 P/C

ALTERATION TO AIR POLLUTION CONTROL SYSTEM PERMIT TO OPERATE G1980 (A/N 492806) BY:
THE REMOVAL OF:
- TWO BURN BOXES

THE VENTING ADDITION OF :
- ONE ACID WET BENCH
- TWO MISCELLANEOUS CHEMICAL STORAGE TANKS

THE VENTING REMOVAL OF:
- SIX ION IMPLANTERS
- NINE DIFFUSION FURNACES
- TWELVE GAS CABINETS
- TWO PLASMA ETCHERS
- FIFTEEN ACID ETCHERS
- TWO QUARTZ CLEANING MACHINES
- ONE WAFER ETCHING AND STRIPPING LINE

APPLICATION NO. 498038: Srubbers 101 & 102 P/C

ALTERATION TO AIR POLLUTION CONTROL SYSTEM PERMIT TO CONSTRUCT A/N 483796 BY:
THE VENTING ADDITION OF :
- THREE GAS CABINET PURGE LINES
- TWO WAFER ETCHING AND STRIPPING LINES
- ONE WASTE ACID STORAGE TANK
- ONE WASTE WATER STORAGE TANK

APPLICATION NO. 498039: Zink Oxidizer P/C

ALTERATION TO AIR POLLUTION CONTROL SYSTEM PERMIT TO OPERATE G1983 (A/N 492810) BY: THE VENTING ADDITION OF :

- FOUR PHOTOTRACKS.
- ONE WAFER ETCHING AND STRIPPING LINE
- TWO PHOTORESIST STRIPPING MACHINES
- TWO SOLVENT BENCHES

APPLICATION NO. 498040: Control: 497037 P/C

STORAGE TANK T-121, PRE-MIX PAE, 7' - 0"DIA. x 6' - 10"L., 2,000 GALLON CAPACITY.

APPLICATION NO. 498041: Control: None P/O no P/C

STORAGE TANK T-411, SCALE INHIBITOR, 1' - 3"DIA. x 1' - 10"H., 20 GALLON CAPACITY.

APPLICATION NO. 498761: Previous: 460734 Control: 498037 P/O

STORAGE TANK T-14, WASTE ACIDS, 10' - 0"DIA. x 11' - 6"L., 5,728 GALLON CAPACITY, WITH TWO 10 HP TRANSFER PUMPS.

HISTORY:	Dates	A/Ns.
Application(s) received on:	10/21/08	491984-5
	4/22/09	498032-41
	5/13/09	498761

		Equipment associated with A/Ns.
Equipment installed/modified:	Yes	491984-5, 498033, 498041, 498761
	No	498032, 498034-40

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

	RECLAIM	Title V
Facility type:	No	Yes

A/Ns.	Reasons for filing
491984-5, 498041	Permit to Operate without Permit to Construct (PO no P/C)
498032, 498040	Permit to Construct new equipment (P/C).
498033, 498761	Change of permit conditions (C/C).
498034-9	Proposed modification (Mod P/C).

Below is a brief explanation. Please see consultant's submission for more details.

		Previous			
A/Ns.	Descriptions	A/Ns.	Permits	Processing Types	Remarks
491984	Waste Water Tank T-506		None	PO no P/C	
491985	Waste Water Tank T-517		None	PO no P/C	
498032	Wafer Etching and Stripping Line 2		None	P/C	
498033	Wafer Etching and Stripping Line 1	483797	P/C	C/C	Increase etchant throughput
498034	IC Manufacturing	492802	G1977	Mod P/C	Add/remove tools, add more used chemicals
498035	Wet Chemical/Solvent	492803	G1985	Mod P/C	Add/remove tools
498036	Photolithographic System	492805	G1979	Mod P/C	Add/remove tools
498037	Scrubbers 1 & 2	492806	G1980	Mod P/C	Add/remove venting points
498038	Scrubbers 101 & 102	492808	G1982	Mod P/C	Add venting points
498039	Zink Oxidizer	492810	G1983	Mod P/C	Add venting points
498040	Mixed Acids Tank T-121		None	P/C	
498041	Scale Inhibitor Tank T-411		None	PO no P/C	No control
498761	Waste Acids Tank T-14	460734	G1999	C/C	Add HCl, a stored chemical

A/N 498039: Zink Oxidizer

There are 2 fabrication areas (Fab 1 and Fab 2) in the facility. McGill oxidizer (existing permit G1981, A/N 492807) controls VOC emissions from equipment in Fab 1, and Zink oxidizer (Current A/N 498039) controls VOC emissions from Fab 2. To save fuel, the applicant proposes to also connect Fab 1 to Zink oxidizer in addition to the existing McGill oxidizer so that VOC emissions from Fab 1can also be vented to Zink oxidizer for control.

A/N 498037: Srubbers 1 & 2

The venting removal: Except for the wafer etching and stripping line (Current A/N 498032) which was listed as a venting point of this APC system by mistake (it was supposed to be listed under the APC system A/N 498038 Scrubbers 101 & 102, it is now listed with the correct APC system), the removal of other venting points is due to the removal of those tools.

The removal of two burn boxes: These burn boxes are removed along with the removal of the tools it vents.

PROCESS DESCRIPTION

The equipment is for semiconductor device manufacturing. Oxidizers or carbon adsorbers are used for VOC control and wet scrubbers are used for PM control. In addition, resin adsorbers are used to control arsine emissions from ion implanters that use arsine.

CALCULATIONS

Storage tanks:

TANK 4.0.9d is used to calculate emissions from storage tanks. The vapor pressures are calculated by adding all individual vapor pressure of each component in the mixture.

Emissions from wet chemicals are calculated using Preferred and Alternate Methods for Estimating Air Emissions from Semiconductor Manufacturing, Volume II: Chapter 6 (Prepared by Eastern Research Group, Inc. for Point Sources Committee of the Emission Inventory Improvement Program and EPA's Emission Factor and Inventory Group).

Emissions from IC manufacturing are based on material balances.

All calculations are in attachments to this evaluation. Below is a summary of calculated emissions.

A/N 491984 T-506

	PM10	
	Uncont.	Controlled
lb/hr	0.0003	0.00002
lb/day	0.01	0.0004
lb/yr		0.13

A/N 491985 T-517

	PM10	
	Uncont.	Controlled
lb/hr	4.49E-06	2.24E-07
lb/day	0.0001	0.00001
lb/yr		0.002

A/N 498032 Etch/Strip line

	PM10		VOC	
	Uncont.	Controlled	Uncont.	Controlled
lb/hr	0.0002	1.14E-05	0.09	0.001
lb/day	0.005	0.00027	2.18	0.03
lb/yr		0.10		10.30

A/N 498033 Etch/Strip line

	PM10		VOC	
	Uncont.	Controlled	Uncont.	Controlled
lb/hr	0.01	6.80E-04	0.09	0.09
lb/day	0.33	0.02	2.18	2.18
lb/yr		5.94		792.32

A/N 498034 IC Manufacturing

	PM10	
	Uncont.	Controlled
lb/hr	0.24	0.01
lb/day	5.7943	0.29
lb/yr		106.22

A/N 498035 Wet/Solvent

	PM10		VOC	
	Uncont.	Controlled	Uncont.	Controlled
lb/hr	6.41	0.08	0.23	2.32E-03
lb/day	153.84	1.92000	5.5783	0.06
lb/yr		698.88		20.30

A/N 498036 Photoresist

	VOC	
	Uncont.	Controlled
lb/hr	5.61	0.28
lb/day	134.65	6.73
lb/yr		2450.61

A/N 498039 Oxidizer

	ROG	NOx	SOx	CO	PM10
lb/hr	0.03	0.24	0	0.09	0.01
lb/day	0.72	5.76	0	2.16	0.24
lb/yr	109	1036	12	411	87.36

A/N 498040 T-121

	PM10		VOC	
	Uncont.	Controlled	Uncont.	Controlled
lb/hr	4.53E-06	2.27E-07	6.28E-04	3.14E-05
lb/day	0.0001	0.00001	0.02	0.0008
lb/yr		0.002		0.27

A/N 498041 T-411

	PM10	
	Uncont.	Controlled
lb/hr	1.42E-07	1.42E-07
lb/day	0.000003	0.000003
lb/yr		0.001

A/N 498761 T-14

	PM10		VOC	
	Uncont.	Controlled	Uncont.	Controlled
lb/hr	1.09E-03	5.47E-05	1.46E-01	7.30E-03
lb/day	0.03	0.001	3.51	0.18
lb/yr		0.48		63.82

Table 1

Project PM10 Emission Increase

Applications		PM10 Emissions, lb/day			Permit Types	Remarks
Current	Previous	Current	Previous	Increases		
491984	None	0.0004	-	0.0004	P/O no P/C	
491985	None	0.00001	-	0.00001	P/O no P/C	
498032	None	0.0003	-	0.0003	P/C	
498033	483797	0.02	0.02	-	P/O	See Note 1 below
498034	492802	0.29	0.26	0.03	P/C	
498035	492803	1.92	1.92	-	P/C	
498036	492805	-	-	-	P/C	VOC source
498040	None	0.000005	-	0.000005	P/C	
498041	None	0.000003	-	0.000003	P/O no P/C	
498761	460734	0.001	0.001	-	P/O	See Note 2 below
Total project impact				0.03		

Note 1: Previous PM10 emissions were overestimated by assuming that all HNO_3 in the tank would be evaporated and become PM emissions. If previous emissions were calculated using the same method as for the current emissions, there would be no change in the PM10 emission for this permit unit.

Note 2: There is no actual PM10 emission decrease. Previous emissions were calculated using Raoult's Law to estimate the partial vapor pressures. That resulted in higher PM10 but lower VOC (acetic acid) emissions. Vapor pressure of each component is used for the current calculations which give lower PM10 but higher VOC (acetic acid) emissions.

Table 2

Project ROG Emission Increase

Applications		ROG Emissions, lb/day			Permit Types	Remarks
Current	Previous	Current	Previous	Increases		
491984	None	-	-	-	P/O no P/C	PM source
491985	None	-	-	-	P/O no P/C	PM source
498032	None	0.03	-	0.03	P/C	
498033	483797	2.2	2.2	-	P/O	
498034	492802	-	-	-	P/C	PM source
498035	492803	0.06	0.06	-	P/C	
498036	492805	6.73	6.73	-	P/C	
498040	None	0.0008	-	0.0008	P/C	
498041	None	-	-	-	P/O no P/C	PM source
498761	460734	0.18	0.18	-	P/O	See Note 3
Total project impact				0.03		

Note 3: There is no actual VOC emission increase. Previous emissions were calculated using Raoult's Law to estimate the partial vapor pressures. That resulted in higher PM10 but lower VOC (acetic acid) emissions. Vapor pressure of each component is used for the current calculations which give lower PM10 but higher VOC (acetic acid) emissions.

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, Mountain View Christian School, is 3168 feet from the facility). The equipment is not subject to the public notice requirements of subdivision (c).

River Springs Charter School, located at 43466 Business Park Dr., CA 92590, is listed 0.1 mile from the facility. However, a check on the maps shows that the distance is actually more than 0.3 mile. Also, further investigation reveals that River Springs Charter School, located at 43466 Business Park Dr., CA 92590 is only an administration building, and there is no class held at the location.

(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

Results of Tier 1 analysis show that MICR is less 1 in a million and HIs are less than 1. 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 - Visible Emissions:

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

Rule 402 - Nuisances:

Nuisance problems due to the equipment operation are unlikely.

Rules 407/409:

This equipment is fired with natural gas. Compliance is expected.

Rule 1164 - Semiconductor Manufacturing:

VOC emissions from solvent benches and photoresist operations are controlled by over 90%. Complies. Isopropyl alcohol is used in Rinsing Tank No. 6 of the wafer etching and stripping lines 1 and 2. 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:

A/N 498041: Tank T-411

The maximum daily emissions are less than 1 lb. No BACT analysis is required.

A/Ns 498033:

There is no emission increase because of the change of conditions. No BACT analysis is required. Previous PM10 emissions were overestimated by assuming that all HNO_3 in the tank would be evaporated and become PM emissions. If previous emissions were calculated using the same method as for the current emissions, there would be no change in the PM10 emission for this permit unit.

A/Ns 491984-5, 498032, 498034-6, 498040-1, 498761:

Scrubbers for PM control and afterburners for VOC control are BACT for the equipment.

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:

CO:
CO is in attainment. See Rule 1703 evaluation.

VOC:
The facility has a VOC facility limit of 1,830 pounds in one calendar month. This limit is not expected to be exceeded with the modification and change of conditions. Reported VOC emissions from July 07 to August 08 show that VOC emissions from this facility were less than 1,400 lbs/month.
Per AQMD's January 9, 2009 Permit Moratorium Fact Sheet, since the facility has an NSR cap on VOC and the modification and change of conditions will not increase emissions beyond the cap, the permit can be issued without requiring VOC ERCs to offset the VOC emission increase due to the modification or change of conditions.

NOx/SOx
There is no emission increase from the project. No external offsets are required.

PM10
Project maximum emission increase is less than 0.5 pound per day. Per AQMD's January 9, 2009 Permit Moratorium Fact Sheet, no PM10 ERCs are required.

Rule 1401:

		Rule 1401 Chemicals
APPLICATION NO. 491984:	T-506	HF, H2SO4, HCl, NH3, HNO3, H3PO4
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 491985:	T-517	HF, HNO3
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498032:	Etch/Strip line	NH3, HF, HCl, IPA
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498033:	Etch/Strip line	HF, HCl, IPA
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498034:	IC Manufacturing	AsH3, PH3, Cl2
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498035:	Wet/Solvent	IPA, Xylene
There are no emission increases of toxic air contaminants due to the modification.		
APPLICATION NO. 498036:	Photoresist	Cresol
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498037:	Scrubber	
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498038:	Scrubber	
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498039:	Oxidizer	
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498040:	T-121	HNO3, H3PO4
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498041:	T-411	HCl, H2SO4, H3PO4
MICR is less than 1 in a million and HIs are less than 1. Complies.		
APPLICATION NO. 498761:	T-14	HNO3, H3PO4, HF, H2SO4, HCl
MICR is less than 1 in a million and HIs are less than 1. Complies.		

Rule 1703 - PSD Analysis:
There is no CO emission increase due the modification, all requirements of Regulation XVII - Prevention of Significant Deterioration - are not applicable.

DISCUSSIONS

Zink oxidizer load: The company's analysis on the oxidizer load shows that Zink oxidizer has enough capacity for both Fab 1 and Fab 2 equipment (See Ignacio Verzuco's email to Kien Huynh dated May 15, 2009).

Wafer Etching and Stripping line A/N 498033: With the use of method described in Preferred and Alternate Methods for Estimating Air Emissions from Semiconductor Manufacturing, Volume II: Chapter 6 (Prepared by Eastern Research Group, Inc. for Point Sources Committee of the Emission Inventory Improvement Program and EPA's Emission Factor and Inventory Group) for process tanks, no BOE etchant limit is necessary and it will be removed.

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

RECOMMENDATIONS:

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

ATTACHMENT
Waste Water
T-506
Rectangular

Control:	G1982/492808 (Current A/N 498038)			A/N	491984
Previous:	None				
Dimensions:	ft	inches	gals		
W	4	0	416		
L	7	3		Convert to	
H	1	11		Horizontal	
Tank diameter (Used for calculations)*			D	3.1	ft
Tank length			L	7.25	ft
*Diameter of a circle whose area is equal to the surface cross section area.					
Working volume				416	gals
Desired throughput:				22,075,200	gals/yr
Turnovers per year				53,092	
Month selected for emission calculations:				July	
Number of days in July:				31	
Total pressure:				0.37	psia
Maximum emissions**					
Working				49.73	lb/month
Breathing				0.05	lb/month
Note: **From TANK 4.0.9d Emissions Report					
Weight% of acid in vapor:				0.47%	
Control efficiency:				95%	
Operating Schedule:					
hrs/day				24	hrs/day
days/wk				7	days/wk
weeks/yr				52	wks/yr
PM10 in PM				96%	

Calculations:

Emissions:

Total emission (working + breathing), lb/month

(49.73 + 0.05) lb/month = 49.78 lb/month

PM/Acids		
lb/day		
Uncontrolled	49.78 lb/month/31 days/month*0.0047 =	0.008 lb/day
Controlled	0.008 lb/day*(1-0.95) =	0.0004 lb/day
lb/hr		
Uncontrolled	0.008 lb/day/24 hrs/day =	0.0003 lb/hr
Controlled	0.0004 lb/day/24 hrs/day =	0.00002 lb/hr
lb/yr	0.0004 lb/day*7 days/wk*52 wks/yr =	0.14 lb/yr

PM10

lb/day

Uncontrolled	0.008 lb/day*0.96 =	0.007 lb/day
Controlled	0.0004 lb/day*0.96 =	0.0004 lb/day

lb/hr

Uncontrolled	0.0003 lb/day*0.96 =	0.0003 lb/hr
Controlled	0.00002 lb/day*0.96 =	0.000015 lb/hr
lb/yr	0.14 lb/yr*0.96 =	0.13 lb/yr

	PM	PM10	HF
lb/hr			
Uncontr.	0.0003	0.0003	0.0003
Contr.	0.00002	0.00002	0.00002
lb/day			
Uncontr.	0.008	0.007	0.008
Contr.	0.0004	0.0004	0.0004
lb/yr (Contr.)	0.14	0.13	0.14

Monthly throughput limit: 416 gals*53092 times/yr/12 months/yr = 1,839,600 gals/month

TIER 2 SCREENING RISK ASSESSMENT

Application deemed complete date: 10/21/08

A/N: 491984
Fac: International Rectifier

Stack Data

		Units
Hour/Day	24	hr/day
Day/Week	7	day/wk
Week/Year	52	wk/yr
Emission Units	lb/hr	
		0
Control Efficiency	0.00	fraction range 0-1
Does source have TBACT?	NO	
Point or Volume Source ?	P	P or V
Stack Height or Building Height	10	feet
Area (For Volume Source Only)		ft^2
Distance-Residential	1000	meters
Distance-Commercial	50	meters
Meteorological Station	Norco	

Source Type:	O - Other	
Screening Mode	NO	

Emission Units	lb/hr	
Source output capacity	n/a	n/a

FOR USER-DEFINED CHEMICALS AND EMISSIONS, FILL IN THE TABLE BELOW

USER DEFINED CHEMICALS AND EMISSIONS				R1 - Uncontrolled	Efficiency Factor	R2 - Controlled
Code	Compound	lb/hr	Molecular Weight	lbs/hr	Fraction range 0-1	lbs/hr
s8	Sulfuric acid and oleum	1.57E-05	98.08	1.57196E-05		1.57196E-05
n10	Nitric acid	1.57E-05	63.02	1.57196E-05		1.57196E-05
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		

TIER 1 SCREENING RISK ASSESSMENT

Receptor Distance (actual)	50
Receptor Distance (for X/Q lookup)	50

Tier 1 Results	
Cancer/Chronic ASI	**Acute ASI**
1.58E-03	3.14E-04
PASSED	PASSED

APPLICATION SCREENING INDEX CALCULATION

Compound	Average Annual Emission Rate (lbs/yr)	Max Hourly Emission Rate (lbs/hr)	Cancer / Chronic Pollutant Screening Level (lbs/yr)	Acute Pollutant Screening Level (lbs/hr)	Cancer / Chronic Pollutant Screening Index (PSI)	Acute Pollutant Screening Index (PSI)
Sulfuric acid and oleum	1.37E-01	1.57E-05	8.67E+01	1.20E-01	1.58E-03	1.31E-04
Nitric acid	1.37E-01	1.57E-05		8.59E-02		1.83E-04
TOTAL (APPLICATION SCREENING INDEX)					**1.58E-03**	**3.14E-04**

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-506
City:	
State:	
Company:	
Type of Tank:	Horizontal Tank
Description:	

Tank Dimensions

Shell Length (ft):	7.25
Diameter (ft):	3.10
Volume (gallons):	416.00
Turnovers:	53,065.38
Net Throughput(gal/yr):	22,075,200.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Long Beach, California (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-506 - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Press Calculations
Waste Water	Jul	71.26	65.04	77.47	64.33	0.3700	0.3700	0.3700	18.3500			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-506 - Horizontal Tank

Month:	January	February	March	April	May	June	July	August	September	Oct
Standing Losses (lb):							0.0533			
Vapor Space Volume (cu ft):							34.8539			
Vapor Density (lb/cu ft):							0.0012			
Vapor Space Expansion Factor:							0.0426			
Vented Vapor Saturation Factor:							0.9705			
Tank Vapor Space Volume:										
Vapor Space Volume (cu ft):							34.8539			
Tank Diameter (ft):							3.1000			
Effective Diameter (ft):							5.3508			
Vapor Space Outage (ft):							1.5500			
Tank Shell Length (ft):							7.2500			
Vapor Density										
Vapor Density (lb/cu ft):							0.0012			
Vapor Molecular Weight (lb/lb-mole):							18.3500			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Daily Avg. Liquid Surface Temp. (deg. R):							530.9285			
Daily Average Ambient Temp. (deg. F):							73.0500			
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731			
Liquid Bulk Temperature (deg. R):							523.9983			
Tank Paint Solar Absorptance (Shell):							0.1700			
Daily Total Solar Insulation Factor (Btu/sqft day):							2,302.7457			
Vapor Space Expansion Factor										
Vapor Space Expansion Factor:							0.0426			
Daily Vapor Temperature Range (deg. R):							24.8571			
Daily Vapor Pressure Range (psia):							0.0000			
Breather Vent Press. Setting Range(psia):							0.0600			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.3700			
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.3700			
Daily Avg. Liquid Surface Temp. (deg R):							530.9285			
Daily Min. Liquid Surface Temp. (deg R):							524.7142			
Daily Max. Liquid Surface Temp. (deg R):							537.1427			
Daily Ambient Temp. Range (deg. R):							19.3000			
Vented Vapor Saturation Factor										
Vented Vapor Saturation Factor:							0.9705			
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):							0.3700			
Vapor Space Outage (ft):							1.5500			
Working Losses (lb):							49.7315			
Vapor Molecular Weight (lb/lb-mole):							18.3500			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Net Throughput (gal/mo.):							1,839,600.0000			
Annual Turnovers:							53,065.3846			
Turnover Factor:							0.1672			
Tank Diameter (ft):							3.1000			
Working Loss Product Factor:							1.0000			
Total Losses (lb):							49.7847			

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

T-506 - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Waste Water	49.73	0.05	49.78

Mixture Vapor Pressure

Waste Water

T-506

Previous: None A/N 491984

Operating temperature 70 F

Compounds	Amount, lb	Solution wt%	Molecular Weight	VP* mmHg	moles fraction	Weight Contribution**	Wt% w/ water	Wt% w/o water
Columns	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HF	1	1%	20.01	0.08	0.004	0.08	0.5%	100%
Water	99	99%	18.02	18.82	0.996	17.94	99.5%	-
	100	100%		18.90	1.000	18.02	100%	100%
			psia	0.37		w/o water	0.47%	

Mixture MW

If molecular weight of HF is used: 18.02

If molecular weight of H_2SO_4 is used: 18.35

Desired throughput 1,839,600 gals/month

22,075,200 gals/yr

Assumption: Effects of interactions between acids are minimum.

*Vapor pressure of each component in aqueous solution (as if it is the only component in water) is used.

For water, vapor pressure of pure water is used.

For HF, the vapor pressure is vapor pressure of 5% HF solution

The tank contains HCl, HNO_3, H_3PO_4, HF, H_2SO_4, and NH_4OH. For vapor pressure calculations, we use HF, since it has higher vapor pressure than other acids.

Notes:

- At a low pH level, NH_4OH is neutralized by the acids in the waste water. Therefore, NH_3 emission is minimal, if any.
- To be conservative, we will use MW = 18.35

ATTACHMENT
Waste Water
T-517
Vertical

Control:	G1982/492808 (Current A/N 498038)			A/N 491985
Previous:	None			
Given:				
Tank dimensions:	ft	in		
DIA.	4	0 OK	525 gallons	4.00 ft
L	5	7		5.58 ft
Annual throughput:				239,075 gallons
Month selected for emission calculations:				July
Number of days in the selected month:				31
Total vapor pressure:				0.37 psia
Maximum month emission*				
Working				0.71 lb/month
Breathing				0.03 lb/month
Note: *From TANK 4.0.9d Emissions Report				
Control efficiency:				
Acid PM				95%
Operating Schedule:				
hrs/day				24 hrs/day
days/wk				7 days/wk
weeks/yr				52 wks/yr
PM10 in Total PM:				96%
Weight% of all acids in vapor:				0.47%
HF in PM				100%
HNO_3 in PM				-
Calculations				
Tank volume:				520 gallons
Turnovers per year				460
Emissions:				
Total emission (working + breathing), lb/month			(0.71 + 0.03) lb/month =	0.74 lb/month
PM/Acids				
lb/day				
Uncontrolled			0.74 lb/month/31 days/month*0.0047 =	0.0001 lb/day
Controlled			0.0001 lb/day*(1-0.95) =	0.00001 lb/day
lb/hr				
Uncontrolled			0.0001 lb/day/24 hrs/day =	0.000005 lb/hr
Controlled			0.00001 lb/day/24 hrs/day =	0.0000002 lb/hr
lb/yr			0.00001 lb/day*7 days/wk*52 wks/yr =	0.002 lb/yr

ATTACHMENT
Waste Water
T-517

PM10
lb/day
Uncontrolled 0.0001 lb/day*0.96 = 0.0001 lb/day
Controlled 0.00001 lb/day*0.96 = 0.00001 lb/day
lb/hr
Uncontrolled 0.000005 lb/day*0.96 = 0.000004 lb/hr
Controlled 0.0000002 lb/day*0.96 = 0.0000002 lb/hr
lb/yr 0.00001 lb/day*7 days/wk*52 wks/yr = 0.002 lb/yr

HF:
lb/day
Uncontrolled 0.0001 lb/day*1 = 0.0001 lb/day
Controlled 0.00001 lb/day*1 = 0.00001 lb/day
lb/hr
Uncontrolled 0.000005 lb/hr*1 = 0.000005 lb/hr
Controlled 0.0000002 lb/hr*1 = 0.0000002 lb/hr
lb/yr 0.002 lb/yr*1 = 0.002 lb/yr

	PM	PM10	HF	HNO_3
lb/hr				
Uncontr.	0.000005	0.000004	0.000005	-
Contr.	0.0000002	0.0000002	0.0000002	-
lb/day				
Uncontr.	0.000	0.0001	0.0001	-
Contr.	0.00001	0.00001	0.00001	-
lb/yr (Contr.)		0.002	0.002	-

Throughput limit: 239075 gals/yr/12 months/yr = 19,923 gals/month

TIER 2 SCREENING RISK ASSESSMENT

Application deemed complete date: 10/21/08

A/N: 491985
Fac: International Rectifier

Stack Data

		Units
Hour/Day	24	hr/day
Day/Week	7	day/wk
Week/Year	52	wk/yr
Emission Units	lb/hr	
		0
Control Efficiency	0.00	fraction range 0-1
Does source have TBACT?	NO	
Point or Volume Source ?	P	P or V
Stack Height or Building Height	10	feet
Area (For Volume Source Only)		ft^2
Distance-Residential	1000	meters
Distance-Commercial	50	meters
Meteorological Station	Norco	

Source Type:	O - Other	
Screening Mode	NO	

Emission Units	lb/hr	
Source output capacity	n/a	n/a

FOR USER-DEFINED CHEMICALS AND EMISSIONS, FILL IN THE TABLE BELOW

USER DEFINED CHEMICALS AND EMISSIONS				R1 - Uncontrolled	Efficiency Factor	R2 - Controlled
Code	Compound	lb/hr	Molecular Weight	lbs/hr	Fraction range 0-1	lbs/hr
f2	Hydrogen fluoride (hydrofluoric acid)	2.34E-07	20	2.33678E-07		2.33678E-07
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		

TIER 1 SCREENING RISK ASSESSMENT

Receptor Distance (actual)	50
Receptor Distance (for X/Q lookup)	50

Tier 1 Results	
Cancer/Chronic ASI	**Acute ASI**
	9.74E-07
PASSED	PASSED

APPLICATION SCREENING INDEX CALCULATION

Compound	Average Annual Emission Rate (lbs/yr)	Max Hourly Emission Rate (lbs/hr)	Cancer / Chronic Pollutant Screening Level (lbs/yr)	Acute Pollutant Screening Level (lbs/hr)	Cancer / Chronic Pollutant Screening Index (PSI)	Acute Pollutant Screening Index (PSI)
Hydrogen fluoride (hydrofluoric acid)	2.04E-03	2.34E-07		2.40E-01		9.74E-07

TOTAL (APPLICATION SCREENING INDEX) **9.74E-07**

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	T-517
City:	
State:	
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	

Tank Dimensions

Shell Height (ft):	5.58
Diameter (ft):	4.00
Liquid Height (ft) :	5.00
Avg. Liquid Height (ft):	4.00
Volume (gallons):	470.02
Turnovers:	508.65
Net Throughput(gal/yr):	239,075.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Dome
Height (ft)	0.00
Radius (ft) (Dome Roof)	0.00

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Long Beach, California (Avg Atmospheric Pressure = 14.7 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

T-517 - Vertical Fixed Roof Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Press Calculations
Wsate Water	Jul	71.26	65.04	77.47	64.33	0.3700	0.3700	0.3700	18.0200			0.00	

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

T-517 - Vertical Fixed Roof Tank

Month:	January	February	March	April	May	June	July	August	September	Oct
Standing Losses (lb):							0.0348			
Vapor Space Volume (cu ft):							23.3026			
Vapor Density (lb/cu ft):							0.0012			
Vapor Space Expansion Factor:							0.0426			
Vented Vapor Saturation Factor:							0.9649			
Tank Vapor Space Volume:										
Vapor Space Volume (cu ft):							23.3026			
Tank Diameter (ft):							4.0000			
Vapor Space Outage (ft):							1.8544			
Tank Shell Height (ft):							5.5800			
Average Liquid Height (ft):							4.0000			
Roof Outage (ft):							0.2744			
Roof Outage (Dome Roof)										
Roof Outage (ft):							0.2744			
Dome Radius (ft):							4.0000			
Shell Radius (ft):							2.0000			
Vapor Density										
Vapor Density (lb/cu ft):							0.0012			
Vapor Molecular Weight (lb/lb-mole):							18.0200			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Daily Avg. Liquid Surface Temp. (deg. R):							530.9285			
Daily Average Ambient Temp. (deg. F):							73.0500			
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):							10.731			
Liquid Bulk Temperature (deg. R):							523.9983			
Tank Paint Solar Absorptance (Shell):							0.1700			
Tank Paint Solar Absorptance (Roof):							0.1700			
Daily Total Solar Insulation Factor (Btu/sqft day):							2,302.7457			
Vapor Space Expansion Factor										
Vapor Space Expansion Factor:							0.0426			
Daily Vapor Temperature Range (deg. R):							24.8571			
Daily Vapor Pressure Range (psia):							0.0000			
Breather Vent Press. Setting Range(psia):							0.0600			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):							0.3700			
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):							0.3700			
Daily Avg. Liquid Surface Temp. (deg R):							530.9285			
Daily Min. Liquid Surface Temp. (deg R):							524.7142			
Daily Max. Liquid Surface Temp. (deg R):							537.1427			
Daily Ambient Temp. Range (deg. R):							19.3000			
Vented Vapor Saturation Factor										
Vented Vapor Saturation Factor:							0.9649			
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):							0.3700			
Vapor Space Outage (ft):							1.8544			
Working Losses (lb):							0.7137			
Vapor Molecular Weight (lb/lb-mole):							18.0200			
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):							0.3700			
Net Throughput (gal/mo.):							19,922.9167			
Annual Turnovers:							508.6524			
Turnover Factor:							0.2256			
Maximum Liquid Volume (gal):							470.0165			
Maximum Liquid Height (ft):							5.0000			
Tank Diameter (ft):							4.0000			
Working Loss Product Factor:							1.0000			
Total Losses (lb):							0.7484			

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: July

T-517 - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Wsate Water	0.71	0.03	0.75

Mixture Vapor Pressure

Waste Water

T-517

Previous: None A/N: 491985

Operating temperature 70 F

Compounds	Amount, lb	Solution wt%*	Molecular Weight	VP* mmHg	moles fraction	Weight Contribution*	wt% w/ water	wt% w/o water
Columns	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HNO_3	1.5	1.5%	63.01	-	-	-	-	-
HF	1.3	1.3%	20.01	0.08	0.0042	0.08	0.5%	100.00%
H_2O	97.2	97.2%	18.02	18.8	0.9958	17.94	99.5%	-
	100.0	100%		18.90	1.00	18.02	100%	100.00%
			psia	0.37		W/o water	0.47%	

Desired throughput 19,923 gals/month

239,075 gals/yr

Assumption: Effects of interactions between acids are minimum.

*Vapor pressure of each component in aqueous solution (as if it is the only component in water) is used.

For water, vapor pressure of pure water is used.

For HF, the vapor pressure is vapor pressure of 5% HF solution

ATTACHMENT
Wafer Etching and Stripping Line 2

Control: 498038/498039 A/N 498032
Previous: None
Given:

Wind speed U (Applicant's data) 1.7 mph
1.7 mph*5280 ft/mile/60 minutes/hr = 150 fpm
150 ftm/60 seconds/minute = 2.493 ft/sec

Gas-phase mass transfer coefficient K, ft/sec[(1)]

$K=0.00438*U^{0.78}*(18/MW)^{1/3}$

Where: MW = Molecular weight, lb/lbmole

Evaporation rate W, lb/sec[(1)]

$W = (MW*K*A*VP)/(R*(T+460))$

Where: A = Tank surface area, ft^2
VP = Vapor pressure of chemical
R = Ideal gas constant
= 10.73 $psia*ft^3/^oR*lbmole$
T = Operating temperature, F

[(1)] Source: Preferred and Alternate Methods for Estimating Air Emissions from Semiconductor Manufacturing, Volume II: Chapter 6 (Prepared by Eastern Research Group, Inc. for Point Sources Committee of the Emission Inventory Improvement Program and EPA's Emission Factor and Inventory Group).

Wet scrubber control efficiency		
For acids	95%	
NH_3	0%	
Oxidizer control efficiency:	98.7%	
Ozone usage:		
Ozone content	250	g/m3
250 g/m3/1000 L/m3 =	0.25	g/L
Ozone rate	2.5	L/min
Ozone time used	20	minutes/hr
Ozone molecular weight	48	lb/lbmole
Molar volume	379.49	ft^3/lbmole
Exhaust flow rate	60,000	cfm
Conversion factor from gram to lb:	0.002206	lb/g
Conversion factor from μ/m^3, measured at 75 F, to ppmv for ozone:	0.00051	ppmv/[μ/m
Operating schedule:		
hrs/day	24	hrs/day
days/wk	7	days/wk
wks/yr	52	wks/yr
PM10 factor:	96%	

Tank 1:

Dimensions:	ft	inches
W	0	10.82
L	1	4.38
H	0	7.15

Chemical NH_3 4.3%

Molecular weight: 17.03 lb/lbmole

Operating temperature: 70 C 158 F

Vapor pressure: 0.20 psia

Surface area: (0 ft+10.82 in/12 in/ft)*(1 ft+4.38 in/12 in/ft) = 1.23 ft^2

Computations:

Gas-phase mass transfer coefficient K:

0.00438*2.493 ft/sec^0.78*(18/17.03 lb/lbmole)^(1/3) = 0.0091 ft/sec

NH_3:

Emission rates:

lb/sec (Uncontrolled)

17.03 lb/lbmole*0.0091 ft/sec*1.23 ft2*0.2 psia/(10.73 psia*ft3/oR*lbmole*(158+460)) = 0.0000058 lb/sec

lb/hr

Uncontr. 0.0000058 lb/sec*3600 sec/hr = 0.0207 lb/hr

Controlled: 0.0207 lb/hr*(1-0) = 0.0207 lb/hr

lb/day

Uncontr. 0.0207 lb/hr*24 hrs/day = 0.50 lb/day

Controlled: 0.02071 lb/hr*24 hrs/day = 0.50 lb/day

lb/yr 0.5 lb/day*7 days/wk*52 wks/yr = 180.90 lb/yr

Exhaust flow rate: 60,000 cfm

60,000 cfm*(60 F+460)/(158 F+460) = 50,485 scfm

NH_3 concentration at scrubber exhaust: 0.152 ppm

Note: This ammonia concentration is at the exhaust of the wet scrubber. At ground level, the concentration is much lower. Even at the wet scrubber exhaust, the ammonia concentration is well below the ACGIH (American Conference of Governmental Industrial Hygienist) threshold level of 25 ppm.

Tank 3:

Dimensions:	ft	inches
W	0	11.38
L	1	4.38
H	0	11.2

Chemical HF 0.99%

Molecular weight: 20.01 lb/lbmole

Operating temperature: 25 C 77 F

Vapor pressure: 0.08 mm Hg

0.08 mm Hg/(760 mm Hg/14.7 psia) = 0.00155 psia

Surface area: (0 ft+11.38 in/12 in/ft)*(1 ft+4.38 in/12 in/ft) = 1.29 ft^2

Computations:

Gas-phase mass transfer coefficient K:

0.00438*2.493 ft/sec^0.78*(18/20.01 lb/lbmole)^(1/3) = 0.00862 ft/sec

PM/HF:

Emission rates:

lb/sec (Uncontrolled)

20.01 lb/lbmole*0.0086 ft/sec*1.29 ft2*0.00155 psia/(10.73 psia*ft3/oR*lbmole*(77+460)) = 0.0000001 lb/sec

lb/hr

Uncontr. 0.0000001 lb/sec*3600 sec/hr = 0.0002 lb/hr

Controlled: 0.0002 lb/hr*(1-0.95) = 0.00001 lb/hr

lb/day

Uncontr. 0.0002 lb/hr*24 hrs/day = 0.01 lb/day

Controlled: 0.00001 lb/hr*24 hrs/day = 0.0003 lb/day

lb/yr 0.0003 lb/day*7 days/wk*52 wks/yr = 0.09 lb/yr

PM10:

lb/hr

Uncontr. 0.0002 lb/hr*0.96 = 0.0002 lb/hr

Controlled: 0.00001 lb/hr*0.96 = 0.00001 lb/hr

lb/day

Uncontr. 0.01 lb/day*0.96 = 0.005 lb/day

Controlled: 0.0003 lb/day*0.96 = 0.0002 lb/day

lb/yr 0.0002 lb/day*7 days/wk*52 wks/yr = 0.09 lb/yr

Tank 4:

Dimensions:	ft	inches
W	0	9.5
L	1	4.37
H	0	11.13

Chemical HCl 9.1%

Molecular weight: 36.46 lb/lbmole

Operating temperature: 25 C 77 F

Vapor pressure: 0.0067 mm Hg

0.01 mm Hg/(760 mm Hg/14.7 psia) = 0.00013 psia

Surface area: (0 ft+9.5 in/12 in/ft)*(1 ft+4.37 in/12 in/ft) = 1.08 ft^2

Computations:

Gas-phase mass transfer coefficient K:

0.00438*2.493 ft/sec^0.78*(18/36.46 lb/lbmole)^(1/3) = 0.00706 ft/sec

PM/HCl:

Emission rates:

lb/sec (Uncontrolled)

36.46 lb/lbmole*0.0071 ft/sec*1.08 ft2*0.00013 psia/(10.73 psia*ft3/oR*lbmole*(77+460)) = 0.00000001 lb/sec

lb/hr		
Uncontr.	0.00000001 lb/sec*3600 sec/hr =	0.00002 lb/hr
Controlled:	0.00002 lb/hr*(1-0.95) =	0.00000 lb/hr
lb/day		
Uncontr.	0.00002 lb/hr*24 hrs/day =	0.001 lb/day
Controlled:	0.000001 lb/hr*24 hrs/day =	0.00003 lb/day
lb/yr	0.00003 lb/day*7 days/wk*52 wks/yr =	0.01 lb/yr
PM10:		
lb/hr		
Uncontr.	0.00002 lb/hr*0.96 =	0.00002 lb/hr
Controlled:	0.000001 lb/hr*0.96 =	0.000001 lb/hr
lb/day		
Uncontr.	0.001 lb/day*0.96 =	0.001 lb/day
Controlled:	0.00003 lb/day*0.96 =	0.0000 lb/day
lb/yr	0.00003 lb/day*7 days/wk*52 wks/yr =	0.01 lb/yr

Total particulate emissions:

PM:		
lb/hr		
Uncontr.	(0.0002+0.00002) lb/hr =	0.0002 lb/hr
Controlled:	(0.00001+0.000001) lb/hr =	0.00001 lb/hr
lb/day		
Uncontr.	(0.0052+0.0005) lb/day =	0.0057 lb/day
Controlled:	(0.0003+0.00003) lb/day =	0.0003 lb/day
PM10:		
lb/hr		
Uncontr.	(0.0002+0.00002) lb/hr =	0.0002 lb/hr
Controlled:	(0.00001+0.000001) lb/hr =	0.00001 lb/hr
lb/day		
Uncontr.	(0.005+0.0005) lb/day =	0.0055 lb/day
Controlled:	(0.0002+0.00003) lb/day =	0.0003 lb/day
lb/yr	(0.09+0.01) lb/yr =	0.1 lb/yr

Tank 5:

IPA used: (Applicant's data)		10 gals/month
IPA Sp. Gr.		0.78505
Density of wate @ 77 F		8.32 lb/gal
VOC:		
lb/month	10 gals/month*0.78505*8.32 lb/gal =	65.30 lb/month
lb/hr		
Uncontr.	65.30 lb/month/30 days/month/24 hrs/day =	0.09 lb/hr
Controlled:	0.09 lb/hr*(1-0.987) =	0.0012 lb/hr

lb/day

Uncontr.	0.09 lb/hr*24 hrs/day =	2.18 lb/day
Controlled:	0.0012 lb/hr*24 hrs/day =	0.03 lb/day
lb/yr	0.03 lb/day*7 days/wk*52 wks/yr =	10.30 lb/yr

Ozone emissions

lb/hr		0.03 lb/hr
		0.66 lb/day
		240.90 lb/yr
Ozone concentration (at exhaust stack)		0.18 ppm

Modeling results:

Modeling rate:		1.00 g/second
	1 g/sec/0.126 [g/sec]/[lb/hr] =	7.94 lb/hr
Max ground level concentration (GLC)		87.23 $\mu g/m^3$

Ozone maximum GLC, 1-hr

	87.23 microgram/cubic meter/7.94 lb/hr*0.03 lb/hr =	0.30 $\mu g/m^3$
	0.3 microgram/cubic meter*0.00051 ppm/[microgram/cubic meter] =	0.0002 ppmv
Average 8-hr factor:		0.7 ppmv
Ozone maximum GLC, 8-hr	0.0002 ppmv*0.7 =	0.0001 ppmv

Most stringent ozone standards:

1-hr	0.09 ppmv
8-hr	0.07 ppmv

▶The impacts are much lower than the most stringent standards: OK

Summary: VOC control: Oxidizer

		PM	PM10	VOC	NH_3	HF	HCl	IPA
lb/hr								
	Uncontr.	0.0002	0.0002	0.09	0.021	0.0002	0.00002	0.09
	Contr.	0.00001	0.00001	0.0012	0.0207	0.00001	0.000001	0.0012
lb/day								
	Uncontr.	0.006	0.005	2.18	0.50	0.01	0.001	2.18
	Contr.	0.0003	0.0003	0.03	0.50	0.0003	0.00003	0.03
lb/yr			0.10	10.30	180.90	0.09	0.01	10.30

TIER 2 SCREENING RISK ASSESSMENT

Application deemed complete date: 04/22/09

A/N: 498032
Fac: International Rectifier

Stack Data

		Units
Hour/Day	24	hr/day
Day/Week	7	day/wk
Week/Year	52	wk/yr
Emission Units	lb/hr	
		0
Control Efficiency	0.00	fraction range 0-1
Does source have TBACT?	NO	
Point or Volume Source ?	P	P or V
Stack Height or Building Height	10	feet
Area (For Volume Source Only)		ft^2
Distance-Residential	1000	meters
Distance-Commercial	50	meters
Meteorological Station	Norco	

Source Type:	O - Other
Screening Mode	NO

Emission Units	lb/hr	
Source output capacity	n/a	n/a

FOR USER-DEFINED CHEMICALS AND EMISSIONS, FILL IN THE TABLE BELOW

USER DEFINED CHEMICALS AND EMISSIONS				R1 - Uncontrolled	Efficiency Factor	R2 - Controlled
Code	Compound	lb/hr	Molecular Weight	lbs/hr	Fraction range 0-1	lbs/hr
a9	Ammonia	2.07E-02	17.03	0.020707443		0.020707443
f2	Hydrogen fluoride (hydrofluoric acid)	1.08E-05	20	1.07949E-05		1.07949E-05
h11	Hydrogen chloride (hydrochloric acid)	1.13E-06	36.46	1.12536E-06		1.12536E-06
i2	Isopropyl alcohol	1.18E-03	60.09	0.001179041		0.001179041
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		
				0		

TIER 1 SCREENING RISK ASSESSMENT

Receptor Distance (actual)	50
Receptor Distance (for X/Q lookup)	50

Tier 1 Results	
Cancer/Chronic ASI	**Acute ASI**
1.05E-02	6.89E-03
PASSED	PASSED

APPLICATION SCREENING INDEX CALCULATION

Compound	Average Annual Emission Rate (lbs/yr)	Max Hourly Emission Rate (lbs/hr)	Cancer / Chronic Pollutant Screening Level (lbs/yr)	Acute Pollutant Screening Level (lbs/hr)	Cancer / Chronic Pollutant Screening Index (PSI)	Acute Pollutant Screening Index (PSI)
Ammonia	1.81E+02	2.07E-02	1.73E+04	3.20E+00	1.04E-02	6.47E-03
Hydrogen fluoride (hydrofluoric acid)	9.43E-02	1.08E-05		2.40E-01		4.50E-05
Hydrogen chloride (hydrochloric acid)	9.83E-03	1.13E-06	7.80E+02	2.10E+00	1.26E-05	5.36E-07
Isopropyl alcohol	1.03E+01	1.18E-03	6.07E+05	3.20E+00	1.70E-05	3.69E-04
TOTAL (APPLICATION SCREENING INDEX)					**1.05E-02**	**6.89E-03**

IPA Concentration
Tank No. 5

		A/N 498032
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

Partial Pressure of NH_3 over Aqueous Solution of NH_3, psia

	Data*		Calculated for	
	$W\%_1$	$Wt\%_2$		$Wt\%_3$
	4.75	9.5		1.3
°F	Partial VP, psia		n^+	Partial VP_3^{++}, psia
	VP_1	VP_2		
130	3.28	6.09	2.53	0.12
140	3.97	7.41	2.54	0.15
150	4.78	8.92	2.54	0.18
160	5.68	10.7	2.56	0.20
170	6.75	12.67	2.56	0.25

*Data from Chemical Engineers' Handbook, Perry & Chilton, Fifth Edition, Page 3-68.

$^+$Calculated from Equation $(VP_2/VP_1) = (Wt\%_2/Wt\%_1)^n$

$^{++}$Calculated from Equation $(VP3/VP_1) = (Wt\%_3/Wt\%_1)^n$

FOR OZONE CONCENTRATION CALCULATIONS A/N 498032

10/28/08
13:02:27

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Scrubbers 101 & 102

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	1.00000
STACK HEIGHT (M)	=	15.2400
STK INSIDE DIAM (M)	=	1.4700
STK EXIT VELOCITY (M/S)	=	13.5147
STK GAS EXIT TEMP (K)	=	297.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	.0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 48600.000 (ACFM)

BUOY. FLUX = .964 M**4/S**3; MOM. FLUX = 97.341 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
25.	.4943	3	10.0	10.9	3200.0	19.96	5.57	5.11	NO
100.	59.74	3	4.0	4.4	1280.0	28.94	21.92	20.38	NO
200.	55.05	4	2.5	2.8	800.0	36.70	31.40	27.88	NO
300.	77.50	6	1.0	1.1	10000.0	38.60	31.89	21.02	NO
400.	87.22	6	1.0	1.1	10000.0	38.60	41.39	26.16	NO
500.	82.23	6	1.0	1.1	10000.0	38.60	50.65	30.97	NO
600.	73.34	6	1.0	1.1	10000.0	38.60	59.64	35.46	NO
700.	64.40	6	1.0	1.1	10000.0	38.60	68.39	39.68	NO
800.	56.53	6	1.0	1.1	10000.0	38.60	76.88	43.66	NO
900.	49.87	6	1.0	1.1	10000.0	38.60	85.15	47.44	NO
1000.	44.30	6	1.0	1.1	10000.0	38.60	93.21	51.03	NO
1100.	39.65	6	1.0	1.1	10000.0	38.60	101.05	54.47	NO
1200.	35.73	6	1.0	1.1	10000.0	38.60	108.71	57.76	NO
1300.	32.43	6	1.0	1.1	10000.0	38.60	116.18	60.92	NO
1400.	29.60	6	1.0	1.1	10000.0	38.60	123.48	63.96	NO
1500.	27.18	6	1.0	1.1	10000.0	38.60	130.61	66.90	NO
1600.	25.08	6	1.0	1.1	10000.0	38.60	137.59	69.74	NO
1700.	23.25	6	1.0	1.1	10000.0	38.60	144.43	72.49	NO
1800.	21.65	6	1.0	1.1	10000.0	38.60	151.12	75.16	NO
1900.	20.23	6	1.0	1.1	10000.0	38.60	157.68	77.75	NO
2000.	18.97	6	1.0	1.1	10000.0	38.60	164.11	80.28	NO
2100.	17.84	6	1.0	1.1	10000.0	38.60	170.43	82.74	NO

2200.	16.83	6	1.0	1.1	10000.0	38.60	176.62	85.14	NO
2300.	15.92	6	1.0	1.1	10000.0	38.60	182.71	87.48	NO
2400.	15.10	6	1.0	1.1	10000.0	38.60	188.69	89.77	NO
2500.	14.35	6	1.0	1.1	10000.0	38.60	194.57	92.01	NO
2600.	13.67	6	1.0	1.1	10000.0	38.60	200.35	94.20	NO
2700.	13.04	6	1.0	1.1	10000.0	38.60	206.04	96.35	NO
2800.	12.47	6	1.0	1.1	10000.0	38.60	211.64	98.46	NO
2900.	11.94	6	1.0	1.1	10000.0	38.60	217.15	100.52	NO
3000.	11.45	6	1.0	1.1	10000.0	38.60	222.59	102.55	NO
3500.	9.479	6	1.0	1.1	10000.0	38.60	248.61	112.20	NO
4000.	8.064	6	1.0	1.1	10000.0	38.60	272.96	121.13	NO
4500.	7.003	6	1.0	1.1	10000.0	38.60	295.89	129.49	NO
5000.	6.181	6	1.0	1.1	10000.0	38.60	317.61	137.36	NO
5500.	5.526	6	1.0	1.1	10000.0	38.60	338.27	144.83	NO
6000.	4.993	6	1.0	1.1	10000.0	38.60	358.00	151.94	NO
6500.	4.552	6	1.0	1.1	10000.0	38.60	376.90	158.74	NO
7000.	4.181	6	1.0	1.1	10000.0	38.60	395.06	165.27	NO
7500.	3.864	6	1.0	1.1	10000.0	38.60	412.55	171.56	NO
8000.	3.591	6	1.0	1.1	10000.0	38.60	429.45	177.63	NO
8500.	3.354	6	1.0	1.1	10000.0	38.60	445.79	183.50	NO
9000.	3.146	6	1.0	1.1	10000.0	38.60	461.64	189.20	NO
9500.	2.961	6	1.0	1.1	10000.0	38.60	477.02	194.73	NO
10000.	2.797	6	1.0	1.1	10000.0	38.60	491.98	200.11	NO
15000.	1.794	6	1.0	1.1	10000.0	38.60	623.68	247.63	NO
20000.	1.319	6	1.0	1.1	10000.0	38.60	733.36	287.45	NO
25000.	1.042	6	1.0	1.1	10000.0	38.60	829.18	322.40	NO
30000.	.8608	6	1.0	1.1	10000.0	38.60	915.28	353.92	NO
40000.	.7228	4	1.0	1.1	320.0	68.88	1552.30	1553.24	NO
50000.	.6427	4	1.0	1.1	320.0	68.88	1745.81	1750.07	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 25. M:

398.	87.23	6	1.0	1.1	10000.0	38.60	41.30	26.11	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SCREEN DISCRETE DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
50.	37.30	3	10.0	10.9	3200.0	19.96	10.97	10.08	NO
1000.	44.30	6	1.0	1.1	10000.0	38.60	93.21	51.03	NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	87.23	398.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Modeling Data
Scrubbers 101 & 102

Exhaust flow rate:

acfm	48,600	
scfm		
Stack diameter, in	58	in
Stack height, ft	50	ft
Temperature, F	75	F

Catalytic

	Yes	No*
Rain cap?		x

*Or with a swing rain cap fully open when operated.

Data for modeling:

Actual volume flow rate (acfm)	48,600	acfm
Stack diameter, m	1.47	m
Stack height, m	15.24	m
Temperature, K	297	K