



State of Ohio Environmental Protection Agency

**RE: FINAL PERMIT TO INSTALL
WARREN COUNTY**

CERTIFIED MAIL

Street Address:

122 S. Front Street

Lazarus Gov. Center TELE: (614) 644-3020 FAX: (614) 644-2329

Mailing Address:

Lazarus Gov. Center
P.O. Box 1049

Application No: 14-05777

Fac ID: 1483080196

DATE: 12/6/2005

SUMCO USA
William Romaine
537 Grandin Road
Maineville, OH 450390000

Enclosed please find an Ohio EPA Permit to Install which will allow you to install the described source(s) in a manner indicated in the permit. Because this permit contains several conditions and restrictions, I urge you to read it carefully.

The Ohio EPA is urging companies to investigate pollution prevention and energy conservation. Not only will this reduce pollution and energy consumption, but it can also save you money. If you would like to learn ways you can save money while protecting the environment, please contact our Office of Pollution Prevention at (614) 644-3469.

You are hereby notified that this action by the Director is final and may be appealed to the Ohio Environmental Review Appeals Commission pursuant to Chapter 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. It must be filed within thirty (30) days after the notice of the Directors action. A copy of the appeal must be served on the Director of the Ohio Environmental Protection Agency within three (3) days of filing with the Commission. An appeal may be filed with the Environmental Review Appeals Commission at the following address:

Environmental Review Appeals Commission
309 South Fourth Street, Room 222
Columbus, Ohio 43215

Sincerely,

Michael W. Ahern, Manager
Permit Issuance and Data Management Section
Division of Air Pollution Control

CC: USEPA

HCDES



**Permit To Install
Terms and Conditions**

**Issue Date: 12/6/2005
Effective Date: 12/6/2005**

FINAL PERMIT TO INSTALL 14-05777

Application Number: 14-05777
Facility ID: 1483080196
Permit Fee: **\$3800**
Name of Facility: SUMCO USA
Person to Contact: William Romaine
Address: 537 Grandin Road
Maineville, OH 450390000

Location of proposed air contaminant source(s) [emissions unit(s)]:
**537 Grandin Road
Maineville, Ohio**

Description of proposed emissions unit(s):
Modification to PTI 14-05571; 18 epitaxial reactors (P051-P069).

The above named entity is hereby granted a Permit to Install for the above described emissions unit(s) pursuant to Chapter 3745-31 of the Ohio Administrative Code. Issuance of this permit does not constitute expressed or implied approval or agreement that, if constructed or modified in accordance with the plans included in the application, the above described emissions unit(s) of environmental pollutants will operate in compliance with applicable State and Federal laws and regulations, and does not constitute expressed or implied assurance that if constructed or modified in accordance with those plans and specifications, the above described emissions unit(s) of pollutants will be granted the necessary permits to operate (air) or NPDES permits as applicable.

This permit is granted subject to the conditions attached hereto.

Ohio Environmental Protection Agency

Director

Part I - GENERAL TERMS AND CONDITIONS

A. Permit to Install General Terms and Conditions

1. Compliance Requirements

The emissions unit(s) identified in this Permit to Install shall remain in full compliance with all applicable State laws and regulations and the terms and conditions of this permit.

2. Reporting Requirements

The permittee shall submit required reports in the following manner:

- a. Reports of any required monitoring and/or recordkeeping information shall be submitted to the appropriate Ohio EPA District Office or local air agency.
- b. Except as otherwise may be provided in the terms and conditions for a specific emissions unit, quarterly written reports of (a) any deviations (excursions) from emission limitations, operational restrictions, and control device operating parameter limitations that have been detected by the testing, monitoring, and recordkeeping requirements specified in this permit, (b) the probable cause of such deviations, and (c) any corrective actions or preventive measures which have been or will be taken, shall be submitted to the appropriate Ohio EPA District Office or local air agency. If no deviations occurred during a calendar quarter, the permittee shall submit a quarterly report, which states that no deviations occurred during that quarter. The reports shall be submitted quarterly, i.e., by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarters. (These quarterly reports shall exclude deviations resulting from malfunctions reported in accordance with OAC rule 3745-15-06.)

3. Records Retention Requirements

Each record of any monitoring data, testing data, and support information required pursuant to this permit shall be retained for a period of five years from the date the record was created. Support information shall include, but not be limited to, all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. Such records may be maintained in computerized form.

4. Inspections and Information Requests

The Director of the Ohio EPA, or an authorized representative of the Director, may, subject to the safety requirements of the permittee and without undue delay, enter upon

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the premises of this source at any reasonable time for purposes of making inspections, conducting tests, examining records or reports pertaining to any emission of air contaminants, and determining compliance with any applicable State air pollution laws and regulations and the terms and conditions of this permit. The permittee shall furnish to the Director of the Ohio EPA, or an authorized representative of the Director, upon receipt of a written request and within a reasonable time, any information that may be requested to determine whether cause exists for modifying, reopening or revoking this permit or to determine compliance with this permit. Upon verbal or written request, the permittee shall also furnish to the Director of the Ohio EPA, or an authorized representative of the Director, copies of records required to be kept by this permit.

5. Scheduled Maintenance/Malfunction Reporting

Any scheduled maintenance of air pollution control equipment shall be performed in accordance with paragraph (A) of OAC rule 3745-15-06. The malfunction of any emissions units or any associated air pollution control system(s) shall be reported to the appropriate Ohio EPA District Office or local air agency in accordance with paragraph (B) of OAC rule 3745-15-06. Except as provided in that rule, any scheduled maintenance or malfunction necessitating the shutdown or bypassing of any air pollution control system(s) shall be accompanied by the shutdown of the emissions unit(s) that is (are) served by such control system(s).

6. Permit Transfers

Any transferee of this permit shall assume the responsibilities of the prior permit holder. The appropriate Ohio EPA District Office or local air agency must be notified in writing of any transfer of this permit.

7. Air Pollution Nuisance

The air contaminants emitted by the emissions units covered by this permit shall not cause a public nuisance, in violation of OAC rule 3745-15-07.

8. Termination of Permit to Install

This Permit to Install shall terminate within eighteen months of the effective date of the Permit to Install if the owner or operator has not undertaken a continuing program of installation or modification or has not entered into a binding contractual obligation to undertake and complete within a reasonable time a continuing program of installation or modification. This deadline may be extended by up to 12 months if application is made to the Director within a reasonable time before the termination date and the party shows good cause for any such extension.

9. Construction of New Sources(s)

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The proposed emissions unit(s) shall be constructed in strict accordance with the plans and application submitted for this permit to the Director of the Ohio Environmental Protection Agency. There may be no deviation from the approved plans without the express, written approval of the Agency. Any deviations from the approved plans or the above conditions may lead to such sanctions and penalties as provided under Ohio law. Approval of these plans does not constitute an assurance that the proposed facilities will operate in compliance with all Ohio laws and regulations. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed sources cannot meet the requirements of this permit or cannot meet applicable standards.

If the construction of the proposed emissions unit(s) has already begun or has been completed prior to the date the Director of the Environmental Protection Agency approves the permit application and plans, the approval does not constitute expressed or implied assurance that the proposed facility has been constructed in accordance with the approved plans. The action of beginning and/or completing construction prior to obtaining the Director's approval constitutes a violation of OAC rule 3745-31-02. Furthermore, issuance of the Permit to Install does not constitute an assurance that the proposed source will operate in compliance with all Ohio laws and regulations. Approval of the plans in any case is not to be construed as an approval of the facility as constructed and/or completed. Moreover, issuance of the Permit to Install is not to be construed as a waiver of any rights that the Ohio Environmental Protection Agency (or other persons) may have against the applicant for starting construction prior to the effective date of the permit. Additional facilities shall be installed upon orders of the Ohio Environmental Protection Agency if the proposed facilities cannot meet the requirements of this permit or cannot meet applicable standards.

10. Public Disclosure

The facility is hereby notified that this permit, and all agency records concerning the operation of this permitted source, are subject to public disclosure in accordance with OAC rule 3745-49-03.

11. Applicability

This Permit To Install is applicable only to the emissions unit(s) identified in the Permit To Install. Separate Permit To Install for the installation or modification of any other emissions unit(s) are required for any emissions unit for which a Permit To Install is required.

12. Best Available Technology

As specified in OAC Rule 3745-31-05, all new sources must employ Best Available Technology (BAT). Compliance with the terms and conditions of this permit will fulfill this requirement.

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13. Source Operation and Operating Permit Requirements After Completion of Construction

This facility is permitted to operate each source described by this Permit to Install for a period of up to one year from the date the source commenced operation. This permission to operate is granted only if the facility complies with all requirements contained in this permit and all applicable air pollution laws, regulations, and policies. Pursuant to OAC Chapter 3745-35, the permittee shall submit a complete operating permit application within ninety (90) days after commencing operation of the emissions unit(s) covered by this permit.

14. Construction Compliance Certification

The applicant shall provide Ohio EPA with a written certification (see enclosed form) that the facility has been constructed in accordance with the Permit to Install application and the terms and conditions of the Permit to Install. The certification shall be provided to Ohio EPA upon completion of construction but prior to startup of the source.

15. Fees

The permittee shall pay fees to the Director of the Ohio EPA in accordance with ORC section 3745.11 and OAC Chapter 3745-78. The permittee shall pay all applicable Permit to Install fees within 30 days after the issuance of this Permit to Install.

B. Permit to Install Summary of Allowable Emissions

The following information summarizes the total allowable emissions, by pollutant, based on the individual allowable emissions of each air contaminant source identified in this permit.

SUMMARY (for informational purposes only)
 TOTAL PERMIT TO INSTALL ALLOWABLE EMISSIONS

<u>Pollutant</u>	<u>Tons Per Year</u>
HCl	0.665

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Facility ID: 1483080196

Emissions Unit ID: P051

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>
P051 - B05 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-17-11(B) OAC rule 3745-31-05(A)(3) OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements) OAC rule 3745-17-07(A)(1)

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**Applicable Emissions
Limitations/Control Measures**

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: **P052**

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P052 - B06 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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**Applicable Emissions
Limitations/Control Measures**

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P053

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P053 - B07 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;
- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and

- b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

- 2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services)

by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

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Emissions Unit ID: P053

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P054

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)**A. Applicable Emissions Limitations and/or Control Requirements**

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P054 - B08 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: **P055**

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P055 - B09 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

$$\text{actual trichlorosilane usage (lbs TCS/hr)} \times \text{unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS)} \times \text{stoichiometric ratio (3 moles HCl/1 mole TCS)} \times \text{unit conversion HCl (36.3609 gMW HCL/1 mole HCl)} = \text{lbs HCl/hr}$$

- b. for the addition of HCl in the hi-etch process:

$$\text{actual cycle time (min/cycle)} \times \text{actual production rate (cycles/hr)} \times \text{actual flow rate (liters HCl/hr)} \times \text{conversion factor (ft}^3\text{/28.3168 liters)} \times \text{conversion factor (1 lb HCl/9.7752 ft}^3\text{ HCl)} = \text{lbs HCl/hr; and}$$

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P056 - B10 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line

Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077 (Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

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**Applicable Emissions
Limitations/Control Measures**

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P058

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)**A. Applicable Emissions Limitations and/or Control Requirements**

- The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P058 - B12 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P059

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)**A. Applicable Emissions Limitations and/or Control Requirements**

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P059 - B13 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P060

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)**A. Applicable Emissions Limitations and/or Control Requirements**

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P060 - B14 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

$$\text{actual trichlorosilane usage (lbs TCS/hr)} \times \text{unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS)} \times \text{stoichiometric ratio (3 moles HCl/1 mole TCS)} \times \text{unit conversion HCl (36.3609 gMW HCL/1 mole HCl)} = \text{lbs HCl/hr}$$

- b. for the addition of HCl in the hi-etch process:

$$\text{actual cycle time (min/cycle)} \times \text{actual production rate (cycles/hr)} \times \text{actual flow rate (liters HCl/hr)} \times \text{conversion factor (ft}^3\text{/28.3168 liters)} \times \text{conversion factor (1 lb HCl/9.7752 ft}^3\text{ HCl)} = \text{lbs HCl/hr; and}$$

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: P061

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)**A. Applicable Emissions Limitations and/or Control Requirements**

- The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P061 - B15 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line

Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077 (Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

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PTI A

Issued: 12/6/2005

Emissions Unit ID: **P062**

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P062 - B16 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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**Applicable Emissions
Limitations/Control Measures**

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P063 - B17 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P064 - B18 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

- 1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P065 - B19 - AMT Barrel Reactor; CS-2 Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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Issue:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency $(1 - 99.5/100) =$ lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P066 - B20 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line

Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077 (Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P067 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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**Applicable Emissions
Limitations/Control Measures**

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: **P068**

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P068 - B22 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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Issue:

Facility ID:

1483080196

Emissions Unit ID: P068

- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").

SUMC

PTI A

Issued: 12/6/2005

Emissions Unit ID: **P069**

PART II - SPECIAL TERMS AND CONDITIONS FOR SPECIFIC EMISSIONS UNIT(S)

A. Applicable Emissions Limitations and/or Control Requirements

1. The specific operations(s), property, and/or equipment which constitute this emissions unit are listed in the following table along with the applicable rules and/or requirements and with the applicable emissions limitations and/or control measures. Emissions from this unit shall not exceed the listed limitations, and the listed control measures shall be specified in narrative form following the table.

<u>Operations, Property, and/or Equipment</u>	<u>Applicable Rules/Requirements</u>	
P069 - B23 - AMT Barrel Reactor; CS-2 - Plant-wide condenser, scrubber, and hydrogen recovery unit	OAC rule 3745-31-05(A)(3)	OAC rule 3745-17-11(B)
	OAC rule 3745-31-05(C) (to avoid being subject to OAC rules 3745-31-28 and Title V permitting requirements)	
	OAC rule 3745-17-07(A)(1)	

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Applicable Emissions
Limitations/Control Measures

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr).

The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY).

See term and condition A.2.c.

The requirements of this rule also include compliance with the requirements of OAC rule 3745-31-05(C) and OAC rule 3745-17-07(A)(1).

See term and condition A.2.b.

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

The emissions limitation specified by this rule is less stringent than the emissions limitation established pursuant to OAC rule 3745-31-05(A)(3).

2. Additional Terms and Conditions

- 2.a** The hourly and annual emissions limitations outlined in term and condition A.1. are based upon the emissions unit's potential to emit. Therefore, no records are required to demonstrate compliance with those limitations.
- 2.b** The actual emissions of Hazardous Air Pollutants (HAPs), as identified in Section 112(b) of Title III of the Clean Air Act from emissions units P001 (Silicon Wafer Manufacturing), P004 (Epitaxial Silicon Wafer Mfg.), P005 (Silicon Wafer Wax mount-removal), P006 (Poly clean Etch Line), P007 Mini-Preclean Line), P008 (Silicon Crystal Formation Process), P009 (Silicone Crystal), P010 (Lapping Process), P012 (Silicone Wafer), P013 (Reactors Process), P014 (Polishing Process), P015 (Final Clean), P016 (Materials Characterization), P017 (Epitaxial Reactor), P020 (Silicon Wafer Mfg.), P021 (ASM Single Wafer Epitaxial Reactor #63), P022 (ASM Single Wafer Epitaxial Reactor #64), P023 (ASM Single Wafer Epitaxial Reactor #65), P024 (E01 - EpiPro Pancake Reactor), P025 (E02 - EpiPro Pancake Reactor), P026 (E03 - EpiPro Pancake Reactor), P027 (E04 - EpiPro Pancake Reactor), P028 (E05 - EpiPro Pancake Reactor), P029 (E06 - EpiPro Pancake Reactor), P030 (E07 - EpiPro Pancake Reactor), P031 (E08 - EpiPro Pancake Reactor), P032 (G01 - Gemini III Pancake Reactor), P033 (G02 - Gemini III Pancake Reactor), P034 (G03 - Gemini III Pancake Reactor), P035 (G04 - Gemini III Pancake Reactor), P036 (A01 - ASM Single Wafer Reactor), P037 (A02 - ASM Single Wafer Reactor), P038 (A03 - ASM Single Wafer Reactor), P039 (A04 - ASM Single Wafer Reactor), P040 (A05 - ASM Single Wafer Reactor), P041 (A06 - ASM Single Wafer Reactor), P042 (A07 - ASM Single Wafer Reactor), P043 (A08 - ASM Single Wafer Reactor), P044 (A09 - ASM Single Wafer Reactor), P045 (A10 - ASM Single Wafer Reactor), P046 (A11 - ASM Single Wafer Reactor), P047 (A12 - ASM Single Wafer Reactor), P048 (A13 - ASM Single Wafer Reactor), P049 (A14 - ASM Single Wafer Reactor), P050 (A15 - ASM Single Wafer Reactor), P051 (B05 - AMT Barrel Reactor), P052 (B06 - AMT Barrel Reactor), P053 (B07 - AMT Barrel Reactor), P054 (B08 - AMT Barrel Reactor), P055 (B09 - AMT Barrel Reactor), P056 (B10 - AMT Barrel Reactor), P057 (B11 - AMT Barrel Reactor), P058 (B12 - AMT Barrel Reactor), P059 (B13 - AMT Barrel Reactor), P060 (B14 - AMT Barrel Reactor), P061 (B15 - AMT Barrel Reactor), P062 (B16 - AMT Barrel Reactor), P063 (B17 - AMT Barrel Reactor), P064 (B18 - AMT Barrel Reactor), P065 (B19 - AMT Barrel Reactor), P066 (B20 - AMT Barrel Reactor), P067 (B21 - AMT Barrel Reactor), P068 (B22 - AMT Barrel Reactor), P069 (B23 - AMT Barrel Reactor), P070 (B24 - AMT Barrel Reactor), P071 (B25 - AMT Barrel Reactor), P072 (B26 - AMT Barrel Reactor), P073 (B27 - AMT Barrel Reactor), P074 (B28 - AMT Barrel Reactor), P075 (Exhaust Line Etch-07, Bell Jar Etch-08, Small Quartz Etch-09), P076 (Acid Etch-10), P077

(Acid Etch-11), P078 (Mounter/Polisher Line 1), and P079 (Acid Etch-11, Side B) shall not exceed 9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs, including HAP acid mists. Compliance with the above limitations shall be based on a rolling, 12-month summation. The permittee has existing records to demonstrate compliance with these limitations upon issuance of this permit.

- 2.c** Compliance with OAC rule 3745-31-05(A)(3) shall be demonstrated by the use of a wet scrubber, compliance with the HCl emissions limitations and compliance with the facility-wide HAPs emissions limitations.

B. Operational Restrictions

1. The scrubber water recirculation flow rate shall be continuously maintained at a value of not less than 60 gallons per minute at all times while the emissions unit is in operation.
2. The pH of the scrubbing liquor shall be maintained within the range of 8-13 at all times while the emissions unit is in operation.

C. Monitoring and/or Recordkeeping Requirements

1. The permittee shall properly install, operate and maintain equipment to continuously monitor the scrubber water recirculation flow rate into the scrubber and the pH of the scrubber liquor while the emissions unit is in operation. The monitoring devices and any recorders shall be installed, calibrated, operated and maintained in accordance with the manufacturer's recommendations, instructions and operating manuals.

The permittee shall collect and record the following information each day:

- a. the scrubber water recirculation flow rate, in gallons per minute, on a once per day basis;
 - b. the pH of the scrubber liquor, on a once per day basis; and
 - c. the operating times for the capture (collection) system, control device, monitoring equipment, and the associated emissions unit.
2. The permittee shall collect and record the following information each month for the entire facility as denoted in term A.2.b above:

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- a. for all epitaxial reactors, the amount of hydrogen chloride (HCl) used (input), in pounds;
- b. for all epitaxial reactors, the amount of HCl released from the reaction of trichlorosilane (TCS), in pounds;

- c. for all epitaxial reactors, the amount of controlled emissions of each HAP, in tons;
- d. for all emissions units, the amount of any other material used which contains HAPs, in tons;
- e. for all emissions units, the individual HAP content for each HAP of each material used, in percent by weight (ton HAP/ton material);
- f. the total individual HAP emissions for each HAP from all materials employed, in tons per month [for each HAP the sum of c. plus (d. times e.)];
- g. the total combined HAP emissions from all materials employed, in tons per month (the sum of all HAPs as calculated in f.);
- h. the updated rolling, 12-month summation of each individual HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months; and
- i. the updated rolling, 12-month summation of total combined HAP emissions, in pounds or tons. This shall include the information for the current month and the preceding eleven calendar months.

* A listing of the HAPs can be found in Section 112(b) of the Clean Air Act or can be obtained by contacting your Hamilton County Department of Environmental Services contact. This information does not have to be kept on a individual emissions unit basis.

D. Reporting Requirements

1. The permittee shall submit quarterly deviation (excursion) reports to the Hamilton County Department of Environmental Services that identify all periods of time during which the following scrubber parameters were not maintained within the requirements of the Operational Restrictions:
 - a. the scrubber water recirculation flow rate; and
 - b. the scrubber solution pH.

If no exceedances occurred during the reporting period then a report is required stating

so. These reports shall be submitted by January 31, April 30, July 31, and October 31 of each year and shall cover the previous calendar quarter.

2. The permittee shall notify the Hamilton County Department of Environmental Services of any exceedance of the HAP emissions limitations set forth in term A.2.b. The reports shall be submitted to the Director (the Hamilton County Department of Environmental Services) by January 31, April 30, July 31 and October 31 of each year and shall cover the previous three calendar months (October through December, January through March, April through June and July through September, respectively.)

If no exceedances occurred, the permittee shall state so in the report.

E. Testing Requirements

1. Compliance with the emissions limitation(s) in Section A.1 of these terms and conditions shall be determined in accordance with the following method(s):

Emissions Limitations

The hydrochloric acid (HCl) emissions shall not exceed 0.008 pound per hour (lb/hr)
The hydrochloric acid (HCl) emissions shall not exceed 0.035 tons per year (TPY)

Applicable Compliance Methods

Compliance with the hourly HCl emissions limitation shall be determined by the following calculations:

- a. for the conversion of TCS to HCl in the scrubber:

actual trichlorosilane usage (lbs TCS/hr) x unit conversion trichlorosilane (1 mole TCS/135.4524 gMW TCS) x stoichiometric ratio (3 moles HCl/1 mole TCS) x unit conversion HCl (36.3609 gMW HCL/1 mole HCl) = lbs HCl/hr

- b. for the addition of HCl in the hi-etch process:

actual cycle time (min/cycle) x actual production rate (cycles/hr) x actual flow rate (liters HCl/hr) x conversion factor (ft³/28.3168 liters) x conversion factor (1 lb HCl/9.7752 ft³ HCl) = lbs HCl/hr; and

- c. (lbs HCl/hr from the conversion of TCS + lbs HCl/hr from the addition of HCl) x

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scrubber efficiency (1 - 99.5/100) = lbs HCl/hr from the scrubber stack

As long as compliance with the hourly emissions limitation is demonstrated, compliance with the annual HCl emissions limitation is assured

Emissions Limitation

Visible particulate emissions from any stack associated with this emissions unit shall not exceed 20 percent opacity, as a six-minute average, except as specified by rule.

Applicable Compliance Method

Compliance shall be determined in accordance with Test Method 9 as set forth in "Appendix on Test Methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such Appendix existed on July 1, 2002.

Emissions Limitations

9.9 TPY for any single HAP and 24.9 TPY for any combination of HAPs

Applicable Compliance Method

Compliance with the HAPs emissions limitations outlined in term and condition A.2.b. shall be demonstrated by the recordkeeping requirements in term and condition C.2.

2. Compliance with the operational restrictions for the wet scrubber in terms and conditions B.1. and B.2. shall be demonstrated by the recordkeeping requirements in term and condition C.1.

F. Miscellaneous Requirements

1. The following terms and conditions of this permit are federally enforceable: A, B, C, D and E.
2. The terms and conditions in this Permit to Install shall supersede the terms and conditions in Permit to Install 14-05571 as issued on December 28, 2004.
3. Modeling to demonstrate compliance with the Ohio EPA's "Air Toxic Policy" was not necessary because the increase in emissions due to the modification(s) to the emissions unit was less than 1 ton per year of each toxic pollutant that has a listed Threshold Limit Value (TLV), as documented in the most current version of the American Conference of Governmental Industrial Hygienists' (ACGIH's) handbook entitled "TLVs and BEIs" ("Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices").