



Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

## Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

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March 4, 2016

Mr. William Brissette  
Facilities Manager  
IQE KC LLC  
200 John Hancock Road  
Taunton, MA 02780

**RE: Taunton**  
Transmittal No.: X267261  
Application No.: SE-15-030  
Class: SM25  
FMF No.: 336269  
**AIR QUALITY PLAN APPROVAL**

Dear Mr. Brissette:

The Massachusetts Department of Environmental Protection (“MassDEP”), Bureau of Air and Waste (BAW), has received your Non-Major Comprehensive Plan Application (“Application”) listed above. This Application concerns the proposed construction and operation of three additional Metalorganic Vapor Phase Epitaxy (MOVPE) reactors at your semiconductor manufacturing facility located at 200 John Hancock Street in Taunton, Massachusetts (“Facility”).

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 “Air Pollution Control,” regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-J, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP’s review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator (“Permittee”) must comply in order for the Facility to be operated in compliance with this Plan Approval.

## 1. DESCRIPTION OF FACILITY AND APPLICATION

IQE KC LLC is a manufacturer of compound semiconductor crystalline wafers, which are used as transistors in cellular phones and other wireless devices. This application approves the construction and operations of three (3) additional Metalorganic Vapor Phase Epitaxy (MOVPE) reactors, in addition to the one (1) MOVPE reactor currently approved in MassDEP Approval SE-14-018, for a total of four (4).

Each MOVPE reactor will be paired with an Edwards Spectra G-800 natural gas fired thermal oxidizer which will be equipped with an Edwards burner that has a maximum firing rate of 190,800 Btu per hour. The Permittee continuously monitors the concentration of ammonia leaving the oxidizer. The sensors have detection limits of 0 to 200 parts per million by volume (ppmv). For the majority of the time, the concentration of the ammonia exhaust leaving the oxidizer is below 3.0 ppmv. However, there are short periods of time when spikes may occur. At 100 ppmv, the reactor automatically shuts down.

The Permittee modeled the ammonia discharged to the atmosphere using the USEPA SCREEN3 Industrial Source Complex Model Version 96043. The results from the SCREEN3 modeling show the ammonia emissions from the facility are well below the MassDEP Threshold Effects Exposure Limit (TEL) and Allowable Ambient Limit (AAL).

The Permittee has indicated that the electronic records of the concentration of ammonia exiting the thermal oxidizer can be kept for one year, due to a manufacturer's software limitation. All other records will be maintained for 5 years as required by Table 4 of this Approval.

## 2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

<b>Table 1</b>			
<b>EU#</b>	<b>Description</b>	<b>Design Capacity</b>	<b>Pollution Control Device (PCD)</b>
1	Metalorganic Vapor Phase Epitaxy (MOVPE) Reactor	100 SLM of NH <sub>3</sub>	direct fire thermal oxidizer
2	Metalorganic Vapor Phase Epitaxy (MOVPE) Reactor	80 SLM of NH <sub>3</sub>	direct fire thermal oxidizer
3	Metalorganic Vapor Phase Epitaxy (MOVPE) Reactor	100 SLM of NH <sub>3</sub>	direct fire thermal oxidizer
4	Metalorganic Vapor Phase Epitaxy (MOVPE) Reactor	100 SLM of NH <sub>3</sub>	direct fire thermal oxidizer

**Table 1 Key:**

EU# = Emission Unit Number  
 SLM = Standard liters per minute

PCD = Pollution Control Device  
 NH<sub>3</sub> = Ammonia

**3. APPLICABLE REQUIREMENTS**

**A. OPERATIONAL, PRODUCTION and EMISSION LIMITS**

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2, below:

<b>Table 2</b>			
<b>EU#</b>	<b>Operational / Production Limit</b>	<b>Air Contaminant</b>	<b>Emission Limit</b>
1, 2, 3, 4	Capture efficiency = 100%. Destruction efficiency=99.8%. ≤ 595 hours of ammonia feed per month, each. ≤ 6,750 hours of ammonia feed per consecutive 12-month period, each.	Non-criteria pollutant: NH <sub>3</sub>	≤ 100 ppmv, each ≤ 2.4 lb/hr, combined 0.71 TPM, combined 8.10 TPY, combined
PCD1, PCD2, PCD3, PCD4	None	NOx	0.30 lbs/hr, each 0.45 TPM, combined 5.26 TPY, combined
Facility-wide	None	opacity	0%

**Table 2 Key:**

EU# = Emission Unit Number

TPM = tons per month

ppmv = parts per million volume

NOx = Oxides of Nitrogen

PCD = Pollution Control Device

NH<sub>3</sub> = Ammonia

TPY = tons per consecutive 12-month period

≤ = Equal to or less than

lb/hr = pounds per hour

**B. COMPLIANCE DEMONSTRATION**

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5 below:

<b>Table 3</b>	
<b>EU#</b>	<b>Monitoring and Testing Requirements</b>
1, 2, 3, 4	<ol style="list-style-type: none"> <li>1. The Permittee shall continuously monitor the exhaust concentration of NH<sub>3</sub> exiting each thermal oxidizer. The Permittee shall maintain the NH<sub>3</sub> monitoring system as required by the manufacturer. The monitor shall be connected to an audible alarm.</li> <li>2. The Permittee shall monitor the hours of the NH<sub>3</sub> feed for each reactor.</li> </ol>
Facility-wide	<ol style="list-style-type: none"> <li>3. If and when MassDEP requires it, the Permittee shall conduct emission testing in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13</li> </ol>

**Table 3 Key:**

EU# = Emission Unit Number

NH<sub>3</sub> = Ammonia

<b>Table 4</b>	
<b>EU#</b>	<b>Record Keeping Requirements</b>
1, 2, 3, 4	<ol style="list-style-type: none"> <li>1. The Permittee shall maintain a record of all faults and alarms associated with each thermal oxidizer.</li> <li>2. The Permittee shall maintain a record of the hours of the NH<sub>3</sub> feed for each reactor.</li> </ol>
Facility-wide	<ol style="list-style-type: none"> <li>3. The Permittee shall maintain adequate records on-site to demonstrate compliance with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve month period (current month plus prior eleven months). These records shall be compiled no later than the 15<sup>th</sup> day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at <a href="http://www.mass.gov/dep/air/approvals/aqforms.htm#report">http://www.mass.gov/dep/air/approvals/aqforms.htm#report</a> .</li> <li>4. The Permittee shall maintain records of monitoring and testing as required by Table 3.</li> <li>5. The Permittee shall maintain a copy of this Plan Approval, underlying Application and the most up-to-date SOMP for the EU(s) and PCD(s) approved herein on-site.</li> <li>6. The Permittee shall maintain a record of routine maintenance activities performed on each approved EU (MOVPE reactor), the PCD (thermal oxidizer), and the NH<sub>3</sub> monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed.</li> <li>7. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on each approved EU (MOVPE reactor), the PCD (thermal oxidizer), and the NH<sub>3</sub> monitoring equipment. At a minimum, the records shall include: date and time the malfunction occurred; description of the malfunction; corrective actions taken; the date and time corrective actions were initiated and completed; and the date and time emission rates and monitoring equipment returned to compliant operation.</li> </ol>

<b>Table 4</b>	
<b>EU#</b>	<b>Record Keeping Requirements</b>
	8. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years, except for the electronic records of the concentration of NH <sub>3</sub> exiting the thermal oxidizer, which shall maintained on-site for a minimum of one (1) year.
	9. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

**Table 4 Key:**

SOMP = Standard Operating and Maintenance Procedure  
 MOVPE = Metalorganic Vapor Phase Epitaxy  
 NH<sub>3</sub> = ammonia  
 USEPA = United States Environmental Protection Agency

EU = Emission Unit  
 PCD = Pollution Control Device  
 EU# = Emission Unit Number

<b>Table 5</b>	
<b>EU#</b>	<b>Reporting Requirements</b>
Facility-wide	1. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a “Responsible Official” as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).
	2. The Permittee shall notify the Southeast Regional Office of MassDEP, BAW Compliance and Enforcement Chief by telephone 508-946-2817, email, <a href="mailto:sair@state.ma.us">sair@state.ma.us</a> or fax 508-947-6557, as soon as possible, but no later than three (3) business day after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to Compliance and Enforcement Chief at MassDEP within ten (10) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).
	3. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30-days from MassDEP’s request.
	4. The Permittee shall submit to MassDEP for approval a stack emission pretest protocol, at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.
	5. The Permittee shall submit to MassDEP a final stack emission test results report, within 45 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.
	6. The Permittee shall report every three years to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval.

**Table 5 Key:**

EU# = Emission Unit Number

#### 4. SPECIAL TERMS AND CONDITIONS

The Permittee is subject to, and shall comply with, the following special terms and conditions:

- A. The Permittee shall comply with the Special Terms and Conditions as contained in Table 6 below:

<b>Table 6</b>	
<b>EU#</b>	<b>Special Terms and Conditions</b>
1, 2, 3, 4	1. The Permittee shall interlock each MOVPE reactor and the thermal oxidizer so that a reactor cannot be operated unless its thermal oxidizer is operating, and the exhaust concentration of NH <sub>3</sub> exiting the thermal oxidizer is equal to or less than 100 parts per million volume.
Facility-wide	2. This Plan Approval, Tr. No. X267261, supersedes the Conditional/ Plan Approval, Tr. No. X262056, issued to the Permittee on July 16, 2014, in its entirety, with the exception that all plan application materials submitted as part of the Plan Approval Tr. No. X262056 become part of this Plan Approval, Tr. No. X267261.

**Table 6 Key:**

EU# = Emission Unit Number

NH<sub>3</sub> = ammonia

- B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including but not limited to rain protection devices known as “shanty caps” and “egg beaters.” The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7 below, for the Emission Units that are regulated by this Plan Approval:

<b>Table 7</b>				
<b>EU#</b>	<b>Stack Height Above Ground (feet)</b>	<b>Stack Inside Exit Dimensions (feet)</b>	<b>Stack Gas Exit Velocity Range (feet per second)</b>	<b>Stack Gas Exit Temperature Range (°F)</b>
1	41	3.5	92	70 - 90
2	41	3.5	92	70 - 90
3	41	3.5	92	70 - 90
4	41	3.5	92	70 - 90

**Table 7 Key:**

EU# = Emission Unit Number

°F = Degree Fahrenheit

## **5. GENERAL CONDITIONS**

The Permittee is subject to, and shall comply with, the following general conditions:

- A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).
- B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.
- C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.
- D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.
- E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.
- F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.
- G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.
- H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.

- I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.
- J. The Permittee shall conduct emission testing, if requested by MassDEP, in accordance with USEPA Reference Test Methods and regulation 310 CMR 7.13. If required, a pretest protocol report shall be submitted to MassDEP at least 30 days prior to emission testing and the final test results report shall be submitted within 45 days after emission testing.
- K. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

## **6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT**

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain “Fail-Safe Provisions,” which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

## **7. APPEAL PROCESS**

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars (\$100.00) must be mailed to:

Commonwealth of Massachusetts  
Department of Environmental Protection  
P.O. Box 4062  
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Dan Kamieniecki by telephone at 508-946-2717, or in writing at the letterhead address.

*This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.*

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Thomas Cushing  
Permit Section  
Bureau of Air and Waste

Enclosure

ecc: Taunton Health Dept / Taunton Fire Department  
Capaccio Environmental Engineering – M. Melvin  
MassDEP/SERO - M. Pinaud  
L. Ramos  
D. DiSalvio  
MassDEP/Boston - Y. Tian