



Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

## Department of Environmental Protection

Central Regional Office • 627 Main Street, Worcester MA 01608 • 508-792-7650

DEVAL L. PATRICK  
Governor

TIMOTHY P. MURRAY  
Lieutenant Governor

RICHARD K. SULLIVAN JR.  
Secretary

KENNETH L. KIMMELL  
Commissioner

August 9, 2012  
Daniel C. McHugh  
Intel Massachusetts, Inc.  
75 Reed Road  
Hudson, MA 01749-2895

**RE: Hudson**  
Transmittal No.: X250554  
Application No.: CE-12-015  
Class: *SM80-7*  
FMF No.: 306108  
**AIR QUALITY PLAN APPROVAL**

Dear Mr. McHugh:

The Massachusetts Department of Environmental Protection ("MassDEP"), Bureau of Waste Prevention, has reviewed your Limited Plan Application ("Application") listed above. This Application concerns the proposed control of emissions of greenhouse gases ("GHG") from Intel Massachusetts Inc., at your facility located at 75 Reed Road in Hudson, 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.

**This Plan Approval supersedes Plan Approval Transmittal #X236131 issued April 19, 2011. This Plan Approval does not alter any requirements contained in other plan approvals currently active for the facility.**

## **1. DESCRIPTION OF FACILITY AND APPLICATION**

The Permittee has operated the Facility since purchasing it from Digital Equipment Corporation in 1998. On September 29, 1998, MassDEP issued Air Pollution Control Plan Approval Tr # W001766 for the build-out and operation of Fab-17. The approval was for the installation and operation of semiconductor manufacturing equipment. The approval included limits on emissions of Volatile Organic Compounds (“VOC”), Hazardous Air Pollutants (“HAPs”), acid gases and emissions from facility fuel burning equipment. On March 10, 2006 MassDEP issued Approval Tr# W071354-Amd1 for installation and operation of two emergency generators.

Massachusetts considers green house gases to be air contaminants. In 2010, the United States Environmental Protection Agency (USEPA) promulgated regulations pertaining to greenhouse gas (“GHG”) emissions. *In 40 CFR 98.6, the USEPA has defined GHG as the following: “Greenhouse gas or GHG means carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases as defined in this section.”* Under these regulations, facilities with an emission potential of more than 100,000 tons per year carbon dioxide equivalent (“CO<sub>2</sub>e”) as of July 1, 2011, will be considered major sources for the purposes of the Title V Operating Permit Program. The Permittee found that its present GHG potential emissions from this facility were more than 100,000 tons CO<sub>2</sub>e.

On April 19, 2011, the Permittee was issued NMCPA Plan Approval Tr. #X236131 restricting its potential GHG emissions below 100,000 tons. In April 2012, the Permittee submitted to MassDEP LPA Plan Application Tr. #X250554 to amend Approval #X236131 by including operations from an additional process line and control system. The new application continues to seek restriction of Facility GHG emissions to below 100,000 tons.

The Permittee uses and emits GHG from certain processes called “tools”. Tool is a term used by the Permittee to describe a single piece of equipment used to manufacture semiconductors. The GHG emitted include perfluorocarbons (“PFC’s”), sulfur hexafluoride (“SF<sub>6</sub>”) and nitrous oxide (“N<sub>2</sub>O”). The Permittee also emits carbon dioxide (“CO<sub>2</sub>”) as a product of combustion for its fuel burning equipment.

The Permittee operates two thermal processing units (“TPUs”) to control emissions of SF<sub>6</sub> from the “LRC etch tools” (“LRCs”) and an additional TPU to control SF<sub>6</sub> and CF<sub>4</sub> emissions from the DSE tool (“DSE”). The LRC TPUs were installed to support a voluntary greenhouse gas emissions reduction goal that the U.S. Semiconductor Industry Association agreed to with the USEPA. The exhaust from the tools connected to the TPUs, as well as other tools, are vented to a duct leading to an acid scrubber system and then to ambient. Other tools are vented to an Eisenmann Regenerative Thermal Oxidizer (“RTO”) and general exhaust.

This Plan Approval establishes limits on emissions of GHG from the Facility by setting minimum emission control requirements, combustion efficiency limits, and limits on the use of raw materials; and also by setting monitoring, record keeping, testing and reporting requirements related to the emissions of GHG.

**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>GHG Pollution Control Device (PCD)</b>
1A	All tools associated with the P861 process that use or emit GHGs.	NA	Two TPUs rated at 95% (for SF <sub>6</sub> ) control efficiency each, on the LRC etch tools
1B	All tools associated with the P830 process that use or emit GHGs.	NA	One TPU rated at 95% (for SF <sub>6</sub> ) and 90% (for CF <sub>4</sub> ) control efficiency, on the DSE tool
2	All fuel burning equipment.	NA	Fuel limits
3	All fuel fired emergency generators.	NA	Fuel limits

**Table 1 Key:**

- EU# = Emission Unit Number
- GHG = Greenhouse gas as defined in 40 CFR 98.6
- TPU = Thermal processing unit
- LRC = A proprietary Intel designation for certain tools
- DSE = A proprietary Intel designation for certain tools
- SF<sub>6</sub> = Sulfur hexafluoride
- CF<sub>4</sub> = Carbon tetrafluoride
- % = percent

**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:

<b>Table 2</b>			
<b>EU#</b>	<b>Operational / Production Limit</b>	<b>Individual GHG Air Contaminants</b>	<b>Total GHG Emission Limits as CO<sub>2</sub>e (Note 1)</b>
1A and 1B	The Permittee shall restrict the total quantity of SF <sub>6</sub> , PFCs and N <sub>2</sub> O used to less than what is needed to comply with the CO <sub>2</sub> e emissions noted herein. In addition, the Permittee shall comply with the requirements to control SF <sub>6</sub> and CF <sub>4</sub> emissions as specified in the special conditions (Table 6).	SF <sub>6</sub> , PFCs, N <sub>2</sub> O	13,000 TPM 65,000 TPY
2	1) Natural gas usage at the facility not to exceed <b>5,000,000 therms per 12-month rolling total.</b> 2) Natural gas usage at the facility not to exceed <b>1,000,000 therms per calendar month.</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	4,874 TPM 29,244 TPY
3	1) Gallons of ULSD not to exceed <b>186,000 per 12-month rolling total.</b> 2) Gallons of ULSD not to exceed <b>31,000 per calendar month.</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	296 TPM 1,775 TPY
Facility-wide	See Table 6, Special Terms and Conditions, item 4.	CO <sub>2</sub> e	16,003 TPM 96,019 TPY

**Table 2 Notes:**

Note 1: The total GHG emissions shall be calculated from the mass emissions of individual GHG air contaminants as follows: The Permittee shall utilize the “tons CO<sub>2</sub>e” emission factors as approved by EPA in 40 CFR 98. The carbon dioxide equivalent (CO<sub>2</sub>e) of each individual GHG air contaminant emitted (PFC, SF<sub>6</sub> and N<sub>2</sub>O) shall be calculated according to Equation A-1 of 40 CFR 98.2. The total GHG emissions will be the sum of the CO<sub>2</sub>e of each individual GHG air contaminant.

**Table 2 Key:**

EU# = Emission Unit Number  
 CO<sub>2</sub> = Carbon Dioxide  
 CO<sub>2</sub>e = Carbon Dioxide Equivalent  
 GHG = Greenhouse gas as defined in 40 CFR 98.6  
 CH<sub>4</sub> = Methane  
 PFCs = Perfluorocarbons  
 SF<sub>6</sub> = Sulfur Hexafluoride

N<sub>2</sub>O = Nitrous Oxide  
 ULSD = Ultra-low sulfur diesel  
 TPM = tons per month  
 TPY = tons per consecutive 12-month period

**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:

<b>Table 3</b>	
<b>EU#</b>	<b>Monitoring and Testing Requirements</b>
1A and 1B	1. The Permittee shall install and operate a temperature monitor that continuously monitors operating temperature of each TPU. In the event that temperature falls below a minimum operating temperature, the TPUs will shut off automatically, an alarm system will sound, and the date and time of TPU downtime (and uptime) will be recorded on a continuous monitoring system. The monitor shall be maintained in an accurate operating condition at all times.
	2. The Permittee shall keep a monthly running inventory of all GHG producing raw materials used at the Facility.
	3. a) Every five (5) years, the Permittee shall conduct performance and emission testing on at least one TPU system to determine the capture and destruction efficiency of the control system and to determine compliance with the provisions of this Plan Approval. All TPUs shall be tested at least once every 10 years.  b) Within sixty (60) days of performing the compliance test the Permittee shall supply MassDEP with a copy of the final test report.
	4. If and when MassDEP requires it, the Permittee shall conduct additional emission testing in accordance with USEPA Reference Test Methods and Regulation 310 CMR 7.13.
	5. The Permittee shall monitor the operations of the entire Facility such that necessary information is available for demonstration of compliance with the GHG limits presented in this Plan Approval.

**Table 3 Key:**

EU# = Emission Unit Number  
 GHG = Greenhouse gas as defined in 40 CFR 98.6  
 TPU = Thermal processing unit

<b>Table 4</b>	
<b>EU#</b>	<b>Record Keeping Requirements</b>
Facility-wide	1. 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 12-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> .
	2. The Permittee shall maintain records of monitoring and testing as required by Table 3.
	3. 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.
	4. The Permittee shall maintain a record of routine maintenance activities performed on the approved EU(s), PCD(s) and 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.
	5. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on the approved EU(s) and PCD(s) and 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.
	6. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration.
	7. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years.
	8. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

**Table 4 Key:**

- EU# = Emission Unit Number
- PCD = Pollution Control Device
- SOMP = Standard Operating and Maintenance Procedure
- USEPA = United States Environmental Protection Agency

<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 Central Regional Office of MassDEP, BWP Permit Chief by telephone: 508-767-2845 , email: CERO.Air@massmail.state.ma.us or fax : 508-792-7621, as soon as possible, but no later than one (1) business day after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to Permit Chief at MassDEP within three (3) 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 report annually 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.
	4. 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.
	5. The Permittee shall submit to MassDEP for approval a pretest protocol, at least 30 days prior to emission testing, for performance and emission testing as defined in Table 3 Monitoring and Testing Requirements.
	6. The Permittee shall submit to MassDEP a final test results report, within 60 days after testing, for performance and emission testing as defined in Table 3 Monitoring and Testing Requirements.
	7. The Permittee shall report facility-wide GHG emissions to the MassDEP GHG Reporting Registry in accordance with 310 CMR 7.71.

**Table 5 Key:**  
 EU# = Emission Unit Number

#### **4. SPECIAL TERMS AND CONDITIONS**

A. The Permittee is subject to, and 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>
1A and 1B	<p>1. The scrubber stacks from which the TPU exhaust is finally vented shall have exit heights of at least 50 feet above ground level.</p> <p>2. The Permittee shall ensure that all LRC etch tools emitting SF<sub>6</sub> and the DSE tool emitting SF<sub>6</sub> and CF<sub>4</sub> are equipped with an emission capture system that provides for 100% capture via a permanent total enclosure (or equivalent) , that said system is maintained in good operating condition at all times and that captured emissions are directed to properly functioning TPUs. In the event of a malfunction of a TPU the Permittee shall document the quantity of GHG emitted as result of the malfunction. The total amount of CO<sub>2</sub>e released shall be added to the facility total CO<sub>2</sub>e amount for that period.</p> <p>3. The minimum operating temperature of TPU shall be 1382° F. or 750° C.</p> <p>4. The minimum destruction efficiency of the TPUs on the LRC etch tools shall be 95% for SF<sub>6</sub> emissions. The minimum destruction efficiency of the TPU on the DSE tool shall be 95% for SF<sub>6</sub> and 90% for CF<sub>4</sub> emissions.</p>
2	5. Natural Gas - The Permittee shall only burn natural gas in any combustion equipment located at the Facility (except emergency generators).
3	6. The Permittee shall only burn natural gas or ULSD fuel oil in any emergency generators located at the Facility as approved by MassDEP regulations or existing Facility Plan Approvals.

**Table 6 Key:**

- EU# = Emission Unit Number
- GHG = Greenhouse gas as defined in 40 CFR 98.6
- TPU = Thermal processing unit
- SF<sub>6</sub> = Sulfur hexafluoride
- CF<sub>4</sub> = Carbon tetrafluoride
- CO<sub>2</sub>e = Carbon Dioxide Equivalent
- ULSD = Ultra-low sulfur diesel
- % = percent
- LRC = A proprietary Intel designation for certain tools
- DSE = A proprietary Intel designation for certain tools

**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 Paul Dwiggins by telephone at 508-767-2760, 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.***

---

Roseanna E. Stanley  
Acting Permit Chief  
Bureau of Waste Prevention

Enclosure

ecc: Hudson Board of Health  
Hudson Fire Department  
MassDEP/Boston - Yi Tian  
Capaccio Environmental Engineering