Mr. David Isaacs
Vice President, Government Policy
Semiconductor Industry Association
1101 K Street, NW, Suite 450
Washington, DC 20005

December 22, 2011

Dear Mr. Isaacs:

In a letter dated July 29, 2011, the Semiconductor Industry Association (SIA) requested feedback on a number of questions related to greenhouse gas (GHG) permitting for the semiconductor industry. In a letter dated August 26, 2011, the U.S. Environmental Protection Agency responded to many of SIA's questions. In that letter, we also indicated that our response to one set of questions, related to the use of plantwide applicability limitations (PALs), would be forthcoming. This letter contains our response to the SIA's request for feedback on PALs.

In the final GHG Tailoring Rule, the EPA committed to explore methods to streamline the permit requirements for sources as part of our overall effort to phase-in GHG permitting to the statutory major stationary source thresholds.[1] The EPA is supportive of PALs and we recognize that the structure of the current PAL regulations could be improved for more efficient application to GHGs. Accordingly, as part of our GHG permitting streamlining efforts, we are considering whether to propose amendments to the PAL regulations. We expect these proposed amendments would make the PAL regulations a more effective tool for regulating GHG emissions under the PSD program by making the PAL provisions apply to GHG emissions more consistently with how they apply to other pollutants. Specifically, we are considering making PALs available to sources that do not currently qualify as a major existing stationary source based on their emissions of any regulated air pollutant but that could become major because of their GHG emissions. Further, we are considering whether GHG PALs can be set on either a mass basis or a carbon dioxide equivalent (CO2e) basis. We expect to have a proposal available for comment late winter or early spring 2012 and that any subsequent rule revisions will provide additional permitting flexibility options for SIA member companies, and other similar sources.

The EPA's responses to the specific SIA requests for feedback are presented below. For ease of reference, our responses follow the order of topics contained in your letter.

1. Information used to determine historical actual emissions of GHGs for the semiconductor industry.
2. Setting a PAL for a new facility.
3. Clarification of the way that a GHG PAL and the 75,000 tpy CO2e threshold limit PSD applicability.
4. Conversion of minor source caps to PALs.

[1] 75 FR 31516; June 3, 2010.

1. Information used to determine historical actual emissions of GHGs for the semiconductor industry

Your letter explains that the GHG emissions from semiconductor manufacturing facilities are generally associated with 1) combustion of fuels and 2) process gases used in the fab (e.g., fluorinated GHGs). You also provided a summary of the types of emission-related data generally available for sources to estimate historical emissions, and provided proposed activity data inputs and emission factor approaches that a reviewing authority could use to compute the baseline actual emissions for the purpose of establishing a PAL for GHGs. Specifically, you proposed the following approaches by emissions unit category and requested feedback on whether we consider the proposed data sources and emissions estimation approaches adequate for establishing a GHG PAL:

- For the use of gaseous fuels (natural gas or propane) in combustion equipment (boilers, regenerative thermal oxidizers (RTOs), engines), historical emissions would be based on natural gas or propane purchases and standard emissions factors for GHGs for the combustion of those fuels.
- For the use of liquid fuels (oil, diesel, or distillate) in combustion equipment such as boilers or engines, the following would be used:
    - Boiler emissions would be based on fuel use records and standard emissions factors for GHGs. Fuel use is based on fuel purchases, oil storage tank inventory tracking, or fuel meters on the units.
    - Emergency generator and fire pump emissions would be based on either:
        - Records of hours of operation converted to fuel use and emissions using standard emissions factors, or
        - Fuel use records based on deliveries, purchases or fuel meters and standard emissions factors.
- For the emissions of GHGs from the use of gases in the semiconductor manufacturing process, Tier 2 or Tier 3 methods for emissions determinations, as prescribed in the "2006 IPCC Guidelines for National Greenhouse Gas Inventories," would be used to determine historical emissions.

Response – general

The NSR regulations require permitting authorities to use adequate information to establish baseline actual emissions and for existing units to use information from a consecutive 24-month period from the 5-year or 10-year period, depending on type of unit, immediately preceding either the date the owner or operator begins actual construction of the project, or the date a complete permit application is received by the EPA or by the reviewing authority, whichever is earlier.[2] Where information necessary to establish baseline actual emissions for a given regulated NSR pollutant during a given consecutive 24-month period is unavailable or inadequate, the reviewing authority may not use that period to determine baseline actual emissions. In the preamble to the 2002 NSR reform rule, we stated that the type of data necessary to determine emissions can vary substantially from source category to source category and from process to process within a source category, and agreed with commenters that the adequacy of

[2] 40 CFR 52.21(b)(48)(i), (ii), (iv).

given data should be left to the case-by-case judgment of individual reviewing authorities.[3] Accordingly, as with any source-specific applicability determination, reviewing authorities assess on a case-by-case basis whether any given emissions information is adequate, taking into account industry, source, and process-specific factors, and other considerations as relevant. In all cases, sources may not select years to establish baseline actual emissions during which they lack fundamental process data necessary to estimate emissions (e.g., production rate, hours of operation, raw material/process inputs and/or fuel use).

For GHG emissions, the provisions of the recently finalized rule for mandatory reporting of GHGs (GHG reporting rule)[4] provide procedures for quantifying emissions, on a ton per year basis, for a number of source categories, including general stationary fuel combustion sources and electronics manufacturing. The calculation methods, monitoring and QA/QC provisions of the GHG reporting rule represent EPA's current conclusions on available and appropriate quantification methods for annual emissions quantification by source and emissions unit category. In general, we believe methodologies consistent with GHG reporting rule requirements should be approvable for the purpose of establishing baseline actual emissions and PALs, in most circumstances. Nonetheless, reviewing authorities will make a final determination on the approaches and input data that represent the best available information for quantifying GHG emissions for the particular emissions unit(s).

Combustion units

Based on the information you provided, combustion units located at semiconductor manufacturing facilities generally include boilers, oxidative control systems (e.g., thermal oxidizers or RTOs) and reciprocating engines used for emergency power generation. Fuels used in these combustion units include pipeline natural gas, propane and fuel oil (No. 2 fuel oil or diesel). The GHG emissions from combustion units include carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). SIA's proposed methods for determining baseline actual emissions for combustion units are based on fuel use records (or hours of operation converted into fuel use), standard fuel-specific heating values and literature-based emission factors. SIA's proposed methods generally comport with the Tier 1 methodology contained in the GHG reporting rule, and therefore, we believe that, in general, permitting authorities may accept these methods to establish baseline actual emissions. However, in some instances, these proposed methods may not comport with the level of precision necessary to properly calculate a two year average rate. For example, using fuel deliveries or purchases to calculate emissions from an infrequently used piece of combustion equipment, such as a backup generator, might significantly under or overestimate emissions. As with all applicability calculations, where information is available to more accurately estimate emissions, that information should be used preferentially. For example, if measured fuel heat value data are available for natural gas or fuel oil used in a combustion unit or units at a specific facility, those data should be used in lieu of default values.

In addition, when vendor emissions data are available, it may be appropriate for a source to use these data in lieu of default emission factors for certain types of combustion units such as for reciprocating engines. Emissions of N_2O and CH_4 from such units can vary per unit of fuel heat input depending on the specific design of the engine. Finally, if a source uses default fuel high heat values and emission

[3] 67 FR 80200; December 31, 2002.
[4] 40 CFR 98 Subparts C and I.

factors, we recommend that the source obtain those values from the tables in Subpart C of the GHG reporting rule.[5]

Fab process emissions

Background

Semiconductor manufacturing processes use multiple long-lived fluorinated GHGs including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6), and nitrogen trifluoride (NF_3), as well as N_2O. The industry uses fluorinated GHGs mainly for plasma etching of thin films (e.g., dielectric, metals) and substrate (e.g., silicon), cleaning chemical vapor deposition (CVD) tool chambers, and wafer cleaning. Additionally, the industry uses fluorinated GHG as heat transfer fluids to, for example, cool process equipment and control temperature during device testing. The industry also uses N_2O in deposition and other manufacturing processes.

Available GHG emissions estimation approaches for semiconductor fabs include those contained in Intergovernmental Panel on Climate Change (IPCC) guidance (the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[6] and their predecessor, the IPCC Good Practice Guidance) and the EPA GHG reporting rule.[7] Both references utilize tiered approaches that generally specify more data intensive methods for higher level tiers. The IPCC guidance was designed for estimating national averages of emissions for specific source categories (such as semiconductor manufacturing) rather than facility-specific emissions. However, the same approaches can be used to estimate facility emissions with varying degrees of accuracy depending on data availability. The industry reports having used IPCC Tier 2 methods to estimate and report emissions under the voluntary partnership[8] between SIA and EPA.

On December 1, 2010, the EPA published the final GHG reporting rule provisions for electronics manufacturing (subpart I of 40 CFR 98).[9] The reporting rule requirements reflect the EPA's assessment of industry capabilities and the need for accurate facility-specific emissions estimates.

In January 2011, SIA petitioned the EPA for reconsideration of subpart I based on technical, cost and intellectual property concerns. The EPA has taken several actions that relate to SIA's petition , including: 1) allowing the largest semiconductor manufacturing facilities the option to calculate emissions using default emission factors already contained within subpart I, instead of recipe-specific emission factors, for the plasma etching process type for reporting years 2011, 2012, and 2013; 2) extending the date by which an owner or operator may submit a request to extend the use of Best Available Monitoring Methods (BAMM); and 3) clarifying that the subpart I BAMM provisions for estimating emissions beyond December 31, 2011 do not specify an end date to the period for which the EPA may approve the use of BAMM.[10] These actions provide more time for EPA to work on various

[5] 40 CFR 98 Subpart C, Tables C-1 and C-2.
[6] 2006 IPCC Guidelines for National Greenhouse Gas Inventories; Chapter 6, Electronics Industry Emissions.
[7] 40 CFR 98 Subpart I – Electronics Manufacturing.
[8] PFC Reduction/Climate Partnership for the Semiconductor Industry; see http://www.epa.gov/semiconductor-pfc.
[9] 75 FR 74774, December 1, 2010.
[10] It is important to note that EPA does not anticipate approving the use of BAMM for current subpart I provisions beyond the time that EPA promulgates a final rule with alternative methodologies, which EPA anticipates issuing by January 1, 2014.

approaches SIA has proposed as alternatives to the recipe-specific approach. SIA is currently in the process of providing information to the EPA for consideration and evaluation.

SIA Proposed Methods for Fabs

SIA proposes to use 2006 IPCC Tier 2 or Tier 3 methods for determining baseline actual emissions of GHGs for fabs for establishing GHG PALs. As indicated in your letter and described above, the methods to quantify emissions of GHGs from fab operations are evolving for certain fab process categories, and will likely change as the EPA continues to evaluate alternative methodologies and undertakes further rulemaking.

For years prior to 2011, the 2006 IPCC Tier 2 or Tier 3 methods for baseline periods with corresponding complete records of activity data (e.g., chemical-specific gas consumption rates) likely represent the best available information for establishing baseline actual emissions for establishing a PAL, in many cases. In some cases, however, the best approach may be a hybrid of established methods but this will depend on the availability of historical data needed to apply a hybrid approach. For example, a source may have data, source test data or facility-specific heel factors that would allow for refinement of IPCC Tier 2 methods, and provide more accurate emissions estimates. In all cases, methods used for estimating baseline actual emissions must cover all GHG-emitting processes and equipment within the fab, and all GHGs emitted from those processes. For example, when IPCC methods are employed, those methods must be modified to also account for N_2O, which is regulated as a GHG under PSD but not specifically accounted for in the IPCC methods. Similarly, the IPCC methods may include gases that are not regulated as GHGs under PSD such as nitrogen trifluoride (NF_3).

In the future, facilities looking to obtain a GHG PAL permit for which the baseline emissions will be based on 2011 and later years data should use methods at least as accurate as those contained in subpart I of 40 CFR 98 or any subsequent revisions to that subpart. As a general matter, we expect that baseline emissions calculations based on the methods in subpart I would be acceptable, but where information is available to more accurately estimate emissions, that information should be used preferentially.

It is important to point out that according to the Federal PAL regulations, reopening of a PAL permit is required during the PAL effective period "to reflect a more accurate determination of emissions used to establish the PAL."[11] We do not interpret this provision to require a source to establish a revised PAL based on a different 24-month baseline period when more accurate emissions data becomes available (for example, as a result of implementing GHG reporting rule requirements)**.** It is important**,** however**,** that PAL limits be adjusted to reflect more accurate emissions estimates for the PAL pollutant during the established baseline period**,** to the extent that GHG baseline actual emission rates can be revised to improve accuracy and consistency with monitoring approaches used to demonstrate compliance with the PAL. Such revisions should be made through a PAL permit reopening. For example, assume that a source initially estimated baseline actual emissions for GHGs from a fab using the 2006 IPCC Tier 2a method and later implements a more refined method for the purpose of the GHG reporting rule. If the fab was configured and operated in the same manner during the PAL baseline period, it may be possible to apply the more refined information from the newer method to the baseline period gas purchase data to refine the estimate. Also, in some circumstances, it may not be possible to apply the methods we

[11] 40 CFR 52.21(aa)(8)(ii)(1).

established in the GHG reporting rule to past baseline periods because records are not available for that purpose.

Finally, we would like to acknowledge that state and local permitting authorities may be able to adopt different interpretations and positions regarding adequate information for PAL establishment under their SIP-approved NSR programs. We encourage sources to engage with their reviewing agencies early in the PAL development process to ensure that the applicable regulatory requirements are complied with, to confirm agency policies, and to validate proposed PAL establishment approaches.

2. Setting a PAL for a new facility

Under the current the EPA rules, actuals PALs are available only for existing major stationary sources. Greenfield major stationary sources may not apply for a PAL until the source establishes at least two years of operating data necessary to establish baseline emissions.[12,13] For an existing major stationary source seeking a PAL, emissions units constructed at the source after the selected 24-month baseline actual emissions period and emissions units with less than two years of operation, are counted toward the PAL level using the emissions units' potential to emit, which takes into account legally and practicably enforceable limitations. In summary, a source may obtain a PAL only if it qualifies as an existing major stationary source, but not all emissions units must have at least two years of operation as of the selected baseline actual emissions period.

3. Clarification of the way that a GHG PAL and the 75,000 tpy CO2e threshold limit PSD applicability

In your letter, SIA requested clarification on the role of the 75,000 tpy or more CO2e emissions increase provision, found in the definition of "subject to regulation," for sources that obtain a PAL. *See 40* CFR 52.21(b)(49). The Federal PAL regulations currently authorize permitting authorities to establish only mass-based PALs for GHG, as an alternative means of determining whether a project results in a major modification. The regulations do not authorize PALs for GHG on a CO2e basis.[14] Accordingly, under the current rules, any source that establishes a mass-based PAL for GHG and that emits or has the potential to emit GHGs in excess of 100,000 tpy CO2e, would still have to review modifications to determine whether the project will result in an emissions increase equal to or greater than 75,000 tpy CO2e. Generally, if GHG emissions from a project exceed this emissions threshold, then the source is

[12] In reviewing challenges to EPA's 2002 final rule (67 FR 80186), the D.C. Circuit Court of Appeals ruled that, "EPA erred in promulgating the Clean Unit applicability test." *New York v. U.S. EPA*, 413 F.3d 3, 10 (D.C. Cir. 2005). The Clean Unit applicability test would have allowed major stationary sources to use an emissions unit's allowable emissions limitations to determine whether a project at the emissions unit triggered major NSR permitting requirements. The Court based its ruling on a finding that the CAA requires emissions changes to be measured in terms of "actual" emissions. Following this ruling, EPA abandoned efforts to develop a PAL rule based on allowable emissions.

[13] Technical Support Document for the Prevention of Significant Deterioration and Nonattainment Area New Source Review Regulations. November 2002. Section 7.6.3, p I-7-27.

[14] In certain circumstances, an individual State may be able to interpret its SIP-approved regulations in a manner different from EPA's interpretation of similar Federal regulations, and thus a State may find that its SIP authorizes issuance of a PAL based on CO2e. (See letter dated June 27, 2011 from Ms. Beverly Banister, Director Air, Pesticides, and Toxics Management Division, EPA Region 4 to Ms. Sheila Holman, Director, Division of Air Quality, North Carolina Department of Environment and Natural Resources, objecting to the issuance of a title V permit for the Shurtape Technologies, LLC facility located in Catawba County, North Carolina.)

emitting GHGs as a pollutant subject to regulation and it must determine if it also is exceeding the 100/250 tpy major source statutory thresholds. If the source's GHG emissions exceed the major source statutory thresholds, the source would then be considered a major stationary source because of GHGs and it must determine whether the project will result in a significant emissions increase and significant net emissions increase of any other NSR regulated pollutant. If it does, the project is a major modification for that non-GHG pollutant(s), and the source must obtain a major NSR permit for the non-GHG NSR pollutant before beginning construction. Notwithstanding this emissions increase in another NSR regulated pollutant, if the source maintains GHG emissions below the PAL level, then it will not trigger major NSR for GHG.

4. Conversion of minor source emission limits to PALs

You requested feedback on whether sources can convert existing plantwide synthetic minor limits (or caps) to PALs using a streamlined administrative process. Before responding to your specific request, we need to emphasize that PALs are currently available only for existing major stationary sources as discussed above. As such, before a source could consider converting existing minor source caps to PALs, the source must become a major stationary source because of one or more regulated NSR pollutants. The rest of this response assumes that the source is an existing major source because of one or more regulated NSR pollutants.

Synthetic minor permit limits establish restrictions on a source's potential to emit such that otherwise applicable requirements (e.g., major NSR) do not apply. States often establish such limitations in minor NSR permits. The PAL regulations specify the specific administrative process that a permitting authority must use to establish a PAL permit. These regulations do not provide a streamlined approach for converting a synthetic minor plantwide emissions cap into a PAL. Establishment of a PAL requires that a source meets all of the substantive and procedural requirements in 40 CFR 52.21(aa)(1) through (15) or the equivalent SIP-approved state regulations, including permit application, permit content, monitoring, and reporting and notification requirements. We believe these procedures are necessary to assure that PAL permits satisfy Clean Air Act statutory requirements, including requirements for public participation.

Notwithstanding the lack of an approved streamlined procedure for converting synthetic minor limitations to PALs, sources with facility-wide emissions caps may nonetheless, experience improved efficiencies in obtaining PAL permits as a result of having minor source caps permits. For example, some of the established monitoring, testing, recordkeeping, and reporting conditions contained in the synthetic minor permit may be appropriate for a PAL permit, and therefore application of those conditions in the PAL may expedite the permit application process and simplify implementation of the final PAL permit requirements. Given the usefulness of PALs as an NSR compliance mechanism that provides opportunities to respond quickly to change, EPA encourages state and local permitting authorities to complete PAL permitting actions, including such actions to convert minor source cap sources to PALs, in an expeditious and efficient manner.

<u>Conclusion</u>

PALs offer a voluntary alternative for determining NSR applicability that can provide sources with significant flexibility to manage facility-wide air emissions without triggering major NSR permitting

requirements. As a result, PALs allow sources to respond rapidly to market conditions while maintaining environmental protections that are consistent with the goals of the NSR program. The EPA supports PALs and is committed to working with state and local permitting authorities to provide assistance for the implementation of the PAL provisions and other elements of the EPA NSR regulations in all state and local agency and tribal jurisdictions, including areas in which SIA member company facilities are located. The EPA will continue to work with SIA and its member companies, on an as-needed basis, to encourage permitting authorities to adopt the federal PAL provisions.

In addition, as stated above, in the final GHG Tailoring Rule we committed to explore methods to streamline the permit requirements for sources as part of the EPA's overall effort to phase-in GHG permitting to the statutory major stationary source thresholds. We recognize that the structure of the current PAL regulations could be improved for more efficient application to GHGs. Accordingly, as explained above, we are considering whether to propose amendments to the PAL regulations to make them a more effective tool for regulating GHG emissions under the PSD program by making the PAL provisions apply to GHG emissions more consistently with how they apply to other pollutants.

Our responses in this letter are based on our interpretation of the Federal PSD regulations. We encourage you to work with your reviewing agencies to confirm the specific requirements applicable to individual semiconductor manufacturing facilities based on the regulations that apply in that area.

I appreciate this opportunity to respond to your questions, and I hope this response answers your questions. If you have additional questions, please contact Juan Santiago at (919) 541-1084.

Sincerely,

/s/ Stephen D. Page

Stephen D. Page
Director
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cc:
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