NEC Electronics America, Inc.
Roseville Manufacturing Facility
7501 Foothills Boulevard
Roseville, CA 95747
Telephone (916) 786-3900

Barbara Fry, Chief
Measurements Assessment Branch
Stationary Source Division
California Air Resources Board
1001 I Street
P.O. Box 2815
Sacramento, CA 95812

February 4, 2009

Subject: Comments Regarding ARB Report: "Initial Statement of Reasons For Proposed Regulation To Reduce Greenhouse Gas Emissions From Semiconductor Operations"

The NEC Electronics America, Inc. Roseville site (NEC) appreciates the opportunity to comment on the California Air Resources Board's (ARB) report entitled, "Initial Statement of Reasons For Proposed Regulation To Reduce Greenhouse Gas Emissions From Semiconductor Operations". The proposed regulation order, California Code Of Regulations, Title 17, Subchapter 10 (Climate Change), Article 4 (Regulation To Achieve Greenhouse Gas Emission Reductions), Subarticle 2 (Semiconductors and Related Devices), sections 95320-95326 is included in this report. We have analyzed the report and the proposed regulation. We continue to have the same serious concerns that we have expressed previously with ARB staff at prior public workshops and meetings. These concerns are:

- The proposed Semiconductor Industry Emission Reduction target is too aggressive under the current proposed schedule.
- ARB is using 2006 as a base year for measuring compliance, which fails to take into account the prior emission reduction accomplishments of companies such as NEC.
- We disagree with the stated economic impact, the methods used to derive the cost of compliance by the State, and by extension, its impact on ARB's aggressive proposed emission reduction standard.
- In addition to NEC, two other companies are being unfairly charged with achieving 69% of ARB's proposed emission reduction standard.
- NEC is strongly opposed to the tier system proposed by ARB.
- There is no specific guidance for the Air Districts regarding how permit fees will be assessed and how confidential business information will be controlled.

1. Proposed Emission Reduction Target Is Too Aggressive

NEC's most important concern is the Semiconductor Industry Emission Reduction target of 0.18 $MMTCO_2e$ and the January 1, 2012 deadline for meeting this target. The target is far too aggressive for a 2-year period and presents a severe financial impact on the semiconductor industry in California and affects the industry's ability to be competitive in the global market. The January 1, 2014 deadline for companies converting from 150 mm to 200 mm wafer equipment is also potentially too aggressive.

Section 38560.5(a) of the California Health & Safety Code calls for early reductions, but does not call for the 2-year time period of 2010-2011 that ARB is currently proposing. The regulation calls for early reduction actions to begin 1 year before the remaining actions that ARB will target. The regulation calls for emission reductions "that can be reasonably achieved"," but it does not call for all of an industry's emission reductions to be completed within such a short time period.

NEC feels it is reasonable to target a 25% reduction from 2006 levels by January 1, 2012, and require another 25% to be completed incrementally in progressive 2-year periods by AB32's main deadline of 2020. This would require ARB to modify the semiconductor industry's early Emission Reduction target from 0.18 $MMTCO_2e$ to 0.045 $MMTCO_2e$, and the final target would be 0.09 $MMTCO_2e$. This is not an unreasonable adjustment because according to ARB staff, the 2000 emissions inventory was determined to be 1.23 $MMTCO_2e$ and the 2006 emissions inventory was 0.27 $MMTCO_2e$. **This means that semiconductor emissions have already been reduced by 78% from 2000 to 2006**.

There are key benefits to this approach. Many companies are struggling in this current economy and it may take several years to obtain the necessary capital for the expensive abatement equipment that will be needed to comply. Some companies, including NEC, will need to install end-of-pipe abatement systems to meet the current aggressive emissions reduction target. Dedicated technology for these systems does not actually exist. It can only be completed by manifolding together several smaller thermal abatement units. Recovering the condensed gases from the exhaust, instead of burning it at very high temperatures and creating CO_2, represents the most promising technology. However, there is only one known manufacturer and the design is still being tested. These are all excellent reasons why ARB should lower the Emission Reduction target and extend the final compliance deadline over multiple incremental periods.

2. <u>Using 2006 As The Base Year Ignores Prior Emission Reductions</u>

ARB is using 2006 as the base year for establishing its semiconductor emission reduction target. The use of 2006 as a base year does not take into account the fact that companies like NEC have already made major gains in reducing greenhouse gas emissions. Prior to releasing the proposed regulation, ARB staff stated on several occasions that the forthcoming standard would acknowledge and take into account the proactive steps a semiconductor company had taken under a voluntary agreement with the U.S. EPA to reduce PFC emissions. This agreement, known as the EPA Memorandum of Understanding (MOU) utilizes 1995 as the base year. NEC has proudly participated in this program since its inception. However, instead of recognizing how far the semiconductor industry has come in the way of reducing emissions, the proposed standard completely ignores these early reductions by using 2006 as the base year when setting the industry's targeted emission reductions. NEC has reduced PFC emissions from 1995 to 2006 by 30% under the MOU program, but will get no credit for these reductions. Please note that this was accomplished despite a very significant growth in production during that period.

In addition, sections 38562(b)3 and 38563 of Title 17, give ARB broad authority to provide "early reduction credit where appropriate". NEC believes that early reduction credit can be addressed through either of the following changes:

1. ARB could use 2000 as the base year by using its current 2000 emission inventory estimate, or conduct another state-wide emission inventory assessment. The same reduction target (i.e. 59%) could be applied to the 2000 emission inventory. The maximum emissions limits in Table 1 of proposed section 95323 would then be modified accordingly. Or,

2. Those companies who which have participated in the EPA's MOU program could be allowed to use 2000 as their base year when calculating compliance. The difference between their 2000 and 2006 emissions inventory should be applied when determining how much their emissions will have to be reduced to meet the proposed emission reductions in Table 1. See the following matrix for an example:

Company A *(an MOU participant)*		
MOU Reported Emissions For 2000	ARB Reported Emissions For 2006	Tier 1 Emissions Limit
1.1 Kg CO_2e/cm^2	0.7 Kg CO_2e/cm^2	0.2 Kg CO_2e/cm^2
1.1 – 0.7 = 0.4 Kg CO_2e/cm^2 *(Emission reductions made during 2000-2006.)*	0.7 – 0.2 = 0.5 Kg CO_2e/cm^2 *(Reduction required in proposed regulation.)*	
Give Credit For 2000-2006Reductions By: (0.5 – 0.4 = 0.1 Kg CO_2e/cm^2) Therefore, *Company A* Would Only Have To Reduce Its' 2006 Emissions By: 0.1 Kg CO_2e/cm^2		

The MOU data is just as verifiable as the data that ARB will be requiring for compliance when the regulation becomes effective. This would be consistent with ARB's prior verbal commitment, (and with the intent of Title 17) to make sure that the MOU companies are credited for their prior efforts to reduce emissions of global warming gases. NEC has voluntarily participated in this program and we believe that the efforts of the MOU companies should be acknowledged with this type of innovative regulatory language. The current ARB proposal only serves to sanction those MOU companies who have not had the financial ability to achieve the near total elimination of the emission of global warming gases that the proposed regulation will require.

3. <u>Economic Impact Analysis Conclusions Are Inaccurate</u>

Based upon prior verbal statements made by the ARB staff, it appears the intent of having different Tiers is to impose a disproportionate burden of the cost of compliance to upon those companies that ARB feels can best afford it. Given that the economic condition in California is perhaps at its worst since the Great Depression, how did ARB ascertain that the 13 companies that will be required to reduce their emissions will be able to obtain $21.8 million and have the necessary abatement projects completed by January 1, 2012? It is not reasonable in our opinion for ARB to assume that a company can use all of its' net profits during the interim period, and/or obtain bank loans, in order to comply with this proposed standard. It is also not acceptable in keeping with industry standards for ARB to amortize the costs over 10 years. The $21.8 million in initial costs are more commonly capitalized by private industry over a 5-year period. This would essentially double ARB's estimated cost of abatement per metric ton from $21 to $42. Regardless, where will the money come from during a severe economic recession?

The report states that another 4 semiconductor companies in California will soon be ceasing operations. As stated previously, NEC believes the financial impact of this regulation will be severe enough that it is very likely more companies may curtail or terminate operations. At a minimum, it will drive the cost of doing business in California

high enough that semiconductor companies will have reduced sales, reduced profit, and will be less competitive in a global market. Other factors that are not accounted for are the economy, future growth in production, and the financial impact of other revised regulations being promulgated by Cal-EPA. Please also note that the semiconductor industry has been through a cyclic series of highs and lows in sales. It is risky for ARB to propose an aggressive standard that could end up exacerbating the current down cycle. This could adversely impact future investment in new plants and equipment, which would be devastating to California's semiconductor industry.

The current state of the world's rapidly declining economic condition needs to be taken into account. This is especially important if the current recession continues into 2010-2011. All business that is lost will move to other states or foreign companies, which does not change the effect on global warming. In fact, to the extent production is shifted to locations which are less regulated, the global warming effect will be exacerbated. The emission reduction target is so aggressive that it will require >95% emissions reductions for any new manufacturing equipment that will be needed to support future growth in production. This is especially burdensome for California's semiconductor industry when the World Semiconductor Council member companies have set a 10% reduction target versus ARB's proposed 59% reduction target. Another factor that affects NEC directly is that the Regional Water Quality Control Board lowered its' fluoride discharge limit for this region, which will require NEC to spend as much as $3,000,000 by June 1, 2012 in order to meet this new requirement.

ARB's methodology used to prepare their Economic Analysis significantly underestimates the cost of compliance, fails to address leakage, and is inaccurate when it states there will be "no significant impact" on "business". If ARB chooses to move forward with this proposed regulation, just 3 semiconductor companies will be targeted to achieve 69% of the State's targeted emission reductions for the semiconductor industry. The condition of the economy in California for the foreseeable future is bleak, at best. It is our hope that it will become clear that the long-term impact of the cost of compliance by the affected 13 companies needs to be reevaluated more carefully.

4. <u>Tier 1 Companies Are Being Unfairly Targeted</u>

NEC is concerned that the proposed regulation unfairly penalizes those companies that are producing more complex products that require the use of more PFC gases per wafer. The data presented at previous Workshop Meetings, and the subsequent discussion by the attendees, clearly suggests that using a simplified method such as emissions per wafer area does not adequately reflect a particular company's operations. The complexity of the semiconductors produced by each company is best reflected by the average number of "masking layers" per wafer. This number can vary widely between among semiconductor companies. The number of masking layers per wafer is very closely associated with the number of "steps" that require the use of PFC gases. This fact should hopefully prompt ARB to reassess the concept of "maximum technological feasibility" as related to NEC's operating scenario.

Unless ARB can lower its' Emission Reduction target, it is our proposal that ARB resurvey all of the affected companies and ask them to provide the annual average of masking layers per wafer for 2006. This particular variable is easy for a producer to determine and report. Please note that this is confidential business information. Any

claims by an organization that it can provide this information regarding other companies' production methodologies must be considered to be unreliable.

It is NEC's request that if the Tier system is retained, it should be reformatted with a masking layer factor in lieu of using the wafer surface factor. While conducting another survey will take additional time, the masking layer variable provides the fairness that ARB seems to be seeking, especially when assessing those companies that have already made significant emission reductions. The 3 tiers in Table 1 of proposed section 95323 can be redefined as:

Tiers	Average Masking Layers	Maximum Emissions Limit
Tier 1	1 -10	0.20 Kg CO_2e / cm^2
Tier 2	11 – 20	0.30 Kg CO_2e / cm^2
Tier 3	>20	0.50 Kg CO_2e / cm^2

NEC believes the proposed regulation unfairly targets a company making more complex products that require a higher amount of PFC gases per wafer. As an example, NEC is averaging >20 masking layers per product while many of the other companies in California are averaging about 5 layers. It would be more equitable to use the this modification of the Tier system, or simply eliminate the Tier system.

5. <u>NEC Is Opposed To The Proposed Tier System</u>

A major NEC concern is the tiered approach that ARB has unnecessarily imposed on the regulatory process. NEC is strongly opposed to the current proposed tier system. The Economic Analysis does not provide either an explanation of how these tiers were derived and or an adequate explanation of the purpose of the tiers. However, ARB staff has verbally stated that the Tier system was designed to burden the largest producers with the majority of the State's emission reduction target and the majority of the costs to achieve these reductions. As stated previously, the proposed standard unfairly burdens 3 companies with 69% of the total emission reductions for the entire semiconductor industry. Please note that NEC is one of these three companies and, as discussed earlier, has been an active EPA MOU participant.

The proposed reductions for the Tier 2 and Tier 3 companies only amount to 31% of the proposed standard's total emission reduction goal. Based upon our internal projected emissions for the proposed compliance date, NEC will be forced to achieve >40% of ARB's targeted emission reductions for the entire state of California. As stated earlier, NEC has already made substantial emission reductions. Unfortunately, this proposed regulation will sanction those MOU companies that have already made substantial investments to reduce emissions. However, the Tier system could be made more equitable by using the masking layers concept as discussed in section 4.

6. <u>No Specific Guidance For Air District Permitting</u>

NEC is already paying the Placer County Air Pollution Abatement District approximately $66,000 per year in permit fees. It is our expectation that the large number of devices that will be required for NEC to comply with the proposed standard would cause NEC's fees to rise by about 50%. As a solution, we are requesting that the proposed regulation state that a single permit shall be utilized per site for all devices used to reduce the emissions of global warming gases as required by this regulation.

The proposed regulation also has no provisions for requiring the air districts to protect all information submitted by an affected company as, "Confidential Business

Information" (CBI). This is an extremely important consideration because some of this information can be used in a detrimental manner by competitors. Although the ARB has strict internal controls for CBI, it should not be assumed that all of the air districts have similar controls.

SUMMARY

Considering our serious concerns, it is our hope that ARB will reassess the economic impact that this proposed regulation will have on our operations in Roseville and more broadly on California's semiconductor industry. Section 38560.5(c) establishes two key requirements for discrete early emission reductions: "achieve the maximum technologically feasible and **cost-effective** reductions in greenhouse gas emissions." Moreover, sections 38562(b)3 and 38563 of Title 17, gives ARB broad authority to provide "early reduction credit where appropriate". NEC has already reduced its' emissions by 38% from 2000 to 2007. Due to the fact that NEC is an MOU participant and that it is a Japan-owned company that chooses to adhere to the Kyoto Protocols for all of its' sites, NEC Roseville is planning on additional emissions reductions whether or not this new ARB regulation is imposed in its current form. Unfortunately, ARB's current proposed regulation will require a much higher reduction that is not cost-effective.

The current approach by ARB does not meet AB32's requirement to institute "cost-effective" regulations that are "technologically feasible" and to not create "leakage"." Flexibility is provided in AB32 through the "Alternative Compliance Mechanism," and but this flexibility has not been included in the proposed regulation. AB32 provides ARB the ability to utilize flexible compliance schedules and ARB needs to implement this regulation as it was intended.

The ARB is requested to take our comments seriously and to please find a way to address our concerns by both extending the final compliance deadline to 2018 and by lowering the semiconductor Emissions Reduction Target by 50%, from 0.18 MMT CO_2e to at least 0.09 MMT CO_2e. As a reminder, semiconductor greenhouse gas emissions have already been reduced by 78% from 2000 to 2006. No other industry in California has achieved such an outstanding environmental accomplishment.

It is our hope that ARB will address our concerns related to its' proposed standard to reduce the emissions of global warming gases in a manner that is both cost-effective and prevents companies from sustaining a severe financial impact from the high cost of compliance. Alternative methods have been outlined in this letter for ARB to establish reasonable emission reduction targets that meet the specific requirements of AB32. If leakage of production occurs as we would expect, the regulation will not mitigate and, in fact, may exacerbate a problem that has a global effect. Another facility on another part of this planet will get the lost business that will be inevitably forced out of California by this proposed regulation and it will likely be a company in a third-world country that is making a minimal effort to reduce these emissions.

Gabe Kim, Plant Manager
NEC Electronics, Inc.
Roseville Site