October 24, 2007

Ms. Mary Nichols
Chairperson

Mr. Tom Cackette
Chief Deputy Executive Officer

Mr. Bob Fletcher and Mr. Mike Tollstrop
California Air Resources Board
1001 "I" Street
Post Office Box 2815
Sacramento, California 95812

Subject: Additional Comments on the California Air Resources Board Final Expanded List of Early Action Measures Published October 2007

Dear Ms. Nichols, Mr. Cackette, Mr. Fletcher, and Mr. Tollstrop:

As members of the California cement industry, we would like to share our detailed concerns about the final "Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board Consideration" (California Air Resources Board's [ARB's] Final EAM Report, October 2007). Also referenced in this letter is the California Environmental Protection Agency (CalEPA) Climate Action Team's (CAT's) Updated Macroeconomic Analysis (September 7, 2007). The early action measures proposed for the cement industry ("Cement EAMs") are not consistent with ARB's mandate under AB 32. It will take research and hard work to turn the Cement EAMs into measures that meet the statutory requirements, while maintaining the safety and affordability of cement supplies necessary to California's economic and environmental objectives. We look forward to working with ARB to accomplish this goal.

Our primary concern with the Cement EAMs is the problem of leakage. Leakage occurs when regulatory requirements and their associated cost burdens cause production and GHG emissions to shift from California to other unregulated jurisdictions, with a consequent increase in overall GHG emissions, instead of the decrease originally intended. The California legislature recognized leakage as unacceptable and included a requirement in AB 32 directing ARB to minimize leakage. Below we discuss this problem in greater detail. We also discuss other ways in which the Cement EAMs, as currently proposed, fall short of the AB 32 requirements.

Two cement measures were assigned to the early action measures list in ARB 's EAM report: Cement energy efficiency (in other words, cement plant equipment replacement) and blended cements (which is blending Portland cement with cement substitutes that have lower GHG emissions). Originally we intended to request the re-assignment of these two cement measures from the early action measures list to the scoping plan, in light of the long time needed to develop and implement these measures, as well as other deficiencies. We have been assured by ARB counsel that the early action measures will meet the same statutory and regulatory requirements and be accorded the same legal protections under AB 32 as scoping plan measures. Therefore, we have refocused our comments on our evaluation of the cement measures under the AB 32 statutory requirements that apply to both scoping plan and early action measures. We understand that if, during the upcoming regulatory development process, ARB discovers that one of the cement early action measures is either not technologically feasible, not cost effective or both, ARB will eliminate that measure from further consideration. However, if future ARB actions or changes in the legal framework lead to a reversal of the assurances made by ARB counsel about early action measures, we note for the record that we have significant concerns about the validity of the assignment of the cement measures to the early action measure list.

Although we have concerns about both cement measures, we are especially concerned about the cement energy efficiency measure. We believe that the assignment of the cement energy efficiency measure to the early action measures list has no technical basis and is completely arbitrary. We have conducted detailed research into the references on cement energy efficiency that ARB used to make the assignment to the early action measures list. These references demonstrate that the cement energy efficiency measure is uncertain and its technical feasibility is questionable. Even if the GHG reductions can be achieved, the reductions will be small and will come at a high cost. The small reductions combined with extremely high cost makes this measure inconsistent with CalEPA's own cost effectiveness policies for AB 32, as presented in the Climate Action Team macroeconomic analysis.

The remainder of this letter addresses several topics relating to the future regulatory development process:

- Problem of leakage in the cement industry;
- Legal framework for evaluation of cement GHG measures;
- Comparison of cement energy efficiency measure with AB 32 statutory requirements;

- Discussion of ARB's blended cements early action measure; and

- Plans for future regulatory development on blended cements.

We encourage ARB to use this letter to help guide its future actions in the cement industry, and we would like to work with ARB in implementing the recommendations in this letter.

Problem of Leakage in the Cement Industry

Before discussing our recommendations about the regulatory development process for the cement measures, we would like to discuss leakage. Due to the unique conditions in the California cement industry, leakage should be one of the primary considerations in developing cement GHG measures. Without serious and thoughtful consideration of the leakage problem, the cement GHG measures will be completely ineffective. The points below provide a summary of the comments made in a separate technical paper, submitted to ARB today ("Minimizing Leakage under Climate Change Proposals Affecting the California Cement Industry"). This paper discusses leakage issues in detail, including supporting data. The paper shows that the conditions of competition in the California cement industry make it highly vulnerable to additional costs, and such increased costs will necessarily lead to increased imports of cement, and consequently leakage. Certain features that are unique to the cement industry make this result virtually inevitable under the proposed regulatory scheme:

- Cement is a homogeneous, bulk commodity that is highly substitutable and sold almost exclusively on the basis of price. Thus, customers are generally indifferent to purchasing California-produced versus imported cement.

- The California cement market is a regional market that is isolated from the rest of the United States and competes almost exclusively with imports from outside the United States, and cement imports are readily available in California and already widely used. (Currently, 40 percent of cement consumed in the state is imported.)

- The cement industry is highly capital intensive, and in order to sustain profitability and limit unit costs, both California and foreign producers must keep sales and capacity utilization at high levels. Thus, producers have an enormous incentive to sell excess capacity at low prices, and other producers are forced to match such prices, even in the face of increasing compliance costs.

- New investment in the California cement industry is already subject to high barriers, as evidenced by the absence of any capacity expansion from 2002 to 2006 and by the fact that only one expansion project is expected prior to 2012. Additional compliance costs that are not shared by imports will result in even greater barriers to investment. Hence, the AB 32 cement rules will be ineffective because the investments that the rules are intended to bring about will not occur.

Business interests often express concern that increases in compliance cost will adversely affect their competitiveness or the cost to the consumer. However, it is critical that ARB not ignore this industry's documented concerns, as AB 32 requires ARB to minimize leakage when implementing related regulations. As noted above, we have provided ARB with a detailed paper that demonstrates unequivocally that, if AB 32 imposes additional compliance costs on the California domestic cement industry, these manufacturers will be unable to pass through the costs and will likely not survive without measures imposing a similar cost burden on imports. Therefore, in the absence of an equivalent burden on cement imports, leakage will occur, and overall GHG emissions will increase rather than decrease as a result of AB 32 provisions for the cement industry.

Legal Framework for Evaluation of Cement GHG Measures

AB 32 establishes a number of criteria that must be met by the regulatory programs adopted by ARB. First and foremost, the measures adopted must accomplish the statute's objective: reducing GHG emissions. This landmark legislation does not focus solely on GHG emissions from California, but broadly recognizes that imprudent measures that reduce emissions within the borders of the state may cause an increase in GHG emissions elsewhere. As noted above, AB 32 requires ARB to minimize leakage.

In addition to minimizing leakage, the evaluation and regulatory development process for cement GHG measures – and all other measures – must meet the following AB 32 statutory requirements:

- ARB must adopt measures that achieve maximum technological feasibility and cost effectiveness.

- ARB must adopt measures in a "manner that is equitable, seeks to minimize costs and maximize the total benefits to California."

- ARB must conduct its evaluation of measures by using the "best available economic models, emission estimation techniques, and other scientific methods."

Indeed, all cement measures that are evaluated by ARB must receive the above considerations under AB 32 statutory requirements, not just those that are discussed in detail in this letter.

In the next section, we discuss how ARB 's evaluation of the cement energy efficiency measure thus far has not met these requirements. Significant further work is needed to meet these standards, which apply to both early action measures and scoping plan measures. To assist ARB and continue the dialogue, we also present below our general recommendation for the evaluation procedures to be used during the future regulatory development process for all cement measures.

We recommend that the evaluation of all measures, including early action measures, incorporate the following steps, which we understand to be part of the scoping plan:

- Comparison of cost effectiveness between measures for the same sector and amongst the different sectors. This comprehensive approach will ensure that equity is achieved, benefits are maximized, and costs are minimized.

- Consideration of a cap and trade program. The use of market mechanisms, where appropriate, will ensure that the most effective and economically sound approach is selected for each sector.

- Evaluation of compliance alternatives. It is important to allow maximum flexibility in complying with GHG standards, to avoid overly rigid regulations that stifle innovation.

Full implementation of these steps for all GHG measures considered is essential to ensuring that the above AB 32 statutory requirements are met.

Comparison of Cement Energy Efficiency Measure with AB 32 Statutory Requirements

The cement energy efficiency measure, as currently proposed, does not meet the three AB 32 statutory requirements outlined above.

First, ARB is required under AB 32 to select measures that achieve maximum technological feasibility and cost effectiveness. A review of the Worrell & Galitsky report upon which ARB's cement energy efficiency measure is based (Energy Efficiency Improvement Opportunities for Cement Making, Lawrence Berkeley National Laboratory, January 2004) demonstrates that the cement energy efficiency measure does not meet technological feasibility and cost effectiveness standards for the following reasons (see Table 1):

- The baseline power consumption per unit of cement assumed by Worrell & Galitsky was 150 kWhr/ton cement (dry process kilns). Current average power consumption by California plants, as recently reported by PCA to ARB, is 131 kWhr/ton cement (all California kilns are dry process kilns). Because the current power consumption is below the baseline level quoted by Worrell & Galitsky and achievable reductions are directly related to the starting condition of the equipment, it is likely to be difficult to achieve the reductions specified in Worrell & Galitsky.

- In examining the basic references that Worrell & Galitsky summarizes in its review paper, we have discovered that many of the reductions listed by Worrell & Galitsky for specific equipment changes are overestimated, due to errors in transferring the information or because offsetting power consumption increases associated with the projects are not taken into account.

- In addition, there are problems in evaluating reductions for combined equipment changes because the power consumption reductions for multiple equipment changes are not necessarily additive. Further work is needed to evaluate the overall reductions that combined equipment changes might achieve.

Overall, we conclude that the reductions achieved as a result of the equipment changes described in Worrell & Galitsky are likely to be smaller than expected by ARB. This means that the value of the cement energy efficiency measure in terms of contribution to overall GHG reductions needed will be smaller than expected, and that the dollars per ton CO_2 will be higher than expected. Extensive further work would be needed to assess whether the cement energy efficiency measure would meet the statute's requirements of technical feasibility and cost effectiveness. Data currently available demonstrates that these standards cannot be met.

Second, ARB is required under AB 32 to adopt measures in a "manner that is equitable, seeks to minimize costs and maximize the total benefits to California". The Climate Action Team (CAT) updated macroeconomic report issued on September 7, 2007, identifies 134 million metric tons per year of GHG emission reductions from measures with costs below $60 per metric ton (MT) CO_2. In contrast, ARB indicates that the cement energy efficiency measure will achieve a reduction of only 0.3 million metric tons CO_2 per year at a cost of $1,100 to $1,300 per MT CO_2. ARB 's selection of the cement energy efficiency measure over other, less expensive measures highlights a substantial inequity between treatment of different sectors of the economy, as well as a failure to maximize benefits and minimize costs. Evaluating measures for their relative cost effectiveness, as we anticipate will be done under the scoping plan, is important, because the

more expensive the reductions selected are, the fewer reductions that will be made and also the greater the burden on the public, resulting in a backlash against the regulation.

Third, ARB is required under AB 32 to conduct its evaluation of measures using the "best available economic models, emission estimation techniques, and other scientific methods." This clearly has not been done for the cement energy efficiency measure. For example, a review of recent publications on energy efficiency (see Table 2) shows that the same experts who wrote a report on cement energy efficiency also wrote a report on petroleum sector energy efficiency (Profile of the Petroleum Refining Industry in California, Lawrence Berkeley National Laboratory, March 2004, and Energy Efficiency Roadmap for Petroleum Refineries in California, Energetics, Inc., Final Report, April 2004). The authors, Worrell & Galitsky, concluded in both cases that evaluating technical feasibility and cost effectiveness requires a site-specific analysis, because their findings are for plants across the U.S., whereas California plants are already very efficient. Here, we have the same government agency sponsoring the research, the same authors, and the same approach in both reports, and both reports concluded that it was not possible to assess technical feasibility or cost effectiveness across the industry. Yet ARB assigned the petroleum sector energy efficiency measure to the scoping plan whereas they assigned the cement energy efficiency measure to the early action list.

Furthermore (see Table 3), whereas the Worrell & Galitsky report on the petroleum sector identified a large number of measures with payback periods of two years or less, the Worrell & Galitsky report on the cement sector indicated that almost all of the proposed cement power consumption-related projects had payback periods of ten years or more, implying that these projects are not cost effective. Nonetheless, ARB assigned the proposed GHG reduction measure that was significantly less cost effective, the cement sector energy efficiency measure, to the early action measures list, and the more cost effective measure, the petroleum sector energy efficiency measure, to the scoping plan. Therefore, this decision by ARB does not meet the standards of "best available" information and appears to be arbitrary.

Discussion of ARB's Blended Cements Early Action Measure

The blended cements measure, as currently proposed, suffers from many of the same deficiencies as the cement energy efficiency standard. However, we are more optimistic that a cement blending measure can be developed that meets the requirements of AB 32. The issue is complex, and there are many technical and logistical hurdles to be overcome in developing such a measure. For example, since the bulk of blending now takes place at ready-mix facilities rather than the cement plants, involvement of the ready-mix facilities is needed to take advantage of existing infrastructure, to assure the most cost effective measure. In addition, it will require

significant additional work to determine the percentage of substitutes that might be used in the various cement products and applications without compromising quality and performance. We recognize that this will not be an easy task, and we in the cement industry look forward to working with ARB staff to complete it. Because of these complexities in implementation, we believe that this measure also will have difficulty meeting the timeframe for being an early action measure. However, we support this measure and will assist ARB to overcome the technical and logistical hurdles so that this measure can be implemented.

By working together to maximize the emission reductions under the blended cements measure, ARB and the cement manufacturers can achieve higher emission reductions sooner than for the combination of the energy efficiency measure and the blended cement measure as currently envisioned by ARB. Hence, there would likely be no need to pursue the cement energy efficiency measure.

Plans for Future Regulatory Development on Blended Cements

We recommend the following plan for development of the blended cements regulation, and will work with ARB to analyze and define the applicability, requirements, recordkeeping and reporting, compliance schedule, and other provisions.

As an initial step, we are developing comments for the mandatory reporting workshop on October 31, 2007. Our comments will explain that, for the blended cements rule to work, mandatory reporting regulations must include reporting of ready-mix concrete product sold, to track the use of cement substitutes, and must also address reporting of cement imports as well as cement production, to confirm the extent of substitution.

Further, we offer to help ARB perform the technical studies necessary to develop a future blended cements rule that is technologically feasible and cost effective:

- Modifications to specifications for concrete products in coordination with Caltrans and other government agencies
- Education and incentives for ready-mix facilities to broaden the use of substitutes in concrete products for all projects, including non-government projects
- Technical research and demonstration projects to address problems with product quality, consistent performance, and special handling needs.

- Provisions for ensuring adequacy of supply of substitutes and fair market practices in distribution.

Conclusion

The Cement EAMs as described in the EAM Report are neither technologically feasible nor cost effective. However, the cement manufacturers are optimistic that a blended cements measure can be developed that meets the AB 32 criteria. The cement manufacturers are committed to working with ARB on development of such a measure. In furtherance of that aim, representatives of the cement manufacturers will contact ARB to schedule a meeting as soon as possible with ARB staff involved in the cement measures assigned to the EAM list. In the meantime, we are continuing to collect more detailed technical information in preparation for this meeting.

Sincerely yours,

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Attachments:
Table 1: Examples of Discrepancies Identified in Worrell & Galitsky Cement Paper
Table 2: Comparison of Cement and Petroleum Energy Efficiency Measures
Table 3: Further Comparison of Cement and Petroleum Energy Efficiency Measures

Table 1: Examples of Discrepancies Identified in Worrell & Galitsky Cement Paper

Total baseline or Reduction due to	Value per Worrell & Galitsky	Correction after Review
Total baseline power consumption	150 kWhr/ton (U.S. average for dry process)	131 kWhr/ton (CA average, all dry process)
Pre-grinding on ball mill	6 - 22 kWhr/ton	4 - 14 kWhr/ton
High-pressure roller press	6 - 25 kWhr/ton	6 - 12 kWhr/ton

Table 2: Comparison of Cement and Petroleum Energy Efficiency Measures

Item	Petroleum EE Measure	Cement EE Measure
California plants already very efficient	True	True
Significant capital investment involved	True	True
Cost estimate requires site-specific analysis	True	True
ARB assignment in draft EAM report	Scoping plan	Early action

Table 3: Further Comparison of Cement and Petroleum Energy Efficiency Measures

Aspect	Petroleum EE Measure	Cement EE Measure
CEC Study Authors	Worrell & Galitsky	Worrell & Galitsky
Typical Payback Period	< 2 years	> 10 years
Status in ARB Assignment	Placed in Scoping Plan	Early Action Measure