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Additional submitted attachment is included below.

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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In re:

Commercial and Industrial Air Compressors
Docket No. 18-AAER-05,
Proposed Rules Amending
Title 20, California Code of Regulations, §§ 1601-1609
Published November 16, 2018

DECEMBER 21, 2018 COMMENTS OF ATLAS COPCO NORTH AMERICA TO IMPROVE PROPOSED RULES GOVERNING ROTARY AIR COMPRESSOR EFFICIENCY

These comments are submitted on behalf of Atlas Copco North America in response to the November 16, 2018 Proposal by the California Energy Commission ("November 16 Proposal") to impose energy efficiency, testing, and reporting requirements governing industrial and commercial rotary air compressors offered for sale in California. The November 16 Proposal expressly follows the abortive DOE efficiency standard, which was posted as a final rule, but not published in the Federal Register as such because of its withdrawal by the Trump Administration.[1]

Provided appropriate changes are made in the November 16 Proposal to address significant problems with testing and certification requirements, Atlas Copco supports the adoption of the improved efficiency levels specified by the November 16 Proposal and believes they are reasonable.

Atlas Copco has consulted with Commission staff since June 2018 regarding the Commission's intention to adopt rotary air compressor efficiency rules and the difficult

[1] The November 16 proposal notes that DOE did not complete work on its rotary air compressor efficiency standard. Notice of Proposed Action (NOPA), p. 4. That assertion is correct; there is no currently effective federal efficiency rule even though the State of California and other plaintiffs have brought an action to force DOE to publish the DOE Final Rule Package, and prevailed on February 15, 2018 at the District Court level. *NRDC, et al, v. James Perry, et al.,* 302 F.Supp. 3d 1094 (2018), *appeal pending,* C.A. No. 18-15475 (9th Cir. Argued, Nov. 14, 2018). The decision was stayed pending appeal, and that appeal was argued on November 14, 2018. Affirmance of the District Court decision would result in publication of a final federal air compressor efficiency rule in the Federal Register, a national rule with the same efficiency levels proposed on November 16 but different compliance dates. Thus, affirmance could require significant revisions of the November 16 Proposal to harmonize the overlapping and potentially conflicting requirements.

compliance certification issues these rules create. The company greatly appreciates the cordial and constructive tone of those discussions.

Atlas Copco is a worldwide manufacturer of rotary air compressors and other industrial equipment; the company sells rotary air compressors in the United States (including California) under the Atlas Copco, Quincy Compressor, Chicago Pneumatic, and Fiac brand names. Atlas Copco currently offers over 800 distinct rotary air compressor models subject to the proposed regulations. We estimate that there are around 6,000 distinct basic rotary air compressor models offered for sale in the United States that will be subject to the November 16 Proposal.

These rotary air compressors are expensive, customized machines tailored to industrial or commercial needs for a wide range of specific air flows, pressures, and performance characteristics.

For the size of machines covered by the November 16 Proposal, the total U.S. market for all manufacturers in 2013 was only about 26,000 machines. These machines came from around 6,000 distinct basic rotary air compressor models, virtually all of which are believed to be offered for sale throughout the U.S. The California market is even smaller – around 3,100 machines shipped in 2013 – meaning that for many models there are no machines sold in California in any given year, and that the number of machines sold in California from any particular model in any year is almost always very small.

Because of the small size of the California rotary air compressor market, the large number of models offered, each of which may require re-testing in order to be certified, and the high costs of such efficiency testing, the November 16 Proposal as currently written will impose very high unit costs on manufacturers for each compressor model offered for sale in California. In commercial terms, the California market is a customized market on which the November 16 Proposal would impose certification and testing requirements and costs based on the erroneous assumption that such costs can be spread across mass market sales.

Unless the November 16 Proposal's certification provisions are revised, we predict that a large number of rotary air compressor models will be withdrawn from sale in California, as the small number of machines sold from any particular model will be too small to warrant the certification costs.

We emphasize that this market reality will likely result in the withdrawal of a large number of compliant compressor models, and most of these will be ***models that already meet the actual efficiency standard in the November 16 Proposal.*** This market reality will be reinforced by the aggressive compliance date in the November 16 Proposal, less than three years as opposed to the five year deadline the federal DOE had proposed to use.

There is no assurance, after such withdrawals, that California businesses will be able to obtain the rotary air compressors they need for efficient operations, compressors tailored to meet their specific air flow, pressure, and performance needs. The likely result will be the frequent substitution of oversized or overqualified machines (or of unregulated used machines) for the correctly sized new units. As the Commission is well aware, a mismatch of machine size with performance needs usually results in inefficient operation, as will the substitution of used machines not subject to these standards.

These adverse market results can be largely avoided by revising the November 16 Proposal to allow compliance certification based on existing data from prior efficiency tests using the industry consensus test standard -- ISO1217:2009. The ISO1217 standard is a well-accepted and widely used standard to measure rotary air compressor efficiency.

We thus strongly recommend revising the certification and test requirements to make clear that valid ISO1217:2009 test data from past testing may be used to certify the compliance of existing models of rotary air compressors with the efficiency standard in the November 16 Proposal.

With such changes, Atlas Copco supports the adoption of the improved efficiency levels specified by the November 16 Proposal and believes they are reasonable.

SUMMARY

Evidentiary support for these comments is provided by the Declaration of David P. Prator, an industry expert with forty-seven years of experience in the rotary air compressor industry. Mr. Prator has worked for decades in efforts to improve energy efficiency and testing accuracy for such machines, efforts by Atlas Copco and by the air compressor manufacturers' trade association, the Compressed Air & Gas Institute (CAGI). His declaration includes (a) pricing data on 2019 air compressor efficiency testing, and (b) air compressor efficiency test data comparing two methods used to test the efficiency of the same model of air compressor. Mr. Practor's declaration sets forth his expert qualifications. Prator Dec. ¶¶ 4, 10-36.

Part I of these Comments uses Department of Energy (DOE) information to estimate the size of the California market for replacement rotary air compressors ("Replacement Market"). Future Replacement Market size is a critical parameter in estimating the energy saved, and thus cost savings and emissions reductions resulting from adoption of the November 16 Proposal. The November 16 Proposal overstates the Replacement Market size by at least sixty percent, and possibly by as much as a factor of two. Thus, ***the November 16 Proposal greatly overstates the energy saved, money saved, and emission reductions resulting from its adoption***.

Part II predicts that adoption of the substantive efficiency standards will reduce by about one fourth the number of rotary air compressor models offered for sale to California businesses. Because of the small size of the Replacement Market for any basic rotary air

compressor model, manufacturers are most likely to withdraw non-compliant models rather than redesign them for such a small Replacement Market.
If the more aggressive standard sought in the California Investor Owned Utility (IOU) March 2018 proposal (submitted by the IOU as a comment) is adopted, it is reasonable to expect that half the basic rotary air compressor models currently offered for sale in California will be withdrawn without replacement, substantially disrupting many California businesses that need rotary air compressors with specific air flow and pressure specifications.

Part III reviews the November 16 Proposal's requirements that every rotary air compressor model offered for sale in California must be certified as compliant with efficiency standards, and listed on the Modern Appliance Efficiency Database (MAEDBS). The November 16 Proposal failed in several ways to address the very high costs its certification requirements impose and the adverse effects on California businesses unable to obtain the compressor models they need.

Because this certification must be based on testing by California-certified laboratories, none of which yet exist***, the November 16 Proposal may be a costly mandate for duplicative testing, and is likely to raise certification costs to uneconomic levels for many models of rotary air compressor, even though they fully comply with the energy efficiency standards.*** These impacts are avoidable with modest changes in the certification requirements.

Consequently, these comments suggest specific revisions to the regulatory language of the proposed terms of 20 CCR Section 1606(a)(3)(A) Exception 3 to allow the use of existing ISO1217:2009 test data and modeling based on ISO1217 data in order to make the required certifications to offer rotary air compressors for sale in California. These revisions are intended to reduce the high costs of certification without detracting from the substantive efficiency improvements resulting from the standards.

I. The November 16 Proposal Substantially Overstates the Cost Savings and Emission Reductions Likely to Result from Its Adoption.

In its 2016 rulemaking, DOE estimated the size of the United States rotary air compressor market for the models of air compressors which would be subject to DOE's efficiency rule. DOE December 2016 Technical Support Document (TSD), p. 9.3.2*. The total number of compressors sold is a critical parameter to use in estimating the resulting energy savings from adoption of the efficiency standard. Prator Dec. ¶ 38.

Those energy savings equal the difference between the energy used by the newer compliant models and the energy used by the less efficient existing models they replace. The estimated energy savings, in turn, are the basis to estimate money saved on operating

* Commission staff have put the TSD and DOE's December 5, 2016 Final Rule Package in the record of this rulemaking as the evidentiary foundation for the November 16 Proposal.

costs and the emission reductions. The more energy saved, the greater the benefit to California residents and the environment.

The November 16 Proposal states that 6,000 compressor units per year covered by this proposal are sold each year in California. Initial Statement of Reasons (ISR), p. 10. Atlas Copco submits, for reasons explained below, that this 6,000 unit figure is substantially overstated, because it is much larger than the figures which can be derived from the DOE rulemaking record on which the November 16 Proposal relies as its evidentiary basis.

A. Estimated California Rotary Air Compressor Market Size.

One reasonably accurate way to forecast future demand for industrial and commercial rotary air compressors is to take known figures about compressor sales and to use estimated changes in Gross Domestic Product (GDP) to determine how that rotary air compressor market will grow or shrink. Prator Dec. ¶40 . Atlas Copco has found that this method works not only for projections of United States demand, but also for U.S. regions or for large states such as California. *Id.*

The DOE TSD estimated that there were about 23,700 compressors sold in the United States in 2013 of sizes which would have been regulated by the proposed rule. TSD, Sections 9.3.3, 9.3.4, pp. 9-6 to 9-7. Seventy (70) percent (about 18,100 units) were fixed speed air cooled units. *Id.* Table 9.3.4. DOE forecast that 27,900 rotary air compressors covered by the standards would be shipped nationally in calendar 2022. *Id.*

In order to estimate compressor shipments, DOE used data on compressor shipments from manufacturers and subject matter experts. Final Rule Package, pp. 214-215. DOE then used the projections of annual equipment shipment data to project national energy savings and net present value for the potential standards levels. *Id.* p. 216.

David Prator, Atlas Copco's expert witness who has forty-seven years of experience in the rotary air compressor industry, has reviewed market data (including data gathered by CAGI) as part of his duties for Atlas Copco. He assesses that the DOE market estimates and forecasts for the United States are reasonably accurate. Prator Dec. ¶ 43. DOE's estimates are derived using a macroeconomic approach very similar to what Mr. Prator and his colleagues have used for Atlas Copco to estimate market demand for rotary air compressors. *Id.*

Mr. Prator reports that in order to estimate the number of rotary air compressors shipped for a regional or large state market such as California, Atlas Copco's approach would be to compare the gross domestic product of that region or state to the U.S. Gross Domestic Product (GDP) for the same calendar year. Prator Dec. ¶ 44. Based on his experience, he estimates that California rotary air compressor shipments are in roughly the same ratio to U.S. shipments of these machines as the ratio of the California GDP is to the US GDP. *Id.*

The U.S. 2013 GDP was about $16,692 billion dollars according to the U.S. Bureau of Economic Analysis; the California 2013 GDP was $2,224 billion according to the State Finance Office. The California GDP in calendar 2013 was thus about 13.3 percent of the U.S. GDP for that year. Prator Dec. ¶ 45.

When this percentage (13.3) is applied to rotary air compressor shipment data, it yields a figure of about 3,100 compressor units (rounded to the nearest 100) of the 23,500 rotary air compressor units of the affected sizes shipped in the United States in calendar 2013. *Id.* Using DOE's calendar 2022 estimates, there would be about 3,700 rotary air compressor units shipped to California businesses that year. *Id.*¶46. From the data provided in the DOE documents cited by the November 16 Proposal, these are the most accurate estimates for the California rotary air compressor market that can be made. *Id.*¶47.

B. California's Rotary Air Compressor Market Is Customized, with Nearly Twice as Many Basic Compressor Models Offered for Sale as There Are Individual Compressor Units Sold.

The November 16 Proposal claims much larger rotary air compressor sales in California than can be derived from DOE's shipment data. "The Energy Commission estimates annual California shipments of air compressors to be 6,000 units." Commission Initial Statement of Reasons (ISR), p. 10.

The November 16 Proposal appears to have confused information about the large number of distinct basic rotary compressor MODELS offered for sale in California – around 6,000 -- with the smaller number of actual compressor UNITS actually sold in the state, around 3,100 in 2013.

Atlas Copco offers, through its various brands, over 800 basic rotary air compressor models which would be addressed by the November 16 Proposal. *Id.* ¶48. A manufacturer's basic rotary air compressor model has distinct ratings for maximum air flow and maximum pressure, among other operating characteristics. Based on data from CAGI, Mr. Prator estimates that Atlas Copco's competitors offer nearly 5,000 additional basic rotary air compressor models which would be subject to the November 16 Proposal. *Id.*

There are thus nearly 6,000 distinct basic rotary air compressor MODELS subject to this rule and offered for sale in the United States. In commercial terms, the California rotary air compressor market is customized, with nearly twice as many different distinct models offered for sale (6,000) as there are individual compressor units sold in a year (3,100 in 2013).

According to Mr. Prator's review, there have NOT, based on his review of the DOE data above, been anywhere close to 6,000 rotary air compressor UNITS sold in California in any recent year, nor do the DOE data in the TSD support such estimated annual sales

figures by calendar 2036, when the November 16 Proposal expects full turnover of the compressor population to occur. *Id.* ¶ 49.

C. The November 16 Proposal Overstates Resulting Benefits by a Wide Margin.

As compared to figures based on DOE's estimates for 2013, the November 16 Proposal has overstated the figures for the actual rotary air compressor market by a factor of almost two: 6,000 compressors vs. 3,100. Prator Dec. ¶ 50-53. It appears that the November 16 Proposal has overstated the resulting energy savings, emission reductions, and user savings from adoption of this proposal by more than sixty percent (6,000 vs. 3,700) if 2022 figures are used and by nearly a factor of two if 2013 figures are used (6,000 v. 3,100).

This figure for rotary air compressor units actually sold in California is critical to the November 16 Proposal's estimates of energy savings, emission reductions, and user cost savings. It appears that the November 16 Proposal has overstated these benefits by a wide margin. Consequently, the November 16 Proposal is thus far less beneficial to the environment, to California businesses, and to consumers than the Proposal claims. Notice of Proposed Action (NOPA), p. 4. If the 2013 sales figures are used, the projected benefits and savings are only about half of what the November 16 Proposal estimated. As explained below, the costs are substantially more than forecast by the November 16 proposal.

II. Because of the Small Size of the California Rotary Air Compressor Market, Adoption of the November 16 Proposal Will Prompt Manufacturers to Withdraw about One Quarter of the Air Compressor Models Currently Offered for Sale, Without Offering Redesigned Models.

For reasons stated below, despite the significant commercial impact, Atlas Copco supports adoption of the state standards at the proposed efficiency level, provided the substantial certification and testing issues noted in Part III are resolved.

While Atlas Copco supports the efficiency limits contained in the November 16 Proposal, Atlas Copco is opposed to adoption of the more stringent efficiency standard set forth by the IOU March 2018 comment. Atlas Copco does so because the likely response by manufacturers to the IOU standard proposal will be to withdraw nearly half of currently offered air compressor models from the California market, to the substantial detriment of California businesses which require air compressors in many different configurations, air flows, pressures, and other operating characteristics. That withdrawal will not improve energy efficiency, since inefficient used units or units mismatched in size may be substituted instead.

Air compressor manufacturers design and build rotary air compressors to serve a wide geographic market, and seek to market the same basic rotary air compressor models across the United States' market. Prator Dec. ¶ 54.

The design, testing, refinement, adoption, and offering of a new rotary air compressor model to produce a specific range of air flow and pressure is a long and costly process. This effort ordinarily takes more than a year, requires multiple rounds of laboratory testing, the expenditure of hundreds of hours of professional engineering time, the proof of prototypes, the testing of new components, the re-tooling of production facilities, the qualification of suppliers for new components, coordinating the global supply chain, and many other steps before a new rotary air compressor product is offered for sale. *Id.* ¶ 55.

The California rotary air compressor market is estimated (above) to be 13.3 percent of the U.S. market for these machines. These figures make the California market less than 1/7 the size of the U.S. market. Because there are significantly fewer compressor units sold in California (3,100 in 2013) than there are basic rotary air compressor models to choose from (6,000), for most models either no units or a very small number of units are sold annually in California. *Id.* ¶ 56.

This small sales volume for any particular basic model makes it unrealistic to expect manufacturers to re-design their air compressors to meet the November 16 Proposal's energy efficiency standards, even though manufacturers would likely do so in order to serve the full United States' market after adoption of a similar federal rule. *Id.* ¶ 57.

In this respect, the rotary air compressor market contrasts sharply with the automobile market, where California's market power makes it reasonable to expect that auto makers would re-design cars to meet aggressive emission standards. *Id.* ¶ 58.

The November 16 Proposal adopts the same efficiency standard as the DOE Final Rule Package would have. The Final Rule Package and November 16 Proposal both refer to this efficiency standard as Trial Standard Level (TSL) 2. ISR, pp. 10-11.

The DOE TSD projected that about twenty-eight percent (28%) of compressors currently sold would fail to meet this standard without re-design. TSD, Table 10.2.1, page 10-2, Base Case Efficiency Distribution for all Equipment Classes.

When DOE's proposed performance standard is applied to publicly reported compressor performance data from across the industry, Atlas Copco has estimated that the number of failing basic models across the industry will be in the same range as projected by DOE, with about one in four basic models failing. Prator Dec. ¶ 61-62.

DOE has forecast that manufacturers would redesign their non-compliant basic models for greater energy efficiency in order to continue to sell their products across the United States nationwide in the full range of air flow, compression, and performance specifications currently offered. Atlas Copco agrees with this forecast -- that most basic

rotary air compressor models would be re-designed to meet a federal standard. Atlas Copco also believes that in some cases, particularly for basic models which are sold infrequently, some manufacturers would simply discontinue that basic model. Prator Dec. ¶ 63.

Because of the much smaller size of the California market, if the November 16 Proposal's efficiency rule is adopted, Atlas Copco forecasts a much different manufacturer response: most non-compliant models will simply be withdrawn without replacement by the manufacturer, since the costs of redesign and retooling cannot be economically justified for such small sales volumes. Prator Dec. ¶ 64.

Because the November 16 Proposal has a significantly shorter compliance time period than DOE had proposed – less than three years as opposed to DOE's five years – manufacturers will have even stronger incentives to withdraw from the California market rather than redesign currently non-compliant models for such a small sales volume, given the normal lengthy time line for product re-design and the low return from such an investment. Prator Dec. ¶ 65. DOE reported that a three year compliance time line was problematic for the industry, because of the limited number of qualified design engineers, one of the reasons DOE proposed a five year compliance time line. Final Rule Package, p. 285.

Because of this market dynamic, Atlas Copco forecasts that even if compliance certification problems discussed below are resolved, the number of rotary air compressor models offered for sale in California will drop by about one quarter if the proposed efficiency level – TSL 2 - is adopted on the time line proposed by the Commission. Prator Dec. ¶ 66. This estimate is consistent with the data reported in TSD Table 10.2.1.

DOE considered a more aggressive efficiency standard, known as Trial Standard Level (TSL) 3, but declined to adopt it. According to DOE:

> The Secretary concludes that at TSL 3 for compressors, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the emission reductions are outweighed by the economic burden on some consumers, and the impacts on manufacturers, including conversion costs and profit margin impacts that could result in a large reduction in INPV [Industry Net Present Value]. Consequently, the Secretary has concluded that TSL 3 is not economically justified.

DOE Final Rule Package, pp. 310-11.
In the Commission's Initial Statement of Reasons (ISR), it recognized that the current rulemaking record – primarily the Final Rule Package and TSD - does not support adoption of TSL 3, particularly not on the accelerated schedule the Commission prefers. ISR, p. 11.

Despite the absence of support in the DOE rulemaking record, the Codes and Standards Enforcement (CASE) Initiative for PY 2018: Title 20 Standards Development for Compressors, asserts that the Commission could adopt TSL 3 without causing any significant problem for California businesses. This is because "a total of 56 percent of the currently available products [are] already meeting the standard." CASE Report, p. 23-24. CASE based this assertion on Table 10.2.1 on page 10-2 of the TSD.

The basic rotary air compressor models proposed to be covered by this rulemaking include a very wide range of air flows and pressures desired by industrial and commercial users. The withdrawal of roughly half the basic rotary air compressor models offered for sale in the state of California is likely to be commercially disruptive for California businesses which need this equipment, since there is no assurance that there will be compliant equipment available for many reasonably common air flow and pressure configurations. Put simply, basic rotary air compressor models are not nearly as fungible for industry needs as different models of passenger cars are to fulfill needs for a family car. Prator Dec. ¶ 70.

Because of the short compliance time line and the substantial costs for redesign, Atlas Copco estimates that if the Commission adopts TSL 3, manufacturers will withdraw roughly half the basic rotary air compressor models currently available in the California market upon the proposed compliance date. California businesses will instead have strong incentives to purchase available new machines in larger sizes than required or to buy used, less efficient machines, exempt from regulation because they were built before the compliance date. Prator Dec. ¶ 71.

The withdrawal of roughly half the basic rotary air compressor models offered for sale in the state of California is likely to be commercially disruptive for California businesses which need this equipment in a wide variety of air flows, pressures, and configurations. Prator Dec. ¶ 72.

III. The November 16 Proposal's Testing and Certification Procedures Are Badly Flawed. Unless Corrected, These Provisions Will Be Needlessly Costly, Do Nothing to Improve Efficiency, and Cause the Withdrawal of a Large Number of Air Compressor Models from the California Market.

Atlas Copco strongly urges revision of the proposed language of Section 1606 the November 16 Proposal's certification and testing provisions in order to expressly allow the use of prior test data both from prior ISO1217:2009 testing and from previous tests using the 2017 DOE Test Method. The ISO1217 data, like the 2017 DOE Test data, should also be authorized for use in applying AEDMs, the mathematical forecasts of compressor efficiency to be used in forecasting the efficiency of models made infrequently.

Unfortunately, as currently written, the November 16 Proposal can be read to require almost all rotary air compressor models offered for sale in the California market to be

tested before certification, even in the numerous cases where manufacturers have valid test data from prior tests to use in making the required certifications or to apply in AEDMs.

As explained below, the November 16 Proposal is based on mistaken assumptions about the application of the DOE Test Rule and ignores the very high costs of testing and certification, and may bar the use of prior valid test data without improving accuracy or energy efficiency.

Unless these problems are corrected, Atlas Copco believes that manufacturers will withdraw a very large number of rotary air compressor models from the California market ***even though most of these models would comply with the substantive energy efficiency standard, and even though for many models past testing shows that they meet the required efficiency standard.***

A. Certification Requirements as Proposed May Bar Use of Prior Test Data

The November 16 Proposal requires that every rotary air compressor model offered for sale in California must be certified as compliant with efficiency standards, and listed on the Modern Appliance Efficiency Database (MAEDBS). Prator Dec. ¶ 73.

The Proposal would amend section 1606(a)(3)(A) by inserting the following language about certification:

> **Exception 1. to Section 1606(a)(3)(A) of this Article:**
>
> For state-regulated compressors, the manufacturer shall submit a statement that the appliance has been tested in accordance with all applicable requirements of sections 1603 and 1604 of this Article, or that the appliance has been rated according to an alternative efficiency determination method (AEDM) in accordance with all applicable requirements of section 1604(s) of this Article.

Section 1604(s) in turn is amended to reference the federal AEDM requirements. Section 1603 is unchanged, but contains terms that may create serious problems unless clarified to allow use of past test data.
Section 1603(a) provides in pertinent part that:

> The testing shall be at a laboratory that the Executive Director determines, under section 1608(i) of this Article, that:
> **(1) has conducted tests using the applicable test method within the previous 12 months;**
> (2) agrees to and does interpret and apply the applicable test method set forth in section 1604 of this Article precisely as written;

> (A) for laboratories testing federally regulated appliances and equipment, agrees to and does interpret and apply any applicable provisions of 10 C.F.R. section 429, subpart C;
> (3) has, and keeps properly calibrated and maintained, all equipment, material, and facilities necessary to apply the applicable test method precisely as written;
> (4) agrees to and does maintain copies of all test reports, and provides any such report to the Executive Director on request, for all basic models that are still in commercial production; and
> (5) agrees to and does allow the Executive Director to witness any test of such an appliance on request, up to once per calendar year for each basic model.

(Emphasis added). The potential problem arises because this language appears to bar the use of test data gathered prior to certification of the laboratory by the Executive Director. At present, there are no laboratories certified to conduct the required testing because the requirement is new and because, as explained below, the application of the Federal Test Rule has been effectively suspended by DOE.

According to the MAEDBS website, certifications of third-party laboratories are prospective: "Test lab applications for the next certification year become available on November 1st each year." https://cacertappliances.energy.ca.gov/Login.aspx. This MAEDBS website language also suggests that laboratories could not even apply to be certified until November 1, 2019, for testing to be conducted starting in calendar 2020.

Given this MAEDBS regulatory language, it appears that only data generated by a certified test laboratory AFTER the laboratory has been certified by the State of California can be used to register a product for sale on the MAEDBS. If that is the case, and no prior data can be used, then manufacturers will face very high testing costs in order even to offer to sell any of their rotary air compressors in the State of California.

The use of AEDMs does not resolve the problem because under the applicable rule the alternative method to demonstrate efficiency must be validated with laboratory data using the DOE Test Method. If the laboratory data used for validation has to be obtained from a certified laboratory, many of the same timing and capacity limitations also arise.

There is no indication in the November 16 Proposal that laboratory certification delays and laboratory capacity for such efficiency testing were considered or addressed. Indeed, some language in the November 16 Proposal seems to assume that prior test data ***can*** be used. If that is the intention, the language in section 1606 needs clarification to expressly provide that prior valid test data can be used.

B. Testing Is Costly Given That About 6,000 Distinct Basic Rotary Compressor Models Are Offered for Sale in the U.S. Market, and Thus in California.

Intertek, the independent testing laboratory used by CAGI to test rotary air compressor efficiency, has posted its prices for such laboratory testing for 2019. Prator Dec. ¶ 96. For fixed speed rotary air compressors, the cost is $1,740 per unit, and for variable speed drive (VSD) rotary air compressors, the cost is $2,125 per unit. *Id.* ¶ 97. Two units will need to be tested for each model in order to satisfy DOE test requirements, making certification testing cost $3,480 for a fixed speed compressor, and $4,250 for a VSD compressor. *Id.* Additionally, laboratory costs of $200 per day must be added, making test costs $3,680 for a fixed speed compressor and $4,450 for a VSD compressor. *Id.* A copy of these figures and related charges is attached to the Prator Declaration.

If all 6,000 rotary air compressor models currently on the U.S. market must be tested to comply with California certification requirements, the cost is around $20 million, assuming most models are fixed speed drives. *Id.* ¶ 98. Even if the robust use of AEDMs cuts testing in half, the testing costs would be around $10 million at the Intertek rates.

These estimates assume that this favorable pricing would be available to all manufacturers, a proposition that smaller companies have vigorously disputed in the federal rulemaking proceedings, quoting prices of as much as $25,000 per model.

The high cost of testing was noted repeatedly at the June 20, 2016 rulemaking hearing, Transcript, pp. 130, 133, 155. https://www.regulations.gov/document?D=EERE-2013-BT-STD-0040-0044
As explained below, DOE later suspended application of the Test Rule because of perceived problems including high costs to small business:

> A number of small businesses have written DOE expressing concern about the economic burden of the test procedure rule (*see e.g.,* submission from Compressed Air Systems (CAS)). They are concerned both about the cost of implementing the necessary changes to comply with the test procedure, as well as the cost of changing their informational literature to comply with the representation requirements. For example, Compressed Air Systems (CAS) has argued that DOE's cost estimates for the test procedure rule significantly under-estimated the cost the rule would impose and that when the DOE performed its financial impact analysis DOE failed to take into account a number of factors.

82 Fed. Reg. 31890, 31891 (July 11, 2017).

Because the number of units of any particular compressor model sold annually in California will be small, and for many models zero in any particular year, the testing costs can become a significant incentive for a manufacturer to remove many models with infrequent sales from the California air compressor market.

The November 16 Proposal does not address testing costs beyond stating that they would be passed onto consumers. NOPA, p. 6. The discussion assumes that the only significant compliance costs are the increased costs of making more efficient air compressors, compliance costs that consumers will recover in energy savings from more efficient models. *Id.* 6-7. Reliance on the federal rulemaking record does not cure the problem, because DOE subsequently suspended the application of the Test Rule, in large part because of concerns about the high costs of testing in relation to sales volumes.

C. DOE's Suspension of the Test Rule Means That Manufacturers Must Decide Whether Low California Sales Volumes Are Sufficient to Warrant Incurrence of Substantial Testing and Certification Costs.

Some of the language of the November 16 Proposal seems to suggest that the Commission staff mistakenly believed that manufacturers were obliged by federal rules to be conducting efficiency tests of all their rotary air compressor models and could use such data in making the required California certifications. Such required federal testing was apparently thought to mean that manufacturers would incur little in the way of additional testing costs to certify compliance with the new efficiency standards. That assumption about required federal testing, however, is untrue.

The November 16 NOPA mistakenly asserts that the DOE Rotary Air Compressor Efficiency Test Rule ("Test Rule") "became effective January 4, 2017 and [has been] required for compliance on July 3, 2017, making it the applicable test procedure for all air compressors manufactured in or imported into the United States." NOPA, p. 4.

In fact, the Test Rule's effective date was repeatedly postponed by DOE. 82 Fed. Reg. 31890, 31891 (July 11, 2017)(noting postponements of effective date from January 4 to July 3). In that same notice, DOE stated that while it was gathering further information about problems with the Test Rule, "DOE will not seek to enforce compliance of the test procedure final rule for a period of 180 days from the July 3, 2017." *Id.* On December 6, 2017, DOE issued an "Enforcement Statement" concerning Air Compressor Test Procedures, and revised it on June 8, 2018. DOE stated that:

> At this time, DOE has not published a final rule establishing either energy conservation standards or a freestanding labeling requirement for compressors. Given these circumstances, ***there will be no enforcement of EPCA's requirement as to representations with respect to the compressor test procedure final rule unless or until compliance with a standard is required or an obligation to label air compressors is established.***

(Emphasis supplied). https://www.energy.gov/gc/downloads/enforcement-statement-air-compressor-test-procedures

Consequently, DOE has made clear to the air compressor manufacturers and importers that for the next few years, there will be no federal enforcement of the federal test rule. If the State of California prevails next year in its litigation to force issuance of the DOE Final Rule Package, the earliest that compliance with the federal Test Rule will be enforced by DOE is five years from publication – some time in calendar 2024.

DOE's inconsistent actions with regard to the Test Rule have sewn confusion among air compressor manufacturers and importers about testing obligations. Prator Dec. ¶ 82. Because of DOE's inconsistencies, many air compressor manufacturers did not proceed with the costly testing needed to certify air compressor models to a non-existent federal efficiency standard. *Id.* ¶ 84.

As a result, the imposition of California's rule – with its short compliance time line – will mean that in order for many manufacturers to offer a specific rotary air compressor model for sale in California, that manufacturer must conduct the required testing (or validate an AEDM) for the first time in order to gather data using the DOE Test Rule procedures.

Recognizing that the California market is only about 13.3 percent of the United States rotary air compressor market, the resulting unit costs for such certification and testing will be spread over a very low sales volume, and thus much higher per unit than DOE assumed in its cost analysis.

As explained below, without clear revisions to authorize use of existing test data obtained from either the ISO1217:2009 test or the later-adopted DOE test, the small size of the Replacement Market and high cost of new testing will result in the withdrawal of a large number of compliant rotary air compressor models, to the detriment of California businesses that use such machines.

D. Use of Existing Test Data from ISO1217:2009 Testing Will Significantly Reduce Certification Costs and Keep Many More Compliant Rotary Air Compressors on the California Market.

Atlas Copco estimates, based on its knowledge of the industry and work with CAGI, that for most basic rotary air compressor models, the manufacturers possess air compressor efficiency data from testing using the ISO1217: 2009 acceptance test. Prator Dec. ¶ 77. Atlas Copco has tested compressor models using ISO1217:2009 and with the more recent DOE test method and obtained comparable efficiency results. Prator Dec. ¶ 86-88 (setting forth results).

The November 16 Proposal, like the DOE Final Rule Package, expresses energy efficiency standards in terms of isentropic efficiency. The ISO1217 test data can be used to derive the isentropic efficiency of a basic rotary air compressor model. Prator Dec. ¶ 77. Annex H of ISO1217 makes the required link between SER and Isentropic Efficiency.

Consequently, these data can provide a valid factual basis on which a manufacturer – and the Commission -- could determine and, if appropriate, certify compliance with that efficiency standard for a basic rotary air compressor model. *Id.* As noted below, DOE's rulemaking record suggests that ISO1217 data would have been usable to certify compliance with the federal compressor efficiency rule.

The DOE rotary air compressor efficiency test rule adopted in January 2017 is based on ISO1217: 2009, with changes intended to improve the reliability and repeatability of test results. At the June 20, 2016 federal rulemaking hearing, Transcript, pp. 130, 133, 155. https://www.regulations.gov/document?D=EERE-2013-BT-STD-0040-0044, and in subsequent comments submitted to DOE, major concerns were expressed about invalidating the results of reliable prior efficiency tests, tests conducted at considerable cost.

In response, DOE stated in the January 4, 2017 notice promulgating the final Test Rule that it did not intend to invalidate or prevent the use of ISO1217:2009 test data to comply with DOE rules

> If historical test data is based on the same methodology [ISO1217:2009] being adopted in this final [Test] rule, then manufacturers may use this data for the purposes of representing any metrics subject to the representations requirements.

82 Fed. Reg. 1052, 1090, 1094. Indeed, DOE concluded that ***for ninety percent of current compressor models, no additional testing would be needed since prior data could be used***. *Id.* 1094-95.

In a similar discussion in the Final Rule Package for the DOE efficiency rule, DOE made similar statements: "if historical test data is consistent with values that will be generated when testing with the test methods established in this final rule, then manufacturers may use this data for the purposes of representing any metrics subject to representations requirements." DOE Final Rule Package, P. 234 (citing DOE, Public Meeting Transcript, No. 0016 at p. 136).

In the January 4, 2017 Test Rule notice, however, DOE postponed acting on key aspects of federal compliance certification requirements. 82 Fed. Reg. 1052, 1096 (DOE is not finalizing an enforcement sampling plan, to allow for further comments and input on how DOE should evaluate compliance).

This deferral by DOE of the enforcement sampling plan has created great confusion among compressor manufacturers about how DOE would address testing results, permissible tolerances with the ISO1217:2009 test method, and related matters. Manufacturers and CAGI have made repeated but fruitless requests for written clarification from DOE to ensure that they may lawfully rely on ISO1217:2009 data for various representations and other purposes. Prator Dec. ¶ 82.

Instead, as noted above, DOE delayed the effective date of the test rule until the end of 2017, and then suspended enforcement of the test rule until the compliance date of any DOE energy efficiency rule. See, Department of Energy June 8, 2018 Enforcement Statement ("Enforcement Statement"), https://www.energy.gov/gc/downloads/enforcement-statement-air-compressor-test-procedures.

Given the confusion DOE has created over the correct application of the federal Test Rule, and given the Commission's apparent determination to proceed with its own air compressor efficiency standard on an accelerated schedule, the use of existing test data from ISO1217 acceptance testing should be expressly authorized in the certification rules proposed by the Commission.

Similarly, ISO1217 test data can be used to forecast energy efficiency of similar basic models of rotary air compressors. In some cases, e.g. where large machines are produced infrequently, there may not be ISO1217 test results, but there may be test results of larger and smaller similar models which would allow mathematical interpolation of the likely efficiency of the untested machine. There is no valid mathematical or engineering reason why such mathematical forecasts, based on ISO1217 tests of similar basic models, should not be usable by a manufacturer to certify compliance with California standards, particularly for models which may not be produced until a specific customer order is received.

The addition of the following italicized language to the November 16 Proposal's language of Section 1606(a)(3)(A) Exception 1 would address the problem:

> For state-regulated compressors, the manufacturer shall submit a statement that the appliance has been tested in accordance with all applicable requirements of sections 1603 and 1604 of this Article, or that the appliance has been rated according to an alternative efficiency demonstration method (AEDM) in accordance with all applicable requirements of section 1604(s) of this Article. *Provided further that, for any rotary air compressor model offered by a manufacturer for sale in the United States prior to July 1, 2020 the manufacturer may make the required statement relying upon on any of the following factual bases:*
>
> - *Results of testing conducted according to ISO1217:2009;*
> - *Mathematical forecasts relying upon ISO1217:2009 testing of similar air compressor models made by the same manufacturer, and appropriately validated;*
> - *Testing conducted before July 1, 2020 using the compressor efficiency test specified in 10 C.F.R. Part 429; or*
> - *AEDM calculations validated with test results conducted according to 10 C.F.R. Part 429 prior to July 1, 2020.*

MILES & STOCKBRIDGE P.C.

> *For statements based on any of these factual bases, the manufacturer shall also certify that the laboratory testing used for certification or validation was properly conducted by appropriate professional personnel with properly calibrated equipment and in compliance with effective quality control standards.*

The suggested language may avoid duplicative testing, and significantly reduce compliance costs, especially costs to continue to offer rotary air compressors for sale that already comply with the November 16 Proposal's energy efficiency standards.

The suggested language also recognizes that there are no test laboratories yet certified by the State of California to conduct the required testing. The process of qualifying a laboratory, either an independent one or one operated by a manufacturer, may take some months after the standards in the November 16 Proposal are adopted by the Commission.

The proposed language would mean that certification of compressor models introduced after July 1, 2020 would be subject to the DOE Test Rule, because laboratories could reasonably be certified by that date. For compressor models introduced into the market before that date, existing ISO12147 data (as well as prior tests using the DOE Test Rule) would be usable. Particularly given the accelerated compliance deadline in the November 16 Proposal – more than two years faster than the earlier federal proposal on which it is based – this accommodation is critical to the timely implementation of the substantive efficiency requirements for rotary air compressors offered for sale in the State of California.

CONCLUSION

For the foregoing reasons, Atlas Copco recommends revising the November 16 Proposal to assure that reliable prior test data can be used to demonstrate compliance with the substantive efficiency standards contained in the November 16 Proposal. If that revision is made, Atlas Copco will support the adoption of the standards contained in the November 16 Proposal.

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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In re:
Commercial and Industrial Air Compressors
Docket No. 18-AAER-05,
Proposed Rules Amending
Title 20, California Code of Regulations, §§ 1601-1609
Published November 16, 2018

Declaration of David P. Prator

David P. Prator declares as follows:

1. I make this declaration in order to support comments by Atlas Copco Compressors LLC about the air compressor efficiency rules proposed by the California Energy Commission on November 16, 2018 ("November 16 Proposal."). My statements are made to the best of my present knowledge, information, and belief.

2. The November 16 Proposal is modeled to be as close as possible to the terms of the U.S. Department of Energy's (DOE) December 5, 2016 Final Rule for rotary air compressor energy efficiency, a rule later withdrawn by DOE before publication in the Federal Register. The November 16 Proposal is reportedly based on DOE's lengthy final rule notice ("Final Rule Package") and on the corresponding DOE Technical Support Document (TSD).

3. I have met previously in person with Commission staff and have participated in a webinar with Commission staff concerning some of these issues. I appreciate the cordial and constructive tone of the Commission staff discussions.

4. Section I of this Declaration explains my forty-seven years of experience with the design, manufacture, sale, and service of rotary air compressors in the United States. This experience includes

    a. Over twenty years work with the industry's trade association, the Compressed Air & Gas Institute (CAGI), including two terms as CAGI's President and eighteen years as a board member;
    b. Contributions to technical publications about rotary air compressors published by CAGI, by the Compressed Air Challenge, and by DOE;
    c. Decades of work with CAGI, DOE, and industry colleagues to make rotary air compressors more energy efficient.

5. Section II of this Declaration uses estimates from DOE's TSD to estimate the size of the California market for replacement rotary air compressors ("Replacement Market"). Future Replacement Market size is a critical parameter in estimating the energy saved, and thus cost savings and emissions reductions enjoyed by adopting the November 16 Proposal. As explained below, the November 16 Proposal has overstated Replacement Market size by at least sixty percent, and possibly by as much as a factor of two. Thus, the November 16 Proposal greatly overstates the energy saved, money saved, and emission reductions resulting from its adoption.

6. Section III of this Declaration uses estimates from DOE's TSD about the percentage (28%) of basic rotary air compressor models offered for sale in the United States (and thus California) that would fail the efficiency requirements of the DOE Final Rule and thus fail the standards of the November 16 Proposal.

7. Because of the small size of the Replacement Market for any basic rotary air compressor model, manufacturers are most likely to withdraw non-compliant models rather than redesign them for such a small Replacement Market. The number of basic rotary air compressor models would thus drop by about one fourth; if the more aggressive standard sought in California Investor Owned Utility (IOU) proposal is adopted, it is reasonable to expect that half the basic rotary air compressor models currently offered in California will be withdrawn without replacement, substantially disrupting many California businesses that need rotary air compressors of specific air flow and pressure specifications.

8. Section IV of this Declaration reviews the November 16 Proposal's requirements that before a basic rotary air compressor model can be offered for sale in California, the model must be certified as compliant with the November 16 Proposal on the Modern Appliance Efficiency Database (MAEDBS). Certification must be based on test results or on a mathematical projection (Alternative Efficiency Demonstration Method (AEDM)) validated with proper test results.

9. As explained below, unless significant adjustments are made, the November 16 Proposal's current wording will preclude use of existing test data and require needless and very costly retesting of most basic rotary air compressor models, thousands of them. Without clear revisions to authorize use of existing test data obtained from either the ISO1217:2009 test or the later-adopted DOE test, the small size of the Replacement Market and high cost of new testing will result in the withdrawal of a large number of compliant rotary air compressor models, to the detriment of California businesses that use such machines.

I. Experience with Air Compressor Technology and Testing Issues

10. I graduated from Louisiana Tech University in 1971 with a degree in management sciences.

11. I went to work for Worthington Corporation, later known as Worthington Compressor in 1971. Worthington was acquired by Atlas Copco Compressors in 1980. I have worked continuously in the air compressor industry since 1971, more than forty-seven years.

12. I am currently the vice-president of corporate affairs of Atlas Copco Compressors LLC, a United States sister company of Atlas Copco Airpower, a Belgian company. Both Atlas Copco Compressors LLC and Atlas Copco Airpower are indirect subsidiaries of Atlas Copco AB, the parent Swedish company.

13. Compressor Technique, the Atlas Copco business area including its compressor manufacturing operations, is collectively one of the largest air compressor manufacturers in the world. It manufactures air compressors in the United States, Belgium, Italy, Brazil, China and other locations. Atlas Copco production companies make and sell rotary air compressors through their subsidiaries in the United States under the Atlas Copco, Quincy Compressor, Chicago Pneumatic, and Fiac brands.

14. My duties for Atlas Copco Compressors LLC until December 2016 included managing sales and service of Atlas Copco air compressor products to all kinds of industrial and commercial businesses who use them. My work now includes regulatory affairs.

15. During my time in the air compressor industry, I have worked directly with hundreds of rotary air compressor customers. I have assisted them by tailoring air compressor products to meet many different industries' needs for reliable compressed air to operate various tools and processes. These industries include food processing, pharmaceutical manufacture, aircraft assembly, power generation, textile and garment manufacture, oil and gas exploration, production and refining, electronics manufacture and assembly, and automotive assembly, among others.

16. I have also worked with many customers in designing, installing, maintaining, and repairing industrial and commercial compressed air systems. Given the widespread use of compressed air systems in all kinds of industrial and commercial applications, we often refer to compressed air systems as a "fourth utility," along with electricity, gas, and water service.

17. Atlas Copco has been a long-time member of the Compressed Air and Gas Institute (CAGI), http://www.cagi.org/membership/members/atlas-copco-compressors.aspx the trade association for the manufacturers of air compressors and other, related equipment in the United States.

18. I have served as an Atlas Copco representative to CAGI since 1997.

19. I have served on CAGI's Board of Directors from 2004 until December 2018. I have been the Atlas Copco Executive Voting Member since 2004.

20. I served as President of CAGI from 2007-2009, and from 2015-2017.

21. My work as representative, voting member, director, and president of CAGI was undertaken as part of my duties for Atlas Copco.

22. During my time at CAGI, I contributed to multiple publications about rotary air compressors and their energy efficiency.

23. In October 1998, the magazine Plant Engineering published my article "Variable Speed Drives Cut Compressor Energy Costs." A copy is attached.

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24. I have served on multiple technical committees and sections for CAGI since joining in 1997, including the committee on energy awareness, now known as energy efficiency. I also served on the sections about rotary air compressors and reciprocating compressors.

25. For several years, I served as the CAGI liaison to the Product Development Committee to the Compressed Air Challenge. https://www.compressedairchallenge.org/

26. The Compressed Air Challenge's website explains its identity and mission as follows:

> The Compressed Air Challenge is a voluntary collaboration of industrial end-users; manufacturers, distributors and their associations; consultants; state research and development agencies; energy efficiency organizations; and utilities. This group has one purpose in mind — helping you enjoy the benefits of improved performance of your compressed air system.
>
> **Mission:** Promote energy and operational efficiency in compressed air systems for industry through information and training, leading end users to adopt efficient practices and technologies while leveraging collaborative cooperation among key stakeholders.
>
> **Vision:** Be the global leader in developing and disseminating innovative product-neutral information and educational materials to help industries generate and use compressed air at maximum sustainable efficiency.
> https://www.compressedairchallenge.org/about

27. The Compressed Air Challenge is supported in part by DOE. DOE has a representative on the Compressed Air Challenge board, as do CAGI and Atlas Copco, among other stakeholders. https://www.compressedairchallenge.org/board

28. CAGI was one of the founding members of the Compressed Air Challenge. CAGI's Energy Efficiency Committee explains it work and its relationship with the Compressed Air Challenge as follows:

> The Energy Efficiency Committee works to enhance the energy efficiency and performance of compressed air systems. CAGI is a founding sponsor of the Compressed Air Challenge (CAC) and a Department of Energy Allied Partner. The CAC is a public/private initiative fostered by the Department of Energy to serve as a resource to help industry achieve energy savings and to increase the effectiveness of compressed air systems.
>
> The Energy Efficiency Committee oversees CAGI's efforts to improve compressed air system effectiveness and efficiency and guides the institute's cooperative activities with DOE and CAC. These activities include development and organization of compressed air system training programs,

production and distribution of educational materials, etc. to benefit compressed air system users.
http://www.cagi.org/about/committees.aspx

29. I have contributed to the manual published by the Compressed Air Challenge, ***The Best Practices for Compressed Air Systems Manual - Second Edition.***
https://www.compressedairchallenge.org/bookstore

30. I have also contributed to several editions of ***The Compressed Air and Gas Handbook***, a lengthy book published by CAGI.
http://www.cagi.org/education/handbook.aspx

31. At DOE's request, I have provided comments on several DOE publications about air compressors and improving their energy efficiency, such as ***Improving Compressed Air System Performance: A Sourcebook for Industry*** (see acknowledgements).
https://www.compressedairchallenge.org/data/sites/1/media/library/sourcebook/Improving_Compressed_Air-Sourcebook.pdf

32. This **Sourcebook** is used in Compressed Air Challenge courses for industry.
https://pdhonline.com/courses/m193/Air_Comp.pdf

33. During my work with CAGI and in the air compressor industry, I have worked extensively with the consensus industry standard for acceptance testing of rotary air compressors. That standard, now known as ISO1217: 2009, as amended in 2016, measures various parameters used to determine the energy efficiency of rotary air compressors. The test is used throughout the air compressor industry in order to determine if a rotary air compressor in fact meets customer specifications.

34. The ISO1217:2009 standard was developed by the International Standards Organization (ISO) in cooperation with CAGI and with Pneurop, (the European counterpart of CAGI), as well as with air compressor manufacturers. ISO1217 is an accepted international standard as well as an American National Standards Institute (ANSI) standard and is used in many commercial contracts in the air compressor industry in the United States and globally.

35. Many CAGI members use CAGI data sheets for their air compressors' performance, data sheets reflecting the results of the ISO1217:2009 tests. Examples may be found on CAGI's website. http://www.cagi.org/performance-verification/data-sheets.aspx

36. As part of my duties as President and Board Member of CAGI, I also became familiar with the arrangements, time requirements, and costs of ISO1217:2009 testing and the testing laboratory (Intertek) used by CAGI for its Performance Verification Program. A copy of Intertek's 2019 pricing to CAGI members for compressor efficiency testing is attached to this Declaration as Exhibit 1. I am informed that Intertek's laboratory charges to non-CAGI members for compressor efficiency testing are somewhat higher, but I do not have specific pricing information on that subject.

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II. The November 16 Proposal Overestimates by a Wide Margin the Cost Savings and Emission Reductions Resulting from Its Adoption.

37. Atlas Copco is one of the largest compressor manufacturers operating in the United States. Atlas Copco sells compressors in the United States under four brand names: Atlas Copco, Chicago Pneumatic, Quincy Compressor and FIAC.

38. In its 2016 rulemaking, DOE estimated the size of the United States rotary air compressor market for the models of air compressors which would be subject to DOE's efficiency rule. TSD, p. 9.3.2. The total number of compressors sold is a critical parameter to use in estimating the resulting energy savings from adoption of the efficiency standard. Those savings equal the difference between the energy used by the newer compliant models and the energy used by the less efficient existing models they replace. The estimated energy savings, in turn, are the basis to estimate money saved on operating costs and the emission reductions. The more energy saved, the bigger the benefit to California residents and the environment.

39. As part of my duties over several decades, I have repeatedly estimated the future market demand for various types and sizes of air compressors. There are strong business reasons for me and my business colleagues to make such projections and to refine these estimation techniques.

40. Based on such experience, my Atlas Copco colleagues and I have found that one reasonably accurate way to forecast future demand for industrial and commercial rotary air compressors is to take known figures about compressor sales and to use estimated changes in Gross Domestic Product (GDP) to determine how that rotary air compressor market will grow or shrink. Atlas Copco has found that this method works not only for projections of United States demand, but also for U.S. regions or for large states such as California.

41. The DOE TSD estimated that there were about 23,700 compressors sold in the United States in 2013 of sizes which would have been regulated by the proposed rule. TSD, Sections 9.3.3, 9.3.4, pp. 9-6 to 9-7. Seventy (70) percent were fixed speed air cooled units (18,100*). Id.* Table 9.3.4. DOE forecast that 27,900 rotary air compressors covered by the standards would be shipped nationally in calendar 2022. *Id.*

42. In order to estimate compressor shipments, DOE used data on compressor shipments from manufacturers and subject matter experts. Final Rule Package, pp. 214-215. DOE then used the projections of annual equipment shipment data to project national energy savings and net present value for the potential standards levels. *Id.* p. 216.

43. Based on my experience in the rotary air compressor market, and market data I have reviewed, I believe that the DOE market estimates and forecasts are reasonably accurate. DOE's estimates are derived using a macroeconomic approach very similar

to what my colleagues and I have used for Atlas Copco in our demand estimates of rotary air compressors.

44. In order to estimate the number of rotary air compressors shipped for a regional or large state market such as California, Atlas Copco's approach would be to compare the gross domestic product of that region or state to the U.S. Gross Domestic Product (GDP) for the same calendar year. Based on my experience in making such estimates, I estimate that California rotary air compressor shipments are in roughly the same ratio to U.S. shipments of these machines as the ratio of the California GDP is to the US GDP.

45. The U.S. 2013 GDP was reportedly about $16,692 billion dollars according to the U.S. Bureau of Economic Analysis; the California GDP was $2,224 billion according to the State Finance Office. The California GDP in calendar 2013 was thus about 13.3 percent of the U.S. GDP for that year.

46. When this percentage (13.3) is applied to rotary air compressor shipments, it yields a figure of about 3,100 compressor units (rounded to the nearest 100) of the 23,500 rotary air compressor units of the affected sizes shipped in the United States in calendar 2013. Using DOE's calendar 2022 estimates, there would be about 3,700 rotary air compressor units shipped to California businesses that year.

47. I believe that these are the most accurate estimates for the California rotary air compressor market that can be made from the DOE materials relied upon as the factual basis for the November 16 Proposal.

48. Atlas Copco offers, through its various brands, over 800 basic rotary air compressor models which would be addressed by the November 16 Proposal. A manufacturer's basic rotary air compressor model has distinct ratings for maximum air flow and maximum pressure, among other operating characteristics. Based on data from CAGI, I estimate Atlas Copco's competitors offer nearly 5,000 additional basic rotary air compressor models which would be subject to the November 16 Proposal.

49. There are thus nearly 6,000 distinct basic rotary air compressor MODELS subject to this rule and offered for sale in the United States. There have NOT, based on my review of the DOE data above, been anywhere close to 6,000 rotary air compressor UNITS sold in California in any recent year, nor do the DOE data support such estimated annual sales figures by 2036, the estimated date for full turnover of the affected compressor population in California (based on average 14 year machine life). ISR, p. 10 (14 year turnover); DOE TSD, Table 9.3.4 (entries for national shipments through 2051).

50. Despite the DOE shipment data, the November 16 Proposal claims much larger rotary air compressor sales in California. "The Energy Commission estimates annual California shipments of air compressors to be 6,000 units." Commission Initial Statement of Reasons (ISR), p. 10.

51. This figure for rotary air compressor units sold is critical to the November 16 Proposal's estimates of energy savings, emission reductions, and user benefits. The November 16 Proposal gives no explanation for the derivation of the 6,000 rotary air compressor UNIT figure; the DOE sources cited by the November 16 Proposal fail to support the 6,000 UNIT figure.

52. As compared to figures based on DOE's estimates for 2013, the November 16 Proposal has overstated the figures for the actual rotary air compressor market by a factor of almost two: 6,000 compressors vs. 3,100. As compared to figures derived from DOE's estimates for calendar 2022 (3,700 rotary air compressors), the November 16 Proposal's estimate (6,000 rotary air compressors sold in the state) overstates the figure by more than sixty percent.

53. Thus, it appears that the November 16 Proposal has overstated the resulting energy savings, emission reductions, and user savings from adoption of this proposal by more than sixty percent (6,000 vs. 3,700) if 2022 figures are used and by nearly a factor of two if 2013 figures are used (6,000 v. 3,100).

III. Because of the Small Size of the California Rotary Air Compressor Market, Manufacturers Are Likely to Withdraw at Least One Quarter of the Air Compressor Models Currently Offered for Sale, Without Offering Redesigned Models.

54. Air compressor manufacturers design and build rotary air compressors to serve a wide geographic market, and seek to market the same basic rotary air compressor models across the United States' market.

55. The design, testing, refinement, adoption, and offering of a new rotary air compressor model to produce a specific range of air flow and pressure is a long and costly process. This effort ordinarily takes more than a year, requires multiple rounds of laboratory testing, the expenditure of hundreds of hours of professional engineering time, the proof of prototypes, the testing of new components, the re-tooling of production facilities, the qualification of suppliers for new components, coordinating the global supply chain, and many other steps before a new rotary air compressor product is offered for sale.

56. The California rotary air compressor market is estimated (above) to be 13.3 percent of the U.S. market for these machines. These figures make the California market less than 1/7 the size of the U.S. market. Because there are significantly fewer compressor units sold in California (3,100 in 2013) than there are basic rotary air compressor models to choose from (6,000), for most models either no units or a very small number of units are sold annually in California.

57. This small sales volume for any particular basic model makes it unrealistic to expect manufacturers to re-design their air compressors to meet November 16 Proposal's

energy efficiency standards, even though manufacturers would likely do so in order to serve the full United States' market after adoption of a similar federal rule.

58. In this respect, the rotary air compressor market contrasts sharply with the automobile market, where California's market power makes it reasonable to expect that auto makers would re-design cars to meet aggressive emission standards.

59. The November 16 Proposal adopts the same efficiency standard as the DOE Final Rule Package would have. The Final Rule Package and November 16 Proposal both refer to this efficiency standard as Trial Standard Level (TSL) 2.

60. The DOE TSD projected that about twenty-eight percent of compressors currently sold would fail to meet this standard without re-design. TSD, Base Case Efficiency Distribution for all Equipment Classes, Table 10.2.1, page 10-2.

61. When DOE's proposed performance standard is applied to publicly reported compressor performance data from across the industry, Atlas Copco has estimated that the number of failing basic models across the industry is in the same range as projected by DOE, with about one in four basic models failing.

62. Given this DOE estimate and Atlas Copco's review of the data, I estimate that a similar proportion – about one fourth - of basic rotary air compressor models would fail to meet the November 16 Proposal's efficiency requirements because the November 16 Proposal includes virtually the same compressor efficiency requirements as the DOE had included in the DOE Final Rule Package.

63. DOE forecast that manufacturers would redesign their non-compliant basic models for greater energy efficiency in order to continue to sell their products nationwide in the full range of air flow and compression specifications currently offered. Based on my experience, I believe DOE would be correct for most rotary air compressor models, as most manufacturers will continue to try to serve the U.S. rotary air compressor market. I estimate that in some cases, however, particularly for basic models which are sold infrequently, the manufacturer would decide to simply stop offering that basic model.

64. Because of the much smaller size of the California market, if the November 16 Proposal's efficiency rule is adopted, I forecast a much different manufacturer response. I estimate that most non-compliant models will simply be withdrawn without replacement by the manufacturer, since the costs of redesign and retooling cannot be economically justified for such small sales volumes.

65. Because the November 16 Proposal has a significantly shorter compliance time period that DOE had proposed – less than three years as opposed to DOE's five years – manufacturers will have even stronger incentives to withdraw rather than redesign currently non-compliant models for the California market, given the normal lengthy time line for product re-design and the low return from such an investment. DOE reported that a three year compliance time line was problematic for the industry,

because of the limited number of qualified design engineers, one of the reasons DOE proposed a five year compliance time line. Final Rule Package, p. 285.

66. Because of this market dynamic, I estimate that even if compliance certification problems discussed below are resolved, that the number of rotary air compressor models offered for sale in California will drop by about one quarter if the proposed efficiency level – TSL 2 - is adopted on the time line proposed by the Commission. This estimate is consistent with the data reported in TSD Table 10.2.1.

67. DOE considered a more aggressive efficiency standard, known as Trial Standard Level (TSL) 3, but declined to adopt it. According to DOE:

> The Secretary concludes that at TSL 3 for compressors, the benefits of energy savings, positive NPV of consumer benefits, emission reductions, and the estimated monetary value of the emission reductions are outweighed by the economic burden on some consumers, and the impacts on manufacturers, including conversion costs and profit margin impacts that could result in a large reduction in INPV [Industry Net Present Value]. Consequently, the Secretary has concluded that TSL 3 is not economically justified. DOE Notice, pp. 310-11.

68. In the Commission's Initial Statement of Reasons (ISR), it recognized that the current rulemaking record – primarily the Final Rule Package and TSD - does not support adoption of TSL 3, particularly not on the accelerated schedule the Commission prefers. ISR, p. 11.

69. Despite the absence of support in the DOE rulemaking record, the Codes and Standards Enforcement (CASE) Initiative for PY 2018: Title 20 Standards Development for Compressors asserts that the Commission could adopt TSL 3 without causing any significant problem for California businesses. This is because "a total of 56 percent of the currently available products [are] already meeting the standard." CASE Report, p. 23-24. CASE based this assertion on Table 10.2.1 on page 10-2 of the DOE Technical Support Document (TSD).

70. The basic rotary air compressor models proposed to be covered by this rulemaking cover a very wide range of air flows and pressures desired by industrial and commercial users. The withdrawal of roughly half the basic rotary air compressor models offered for sale in the state of California is likely to be commercially disruptive for California businesses which need this equipment, since there is no assurance that there will be compliant equipment available for many reasonably common air flow, pressure, or other industry application configurations. Put simply, basic rotary air compressor models are not nearly as fungible for industry needs as different models of passenger cars are to fulfill needs for a family car.

71. Because of the short compliance time line and the substantial costs for redesign, I estimate that if the Commission adopts TSL 3, manufacturers will withdraw roughly half the basic rotary air compressor models currently available in the California

market upon the proposed compliance date. California businesses will instead have strong incentives to purchase used, less efficient machines, made before the compliance date and so exempt from regulation.

72. The withdrawal of roughly half the basic rotary air compressor models offered for sale in the state of California is likely to be commercially disruptive for California businesses which need this equipment in a wide variety of air flows, pressures, and configurations.

IV. The November 16 Proposal Substantially Underestimated Testing and Certification Costs by Precluding Use of Existing Test Data, Something DOE Intended to Allow. Unless Corrected, Many Compliant Rotary Air Compressor Models Will Be Withdrawn from the California Market.

73. The November 16 Proposal requires that before a basic rotary air compressor model can be offered for sale in California, that model must be certified to meet the new energy efficiency standard. That certification must be based either on tests performed by a California certified testing laboratory or based on a mathematical projection using a method validated with certified data (Alternative Efficiency Demonstration Method (AEDM).

74. The new requirements become effective for air compressor models manufactured on or after January 1, 2022. Thus, these requirements do not apply to resale of older compressor units.

75. In its current form, this certification requirement for newly manufactured rotary air compressors will result in additional sharp reductions in the number of basic rotary air compressor models offered for sale in California. Without changes to allow use of existing test data, I estimate that many basic rotary air compressor models which would comply fully with the November 16 Proposal's energy efficiency requirements will nonetheless be withdrawn from the California market rather than incur the high certification and testing cost. This is because most basic air compressor models have very low sales volume, making such testing costs a much greater burden than would be the case for the DOE test rule, which was suspended.

76. Atlas Copco offers, through its various brands, over 800 distinct compressor models which would be addressed by the November 16 Proposal. Based on data from CAGI, I estimate that Atlas Copco's competitors offer nearly 5,000 additional compressor models which would be subject to the November 16 Proposal.

77. Based on my experience in the industry and my work with CAGI, I estimate that for most of these basic rotary air compressor models, the manufacturers possess air compressor efficiency data from testing using the ISO1217: 2009 acceptance test. These data can be used to derive the isentropic efficiency of a basic rotary air compressor model. Consequently, these data can provide a valid factual basis on which a manufacturer – and the Commission -- could determine and, if appropriate,

certify compliance with that efficiency standard for a basic rotary air compressor model.

78. The DOE rotary air compressor efficiency test rule adopted in January 2017 is based on ISO1217: 2009, with changes intended to improve the reliability and repeatability of test results. The high costs of the required testing under the test rule have made it quite controversial, particularly since there is very little difference in the accuracy of this test compared to ISO1217:2009.

79. The high cost of testing was noted repeatedly at the June 20, 2016 rulemaking hearing, Transcript, pp. 130, 133, 155. https://www.regulations.gov/document?D=EERE-2013-BT-STD-0040-0044

80. In response, DOE stated in the January 4, 2017 notice promulgating the final Test Rule that it did not intend to invalidate or prevent the use of ISO1217:2009 test data to comply with DOE rules "If historical test data is based on the same methodology [ISO1217:2009] being adopted in this final [Test] rule, then manufacturers may use this data for the purposes of representing any metrics subject to the representations requirements." 82 Fed. Reg. 1052, 1090, 1094. Indeed, DOE concluded that for ninety percent of current compressor models, no additional testing would be needed since prior data could be used. *Id.* 1094-95.

81. In the January 4, 2017 notice, however, DOE postponed acting on key aspects of federal compliance certification requirements. 82 Fed. Reg. 1052, 1096 (DOE is not finalizing an enforcement sampling plan, to allow for further comments and input on how DOE should evaluate compliance).

82. This deferral by DOE created great confusion among compressor manufacturers about how DOE would address testing results, permissible tolerances with the ISO1217:2009 test method, and related matters. Manufacturers and CAGI have made repeated requests for written clarification from DOE to ensure that they may lawfully rely on ISO1217:2009 data for various representations and other purposes. I have discussed these issues in person on two occasions with DOE personnel at their offices in Washington, DC. Despite these requests by Atlas Copco, other manufacturers, and CAGI, DOE has given no written response.

83. Instead, DOE delayed the effective date of the test rule until the end of 2017, and then suspended enforcement of the test rule until the compliance date of any DOE energy efficiency rule. See, Department of Energy June 8, 2018 Enforcement Statement ("Enforcement Statement"), https://www.energy.gov/gc/downloads/enforcement-statement-air-compressor-test-procedures.

84. I am informed that some air compressor manufacturers have stopped – or never started – testing with the DOE test rule procedures. Based on my work at CAGI,

however, I am also aware that many of these manufacturers have compiled data from many ISO1217:2009 tests of their basic rotary air compressor models.

85. Atlas Copco has tested two large rotary air compressor models using both the ISO1217:2009 test and the more recent DOE test method for energy efficiency. The efficiency results were consistent as shown below. .

86. The results from a 90 kw (120 hp) fixed speed rotary air compressor using ISO1217 and the DOE Test Rule Method are shown here:

	labtest DOE	standard production test		
	7Bar - Max Flow	7Bar - Max Flow (Production)	difference	
Corrected Power (Pcorr)	113,52	113,38	-0,1%	
Isentropic Power (Pisen)	81,18	80,962	-0,3%	
Isentropic Efficiency (η)	0,715	0,714	-0,1%	
SER	396,56	394,73	-0,5%	
Pressure Ratio	8,04	7,99	-0,6%	
Flow Rate (l/s)	286,27	287,23	0,3%	

87. The results from a 200HP production unit tested in 2015 using the ISO1217:2009 test and the results from a different unit of the same model tested in 2017 using the DOE test method are consistent, and show less than a two percent difference in the results

Date	Model no.	Serial no.	Test Location	SER	FAD
8/24/2015	Redacted	Redacted	Production	18.2	1221
8/14/2017	Redacted	Redacted	R&D Lab	18.5	1198

88. The November 16 Proposal, like the DOE test rule, also allows for the use of an Alternative Efficiency Demonstration Method (AEDM), a mathematical projection of efficiency. That method, however, must be validated using test data using the DOE Test, 10 C.F.R. 429.70(h). It is unclear whether such validation testing would have to have been conducted by a California certified laboratory.

89. According to the Modern Appliance Efficiency Database System (MAEDBS), ***there are currently no laboratories anywhere*** certified by the State to conduct any air compressor efficiency test, whether that test is the one set forth in the DOE test rule, or any other compressor test, such as ISO1217:2009, as amended in 2016. https://cacertappliances.energy.ca.gov/Pages/CompanyInfo/CompanyList.aspx

90. I am informed that the Commission will allow efficiency testing done by manufacturers to be accepted provided that the manufacturer's laboratory has obtained state certification. Atlas Copco and its Quincy Compressor subsidiary have testing laboratories in Belgium, Italy and in Bay Minette, Alabama, as part of their manufacturing operations. These laboratories are not yet certified by the State of California to conduct the required air compressor efficiency testing.

91. According to the MAEDBS website, certifications of third-party laboratories are prospective: "Test lab applications for the next certification year become available on November 1st each year." https://cacertappliances.energy.ca.gov/Login.aspx. This MAEDBS website language also suggests that laboratories could not apply to be certified until November 1, 2019, for testing to be conducted starting in calendar 2020.

92. There is no indication in the November 16 Proposal that laboratory certification delays and laboratory capacity for such efficiency testing were considered or addressed.

93. Given this MAEDBS regulatory language, it appears that only data generated by a certified test laboratory AFTER the laboratory has been certified by the State of California can be used to register a product for sale on the MAEDBS. If that is the case, and no prior data can be used, then manufacturers will face very high testing costs in order to sell any of their rotary air compressors in the State of California.

94. The 2019 Intertek pricing given to CAGI members for testing rotary air compressor energy efficiency is attached as Exhibit 1. For fixed speed rotary air compressors, the cost is $1,740 per unit, and for variable speed drive (VSD) rotary air compressors, the cost is $2,125 per unit. I am informed that the prices charged by Intertek for air compressor efficiency testing to non-CAGI members are higher but do not have a detailed price list for such testing.

95. Two units will need to be tested for each model in order to satisfy DOE test requirements, making certification testing cost $3,480 for a fixed speed compressor, and $4,250 for a VSD compressor. Additionally, laboratory costs of $200 per day must be added, making test costs $3,680 for a fixed speed compressor and $4,450 for a VSD compressor. There are often additional, incidental charges if tests take longer than planned, and for other reasonable costs incurred by the laboratory.

96. If all 800 plus of Atlas Copco's basic rotary air compressor models have to be tested using the DOE requirement of two units tested per basic model (at Intertek's rates roughly $4,000 per basic model) in order to certify compliance, the testing costs would exceed $3 million. If all 6,000 or so affected basic rotary air compressor models have to be tested, the costs could easily exceed $20 million for the industry, simply for the right to offer all of their basic models for sale in California, a relatively small market.

97. For a large number of the affected models, there will be no California sales in any given year, simply because the number of models exceeds the number of machines actually sold in a year by a wide margin. Nonetheless, under the proposed rule, every model offered for sale would have to certified, based on testing conducted by a laboratory certified by the State of California. Thus, many manufacturers would face the cost of testing and certification even though they sold no compressors from that model in California that year.

98. Consequently, I estimate that there will be much higher unit costs for testing and certification under the proposed California rule than would be true if DOE had adopted its final efficiency rule posted in December 2016. This result occurs because these California testing costs are spread over much smaller sales: around 3,700 units per year in calendar 2022 rather than the nationwide estimated sales of 27,900.

99. The November 16 Proposal, following the federal test rule, would permit Alternate Efficiency Demonstration Methods (AEDMs) to be used instead of testing every model. While the use of AEDMs can be helpful, the AEDMs as presented by the DOE test rule must be validated with data gathered using the DOE test method. 10 C.F.R. Section 429.70(h). If the Commission insists that such validation testing be conducted by a certified test laboratory, a very large problem still remains, since no laboratories are yet certified.

100. The DOE TSD and the Final Rule Package do not support the November 16 Proposal's apparent insistence on discarding past testing data because the data were not generated by a California certified laboratory. To the contrary, the DOE Test Rule and the Final Rule Package assumed that past data could be used in order to reduce the economic impact of DOE efficiency rule. 82 Fed. Reg. 1052, 1094, 1096. According to DOE's discussion of testing impacts on manufacturers, "if historical test data is consistent with values that will be generated when testing with the test methods established in this final rule, then manufacturers may use this data for the purposes of representing any metrics subject to representations requirements." Final Rule Package, P. 234

101. If the Commission is relying upon the DOE rulemaking record to support its contention that the impacts are tolerable for the manufacturing sector, then the Commission must allow the manufacturers to use test data generated in the past, data obtained prior to laboratory certification by the State of California. Otherwise, the November 16 Proposal's insistence on new test data is not only without support in the record, but is strongly contradicted by the current rulemaking record.

102. Elsewhere in the DOE rulemaking record, DOE stated that the testing impact would be ameliorated by "AEDMs to model the performance of compressors with lower sales volumes based on compressors with higher sales volumes, thereby reducing the burden of testing." Final Rule Package, P. 75. In this instance, however, the sales volumes for almost every model of rotary air compressor sold in California are very small, and in the case of many and perhaps most models, zero. The impact of discarding past test data is thus especially harsh in this limited sales context.

103. If the Commission insists that past testing data cannot be used to certify compliance, but must be generated anew by certified laboratories, I estimate that a large percentage of rotary air compressor models will be withdrawn from sale from the California market, since sales volumes are much too low to warrant the additional expense. Moreover, I estimate that most of models to be withdrawn would probably comply with the actual efficiency standards.

MILES & STOCKBRIDGE P.C.

CERTIFICATION

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct:

David P. Prator

Houston, Texas

December 21, 2018

MILES & STOCKBRIDGE P.C.

EXHIBIT 1

MILES & STOCKBRIDGE P.C.

Appendix B. Schedule of Charges 2019

Service	Fee
A. QUALIFICATION TESTS	
Rotary Screw Compressors (Fixed / VSD)	
1. Initial Test Fees - Original Equipment Manufacturer	$1,740.00/$2,125
2. Private Brand Manufacturer	$1,740.00/$2,125
Refrigerated Air Dryers (Non-cycling / Cycling),	
1. Initial Test Fees - Original Equipment Manufacturer	$1,830/$2,350
2. Private Brand Manufacturer	$1,830/$2,350
B. SCHEDULED TEST (VERIFICATION TEST) FEES	Same as "A" Above
C. INITIAL ONE TIME VERIFICATION PROGRAM ADMINISTRATION FEE	
CAGI Member Manufacturer Participant Joining Program at Commencement of Program	$0
CAGI Member Manufacturer Participant Joining Program After Commencement of Program	$2,500
Non-CAGI Manufacturer	$10,000
D. ANNUAL VERIFICATION PROGRAM ADMINISTRATIVE FEES	
CAGI Member	$0
Non-CAGI Member	$7,500
E. LABORATORY CHARGES	
1. Lost time of regularly assigned personnel who cannot be assigned to other work (due to unit failure).	$60.00/hr
2. Facility Use Fee	$200/8hrs
Note: Manufacturers' responsibility begins with notification of failure of the unit.	
3. Complete retest of a unit or test of Second Sample	Same as "A" Above
F. SELECTION OF UNITS	
Site Visit	$400
Expenses	At Intertek Cost
G. MEETING ATTENDANCE	
Labor	$500/day
Expenses	At Intertek Cost