



January 11, 2023

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Petitions Clerk
IAPMO Board of Directors
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Dear IAPMO Board Members:

Petitioner: Daikin U.S. Corporation

Re: Petition of Decision Docket 11-24, UMC Item #208, Public Comment #4

Action Being Sought: Approval of UMC Item 208, Public Comment #4, with Minor Editorial Amendments to Section 1104.6.5(2) of PC#4.

Hearing Requested: Yes, a Hearing is Requested for This Petition.

Supporting Arguments: This Petition is being filed in view of the following procedural violations and substantive effects, which threaten the integrity of the code development process and urgently warrant Board intervention.

- I. The Standards Council improperly disregarded the decision and vote of the IAPMO membership, in contravention to IAPMO's consensus process.
 - a. ANSI Essential Requirements stipulate that the process must lack dominance.
- II. The Standards Council and the Technical Committee failed to provide sufficient technical justification in rejecting PC#4 and selecting PC#1, in contravention to IAPMO's Regulations Governing Committee Projects.
 - a. ANSI Essential Requirements mandate openness to all persons who are directly and materially affected by the activity in question.
 - b. The Standards Council's basis for denying the appeal improperly weighs and improperly represents facts that are on the record.
- III. The Standards Council's adoption of PC#1 instead of PC#4 violates ANSI's Essentials Requirements to harmonize the UMC with other ANSI standards.
- IV. The Standards Council's adoption of PC#1 over PC#4 may deny consumers access to vital air conditioning equipment by prescribing regulations unwittingly restrictive or ban access major manufacturers' products.

Introduction

We respectfully request IAPMO's Board of Directors, in view of IAPMO procedures and ANSI's Essential Requirements, 1) **uphold** the IAPMO membership's vote in favor of PC#4; 2) **overturn** the decision of the Mechanical Technical Committee and Standards Council to approve PC#1 for Item #208 (appeal 11-24) instead of PC#4; and 3) **adopt** PC#4 to Item 208, to align the UMC with other standards, namely ASHRAE 15 (2022) and UL/CSA 60335-2-40 (4th ed.).

We submit that advancement of PC#1 was done in contravention to IAPMO procedures and could potentially lead to unintended consequences: making UMC inconsistent with other standards and raising the real potential of preventing consumers from purchasing conventional HVAC equipment.

I. The Standards Council improperly disregarded the decision and vote of IAPMO's membership, in contravention to IAPMO's consensus process and ANSI objectives.

IAPMO members—representing diverse industries and regions—traveled to Charlotte, North Carolina to attend the Annual Conference. There, 466 present, voting members made their voices heard by overwhelmingly voting to approve 21 modifications to the Mechanical Code. Yet the Mechanical Technical Committee decided to reject **EVERY** amendment proposed by IAPMO membership. It appears that a select group of the Mechanical Technical Committee chose, in mass, to completely go against long-standing IAPMO procedure by ignoring the membership's vote.

The membership's vote has always been given high regard within the organization, as is reflected by the Section 4-5 of the IAPMO Regulations. The membership listens to the testimony and decides for the good of the organization and the public. IAPMO touts the collective expertise of its membership in developing standards and the importance of participating and **voting** for that reason. IAPMO encourages industry experts to join as members to “become part of the code development process by having a voice and a **vote that counts.**” (IAPMO [website](#), “Why become a member” (emphasis added).) And IAPMO represents that “[a]s a member of IAPMO, you can become an integral part of the code development process by having a voice, which will in turn help shape the future of the Plumbing and Mechanical industry.” According to IAPMO, it accomplishes its important objectives by “drawing from the **knowledge of members** whose expertise stems directly from the Plumbing and Mechanical industry.” (*Id.* (emphasis added).) And, IAPMO has explained that its “consensus-based model code development process opens ourselves up to the **genius of the entire community** and to the sunlight of the communities we serve through our open and transparent process.” (IAPMO [website](#), “The IAPMO Group” (emphasis added).) Yet, for these proposals, IAPMO has set aside that collective expertise—and the “genius” of the community—by rejecting the votes of its many members and the valuable perspectives they bring.

a. ANSI Essential Requirements stipulate that the process must lack dominance.

By setting aside the membership's votes, the Standards Council undermined an important ANSI required objective for code development: No authority, leadership or influence should dominate to the exclusion of fair and equitable consideration of other viewpoints. Here, the Standards Council gave outsized deference to the positions of a smaller subset of commentators on the matters before it when it disregarded the membership's vote without meaningful testimony and evidence to do so.

The opposition to PC#4 before the Standards Council was provided by three individuals, whose arguments were based more on opinion rather than technical or policy reasoning. One opponent to the

membership's vote for PC#4 stated, "And as a TC member, if I don't have the time to review it thoroughly and look at all the information and have it line up properly, I can't accept it. So that was my technical reason for not accepting it." Another stated, "the TC did not have adequate time to review the referenced document. That's what, to me, this really comes down to."

By contrast, at the membership vote and before the Standards Council, a diverse group representing HVAC manufacturers, sensor designers, building coalitions, and environmental interests (to name a few), gave reasoned and meaningful testimony and briefing supporting the membership's vote. More than half of the Mechanical Technical Committee members that voted to oppose the membership-approved amendments did not attend the Association Technical Meeting, despite having the obligation to do so. They voted without hearing any testimony from the membership, appearing instead to accept the positions of select commenters without conducting necessary diligence regarding the specific technical and policy questions at issue.

II. The Standards Council and the Technical Committee failed to provide sufficient technical justification in rejecting PC#4 and selecting PC#1, in contravention to IAPMO's Regulations Governing Committee Projects

When rejecting the membership's vote, Paragraph 4-4.6.3 of the IAPMO Regulations Governing Committee Projects requires the Technical Committee to articulate reasoning "[that] shall be sufficiently detailed so as to convey the TC's rationale for its action so that rebuttal may, if desired, be offered when the Committee presents its Technical Committee Report to the Association for consideration."

But the Technical Committee did not so do. It simply said: "The comment [PC#4] is being rejected based on the action taken on Item #208, Public Comment #1." That statement is neither technical nor does it convey a rationale for rejecting the memberships' vote. And this lack of proper substantiation violates ANSI Essential Requirements, which requires ANSI-governed committees to "record and consider all negative votes [of the committee] accompanied by any comments that are related to the proposal under consideration."

The proponents of Public Comment #4, in contrast, provided detailed substantiation supporting the modifications proposed. Furthermore, AHRI and ASHRAE submitted numerous documents to KAVI supporting PC#4. There was extensive testimony at the Technical Committee meeting in May. Numerous experts in the profession testified on the need to accept Public Comment #4. No substantive technical concerns were ever expressed by the Technical Committee nor by any testifiers regarding the proposed modification in Public Comment #4.

a. ANSI Essential Requirements mandate openness to all persons who are directly and materially affected by the activity in question.

In rejecting PC#4, the Standards Council emphasized an editorial error that created an inconsistency with other standards. But doing so was inconsistent with IAPMO's and ANSI's requirements for openness, as this error had not been raised previously.

The Standards Council stated that one of its reasons for rejecting PC#4 was "[T]here are incorrectly referenced provisions from the extracted ASHRAE language. An example of this is in section 1104.6.2.4 from Public Comment 4. Within this section, there is at least one incorrect reference to another UMC section."

That was simply an editorial error in Section 1104.6.2.4(2), which should have read, “The supply air fan shall continue to operate for at least five minutes after the refrigerant detection system has sensed a drop in the refrigerant concentration below the setpoint value specified in Section 1104.6.5(2).”

But this minor technical error in Section 1104.6.2.4 was never discussed at the Technical Committee meeting in May, at the Association Technical Meeting in September, or during the automatic appeal hearing before the Standards Council. The concern that there is an incorrect reference should have been raised during public discussion to allow a response. It appears this issue was raised during closed discussions by the IAPMO staff, not at the Standards Council. Lack of public discussion on this issue and apparent discussion by the Standards Council with IAPMO staff during a closed meeting would violate the openness provisions of ANSI—provisions which are the cornerstone of the ANSI process and cannot be ignored.

This minor editorial error that purportedly precludes the adoption of PC#4—of which there appears to be just this one and not more as the Standards Council suggests—could easily have been corrected through IAPMO processes if it had been raised during testimony either at the Association Meeting or the automatic appeal hearing before the Standards Council.

Editorial errors unfortunately do occur. Things made by humans, like this Petition, may contain typos and errors. But we should not hold any process, let alone the consensus process, hostage to easily identifiable mistakes. Indeed, the Standards Council’s letter listing the error as the reason for rejecting PC#4 had errors of its own. In two locations, a reference is made to ASHRAE 15-2009 instead of correctly referencing ASHRAE 15-2019. In another location, there is a reference to Addendums A through K. This should have read Addendums a through w, since addendums are identified with lowercase letters and the addendums extend through the letter w not k.

The Standards Council violated ANSI procedures by not raising the issue of the editorial error during public review and debate.

b. The Standards Council’s basis for denying the appeal improperly weighs and improperly represents facts that are on the record.

The Standards Council misunderstands PC#4 and its correlation with ASHRAE 15-2019. The implication in the Standards Council’s letter is that the text of ASHRAE 15 must be extracted to be consistent. But that is not the case, and the extraction of ASHRAE 15 would add many pages to the text of the code. Furthermore, as is discussed in a latter section of this Petition, adopting PC#1 as the Standards Council has done, would introduce even greater and more troubling inconsistencies with ASHRAE 15 and UL 60335-2-40.

In issuing their letter, the Standards Council stated,

[T]he Council is concerned that the language within Public Comment 4 does not correlate with ASHRAE 15-2009 [*sic*, 15-2019] Addendums A through K. One example of this is in UMC section 1104.2 “Refrigeration Concentration Limit (RCL)” which was revised in ASHRAE 15-2009 [*sic*, 15-2019] Addendum C yet was not included in Public Comment 4.

But the Chair of ASHRAE SSPC 15 testified at the automatic appeal hearing that Public Comment #4 does correlate with ASHRAE 15 and UL 60335-2-40. The testimony pointed out that Annex GG in UL 60335-2-40 has multiple means of determining the refrigerant charge limitation based on releasable charge. Furthermore, Annex DD of UL 60335-2-40 requires the manufacturer's installation instructions to specify the allowable charge size and the means of determining the limitation. These limitations are a part of the instructions that the Uniform Mechanical Code requires to be followed for the installation of the equipment.

PC#4 harmonizes with ASHRAE 15 by making modifications to Section 1104.2, which was revised to read, "The concentration of refrigerant in a complete discharge of an independent circuit of high-probability systems shall not exceed the amounts shown in Table 1102.3, except as provided in Section 1104.3, ~~and~~ Section 1104.4 and Section 1104.6. The volume of occupied space shall be determined in accordance with Section 1104.2.1 through Section 1104.2.3."

Furthermore, ASHRAE 15, Addendums g, l, p, and s modified the refrigerant charge requirements to be consistent with UL 60335-2-40. And PC#4 modified Section 1104.6.1 to incorporate the updates to ASHRAE 15. The modified text reads,

Occupied spaces shall comply with the releasable charge limitations of the equipment listing, Section 1104.2. Unoccupied spaces with refrigerant containing equipment, not including ~~but not limited to~~ continuous piping or tubing, shall comply with the releasable charge limitations of the equipment listing or Section 1104.6.4.

The Standards Council also contends that "[a]nother example [of inconsistency] is UMC section 1104.6.2 'Listing and Installation Requirements' which was revised in ASHRAE 15-2009 [*sic*, 15-2019] Addendum K and not part of Public Comment 4."

But there is no inconsistency. Addendum k was a response to a continuous maintenance proposal submitted by Julius Ballanco, P.E. to add a reference to UL 60335-2-40 to the Group A2L requirements. Prior to Addendum k, there was a requirement for the equipment to be listed without a reference to any product consensus standard. The section continues to require the equipment to be installed in accordance with the listing and manufacturer's installation instructions.

Adding references to UL 60335-2-40 to PC#4 was wholly unnecessary since such a requirement already exists in the Uniform Mechanical Code Section 903.1, which requires all air conditioning systems to comply with UL 60335-2-40. Through 903.1 the requirements in Addendum k are already included. The remaining parts of Addendum k are specified in Section 1104.6.2 which states, "Refrigeration systems shall be listed and shall be installed in accordance with listing, the manufacturer's instructions, and any markings on the equipment restricting the installation."

The final reason articulated by the Standards Council for rejecting PC#4 is,

Further, there are incorrectly referenced provisions from the extracted ASHRAE language. An example of this is in section 1104.6.2.4 from Public Comment 4. Within this section, there is at least one incorrect reference to another UMC section. Additionally, the Public Comment failed to incorporate an extracted requirement of ASHRAE into section 1104.6.6, which was then referenced in section 1104.6.2.4. Both of the above examples reflect inaccurate cross-references of ASHRAE requirements.

The editorial error in Section 1104.6.4.2(2) has already been addressed. The second part of the statement relates to a claim that Sections 1104.6.6 and 1104.6.2.4 are not extracted text from ASHRAE 15 and, therefore, inaccurate. But extracting the text from ASHRAE 15 is not mandated for consistency requirements. More importantly, the requirements listed for these two sections in Public Comment #4 are consistent with updates made in **Addendum s** to ASHRAE 15, an addendum that the Standards Council appears to have not considered when alleging the inconsistency.

III. The Standards Council's adoption of PC#1 instead of PC#4 violates ANSI's Essentials Requirements to harmonize UMC with ANSI standards.

Public Comment #4 was submitted to harmonize the Uniform Mechanical Code with ASHRAE 15 and UL 60335-2-40. Both ASHRAE 15 and UL 60335-2-40 are ANSI standards, and ANSI Essential Requirements state, "Good faith efforts shall be made to resolve potential conflicts between and among existing American National Standards and candidate American National Standards."

The expertise for refrigeration requirements lies within the technical committees regulating ASHRAE 15 and UL 60335-2-40. There are no members of the Mechanical Technical Committee that are members of the ASHRAE 15 Committee. Only one member of the Mechanical Technical Committee, Julius Ballanco, P.E., is a member of the UL 60335-2-40 standards committee. To meet ANSI requirements, it is imperative for IAPMO to be consistent with ASHRAE 15 and UL 60335-2-40, not the other way around, especially since these other two standards are already published and the IAPMO Uniform Mechanical Code is not.

Multiple members of SSPC 15 (ASHRAE 15 committee), including the chair, testified regarding the harmonization of the Mechanical Code with ASHRAE 15 at the Association Technical Meeting and the automatic appeal hearing before the Standards Council, as well as the Mechanical Technical Committee meeting in May. Similarly, members of the UL standards committee for UL 60335-2-40 also testified at all three meetings or hearings. They supported the acceptance of Public Comment #4 for harmonization and, more importantly, testified that Public Comment #1 is NOT so harmonized and would create problems in the profession. Both the Standards Council and the Mechanical Technical Committee ignored the testimony of these experts and chose to openly oppose these required harmonization efforts.

The following are examples provided during the testimony of major conflicts between Public Comment #1 and both ASHRAE 15 and UL 60335-2-40:

Refrigerant Detectors

The inconsistency of PC#1 with other standards is, at its core, reflected by PC#1's use of the term "refrigerant detector," which is no longer used by either ASHRAE 15 or UL 60335-2-40.

Turning to specific examples, PC#1, through its Section 1104.6.5(2) requires "[r]efrigerant detectors, as installed, shall activate the functions required by Section 1104.6.2.4 within a time not to **exceed 15 seconds...**" (Emphasis added.) This contrasts with the 30-second requirement to both detect and react provided by ASHRAE 15 and UL 60335-2-40:

"The refrigerant detection system shall...generate an output signal in not more than 30 seconds when exposed to a refrigerant concentration..." (See ASHRAE 15 (2022), Section 7.6.2.4(g).)

“The refrigerant detection system shall **initiate a system response within 30 seconds** when the refrigerant sensor is directly exposed to a refrigerant gas concentration...”
(See UL 60335-2-40 (4th. ed.), Annex LL (emphasis added).)

Annex LL of UL 60335-2-40 has many pages of requirements for refrigerant detection systems for Group A2L refrigerants. The requirements for when refrigerant detection systems are mandated within the equipment are specified in Annex GG. The combined Annexes LL and GG are longer in length than all of Chapter 11 on refrigeration systems in the Uniform Mechanical Code. Thus, harmonization is achieved by PC#4 by appropriate references to other standards, unlike PC#1 which expressly articulates inconsistent, conflicting requirements.

PC#1 also requires that a refrigerant detector shall be provided in accordance with Section 1104.6.5 as a part of the listed equipment where any of the following apply:

- (1) The charge size of any independent circuit exceeds $0.212 \times \text{LFL (lb)}$, where LFL is in pounds per 1000 ft³ ($6 \times \text{LFL [kg]}$ where LFL is in kg/m³).

But neither ASHRAE 15 nor UL 60335-2-40 require a refrigerant detection system for all equipment having a charge size above 0.212 times the LFL (which equates to 1.8 kg of R32 refrigerant). Annex GG of UL 60335-2-40 specifies when a refrigerant detection system is required. An example of when a refrigerant detection system would not be required is a rooftop unit on a larger open mercantile facility, such as a Home Depot. A detector would not be required because the complete release of the refrigerant charge would not pose a meaningful hazard to the public. Similarly, smaller residential units may not require a refrigerant detection system when installed in open basements.

Charge Size

PC#1—unlike PC#4—also conflicts with ASHRAE 15 and UL 60335-2-40’s refrigerant concentration limits.

Consistent with the most recent versions of ASHRAE 15 and UL 2-40, Public Comment #4 references “releasable charge” in Sections 1104.2 and 1104.6, and considers release mitigation through 1104.6.4 (emphasis added):

“When the **releasable charge** of the refrigeration system exceeds the refrigerant concentration limit specified in Section 1104.6.1, the refrigerant charge and **ventilation airflow** shall be in accordance with the equipment listing and ASHRAE 15.”

Both ASHRAE 15 and UL 60335-2-40 have requirements for determining releasable charge based on mitigation measures provided with the system. As was identified in testimony to the Mechanical Technical Committee, numerous research reports validate the safety of the mitigation measures added to UL 60335-2-40 and the changes regarding releasable charge added to ASHRAE 15. All of these research reports were uploaded to the KAVI website for the Mechanical Technical Committee to review.

But Public Comment #1, however, takes a different tack—one that’s inconsistent with these other standards. Public Comment #1’s versions of 1104.2 and 1104.6.1 essentially limit an A2L system’s RCL to **25%** of the LFL. And, to the extent a system exceeds the prescribed RCL threshold, Public Comment #1 gives no weight to two key mitigation techniques considered and required by the most recent versions of ASHRAE 15 and UL 60335-2-40: ventilation and shut-off valves. Both ASHRAE and

UL acknowledge and accept the benefits of ventilation drawing in the fresh air and shut-off valves limiting the amount of refrigerant discharge, to reduce the chance of refrigerant ignition. But Public Comment #1 eschews these important tools.

As an example, a VRF system under PC#1—even with the safety provisions of detection, circulation, and safety shut-off valves—serving a building or space having the smallest room measuring 10 feet by 15 feet with an 8-foot ceiling could have a refrigerant charge of R32 of 5.76 pounds. That is impractical if not impossible for commercially viable VRF system with that small a charge. Public Comment #1 effectively eliminates the use of Group A2L VRF systems. But, under ASHRAE 15 and UL 60335-2-40, VRFs are allowed a larger charge and given credit for mitigation system. Harmonizing the UMC with ASHRAE 15 and UL 60335-2-40 by adopting PC#4 would enable the availability of VRF units in UMC jurisdictions.

While the example above referenced VRF systems, the same limitation on charge size would prohibit the use of many rooftop units, split systems, and multi-split systems. Again, no credit is given in Public Comment #1 when mitigation is provided in a system, which is inconsistent with ASHRAE 15 and UL 60335-2-40.

Mitigation Requirements

Public Comment #1 is inconsistent with ASHRAE 15 and UL 60335-2-40 with respect to mitigation requirements and could create undesirable conditions for occupants and structures. Under PC#1, when the refrigerant detector senses a refrigerant concentration at the maximum value specified in Section 1104.6.5(2), the following actions shall be taken (only relevant text is shown):

(2) Turn off the compressor and all other electrical devices, excluding the control power transformers, control systems, and the supply air fan. The supply air fan shall continue to operate for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.6.5(2).

(4) Turn off any heaters and electrical devices located in the ductwork. The heaters and electrical devices shall remain off for at least five minutes after the refrigerant detector has sensed a drop in the refrigerant concentration below the value specified in Section 1104.6.5(2).

But ASHRAE 15 and UL 60335-2-40 do not require the compressor to turn off when the system is a pump-down system. Consistent with this, Public Comment #4 allows the compressor to stay on for a pump-down system. Pump down of the refrigerant is generally preferred as it keeps the refrigerant within the equipment as opposed to leaking within the space.

Turning to the heaters of Section (4), both ASHRAE 15 and UL 60335-2-40 allow them to remain on during the sensing of a refrigerant leak. Public Comment #4 is consistent with this. If there were false sensing of refrigerant, the building occupants could lose heat during the winter months. And if a building is unoccupied, this could result in frozen pipes and damage. Research has shown that ASHRAE 15 and UL 60335-2-40 are correct in allowing the heat to remain on when a sensor identifies refrigerant, specifically considering the mitigation measures used to prevent the heating from being an ignition source.

IV. The Standards Council’s adoption of PC#1 over PC#4 may deny consumers access to vital air conditioning equipment by prescribing regulations that unwittingly restrict or ban access to major manufacturers’ products.

Federal and state regulations will likely require the use of low-GWP refrigerants in the coming years, and the only likely candidates for low-GWP refrigerants in conventional systems are A2Ls. The safety of A2L refrigerants has been thoroughly studied. In fact, numerous manufacturers have been using R-32—which is an A2L refrigerant—in non-U.S. markets for over a decade without incident. Given that the U.S. HVAC industry’s transition is quickly approaching, published standards must provide consistent guidance in view of underlying research.

Having charge-size and detector requirements in Public Comment #1 that are different from other codes won’t promote IAPMO’s objectives, nor will they benefit various stakeholders—ranging from OEMs, to installers, to consumers, to society as a whole.

Most state and local jurisdictions have adopted either the International Mechanical Code or ASHRAE 15—with a smaller yet sizeable percentage of the country adopting the UMC. It is well understood and appreciated that California adopts the UMC.

But industry participants are currently designing their products, components, and protocols to align with UL 60335-2-40 and ASHRAE 15. Were the UMC to substantially deviate from other standards, certain products may not be available to those in UMC jurisdictions because of the economic costs of designing two separate product lines: one for UMC-adopting jurisdictions and another for IMC- and ASHRAE 15-adopting jurisdictions. In addition, regulatory requirements to switch to A2Ls are fast approaching, and there may not be time to implement the proposed requirements of Public Comment #1.

Adoption of Public Comment #1 could, for example, limit UMC-adopting jurisdictions to window units, packaged terminal air conditioners (PTACs), and mini-split, because conventional ducted units would be challenged to meet the charge-size and detector requirements of Public Comment #1.

Adoption of Public Comment #1 could also make it difficult for HVAC systems, such as VRF systems, with comparative environmental benefits to gain traction in UMC-adopting jurisdictions. Compliance with Public Comment #1’s 25% RCL/LFL requirement could require increasing the number of units installed to cool a space. That is, space would need to be cooled by two units instead of one—to meet Public Comment #1’s 25% RCL/LFL requirement rather than the 50% RCL/LFL requirement proposed by Public Comment #4 and accepted by ASHRAE and UL.

Rejecting Public Comment #4 would needlessly deny stakeholders of these environmental, financial and other benefits. Furthermore, when enacting provisions that have the effect or prohibit access to certain products, private standards-setting organizations must remain cognizant of running afoul of anti-trust restrictions.

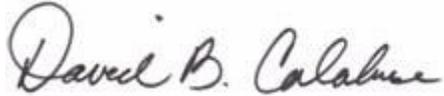
Conclusion

We encourage the Board to accept the vote of the membership by overturning the ruling of the Standards Council, approving Public Comment #4 with a minor editorial correction. The minor editorial correction is to Section 1104.6.4.2(2) with the sentence that would read, “The supply air fan shall

continue to operate for at least five minutes after the refrigerant detection system has sensed a drop in the refrigerant concentration below the ~~setpoint value specified in Section 1104.6.5(2).~~"

The integrity of the organization is challenged by the rejection of the membership vote at the Association Technical Meeting. IAPMO has long claimed, "become part of the code development process by having a voice and a vote that counts." For the vote to count, as stated by the association, the Board must vote in favor of the appeal.

Respectfully submitted,

A handwritten signature in cursive script that reads "David B. Calabrese".

David B. Calabrese
Senior Vice President, Government Affairs
Deputy General Manager, Washington, DC Office