



**WHPA Goal 2: CQM Standard 180 User Guide Working Group  
Thursday March 30, 2017 Meeting Notes**

**Call to Order**

The meeting was called to order at 10:02 am PDT by Don Langston, CQM Committee Chair.

**Roll Call**

The Chair considered one member of each organization to be a voting member for this working group. 9 of 17 voting members in attendance would constitute a quorum. 13 voting members, 1 non-voting members, 2 guests and 1 staff were present for a total of 17 attendees.

P = Present at meeting A = Absent from meeting; if proxy has been assigned it will be noted below. Although Voting Members have been designated by Staff, this group acts primarily by consensus.				
<b>CQM User Guide Working Group Voting Members</b>				
ACCA (Air Conditioning Contractors of America)	Donald	Prather	Contractor Association	
Air Management Industries	April	Yungen	Contractor (Nonresidential)	P
Aire Rite AC & Refrigeration	Don	Langston	Contractor (Nonresidential)	P
AMS (American Mechanical Services)	Marc	Pickett	Contractor (Nonresidential)	P
Charles Segerstrom, Energy Efficiency Consulting	Charles	Segerstrom	Energy Efficiency Program Consultant	P
CLEAResult (formerly PECEI)	Todd	Van Osdol	California IOU	P
FDSI (Field Diagnostic Services Inc.)	Dale	Rossi	Third Party Quality Assurance Providers	
GWP (Goodheart-Willcox Publisher)	Sandy	Clark	Educator, Trainer	P
Honeywell E&ES, Commercial Buildings, Trade	Michael	Lawing	Controls (Manufacturer or Distributor)	P
HSGS (Honeywell Smart Grid Solutions)	Shayne	Holderby	Energy Efficiency Program Consultant	P
Marina Mechanical	Denny	Mann	Contractor (Nonresidential)	P
National Comfort Institute	Jeff	Sturgeon	Educator, Trainer	P
Richard Danks Consulting - FacilityPro	Rick	Danks	Other Stakeholder	P
SCE (Southern California Edison)	Scott	Higa	California IOU	P
Tre' Laine Associates	Pepper	Hunziker	Energy Efficiency Program Consultant	P
Western Allied Corporation	Mike	Gallagher	Contractor (Nonresidential)	
Warren Lupson and Associates	Warren	Lupson	Other Stakeholder	
<b>CQM User Guide Working Group Non-Voting Members</b>				
BELIMO	Darryl	DeAngelis	Controls (Manufacturer or Distributor)	
BMI (BuildingMetrics, Inc.)	Pete	Jacobs	Energy Efficiency Program Consultant	
Brownson Technical School	Bill	Brown	Educator, Trainer	
CLEAResult (formerly PECEI)	Michael	Blazey	Energy Efficiency Program Consultant	
HSGS (Honeywell Smart Grid Solutions)	Steve	Varnum	Energy Efficiency Program Consultant	
PG&E	Christian	Weber	California IOU	P
SCE (Southern California Edison)	Steve	Clinton	California IOU	
SMUD (Sacramento Municipal Utility District)	Bruce	Baccei	Publicly Owned Utility	
<b>CQM User Guide Working Group Guests (Non-Voting)</b>				
Adrienne Thomle, Consulting**	Adrienne	Thomle+		
AirTest Technologies	Mike	Schell	HVAC Manufacturer	P
Little Caesar's **	Wendy	Gallo+		P
<b>WHPA Staff (Non-Voting)</b>				
BBI (Better Buildings Inc.)	Mark	Lowry	WHPA Executive Advisor/BBI COO	
BNB Consulting/WHPA Staff	Bob	Sundberg	Energy Efficiency Program Consultant	P (scribe)
Empowered Solutions/WHPA Staff (WHPA Co-Director)	Shea	Dibble	Energy Efficiency Organization	

\*\* Organization is Not a Member of the WHPA; + Individual is NOT Registered with the WHPA; (P) after last name = Member/Registrant is Pending Approval from the WHPA Executive Committee



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*To avoid repetition, the name of the member organization will not be repeated in the body of the minutes past the first identification with the name of the representative participant.*

**Welcoming and Member Introductions**

No new members or guests.

**Approve Previous Meeting Draft Notes**

The March 16 meeting draft notes were distributed March 19. Members were asked to provide any additional suggested revisions or corrections after which finalized meeting notes would be posted to the WHPA website by Bob Sundberg.

**ACTION Items**

March 16, 2017 ACTION: Bob Sundberg, WHPA staff, would send out a WG email with links to the CQM Committee and WG work products posted at the WHPA website. He'd identify which would be valuable for members to review. Completed.

March 16, 2017 ACTION: Rick Danks would pursue ASHRAE formal approval to share portions of related standards user guides or user manuals to help provide structural guidance for this working group. Completed.

**New Business – Don Langston**

None.

**AGENDA**

<b>Topic</b>	<b>Discussion Leader</b>	<b>Desired Outcome</b>
Welcome, Roll Call, Member Introduction, Approve Past Meeting Notes, Review Action Items, New Business, Meeting Agenda	Chair, WHPA Staff	Record attendees, welcome any new members, approve previous meeting minutes, review status of any open Action items, planned agenda and bring up any new business items for the WG to consider addressing.
WG goals, scope, direction and leadership	Don Langston	Members share a clear understanding for the goals of this WG and determine WG Chair
Standard 180 Overview presentation	Rick Danks	Provide members with a common understanding of Standard 180 origin, audience, issues addressed, structure and Rick's understanding of the intent
ASHRAE Standard 62.1 User Manual	Rick Danks	As time permitted, look together at an example of another standard user manual to better understand ASHRAE approach and common structure
Confirm next meeting date/time, assign actions and proposed agenda and adjourn.	Don Langston, WHPA Staff	Clear understanding of member responsibilities for the next meeting. Next meeting date/time established.

**User Guide Working Group Planning Discussion – Don Langston**

Goals, scope, direction and WG leadership/chair.

Don Langston, Aիրerite AC & Refrigeration and Chair – he'd sensed increased tension within the working group (WG) in the previous meetings. He wanted the group to step back and get a better common understanding of what they were

trying to produce and the context within which it would be developed. Since the CQM Committee and its working groups had been meeting, since 2009 and before, members had always offered their own unique perspectives based on their experience which were all valuable. His was from a contractor perspective delivering contracted HVAC services to customers. Others were looking at this standard from an in-house maintenance staff perspective. In addition, there were owners, facility managers/directors, property managers and those financially responsible for all the related services and costs. Because this WG had been developing its work products for so long and there were a number of new members to the group, he thought it timely to call a “time-out” and make sure that everyone had a good understanding of just what Standard 180 was. Why it was developed and how it might be applied in California.

Rick Danks, Richard Danks Consulting, had offered to inform the group about the genesis of this standard as he’d been involved from the start. To help the group get a common “big picture” understanding before the WG got back down into the weeds developing the user guide.

Michael Lawing, Honeywell E&ES – from his manufacturer’s perspective involved in introducing new products, he understood the user guide’s purpose was to help both contractors and their customers by providing a pathway for their dialogue about what Standard 180 meant and intended for Q maintenance. The next generation of contractors and technicians would be coming along and they could use a guide to help them better understand this standard and how it might be implemented.

### Standard 180 Background and Overview – Rick Danks

#### BACKGROUND

The original effort began around 2006. Bob Baker was given the task of developing a “minimum standard for HVAC maintenance.”

- The Standard 180 FOREWARD went a long way in helping create the context and perspective for a maintenance minimum standard.
- The need for the standard was based on the understanding that most commercial maintenance was non-existent or poorly performed.
- The scope for the standard was determined to be addressing goals of occupant thermal comfort, indoor air quality and energy efficiency. Many folks in the industry had tended to focus on equipment and system reliability. Those were intended to still be key goals for any maintenance program. But, the ASHRAE effort was directed to focus on the three aforementioned goals.
- Those goals, like many, tended to function as competing priorities. The standard doesn’t really address or discuss how one should address competing objectives, to avoid favoring one over another. The balance of those goals would depend on the imperatives for each individual organization.
- The original committee struggled through whether to attack a minimum standard from the perspective of a list of HVAC equipment with prescribed minimum tasks or one of system performance. The prescriptive advocates would talk about filter changes at fixed intervals. The performance based group would advocate not changing filters until you needed and basing replacement on some performance assessment or criteria.
- Bob Roth of TRANE led early efforts to sort out this choice of approach. What evolved in the first edition of the standard was Section 5 with tables for each major type of equipment and lists of maintenance tasks developed for each table. Rick came to appreciate the tables as providing examples for what would be included in a minimum approach to maintenance.
- Another major challenge for the standard was how to develop one that could be applied across the entire facilities management industry and, for those responsible for that maintenance, from a knowledge base of zero to those familiar with cutting edge technologies and approaches. As a result of that range of participants, lot of the tasks were crafted as generically as possible and just described a core responsibility or requirement. Also, the FOREWARD clearly stated that you could and probably should exceed those minimum standards.
- The primary purpose for Section 4 Implementation was to provide a picture of what a maintenance program should look like. Or, if there was already a maintenance program in place, it could be benchmarked against the

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elements outlined in this standard. The same could be said for Section 5, as well (equipment maintenance task tables).

- Major difference between the ASHRAE effort and WHPA effort, regarding Standard 180, were in the frequency of working meetings and limits of the focus:
  - ASHRAE – two meetings per year – some important issues could be overlooked by the time they met, again. A broad standard intended to serve many constituents. And situations which ranged from contracted services through facility staff delivered services. The spirit of the standard was governed by a rules approach from motor sports – if it was not disallowed in the rules, you could do it, it could be included. If it didn't say you couldn't, then you could – approach.
  - WHPA and CQM Committee heavily influenced by Bob Baker's participation and contributions. CQM Committee working groups met weekly, bi-weekly, for the most part and could make much faster progress with their efforts. He and the ASHRAE Standard 180 Committee were delighted with the feedback provided by the WHPA committees and working groups focused on “how could you make this standard work in the real world.” The standard committee really appreciated getting feedback from these groups of actual industry practitioners on how to make the standard work.
  - It had been a bit challenging for the standard committee to deal with and integrate elements of suggestions into their “macro” environment from the WHPA committee working groups which operated in more of a limited “micro” environment. Resolved, somewhat, by the standard committee regarding WHPA generated suggestions as seen through the lens of being “customized” for a limited kind of building and several but a limited number of facility management situations. Their work on a “user guide” was to provide practical examples of “how” to comply with the “what” requirements contained in the standard, especially with IOU based energy efficiency programs and requirements in mind. Rick stated a special “hats off” to the CQM working group focused on their “value proposition” and customer interview/communications work the previous year. That work was essential for broader understanding and adoption of the standard.

Don Langston, Chair – was concerned to get some of the larger blocks of a user guide out there to be filled in. He was concerned that they might become too granular at a stage of just laying out what the user guide could look like, from a California perspective.

Rick Danks – considered this CQM working group to be a sort of pilot program which would help efforts to produce a user manual for a broader base of practitioners.

Don Langston – reminded members that the next ASHRAE Standard 180 Committee meeting would be held in Long Beach, CA toward the end of June. He didn't have an exact date but thought it was probably scheduled for Friday afternoon, June 23. He invited those interested to attend as “observers” even though they might not be members of ASHRAE or this committee.

Rick Danks – visitors were welcomed at the Standard 180 Committee meeting. Rick wanted to alert WG members that there had been some suggested adjustments to the standard terms. “Implementer” was being considered rather than “contractor” to make the reference more generic and inclusive. Implementer was intended to include contracted services as well as those provided by facility employee staff. Use of a term like “contractor” was tricky. If stated that way, it might be interpreted to mean that type of service provider was a requirement of the standard. That use of only one type of maintenance “implementer” could be utilized to achieve compliance with the standard. The committee intended to avoid that implication and confusion by use of a more generic term.

Don Langston, Chair – it had been a fairly steep learning curve since he became directly involved on the joint ASHRAE/ACCA Standard 180 Committee, his first experience with an ASHRAE committee. The slower pace of progress, which Rick had described, was one major learning, very unlike his experience running a company. The committee only met for about 4 hours a couple of times per year.



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Rick Danks – reminded members that activities of ASHRAE committees also needed to comply with protocols of ANSI, the American National Standards Institute and their “due process” requirements. This had an impact on the way work was conducted as well as the content of the work, itself.

### Standard 180 Overview presentation – Rick Danks

The standard included both a Purpose section in the front and appendices at the end of the standard which he chose to only touch on briefly. The overview he’d created focused mostly on Section 4 Implementation.

Rick Danks proceeded with comments on most of the overview presentation slides. A copy of the presentation would be sent out to all committee members and guests along with the March 30 meeting draft notes.

### Slide 2 - Standard 180 Structure and Content

- FOREWARD – explained why the standard was developed and provided a context within which it stood related to other HVAC standards and guidelines. Also, established that the intention of this minimum standard was never intended to limit what practices and/or technologies might be employed which would improve or optimize operation of the HVAC system and spaces it served.
- Section 1 Purpose: goals of the standard would focus on thermal comfort, indoor air quality, energy efficiency.
- Section 2 Scope: what sorts of buildings and systems the standard applied to and how it should be applied.
- Section 3 Definitions
- Section 4 Implementation – what a compliant maintenance program was required to include;
- Section 5 Required Inspection and Maintenance Tasks by Equipment Type. About 25 different kinds of HVAC types of equipment and major subsystems.

Section 5 comments: A healthy debate had been occurring about the difference between maintenance and repair/service tasks. The standard grouped them together within each task. It would be up to the owner and their service provider to sort out “how” that would be accomplished depending on their organizational and/or contracted services agreements. They were working on re-classifying things that sounded a lot like “repair” tasks into more of a non-normative, not required category but rather a “recommendation” part of the standard.

Donald Prather had been leading work on adding a third column to the task tables. 1<sup>st</sup> column – recommended task. 2<sup>nd</sup> column – recommended action. 3<sup>rd</sup> column – recommended frequency. Work remained to differentiate maintenance tasks from those considered repair tasks.

### Slide 3 – Section 4 Implementation Requirements

#### Minimum program elements

- Define responsible party – determined to be the “owner” or similar party, not the service provider
- Define maintenance program
- Require authorization and implementation
- Program review and revision

Comments: A lot of good work has been done by the CQM working groups on fleshing out program review and revision, value proposition for the maintenance approach and the initial discussions with the responsible party to gain agreement on what would be provided in order to accomplish the program goals. Revisions regarding review and revision was the effort to include the notion of “continuous improvement” along the lines of Deming’s quality concepts. Maintenance was not considered a “static” practice but one which needed to respond to ever changing system and component conditions. The owner/responsible party and implementation provider collaboratively work out the details.

### Slide 4 – Maintenance Program Elements

- Asset inventory
- Maintenance Plan

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- Program outcome objectives – what the maintenance program is expected to deliver, previously referred to as program performance objectives.
- Condition indicators for equipment
- Inspection/maintenance tasks
- Task frequency – adjusted and revised as conditions warranted
- Documentation
- Authorization to execute – mostly for unplanned failure or reported unacceptable conditions for which somebody needed to authorized the beyond inspection and maintenance work
- Initial and final Review and revision

Comments: they'd originally referred to maintenance program goals as "performance objectives" and had missed the confusion that description could cause with equipment and system "performance objectives." Like the goal of a pump delivering 20 GPM. Maintenance program goals, in contrast, could be things like minimizing equipment/component failures and maximizing energy efficiency. Program goals now were described by the terms "program outcome objectives" rather than performance objectives. System/component condition indicators could be visual inspections against a criteria or things like airflow delivery rates and Btu delivery rates and other measurable metrics.

In a proactive Standard 180 based program, documentation became almost as important as "wrench" activity. You're monitoring and documenting equipment and operational conditions as well as statistics like frequency of repairs so they could be accessed by reviewers.

The authorization to execute additional investigative and repair activities could be managed within an established budget for facility staff or a "not to exceed" limit for contracted providers or some other similar mechanism. There needed to be a process established to keep a record of how, when and by whom the work was authorized to establish an orderly record of program performance.

Review and revision – how did the execution actual compare to the plan. This was where discussions about altering the frequency of tasks would be addressed.

### Slide 5 - Asset Inventory

- List of items inspected and maintained
- Includes identification, location, capacity
- Can sort by device, unit and/or system
- Data base includes maintenance/repair data

### Slide 6 - Maintenance Plan

- Defines level of effort to meet requirements.
- Planning, organizing and control for the work within resource limits.
- Includes:
  - What to do
  - How often
  - Defines success factors
  - Expected results

### Slide 7 – Objectives for Maintenance Work

- Results/condition state for assets
  - Desired physical condition
  - Desired performance (output)
  - Desired operating characteristics
  - Expected energy efficiency, thermal comfort and indoor air quality performance
  - Up time
  - Frequency of repair

- Visual appearance and integrity

Slide 8 – Program Outcome Objectives and Examples of Program Metrics

- Examples of program metrics
  - Backlog
  - Ratio unplanned to total maintenance
  - Ratio maintenance budget to plant current replacement value
  - Mean time between repairs

Comment: Program outcome objectives is a suggested term to define the goals/targets for the maintenance program to differentiate from the notion of equipment performance (e.g. air flow CFM, cooling capacity BTU, etc.).

Slide 9 – Example: Metric Trend – work order trend

See graph on slide. Work orders completed compared to work orders received.

Comment: attention should be paid more to the trend than just the absolute values.

Slide 10 – Example: Metric Trend – cumulative work order age

See graph on slide. Cumulative work orders older than 90 days compared to work orders older than 180 days.

Comment: this one was scary because of the trend rising both for those older than 90 as well as 180 days. A pretty unacceptable trend. This was one example of what a graphic evaluation of a program might look like.

Slide 11 – About Defining Objectives – collaboratively established between the responsible party and implementing party

- Measurement of objective
  - Must be observable indicators
  - Measurable quantities
  - Are the basis for evaluating or inspecting elements of a system

Slide 12 – Condition Indicators

- Descriptions and measures
  - Physical characteristics
  - Equipment delivery performance
- Compared to agreed upon standard for assessment
  - New condition
  - Design capacities
- Examples:
  - Amount/type of rust indicates physical characteristic
    - Surface or rust through
  - Air flow rate indicates performance characteristic

Comment: intended to simply describe or provide metric for the “desired state” of the system or component. Condition indicators might be visual like an assessment of surface rust or a performance metric like the measurement of air flow rates. For airflow, if the expected rate is 100 cfm and the current measurement is only 50, something is very wrong.

Slide 13 – Condition Indicators – actual compared to desired outcomes

- Actual compared to desired outcomes
  - Measure the effectiveness of the systems and equipment condition and performance
  - Effectiveness of the maintenance program

Comment: a significant aspect of inspection is to monitor and track degradation of condition and performance. This is one way for stakeholders to define success. If condition indicators aren't being met, more needs to be done.

Slide 14 – Define the Work and A Task

Defined work

- Inspection and maintenance actions
- required to preserve equipment its designated purpose over an intended service life

Defined task

- well-defined unit of work
- described by sequence of instructions

Comment: the standard describes the “what” is required. A well-developed user guide would help spell out suggested ways on “how” to accomplish the work or task.

Slide 15 – Examples of Maintenance Tasks

- cleaning
- calibration
- data collection – reading equipment output, what is being delivered
- measurement
- lubrication

Comment: preservative, NOT restorative tasks.

Slide 16 – Task Frequency and example

- Calendar Time
  - Weekly, monthly, quarterly, or annually
- Usage (“run time”)
- System condition

Comment: another starting point would be the equipment manufacturer’s recommended task intervals.

Slide 17 – Documentation

- Record (written or electronic)
  - Inspection results
  - Maintenance results
  - Dates the work was performed
  - Changes to tasks and reasons for change
  - Deferred tasks
- Review and compare to previous results
  - Justify changing program elements

Slide 18 – Authorization and Execution

- Requires the work be performed
- Authorized by supervision
  - Written form usually a work order
    - Planned tasks
    - Other situations requiring maintenance
  - Verbal or written instructions or limits, e.g. “trouble calls”
    - Documentation to follow
- Executed per maintenance plan

Slide 19 – Program Review

- Periodic review of maintenance program
  - Between management and maintenance provider
  - Initial review to agree on
    - Effort to be delivered
    - Expected results
    - How results are measured
  - End of rating period review
    - Results compared to objectives





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- Identify opportunities for improvement

### Slide 20 – Continuous Improvement

- Creating outcome objectives and condition indicators ahead of implementation,
  - Align expectations between facility owner/responsible party and implementer
  - Agreement on the goals and how to evaluate
  - Evaluation measures
- Measuring activity, condition and performance & comparing actual results to plan objectives
  - Identify areas for improving the program
- The key is focus on the trend of changes from one period to the next

Comment: the goal is to see better results than the prior review provided.

### Slide 21 – Section 5: Required Tasks

- Typically result from Section 4 requirements
- Tables for 25 common HVAC equipment types (2012 revision of standard)
- Serves to describe minimum maintenance tasks
- Starting point – if there was no existing maintenance program
- Benchmarking tool

Q: Bob Sundberg, WHPA staff, commented that the WG previously had hotly debated what was meant by “requirements of the standard.” That, if it was not specifically called out or described in the standard, it was not part of the standard, which included the FOREWARD and all of the appendices. Rick had again commented on the standard as a “starting point.” Rick had previously stated that if it wasn’t written out of the standard, it could be included. That from Rick’s perspective, the standard was intended to be “inclusive” rather than “exclusive” of practices. He asked Rick to comment further on his understanding of how the standard was intended to be inclusive or exclusive.

A: Rick Danks – a starting point. An owner or other responsible party without any formal maintenance program could sit down and read through the standard and get a pretty good idea of what a program should look like, at a minimum. If they were to hire a contractor, they’d have something to examine together and talk about. If they worked through Section 4 together, they should end up with something similar to tasks listed in Section 5.

### Slide 22 – Section 5: Required Tasks – example table

#### Working Group Next Steps – Don Langston

Don Langston, CQM Committee Chair – the pace had been perfect but the one hour only allowed members to get the overview and just begin to get into the crux of “how” a user guide could help folks implement the standard, as intended. He wanted to continue the conversation at the next meeting. Everyone was getting a better understanding that the standard was intended to be a framework for a maintenance program but did not spell everything out in detail. He proposed they continue the discussion at the next meeting which would lead to setting some action steps for going forward.

Michael Lawing, Honeywell E&ES and Marc Pickett, AMS both complimented Rick on the overview presentation. This was just the sort of discussion that needed to take place with their customers.

#### Closing Comments/Adjournment

Don Langston, Chair – if anyone had questions, they could email them to Rick Danks or to him. **Don had a change of email address when the company changed over to Microsoft 365 – cloud platform.**

**Going forward, contact Don at:**



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**don.langston@airerite.com**

The next meeting was scheduled for Thursday April 13 at 10:00 am PDT.

The next meeting agenda and topics were yet to be determined.

The meeting was adjourned at 11:15 am PDT.

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<b>Action Items and Key Decisions</b>
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