



WHPA Goal 2: CQM Standard 180 User Guide Working Group Thursday February 16, 2017 Meeting Notes

Call to Order

The meeting was called to order at 10:01 am PST by Dale Rossi, Chair of this working group and a representative of Field Diagnostic Services Inc. (FDSI).

Roll Call

The Chair considered one member of each organization to be a voting member for this working group. 9 of 16 voting members in attendance would constitute a quorum. 11 voting members, 0 non-voting members, 0 guests and 1 staff were present for a total of 12 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.				
CQM User Guide Working Group Voting Members				
ACCA (Air Conditioning Contractors of America)	Donald	Prather	Contractor Association	P
Air Management Industries	April	Yungen	Contractor (Nonresidential)	
Aire Rite AC & Refrigeration	Don	Langston	Contractor (Nonresidential)	
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	P
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	
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	
CQM User Guide Working Group Non-Voting Members				
BELIMO	Darryl	DeAngelis	Controls (Manufacturer or Distributor)	
BMI (BuildingMetrics, Inc.)	Pete	Jacobs	Energy Efficiency Program Consultant	
CLEAResult (formerly PECEI)	Michael	Blazey	Energy Efficiency Program Consultant	
HSGS (Honeywell Smart Grid Solutions)	Steve	Varnum	Energy Efficiency Program Consultant	
SCE (Southern California Edison)	Steve	Clinton	California IOU	
UC Davis EEC (Energy Efficiency Center)	Kristin	Heinemeier	Research Organization	
CQM User Guide Working Group Guests (Non-Voting)				
Adrienne Thomle, Consulting**	Adrienne	Thomle+		
Fresno Unified School District	Frank	DiLiddo		
Little Caesar's **	Wendy	Gallo+		
WHPA Staff (Non-Voting)				
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

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.



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Welcoming and Member Introductions

Attendees were welcomed.

Approve Previous Meeting Draft Notes

The February 9 meeting draft notes were distributed February 13. Finalized meeting notes would be posted to the WHPA website by Bob Sundberg.

ACTION Items

February 9 ACTION: Dale Rossi asked all members to bring their ideas around maintenance program reporting to the next meeting.

New Business – Bob Sundberg

None.

AGENDA

Topic	Discussion Leader	Desired Outcome
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 Topic Outline	Dale Rossi	Agree on 2016 topics the WG will address.
Develop Tasks for each Topic	Dale Rossi	Tasks listed for next topics discussed.
Confirm last meeting date/time, assign actions and proposed agenda and adjourn.	Dale Rossi, WHPA Staff	Clear understanding of member responsibilities for the next meeting. Next meeting date/time established.

User Guide Working Group Planning – Dale Rossi

Dale Rossi, FDSI and Chair, wanted to review the notes he'd taken at the February 9 meeting and verify that he'd caught attendee comments accurately.

Dale Rossi –

- Limit user guide to rooftop units' example
- Include commercial split systems

Maintenance plan

to provide step-by-step instructions and a template. He read through the column detail of the proposed template.

1. One row per condition indicator
2. Columns
 - a. Condition indicator
 - b. Task frequency
 - c. Responsible party
 - d. How condition data is collected

- e. How condition data is to be recorded
- f. Example of acceptable condition (as makes sense for the case)
- g. Example of unacceptable condition (as makes sense for the case)
- h. Example of additional unacceptable condition (as makes sense for the case)
- i. Which of the performance objective(s) does this unacceptable condition impact?
- j. How does an unacceptable condition impact the performance objective?
- k. What is the expected action when the current condition is unacceptable?

Implementing a Maintenance Program

A Maintenance program is ...define, which would include performance objectives and a template

Columns to include:

1. Performance objective
2. How Performance data is collected?
3. What is current performance?
4. What is the desired performance?

Equipment inventory to include:

- to include a template
- One row per unit

Columns to provide:

1. Unique identifier
2. Enough other information as needed to select task lists.
3. Authorization to implement

Review of results

Measurement, Data Collection, and Report Making

Q: to produce key components of a report or an actual template

Attendee comments

Charles Segerstrom:

- a. CS
 1. "how does each activity drive customer value?"
 2. "see metrics, detail about how things would be measured"
 3. "actual savings potential, value, can be expressed as directly as possible"

Todd van Osdol

- b. TVO
 4. Stay at a higher level
 5. Can be meaningful to a customer

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6. More detailed condition indicators that can be brought up to the performance objectives and understood by the lay person

Three proposals were made:

Proposal 1 - Plan to put more effort into the maintenance plan and programs sections and plan to use the 2nd half of the year for measuring, data collection and reporting development.

Proposal 2 – develop reporting first because it's least understood, most difficult, and most lacking currently.

Proposal 3 – develop ideas about the key subjects to be covered in reporting. (next meeting)

Validating Standard 180-based Maintenance

- Proposal – before and after snapshots
- Validation is the conclusions drawn from the reports.
- Scalability is important
- Validation may be getting agreement from the responsible party that the program was successful.
- Feedback, closing the loop on the performance objectives. Was the program successful? What changes or updates need to be carried out?
- Validation may be a higher-level function than the facility level. It could be validating a maintenance program for a portfolio of buildings or of a utility program itself.
- External sources of validation? Energy star etc. Is it in scope?

Conclusion from Feb 9 meeting

Assume 12 additional meetings after February 23th for first half of the year deliverable.

Agenda for next week – make calendar and plan development for 12 or whatever remaining meetings will occur during the first half of 2017.

2- February 16 Meeting

Measurement, Data Collection, and Report Making

Dale Rossi – asked how the group hoped to accomplish valuable reporting. What approaches should be considered? Were they planning to actually produce a report or a description of what a report should be?

Charles Segerstrom – the report should be built on the items selected to be measured. He suggested diving into the items which the group thought should be measured first. Like, a report on the test in/test out data on a unit.

Dale Rossi asked - did he think of “the report” as an annual review report or an update type of report from quarterly inspections? He thought the post-inspection report would be more about the condition of the equipment while the annual report would be based on progress on the performance objectives, like energy savings which would take a year to collect the data and say anything meaningful. Dale thought that a test in/test out evaluation would provide a condition status, not a performance status. Energy efficiency, thermal comfort and IAQ were not things which came from inspecting HVAC equipment.

Charles Segerstrom – he'd hope that the inspections would lead to reporting which could compare units or systems maintenance under Standard 180 which could be compared to other building systems which had only received “drive by” maintenance.

Dale Rossi – the only way he knew that sort of comparison could be made was with proprietary systems like the ones offered by FDSI which could take “snap-shot” assessments of unit operating efficiency and capacity for comparison. But, that level of technology was not something required in the current CA QM programs. He didn't know how to

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convert completing items on the rooftop unit maintenance task list, as the current standard called for, into completing a maintenance program performance objective.

Charles Segerstrom – suggested that any procedures which would yield reliable evidence of greater energy savings, even some proprietary methods, that could document measured improvement on a test in/test out energy use basis and support that with longer term energy use would be user guide recommendations he would support.

Jeff Sturgeon, NCI – everyone here was aware of the QM programs being run. Some might not be familiar with a QR quality renovation program run by SCE as well. As Dale had mentioned, you couldn't tell much about an impact like cleaning a trap, replacing a filter or changing the position of a damper. But, he thought you could collect data about motor current draw and impact of proper air filtration. Every system he'd examined recently had filters installed which resulted in having 3 times the rated system air pressure drop. There was a trend by contractors to replace the recommended pressure drop filters with ones with greater filtration which had direct impact on system operation. Air quality might have been improved but at the cost of reducing system energy efficiency, changing a system which was never engineered for that increased pressure drop. There were additional measurements which could be taken that would be key indicators of any significant change or degradation in system performance. Keeping a proper pressure drop could reduce blower runtime, cycle rate and other factors.

Measuring System Air Pressure Drop

The group discussed that those sorts of air pressure readings were outside the scope and maintenance task lists of the current Standard 180 2012 version.

- Jeff Sturgeon – the time it took to take and record a few benchmarked pressure readings seemed, to him, to be well within the scope of time allowed for Standard 180 based maintenance. His firm trained contractors to routinely take pressure readings and establish benchmark measurements for later comparison.
- Dale Rossi – pressure readings were not called out by the current version of Standard 180 and he didn't believe it was common commercial maintenance practice.

Dale Rossi, Chair/FDSI – it appeared to him that they were agreed that reporting needed to be delivered on two levels: a post-inspection quarterly report; an annual report focused on program performance objectives. Dale also wanted to explore Don Prather's interest in how to convert outcomes of the quarterly report into measurable annual improvements. He asked for ideas from the group on how they would convert equipment inspection findings into quantifiable benefit improvements like addressing thermal comfort.

Donald Prather, ACCA – years ago, working in a hospital the maintenance crew recorded many equipment status readings on a large sheet. They were able to spot big changes and discrepancies because that data had been recorded and they were looking for trends and changes. For example, they measured a pressure drop across filters and coils. That might not be part of current CA programs, but it could be part of a maintenance agreement.

Dale Rossi, Chair – expressed concern for what this committee would recommend. CA QM program managers and implementers followed CQM Committee working group work products. What this WG came up with and included in their work products could find its way into those programs. Should they be recommending that pressure drops be measured even though it was not currently listed or spelled out in the current version of the standard? He asked how any savings might be determined and what frequency should be suggested. Annually? Quarterly? Did the group really want to see CA QM programs require pressure drop measurements? Measuring pressure drop could be recommended. The suggestion could be aspirational if considered beyond the current standard. He wasn't convinced that measuring pressure drops was a common industry practice. Most service techs didn't have manometers and it would require additional expense for contractors to comply.

Jeff Sturgeon, NCI – those comments made taking and recording pressure drop sound far more difficult than it really was. NCI had trained over 25,000 technicians since 1993 on where and how to take repeatable pressure readings without damaging the system and taking accurate readings. He thought pressure readings were among the most

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interpretable available because they established parameters and benchmark readings against which new measurements could be compared. He was aware of sixteen pilot studies and four programs which required taking pressure drop readings across filters, coils and total static pressure. He was convinced that it wasn't that difficult after providing simple instructions and mentoring the first few placements and measurements.

Rick Danks, Richard Danks Consulting – the current standard did not preclude taking pressure drop measurements. It talked about observation and/or measurement of operating parameters. It didn't specifically reference delta T across filters, but he thought that was generically a description of what was intended. He thought it was incorrect to state that the standard didn't allow for pressure measurements.

Marc Pickett, AMS – his firm was currently doing pressure drop readings across filters on the QM program customer maintenance. It was not a utility program requirement but they routinely took and recorded those readings anyway. With new accounts, the first thing they did was have one guy go around and establish the test hole locations and then closed them off. This was done on the whole range of commercial rooftop units from 3 ton up to and beyond 25 tons.

Donald Prather, ACCA - thought it was interesting that the quality installation standard, ACCA Standard 4, required at a minimum to take and record an external static pressure reading. He'd done it on every unit they installed regardless of size. He asked Dale Rossi to remember a recommendation of one of the earlier maintenance task working groups, about providing a sticker on the unit with a record of system measurements for comparison at a later date, no matter which technician performed future service. This was the type of reading they were talking about.

Dale Rossi – he recalled the recommendation and also that it was rarely or never done and would involve additional effort and cost. But, he only recalled the discussion referring to total external static pressure, not about pressure drop measurements across coils or filters.

Jeff Sturgeon – shared some test data from the previous day. Of 17 units, they'd just inspected, they found 15 which had readings of 60% or more over their total external static pressure rating. They went to the blower tables, realized this "condition indicator" pointed to degraded performance and asked what needed to be done next. All of those units were delivering inadequate supply airflow, the lowest was about 250 CFM per ton. All of those units had been outfitted with MERV 8 pleated filters. Typically, anything > than 30% over total external static pressure would indicate a severe pressure drop and airflow issue that needed to be addressed. They replaced with angel hair filters as rated by the equipment which resulted in bringing that total external static pressure ready back down to an acceptable level. Airflow on one unit was increased from 270 to 360 CFM per ton. That was a measurable change that had impact on indoor air quality as well as energy efficiency. It would reduce runtime and cycle rate and reach desired temperatures more quickly. You already had the panels off doing minimum maintenance, so taking those few readings would only took a few minutes.

Making Reports

Dale Rossi – he asked the group to decide whether they would deliver actual report examples or just a description of how to write reports, what a good report would consist of?

Rick Danks – asked a couple of questions about the intended scope for a report.

1. Were they looking at the effectiveness of the maintenance work over the interval of a year? There were things which could be measured, like the number of work orders backlogged, average days to complete a work order, number of planned maintenance calls vs. unplanned. The selected items to track would need to come from consultation with the responsible party and a determination of what was most important to them.
2. The other area for reporting could be about the performance of the building. That reporting would be, as Dale had pointed out, an indirect reference to how well the maintenance program was doing. Tracking uptime and similar items would provide trends and an inference for how well a program was doing over time.

Dale Rossi – from his past experience when he was a contractor, trying to get that sort of tracking data was nearly impossible. He believed contractor systems were not sophisticated enough to allow that sort of reporting.

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Marc Pickett – Dale referred to inadequate software systems but things had changed. Contractors were increasingly moving toward wireless, paperless and integrated software packages.

Dale Rossi – but, this effort was to produce a user guide which would be useful to many contractors, not just those with specific and sophisticated software systems.

Charles Segerstrom – he'd observed many new and very sophisticated software systems which were on display at AHR Expo at the ASHRAE Winter Sessions. Techs were using smart phones to enter data and output reports were being emailed to customers.

The group discussed many newer technologies like smart home/building thermostats capable of collecting and providing many sorts of building conditions that could be used in reporting.

Dale Rossi asked whether contractors could get access to that information and data. It wasn't a given. The responsible party would be responsible for giving access to or providing much of this information. But, what about if they wouldn't?

Rick Danks – ultimately, if the owner wouldn't provide the necessary information or access to it, they might not be in compliance with Standard 180. The origin of most of these concepts came from writings of William Edwards Deming who believed that if you couldn't measure it, you couldn't manage it. One could argue that a "quality approach" was above the minimum standard. If you read the standard FOREWARD, you'd quickly see that the intent of the standard was to drive owners into the 21st Century and innovate.

https://en.wikipedia.org/wiki/W._Edwards_Deming
<https://deming.org/management-system/fourteenpoints>

Dale Rossi – he agreed with much of what Rick said. His only reservation was that the user guide not be so aspirational that it would be unusable in the short-term. Would they be suggesting things that a majority of customers and contractors really could do?

Bob Sundberg, WHPA staff – agreed that much of what they'd been discussing was aspirational. But, they'd been discussing what kinds of information was important to gather and track to determine trends in order to determine whether the maintenance program was accomplishing what it set out to do. He thought development of a user guide was intended to get both contractors and owners to ask the kinds of questions they needed to in order to evaluate how well their program was doing. Not just continue with the minimal inspection practices or neglect which seemed to be the industry norm.

Marc Pickett, AMS – agreed completely. The development of a user guide was part of an education process which would be, ideally, in their own best interest. They'd need evidence to convince their superiors that the program had value and was accomplishing its goals, right?

Dale Rossi – they might have to provide some of each, a balance. Provide what a minimum would be and then some options for aspirational things. He asked Todd Van Osdol for his thoughts since he was a program implementer. What about this idea of including some suggestions which most contractors and their customers were normally doing?

Todd Van Osdol, CLEAResult – he thought the program at SCE wanted to align with the standard and industry as a whole. To bring contractors up to a level of service and quality which the industry wanted them to be at. His sense was that the WHPA was forging a path for industry to adopt best practices. One need of the program recently had been a request for how to determine a level of fault for refrigeration coils. There wasn't much detail in the current standard and its rooftop unit maintenance task table other than to conduct a visual inspection. The standard didn't provide and



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the WHPA had to date declined to provide at what specific measurement points a coil would be considered to be at a fault level or condition that would justify cleaning coils. It was tough for a utility program to require maintenance procedures for which the industry hadn't yet established a best practice with sufficient detail to implement consistently.

Dale Rossi – he seemed to recall that early in the launching of the QM program, a lot of detailed maintenance procedures were imposed on contractors and owners. Later, many were eliminated in order to “simplify” field requirements. The pendulum seemed to have swung to the point where field procedure requirements had practically been eliminated. It seemed that the trend was toward simplification and that more sophisticated technologies and process had fallen out of favor.

Pepper Hunziker, Tre' Laine Associates – was trying to track the ultimate objective for development of a user guide. She thought it probably was market transformation. And, outside of the program, provide valuable contributions toward development of a user manual by ASHRAE. The primary goal would be how to get these practices to be a new standard of the industry without need for utility programs or other infrastructure to support Standard 180 based maintenance practices. Was market transformation the goal of this user guide and an industry developed user manual? Also, that she was a bit confused about whether the WG was focused on supporting improvements in CA utility QM programs or more focused on elucidating the standard itself.

Dale Rossi – wasn't certain development of a user manual was still a goal of the ASHRAE/ACCA Standard 180 Committee. At recent meetings, he'd heard the committee chair state that if the standard was revised to be sufficiently clear and concise would remove the need for a user manual. Dale's understanding was that they were, first, focused on improving an understanding of the standard. Doing so, he knew that whatever the WG developed would be reviewed and considered by CA utility program staff and implementers as they considered how to revise and improve their commercial QM related programs. He added that Standard 180 was very flexible by design. A maintenance program developed could go a lot of different directions depending on what goals different people had and agreed to.

Closing Comments/Adjournment

Dale thought the group had one more meeting to lay out plans for what they intended to accomplish by the end of June. At the next meeting their goal would be to finalize a plan – a topic and objective for each of the remaining meetings.

The next meeting was scheduled for Thursday February 23 at the same time, 10:00 am PST, to continue their outline planning for 2016.

The meeting was adjourned at 11:08 am PST.

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Action Items and Key Decisions

None.