



THE BOC Bulletin

WINTER/SPRING 2008

A Newsletter for BOC Graduates, Enrollees and their Employers

Improving Indoor Air Quality, Saving Energy & Reducing Your Carbon Footprint

by William A. Turner, MS, PE; Steven M. Caulfield, PE, CIH and Jeffery H. Harrison, PE

1.0 OVERVIEW

As you read this, it has been cold and windy in many areas of the USA. Given the current escalation in fossil fuel costs, and the drive to reduce greenhouse gases, most facility managers are looking for ways to save energy. Given the increased concerns for global warming, in this article we'll focus on reducing heating costs while still maintaining good IAQ/moisture control, and mention some of the impacts heating changes may have on carbon dioxide emissions, one of the greenhouse gases that appears to be a concern.

To provide an environment to enhance productivity or improve learning, a building must be reasonably warm when it is cold outside in the morning, must provide adequate ventilation, and must not blow cold air onto the occupants (create cold drafts). This may sound easy, but when it is 11 a.m., the sun is shining in on a southeast exposure room with a window wall, and a room with the northwest exposure is on the same ventilation and heating system, this can be a real challenge.

The ultimate goals are energy efficiency, good indoor air quality and good occupant comfort/productivity. Additionally, minimizing our carbon dioxide footprint or being carbon neutral is a sound environmental goal.



2.0 IMPORTANT QUESTIONS TO ASK WHEN TRYING TO IMPROVE HEATING ENERGY EFFICIENCY

1. Are heating and cooling/ventilation systems fighting each other?

Are some areas overheating? Attempting to heat and cool the same air can be very expensive. Occasionally this is done to dry air, but there are better ways to do that with a commercial dehumidifier or by balancing makeup with exhaust. From a practical perspective, in the swing seasons or in winter, it is important to make sure the heating systems (modulating gas furnaces, modulating heating coils, radiant floors & boilers) are only providing heat when and where it is needed. An inexpensive infrared thermometer can help you figure this out quickly. Leaving a data logger in questionable areas to monitor temperature and relative humidity can quickly answer questions.

In older buildings where the windows and roofs have been upgraded, overheating rooms can be a big challenge for the facility and maintenance folks. Often adding insulation to pipes that don't have it is all that is needed. So long as there are years of future operation left in the piping system, adding heating coils

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Reminder:

2008 BOC Grads

By March 20, 2009, you will need Continuing Ed credit to renew your level certification. Level 1 renewal requires 5 hours annually and Level 2 requires 10 hours. See page 12 in this newsletter for details.

CARBON FOOTPRINT (Continued from page 1.)

(glycol should be considered) to ventilation systems on northern exposure room wings can also help, or adding additional heating control valves may be a good answer. In general any un-insulated heating pipes in an insulated building leads to lots of overheating problems.

One location where you need to be a bit careful about insulating heating pipes is crawlspaces. In some cases the heat loss may have been keeping the crawlspace dry for years, also keeping mold from growing or wood from decaying. There are likely better means of keeping the crawlspace dry, so certainly consider insulating any heating pipes, but also figure out how to keep the crawlspace from becoming a mold factory if you remove the historic drying mechanism (heat).

We have found that using sub-membrane exhaust systems in crawlspaces (radon removal technology) is very effective in assisting to keep them dry and stopping soil gas odors. There is lots of information now available regarding keeping crawlspaces sealed up, warm and dry year-round, vs. vented, damp and cold.

Air sealing the building envelope is a really important step, and adding insulation to buildings or pipes is also a great way to reduce emissions and your carbon footprint.

When buildings rely on economizer cooling, it is important to have a light colored roof to assist with effective economizer cooling and reducing microclimate effects on the roof.

2. Are the rooms with vending machines on the north side of the building?

Vending machines, even with vend misers installed, give off lots of heat. Placement in a normally cool area is better than one where there is too much heat already.

3. Do the roof/wall joints, windows or air intakes leak lots of air at night?

As noted above, and this is very important, likely more important than the amount of insulation in many facilities. Uncontrolled air leakage during unoccupied hours is a major source of wasted heat energy in any building, old or new. The National Institute of Science and Technology has released a report (rpt. #7238, 2005) showing that tight buildings would save, on average, 60 percent on heating and 25 percent on electricity. Snug fitting windows, doors, and dampers are always an important part of the equation, especially when it is below freezing. One roof penetration the size of your wrist can hinder attic insulation efforts.

Almost all flat roofs leak air where they join the top of the wall unless they have been sealed up with expanding foam. As a retrofit, one can often push the insulation in the joint inward, and use expanding fireblock foam to seal up the gap. The good re-usable foam gun should cost \$30-50 and the foam is about \$20 for a large screw on canister. This type of system is much more controllable than hardware store aerosol can squirt foam. There's not a lot of benefit to anyone to heat and cool the outdoors.

4. Are exhaust fans or ventilation systems running when not needed?

Most ventilation systems that move air out of or into a building need only run when the building is occupied. Further, they likely do not need to run at full speed unless the full occupancy is

present. This can be a tricky topic, but more and more, folks are using demand-controlled ventilation to reduce over-ventilation and excess dryness in the winter or excess humidity in the summer. These control strategies can either reduce outdoor air damper openings on constant volume systems, or control variable speed drives on VAV systems. If carbon dioxide levels are only in the range of 600 PPM in an occupied building by 11 a.m. during very cold weather, the building is likely getting way too much outdoor air, and/or is likely to have severe air leakage problems that can be found with a few hours of infrared thermography. Areas with high quantities of make-up air should be evaluated for any recent change of use that would lower ventilation needs, and long-term energy recovery opportunities. Moving outdoor air through a building is likely worth about \$6 to \$7 a year per CFM depending on your location and hours of operation. Reducing over-ventilation is a great way to reduce one's carbon footprint.

5. Can you eliminate odors?

Odors need to be found and eliminated. Diluting them is a poor way of controlling sources and wastes energy. Wet moldy areas should be removed under containment in accordance with US EPA Guidelines, and rebuilt to keep them clean and dry. Spot odor-makers, such as high use copiers or laminators, should be isolated and locally exhausted; distributing their fumes to the occupants makes no sense.

6. Are control systems working as intended?

Are air filters and belts being maintained? Nighttime operation usually has a very different objective than the occupied mode. Running systems in the occupied mode for 24 hours because the controls are not operating correctly, or because the building shell is leaky and perimeter areas get cold, usually wastes lots of heating and electrical energy. Motors running with loose belts provide poor heating air distribution, and poor or missing air filters (less than MERV 7) mean that the owner will unnecessarily be paying for expensive coil and duct cleaning.

7. What does the thermal envelope look like with an infrared scan?

This is a critical step when it comes to finding heat loss. In any size building, the most effective means of quickly finding the building envelope air leakage holes (that cost lots of completely wasted energy use at night during cold weather when the wind is blowing) is with an infrared camera and operator. For likely \$2,500 or less on a heating season night, the owner can very quickly



You can complete your reading
of this article on the Web at

www.theboc.info

About the Authors

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A Baker's Dozen Energy Saving Ideas

By: Alan R. Mulak, PE and William A. Turner, MS, PE

Introduction and Overview:

Energy prices have gone up in recent months and all indications and expectations are they will continue to do so. Budgeting for this upward trend is difficult at best. While clear that something must be done ASAP, it is often hard to know where to begin. There are plenty of expensive, hi-tech gizmos out there with complicated guarantees of huge energy savings. These may be in your future, but first it is worth starting with the basics, addressing the simple, often low-tech (and sometimes low-cost) solutions. When doing this, it is also important not to inadvertently sabotage indoor air quality (IAQ), especially in the damper climates of the East Coast and the Pacific Northwest. The following, in no particular order, are thirteen energy efficiency actions, activities, and equipment purchases that will start saving energy tomorrow, with some basic guidance regarding IAQ implications.

1. Throw Away all Incandescent Bulbs. If nothing else, get rid of every incandescent bulb in your facility and your home as well. Compact fluorescent lamps (also known as CFLs) are just the ticket and have improved dramatically over the CFLs that first hit the market two decades ago. Modern CFLs can be dimmed, come in all sizes, start in the cold, and provide "warmer" light. Some even look like old fashion bulbs and still others come with reflectors attached! Make sure you know how to dispose of CFLs properly in your state, since most contain some mercury just like fluorescent tubes and other light bulbs.



2. In Gyms, Garages or Warehouses, Replace Aging HID Fixtures with T5* High Output Fixtures. Perhaps the most significant recent advancement in lighting technology is the arrival of T5 High Output lamps and ballasts. By every measure, the best Metal Halide HID (High Intensity Discharge) technology and perhaps most important, T5HOs can be controlled with now readily-available occupancy sensors. This is huge, since old fashion HID fixtures take so long to re-strike (get back up to full brightness) that no one turns them off, even when the room is empty. The photo below is a gym where HID's have been replaced with T5HOs. More light, easy to turn off, 44% reduction in electricity usage, and the tennis and basketball players give a "thumbs up!" As energy engineering associate and BOC instructor Rich Vaillencourt is fond of saying, "You cannot save more energy than when the lights are off."



* The "T" in T5 indicates thickness or diameter of the lamp, in eighths of an inch. Therefore, a T5 is 5/8 of an inch in diameter, a T8 is 8/8 of an inch, and so on.

3. Install High Performance T-8s everywhere else. Now that you have replaced those obsolete HID fixtures, take a look at all the other fluorescent lights. Current practice is to replace all the lamps and ballasts with High Performance T8 systems. These use 1/3 less energy than 32 watt units, thus not only saving electric energy but reducing the air conditioning costs

as well! Most utility and energy service companies offer incentives to help you with this cost-effective investment.

4. Install Occupancy Sensors. This is a slam-dunk. For all office spaces, classrooms, rest rooms, conference rooms, gyms, warehouses, garages, and every other space where occupancy is not 100%, install occupancy sensors. Using schools as an example, dual sensing ceiling mounted devices are perfect for a classroom setting. Even in an elementary school, studies have shown classrooms are empty at least 10% of the school day. Occupancy sensors will remember to turn off the lights, even when the occupant forgets, and this lowers the air conditioning load as well.



HINT:

Be sure to specify "dual sensing" occupancy sensors. These might cost a few dollars more but will eliminate the annoying situation when the lights go out on occupants who are sitting still.

5. Know Thy Utility Account Rep and/or Your State Energy Contacts! It is astounding how many facility managers do not know who their utility representatives are and what type of incentive programs are available. In these times of rising energy costs, utility and state programs with their generous cash subsidies are more important than ever. Additionally, these trained individuals can advise on new products, financing, training programs, and a host of other energy related services. In short, these folks are your friends! And by all means, ask for an energy audit of your facility. These folks know what to look for.

6. Electric Motor Game Plan. Believe it or not, your buildings have many electric motors running at this very moment. In almost any type of building, electric motors consume a significant portion of the total energy usage—Electric motors drive pumps, turn fans, and perform a variety of other behind-the-scenes tasks. The best time to upgrade your motor is when it burns out, but generally, it is a minor crisis when this happens. Old habits die hard and we often buy the same motor from the same source, ignoring



(Continued on page 4.) See **Baker's Dozen**.

newer and better options. Have a game plan to replace these inefficient devices with premium efficiency counterparts. The utility will very often pay you the incremental difference to do so! Do you have a plan to upgrade?

7. Train and Keep Training Your Building Operators!

Would you bring your car in for service to a garage that hires untrained mechanics? Why then do you allow your buildings to be operated by untrained building operators?

If they are trained, when is the last time they took a refresher course? Equipment changes all the time. Energy costs have risen as much as 80% in the last decade. There is always more to learn. And by the way, the results are the same. Trained auto mechanics are very likely to deliver a complete tune up so that your car operates to its utmost capacity, requiring minimal maintenance. With untrained mechanics, the reverse is true. Same with buildings.



HINT:

At a loss as to where to find a course? Contact your local utility or energy service company. They are always promoting and offering such courses. (Obviously we believe the Building Operator Certification (BOC) course is particularly effective!)

8. Purchase and Populate a Computerized Maintenance Management System (CMMS). Often, facilities are maintained by knowledgeable personnel who take pride in keeping their facilities running as smoothly as possible under the budget constraints we all deal with. This is the good news. The bad news is all of the information required to do this complex job is often stored in the head of the facility manager. And when these key personnel retire, so goes this institutional memory. A CMMS is just the ticket. A good system should have:

- A.** a work order trigger for date and season.
- B.** a record of past work completed, with details such as hours required, safety considerations, parts required, etc.
- C.** a comments/notes section to add hints and "watch out for ..." items.
- D.** a user-friendly data entry form/screen for non-expert computer operators.
- E.** Prioritization capabilities for work orders.
- F.** a cost estimate calculator.

And yes, garbage in – garbage out. Someone must take the time to enter technically accurate data. However, once that is done, they are easy to update, friendly to use, issue accurate work orders, have a really good memory, and can even keep track of your yearly energy use.

9. Change Your Air Filters and Clean the Strainer!

What do good (Merv-7) filters do? They clog up with the stuff they are designed to filter, which is great since dust, pollen, and a variety of other airborne nasties have no place on the coils or in our buildings, and you avoid duct cleaning costs. However, once clogged, they are no longer a filter but a dam. A clogged filter requires the fan, pump, or motor to work harder to accomplish less, which of course further clogs the filter. On it goes until you hire the duct cleaner. Why not change all filters at every change of

season. Schedule replacement three to four times a year. Strainers should be serviced yearly at a minimum.

10. Older Than Three Years? Often, the objection raised when the topic of energy efficient equipment comes up is "we have done it already." That might be true but in the last three years, electric/gas/oil rates have gone way up. As the cost of energy soars, the economics of an energy-related project improves. Also, as the hours of use add up, efficient products such as T8s need to be replaced before they start failing one at a time, creating a labor headache.

11. Take a Field Trip. Where? To your own facility...but always after hours and on weekends. A walk-thru assessment after hours can yield very interesting results. Why are the fans or pumps running? Are the boilers and AC systems really on night setback? Windows open? Lights on? Air conditioning running? All of these "not supposed to be's" add up to serious wasted energy and money.

12. A Few Other Things that Save Money as well as Energy:

- A.** Vending machine controls such as Vendor Misers turn off the machine when no one is around. Since energy costs for these machines can be about \$400 per year, turning these devices off for about 33% of the time is a simple, inexpensive, cost-effective idea.
- B.** Economizers on roof top HVAC systems take advantage of "free" cooling during those days when it is not too hot and not too cold. Yet, many RTUs (Roof Top Units) are not equipped with functioning economizers. And while you are at it, install a dual enthalpy control on the economizer. This can extend your free cooling by as much as 20%!
- C.** Everyone talks about improving Operations and Maintenance (O&M) and the inherent benefits of doing so. The problem is trying to figure out what superior O&M really is. A free resource that belongs on everyone's shelf is FEMP O&M Best Practices Guide which can be downloaded from the following website: www1.eere.energy.gov/femp/pdfs/omguide_complete.pdf.
(Note: There may be other O&M guides but this one is the best I have seen and the price is right!)
- D.** As with the FEMP O&M Best Practices guide above, another free and valuable resource is COMcheck. This software is easy to use and generates very helpful reports. It is the only code compliance software I know of, and the output can be used for a variety of purposes, such as verification of code compliance (for most states), quantification of energy power density for grant applications, back up for LEED and Advanced Building Certifications, etc. And again, the price is right! COMcheck can be downloaded from the following website: www.energycodes.gov/comcheck/ez_download.stm.
- E.** And keeping with the free software topic, electric motor studies can be made easy by using free software which will quantify energy savings when upgrading to premium efficiency electric motors.
(Note: these motors must be NEMA Premium Efficiency). This software is known as MotorUp and can be found at: www.eere.energy.gov/industry/bestpractices/software.html#mm.

(Continued on page 8) See **BAKER'S DOZEN**.

BOC Grads Making a Difference!



BOC grad **Luke Hutchins is Director of Buildings & Grounds at Parker Ridge Retirement Community in Blue Hill, Maine.** Parker Ridge's facility, first established in the early nineties, has approximately 65,000 sq. ft. of apartments at its main inn and 24 cottages averaging 1,700 sq. ft. each located on twenty-plus beautifully landscaped acres. Hutchins completed the BOC course in Fairfield,

Maine this past fall. For him, the BOC training "gave me the confidence and ability to come back to my facility and start making decisions based on energy savings and moving ahead with technology."

Having thirteen years experience in the residential management field, Hutchins observed, "Anyone who works in the facilities industry knows time is not on your side, so being able to complete all the projects I want to will never happen, but we're taking it one step at a time." The first project was a small one, a simple exit light retrofit/replacement from the existing CFL design to the new LED lights. Efficiency Maine was giving rebates of \$10.00 per fixture and Hutchins purchased the required fifty fixtures for \$13.50 each. With the utility incentive, the total purchase was \$675.00, less \$500.00 rebate, so that a \$175.00 investment, giving an energy saving of about \$600.00 per year had a payback of less than three and a half months. Hutchins easily installed all the lighting himself in a matter of a couple weeks as time permitted.

Several other projects are on the horizon, including a lighting retrofit in the main kitchen, boiler room and activity rooms where all the lighting is outdated and inefficient. But the biggest project about which Hutchins is most excited an automation system in the boiler room. His calculations indicate that it could save at least \$25,000 per year at a cost of about \$65,000 to implement - a 2.5 year payback without even factoring in the effects of greatly reduced maintenance costs as well as alarm set points that alert facilities personnel to problems before they get complaints. Hutchins is hopeful that the project will be budgeted for this year. Since the automation system consulting company with which he is working has received custom utility incentives for this type of project in the past, he believes payback could be even sooner.



Hutchins discovered many advantages to the BOC training. "The content that the BOC course included was great, covering all aspects of facility maintenance and energy savings, but a major part of the course for me was making friends and contacts with people from other facilities in Maine. I have touched base with many of them, asking questions about policies or operations, and have been able to make good decisions based on the many more years of experience that they have in the industry. Without the BOC course I would be in the dark on everything that is good about a changing industry."



In early 2007, **Matt Thomson, BOC graduate and Facilities Coordinator at Gunderson Dettmer in Menlo Park, CA,** worked with his facilities management team on a small, focused remodeling project. The challenge was to convert what had previously housed a law library, an area of about 600 square feet, to a multi-purpose area for anything from client meetings or business presentations

to CPR training or yoga classes for employees. The goal was to make it as comfortable, useable and energy-efficient as possible.

Nine windows were professionally re-covered using 3M P18 ARL window film, protecting occupants from southern and northeastern exposure, particularly during low angle sun periods. Of the work Thomson says, "We are very happy with the crystal clear results, which afford a very relaxing, pleasing view of coastal California hills, replete with redwoods and birch in this established business park. We enjoy backyard San Francisco Bay migratory flocks throughout much of the year, the ebb and flow of bay waters, ducks annually pairing off in the foundation plantings and a very special pair of red-tailed hawks!"

The ceiling was left untouched except for attaching HVAC flexible insulating ducts to existing return air grilles on the plenum side. This is an inexpensive yet effective way to minimize sound transmission between adjoining rooms. Existing T-12 lamps and ballasts were stripped out by facilities staff over a period of several weeks and T-8 dimming ballasts and lamps installed, with a single daylight adjusting sensor and a new occupancy sensor from Watt-Stopper. Initial lamp burn-in caused a few ballast failures, but these were promptly replaced by Sylvania. Thomson notes that, "The lighting controls presented an initial learning curve for our staff but have proven to be worth the trouble by allowing occupants to custom-alter lighting levels for the purpose at hand. I think our main hurdle making initial set-up adjustments was due to the window film presenting a narrower range of set points."

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One of the hallmark dictums of BOC training is working as a team to integrate operational strategies with innovative building design to bring about optimal solutions. Thomson's experience highlights how successful this approach can be. "Although this was a small project, our estimated ROI is approximately one and a half years. But the sheer pleasure of the results, and the first-hand experience of the installation for our facilities personnel has strengthened our small but friendly core group in ways that are best achieved through simple hands-on work." He says, adding, "In short, we had fun, our results have been warmly acknowledged, and we strongly feel our team has added value to the firm."

Congratulations!

BOC Level I & II Students Certified in September 2007 – December 2007

Level I Certified Students

Adkisson, Johnnie, UCLA--On Campus
Housing Maintenance

Aguila, Reynaldo, San Jose State University

Allen, Jeff, USMC Camp Pendleton

Allen, Timothy, CSU Channel Islands

Alvarez, Jesse, The Irvine Company

Amador, Raul, CSU LA Facilities Services

Amador, Samuel, Rose Hills Memorial Park
& Mortuary

Barnette, Leroy, San Jose State University

Batuyong, Erlindo, USMC Camp Pendleton

Bazaldua, Gerard, Amgen, Inc.

Beaudoin, Ron

Beed, Keith, Southern Oregon University

Behrendt, Ken, Scripps Memorial Hospital

Bennett, David, Raytheon

Bialous, Sherie, St. Joseph Hospital, Eureka

Bilka, Donald, Eastern Suffolk BOCES

Birkhofer, Eric, Camp Pendleton DSG

Bolton, Jacob, St. Joseph Hospital

Bonesteel, James, Northland Investment Corp

Bonifacius, Gary, CSU Chico, UHFS

Bracy, Herman, Mount Desert Island
High School

Bredesen, James, Amgen, Inc.

Breeze, Donald, Hawthorne Machinery Co.

Briner, Jr., John, Pelican Bay State Prison

Brown, Calvin, San Jose State University

Brown, John, Scripps Memorial Hospital,
La Jolla

Burchhardt, Susan, SDGE

Burns, Jr., James, UCSD

Buschman, Jeromy, Gold Country Casino

Camaclang, Patricio, DSG/ACE Fac, MCB
Camp Pendleton

Card, Paul, City of Long Beach, Fac Maint Div

Castriello, Liberato, San Diego State University,
Physical Plant

Castro, Jose, St. Paul's Senior Homes & Services

Chambers, Scott, University CA Santa Barbara

Chatwood, Todd, City of Eugene

Chirco, Joseph, Copiague Public School District

Clear, Gerald, Camp Pendleton, Marine
Corps Base

Clowser, David, CSU Chico, UHFS

Cole, Sr., Ronnie, Camp Pendleton, Marine
Corp Base

Comparon, Scott, Ultimate Services, Inc.

Conrad, Michael, Amgen, Inc.

Conrad, Shane, World Vision

Cooper, Carl, County of Humboldt

Costello, Timothy, Santa Buckley Energy

Craig, Barry, Brunswick Housing Authority

Cyr, Frederick, Loring Job Corps Center

Davis, David, UC Santa Barbara

Dayanghirang, Rodante, San Jose State
University

Delling, Bruce, Tetratex EMI

Determan, Dan, Action Property Management

Donovan, Thomas, Eastern Suffolk BOCES

Donzella, John, Deringer-Ney Inc.

Edwards, Drew, Durham Unified School District

Elisondo, Benjamin, California State Northridge

Ellsworth, Vanessa, CSU Northridge, Phys
Plant Management

Elmer, Randy, St. Paul's Senior Homes &
Services

Engelhardt, Jeffrey, Copiague High School

Fitzpatrick, Gregory, Office of Policy and
Management

Forsyth, Robert, UC Santa Barbara

Fraser, Steve, UCLA - OCHM

Frowiss, Walter, UC Santa Barbara

Gabaldon, Alan, Scripps memorial Hospital

Galang, Ramon, SJSU

Gallagher, Mark, SHW Casting Technologies, Inc.

Garcia, Regino, San Jose State University

Garcia, Rudy, PM Realty Group

Garcia, Sergio, San Jose State University

Gardner, Christopher, CSU Chico

Gauthier, Anthony, Oregon Coast Aquarium

George, Steven, Scripps Memorial Hospital

Gollinger, Jeri, The Meadows Real Estate
Management & Development

Gonzalez, Arthur, Mt. San Antonio College

Gonzalez, George, Longwood Central School

Grant, Andrew, UC Santa Barbara

Gregory, Bill, Silver Stream Production &
Design, Inc.

Griffin, Greg, Children's Hospital of Central CA

Gubanez, Steven, HSU Housing and Dining

Guillen, Efrain, CSU Northridge, Phys Plant
Management

Hale, Richard, Cal State University Fullerton

Haran, John, California State University
Northridge

Harding, Johnney, School District #9

Hargis, Jr., Ralph, Camp Pendleton, Fac Maint
Department QAB

Hart, Roger, University of CA, Santa Barbara

Hayer, Daniel, CSU Chico

Hembrow, Peter, University of California
Santa Barbara

Henry, Michael, Cedars Sinai Medical Center

Herrmann, Joseph, Applied Biosystems

Hill, Raymond, Camp Pendleton, Fac Maint
Department QAB

Hill, Renell, SDGE

Hoffman, Jay, SDSU, Dept of Physical Plant

Hornbaker, Erik, California State Lottery

Hough, James, Pelican Bay State Prison

Howard, John, Cal Poly State University, SLO

Howell, Charles, Camp Pendleton

Hughes, Joseph, CSU Northridge, Physical Plant
Management

Hunter, Randy, University of Santa Barbara

Hutchins, T. Luke, Parker Ridge Retirement
Community

Isbell, Thomas, SDSU, Dept of Physical Plant

Jacobs, David, San Diego State Univ, Phys Plant

Jahnke, Kurt, University of California

Santa Barbara

Johnson, Eric, United Indian Health Services

Kemper, John, DSG Camp Pendleton

Kestel, Gary, San Jose State University

Ketron, Kimberly, SDGE

Kieny, Richard, HSU Housing and Dining

Kirby, Richard, Camp Pendleton, Marine
Corp Base

Kirkpatrick, Thomas, Marine Corp Base
Camp Pendleton

Koetz, Ron, USDA/Forest Service

Krause, Ken, Eastern Suffolk BOCES

LaBreck, Robert, City of Augusta

LaMothe, Richard, Maine Public Service Co

Langendorf, Ben, City of Moreno Valley

LaPointe, Clayton, Military Dept.

Linbrunner, Richard, Longwood School District

Lindstrom, Matthew, Camp Pendleton Marine
Corp Base

Lombardo, Joseph, San Bernardino City
Unified San Diego

Lopez, John, California State University LA

Lowden, Brian, Feather Falls Casino

Macek, David, Camp Pendleton

Martin, Robert, CSU Chico

McNeally, Andrew, Maine Public Service Co

McElhinney, Melissa, Continental Rehabilitation
Hospital

McGrath, David, Cablevision

McMahon, Tom, Nonwalk-La Mirada Unified SD

Melhorn, Sonny, Lane Transit District

Miles, Ulysses, University California

Santa Barbara

Montgomery, William, University California
Santa Barbara

Montoya, Rick, Raytheon

Morgan, Michael, City of San Clemente

Morris, Robert, HSU Housing and Dining

Morrow, Wayne, CSU Northridge, Physical Plant
Management

Niekrasz, Michael, County of Humboldt

Novellino, Nicholas, Longwood School District

Nowak, Andrew, The Irvine Company

O'Connor, Loni, Eagle Point School District #9

Ohr, Damon, The Irvine Company

O'Keefe, Chris, Sun City Lincoln Hills

Pakingan, Juanito, Camp Pendleton, Fac Maint
Dept QA

Pampliega, Cornelio, CSU Northridge,
Phys Plant Mgmt

Parsons, James, MSAD #56

Paschalidis, Panos, AO Sherman Co, Inc.

Patino, Adam, City of Moreno Valley

Paulson, Richard, California State University
Channel Islands

Pierce, Mitchell, Johnson Controls, Inc.

Pinell, Bill, CSU Northridge, Phys Plant Mgmt

Place, Duane, The Mill Casino-Hotel

Plance, Robin, Halton Company

Polishchuk, Mark, San Francisco State University

Polkowski, Christopher, Pratt & Whitney

Prieto, Jose, The Irvine Company

Prue, Phillip, Servus Management Corp

Puig, Julio, California State University LA

Radcliffe, Steven, Linemaster Switch Corp

Ramsey, Clel, MEO--Pest Control

Reifer, Earl, California State University LA
Reyes, Doug, California State University LA
Riedo, Doug, University California Santa Barbara
Robinson, Charles, Raytheon, Inc.
Robinson, Tommie, San Francisco State University
Rocha, David, Humboldt State University
Rosales, Chanda, The Pape Group, Inc.
Rosemund, Vaughn, Marine Corps Camp Pendleton
Rusick, Ronald, Azusa Pacific University
Salcedo, Virgilio, Camp Pendleton Marine Corp Base
Schauland, Ryan, University California Santa Barbara
Schmid, Marc, UC Santa Barbara
Shea, John, Iseli Company
Sherman, Jeff, Lane Transit District
Shrope, Tom, Camp Pendleton, Facilities Maintenance Department QAB
Shubb, Scott, California State University Channel Islands
Smith, Dion, University California Santa Barbara
Smith, Thea, NOAA Northwest Fisheries Science Center
Smiyun, Anatoliy, University California Santa Barbara
Smiyun, Mikhail, University California Santa Barbara

Soto, Reuben, San Jose State University
Spargo, Kevin, Pratt & Whitney
Spencer, John, University California Santa Barbara
Stanton, Thomas, Amgen, Inc.
Stifel, David, Quinebaug Valley Community College
Stigter, Gary, Beverly Wilshire Hotel
Sullivan, Jerry
Symes, Douglas, Kents Hill School
Tamayo, Armando, San Bernardino City Unified San Diego
Thomas, Steve, CSU Northridge
Torkelson, Erik, Wiremold/Legrand
Torres, Hector, The Irvine Company
Tran, Alexander, San Jose State University
Turner, Ronald
Valentino, Thomas, City of Albany
Vance, Larry, Butte County Facilities Services
Vaught, Johnnie, DeMarco Management Corp
Verbeek-Groth, Jane, San Diego Gas & Electric
Vieu, Rene, San Diego State Univ, Phys Plant
Virissimo, Daniel, CSU Channel Islands
Wahl, Debra, Jones Lang LaSalle
Wallace, Johnny, Camp Pendleton
Waltz, Brian, Rockwood Retirement Communities
Watson, Bruce, UC San Diego
Welch, Gail, Qualcomm, Inc.
West, Craig, Humboldt State University

Wheeler, Daniel, Scripps Memorial Hospital, La Jolla
Wilcox, John, Amgen, Inc.
Williams, James, New York State OGS
Williams, Lorenzo, Open Health Assoc
Young, Bradley, California State University Fullerton
Zamora, Pete, San Diego State Univ, Phys Plant

Level II Certified Students

Alvarez, Jr., Vidal, Cushman & Wakefield at Adobe
Bozzo, Robert, City of Gilroy
Brandini, Rick, City of Gilroy
Hornbaker, Erik, California State Lottery
Perkins Sr., Jubel, Native American Rehabilitation Association
Quach, Thien, City of Los Altos
Rogers, Chris, City of Gilroy
Souza, Anthony, Cushman & Wakefield
Swan, Mark, Evergreen School District, MOT
Terry, Randy, Applera - Applied Biosystems

2008 COURSE SCHEDULE *

BOC Level I Certification

The Level I series comprises eighty hours of training and project work in building systems maintenance. Courses include: Building Systems Overview, HVAC Systems and Controls, Facility Electrical Systems, Indoor Air Quality, Environmental Health & Safety Regulations, Efficient Lighting Fundamental and Energy Conservation Techniques. See websites for cost and updated dates and locations.

BOC Level II Certification

Level II has seventy hours of training and project work in equipment troubleshooting and maintenance. Courses include four core classes and two supplemental classes. The four core classes include: Preventive Maintenance & Troubleshooting Principles, Advanced Electrical Diagnostics, HVAC Troubleshooting & Maintenance, HVAC Controls and Optimization. See websites for supplemental class topics, dates and locations.

CALIFORNIA - Level I www.theBOC.info/ca
 San Diego.....2/26/08 - 8/26/08
 Irwindale.....2/27/08 - 8/27/08
 Downey.....4/23/08 - 10/15/08
 Irvine.....4/24/08 - 10/16/08
 San Ramon5/7/08 - 11/5/08
 Fresno5/8/08 - 11/6/08
 Ontario**.....9/9/08 - 3/10/09
 San Diego.....9/10/08 - 3/11/09
 Northridge.....10/9/08 - 4/9/09
 San Jose.....10/15/08 - 4/15/09
 San Francisco10/16/08 - 4/16/09

CALIFORNIA - Level II www.theBOC.info/ca
 Santa Barbara4/8/08 - 9/9/08
 San Jose.....4/8/08 - 10/9/08
 Irvine.....9/3/08 - 2/4/08
 Los Angeles.....9/4/08 - 2/5/09

OREGON - Level II www.nweei.org
 Portland(TBA)... 4/08 - 9/08

WASHINGTON - Level I www.theBOC.info/wa
 Bellingham3/4/08 - 10/7/08
 Silverdale.....5/29/08 - 12/11/08
 Renton10/7/08 - 4/7/09

WASHINGTON - Level II www.theBOC.info/wa
 Renton9/17/08 - 2/26/09

NORTHEAST - Level I www.theBOC.info/ne
 Glastonbury, CT.....(SOLD OUT).....3/11/08 - 6/10/08
 Westboro, MA3/13/08 - 7/24/08
 Bangor, ME.....4/10/08 - 6/19/08
 Windsor Locks, CT... (SOLD OUT)4/15/08 - 7/9/08
 Westwood, MA4/22/08 - 8/20/08
 Providence, RI8/19/08 - 12/9/08
 Melville, NY(TBA).... Summer 2008

Limestone ME.....9/11/08 - 10/31/08
 Buzzards Bay, MA.....9/23/08 - 12/10/08
 Andover, MA(TBA)....Fall 2008
 Springfield, MA.....(TBA)....Fall 2008

NORTHEAST - Level II www.theBOC.info/ne
 Mexico, NY.....(TBA)..... 3/08
 Leroy, NY(TBA)..... 3/08
 Hartford, CT(SOLD OUT).....8/27/08 - 11/12/08
 Melville, NY(TBA).... Summer 2008
 Sanford, ME10/7/08 - 12/16/08

* As of publication date; see BOC website for up-to-date schedule information (www.theBOC.info)

** dates not yet confirmed

(TBA) – Dates To Be Announced

BOC Training – A Significant Step to Lifelong Learning

Reactions of participants in the BOC program over the years have been very gratifying. All levels of maintenance personnel report in their program evaluations and recertification applications that they return to their facilities with a new outlook on how to assess and, more importantly, improve operations in terms of energy efficiency and facility comfort.

Technological improvements happen all the time and BOC participants learn to be on the lookout for alternatives. Many BOC grads are interested in more training, information resources, and higher educational certification opportunities. That in mind, here is a quick Q&A to provide some answers.

Q. After BOC, where can I go for further educational opportunities?

A. There is a full range of technical and management oriented training and certificate programs for facilities professionals. This link – www.theboc.info/maintaining.html – provides a good list, and the Continuing Ed section of this bi-annual BOC Bulletin also details information about up-to-date training opportunities in the field available locally and regionally.

Q. Are there mailing lists, lists of seminars, or periodicals accessible for ongoing information that you would recommend?

A. Again, the BOC Bulletin has a limited listing of seminars for energy efficiency. It is always a good idea to check your local utility provider web sites, which often have numerous workshops/ seminars on offer. For periodicals, excellent and timely information is available from the following: HPAC Engineering, Maintenance Solutions, Building Operating Management, and Sustainable

Facilities Journal (formerly, Energy & Power). Many of these are available online and can be found with an easy Google search.

Q. Are there organizations or programs (ie: IFMA) that you would recommend?

A. There are numerous professional associations in the facilities management industry. Many are sector-oriented – e.g., K-12, higher education, healthcare – where some, such as IFMA (International Facilities Management Association), are broadly focused. Often the broadly focused associations will have web links to more local or more industry-specific chapters. To name just a few: ASHE (American Society for Healthcare Engineering), AEE (Association of Energy Engineers), AFE (Association of Facilities Engineers) and the U. S. EPA Energy Star program. Some of these associations are cited in the Continuing Ed and Conferences & Symposiums section of this issue, but their web sites can easily be found via Google.

Q. Can older facilities managers get engineering degrees? Are there programs aimed at older students for this?

A. Education is a life long endeavor. It's never too late to learn or to add professional credentials. You will probably find that in many continuing education programs, the average student age is higher than you think. There are two-year associate degrees in building engineering as well as four-year professional engineering degrees. The sooner you make the decision, the sooner you earn the degree!

BAKER'S DOZEN (Continued from page 4.)

13. Begin to Plan for Future Items: There are many items that require budgeting and planning and with all capital expenses, the dreaded review cycle. The time to start the project rolling is today. Remember, the upward spiral of energy costs is here to stay. The following are a few ideas for the "future upgrade" list.

A. Roofing upgrades: Light colored and better insulation is a combination that saves heating and air conditioning costs while improving occupant comfort. Further, a well constructed roof can eliminate leaks which cause all sorts of problems including huge sums of money for mold remediation. A great reference for light colored, energy efficient roofs is the Florida Solar Power website.

B. Window upgrades: Argon-filled windows are rated at U - 0.25 vs. U - 1.0 for single pane. The problem with window upgrades is the cost. These are frightfully expensive and the simple payback (cost/savings) is excessive. To attack a window upgrade challenge, grants from government agencies such as EPACT or USDA are almost a must. **

** For more information on these grants, simply Google EPACT or USDA Energy Grant and read the fine print. You may be eligible!

C. Air sealing: An infrared scan of your facility will point out the leaky areas which, as you can well imagine, are costing significant dollars in wasted heating and cooling. Sometimes, the local fire department will provide this service for little or no cost. Once the leaks are identified, a "foaming" contractor can seal the air leaks at the wall roof interface or other leaky areas. As a general note, flat roofs always leak air where they meet the outside walls. Why heat the outdoors?

D. Boiler upgrades: If your boiler was installed prior to 1990, it is almost guaranteed to be obsolete. New boilers (and furnaces) are as much as 20% more efficient, smaller, easier to maintain, and far more reliable. Full condensing boilers are frightfully expensive (that's the bad news) but worth every cent with dramatically reduced O&M costs (that's the good news). Even some oil-fired boilers are now full condensing.

Summary. There are many more ideas and topics that could be discussed in this article. This is just the tip of the energy efficiency iceberg. The most important advice is to do something – anything – and start today. Good luck!

Continuing Education Opportunities For Certification Renewal Credit

Below you will find listings of various organizations that offer continuing education courses that are applicable to annual BOC certification renewal. Check out the Education, Professional Development and Events Calendars at these sites or call for information regarding upcoming training opportunities.

APPA – Association of Physical Plant Administrators

Class Information: www.appa.org

BetterBricks Professional Training Program

Website: www.BetterBricks.com

Contact: 206-343-3960

Workshops, and webinars for design, engineering and facilities professionals in the Northwest.

BOMI – Building Owners & Managers Institute

Class Information: www.bomi-edu.org

BOMA – Greater Los Angeles

Class Information: www.bomagla.org

CASBO – California Association of School Business Officials

Class Information: www.casbo.org

California Society for Healthcare Engineering

Class Information: www.cshe.org

CALIFORNIA ENERGY EFFICIENCY TRAINING RESOURCES

Customer Technology Application Center - Edison, CA

Website: www.sce.com/RebatesandSavings/EnergyCenters/workshops.htm

Energy Training Center - Stockton, CA

Website: www.pge.com/education_training/

FSTC - Food Service Technology Center

Website: www.fishnick.com/education/seminars/list.php

Energy Resource Center (ERC)

Website: www.socalgas.com/business/resource_center/erc_home.shtml

Pacific Energy Center - San Francisco, CA

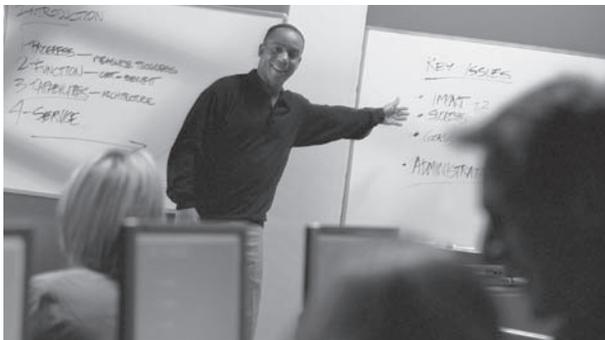
Website: www.pge.com/education_training/classes/energy_efficiency/

San Diego Regional Energy Office

Website: www.sdenergy.org/ContentPage.asp?ContentID=50&SectionID=46

Sacramento Municipal Utility District

Class Information: www.smud.com/education-safety/index.html



NORTHEAST UTILITY ENERGY EFFICIENCY TRAINING CENTERS:

Efficiency Maine

Website: www.efficiencymaine.com/education_programs.htm

Long Island Power Authority

Website: www.lipower.org/community/education/

Energy Services

Website: www.energyexperts.org/calendar/

FEMP – Federal Energy Management Program Workshops & Conferences

Website: www.eer.e.energy.gov/states/

HVACR Education: On-Line Learning for the HVACR Industry

Website: www.hvacreducation.net/

IFMA International Facility Management Association

Website: www.ifma.org

The International Facilities Management Association has several regional chapters, all of which can be accessed from the association's main web site address above. Be sure to check out the site for the variety of learning options available both online and via seminar.

NYSERDA - New New York State Energy Research & Development Authority

Website: www.nyscrda.org/events.asp

NEEI - Northwest Energy Education Institute

Website: www.nweei.org

Contact: Erik Westerholm at 541-463-3154 or

E-mail: westerholme@lanecc.edu

Northwest Lighting Design Lab & Portland Daylighting Lab

Class Information: www.lightingdesignlab.com/calendar/index.html

The UC/CSU/IOU Partnership (University of California, California State University, Investor-Owned Utility Energy Efficiency Partnership)

Website: www.uccsu.northwoodsoft.com/

University of Washington Engineering Professional Programs and Certificate Programs

Contact: 866-791-1275

WAMOA – Washington Association of Maintenance & Operations Administrators

Website: www.wamoa.org

Washington State Society for Health Care Engineering

Website: www.wsshe.org

WSU Energy Program – Continuing Education Calendar

Website: www.energyideas.org

Conferences & Symposiums

National and Regional – Winter/Spring 2008

NATIONAL

Maintenance Solutions Expo

March 4-6, 2008 • Baltimore Convention Center • Baltimore, MD

More info: www.nfmt.com

National School Plant Management Association

April 12-15, 2008 • Sheraton Music City Hotel • Nashville, TN

More info: www.nspma.org

Total Facility Management Show

April 22-24, 2008 • The Navy Pier • Chicago, IL

More info: www.tfmshow.com

National Conference on Building Commissioning

Newport Beach, CA

April 22-24, 2008

More info: www.peci.org/ncbc/ncbc.htm

REGIONAL FACILITIES EXPO EVENTS

More info: www.facilitiesexpo.com (See link for 2008 schedule details)

CENTRAL Valley Facilities Expo

March 12-13, 2008 • Modesto, CA

New England Facilities Expo

March 19-20, 2008 • Boston, MA

Northwest Facilities Expo

April 16-17, 2008 • Portland, OR

Southern California Facilities Expo

April 23-24, 2008 • Anaheim, CA

CALIFORNIA

Facility Management Show West (WESTFAC)

March 5-6, 2008 • Anaheim, CA

More info: www.westfac.com

CASBO (California Association of School Business Officials)

April 26-29, 2008 • Anaheim, CA

More info: www.casbo.org

CSHE Annual Institute (California Society for Healthcare Engineering)

April 16-18, 2008 • San Francisco Airport • Burlingame, CA

More info: www.cshe.org

WASHINGTON

Engineering Vision 2030

March 26-27, 2008 • Seattle, WA

More info: www.pugetsoundashrae.blogspot.com/2007/12/puget-sound-ashrae-and-ieee-announce.html

West Coast Energy Management Congress (EMC)

May 14-15, 2008 • Seattle, WA

More info: www.energyevent.com

Energy & Facilities Connections

May 21-23, 2008 • Leavenworth, WA

More info: www.ga.wa.gov/plant/EFC.HTM

MAINE

Energy Efficiency in Schools Workshop

April 18, 2008 • Lewiston, ME

More info: www.energymaine.com

FREE
BOC
Webcast

Learn more about the program by participating in a free BOC Informational Web Cast. All you need is a desktop browser and a telephone. The presentation describes Level I and Level II course topics, schedules and certification requirements in detail. Listen in and find out who benefits by attending BOC training and how graduates are improving their facilities.

The next Web Cast dates for 2008 are:

Wednesday, March 5th
Thursday, June 26th

8:30AM - 9:30AM (PST)

9:30AM - 10:30AM (MST)

10:30AM - 11:30AM (CST)

11:30AM - 12:30PM (EST)

To sign up go to:

www.theBOC.info



Improving Indoor Air Quality, Saving Energy & Reducing Your Carbon Footprint: During the Heating Season

Here is an easy way to earn **one continuing education hour** towards annual BOC recertification. Read the article on IAQ & Energy Savings that begins on page 1 and take this short quiz on the material. Mail or fax your answers to our offices, with your certification renewal application, as directed at the end of the quiz. With a passing grade, we will apply one credit hour to your record.



CHECK YOUR ANSWER(S):

- 1) Reducing fuel use via energy conservation strategies is often a productive means of reducing one's carbon footprint and saving money.
a. TRUE b. FALSE
- 2) In many facilities with northern and southern window exposures, it is important to be able to heat the north side ventilation air and not heat the south side.
a. TRUE b. FALSE
- 3) A reasonable goal in any facility is: energy efficiency, good indoor air quality, good occupant comfort/productivity and minimizing the carbon dioxide footprint.
a. TRUE b. FALSE
- 4) To improve HVAC operations which items below should be addressed?
 - a. Locate areas where fans run unnecessarily during off hours.
 - b. Locate areas where overheating is occurring
 - c. Insulate heating pipes that are not insulated.
 - d. Make roofs a light color where air is drawn in at a rooftop unit.
 - e. Air seal the building envelope with expanding foam as needed.
 - f. All the above.
- 5) Vending machines should be located on the north side of buildings.
a. TRUE b. FALSE
- 6) Tight air sealed buildings allow better control of indoor air quality, save money and should reduce the carbon footprint.
a. TRUE b. FALSE
- 7) In most parts of the USA, exhaust or makeup air costs \$6 to \$7 per CFM annually.
a. TRUE b. FALSE

- 8) Retrofitting Variable Frequency Drives to fans and pumps often saves energy and reduces the carbon footprint.
a. TRUE b. FALSE
- 9) For most facilities, beginning to plan for future energy costs is an important activity, which may help to reduce the impact of future escalations in costs.
a. TRUE b. FALSE

END OF QUIZ

We include a quiz like this in each of our bi-annual newsletters. To submit your completed quiz for re-certification credit (1 credit per quiz passed), please complete the following and either fax it to 206-292-4125, or mail it to: BOC Quiz, NEEC Office, 605 1st Avenue, Suite 401, Seattle, WA 98104. Please remember to send it with your certification renewal application.

Your Name: _____

Title: _____

Employer: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____

Fax: _____

Email: _____



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BOC Phone:

206-292-4793 ext. 2



BOC Fax:

206-292-4125



Email: **BOCinfo@theBOC.info**



Thank you to these sponsors of the Building Operator Certification in the New England states, New York, California, Oregon & Washington:

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Energy Research Development Authority
Northwest Energy Efficiency Alliance • NSTAR
North Carolina Community College System
Pacific Gas & Electric Company • Pacific Power
Puget Sound Energy • Sacramento Municipal
Utility District • San Diego Gas & Electric
Seattle City Light • Snohomish County PUD
Southern California Edison • Southern California
Gas • Tacoma Power • U.S. Dept. of Energy,
Federal Energy Management Program • Unitil
Washington State General Administration
Western Massachusetts Electric Company

Editor and Contributing Writer: Christine Doonan
Graphic Design: Thom Harris Design

BOC CERTIFICATION RENEWAL

To retain BOC certification, graduates must accumulate continuing education (CE) hours each year, following a full calendar year after their graduation. Level I certification renewal requires 5 CE hours each year, and Level II renewal requires 10 CE hours each year. The hours may be earned in any of the following ways:

BOC CERTIFICATION RENEWAL ACTIVITIES	CE HOURS EQUIVALENCY
• Continued employment in building operations	2 hours/year
• Continuing education in building operations	Actual hours of classroom time
• Energy efficiency projects completed at your facility	Up to 11 hours per year
• Membership in a building operations membership association	1 hour/year
• Offices held in membership associations.....	2 hours/year
• Awards received for efficient building operations	2 hours/award
• BOC Newsletter quiz (see below).....	1 hour/passed quiz
• Completion of an energy consumption benchmark for the previous 12 month period using ENERGY STAR® Portfolio Manager or alternative energy accounting tool	3 hrs/year equivalency

You will be notified by mail when your certification is up for renewal (your renewal date appears on your wallet card). Once you have received a renewal notice, complete the short application, provide a list of your certification renewal activities from the past year and return the information to NEEC. For 2008, the renewal fee is \$45 for each of Level I and Level II, or \$75 for a "combo" renewal of both Level I and Level II.

EASY CERTIFICATION RENEWAL CREDIT

Another easy way to get some continuing education credits for your yearly certification renewal requirement is right here in the BOC Bulletin. Just read the featured technical article (pages 1-2 and continued online), then take the short quiz provided on page 11 of the newsletter. Send or fax it back to us for one CEU credit hour per quiz passed, **along with your recertification application. Please do not send separately.**