Plant Operations Support ShopTalk

Plant Operations Support Consortium Volume 13, No. 3 Fall 2008

Inside

A new life for a historic landmark

The City of Hoquiam renovates its 1914 train station

By Bob MacKenzie, POS manager

The City of Hoquiam, project team and Washington State Departments of Transportation, Licensing and General Administration celebrated a significant milestone in August 2008 with an open house and ribbon cutting of the newly renovated Hoquiam Train Station. The event marked a unique finish line on an arduous race to revitalize the hard-hit Hoquiam city core. The vintage 1914 station – long an eye sore, located near the municipal services campus in downtown Hoquiam – had stood vacant since 1955. Many rehabilitative avenues had been explored by city administrations dating back to 1988, all without success.

Finally, in 2004, Jack Durney, City of Hoquiam mayor, and Brian Shay, the city administrator, partnered with Washington State Departments of General Administration and Transportation to obtain funding and project expertise to renovate and place into active operation the venerable building. City of Hoquiam leaders received federal grants from the Washington State Department of Transportation's local programs in the order to assist in this renovation and ultimately provide the City of Hoquiam a spark to revitalize its inner core. Additional city funds and resources were utilized to flesh-out areas not covered by specific federal grants.

(Please see "Train", continued on page 8)

Pat Herrington (left), Licensing Services Office supervisor in Hoquiam, WA (left) and Liz Luce, director of Washington State Department of Licensing, cut the ceremonial ribbon for the newly renovated train station.

The historic 1914 train station had been vacant since 1955 and now houses the Washington state Licensing Services Office.

Washington State University

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POS notes

By Phil Partington, POS staff program coordinator

Phil Partington

Bob MacKenzie, Plant Ops manager, has been busy lately. Aside from managing the daily workings of the program, Bob's been sharing his wisdom by presenting at numerous training venues. He also presented Plant Ops' energy conservation report of the City of Tumwater to its council members, which was aired on a local access channel.

We'd like to remind you that online registration for the fifth annual Energy/Facilities Connections Conference is up and running. The conference will be held May 13-15, 2009.

Register online: www.ga.wa.gov/plant

Special thanks

Plant Ops staff would like to thank Bob Cowan, director of facilities engineering at the Fred Hutchinson Cancer Research Center in Seattle. Cowan sponsored a tour of the Research Center facilities and operations at our request. Bob Carr, maintenance manager for Pierce County Facilities Management Department, had requested POS assistance in touring a top-flight example of a maintenance organization. Carr and five of his supervisors joined POS staff for an illuminating tour of the Fred Hutch facilities. Cowan had developed an innovative, in-house program which enables easier and more effective interoffice communication, as well as management of daily tasks.

We'd also like to thank Dean Crawford, Hood Canal Bridge maintenance supervisor, for giving Plant Ops staff and associates a guided tour of their operations of Hood Canal Bridge. The Hood Canal Bridge is the longest floating bridge over a saltwater tidal basin in the world.

These are certainly two unique and well-managed organizations. These types of on-site tours are an excellent means to share best practices and lessons-learned and help us avoid re-inventing the wheel.

Phil

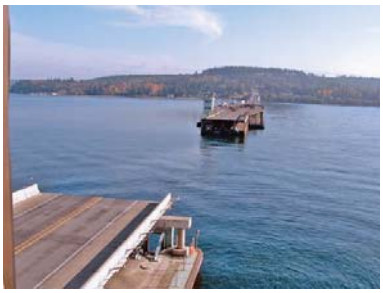
Bob Cowan (right) explains the interoffice communication system to Larry Covey.

The tour at the Fred Hutchinson Cancer Research Center gave Pierce County facilities leaders ideas to implement in their own operations.

Dean Crawford proudly displays a Zodiac craft used by his bridge crew for safety operations.

Tom Ford, bridge technician, operates the control panel to separate the bridge pontoons as a vessel transits the canal.

The Hood Canal Bridge can open up to 600-feet wide to allow ships to transit.



Shop Talk is a quarterly publication of the Plant Operations Support program. The newsletter is intended to be an informative and operationally-oriented medium for public facilities managers. Contents are also available in hard copy. We welcome feedback and input on the newsletter's contents from readers. We reserve the right to edit correspondence to conform to space limitations.

Bob MacKenzie is program manager and editor, (360) 956-2055 or e-mail bobmac@energy.wsu.edu. Phil Partington is POS webmaster and assistant editor. Contact him at (360) 956-2057, or e-mail phil@energy.wsu.edu. Special thanks to Steve Valandra, Viet La, Sue Brown and Larry Covey for editing assistance.

Maintenance and troubleshooting HVACR equipment for mechanical problems (part two)

By Greg Jourdan, HVAC professor and BOC instructor, Wenatchee Valley College
Please see page 3 Summer 2008 Shop Talk for Part One (http://ga.wa.gov/plant/SHOPTALK/SUM08.pdf)

This article was originally published in the BOC Bulletin and is reprinted here with permission. For more information about Building Operator Certification, go to www.theBOC.info/wa. Images and illustrations provided by the Fluke Corporation. Look for parts 2 and 3 of this article in upcoming issues.

Greg Jourdan

Part one introduced the article and discussed the compressor, temperature surveys, and recording a temperature overnight. Part two focuses on troubleshooting the refrigeration system, and the central AHU air supply system which is utilized in most commercial building.

Troubleshooting compressor electrical motor faults

A clamp meter is a great tool for troubleshooting electrical motor faults, especially meters designed to accurately measure both alternating voltage and alternating current. These meters allow current to be measured without breaking into the electrical circuit. A compressor failure is often caused by an electrical fault. To check the compressor for electrical problems, check voltage at the contactor (starter) terminals, followed by de-energized tests at the compressor: use an insulation tester to check resistance on windings and check from each winding to ground.

Troubleshooting compressor electrical motor failures caused by refrigeration system problems

Occasionally defective compressors with electrical winding failures are diagnosed by a service technician as caused by an electrical system problem. To quickly verify whether electrical is at fault, use an infrared thermometer to scan connectors, wiring, and circuit breakers while equipment is operational (if possible). Be sure to check compressor and pump motor amps to verify they were within manufacturer's design criteria. Any loose connections or overloaded circuits will appear as abnormal temperatures. However, mechanical system failure or inferior installation and service practices often cause compressor electrical problems. These problems include:

1. Poor piping practices resulting in oil not adequately returning to the compressor during the run cycle.
2. High discharge temperatures creating acids in the oil.
3. Insufficient air flows across the evaporator and condenser coils.
4. Extremely low suction pressures.
5. Liquid refrigerant flooding back into the compressor.

Diagnosing these refrigeration system problems and avoiding compressor failure can be done effectively using DMMs, clamp meters, digital thermometers, pipe clamps, infrared thermometer and refrigeration gauges or pressure/vacuum modules. (See Figure 4)

Figure 4 - Checking running current on the compressor controls.

Simple procedures to diagnose these refrigeration problems:

1. Compressor bearings can fail or lock up due to poor piping practices, which causes oil clogging in the system and results in insufficient oil return to the compressor. If the bearings don't lock-up and continue to wear during these conditions, the rotor will lower into the starter housing, shorting out the windings. To diagnose this problem, measure the compressor amps. They should not exceed the manufacturer's full load ratings. Worn bearings will cause higher than normal amps. You can also scan the bearings with an IR thermometer, like the Fluke 561, and look for abnormally high temperatures.

Inspect the oil level via the compressor sight glass.

If there is no sight glass, use your infrared thermometer to measure the sump of the compressor housing. The oil level can be detected with the temperature probe. The sump temperature will be different on the compressor housing at the oil level.

Caution: Whenever an oil problem exists due to poor piping practices, the correct remedy is to fix the piping, not to continue to add more oil to the system.

2. High discharge temperatures are caused by high head pressures or high superheat. The compressor discharge line can be measured quickly using the infrared thermometer on a dull section of pipe.

(Please see "HVAC", continued on page 6)

The more things change, the more they stay the same

Techniques for handling customer cleaning complaints

By Alan S. Bigger and Linda B. Bigger

This article was reprinted with kind permission from Executive Housekeeping Today, the official publication of the International Executive Housekeepers Association. (IEHA). For more information, please visit www.ieha.org.

Alan S. Bigger

Linda B. Bigger

It is hard to believe I've been collecting surveys since 1992. Yes, that's right, I have collected over 80 surveys from all sorts of facilities management industry sources over the past 16 years. Recently, I went back and reviewed the surveys, and discovered that not many things have changed since 1992 in regards to the types of complaints that managers receive about the cleanliness and level of service provided in their facilities. Surveys have been around for a long time, and have yielded pretty much the same statistics year after year—are we listening to the results or not?

Recently, I discovered an article on the Internet titled "Top 5 Cleaning Complaints and How to Solve Them" by Steven Hanson (article has since been re-titled, "How to Handle Customer Complaints in Your Cleaning Business" http://ezinearticles.com/?How-to-Handle-Customer-Complaints-in-Your-Cleaning-Business&id=404538). The article listed the following top five cleaning complaints: Supplies empty, dirty restrooms, inadequate dusting, trash not being emptied, and lack of vacuuming. The article was written in 2006. Now, let's roll back the clock to 1994—surveys I have for cleaning operations indicate that restroom cleaning, restroom supplies, carpet cleaning, dusting and trash removal were the source of most complaints. Thus, for over 14 years, the types of complaints have remained the same.

There are many phrases that are used today, such as, "The more things change, the more they stay the same," that can set a pessimistic tone for businesses. These phrases are often repeated again and again, but do people really heed what the words are saying to them? Unfortunately, ignoring such phrases may be to our own detriment. What might be some phrases that could have contributed to this stagnation in solving the cleaning complaints?

- **"We have always done it that way!"** There is ample proof that many of the old ways of doing things are passé and not as effective as some of the newer technologies available today. For example, the utilization of microfiber technology indicates that it is possible to have a new cleaning cloth that removes more dirt than ever before, in most cases, with less effort. In contrast, "We have always done it that way," leads to stagnation.

- **"It's been my way or the highway!"** Too often, managers get stuck in a rut and are only willing to listen to and implement their own ideas. Many times, the frontline workers have the best ideas on how to solve a problem. For example, a world-class manufacturer of cars in the United States was trying to decrease its solid waste flow and recycle as much as possible. However, the programs that they implemented didn't seem to be very effective until management went out on the floor and talked to the teams on the assembly lines. The workers provided strategies to make recycling more efficient and effective and management listened, instead of ramming, "It is my way or the highway" down the throats of the workers. Due to listening to the frontline employees, the company was able to implement a solid waste minimization plan that enabled that one plant to recycle over 98% of its solid waste stream!

- **"You cannot teach old dogs new tricks!"** This phrase implies that people are not teachable. Despite this mindset, employees have learned to use "no-touch" cleaning equipment, microfiber technologies, and other new techniques or "tricks." With proper training, we can all learn new tricks. Years ago, I had someone who worked with me who indicated they could not learn how to use a computer, but they did. The same individual felt that they could never use data from electronic time clocks and generate a computer-based payroll, but they did! We can all learn and teach others to learn if we take the time to teach new tricks.

"…for over 14 years, the types of complaints [we receive about cleaning] remain the same."

Such phrases, and the thinking that goes with such phrases, does not encourage an environment in which problems can be solved to the customer's satisfaction. What are some tips that facilities managers can utilize to break the vicious cycle of complains?

- **Make sure you understand the customer's expectations:** Sit down with the customer, eye to eye—note behind a contractual document (even though such a document may be the starting point)—to clearly understand their expectations. The word "clean" means different things to different people. The true meaning of clean will only be realized when we take time to understand the customer's paradigm of clean.

(Please see "Complaints", continued on page 8)

The heart and soul of maintenance

Sustaining an operations starts with a team effort

By Edwin Valbert, project manager for Department of Social and Health Services Capital Projects Office

Edwin Valbert

Without a sustainable heart and soul, an organization cannot have sustainable operations. To me, the heart and soul of any organization is its individual employees. A sustainable heart and soul of any operation must start with a team effort between management and employees.

Employees have a responsibility to sustain the operation by using their direct connection to the customer to identify operation improvements. Management has the responsibility to listen to employees and investigate operational improvements regardless of what level they come from.

Here are a couple examples that might help illustrate this point.

The high jump is a track and field event that has seen many facelifts since its inception. In earlier years, high jumpers would land in a sawdust pit and not on a raised pad as they do today. For this reason, techniques in previous times focused more on safe landings than increasing the height of the jump.

(Please see "Heart," page 7)

The development of the high jump

The art of high jumping has evolved over time. Similarly, best practice methods in facilities maintenance must also develop by trial and error, and require cooperation by management and employees to succeed.

1. High jumpers hurdled the bar with a forward-facing, head-first leap.

2. Other techniques included a scissor-kick leap where the jumper led with his foot.

3. After much trial and error, the most current method of high jumping, known as the "Fosbury Flop," is also the most effective.

Consortium member roster

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Abbotsford, BC
Anacortes SD
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Brewster
Bridgeport
Camas
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Coquitlam, BC
Delta, BC
East Valley, Spokane
Easton
Eatonville
Edmonds
Enumclaw
ESD 101
ESD 171
Federal Way
Goldendale
Highline
Hoquiam
Ketchikan, AK
LaCrosse
Liberty
Marysville
McCleary
Mission, BC
Moses Lake
Mount Vernon
Mukilteo
North Thurston
Oak Harbor
Ocosta
Okanagan Skaha, BC
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Cascadia CC
Clark College
Columbia Basin CC
CC of Spokane
Everett CC
Grays Harbor College
Highline CC
Olympic College
Renton TC
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The Evergreen State College
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WSU Extension Energy

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Port of Kennewick
Port of Sunnyside

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City of Hoquiam
City of Kent
City of Oak Harbor
City of Olympia
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City of Seattle, Fleet and Facilities Dept.
Seattle City Light
City of Seattle, Public Util.
City of Tumwater
City of Walla Walla
City of Vancouver
Clark County
Cowlitz County
Cowlitz County PUD #1
Grays Harbor Public Dev. Auth.
Jefferson County
King County Dept. of Exec. Services
Lakehaven Utility District
Lewis County
Pierce County
Pierce County Library System
Skamania County
Tacoma-Pierce Cty Health
Whatcom County

States/Tribal

Alaska DOT
Hopelink
Oregon Youth Auth.
Squaxin Island Tribe
Vancouver Convention & Exhibition Center

Wash. St. Agencies

Corrections
Criminal Justice Training Comm.
Ecology
General Administration
Health
Information Services
Licensing
Liquor Control Board
Military
Natural Resources
Parks & Recreation
School for the Blind
School for the Deaf
Social & Health Services
Transportation
Veteran's Affairs
Washington State Patrol

Our warm welcome to new members in green type and to those members who have re-subscribed. We look forward to serving your facility and operations needs.

("HVAC," continued from page 3)

Measure the discharge pressure at the gauge panel on the equipment. If a gauge panel is not provided with the equipment, utilize a set of refrigeration manifold gauges or use a pressure/vacuum module. Convert the refrigerant pressure to temperature and compare it to the ambient air temperature. If there is a temperature difference greater than 20°F to 30°F (11°C to 17°C), there is either non-condensible gases in the system or restricted airflow across the condenser. If you are doing this test on water cooled condenser, you should expect to find a 10°F to 15 °F (5 °C to 8.5 °C) temperature difference between the inlet and outlet water temperatures. Note: Temperature differences will vary due to size and application; refer to original manufacturer's design specifications to determine optimum efficiencies.

3. Check for insufficient airflows across the evaporator using a digital thermometer.

Place a bead thermocouple on the discharge side of the coil and on the return side of the coil. Record the temperature difference on the air conditioning unit. Expect about 18 °F to 22 °F (10 °C to 12 °C) temperature difference. On refrigerated chilled water units expect about 10 °F to 15 °F (5 °C to 8.5 °C) temperature difference. Note: Temperature differences may vary depending upon initial design and humidity requirements.

4. Extremely low suction pressures can be checked using the panel mounted gauge set, or use refrigeration gauges, or a pressure/vacuum module and your DMM. Record your suction pressure at the compressor. Convert the refrigerant pressure to temperature using a pressure temperature (PT) chart. Measure the return air temperature before the evaporator. Compare the refrigerant temperature to the desired evaporator return air temperature. On air conditioning units, expect about 35 °F to 40 °F (19 °C to 22 °C) temperature difference and refrigerated chilled water units expect about 10 °F to 20 °F (5 °C to 11 °C) temperature difference.

5. Check for liquid refrigerant flooding back to the compressor by determining the superheat using your low side refrigeration pressure. Check suction pressure and convert the refrigerant pressure to temperature, using your PT chart. Measure the suction line pipe temperature. Compare the difference of the two temperatures. If there is no temperature difference, then you are bringing back liquid to the compressor. If there is a temperature difference between 10 °F to 20 °F (5 °C to 11 °C), then you have normal superheat and you are not slugging the compressor with unwanted liquid.

Maintenance and Troubleshooting the Chillers and Cooling Systems

Good maintenance often requires simple but labor-intensive procedures and a PM checklist for the maintenance staff.

• Refrigerant leaks should be fixed as soon as possible according to law.

• Condenser and Evaporator Coils should be cleaned regularly and checked for debris that could block airflow or water flow.

• General maintenance considerations: Keep water strainers and filters clean, check oil heaters, follow manufacturer recommended inspections for routine over-haul procedures, and time frames. Meg ohm test with an electrical megger all large motors annually or as recommended by the equipment manufacturer.

• Circulating Pumps should can typically be checked quickly by simply measuring the differential pressure across the inlet and discharge of the pump.

• Chiller maintenance: Check refrigerant quantity, system pressures and temperatures, water flow rates, and have a 3rd part oil analysis on compressor lubricants. Clean water side of vessels when pressure drop across the vessel exceeds minimum requirements. Good chiller maintenance may require bringing in the factory reps annually to perform non-destructive testing such as eddy current testing, pressure drops, and gpm water flow analysis.

• Optimizing controls: Check set point vs. control point. Set point is the desired condition, but control point is the actual condition. Calibrate controls as needed. The controls can drift out of calibration from set point, thus not control the process accurately.

• Remember to verify minimum condensing pressures are being implemented to minimize compressor energy.

Check out Part 3 of Greg Jourdan's article on HVAC in the Winter 2008 Issue of *Shop Talk*, when Greg will discuss more troubleshooting and equipment maintenance issues, and more.

Check out Part 1 of Jourdan's article on HVAC in the Summer 2008 issues of *Shop Talk.*

Greg Jourdan has been the Director/Instructor of the Refrigeration Technology Program at Wenatchee Valley College since 1985. He is a certified instructor for the Air Conditioning Contractors of America and has taught for the U.S. Navy and Grand Coulee Dam. Contact Greg for more information, 509-741-7105, or e-mail gjourdan@msn.com

("Heart," continued from page 5)

Jumpers would either approach the bar straight on and try to clear it that way, or they'd approach it more from the side and try to use the scissors technique where they'd raise one leg up and pull their other leg up at the last moment to clear it.

Over the years, jumpers have come up with new and innovative ways of getting over the bar, including the "Fosbury Flop," which is the current method used by jumpers. They approach the bar at an angle and leap over it leading with their back. This method has proven to enable jumpers much higher jumps overall.

To reach this level of excellence, it took jumpers trying new techniques and thinking outside of the box. It's likely that some were even ridiculed for trying something different, but all the trial and error eventually led to better high jumping. (Source: *http://www.trackandfield.com/events/field-events/high-jump/*)

Another great example of out-of-the-box thinking in industry is with the United Parcel Service (UPS), which thrives on being efficient. UPS strives to minimize making left turns as much as possible. Adding up the time and gas spent by all UPS trucks across the world sitting in left-hand turn lanes had led to a surprising sum. According to an article at ABC News' website, UPS drove 2.5 billion miles last year. The company claims its package flow technology and practice of right-turn routes saved 28,541,472 million miles and 3 million gallons in fuel. (Source: *http://abcnews.go.com/WNT/story?id=3005890*)

Sustainable operations require constant growth, which requires innovation.

Innovation often comes at the grassroots level of an operation, and often involves employees and management moving outside their areas of expertise or control. But for an innovative idea to reach fruition, management must develop the habit of listening to its employees, supporting their ideas and working together to come up with a plausible solution. Not all great ideas are plausible. Factors such as a limited budget often get in the way. Yet, with forward-moving conversations between employees and management, representing a variety of areas in the organization, innovation and compromise is often possible. For example, where Chesapeake Bay meets the Atlantic Ocean, there's an innovative bridge-tunnel that connects Southeastern Virginia and the Delmarva Peninsula (Delaware plus the Eastern Shore counties in Maryland and Virginia). The bridge-tunnel cuts 95 miles from the journey between Virginia Beach and points north of Wilmington, Delaware. (Source: *http://www.cbbt.com/history.html*)

Such a success (as seen in accompanying photo) must have been dependent on communication, teamwork, and thinking outside one's area of responsibility. It was impractical to build a typical bridge across the water, since ships and ferries would still need to pass. However, it would cost too much money to build a tunnel under that length of water. Communication must have been necessary to determine how much bridge and tunnel to build. Of course, that communication could not have taken place if the tunnel team and the bridge team weren't both willing to move past their own areas of expertise. Someone had to suggest a bridge tunnel option and others had to make a choice to investigate the option.

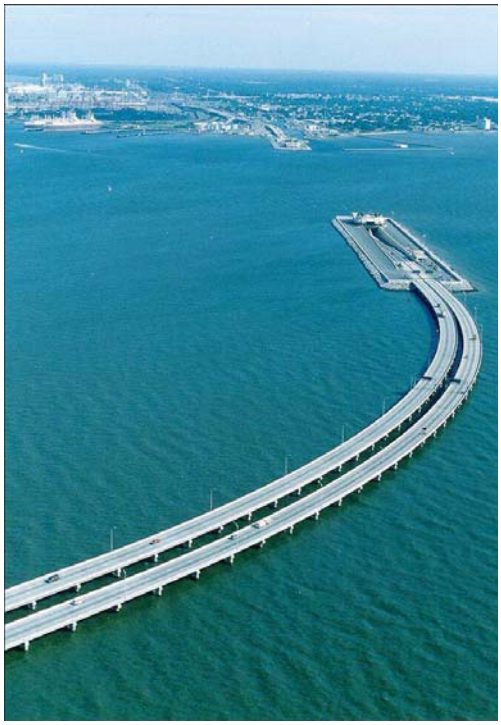
Sustainable operations have to be realistic.

Limited resources will most likely always be an issue in any operation. And lately, the call for doing more with less has grown louder. Employees and management need to remember there are limits to doing more with less. Employees have to be honest regarding how much load they can realistically carry. This involves employees being honest regarding being overworked, as well as under-worked. Management has to be realistic about how much load is reasonable to assign. This involves understanding how much time tasks take and listening and trusting employees if work load issues arise. Remember, the heart and soul of any operation is the people, and people can wear down and wear out.

Maintaining the heart and soul remains a team effort between management and employees, to help reduce the wear and tear on that heart and soul I offer a few suggestions:

1. Employees need to ask for training and management needs to support that requests
2. Employees need to show personal responsibility in their work and work attitudes
3. Management needs to trust and support employees
4. Employees and management need to take vacations and recharge.

As the heart and soul of the operation goes, so goes the operation itself.



Another innovative application is a bridge-tunnel that connects Southeastern Virginia and the Delmarva Peninsula, where Chesapeake Bay meets the Atlantic Ocean.

Edwin Valbert has spent the last 19 ½ years with DSHS where he has been a construction project manager managing large and small construction projects at DSHS facilities statewide. For more information on "The heart and soul of maintenance," or ideas for innovation in the work place, contact Ed, (253) 476-7022, or e-mail valbeel@dshs.wa.gov.

("Complaints," continued from page 4)

I recently read some articles that discuss the definition of clean, and there seemed to be many more definitions of what cleaning is not than what cleaning really is. Much is in the mind of the beholder and sitting down with a customer may be time consuming. However, such discussions help to clarify the meaning of clean for all parties.

• **Over promise and under-deliver:** Once you have a clear understanding of the cleaning expectations, strive not to make promises, rather strive to exceed expectations. For example, an institution recently had some cleaning work performed by a cleaning service. The cleaning company promised that all would be cleaned on time and up to the cleaning specifications. Regrettably, the company failed in both areas.

• **Train the staff to exceed expectations:** Training is critical and should provide theory, proper application, and real-world evaluation on the job site. Too often, people are hired to clean and are put out on the job with minimum training, and sometimes the training is provided by a fellow employee who may not know all of the techniques and processes involved in cleaning. Cleaning is a science that needs to be taught, and it cannot be taught by osmosis. There is no doubt that a manager cannot over-train employees with cleaning processes and techniques.

• **Provide clear procedures and rationale behind those procedures:** The more that our staff knows about cleaning procedures and the reason for the procedures, the greater the probability of success. The best approach to ensuring this clear understanding is to communicate the who, what, when, where, and how.

• **Carefully analyze the nature of complaints and identify the process that broke down:** This takes time on the manager's part, yet it can reap rich rewards. Meet individually with all parties involved. Discuss the complaint and the nature of the complaint in a non-defensive manner. We are all in the same battle—the battle to defeat dirt. We are not in our jobs as facilities managers to battle anyone. Clearly identify the service that was not provided and what did not happen to ensure the service was delivered as expected. Listen to customers to clearly identify what they expect and what it is that your cleaning operation is able to deliver. This is not a blame game, it is a solution process that should be non-threatening for all.

For instance, the customer could complain that the hard floor surface had not been mopped or cleaned, because there is a film on the floor. By sitting down with the custodian and talking through the process that he or she used, you could discover that the custodian was using a dirty mop and mixed chemicals incorrectly. This is a teaching moment! Explain the process and the techniques and then follow-up to ensure that the floor is being cleaned to expectations.

• Follow-up, follow-up, follow-up: When I have talked to customers who have been dissatisfied with cleaning services, I often hear the customer say that the cleaning manager did respond, the area improved for a while, but shortly thereafter, the same problem areas developed. Follow-up right after the complaint to ensure that it was resolved, and then later in a few months.

No matter what kind of business we may be in, the receiving of complaints does not make for happy customers, or facilities managers. Applying a few simple tips on how to break the complaint cycle today will enable us to clean up our act for tomorrow. Seize the opportunities now!

Alan Bigger has been involved in facilities management for more than 20 years. An author and speaker, he has written or co-authored more than 250 articles and several books. He has received regional and national awards from housekeeping and facilities management organizations, including the International Executive Housekeepers' Association William D. Joyner Achievement Award (2004) and Cleaning and Maintenance Management's Person of the Year Award (2004). Alan is also the former President of APPA. Linda is a homemaker and freelance editor.

Contact Alan, 765-983-1678, or e-mail biggeral@earlham.edu.

("Train," continued from, page 4)

The project evolved into three phases, the first two encompassing remodeling of the core and shell of the train station. The final phase was a collaborative effort with General Administration for the total build-out of the train depot for use by the Department of Licensing as a regional licensing and inspection operation.

Jack Durney, Mayor

Brian Shay

"The entire team was most professional and efficient during the entire project," said Shay. "Plus, through our project partnership we realized a number of synergies which enabled the City to realize ultimate success and economic vitality."

For more information on the Hoquiam Train Station project, contact Bob MacKenzie, 360-956-2055, bobmac@energy.wsu.edu.