

The official publication
of the Association
of Physical Plant
Administrators of
Universities and Colleges

Facilities Manager

Volume 7 Number 1

Winter 1991

A photograph of a person wearing a full-body yellow protective suit, including a hood and gloves, working in a laboratory or industrial setting. The person is positioned behind a large, yellow, vertical gas cylinder that is secured with a chain. The background shows shelves with various bottles and equipment. The text "THE HAZARDOUS WASTE CHALLENGE" is overlaid in large, bold, white capital letters across the middle of the image.

THE HAZARDOUS WASTE CHALLENGE

Also in this issue

- Attaining Facilities Equilibrium
- Designing for Energy Management
- Index of Volume 6, 1990



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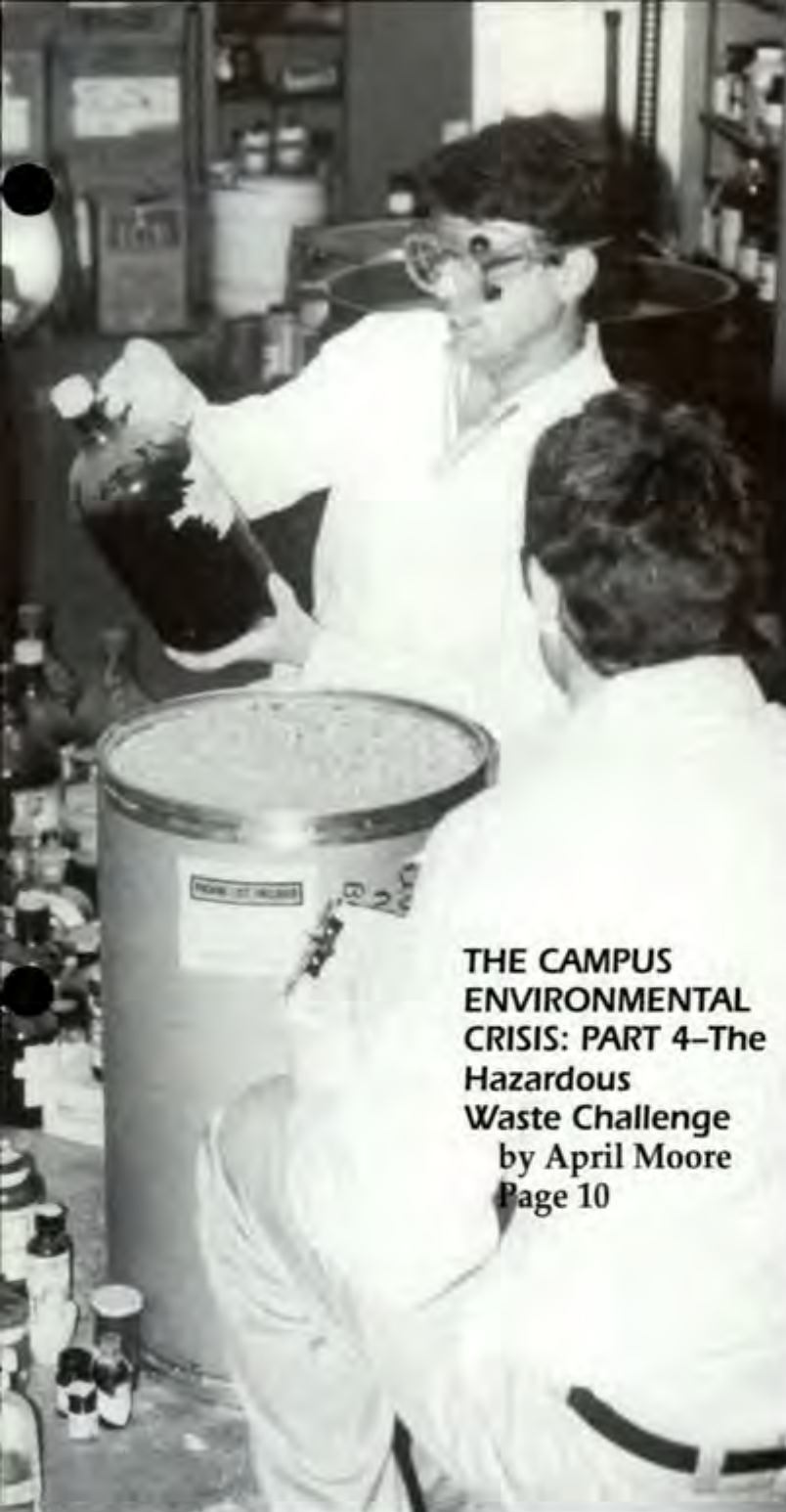
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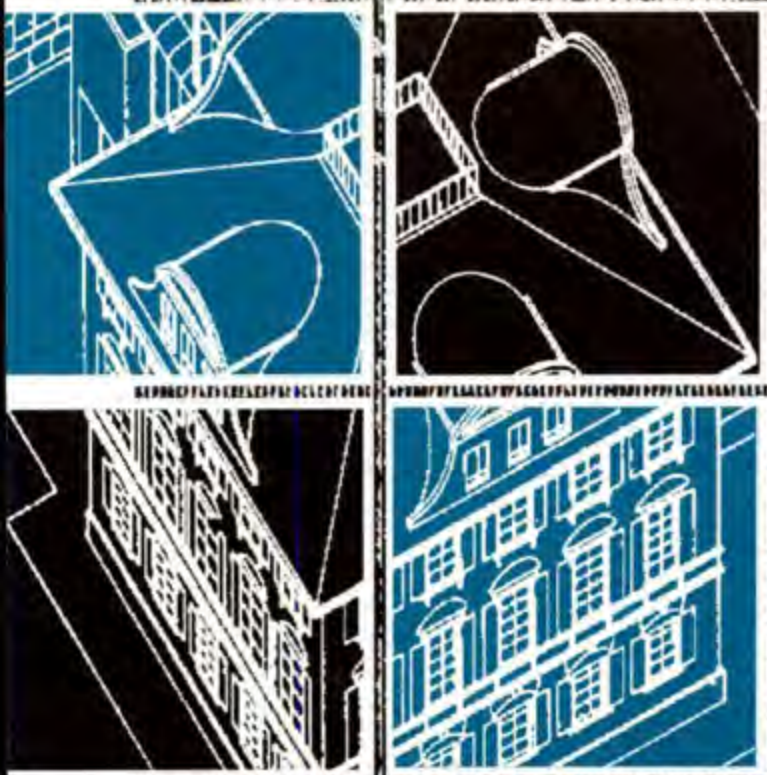
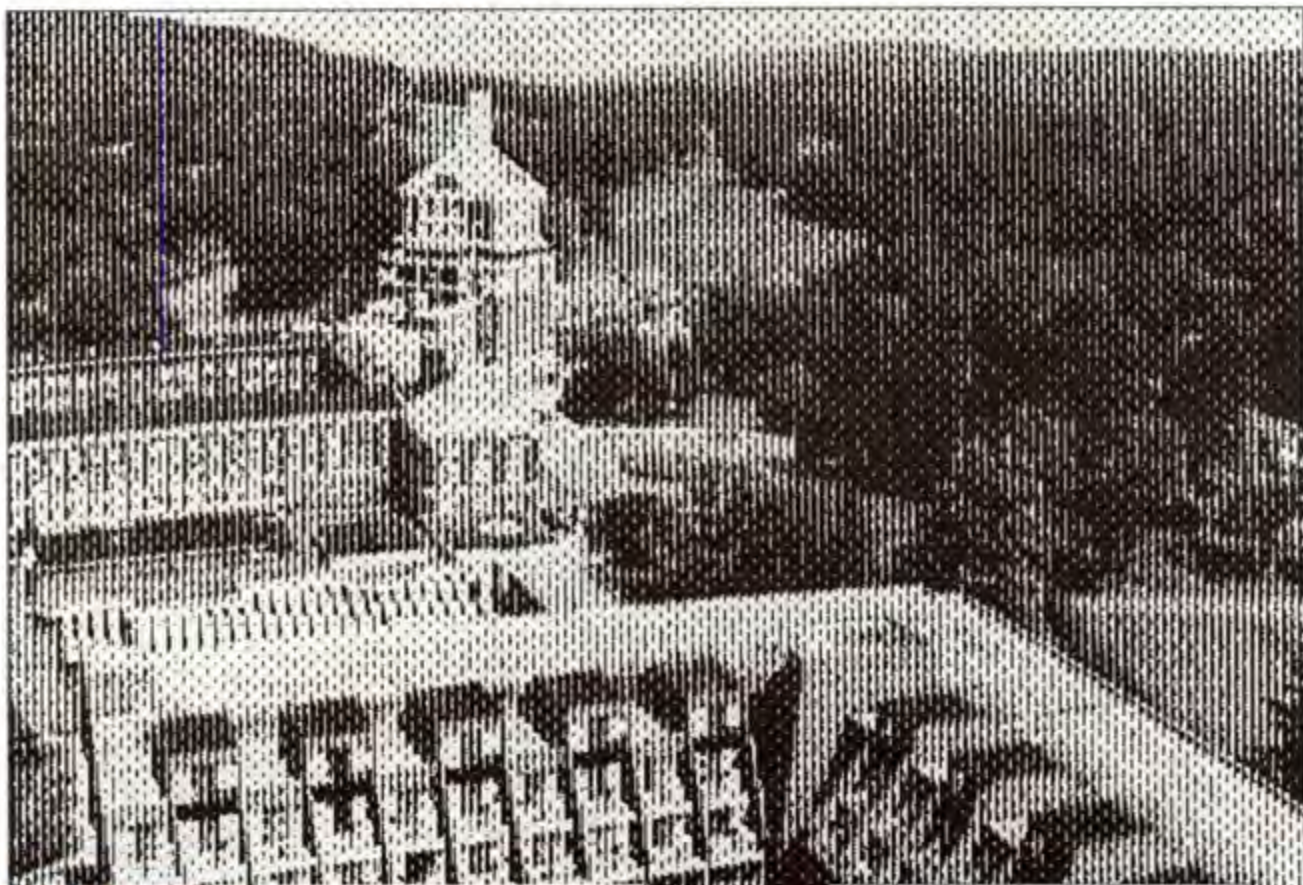
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Comparative Costs Report Designed for Easier Use

by Pieter J. van der Have

With the publication last month of the 1989-90 *Comparative Costs and Staffing Report for College and University Facilities*, APPA's Information Services Committee has again met its objective to provide data relating to the various functions classified as maintenance and operations, as well as some raw data relating to energy and utilities, within higher education facilities management. Without question, this report provides the most comprehensive comparison of physical plant costs and staffing data available.

The committee collected data during the summer of 1990. The feedback from nearly 400 respondents was reviewed by the regional representatives to the committee, with the intent of eliminating any unreliable data.

As with previous reports, readers should keep in mind that there are many variables in the operation of a physical plant organization. We therefore strongly suggest that comparison of data be made only in conjunction with a reasonable familiarity with the individual institutions being examined.

How to Use the Report

The format for this report was kept as simple as possible to facilitate its use. The major portion of the report presents all data submitted by all respondents, a slight deviation from the last edition.

One of our goals was to provide reliable information in a way that is more easily accessed. We therefore "cleaned" each data field item for each type of institution in each region. We accomplished this by calculating the average for that group for each data field, identifying a range of plus/

APPA News



minus one standard deviation, and then recalculating the average for that "narrower" range. This process purges the responses at the extreme ends of the response spectrum for that one field. It should therefore provide an acceptable arithmetic mean for that one data field, based on the institutions that provided data for that field. This process required more than 15,000 individual calculations using more than 100 subroutines.

The report is divided into nine separate sections. The contents page of each section lists the specific reports contained therein. Following is a brief description of each section.

• Summary Charts and Graphs/Statistical Reductions.

This includes representations of data, in table format, for each Carnegie classification of institution, and by region, following the purification process described above. The section begins with a two-page summary of the averages across the six main APPA regions, followed by two pages for each region; the first page pertains to general cost and staffing data, and the second page relates to energy.

Graphic representations of the cost-per-square-foot figures are provided following each regional summary. We have grouped these graphs for each Carnegie classification both nationally and by APPA region: Central, Eastern, Midwest, Pacific Coast, Rocky Mountain, and Southeast. We hope that in assembling the information in this way we have provided a more useful tool.

A caveat is appropriate here. Care must be exercised in using the summary data derived through this process. One cannot simply refer to the tables identifying the "average" charges for research institutions in the Rocky Mountain region, for example, and take all the data fields to build a "model" institution. The reason is especially apparent in the energy fields. Not all institutions buy coal, and oil, and natural gas, and transportation gas, and other resources. Usually it is a mix of only one or two of those resources. The averages shown are based on all responses provided for that field by all respondents in that grouping.

For example, if only one respondent in a region/classification reported using a substantial amount of purchased steam for heating, the mean for that field would be relatively high. Yet, its coal consumption would be low or nonexistent, although the average coal consumption for all others in the same group who responded might be high. Thus, applying both of those figures to a model would be unrealistic. This consideration is much less critical in the categories for salaries or costs per square foot, since the majority of the respondents had a figure for most of those data fields.

• Summary of Cost Data by FTE Enrollment.

These charts summarize some basic costs for each Carnegie classification, across all regions, public and non-public combined, by five ranges of student full-time equivalent enrollment: 0-1,999, 2,000-4,999, 5,000-11,999, 12,000-19,999, and 20,000 and higher.

• Index of Reporting Institutions.

This includes an alphabetical listing of the reporting institutions (with FTE and GSF), institutions by state or country, and public and non-public institutions by region. Some raw data is included in each.

- Profiles of Reporting Institutions.
- Costs Per Gross Square Foot.
- Wages and Union Affiliations.
- Electrical, Natural Gas, Coal, and Other Fuel Costs.
- Oil, Water, and Sewer Costs.

These sections include complete listings of all data provided by all respondents. These listings should help the reader analyze information appearing throughout the report. Because of the sheer volume of data provided, a number of individual listings

Pete van der Have is director of facilities maintenance and support services at the University of Utah, Salt Lake City, Utah. He is a member of APPA's Information Services Committee, which developed and produced the Comparative Costs and Staffing Report. His last article for Facilities Manager, which appeared in the Spring 1988 issue, was on the APPA/NACUBO/Coopers & Lybrand CRDM research study.

had to be prepared. We printed all the information in the same direction, so that the reader would not have to turn the book back and forth.

Tables 2 through 6 provide information grouped by region first, with subordinate groupings by Carnegie classification. No calculations are performed on any of the data in these tables. In each of these tables, Table x-A provides data relating to public institutions, and Table x-B provides data relating to non-public institutions.

• Appendix.

This simply provides the original survey instrument and the instruction booklet that were sent to all potential respondents.

In spite of the tremendous amount of data within the pages of this report, we feel the format of the presentation lends itself to ease of reading and interpretation. We hope that the reader finds the information useful. Although we strongly discourage using any of this information to show that "we're better than the next school," we expect that in certain cases the report may help to identify areas where an organization could become more effective and efficient in its operations.

How to Order

All respondents to the survey received a complimentary copy of the 1989-90 *Comparative Costs and Staffing Report*. Copies of the report cost \$35 each for APPA member institutions, \$90 for all others. Floppy diskettes of the raw data, which are not intended to be purchased separately from the printed report, are available in DataEase or ASCII format. The cost is \$20 each for APPA members, \$40 for all others. The total order should include \$8 for shipping and handling.

All orders, including check or purchase order, should be sent to APPA Publications, P.O. Box 753, Waldorf, MD 20604. Telephone orders will not be accepted. ■

Dexter Makes Donation

The Dexter Corporation Foundation has donated \$5,000 for support of APPA's Higher Education Facilities Trust. Dexter Water Management Systems Division provides chemicals, equipment, and services to assure optimum equipment performance. The company has been an APPA Subscribing Member since 1985.

Executive Development Institute Slated for April

APPA's Executive Development Institute, held April 28 through May 3, now in its fourth year of existence. This highly successful program teaches a select group of facilities administrators to master management skills. The institute is held each year at the University of Notre Dame.

The institute is designed for experienced senior facilities managers. The successful applicant should be a director or equivalent, have at least five years of experience in the area of physical plant administration, have a degree or equivalent education experience, and should be committed to utilize the knowledge gained from the program for enhancing the physical plant organization.

Instructors for the institute are faculty members of the university's College of Business Administration. These educators and participants work together to apply textbook theories of accounting, organizational behavior, marketing, leadership, and strategic planning to real-life facilities management issues.

The curriculum includes sessions in accounting and finance, creativity and innovation in organization, decision making, leadership and motivation, marketing of services, organizational culture, and strategic planning.

Anyone interested in this program must apply to attend. Only thirty-five people are accepted for one institute.

Applications must be completed and returned to APPA by **January 31, 1991**. All applications received by the deadline are reviewed by the Educational Programs Committee. The thirty-five individuals selected will be notified by the first week in March.

Each APPA region is sponsoring a matching funds scholarship to the institute. The scholarship is for \$1,000—\$500 from the region and \$500 from APPA—applicable toward the registration fee. Each participating region will select one recipient per institute.

For more information, contact APPA, 1446 Duke Street, Alexandria, Virginia 22314-3492; 703/684-1446; fax 703/549-2772.

Manville Trust May Cease Operations

Kurt Shaffir, executive director of the Manville Property Damage Settlement Trust, announced that the trust will probably suspend operations in October 1992. At a briefing cosponsored by APPA and the National Association of College and University Business Officers, Shaffir said that once the trust receives about \$300 million in payments from Manville Corporation insurers over a three- or four-year period, it will not receive additional funds until the personal injury trust has discharged all of its obligations.

Information Request

APPA's information services department is looking for information on four-day work weeks. Any one who has established such a program or who has looked into starting one, please contact Maxine Mauldin, Information Services Manager, APPA, 1446 Duke Street, Alexandria, Virginia 22314-3492; or call the information services hotline 703/684-4338; fax 703/549-2772.

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Of APPA's annual membership dues, \$30 pays for the subscription to *Facilities Manager* and *APPA Newsletter*. Additional annual subscriptions for both periodicals cost \$40 (\$50 for non-U.S. addresses). For information on rates and deadlines for display and classified advertising, telephone 703/684-1446.

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From the President-Elect: Looking to the Future

by Joe J. Estill
Texas A&M University
College Station, Texas



The office of APPA President-Elect has to be one of the greatest positions there is to hold in this organization. My wife Phyllis and I have been fortunate enough to make at least a portion of five of the regional meetings. We visited the Pacific Coast, Rocky Mountain, Central, Midwest, and part of the Southeastern region meetings. Even though each of these meetings were different, there was a common thread through each of them.

I was impressed by the quality of the presentations made and the indication of interest expressed by all the attendees. Some presentations spoke to the concerns of the region, others were on national issues. I was also impressed by the open communication and the willingness of individual members to share problems and solutions they have encountered in their school's activities. There was an air of pride and professionalism that made me feel not only proud to be a member of APPA, but humbled to be chosen as a part of its leadership.

We made many new friends at these meetings and look forward to return visits next year. I also want to express our appreciation and that of APPA for the courtesies and friendship extended to us at all of the meetings. I only hope we can make the Eastern Region meeting next year.

The office of President-Elect has a basic responsibility to develop an operating plan for the next year. This planning process includes the four vice presidents and their areas of

responsibility. This year we are trying to flesh out the long-range plan that has been developed over the past two years, and which was approved by the full Board of Directors at its meeting in Ottawa, Canada. In order to do this, President Bill Middleton has expanded the Planning Committee to include a broad background of leadership in APPA—private and state institutions, large and small institutions, and representatives from all the regions.

The document from which we are working is entitled "Toward the Twenty-First Century." This long-range plan for APPA was developed by the Planning Committee last year through a comprehensive member opinion survey and a three-day Higher Education Facilities Trust focus group planning meeting.

An analysis of the survey results was prepared by Sean Rush of Coopers & Lybrand. The full board then developed an outline, which was completed in a three-day planning meeting. Those participating in this meeting covered a broad range of individuals that were associated with higher education in facilities management, university administration, board of trustee oversight for education, and other individuals that deal with our institutions but are outside the actual administration.

This plan is one of the most comprehensive and far reaching that I have seen in my years with APPA. I would urge each of you to review and study the issues and goals that were established. Do this with an open mind and the understanding that we all operate a service organization and are judged by how those around us perceive our work.

Perceptions are difficult to change. They are generally not altered overnight or without excellent communication. APPA strives to enhance the professional standing of its members through education programs, publications, interaction with other associations in higher education, and a commitment to recognize achievements of its members.

I received excellent feedback from the regions in response to the long-range plan. I enjoyed the free and

open discussion that many of us were able to have, and I especially appreciated the time taken by the regional boards to respond directly to the long-range plan. This will certainly help me establish priorities for next year.

I look forward with anticipation to serving you during the remainder of this year and throughout next year. Please remember that APPA is made up of a diverse group with common goals. You, the membership, are the most important part in the determination of the direction that this organization will move. I would encourage you once again to study the long-range plan, develop in your mind what is most important, and then contact me with your comments or suggestions.

Thank you for the opportunity you have provided me with to be a part of the leadership of this organization. APPA is truly a group of professional facilities managers.

GWU Begins FM Certificate Program

George Washington University will begin a certificate program in facility management in February 1991. The program will be held in the Washington, D.C. metro area. The program is designed for professionals by professionals. It will consist of ten courses, seven of which are mandatory. The inaugural classes will be prerequisite courses: Principles of Facility Management, Facilities Planning and Design, and Facilities Operations and Maintenance. The program is applicable for those in private or public sector who wish to upgrade their skills and for architects, engineers or administrative managers who want to become facility managers. For more information, contact Frances Lumbard, Center for Career Education and Workshops, 202/994-7036.

Harris Receives AIPE Fellow Award

Vander E. Harris, director of physical plant at Morgan State University (MD), received the 1990 American Institute of Plant Engineers Fellow Award for contributions to the engineering profession and the association. Harris has worked at Morgan State since October 1989 and has worked in plant engineering positions for several colleges and universities since 1960.

Eastern Region Meeting Highlights

by Carol Trexler
Rutgers University
New Brunswick, New Jersey

From the opening dinner at Rosecliff Mansion to the final speaker at the closing breakfast, the 40th Annual ERAPPA Conference held in Newport, Rhode Island, was flawless. More than 400 members and guests representing 100 ERAPPA institutions attended the four-day conference hosted by the Southern New England Chapter.

Highlights included the installation of the new board members and the institution of membership dues. At a banquet reception, Immediate Past ERAPPA President, Donald Hedrick of Allegany Community College (MD), turned the gavel over to the new President, Norman H. Bedell of Pennsylvania State University. Wil-

liam Middleton, APPA president, was the keynote speaker.

At the business meeting, a proposal was approved to charge an annual membership fee of \$20, which will be collected by the APPA national office. The new dues structure will generate additional funds and more evenly distribute the financial burden of supporting regional activities by shifting the burden to the membership at large.

In addition to presenting new administrators and procedures in ERAPPA operations, the annual meeting provided members with an opportunity to examine specific issues common to all institutions, and exchange ideas and information to assist each other in dealing with the ever changing roles of their individual departments. Some of the most popular education panels included recycling,

facilities management issues for the 1990s, and what your boss can do to help optimize your job.

The scholarship winners for the January Institute are as follows: Diane Jankowski, Pennsylvania State University; Susan Bennett, University of New Hampshire; and Bill Suter, George Washington University (DC).



Desmond D. Martin

Editor's Note

This issue of *Facilities Manager* marks the beginning of a new year, Volume 7, and several changes that are designed to make the magazine more valuable to our readers. First, we are proud to announce that the magazine is now being printed on recycled paper. We have been searching for a quality paper that is comparable in price to our previous stock, and we are happy to have found it.

Next, the Winter issue, which is always published in January, is now the first issue of the year; previously, it was published as number 4. Thus, there were only three issues—Spring, Summer, and Fall—published in 1990 of Volume 6. This minor change in no way affects the number of issues you receive as part of your membership or subscription.

A more noticeable change in the magazine is that we have dropped the APPA Update section and incorporated those columns and news items into the regular magazine format. You will find that a new column called APPA News begins each issue of *Facilities Manager*. This will include announcements of new APPA publications and educational programs, updates from the APPA Board of Directors, and news on activities of importance to campus facilities managers.

The Environment is a column by Stephanie Gretchen that appears monthly in the magazine and *APPA Newsletter*. You will continue to find the latest information on recent or upcoming federal legislation and regulations and other related topics. Job Corner and Coming Events can now be found in the back of the magazine. We hope that these changes make *Facilities Manager* a better and more useful publication.

Finally, I am pleased to introduce a new column to the magazine. Focus on Management columnist Sig Ginsburg will offer his views on a variety of topics committed to the best use of your human and dollar resources. Ginsburg works at Barnard College and Fordham University, and he still finds time to write for *Business Officer*, *American School and University*, and, now, *Facilities Manager*. We're glad to have him with us.

I hope you enjoy Focus on Management, as well as all the other changes we've made to your magazine. Please let us know if you have any suggestions or comments; we would appreciate hearing from you.

—Steve Glazner
Editor

Desmond Martin Dies

Desmond D. Martin, well known to APPA members as a faculty member at APPA's Institute for Facilities Management, died of a heart attack November 16. Martin taught the Principles of Supervision and Motivation class in the current Institute program, as well as several other management courses at the Institute since 1973. Des served as the director of the University of Cincinnati Executive Program and a professor of management at the university.

He has published a number of books and articles on management, including *What Every Engineer Should Know About Human Resources Management* and his most recent book, *Management of Professionals* (both coauthored with Richard L. Shell). He also authored a chapter in APPA's *Facilities Management: A Manual for Plant Administration*, second edition.

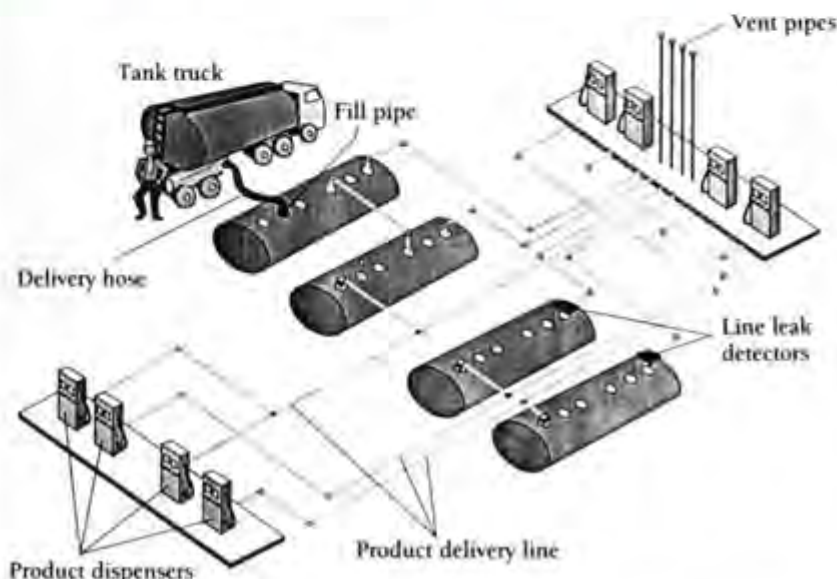
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Has your institution or department received special recognition, or have you undertaken new or innovative projects? If so, please send them to us for possible inclusion in the newsletter or magazine. Send all items to Stephanie Gretchen, APPA, 1446 Duke Street, Alexandria, VA 22314-3492; 703/684-1446, fax 703/549-2772.

The Environment

Stephanie Gretchen

EPA has found that small businesses and local governments need additional time to comply with Subtitle I of the Resource Conservation and Recovery Act (RCRA). According to EPA, in an effort to balance the need of underground storage tank operators and users and to ensure the financial capability for responding to leaks, the



agency has extended the deadlines for compliance with this standard. EPA has revised its original deadlines of April 26, 1990 and October 26, 1990. Petroleum marketers owning up to 100 tanks, local governments, and any non-marketers with a net worth of less than \$20 million now have new compliance dates. Marketers with 13 to 99 tanks need to comply by April 26, 1991. Marketers with 1 to 12 tanks (or less than 100 at one facility) and non-marketers reporting less than \$20 million need to comply by October 26, 1991. For more information, contact your state government or call the RCRA/Superfund Hotline, 800/424-9346; in Washington, D.C. the number is 202/382-3000.

Government Institutes, Inc. has a number of environmental resource books available. They include the *Directory of Environmental Information Sources*, *Book of Lists for Regulated Hazardous Substances*, EPA Headquarters

Telephone Directory, EPA Organizational and Functions Manual, Environmental Engineering Dictionary, Environmental Regulatory Glossary, and the 1990-1991 Environmental Telephone Directory. For more information, contact Government Institutes, Inc., 966 Hungerford Drive, #24, Rockville, MD 20850; 301/251-9250.

The University of Kansas is offering environmental training in a number of areas from January through June 1991. Hazardous waste, indoor air quality, and industrial hygiene are some of the topics covered. For more information, contact the University of Kansas, Division of Continuing Education, 6600 College Boulevard, Suite 315, Overland Park, KS 66211; 913/491-0221.

EPA released new guidelines September 7, 1990, encouraging building owners to curb "unnecessary" asbestos removal by establishing operations and maintenance programs for asbestos-containing materials. William K. Reilly, EPA administrator, said, "Millions of dollars have been wasted on unnecessary asbestos removal opera-

tions." According to EPA, this guide's focus is to help people realize in-place asbestos management can still protect public health, reduce costs, and guard against liability, especially since improper removals could be quite dangerous. For more information or a copy of the guide, contact EPA's Toxic Substance Control Act (TSCA) Hotline, 202/554-0404, or your regional EPA office.

EPA has made changes to the general pretreatment regulations (55 FR 30082) that affect both publicly owned treatment works and industrial users of POTWs July 24, 1990. Users must now submit a one-time notification of hazardous wastes discharged into sewers. According to EPA, any discharge to the sewer of more than 15 kilograms per calendar month of RCRA hazardous waste, or a discharge of any quantity of an acutely hazardous waste identified in 40 CFR 261.30 (d) and 261.33 (e), should be reported once.

A discharge of 15 kilograms or less of a RCRA hazardous waste during a calendar month need not be reported, except for the acutely hazardous wastes identified in 40 CFR 261.30 (d) and 261.33 (e), according to EPA. For more information, contact your local sewerage authority. Questions on whether your waste is hazardous should be directed to the EPA's RCRA Hotline, 800/424-9346.

Who's Who in America is requesting biographical information for a new reference book, *Who's Who in Environmental and Energy Management*. Anyone interested in submitting his or her name should contact Marquis Who's Who, 3002 Glenview Road, Wilmette, IL 60091; 800/621-9669, in Illinois 708/441-2387.

Programs in Environmental Hazard Management (PEHM), a division of University of California/Berkeley Extension, is offering continuing education and training under EPA's AHERA regulations. Course topics include asbestos identification, regulation, and management, and lead-based paint. These courses will take place in several California towns throughout the spring. For more information, contact Programs in Environmental Hazard Management, UC Berkeley Extension, 2223 Fulton Street, Berkeley, CA 94720; 415/643-7143.

Stephanie Gretchen is the assistant editor of Facilities Manager and APPA's communications manager.

EMPLOYEE ASSISTANCE PROGRAMS

This new column seeks to provide you with information, ideas, insights, encouragement, and stimulation to learn more so that you will improve your management knowledge and skills and thus become a more effective facilities management professional. I'll cover current topics, some that are just beginning to emerge as important ones, and some continuing problems and issues in management.

In roughly 1,000 words all I can hope to do in a column is provide you with some kernels of management philosophy, techniques, and tools for you to build on and modify so that they can be useful to you. My goal is that you will find the time spent reading, and more important, thinking, expanding, and acting on what I've written, as well worth your effort. That said, let's now talk about employee assistance programs.

The physical plant administrator often has under his or her supervision one of the largest groups of non-unionized and/or unionized employees in the institution. A major current issue, and one that will increase in importance in the future, is the need for various employee assistance programs. Of course, compensation, wages/salary, and basic employee benefits such as health/life/disability insurance and pensions (these are usually called fringe benefits, but since they generally constitute 30 to 40 percent of payroll costs, they're certainly not a "fringe") will continue to be a major concern, along with job responsibilities and working conditions, for physical plant employees.

But in recent years, individual employees, unions, and employers have found employee assistance programs (known as EAPs) to be of growing interest and importance. Many organizations, as well as a number of unions, now offer them to their employees.

Employee assistance programs be-

Focus on Management

Sigmund G. Ginsburg

gan slowly in the 1940s as a result of efforts in both the private and public sectors to deal with on-the-job problems and absenteeism caused by alcoholism. In the 1960s, 1970s, and 1980s, human resources professionals and top management also recognized the economic as well as humanitarian benefits to be achieved in offering approaches to drug abuse problems and psychological/emotional stresses and illnesses. Financial and legal counseling are sometimes offered through an EAP.

One recent study estimated that approximately 60 to 70 percent of all employers with 3,000 or more employees offer some type of EAP, while the percentage for smaller firms is much less. Assistance is provided to workers in more than 12,000 companies, and it is estimated that there are 10,000 to 12,000 counselors and others providing services to employees. This includes a good number of employees who, without the availability of these programs, would not otherwise have sought help.

Although originally there was concern that organizations should stay away from dealing with personal matters, all indicators—the impact on the company, the attainment of its objectives, productivity, the safety of the affected employee as well as other employees, absenteeism, accident and health claims, and satisfactory job performance—point to the need to consider the value of EAPs.

Alcoholism is estimated to affect about 6 to 7 percent of all workers in the United States and costs about \$10 billion a year in lost work time, decreased productivity, sick pay, and absenteeism. Insurance, wage losses, medical expenses, and property damages add another \$3 billion to \$3.5 billion. The losses from drug abuse are in the same range and also involve losses due to theft.

In addition to substance abuse issues, attention is also being paid em-

ployees' personal crises that may significantly affect his or her work. The crisis may involve marital, family, personal relationships, financial, medical, or legal matters. Either separate from or as part of the personal crisis area, there is also the small percentage of employees who have severe emotional problems requiring professional help. The "growth" area for EAPs appears to be in the personal crisis/emotional areas as members of an organization at all levels (including facilities managers, directors, vice presidents, and presidents) face the stresses of the job as well as those off the job.

Basically an EAP seeks to: 1) identify employees who might be eligible or benefit from the program, 2) determine appropriate assistance alternatives, and 3) relate employee assistance to work performance.

When EAPs work well, they are of great benefit to the organization and the individuals who participate. When they are not well thought out and well run they can be an utter disaster for the organizations and individuals they seek to help, and an expensive waste of money. To work well, the organization's commitment to the program must be strong, clear, and well communicated (a high percentage of referrals come from participating employees themselves). Although most administrators are not equipped to diagnose emotional or physical problems professionally, they can note declining work performance, lateness, absenteeism, changes in personality, appearance, and mood, and thus can suggest that an employee visit an EAP for assistance. Organizations can offer a variety of approaches, from qualified individual counselors on staff to community agencies and specialists. Some EAPs are offered through local hospitals or health maintenance organizations.

Confidentiality is a major concern for individuals and their organizations and is necessary for program success. Some employers require the individual to complete the steps required by an EAP after going through the program; if an individual's performance doesn't improve the job could be terminated. Thus, an employee who might come to the realization that help is needed might be concerned about the cost—both monetarily and, even more important, in terms of confidentiality.

Anonymity may offer more poten-

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tial for a successful EAP than confidentiality—for example, a 24-hour telephone hotline staffed by professionals who can evaluate and refer callers to appropriate agencies, or a circulated list of agencies and individuals, with addresses and telephone numbers that employees might wish to contact for various needs. Of course, any organization listing these contacts ought to assure itself that

those listed are highly qualified (and that the costs are reasonable).

As facilities managers face the burden of increasing demands in the face of a recession and declining budgets in terms of real dollars—as well as the need to attract and retain well qualified employees—attention to those problems dealt with by EAPs is well worth the effort. The formerly good employees, those with high potential

who gradually or quickly have become an unsatisfactory employee, can often be returned to their previous satisfactory performance if provided with a quality program. In providing the assistance, either directly or by referral, the organization, and at times the supervisor who counseled the employee to seek assistance, can often earn the employee's gratitude and an increased measure of dedication and support. ■

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THE CAMPUS ENVIRONMENTAL CRISIS: Part 4-The Hazardous Waste Challenge

by April Moore

The University of Virginia recently spent \$30,000 to dispose of a five-gallon container of hazardous waste. "At \$6,000 per gallon, that's pretty expensive," said Ralph O. Allen, director of environmental health and safety at the university. While the high price tag is not a typical fee, it does represent the expensive process of determining what was in the container so that it could be dealt with safely. This example illustrates the challenge of managing hazardous wastes at our colleges and universities.

Hazardous wastes generated by campus research labs, art classes, maintenance departments, and other sources are a growing problem. For example, between 1984 and 1986 the hazardous waste accumulated at the University of Wisconsin rose from 36,000 kilograms (kg) annually to 105,000 kg, said Peter Reinhardt, director of chemical safety at the university.

Many other schools report similar increases over the last few years. In many instances the increased volume is the result of cleaning out dangerous chemicals that have been sitting on the shelves for decades, rather than a rise in the production of hazardous wastes. In addition, the costs of disposing of those wastes is skyrocketing. According to Anthony Wilbraham, acting director of hazardous waste management at Southern Illinois University, the cost of getting rid of hazardous wastes has increased from \$20 per 55-gallon drum in 1977 to hundreds of dollars today.

Even though hazardous wastes generated by the nation's campuses account for less than 1 percent of the 240 million metric tons generated nationwide, it is important to human and environmental health that these dangerous materials be dealt with safely.

Flammable liquids are transported by tanker to a disposal facility where they are utilized as fuels.



April Moore is a freelance writer and editor based in Silver Spring, Maryland. She wrote about the 1990 Award for Excellence winners in the Fall 1990 Facilities Manager.

The Law

Most colleges and universities are now included in the Resource Conservation and Recovery Act (RCRA) thanks to the Hazardous and Solid Waste Amendments (HSWA) that went into effect in 1986. The amendments added small quantity generators (100-1,000 kg per month) of hazardous waste to the large generators already covered by RCRA.

The amendments established rules for small quantity generators to follow in accumulating, storing, and disposing of hazardous wastes. A waste is hazardous, according to law, if it is reactive, ignitable, corrosive, toxic, or if it is one of the wastes listed in the Code of Federal Regulations. A few common campus-generated hazardous wastes include solvents, acids, pesticides, and metals. There are hundreds more.

The law also phases out land-based disposal for hazardous wastes. Because of the danger of toxins in soil

and groundwater, the law stipulates moving toward recycling and incineration as the main ways to deal with hazardous wastes.

In addition to the particular aspects of HSWA, right-to-know laws should also be kept in mind by anyone administering a campus hazardous waste management program. There are two types of right-to-know laws: those that protect employees and those that protect the community. Right-to-know rules can be confusing; colleges and universities located in states that do not have Occupational Safety and Health Administration (OSHA)-approved plans are subject to federal laws. Those educational institutions in states with an OSHA-approved plan are regulated by the state, not by the federal government.

RCRA establishes "cradle-to-grave" responsibility for small quantity generators. In other words, the campus generating the waste is responsible for its safe handling—from storage and packaging to transportation and eventual disposal. Even if an outside firm is hired to transport and dispose of the waste, the campus that generated the waste is legally responsible if those processes are not conducted according to Environmental Protection Agency regulations.

Of course, most campus administrators want to handle their hazardous wastes safely, and they want to comply with the law. "But it can be very difficult," according to Peter Ashbrook, head of hazardous waste management for the University of Illinois. He points to the large number of different hazardous wastes, many of them in very small quantities, generated by a college or university. His institution, for example, disposed of more than 2,500 different hazardous wastes during the 1989-90 academic year, mostly in very small amounts. "The nature of the wastes, combined with rising disposal costs, pose serious problems for colleges and universities," said Ashbrook.

Other aspects of hazardous waste management that can pose problems are the storage and transporting of wastes. An enormous organizational effort is required to track the waste from its arrival on the campus in its original form through its use, its storage as waste, packaging and transporting, and safe disposal.

While hazardous waste management is often difficult, some institutions have developed ways to deal



with the waste legally, safely, and relatively economically.

Waste Minimization

The less hazardous waste there is to deal with, the better. To counter the difficulty of dealing with an institution's hazardous wastes as well as the rising costs of getting rid of it, many institutions have found ways to reduce the volume of waste they generate.

Recycling is one of the most effective ways to lower the quantity of hazardous waste. Fortunately, one school's waste may be another school or company's raw material. By participating in a regional waste exchange, campuses can get rid of much of their unwanted chemical stocks. The non-profit, usually state-supported organizations established in each region of the country act as information clearinghouses and marketing facilitators for waste materials. For example, a campus with materials to dispose of can advertise through the exchange. "During our first year using the service," said Steven Galitzer, university industrial hygienist at Kansas State University, "we saved more than \$27,000 in transportation and disposal costs alone."

Recycling can also be done within the campus. The University of Wisconsin, for example, operates an internal waste exchange. The university's safety department maintains a central stockroom of unwanted chemicals. Every quarter the department circulates a newsletter to the entire campus listing available chemicals. The program saves the university close to \$40,000 annually in purchasing costs, according to Peter Reinhardt.

To further reduce the volume of hazardous wastes, some campuses are ordering fewer new materials that will be dealt with later as hazardous waste. The University of Virginia has instituted a computerized system that allows for centralized ordering of chemicals. "The system allows us to check



PHOTO: UNIVERSITY OF VIRGINIA



current stocks throughout the university before ordering new materials," according to Ralph Allen. "This way we can save money both in purchasing and in disposal. We use what we get, and we can keep better track of what we have."

Science departments, among the major hazardous waste generators on

most campuses, can minimize waste production by using smaller quantities of material in their experiments. For example, Dr. Dana Mayo, a chemistry professor at Bowdoin College in Maine, has shifted to "microscale" experiments in the lab. This means he uses only one to ten milligrams of each substance in his experiments rather than the fifty to 100 traditionally used. This practice cuts costs both in ordering new chemicals as well as in disposal. Another way to cut the production of classroom hazardous waste is to use computer simulation of chemical processes wherever appropriate.

Another way to reduce hazardous waste is to treat some hazardous substances in ways that render them reusable or no longer hazardous. In fact, it is often cheaper to distill and reuse

than to dispose and buy anew. "We save \$60,000 annually just through the frequent distillation of two chemicals," said Ed Bogard, physical plant director of the University of Nebraska Medical Center.

Some schools use distilled solvents for class experiments, as thinners and degreasers in maintenance operations, and even as fuel. Some campus photography labs recover silver and sell it back to the manufacturer. Mercury and certain other metals can also be recovered. Hazardous substances such as corrosives can be made nonhazardous by neutralizing them. They can then be safely disposed of by pouring them down the drain. "We save about \$12,000 a year by treating hazardous wastes," according to John DeLaHunt, environmental health and safety coordinator for The Colorado College. "And most treatments are simple and involve the use of inexpensive chemicals and glassware," he said.

From the Cradle . . .

Campuses vary in their administrative authority over hazardous waste. At some schools hazardous waste management is the responsibility of the physical plant department. At other schools, a separate environmental health and safety department oversees hazardous waste management for all academic departments and for the physical plant as well. "Whoever is in charge of the program," said DeLaHunt, "should have a chemistry background." An understanding of the various chemicals he or she is working with, including knowledge of what to do in case of a spill or other accident, is essential to safe hazardous waste management, DeLaHunt believes.

Some schools, like the University of Maryland, deal with the complexities of hazardous waste management by hiring outside experts. "We work with a contractor who does all the identification and packaging of wastes for disposal," said Michael Broumberg, hazardous waste operations manager in the University of Maryland's Department of Environmental Safety. "The contractor then subcontracts for the removal of the waste from the campus and its incineration or disposal." The price tag to the university? A whopping \$950,000 for the 1990-91 academic year, Broumberg estimated.

The Colorado College, a small school in Colorado Springs, takes a different approach. DeLaHunt main-



PHOTO BY UNIVERSITY OF VIRGINIA

University of Virginia's Office of Environmental Health and Sciences must sort through and identify each container of waste and make determinations on how it can be "lab packed," based upon EPA, DOT, and disposal company criteria.



PHOTO BY COLORADO COLLEGE

Environmental Health and Safety Coordinator John DeLaHunt, The Colorado College, working in the laboratory, treating chemical waste.

tains that wastes can be handled successfully in-house. He recommends that small schools hire an environmental health and safety coordinator to manage all handling of hazardous waste. "Beware of outside contractors," he warned. "They have a vested interest in making you think you cannot handle the situation yourself. They will tell you the regulations are changing so rapidly and that compliance is so difficult that you will end up paying big fines if you don't hire an outsider to do the work for you." According to DeLaHunt, hiring an energetic professional with a chemistry background to handle all campus environmental health and safety concerns is the most cost-effective approach for small schools.

DeLaHunt estimated that The Colorado College spends only about \$5,000 per year to handle its hazardous wastes. Even though his institution is a small one, DeLaHunt believes the figure could easily reach \$30,000 if the school relied on an outside contractor for most of the work.

Many schools are not equipped to handle all aspects of hazardous waste management themselves, yet they cannot afford to hire an outside contractor to run the whole program. "It can be very helpful, especially for small schools, to network," said Brent

Douglass, director of operations and physical plant at Randolph-Macon College in Virginia. "Small schools have similar problems when it comes to hazardous waste management, and they can help each other by sharing ideas. They can also cooperate," he said. A group of small schools in the same area, for example, could save money by hiring the same waste disposal company and then establishing the same pick-up schedule.

"Don't forget that free help is available," said Jolanda Janczewski, president of Consolidated Safety Services, Inc. in Virginia. "Regional EPA offices can supply much of the information campus administrators need, and all at no charge."

Regardless of who handles hazardous waste on the campus, storage is an important concern. Those materials being stored for use, not as waste, should be carefully monitored. Ideally, they should be stored in a central location for use by all departments and for convenient safety monitoring. Materials that remain unused for years should be eliminated since some chemicals' deterioration over time can be dangerous. Chemicals that can react with each other should be stored far apart.

Once hazardous materials are designated as waste, they must be stored



according to RCRA specifications. Some campuses, to save money, may want to accumulate wastes longer than RCRA allows. New Mexico State University, for example, applied for and received a permit from EPA to store wastes longer than the allotted time. This way the university saves shipping fees that average \$3,000-\$5,000 per shipment. This fee is charged every time a pick-up is made, in addition to the charge per item, and is made regardless of the amount of waste carried. Consequently, storing the waste longer means fewer pick-ups and less money spent in transport fees.

... To the Grave

Every school must make arrangements for the safe removal and disposal of those hazardous wastes that cannot be dealt with in some other way. Most hazardous wastes must be carefully packaged into 55-gallon drums that contain filler that is designed to absorb liquid should any of the "lab packs" inside the drum break or leak. These drums are then carried by EPA-licensed transporters to privately owned disposal sites, such as incinerators authorized to burn particular hazardous materials. Offsite transportation—i.e., from the campus to disposal site—is regulated by the U.S. Department of Transportation as well as by EPA.

Most schools hire a professional hazardous waste management company to take the wastes away and dispose of them safely. "Use caution in choosing a waste disposal company," said Jim Wickoff, physical plant director at Northern Montana College. "Since the institution is legally responsible for the waste, even after it leaves the campus in someone else's truck, it is imperative that the company be reliable," he said. Wickoff recommends that before hiring a disposal firm, the institution carefully check references. The best references will be those from



other colleges and universities.

Some other questions to consider in hiring a firm to remove and safely dispose of hazardous wastes are offered by author John Lucks, in an October 1989 *Cleaning Management* magazine article.

- Make sure the firm has the correct permits necessary for handling all of your specific wastes. Most states have permit requirements in addition to EPA's permitting process. Make sure too that the firm has an EPA identification number. Obtain these permits and ID numbers for your records.
- Find out if the company has a final permit or is still in the application process.
- Have any state or federal regulatory agencies taken action against the company regarding permits or approvals?
- Has any action been taken against the firm by citizens or other non-government groups?
- Does the company have adequate insurance and finances to cover damages and clean-up of any accidents, including possible legal proceedings?
- What is the quality of the company's personnel? Do they have sufficient training and experience to handle materials safely and to respond effectively in an emergency?

Some disposal firms are reluctant to deal with campus wastes because the small amounts and their varied nature makes paperwork and handling cumbersome. Some schools find they must hire more than one disposal firm because some firms refuse to take certain types of hazardous wastes.

Because of the complexity of getting the waste removed and disposed of properly, the University of Minnesota introduced the Minnesota Chemical Waste Assistance Project. Offered by the university's Twin Cities campus, the service includes pick-up of hazardous wastes and their safe disposal. "We make pick-ups on a regular or as-needed basis," said Gene



Loading refuse into incinerator hopper.

Christenson, chemical waste supervisor at the university's department of environmental health and safety. For example, regular hazardous waste pick-ups are made to the Twin Cities, Duluth, and other university branches and research stations around the state. "Other schools call us when they need a pick-up, and we sponsor an annual Chemical Safety Day," he said. "This is the day every year when we pick up hazardous wastes from small colleges, junior colleges, and high schools all over Minnesota." The waste pick-up is done by a trained, EPA-registered driver with an EPA-authorized truck. At each pick-up site the driver makes sure all hazardous wastes being picked up are packaged properly.

Christenson's department provides each participating institution with a guidebook that describes the proper segregation of hazardous wastes and their appropriate packaging. Also included in the guidebook is safety information for use in handling the wastes as well as emergency response guidelines. The department of environmental health and safety also helps participating schools by taking care of their required record keeping.

The institutions are charged on a fee for service basis. "Our budget for the entire program," according to Christenson, "is \$68,000 annually. This is far cheaper per school than it would be if each school handled its own hazardous waste disposal." The University of Minnesota minimizes waste and saves a little money by re-

using the wastes collected through the program wherever possible. "About 25 to 30 percent of the wastes collected can be reused," Christenson said.

Another disposal option is to build an incinerator. This option is available only to a few schools because of the high costs involved and the time required to go through the EPA permitting process. A few large quantity generating schools, however, have found it cost-effective to build an incinerator where they can dispose of the relatively high volume of wastes generated by their institution.

Establishing a Campus Hazardous Waste Management Program

"The key to an effective hazardous waste management program is education," according to William Plaskett, physical plant director at Marietta College in Ohio. All those on the campus who handle hazardous materials—faculty, students, and physical plant staff—need a thorough education in hazardous materials management. In addition to using the materials safely, users must know how to handle them so that the minimum amount of hazardous waste is created. Knowledge of how to identify and store the hazardous waste that is inevitably created is also essential.

Faculty members must keep careful track of their stock of chemicals, labeling each according to contents and date. They are also responsible for educating their students about the importance of carefully identifying and monitoring hazardous wastes. Students who work with these chemicals also need to know that labeling of all substances used and created in the lab is absolutely necessary and that wastes should not be mixed. Disposal costs can increase by factors of ten to 100 for unknown or complex mixtures, warned Allen of the University of Virginia.

Physical plant personnel need to know, for their own safety and that of others, how to handle hazardous wastes. They should receive right-to-know training and should have a thorough understanding of safe handling methods, including emergency response.

Physical plant staff can also be instructed in waste minimization techniques such as switching from oil-based to water-based paints and using recovered solvents rather than new ones wherever possible.

When those who are dealing with hazardous wastes are educated, an effective campuswide hazardous waste management plan can be put into place. "When we implemented a comprehensive hazardous waste management plan at The Colorado College," said DeLaHunt, "we involved all who would be affected. We met with heads of the chemistry, geology, and art departments to explain what was needed to comply with EPA regulations and to get their ideas for the best ways to create a successful hazardous waste management program." DeLaHunt then took the ideas from those with whom he had consulted, and drafted a plan for tracking and handling the materials. The plan was again reviewed by those who would be affected. It was then modified and approved by the college president. "The cooperation from everyone involved has been tremendous," stated DeLaHunt. "By showing people that we were interested in their input from the beginning we fostered an atmosphere of support and trust. Departments on our campus are happy to do their part to comply with the law, and they fully understand what is involved, thanks to our efforts to work together to create a viable program."

Resources

The following resources may be

helpful to those involved in a campus hazardous waste management program.

- *Regulatory Compliance for Facilities Managers*, a 74-page book published by APPA, is a quick reference guide to the current legislation affecting higher education. Topics discussed include hazardous and solid waste, clean air, water quality, underground storage tanks, toxic substances, right-to-know laws, and medical waste. The cost is \$22 for APPA member institutions, \$30 for nonmembers. See next item for ordering information.

- APPA has also published a companion book, *Case Studies in Environmental Health and Safety*, which explores how sixteen colleges and universities are facing the challenges of current health and safety regulations. Included are chapters on hiring a safety officer at a small college, reducing the volume of hazardous waste, treating "sick" buildings, designing a campus recycling program, monitoring asbestos abatement, and other topics. This 106-page book costs \$25 for APPA members, \$35 for nonmembers; there is a charge of \$8 for shipping and handling of the total APPA order. Both *Regulatory Compliance* and *Case Studies* are available from APPA Publications, P.O. Box 753, Waldorf, MD 20604.



- "The Environmental Manager's Compliance Advisor" is a biweekly newsletter that provides details on RCRA and its amendments as well as on other federal environmental laws. It includes information about how to comply, and each issue contains a summary of pertinent information from the *Federal Register*. The newsletter is available for \$228 per year from: Business and Legal Reports, 64 Wall Street, Madison, CT 06443; or call 800/727-5257.

- "The Hazardous Waste Computerized System" is a software program designed to help set up a hazardous waste management program at a college, university, or research institution. Written by the University of Wisconsin's Safety Department director David Drummond, the program is available from the National Safety Council. Members of the Campus Safety Association may obtain the program for \$360. For nonmembers the fee is \$450. For more information, contact Steve Jackson at the National Safety Council, 312/527-4800 ext. 6222.

- Campus hazardous waste management officials from many institutions meet together annually to exchange information and share ideas. To find out how you can participate in next year's meeting of this informal group, contact Peter Reinhardt, director of chemical safety at the University of Wisconsin, 608/262-8769.

- *Waste Disposal in Academic Institutions* is a 200-page book containing information on federal regulations, identification of unknown wastes, methods for treatment and handling, and more. The book is available for \$55 plus 8 percent shipping and handling from: Lewis Publishers, 121 South Main Street, Chelsea, MI 48118. For more information, call 800/272-7737.



PHOTO BY UNIVERSITY OF VIRGINIA

Green drums of bulk waste from physical plant operations are just a part of the average of 1,000 containers of waste collected each month at the University of Virginia.

ATTAINING FACILITIES EQUILIBRIUM: The Institute for Facilities Finance



by Stephanie Gretchen

The adequacy of funding for facilities is one of the seven major issues facing the facilities management profession as identified in APPA's Long-Range Plan. APPA's Educational Programs Committee has met this important issue head-on with the new Institute for Facilities Finance in Higher Education, which was offered for the first time in Washington, D.C. on November 4-6, 1990. "The institute provided a comprehensive program of topics that explored every aspect of the financial needs facing the facilities profession," said APPA President William D. Middleton, assistant vice president for physical plant at the University of Virginia. "[It also] presented a variety of models and strategies for successfully resolving these financial needs."

The institute received excellent reviews from the wide variety of participants, which included facilities managers, business officers, vice presidents, treasurers, and trustees.

History

APPA developed this institute to help its members better handle the fi-

nancial responsibilities tied to working with the largest financial asset and capital investment an institution has—its facilities. Facilities management is and will continue to be a key issue in higher education because of its financial implications. To be competitive in the 1990s, APPA members must be prepared to address the financial issues and surrounding needs of higher education facilities.

"I went [to the institute] because I'm dealing with a capital renewal backlog here and looking at bad financial times ahead," said Vernie Coston, assistant vice president of facilities maintenance and operations, Rutgers University. "I need all the information and ammunition I can get to deal with my trustees. I picked up some ideas, especially from the case studies, on how other people deal with their capital needs."

James Yamane, principal systems analyst in the facilities services department at Colorado State University, said, "[The] basic reason for coming [to the institute] was to be able to identify new sources of internal funding. We recognize that taxpayers are at the end of their ropes, so we have to make some dynamic choices internal to the institution. I came to learn and understand new ways of approaching funding."

One of the institute faculty members, Dave Cyganowski of the investment firm First Boston, said, "I think one of the hidden truths of the 1980s is the unfunded depreciation and plant needs, which will be the number one obstacle for colleges and universities. There needs to be, because of the magnitude [of the situation], a closer linkage between facilities, financial, and endowment development people. The 1990s will represent a decade of scarce and diminishing resources so that these three areas need to work arm-in-arm or else face tremendous problems. The institute forum facilitates that kind of dialogue."

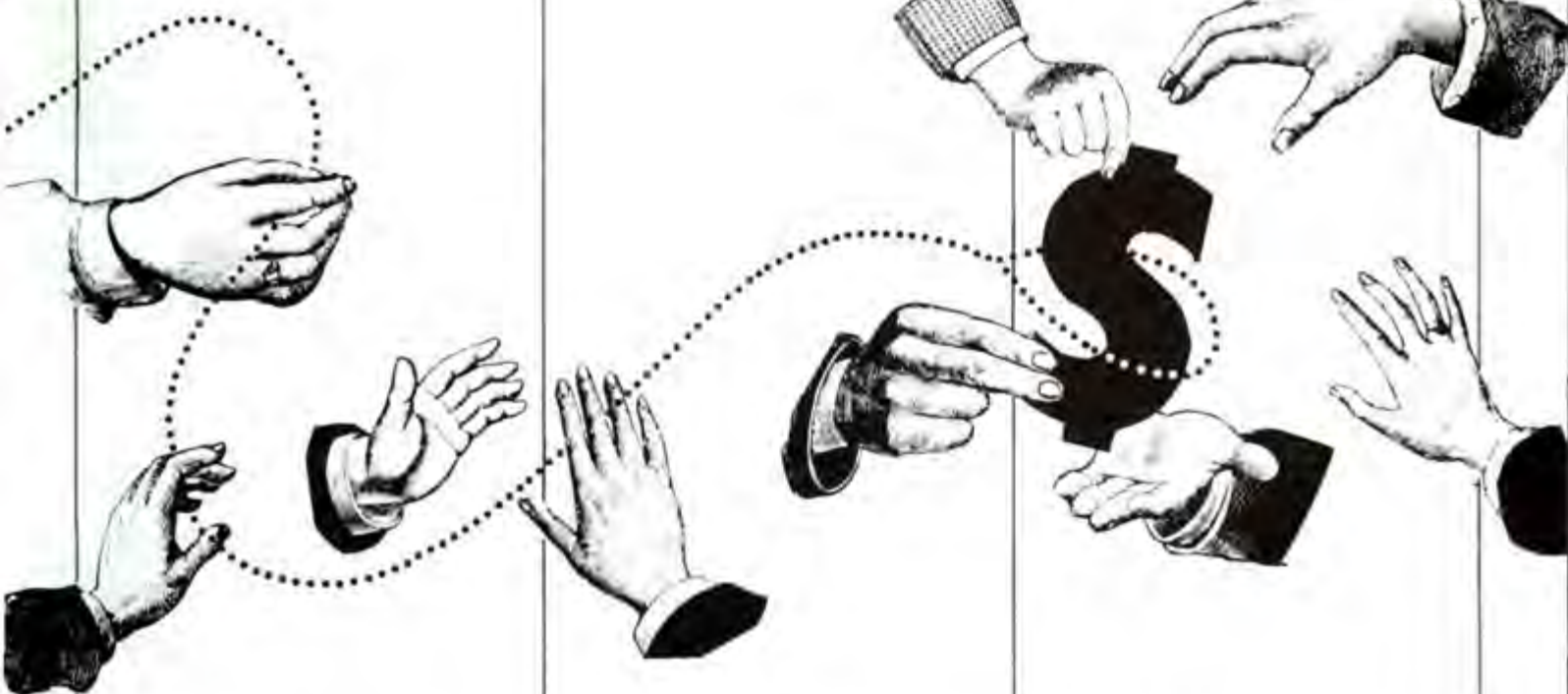
The Curriculum

The institute began with an accounting refresher course that covered types of costs, work order systems, operating ratios, and budget development.

Sean Rush, partner and director of the national higher education consulting service, Coopers & Lybrand, started the second day with a look at facilities finance from the past through the future. Rush stressed the importance of recognizing facilities as a capital asset. "Facilities . . . [are the] single largest group of assets on an institution's balance sheet."

Many attendees found the idea of

Stephanie Gretchen is assistant editor of Facilities Manager and APPA's communication manager.



utilizing facilities as a capital asset an excellent new way to tackle their financial problems.

Rush compared the priority placed on the management of endowments and the priority placed on the condition of facilities. He introduced the concept of facilities equilibrium and explained that while the endowment asset for higher education institutions in the United States is approximately \$75 billion, the replacement value nationwide of campus facilities is more than \$300 billion. Yet, endowment assets are managed more carefully than facilities assets. Rush also covered facilities audits and financial planning.

"The concept of physical facilities as an asset and managing it as money is excellent. The [institute] explained [this concept] in a way I can get a hold of. It has been very informative," said Larry Kramka, director of physical plant at the Illinois College of Optometry. "I came here because our institution is on an austerity budget for the first time in ten years. Our business officers are coming up with no innovative ideas to deal with this problem. I'm trying to help."

Duncan Watt, vice president of facilities at the University of Regina said, "I think everything [at the institute] is very relevant. [Canadian institutions] have the exact same issues as U.S. in-

stitutions. Having colleagues here who are not in physical plant is helpful because it gets people not really in physical plant thinking about facilities as an asset, as money."

Speaker Clint Hewitt, associate vice president for physical planning at the University of Minnesota, discussed capital facilities planning, construction factors, prioritization, and space utilization.

Later that afternoon, cost/benefit analysis, lease-buy backs, utilities pay backs, and real estate management were discussed in a session on requirements and options for capital improvement. Sallie Mae and First Boston representatives presented various funding options and discussed new trends in facilities finance.

Vernie Coston of Rutgers University said, "[The institute] was good. For a physical plant-type person it gave a good overview of different ways to get financing for capital renewal and deferred maintenance."

Another attendee cited the most beneficial information as the depreciation methodology and how various organizations were actually using this to deal with deferred maintenance.

At the institute banquet keynote presentation, Art Hauptman, consultant to the American Council on Education and author of *The College Tu-*

ition Spiral, gave a sobering look at the future of higher education.

A panel discussion on the third day of the institute included Bill Middleton, University of Virginia, who talked about contracting for services and how to assess whether and when it is appropriate to contract out for services. During the same panel, Brenda Albright, deputy executive director of the Tennessee Higher Education Commission, explained that state's priority of renovating its campus buildings instead of constructing new facilities. Other topics included in the panel discussion were policy making, budget reduction, charging for academic space, and state policy limitations.

In an effort to help solve some of these problems, a session on funding sources and a panel on successful strategies in utilizing facilities as a capital asset were held. In the case studies panel session, Jon Gullette provided an example of Vanderbilt University's money-saving boiler plant expansion project.

Terry Armstrong, director of finance/management of The Sidwell Friends School, said, "This is a very important topic, especially for a smaller institution. We can't put our money and resources into programs the way Vanderbilt can, but we can modify the ideas to our limited resources. It's very

"The concept of physical facilities as an asset and managing it as money is excellent. The institute explained this concept in a way I can get a hold of."



interesting to see what other schools are doing.

"Even on our campus," Armstrong continued, "physical plant is the largest single asset we have, and it tends not to get funded. [Facilities finance] is beginning to be a hot topic again. It's a lot harder to get money, but it's got to come from somewhere. [The institute] has given me some interesting approaches to this problem."

Walter Camp, assistant director of plant services at Case Western Reserve University, said, "I enjoyed [the institute] quite a bit. I learned a heck of a lot. A lot of specifics about what others are doing about deferred maintenance was very helpful; we can bring this information to our board and officers and say, 'Here's what someone else is doing, and here are the benefits and costs.'"

"The case histories were excellent. It was nice to hear how these people did it and convinced their people. It helped me realize how to get this done on my campus."

The Reaction

"I came with high expectations, and I have not been disappointed. I'm the financial manager of physical plant, and this conference has reinforced my beliefs. Now, my biggest challenge will be to change other people's mind sets. These problems are nationwide.

This conference has given me ideas on ways we can solve these problems," said Lois Eagleton, fiscal manager, physical plant, University of Oregon.

Matthew Hurteau, director of financial affairs at Mater Dei College said, "There's such a diversity of people here, and there is something for everyone [in the sessions]. I wear lots of hats because I work at a small college. [In coming to this] I can communicate and help implement the ideas learned here. I realize the seriousness of facilities deterioration. They've talked about competition for pieces of [the financial] pie—facilities, faculty, development, librarians, computers. I can be the communication link between them all."

Camp said, "It was good to have a mix of physical plant people and business officers. It was good to gather together all of these people, including the people who have the capability to make some of these decisions. It was great to have a trustee there. We should try to get more board members to attend."

Faculty

Albright said, "The institute combines presentations of the most up-to-date information about facilities finance with an array of solutions to current issues facing decision makers. Participants may choose the practical

and proven successes or new untried strategies.

"The institute is important because it emphasized the whole of facilities in both the educational and the financing process," said Albright. "I'm impressed with the interaction between participants and faculty—the diverse viewpoints of business officers, facilities managers, policy makers, and how those viewpoints come to a consensus on major policy areas."

Jon Gullette, associate vice chancellor for operations at Vanderbilt University, said, "The Institute for Facilities Finance provides plant managers, business officers, and other higher education people with a common framework of knowledge to better understand how to effectively act as stewards of our physical assets."

Conclusion

"My experience has been that anything APPA has done in the past twenty years has been worthwhile. I've never wasted time or money [on an APPA event/product]," said Kramka.

Walter Schaw, APPA executive vice president, said, "In three intensive but highly stimulating days, I believe we did what we set out to do. That is best expressed, however, by the attendees. In my mind, APPA has again offered leadership in an area of significance to the future outcome of facilities in higher education."

Ken L. McMillan, vice chairman, University of Regina Board of Governors, said, "The board member or trustee must, in order to provide responsive stewardship, have a clear picture of the academic and facility assets of the university community served. The APPA Institute for Facilities Finance in Higher Education has provided an outstanding vehicle to enhance that picture. Plans should be implemented to present a similar if not identical institute to the trustee group. APPA has provided a great service on a sensitive subject, in a well planned and presented forum."

The institute was developed in cooperation with the National Association of College and University Business Officers and four of its committees, which were involved in the review process before the program was finalized. The institute is another example of APPA's commitment to working in coordination with other higher education associations on issues of common concern. ■



DESIGNING FOR ENERGY MANAGEMENT: Award Winning Techniques

by Sam Ragusa

Energy management gained prominence in the 1970s as a result of the oil crisis. Those who took the time and effort to review their usage were able to minimize waste and in many cases achieve considerable success in saving money.

With few exceptions, one could say that the era of the quick fix and retrofit is over. However, with energy stability again affected by world events, there are still savings to be achieved by incorporating careful and inexpensive design features into new capital projects.

Griffith University's Energy Management Program, which began with the quick fix and retrofit, has extended into the design of new projects. The results have been worthwhile in terms of cost savings. The university's initiatives have also been rewarded by having twice been awarded the National Energy Management Award, Australia's highest award for energy management.

This case study outlines initial and ongoing work in energy management throughout existing campus buildings and in the design of new projects.

Establishment and Development of the University

Griffith University is located in Brisbane, Australia and enjoys a subtropical climate with a daily average of 10°C (50°F). Winter minimum temperatures are rarely below 8°C (46.4°F), while summer maximums reach about 34°C (93.2°F).

The university was created in 1971 and began teaching in 1975 with an initial enrollment of 425 students. The university was the second university in its region and is now one of five in the State of Queensland. There are approximately fifty institutions of higher education in Australia, ranging from diploma-awarding colleges to research universities.

The university currently has a full-time equivalent enrollment of 8,650 students which is expected to grow to 10,200 students by 1992 and 15,000 students by the end of the century. Enrollment growth is supported by an ongoing program of capital works. The many schools within the academic divisions of the university include humanities, modern asian studies, international business relations, microelectronic engineering, Australian environmental studies, applied behavioral science, and nursing among others.

The university is a modern complex of buildings set in a eucalyptus forest of some 600 acres. Planning of the university strives to minimize the

length of service runs of major utilities. The buildings are aligned to the university grid with their long axes along the east-west grid and with minimum fenestration to eastern and western facades. Generous overhangs are provided to all north-facing windows to prevent the intrusion of the winter sun. (In the southern hemisphere, winter sun is in the north.) Roofing is pitched, white, metal decking, and building structures are white or off-white concrete or concrete masonry. Both the campus as a whole and several individual buildings have won architectural, engineering, and landscaping awards for their design.

The Early Days

The 1975 annual energy budget had been set late in 1974 at \$30,000. In April 1975, the university received its first monthly account after the commencement of teaching. That bill was just over \$10,000. There was a suspicion that something was not quite right, but in those days, money was not a problem so the university paid the account and increased the annual budget.

However, it became apparent from some preliminary investigations that the library, which comprised 35 percent of building area, was using 76 percent of the energy. Further investigation revealed that the library air conditioning ran twenty-four hours a day, seven days a week.

Sam Ragusa is manager, facilities division, of Griffith University, Brisbane, Queensland, Australia. This article is taken from a paper presented in April 1990 at the Australian Institute of Energy Conference in Brisbane.



[Ed. note: For a fuller discussion of the needs of libraries, see "The Library Environment and the Preservation of Library Materials" in the Fall 1990 *Facilities Manager*.]

Remarkable savings were made simply by programming the library air conditioning off between 11:00 p.m. and 7:00 a.m.; when the librarian was informed of the cost savings twelve months later, he could only agree that it had been a reasonable action.

The university finished the year with an \$83,000 expenditure on energy.

By 1979, the university's building area had doubled, but its energy consumption had tripled. It was apparent that energy costs were growing out of control. To complicate matters, the supply authority then increased energy tariffs by a hefty 18 percent.

The university was therefore moved to embrace energy management for the usual commercial reasons—to save money!

The Library—Our First Quick Fix

Universities are traditionally conservative while at the same time at the leading edge of innovation and change. In order to convince the institution of the value of energy management, it was first necessary to point to achieved results. Energy management therefore began as an unofficial function of the facilities division.

The most obvious place to make savings was in the largest consumer, where small percentage savings amount to large dollar amounts. So we started with the library again—our energy hog!

Every university can lay claim to an energy hog—often the library or research laboratory—an energy consumer that stands out above the rest.

When completed, the building had a lighting system comprising a two-directional grid in all areas other than bookstacks. Single 40-watt tubes were placed along each side of a 1,200 mm square.

It became the perfectly symmetrical

TABLE 1
LIBRARY BUILDING, LIFE CYCLE COSTS OF EXTRA LIGHTING

	\$ (1989)
Initial Capital Cost of Extra Lighting	650,000
Initial Capital Cost of Extra Air Conditioning Capacity	200,000
Maintenance and Retubing	100,000
Energy	2,400,000
Total Cost Penalty	\$3,350,000

ceiling with no shadows anywhere. The lighting level, however, just happened to be 1,200 lux in reading areas, corridors, offices, lobbies; everywhere except the bookstacks, where it was 600 lux because the lighting was only unidirectional, consisting of end-to-end 40-watt fittings.

The Australian Standard, AS 1680 Lighting Levels and the Visual Environment, suggests that lighting levels of 400 to 600 lux are adequate for reading areas and states that 50 lux is reasonable for bookstacks.

It was clear that savings could be achieved by reductions of the lighting levels. The easiest solution was simply to convert the two-way grid to a unidirectional grid, a solution that would not detract from the ceiling's aesthetics, and would provide even illumination at the workplace.

When the library was built in 1974, illumination had been provided by some 6,500 40-watt fluorescent tubes. The building has a usable floor area of 4,250 square meters and at that time comprised 1,000 square meters of reading area, 1,250 square meters of bookstacks, and 2,000 square meters of general offices, which has since been reduced by the expansion of the bookstacks.

Energy consumption was cut from 1,815,600 kWh in 1975 to 1,176,240 kWh in 1980, a reduction of 35 percent. The energy cost for the building fell by 30 percent over the same period.

The simple, quick-fix solution was to unplug 2,000 light fittings from the wiring loom. The light fittings are still

in the ceiling, since to remove them would have incurred storage costs. The cost of implementation was \$1,000. Savings in the first year amounted to almost \$24,000.

We have calculated that the savings for this building alone amounted to \$460,000 between 1980 and 1989. And the savings keep accruing!

It is important to note the effect of lighting on the air conditioning system. When the building was constructed, lighting contributed almost 50 percent of the air conditioning load. Even now it constitutes 35 percent of the load. In 1980, the reduction in air conditioning energy costs was \$4,600; at today's rates the savings are approximately \$10,000.


The effect of the lighting goes even further: air conditioning heaters have never operated. When lighting provides 225 kW of heating to the space there is no need for heating.

If one considers the life cycle of this situation the impact is even more dramatic. Table 1 shows the cost over the building life of fifty years, for example. The building is bulk-relamped on a three-year cycle. The cost penalty is \$3,350,000 in 1989 dollars.

Energy Management Policy

Armed with the results of the initial work it was reasonably easy to convince the vice-chancellor, the university's chief executive officer, of the value of energy management.

As a result, the university soon adopted a formal policy for energy management, established an energy management committee, and allocated



responsibilities for this work to an energy manager.

Early in 1981, the following policy statement was issued: "Griffith University has adopted an Energy Management Policy which actively seeks to reduce the consumption of energy on site so that University funds can be directed to the primary functions of teaching and research consistent with the development of the University.

"The objectives of the University are to minimize waste and to improve the energy efficiency of use, function or program.

"The methods which will be adopted to achieve these objectives will be determined within the financial limitations of the University and with regard to the likely savings to be achieved."

The committee reports directly to the vice-chancellor and has representatives of the university's major consumers (the library, science-based schools, housing) as well as a representative from the supply authority.

Energy Management Action

The university's official sanction work began auditing energy consumption with a view to continuing the work of minimizing energy waste, primarily through quick-fix and retrofit solutions. A central control and monitoring system had been installed in 1978 mainly as a monitoring device for the central chiller plant, which supplies chilled water for air conditioning via underground pipes to eleven major buildings. No local air conditioning chillers are installed in buildings.

All buildings had been separately metered. Energy is purchased centrally at high voltage on a maximum demand tariff. Because of the demand tariff, where energy is charged at 3.55c/kWh and maximum demand at \$18.05/kW (1989 rates), it makes the most sense to tackle the peak demand problem by load shedding or redistribution of demand. This form of approach was adopted.

To maximize the impact, it was again decided to target the largest consumers where small percentage savings yield large absolute savings.

Below are examples of the principal work undertaken since 1981. All figures are in 1989 cost levels.

1. *CCMS Load Shedding.* The university had a ready-made tool in its central control and monitoring system that had been expanded to cover all buildings on campus. It was and is still capable of switching equipment on and off according to time programs and to shed load on a predetermined rotating pattern when preset limits of maximum demand were reached. In 1983, a number of transducers to measure instantaneous demand at the main substation were installed, as well as some software modifications on the CPU. A satellite computer was also added to record data onto hard disk for twelve months.

Load shedding of approximately 130 kW of air conditioning heating, hot water heating, and other small loads was achieved immediately resulting in demand savings of \$15,000. The initial cost was \$40,000, but this enabled further load shedding initiatives.

2. *Hot Water Heating.* Hot water heating is decentralized with each building having its own electric hot water heating system of multiple Rheem units. Heating had been designed for continuous rating. In two science buildings, hot water storage capacity was increased from 4x250 liter tanks each with 3x3.6 kW elements to 10x317 liter tanks each with only 1x3.6 kW elements.

The capacity to deliver hot water was increased for a slight reduction in connected load. More importantly, heating could be switched off at times of peak demand. Demand savings amount to approximately \$10,000. The cost of implementation was \$6,000.

Similar work was carried out in the university's student housing, where 700 residents live in a combination of

flats and serviced rooms. In this instance, 126 kW of hot water heating can be shed with potential annual savings of \$30,000. The cost of implementation was \$10,000.

3. *Water Distillation.* The science-based schools each produced distilled water within laboratories using demineralized water as the input. Eleven stills contributed a total of 21.5 kW to maximum demand. These have progressively been replaced with reverse osmosis units in each laboratory, with payback being less than two years.

4. *Low Load Chiller.* Until 1982 the university's smallest refrigeration chiller was of 150 Tons(R) capacity. Centrifugal chillers are extremely inefficient at low load and severe maintenance problems can occur. A low load chiller of 50 Tons(R) was installed to provide for low load conditions particularly in winter and overnight in summer. It has been calculated that annual savings amount to approximately \$15,000. The initial cost was \$30,000.

5. *Lecture Theatre Movement Detectors.* Staff and students are notorious for not switching off lights and air conditioning when leaving large lecture theatres. Movement detectors now switch off services in spaces that are unoccupied for more than four minutes. Payback periods range between four months and fifteen months.

6. *Energy Savings Competition.* To promote energy awareness on campus the university publishes an energy newsletter. Through the newsletter the university promoted an energy savings competition soliciting suggestions from staff and students.

None of the above ideas or actions are in themselves particularly difficult. The difficulty is in the resolve to implement the program.

Conservative estimates of energy savings through 1985 exceed \$1.6 million. The cost at that time had been approximately \$100,000, but the savings keep accumulating.



As a result of this work, the university was awarded the National Energy Management Award for 1985. That award spurred us to greater efforts.

Designing for Energy Management

With many of the existing buildings on campus under continuing review and control, the university turned its attention to capital works in the planning stage. It was important that we apply to new works the lessons learned in retrospect. The opportunity presented itself with a new technology building, to be built in 1986 and 1987.

Passive Energy Management

Requirements for passive energy management form part of the university's design standards that are mandatory requirements for new buildings. These can be summarized as follows:

1. **Orientation.** All buildings are to be aligned to the campus grid and long axes should lie in the east-west direction. As well as minimizing the exposure to eastern and western sun loads, this has the added benefit of allowing buildings to benefit from northeasterly prevailing breezes in summer and northern sun in winter.
2. **Fenestration.** Eastern glass is to be minimized and western glass shall be avoided. All glass subject to direct sunlight shall be shaded by architectural features such as roof overhangs, building projections, fins, etc. Tinted glass and curtains are to be avoided as methods of sun control, although curtains and blinds are becoming necessary as a means of protecting computer screens from unwanted reflections.
3. **Roofs** shall be white or off-white and shall be insulated.
4. **External walls** shall be white or off-white concrete masonry or concrete.

Features of the Project

The technology building was to form part of the campus precinct de-

TABLE 2
CCMS POINTS (1988)

Building	No. of CCMS Points (Monitoring and Control)		
	Available	Total Installed	Control Points
Technology	160	76	44
Science	48	43	13
Campus	536	362	167

voted to science and technology. Two buildings already existed that catered to a similar range of functions, which included staff offices, laboratories, equipment rooms, lecture theatres, and seminar rooms. All three buildings were to be designed by the same architect and had a similar architectural style and form of construction. One of the existing buildings was one of the heaviest energy consumers on the campus.

All buildings have been designed to have faculty offices along the northern facade so that these spaces that are not air conditioned can take advantage of the prevailing summer breezes and winter sun. Faculty offices have as standard equipment a 750-watt radiant heater and a 900 mm diameter ceiling fan.

Laboratories, equipment rooms, lecture theatres, and seminar rooms are all air-conditioned and located on the southern side of the building or in the center zone. The obvious effect of this type of design is that windows of air-conditioned spaces have no direct solar load. It was decided that particular attention to air conditioning and control systems was to be paid to these buildings.

Technology Building: An Example of Unitary Air Handling Systems

The technology building is multifunctional. It includes common teaching areas, faculty accommodation, wet laboratories, dry laboratories, computer laboratories, and multipurpose space. Most importantly, adaptability of space was a criterion to be designed into the building. The building has a net area of 4,248 square meters and a

gross floor area of 5,991 square meters.

Because of the variety of use among the undergraduate programs and research needs, and the requirement for different areas to be available over different time zones, a system of unitary air conditioning has been installed.

Apart from forty-five faculty offices, the building is fully air conditioned. Because of the unitary type of system used, the building has thirteen large air conditioning units in distributed plant rooms and forty-five chilled-water fan coil units located in the rooms served. Total installed cooling capacity is 250 Tons(R). Electric heating to air conditioning plus faculty offices totals 343.35 kW.

All units are able to be individually started and stopped at any time or via the time programs of the university's CCMS. The CCMS is also able to shed heating to control maximum demand. Load shedding of faculty office heating is also possible through the CCMS. A total of forty-four points control these functions via the CCMS compared with the ability to control only thirteen similar functions in one of the science buildings.

Of the technology building's load, 223 Tons(R) or 89 percent of cooling and 333.86 kW or 97 percent of heating is subject to direct control.

Table 2 shows that the level of control and monitoring in the building is substantially higher than in the science building.

Local Control

In a number of areas local control was also provided. However, CCMS control was also installed to provide



bandwidth control, i.e., the CCMS controls the time zone within which air conditioning is available, although it will be the responsibility of room users to switch the fan coil unit on. If left on, the CCMS will switch the unit off at the end of the time zone.

Movement Detectors

Movement detectors were also provided as a form of local control in seminar rooms. The CCMS provides time zone control in accordance with the published timetable. In this way, casual use by one or two people for private study will not necessarily start air conditioning. Similarly, the plant will not run during a time-tabled period in the event of nonuse of the room by the class.

Faculty Office Heater Control

The primary purpose of this system is to minimize maximum demand. It is quite common that faculty switch on room heaters on arrival. The heaters are then often left on all day and into the evening whether staff are in their rooms or not. The system that we devised allows any individual to switch on the heater. All heaters are, however, hard-wired through individual push-button stop-stations to a floor contact controlled by the CCMS. If maximum demand load shedding is required, the CCMS will automatically deactivate the heater circuit and re-energize it ten minutes later. However, the heaters will not be restarted unless someone presses the push-button on. As the university's maximum demand occurs during the middle of the day and air temperature has risen by then, most heaters remain off until the demand has dropped below our pre-determined maximum.

Building Comparisons

As indicated earlier, the buildings are very similar in construction, orientation, and usage patterns. A comparison of the energy consumption for 1988 in the two buildings is indicated in Table 3.

TABLE 3
ENERGY USAGE 1988, SCIENCE AND TECHNOLOGY

Building	Science	Technology
Gross Floor Area (m ²)	8,473	5,991
Total Energy Consumption (kWhr)	1,839,344	754,096
Energy Consumption per sq. meter (kWhr/m ²)	217	126

TABLE 4
ENERGY USAGE AND COSTS 1987, 1988

Year	1987	1988	Change %
Total Consumption (kWhr)	8,352,424	8,687,234	4
Gross Floor Area (m ²)	61,192	67,338	10
Student Load (eftsu)	3,662	4,167	13.8
Consumption/m ² (kWhr/m ²)	136.5	129	-5.5
Total Cost \$	668,194	715,345	7
Cost/m ² gfa (\$/m ²)	10.92	10.62	-2.7

Consumption rate ratios of approximately 1:0.6 continue to the present.

System Cost

Critics of unitary air conditioning systems often attack the capital cost of such systems. The air conditioning systems for the technology building, including reticulation of chilled water mains to the building, cost \$687,000 (1987 dollars) or \$2,748/Ton(R) of installed capacity, exclusive of refrigeration plant. If refrigeration plant costs of \$750/Ton(R) are added, the end cost of \$3,498/Ton(R) compared with average costs for central air handling systems of \$3,168 to \$4,488/Ton(R) (Rawlinson's *Australian Construction Handbook*, fifth edition, 1987).

Total University Performance

The university's energy performance in 1988 compared with 1987 is illustrated by Table 4.

As can be seen, although building area and student load increased substantially, the rate of consumption and cost both decreased.

Conclusion

Griffith University's approach to en-

ergy management has been to include passive design for the building envelope, to maximize individual control of air conditioning and heating systems, and thereby to capitalize on the diversity obtainable through the central chilled water plant.

In the case of the technology building, the air handling plant is estimated to have cost no more than if central air handling systems had been used. It can be argued that we have avoided expenditure of \$200,000 (1987 dollars) for the chiller plant.

Our energy performance reflects our efforts. In 1988, this performance won the National Energy Innovation Award for Outstanding Achievement in Energy Management in Building Design and Operation. Monetary savings have been calculated to be approximately \$3 million since 1978.

Our ability to achieve these results has now yielded an additional benefit. From 1990, energy savings will directly benefit our maintenance operations because the university's budget authority has agreed that energy savings can be retained by the facilities division to be used for its general operations. ■

FUTURE HISTORY

Let's depart from our custom of reviewing hardware or software (do I hear cheers?) and instead spend some time looking into the future.

First the usual caveat about predictions. Whether in a carnival tent or boardroom, fortune telling is a risky business, especially when dealing with the fast-paced computer industry. Nevertheless, some trends begin to emerge, such as the move away from the standalone, isolated computers to interconnected (networked) computers. Industry analysts predict that by 1993 three out of four computers will be part of a network.

Presently, networks come in two basic flavors: local (perceptively called a local area network, or LAN) and wide area network (WAN). The difference between the two most often has to do with size and distance. Local area networks often consist of computers in close proximity, say the same office or same building. Conversely, a wide area network consists of computers separated by hundreds or thousands of miles. Wide area networks include local area networks.

Both types of networks let you exchange e-mail, send files to one another, schedule meetings, access common software applications, and discuss yesterday's soap operas or ball games.

Recently, publishers such as Lotus Development, Wollongong Group, and Software Publishing Corporation have begun marketing easy-to-use (and expensive) "groupware," a special kind of sophisticated software that enables communication between incompatible computer languages.

What does this mean to you? Plenty, because if for whatever reason you choose to ignore this technology, you will miss out on one of the most important advances in dedicated business computers. Within the next two years this emerging technology will dictate how you interact with the other members in your organization. It will erase the present barriers that

Data Base Update

Howard Millman

isolate individuals as well as entire departments from each other.

Underutilized Technology

Pablo Picasso noted that "computers are useless; they only give you answers." From an artist's perspective, Picasso's disregard for technology rings true. In business, however, we require answers, and we want them fast, accurate, and complete.

Standalone computers meet two of those requirements (speed and accuracy); but getting complete answers continues to prove elusive. Like humans, computers cannot tell you what they don't know. So, just as humans attend meetings to share information, technology now provides a way for computers to attend meetings for cooperative data sharing.

In order to successfully share information at a meeting, all participants need to speak the same language or have a translator present. The same rule applies to computers, except finding a translator proved an uphill swim since so many incompatible languages and protocols exist.

For example, in a typical contemporary university setting, you work with an IBM compatible. Your office's architects work on Apple MACs (they like the graphics). Central accounting uses an IBM mini and the student activity office uses a DEC VAX. So the electronic stewpot contains the incompatible products of four manufacturers, each with an operating system unable to communicate with any of the other three. As a further obstacle to painless interdepartmental communication, each department likely uses a different spreadsheet, wordprocessor, or data base application.

Integrated Networks

Who knows what data lurks on the recesses of the corporation's computers—now the intelligent integrated network does. Products like Software Publishing Company's InfoAlliance

enables you to communicate with all of these dissimilar units. Sort of a great electronic equalizer, it welds these electronic nonconformists into a unified cohesive group that all speak the same language. Data can be shared no matter what form it's in and no matter where it resides; if it's in the system, then it's available.

And, the sharing is passive. In the old days (last year) before someone could access your files, they had to either physically use your computer or you had to post your file on the network in a universally readable form. Now, you write a letter in Wordperfect on an Apple and share it with someone else using Displaywrite on an IBM in another office or another country.

While this technology epitomizes the team player concept, you may consider this an invasion of your privacy. If you do, your position has merit. For whatever reasons, some primal instincts keep us from physically invading someone else's territory, so few of us will physically invade someone else's file cabinet looking for a document. But this doesn't apply to an electronic search because for one reason we won't even know whose data files we're searching. You simply ask the system for information and the system sends out its sleuths to search and retrieve.

"You call this an improvement?," you shout. "This is gross invasion of privacy!" Well, yes it is, but it isn't all that bad (at least not yet). You're offered options to secure sensitive files against searching or being accessed by others. And staged levels of security exist, allowing certain colleagues to reach deeper into your corporate memory than others.

But the overall emphasis focuses on data sharing, not data hogging. Representative of that new focus, you'll soon be hearing expressions like cooperative analysis, distributed decision making, collaborative input, and datasource integration. These terms all have more or less the same meaning—to make data freely available between qualified trustworthy coworkers who have a legitimate need to know.

For businesses, the conversion from standalone computers to networked computers is a race well worth running. And once the ethical issues of privacy are resolved (as they surely will be) the dollar return on investment will be enormous.

The purpose of commerce is to in-

Howard Millman is assistant director of facilities at Columbia University's Lamont Doherty Geological Observatory in Palisades, New York, and Nevis Nuclear Laboratory in Irvington, New York. He is also a freelance technical writer and frequent contributor to several national computer magazines.

crease either profit or prestige by fulfilling a real or perceived need. You can't even begin to conduct business without communication. For millenia we used verbal, written, and gestures to communicate. Now we will begin communicating using vast interconnected electronic data exchanges for distributed decision making and collaborative input.

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Resolving Conflict

Getting Disputes Resolved: Designing Systems to Cut the Costs of Conflict, by William L. Ury, Jeanne M. Brett, & Stephen B. Goldberg. San Francisco: Jossey-Bass Publishers, Inc., 1988. 201 pp. \$21.95, hardcover.

Disputes—are they a part of your world? Then read further. For those facilities managers who compete with other departments for resources, deal with labor grievances, negotiate agreements, administer construction contracts, or persuade their kids to clean up their rooms, read this book.

The authors take a ponderous subject involving law, personality dynamics, psychology, and myriad other facets, and write a readable, practical primer on the science of dispute resolution. I was never once browbeaten by the authors, but came away with a new understanding of the dispute resolution process.

My own background is design and construction. Disputes are more than common; they are unavoidable. But, how do you analyze a dispute and solve it? Which is the least expensive method? Which method will result in getting what is most important to you?

The authors have extensive experience in labor dispute resolution. These disputes may seem different from arguments between department heads or disagreements between architects and construction contractors. However, the authors have distilled the essence of a dispute from the particular conflict and clearly articulated the resolution process in general terms. I found it valuable that the authors effectively spice their explanations with actual experiences.

Every organization, or individual, should have a system to resolve disputes. The authors propose that a dispute resolution system should be designed with a foundation of interest-based procedures, followed by rights-based methods, with power-based strategies as a last resort. The desired outcome is a system that resolves disputes at the lowest transaction cost possible, with the most balanced satisfaction between the disputants. If the outcome can also have a lasting effect on the parties' relationship and produce a durable resolution, the system has achieved its goal. The key is educating the disputants. If you think you can't win, why play?

Some prefer to go to court or strike instead of negotiating. The authors explain that this is a result of frustration with the present dispute system, or the lack of one

The Bookshelf

altogether. The authors give examples of certain parties using strict interpretation of rules as a crutch to get their way. The other party is given no avenue to air their desires, or may feel that the avenues presented will never effect a desired result. They are forced to a lawsuit (a rights-based solution) or a strike or violence (power), when all they wanted was someone to listen to them. The party that feels injured may also "lump it," or defer action until the weight of the frustration leads to a spontaneous power-based response.

The design of the dispute resolution system is presented as satisfying six principles.

1. The focus should be on interests.
2. The procedures should encourage the disputants to return to negotiation at any point.
3. The system should provide low-cost rights and power procedures that, if all else fails, can bring a final resolution to a dispute.
4. Disputes should be prevented, whenever possible, with the use of consultation procedures and constructive feedback.
5. Procedures should be sequenced from least to most costly.
6. The system should provide the motivation, skills, and resources to make the procedures work.

The authors provide examples of how disputes resolved at the lowest level and as early as possible generally produce the best results. The further the solution is made from the disputing parties, the less likely the solution will address, let alone resolve, the interests that are of prime concern to the disputants. It is much more effective to resolve that problem at the drafting board, on the shop floor, or on the site, than to let it get to the judge or the picket line.

Implementing an improved dispute resolution system is not just a matter of issuing directives and rules. It is also a political task of garnering support, dealing with resistance, and motivating people to use the procedures. The authors suggest that parties most likely to use the dispute system should be involved in the diagnosis and design process. Mock negotiations can be held to educate parties of the possibilities of interest-based solutions. Whatever is done, mediation between key parties to bring about changes in the system and coaching to get the parties to use the system is necessary.

The book then provides three detailed case studies of the diagnosis, design, and implementation of an interest-based dis-

pute resolution system in the coal mining industry. I found them interesting; however, the cases take up more than half the text. The reader can get a lot out of the cases, but may choose to skip them since many examples are given throughout the book.

To summarize, the book offers facilities managers a systematic approach to evaluating, designing, and installing an interest-based dispute resolution process. History and common sense tell us that interest-based solutions provide better results—better because there are more winners than losers and because it costs less in the long run. The book deals with actual experiences and people, not "blue sky" theories. I recommend *Getting Disputes Resolved* without reservation.

This book is available from Jossey-Bass Publishers, Inc., 350 Sansome Street, San Francisco, CA 94104.

—David Sheahen

University Engineer

University of Missouri System

Columbia, Missouri

Teamwork

Groups That Work (and Those That Don't), ed. J. Richard Hackman. San Francisco: Jossey-Bass Publishers, Inc., 1990. 512 pp. \$34.95, hardcover.

Mention the word "teams" and almost all physical plant managers will think of sports teams. Sports analogies abound in management discussions about organizations. I have even read about the hazards of selecting the wrong sports metaphor for a situation, such as selecting a football analogy when baseball would have been better. Despite the popularity of sports references when discussing teams, this book points out that sports teams represent only one of seven different types of teams; and of the seven, sports teams may be the least applicable to physical plant organizations.

Three of the groups—performing groups (sports included), professional support teams, and human service teams—are not particularly applicable to physical plant situations. Top management groups, task forces, production teams, and, for some areas, customer service teams are directly applicable to physical plant management.

As Hackman shows us, each group (or team; the terms are used interchangeably) has different structural, organizational, and leadership needs. The writers demonstrate clearly the need to recognize what type of group is involved to ensure appropriate management of that group. Treat a task force like a production team and you will have problems.

In addition to the distinctions between various groups and the ways to use them effectively, the book draws some conclusions that seem to apply to all groups.

Some groups use a "hub and spoke" communication system where all information flows from the spokes (the members)

Correction

The Fall *Facilities Manager* Bookshelf column incorrectly identified the author of *The Leadership Challenge* on page 49. James Kouzes and Barry Posner wrote the book.

through the hub (the leader). Other groups have free-flow information exchanges where any member deals with any other member. A group member working in a hub and spoke group who expects free-flow communications will have problems and will cause problems for the rest of the group. To be effective, everyone in the group needs to know what the communication system is and agree to use it.

Most groups, but particularly task forces, follow a pattern in their activities. First is a series of high-effort, low-effort, high-effort fluctuations. Second, as the project or activity is at about the midpoint, there is heightened interpersonal conflict. Third, there is a final burst of productive activity and rush to finish. There were some groups whose midpoint conflict was so disruptive that people had to be removed from the group. Yet, the book explains that "improving relations among members brings no guarantee that improvements in team performance will follow." The conclusion is that, for some reason, the midpoint conflict is a necessary part of group activity and, unless it is too disruptive, acts as a catalyst to the final push to completion. In addition, people can dislike each other but still perform effective teamwork.

To maximize its effectiveness, any group needs to have a clear picture of its goals, its authorities, and its communications system. The organization must provide structural support, sufficient resources, and rewards for group success. The members of the group need to have requisite skills and abilities. The leader needs to treat the building and maintaining of the team as an important personal objective, and not just concentrate on the ostensible group goal.

The information the book provides is useful for any manager who wants to nurture effective teams in his or her organization. It is easy to read, the style is lucid, and the conclusions and advice follow easily from the case study research.

Groups That Work is available from Jossey-Bass Publishers, Inc., 350 Sansome Street, San Francisco, CA 94104.

—R.A. Jackson

Personnel Administrator
Department of Physical Plant
University of Alberta
Edmonton, Alberta, Canada

Training

Training and Development in Organizations, by Irwin L. Goldstein & Associates. San Francisco: Jossey-Bass Publishers, Inc., 1989. 460 pp. \$34.95, hardcover.

If you want to know what the latest ideas in training and development are, this 1989 publication fills the need.

In cooperation with nineteen other authors, Irwin L. Goldstein has put together a compendium of information positioned in four categories: training systems issues, learning and cognitive issues, social sys-

tems issues in training research, and commentaries on the training issues.

At 460 pages, this book is no lightweight in terms of volume or information. Its authors' intent is to stimulate thinking in the field of training and development with creative ideas and insights. The impetus of this book came from the Society for Industrial and Organizational Psychology, whose purpose is to advance the status of the field.

Because the book has a general central theme and not a specific message, it is hard to be specific regarding content. Each author presents information specific to his or her research. Each of these subjects builds upon the knowledge base in training and development, and in this way satisfies or stimulates thinking regarding the subject presented. Subjects are disconnected from one another and could be read independently. Subject areas include the following:

- Critical training issues: past, present, and future.
- Assessing training needs: critical levels of analysis.
- Using utility analysis to assess training outcomes.
- Evaluating change due to training.
- Training the human information processor: a review of cognitive models.
- Individual attributes and training performance.
- Behavioral approaches to the training and learning process.
- Aging and the training and learning process.
- Retraining mid-care workers for the future workplace.
- Socialization, resocialization, and training: reframing the research agenda.
- Training the international assignee.
- A historical perspective on training.
- The agenda for theory and research.
- Contributions to the practice of training.

This book describes what type of research is being done and what new ideas are being developed in training and development. The reader should be aware that the book is presented in a "research thesis" form and is packed with references of recent and past studies. On the other hand, if you are titillated by reading research, then this one will keep you captivated for many hours.

This book is available from Jossey-Bass Publishers, Inc., 350 Sansome Street, San Francisco, CA 94104.

—John Hohman

Training Coordinator
Professional Development
Central Michigan University
Mount Pleasant, Michigan

Participative Management

High-Involvement Management, by Edward E. Lawler III. San Francisco: Jossey-Bass Publishers, Inc., 1988. 252 pp. hardcover.

Participative management is the moving

of power, rewards, knowledge, and information to the lowest level of the organization. In *High-Involvement Management*, Edward Lawler explores participative management approaches that are gaining popularity in the United States. Quality circles, self-managing work teams, job enrichment, and gain sharing involve the common goal of increasing employee participation in the daily workings of a business with the expectation of raising quality, productivity, and performance. Lawler addresses the effectiveness of each of these approaches, detailing its strengths and weaknesses, applicability, and guidelines for implementation.

The first three chapters provide introductory material on participative management. Chapter one provides a brief history of participative management in the United States. The participative approach is contrasted to the traditional managerial style in U.S. corporations. Chapter two centers on why the participative approach meets the needs of today's business and social environment. Chapter three focuses on how participation affects five major determinants of organizational effectiveness: motivation, satisfaction, acceptance of change, problem solving, and communication.

Chapter four discusses why quality circles are so popular and their effectiveness. The chapter provides some practical suggestions on resolving problems that you may face in your attempts to implement quality circles.

In chapter five, the author looks at attitude surveys and their use to encourage, structure, and measure the effectiveness of employee participation. The survey process increases the flow of information upward in an organization. When feedback from a survey is handled well, it can improve the downward flow of information.

Chapter six covers job-enrichment programs, a participative approach designed to involve people in their work. The results of job-enrichment programs, their limitations, and expected life are also considered.

Chapter seven discusses the characteristics, results, and practical applications of work teams. A work team has responsibility for a meaningful area of the workplace and makes decisions concerning when and how the work will be done. This is similar in many ways to the concept of zone or area maintenance used on many campuses. Each work team is given responsibility for enough of a service or product so that there is a clear input and clear output for which they can be held responsible. Of the participative approaches discussed, work teams have the potential to be most effective in the facilities management setting.

Chapter eight describes the characteristics of union-management quality-of-work-life programs. A number of organizations have used QWL programs effectively to reduce grievances, absenteeism, and turnover. QWL represents the only established

way for union and management to introduce a participative relationship.

Gain sharing is discussed in chapter nine. This chapter describes the general characteristics of gain-sharing plans, with particular emphasis on the Scanlon and Rucker Plans. These plans combine financial rewards with participation in decision making.

Chapter ten describes a concept called new-design plants. These organizations are designed to move power, information, and knowledge to the lowest levels of the organization. General Motors used this approach in the design and operation of its Saturn plant. This chapter focuses on employee selection, the design of the physical layout, job design, organizational structure, and management philosophy of a participative management organization.

The preceding chapters discussed the major participative management approaches, while chapter eleven reviews how these approaches can form a high-involvement organization. The chapter provides an excellent section on information systems and how they can enable a business to move information horizontally and vertically throughout an organization.

Chapter twelve describes the efforts required in changing to a high-involvement organization. I found the implementation suggestions a good guide for attempting to change any major program within an or-

ganization.

High-Involvement Management provides valuable insights into participative programs. The book is research-based, but numbers and detailed referencing is kept to a minimum. I found the book easy to read and would recommend it to an organization interested in participative management.

This book is available from Jossey-Bass Publishers, Inc., 350 Sansome Street, San Francisco, CA 94104.

—Tom Sichko

Management Engineer

University of North Carolina/Chapel Hill
Chapel Hill, North Carolina

Cynics in the Workplace

The Cynical Americans, by Donald L. Kanter & Philip H. Mirvis. San Francisco: Jossey-Bass Publishers, Inc., 1989. 286 pp. \$22.95, hardcover.

Cynicism in the American workplace—should it be of concern to us? In *The Cynical Americans*, the authors describe a situation in which 43 percent of American workers can be seen as cynics. The profile of the cynic is described by the authors as a person who "believes that lying, putting on a false face, and doing whatever it takes to make a buck are all part of our human nature." The pervasive nature of cynicism in the workplace can dramatically affect

the very health of the organization itself.

Much of the authors' data is based upon a survey conducted in 1983. If one accepts that the analysis of 649 respondents within the survey is valid and representational, and that the survey is not dated, then the implications of the survey data ought to be of concern to us all.

Understanding how to combat cynicism means recognizing the signs, roots, and ultimate consequences of cynicism in the workplace. Each of these elements is explored in detail by the authors, which serve as an excellent base for their concluding section entitled "Remedies for Cynicism." Kanter and Mirvis cite three key ingredients in the development of the cynical outlook: "the formulation of unrealistically high expectations," "the experience of disappointment, in oneself and in others, and consequent feelings of frustration and defeat," and "disillusion, the sense of being let down or of letting oneself down, and more darkly, the sense of being deceived, betrayed, or used by others."

Communication will play a major role in regaining, and sustaining, a healthy organization. We need to be clear in our expectations of our workers, in expressing the goals of the organization, and in helping the employees understand more about what it is we do as managers. We need to be able to admit mistakes, for any other less-than-direct method of dealing with such situations will only breed cynicism. Establishing and maintaining credibility within the organization will not be easy, but it is essential if we are to successfully minimize the highly negative effects that cynical attitudes have upon organizational performance.

Kanter and Mirvis have done an excellent job of integrating useful case studies into their presentation, as examples of how very different organizations have tried to confront the difficulties of cynicism within their organizations. Using such diverse companies as Ben & Jerry's Ice Cream and Caterpillar Tractor, we can see the importance of the commitment to the communication process. At Ben & Jerry's, for example, the company faced the difficulty of trying to sustain a "fun" atmosphere in the real environment of increasing production demands.

All organizational managers could benefit from this informative text, although the somewhat tedious writing style of the authors will make this a rather laborious reading endeavor. The dryness is outweighed by the useful and valuable information on how to identify, correct, and maintain your organizational health.

This book is available from Jossey-Bass Publishers, Inc., 350 Sansome Street, San Francisco, CA 94104.

—Stephen L. Delaney

Manager, Facilities Planning
Phillips Academy
Andover, Massachusetts

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EEO/AA.

**UNIVERSITY ARCHITECT
FERRIS STATE UNIVERSITY**

Ferris State University is accepting applications for the position of university architect. Responsibilities include campus master planning, program statement development, planning and coordination of facilities expansion and remodeling projects, professional services and construction contract administration, and architectural consultation within the university.

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Applicant must include an experience resume, salary history, and three professional references. To be considered, applications must be postmarked **no later than February 15, 1991**. Submit to: Ferris State University, L. James Bishop, Assistant Vice President Plant Management, General Services Building, 901 South State Street, Big Rapids, MI 49307.

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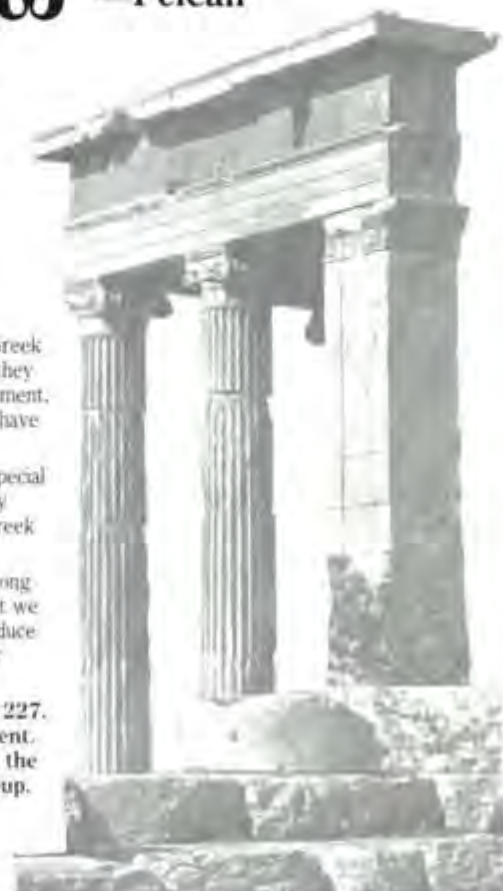
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Contact the APPA Educational Programs Department at 703/684-1446.

Feb. 28-Mar. 1—Preservation of Library and Archival Materials. Washington, DC.

Mar. 11-12—Custodial Staffing and Standards Seminar. Nashville, TN.

Apr. 28-May 3—Executive Development Institute. South Bend, IN.

Jul. 21-24—78th Annual Meeting. Orlando, FL.

Aug. 18-23—Institute for Facilities Management. New Orleans, LA.

Other Events

Jan. 22-24—Telecommunications Infrastructure Planning. Atlanta, GA. Contact: Washington State University, Conferences and Institutes, College of Engineering and Architecture, Pullman, WA 99164-2712; 509/335-7225, fax 509/335-7632.

Jan. 23-24—Planning, Estimating, and Scheduling Maintenance. Las Vegas, NV. Contact: Don Theobald or Keith McNeil, Division of Continuing Education, University of Nevada/Las Vegas, Las Vegas, NV 89154; 702/739-3707.

Jan. 28-30—Hazardous Materials Management: An Integrated Approach to RCRA, SARA, and OSHA. Philadelphia, PA. Contact: Bonneville Sierra Technology Services, 560 West 200 South, Suite 2005, Salt Lake City, UT 84101; 800/445-4779.

Jan. 29-30—Ohio State University Athletic Fields/Sportsturf Seminar. Columbus, OH. Contact: Sue White, 614/292-7457, or the Department of Conferences and Institutes, 614/292-4230.

Feb. 4-5—International Conference of Building Officials Code Development Committee Meeting. Austin, Texas. Contact: ICBO, 5360 South Workman Mill Road, Whittier, CA 90601; 213/699-0541.

Feb. 26-28—Telecommunications Infrastructure Planning. Scottsdale, AZ. Contact: Washington State University, Conferences and Institutes, College of Engineering and Architecture, Pullman, WA 99164-2712; 509/335-7225, fax 509/335-7632.

Mar. 4-5—Architectural and Standing Seam Metal Roofing Systems. Virginia Beach, VA. Contact: Roofing Industry Educational Institute, 14 Inverness Drive East, Building H-110, Englewood, CO 80112-5608; 303/790-7200, fax 303/790-9006.

Mar. 7—Roof Problem Analysis and Roofing Options. Seattle, WA. Contact: National Roofing Contractors Association, P.O. Box 4752, North Suburban, IL 60197-4752; 708/299-9070.

Mar. 14—Asbestos Management Refresher. Austin, TX. Contact: Center for Environmental Research and Training, Box 19021, Arlington, TX 76019-0021; 817/273-3878.

Mar. 17—Hazardous Materials Management. Houston, TX. Contact: Center for Environmental Research and Training, Box 19021, Arlington, TX 76019-0021; 817/273-3878.

Mar. 21—Roof Problem Analysis and Roofing Options. Kansas City, MO. Contact: National Roofing Contractors Association, P.O. Box 4752, North Suburban, IL 60197-4752; 708/299-9070.

Apr. 2-5—EPA 1991 International Symposium on Radon and Radon Reduction Technology. Philadelphia, PA. Contact: Conference of Radiation Control Program Directors, 205 Capital Avenue, Frankfort, KY 40601; 502/227-7862.

Apr. 22-23—Custodial Staffing Guidelines. St. Charles, IL (Chicago area). Contact: Robert A. Getz, M/C 270, University of Illinois/Chicago, Physical Plant Department, Box 4348, Chicago, IL 60680; 312/996-2837.

Apr. 30-May 2—Telecommunications Infrastructure Planning. Cincinnati, OH. Contact: Washington State University, Conferences and Institutes, College of Engineering and Architecture, Pullman, WA 99164-2712; 509/335-7225, fax 509/335-7632.

May 6-10—A/E/C Systems '91: Computer Management Show for Design and Construction Industry. Washington, DC. Contact: Sharon Price, A/E/C Systems '91, P.O. Box 310318, Newington, CT 06131-0318; 800/451-1196, 203/666-6097.

May 13-15—Gas Mart '91. Orlando, Florida. Contact: Gas Price Index, P.O. Box 70587, Washington, DC 20024; 202/444-4505.

Jun. 22-26—International District Heating and Cooling Association's Annual Conference: District Energy and the Environment. San Francisco, CA. Contact: IDHCA, 1101 Connecticut Avenue, N.W., Suite 700, Washington, DC 20036; 202/429-5111.

Jun. 23-26—American Association of Cost Engineers Annual Meeting. Seattle, WA. Contact: AACE Headquarters, P.O. Box 1557, Morgantown, WV 26507-1557; 304/296-8444.

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1990 Index



by Steve Glazner



Facilities Manager, Volume 6

[Ed. note: Due to a change in the volume sequence, there were only three issues of *Facilities Manager* published in Volume 6. Beginning with the current issue, the sequence of the four issues of each volume is Winter, Spring, Summer, and Fall.]

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Steve Glazner is APPA's director of communications and editor of *Facilities Manager*.

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