MARCH 1984

SHARED ENGINEERING MANAGEMENT NORTHEASTERN VERMONT REGIONAL HOSPITAL

With the recent emphasis on cost control involving all phases of health care operation an innovative approach has been taken to minimize plant management expenses at two major northern health care facilities in Vermont.

While maintaining my current position at North Country Hospital in Newport my services have recently been contracted to Northeastern Vermont Regional Hospital in St. Johnsbury. Although this "shared" management arrangement is in it's infancy we feel substantial merit has and will be realized; both financially and in areas of departmental efficiency.

Realizing from the onset my day to day operational involvement would have to be compromised both engineering departments are being standardized with working supervisory providing direct direction to their maintenance function. I feel this will improve professionalism and performance as the staff will be often called upon to make their own decisions and act accordingly.

Various technology and equipment is readily shared between the two plants. While major transportable equipment purchased through capital funds will be split between the hospitals enabling access to resources previously unaffordable. Computerized energy management systems are being considered for a multi-facility application; again providing savings for both North Country Hospital and Northeastern Vermont Regional Hospital in the area of efficient fuel and utility usage.

In-house human resources will improve under our shared program as specialized personnel can be gainfully employed at both locations. For example, skills such as refrigeration, bio-medical electronics and project management can result in scaled-down service contract and purchased service expenses. Immediate development of a merged renovation crew with a foreman and skilled trades is expected to eliminate the need for existing employees to work out of class.

In summary the shared service has enabled both facilities to become exposed to the concept and take advantage of its benefits. It is our hope that the successful interaction of the engineering departments will prompt similar arrangements involving other departments and facilities in the years to come.

- Jack Gosselin

SPRING SEMINAR MARCH 27, 1984 ENVIRONMENTAL ENGINEERING ASPECTS OF HOSPITAL WATER SYSTEMS

This year's Spring Seminar is designed to enlighten all hospital personnel, in particular those with engineering responsibility, on the mysteries of Legionnaires Disease and the role we play in preventing it.

Surely, a review of the environmental engineering aspects, associated with past Legionella outbreaks may help to prevent future occurrences. A review of outbreaks investigated has shown that most were associated with buildings and their systems. Construction and excavation have been implicated. We're all aware of the association with cooling towers and evaporative condensers. Are you aware that our domestic hot water systems could provide the ideal conditions for the growth of the organism? It's in our ballpark and we have a need to know.

Our main speaker will be Mr. Linden E. Witherell. He is an Environmental Health Consultant, a degree Civil Engineer and holds a Master's Degree in Public Works Engineering and Administration and a Master's Degree in Public Health. He is also a Registered Professional Engineer and a Registered Sanitarian.

Due to the large turnout expected, pre-registration is encouraged. We urge those interested in attending to make their reservations as early as possible. I cannot over emphasize the importance of pre-registration and reducing the bottleneck at the door. The cut-off date for registration is March 23, 1984.

This program is offered in conjunction with the New England Hospital Assembly's annual meeting.

Edward Boyer
Program Chairman

NFPA and NEHES

Although it has not often been publicized, NEHES has for many years actively participated in the development of NFPA (National Fire Protection Association) Codes and Standards which effect hospital engineering. The Executive Committee includes a permanent member designated as NFPA Liaison who is appointed by the President of NEHES. At present, the NFPA Liaison is James Bernard, a NEHES member from the University of Vermont.

From time to time, NEHES is also able to appoint official representatives of the Society to specific Technical Committees of the NFPA. The Technical Committees are the groups which actually write the codes and standards, which are then presented for public review. At the present time, the NEHES representatives are:

James DuCharme of Rutland Regional Medical Center.
NEHES Representative to the Technical Committee on Emergency Power Supplies (Responsible for NFPA 100)
James Bernard of the University of Vermont. NEHES Representative to the Technical Committee on the Safe Use of Electricity in Health Care Facilities (Responsible for Chapter 9 of NFPA 9, the Health Care Facilities Code. Chapter 9 was formerly known as NFPA 76B)

In addition, members of NEHES represent other organizations on NFPA Committees. At present, these include:

Donald Kohler of Bridgeport Hospital (Past President of NEHES)
American Hospital Association Representative to the Technical Committee on Medical Surgical Vacuum Systems (Responsible for Chapter 6 of NFPA 99. Chapter 6 was formerly known as NFPA 56K)

James Bernard of the University of Vermont American Hospital Association Representative to the Technical Committee on the Safe Use of High Frequency Electricity in Health Care Facilities (Responsible for Appendix E of NFPA 99. Appendix E was formerly known as NFPA 76C)

HOSPITAL ENGINEERING CERTIFICATION UPDATE

I am taking this opportunity to inform you of the progress and accomplishments of the CHES Special Committee assigned to the Certification Program.

At the risk of being redundant, I have capitalized previous reports and minutes presented at regular CHES meetings plus current events in order to create a complete picture.

As you may recall, a Research Committee
was formed in early August to determine the feasibility of a Certification Program for hospital engineers. By October, several meetings had taken place and much hard work had been completed, through the efforts of a dedicated committee, James Piro, Roy LeClaire, Tom Riccio, Alan Seagrave, David Elliott and our Ad Hoc Committee, Les Lewandowski and Rod Cameron.

Initially research began by investigating a variety of professional certification opportunities and most important of all, the ramifications surrounding the legal aspects of such a program. Our goals were to be able to present to the membership a program for certification by exam on a voluntary basis. It would be of such design as to afford members and non-members alike a meaningful recognition in the field of hospital engineering. Accordingly, examining and judging a fellow constituent could not be the function of our Society on any level.

The special Research Committee made an extremely interesting trip to Washington, D.C. on December 20, 1983 for the first formal meeting with Dr. John Antrim, General Manager of the National Institute for Certification in Engineering Technologies and National Society of Professional Engineers. At that time, I had requested and received approval from the Executive Board to finance the expense of a rental car to make the trip to Washington. All other expenses associated with the trip were absorbed by the committee members.

The purpose of the meeting was to educate us to the Certification Program in general to determine the feasibility of the program in the field of hospital engineering and to identify the criteria necessary to implement the program within the State of Connecticut.

I can summarize the meeting as being extremely encouraging not only for our Society but societies throughout the country. There is no question that the program is viable and can, in fact, be instituted in the form of a recognized certification in the field of hospital engineering.

Our initial task was to provide the background information for NICET relative to the work experience and knowledge necessary for one to function in this role. Since that time, the Special Committee has met on three occasions January 5th and February 8th. The meetings were held at Vallee's Steak House in Hartford and we have been most fortunate with the excellent attendance of all of our energetic committee members.

The committee's objectives were as follows:

a) to determine or refine the job competency comprising the engineer's area of responsibility.

b) to establish or refine certification criteria and minimum requirements for certification.

c) to determine what assortment of questions adequately measures specific competency and to classify the test questions by work element or functional area of responsibility in the prescribed format.

The Committee has been most successful in accomplishing this primary task. To date, 13 elements have been listed with approximately 45 areas of functional responsibility. These categories have been consolidated into five major elements and will eventually serve as a guide in writing and examination questions.

All material has been sent to the NICET office in Washington, D.C. for review and critique.

The committee has also addressed specific certification requirements, level of certification and question writing.

An you can appreciate, this is an enormous undertaking. . . a great deal of planning and energy must go into a program of this magnitude and I am sure, once in place the certification will be a meaningful recognition for all hospital engineers. It will surely recognize the uniqueness of our field to other professionals.

Certification also provides an individual with a sense of achievement since it reflects professional advancement in a chosen field and much more.

Basically, the idea of certification is still in its infancy and it would be inappropriate to attempt to predict exactly how long it would take to finalize and implement the total program. Part of the reason is that, although our ambition was to certify members of our Society and possibly those in the New England Group the NICET office was thinking along the lines of instituting a National program as a result of the CHES efforts.

Recently, I had spoken to Dr. Antrim who had returned from the National NICET meetings in California and Texas where the certification program for hospital engineers was presented and well received.

In closing, I would like to thank each of the Special Committee members for their efforts and willingness to assist in this endeavor and to you for your continued support.

I will continue to make every effort to provide complete coverage of any new developments regarding the Certification Program. Please feel free to contact me or any member of the Special Committee regarding the program.

- James J. Piro
President of CHES

NFPA NEWS

The Annual Meeting of NFPA took place in November 1983 in Orlando, FL. Among the items of interest to hospital engineers was the adoption of NFPA 99, the Health Care Facilities Code. This new document places most of the 56 and 76 series standards in one document, although they are not yet fully intergraded. This means that there are now only three NFPA books you will ordinarily need as a hospital engineer:

National Electrical Code (NFPA 70)
Health Care Facilities Code (NFPA 99)
Life Safety Code (NFPA 101)

The annual meeting passed a few amendments to NFPA 99, which under the rules go back to committee for approval before any change takes place. These amendments, if they receive final approval, would:

1. Remove the isolated power requirements from all but flammable anesthetizing locations.

2. Allow hospitals to use some low voltage equipment where oxygen is being administered by nasal canulae. This is presently not allowed within 5 feet of any part of the oxygen administration system.

3. Raise the equipment ground test limit from .15 ohms to .50 ohms.

This newsletter will report if these changes receive final approval.

WATER SURVEY

Your Hospital Engineering Society is conducting a water survey, its use, cost, etc. as it applies to the health care facility.

We have all seen surveys put together by nationwide agencies and associations where we have had little or no input. The intent of our survey is to compile statistics so as to be helpful to all of us in determining how our hospitals measure up in this situation. This survey will give you a fair rule of thumb in determining how water is being used in the health care facilities throughout New England.

We are all aware that water is becoming extremely scarce. It is still our most precious resource. It is also the most used and abused, even more so than fuel. In many parts of the world, including the United States, there is a vast shortage. In many parts of New England, restrictions have been placed on the use of water.

A survey form was sent to you in the r. Please take a few moments from your busy schedule today to complete the mailed questionnaire. The information gathered will be compiled and treated as highly confidential to the individual institution. However, each participant will receive a copy of the results.

As a member of the Society, I hope you will feel obligated to help in this endeavor. If you know of any hospital engineers who are not members and would like to participate in the survey, please either make them a copy, write or call me. I shall be glad to send them a copy. Thank you.

Edward Boyer, Chairman
Research Committee

UNIVERSITY OF CONNECTICUT HEALTH CENTER GETS NEW BUILDING MANAGEMENT SYSTEM

A $1.4 million contract was recently awarded to provide an environmental monitoring and control system for the University of Connecticut Health Center.

The system is manufactured and will be installed by the Building Automation Systems Group of United Technologies. The Center is one of the most modern medical and educational facilities in Connecticut. It provides an ideal location for advanced equipment which will reduce energy use and improve building operation.

Richard E. Popham, director of facilities at the Health Center, said, "We are pleased about this and are anticipating the installation of this advanced state-of-the-art equipment, which will aid us in efficient operation
and control of our plant."
The direct digital closed loop control system will monitor and control all of the heating, ventilating and air conditioning (HVAC) in the 1.1 million square-foot Health Care facility.
The system will also interface with the Center's existing fire and life safety system. As part of the contract, the facility's present environmental control center will be modernized.
The system includes 82 microprocessor-based unit controllers, which will gather temperature, humidity and energy usage data on their individual areas. The unit controllers will interpret the data and then automatically adjust the HVAC systems to meet the Center's requirements. Direct digital control will provide the Center with the highest degree of accuracy while maintaining a comfortable and energy efficient environment.

Data collected from the unit controllers will be simultaneously sent to a central computer where one operator can monitor and control all of the complex environmental systems.

A unique feature of this installation is that remote digital panels will be provided, which will simultaneously display all the temperature and humidity readings for air handling units and specified rooms. They will make it much easier to know what is happening in the remote areas of the Health Center.

Hospitals and other health facilities represent a major percentage of the marketplace of environmental control systems. This project, which was won against some difficult competition, represents a significant entry into this market by UTC.
The system is expected to be operational by February, 1985.

Located on a 150-acre campus, the UConn Health Center integrates facilities for professional, undergraduate and graduate medical and dental education, patient care and research.

INFRARED SURVEYS FOR ELECTRICAL PREVENTIVE MAINTENANCE

Recognizing the effectiveness of infrared surveys as part of an electrical preventive maintenance program, the National Electrical Testing Association has developed a specification for Infrared Scanning of Electrical Equipment. This issue of Testing Grounds will focus on the use of thermography as an inspection tool.

Before we discuss the application of thermography to the electrical distribution system, let's first examine the technology itself. All objects at temperature above Absolute 0° (-273°C) emit infrared radiation in proportion to their temperatures. Infrared radiometric or imaging devices contain one or more of infrared sensitive materials, known as detectors, which emit a small electrical signal in proportion to the amount of IR radiation received. Infrared detectors used in hand held scanners or radiometers generally function in the 2.5- or 8-14 micron range. Infrared detectors in common use include indium antimonide, lead selenide and mercury cadmium telluride to name but few. Single surface mirrors and optics with anti-reflective coatings are used to focus the infrared radiation onto the detector array. Because glass is not transparent to infrared, less common and more costly materials including germanium, sapphire or silicon are employed.

Once the infrared radiation is received and focused onto the detector, the electrical signal is processed to produce either a temperature readout or an image. In the infrared radiometer, this conversion is linear resulting in a digital display of the target temperature. An infra-red imager utilizes a cathode ray tube or a series of light emitting diodes to produce an image which is viewed through eyepiece or on a TV-like screen. This image, which varies in brightness in accordance with target temperature, may be recorded photographically, on video tape, or in the more sophisticated systems, on computer discs for future retrieval and manipulation.

Equipment is now available which will provide both image and temperature outputs. The cost of infrared equipment ranges from under $1,500 for the point radiometer to as much as several hundred thousand dollars for the most sophisticated radiometric imaging systems. For the purposes with which we are concerned, i.e. industrial plant maintenance, equipment costs range from $12,000 to $20,000.

Within the industrial plant, most operating equipment produces a recognizable thermal pattern identifiable to the trained eyes. Changes in these patterns, the presence of heat where none should be present are almost certain indicators that problems are developing. In the electrical distribution system, these thermal patterns can indicate many types of deficiencies. These include loose bolted connections, defective bus joints, loose switch blade contacts, poor fuse contacts, overloads or imbalanced loads, poor breaker contacts, defective splices, worn brushes and worn or dry bearings in rotating equipment. Needless to say, this is only a partial list the applications are far too numerous to list here.

Although infrared scanning is only one of many tests which should be performed on electrical equipment to insure its safe and proper operation, it has been proven that periodic thermographic inspections reduce equipment failures, production losses and repair costs. In many cases, production requirements do not allow for sufficient downtime to properly maintain electrical equipment. Since infrared scans must be conducted while equipment is energized and under load, thermographic inspections are of particular value in those plants where maintenance shutdowns are few and far between. If a shutdown is planned, an inspection several weeks before will help determine where limited manpower is best spent. Conducting an infrared survey provides the additional benefit of a visual inspection of the electrical equipment since it is necessary to remove covers from electrical equipment at the time the survey is performed.

Section 7.25 of the National Electrical Testing Association's Maintenance Specification describes the parameters for an infrared survey of electrical distribution equipment. First, as covers are removed from the equipment enclosures, a visual inspection is made to locate any obvious defects. At this time, bus alignment is also checked visually. Next, the equipment is scanned with a thermographic scanner capable of resolving a 1° temperature difference at 30°C (most commonly available scanners resolve temperature differences of 0.1°C at 22°C). Included are switches, bus duct, switchgear, terminations, cables, cable connections, circuit breakers, rotating equipment etc. Where potential defects are encountered, a thermogram (infrared photograph) and a reference photograph should be obtained of the suspect component. The rise above ambient should also be noted to evaluate the degree of risk presented by the defect. In this case, ambient refers to the temperature of normally operating like equipment under similar load conditions.

Once the infrared survey has been concluded, a report is prepared which contains an index of all areas inspected. Each potential problem must be documented separately. A data sheet describing the defect's location and identification, the temperature rise over ambient and the cause of the temperature rise should be furnished. Recommendations for corrective action should be included for each problem area. NETA has established the following criteria to evaluate the abnormalities detected:

1. Temperature gradients for 1°C to 3°C indicate possible deficiency and warrant investigation.
2. Temperature gradients of 4°C to 15°C indicate deficiency, repair as time permits.
3. Temperature gradients of 16°C and above indicate major deficiency; secure power and repair as soon as possible.

Finally, when considering an infrared survey, the qualifications of the equipment operator are of prime importance. Only qualified electrical personnel should conduct infrared surveys of electrical equipment. The survey technician must be familiar with all types of electrical equipment, as well as with the sophisticated thermal imaging systems. With careful preparation by trained personnel, infrared surveys can provide valuable information concerning the condition of electrical equipment.

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★ DO NOT FORGET ★

A.S.H.E. Annual Conference
June 18-22, 1984
Hollywood, Florida

N.E.H.E.S.
1984 Fall Seminar
October 17, 18, 19, 1984
Mystic, Connecticut
NEWS FROM THE STATES

Maine:
The Maine Hospital Engineer’s held their January meeting at Happy Jack’s in Lewiston.
We had a guest speaker, Mr. Douglas Davis and Associates of Scarborough, Maine on Infra-Red Gun for checking steam traps and electrical panels for hot spots. This would be a very useful tool in any maintenance department for preventive maintenance and energy conservation. The Unit that was demonstrated was their Raytek Mod. II unit, which retails for $1,895.00.

The business portion of the meeting consisted of selecting a new State President. Mr. Ernie Parks of Eastern Maine Medical Center was unanimously voted as State President. He takes over these duties because of Bryant Bourgeois being laid off at Mid Maine Medical Center.

We now have the job of possibly replacing our treasurer-secretary as he is unable to be an active treasurer-secretary.
Our next monthly meeting will be held in Brunswick. We are having a tour at the BNAS to see their new Chip Boiler.

- Percy Hanscom
President-Elect

APOSTROPHEIZATION OF THE NEW ENGLAND HOSPITAL ENGINEERS’ SOCIETY’S NAME

“The article I - Name” of this Society’s ByLaws states that the name of this corporation shall be “New England Hospital Engineers’ Society, Inc.” Note the apostrophization of the possessive noun Engineers’.

“Webster” says, “An Apostrophe and S (‘S) is usually added to a noun to indicate ownership or a relation analogous to ownership as used on the noun ‘Society’s’ in the paragraph. However, the apostrophe is often dropped from the possessive of nouns already ending in an “S” or “Z” sound as used on the noun Engineers’ in our title, despite the fact that this possessive form (which is a survival of old and middle English) is still proper today.

Therefore, in accordance with Article I of our By-Laws and in an effort to use proper English, I suggest that in the future all letterhead, format, plaques, emblems, banners, etc., include the apostrophe as is proper.

- Richard E. Popham
President-Elect

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