MEDDAC/DENTAC RISK ASSESSMENT CHECKLIST
FOR CONTRACT/SELF-HELP PROJECT DEVELOPMENT

In accordance with CG, TRADOC guidance, procedures must be implemented to ensure that risk assessments are performed on all contracts/projects. This risk assessment must be performed and approved by appropriate authorities to ensure the safety and health of military/civilian personnel, as well as the general public.

During the project development stage, the following checklist must be completed. If any question is answered "YES", specifications and drawing must be forwarded to the MEDDAC/DENTAC Safety Manager, so that a formal risk assessment can be performed.

CONTRACT/PROJECT POC:

CONTRACT/PROJECT NUMBER: | BUILDING/LOCATION:

DESCRIPTION OF WORK TO BE PERFORMED:

WILL THE PROJECT	YES	NO
1. Expose the public to hazards?		
2. Effect traffic flow?		
3. Involve the use, removal, or disposal of hazardous materials/waste?		
4. Involve the use, storage, or disposal of flammables?		
5. Involve compressed gases? (i.e. Oxygen, Nitrogen, Nitrous Oxide)		
6. Involve bloodborne pathogens or handling/disposal of infectious waste?		
7. Involve ionizing/nonionizing radiation? (i.e. X-ray, microwave, etc.)		
8. Involve electrical installation, modification, or repair?		
9. Involve the removal of asbestos?		
10. Involve the removal of ceiling or floor tiles?		
11. Involve cutting, burning, or welding?		
12. Involve shutting down heating, ventilation or air conditioning system?		
13. Involve the use of temporary heating devices?		
14. Involve hazardous noise sources?		
15. Involve high pressure steam, hydraulic, or air lines?		
16. Involve abrasive blasting?		
17. Involve high work above 16 feet? Will scaffolding be used?		
18. Involve excavation, or trenching in excess of 4 feet?		
19. Involve cranes, pile drivers, or other heavy construction equipment?		
20. Involve entry into confined spaces?		
21. Be in close proximity to utility lines?		
22. Block EXIT(s) or corridors (means of egress)?		

PRINTED NAME/GRADE/TITLE OF
PERSON COMPLETING CHECKLIST:

SIGNATURE: | DATE:

PRINTED NAME/GRADE/TILE OF
REVIEWING OFFICIAL:

SIGNATURE: | DATE:

SAFETY OFFICE USE

ATTACHED RISK ASSESSMENT
PERFORMED BY NAME/GRADE/TITLE:

SIGNATURE: | DATE:

Hazard Surveillance Survey

Date:________________ **Location:**________________

Topic	Passed	Failed	N/A	Comments
I. Environmental Controls				
Dropped articles				
Spills (water, other)				
Clean environment				
Flooring condition				
Doors propped open				
Storage areas orderly				
Fire Extinguisher available				
II. Electrical/Equipment				
Condition of switches				
Condition of receptacles				
Electrical Safety Checks				
Clutter?				
Faulty carts, chairs, etc.?				
III. Alert/Alarms				
Pull Boxes unobstructed				
Warning signage clear				
MSDS available				
Emergency Preparedness				
Fire Protection Functional				
IV. Staff Behavior				
Demonstrate proper safety				
Staff familiar with all Plans				
Contractors familiar with egress				
V. Life Safety Measures				
Egress routes clear				
Corridors clear of obstructions				
Access to Emergency Services				
Temporary Partitions in place				
Construction site restricted				
Comm. to Governing Body				
Construction site clean, orderly				
Fire protection doubled				
Alternate access for public				

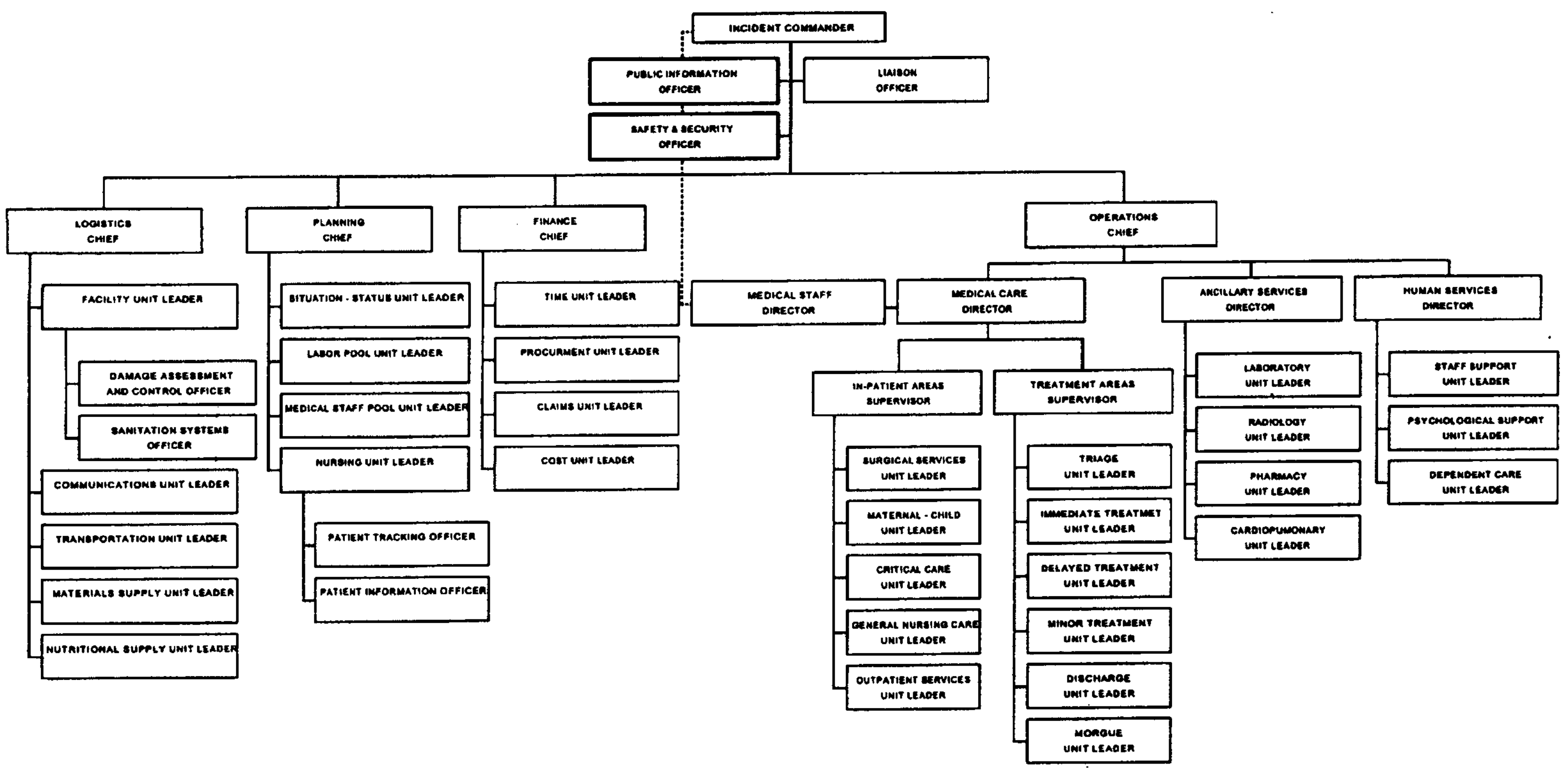
Construction Site Inspection

Date:____________________ **Inspector:**________________

Description	Yes/No	Comments
Contractor acknowledge Asbestos in writing		
Adequate barriers in place		
Smoke proof		
Dust proof		
Signage in place		
Applicable codes complied with		
Contractor acknowledge AIA A201 & Supplement		
American Disabilities Act compliance		
Occupational Health & Safety Admin. compliance		
Interim Life Safety in place		
Staff trained regarding Interim Life Safety		
Temporary Fire Protection in place		
Contractors aware of Egress routes		
Increase in fire drills, other training		
All exits clear		
Free access to Emergency Services		
Alternate access for public and emergency use		
Additional fire fighting staff & equipment available		
Smoking is strictly prohibited		
Construction site clean and orderly		
Hazard Surveillance occurring? How often?		
Staff informed if adjacent areas affected		
Construction site restricted		
Local authorities aware of Interim Life Safety		
Effective site storage of materials, other		
Fire zones maintained, staff aware of changes		
Contractor confirms egress routes for staff clear		

The Hospital Emergency Incident Command System (HEICS)

This organizational chart represents the *response portion* of a hospital's emergency or disaster plan. The HEICS management system fits within a facility's overall Emergency Preparedness Plan, and is supported by policies and procedures which outline this response plan's activation.



CHARACTERISTICS OF A GOOD INDICATOR

Objective: The indicator must be factual – without distortion by opinion, personal feelings, or prejudices. If subjective the sample must be large enough to generate confidence.

Measurable: An indicator must be measurable. If it cannot be measured, it is impossible to tell if change has caused improvement.

Well-Defined: There must be an accurate and consistent definition so that data collected by multiple data collectors over time are not skewed due to the different collectors or the different times. For example, when counting work orders: Are all work orders included, or just repair work orders, repair and maintenance work orders, project orders, and so on? Must be unambiguous.

Based on current knowledge/experience: Significant academic research should not be required to develop it.

Valid: The indicator must have a direct relationship to the structure, process, or outcome that it is measuring. For example, indicators that pool clinical engineering activities with housekeeping and/or plant maintenance tend to use square footage as a workload volume metric. Square footage probably is appropriate as one of housekeeping's workload volume metrics, but square footage bears no direct relationship to the quantity or complexity of medical equipment and therefore is not a valid clinical engineering workload measure.

Easy to obtain/inexpensive to accumulate: Data should be derived from another management process when ever possible – i.e., incident reports, work order closeouts, training tests, etc. If the data cannot be readily collected the indicator has no value. Do not select indicators that require development of a data collection system for that indicator.

Potentially Predictive: If the data is extrapolated into the future will the indicator show the probability of unpleasant outcomes?

REQUIREMENTS FOR STATISTICAL VALIDITY

Accuracy: How close the measurement is to the true value of the parameter; when a large number of measurements are made and averaged, how close the average is to the true value.

Precision: How close the measurement is to all other measurements made under similar conditions; repeatability, over the entire range of interest.

Reliability: Dependability, with emphasis on "consistency, the extent to which the measurement device or test yields the same approximate results when utilized repeatedly under similar conditions".

Sensitivity: How well the measurement responds to the stimulus. If sensitivity is too low, opportunities for response will be missed; if too high, false alarms will result.

Statistical Stability: "Any statistically significant result is 'stable,' in the sense that if the experiment were repeated, one could confidently expect similar results."

Validity: "The extent to which any measuring instrument, device, or test measures what it puports to measure."

Variation: The extent to which the indicator value reflects a stable system, in contrast to reflecting something new or special.

PROBLEM ANALYSIS TOOLS

Problem Analysis: Seeking to understand the root cause of a failure or deviation from the norm or intended outcome. You must visualize the relationships of the components of the system and the variables that influence the component behavior.

Flowcharts: Visually describes a process from start to finish showing relationships among the different steps in the process. Uses commonly accepted symbols to define standard actions or functions such as start/stop, decision points, any activity, and documentation.

Affinity Diagrams: Used during brain storming sessions, organizes verbal information into a visual typology. They cluster broad concepts into related groups and subgroups.

Cause and Effect Diagrams: Commonly known as "fishbone" diagrams they are formally "Ishikawa" diagrams. Starts with the problem and works backward to identify the causes and their effects. After the problem has been identified identify the major factors influencing the process ("4Ms" = methods, manpower, materials, machinery; or "4Ps" = policies, procedures, people, plant). Next identify the subfactors effecting each major factor.

Thematic Content Analysis: Similar to word content analysis seeks to identify recurring themes in verbal data such as a questionnaire.

Pareto Charts: Bar chart which is based upon the principle that 20% of the problems have 20% of the impact on the process. Sorts out the vital few and allows concentration of resources on those problems.

DATA ANALYSIS TOOLS

Data Analysis: Turns raw numbers or words into information. Tells you something about how the process is functioning. Use of statistical analysis techniques will provide an inference about the relationships and strengths of those relationships between two or more variables.

Checksheets: A matrix method of collecting data that simplifies the collection process by organizing the data as it is collected.

Histograms: Based upon the concept of the standard distribution or "Bell Curve". Data is presented in a bar chart. Display allows you to identify the central tendency and variability of the data.

Scatter Diagrams: Uses the X and Y axis to plot individual data points. Must have two variables to compare and results can be both positive and negative. Visual display shows the cluster of the data points. Tight clusters represent minimum variation while scattered clusters represent high variation. When least squares formula is applied to the data a regression is developed that will give a statistical inference about the strength of the relationships.

Run Charts: A line chart that plots data variation over time

Boxplots: Sometimes called a box and whisker plot, it offers a detailed picture of trends and variability over time. Data is divided into an upper quartile in 75% of the data points fall below; and a lower quartile in which 75% of the data points fall above. 100% of the data points fall between the highest and lowest data point. Data is further divided along the median point with 50% of the data points falling above and 50% below. The mean or average for all of the data points can also be calculated.

Control Charts: Used to rack variability in a process over time. Similar to run charts, control charts use greater high and lower statistical or control limits. Thus, as long as process variability remains within the control limits the process is in statistical control and need not be changed. The control limits define the degree of acceptable variation.

Process Capability Ratios: Relates requirements to actual performance. Variability is related to specifications and tolerances. Displays the data as a bell curve and calculates data variability in standard deviation units. Analyst defines the acceptable standard deviation in the process.

FOCUS PDCA

***FOCUS* PDCA**

F = FIND A PROCESS
- Process prioritization
- Customer research
- Review strategic/operational plans
- Identify the important quality characteristics

O = ORGANIZE TO IMPROVE THE PROCESS
- Select a team/individual who has process knowledge
- Create a plan

C = CLARIFY CURRENT KNOWLEDGE OF THE PROCESS
- Look at current process
- Identify quick and easy improvements
- Standardize best current method

U = UNDERSTAND THE SOURCES OF PROCESS VARIATION
- Measure the important quality characteristics
- Stabilize the process
- Identify process variables
- Measure key process variables
- Test to see if there is a relationship between key process variables and the important quality characteristics

S = SELECT THE PROCESS IMPROVEMENT
- Evaluate improvement alternatives for their potential effectiveness and feasibility
- Select the improvement

FOCUS *PDCA*

P = PLAN THE IMPROVEMENT
- Plan the implementation of the improvement
- Plan continued data collection

D = DO THE IMPROVEMENT TO THE PROCESS
- Make the change
- Measure the impact of the change

C = CHECK THE RESULTS
- Examine data to determine whether change led to the expected improvement

QUALITY TOOLS

TOOL	DESCRIPTION	COMMENT(S)
Brainstorming	❖ Way to elicit a large number of ideas from a group of people in a short period of time to help identify issues/problems that may need to be improved.	❖ Usually the first tool used when a group is formed to analyze a problem or issue.
Flow Charts	❖ Tool that graphically shows the inputs and outputs of a given system.	❖ Helps identify any redundancies or problems within a given process and/or system.
Cause and Effect Diagram (Fishbone or Ishikawa)	❖ Used to organize data derived from a brainstorming session ❖ Graphic tool used to explore and display sources of variation in a process	❖ The areas usually identified for the "scales" of the fishbone are: manpower, methods, environment, materials, equipment and others as appropriate.
Affinity Diagram	❖ The means of organizing data into meaningful categories by recognizing their underlying similarities. ❖ Organizes a large number of qualitative inputs into a smaller category, constructs or major dimensions.	❖ Useful for analyzing quality problems, defects data, customer complaints, survey results, etc. ❖ Can be used in conjunction with other techniques, such as cause and effect diagrams or interrelationship digraphs.
Control Charts	❖ Used to help identify the central tendency of a process over time. ❖ Analyzes processes	❖ X,mr charts: used to track individual values or measures taken on a process or its output. ❖ X,R chart (average and range chart): used to track measurement data that is gathered in subgroups between 2 and 9 and averaged out. ❖ X,s chart (average and standard deviation): applied to measurement data. ❖ np charts: used to track the number of defects in a process ❖ p charts: used to track the fraction of items that are defective in a given subgroup ❖ c chart: used to track the number of defects produced by a process when the area of opportunity is constant from subgroup to subgroup.
Run Charts	❖ Graph of data collected over time. ❖ Used to display variation and to detect the presence and/or absence of special causes	❖ Should be used for preliminary analysis of any data measured on a continuous scale that can be organized in time sequence. ❖ They answer the question: "was this process in statistical control for the time period observed?"
Pareto Charts	❖ Indicates which problems should be solved first per the 80/20 rule.	❖ Remember the pareto principle: "the vital few are the few factors accounting for the largest percentage of problems that occur within an organization."

Scatter Diagrams	❖ Plot of one variable versus another. ❖ Used to demonstrate cause and effect relationships.	❖ Scatter plots are used to answer such questions as: "does vender A's material machine perform better than vendor B's?" "Does the length of training have anything to do with the volume of errors that the employee makes?"
Interrelationship Diagraphs (ID)	❖ Graphically displays interrelated factors and show the relationship between factors.	❖ Used when dealing with complex cause and effect issues and/or problems.
Histograms (bar graph)	❖ Used to measure how frequently something occurs within a process. ❖ Pictorial representation of a set of data used to compare processes	❖ Valuable trouble shooting aid. ❖ This tool should not be used alone as a data collection methodology. Always use a run chart or control chart before constructing a histogram. These are needed because histograms will conceal out of control conditions due to the fact that they don't show the time sequence of data.
Arrow Diagrams	❖ Scheduling tool used to manage a project, which shows the preceding and succeeding activities.	❖ This diagram allows managers to plan for an entire project and prioritize critical activities.
Matrix Charts	❖ Used to analyze the correlation between two or more relate groups of ideas.	❖ Decision matrices can be used to help display the timing and responsibilities in a given process.
Check Sheets	❖ Forms designed to collect data in a systematic and consistent manner.	❖ Well-designed check sheets will answer questions such as: "how often does a particular problem occur?" "Has everything been done?" "Have all inspections been performed?"
Tree Diagram	❖ Logic diagram that visually displays the relationship of component parts to a whole.	❖ Often used to demonstrate how various projects interrelate at any one given time.
Force Field Analysis	❖ Planning tool used to understand and/or strategize a process or system.	❖ Helps identify any constraining forces and/or barriers blocking improvement initiatives.
Storyboard	❖ A display of data, analysis and decisions made during the phases of an improvement process.	❖ Can be displayed on a poster board or in a manual. ❖ Utilizes graphs, charts, diagrams, matrices and other display methods to tell the story of a project with minimal use of text.
MANAGEMENT TECHNIQUES		
Statistical Process Control (SPC)	❖ An application of statistical techniques/methods used to measure and/or analyze variation within a process.	❖ Important to have an in-depth understanding of the difference between common and special cause variation when using this technique. ❖ Common cause: variation in a process that is due to the process itself and is produced by interactions of the variables of that process. ❖ Special cause: variation in a process that is assignable to a specific cause(es). They arise because of some particular or special circumstance, which is not inherent in the process.

PDCA Cycle (Deming-Shewhart Cycle)	❖ Model used to assess and evaluate performance improvement initiatives within an organization. ❖ Helps to promote and maintain continuous quality improvement within an organization.	❖ P- plan the process for improvement ❖ D- implement the plan ❖ C- check for how the process has improved the overall functioning of the organization (i.e., lessons learned) ❖ A- act to hold the gains of what has been learned ❖ Otherwise known as Kaizen (cycle of continuous process improvement)
Quality Function Deployment (QFD)	❖ Rigorous system designed to obtain customer input and convey the voice of the customer to all individuals and organizational units. Sometimes called policy deployment.	❖ Often displayed by using the diagram: "house of quality." ❖ Clearly defines the long-range direction of company development in regards to customer satisfaction. ❖ A customer driven process for planning products and/or services.
Control of Quality Costs Analysis	❖ Accounting method used to analyze the total cost of quality.	❖ Prevention Costs- costs identified to prevent poor quality (i.e., training ❖ Appraisal Costs-costs associated with measuring, evaluating or auditing products and/or services (i.e., equipment maintenance) ❖ Failure Costs- costs resulting from products or services not conforming to requirements (i.e., cost of re-work, re-inspections, etc.) ❖ Internal Failure Costs- costs incurred for re-work prior to being delivered to the customer ❖ External Failure Costs- costs incurred after the product has been delivered to the customer (i.e., customer re-calls, processing customer complaints, etc.)
Hoshin Planning Technique	❖ Process-focused system of long term planning designed to convey the voice of the customer to everyone within the organization through the development and deployment of appropriate management policies.	❖ Also called management by policy. ❖ Frequently used to deploy strategic plans.

OPERATIONAL DEFINITIONS:

TOPIC	DEFINITION	COMMENT(S)
Quality Management	• According to Juran (1993), quality management is the process of identifying and administering the activities needed to achieve the quality objectives of an organization. • The system of activities directed at achieving delighted customers, empowered employees, higher revenues, and lower costs.	• Quality objectives should be tied into financial planning. • Attainment of quality requires activities in all functions of an organization.
Quality Assessment	• Organization-wide review of the status of quality.	• Comprised of four elements: a. cost of poor quality b. quality culture in the organization c. operation of the company quality system d. how the organization is compared to others
Internal Failure Costs	• Costs associated with failures and/or nonconformance within the organization.	• Examples: equipment failures due to lack of preventive maintenance; high staff turnover rates; hiring staff that are not qualified and/or competent for the position, etc.

External Failure Costs	• Costs associated with failures and/or nonconformance found in services after they have been delivered to the customer.	• Examples: potential compensable events; negligence, malpractice; etc.
Appraisal Costs	• Costs incurred in determining the conformance to quality requirements.	• Examples: quality control checks; maintenance and testing of equipment; safety checks; IG inspections; JCAHO surveys; etc.
Prevention Costs	• Costs in keeping failure and appraisal costs to a minimum.	• Examples: quality planning; quality audits; education and/or training of staff; performance appraisals; etc.

FACILITYMANAGEMENT

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CONSIDERATIONS TO PREVENT GROWTH AND SPREAD OF LEGIONELLA IN HVAC SYSTEMS

If we have learned one thing about Legionnaire's Disease since its discovery in 1976, it's that the bacteria that causes it thrive under certain conditions that exist within heating, ventilating and air conditioning (HVAC) systems. But, with proper system design and maintenance, adverse health risks can be avoided.

Affecting up to 100,000 people a year in the United States, Legionnaire's Disease is a pneumonia-like and sometimes-fatal illness that took its name from the American Legion Convention it "crashed" at the Bellevue-Stratford Hotel in Philadelphia. It is caused by the bacterium *Legionella Pneumophila*, which thrives in wet areas where conditions are favorable to growth. Carried in water vapor aerosols as small as 1 to 5 microns, the bacteria may be inhaled. Entering the deepest part of the lungs, the bacteria can attack any individual -- particularly someone with a weakened immune system.

Once an individual has been exposed to *Legionella Pneumophila*, pneumonia-like symptoms appear within 2 to 10 days of the exposure. The symptoms exhibited can include fever, chills, muscle aches, diarrhea, headache and a dry cough. Mortality rates of approximately 15 percent are frequently quoted for the disease, however treatment with antibiotics is usually effective.

The Ideal Bacteria Incubator
Within the context of HVAC systems, a number of potential breeding grounds for the bacteria exist. The most common location for the proliferation and amplification of *Legionella Pneumophila* within the HVAC system is the cooling tower. However, the bacteria thrive in humidifiers, drain pans and other sources where standing water may accumulate.

In the normal operation of a cooling tower, a number of conditions exist that are conducive to the survival and transport of the bacteria:

- A standing pool of water.
- Water temperature that is satisfactory to support bacteria growth -- the bacteria typically proliferate between 68 degrees Fahrenheit and 113 degrees Fahrenheit with significant growth occurring between 95 degrees Fahrenheit and 110 degrees Fahrenheit.
- Dirt and other particulate matter easily enter the open water system. These can provide nutrients for the *Legionella Pneumophila*
- Water mist is generated, allowing the bacteria to become airborne.

In fact, *Legionella Pneumophila* is present in the water samples of nearly all cooling towers. However, the levels of bacteria found in most cases are below those that would typically cause human health effects. So, while the mere presence of the bacteria is not cause for alarm, control of its levels is critical in minimizing the potential for detrimental health effects. Such control can be accomplished through the diligent design of the HVAC system, and the administration of an appropriate maintenance program including proper water treatment.

Minimizing Risk by Design

At the design and installation stage of an HVAC system, a number of considerations should be made to limit the potential for the growth of this bacterium and to minimize the potential for inhalation should it become airborne. These include:

- Locate the cooling towers far enough away from outdoor air intakes and other ventilation inlets (such as windows) to eliminate entrainment of water mist in the intake air. Prevailing winds should be considered in selecting a site for the cooling tower and outdoor air intakes.
- Locate cooling tower discharge away from outdoor air intakes, occupied areas, pedestrian walkways and other areas where people may frequently be present.
- Design enclosures for cooling towers to minimize or eliminate the potential for drift from the cooling tower.
- Locate kitchen and bathroom exhausts so that the exhausted air is not brought back into the building through the outdoor air intakes.
- Specify air-handling units with sloped, corrosion-resistant drain pans.
- Locate outdoor air intakes to minimize or eliminate the entry of rainwater.

Maintaining a "Clean" System

Once a system has been properly installed, a number of operation and maintenance tasks can be performed to minimize the potential for elevated levels of the *Legionella Pneumophila* bacteria. These include:

- Chemically clean and flush the cooling tower before putting it into initial service and before annual start-up if located in milder climates where seasonal operation is required.
- Ensure easy access to facilitate frequent, routine cleaning and maintenance.
- Maintain a proper water treatment program, including biocide treatment, to minimize the potential for bacteria growth.
- Perform regularly scheduled quantitative analysis of the cooling tower water for *Legionella Pneumophila* Remember that the mere presence of the bacteria should not be cause for alarm.
- Remove standing water from air handling unit drain pans and rectify problems to allow for proper drainage.
- Correct conditions contributing to the collection of standing water near outdoor air intakes.

When designing and installing an HVAC system, numerous factors must be considered from mechanical, aesthetic, functional and indoor air quality perspectives. However, minimizing the potential for the amplification of the *Legionella Pneumophila*bacteria in HVAC systems need not be expensive or difficult. The proper design of the HVAC system is an important first step. Once the system is designed and installed, appropriate operation and maintenance is critical in achieving this goal. Operating and maintenance schedules must be developed early, and diligently followed to control this bacterium below the levels that may cause health effects.

Jeff Coleman is senior product manager for service marketing in Carrier's Commercial Systems and Services Division, Syracuse, N.Y. For other insights regarding air quality, contact your Carrier representative for a copy of Carrier's Indoor Air Quality, A Guide for Management.

PUBLICATIONS OF THE COMPRESSED GAS ASSOCIATION

Pamphlet Number	Title
AV-1	Safe Handling & Storage of Compressed Gases
AV-3	Filling of Industrial & Medical Nonflammable Compressed Gas Cylinders
AV-4	Charac. & Safe Handling of Medical Gases
AV-5	Safe Handling of Liquefied Nitrogen & Argon
AV-6	Highway Transport. of Gases
AV-7	Charac. & Safe Handling of Carbon Dioxide
AV-8	Charac. & Safe Handling of Cryogenic Liquid & Gaseous Oxygen
AV-9	Handling Acetylene Cylinders in Fire Situations
AV-10	Safe Handling & Use of Medical Gases & Equipment in a
C-1	Methods for Hydrostatic Testing of Compressed Gas Cylinders
C-3	Standards for Welding on Thin Walled Steel Cylinders
C-4	ANSI Method of Marking Portable Compressed Gas Containers to Identify the Material Contained
C-5	Cylinder Service Life-Seamless Steel High Pressure Cylinders
C-6	Standards for Visual Inspec. of Steel Compressed Gas Cylinders
C-6.1	Standards for Visual Inspec. of High Pressure Aluminum Compressed Gas Cylinders
C-6.2	Guidelines for Visual Inspec. & Requalification of Fiber Reinforced High Pressure Cylinders
C-6.3	Guidelines for Visual Inspec. & Requal. of Low Pressure Aluminum Compressed Gas Cylinders
C-7	Guide to the Preparation of Precautionary Labeling & Marking of Compressed Gas Containers
C-8	Standard for Requal .of DOT-3HT Seamless Steel Cylinders
C-9	Standard Color-Marking of Compressed Gas Cylinders Intended for Medical Use
C-10	Recomm. Procedures for Changes of Gas Service for Compressed Gas Cylinders
C-11	Recomm. Practices for Inspection of Compressed Gas Cylinders at time of Manufacture
C-12	Qualification Procedure for Acetylene Cylinder Design
C-13	Guidelines for Periodic Visual Inspec. & Requal. of Acetylene Cylinders
C-14	Procedures for Testing DOT Cylinder/Safety Relief Device Systems
C-15	Procedures for Cylinder Design Proof & Service Performance Tests
C-16	Registration Program for Cylinder Owner Symbols & Company Names
CGA341	Standard for Insulated Cargo Tank Specification for Cryogenic Liquids
E-1	Standard Connections for Regulator Outlets, Torches for Compressed Gases Welding & Cutting Equip
E-2	Hose Line Check Valve Standards for Welding & Cutting
E-3	Pipeline Regulator Inlet Connection Standards
E-4	Standard for Gas Regulators
E-5	Torch Standard for Welding and Cutting
E-6	Standard for Hydraulic Type Pipeline Protective Devices
E-7	ANSI for Medical Gas Regulators & Flowmeters
E-9	Standard for Medium Pressure (3000 PSIG) Flexible P.T.F.E.-Lined Pigtails for Compressed Gas Service
G-1	Acetylene
G-1.1	Commodity Specification for Acetylene
G-1.2	Recommendations for Chemical Acetylene Metering
G-1.3	Acetylene Transmission for Chemical Synthesis
G-1.5	Carbibe Lime - Its Value and Its Uses
G-1.6	Recomm, Practices for Mobile Acetylene Trailer Systems
G-1.7	Standard for Storage & Handling of Calcuim Carbine in Containers
G-2	Anhydrous Ammonia
G-2.1	ANSI Safety Requirements for the Storage and Handling of Anhydrous Ammonia; ANSI K61.1
G-2.2	Guideline Method of Determining Minimum of 0.2% Water in Anhydrous Ammonia
G-3	Sulfur Dioxide
G-4	Oxygen
G-4.1	Cleaning Equipment for Oxygen Service
G-4.3	Commodity Specification for Oxygen
G-4.4	Industrial Practices for Gaseous Oxygen Transmission & Distribution Piping and Systems
G-4.5	Commodity Specification for Oxygen Produced by Chemical Reaction
G-4.6	Oxygen Compressor Installation Guide
G-4.8	Safe Use of Aluminum Structured Packing for Oxygen Distillation
G-5	Hydrogen
G-5.3	Commodity Specification for Hydrogen
G-5.4	Standard for Hydrogen Piping at Consumer Locations
G-6	Carbon Dioxide
G-6.1	Standard for Low Pressure Carbon Dioxide Systems at Consumer Sites
G-6.2	Commodity Specification for Carbon Dioxide
G-6.3	Carbon Dioxide Cylinder Filling & Handling Procedures
G-6.4	Safe Transfer of Low Pressure Liquefied Carbon Dioxide in Cargo Tanks, Tank Cars, & Portable Containers
G-6.5	Standard for Small Stationary Low Pressure Carbon Dioxide Systems
G-6.6	Standard for Elastomer-Type Carbon Dioxide Bulk Transfer Hose
G-7	Compressed Air for Human Respiration
G-7.1	ANSI Commodity Specification for Air
G-8.1	Standard for Nitrous Oxide Systems at Consumer Sites
G-8.2	Commodity Specification for Nitrous Oxide
G-9.1	Commodity Specification for Helium

Pamphlet Number	Title
G-10.1	Commodity Specification for Nitrogen
G-11.1	Commodity Specification for Argon
G-12	Hydrogen Sulfide
HB-3	Handbook of Compressed Gases
P-1	Safe Handling of Compressed Gases in Containers
P-2	Charac. & Safe Handling of Medical Gases
P-2.5	Transfilling of High Pressure Gaseous Oxygen to be Used for Respiration
P-2.6	Transfilling of Liquid Oxygen to be Used for Respiration
P-2.7	Guide for the Safe Storage, Handling & Use of Portable Liquid Oxygen System ins Health Care Facilities
P-5	Suggestions for the Care of High-Pressure Air Cylinders for Underwater Breathing
P-6	Standard Density Data, Atmospheric Gases & Hydrocarbons
P-7	Standard for Requal. of Cargo Tank Hose Used in the transfer of Compressed Gases
P-8	Safe Practices Guide for Air Separation Plants
P-9	The Inert Gases - Argon, Nitrogen and Helium
P-10	Standard for Vinyl Chloride Monomer Tank Car Manway Cover and Protective Housing Arrangement and Emergency Safety Kit
P-11	Metric Practice Guide for Compressed Gas Industry
P-12	Safe Handling of Cryogenic Liquids
P-13	Safe Handling of Liquid Carbon Monoxide
P-14	Accident Prevention in Oxygen-Rich & Oxygen-Deficient Atmospheres
P-15	Filling of Industrial & Medical Nonflammable Compressed Gas Cylinders
P-16	Recomm. Procedures for Nitrogen Purging of Tank Cars
P-17	Procedures for Pneumatic Retesting of Cargo & Portable Tanks
P-18	Standard for Bulk Inert Gas Systems at Consumer Sites
P-19	Hazard Ratings for Compressed Gases
P-20	Standard for the Classification of Toxic Gas Mixtures
P-21	Guidelines for the Development of Pre-Trip Inspec. Check List & reports for MC 338/TC 338 & TC 341 Cargo Tanks
P-22	The Responsible Management & Disposition of Compressed Gases & Their Containers
P-23	Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components
P-24	Guide to the Preparation of Material Data Safety Sheets
S-1.1	Pressure Relief Device Standards - Part 1 - Cylinders & Fitted Hose for Compressed Gases
S-1.2	Pressure Relief Device Standards - Part 2 - Cargo and Portable Tanks for Compressed Gases
S-1.3	Pressure Relief Device Standards - Part 3 - Compressed Gas Storage Containers
SB-1	Hazards of Refilling Compressed Refrigerant(Halogenated Hydrocarbon) Gas Cylinders
SB-2	Oxygen-Deficient Atmospheres
SB-4	Handling Acetylene Cylinders in Fire Situations
SB-5	Hazards of Reusing Disposable Refrigerant (Halogenated Hydrocarbon) Gas Cylinders
SB-6	Nitrous Oxide Security and Control
SB-7	Rupture of Oxygen Cylinders in the Diving Industry
SB-8	Use of Oxy-Fuel Gas Welding and Cutting Apparatus
SB-9	Recomm. Practice for the Outfitting and Operation of Vehicles Used in the Transportation and Transfilling of Liquid Oxygen to be Used for Respiration
SB-10	Correct Labeling & Proper Fittings on Cylinders/Containers
SB-11	Use of Rubber Welding Hose
SB-12	Use of Regulator Pressure Gauges
SB-13	Use of regulators on Compressed Gas Cylinders over 3000 psig
SB-14	Helium Gas for Filling Balloons
SB-15	Avoiding Hazards in Confined Work Spaces During Maintenance, Construction, & Similar Activities
SB-16	Use of High Flow Oxy-Fuel Gas Heating Torch Apparatus
SB-18	Use of Refrigerant (Halogenated Hydrocarbons) Recovery Cylinders
TB-2	Guidelines for Inspection and Repair of MC-330 and MC-331 Anhydrous Ammonia Cargo Tanks
TB-3	Hose Line Flashback Arrestors
TB-4	Certification for Exchange Product or Customer Pickup of Bulk Medical Liquids
TB-8	Evidence of Ownership of Compressed Gas Cylinders
TB-8.1	Poster Version
TB-9	Guidelines for the Proper Handling & Use of the CGA 630/710 Series "Ultra High Integrity Service" Connections
TB-10	Method of Calculating the Acceptable Level of an Impurity in Carbon Dioxide for Carbonated Beverage Applications
TB-11	Sulfur Dioxide tank Truck (Cargo Tank) Connections
V-1	CGA Standard for Compressed Gas Cylinder Valve Outlet & Inlet Connections
V-5	Diameter-Index Safety System
V-6	Standard Cryogenic Liquid Transfer Connections
V-6.1	Standard Carbon Dioxide Transfer Connections
V-7	Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
V-9	ANSI, CGA Standard for Compressed Gas Cylinder Valves

To order publications contact:
CGA
1725 Jefferson Davis Highway #1004, Arlington, VA 22202-4102
or Call: 703-412-0900 Ext. 799 or Fax: 703-412-0128

KEY TO CODE WRITING ORGANIZATIONS & SOURCES

NFPA: National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269

(800) 344-3555

JCAHO: Joint Commission on Accreditation of Health Care Organizations
One Renaissance Boulevard
Oakbrook Terrace, Illinois 60181

(708) 916-5800

CGA Compressed Gas Association, Inc.
1725 Jefferson Davis Highway, Suite 1004
Arlington, VA 22202-4102

(703) 412-0900 Ext #799

ASW American Welding Society, Inc.
NW Lejune Road
Miami, Florida 33126

(800) 443-9353 ext 270

ASTM American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

(610) 832-9585

USP/NF: United States Pharmacopia
12601 Twinbrook Parkway
Rockville, MD 20852

(301) 881-0666

AIA: American Institute of Architects
Committee on Architecture for Health
1735 New York Ave., N.W.
Washington, D.C. 20006

(202) 626-7300

IMPORTANT NFPA CODES

NFPA 10 – Standard for Portable Fire Extinguishers, 1998 Ed
NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems, 2000 Ed
NFPA 13 – Standard for the Installation of Sprinkler Systems, 1999 Ed
NFPA 14 – Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems, 2000 Ed
NFPA 17 – Standard for Dry Chemical Extinguishing Systems, 1998 Ed
NFPA 25 – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1998 Ed
NFPA 45 – Standard on Fire Protection for Laboratories Using Chemicals, 1996 Ed
NFPA 50 – Standard for Bulk Oxygen Systems at Consumer Sites, 1996 Ed
NFPA 55 – Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders, 1998 Ed
NFPA 70 – National Electrical Code, 1999 Ed
NFPA 70B – Recommended Practice for Electrical Equipment Maintenance, 1998 Ed
NFPA 70E – Standard for Electrical Safety Requirements for Employee Workplaces, 2000 Ed
NFPA 72 – National Fire Alarm Code, 1999 Ed
NFPA 75 – Standard for the Protection of Electronic Computer/Data Processing Equipment, 1999 Ed
NFPA 80 – Standard for Fire Doors and Windows, 1999 Ed
NFPA 82 – Standard on Incinerators and Waste and Linen Handling Systems and Equipment, 1999 Ed
NFPA 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems, 1999 Ed
NFPA 91 – Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Non-Combustible Particulate Solids, 1999 Ed
NFPA 96 – Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, 1998 Ed
NFPA 99 – Standard for Health Care Facilities, 1999 Ed
NFPA 101 – Life Safety Code, 1997 and 2000 Eds
NFPA 101A – Guide on Alternative Approaches to Life Safety, 1998 Ed (Applies to 1997 Life Safety Code)
NFPA 101B – Code for Means of Egress for Buildings and Structures, 1999 Ed
NFPA 110 – Standard for Emergency and Standby Power Systems, 1999 Ed
NFPA 111 – Standard on Stored Electrical Energy Emergency and Standby Power Systems, 1996 Ed
NFPA 115 – Recommended Practice on Laser Fire Protection, 1999 Ed
NFPA 170 – Standard for Fire Safety Symbols, 1999 Ed
NFPA 214 – Standard on Water-Cooling Towers, 1996 Ed
NFPA 220 – Standard on Types of Building Construction, 1999 Ed
NFPA 221 – Standard for Fire Walls and Fire Barrier Walls, 1997 Ed
NFPA 232 – Standard for the Protection of Records, 1995 Ed
NFPA 241 – Standard for Safeguarding Construction, Alteration, and Demolition Operations, 1996 Ed
NFPA 424 – Guide for Airport/Community Emergency Planning, 1996 Ed
NFPA 471 – Recommended Practice for Responding to Hazardous Materials Incidents, 1997 Ed
NFPA 472 – Standard on Professional Competence of Responders to Hazardous Materials Incidents, 1997 Ed
NFPA 472 – Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents, 1997 Ed
NFPA 560 – Standard for the Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigation, 1995 Ed
NFPA 600 – Standard on Industrial Fire Brigades, 2000 Ed
NFPA 704 – Standard System for the Identification of the Hazards of Materials for Emergency Response, 1996 Ed
NFPA 1561 – Standard on Emergency Services Incident Management System, 2000 Ed
NFPA 1620 – Recommended Practice for Pre-Incident Planning, 1998 Ed
NFPA 1999 – Standard on Protective Clothing for Emergency Medical Operations, 1997 Ed

GENERIC MANAGEMENT PLAN OUTLINE

1. Mission Statement

2. Program Goals (What you want to do/accomplish)

3. Program Objectives (How you expect to do/accomplish it)

4. Authority of Program Manager

5. Organization Reporting Relationships

6. Critical Processes
    a. Risk Assessment
    b. Inventory Development
    c. Reporting and Investigating Problems, Failures and User Errors
    d. Emergency Procedures/Failure /Response Plans
    e. Regulatory Requirements
    f. Staff Orientation and Training
    g. Maintenance Procedures
    h. Staff Drills, Inspections and Tests

7. Program Performance Monitoring Plan

8. Annual Plan Evaluation
    a. Scope
    b. Objectives
    c. Performance
    d. Effectiveness

9. Coordination With Other Plans (Emergency Management with Life Safety and Security, etc.)

10. Reference Documents (SOPs, Service Regulations or Instructions, Regulatory Requirements, Supporting Internal Documents, etc.)

COMMENTS:

1. The basic purpose of the management plan is to explain to the Joint Commission how your program functions and is managed. You have to do it so make it useful.

2. If well designed it will function as a desk guide and turnover manual for the program.

3. The command should adopt a standard format for all seven plans.

4. Use graphics whenever possible to explain functions or processes.

5. DO NOT FAIL TO CONDUCT THE ANNUAL PROGRAM EVALUATION. Make it a valid assessment and not simply a documentation exercise.