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## Legionella Pneumophila: A Continuing Threat

Anthony G. Marshall

*Florida International University*, [hospitality@fiu.edu](mailto:hospitality@fiu.edu)

Elio C. Bellucci

*Florida International University*, [hospitality@fiu.edu](mailto:hospitality@fiu.edu)

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# Legionella Pneumophila: A Continuing Threat

## **Abstract**

Legionnaires' Disease has been a continuing source of concern to researchers and to medical personnel. As a result of the questions regarding how it is spread, innkeepers must take certain precautions to protect their property and their guests. The authors offer several legal cautions as well as background information for everyone in the industry.

## **Keywords**

Anthony G. Marshall, Elio C. Bellucci, Legionella Pneumophila: A Continuing Threat, Legionnaire's disease, Hotel liability, CDC – Centers for Disease Control, Cooling Tower Institute, American Society of Heating Refrigeration and Air Conditioning Engineers, FIU

# **Legionella Pneumophila: A Continuing Threat**

by  
Anthony G. Marshall  
Dean  
and  
Elio C. Bellucci  
Associate Professor  
School of Hospitality Management  
Florida International University

*Legionnaires' Disease has been a continuing source of concern to researchers and to medical personnel. As a result of the questions regarding how it is spread, innkeepers must take certain precautions to protect their property and their guests. The authors offer several legal cautions as well as background information for everyone in the industry.*

If you don't know what Legionella Pneumophila is, you had better find out in a hurry.

They are bacteria which caused an illness that named itself when it first came to medical attention after convention guests at the Bellevue-Stratford Hotel in Philadelphia were stricken by it in July 1976. The attack left in its wake a terrible toll of 34 dead and another 221 stricken. It also left behind a panic-stricken populace and medical community which were in complete ignorance of what had caused this epidemic and how to treat those who were infected.

By now you should have guessed that the convention guests were all members of the American Legion and that Legionella Pneumophila are the bacteria that caused what was called Legionnaires' Disease.

Contrary to popular opinion, Legionella Pneumophila has not gone away; it exists today as a continuing threat to individual health and welfare.

Since the Bellevue-Stratford outbreak, newspapers have been repeatedly reporting additional outbreaks involving hotels both here and abroad. In the most recent incident, which occurred on April 27, 1985, it was reported that three people died and another 27 became ill at the Hilton Airport Inn located in Romulus, Michigan. This is not meant to imply that the disease strikes only hotels. There was also a recent outbreak at the New York Times Company building in New York on July 30, 1985. In that instance, six employees contracted symptoms of Legionnaires' Disease and another 23 reported respiratory problems. Blood tests on 16 of the victims revealed evidence of "past infection with legionella pneumophila, the causative agent of Legionnaires' Disease" (Associated Press quoting Dr. David Senser, City Health Commissioner, in a July

30, 1985, news release).

Why do we as innkeepers concern ourselves about what seems, at least at first blush, to be a medical or public health problem? Hotels have been singled out as one of the highest risk facilities for the possible epidemic outbreaks of Legionnaires' Disease and, as innkeepers, we are exposed to patronage loss, tort liability, and a sense of guilt for the death or infection of our guests if the same could have been prevented.

### **Disease Causes Business Loss**

The patronage loss is usually destructive. The Bellevue-Stratford Hotel was a prosperous property before its invasion by the disease. The property went into bankruptcy as a result of guest cancellations and abandonment. Even subsequent efforts by a major hotel chain to turn the property around did not work out. In the case involving the Hilton in Romulus, Michigan, a hotel spokesman was reported as saying that the incident had had a negative effect on business: "Over 150 people from a training seminar walked out of here." He further indicated that parties involved in other booked events were considering transferring them to other properties (Associated Press report, July 30, 1985). People are scared of this disease, and once a property has been infected, despite the application of all procedures to rid the property of the bacteria and to grant it a clean bill of health from the local health department, people still are distrustful and will be reluctant to take a chance and return to the property. The Legionnaires' Disease stigma does not wear off easily. It is much more like a tattoo than a paper transfer.

As to the tort liability, after a trial in Eau Claire, Wisconsin, a jury found not only the Holiday Inn Hotel, a Holiday Inn franchisee, liable for the death of a guest, but they also found Holiday Inns of America, the franchisor, equally liable. Investigation of the cause of Legionnaires' Disease epidemic which resulted in the death of four people and the illness of 20 others revealed that all had either been guests at the Holiday Inn Hotel or had been present on the property. When this common denominator was discovered, a thorough examination of the property revealed a heavy concentration of Legionella in the water cooling tower. It was believed that the bacteria found their way into the hotel through an unsealed chimney which was downwind of the water tower. While the hotel had treated the water cooling tower with algicide in order to prevent the growth of algae, they had not treated the water cooling tower with chemicals which were calculated to kill bacteria.

An expert who testified for the plaintiff in the case stated that the hotel should have checked its water cooling system at least once or twice a year and that it was a good idea to treat a cooling system with chlorine or some other bactericide in order to control the growth and spread of infectious bacteria. While we do not espouse that the standard of reasonable care is met by a "once or twice a year" inspection or treatment, it is apparent that the hotel did not inspect or treat at all for bacteria, and that clearly does not meet the "standard" in this enlightened date and time.

The interesting factor in this case is that the franchisor corporation was held liable. Richard L. Wachowski, the lawyer for the plaintiff, said that the theory of liability against the franchisor was that it was negligent

in not informing its franchisees of the risk of illness these types of cooling towers could cause and of any methods for properly maintaining them:

A year before the outbreak in Wisconsin there had been an outbreak at a hospital in Memphis where Holiday Inns is based. It received a great deal of media coverage and it was shown that there was a direct relationship between cooling towers and the outbreak of the disease. Our allegation was that the corporation (Holiday Inns of America) should have been on notice and made its franchisees aware of the potential problem (*Hotel/Motel Security and Safety Management*, February 1985).

While the case was settled with the plaintiff by the defendants for \$100,000, the settlement did not take place until after a jury had found both defendants responsible for the wrongful death of the plaintiff's husband but before the jury had returned a verdict as to how much the damages would be.

The Holiday Inn Hotel case is carrying a message to us loud and clear: Jurys will not accept a "do nothing policy" when it comes to taking reasonable steps to protect a hotel's guests from infection from a historically known source of contamination. A "do nothing attitude" is going to result in some heavy damages because, inasmuch as we are talking tort law, the door is wide open for the imposition of punitive damages. These are "get even" damages which have no relationship to direct damages flowing from the injury suffered by the injured party, but, rather, are imposed for the pure purpose of punishing the callous indifference of a defendant who doesn't care enough about a guest's health to practice some fatal disease control procedures. The damages are usually much higher than actual damages.

The third reason for an innkeeper's cause for concern with the Legionnaires' Disease problem is perhaps more moral than legal in nature but, nonetheless, it has a heavy bearing upon the industry and those who have opted to engage in it as their life's vocation.

So what do we do to protect ourselves? What do we do when all of the "experts" are uncertain and confused as to just what can or should be done in this battle? Let us start by trying to trace what has happened since the Bellevue-Stratford episode and the "discovery" of Legionella.

The medical community was thrown into a panic. Did they have another plague on their hands? What was this mysterious disease that struck out of nowhere, killing some and making others very ill? It seemed to be respiratory-connected and in instances produced pneumonia-like symptoms. Initial symptoms consisted of fever, chills, headache, and muscular aches and pains often followed by pneumonia. Very often they also included cough, chest pains, shortness of breath, mental confusion, vomiting, and diarrhea lasting 10-15 days. Damage to liver and kidneys was also occasionally seen. Mortality rate was about 15 percent. Pathological examinations of samples taken from both the dead and ill victims of the Bellevue-Stratford attack revealed the presence of an unfamiliar, rod-shaped bacterium, thereafter dubbed Legionella Pneumophila. The bacteria common to all the victims were identified

within six months of the Bellevue-Stratford outbreak, and continued experimentation by the medical community soon revealed that these bacteria responded well to a treatment regimen using the antibiotic erythromycin.

### **Disease Poses Problem For Industry**

However, there was still no knowledge of where the bacteria came from and how they got into the systems of the people whom they infected. This was the great mystery, a mystery which has until this day not been totally resolved. As a result, many leading medical research resources have failed to issue position statements or papers relative to the source of the bacteria, the manner in which they invade the human body, and effective prevention treatments, chemical or otherwise. In short, a quandary exists when it comes to which protective and preventive measures are to be taken to protect guests and the public against such infections. While we are not possessed of the material necessary for an absolute position paper from sources such as the United States Centers for Disease Control, the investigative work which has been done to date does clearly indicate the existence of certain information which cannot be ignored with immunity.

On September 29, 1978, the Bacterial Diseases Division of the U.S. Centers for Disease Control issued a report that an isolate resembling the Legionnaires' Disease bacterium had been recovered from an air-conditioning cooling tower near the site of an outbreak.

In another report dated October 12, 1981, the CDC referred to the above, stating there was no proof that the disease is spread to humans from contaminated air conditioning cooling towers. The division, while stating that it had no new or specific recommendations on cooling tower maintenance, did state:

Nonetheless, it might be prudent to encourage adherence to recommendations which have been made for many years for satisfactory mechanical operation of small to medium-sized cooling towers and evaporative condensers, which are used as part of the air conditioning systems of many public buildings and business establishments. Such units should be regularly treated with chemicals which have been tested and shown to be effective in preventing slime, corrosion or scale, algae, or high populations of bacteria in the cooling water or on water contact surfaces. Individuals or contractors skilled in maintenance of cooling towers should monitor treatment on a regular basis to ensure that it has been carried out. By reiterating these established recommendations, CDC does not wish to imply at this time that any type of chemical treatment of air conditioning components is necessary to prevent Legionnaires' Disease; nor does CDC yet have data proving that any specific treatment will be effective in treating the Legionnaires' Disease bacterium.

The report went on to say that CDC had begun laboratory work and consultations to determine whether cooling towers that may be contaminated by Legionnaires' Disease bacteria can be successfully decon-

taminated with presently available EPA registered microbiocides or whether they should be treated by methods or with chemicals not now generally recommended; how such treatment might be carried out safely and effectively would also be evaluated. Then it went on to reiterate that as of that time, however, the CDC had no new or specific recommendations on cooling tower maintenance.

On March 1, 1979, the Cooling Tower Institute issued the equivalent of a position paper which read in part as follows:

The Cooling Tower Institute endorses the recommendations of the CDC (as set out in a letter of 10/12/78) for normal good water treatment in order to minimize the possibility of cooling towers or evaporative condensers serving as a route of transmission of Legionnaires' Disease. We further suggest that operators of air conditioning cooling towers and evaporative condensers check their installations and, if the cooling tower or evaporative condenser is so positioned that the air discharge is likely to be drawn into an air intake for the same or a nearby building, particular care should be taken to diligently maintain a microbiocide program for the cooling tower or evaporative condenser.

In the event that public authorities require treatment of a cooling tower or evaporative condenser to ensure destruction of Legionnaires' Disease bacteria, the owner or operator should follow the then current recommendations from the CDC or other appropriate public health authority.

So we see that way back as far as 1978 and early 1979, some relationship between water cooling towers and evaporative condensers was recognized and some sort of chemical treatments and preventive programs were being espoused. These initial writings were starting to establish the standard of care to which innkeepers will be held. It is interesting to note also that the Cooling Tower Institute paper recognized the possible link between the air discharge of a cooling tower or evaporative condenser being drawn into an air intake source for a building. The Cooling Tower Institute does solicit papers from interested contributors to be presented at the various meetings which they sponsor. Copies of such papers are available from them at a nominal charge; several deal with problems addressed in this writing. However, the institute hasn't taken any positive position other than to say that they subscribe to the recommendations of the CDC and that the future recommendations of the CDC should be followed. So, again, we are left with nothing positive to guide us.

Another group which has been most active in trying to solve the Legionnaires' Disease enigma is the American Society of Heating Refrigeration and Air Conditioning Engineers. On July 26, 1979, ASHRAE issued an initial position statement on the matter of Legionnaires' Disease which indicated its support of the October 12, 1978, CDC report and declared that it would initiate its own investigative body to address the problem. It established a presidential ad hoc committee on Legionnaires' Disease made up of members who had backgrounds in science, medicine, and engineering and came from industry, private prac-

tice, government, and educational institutions. The committee submitted a two-part position paper on Legionella. The first part, submitted on January 23, 1981, and accepted by the ASHRAE Board of Directors on January 28, was entitled "Basic Information" and dealt with the problem in general. The second part, submitted on June 10, 1981, and approved by the Board of Directors on July 2, dealt with "Environmental, Energy and Economic Implications." Both sections are very thorough and in depth studies, but still they leave us with a marked degree of uncertainty as to how to fully protect guests from Legionella.

### **Bacteria Are Abundant In Environment**

All of the investigative forces seem unanimous in concluding that water or wet soil (mud) appears to be the habitat of the genus Legionella. Dr. Suzanne Laussueq of the Respiratory and Special Pathogene Epidemiology Branch of the Division of Bacterial Diseases, Center for Infectious Diseases, Centers for Disease Control of Atlanta, Georgia, stated in a recent communication:

Environmental studies by ourselves and other investigators have revealed the wide-spread presence of the organisms (Legionella) in the environment, mainly in water sources. This includes cooling towers, evaporative condensers, air conditioning units, potable (fit for drinking) water supplies, creek mud, lakes and streams. The widespread presence of the organism in water has made the interpretation of a positive culture difficult. It is quite clear that the organism is often present in potable water or cooling towers unassociated with disease, even in situations where highly immunosuppressed patients have been exposed to these sources. Studies have not demonstrated any enhanced risk of disease in cooling tower workers.

Dr. Laussueq's statement about the abundant presence of Legionella in the environment is borne out by all studies. This was also reported in the ASHRAE position papers. If these bacteria contaminate so much of our everyday environment, why is it that we do not continuously succumb to Legionnaires' Disease? There is evidence that the bacteria even survive chlorination of potable water. Why is it that the bacteria can be in the water we drink and in the food we eat and we do not become infected?

It appears that the main attack on the human body is through the lungs. While the bacteria have never been isolated from air, all evidence seems to clearly point to the fact that they are airborne when they attack the human body. The bacteria are ingested into the lungs in extremely small particles which permits them to become seated in the deep recesses of the lung where, after an apparent incubation period of three to nine days, the disease bursts forth in full bloom.

While it appears that the Legionella Pneumophila bacteria seem to predominantly invade the body through the lungs, the occasional finding of liver and kidney damage in some of the victims leads to the conclusion that in some manner or another they get into the bloodstream. Whether the route into the bloodstream is by being picked up by the blood as they go through the lungs or whether the bacteria have been ingested



into the digestive tract, they survive the destructive effects of the digestive juices and are then picked up by the circulatory system as the blood picks up the nutrients from the food we eat. Most believe that the former method is the manner in which the Legionella get into the bloodstream because they do not believe that the bacteria could survive the hostile environment of the digestive tract. However, until this has been definitely ruled out, the digestive tract cannot be ignored as a possible means of infecting the human body.

The exact route followed by the Legionella Pneumophila from the source to humans is not known. The strongest evidence seems to point toward the airborne route of infection. Because the expertise of the authors is in the law and not in medicine, science, or engineering, we shall try to indicate just where experimentation to date has placed you with regard to your legal duty and responsibility to try to prevent the attack upon guests by these bacterial invaders.

ASHRAE investigators felt that the bacteria found their way from a "deposition site" such as the lakes, wet earth, portable water supplies, shower heads, shower curtains, water towers, ductwork, filters in air conditioning systems, and a myriad of other places, to an "amplifier site." While they said that the distinction between a "deposition site" and an "amplifier site" may not always be clear, they have adopted the meaning of "amplifier site" as a place containing "a high moisture level with temperatures of 25-63 degrees centigrade. It is in these "amplifier sites" that it is believed that rapid multiplication of the Legionella Pneumophila takes place. The doubling time of the bacteria in some of these sites was reported to the ASHRAE investigators to be as little as 150 minutes. That translates itself into a geometric explosion of monumental proportions. For example,  $100 \times 2 = 200 \times 2 = 400 \times 2 = 800 \times 2 = 1,600 \times 2 = 3,200 \times 2 = 6,400 \times 2 = 12,800 \times 2 = 25,600 \times 2 = 51,200$ , *ad infinitum*. In our example we saw that in 9 x 150 minutes or 22.5 hours, the 100 bits of bacteria have become 51,200 bits of bacteria. Its like pouring a bottle of beer into a glass when the foam just rushes up and bubbles over.

Because of the rapid multiplication of the bacteria in the "amplification site," the site becomes highly contaminated. A cooling tower presents a perfect "amplification site." While cooling towers are not the only "amplification sites" on a property, they are sites very worthy of attention. In a paper presented at the Second International Symposium on Legionella by several members of the Vermont State Department of Health, "Legionella Pneumophila in Vermont Cooling Towers," the authors described a cooling tower as:

a wet type heat rejection unit (WTHRU) used to dissipate unwanted heat from air conditioning, materials processing, or manufacturing into the atmosphere. The heat exchange is accomplished by passing heated water through an air stream with cooling resulting from evaporation. The cooled water is collected and passed through the process again. Depending upon design and operation, approximately 5 percent of the water in the system is continuously lost by a combination of evaporation, drainage of water from the unit to control the buildup of solids, and ejections of aerosols from the unit in the

form of fine water droplets which become entrained in the airstream.

It appears that a cooling tower could serve two purposes in this chain between the source of the bacteria and the infection of the human. First, it seems to provide all of the elements necessary for an "amplification site" which enhances the rapid multiplication of the bacteria, i.e. moisture, heat, and nourishment. Tests also suggest that the growth of *Legionella Pneumophila* is enhanced by blue-green algae commonly found in water towers. Second, it provides the transport from the water tower in the ejected "aerosols from the unit in the form of fine water droplets which become entrained in the airstream."

In another paper submitted to the Second International Symposium on *Legionella* by R. Douglas Hume and William D. Hann, "Growth Relationship of *Legionella Pneumophila* With Green Algae (Chlorophyta)," the authors stated that the relationship between the growth of *Legionella Pneumophila* and green algae might parallel its relationship with blue-green algae. The algae abound in water towers and water systems that create aerosols. They suggest that the *Legionella Pneumophila* may concentrate in areas where the algae accumulates, i.e., the sediment and solid-water interfaces rather than in the water columns. Therefore, they suggest that the best place to survey and test the water systems would be at the interfaces, in the sediment, and near algal blooms. That may also make this the best place to attack the bacteria in an effort to eliminate or control their spread. The authors went on to say: "Inhalation of a single algal cell carrying *Legionella Pneumophila* may be an infective dose sufficient to cause disease. The proper use of algicides could help alleviate any potential health problems."

As indicated before, while other means of transport from a contaminated site in the environment to a human cannot be excluded, it clearly appears as if the transport is accomplished via the air.

The ASHRAE position paper discusses the airborne transport of the bacteria in detail. It states that in order for an airborne organism to be infective, it must be able to survive in air at least some of the commonly occurring combinations of temperature, moisture, and solar radiation. It is believed that the micro-organism is merely suspended when being transported in air and that it does not multiply. The paper went on to state that airborne organisms may be associated with dust or soil particles, or with water droplets. Evaporation of the water in the water droplets results in aerosols of very minute size, which may contain *Legionella*. Very low humidity with very rapid drying enhances survival of some micro-organisms, but others survive best under more humid conditions; which category *Legionella* is in is unknown. One limited study seemed to indicate the *Legionella Pneumophila* survived best under more humid conditions, but ASHRAE concluded that it could be transported over long distances under either condition.

### **Cooling Tower Appears To Be Villain**

Thus the cooling tower emerges as one of the number one villains in the Legionnaires' Disease scenario. It is capable of taking a minute amount of *Legionella Pneumophila* from some source which could be rain water, potable water utilized in the water system, or any other source,

incubating and multiplying the bacteria in the warmth of its innards, feeding it on a goodly supply of algae, and then, when the "amplification" process had produced a huge invading force of bacteria, loading the bacteria into the aircraft which will bear the infectious hoard to the front lines, the water droplets aerosols, and launching them into the atmosphere. The "amplification source" is usually located near make up air services or fenestrations that carry the airborne aerosols to their human targets. The aerosols are then breathed into the respiratory tract. The size of the particle will determine where it will come to lie in the respiratory tract. If the particle is large, it will become deposited in the upper respiratory tract. The smaller particles will penetrate further and become lodged deep in the lower respiratory tract. In both instances, the respiratory tract will act as an "amplification site," providing the warmth and moisture which promote the rapid multiplication procedure. Then, after a sufficient incubation period, it will strike the human repository down with illness.

It makes sense that the depth of the location of the infected area in the respiratory system may have something to do with the severity of the disease; the deeper the location, the greater the severity. This may explain the difference in symptoms as well as whether or not pneumonia will develop and whether or not the bacteria will invade the bloodstream. This may account for the two distinct *Legionella Pneumophila* related types of the disease which have been identified. One includes pneumonia and has been labeled "Legionnaires' Disease," which is less common, and the other is the non-pneumonic, less severe illness which is labeled "Pontiac Fever" and is more common.

An epidemiologic study done by the ASHRAE for the five-year period immediately preceding their position paper revealed that there were 1200 cases in 15 epidemics and 2300 sporadic cases in the United States. The studies revealed that there was a higher incidence of the disease in epidemics during the summer. Only four of the epidemics were clearly related to water cooling towers employed in air conditioning systems. Several other situations were less clearly related to such equipment. One epidemic was tied to contaminated shower heads and one may have been related to dust from an excavation. The study further revealed that it was probable that a low level of human infection with *Legionella* had existed for many years prior to its identification, but that infections have intensified during the last three decades because of the increasing use of equipment that exposes hot water to ambient air in ways that 1) permit contamination with *Legionella*, 2) encourage bacterial reproduction, and 3) generate aerosols that contain micro-organisms.

The report further stated that as of that time (1981), the Centers for Disease Control estimated the annual cases of *Legionella* in the United States to be between 40,000 and 100,000. The amplifiers which were implicated in these cases included natural environments, soil disturbances, water systems, and air systems both inside and outside. The position paper went on to state that for the purposes of the paper they would assume that there were 50,000 cases in the United States per year. Based upon CDC experiences, they further estimated that between 25 and 50 percent of those cases were associated with water tower heat reduc-

tion units located outside the buildings. They further estimated that about 50 percent of the water tower heat reduction units are adequately maintained; 25 percent receive marginal maintenance, and 25 percent receive poor maintenance. Further, for the purposes of the study and based upon the CDC experiences, the group assumed that 50 percent or 25,000 of the cases would be attributed to water tower heat reduction units; of these 25,000 cases, most would be attributed to marginally and poorly maintained units.

In view of these assumptions the group recommended, among other things, that ASHRAE should establish a continuing, active educational effort to encourage rigorous maintenance which would be beneficial to the property both from an economical and environmental point of view.

The group concluded that because of the widespread sources of Legionella, control of the bacteria in their natural habitat would be virtually impossible and highly impractical. The group also felt that while technology did exist for filtering particles such as Legionella from air and water with nearly 100 percent positive results, the problems created and the expense involved in its installation and operation made it impractical to utilize these systems at present. It was felt that high intensity ultra violet irradiation or ozone treatment might also be used. These, however, also pose problems as to expense and as to the ozone treatment; an NBC news item released in early October 1985 indicated that exposure to ozone had caused cancer in laboratory animals. Therefore, use of ozone treatment systems should await further research developments.

#### **Solutions Have Other Complications**

The group, however, did indicate that the growth or amplification of the Legionella could be controlled in the amplifier, i.e., the cooling tower by the use of chemicals in the treatment of the water used in the device. However, they are cautious when it comes to recommending what chemicals to use as well as the dosage. While they have no problem in arriving at just which chemicals will kill the bacteria, they have a problem in determining what caustic or corrosive effects the chemicals will have on the system; in addition, the chemicals used in destroying the bacteria may follow the same process in entering the building's air supply, thereby exposing the occupants of the building to the effects of the inhalation of the residue of these chemicals. Therefore, they are reluctant to recommend the use of such chemicals until there has been ample opportunity to fully determine what effects they will have on occupants. It is important that any chemical treatment plan utilized calls for the use of tested chemicals.

Dr. Laussueq also stated:

Several biocides have been shown, under controlled laboratory conditions, to be effective in decontaminating positive water for Legionella Pneumophila. These biocides are calcium hypochlorite, didecyl-ammonium chloride, and nitrilopropionamide. Fixed concentrations of guinea-pig passaged strains of Legionella Pneumophila were exposed in hypochlorite-free sterile tap water to several concentrations of each compound. Aliquots of this water were then inoculated

at various time periods on artificial media and in yolk sacs of embryonated eggs to detect growth of *Legionella Pneumophila*. Under these controlled laboratory conditions, these three compounds were identified as effective in decontaminating positive water for *Legionella*. However, CDC has also found cooling towers to be positive even when treated with suggested amounts of these and other biocides.

It is not known at the present time whether these or other biocides can maintain a cooling tower or potable water supply as *Legionella* free, and, more importantly, whether such maintenance will necessarily prevent an outbreak. In a situation where there is no disease associated with positive towers, it would be quite difficult to argue that such decontamination has effectively prevented an outbreak.

In the absence of demonstrated efficacy in prevention of disease, and faced with exposure of individuals to compounds of unknown long-term toxicity, we have not recommended routine environmental monitoring decontamination, or attempted preventative maintenance for *Legionella*. This in no way precludes an individual institution from undertaking any of these three possible routes.

We should not be content to merely rely on chemical controls, but we should look to make the whole property secure. We should check the locations of our amplifying units and try to make certain that they are not located in a position that makes it possible for the fluent air from the amplifier to become a part of the make up air for the building. A good filtration system for the incoming air would also help in trapping the airborne *Legionella* before they enter the building's air distribution system throughout the building.

All interior amplifiers should be checked and treated regularly and test samples taken. Approaches to the solution of the *Legionella Pneumophila* problem can only be suggested and foolproof control and/or irradiation formulas cannot be provided. The important point to remember is that all reasonable avenues available should be used to detect the presence of the bacteria about a property, both internally and externally, and all reasonable methods available should be utilized to eliminate the contamination and prevent the micro-organisms from gaining entry into the property and exposing guests to illness.

The law does not require absolutes in this matter; you are protected if you use reasonable care in the protection of your guests. You should be able to successfully avoid liability, the stigma of an infected property, and the guilt trip caused by the realization that you could have done something to avoid the death or illness of your guests if you establish a control policy and adhere to it.

At this juncture perhaps the best advice comes from Attorney Wachowski in the Eau Claire, Wisconsin, case: "The lesson to be learned by hotels is if you have a water cooling tower, you have to get it checked by a professional organization periodically and if that organization recommends chemical treatment, you must carry through" (*Hotel/Motel Security and Safety Management*, February 1985). If you do not, then you will be at your own risk.