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IS THE DESIGN ARCHITECT OR ENGINEER RESPONSIBLE FOR SICK BUILDING SYNDROME INJURIES?

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ABSTRACT

The Sick Building Syndrome (SBS), arguably linked to underventilation, has been recognized as a health problem causing roughly $3 billion in lost annual productivity. Accordingly, SBS contamination in occupied office buildings may result in the imposition of liability upon the ventilation system designer. To mitigate exposure to SBS liability, designers may be compelled to warn that certain energy conservation air-handling systems may cause SBS injuries.

Theoretically, a designer's minimum ventilation duty may be defined by local or national building codes, the practice in the community, or other less obvious standards. However, whether a designer has met the legal standard of care may instead turn on the reasonably predictable part-load ventilation performance of a variable-air-volume (VAV) system. This paper assesses a designer's duty and potential liability when confronted with a design that may result in an SBS injury.

INTRODUCTION

An Environmental Protection Agency (EPA) toxic-waste specialist recently described the air pollution inside her office in the following words, "By the time I had been there 15 minutes, my voice started cracking a little, then my eyes, throat, and ears started burning and I couldn't breathe."[1] Since this complaint is only one of many such problems reportedly occurring at the EPA's headquarters, this poor indoor air quality (IAQ) seems to fit within the heating, ventilating, and air conditioning (HVAC) industry's accepted definition of the Sick Building Syndrome (SBS).[2]

> According to industry IAQ [indoor air quality] standards, sick building syndrome (SBS) is diagnosed if significantly more than 20% of a building's occupants complain of such symptoms as headaches, eye irritation, fatigue and dizziness for more than two weeks, if the symptoms are relieved when the complainant leaves the building, and if no specific cause of the problem can be identified.[3]

Office ventilation has provided concern for decades, and numerous adverse health effects have been related to poor air quality.[4] Ongoing studies of IAQ suggest both health risks for building occupants and serious legal problems for engineers and contractors who operate and maintain building control systems.[5] Moreover, the effect of building-related injuries (BRI) on workers caused by SBS has been found to vary from headaches and nausea to more severe respiratory, neurological, or carcinogenic disorders.[6] Current estimates quantify the lost work hours attributable to SBS at more than 240 million annually, at a cost of roughly $3 billion.[7] A recent survey of 30 buildings disclosed that 65% of the buildings operated in an SBS condition, and more than half of the SBS buildings exhibited BRI.[8] This sick building statistic correlates closely with an earlier study which disclosed ventilation complaints in approximately one-third of 100 buildings studied.[9]

Given the recognition of SBS as a potential health problem, arguably linked with significant lost annual worker productivity, and the apparent widespread contamination of occupied buildings, is there a professional duty to design against these potentially injurious underventilation conditions? Is the duty prospective only, or retrospective and continuing? If the latter, are architects and engineers required to notify past clients of potential injuries that may arise out of the use of the ventilation system in strict accordance with the intent of the design?

Technical opinions have been circulating for many years throughout the engineering community criticizing the inadequate ventilation performance of certain building air-conditioning systems. These opinions may form the basis for a tort duty inquiry into the professional conduct of the ventilation system designer. Whether an architect or engineer has either met or failed to meet the requisite standard of design care may turn on the designer's fidelity to relatively new, but widely publicized, opinions concerning the application of well-known criteria to building ventilation systems.

A hypothetical ventilation situation is used in this paper to illustrate both the designer's changing legal duty and complex proof issues associated with a professional malpractice claim. The technical premise for the hypothetical

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ventilation duty inquiry will be a basic VAV air distribution system design for a low-budget office building. VAV systems were commonly used to air condition many office spaces constructed during the 1970s in response to rising energy costs.[10] However, since 1983, the part-load ventilation characteristics of VAV systems have been questioned, and some experts have argued that the under-ventilation performance of VAV systems is linked with SBS.[11]

To understand the designer's potential SBS liability to third parties, the reader must first understand that the legal system may rely on both ventilation standards and technical opinions to determine whether the designer has met the required legal standard of design care. Therefore, this is a hybrid paper. The initial focus is on the legal duty of architects and engineers. The discussion then turns to ventilation design criteria and the paper concludes by applying the presumed ventilation facts to the developing trends in negligence law in assessing a designer's potential liability to an injured office worker.

A DESIGNER'S LEGAL DUTY TO THIRD-PARTY CLAIMANTS

This analysis presumes that the injured claimants are office workers who were foreseeable during the design of the ventilation system. However, establishing the minimum design duty owed to an injured office worker is complicated by the dearth of authority on third-party personal injury claims against designers.

One of the earliest reported findings of architectural liability to a third party arose out of a boiler explosion that scalded a construction worker.[12] The appellate court in *Day* analyzed the design contract and charged the architect with the tort duty to protect those who may be reasonably foreseen to be imperiled by defective or improper construction or lack of adequate supervision.[13] The designer's non-contractual liability was predicated squarely on the contract for professional services:

> The terms and conditions of the architect's contract with the Building Authority clearly imposed upon the architect the obligation of supervising installation of all plumbing and heating facilities.[14]

While finding a breach of the duty to supervise, the appellate court also recognized that no rigid criteria could be established by which the duty of reasonable diligence and care may be measured in every instance.[15] However, the Louisiana Supreme Court reversed the earlier negligence verdict:

> Both breach of legal duty to the deceased (plaintiff) and proximate causation are prerequisites to tort liability. We have been unable to find a breach of such a duty by the architects or any fault on their part which was the proximate cause of the tragic accident.[16]

The Court limited the scope of the architect's negligence duty to the obligations associated with the contract:

> The narrow question here presented is whether the architects' contract with the owner imposed upon them the duty to be aware that the boiler was being installed by Vince, the plumbing subcontractor, and whether they were required by their contract to inspect the hot water system, of which the boiler was a part, during installation and before the boiler was tested by the subcontractor Vince.
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> Thus we do not think that *under the contract* in the instant case *the architects were charged with the duty* or obligation to inspect the methods employed by the contractor or the subcontractor in fulfilling the contract or the subcontract. Consequently we do not agree with the court of appeal that the architects had a duty to the deceased. . . .[17] (emphasis added).

Therefore, *Day* defined the designer's tort duty owed to third parties by reference to the architect's contractual obligations to the owner. A contractual-related tort duty has consistently been applied to third-party malpractice claims against designers.[18] Therefore, since liability to third parties is tied to the obligations of the design contract, what then is the measure of an architect's minimum standard of care ("tort duty")?

It is well settled that, absent an express contractual provision, an architect does not guarantee the owner a perfect plan or a satisfactory result.[19] However, the duty of a design professional to use the standard of skill and care employed by others engaged in the same profession in the same locality is implied in every contract.[20] Therefore, negligence liability to those in contractual privity attaches ordinarily only when the designer's professional conduct falls below the local standard of skill and care.[21]

The designer's malpractice negligence test employed when privity of contract exists appears to remain invariant, even when applied to third-party claims. Contractors, subcontractors, and sureties, all lacking privity with the designer, have all been found to have a negligence action.[22] The third-party malpractice duty inquiry is identical to one used in owner and designer controversies; an architect or engineer must adhere to the standard of care and skill practiced by others engaged in the same profession in the same locality ("community professionalism" standard).[23] Therefore, the weight of the traditional precedent suggests that the architect or engineer owes a duty to employ only community professionalism to protect third parties from harm. However, does the duty change depending upon the judicially perceived misconduct of the designer?

The Changing Standard of Care

While the designer's contractual duty may be expected to change with the scope of each professional services agreement, the implied community professionalism standard should be consistent. However, some appellate courts appear willing to fashion new duty rules for architectural misconduct, and re-engineer malpractice evidentiary requirements.[24] These iconoclastic circuits have alternatively suggested that malpractice claims should be decided on a case-bycase basis, and have either adopted or alluded to exceptions to the community professionalism evidentiary standard.[25]

The Traditional Duty and Evidentiary Requirements To prevail on a malpractice claim, both duty and breach of duty must be proven.[26] Traditionally, breach of duty is established by expert testimony as to the standard of care practiced in the locality, and the designer's failure to adhere to that professional duty.[27] Accordingly, a minimum evidentiary rule has evolved which bars recovery absent the introduction of adverse expert testimony. "Since the duty was not established, it logically follows that there can be no conclusion as to a breach thereof."[28] The same

expert proof evidentiary standard appears to also apply in personal injury claims because the architect's defense in *Day* was sustained only after the defendant proved performance in accordance with good and accepted architectural practice.[29]

The general rule is that designers must render architectural and engineering services in accordance with a community professionalism standard. Competent proof of negligence requires that both the community professionalism standard and breach of that duty be established by expert testimony. Therefore, credible experts must demonstrate both a comprehensive knowledge of the professional level of competence in the locality and expertise on the subject matter. However, precise expert testimony on emerging ventilation issues may be impossible to adduce in SBS cases. Proof of ventilation malpractice may not be available because ventilation design criteria may be changing and engineering opinions critical of existing design practice may not have been widely accepted in the local technical community at the time the design was completed.

A Community Professionalism or National Design Standard What is the legal duty when the community professionalism standard is either unsettled or local professionals adopt standards that are inconsistent with sound design practice? The duty arising out of professional practice appears to be amorphous. Therefore, the concept of duty will be explained by examining decisions that have reached the negligence liability of designers when the design standards were either unsettled or inconsistent with sound practice. Predictably, the traditional defense to these types of negligence claims has been to plead conformance with the community standard. Similarly, the first theory of liability has been to suggest that the customary standard of professional practice in the community was negligent.

Conformance with the community standard is not a prophylactic that insulates a designer from exposure to a malpractice claim. A designer's conduct was found to be negligent when the engineer, like many other designers in the community, failed to obtain *in situ* soil test data before designing a widely spaced grade beam foundation for a home.[30] In scrutinizing the engineer's duty, the court found alternative negligent acts:

> There are two possible breaches of this duty suggested by the record: first, the failure of the engineer to have the soil tested in order to determine how the foundation should be designed to meet the soil characteristics of the site; and, second, the *failure* of the engineer to *include* the grade beams required by *sound engineering practice*.[31]

The first count of negligence appears to pierce the community professionalism defense because many other local designers had adopted a similar practice. It could also be argued that the latter inquiry, in focusing on sound engineering practice, substantially deviated from the traditional community professionalism malpractice test.[32] Although the sound engineering inquiry departure appears to have been unnecessary (the defendant's own expert condemned the grade beam design), perhaps when the community professionalism standard is not proven, is deemed substandard, or when there is no consensus as to the appropriate professional conduct, then the negligence review should be referenced against sound engineering principles.[33]

A sound design duty standard seems to harmonize with those decisions which hold that a profession cannot be shielded from liability by adopting either negligent or substandard conduct as the measure of acceptable practice:

> No profession may, by adopting its own standards of performance, method of operation, or paragons of care, insulate itself from liability for conduct which ordinary reason and logic characterize as faulty or negligent.[34]

These decisions also seem to require a minimum level of competence in the local professional community.[35]

A Community Professionalism or Common Sense Design Standard Both the community professionalism defense and the requirement for expert proof were recently emasculated.[36] Without relying on expert proof, the *Womack* court held that an architect was liable to the contractor for omitting wind bracing details from renovation contract documents:

> It is *common sense* to conclude that it is the duty of an architect to use reasonable skill and care to determine the location of important structural elements before he completes his plans and authorizes work to begin in accordance with those plans. Schwing's [the architect's] error in failing to discover the X-brace is the sort of omission *from which a layman can infer negligence. Expert testimony is not required* for plaintiff to prevail on this point.
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> It [the architect] owed to plaintiff the duty to use reasonable skill and care in the preparation of plans on which plaintiff would base his bid and do his work. Schwing [the architect] breached that duty. That breach caused the harm plaintiff complained of. The *risk of harm* encountered by plaintiff *falls within the scope of* protection afforded by that *duty*.[37]

Moreover, where a professional's conduct was clearly improper and manifestly below reasonable standards, negligence may be proven by the application of ordinary intelligence to the facts.[38] However, the technical facts appear to be too complicated for a lay jury finding, particularly if expert proof is introduced to rebut a *prima facie* showing of ventilation negligence. Therefore, unless a building was designed without a mechanical ventilation system and was hermetically constructed, it does not appear that a common sense inference of negligence, based on a layman's intelligence, could be applied properly in an SBS malpractice action.

Summary Tort Duty The design duty owed third parties arises from contract, and arguably ranges from community professionalism to sound design practice. A designer's negligence may be found by using a layman's common sense inference only when the error is obvious. However, the layman's test appears to be of limited or no utility in SBS and BRI cases because the technical nature of the duty inquiry appears to preclude a lay finding of malpractice. Finally, where the practice employed in the local professional community is substandard, conformance with accepted but negligent standards will not insulate the designer from liability.

WHAT IS THE MINIMUM TECHNICAL VENTILATION DESIGN STANDARD?

What is a Designer's Minimum Standard of Care?

Beginning with the premise that the designer's conduct will be judged against the level of professional competence employed by other engineers and architects practicing in the community, what then are the appropriate ventilation design criteria? Many lawyers might suggest that the applicable state and local building codes define the minimum outdoor quantity that must be introduced into the building by the ventilation system. However, building codes governing construction in the New Orleans area disclose little ventilation guidance for the designer. Moreover, the New Orleans codes address only the ventilation requirements for limited areas of buildings, while codes adopted in adjacent jurisdictions define minimum outside airflow rate requirements for entire buildings, and are based on expected occupancy levels.

For instance, on January 13, 1987, New Orleans adopted the Standard Mechanical Code (SMC). The SMC provides ventilation criteria for exhausting lavatories, toilets, bathrooms, and restrooms.[39] But the building code for the parish adjacent to New Orleans provides instead that 5 cfm of outdoor air is required for each person.[40] Current national technical ventilation publications suggest a much greater minimum ventilation airflow rate is necessary, and also urge designers to schedule ventilation flow rates in excess of those required by applicable building codes.[41] Moreover, an engineer has written that a minimum 15 cfm ventilation airflow rate for each occupant should be used.[42] Therefore, because the building codes are inconsistent and do not appear to reflect a learned consensus on appropriate ventilation design requirements, it can be argued that building codes do not define the designer's minimum level of ventilation care.

As an alternative, ventilation practitioners might suggest that the American Society of Heating, Refrigerating, and AirConditioning Engineers, Inc. (ASHRAE), which publishes both technical handbooks and journals for use in the HVAC industry, provides the appropriate ventilation design criteria:

> The 1985 Fundamentals volume of the ASHRAE Handbook is the latest step in a continuing effort to provide the *most comprehensive* and current sources of reference *data on* air conditioning, heating, *ventilation* and refrigeration.[43]

Support for adopting the ASHRAE criteria may be found in testimony that was based on the ASHRAE manual in a judicial proceeding conducted more than 13 years ago.[44] Since the ASHRAE Guide and related standards define both air-conditioning and ventilation design criteria, and at least some testimony based on ASHRAE has been favorably received in a judicial forum, the ASHRAE Handbook and standards will be used in the hypothetical situation in this paper to initially define the minimum standard of professional ventilation care and skill.[45]

In addition to the Handbook and standards, technical articles are published in the ASHRAE Journal. However, the Journal articles are not ASHRAE standards, and ASHRAE does not necessarily agree with these published statements or opinions.[46] Nevertheless, the Journal frequently contains indoor air quality opinions and ventilation guidelines. Additionally, other published technical articles have demonstrated a further awareness in the HVAC community of the potential link between under-ventilation and both SBS and BRI.

The hypothetical situation used in this paper presumes that the ASHRAE standard establishes the initial minimum ventilation benchmark for design. ASHRAE Ventilation Standard 62-1981 (1981 Standard) expressly purports to define the minimum outdoor air supply rates for various types of occupancies.[47] Although the 1981 Standard was not adopted by either the Standard Building Code or Standard Mechanical Code, parts of these model codes generally allude to ASHRAE standards or publications.[48] Therefore, it appears reasonable to apply the 1981 Standard as the minimum ventilation design criterion used by HVAC professionals in a hypothetical community.

The Changing ASHRAE Standard A revision has been proposed to the 1981 Standard that may be approved by ASHRAE during 1989.

> Many believe it [the revised standard] will provide a margin of safety which will *enable designers to be reasonably confident* that they are providing work and living spaces that are both healthful and conducive to improved productivity (emphasis added).[49]

The inference in the comment introducing the proposed standard is that the present standard leads to an unreasonable design. Perhaps the "unreasonable" design inference arises out of the failure of the drafters of the 1981 Standard to include application design criteria in the ventilation recommendation. Alternatively, the implied lack of confidence in the existing standard may be rooted in the test data underlying the ventilation recommendations, which were developed more than 50 years ago.[50]

Calculating the ASHRAE-recommended ventilation rate is relatively straightforward and "involves looking up values of ventilation air per person in a table . . . and multiplying by the anticipated maximum number of people in a space to determine the minimum ventilation air quantity for the system serving the space."[51] Therefore, assuming this basic quantification procedure was followed by the HVAC designer, it would appear that the full-load ventilation requirement for the building was properly (nonnegligently) quantified. However, merely calculating the outdoor airflow rate intended to be circulated does not ensure that the ventilation system will always introduce the designer's minimum outdoor airflow rate into a fully occupied building.

In summary, the standard merely describes the designer's duty to quantify the minimum ventilation airflow rate for an occupied building.[52] However, the standard is silent as to the minimum part-load ventilation performance of a VAV air distribution system. Therefore, because adequate ventilation is a function of both quantification and circulation, these design considerations may form the basis for a tort duty and breach inquiry. It is likely that the minimum ventilation design quantification calculation will be judged against the appropriate minimum ventilation standard. Secondly, the ventilation circulation system will probably be examined to discover whether the ventilation system continuously introduces the minimum outdoor airflow rate required by the quantification calculation into the occupied building.

Conflicting Ventilation Design Considerations The appropriate ventilation design litmus test becomes much more difficult to read when analyzing the performance of an energy-efficient air distribution system. Some energy-efficient HVAC systems were designed to circulate the maximum design airflow rate only at full-load conditions. These same systems were intended to circulate a reduced total supply (outdoor and return) airflow rate at part-load cooling conditions (VAV).[53] However, a reduced supply airflow rate may also cause a reduction in the ventilation airflow rate at part-load operating conditions, even though the building may be fully occupied.[54] Therefore, while a deft application of ASHRAE's quantification criteria may yield a conforming VAV system design at peak (cooling) airflow rate conditions, this design process may also result in an under-ventilation condition at part load.

The Duty to Design Both an Appropriate and a Constant-Volume Ventilation System Is there a consensus in the HVAC community as to what constitutes appropriate ventilation design criteria? While the latest ASHRAE ventilation standard was issued in 1981, it was not incorporated into the New Orleans area building codes. Moreover, the comments to the revision to the 1981 Standard appear to adopt the frequently published technical opinion that inadequate part-load ventilation occurs in VAV systems.[55] Therefore, the key inquiries appear to be what technical standard and circulation system technology was appropriate at the time the ventilation design duty arose.

More than five years ago the sick building syndrome was acknowledged as an increasingly modern malady.[56] Also, in 1983, an ASHRAE technical committee announced that "VAV in interior zones will operate at minimum volume for most of the time and ventilation will be inadequate."[57] More recently, several authors have cautioned the design community that VAV systems were either aggravating the indoor air pollution problem or under-ventilating buildings at part-load conditions.[58] Nevertheless, ASHRAE has only recently published excerpts of a proposed amendment to the 1981 Standard:

> For the most commonly applied variable air volume (VAV) system concept, supply air flow varies in response to cooling load. The ventilation requirements usually will not vary in the same manner as the cooling load. However, not only total air flow, but ventilation air flow might be reduced in response to a space thermostat controlling supply air flow.
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> This condition is addressed in the Standard (ASHRAE 1987) 5.4 When the supply of air is reduced during times the space is occupied (e.g., variable air volume systems), provision shall be made to maintain acceptable indoor air quality throughout the occupied zone.
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> Also in 6.1.3.2, referring to the air quantities given in Table 2, "While these quantities are for 100 percent outdoor air, they also set the amount of air required to dilute contamination to acceptable levels."[59]

These comments in the ASHRAE Journal appear to coincide with the previously published under-ventilation opinions that were critical of both the standard and certain VAV applications. Therefore, designers who continue to ignore the under-ventilation warnings may be found to have breached their minimum design duty whenever the ventilation performance of a VAV system falls below the minimum required ventilation airflow rate.

CONCLUSION: FULFILLING THE PROFESSIONAL'S VENTILATION DUTY

Establishing the Appropriate Ventilation Design Criteria and Designing the System to Maintain the Minimum Airflow Rate

It is unlikely that an engineer's initial ventilation airflow rate determination, if based on the minimum outdoor air requirements listed in a technically out-of-date building code or other standard, will be adjudged non-negligent conduct. Even if a 5 cfm design predicate is accepted in the community, this basis will probably not survive stricter negligence scrutiny should expert testimony disclose that 15 cfm is the current minimum.[60] An objective fact-finder, even without the benefit of adverse expert testimony, is likely to question whether a ventilation rate of 5 cfm per person is appropriate considering that ASHRAE-recommended levels were based on experiments conducted nearly 50 years ago before modern building materials were created and before SBS was a known problem.[61] What then is an appropriate ventilation design practice?

Theoretically, one relying on the 1981 Standard could assert the shield of conformance with the community professionalism standard as a defense to an SBS claim. A defendant could claim correctly that even the unofficial ASHRAE comments criticizing part-load VAV ventilation performance were only released in late 1988. But even if the community professionalism practice was in conformance with an earlier ASHRAE standard, was the designer's reliance reasonable in light of the frequently published technical opinions criticizing the then-current ASHRAE standard and typical VAV ventilation design practice? If the community standards and design criteria are inappropriate, conformance is not necessarily a bar to designer malpractice liability, because professional custom is not an excuse for negligence in the face of conduct constituting the proximate cause of the injury.

Similarly, an understanding of the fundamental principles of fan performance may compel the conclusion that a reduction in the ventilation airflow rate was foreseeable during the part-load performance of many VAV systems.[62] More than five years ago the ASHRAE Journal reported that inadequate ventilation in VAV systems would occur most of the time.[63] Therefore, whether conformance with the custom in the profession is sufficient to insulate the designer from liability may depend upon whether the local professional standards are found to be acceptable or inappropriate in light of the nationally published technical opinions. Therefore, because of the technical nature of the inquiry, an IAQ negligence duty determination will probably follow an inverted negligence test, and may depend more upon the expert causation testimony than conformance with the community standard of design care.

Is the Ventilation Duty Prospective or Retroactive?

Whether an engineer violated a ventilation design duty may also be controlled by the design professional registration laws. For example, the Louisiana Engineering Rules of Practice define gross negligence in terms of the time when the contract documents were issued:

> The preparation of an incomplete or inaccurate engineering or land surveying plan or document that is below ac-

ceptable standards, which is released for construction or other lawful purposes, and which could result in financial loss or injury.[64]

Therefore, if the registration regulations provide the design negligence test, it appears that the duty inquiry should be evaluated based upon both the local community professionalism standard and possibly the national technical information available at the time the design was released for construction. Therefore, because of changing technical ventilation guidelines, it appears that the duty inquiry must be bifurcated into compliance with the standard of care at the time the design was sealed, and whether a subsequent duty to warn has arisen.

For at least five years commentators have criticized existing ventilation system design practice. This criticism may signal a need to increase the ventilation rate designed into existing structures. The undercurrent of designers who advocate increased ventilation airflow rates seems to suggest a change in interest of the health of building occupants from what might have been customary design practice.

A recent opinion by the California attorney general suggests that an engineer owes a duty to notify third parties upon the discovery of building conditions which may present an imminent risk of serious injury.[65] However, the attorney general's opinion may be limited by the unique facts of that case. The California opinion was based upon a physical building inspection by an engineer, coupled with an express finding of an imminent risk of serious injury and building code violations.

Since inadequate ventilation opinions have been circulating for more than five years, an SBS claimant could argue that the duty of the designer was to follow the published warnings and not to ignore a clear and present health risk. Similarly, claimants could argue that a designer's professional duty to warn may arise out of the registration regulations, which generally provide that a designer is charged with the responsibility to safeguard the life, health, and property of the public.[66]

The designer's retrospective or prospective duty to warn will likely depend upon the standard of care (community, national, or clearly erroneous) that the court applies to the alleged tortious conduct, modified by the effect of both the state registration statutes and building code requirements. However, the overriding policy factor in deciding the scope of the designer's duty may be the seriousness of the potential under-ventilation injury to building occupants. Therefore, as a practical matter, if the severity of the potential injury affects the court's policy decision, then a determination of the designer's duty may be more a function of the expert testimony introduced at trial on the issue of causation (i.e., whether the ventilation design could cause an imminent risk of serious injury) than conformance with a rather nebulous minimum ventilation design standard of care.

Inform the Owner of the Ventilation Design Limitations Is there a ventilation solution that is economical, practical, and provides a measure of liability insulation to those practicing HVAC design? The answer appears to be a qualified yes. Courts have limited the financial exposure of designers, despite a loss of building utility, when the design was based on an informed decision by the owner to save money.[67] Similarly, liability has been restricted to the scope of the undertaking when designers have offered to render only limited services.[68] Therefore, by arguing that the malpractice precedent that has developed around controversies that involve only economic harm also applies to a third-party personal injury SBS claim, it may be possible to limit the designer's exposure to under-ventilation claims. However, where a serious personal injury damage is imminent, mere notice to the owner may be insufficient to insulate the designer from negligence claims.[69]

Nevertheless, by both carefully informing the owner of the potential shortcomings of the ventilation system design, and by disclosing the limitations of the ventilation design, the designer may obtain the owner's informed consent to utilize a specific design concept. By securing the owner's system acceptance, the designer's exposure to third-party claims on new projects may be limited. However, should the design of an occupied building routinely under-ventilate the project, there may be a duty to inform the owner, building authority, and occupants of this condition, particularly when normal ventilation system operation presents an imminent health risk.

REFERENCES

1 *Newsweek,* June 6, 1988, p. 15.
2 See *Id.*; Rask, D., 1988. "Indoor air quality and the bottom line," *Heating, Piping, Air Conditioning,* September, p. 45; Wheeler, A.E. 1988. "Office building air conditioning to meet proposed standard 62-1981R." *Ashrae Journal,* July, p. 40.
3 Rask, p. 45.
4 Carlton-Foss, J.A. 1988. "Office ventilation," *Ashrae Journal,* September, p. 24; Burge, H.A., and Hodgson, M. "Health risks of indoor pollutants." *Ashrae Journal,* July, pp. 34, 36.
5 See, D. Rask, 1988. "Indoor air quality and the bottom line," *Heating, Piping, Air Conditioning,* September, p. 45.
6 *Id.* p. 46.
7 *Id.*
8 *Id.*
9 See, M. Mechler, 1985, "Ventilation/air distribution cure 'sick' buildings," *Specifying Engineer,* Jan., p. 82.
10 See P.E. McNall, Jr., 1986. "Indoor air quality strategies; today and tomorrow," *ASHRAE Journal,* July, p. 37.
11 *Id.*
12 See *Day v. National U.S. Radiator Corporation,* 117 So. 2d 104 (La. App. 1st Cir. 1959), modified, 128 So. 2d 660 (La. 1961).
13 *Day,* 117 So. 2d, p. 120.
14 *Id.*, p. 124.
15 *Id.*, pp. 119 and 120.
16 *Day,* 128 So. 2d, p. 669.
17 *Day,* 128 So. 2d, p. 666; see also, *Thomas v. Fromherz Engineers,* 159 So. 2d 614, 615 (La. App. 1st Cir. 1964), *writ refused,* 161 So. 2d 276 (1964); *Calandro Development, Inc. v. R. M. Butler Contractors, Inc.,* 249 So. 2d 254, 264 (La. App. 1st Cir. 1971)
18 See *Alexander v. State,* 347 So. 2d 1249, 1251 (La. App. 1st Cir. 1977). See also, *Kent v. Gulf States Utilities Co.,* 418 So. 2d 493, 500 (1982); *Standard Roofing Co. v. Elliot Const.,* 535 So. 2d 870, 880 (La. App. 1st Cir. 1988); *Patin v. Industrial Enterprises, Inc.,* 421 So. 2d 362 (La. App. 1st Cir. 1982), *writ denied,* 423 So. 2d 1166; *Fromherz,* 159 So. 2d, pp. 614, 615.
19 See *Maloney v. Oak Builders,* 224 So. 2d 161, 168 (La. App. 4th Cir. 1969), writ issued, *227 So. 2d 143, modified,* 235 So. 2d 386 (1970); see *Seiler v. Ostarly,* 525 So. 2d 1207, 1209 (La. App. 5th Cir. 1988); *Weill Const. Co., Inc. v. Thibodeax,* 491 So. 2d 166, 171 (La. App. 3rd Cir. 1986); *Bowman v. Coursey,* 433 So. 2d 251, 253 (La. App. 1st Cir. 1983).

20 See *Maloney, 226 So. 2d, p. 168; Seiler,* 525 So. 2d, p. 1209; *Weill Const. Co., Inc.* 491 So. 2d, p. 171; *Bowman,* 433 So. 2d, p. 253; *Pittman Construtions Co. v. City of New Orleans,* 178 So. 2d 312 (La. App. 4th Cir. 1965), *appl. denied,* 179 So. 2d 274 (La. 1965).

21 *Maloney,* 224 So. 2d, p. 168; *Seiler,* 525 So. 2d 1207, 1209 (La. App. 5th Cir. 1988); *Weill Const. Co., Inc.,* 491 So. 2d. p. 171.

22 See *C. H. Leavell & Company v. Glantz Contracting Corp. of La.,* 322 F. Supp. 779 (E.D. La. 1971); *Milton J. Womack, Inc. v. House of Representatives,* 509 So. 2d 62, 67 (La. App. 1st Cir. 1987); *Sams v. Kendall Construction Co.,* 499 So. 2d 370, 374 (La. App. 4th Cir. 1986); *Edmond v. Tyler Building and Construction Co.,* 438 So. 2d 681, 687 (La. App. 2d Cir. 1983); *Gurtler Hebert and Co., Inc. v. Weyland Mach. Shop, Inc.* 405 So. 2d 660, 663 (La. Ap. 4th Cir. 1981). *A.F. Blair Co., Inc. v. Mason,* 406 So. 2d 6, 14 (La. App. 1st Cir. 1981); *Am. Fid. Fire Ins. v. Pavia-Byrne Engineering,* 393 So. 2d 830, 836 (La. App. 2nd Cir. 1981), *citing, Calandro Development, Inc. v. R.M. Butler Contr., Inc.,* 249 So. 2d 255, 265 (La. App. 1st Cir. 1971); see also Wagner, "Liability to one injured in course of construction, based upon architect's alleged failure to carry out supervisory responsibilities," 59 *ALR* 3d 869; J.L. Nieschwitz, "The crumbling tower of architectural immunity: evolution and expansion of the liability to third parties," *Handbook for Architects, Engineers and Contractors* (1985).

23 See *Sams,* 499 So. 2d, p. 374; *Edmond,* 438 So. 2d, p. 685; *Weyland,* 405 So. 2d, p. 663; *Charles Carter & Co. V. McGee,* 213 So. 2d 89, 95 (La. App. 1st Cir. 1968).

24 See *Milton J. Womack, Inc.,* 509 So. 2d, p. 67; *Edmond,* 438 So. 2d, p. 685; *Town of Winnsboro v. Barnard & Burk, Inc.,* 294 So. 2d 867, 878 (La. App. 2nd Cir. 1974).

25 See *Milton J. Womack, Inc.* 509 So. 2d, p. 67; *Hogan Exploration v. Monroe Engineer, Assoc.,* 430 So. 2d 696, 700 (La. App. 2nd Cir. 1983); *Lawyers Title Ins. v. Carey Hodges & Assoc.,* 358 So. 2d 964 (La. App. 1st Cir. 1978); *Town of Winnsboro,* 294 So. 2d, p. 878; *Day,* 117 So. 2d, pp. 119, 120.

26 See *Day,* 128 So. 2d, p. 669.

27 See *Maloney,* 224 So. 2d, p. 169; *Edmond,* 438 So. 2d, p. 685; *Weill,* 491 So. 2d, p. 172; *Seiler,* 525 So. 2d, p. 1209; *Pittman Construction Co.,* 178 So. 2d, p. 321.

28 *Maloney,* 224 So. 2d, p. 169; see also, *Sams,* 499 So. 2d, p. 374; *Charles Carter & Co. v. McGee,* 213 So. 2d 89, 96 (La. App. 1st Cir. 1968).

29 See *Day,* 128 So. 2d 666, 667; see also, *Fromherz Engineers,* 159 So. 2d, pp. 614, 615.

30 See *Edmond,* 438 So. 2d, p. 685.

31 *Id.* (emphasis added).

32 See *Seiler,* 525 So. 2d, p. 1209; *Bowman,* 433 So. 2d, p. 233.

33 See *Edmond,* 438 So. 2d, p. 685; see also, *A.F. Blair Co., Inc.,* 406 So. 2d, p. 14.

34 See *Favalora v. Aetna Casualty and Surety Company,* 144 So. 2d 544 (La. App. 1st Cir. 1962); *Carey Hodges,* 353 So. 2d, p. 968; see also *Day,* 117 So. 2d, p. 125.

35 See *Id.*; *Edmond,* 438 So. 2d, pp. 684, 685.

36 *Milton J. Womack, Inc.,* 509 So. 2d, p. 67.

37 *Womack,* 509 So. 2d, p. 67 (emphasis added).

38 See *Carey Hodges,* 358 So. 2d, p. 968; see also, *Hogan Exploration,* 430 So. 2d, pp. 699, 700; *Town of Winnsboro,* 294 So. 2d. p. 878.

39 See Ordiance No. 17,525, City of New Orleans, January 13, 1987; Standard Mechanical Code, 1985 Edition, Article 308.2.4, see also, Standard Building Code, 1985 Edition, Article 2001.5.1, 5.2.

40 Building Code and Related Regularions, Parish of Jefferson, 1952, rev. 1977, Article 4822, Ordinance No. 2225.

41 McNall, P.E. 1986. "Indoor air quality strategies: today and tomorrow." *ASHRAE Journal,* July, p. 38.

42 *Id.*

43 *ASHRAE handbook—1985 fundamentals,* Preface, p. iii (emphasis added).

44 See *Schamens v. Crow,* 326 So. 2d 621, 624 (La. App. 2nd Cir. 1976).

45 See *ASHRAE Handbook—1985 Fundamentals,* p. 22.1; ASHRAE Standard 62-1981, Ventilation for acceptable indoor air quality.

46 See *ASHRAE Journal,* September 1988, p. 3.

47 ASHRAE. 1985. *ASHRAE handbook—1985 fundamentals,* p. 22.1. Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

48 See *Id.* Standard Building Code, Article 3001; Standard Mechanical Code, Article 302.1; Jefferson Parish Code, Article 4810.

49 *ASHRAE Journal,* September 1988, p. 5 (emphasis added).

50 See Comstock, W.S. 1988. "Commentary." *ASHRAE Journal,* September, p. 5; Fitzgerald, D. 1984. "Mimimum ventilation rate." *ASHRAE Journal,* December 1988.

51 *Id.,* Wheeler, p. 40.

52 *Id.,* Wheeler.

53 *Id.,* Wheeler, p. 43; Gardner, T.F. 1988. "Part load ventilation deficiencies in VAV systems." *Heating, Piping, Air Conditioning,* February, p. 89.

54 *Id.,* Carlton-Foss, p. 40.

55 *Id.,* Wheeler; see also, Gardner; Carlton-Foss, J.A. 1983. "The tight building syndrome." *ASHRAE Journal,* December, pp. 38, 40.

56 *Id.,* Carlton-Foss, p. 40.

57 *Id.,* p. 40 (emphasis added).

58 See *Id.,* M. Mechler, p. 82; Morris, R.H. 1986. "Indoor air pollution." February, p. 84.

59 *Id.,* Wheeler, p. 43.

60 *Id.,* McNall, p. 38.

61 *Id.,* Comstock, W.S.; Fitzgerald, D.

62 See *ASHRAE Equipment 1983,* chap. 3; see also, Carlton-Foss, p. 40; Gardner, p. 91; Wheeler, p. 43.

63 *Id.,* Carlton-Foss, p. 40.

64 LAC 19-3:2.6.2 (1981).

65 James Acret, Architects & Engineers 1.10 (2d Ed. 1988), *citing,* 1985 Ca. Atty's Gen. Opin. No. 85-208.

66 LAC 19-3:1.1; 2.6.

67 *Bowman,* 433 So. 2d, p. 253.

68 *Seiler,* 525 So. 2d, p. 1209; *Weill Const. Co., Inc.,* 491 So. 2d, p. 171.

69 *Id.,* FN. 61.

DISCUSSION

G.W. Poole, Facilities Engineer, Henrico County Public Schools, Richmond, VA: In a building with known (confirmed) sick building syndrome problems, if only 1% of the occupants actually have problems and therefore the suit is thrown out of court, what will the plaintiff's recourse be? My experience has been that such occupants are not going to quit.

T.F. Gardner: These plaintiffs may have no professional negligence cause of action against the designer of the ventilation system. However, a professional malpractice claim is not the only remedy those soft-tissue plaintiffs have against other parties. For instance, the building owner may have a higher duty to these plaintiffs based upon strict liability, not negligence.

R.L. Westbrook, Mechanical Engineer, McFarland-Johnson Engineers, Binghamton, NY: What about large facilities, such as schools or hospitals, where multiple zones exist and the A/E is retrofitting one particular zone? Perhaps a deficiency exists in another zone where a potential hazard exists (say, where a process or a specialized ventilation system is in use), causing a cross-contamination.

If the situation exists and it is not clearly identified to the A/E at the undertaking of a project, does the A/E have any liability in this instance? Should the A/E always expand his scope to evaluate potential hazards such as this or can he protect himself contractually?

Gardner: Professional liability nearly always flows from the obligations defined in the contract for professional services. Therefore, your contractual obligation to an owner generally establishes the scope of your responsibility as well as your duty to third parties. However, if a design professional perceives a problem that presents an imminent threat of personal injury, but that lies outside the scope of the design obligation, there is probably a minimum duty to warn of the danger.

B.E. Moul, Senior Mechanical Designer, Basco Associates Ltd., York, PA: If a conflict exists between ASHRAE standards and another authority (i.e., BOCA) relative to O/A requirements, what does a consultant do about liability?

Gardner: Notify the owner of the conflict and advise that your design will be predicated on the more severe requirement listed in the conflicting codes and standards. Inform the owner of the first-cost premium, the higher operational cost of the enhanced outside-air system, and the countervailing concern for higher indoor air quality. If the owner directs you to use a lower ventilation airflow rate, then confirm that this change was an informed decision by the owner, and that a different ventilation system is being implemented. Disclose the increased potential for indoor air quality problems.

H. Becker, Energy Analyst, New York, NY: Regarding the "promise of results" for coverage by insurance companies—specifically, what promises are they and how does an A/E get around such contract clauses?

Gardner: Professional liability insurance policies cover acts of negligence only. Every contract and undertaking should be scrutinized to eliminate indoor air quality warranties and guarantees. These types of express promises fall outside the insurance coverage agreement.