



# Indoor Air Quality and the Gaming Industry

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## Note to the Reader

Just as this paper was going to press, Richard Carmona, the U.S. surgeon general, published the latest in a series of studies on the health effects of secondhand smoke. Released June 30, 2006, *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*, details the U.S. government's most comprehensive statement on secondhand smoke to date.

According to the report, the only way to adequately protect people from the extreme risks of secondhand smoke is to make indoor spaces smoke-free. While the gaming industry has actively worked to improve indoor air quality by installing state-of-the-art ventilation systems in newer and renovated properties, the report concludes that any exposure to secondhand smoke is dangerous, citing the inability of even the most advanced ventilation systems to mitigate the risks.

"Restrictions on smoking can control exposures effectively, but technical approaches involving air cleaning or a greater exchange of indoor with outdoor air cannot," the report says.

According to the report, nearly half of nonsmoking Americans are exposed to dangerous levels of secondhand smoke, and the chance of a non-smoker developing heart disease or lung cancer is increased by nearly 30 percent with exposure to smoke.

The report does not offer any new data, but provides an analysis of what Carmona terms the best available research on the topic. Carmona commends the number of state and local mandates calling for smoke-free buildings across the country, indicating they are a great success for public health.

While gaming facilities thus far have been exempt from recently enacted smoking bans in New Jersey and Colorado, anti-smoking groups in each state continue to fight the exemptions and in some cases have filed legal action. According to experts, the surgeon general's report will bolster efforts toward tougher smoking restrictions in the states and jurisdictions still considering bans.

The main body of this paper has not been amended to reflect the new information in the report, but there is no doubt the surgeon general's warning will strengthen the efforts of those working for comprehensive smoking bans across the country. The release of the report reinforces the contention of this paper that the gaming industry must make the development of an industrywide approach to indoor air quality a primary concern, and suggests the industry may need to develop even more stringent IAQ controls than are suggested here.

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## **Executive Summary**

Over the past 20 years, Americans have accepted increasingly stringent limits on smoking tobacco products in public places. State and local governments have taken the lead, reacting to growing evidence about the dangers of exposure to secondhand smoke. Smoking bans first reached offices, shopping malls and commercial spaces in the 1980s, but in recent years have extended rapidly to most or all buildings in many jurisdictions, including bars, restaurants, bowling alleys and casinos. Delaware adopted a statewide ban on smoking in all public places in 2004, becoming the first American jurisdiction to ban smoking in gaming facilities.

In general, the gaming industry has opposed such bans, arguing instead for technology-based solutions to indoor air quality (IAQ) concerns. Increasingly, new gaming resorts limit smoking to gaming areas, restaurants and bars, and some gaming companies have installed advanced ventilation systems intended to minimize exposure to secondhand smoke.

But as evidence continues to accumulate about the health impacts of secondhand smoke, the trend toward state and local bans accelerates. New Jersey and Colorado — both gaming states — recently adopted broad smoking bans, but exempted casinos. In contrast, a new ban in Puerto Rico applies everywhere, including in the Territory’s many casinos, and even in personal vehicles with passengers younger than 13 years old.

This paper provides a comprehensive look at the indoor air quality issue as it relates to the gaming industry, including an overview of the characteristics and health risks of secondhand smoke, the growth of smoking restrictions in the U.S., research on the economic impact of smoking bans and an analysis of various options the gaming industry can use to address secondhand smoke in its facilities.

Based on this information, it is clear that if the gaming industry continues to win smoking ban exemptions for gaming areas in the short term, casinos could soon be the only publicly accessible places in America where smoking is allowed. However, it is unlikely that the industry can sustain these exemptions over the long term unless it takes more proactive steps to provide significantly improved air quality in its casinos and to make the issue one of primary concern.

Smoking opponents will continue to resist casino exemptions, and with fewer and fewer jurisdictions allowing smoking, opponents will be able to focus their efforts. More important, the industry must address the health issues raised by the continued exposure of employees and customers to secondhand smoke.

There are significant innovations in ventilation and filtration that could make it possible to provide good indoor air quality and continue to allow smoking, at least in gaming areas. The gaming industry now must take the

initiative in establishing a comprehensive industrywide strategy for improving indoor air quality. While no government has established a standard for safe exposure to tobacco smoke, technology currently exists to provide air quality in smoking areas that is at least equal to or, in some cases, even better than outside air. Until safe exposure standards become available, ventilation to achieve air of at least outdoor quality could be a good first step. The gaming industry must demonstrate success in using ventilation to achieve good air quality — or it will someday find itself losing the exemptions it has worked hard to earn.

## Introduction

During the past 20 years, attitudes about tobacco use have shifted fundamentally in the United States. Secondhand smoke, also called “environmental tobacco smoke” (ETS), is now seen as a major public health threat, and as a result Americans are increasingly willing to support tough limits on smoking.<sup>1</sup> As research has accumulated regarding the health risks of secondhand smoke, many state and local governments have responded by banning or restricting smoking in offices, retail and commercial buildings, restaurants, bars and other public places.

The earliest smoking restrictions usually did not apply to restaurants, bars, casinos, hotels and other “hospitality” buildings.<sup>2</sup> These establishments were excluded from the restrictions on the premise that, in contrast to other workplaces, most occupants in these kinds of businesses are not workers, but periodic visitors who can choose to stay or leave. Also, some of these places — especially bars and casinos — are frequented almost exclusively by adults, and disproportionately by smokers. For these and other reasons, smoking has tended to remain legal in many hospitality buildings after being banned in other public places.

However, beginning with California’s 1995 historic statewide ban on smoking in restaurants (extended to bars in 1998), the trend has been toward comprehensive bans. The movement continues to gain momentum and poses a major dilemma for gaming establishments. Many casino patrons still want to smoke while engaging in gaming activities, but increasingly vocal nonsmoking customers, as well as industry employees, are demanding better air quality in casinos. These competing demands have made indoor air quality a matter of pressing concern to the gaming industry in the United States.

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## Characteristics and Health Risks of Secondhand Smoke

Most secondhand smoke originates from cigarettes. Secondhand smoke is a combination of smoke exhaled by smokers (called “mainstream smoke”) and emissions directly into the air from smoldering cigarettes (called “sidestream smoke”). Secondhand smoke is made up of fine particulates and gases — hundreds or even thousands of potentially harmful constituents including carbon monoxide, carbon dioxide, formaldehyde and cyanide. Because of the numerous chemical compounds found in tobacco smoke, many of which also are found in other indoor pollutant sources, experts disagree about the toxicity of ETS and even how to measure it. Opponents of smoking argue that the dangers of ETS cannot be accurately evaluated without measuring and taking into account the toxicity of all its components individually and also the synergistic effects of exposure to the constituents in combination. However, no one has ever attempted such detailed measurements and analyses. Instead, scientists measure “indicator” or “marker” chemicals in ETS such as nicotine, respirable suspended particles (“RSP”), 3-Ethenylpyridine (3-EP), benzene and carbon monoxide.

Hundreds of peer-reviewed studies have examined the potential health effects of secondhand smoke. The surgeon general of the United States first published a landmark study on the health effects of “involuntary smoking” in 1986.<sup>3</sup> Among other findings, this report documented a link between secondhand smoke exposure and lung cancer in nonsmokers. Later studies confirm these results and also establish that chronic exposure to secondhand smoke can cause coronary heart disease at even greater rates. Studies also link secondhand smoke exposure to increased risk of asthma, bronchitis and other respiratory diseases in children and adults.

Authorities disagree on whether there is any safe level of exposure to secondhand smoke. Because tobacco smoke is recognized as a potent carcinogen, many in the public health community maintain that there can be no level at which exposure is safe. On the other hand, at least one agency of the federal government has considered developing an exposure level for ETS.<sup>4</sup> As of this writing there has not been any major effort to conduct risk assessments, establish certainty about measurements or undertake the epidemiological work necessary to develop a health-based exposure standard. Some smoking opponents maintain that these are impossible tasks, or at least extremely difficult and expensive. They argue that it would be more effective and less expensive simply to prevent exposure altogether by banning smoking. Experts do agree that risks increase with greater levels of exposure to secondhand smoke and decrease with lower exposure levels. Thus, the question of a safe exposure level remains to be answered.

# Growth of Smoking Restrictions

## The Federal Government

In 1994, the United States Occupational Safety and Health Administration (OSHA) proposed to regulate carcinogens in the workplace.<sup>5</sup> The proposal included a complete ban on workplace smoking. OSHA reasoned that, unlike other workplace contaminants, environmental tobacco smoke could be completely eliminated by banning smoking. OSHA's proposed rule engendered fierce controversy; the agency received thousands of comments both for and against the rule and held extensive public hearings. However, the rulemaking languished for years, and OSHA took no final action.

In 2001, Action on Smoking and Health (ASH), a public health group, sued OSHA, seeking to force the agency to finalize its workplace smoking ban. In response, OSHA suggested that since so much time had passed since the rulemaking began, it would be necessary to revisit and update the rulemaking record before finalizing the rule. Among other things, OSHA noted that new risk assessment methods and additional data — not available in 1994 — could enable the development of a safe exposure level to environmental tobacco smoke as an alternative to an outright ban.<sup>6</sup> This was an unprecedented idea; no government or other standard-setting authority had acted (or has acted since) to establish health-based ETS exposure levels.

OSHA's suggestion inadvertently shed light on a major phenomenon in the United States: the tremendous growth of smoking bans at the state and local level. In the seven years since OSHA's original proposed rule, the majority of American workplaces had become smoke-free via an ever-growing patchwork of state and local laws. Paradoxically, OSHA's adoption of an ETS exposure limit could have preempted these bans or caused state and local governments to revisit them — and could have taken the momentum out of the movement for further bans. For many public health advocates who had long supported a federal smoking ban, this kind of federal action would have been a serious blow. OSHA and ASH quickly settled the lawsuit by agreeing that OSHA would terminate the rulemaking without taking further action.

The story of the OSHA rulemaking highlights one of the major challenges of regulating smoking in the United States. Health authorities generally agree that secondhand smoke poses serious health risks and that exposure should be controlled; however, OSHA, the only federal entity with authority over indoor air quality standards, has not acted either to ban smoking or to develop a federal health-based exposure standard. The Environmental Protection Agency (EPA), which comprehensively regulates outdoor air quality in the United States, has no authority to impose indoor air quality standards. Additionally, the Public Health Service (an agency within the Department of Health and Human Services)

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has set a policy goal of achieving workplace smoking bans or restrictions in all 50 states by 2010, but has no legal authority to impose bans or set health-based federal standards. Thus, no regulatory guidance is available from the federal government, and none is likely to be forthcoming.

### **State and Local Governments**

In the absence of federal action and frequently in response to committed public health advocacy groups, state and local governments have acted on their own to ban or restrict smoking. California banned smoking in restaurants in 1995 and followed up with a bar ban in 1998. New York City banned smoking in all public places in 2002. States, cities and counties are adopting smoke-free laws and ordinances at an accelerating pace nationwide, and these bans increasingly are being applied to bars, restaurants and other hospitality venues.

As of spring 2006, 13 states, two territories and the District of Columbia have smoke-free laws that apply to, or that will ultimately extend to, restaurants and bars. In addition, New Hampshire, Illinois, Virginia and many local jurisdictions are debating similar legislation.

The first statewide ban to affect gaming establishments was in Delaware, which adopted a ban in 2004. The ban applies to all public spaces, including Delaware's racinos (racetracks at which slot machines are permitted). New Jersey, Colorado and Rhode Island have since adopted their own smoking bans, but each has taken a different approach to the gaming businesses within its borders. New Jersey and Colorado exempted casino floors, although other areas of gaming resorts are subject to the ban. Not surprisingly, the New Jersey casino exemption has been controversial, and legislation was introduced in spring 2006 to withdraw it. Rhode Island exempted pari-mutuel wagering sites that provide separately ventilated smoking and nonsmoking areas. Further, employees of Rhode Island casinos must be given the opportunity to opt out of working in smoking areas.

Kansas City, Mo. in late 2004 adopted a comprehensive smoking ban, but exempted its casinos because of concerns that patrons would go to gaming establishments in neighboring jurisdictions where smoking still is allowed. The ordinance therefore provides an exemption from the ban for Kansas City casinos until the cities of North Kansas City and Riverside both adopt smoking bans that apply to their casinos.

### **American Society of Heating, Refrigeration and Air Conditioning Engineers**

Since at least 1999, the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) has been debating its ventilation standards in response to mounting concerns about the health effects of secondhand smoke. ASHRAE is an international professional

association of mechanical engineers, and one of its chief functions is the development of industry standards for building ventilation. The standards are voluntary but influential. State and local governments often incorporate ASHRAE standards into their enforceable building codes, either directly or via the International Mechanical Code.

ASHRAE's Standard 62 contains ventilation rates intended to provide "acceptable" indoor air quality. For many years, ASHRAE based these rates on the assumption that "a moderate amount of smoking" would occur.<sup>7</sup> However, ASHRAE members increasingly raised questions about how the standard could provide good indoor air quality and allow smoking, especially after the 1986 *Report of the Surgeon General* and succeeding studies. Beginning with the 2001 re-publication of Standard 62, ASHRAE deleted existing ventilation rates for smoking lounges and removed other language about smoking. In 2004, ASHRAE further changed the standard to require "additional" ventilation in buildings or areas in which smoking is allowed. The standard does not specify the amount of additional ventilation needed; that determination is left up to designers. In 2006, ASHRAE further amended the standard to require separation — by physical and engineering means — of smoking areas from nonsmoking areas. The updated standard also prohibits the recirculation of air from smoking areas to nonsmoking areas and requires the posting of signs at the entrances to smoking areas.

Once ASHRAE finalizes a standard, it seeks to have the standard incorporated into various uniform codes. ASHRAE is currently working to get its changes to Standard 62 added into the International Mechanical Code. Assuming this effort is successful, ASHRAE's smoking restrictions may be expected to show up in state and local laws beginning in 2008 or 2009, and perhaps earlier in jurisdictions that base their building codes directly on ASHRAE standards rather than on uniform codes.

ASHRAE's deliberations on smoking have been controversial and divisive. Many ASHRAE members believe their organization should act decisively to ban smoking outright; others argue that smoking bans represent policy judgments that are best made by governments and go far beyond ASHRAE's mission of providing standards for the building and engineering community. The result is a compromise that recognizes that smoking is a legal activity and will continue to occur in publicly accessible buildings for the foreseeable future. ASHRAE believes its standards achieve a balance, accommodating smoking without taking any position on safe levels of exposure to secondhand smoke.

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## The Economic Impacts of Smoking Bans

The gaming industry is concerned that smoking bans would have immediate and permanent negative effects on its revenues. In 1991, the Silver City Casino, owned by the Circus Circus Company, banned smoking in a bid to attract nonsmoking gamers. The ban was not profitable for Silver City, and after three years of declining revenues the company abandoned it. The Silver City experience is still widely cited within the industry as the best evidence that smoking bans are not economically feasible for gaming facilities; as a result, casinos have been reluctant to try them facility-wide.

More recently, an economic study conducted in 1996 on behalf of the Nevada gaming industry in connection with OSHA's proposed rule predicted substantial job losses and significant decreases in revenue if a smoking ban were to be enacted.<sup>8</sup> That report — based on a regional input/output economic model and existing economic data — warned of dramatic negative impacts on Nevada's economy, including 7,900 lost jobs in the first year, a decrease in economic growth over five years of more than 60 percent, as many as 50,000 lost jobs over five years, and \$3.5 billion lost to the state's economy in gaming revenues, sales taxes and other income. The OSHA ban never was adopted, so the accuracy of these conclusions has never been tested.

Several recent economic studies examine the impact on racinos of Delaware's 2003 smoking ban. These are the first serious and detailed economic analyses of the actual impacts of smoking bans on gaming facilities in the United States. Drs. Mandel, Glantz and Alamar of the University of California, San Francisco, concluded in a 2005 study that Delaware's smoke-free law had no significant impact on total revenue or average revenue per gaming machine.<sup>9</sup> Economist Michael Pakko found flaws in the report, which were acknowledged and corrected by the authors. However, the authors maintained that the revised analysis supported the same conclusion: no negative impact on revenues. Pakko conducted his own analysis and reached a contrary conclusion in his study dated December 2005. Pakko documented a permanent downward shift in revenues that was statistically significant, and that was especially marked in the case of two racinos with competitor facilities in nearby states that do not have smoking restrictions.<sup>10</sup> Pakko also reported that Delaware gaming tax revenues dropped significantly in the year following the ban, a fact that Mandel, Glantz and Alamar do not refute or address. According to Pakko, the loss in tax revenues caused the state legislature to increase the number of gaming machines allowed at each facility, extend opening times and impose higher taxes to recover the lost revenues. Correcting for these adjustments in his regression analysis, Pakko concluded that the state lost

\$33 million per year in gaming revenues after the ban took effect and that gaming businesses lost \$94 million in annual revenues.

During the recent legislative debate on New Jersey's smoking ban, supporters and opponents prepared competing studies intended to predict the impact of a smoking ban on gaming revenues and employment. Both studies looked to the Delaware experience for evidence of how a ban would affect New Jersey. The New Jersey Group Against Smoking Pollution ("GASP") cited the Delaware study by Mandel, Glantz and Alamar and concluded that a ban would have no significant impact on gaming revenues.<sup>11</sup>

The Casino Association of New Jersey engaged PricewaterhouseCoopers (PwC) to prepare its own economic analysis and a rebuttal of the GASP Report.<sup>12</sup> PwC employed available economic data from Delaware, the economic studies on Delaware racinos and interviews with Delaware gaming officials, regulators and others. It also decided to base its predictions about Atlantic City principally on an analysis of the Dover Downs Racino, reasoning that as the only Delaware facility with hotel and conference facilities, Dover Downs has more in common with New Jersey resorts than other Delaware facilities. The PwC report concluded that a smoking ban would cause a loss of 20.4 percent in Atlantic City gaming revenues in the first two years after the ban, and 3,377 lost jobs.

The New Jersey Legislature did adopt smoke-free legislation in 2006, but it exempted casino floors from the ban, perhaps in recognition of the concerns expressed by the gaming industry and documented in the PwC analysis. The exemption is controversial, and a coalition of bar, restaurant and bowling alley owners filed a federal lawsuit challenging it. The lawsuit was rejected by a federal judge in April 2006.<sup>13</sup> For now, the debate about economic impacts in New Jersey will remain unresolved.

These studies — in particular the two economic studies of the Delaware law and its impacts — may finally begin to answer the questions of how smoking bans will affect the gaming industry and whether those effects will be different in kind and degree from the effects of bans on restaurants, bars and other hospitality venues.

There are literally hundreds of studies that attempt to predict or measure the economic impacts of smoking bans on restaurants, bars and other facilities.<sup>14</sup> These studies usually are based on anecdotal evidence or statistical analyses of economic data, and sometimes on a combination of the two methods. Smoking ban advocates point to the volume of studies, arguing that they show that bans will at most cause only temporary negative impacts, and that bans are economically positive in the longer term. They emphasize the obvious public health benefits and argue that nonsmokers will eventually visit restaurants, bars and casinos in greater

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numbers after a ban, more than replacing any lost business. On the other hand, practically all of these studies measure the impact of bans on restaurant and bar smoking; only a handful examine the impacts of a smoking ban on gaming establishments. The recent studies from Delaware and New Jersey are the first to consider how smoking bans will affect gaming businesses in the United States.

Not surprisingly, it is difficult to generalize about the results of these studies, and there is no conclusive answer. Both sides of the smoking debate tend to characterize the study results in absolute terms that favor their views. The existing literature does tend to confirm fears of immediate negative impacts on businesses after a smoking ban, but the severity and duration of impacts differ widely. There also is some evidence that negative economic impacts are mostly short-term for many businesses such as restaurants and shopping centers, but there is reason to be concerned that economic impacts in the gaming industry will be more dramatic and lasting. Most smokers can forgo cigarettes for the hour or two it takes to eat, or can go outside to smoke a cigarette at a bar. Gamblers, in contrast, may stay at a card table or slot machine for long periods of time. For these customers, leaving a large casino to smoke may be very inconvenient and may cause them to make much shorter visits, take business to jurisdictions where smoking is legal, or even stay at home.

## **Options for the Gaming Industry to Address Secondhand Smoke**

Four major cultural crosscurrents have created demand for better indoor air quality in casino resorts. First, Americans everywhere have become much less tolerant of smoking in public places. Second, the gaming industry has evolved quickly from an exotic niche business in Nevada and New Jersey, serving a narrow customer base, to a widespread and mainstream provider of entertainment and hospitality services that include, but are not limited to, gaming. Third, today's large and diverse casino resorts attract restaurant-goers, movie-goers, families with young children and other groups who never gamble, or whose patronage is not related principally to the gaming features of the facilities. Finally, and perhaps most important, casino employees, like most other Americans, are demanding better indoor air quality in their workplaces. While the policy debates continue at the local, state and federal levels, gaming establishments are looking at a variety of approaches to minimize secondhand smoke.

## Smoking Bans and Restrictions

Undoubtedly, the most effective way to limit ETS levels would be to prohibit the use of tobacco products in gaming businesses. Even a ban, however, could not eliminate exposure entirely, because smokers carry ETS on their clothing and skin, and exhale mainstream smoke inside buildings even when they extinguish cigarettes before entering. Also, casino resorts typically have numerous entrances, and smokers inevitably will enter spaces where smoking is prohibited with lighted cigarettes.

Very few casinos have tried complete smoking bans, principally because of the failed Silver City Casino experience in Las Vegas in the early 1990s. Also, casino marketing surveys of their own customers have revealed that many gaming customers — especially repeat customers and high-stakes gamblers — want to smoke and likely would go elsewhere if smoking were banned. Undoubtedly, some customers would adjust to a government ban that affected all casinos, but many gamblers also would have viable alternatives for the foreseeable future where they would be able to smoke. For instance, high-stakes gamblers from Asia could choose to visit Macau, where smoking is prevalent and not likely to be banned, rather than traveling to Las Vegas or Atlantic City. U.S. gamblers who live near Indian-operated casinos may choose to patronize those facilities, where smoking still could be allowed, instead of casinos affected by federal, state or local-level smoking bans.

Meanwhile, many gaming facilities have adopted more targeted restrictions in response to market demand. Nonsmoking hotel rooms are common at casino resorts because many travelers demand them. Most resorts also ban smoking in nongaming areas, such as food courts, arcades, retail shops, some restaurants and movie theaters where families, children or youth are likely to enter or gather. Smoking restrictions are somewhat less common in bowling alleys, some showrooms and gaming areas.

A notably successful experience with casino smoking restrictions is the Harrah's resort in Laughlin, Nev., which has a physically separate nonsmoking section accounting for about 30 percent of its casino floor space. Many other resorts have designated smaller areas — particular tables, rooms or types of games — as nonsmoking. A successful example is at the Bellagio Resort in Las Vegas, which has banned smoking in a high-stakes poker room in part because customers requested it.

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## Improved Ventilation and Filtration

Until 2001, ASHRAE's ventilation standard assumed that a moderate amount of smoking would occur in all buildings, and minimization of secondhand smoke was not a priority. Many state and local building requirements in the United States are still based on ASHRAE's pre-2001 standard, although building occupants typically expect smoke-free air or at least significant reductions in tobacco smoke. Newer editions of ASHRAE's Standard 62, published in 2001 and 2004, arguably apply only to buildings in which no smoking is anticipated, leaving design engineers with no current guidance about how to design ventilation systems for buildings where smoking is allowed. To fill this gap, ASHRAE contracted several years ago with Dr. Brian Rock, a professor at the University of Kansas, to write a monograph containing such guidance. Dr. Rock's book, *Ventilation for Environmental Tobacco Smoke*, was published in 2006. The book's target audience is ventilation system designers and operating engineers. It contains detailed technical information about conventional and state-of-the-art ventilation technologies and how they can be used to minimize secondhand smoke.

The first major casino resort designed expressly to provide dramatically improved indoor air quality and to minimize secondhand smoke was the Bellagio Hotel and Casino in Las Vegas. Bellagio was the most expensive resort ever built when it opened in 1997. Then owner Mirage Resorts incorporated state-of-the-art ventilation equipment and features, including high ceilings and ventilation with 100 percent outside air.

According to the company's marketing representatives, Bellagio reports high customer satisfaction and few complaints about smoke or other air quality issues. Hoping to validate this anecdotal evidence, Bellagio undertook an air quality study in 1999 to assess the effectiveness of ventilation in improving indoor air quality in the casino.<sup>15</sup> Bellagio collected a variety of measurements of typical ETS markers, including respirable suspended particulates (RSP), ultraviolet particulate matter (UVPM) and fluorescent particulate matter (FPM) to measure particulate-phase ETS, and carbon monoxide (CO), nitrogen dioxide (NO<sup>2</sup>), nicotine and 3-Ethenylpyridine (3-EP) for gas-phase ETS concentrations.<sup>16</sup> Bellagio also collected data on temperature and humidity because these parameters affect occupant comfort and perception of indoor air quality. The study found extremely low RSP concentrations, from 12 to 58 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ). These levels compare favorably with an industrial hygiene standard of 3000  $\mu\text{g}/\text{m}^3$ , developed by the American Council of Government Industrial Hygienists (ACGIH). It should be noted that the ACGIH standard is not specifically for ETS-related RSP. The only such available standard or guideline was developed by the World Health Organization in 1986. That guideline provides that

100 or fewer  $\mu\text{g}/\text{m}^3$  of tobacco-related RSP are of “limited or no concern.” The concentrations measured in the Bellagio in 1999 fell well below that threshold. Finally, analysis of UVPM and FPM, which can establish some distinction between ETS-related particulate matter and particles from other sources, showed that less than half of the RSP measured in Bellagio (and often less than 20 percent) was ETS-related.

Gas-phase ETS measurements were similarly low. Readings of CO ranged from 0.8 to 2 parts per million (ppm), well below the level of 25 ppm (averaged over an 8-hour workday) set by ACGIH and OSHA.  $\text{NO}_2$  concentrations ranged from 0.23 to 0.46 ppm, as compared to ACGIH and OSHA standards of 3 ppm (8-hour workday). The study included an analysis of nicotine levels as a gas-phase tracer; these levels ranged from 3.4 to 9.2  $\mu\text{g}/\text{m}^3$ , which are very low when compared to an OSHA nicotine exposure standard of 500  $\mu\text{g}/\text{m}^3$  (8-hour workday).

The 1999 study of Bellagio air quality demonstrated that ventilation can successfully and dramatically reduce ETS levels and provide good air quality. Importantly, the study showed that Bellagio indoor air quality was similar to air quality outside the casino, and significantly better in some cases.

Bellagio updated the study in 2005, in part to assess the continued effectiveness of the ventilation system after five years of operation,<sup>17</sup> as well as to determine how indoor air quality in its nonsmoking poker room compared to air quality in buildings with complete smoking bans. The 2005 study established that Bellagio’s ventilation system continues to function effectively, with particle-phase and gas-phase ETS measurements similar in every case to those documented in 1999. Of note, gas-phase ETS measurements were significantly lower than in 1999 all over the casino. The most important results of the 2005 study were the air quality measurements in Bellagio’s nonsmoking poker room. Even though this space is not physically separate from smoking areas in the casino, gas-phase ETS tracers were comparable to those documented in a 2003 study of Toronto office buildings in which smoking was completely prohibited. These results suggest that state-of-the-art ventilation could be just as effective at removing ETS as ASHRAE’s ban/separation requirement.

Since the development of the Bellagio, major casino resorts in the United States have considered indoor air quality to be an important element of design and construction. Newer casinos, such as Mandalay Bay, Aladdin and the Wynn Resort in Las Vegas, as well as the Borgata in Atlantic City, have dramatically better indoor air quality than older casinos. This trend will continue.

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Siano, regional director of facilities for Boyd Gaming Corporation, the cost of new ventilation equipment is of greater concern to current operators than to the large new resorts, but experience from retrofits so far suggests that the system upgrades — besides improving air quality — also reduce energy consumption and therefore will pay for themselves over time.

Iowa's Dubuque Greyhound Park & Casino recently added an advanced filtration and ventilation system as part of a \$30 million remodel and expansion. In addition to conventional particulate filters, the system includes proprietary gas-phase filtration developed and installed by Promark, a Skokie, Ill. company. Promark's new Spectrum™ filtration system recently earned an award from ASHRAE for innovation in indoor air quality. The Dubuque facility also installed state-of-the-art displacement ventilation, which moves ETS up and out of the casino quickly rather than mixing and diluting room air with fresh air, as more traditional ventilation systems do (see discussion below). According to facility managers, the customer response has been dramatic and positive. Initial tests at the Dubuque facility also show dramatically reduced ETS constituents, although further tests are necessary to validate these results.

## **Ventilation Innovations**

Indoor air quality is now one of the most important considerations in designing new casinos, and this priority will inevitably drive innovation in the gaming industry of the future. There are new advances in gas-phase filtration and much room for future improvement. Another development with potential application in casinos is the refinement of so-called “displacement” and “underfloor air distribution” ventilation systems. Most forced-air ventilation systems are designed to mix incoming air with the air in a building or room in order to dilute pollutant levels. Air vents and returns often are located in or near the ceiling. Bellagio Hotel and Casino's system illustrates a particularly successful version of dilution ventilation. However, the Bellagio system requires 100 percent outdoor air, which may not be feasible in all buildings. The Bellagio system also is expensive from an energy efficiency standpoint, especially during the very warm summer months in Las Vegas.

Newer displacement systems introduce cool air either through ductwork or through a raised floor. The air quickly drops to floor level, and then moves naturally upward as it is warmed by building occupants and other heat sources, displacing the air already in the room. There is little or no mixing and dilution of contaminants as the warming air rises. Underfloor air distribution systems are similar in some respects, but usually feature a raised floor from which air is delivered via diffusers in the floor, causing mixing and dilution with existing air at levels below the breathing zone. In both displacement and underfloor air distribution, the systems are designed to take advantage of the natural upward flow of air

as it warms. These systems potentially can produce significant energy savings because ventilation air requires less conditioning than with traditional dilution systems. There also is a significant side benefit for casinos: well-designed air displacement systems would move secondhand smoke up and away from occupants and remove it from a casino with little or no mixing. The Dubuque Greyhound Park & Casino, mentioned earlier, is the first gaming facility to use this promising technology. It remains to be deployed in major casino resorts.

### **Combination of Smoking Bans and Improved Ventilation**

Because many gaming facilities are so large and contain such diverse spaces, the most workable option may be to combine bans in certain areas of the facility with improved ventilation in others. The gaming industry's concern about negative economic impacts relates primarily to gaming revenues. Therefore, resorts conceivably could ban smoking in nongaming areas without significant inconvenience to patrons and without impacting gaming revenues. Smoking could be allowed on the casino floor, combined with state-of-the-art ventilation to provide the best possible air quality.

### **Conclusion**

The gaming industry's first efforts to use ventilation to remove secondhand smoke are promising. The monitoring results suggest that significantly improved air quality can be achieved, and perhaps can be comparable to buildings where smoking is banned completely. However, these initial indications must be tested and repeated to gain credibility. Smoking opponents believe ventilation cannot protect building occupants from ETS exposure, and they will be skeptical of research supporting ventilation. Such research must be independent, sound and peer-reviewed.

Because secondhand smoke contains known carcinogens, many also doubt the efficacy of filtration and believe that the only solution is to remove secondhand smoke at the source, with bans. Overcoming this skepticism and convincing policy-makers that ventilation can provide acceptable indoor air quality are the major challenges the industry must meet if its goal is to avert the momentum toward complete smoking bans.

For the time being, the gaming industry has achieved some success gaining exemptions from smoking bans for casinos, as happened recently in New Jersey and Colorado. If the industry is willing to invest the necessary effort in demonstrating that ventilation can protect employees and customers, it may be able to sustain these exemptions over the long term. Without such an industrywide commitment and approach, the exemptions may be too fragile and too controversial to last.

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**Overcoming this skepticism and convincing policy-makers that ventilation can provide acceptable indoor air quality are the major challenges the industry must meet if its goal is to avert the momentum toward complete smoking bans.**

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## Endnotes

<sup>1</sup>National Cancer Institute: The American Stop Smoking Study, Conceptual Framework and Evaluation Design, (1999); <http://dceg.cancer.gov/pdfs/stillman232591999.pdf>.

<sup>2</sup>J. Chriqui, PhD, J. O'Connor, JD, MayaTech Corporation, Silver Spring, Maryland. S Babb, MPH, NA Blair, MPH, G Vaughn, A MacNeil, MPH, Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC. State Smoking Restrictions for Private-Sector Worksites, Restaurants, and Bars — United States 1998 and 2004. 54(26); 649-653. (July 8, 2005) <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5426a1.htm>.

<sup>3</sup>US Department of Health and Human Services. The Health Consequences of Involuntary Smoking: A Report of the Surgeon General. Centers for Disease Control. (1986). [http://www.cdc.gov/tobacco/sgr/sgr\\_1986/index.htm](http://www.cdc.gov/tobacco/sgr/sgr_1986/index.htm).

<sup>4</sup>See Growth of Smoking Restrictions, Federal Government, below.

<sup>5</sup>59 Fed. Reg. 15968 (April 5, 1994).

<sup>6</sup>Secretary of Labor's Response to ASH's Petition for a Writ of Mandamus, Action on Smoking and Health, Petitioner (D.C. Cir. August 10, 2001).

<sup>7</sup>ASHRAE 62-1989.

<sup>8</sup>Dobra, John L., PhD. *Economic Impacts of the Proposed OSHA Smoking Ban on the State of Nevada: A Report Submitted to The Greater Reno-Sparks Chamber of Commerce and The Las Vegas Chamber of Commerce*. Las Vegas Chamber of Commerce, The Greater Reno-Sparks Chamber of Commerce. (December, 1996) <http://legacy.library.ucsf.edu/cgi/getdoc?tid=xzx97d00&fmt=pdf&ref=results>.

<sup>9</sup>Mandel, L; BC Alamar; and SA Glantz, "Smokefree Law did not affect revenue from gaming in Delaware" *Tobacco Control* 14 (2005), 10-12

<sup>10</sup>Pakko, Michael. *No Smoking at the Slot Machines: The Effect of a Smoke-Free Law on Delaware Gaming Revenues*. Federal Reserve Bank of St. Louis Working Paper 20005-054C (June 2005; revised December 2005). <http://research.stlouisfed.org/wp/2005/2005-054.pdf>.

<sup>11</sup>New Jersey Group Against Smoking Pollution, *Trends in Smokefree Gaming* (September 13, 2005).

<sup>12</sup>PricewaterhouseCoopers, *Smoking Ban Economic Effect Analysis*, (November 17, 2005).

<sup>13</sup>McAleer, Pete. *Smoking ban can exempt casinos*. The Press of Atlantic City, April 14, 2006.

<sup>14</sup>Scollo, M. and Lal, A. Summary of Studies Assessing the Economic Impact of Smoke-Free Policies in the Hospitality Industry. VicHealth Centre for Tobacco Control. (July 2005) <http://www.vctc.org.au/tc-res/Hospitalitysummary.pdf>.

<sup>15</sup>Indoor Air Quality Monitoring, Bellagio Casino, Las Vegas, Nevada (December 1999).

<sup>16</sup>National Institute for Occupational Safety and Health (NIOSH), Method 2551, Nicotine, NIOSH Manual of Analytical Methods (NMAM), 4th ed. DHHS (NIOSH) Publication 94-113 (August, 1994), 1st Supplement Publication 96-135, 2nd Supplement Publication 98-119, 3rd Supplement 2003-154, Schlecht, P.C. & O'Connor, P.F. (pfo1@cdc.gov), Eds.

<sup>17</sup>*Indoor Air Quality and Environmental Tobacco Smoke Monitoring Study of the Bellagio Casino*, Las Vegas, Nevada (May 25, 2005).

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