

# RIVERSIDE

## CASINO & GOLF RESORT

Live it up!

On March 23, 2007, an indoor air quality survey was conducted at the Riverside Casino. The purpose of the survey was to evaluate the effectiveness of the ventilation system with regard to comfort. Air quality measurements were taken in gaming areas. The survey included measurements of typical indoor air quality parameters. Environmental Tobacco Smoke related contaminants were assessed by monitoring for nicotine and total particulates. The survey was conducted to establish baseline measurements and to ensure that the ventilation system is working as designed.

### AIR QUALITY MEASUREMENTS

As one indicator to evaluate the effectiveness of the ventilation system, carbon dioxide (CO<sub>2</sub>) levels were measured on the gaming floor. The indoor CO<sub>2</sub> measurements ranged from 461 ppm to 688 ppm in the Gaming areas. Carbon dioxide concentrations were well below the guidance level recommended by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), of a maximum differential of 700 ppm CO<sub>2</sub> between outside air and the measured indoor air. The outside air CO<sub>2</sub> measurement ranged from 458 ppm to 502 ppm.

The casino's ventilation system brings in 100% outside air at all times. The air is conditioned, heated or dehumidified. The air is then sent under the floor and enters the casino through openings in the slot bases. The air returns are located at the ceiling level. Carbon dioxide sensors are in use that constantly monitors the CO<sub>2</sub> levels; the system adjusts the number of air exchanges based on the carbon dioxide levels present. A CO<sub>2</sub> measurement was taken at one slot base air supply and the reading (510 ppm) was comparable to the outdoor measurement taken during the same time period (502 ppm).

### ENVIRONMENTAL TOBACCO SMOKE

Vapor phase nicotine and respirable suspended particulate matter (ETS-RSP) are the most commonly used markers for ETS because of their ease of measurement, knowledge of their emission rate from tobacco combustion, and their relationship to other ETS contaminants.

The nicotine level measured was less than that expected in a smoking environment. In addition, the levels were less than the OSHA and ACGIH recommended eight (8)-hour exposure limit of 0.5 mg/m<sup>3</sup> for workers. The carbon monoxide concentrations noted ranged from zero to 1 ppm, similar to levels noted outdoors. At this time, there are not yet any federal requirements that limit the level of tobacco smoke in indoor, public environments.

Time	Location	Measured CO <sub>2</sub> Concentration (ppm)	Indoor - Outdoor CO <sub>2</sub> Concentration (ppm) (1)**	Temperature (°F)	Relative Humidity (%)
8:45 pm	E186 (SE) Slots	640	154	71.4	63.9
	Show Bar	653	167	72.7	62.3
	C090-12/Cashier	553	67	72.3	60.8
	C096-06/Ft. Knox	630	144	72	61
	B056-03/Penny Party	526	40	71.4	60.6
	A010-04/Riverside Reels	553	67	71.4	61.1
	A002-06/Main Entry	569	83	71.6	61.5
	F250-01 Slots	528	42	71.6	61.4
	Ultimate Texas Hold Em	602	116	71.6	61.2
	E. Roulette	576	90	72	62.4
	W. Roulette	569	83	71.8	61.4
	Craps Tables	620	134	72	60.8



## PROMARK ASSOCIATES, INC.

Complete Source for Gas Phase Filtration

August 9, 2005

### **Executive Summary of Air Quality Test Results: Dubuque Greyhound Park & Casino**

On July 23, 2005 samples were taken of the air inside and outside the Dubuque Greyhound Park and Casino. The samples were analyzed by Prism Analytical Technologies, Inc, Mt. Pleasant, MI. They reported the following results for the Total Volatile Organic Compounds (TVOC's) found by location. (The test is capable of detecting over 300 VOC's.) A sheet that lists air quality ratings relative to the TVOC level is attached.

<u>Time</u>	<u>Location</u>	<u>TVOC (ng/L)*</u>	<u># of Compounds</u>
3:22-6:42	Inlet to Total Spectrum	340	47
3:22-6:42	Outlet of Total Spectrum	290	26
3:22-6:42	Casino floor-head height	<200	11
9:18-12:22	Inlet to Total Spectrum	<200	4
9:18-12:22	Outlet of Total Spectrum	<200	13
9:18-12:22	Casino floor-head height	<200	8
6:53-9:07	Outside air taken away from building	<200	2

\* ng/L is nanograms per liter; a nanogram is 1 billionth of a gram.

Attendance at the casino on July 23<sup>rd</sup> was 7,735, an all-time record. This is a 30,000 square foot facility with a 20-foot ceiling above the casino floor. Fresh air is being introduced at 33% over all through the three air handlers; the remaining 67% is recirculated indoor air.

A detailed report from Prism is available listing all the chemicals detected. Of those menthol stands out as a marker for cigarettes. It enters at 2ng/L and is undetectable at the outlet of the Total Spectrum. Other chemicals are from tobacco burning but are not exclusive to it. Since this is a casino where 60% of clientele smoke, I feel it is fair to assume most chemicals are from Environmental Tobacco Smoke (ETS). Cleaning chemicals also appear and are removed, such as d-limonene, a common additive to general-purpose cleaners.

The test results demonstrate that Total Spectrum is cleaning indoor air of chemical contaminants brought in or generated inside the casino. The air that clients and employees breathe is as good or better than the air in a nonsmoking home or office. Total Spectrum sets a new standard for Indoor Air Quality for any establishment where smoking is allowed. With proper airflow and the Total Spectrum, high quality air, free from the carcinogens created by smoking, may be achieved.

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