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MISSISSIPPI
Tobacco Data

THE VICKSBURG & NATCHEZ AIR QUALITY STUDY REPORT

JUNE 2013

EXECUTIVE SUMMARY



In June 2013, indoor air quality was assessed in Vicksburg and Natchez. Neither community has an ordinance regarding smoking.

We used a TSI SidePak AM510 Personal Aerosol Monitor using the protocol developed by the Roswell Park Cancer Institute to measure the concentration of fine particle air pollution, $PM_{2.5}$. Air quality studies typically monitor particles of this size because $PM_{2.5}$ are released in significant amounts from burning cigarettes, are easily inhaled deep into the lungs, and cause a variety of adverse health effects including cardiovascular and respiratory morbidity and death.



TOBACCO SMOKE

According to the Surgeon General, there is no safe level of exposure to secondhand smoke¹. Tobacco smoke contains more than 7,000 chemicals, of which at least 69 cause cancer². Acute risks of secondhand smoke exposure include sudden infant death syndrome, acute respiratory problems, otitis media, increased asthma severity, and myocardial infarction. The numerous chronic and acute harms of tobacco smoke have been documented in many literature reviews^{1,2}.

AMERICAN HEART ASSOCIATION

Tobacco smoke causes about 46,000 heart disease deaths and 3,400 lung cancer deaths. Studies show that the risk of developing heart disease is about 25-30 percent higher among people exposed to environmental tobacco smoke at home or work. Secondhand smoke promotes illness, too. Children of smokers have many more respiratory infections than do children of nonsmokers. Nonsmoking women exposed to tobacco smoke are also more likely to have low-birthweight babies.

AMERICAN CANCER SOCIETY

Secondhand smoke is classified as a “known human carcinogen” (cancer-causing agent) by the US Environmental Protection Agency (EPA), the US National Toxicology Program, and the International Agency for Research on Cancer (IARC), a branch of the World Health Organization.

Tobacco smoke contains more than 7,000 chemical compounds. More than 250 of these chemicals are known to be harmful, and at least 69 are known to cause cancer. SHS has been linked to lung cancer. There is also some evidence suggesting it may be linked with childhood leukemia and cancers of the larynx (voice box), pharynx (throat), brain, bladder, rectum, stomach, and breast.

CURRENT STUDY

Mississippi is one of the few states that has not passed a statewide law regulating smoking in public indoor places. However, several municipalities in this state have passed local ordinances restricting smoking. Currently, 71 municipalities have implemented 100% comprehensive smoke-free ordinances and 12 have passed partial ordinances.

The goal of this study was to measure the level of fine particle air pollution in restaurants where smoking was permitted and compare this to smoke-free locations. Specifically, we examined indoor particle air pollution levels in locations where smoking is not allowed at all, non-smoking areas within locations that allow smoking, and locations where smoking is allowed in all places.

TOBACCO SMOKE & METHODS

U.S. ENVIRONMENTAL PROTECTION AGENCY

Health studies have shown a significant association between exposure to fine particles and premature death from heart or lung disease. Fine particles can aggravate heart and lung diseases and have been linked to effects such as: cardiovascular symptoms; cardiac arrhythmias; heart attacks; respiratory symptoms; asthma attacks; and bronchitis. These effects can result in increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days. Individuals that may be particularly sensitive to fine particle exposure include people with heart or lung disease, older adults, and children.

METHODS

In June 2013, indoor air quality was assessed in Vicksburg and Natchez. We applied a purposeful convenience sample rather than a random sample of venues for logistic reasons. Also, a small random sample of venues would unlikely be representative of the entire population of venues in the state. Neither community has an ordinance regarding smoking. There were two smoke-free restaurants and bars with no observed smoking, one non-smoking section within a restaurant that allowed smoking, one smoking-permitted restaurant with observed smoking, and two smoking-permitted casinos with observed smoking, one with a non-smoking section.

MICROGRAMS PER CUBIC METER ($\mu\text{G}/\text{M}^3$)

Air quality is assessed based on Particulate Matter (PM). The size of particles is directly linked to their potential for causing health problems. Very small particles generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. Air quality levels are defined as the mass of particulate matter ≤ 2.5 microns in diameter in a volume of air: micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). A microgram is one millionth of a gram. A cubic meter (approximately 39" X 39" X 39") describes a volume of air that is about the size of a washing machine.

METHODS

We used a TSI SidePak Monitor using the protocol developed by the Roswell Park Cancer Institute³ to measure the concentration of fine particle air pollution. The specific class of RSPs monitored was particulate matter ≤ 2.5 microns in diameter ($PM_{2.5}$), a commonly used marker for tobacco smoke exposure^{4,5}. Air quality studies typically monitor particles of this size because $PM_{2.5}$ are released in significant amounts from burning cigarettes, are easily inhaled deep into the lungs, and cause a variety of adverse health effects including cardiovascular and respiratory morbidity and death.

THE ROSWELL PARK CANCER INSTITUTE PROTOCOL⁶

The number of people inside the venue and the number of burning cigarettes were recorded during sampling. These observations were averaged over the time inside the venue to determine the average number of people on the premises and the average number of burning cigarettes. Room dimensions were also determined using a combination of counting construction materials of a known size such as floor tiles or estimation. Room volumes were calculated from these dimensions.

A TSI SidePak AM510 Personal Aerosol Monitor (TSI, Inc., St. Paul, MN) was used to sample and record the levels of respirable suspended particles in the air. The SidePak uses a built-in sampling pump to draw air through the device where the particulate matter in the air scatters the light from a laser. This portable light-scattering aerosol monitor was fitted with a 2.5 μm impactor in order to measure the concentration of particulate matter with a mass-median aerodynamic diameter less than or equal to 2.5 μm , or $PM_{2.5}$. Tobacco smoke particles are almost exclusively less than 2.5 μm with a mass-median diameter of 0.2 μm . The Sidepak was used with a calibration factor setting of 0.32, suitable for secondhand smoke. In addition, the SidePak was zero-calibrated prior to each use by attaching a HEPA filter according to the manufacturer's specifications.

Sampling was discreet in order not to disturb the occupants' normal behavior. For each venue, the first and last minute of logged data were removed because they are averaged with outdoor and entryway air. The remaining data points were averaged to provide an average $PM_{2.5}$ concentration within the venue.

RESULTS & CONCLUSION

RESULTS

	VENUE NUMBER	SIZE	AVG NUMBER OF PEOPLE	AVG NUMBER OF BURNING CIGARETTES	AVG PM 2.5 LEVEL
smoke-free restaurants & bars →	1	36,000	16	0	3.0
	2	7,200	23	0	3.3
non-smoking section of restaurants & bars →	3	18,000	41	1	19.3
smoking permitted restaurants & bars →	4	12,000	22	3	96.9
smoking permitted casinos →	5	320,640	263	11	26.0
	6	4,054,000	1,200	27	20.5
smoking bar in smoking permitted casino →	6	110,000	80	3	28.4
non-smoking section of smoking permitted casino →	6	36,000	99	2	18.0

CONCLUSION

This study demonstrates that employees and patrons in Mississippi venues permitting indoor smoking are exposed to harmful levels of indoor air pollution resulting from indoor smoking. A comprehensive smoke-free air policy that prohibits indoor smoking in all indoor places is the only proven means to eliminate this exposure to toxic tobacco smoke pollution. This type of policy will result in improved quality of life and health outcomes for Mississippi workers and residents.

ACKNOWLEDGEMENTS

The study was funded by the American Lung Association Gulf-Plains Region. The protocol for this study and the report approach were developed by the Roswell Park Cancer Institute (RPCI).

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REFERENCES

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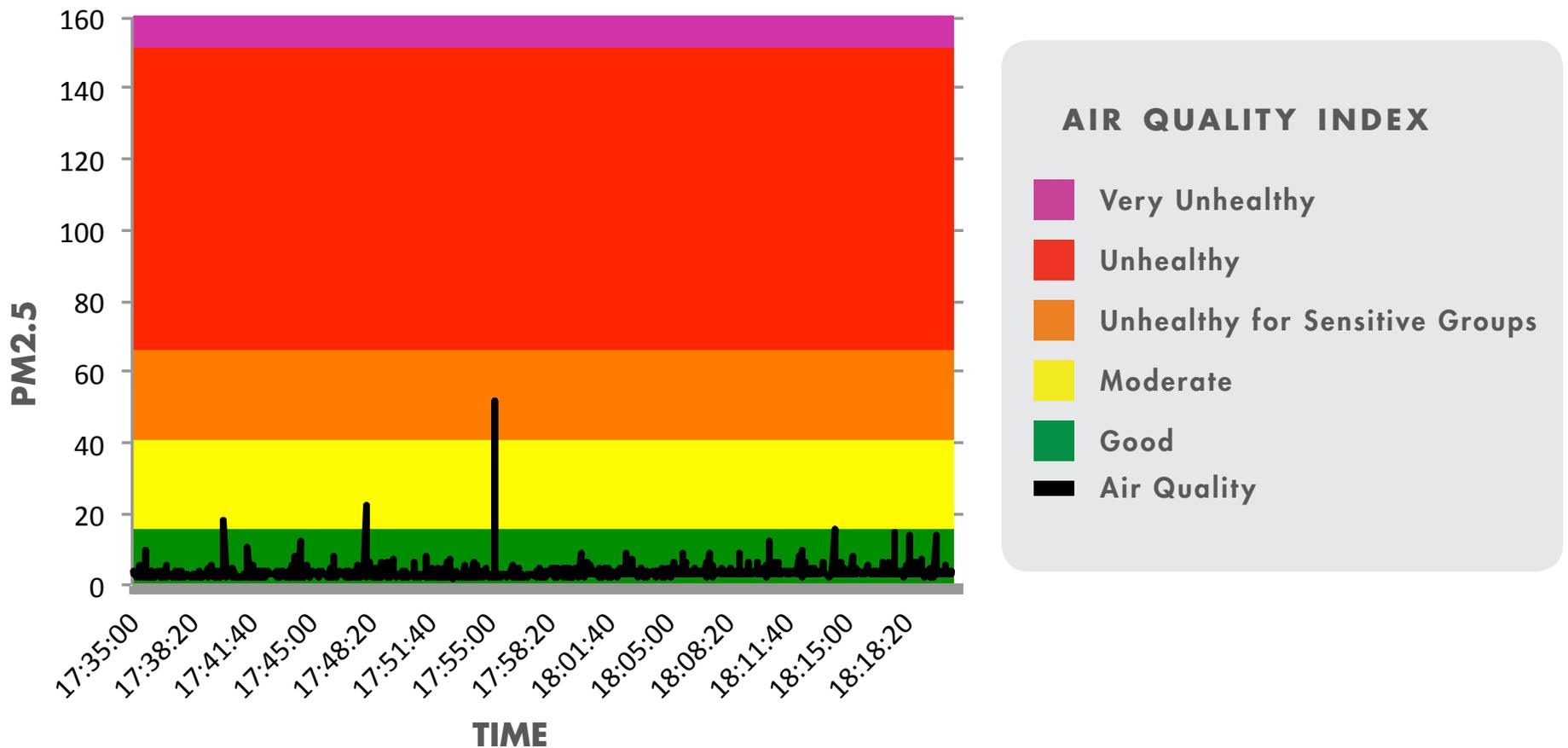
1. U.S. Department of Health and Human Services. *The health consequences of involuntary exposure to secondhand smoke: a report of the Surgeon General*. 2006.
2. U.S. Department of Health and Human Services. *How tobacco smoke causes disease: the biology and behavioral basis from smoking-attributable disease - a report of the Surgeon General*. 2010.
3. Travers M. *Indoor Air Monitoring Protocol*. Roswell Park Cancer Institute. 2006.
4. Connolly GN, Carpenter CM, Travers MJ, et al. How smoke-free laws improve air quality: a global study of Irish pubs. *Nicotine Tobacco Research*, 2009;11:600–5.
5. CDC. Indoor air quality in hospitality venues before and after implementation of a clean indoor air law—western New York, 2003. *MMWR* 2004;53:1038–41. ([Link](#))
6. Travers MJ, Vogl L. *Fayetteville, Arkansas air quality monitoring study*. Roswell Park Cancer Institute. 2011.

APPENDIX

US EPA AIR QUALITY INDEX

Air Quality	PM _{2.5} (µg/m ³)	Health Advisory
Hazardous	≥251	People with heart or lung disease, older adults, and children should remain indoors and keep activity levels low. Everyone else should avoid all physical activity outdoors.
Very Unhealthy	151-250	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.
Unhealthy	66-150	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.
Unhealthy for Sensitive Groups	41-65	People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.
Moderate	16-40	Unusually sensitive people should consider reducing prolonged or heavy exertion.
Good	≤15	None.

SMOKE-FREE | NATCHEZ RESTAURANT

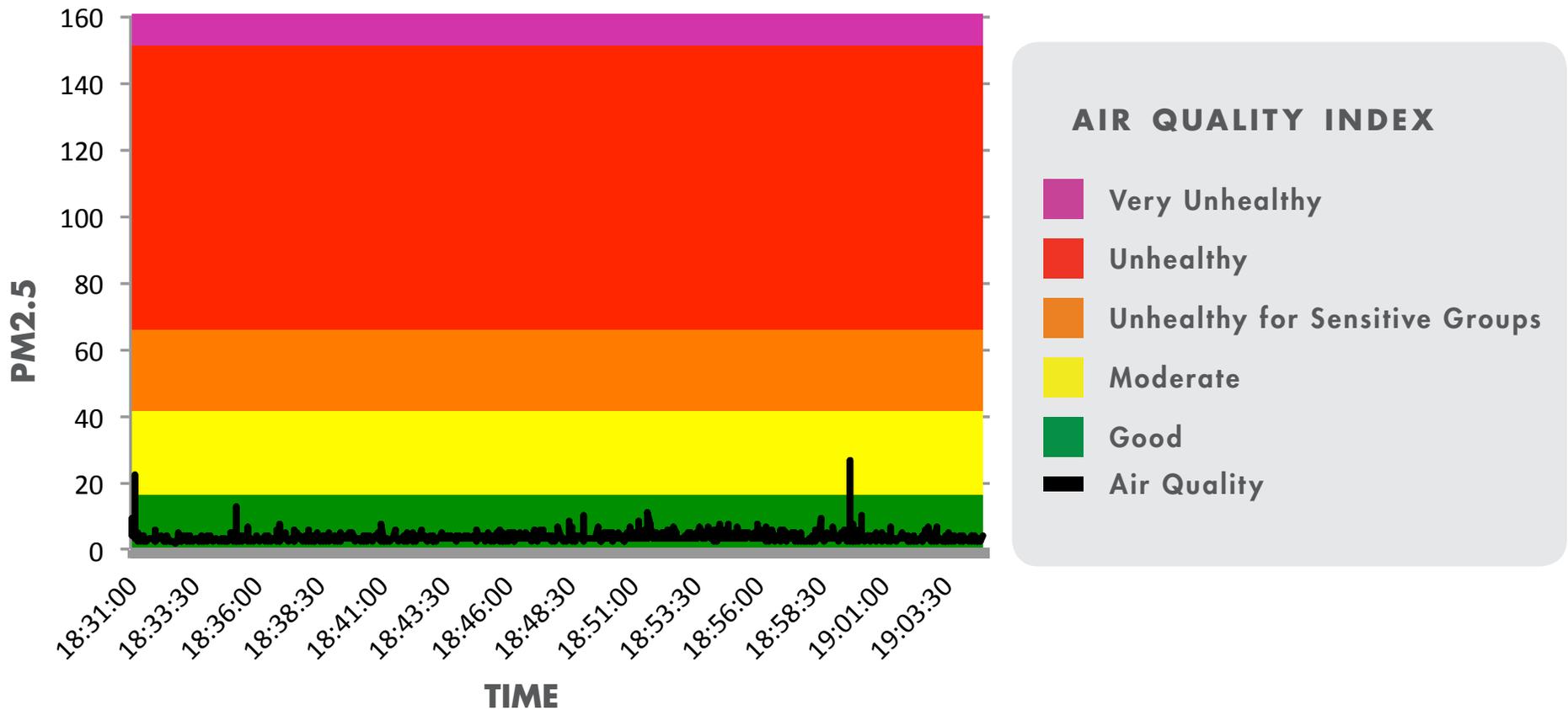


PM2.5 = 3.0 $\mu\text{g}/\text{m}^3$

This PM2.5 level is within the current U.S. Environmental Protection Agency's threshold for *Good Air Quality*.

→ venue 1

SMOKE-FREE | NACHEZ RESTAURANT



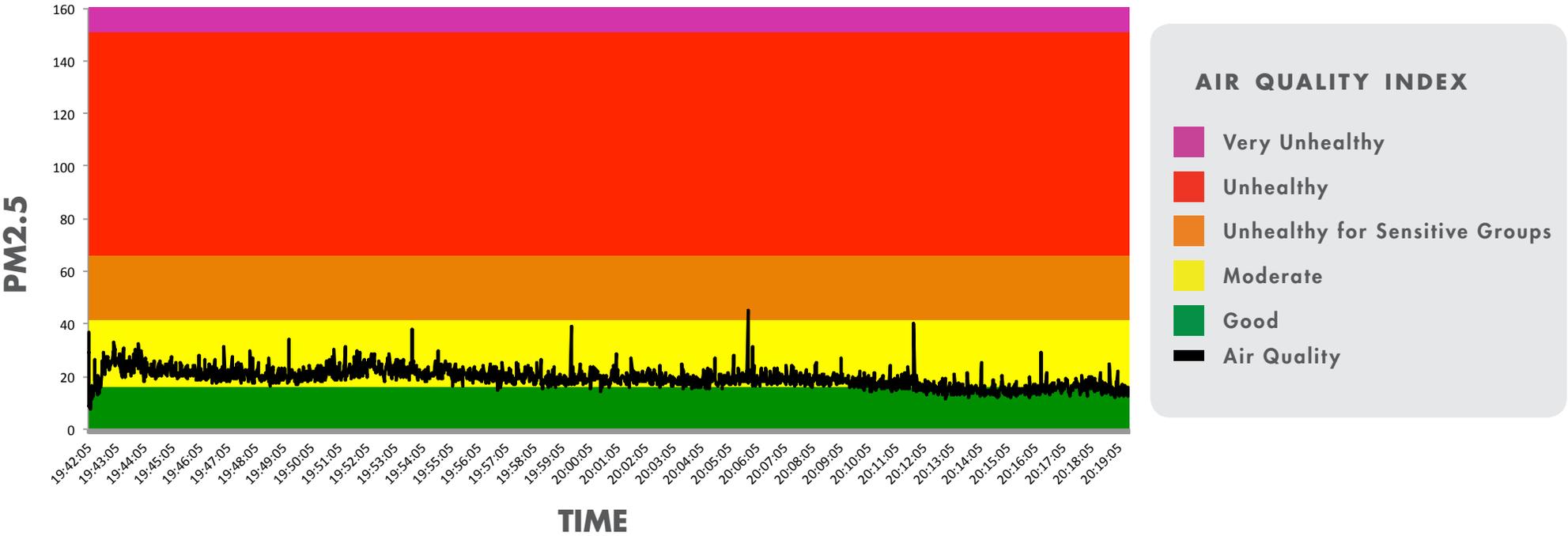
PM2.5 = 3.3 $\mu\text{g}/\text{m}^3$

This PM2.5 level is within the current U.S. Environmental Protection Agency's threshold for *Good Air Quality*.

→ venue 2

NON-SMOKING SECTION IN SMOKING ALLOWED

NATCHEZ RESTAURANT

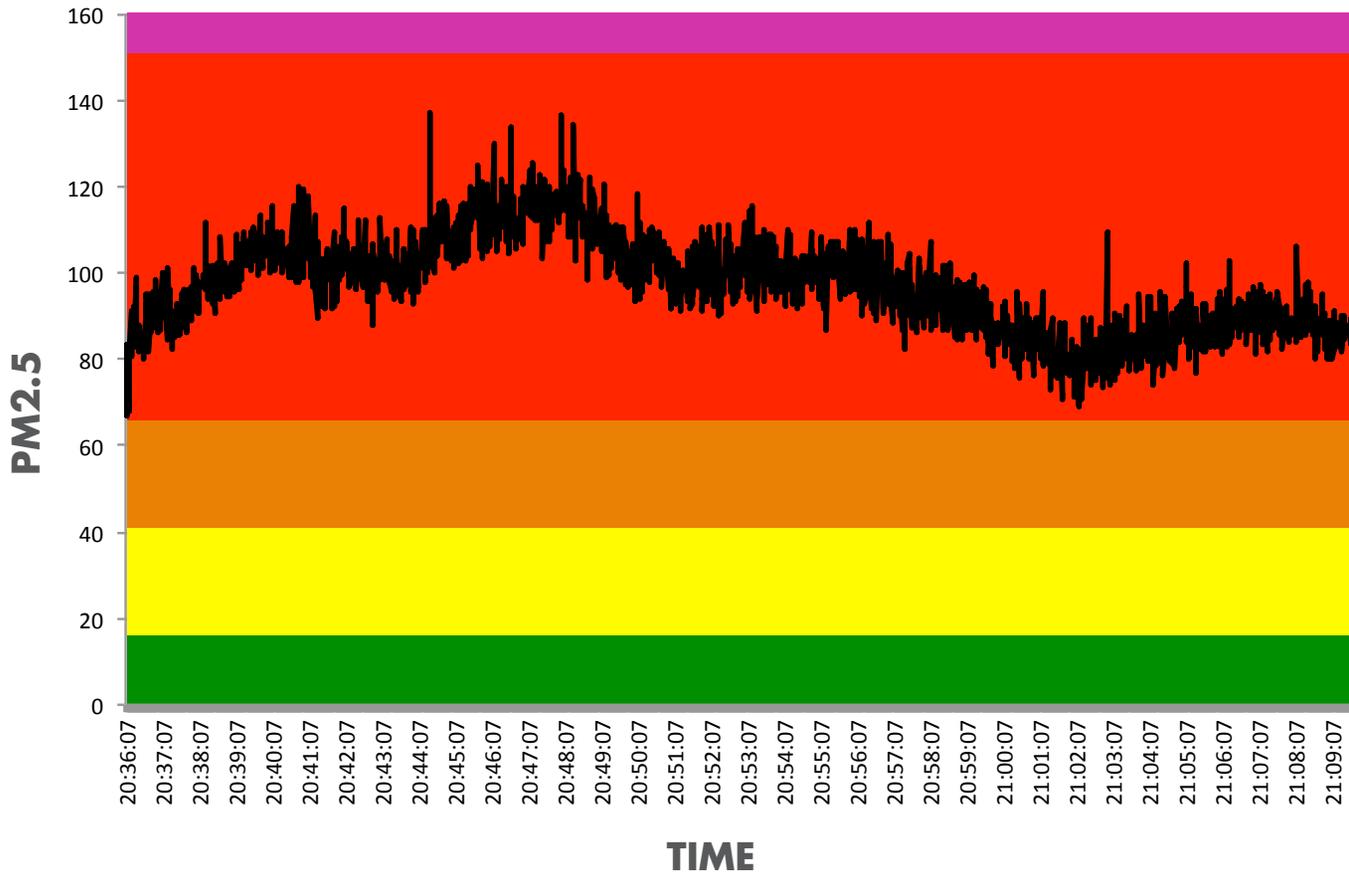


Non-Smoking PM2.5 = 19.3 $\mu\text{g}/\text{m}^3$

This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Moderate Air Quality*.

→ venue 3

SMOKING ALLOWED | NATCHEZ RESTAURANT



AIR QUALITY INDEX

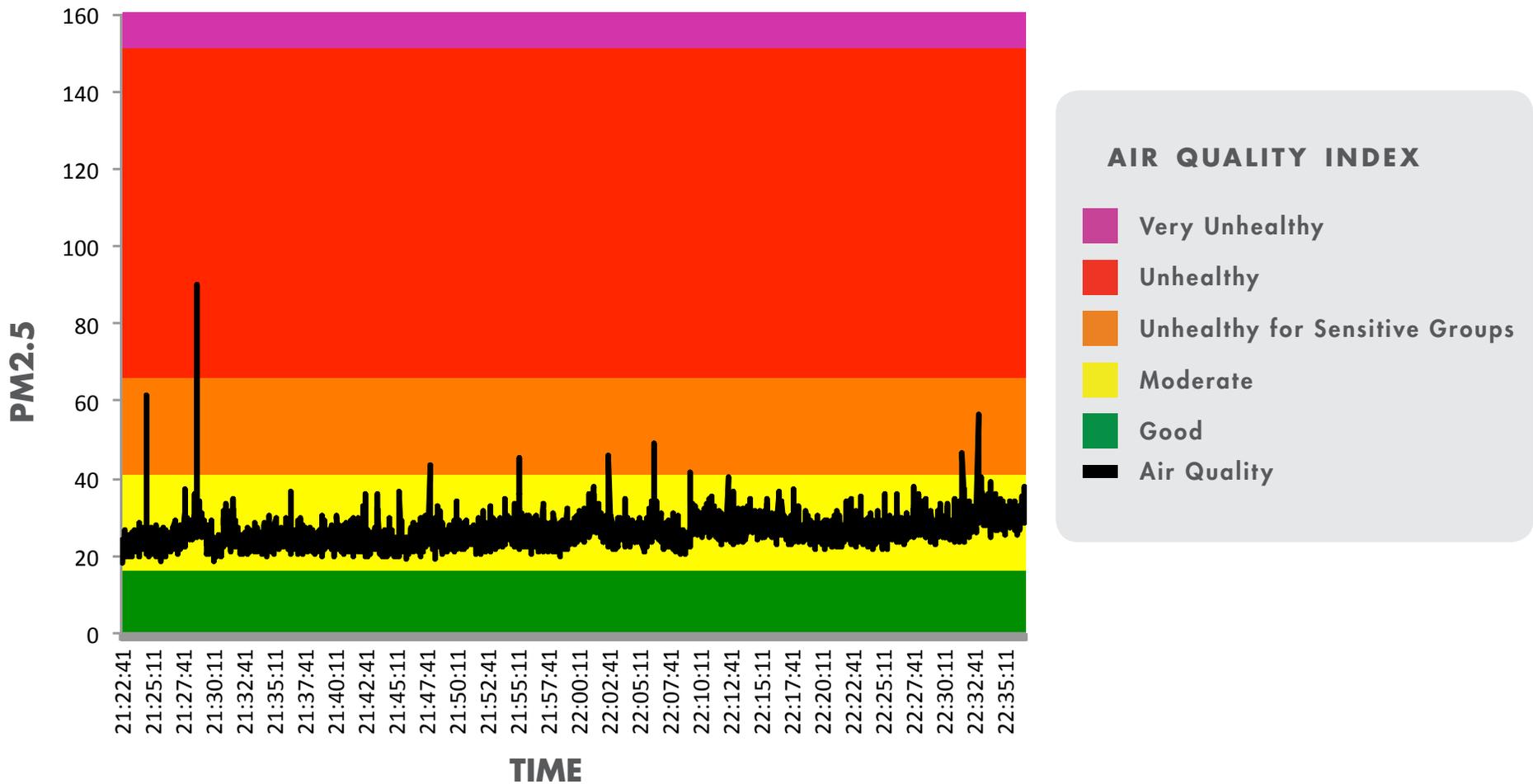
- Very Unhealthy
- Unhealthy
- Unhealthy for Sensitive Groups
- Moderate
- Good
- Air Quality

PM2.5 = 96.9 µg/m³

This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Unhealthy Air Quality*.

→ venue 4

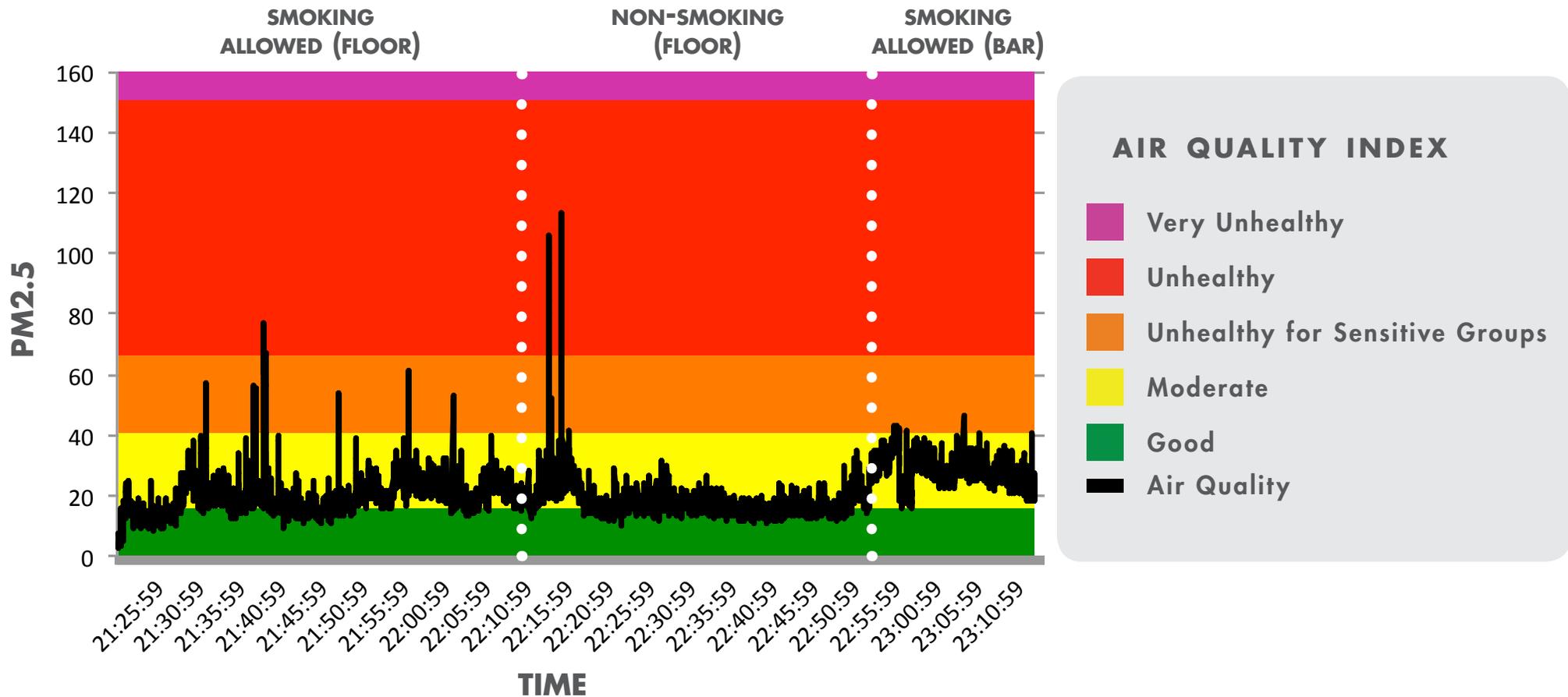
SMOKING ALLOWED | NACHEZ CASINO



PM2.5 = 26.0 $\mu\text{g}/\text{m}^3$

This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Moderate Air Quality*. → venue 5

SMOKING AND NON-SMOKING | VICKSBURG CASINO



Smoking-Floor: PM2.5 = 19.0 $\mu\text{g}/\text{m}^3$
 This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Moderate Air Quality*.
 → venue 6

Non-Smoking-Floor: PM2.5 = 18.0 $\mu\text{g}/\text{m}^3$
 This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Moderate Air Quality*.
 → venue 6

Smoking-Bar: PM2.5 = 28.4 $\mu\text{g}/\text{m}^3$
 This PM2.5 level exceeds the current U.S. Environmental Protection Agency's threshold for *Moderate Air Quality*.
 → venue 6

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