



Malaysian Occupant's Performance Evaluation

CK Tang

Veritas Environment Sdn Bhd



Thermal Comfort



MS 1525 (2014)

Items	Descriptions	Parameters
1	<i>Recommended</i> Dry Bulb Temp	24°C - 26°C
2	<i>Minimum</i> Dry Bulb Temp	23°C
3	<i>Recommended</i> <u>Design</u> Relative Humidity	50% - 70%
4	<i>Recommended</i> Air Movement	0.15 m/s – 0.50 m/s
5	<i>Maximum</i> Air Movement	0.70 m/s

Note:

No mention of Operative Temperature or Mean Radiant Temperature.

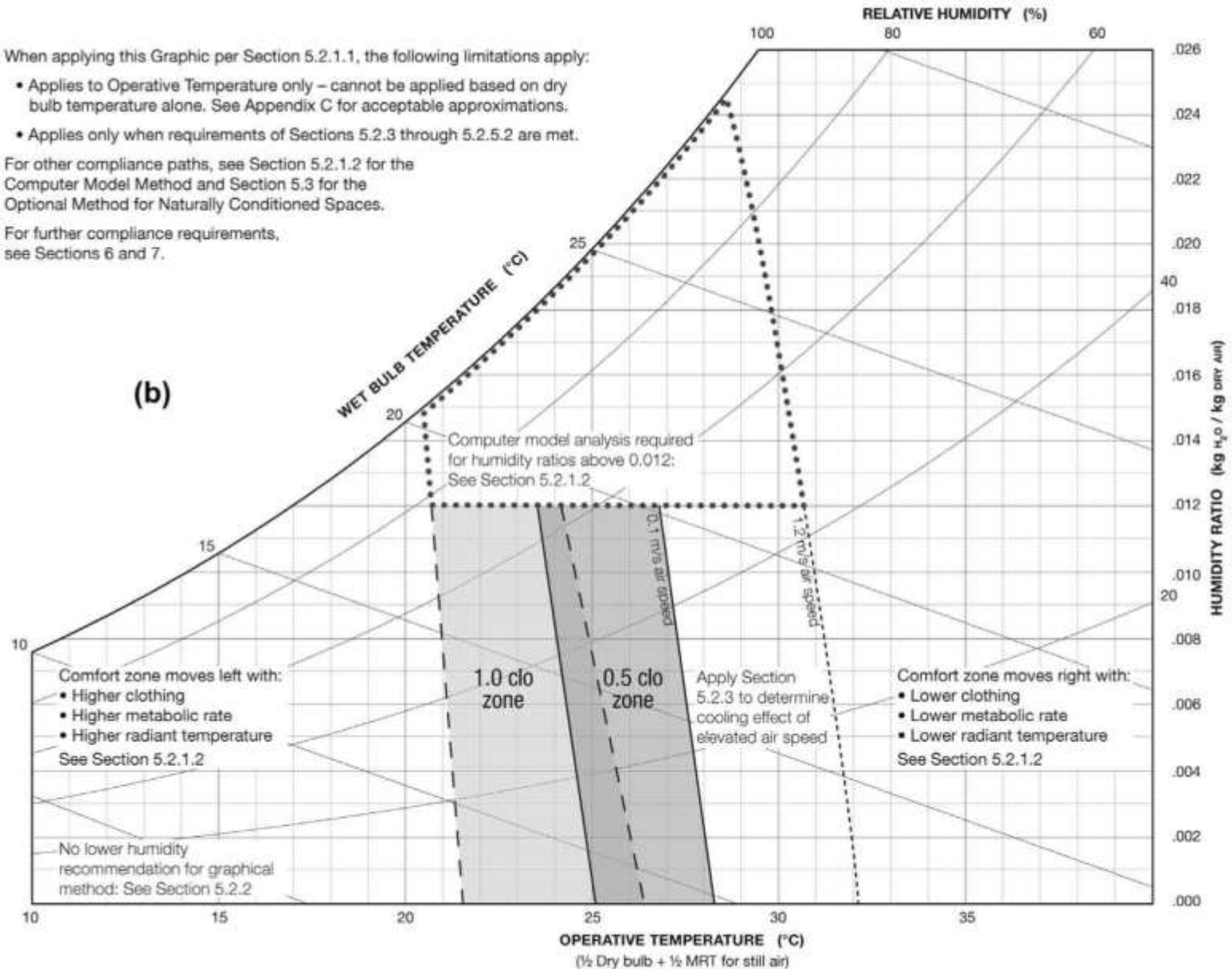
Ashrae 55 (2013) Graphical Method

When applying this Graphic per Section 5.2.1.1, the following limitations apply:

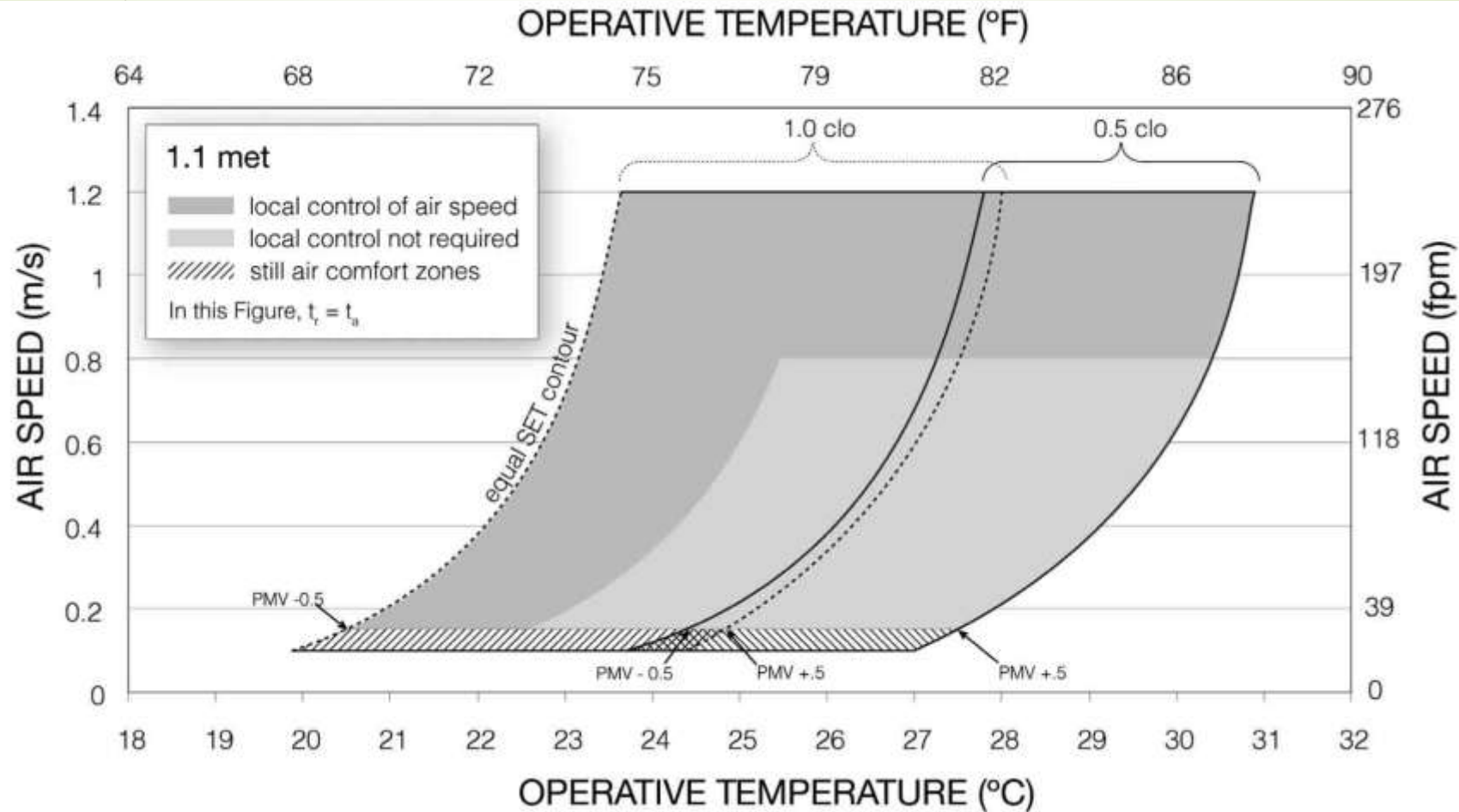
- Applies to Operative Temperature only – cannot be applied based on dry bulb temperature alone. See Appendix C for acceptable approximations.
- Applies only when requirements of Sections 5.2.3 through 5.2.5.2 are met.

For other compliance paths, see Section 5.2.1.2 for the Computer Model Method and Section 5.3 for the Optional Method for Naturally Conditioned Spaces.

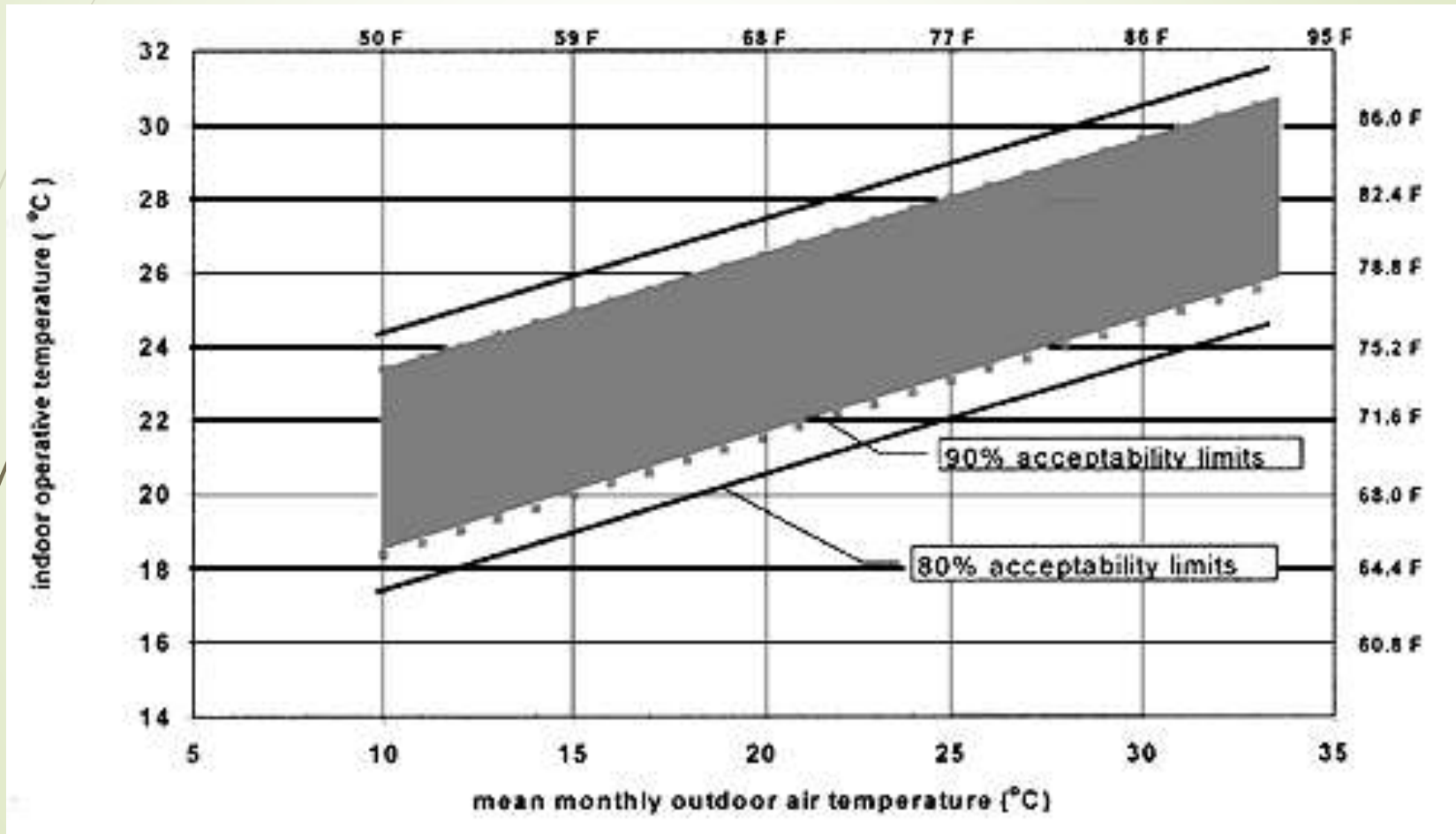
For further compliance requirements, see Sections 6 and 7.



Ashrae 55 (2013) Graphical Method



Ashrae 55 (2013) Graphical Method





In Malaysia...

- ▶ Are Malaysian less sensitive to Mean Radiant Temperature (and/or Operative Temperature)?
- ▶ MS 1525 limits on Air Speed is 0.7 m/s, Ashrae allowed up to 1.2 m/s, if occupants have control, 0.8 m/s if occupants have no control. Malaysian does not like higher air speed?
- ▶ MS 1525 emphasis on Design Relative Humidity. Is Relative humidity a bigger thermal comfort factor than Mean Radiant Temperature in a building for Malaysian?
- ▶ Is it necessary to make any changes to the MS 1525 thermal comfort parameters?



Indoor Air Quality





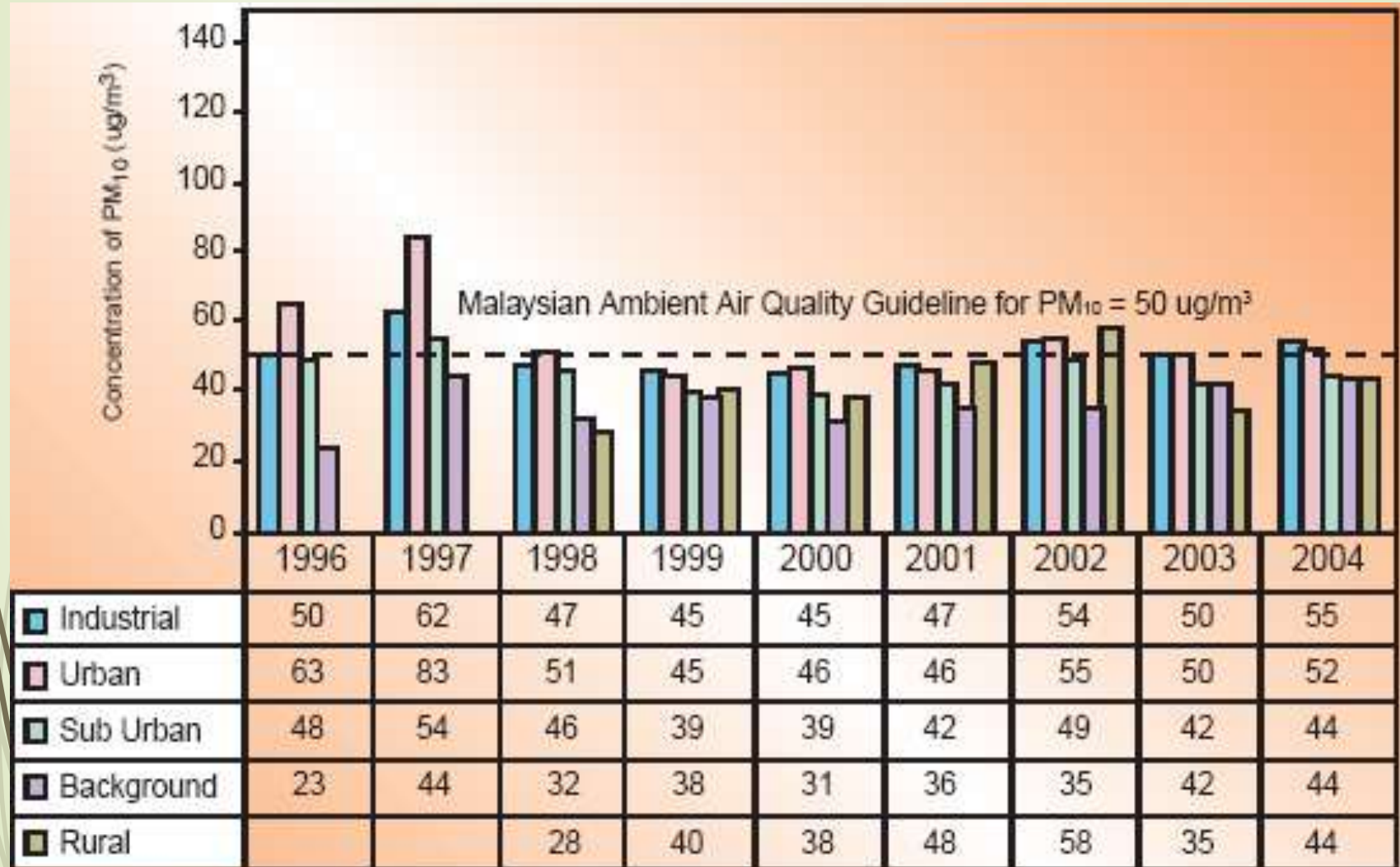
Particles (PM_{10})

Concentration of Interest $50\mu\text{g}/\text{m}^3$

- Sources – burning of wood, diesel and other fuels, industrial plants, agriculture (plowing, burning of fields); unpaved roads.
- Health effects – nose and throat irritation, lung damage, bronchitis, early death.

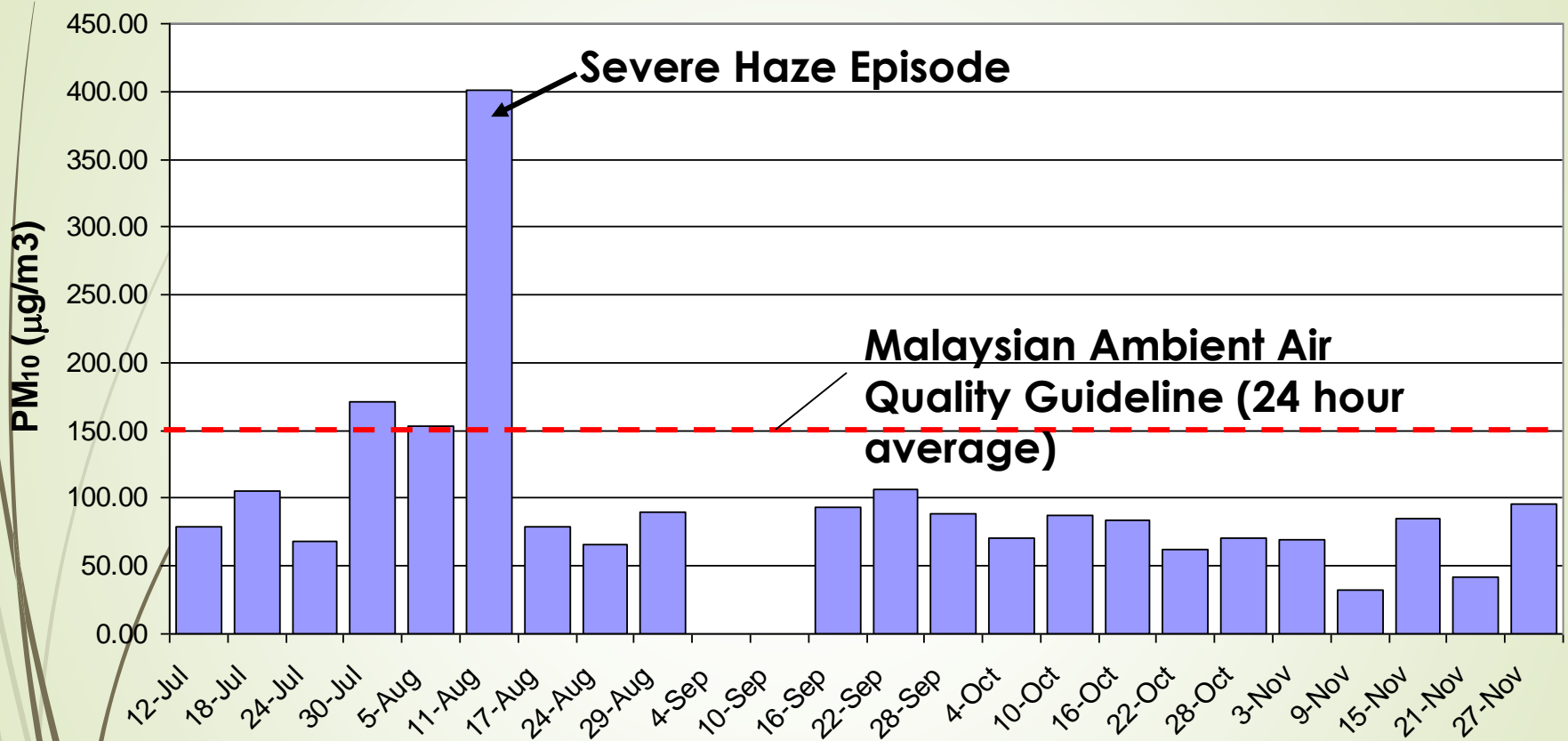
Ashrae 62.1 (2013) Table B-2

Annual Average PM₁₀ concentration by land use in Malaysia



Source: DOE, 2004

Sample Kerbside PM₁₀ Concentrations



- 24-hour average concentrations data near Kota Raya Station
- July 12 – Nov 27 (measurement every 6 days)
- Simultaneous CO and PM₁₀ data not available

Source:
DOE, cited
by Kee, 2006

World Health Organization

WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide

Global update 2005

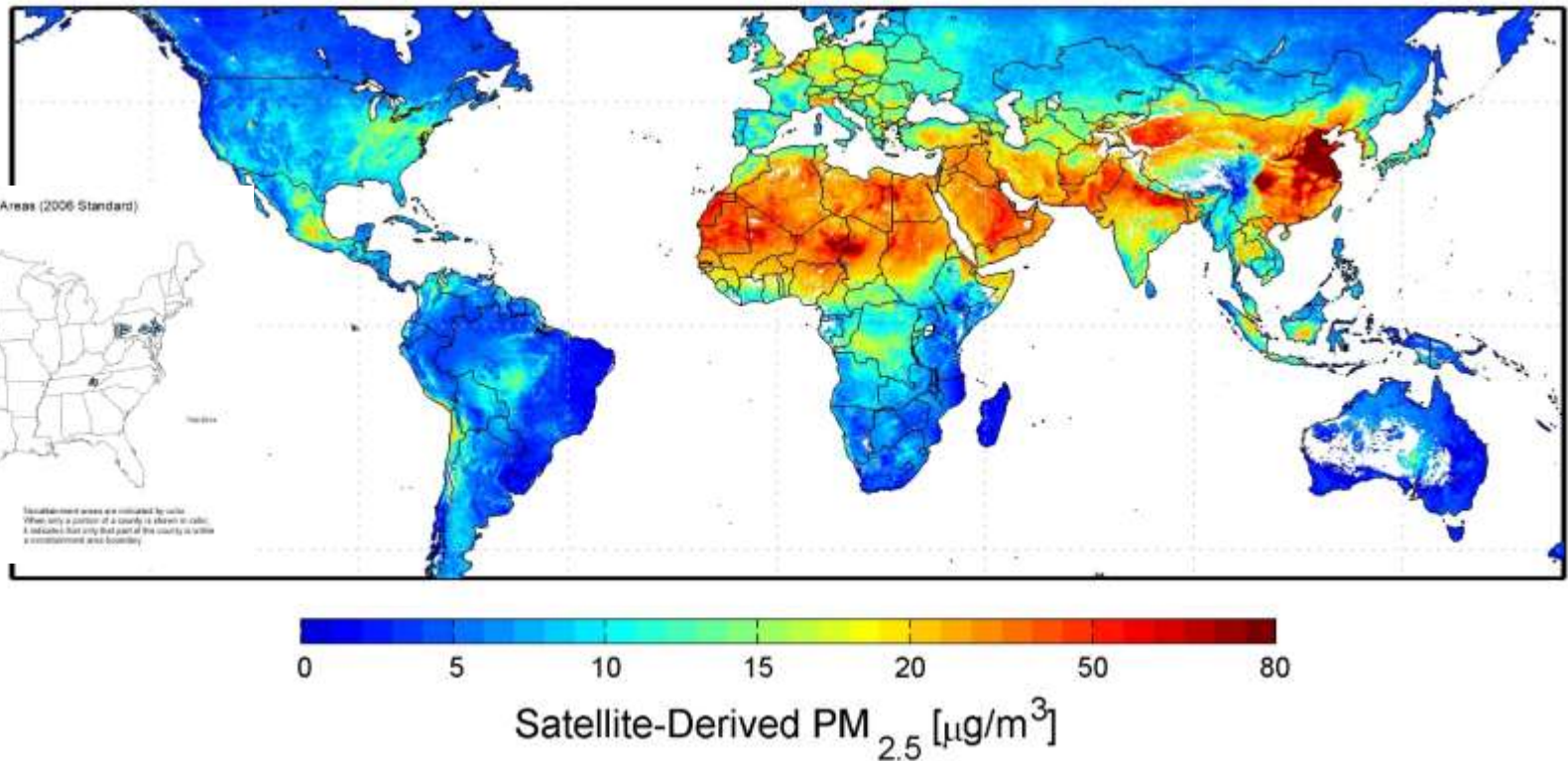
Summary of risk assessment

Guidelines

PM_{2.5}:	10 $\mu\text{g}/\text{m}^3$ annual mean 25 $\mu\text{g}/\text{m}^3$ 24-hour mean
PM₁₀:	20 $\mu\text{g}/\text{m}^3$ annual mean 50 $\mu\text{g}/\text{m}^3$ 24-hour mean

PM_{2.5}

PM_{2.5} particle is marked as the 'culprit of haze', equally known as the 'particles inhalable to lungs'.... carries a large amount of toxic and harmful materials... stay in the air longer...



Global satellite-derived map of PM_{2.5} averaged over 2001-2006. Credit: Dalhousie University, Aaron van Donkelaar



Ashrae Requirement

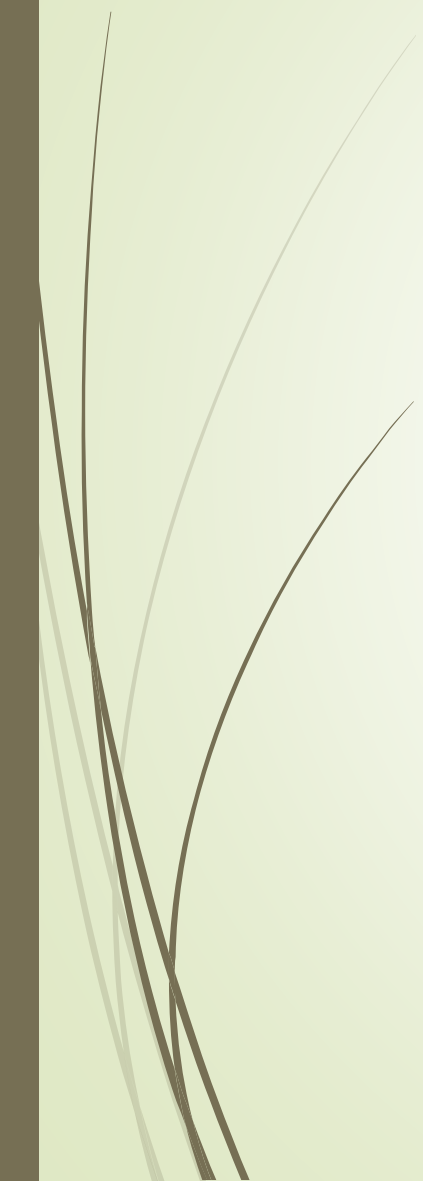
- ▶ 6.2.1.1. PM(10)
 - ▶ Particulate matter filters or air cleaners shall have a minimum efficiency reporting value (MERV) of 6 or higher when rated in accordance with Ashrae Standard 52.2.
- ▶ 6.2.1.2. PM (2.5)
 - ▶ Particulate matter filters or air cleaners shall have a minimum efficiency reporting value (MERV) of 11 or higher when rated in accordance with Ashrae Standard 52.2.

Ashrae 62.1 (2013)



In Malaysia...

- No enforcement in buildings.
 - No requirement by local green buildings rating system.
 - No measurement of PM 2.5

 - Are Malaysian stronger and fitter than the rest of the world and can tolerate higher contamination in our air?
- 



Lighting Comfort

Quantity vs. Quality





Recommended Office Lux Level

- MS 1525 : 300 – 400 lux
- Cibse: 500 lux
- IES: 300 – 800 lux
- Hong Kong : 500 lux
- Singapore : 500 lux

Lighting quality and office work: two field simulation experiments

NRCC-48155

Boyce, P.R.; Veitch, J.A.; Newsham, G.R.;
Jones, C.C.; Heerwagen, J.; Myer, M.; Hunter,
C.M.

~ 70%
Satisfaction



~ 80%
Satisfaction



~ 90%
Satisfaction





In Malaysia...

- ▶ What lux level is satisfactory?
- ▶ How do you measure “quality” in lighting?
 - ▶ CRI?
 - ▶ Color Temperature?
 - ▶ Contrast Ratio?



The End.