Health Consultations

- OH – Westerville Schools (2003)
- MI – Mid-Michigan Mercury Floor (2004)
- OR – Salem-Keizer School District 3M Flooring (2006)
- MN
  - Mercury Vapor Release/Athletic Polymer Floors (2006)
  - Bethel University (2008)

Gym Dandy!

Michigan's Experience

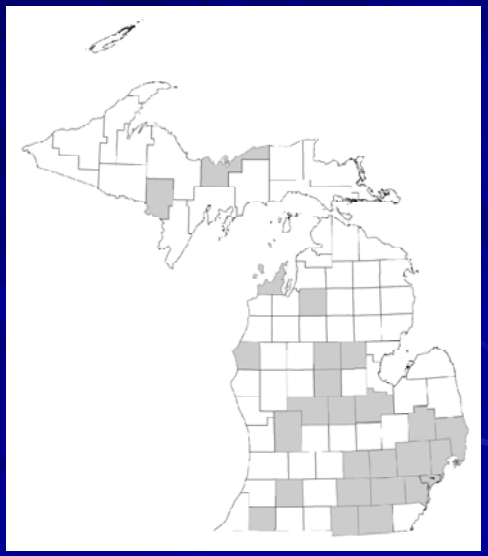
- Letters to schools
  - "…potential chemical contamination issue…"
  - "…free screening…"
  - Signed by dept admin

Questions/Checklist

- Room dimensions, features (stage, balcony, etc.)
- Floor characteristics (mfr, install date, modified?, surface condition)
- Environment (HVAC cfm, room temps, how cleaned, how used)

Responses from schools

- Worked with Dept Ed
- ~4,500 letters sent
- 70-75 responses
- 45-50 potential +'s



Concerns related to floors

- **Exposures**
- **Disposal options**
- **New flooring over the old**
- **Parental and community concern – Risk Communication**

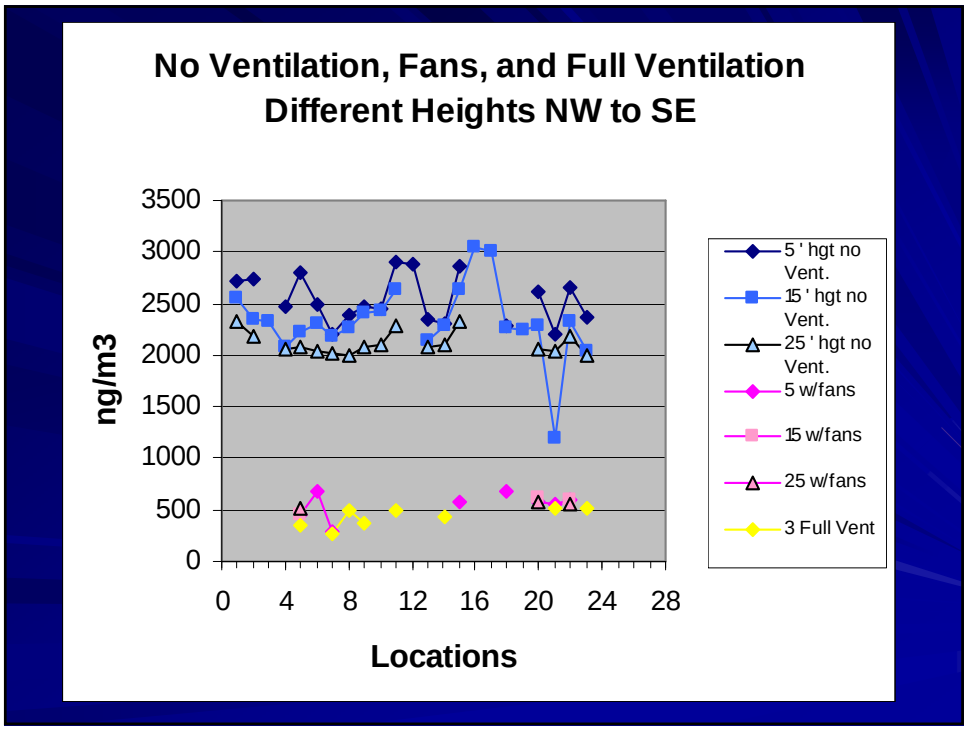
After 24 years,...
emissions from 1 (large) gym
still about **800 ug per minute**

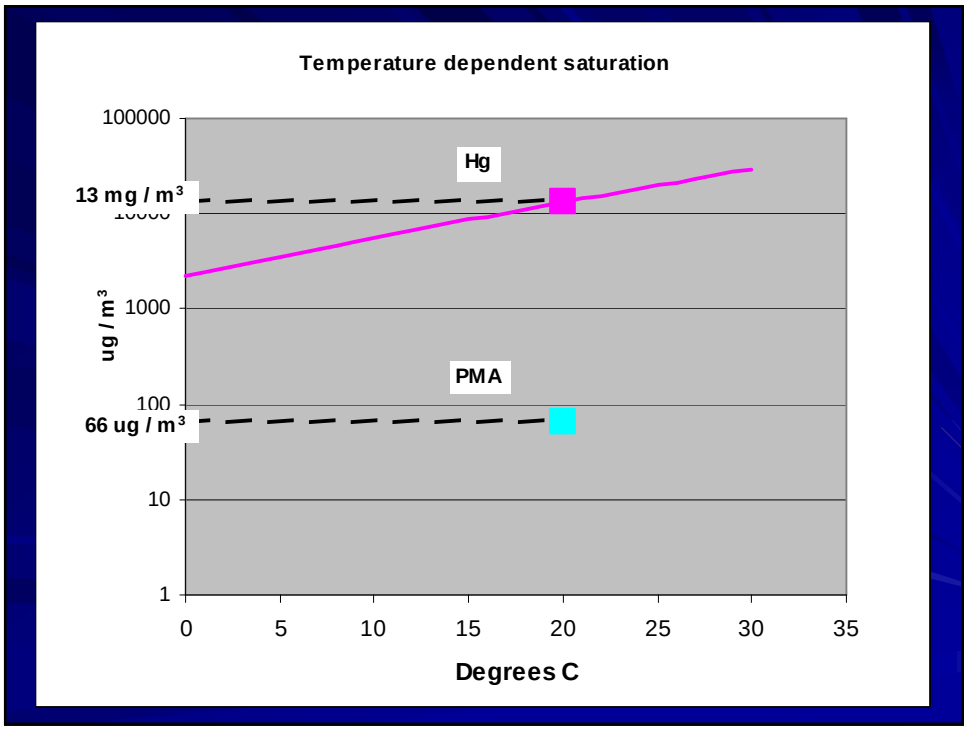
Equivalent to breaking 1 CFL every 4-5 minutes - -

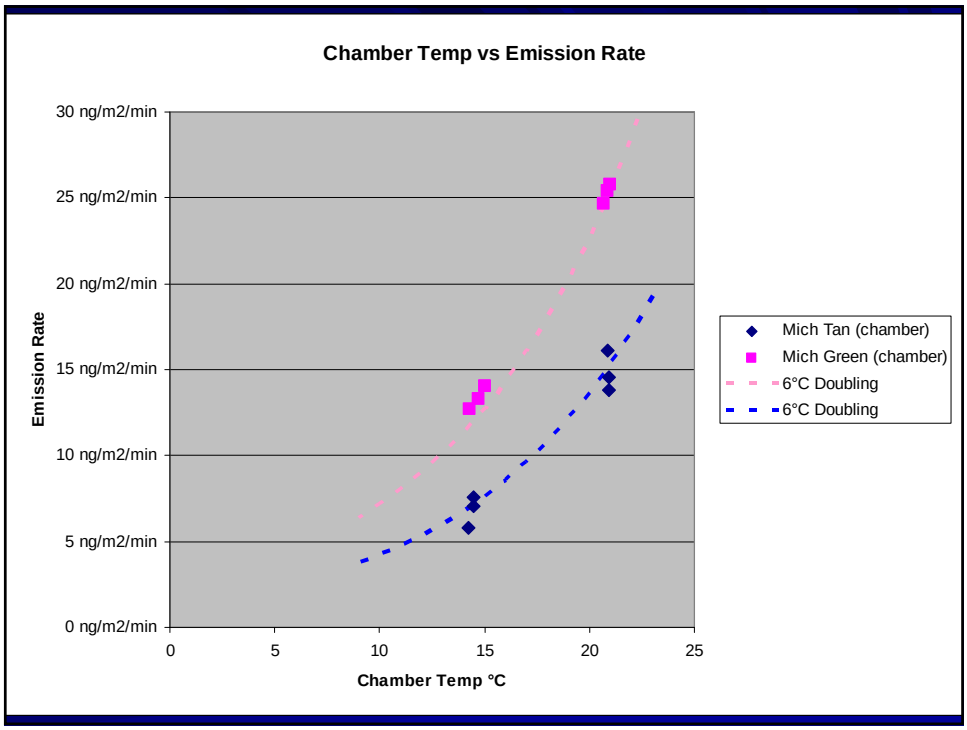
~ 280 broken CFLs per day

Exposure Concentrations

- **Mixing**
- **Building Ventilation**
- **Temperature**




Temperature dependent saturation
100000
1000
100
10
1
ug / m3
Hg
13 mg / m3
PMA
66 ug / m3
0
5
10
15
20
25
30
35
Degrees C


Chamber Temp vs Emission Rate
30 ng/m2/min
25 ng/m2/min
20 ng/m2/min
15 ng/m2/min
10 ng/m2/min
5 ng/m2/min
0 ng/m2/min
Emission Rate
0
5
10
15
20
25
Chamber Temp °C
Mich Tan (chamber)
Mich Green (chamber)
6°C Doubling
6°C Doubling

Reference Exposure Concentrations

- Chronic – EPA RfC – 300 ng/m^3
- Acute – CA OEHHA – 1800 ng/m^3

Exposure

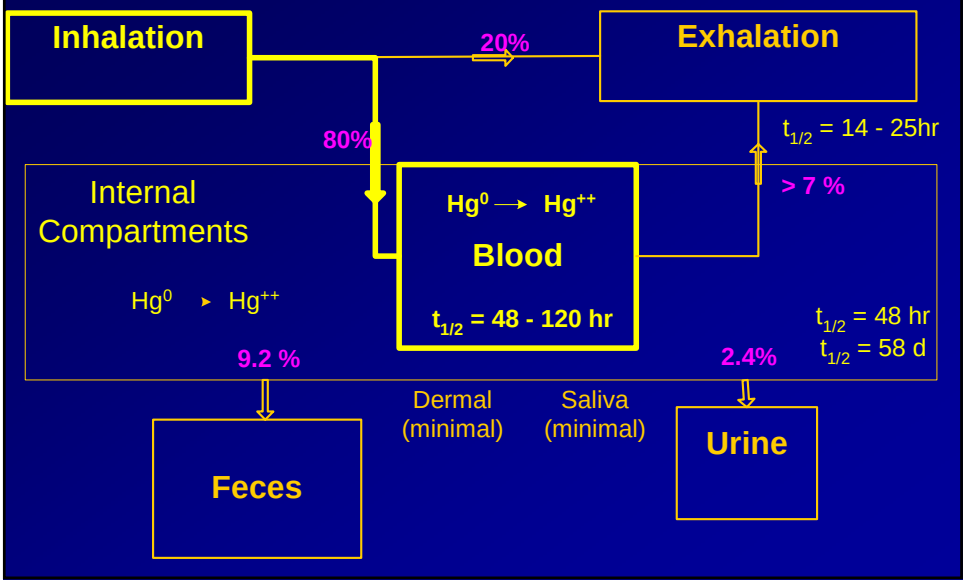
RfC * 14 / 5 = Workplace Exposure

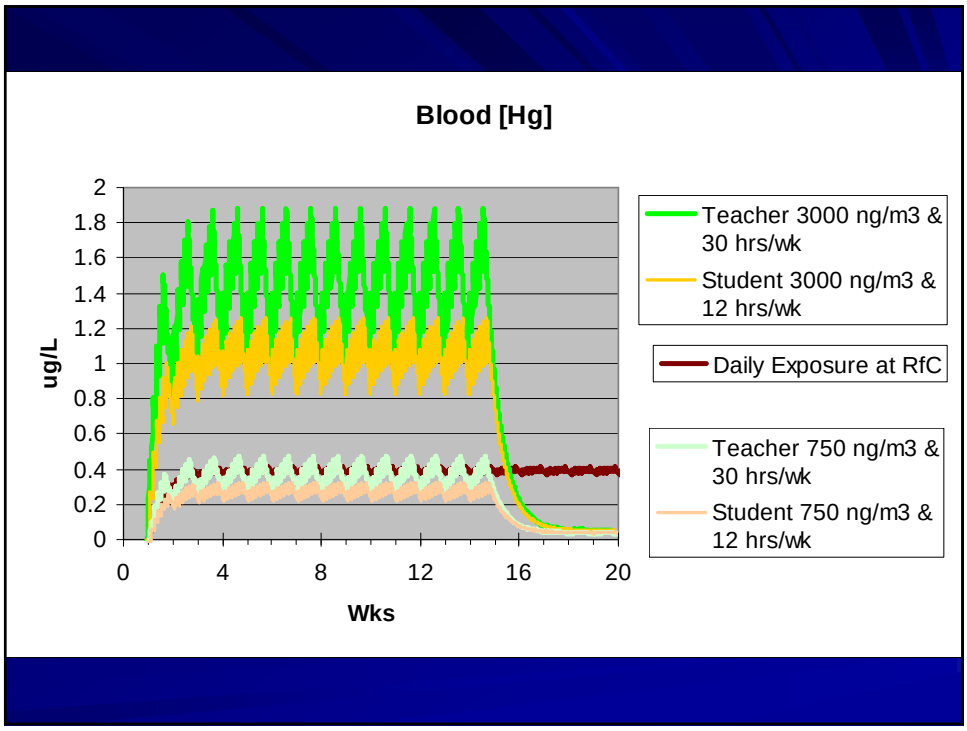
300 ng/m^3 * 14 / 5 = 840 ng/m^3

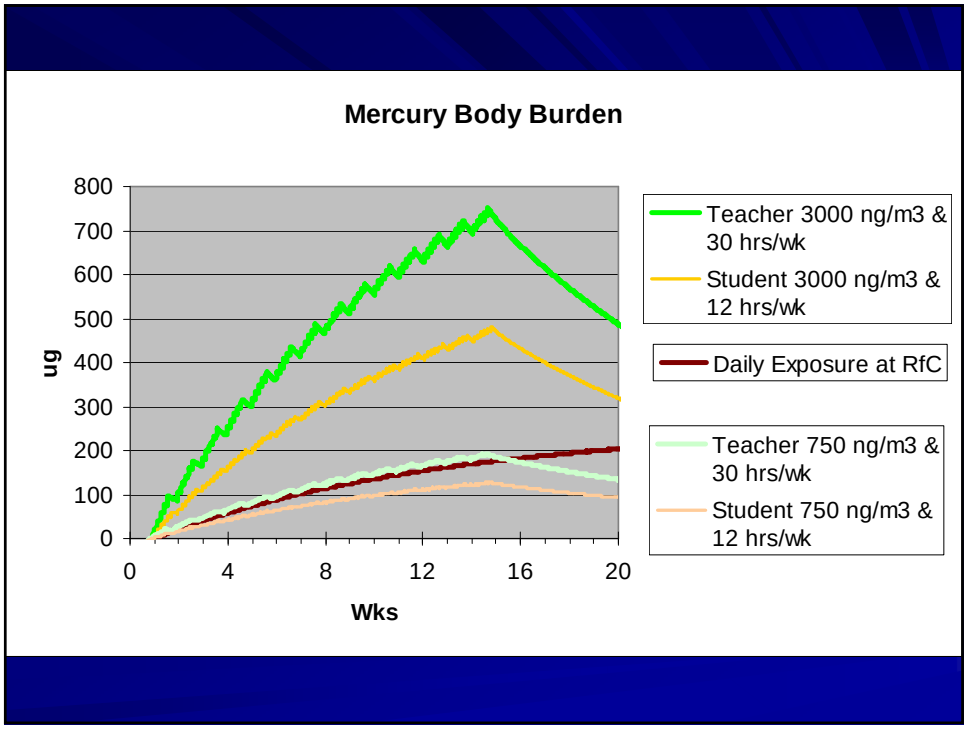
Teacher / Student Exposures

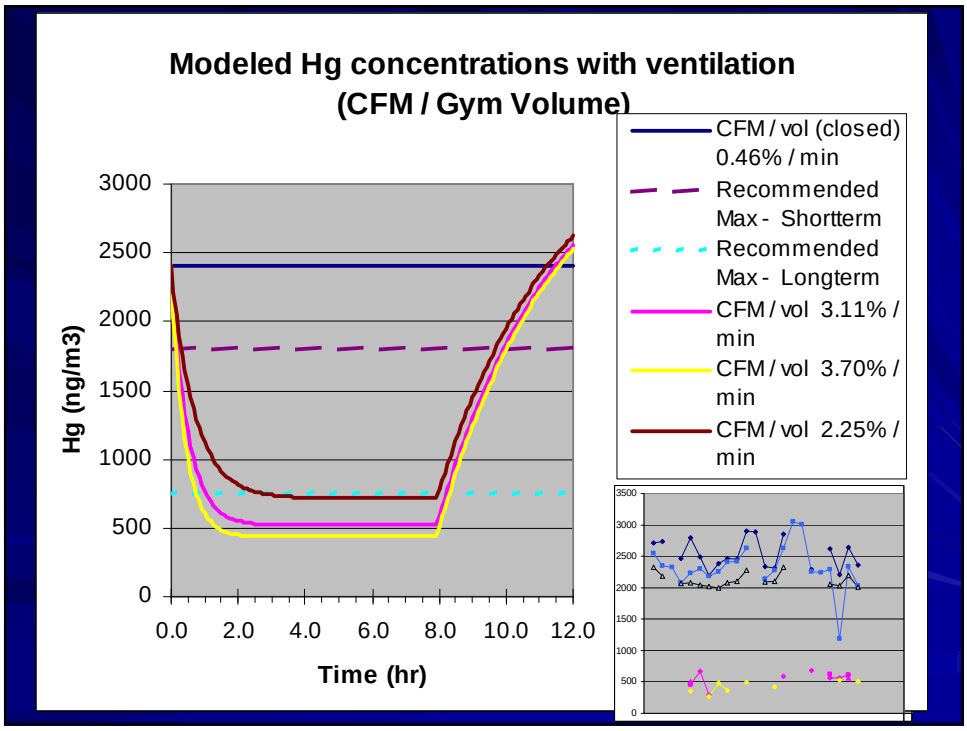
	Teacher	Student
Event Duration	6 hours	2 hours
Days per week	5 days	6 days
Ventilation Rate	1.2 m^3 / hr	1.9 m^3 / hr

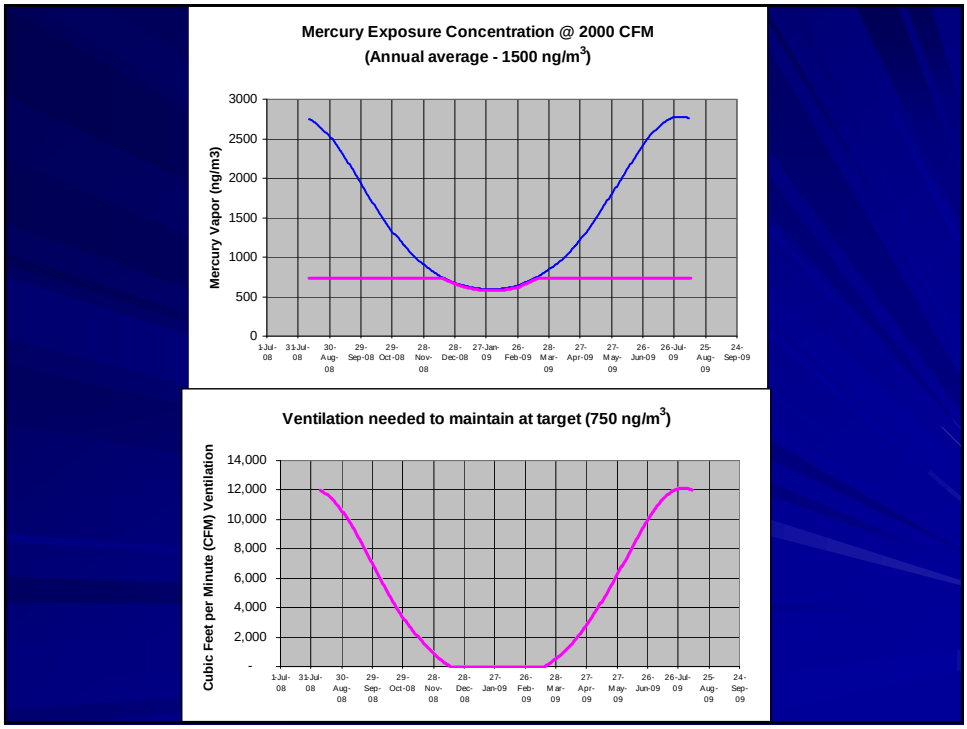
Simplified inhalation model




Blood [Hg]
ug/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0
4
8
12
16
20
Wks
Teacher 3000 ng/m3 & 30 hrs/wk
Student 3000 ng/m3 & 12 hrs/wk
Daily Exposure at RfC
Teacher 750 ng/m3 & 30 hrs/wk
Student 750 ng/m3 & 12 hrs/wk

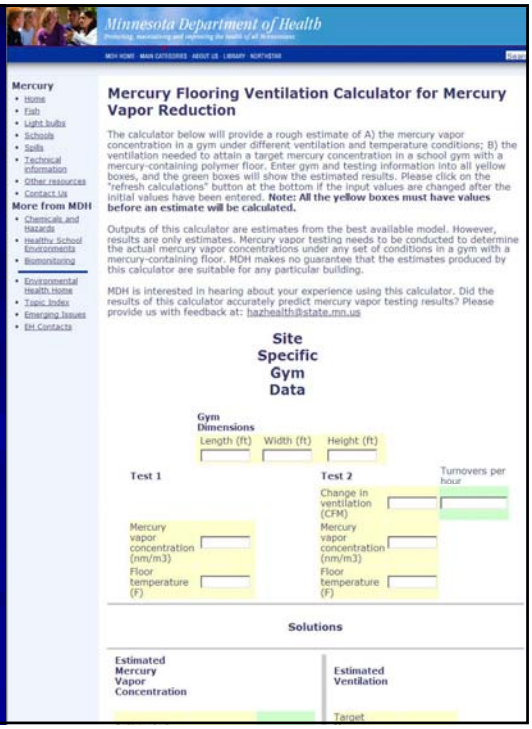

Mercury Body Burden
ug
800
700
600
500
400
300
200
100
0
0
4
8
12
16
20
Wks
Teacher 3000 ng/m3 & 30 hrs/wk
Student 3000 ng/m3 & 12 hrs/wk
Daily Exposure at RfC
Teacher 750 ng/m3 & 30 hrs/wk
Student 750 ng/m3 & 12 hrs/wk


Modeled Hg concentrations with ventilation
(CFM / Gym Volume)
Hg (ng/m3)
3000
2500
2000
1500
1000
500
0
0.0
2.0
4.0
6.0
8.0
10.0
12.0
Time (hr)
CFM / vol (closed) 0.46% / min
Recommended Max - Shortterm
Recommended Max - Longterm
CFM / vol 3.11% / min
CFM / vol 3.70% / min
CFM / vol 2.25% / min


Mercury Exposure Concentration @ 2000 CFM
(Annual average - 1500 ng/m3)
Mercury Vapor (ng/m3)
Ventilation needed to maintain at target (750 ng/m3)
Cubic Feet per Minute (CFM) Ventilation

Mitigation option = **ventilate**

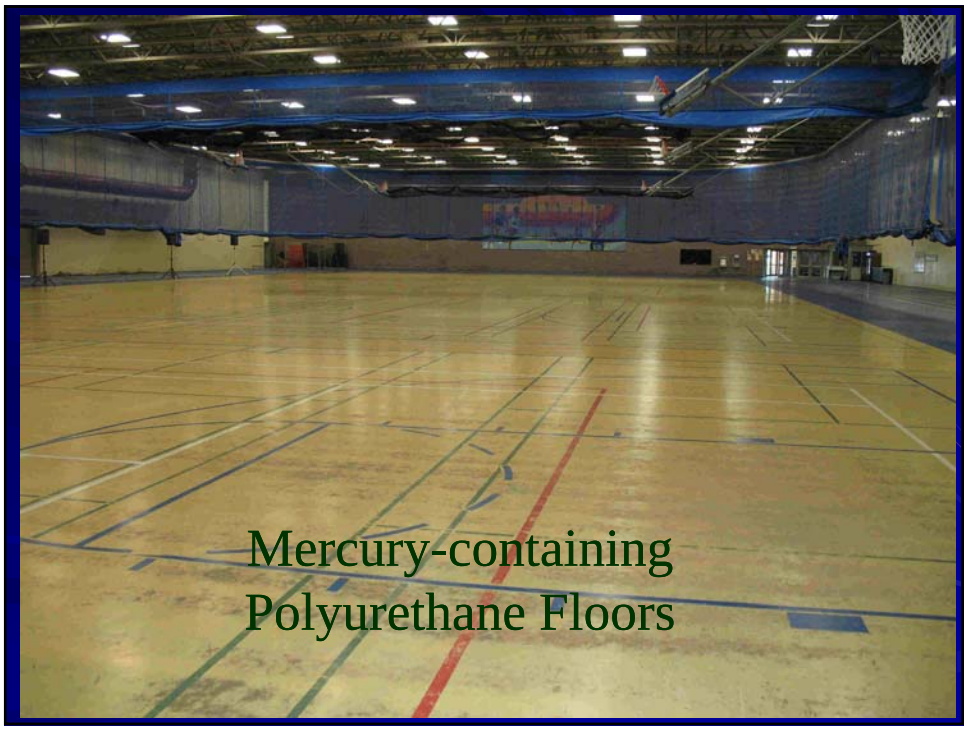
http://www.health.state.mn.us/divs/eh/hazardous/topics/mercury/hgvaporcalc.html



Needs

- How many floors?
- Temporal variability?
- What happens when covered?

- Disposal options?
- Other uses?


Mercury-containing
Polyurethane Floors