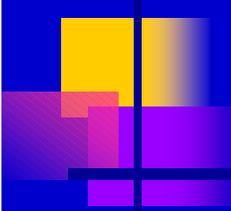


# Environmental Impact of Energy Development -- Coal

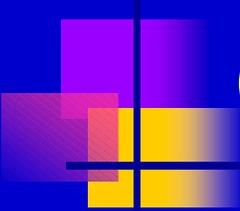


Presented at the  
Governor's Energy Summit  
by

Anne Hedges

Montana Environmental Information Center

October 18, 2005

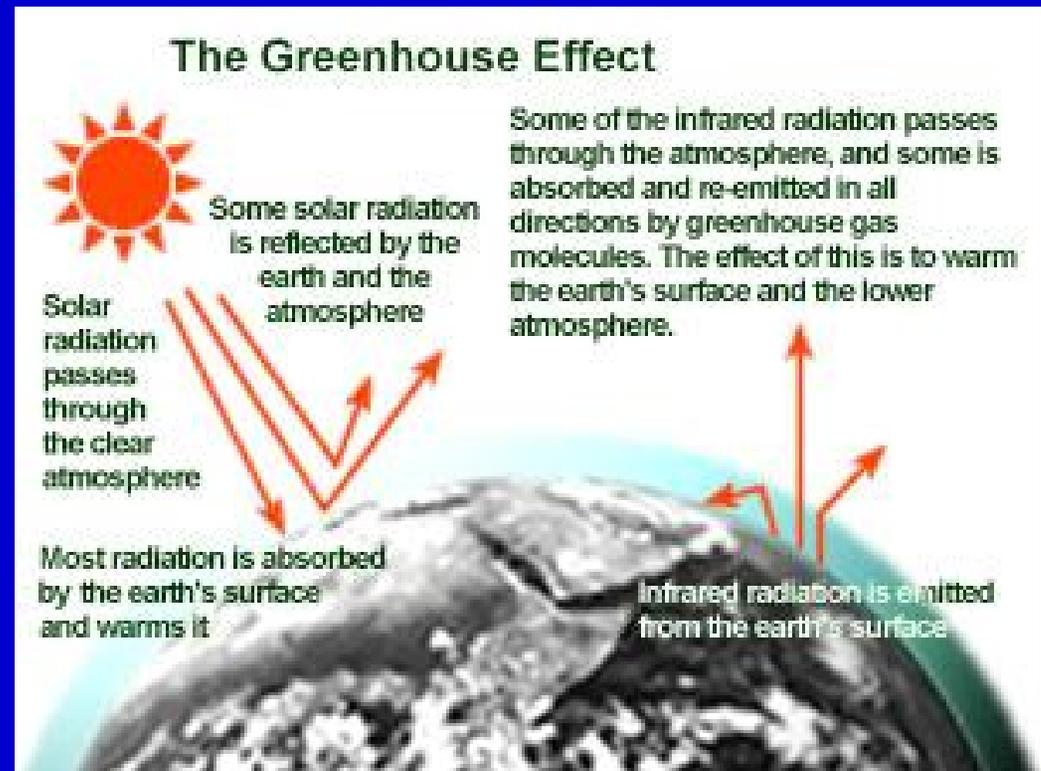


# Environmental Concerns of Coal Development

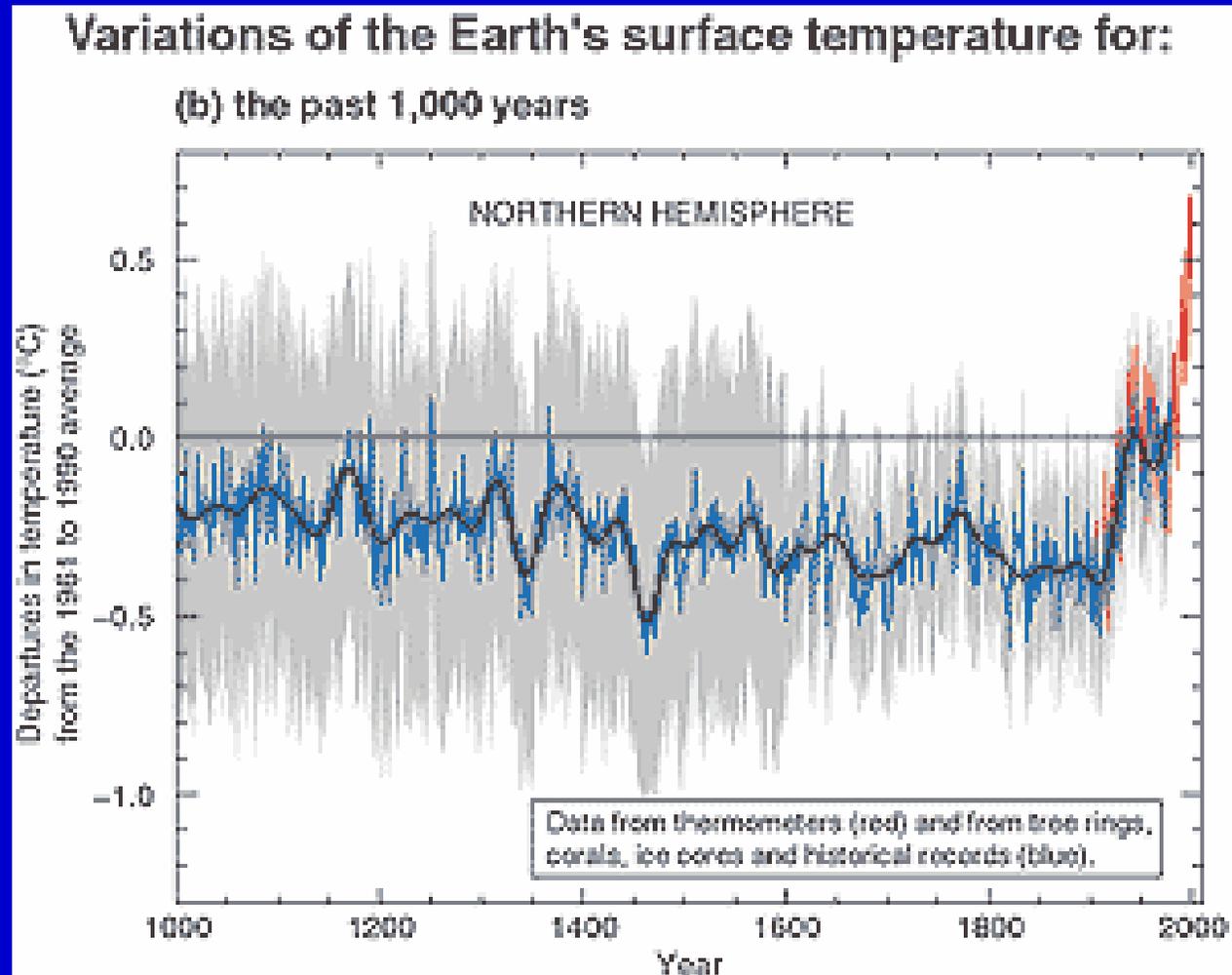
- n Criteria air pollutants
  - n SO<sub>x</sub>, NO<sub>x</sub>, PM, CO
- n Solid Waste -- Ash
- n Water Requirements
- n "Fuel Cycle Costs" (mining, transport)
- n *Global Warming Pollution*
- n *Mercury Pollution*

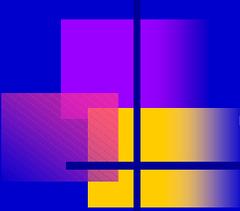
# Greenhouse Effect

- n The "Greenhouse Effect" -- the mechanism by which certain gases increase planetary temperatures -- is well-known and undisputed.
- n Greenhouse gases such as CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and CFCs act as a blanket, trapping the sun's energy and causing the planet to warm.



# Long-term temperature profile





# 20 Hottest Years on Record

1. 1998
2. 2002
3. 2003
4. 2004
5. 2001
6. 1990
7. 1995
8. 1991
9. 1999
10. 1988
11. 2000
12. 1997\*
13. 1981\*
14. 1996
15. 1987
16. 1983
17. 1994
18. 1989
19. 1980
20. 1986

\*indicates tie

# The Economist

JULY 6TH-12TH 2002

The politics of corporate scandals

PAGE 27

East Asia's economies, five years on

PAGES 13 AND 65-67

Why Arab countries have failed

PAGES 24-26

THE GLOBAL ENVIRONMENT

SURVEY, AFTER PAGE 50

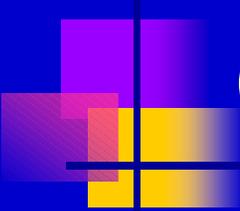
# CO<sub>2</sub>AL

## Environmental enemy No.1

US\$4.50 • C\$5.50

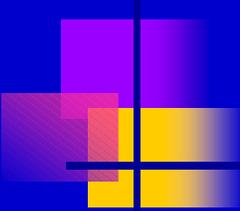


Argentina	.....	18.50	Canada	.....	C\$5.50	Colombia	.....	4.50	Costa Rica	.....	5.00	Cuba	.....	5.00	Denmark	.....	5.00	Egypt	.....	5.00	France	.....	5.00	Germany	.....	5.00	Greece	.....	5.00	Hong Kong	.....	5.00	India	.....	5.00	Indonesia	.....	5.00	Italy	.....	5.00	Japan	.....	5.00	Malaysia	.....	5.00	Mexico	.....	5.00	Netherlands	.....	5.00	New Zealand	.....	5.00	Norway	.....	5.00	Philippines	.....	5.00	Poland	.....	5.00	Portugal	.....	5.00	Russia	.....	5.00	South Africa	.....	5.00	Spain	.....	5.00	Sweden	.....	5.00	Switzerland	.....	5.00	Taiwan	.....	5.00	Texas	.....	5.00	Thailand	.....	5.00	Turkey	.....	5.00	USA	.....	4.50	Venezuela	.....	5.00
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# Coal Production in Montana

- n Montana has 44 power plants, that have the capacity to produce 5100 MW (produce about 3000 average MW/year)
- n Montana coal plants have capacity to produce 2,527 MW per year.
- n Newly permitted plants could increase that capacity by 912 MW per year
- n Proposal for another 4,450 MW of capacity

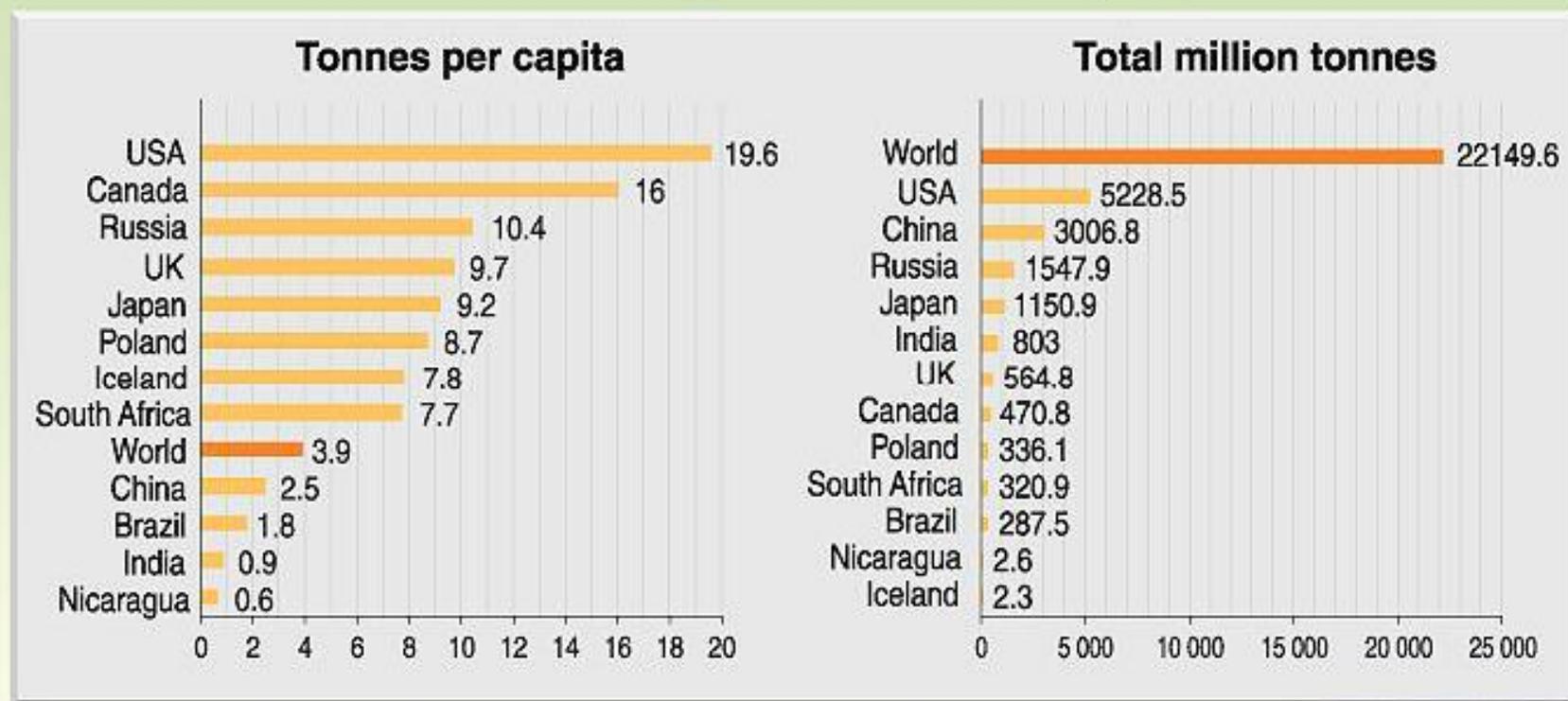


# Global Warming Pollution - U.S. & Montana Contributions

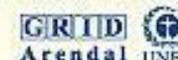
- n With only 5% of the world's population, the U.S. emits 22% of the world's global warming pollutants - 23.8 tons per person.
- n Montana emits 35.3 tons per person (ranks 8th in the nation).
- n Globally, nationally, and in MT, fossil fuel-based power plants are the leading source of CO<sub>2</sub>, and coal-fired power plants are the primary culprit.

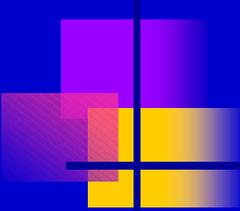
# Per Capita & Total CO2 Emissions - selected countries

Emissions of CO<sub>2</sub> - selected countries (1995)



GRAPHIC DESIGN : PHILIPPE REKACEWICZ

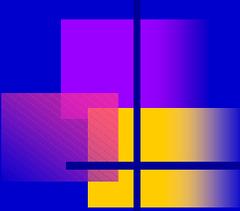




# Impacts

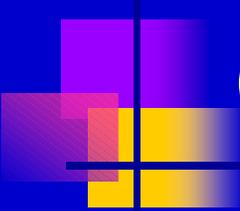
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- n A rapidly changing climate will have a host of adverse impacts for both humans and natural systems.
  - n extinction
  - n drought
  - n forest health
  - n wildfire



# Montana Evidence

- n 150 glaciers present in GNP 100 years ago-26 remain (expected to vanish within 30 years).
- n Spring melt-off comes 15 days earlier.
- n Missoula area snowfall has fallen from 55 inches to 40 inches, and the number of frost-free days has increased by 15.
- n Flathead Lake reported the highest ever mid-lake temperature on July 22, 2003: 76 degrees.

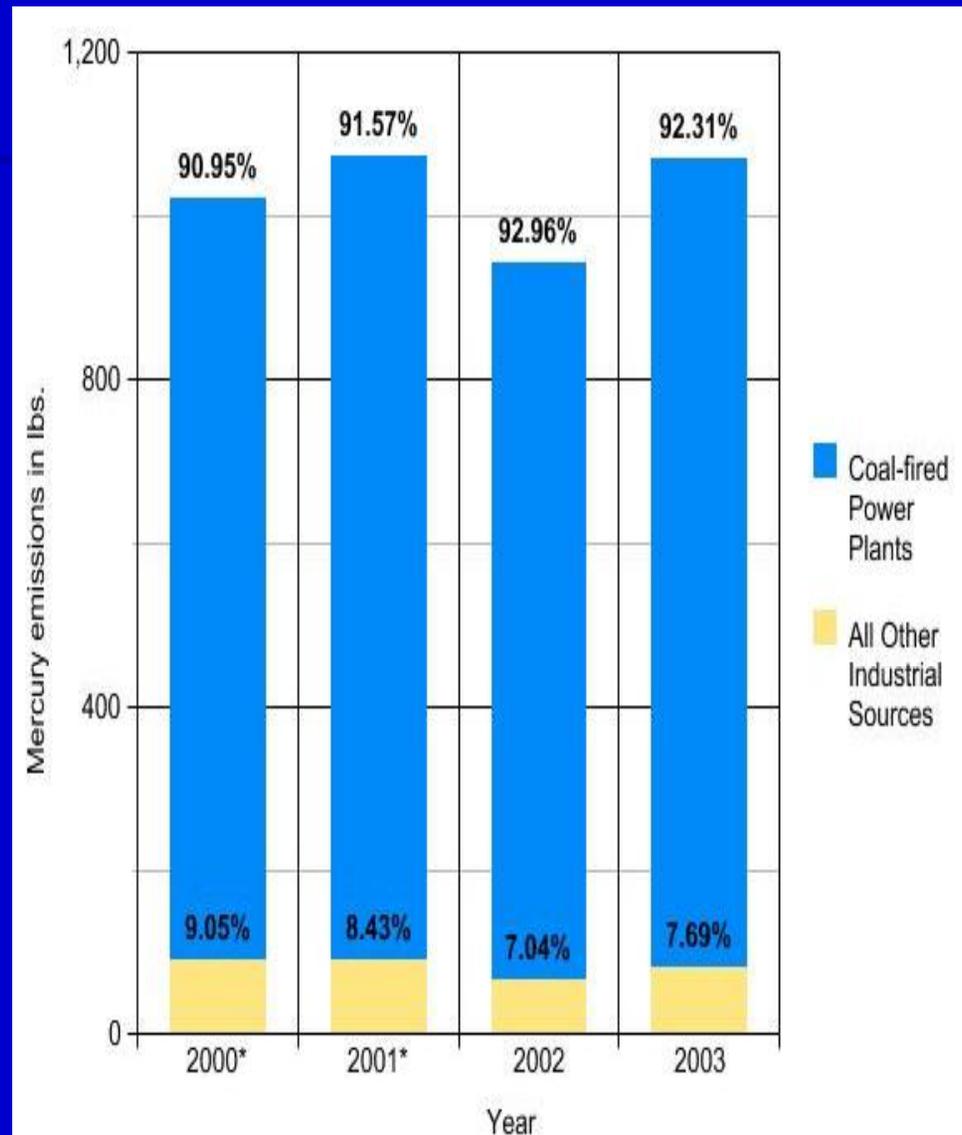


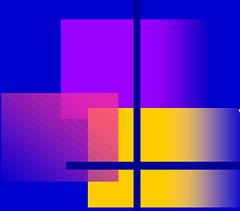
# Climate Solutions

- n Energy Conservation
- n Renewable Energy
  - n Wind farms
  - n Solar Electric
  - n Solar Hot Water Heating
  - n Geothermal & Some Biomass
- n Transportation
  - n Improved CAFE Standards
  - n Biodiesel, Ethanol
  - n Smart Growth / Land Use Planning

# Mercury Pollution

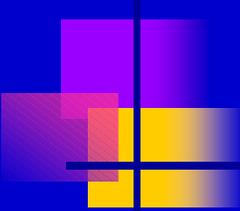
- n Nationally, over 40% of human-caused airborne mercury comes from coal-fired power plants
- n In Montana, coal-fired power plants cause 92% of human-caused airborne mercury and 75% of overall mercury





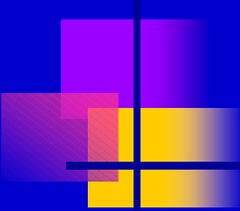
# Specific Health Effects

- n Learning disabilities
- n Autism
- n Visual and hearing impairment
- n Cardiac abnormalities, disease
- n Heart disease
- n Motor and mental disturbances
- n Immune system dysfunction
- n Loss in IQ
- n Mental retardation



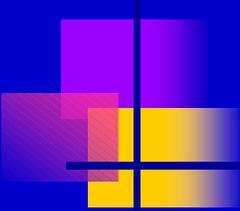
# Mercury and Children's Health

- § Mercury crosses the placenta and accumulates in fetal tissues.
- § 1 in 6 women of childbearing age have elevated levels of mercury in their blood, putting more than 600,000 newborns at risk.
- § Health effects are observed at very low doses.
- § The neurotoxic effects of exposure in the womb are irreversible.



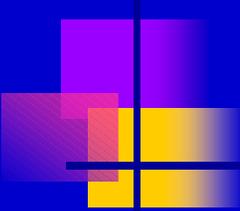
# Mercury & the Environment

- n Power plant deposition local and global
- n Impacts to aquatic and non-aquatic species
- n Statewide fish advisories due to Hg
- n Montana has 418,836 acres of lake and 1,280 miles of stream impaired from Hg



# Mercury Control Technology

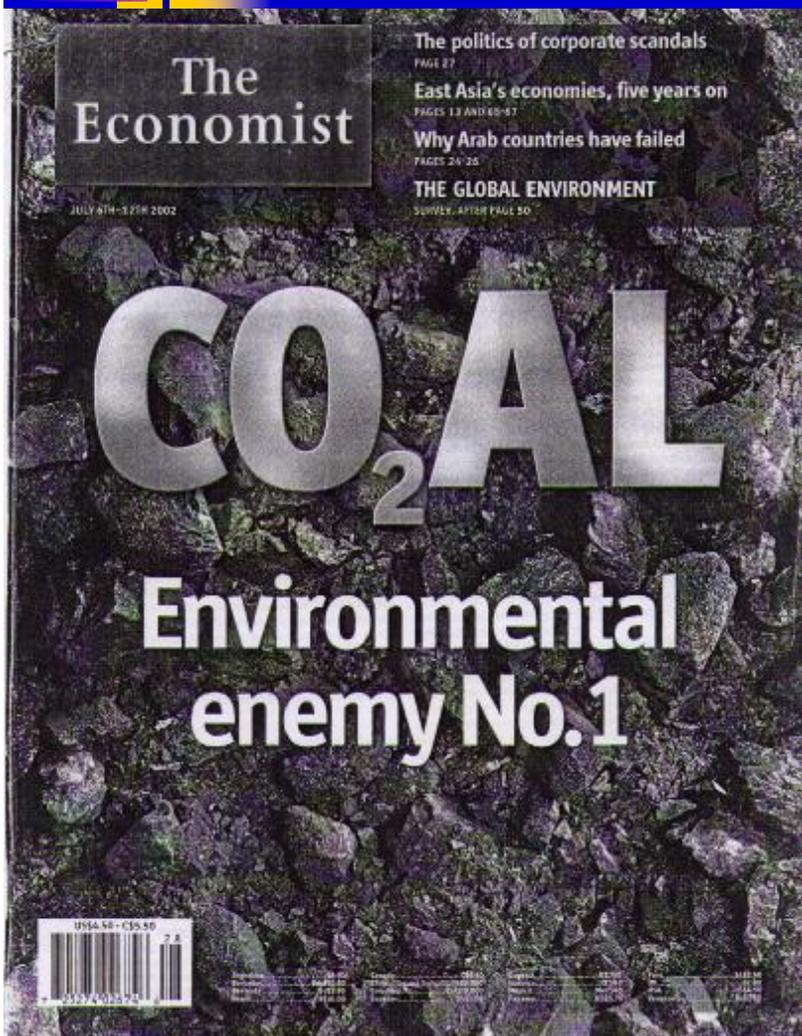
- n Activated Carbon Injection
- n ACI: used for 20 years in MSW Incinerators
- n 40 full scale tests completed at power plants
- n Results: 90% + control using subbituminous coals
- n Costs: \$1 million installation; \$1-2 million /year.
- n 5 plants in West have agreed to install ACI



# Proposal in Montana

- n Rule before the Board of Environmental Review (postponed until February 2006)
- n Control 90% or 1.5 lbs/TBTU
- n Potential for 5 year alternative emissions limit

# The Answer?



OR

