Managing Community Metals Poisoning in the Global Economy

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Lead Poisoning -The World's Worst are Becoming Worse

More Children at More Places are being More Severely Poisoned

(Other Metals to Follow)

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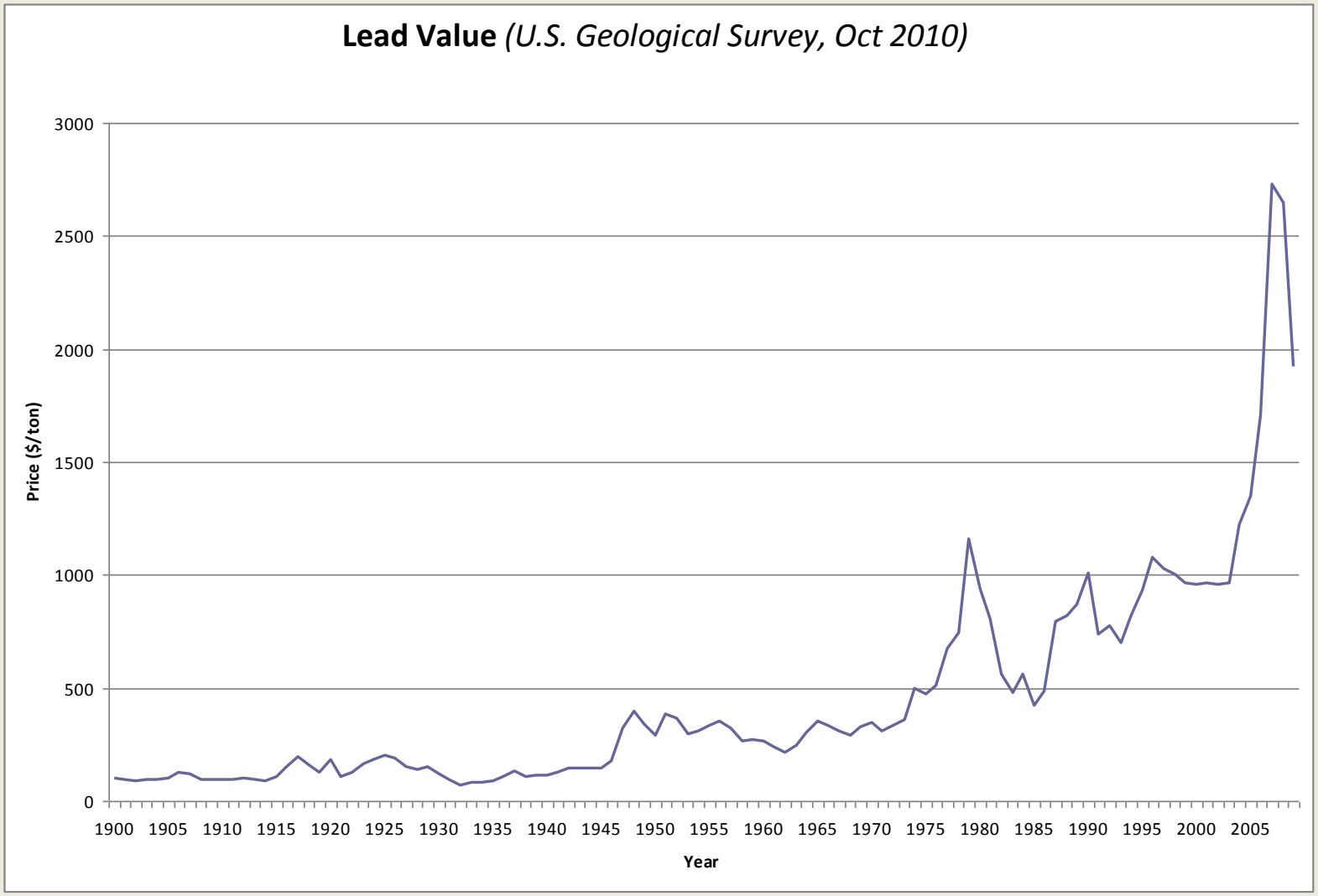
Price of Lead 1900-2010



World's Worst Lead Sites 1970s

Bunker Hill Smelter – Idaho USA 1973-75

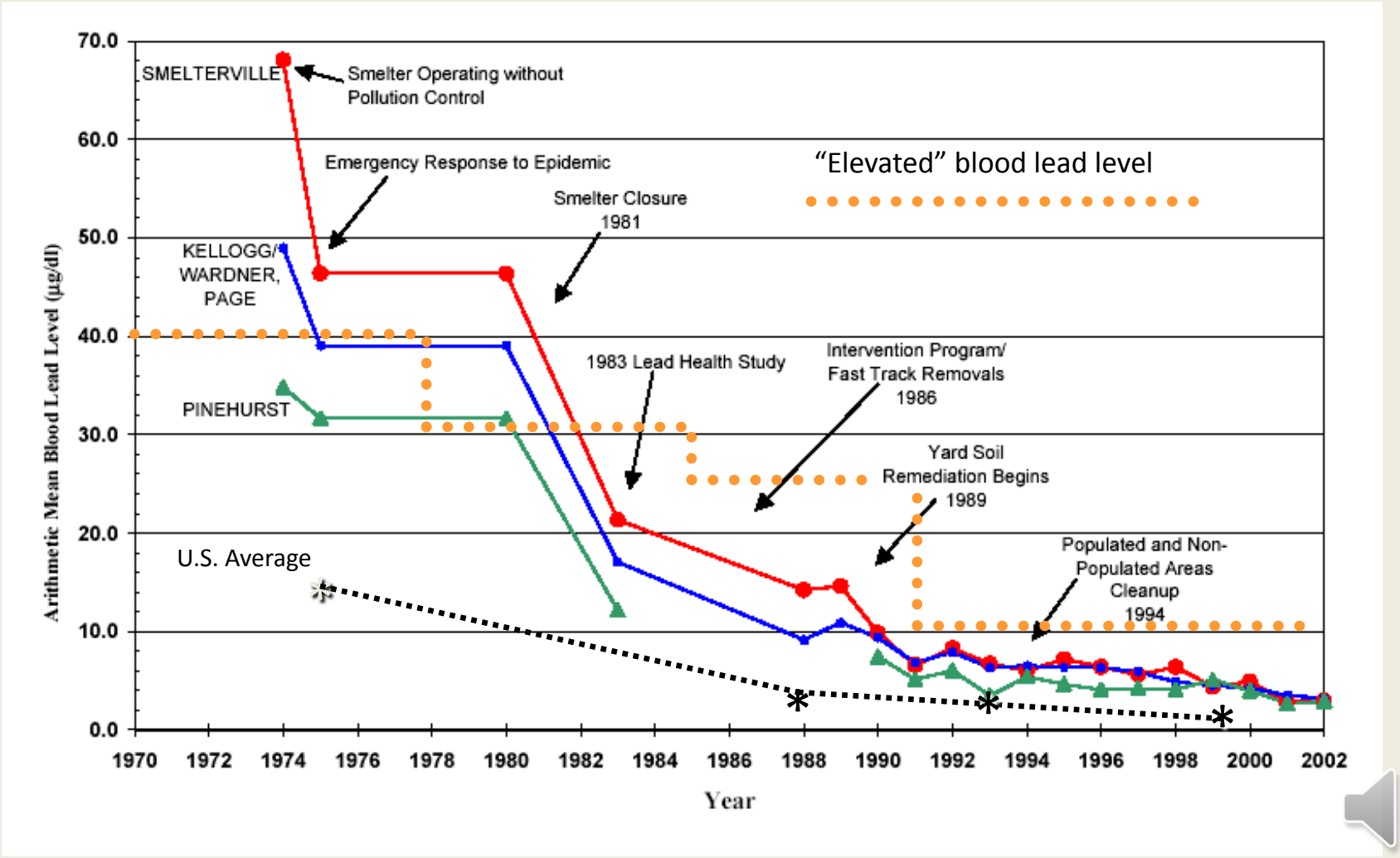
Smelter Kosovo, Yugoslavia 1972-1975

Broken Hill Smelter – Kabwe, Zambia 1972-75

- ❑ Thousands of children poisoned in surrounding areas
- ❑ Blood lead levels 40-200 ug/dl
- ❑ Some mortality, several comatose in Kabwe, extensive CNS / brain damage
- ❑ All coincided with high lead price in 1970's

Bunker Hill Site Idaho US

Mean Blood Lead Levels: 1974-2002



Bunker Hill Smelter, Idaho US

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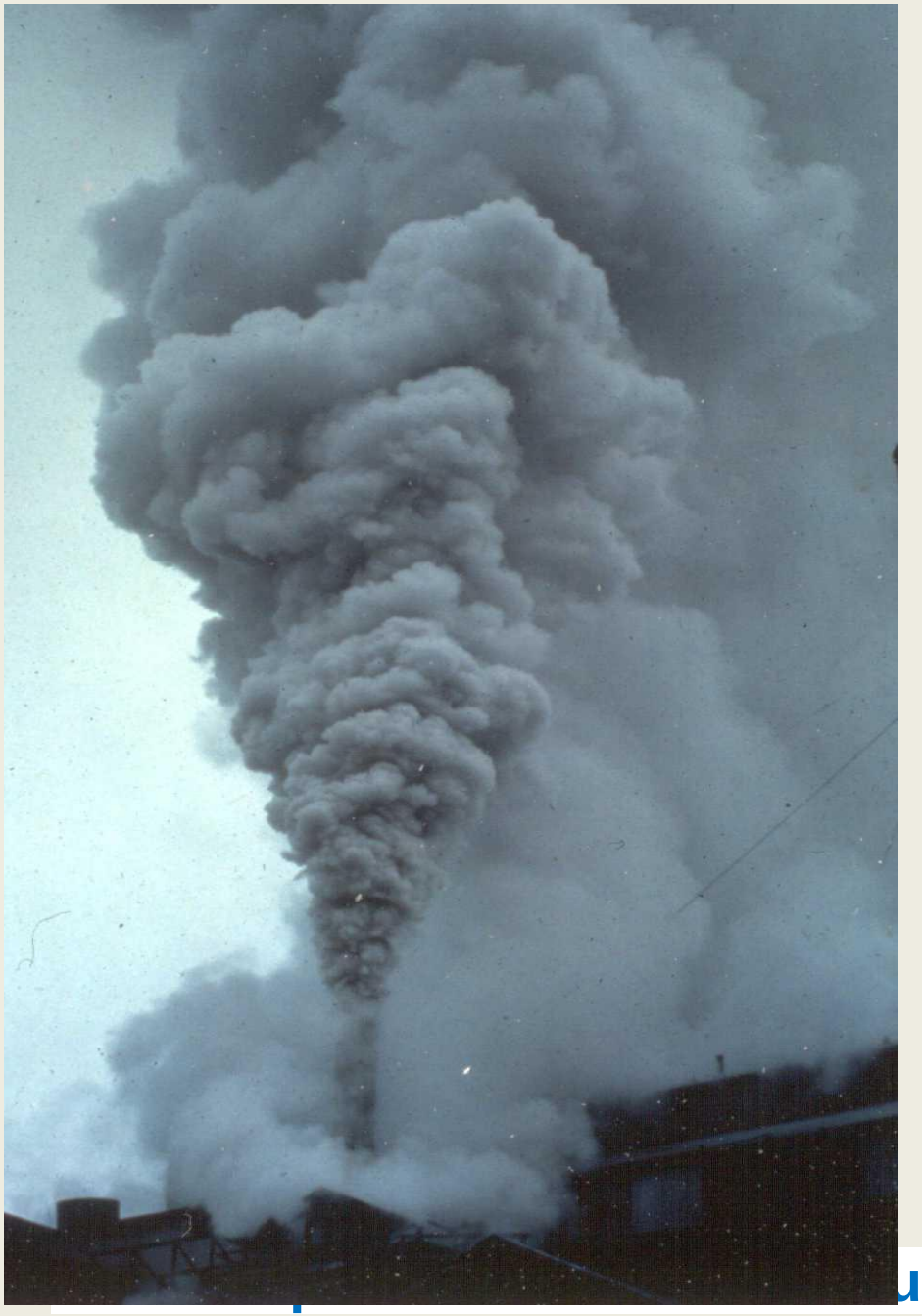

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Kabwe, Zambia

Pollutants: lead
Type: Soil
Source: lead mine, smelter
Legacy
Cleanup effort: Early Progress

Kabwe, Zambia

Health

On average, childrens' blood levels in Kabwe are 5 to 10 X allowable levels

Kabwe, Zambia

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Kabwe, Zambia

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Trepca Smelter, Mitrovica, Kosovo

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Legacy waste and tailings piles

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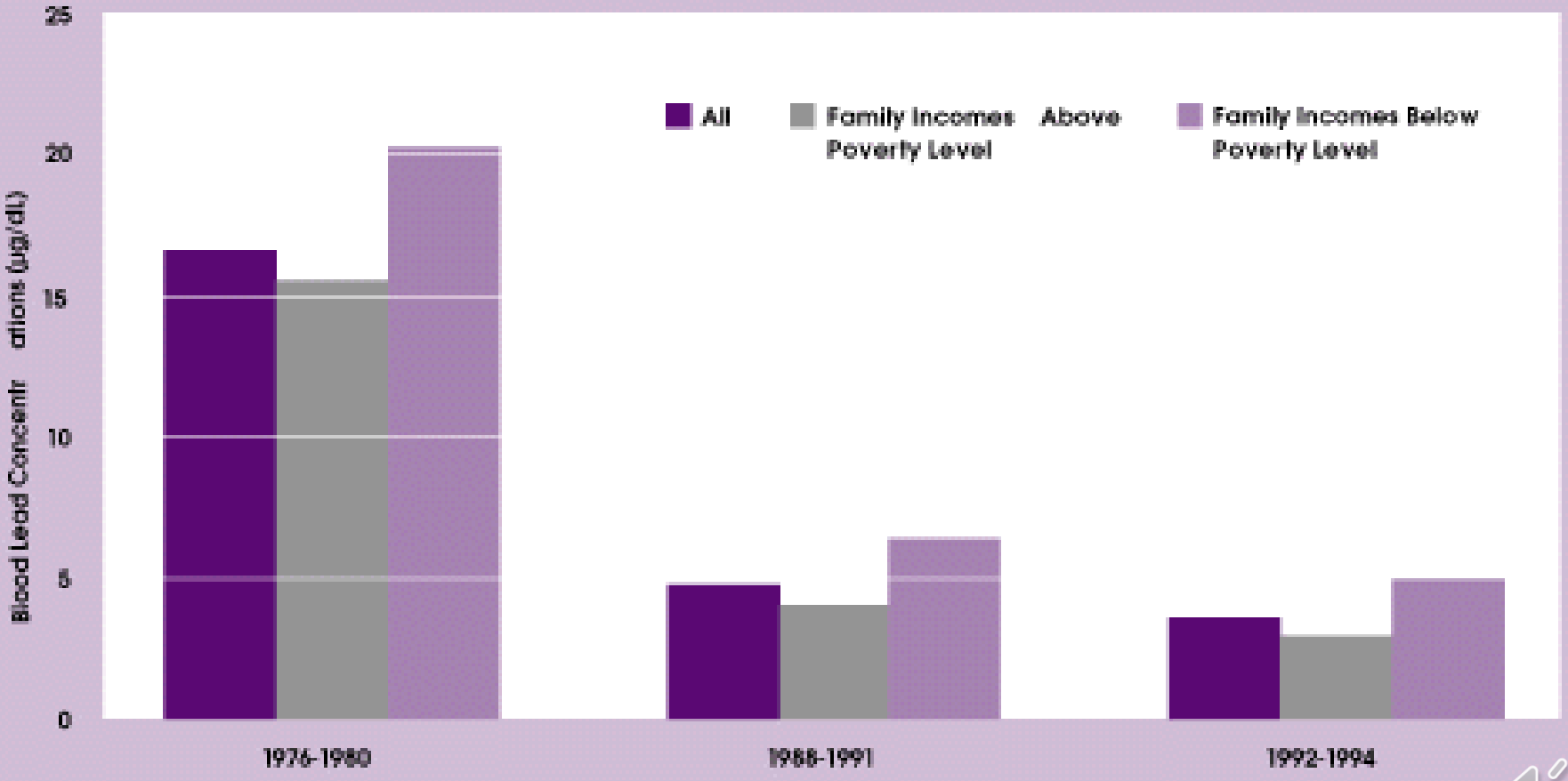
Trepca Smelter, Mitrovica, Kosovo

Contaminated residential areas near smelter

United States Historic Childhood Blood Lead Levels

Measure B1

Average concentrations of lead in blood for children 5 and under



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey.

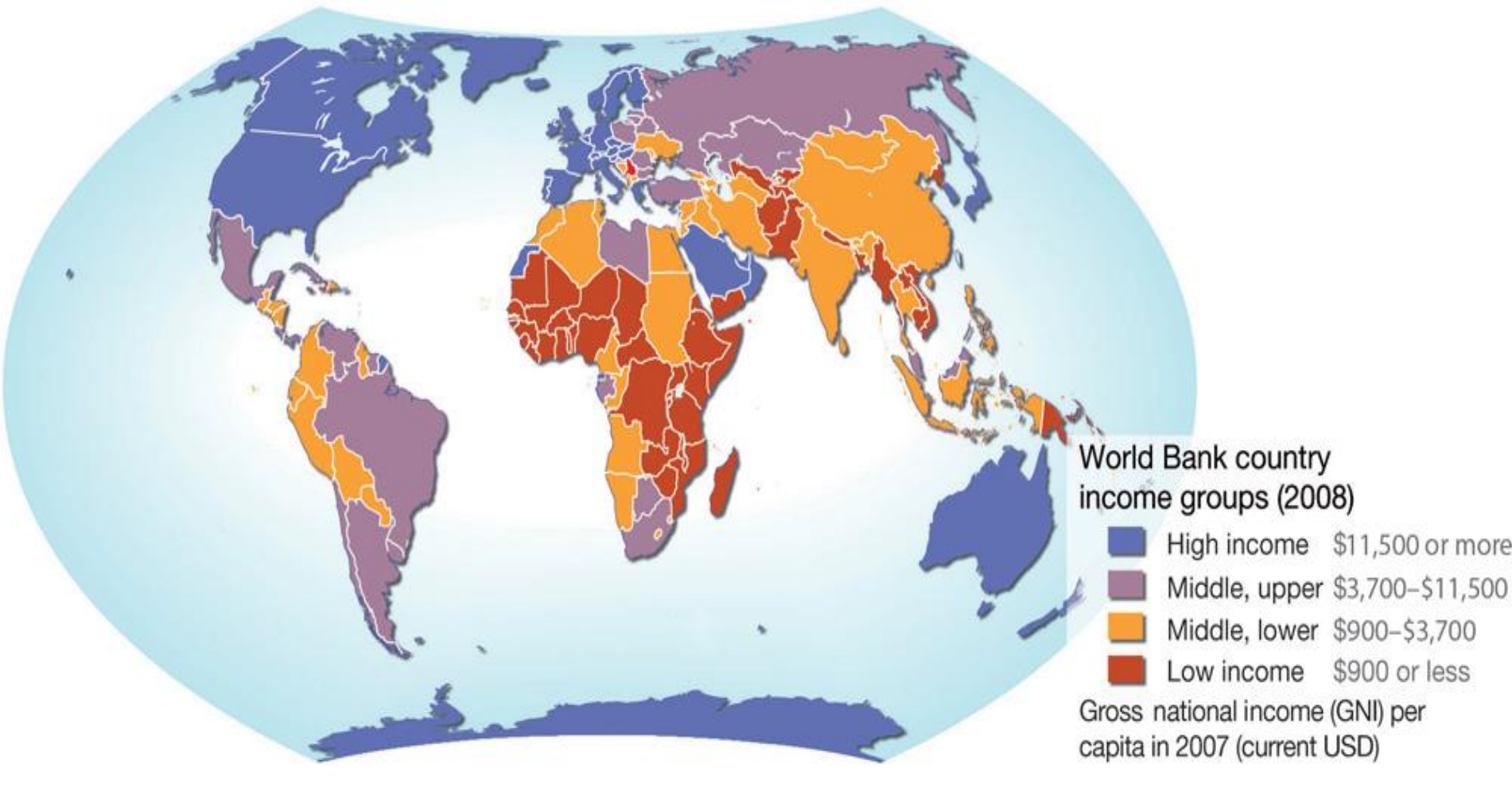
New World Order

Developed Countries (High Income)

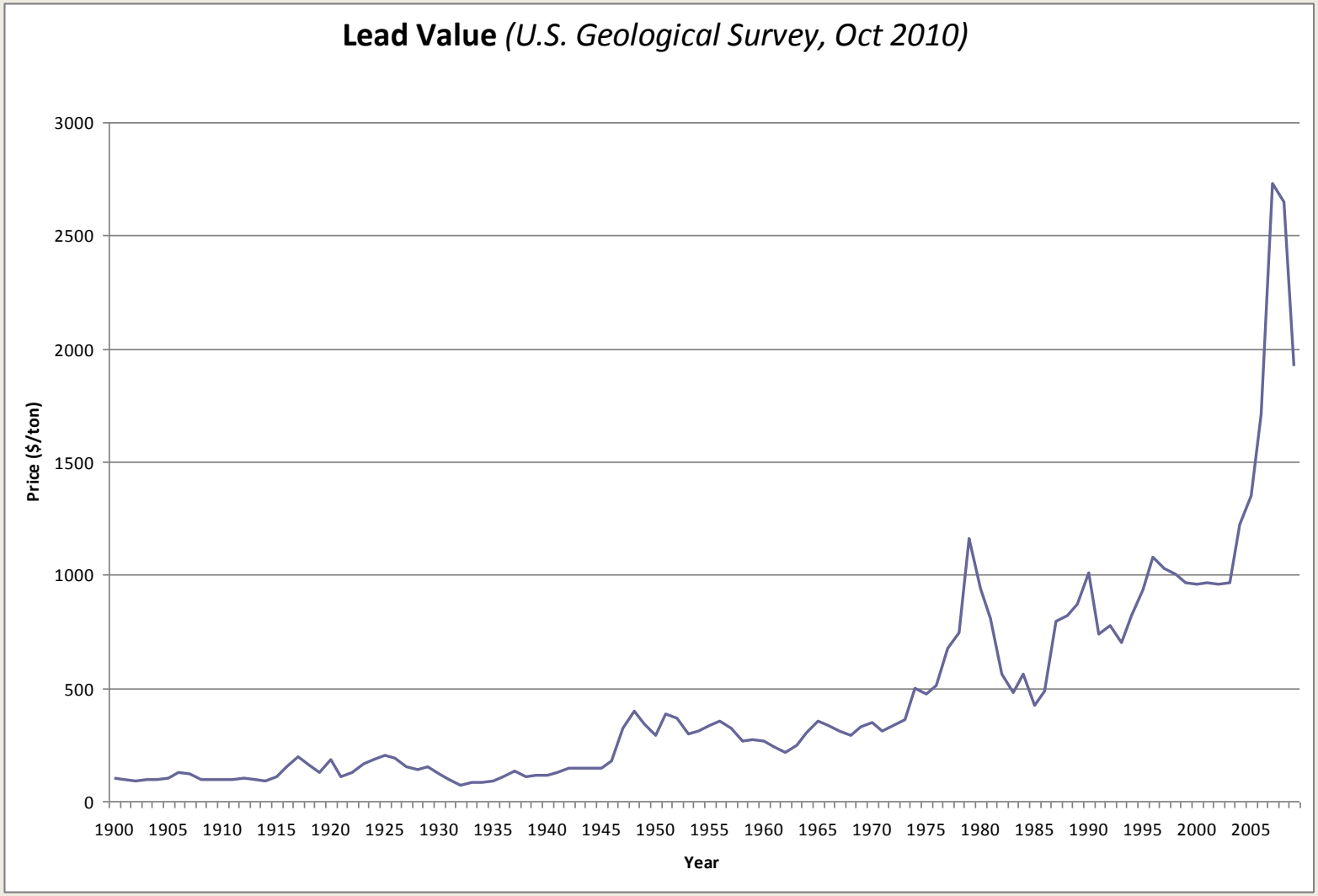
Middle Income Countries

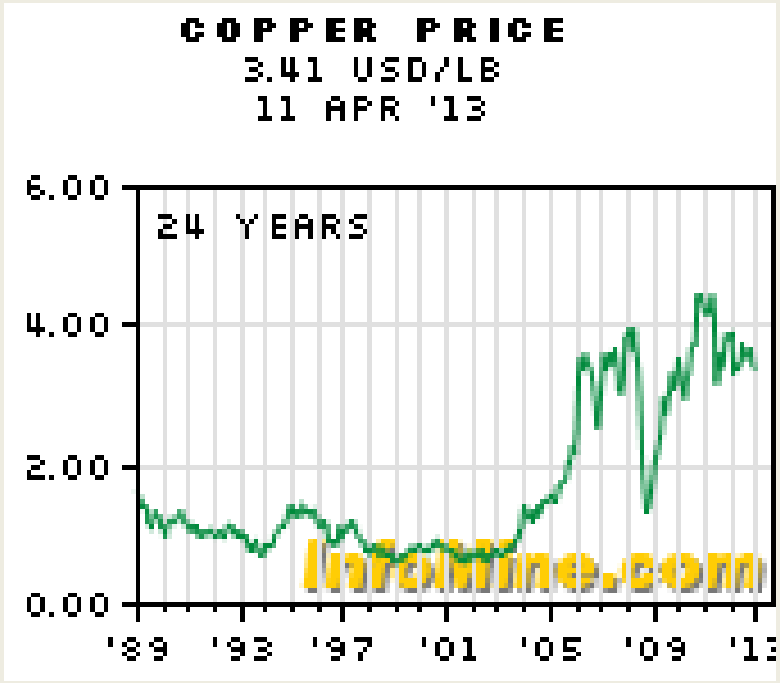
Low Income Countries (Poor)

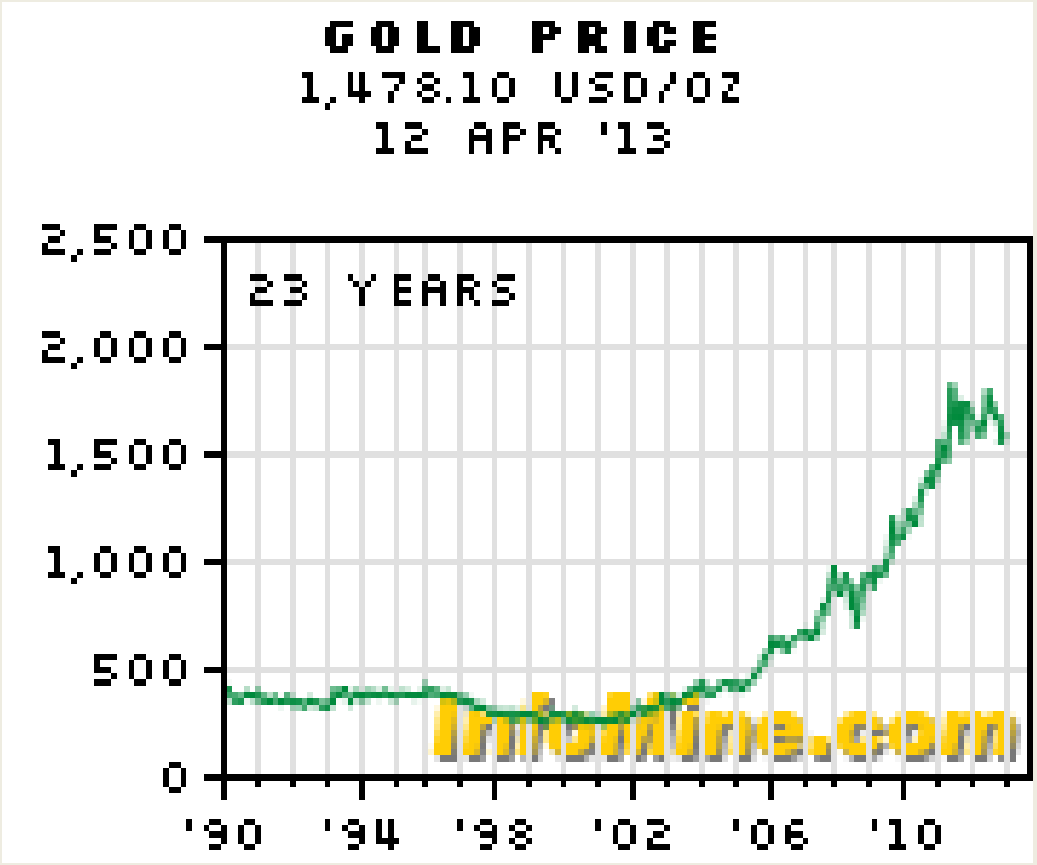
New World Order



Price of Lead 1900-2010

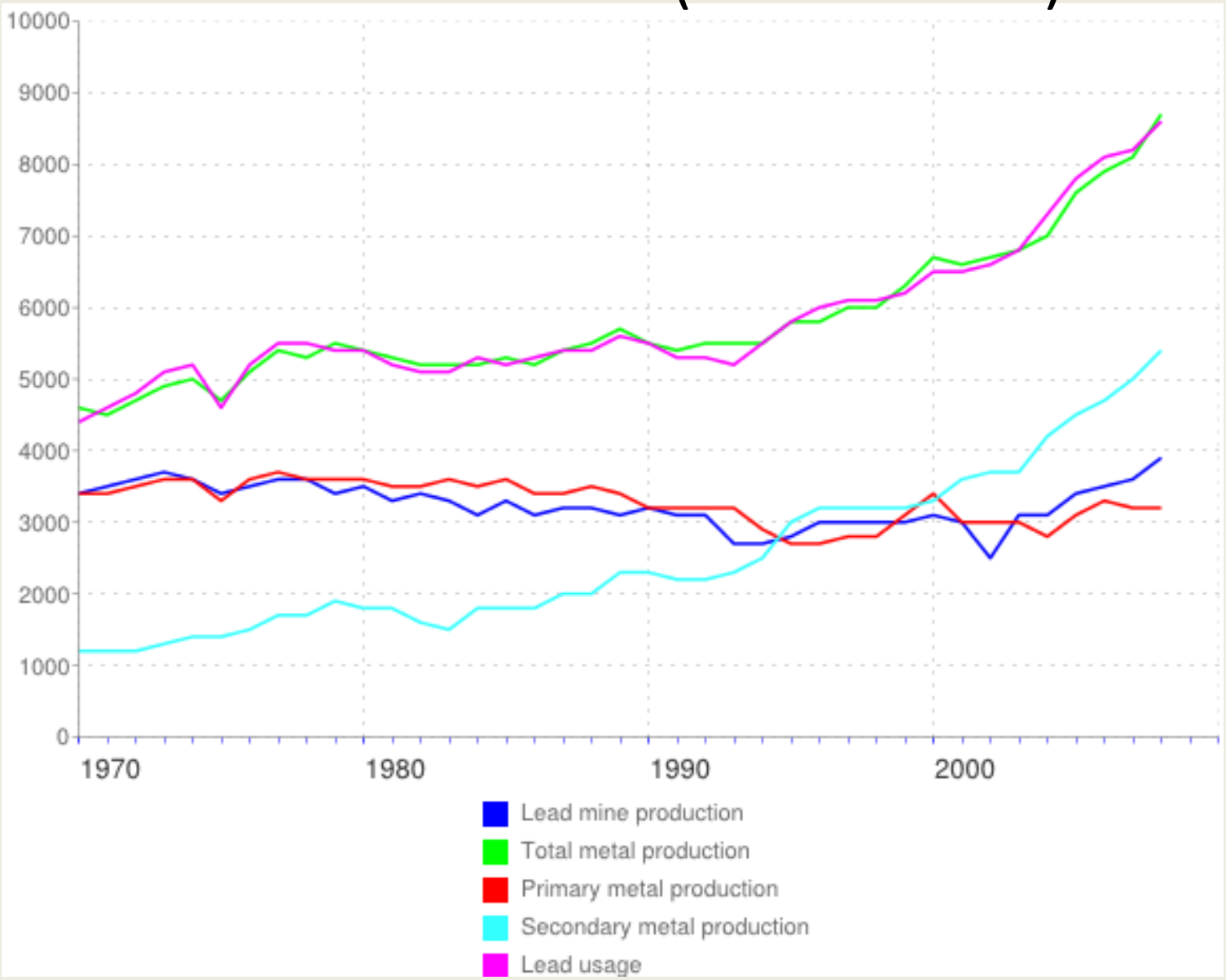


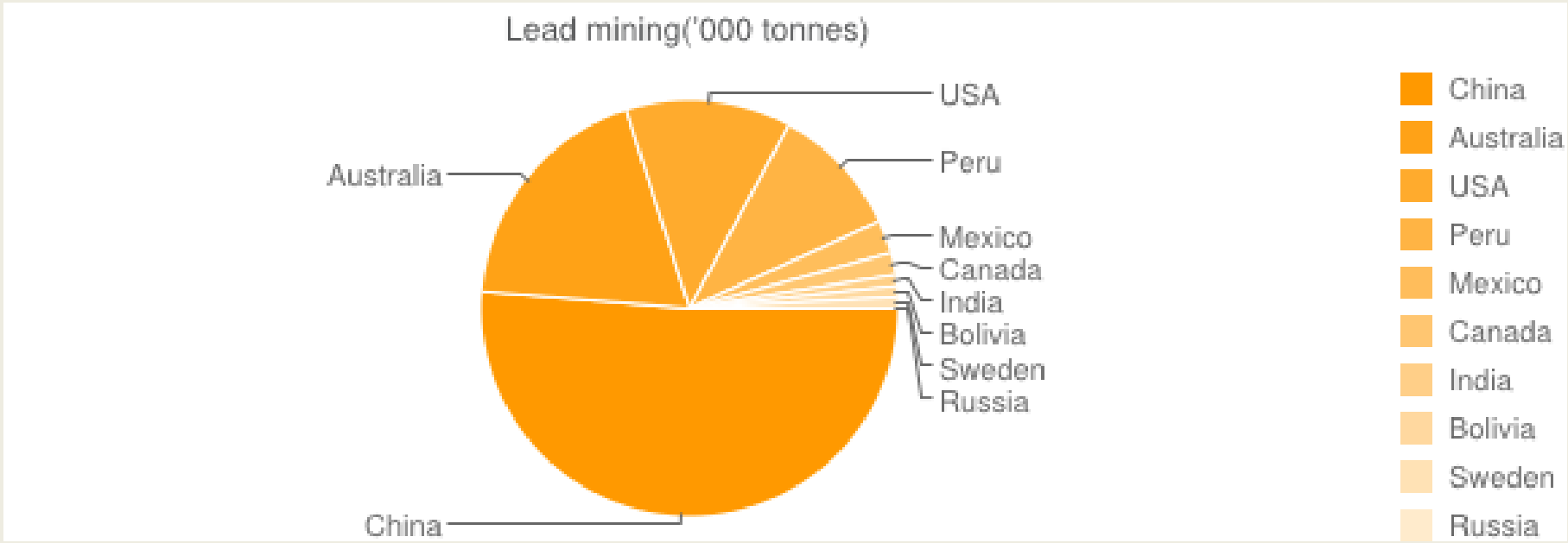




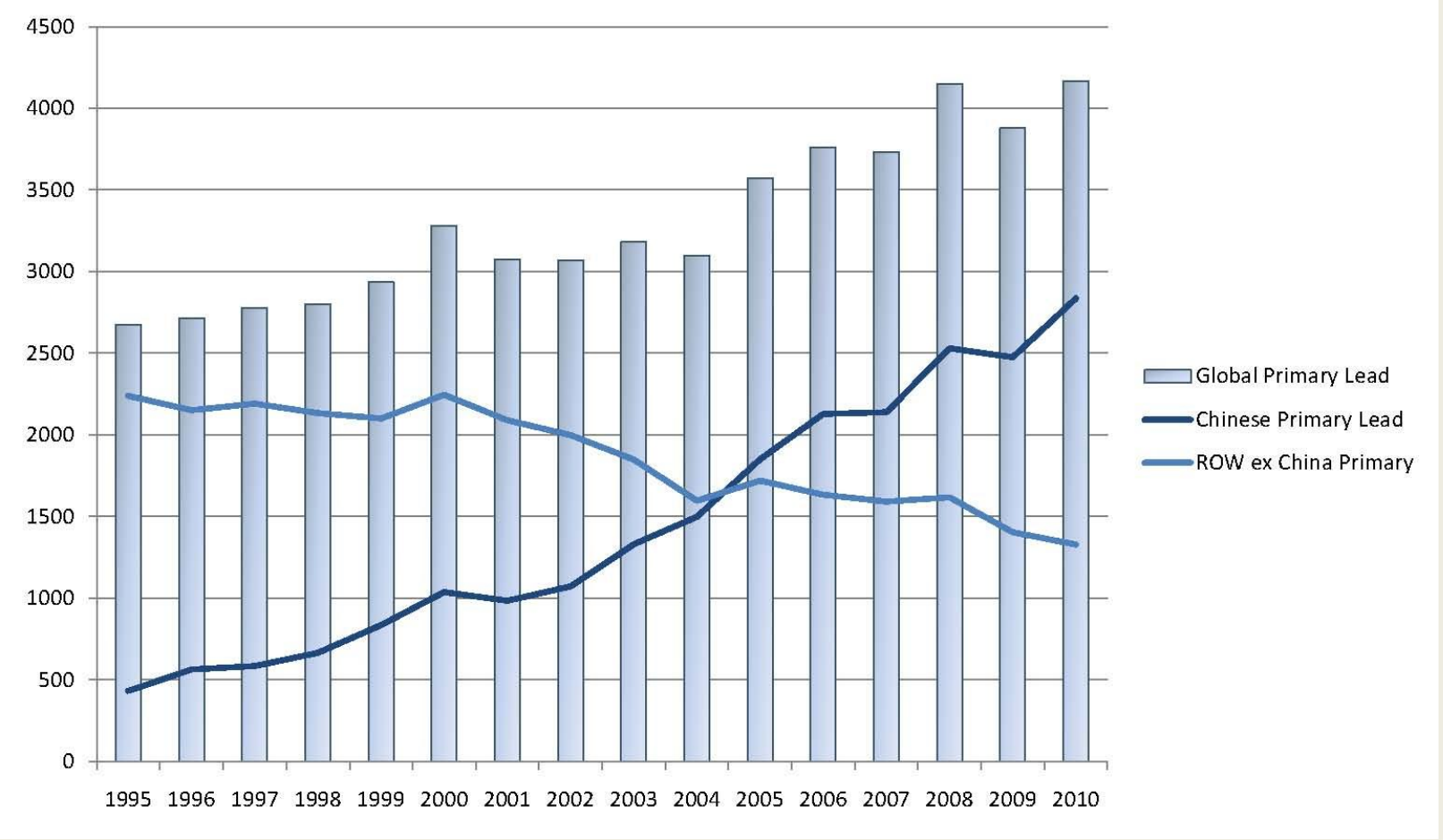
Gold prices continue to rise

World Totals for Lead (1000 tonnes)



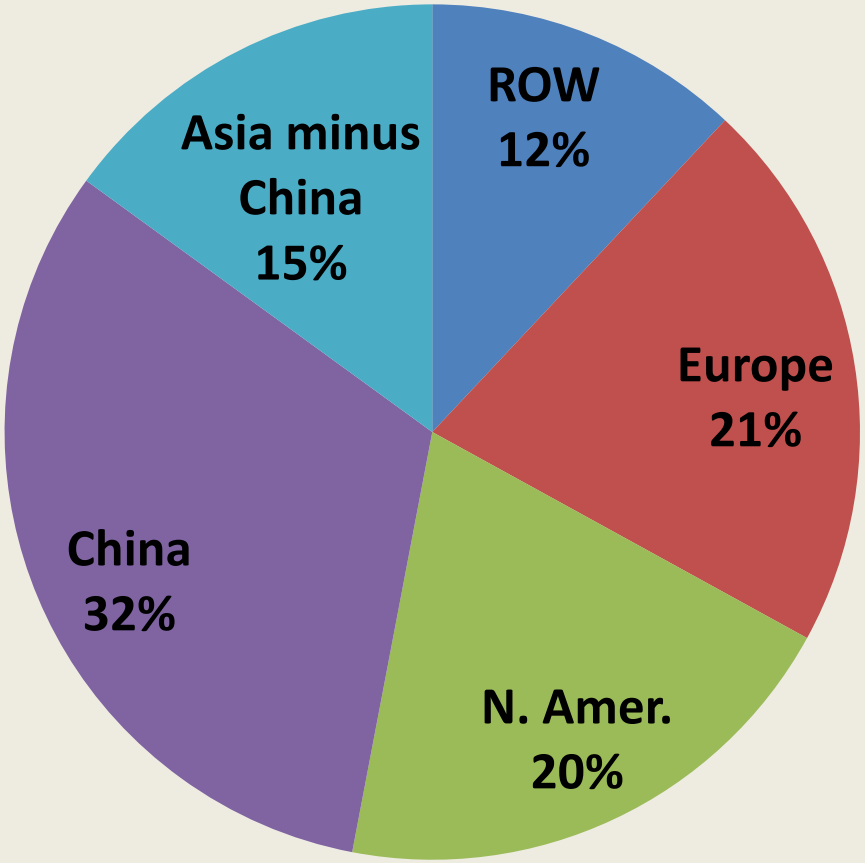

Lead mining('000 tonnes)
USA
Peru
Australia
Mexico
Canada
India
Bolivia
Sweden
Russia
China
China
Australia
USA
Peru
Mexico
Canada
India
Bolivia
Sweden
Russia

Primary Lead Production by Region

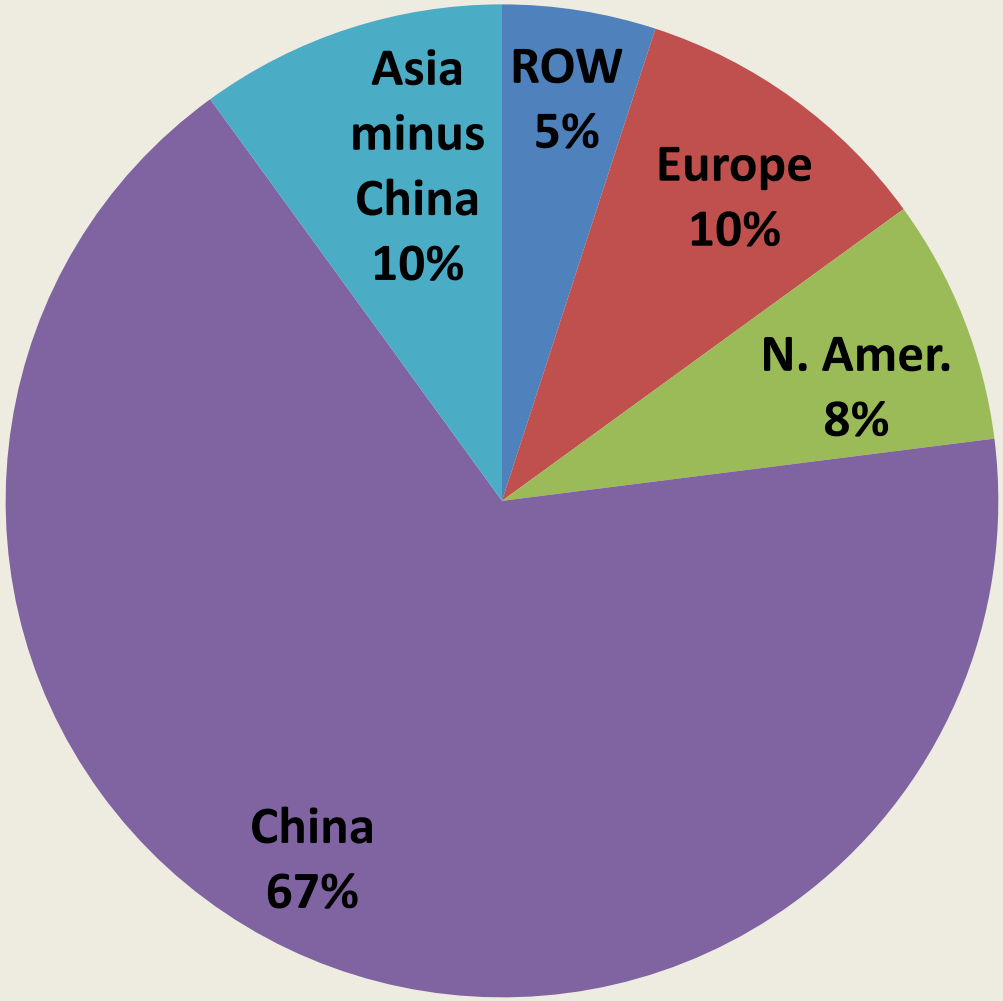


ILZSG

Shift in Location of Lead Production

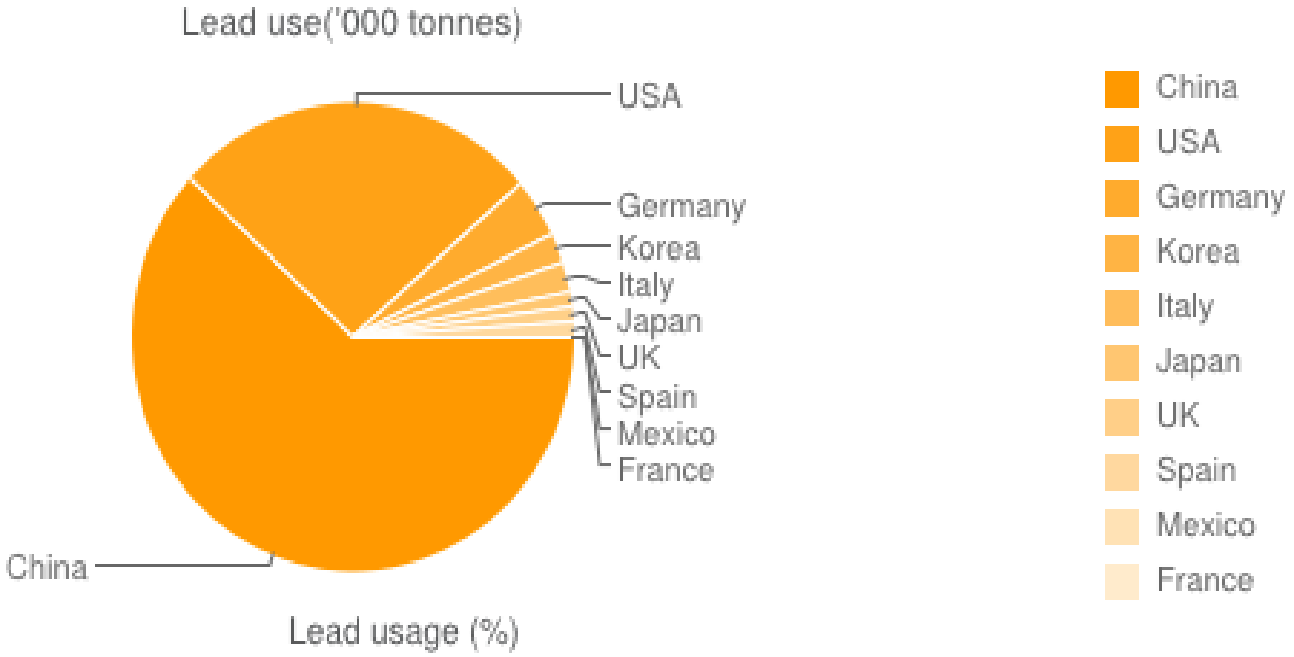


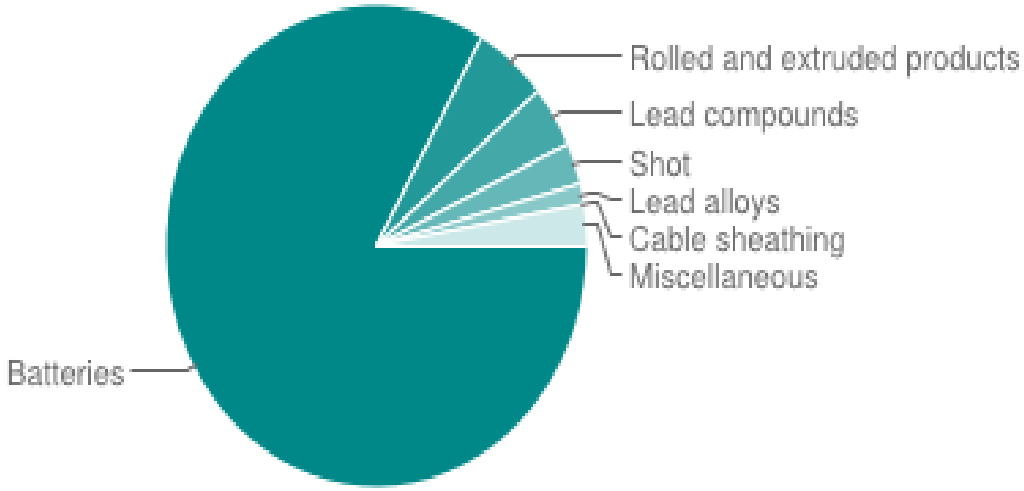
2000



2010

Lead Consumption 2010





Summary of Primary Lead Smelting Industry Perspective

1. Primary lead smelting has moved from the West to China
2. Primary lead demand is fueled by “new” uses -primarily vehicle growth as new vehicles need new lead
3. Lead recycling is essentially a closed loop and cannot address growth
4. Forecast mined lead output will not keep pace with new lead demand resulting in supply deficits
5. Very little new mine production is coming on-stream post 2010
6. Combination of limited lead concentrate availability and excess smelting capacity in China will increase competition for concentrates and keep TC’s low

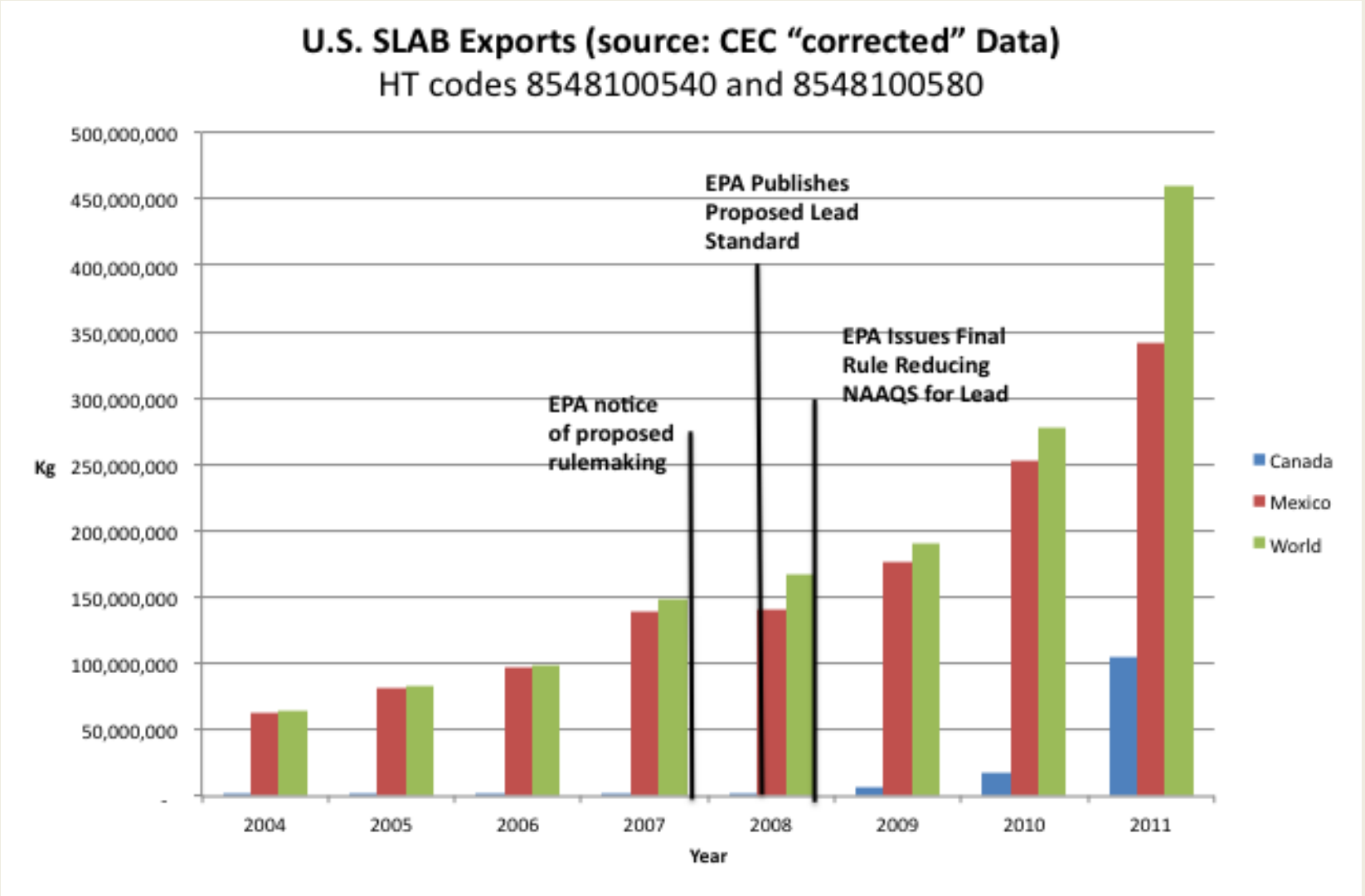
7. So will primary lead production survive in the recycling era?

   Unequivocally YES!

Summary of Mining and Primary Smelting Health and Environment Perspective

- Mining – controlled in Developed Countries; varied in Middle Income countries; lax in Poor Countries
- Primary Smelting – Leaving Developed Countries; varied in Middle Income Countries; absent in Poor Countries; most in China

Recycling and Recovery – Secondary Smelting
The Formal Sector



Summary of Lead Pollution / Exposure Secondary Smelting Formal Sector

- Controlled in Developed Countries leaving the US for lesser controlled Middle Income Countries
- Varied in Middle Income Countries
- Absent in Poor Countries

Other Metals and Ores - Historic Production

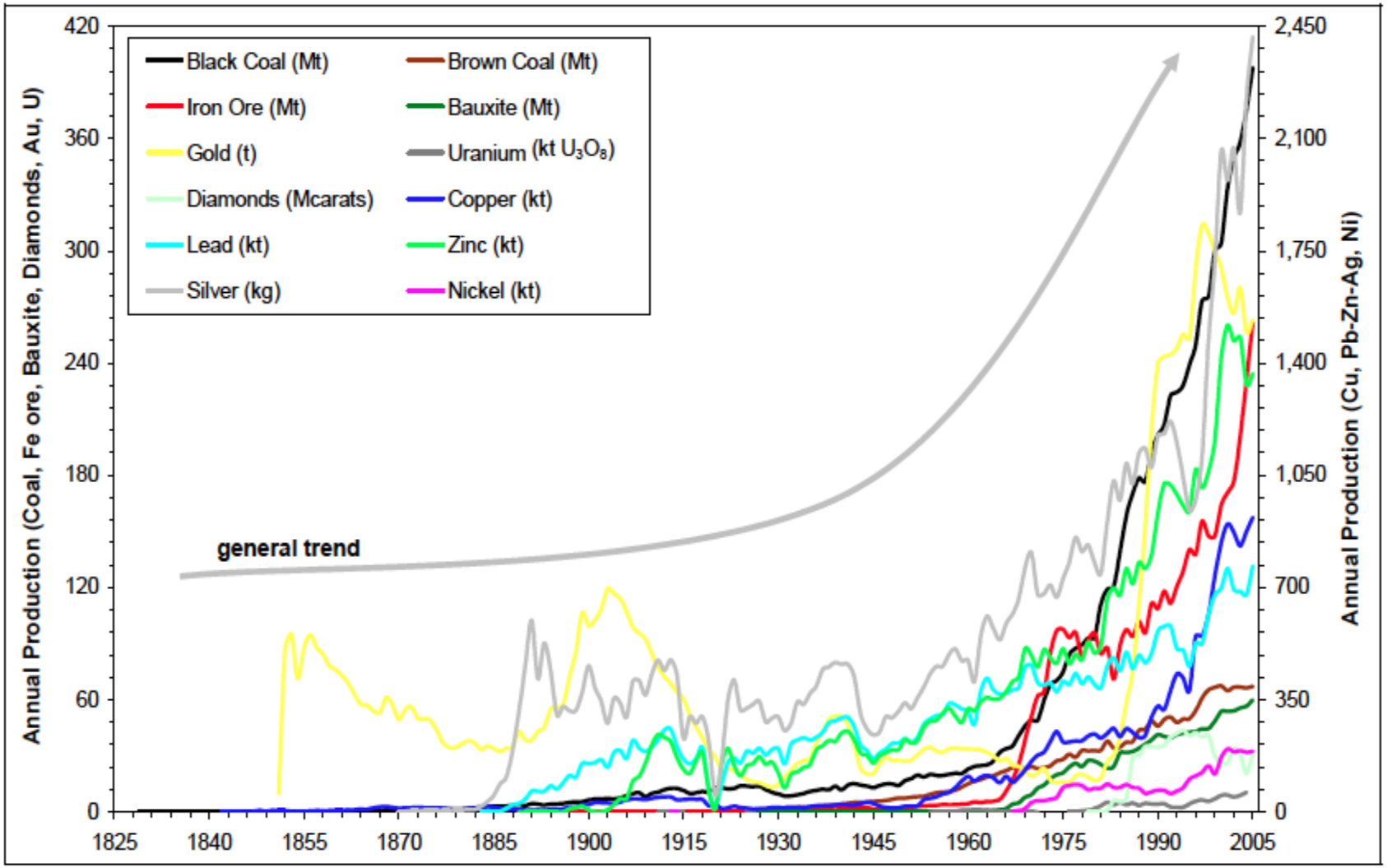
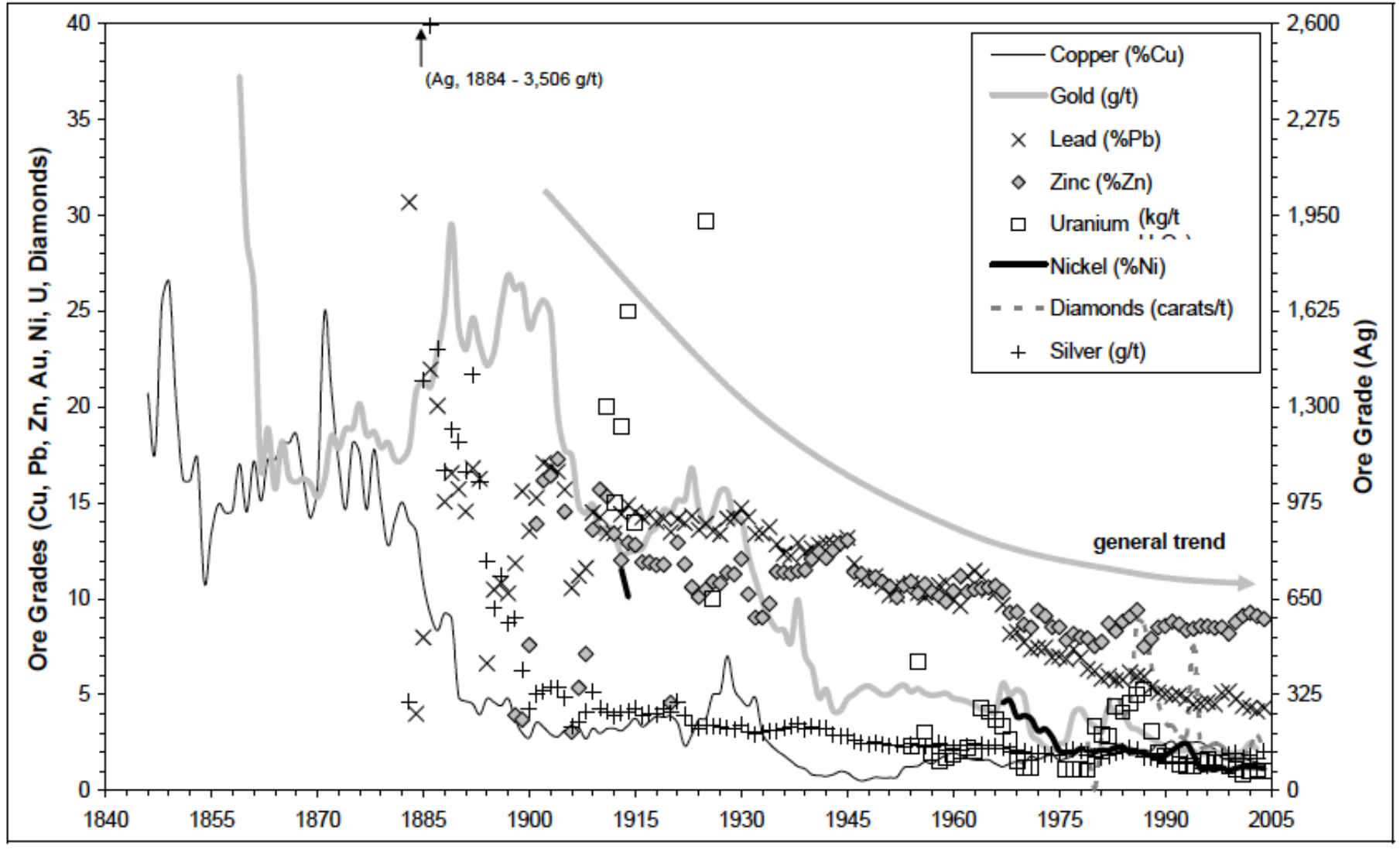


Figure 1. Historical Australian metal and mineral production (1825-2005) (Mudd, 2007d)

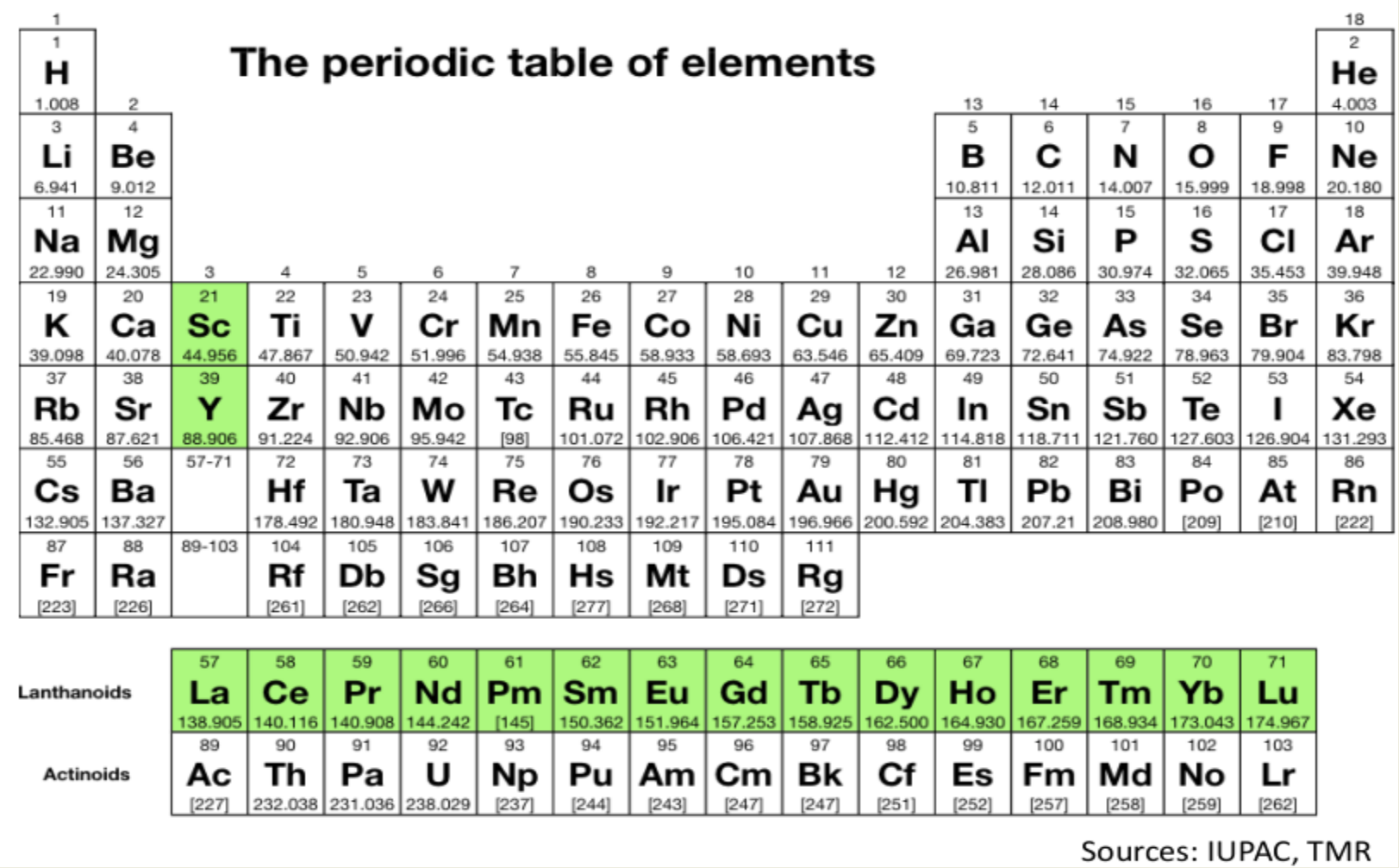
Other Metals and Ores - Historic Ore Quality



Summary of Lead Pollution / Exposure Secondary Smelting and Other Metals Recovery in the Informal Sector

- ❑ Absent in Developed Countries
- ❑ Varied in Middle Income Countries
- ❑ Rampant and Uncontrolled in Poor Countries

Rare Earth Elements-The Next Generation



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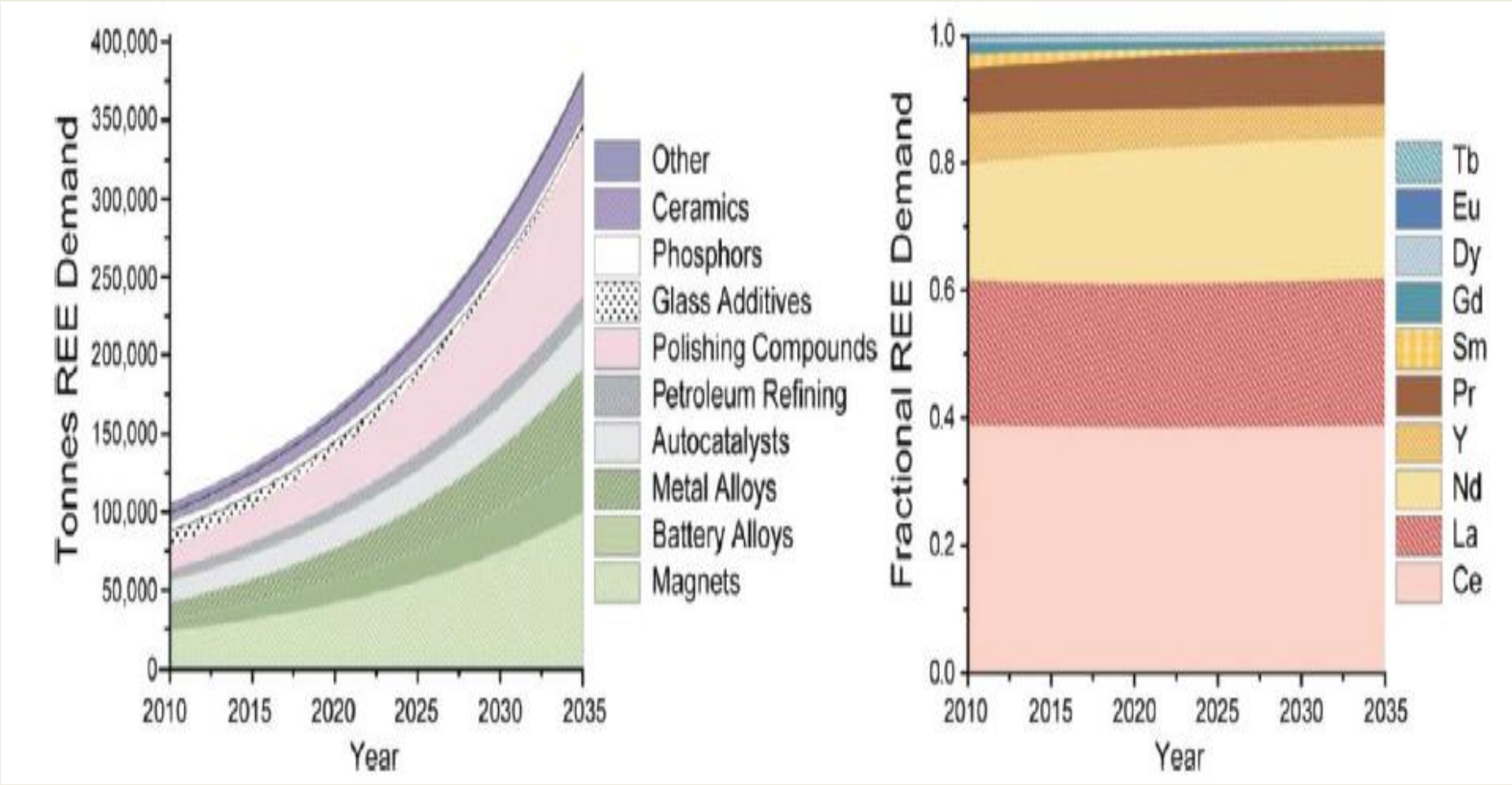
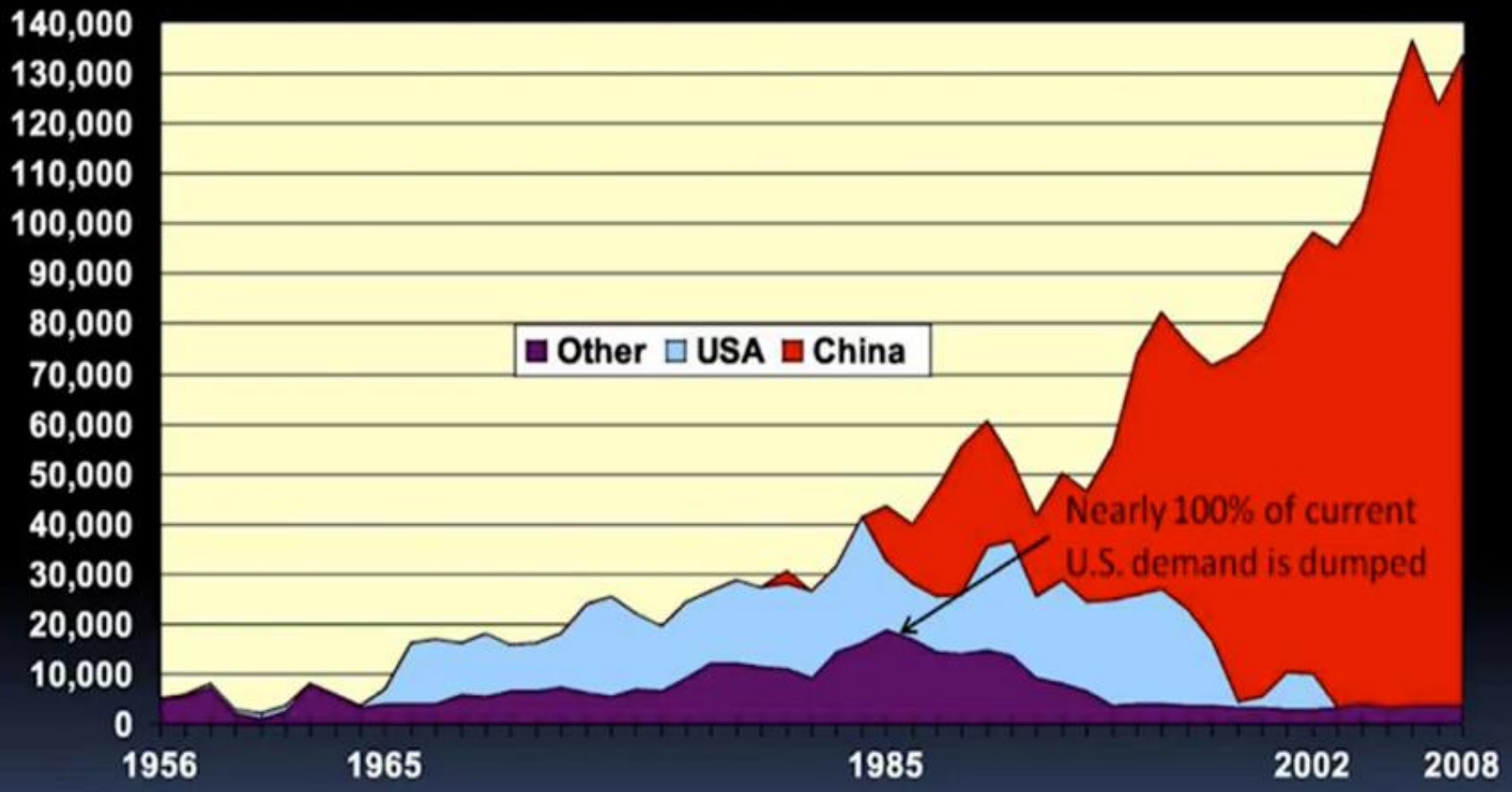
Uses and Demands for Rare Earth Elements



by Gordon Haxel, Greta Orris, and James Hedrick, updated by Hedrick

Nearly all REE came from the heavy Mineral Sands mining industry as a Monazite byproduct.

In 1985 the Mineral Sands industry was producing over 10,000 tpy of REEs as a byproduct



Conclusions

- Mineral Exploitation will Continue at an Exponential Rate
- Lower Grade Ores and Wastes will become more Valuable
- Developed Countries are Exporting their Pollution
- Middle Income Countries are Incentivized to Lower Standards to Attract Business
- Poor Countries are Desperate to Undertake Severe and Dangerous Practices to Mine and Recover Wastes

Economic Incentives

- Developed Countries
  - Export the Pollution Problems
  - Hope that Product Prices Don't Increase
- Middle Income Countries
  - Compromise Standards to Compete for Business
  - Adopt Lower Standards to Decrease Costs
- Poor Income Countries
  - Desperate for Any Income
  - No Standards and Corruption

Last Word

- The Prognosis is for Evermore Horrific Mining and Informal Recycling Related Environmental Health Catastrophes in Poor Countries
- Middle Income Countries will Face Increasing Pressure to Compromise their Health, Environment and Worker Protection to Attract Mineral Processing Business
- Developed Countries will Export their Environmental Health Problems to Avoid Compliance Costs and Lower Commodity Prices

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Soil and Dust in Compounds
Contaminated Food, Water
Mining / Processing Waste

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