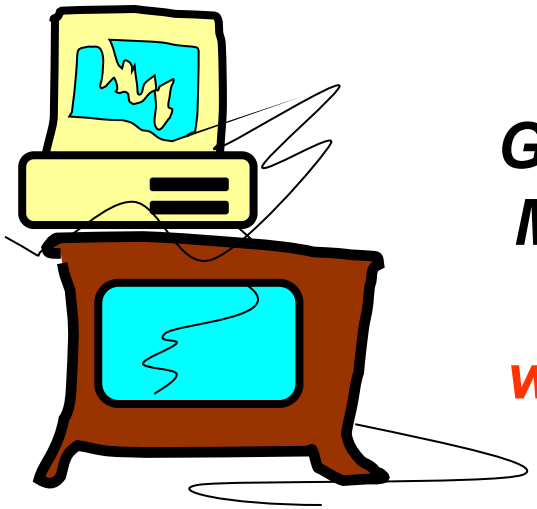
Outlook for E-Waste Solutions:

Infrastructure and end-markets for e-scrap in the Northeast



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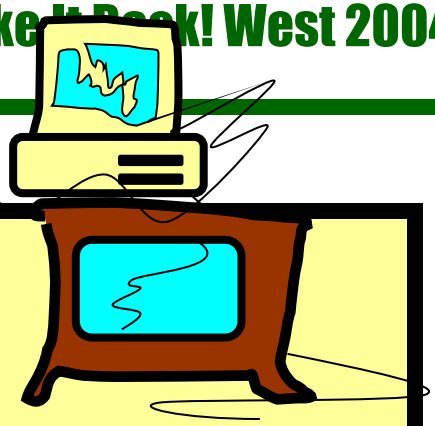
Take It Back! West

1994-2004



'94 Monitors fail TCLP, initially EPA wishes to force infrastructure through threat of law. High Cost, misses household (esp. TVs) entirely.

'97 Massachusetts implements the "commodity" exemption (so long as potentially reused, not yet a waste, ergo not HW), begins pilot collections at Goodwill, Salvation Army, etc.

'98 Massachusetts funds market research and first statewide processing contract before initiating first waste disposal ban

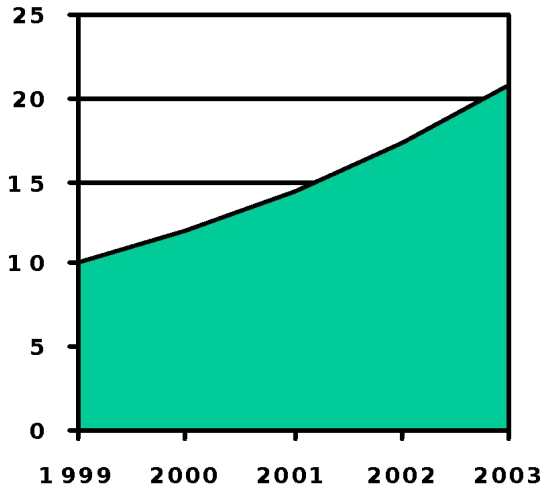
'99 VT, ME, NH, RI begin to purchase services under MA contract. Number of CRT processors, investments, increase 5X. Volumes increase, competition increases, prices fall.

'01 California implements disposal ban. BAN releases "Exporting Harm". EPA proposes "commodity exemption" for raw material as well as reuse/repair. Prices between vendors vary from $0 to $0.45 / lb.

Meanwhile

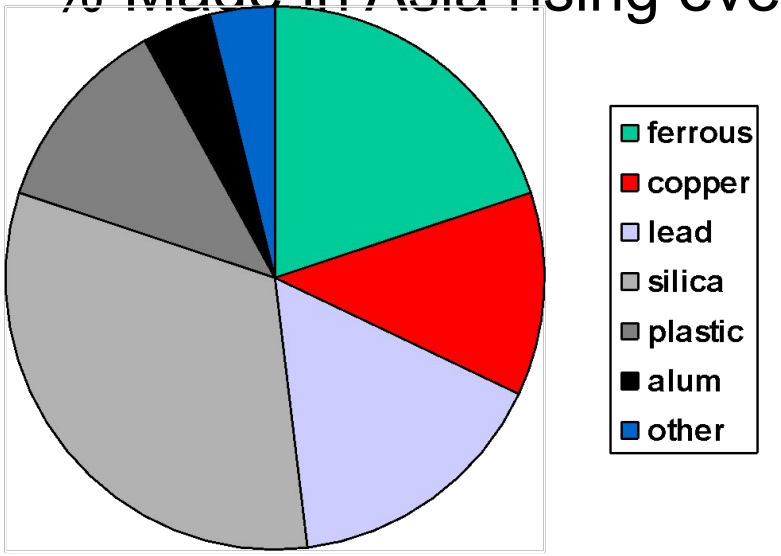
- World Demand for Electric and Electronic Devices is Rising
  - Disposal and mining
    - vs
  - Reuse and recycling

China's copper demand has compounded at 20% per year for the past 4 years.



Example: the CRT Monitor

- US demand: 50M monitors per year
- Chinese demand: 50M monitors per year
- India demand: 50M monitors per year
- % Made in Asia rising every year



USA secondary (used) market is 1:3.
Asia is 3:1.

Cost of Consumption

Gorilla and orangutan extinction is arguably driven by electrics metal mining.
One Copper mine in Papua New Guinea (feeding China) dumped 80,000 Tons Per Day of Cyanide tailings into the OK Tedi River from 1990-2000

USGS – At 1990 rate of consumption, all known copper reserves will be exhausted this century: Ocean mining will be the primary source of copper in our lifetimes.

USA Model? 95% from federal lands, $5/acre, 14/15 largest Superfund sites

Hard rock mining produces 45% of all toxics produced by all USA industries.

E-Scrap is 300% richer in copper and other metals than mined ore

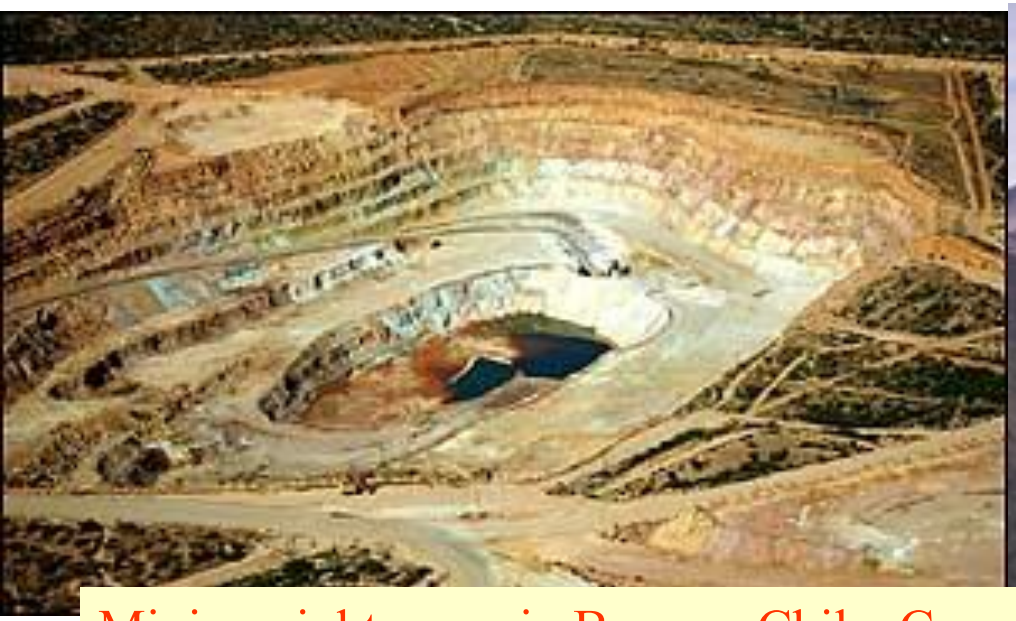
Recycling produces a fraction of the pollution from mining.

Gold mining releases more mercury than mercury mining and disposal combined!!!

Chinese demand in particular drives both recycling and mining

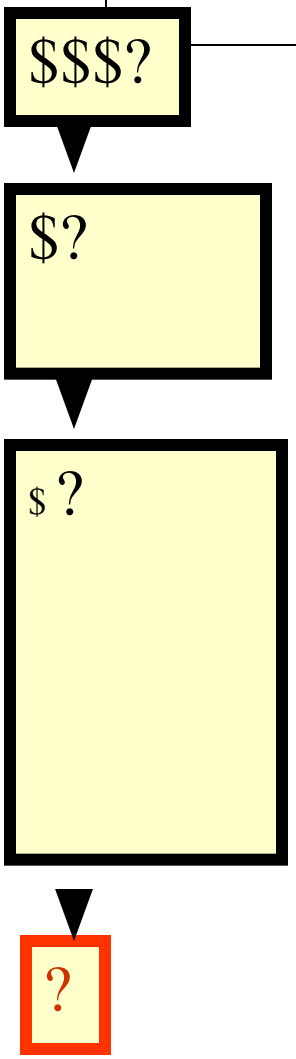
1. Electric and electronic appliances "made in China"
2. Chinese "New Deal" scale infrastructure development
3. Asia #1 in per capita consumption of gold & platinum

(the only materials which the West does not consume most of)



Mining nightmares in Borneo, Chile, Congo, Philippines, Turkey, etc.

Basic Process: Triage for value



1) Can it be reused? 5% material = 50% of income
   - e.g. 17" monitor tested working, $30

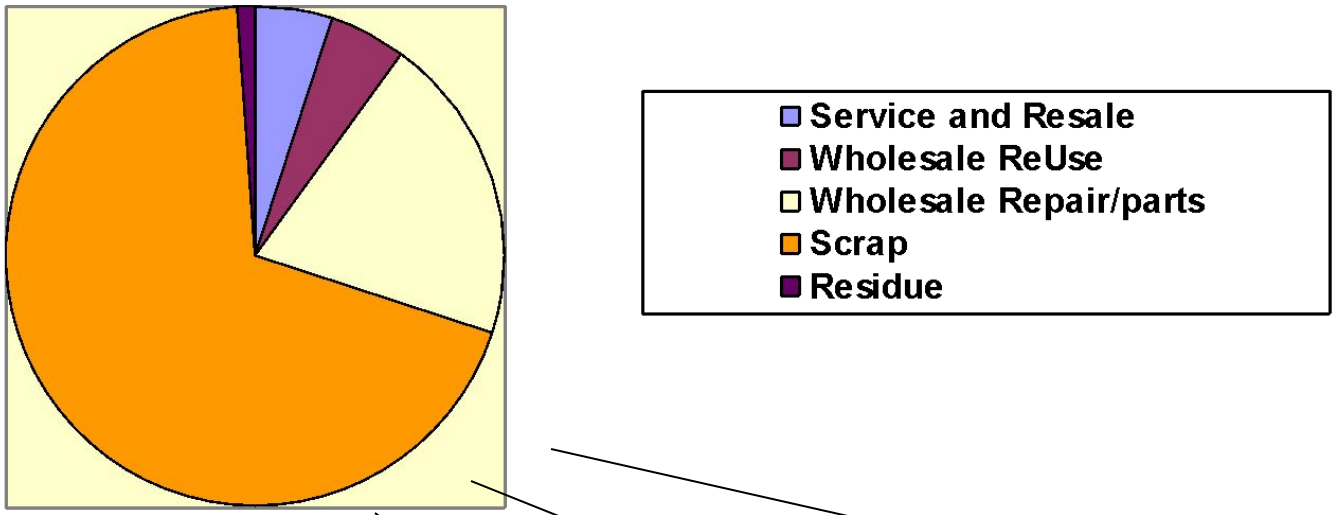
2) Can it be repaired? 15% material = 30% of income
   - e.g. white box PCs, repairable monitors, $5 each

3) Can it be recycled? 75% of material = 20% of income
   - gold, copper, aluminum, steel, plastic, pennies per pound

3) Disposed (incl. contaminants)? 5% material = LOSS
   - Wood debris, cable casings

- All Income combined = 1/3 of collection and operating cost

Destiny of materials at Good Point Recycling: 2.5M lbs since 2001



Glass Smelters

Plastic Recyclers

Gold, copper, aluminum other metals Smelters

Digital Scrap

- Over 1,000 parts requests per day via internet parts exchange services (tradeloop.com, pricewatch.com, etc.)
  - http://www10.tradeloop.com/tlTF2/pgSummary.cfm
- Contact with over 200 international repair shops via exporters.com.sg, alibaba.com, globalrecycle.net, recycle.net, etc. http://www.exporters.com.sg/members/myshowroom/
- Sales of parts and refurbishment on ebay.com
  - www.ebay.com
- Scrap copper, alum, plastic sold directly to end users
  - www.globalrecycle.net

The internet has completely changed the secondary parts and scrap market during the past 8 years, lowering the barrier to entry into technical and export markets.

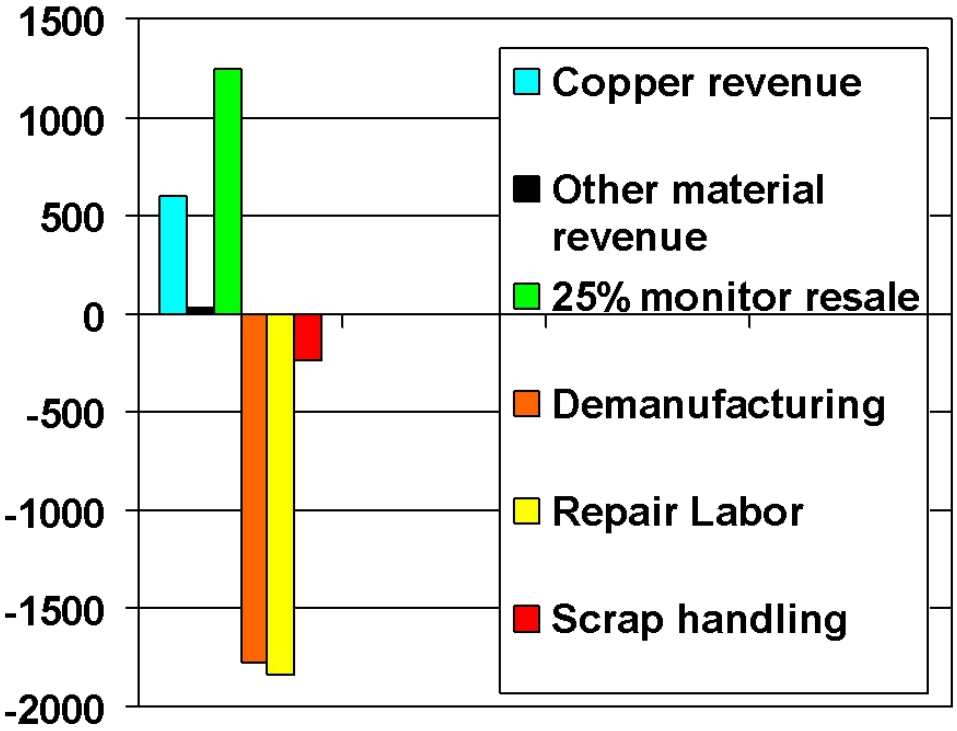
Market Forces ~ Recycling Costs

Next 3 Slides:

-USA costs currently (1000 monitors)
-USA costs with 1900 copper prices
-USA costs with Chinese labor rates

Overall USA Monitor Management

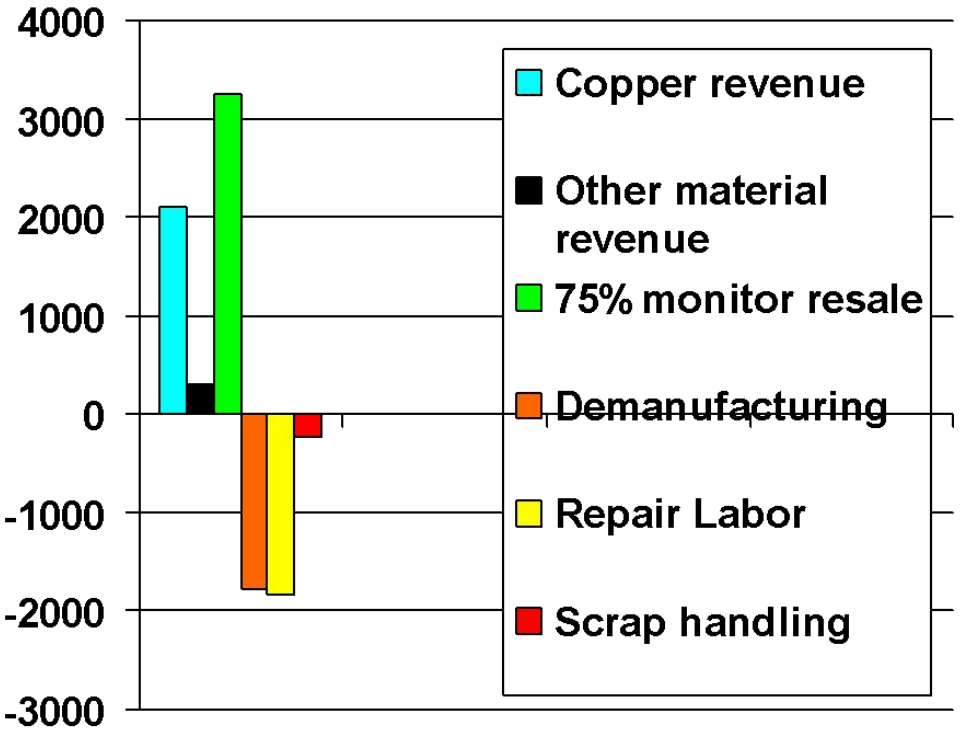
$ spent and earned per 1000 monitors



Most demand
for used is overseas

Possible USA Monitor Management

$ spent and earned per 1000 monitors

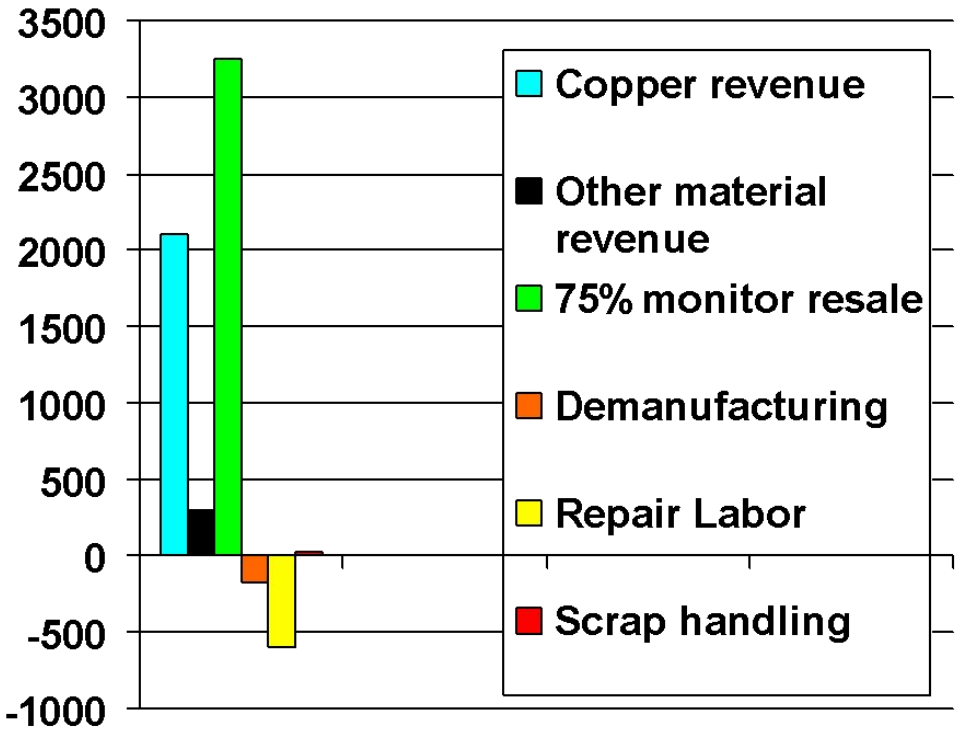


If copper and lead returned to 1900 prices, and monitors were repaired at 75% rate

Countries with high reuse and no mining subsidies have the advantage in scrap sales. Countries with high reuse and "free" software have the advantage in reuse.

Overseas Monitor Management

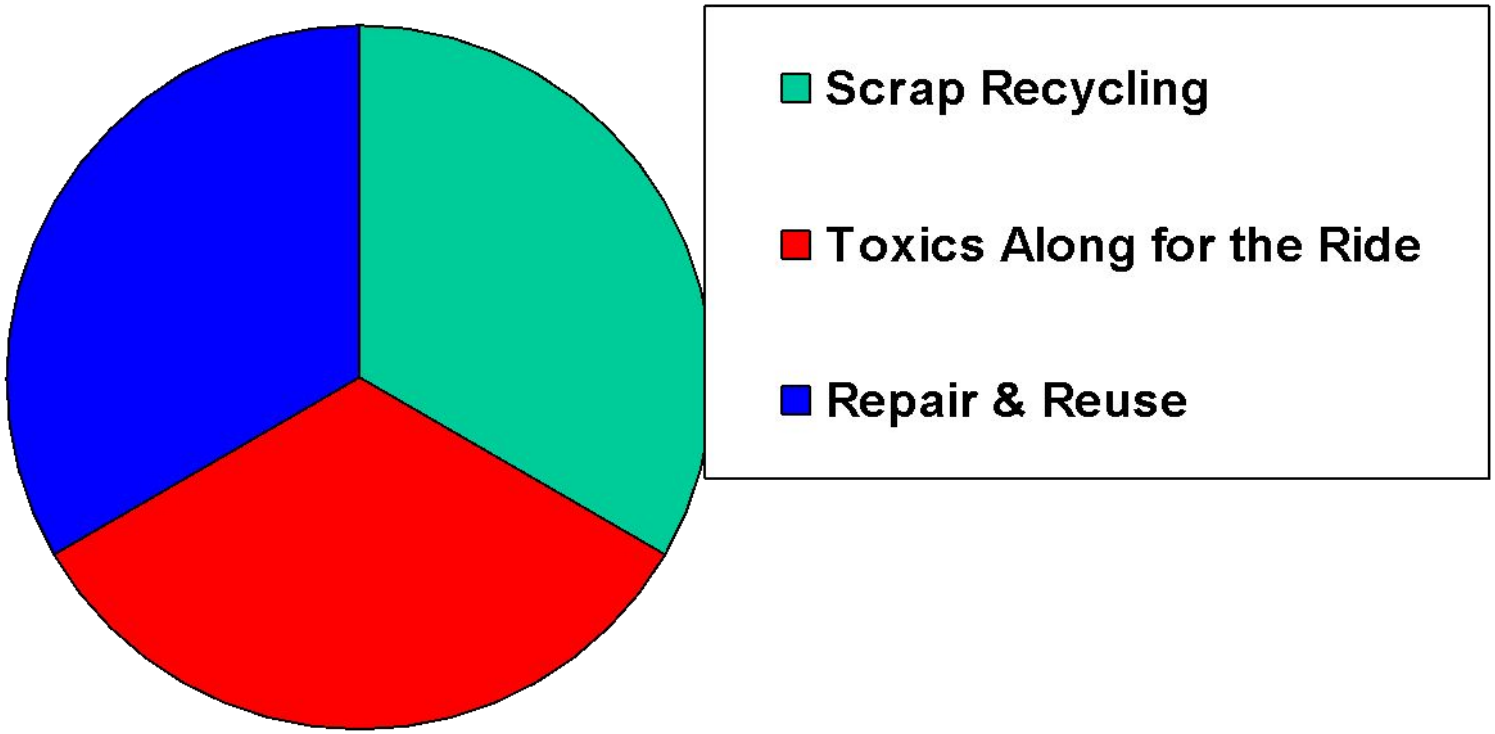
$ spent and earned per 1000 monitors



No mining subsidies, and 10% technical and handling labor cost

Countries with high reuse, no mining subsidies, and low wages are the winners

The good, the bad, and the ugly exports



Struggle to keep recycling from embarrassing itself

REALITY: If USA exports **everything**, we send 1/3 reusables, 1/3 recyclables, and 1/3 Toxics Along for the Ride.

REALITY: if USA exports **nothing**, we destroy reuseables (and they can't afford new); they mine to replace the recycled metals, and mining produces even more toxic harm than recycling.

SOLUTION: **Setting a Higher Standard**. USA processing, limited exports (tested equipment, copper scrap), simple tests (like CRT Glass Test); market development to promote best practices; (funded) state processing contracts with restrictions and incentives; etc.

Understanding your own supply

1) Pristine takeouts, off lease equipment

- you can deal with anyone directly

2) Picked over Junk, Obsolete and burnt

- you should insist on domestic processing

3) "I dunno"…Mix of good, bad and ugly

- you should deal with USA company with capacity to separate, process and market, and get documentation

Understanding your own supply

1) Pristine takeouts, off-lease equipment (Reuse material)

Highly Sorted Working and repairable monitors, P2s+, cords, peripherals, cartridges

positive revenue

dollars per item (not pennies per pound)

high overseas demand, with incentives to hide it from tariff collectors and anti-gray-market enforcers

Working monitors
-No screen damage
-No VGA
-No Apple
-Make, Model, COM,
-Year, other tech details

Understanding your own supply

2) The Dregs:

- Cherry-picked material, TVs, obsolete equipment, residue, shredded or baled material.
- Damaged CRTs
- Pennies per pound
- Overseas demand based on copper, gold and aluminum content

Understanding your own supply

- "I don't know": Then make sure the company you select has capacity to handle either type of E-Scrap.

"Crapple"

One fellow insisted his 1990 public school Stuff "works as good as when it was new".

"We're switching to flat screens"

Another commercial client insisted that working monitors, replaced by flat screens, should be recycled/destroyed here in the USA.

4 Simple Due Diligence Tests

- Glass recycling records
- Gold-bearing scrap records
- Sample manifests (declared reuse items)
- Employees or capital investment per ton

1. CRT Glass Test - Legitimate USA recyclers must be able to show where the LEAD (non-repairable glass) goes.

2. Printed Circuit Board (PCB) Gold Test (DRAFT)

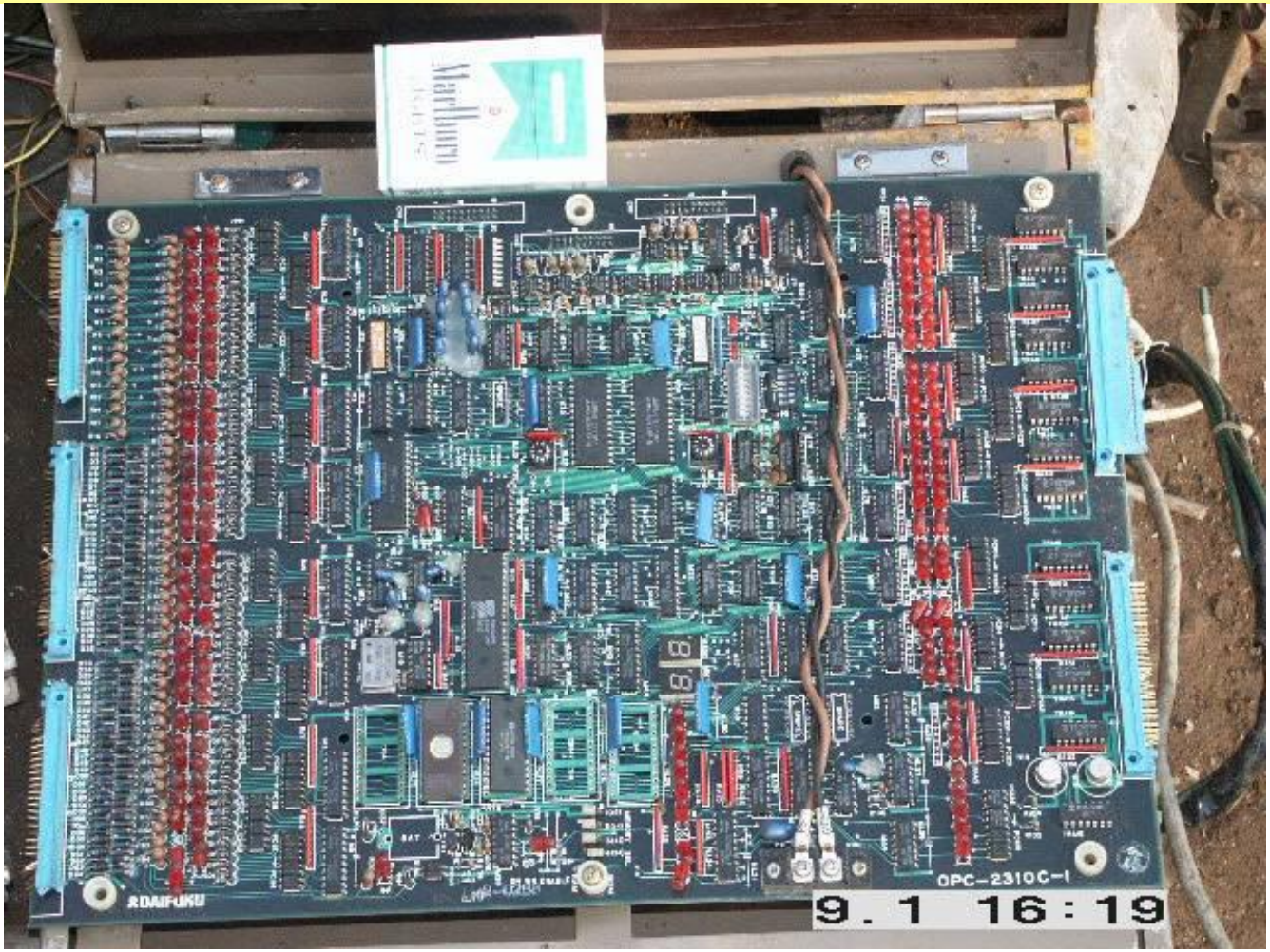
Nasty recycling (and nastier mining) practices. We do all Printed Circuit Boards domestically.

Q: Will this lead to more mining?
A: Gold mining is maxed out already

Reuters: chinese miner

BAN: chinese circuit board / gold recycler

3. Truth in Exporting Test - Legitimate bill of lading shows make/model/voltage/COO/condition.



4. Employment / Capacity Test

- How many tons did the company handle last year?
- How many employees per ton?
- If fewer employees, how much automated processing equipment is in place?

- mineralpolicy.org
- mpi.org.au
- USGS.gov
- moles.org
- ban.org
- copper.org
- www.antigraymarket.org
- these and other links www.retroworks.com