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CONTEXT SETTING
- “Waste” management heirarchy
- Where does the material go?

LAWS & REGULATIONS

“R2” RECYCLER CERTIFICATION
THE WASTE MANAGEMENT HEIRARCHY

1. REUSE
2. RECYCLING
3. DISPOSAL

EPA’s REGULATORY AND VOLUNTARY PROGRAMS EMPHASIZE THIS HEIRARCHY

ALTHOUGH NOT PREFERRED, “E-WASTE” CAN BE SAFELY DISPOSED IN NON-HAZARDOUS WASTE LANDFILLS
DISPOSAL vs REUSE & RECYCLING

- **EPA:** NO HAZARD IF PROPERLY LANDFILLED

- **ALTHOUGH DISPOSAL IN U.S. SAFE, TREMENDOUS LOSS IN:**
  - GREENHOUSE GAS SAVINGS
  - ENERGY CONSUMPTION
  - MATERIALS LOSS
  - AVAILABILITY OF AFFORDABLE, USED EQUIPMENT FOR BRIDGING “DIGITAL DIVIDE”

- **EPA STRONGLY SUPPORTS REUSE & RECYCLING**

- **HOWEVER, RISKS FROM IMPROPER RECYCLING ARE MUCH GREATER THAN LANDFILLING**
YES, THERE ARE SOME PROBLEMS

HOWEVER, THE MAGNITUDE OF THESE PROBLEMS IS VASTLY DISTORTED, and

EXPORT MARKETS ARE ESSENTIAL TO COLLECTION EFFORTS IN THE U.S.
REUSE & RECYCLING MARKETS for U.S. “E-Waste”

- MOST REUSE MARKETS ARE EXPORT
  - LARGE FOR-PROFIT & NON-PROFIT MARKETS IN DEVELOPING COUNTRIES

- MANY RECYCLING MARKETS ARE EXPORT
  - STRONG FOREIGN DEMAND FOR RAW MATERIALS
  - NO U.S. SMELTERS FOR COPPER & PRECIOUS METAL RECOVERY FROM CIRCUIT BOARDS
  - NO CRT GLASS FURNACES IN WESTERN HEMISPHERE
  - PLASTIC RECYCLING MARKETS ALMOST ALL OVERSEAS
IT IS A MYTH THAT 50-80% OF U.S. EXPORTS OF “E-WASTE” ARE TO PRIMITIVE RECYCLING FACILITIES

**IAER 2006 Industry Report (2005 data):**
- More than 500 U.S. recyclers handle 2.8 billion lbs
- Nearly half (1.3 billion lbs) processed into recyclable materials in the U.S. (about half then exported)
- In total, 74% of collected electronics exported in some form:
  - Processed recyclable materials
  - Working, whole electronics or parts for reuse
  - Non-working electronics
- Less than 13% of collected electronics are exported in non-working condition (equates to less than 20% of exports)

**NUMEROUS EXCELLENT FOREIGN PROCESSING & MANUFACTURING FACILITIES (metals, glass, plastics)**
RECYCLING MARKETS
CIRCUIT BOARDS

- ONLY 5 COPPER/PRECIOUS METAL SMELTERS IN THE WORLD PROPERLY EQUIPPED TO MINIMIZE EMISSIONS OF DIOXINS & FURANS
  - ALL OECD COUNTRIES
    - CANADA
    - BELGIUM
    - SWEDEN
    - GERMANY
    - JAPAN

- NEARLY ALL SCRAP CIRCUIT BOARDS DERIVED FROM PROCESSING ELECTRONICS IN U.S. GO TO THESE SMELTERS
RECYCLING MARKETS
CRT GLASS CULLET

NO CRT GLASS-MAKING FURNACES IN WESTERN HEMISPHERE

– About a dozen glass-making facilities worldwide
  ■ ASIA (10-12)
    – S. KOREA, MALAYSIA, INDIA, CHINA
  ■ POLAND (1)
– NUMBER OF FURNACES CONTINUES TO SHRINK RAPIDLY
– DEMAND REMAINS STRONG FOR CRT GLASS CULLET – HOWEVER, GOVERNMENTS TIGHTLY CONTROL IMPORT
ASIAN FACILITIES

Chinese plastics recycler

Malaysian CRT manufacturer

Chinese metals refinery
INDONESIAN TV & MONITOR MANUFACTURER – USED CRTs
DOMESTIC MARKETS

- NO NEW SMELTERS LIKELY FOR E-SCRAP
- NO NEW CRT MANUFACTURING FACILITIES
- U.S. MARKETS EXIST FOR:
  - MOST STEEL & ALUMINUM
  - ALL BATTERIES, MERCURY LAMPS/DEVICES
- SOME DEVELOPMENTS IN ALTERNATIVE PROCESSES & USES
  - NEW USES FOR PLASTICS & GLASS
  - EXTRACTION OF METALS FROM CIRCUIT BOARDS WITHOUT SMELTING
  - U.S. MARKETS MUST COMPETE WITH FOREIGN ONES
LAWS & REGULATIONS

STATE PROGRAMS
- RoHS-LIKE LAWS
- LANDFILL BANS
- COLLECTION PROGRAMS
  - Advanced recovery fee (CA only)
  - Producer responsibility programs

FEDERAL LEGISLATION
- IF HAPPENS, MOST LIKELY AREAS OF FOCUS:
  - DISPOSAL BAN
  - EXPORT CONTROLS
  - FLEXIBLE PRODUCER RESPONSIBILITY PROGRAMS

FEDERAL/STATE ROLES
- WASTE MANAGEMENT NORMALLY A STATE & LOCAL RESPONSIBILITY
- EXPORTS ARE EXCLUSIVELY THE ROLE OF THE FEDERAL GOVERNMENT
GENERALLY, MOST E-WASTE UNDER EPA RULES IS EITHER:
- NON-HAZARDOUS WASTE
- NON-WASTE

MOST WHOLE EQUIPMENT DOES NOT TEST HAZARDOUS

SEVERAL HAZARDOUS WASTE EXEMPTIONS & EXCLUSIONS APPLY
- TO ENCOURAGE REUSE & RECYCLING
RCRA EXCLUSIONS & EXEMPTIONS

- **RCRA**: Resource Conservation and Recovery Act
  - FEDERAL LAW re HAZARDOUS WASTE

- Under RCRA, a material must first be a waste in order to have the potential to be a hazardous waste

- EPA regulations under RCRA have many exclusions and exemptions
  - EXCLUSION: It is not a waste
  - EXEMPTION: It is a waste, but not a hazardous waste
RCRA INCENTIVES
for REUSE & RECYCLING

- EQUIPMENT FOR POTENTIAL REUSE IS NOT WASTE

- WASTE CAN BE MADE NON-WASTE BY PROCESSING – i.e., raw materials/commodities can be produced
HAZARDOUS WASTE EXEMPTIONS

NON-HAZARDOUS WASTES:
- HOUSEHOLD WASTES incl any electronics from households
- SCRAP METAL FOR RECYCLING
- WHOLE CIRCUIT BOARDS FOR RECYCLING
- PRECIOUS METALS FOR RECYCLING
HAZARDOUS WASTE EXCLUSIONS

NON-WASTES: (Products or commodities)

- MATERIALS OR EQUIPMENT FOR REUSE
- PROCESSED SCRAP METAL FOR RECYCLING
- SHREDDED CIRCUIT BOARDS FOR RECYCLING
  - Must be packaged to prevent release
  - Free of NiCd and Li batteries and mercury devices
- PROCESSED CRT GLASS FOR RECYCLING
- INTACT CRTs FOR RECYCLING
- PARTIALLY PROCESSED CRTs FOR RECYCLING
  - CONDITIONS APPLY
JUNE 2002 FEDERAL REGISTER:

- BECAUSE OBSOLETE ELECTRONICS ARE OFTEN CAPABLE OF REUSE, THEY ARE NOT CONSIDERED WASTES UNTIL A DECISION IS MADE THAT THEY CANNOT OR WILL NOT BE REUSED

- SUCH DECISIONS ARE MADE BY PERSONS WITH SPECIALIZED EXPERTISE (unless destruction specified)
  - i.e., resellers & recyclers

- THIS ALLOWS COLLECTION TO OCCUR WITHOUT REGARD TO WASTE RULES.
HAZARDOUS WASTES

IF ALL FOUR ELEMENTS APPLY:
- GENERATED BY NON-HOUSEHOLDS
- GENERATED AT MORE THAN 220 lbs/mo
- HAVE A HAZ WASTE “CHARACTERISTIC,” e.g., FAIL TCLP.
- EXAMPLES:
  - CRTs
  - SOME LAPTOPS, CELL PHONES, ETC.
- SENT FOR DISPOSAL
SUMMARY
COLLECTION, REUSE & RECYCLING

PERSONS OR BUSINESSES THAT SEND USED ELECTRONIC EQUIPMENT TO RECYCLERS:

1. ARE NOT WASTE GENERATORS
   - Unless they require destruction
2. GENERALLY AVOID RCRA LIABILITY

MUCH OF WHAT A RECYCLER COLLECTS IS NOT WASTE

RECYCLERS’ OUTPUT INCLUDES:

- Used and unused products
- Recyclable commodities
  - Both non-wastes & non-hazardous wastes
- Wastes requiring special handling or disposal
WASTES REQUIRING SPECIAL HANDLING

UNIVERSAL WASTES ARE HAZARDOUS WASTES WITH SPECIAL CONTROLS TO FACILITATE TREATMENT/RECYCLING

- Certain batteries
  - NiCd, Li, Pb acid
- Lamps and other mercury devices
STATE HAZARDOUS WASTE RULES

REMEMBER:
- BE AWARE OF STATE RULES
- STATE RULES MAY BE MORE STRINGENT THAN EPA

SOME STATES CLASSIFY E-WASTE AS UNIVERSAL OR HAZARDOUS WASTE
U.S. EXPORT RULES

EPA has export rules for:

- Hazardous waste – Generally, not e-waste
- Federal (not state-only) universal wastes
  - Hazardous waste batteries, lamps, and mercury devices
  - Notification and consent system
- CRTs and CRT glass – Rules effective 1/29/07
  - Export for recycling: Notification and consent system
  - Export for reuse/refurbishment: EPA notification
“R2” RECYCLER CERTIFICATION

- Can be a valuable alternative to a comprehensive federal regulatory program
- Third-party-implemented
- Accredited certifying bodies
- Consensus-based “standards”
CERTIFICATION TO “RESPONSIBLE RECYCLER” (R2) PRACTICES

OVER THE LAST 3 YEARS, EPA HAS SPONSORED THIS MULTISTAKEHOLDER EFFORT

- Involves EPA, OSHA, states, manufacturers, recyclers, environmental NGOs

PURPOSE: CREATE A MARKET MECHANISM THAT ENABLES “RESPONSIBLE” RECYCLERS TO DIFFERENTIATE THEMSELVES FROM “SHAM” RECYCLERS

RECYCLERS WILL VOLUNTEER TO BE CERTIFIED AS TO CONFORMANCE WITH THE R2 PRACTICES

“STANDARDS” COMPLETED IN OCTOBER 2008

- Sets a very high “bar” for environmental & worker protection
- Supersedes existing EPA national guidelines on safe management
- American National Accreditation Board (ANAB) now working toward accrediting certifying bodies
OVERARCHING PRINCIPLES

- **VOLUNTARY PROGRAM, HOWEVER:**
  - Federal government will require use of R2-certified recyclers for federal government surplus
  - Many states and local governments will require use of R2 recyclers

- **PRIMARY FOCUS IS ON HUMAN HEALTH & THE ENVIRONMENT**

- **ELECTRONICS RECYCLERS MUST COMPLY WITH EXISTING FEDERAL, STATE, LOCAL & INTERNATIONAL REQUIREMENTS**

- **EPA WILL NOT DIRECT IMPLEMENTATION OF THE PROGRAM**
  - No EPA certification
  - Multistakeholder “R2” practices
  - Use of “third-party” auditors and certifying bodies (ANAB)
ESSENTIAL “R2” CONCEPTS

- **REUSE & RECYCLING MUST BE MAXIMIZED—DISPOSAL ONLY USED IN EXCEPTIONAL CIRCUMSTANCES**

- **WORKER & ENVIRONMENTAL PROTECTION**
  - Ongoing hazards identification and assessment of risks, as well as monitoring

- **DOWNSTREAM DUE DILIGENCE (including export) FOR PRIORITY (“FOCUS”) MATERIALS**
  - Batteries, mercury lamps & devices, CRTs, circuit boards
  - Written “focus material” management plan for recycler & downstream vendors
  - However, not required for equipment meeting some “reuse” criteria

- **EVIDENCE OF LEGALITY OF EXPORT & IMPORT**

- **NEED FOR COMPREHENSIVE MANAGEMENT SYSTEMS (EH&S)**
  - Written programs using “Plan-Do-Check-Act” model for continual improvement

- **COMPLIANCE WITH ALL LAWS & RULES**
OTHER “R2” PROVISIONS

- **DATA SECURITY**
  - Use of NIST Guidelines for Media Sanitation—800-88, or other generally-accepted standard or certification program

- **TRACKING THROUGHPUT & RECORDKEEPING**
  - Business records documenting all transfers of equipment and materials into and out of facility

- **STORAGE**

- **TRANSPORT**

- **RECYCLING FACILITY CLOSURE & FINANCIAL RESPONSIBILITY**

- **FACILITY SECURITY**
“R2” CERTIFICATION

- LIKELY TO BECOME INDUSTRY STANDARD

- VERY STRINGENT VOLUNTARY STANDARD
  - Very, very few recyclers can meet at present

- WILL BE REQUIRED BY MANY GOVERNMENTAL ENTITIES

- FIRST “R2” CERTIFICATIONS LIKELY LATER IN 2009

- “R2” WILL MAKE SELECTION OF RELIABLE RECYCLERS MUCH MORE SIMPLE
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