



Comprehensive Battery Recycling

Presented by: David Miller, Toxco Inc

To: Used Oil Recycling / HHW Training and Conference

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Comprehensive Recycling for All Batteries



- ◆ Part B TSDF
- ◆ 4 M lb Capacity per month
- ◆ Manage all battery chemistries
- ◆ Ca, Oh, BC Canada



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Comprehensive Recycling for All Batteries



- ◆ Primary activities are centered on Large application batteries
 - Motive Electric power
 - Stand By Power
 - Emergency Back Up
- ◆ Secondary Batteries
 - Rechargeable Batteries
 - ◆ Nicad, NiMh, Li Ion, (Portable power)
- ◆ Primary Batteries
 - Household Alkaline Batteries

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Activities in Anaheim (Related to Batteries)

- ◆ Demanufacture Batteries for Components
- ◆ Material Separation
- ◆ Treatment of Electrolytes
- ◆ Consolidation for Other Facilities (Oh, BC)
- ◆ Battery Pack Processing
- ◆ Logistics and Management

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Battery Operations



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Primary Collection Routes:

- ◆ Commercial Facilities
- ◆ Telecommunication Companies
- ◆ Hazardous Waste Management Companies
- ◆ Scrap Battery Dealers
- ◆ Government/Large Contractual Clients
- ◆ HEV Manufacturers
- ◆ Other Battery Handlers

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Primary Collection Routes:

- ◆ Works Well for Industrial and Commercial Entities
- ◆ Reverse Distribution – Proven Methodology
- ◆ Typically Larger Quantities of Batteries
- ◆ Deal Directly With Producers (Generators)

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Primary Collection Routes (may not be adaptable) :

- ◆ Small quantity generators?
- ◆ Small rechargeables?
- ◆ Capturing Alkaline Batteries (Approx 80% of all consumer style batteries sold)
- ◆ Household Batteries

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Different Collection System Needed

- ◆ Address SQG's
- ◆ Mixed Chemistries (all batteries)
- ◆ Compliance
- ◆ Transportation and Logistics

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What is The Big Green Box :

- ◆ UN Approved corrugated container.
- ◆ 43 pound UN rated shipping capacity
- ◆ Pre labeled with return shipping to recovery facility (CA or OH)
- ◆ Simply buy it, fill it, ship it, recycle it !

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The Big Green Box™ Collection System (2003):

- ◆ All inclusive recycling program focused on all batteries and portable electronics



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The Big Green Box™ Collection System:

- ◆ Accomplishes Multiple Goals
 - Compliance
 - Battery Management
 - Transportation
 - Recycling
 - Ease of Use
 - Low Cost Burden



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Why Use The Big Green Box™ :

- ◆ ISO Certification
- ◆ Promote Corporate Citizenship
- ◆ Practice Recycling
- ◆ Community Programs
- ◆ Eliminate/Reduce Waste
- ◆ Mandated Legislation

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The Big Green Box Customers

- ◆ Active in all 50 States and by 9 Federal Agencies - IRS, EPA, FBI, DOE, DOT, DOI, DOA, DOD, DOT (Treasury)
- ◆ State of Maine stocks in central warehouse for use in all state offices.
- ◆ TSA-All Airports around the U.S.

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The Big Green Box Customers

Ikea

Panasonic

Eastman Chemicals

Bayer Polymers

Ricoh

SBC

Boeing

Qualcomm

Fujitsu

Fastrak

OC Performing Arts

Bechtel

Delphi

Kikkoman Foods

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The Big Green Box Customers

Used by over 50 Parks, Forests, and Wildlife Preserves:

YOSEMITE
NATIONAL PARKS SERVICE
LK TAHOE BASIN MGM UNIT
US FWS IMPERIAL NWR
US FISH & WILDLIFE
GRAND TETON

USDA FS NORTH FORK CA
INYO NATIONAL FOREST
MOJAVE RESERVE
USFS LOS PADRES NF
GRAND CANYON

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The Big Green Box Customers

City of Fountain Valley
City of Elk Grove
Rancho Santa Margarita
San Juan Capistrano
Irvine Ranch
City of San Clemente
City of Dana Point
California Dept of Education
City of Vacaville
Monterey Bay Aquarium

Sacramento Transfer Station
County of San Diego
County Of Orange
City of Escondido P.W.
City of Anaheim
City of Ventura
UC Schools
City of Aliso Viejo
CalTrans
LA Zoo
California Guest Services

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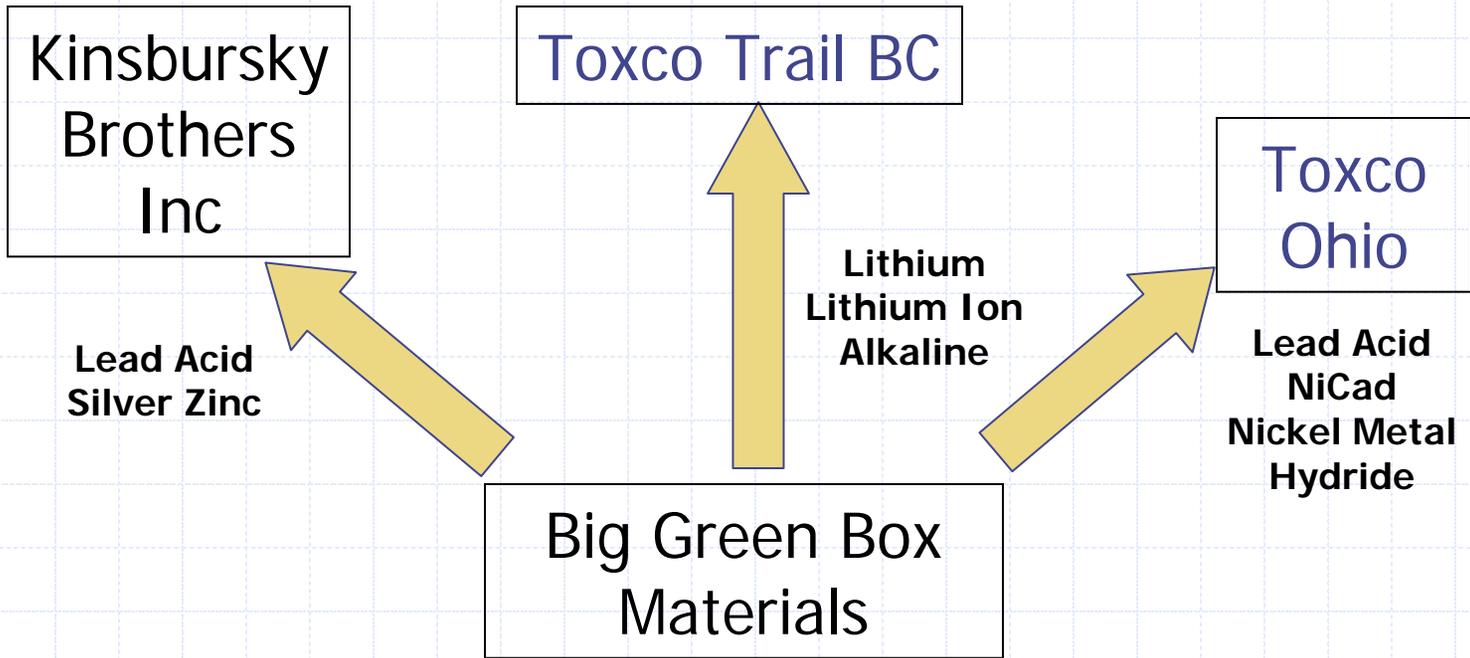
The Big Green Box Program:

Material disposition

- ◆ Batteries are consolidated in Anaheim.
- ◆ Sorted
- ◆ Pre-processed (plastic removal)
- ◆ Shipped to Appropriate facility



Comprehensive Recycling for All Batteries

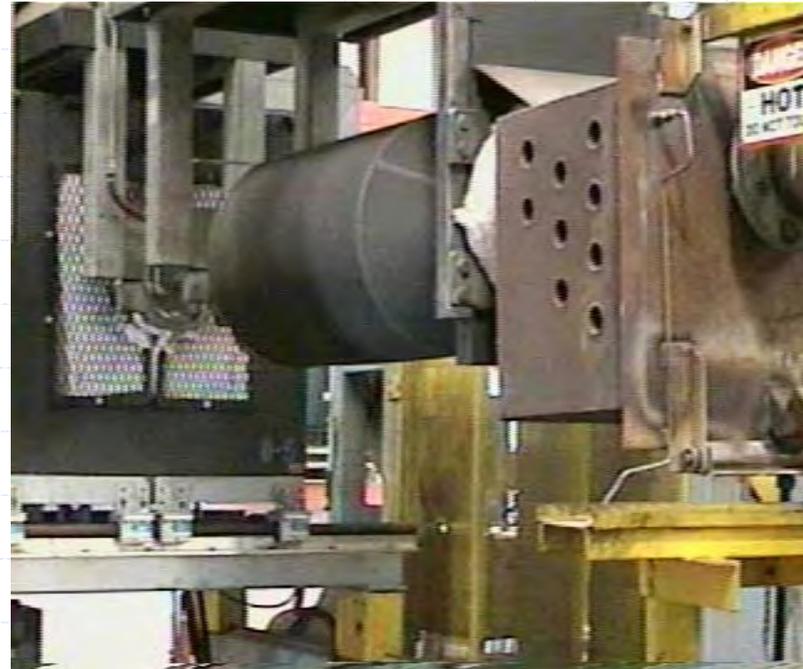


Battery Disposition

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- ◆ Nickel cadmium recovery facility in Ohio.
- ◆ Meets BDAT
- ◆ Recovery of .999 Cd



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- ◆ Cadmium Ingots
- ◆ Re-Use back into Batteries



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Comprehensive Recycling for All Batteries - Ohio



- ◆ Electric Arc Furnace
- ◆ Recovers Cobalt and Nickel
- ◆ Consumer and Electric Vehicle Applications



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Comprehensive Recycling for All Batteries - Canada



Alkaline Battery Processing

1. Batteries are shredded in mild aqueous acid to neutralize caustic electrolyte - neutralized
2. Ferrous metals recovered via conventional metal separation techniques – sold for reuse
3. Zinc and manganese left in neutral solution
4. Solution pressed out leaving a cake that is rich in zinc / manganese – sold for reuse

Comprehensive Recycling for All Batteries - Canada



- ◆ Trail BC Facility
- ◆ The Only Primary and Secondary Lithium Recycling Facility
- ◆ Recovers, Metals, Cobalt, Manganese Dioxide, and Lithium Carbonate from Batteries



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Other Activities



Electric Vehicle Management and Recycling



Precious Metal Recovery from Catalyst



E-Waste Management 1,000,000 pounds per month

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HOW DO YOU VERIFY RECYCLING VS DISPOSAL OF YOUR BATTERIES

1. Visit the processing facilities
2. Request receipts of recovered material sold
3. Review company history
4. Review processes
5. Review compliance history
6. Ask for customer references
7. Ask for final disposition and verify answer

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