



**MINUTES
INFORMATIONAL MEETING
INTERNATIONAL CADMIUM ASSOCIATION
Thursday, April 10, 2008 – 10:00 AM**

**International Lead Zinc Research Organization
2525 Meridian Parkway, Suite 100, Durham, North Carolina 27713 USA**

1. CALL TO ORDER

In the absence of the Chairman, the informational meeting was called to order at 10:05 AM by its Managing Director, Christian Canoo. The following persons were in attendance:

REPRESENTATIVE

Tim Pugh (by conference call)
Lisa Krueger
Al Hardies
Jeff Mamarella

STAFF AND GUESTS

Astrid Voigt
Christian Canoo
Hugh Morrow
Sophie Duhayon

MEMBER COMPANY

Black & Decker Corporation
First Solar
INMETCO
James M. Brown, Ltd.

ORGANIZATION

International Zinc Association
International Cadmium Association
International Cadmium Association
International Cadmium Association

An attendance roster was circulated for each attendee to sign. The Managing Director asked Hugh Morrow to serve as the Secretary Pro-Tempore to record the Minutes of the meeting. Dr. Canoo then asked each attendee to introduce himself / herself.

2. ADMINISTRATIVE, REGULATORY AFFAIRS, RESEARCH AND MARKET UPDATES

As an informational meeting of the association, no formal business was conducted, and the meeting consisted of a series of updates on various administrative, regulatory, research and market issues of interest to and affecting the worldwide cadmium industry.

Annex I contains the presentations made by Drs. Christian Canoo and Sophie Duhayon with updates on European Regulatory Affairs, the status of the EU Cadmium REACH Consortium, and the status of the industry-sponsored cadmium research programs. Annex II presents Hugh Morrow's update on North American and International Regulatory Affairs. Annex III summarizes the latest report on the status of the cadmium market.

3. NEXT GENERAL ASSEMBLY OF MEMBERS

The Managing Director announced that the next General Assembly of Members of the International Cadmium Association would tentatively be held during the afternoon of Thursday, October 16, 2008 in London, UK during London Metals Exchange Week.

Respectfully Submitted,

Approved,

Hugh Morrow
Secretary, Pro-Tempore

Christian Canoo
Managing Director



ICdA programs

Informational meeting – April 2008

Raleigh, NC – 10 April, 2008

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Agenda

- Chairman's introduction & reminder of Competition law compliance
- Update on ICdA Operational Matters – VAT and By-Laws Status
- ICdA 2007-Financial Report and Budget 2008
- Cadmium European Regulatory Update
- Status of Cadmium REACH Consortium

- Luncheon at DoubleTree Guest Suites – 2515 Meridian Parkway

- Cadmium Research Programs
- Cadmium North American Regulatory Update
- Cadmium International Regulatory Update
- Cadmium Market Update

- Next Meeting Date

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STATEMENT OF COMPLIANCE

- The purpose of the meeting is to address, under the applicable confidentiality rules, issues concerning Cadmium and Cadmium compounds producers and importers and more particularly their obligations under the several regulations.
- The minutes kept during the meeting will have to reflect all significant matters discussed during the meeting.
- No discussions will be held, formally or informally, during specified meeting times or otherwise, involving, directly or indirectly, express or implicit agreements or understandings related to: (a) any company's price; (b) any company's terms or conditions of sale; (c) any company's production or sales levels; (d) any company's wages or salaries; (e) the division or allocation of customers or geographic markets; or (f) customer or suppliers boycotts; or (g) any disclosure of information which may affect applicable rules on Competition Law.
- The International Cadmium Association (ICdA), as a group will make no recommendations of any kind and will not try to reach any agreements or understandings with respect to an individual company's prices, terms or conditions of sale, production or sales levels, wages, salaries, customers or suppliers.



Administrative update

- Staff : Beside Hugh Morrow (p.t.) and Christian Canoo (p.t.), Sophie Duhayon (p.t.) joined the team in December 2007.
- In terms of VAT registration n°, we still had to clear a confusing situation last year. During an extra-ordinary GA-meeting, on October 20th 2007, the former ICdA-association was formally wound-up with a transfer of the activities to the new ICdA running under the VAT number BE 0466.551.786, implying the transfer of the assets and liabilities as well. This occurred formally on January 1st 2008
- Accounts of 2007, reviewed by Deloitte & Touche, will be acted during the next Board-meeting and will have to be approved by the GA in October 2008



P&L2007 - Budget 2008

	Forecast 9+3	2007 Reviewed *	2008 Plan
Total Staff Costs	78.509	81.905	119.571
Total Operation Costs	43.527	35.005	49.069
Depreciation & non-deductible		1.535	
TOTAL Staff & Operational COSTS	122.036	118.445	168.640
Special studies	150.000	155.343	0
			5.000
TOTAL EXPENSES	272.036	273.787	173.640
TOTAL SUBSCRIPTION INCOME	279.405	284.688	190.868
SURPLUS/(LOSS) FOR YEAR	7.368	10.901	17.227
SURPLUS/(LOSS) BROUGHT FORWARD	101.454	101.454	112.355
SURPLUS/(LOSS) CARRIED FORWARD	108.822	112.355	129.582
* Reviewed by Deloitte-Touche-Tohmatsu			

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Update on the EU-regulatory issues

- Cd & Cd-compounds Risk Assessment
- Cd & Cd-compounds Risk Reduction Strategy
- REACH-implementation

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The Cd / CdO Risk Assessment (1)

- The Risk Assessment (RA) is virtually completed since 2005; but it will only be officially finalized after incorporation of the results of the additional study on "ecotoxicity of Cd⁺⁺ in very soft waters" (concl. i).
- That study (NIVA in Norway and Univ. Ghent in Belgium) has been completed in the summer-2007, and the results, summarized by the Belgian rapporteur, were submitted to the TCNES III in September 07
- The resulting proposal is that the current PNEC (0,08 µg/l) for low hardness waters is enough protective, even in very soft waters.

The Cd / CdO Risk Assessment (2)

- At the TCNES, Industry was thanked for providing those requested additional results; however, due to a late delivery of the final NIVA report, a written procedure was now launched in October-2007 in order to collect additional comments from the members states
- Those comments resulted in a slightly amended version compared with the B-rapporteur's original position.
- Following step: the Official Journal publication should occur before June 2008.

The Cd / CdO Risk Reduction strategy –RRS (1)

- On May 10, 2007 the European RRS-committee of the member states discussed the Cd/CdO file on the basis of the Belgian Rapporteur proposals
- The ICdA-delegation had the opportunity to present the Industry programme, i.e. to protect workers:
 - Updated Eurometaux / ICdA Guidance document (04 2006)
 - Formal written declaration by ~20 sites confirming applying these guidance principles (05 2007)
 - 3y-plan to develop:
 - ✓ A collective European bio-monitoring programme
 - ✓ A specific study on the effect of Cd on Bone mineralisation of workers



The Cd / CdO Risk Reduction strategy –RRS (2)

- The meeting largely confirmed the Belgian rapporteur's proposals with, however, a still unresolved proposal of Sweden (relayed by Denmark and Norway) to go further and to consider "market & use restrictions" whenever possible to protect the general population from the Cd-risks induced through environmental exposure.
- The final phrasing of the RRS-proposals was expected to be issued by the Commission, but apparently the "fertilizers"-case is a difficult one to resolve between DG-Enterprise and DG-Environment.
- We have to be attentive to those final documents that will be transferred to the EU-Parliament for final vote
- Finalization of the whole RA / RRS process is expected before June 2008



Final phrasing of the RRS : March 2008

RRS for occupational exposure

- To set at community level, Occupational Exposure Limit (OEL) & Biological Limit Values (BLVs)
- To take note of the recommended measures > Guidance document Eurometaux – ICda already available
 - > Not included in one of the final proposals
 - > A comment was sent on that issue to the commission



RRS for consumers

- Marketing and use restrictions of Cd-containing brazing sticks and Cd-containing products intended to come into contact with the skin
- No additional ban on NiCd batteries vs Batteries Directive 2006/66/EC, because:
 - On its low impact on general population
 - > Input of batteries in total Cd emission: 0.2-0.7%
 - Substitution would lead to significant economic impact due to technological constraints



RRS for environment

- Air & Soil: No additional measures. Implementation of existing legislation will reduce emissions in Environment
- Soil: to set a Eu maximum-level on the cadmium content of fertilisers

RRS for man via environment

- To revise the maximum levels for Cd in foodstuff
- To set a limit for Cd in tobacco blend/leaves
- Soil: to set a Eu level on the cadmium content of fertilisers



Consortium

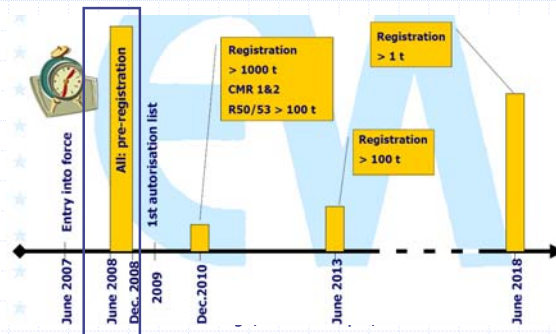


Status of the project – April 2008–



Registration, Evaluation and Authorization of Chemicals (REACH)

- Cd Consortium was created in July 2007
- 18 Members so far
- Following step -> pre-registration requirements



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About the Membership

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Cadmium-Consortium Members so far

* new Members since 04 09 07, in red

18 Members	SG. I	SG. II
<u>5N PV GmbH</u>		x
<u>BOCHEMIE a.s.</u>		x
BOLIDEN AB	x	
FLORIDIENNE CHIMIE	x	x
<u>Huta Cynku MIASTECZKO SLAKIE</u>	x	
<u>JAMES M. BROWN Ltd</u>		x
<u>JSC Chelyabinsk Zinc Plant</u>	x	
KCM 2000 S.A.	x	
METALEUROP S.A.		x
NYRSTAR S.A.-N.V.	x	
<u>PORTO-VESME</u>	x	
ROCKWOOD PIGMENTS		x
RUHRZINK	x	
SAFT S.A.	x	x
<u>SLMC</u>		x
<u>TODINI & Co, SPA</u>	x	x
UMICORE	x	x
XSTRATA ZINC GmbH	x	

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About the Substances covered

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Substances currently in the scope of subgroups I & II "Cadmium and cadmium compounds"

	<u>EINECS</u>
<input type="checkbox"/> Cadmium metal	231-152-8
<input type="checkbox"/> Cadmium Oxide	215-146-2
<input type="checkbox"/> <u>Cadmium hydroxide</u>	244-168-5
<input type="checkbox"/> <u>Cadmium nitrate</u>	233-710-6
<input type="checkbox"/> <u>Cadmium carbonate</u>	208-168-9 / 298-586-8
<input type="checkbox"/> Cadmium sulphide	215-147-8
<input type="checkbox"/> Cd Sulphoselenide	235-758-3 / 261-218-1
<input type="checkbox"/> Cd Zn sulphide	232-466-8
<input type="checkbox"/> Cd telluride	215-149-9

Substances currently in the scope of subgroups III "Cadmium compounds as Intermediates"

	<u>EINECS</u>
<input type="checkbox"/> Cadmium Sulphate	233-331-6

Identifying and addressing data gaps for chemical safety report (CSR)

- **Tasks:**
 - Check REACH requirements related to the CSA/IUCLID V with available information in risk assessment and beyond
 - Identification of data gaps, planning for further testing, if needed
 - Filling in of data gaps
- **Data gaps identified and addressed so far:**
 - Human health: workers:
 - Bone effects: the protocol of the study (2008-2009) is in elaboration with the UCL – Ind. Toxicology laboratory (Prof. Lison & Hoet)
 - NOEL for workers – kidney effects: it would be advisable to have a scientific review of existing occupational records and to derive a more practical NOEL than the conservative one in the RA (Prof. Bernard)
- **Environment:**
 - A Marine ecotoxicity data base for deriving the marine PNEC needs to be established (D. Haesaerts / A. Voigt)
- **Meetings planned:**
 - with C. Boreiko for discussion of human tox. data gaps: 10/4
 - final discussion with EU commission and member states on metal specific RA (CSR) methodology: April 8th

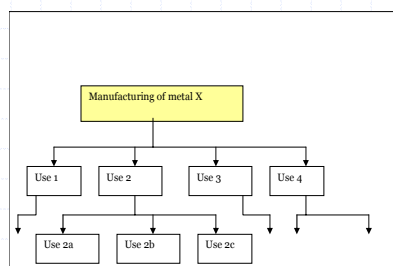
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Identification of all Cd/Cd compounds uses throughout the supply chain

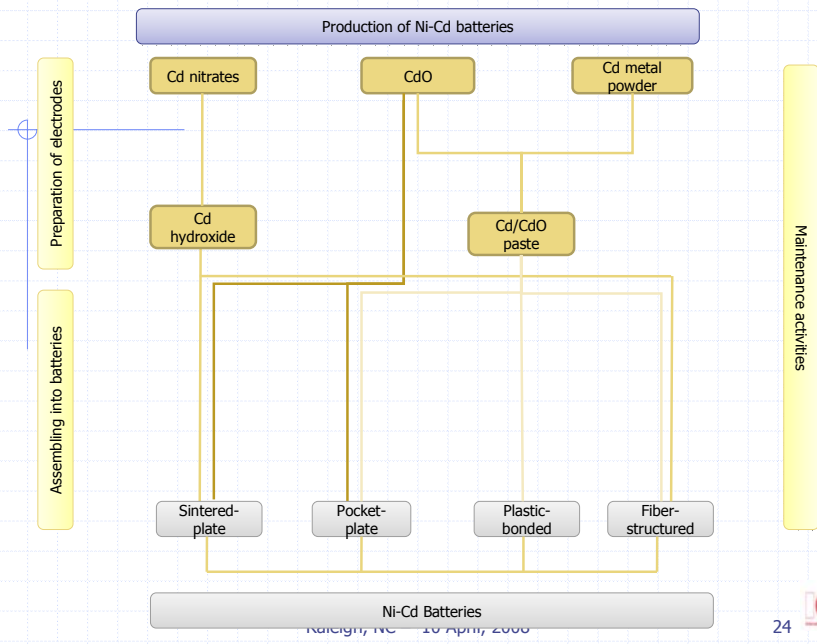
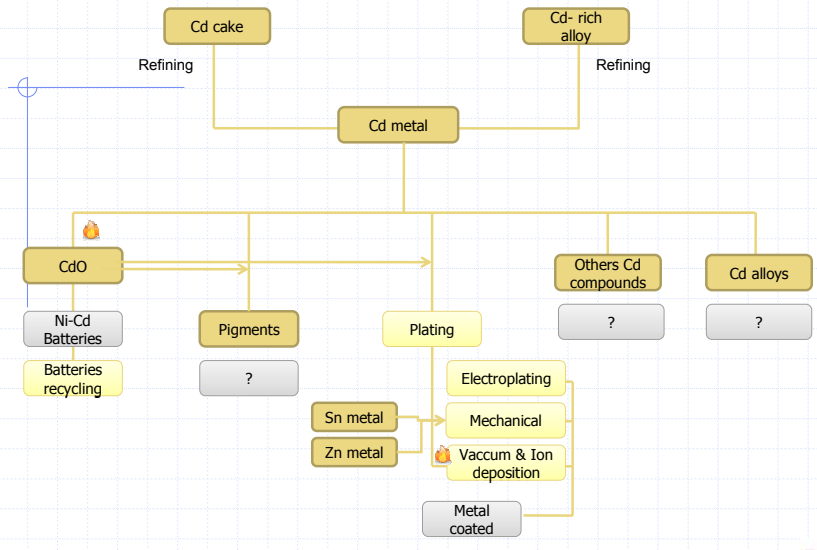
- All uses need to be covered by exposure scenarios.
 - Manufacturers and downstream users have to work together to identify all the uses of their products and the related possible exposures.



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Drafting of "pilot" exposure scenarios

- Task: Initiate discussion process on ES with user sectors, as learning cases
 - EU guidance is still under development
 - Eurometaux ES WG is working on tool for ES compliance checking
- ES's drafted for Cd and Cd use sectors:
 - Cd production
 - ✓ Site visit Budel
 - NiCd battery production
 - ✓ Site visit SAFT 7/3
 - Planned: Cd-pigment production/CdO production
- Draft ES's will be further elaborated with the sectors



Short Term workplan Priorities: April '08 – July '08

- 1): Pre-registration requirements:
 - ✓ Finalisation of identification and scope in/out of Cd-compounds (intermediates?)
 - ✓ Finalisation of requirements for pre-registration
 - ✓ Learn to use pre-registration IT tool (EM REACH conference 20/5)
 - ✓ A working session on pre-registration will be organised June 23-24 (see further)
- 2): Registration requirements:
 - ✓ To explore further testing needs for toxicity/ecotoxicity: potential data-gaps for Registration or Classification purposes
 - ✓ Further elaboration of exposure scenarios for DUs, e.g. Cd-pigments production
 - ✓ To plan visits/discussions in Pigment- and CdO- production plants
 - ✓ Initiate general cross-reading cases
- 3) Clarification on general metal guidance and RIPs
 - ✓ Participation in WGs Eurometaux ⇒ extract guidance relevant for the Cd Consortium



Remarks on pre-registration

- Pre-registration requirements :
 - ✓ Eurometaux organize a 2 days-seminar on 20-21 Mai at the Brussels-Marriott
<http://www.eurometaux.org/content/showevent.asp?menuid=1482&level=1&folderid=1973>
 - ✓ The Consortium secretariat is intending to organize a practical "website / seminar" on pre-registration on June 23-24, on basis of the specific IT-tool (ad-on to IUCLID V) made available recently on:
<http://ecbwbiu5.jrc.it/index.php?fuseaction=home.preregistrationPlugin&type=public>

- IUCLID V platform is operational on our server



Communication

- Dedicated website (www.reach-cadmium.eu)
 - Link to www.cadmium.com (ICdA website) and Eurometaux gateway (www.reach-metals.eu), f.i.
 - ✓ EM-ICMM leaflet on imported alloys (in finalization)
 - ✓ EM-ICMM leaflet on pre-registration (in finalization)
 - Information available on Internet
 - ✓ Consortium mission and scope
 - ✓ Contacts, ...
 - Information available on Intranet (members only)
 - ✓ Membership
 - ✓ Consortium agreements
 - ✓ Meeting files (agenda, minutes, presentations, ...)
 - ✓ Progress reports

- One login-name & pass-word per company



Cd-reach website: www.reach-cadmium.eu

Cd REACH
Cadmium REACH Consortium
166 Avenue de Tervuren, Box 4, B-1120 Brussels, Belgium
Tel. +32 (0) 2 776 00 73 Fax +32 (0) 2 776 00 02 email: fpetit@zaeurope.com

Home | Cd Consortium Info | REACH Documents & Links | Contact Us

Introduction
The EU REACH Regulation entered into force on June 1, 2007. REACH stands for Registration Evaluation and Authorization of Chemicals.
REACH will replace the current European legislation on existing substances (CS/79/370/EEC).
The EU Chemicals Agency (ECHA) based in Helsinki, Finland will oversee and administer the whole program.
All substances, such as cadmium metal, alloys and compounds (cadmium oxide, nitrates, pigments, etc.) manufactured in Europe and/or imported into Europe will be required to be registered. Presently, zinc-cadmium concentrates when not chemically modified seem to be exempted from the obligation to be registered.
[Read more...](#)

Register for Newsletter
The Cadmium REACH Consortium publishes a free newsletter covering various aspects of the REACH legislation. If you would like to receive copies of the newsletter, please send an email to [Mrs. Françoise Petit](mailto:Mrs.Francoise.Petit)

Recent News
[Read more...](#)

Events
Next General Assembly April 8, 2008 Brussels, Belgium
[View Events...](#)

Member Log-In
If you are a member of the Cadmium REACH Consortium [please log in here](#). If you have forgotten your username and password, please contact Mrs. Françoise Petit.

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Next meetings

- Next General Assembly:
 - The next Annual Meeting of Members of the ICdA will be held during LME-week, in London, probably on October 16th, 2008

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ICdA Research program

Sophie Duhayon – 10/04/08

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Research program

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- **Bone study in Cd exposed workers**

- **Kidney study in Cd exposed workers –
No Observed Adverse Effect Level (NOAEL)**



Bone study in Cd exposed workers

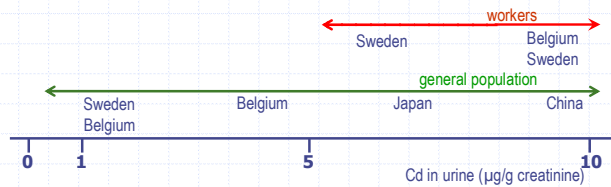
- **Risk Assessment (RA) recommendation:**
 - LOAEL for the general population (GP)= 3 µg Cd/g creatinine = LOAEL for workers
-> No relevant bone study in Cd exposed workers => **conservative approach**
 - « ...further epidemiological studies are strongly encouraged.. »
- **Objectives:**
 - Does Cd have an effect on the bone in workers ?
 - At what Cd level is this effect observable ?
- Materials: ~ 400 Workers (♂ & ♀) exposed to Cd (no simultaneous exposure to Pb)
- The protocol of the study is in elaboration with
Université Catholique de Louvain – Ind. Toxicology laboratory (Belgium) (Prof. Lison & Hoet)
- Cost: 180 000 € - REACH Cd Consortium & Timing: 2008-2009



Kidney study in Cd exposed workers

- ❑ **RA recommendation:** LOAEL for the GP: 2 µg Cd/g creatinine = LOAEL for workers
- ❑ **Basis:** Critical concentrations of Cd in urine for the induction of tubular dysfunction vary between GP and workers
 - > Variations in sensitivity between the GP and workers:
 - > "It is plausible that the lower LOAEL in the GP exposed by the oral route is the consequence of an interaction of Cd exposure with pre-existing or concurrent renal disease" -> « workers can suffer from such disease »

=> RA recommended conservative approach



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- ❑ **Other possible explanation:**
 - ❑ Lack of consideration for **confounding factors in the studies:**
 1. **Reverse causality**
 2. **Effect of removal of exposure**

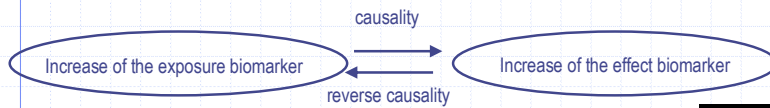
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1. Reverse causality

- Reverse causality >< causality: the effect increases the internal dose of metal



- The case of albuminuria:

- Albumine: major plasma protein excreted in urine
- Cd Binding protein -> Cd must follow the same glomerular filtration-tubular reabsorption pathway as the proteins to which they are bound

↑ Increased urinary excretion of albumin ↑ urinary excretion of Cd

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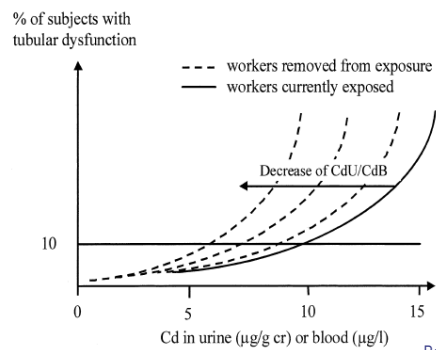
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2. Effect of removal of exposure

-> When subjects are removed from exposure -> ↓ of Cd in urine/blood

-> Dose-effect/response relationships are shifted towards lower levels of exposure and the thresholds of toxicity are underestimated accordingly



Bernard, 2004

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Kidney study in Cd exposed workers

Objective ?

To assess NOAEL for kidney effect in Cd exposed workers;
Cd-induced tubular proteinuria on the basis of associations that are biased by:

- Reverse causality due to a co-excretion of protein and Cd in urine
- Decrease of urinary Cd due to removal from exposure
- Other potential confounding factors: e.g. age, pre-existing diseases

Materials: ~ 400 Workers (♂ & ♀) exposed to Cd (no simultaneous exposure to Pb)

The protocol of the study is in elaboration with
Université Catholique de Louvain – Ind. Toxicology laboratory (Belgium) (Prof. Bernard)

Cost: 70 000 € over two years - REACH Cd Consortium

Timing: 2008 -2010



Data gaps related to REACH



Lung cancer

EU classification for Carcinogenicity: category 2:

Substances that should be regarded as if they are **carcinogenic** to humans, for which there is sufficient evidence, based on long-term animal studies and other relevant information, to provide a strong presumption that human exposure may result in the development of cancer

Basis: animal and human studies

Controversy: in human studies, potential confounding factor (e.g. Arsenic exposure) cannot be excluded



Research program:

- A retrospective study on mortality from lung cancer was initiated on Belgian workers with data on exposure to As
- ? Timing of the study depends on the request of the Flemish government. The study is an initiative of Umicore (B) as a response to press releases suggesting relation between environmental Cd exposure and cancer
 - Feasibility study has shown that it is possible to do the study
 - Very large cohort of exposed workers (> 3000) , going back > 50y

Question: - which position should we have about the potential lung carcinogenic effect of Cd?

=> meeting planned with C. Boreiko (10/04/08)



Eu classification of mutagenicity: category 3:

Substances which cause concern for man owing to **possible mutagenic effects**.

There is evidence from appropriate mutagenic studies but this is insufficient to place substance in category 2

Mechanisms suggested:

- Direct DNA damage
- Oxidative damage
- Inhibition of DNA repair

Basis: animal studies and human conflicting studies: potential confounding factors?

Question: - should we considered Cd as a non threshold carcinogenic substance ?

=> meeting planned with C. Boreiko (10/04/08)
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Neurotoxicity

RA conclusion: concl (i) on hold, Effects to be better documented

Basis: animal studies, adverse health effects especially on the developing brain suggested

Question: which type of approach will be efficient?

=> meeting planned with C. Boreiko (10/04/08)



Regulatory Affairs Report North America and International International Cadmium Association Informational Meeting

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North American Cadmium Issues

- NAFTA CEC Sound Management of Chemicals
 - No Programs Planned on Cadmium in 2008
 - North American Symposium on Assessing Environmental Effects of Trade – April 23, 2008 - Mexico
- EPA Initiatives
 - NESHAPs – PM Standards for Secondary Nonferrous Metals Processing; Proposed Standards for Metal Fabrication and Finishing, Plating and Polishing Industries (Cd,Cr,Pb,Mn,Ni)
- USA State Programs on Cadmium Products
 - NiCd Disposal Bans - FL, IA, ME, MD, MN, NJ, RI, VT
 - WEEE RoHS – CA, Proposed in Many Jurisdictions
- Assessments of Cadmium Effects
 - ATSDR, NTP, IRIS, US State Reviews

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Assessments of Cadmium Effects

- ❑ Agency for Toxic Substances and Disease Registry
 - Cadmium Not Included in Sets 19, 20 and 21 (15 Chemicals)
 - Cadmium Proposed as Priority 4 in Set 22 for Re-Evaluation
- ❑ National Toxicology Program (NTP)
 - Listed as Known Human Carcinogen in 11th ROC
 - Evaluating Toxicology of Cadmium Telluride
- ❑ US EPA Integrated Risk Information System (IRIS)
 - As of 1998, "Being Reassessed " But No New Information
- ❑ US State Reviews on Cadmium Effects
 - Children's Health, Ambient Air, Drinking Water, CA OEHHA



International Cadmium Issues

- ❑ United Nations Economic Commission for Europe (UNECE) Long Range Transboundary Air Pollution (LRTAP) Heavy Metals Protocol
- ❑ United Nations Environment Programme (UNEP) Heavy Metals Program
- ❑ Intergovernmental Forum on Chemical Safety (IFCS) Forum VI Working Group on Lead and Cadmium



UNECE LRTAP HM Protocol

- Based on 2006 Sufficiency & Effectiveness Review, Developed a Work Plan in 2007 to Further Reduce Pb, Cd & Hg Air Emissions
 - Stressed Need to Improve HM Emission Data
 - Increase Number of Ratifications to HM Protocol
 - Hold 2009 Workshop in Belarus on Ratifications
 - No Agreement to Negotiate HM Protocol Revision
 - Invited TFHM to Continue Its Work in 2008
- Working Group on Strategies and Review
 - Meeting in Geneva, April 14-17, No Cadmium Plan



Task Force on Heavy Metals

- Consider Technical Options for Updating BATs to Reduce HM Emissions and Include Flexibility in Management Options
- Strong Emphasis on Increasing Ratifications by Including Management Options
- Examine the Effects of Management Options on Other Provisions and Annexes of Protocol
- Convene TFHM Meeting in London June 4-6



UNEP Heavy Metals Program

- ❑ ICdA Submitted Extensive Comments on UNEP "Scientific Review" on Cadmium
- ❑ Comments are to be Considered by the Danish Contractor and a Revised Draft Issued
- ❑ Working Group Members (Includes ICdA) Will Review Revised Draft from March-June 2008
- ❑ Contractor Will Issue Final Draft from July-Sept 2008 Based on Comments from WG

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UNEP Heavy Metals Program

- ❑ Finalize Scientific Reviews and a Compilation of Risk Management Measures with Particular Emphasis on Needs of Developing Countries
- ❑ Convene a Meeting of the Working Group on Lead & Cadmium to Finalize These Materials
- ❑ Publish Finalized Scientific Reviews-Nov 2008
- ❑ Develop Necessary Proposals and Documents for UNEP Governing Council in February 2009

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IFCS Forum VI Working Group on Lead and Cadmium

- ❑ Forum Standing Committee (FSC) is Proposing a Meeting to Consider Need for International Action on Pb & Cd Products
- ❑ Assume Global Trade in Cadmium Products Leads to Pollution in Developing Nations
- ❑ Effort Being Led by Germany and EU Nations
- ❑ The Center for International Environmental Law (CIEL) Has Prepared a Review "Lead and Cadmium: Need for International Action?"

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IFCS Forum VI Working Group on Lead and Cadmium

- ❑ ICdA and International Lead Association Have Commented Extensively on CIEL Review
- ❑ David Wilson of ILA and/or Brian Wilson of ILMC Will Present Paper on Behalf of Lead at IFCS Forum VI in Dakar, Senegal, Sept 2008
- ❑ The IFCS FSC, CIEL and Germany Appear to be Focusing on NiCd Batteries and Fertilizers
- ❑ USA and Canada Have Withdrawn Their Support from IFCS and Thus This Forum is Largely the EU Persuading the Developing Countries to Ban Cadmium Products

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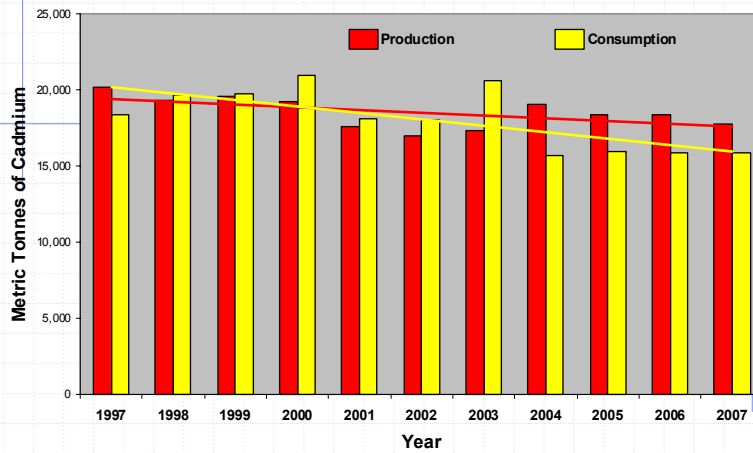
Cadmium Market Report

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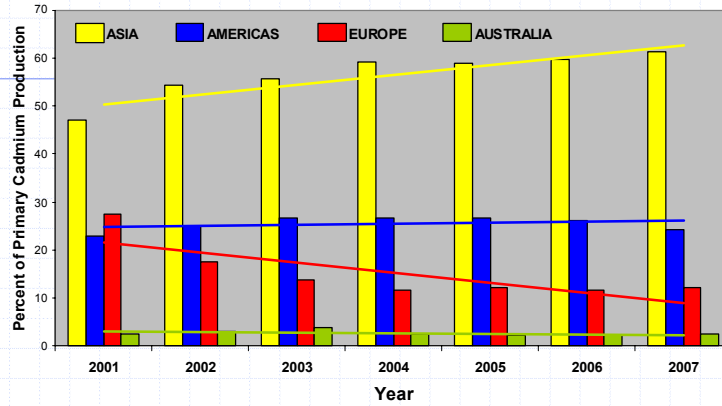


Primary Cadmium Production and Consumption, 1997 - 2007



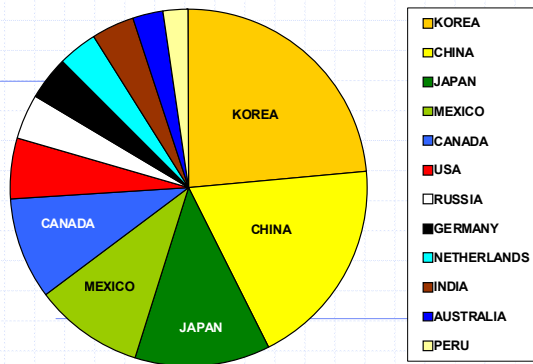
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Geographical Trends in Primary Cadmium Production



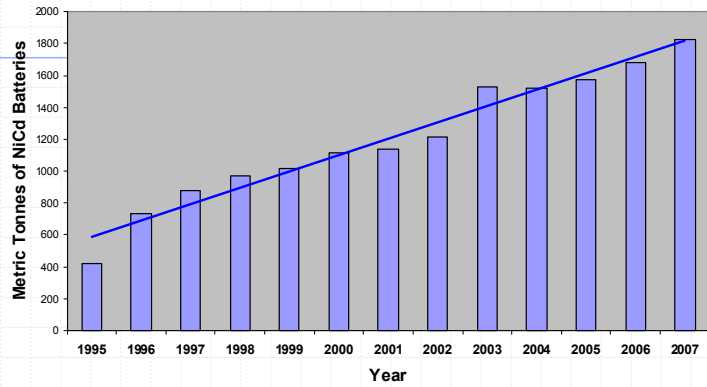
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2007 Primary Cadmium Production by Country



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NiCd Batteries Collected in USA and Canada by the Rechargeable Battery Recycling Corporation

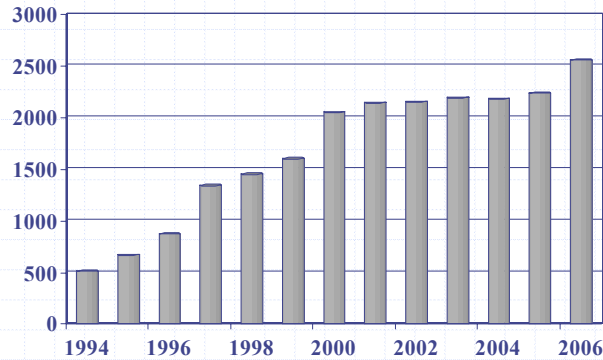


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Sealed/Portable Ni-Cd Batteries

Spent Portable Ni-Cd Batteries from European Sources collected separately and processed in Recycling Plants (15 EU MS + CH + N) - Data in Metric Tonnes per year

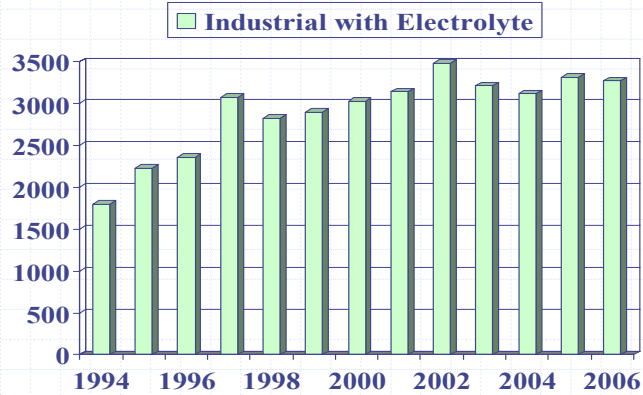


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Industrial Ni-Cd Batteries

Spent Industrial Ni-Cd Batteries from European Sources collected separately and processed in Recycling Plants (15 EU MS + CH + N) - Data in Metric Tonnes per year



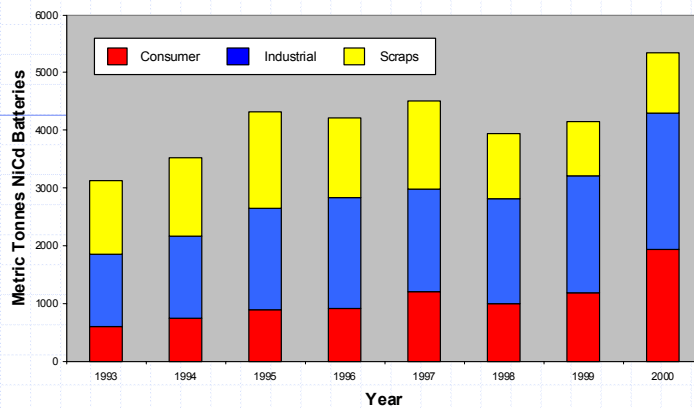
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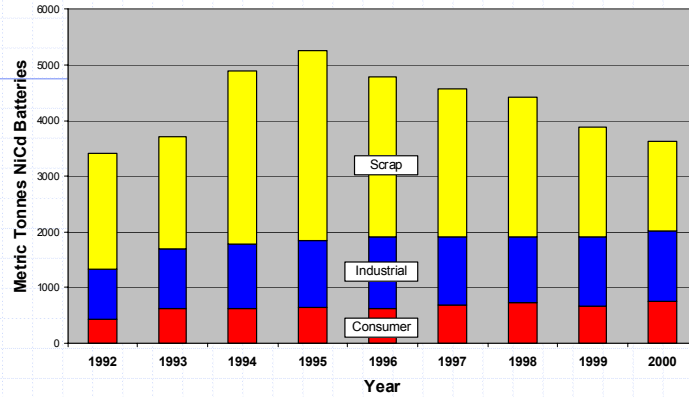
NiCd Batteries Recycled at SNAM



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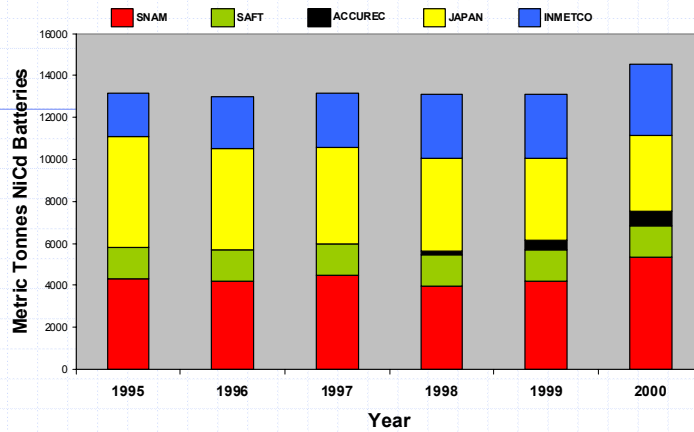
8

NiCd Battery Recycling in Japan



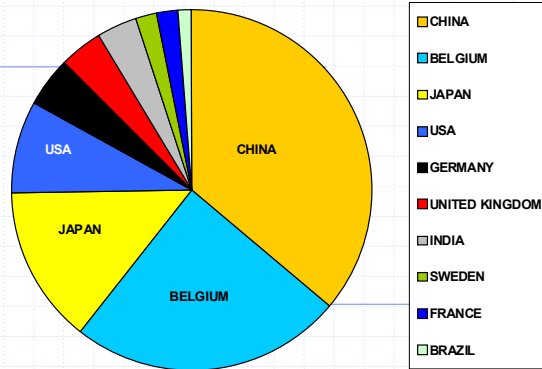
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Worldwide NiCd Battery Recycling, 1995 - 2000



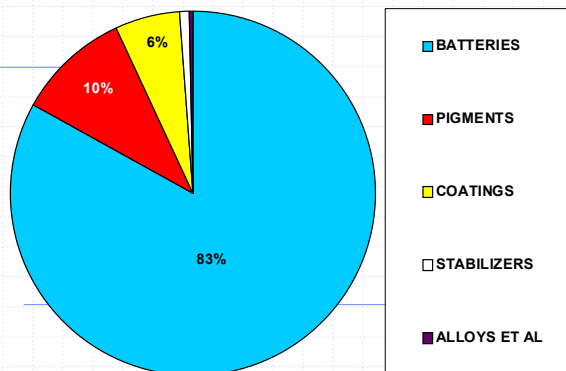
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2007 Primary Cadmium Consumption by Country



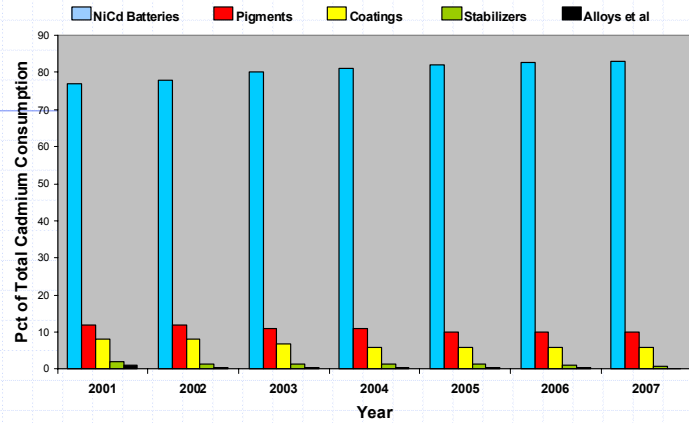
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2007 Cadmium Consumption by Applications



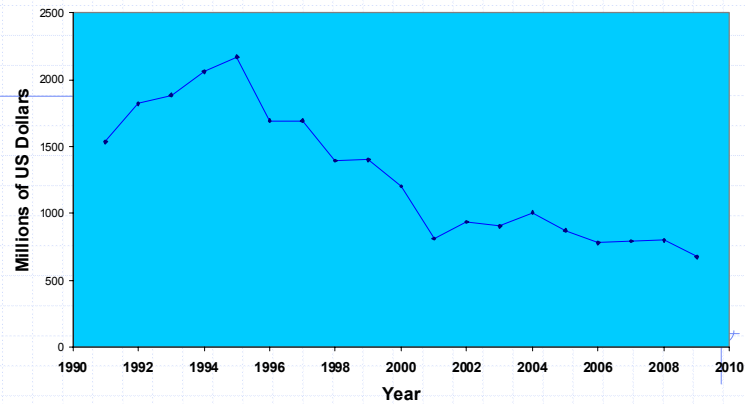
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Trends in Cadmium Consumption Patterns



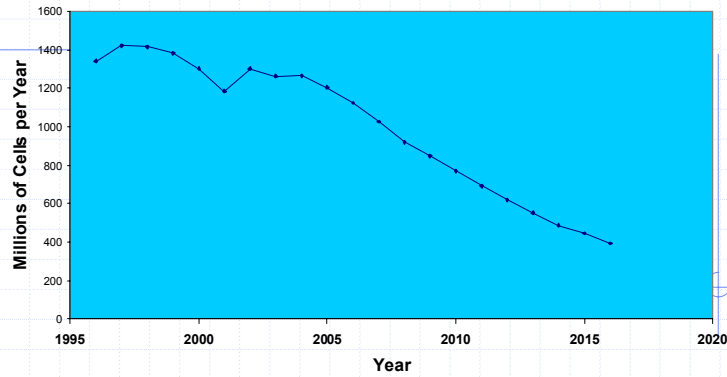
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Worldwide Portable NiCd Battery Sales, 1991 - 2009 (Data Source: Takeshita 2008)



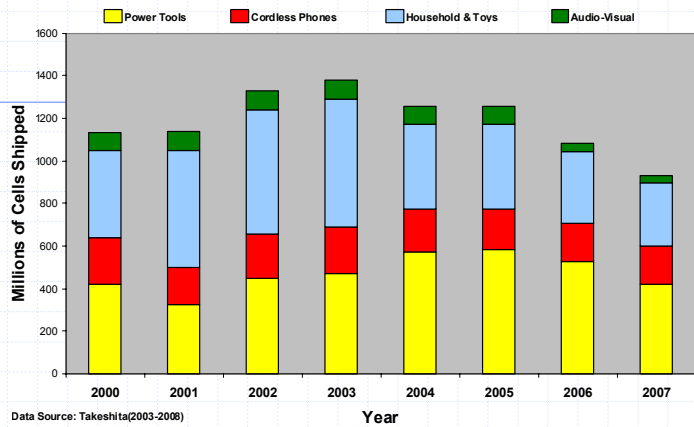
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**Portable NiCd Battery Demand Forecast,
1996 - 2016
(Data Source: Takeshita 2008)**



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Worldwide Consumer NiCd Shipments



Data Source: Takeshita(2003-2008)

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The Future of the Portable Nickel-Cadmium Battery Market

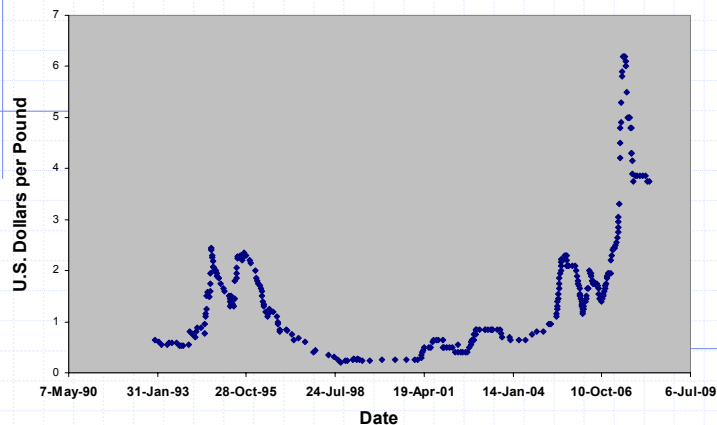
- ❑ High Nickel and Cobalt Prices Have Seriously Hurt the NiCd and NiMH Battery Markets
- ❑ Advanced Battery Chemistries in the Lithium-Ion Family Will Dominate Battery Future
- ❑ Lithium Iron Phosphate Batteries Will Be the Battery for Future Power Tool Applications
- ❑ The EU Battery Directive Has Also Had a Negative Effect on NiCd Battery Market

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Metal Bulletin 99.99% Cadmium Price, 1993-2008



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Cadmium Market Summary

- ❑ Primary Cadmium Production & Consumption are Decreasing
- ❑ Top Primary Producers are Korea, China, Japan, Mexico and Canada
- ❑ Top Primary Consumers are China and Japan
- ❑ Secondary Cadmium Production Increasing
- ❑ Top Secondary Producers are Japan, France, and USA. China Production Unknown.

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Cadmium Market Summary

- ❑ Cadmium Applications Dominated by Consumer Nickel-Cadmium Batteries, But Use Will Decrease in the Future
- ❑ Cadmium Pigments and Coatings Have Remained Steady at 10% and 6% of Total
- ❑ Cadmium Stabilizers and Alloys Applications Have Largely Been Replaced by Cd-Free
- ❑ In 2007, Cadmium Price Rose to \$6.50 per lb. and is now at \$3.50 per lb

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