

# **THE OECD PROGRAM TO PROMOTE THE COLLECTION AND RECYCLING OF NICKEL-CADMIUM BATTERIES**

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## **Abstract**

The Organization for Economic Cooperation and Development (OECD), consisting of the 30 most industrialized nations in the world, has been working for over ten years now on a program to reduce human health and environmental risks from cadmium by promotion of nickel-cadmium (NiCd) battery collection and recycling programs. Five major workshops have been convened and five OECD documents issued designed to share information, harmonize collection systems, and facilitate collection of the widely diffused portable NiCd consumer batteries.

At present, there are five major efforts underway within the framework of the OECD NiCd Collection and Recycling Program. These include:

- Publication of an OECD document reflecting experiences of Member Countries with the collection and recycling of NiCd batteries,
- Adoption of an OECD-wide common NiCd battery label to encourage and facilitate NiCd battery collection,
- Analysis of recycling rate calculations to enable harmonization of recycling rate determinations and thus allow comparison of collection systems,
- Relaxation of regulations governing the international shipment of NiCd batteries destined for recycling to facilitate and increase worldwide NiCd recycling, and
- Development of an OECD web site to allow consumers to rapidly determine where spent NiCd batteries may be taken for collection and recycling.

The OECD web site has been developed and is operational. The OECD Experiences Document has been prepared, comments have been received from Member Nations, and these comments are being incorporated into the final document by the lead countries, Canada and the United States. The OECD-wide label has been developed and is available for use by any OECD Member Nation, although the European Commission has refused to allow its adoption within the European Union. The work on the recycling rate determinations and facilitation of international shipments destined for recycling have yet to be established.

### **The OECD**

The Organization for Economic Cooperation and Development (OECD) at present consists of the 30 most industrialized nations in the world. It was formed after World War II and to some extent grew out of the United States' Marshall Plan to assist in the reconstruction of Europe after 1945. The OECD is headquartered in Paris, France, and its Member States are summarized in Table I.

**Table I. Member States of the OECD**

<b><u>European Union</u></b>	<b><u>Others</u></b>	<b><u>North America</u></b>
Austria		
Belgium	Czech Republic	Canada
Denmark	Hungary	Mexico
Finland	Iceland	United States
France	Norway	
Germany	Poland	
Greece	Slovak Republic	<b><u>Asia Pacific</u></b>
Ireland	Switzerland	
Italy	Turkey	Australia
Luxembourg		Japan
Netherlands		New Zealand
Portugal		South Korea
Spain		
Sweden		
United Kingdom		

From the political point of view, the countries of the European Union (EU) dominate the OECD with 15 of its 30 Member States. In addition, 6 of the other countries are also European although not within the EU at the present time. However, from a more practical point of view, countries such as the United States and Japan, which contribute a large share of OECD's total operating cost, exert a strong influence within the organization. Nonetheless, the importance of the EU as a voting bloc

within OECD can never be overlooked and does have an effect on the policies with which OECD moves forward.

### **The OECD Cadmium Risk Reduction Program**

During the latter half of the 1980s and the early 1990s, there was considerable activism in Europe over the perceived environmental and human health effects of cadmium. Certain countries which already had cadmium product restrictions in place promoted the view that cadmium products should be eliminated throughout the European Union and even amongst the OECD nations. In 1988, the European Council promulgated a Council Resolution on a Community action programme to combat environmental pollution by cadmium (88/C30/01 dated 25 January 1988) which proposed, inter alia, "limitations of the uses of cadmium to cases where suitable alternatives do not exist" and "collection and recycling of products containing cadmium, for example batteries." The EC Council Resolution did not express a preference for the product ban measure over the collection and recycling alternative, but it is clear that the governments of certain countries and DG Environment of the European Commission preferred product bans while industry preferred collection and recycling as preferred risk reduction options. Further, in the early 1990s, two European Commission Directives were implemented which addressed these two options. Directive 91/157/EEC required proper labeling, removability from devices and disposal of NiCd batteries while Directive 91/338/EEC placed restrictions on the marketing of certain cadmium pigments, stabilizers and coatings applications. However, neither of these Directives encouraged NiCd battery recycling, but rather encouraged cadmium product bans.

In this atmosphere within the European Union and in a European-Union-dominated OECD, it is not surprising that proposals were put forth to carry out similar measures across all OECD nations. The actual origin of the OECD Risk Reduction Programs was in an even earlier Swedish "Chemicals Sunset" Program where Swedish authorities sought to completely eliminate the use of more than 100 widely used chemicals, including metals such as nickel and cadmium and all of their compounds. Formal OECD action began in February 1990 with the adoption of an OECD Council Act, which is binding upon its Members, to develop pilot risk reduction programs on five priority substances – cadmium, lead, mercury, methylene chloride and brominated flame retardants. Each one of these pilot risk reduction programs was led by a specific country with interests in legislating against the materials in question. The lead countries for the cadmium pilot risk reduction activities were Sweden and the European Commission, both of whom had openly expressed their intentions to eliminate all cadmium products. What is remarkable is that after more than ten years, the entire OECD Cadmium Risk Reduction Program has been directed not towards the banning of

cadmium products but to recycling them. However, many years of hard work by many persons in industry, governments and OECD staff was necessary to achieve this redirection of policy.

The first document to be issued from the OECD Cadmium Risk Reduction Program was a 1990 Pilot Project Report on Cadmium. This report concluded, *inter alia*, and with specific reference to NiCd batteries, that:

- The importance of the various sources of human and environmental cadmium needed to be established in order to prioritize those of highest importance;
- It was important to establish cadmium emission trends in the environment, particularly if there was concern that they might be increasing;
- It was necessary to study and develop potential substitutes for NiCd batteries as this application was the largest and fastest growing use of cadmium;
- For NiCd battery applications where substitution was not possible, it was considered essential to develop and promote collection and recycling;
- It was also concluded that alternate energy sources besides battery power should be investigated for existing NiCd applications; and
- The cost-benefit relationships and performance trade-offs of substitutes for NiCds needed to be more thoroughly investigated.

With regard to the first priority, studies (Van Assche and Ciarletta 1992; Van Assche 1998) had already shown that cadmium products accounted for only a very small percentage (2%) of total human cadmium exposure. The largest sources were fertilizers, fossil fuels, iron and steel production, and natural emissions in that order (Figure 1). Secondly, numerous studies (IIASA 1992; Mukunoki and Fujimoto 1996) have also shown that cadmium emissions have decreased steadily since the 1970s despite increased cadmium use (Figures 2 and 3), and that the human daily cadmium intake has likewise decreased steadily since the 1960s (WHO 1992)(Figure 4). While potential substitutes for NiCds such as NiMHs and Li-ion batteries were being developed, little was being done at the time to promote the collection and recycling of NiCds or to develop alternate energy sources to replace battery power. Finally, no one then had really studied the cost-benefit relationships and performance trade-offs of substitutes for NiCds.

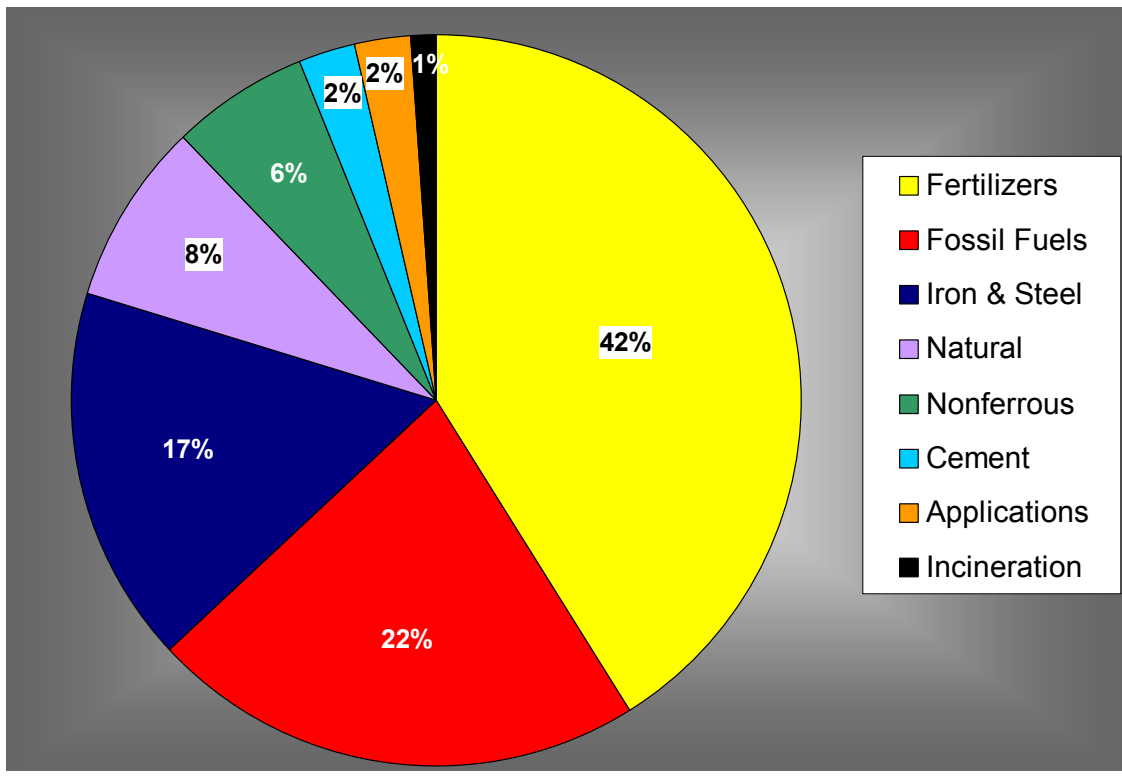


Figure 1. Sources of Human Cadmium Exposure (Van Assche 1998)

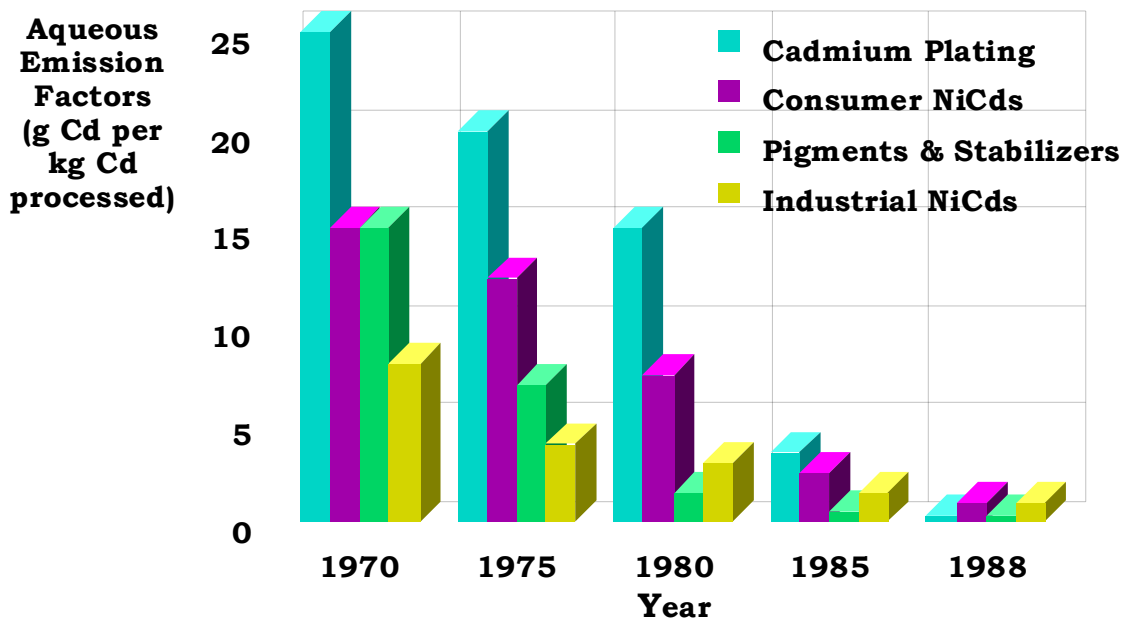


Figure 2. Aqueous Emission Factors to Rhine River Basin (IIASA 1992)

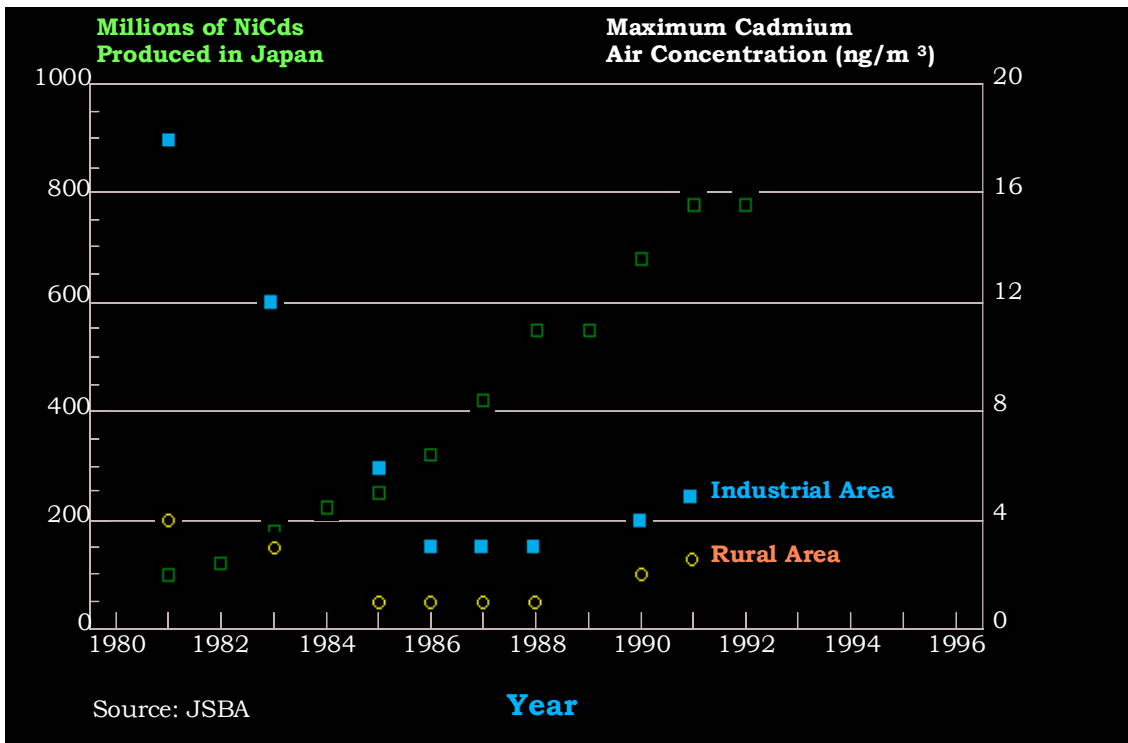


Figure 3. Maximum Cadmium Air Concentrations in Japan Compared to Production Levels of NiCd's as a Function of Time (Fujimoto 1996)

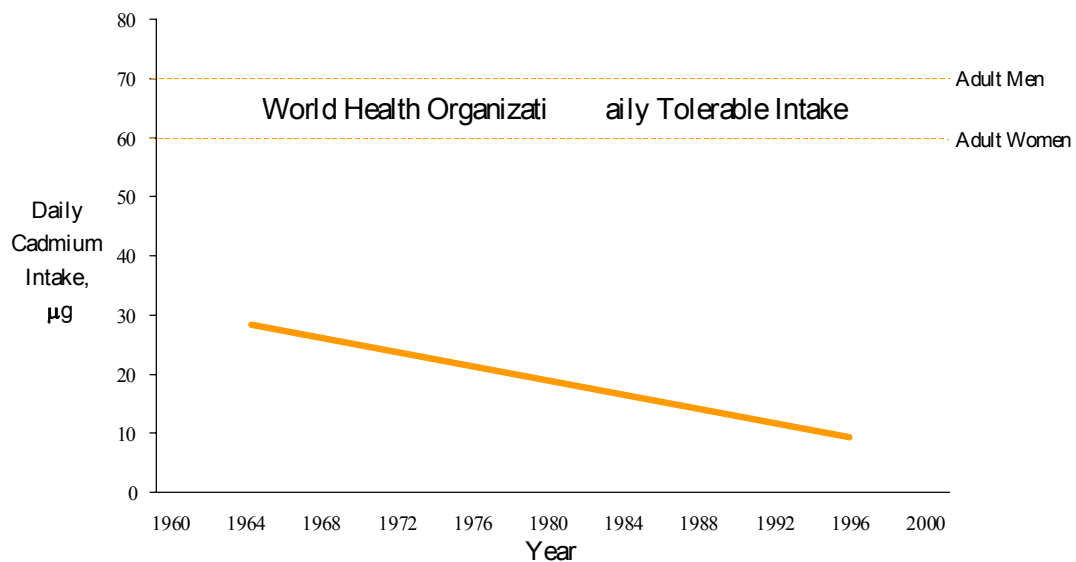


Figure 4. Daily Cadmium Intake for the General Population Compared to WHO Daily Tolerable Intake Levels (WHO 1992)

Based on this initial Pilot Project Report on Cadmium, the OECD Risk Reduction Program on Cadmium then moved forward through many iterations over the next ten years, gradually moving away from the cadmium product ban concept toward the cadmium product recycling concept. A brief chronology of the major events over those years is summarized in Table II.

**Table II. Chronology of the OECD Cadmium Risk Reduction Program**

<u>Date</u>	<u>Event</u>
June 1992	Workshop on Cadmium Risk Reduction – Bordeaux
Spring 1994	Risk Reduction Monograph on Cadmium – Paris
October 1995	Workshop on Sources of Cadmium in the Environment Part 1 (Products); Part 2 (Fertilizers) – Stockholm
September 1996	Workshop on Non-Regulatory Initiatives – Washington
September 1997	Workshop on Effective Collection and Recycling of Nickel-Cadmium Batteries – Lyon
December 1998	Workshop to Promote the Effective Collection and Recycling of NiCd Batteries – Mexico City
November 1999	Working Group on Waste Management Policy Impediments to NiCd Recycling – Cancun

In the early workshops and the 1994 monograph, emphasis was focused on total cadmium input into the environment from all sources, both natural and anthropogenic, and from both the intentional and unintentional presence of cadmium. While there was concern over NiCd batteries as the largest and most rapidly growing application for cadmium, specific efforts were not directed towards NiCd batteries until the October 1995 Workshop in Saltsjobadan near Stockholm in Sweden. This workshop represented the most serious attempts to ban NiCd batteries under an OECD program. After 1995, the OECD emphasis shifted markedly towards the collection and recycling risk management option.

### **The 1992 Cadmium Risk Reduction Workshop in Bordeaux**

The first major OECD workshop on the Risk Reduction of Cadmium was held in Bordeaux, France on June 23-25, 1992. It was hosted by France and included considerable discussion on cadmium in fertilizers, soils and uptake of cadmium by crops since France, Morocco and Algeria were all major producers and users of phosphate fertilizers. While the three-day workshop covered a wide range of issues dealing with all cadmium emission sources into the environment, their movements through various pathways, and their eventual transfer to man and terrestrial and aquatic organisms, there were only a limited number of conclusions specific to nickel-cadmium batteries.

The working group which discussed NiCd batteries came to four basic conclusions:

- Emissions of cadmium from NiCd battery production were Already well controlled by regulation and no further limitations were needed;
- Emissions of cadmium from the ordinary use of NiCd batteries was not a cause of concern, and was even desirable under controlled conditions in that cadmium was an inevitable zinc by-product. It was concluded that it was preferable to have cadmium in products than in mining wastes;
- Complete life cycle analyses would be required on NiCd batteries and their contemplated alternates before any OECD substitution policy could be adopted;
- NiCd disposal after use was the key issue, and three important conclusions were reached on this issue:
  - Effective collection systems had to be organized
  - Effective sorting technology had to be developed
  - Recycled cadmium had to be reused in products, preferably new NiCd batteries.

Most of these conclusions have been carried through the OECD efforts over the past ten years. Unfortunately, the records of the working and the conclusions from this workshop were never published as an OECD document because of changes in the administration at OECD.

### **OECD Risk Reduction Monograph No. 5: Cadmium**

During the time period from 1992 through 1994, the OECD Risk Reduction Program on Cadmium shifted its work towards the preparation of a monograph on cadmium reflecting the national policies, experiences and strategies undertaken by member states to reduce cadmium risk in their specific country. France continued to serve as the lead country on the program and all meetings between governments, industry and non-governmental organizations in the preparation of this monograph were held at OECD headquarters in Paris. It was immediately evident that individual nations had widely varying policies and attitudes towards cadmium, and the only possible conclusions were for each nation to summarize its policy and experiences. Included also in this monograph were a compilation of all of the existing regulations regarding cadmium in each OECD nation, and summaries of total environmental emissions of cadmium in each OECD nation.



It was impossible to reach any consensus regarding prohibitions on cadmium products other than to state that four countries had cadmium product restrictions in 1990 but that all other OECD nations did not. In 1991, however, the European Commission adopted Directive 91/338/EEC which placed restrictions on certain applications of cadmium pigments, stabilizers and coatings, but not on NiCd batteries. Measures to recycle NiCd batteries, either through government mandated programs or voluntary industry programs, were, however, more widespread throughout OECD nations. In Japan and the United States, voluntary industry programs had been or were being organized respectively by the Battery Association of Japan and the Portable Rechargeable Battery Association. In Europe, both national mandatory programs and voluntary industry programs existed.

### **The 1995 Workshop on Sources of Cadmium in the Environment**

The most comprehensive and largest workshop on the OECD Cadmium Risk Reduction Program was held in Saltsjobadan, Sweden, just outside of Stockholm, on October 16-20, 1995. It was hosted by Sweden and included two major sections – *Sources of Cadmium in the Environment* and *Fertilizers as a Source of Cadmium*. Each of these two major sections was then further subdivided into working group sessions which dealt with specific aspects of each major section. One of the working groups in the section on sources of cadmium in the environment was on Batteries, Accumulators and Coatings. At the conclusion of the Workshop, a Working Group Meeting of the OECD national representatives and the OECD Business and Industry Advisory Committee (BIAC) was held to develop the conclusions from the Workshop and to recommend further steps to be taken.

Approximately 60 papers were presented at the Saltsjobadan Workshop along with the conclusions from approximately one dozen working group sessions, all of which were published by OECD in two bound volumes. These proceedings are available from OECD or may be obtained online from the OECD website ([www.oecd.org](http://www.oecd.org)). While there were many points of view expressed and conclusions drawn, those of interest to the NiCd battery industry from the battery working group essentially were:

- No scientific linkage could be established between landfilled NiCd batteries and human exposure to either cadmium or nickel;
- No general agreement could be reached on whether NiCds in the waste stream were a major environmental concern;
- More scientific information was required on the potential

long-term leaching of cadmium and nickel from landfilled NiCd batteries; and

- Any proposed restrictions on NiCd or other chemistries would require consideration of international trade implications.
- Transboundary cadmium air pollution was discussed as a potential problem if incineration of NiCd batteries were utilized on a large scale in the future. It did not appear to be a problem at present, air emission control technology was judged to be adequate, and any potential problem depended upon the extent to which incineration was used.
- Four risk management options were discussed for NiCd batteries – recycling, substitution, stockpiling cadmium after removal from zinc ore, and relegation of cadmium to a limited number of specific markets, e.g. industrial batteries.

Of the four risk management options discussed, only recycling and substitution received widespread support. Arguments supporting the substitution alternative included low collection and recycling rates and the need to develop more widespread and effective collection systems. Positive factors for the recycling option included the recovery of valuable natural resources, the existence of adequate recycling capacity, and the reduction in the amount of cadmium entering the waste stream. It was also agreed that life cycle analyses would be required on NiCd batteries and all of its potential substitutes before any substitution programs could be further considered. It was also noted that substitution efforts would have a negative economic impact on collection and recycling efforts, that substitution for NiCd batteries was not possible in all cases, and that considerable uncertainties remained regarding questions of mixed battery markets, mixed battery recycling, and the final disposal of cadmium wastes from zinc production if it is not utilized in cadmium products.

Following the Saltsjobadan Workshop, a Working Group Meeting of the OECD national representatives was held to consider the results of the Workshop and to make recommendations for further work on the OECD Risk Reduction Program. With regard to cadmium products, there were three principal recommendations made, two of which were carried forward into future programs:

- Establish the long-term fate of cadmium in landfills to determine the extent of leaching from waste products into groundwater and soil. Undertaken by Switzerland.

- Life cycle analyses should be applied to substitution proposals for any battery chemistries.
- OECD should facilitate the exchange of information from governments and industry regarding the collection and recycling of NiCd batteries.

The first recommendation was carried out under a study performed by the University of Berne for the Swiss environmental authorities. Municipal solid waste landfill leachate data for cadmium was gathered from around the world and compiled into one report. It was reported that 90% of the leachate from these landfills, some of which were unlined and as much as 50 years old, passed the WHO cadmium drinking water standard of 3 micrograms per liter. With regard to the second recommendation, there have been a number of life cycle analyses performed on NiCd batteries and their potential substitutes, but most are only partial life cycle analyses which inherently involve many assumptions and OECD has never launched a formal program to carry out the second of the three Saltsjobadan recommendations. The third recommendation, to facilitate the exchange of information concerning NiCd battery collection and recycling, has, however, been actively carried forward, and the OECD Cadmium Risk Reduction Program has, in fact, been transformed into the OECD NiCd Battery Collection and Recycling Program.

### **The 1996 Workshop on Non-Regulatory Initiatives**

The first step forward in implementing the third recommendation from Saltsjobadan was an OECD Workshop on Non-Regulatory Initiatives for Chemical Risk Management, sponsored by the governments of the United States and Canada, and held in Crystal City, Virginia, USA on September 10-12, 1996. The emphasis of the workshop was on managing chemical risks through non-regulatory initiatives such as voluntary industry programs rather than by government regulation. One such voluntary program which was reported at the workshop was the voluntary NiCd battery program in the United States. The Portable Rechargeable Battery Association (PRBA) and the International Cadmium Association (ICdA) jointly presented a paper entitled "Reducing Cadmium Risk in the United States through an Industry-Sponsored Nickel-Cadmium Battery Collection and Recycling Program," by Norman England (PRBA), David Weinberg (counsel to PRBA) and Hugh Morrow (ICdA).

This presentation was a detailed description of the PRBA/RBRC NiCd battery collection and recycling program in the United States, and a thorough discussion of the benefits of the non-regulatory rather than the mandatory approach to achieve reduced cadmium risk to human health and the environment. One of the major conclusions from the

workshop was that OECD should provide a forum for expanding on-going non-regulatory initiatives, specifically citing the NiCd battery industry collection and recycling efforts in Canada, Japan and the United States. It was also at this meeting that the government of Mexico specifically approached industry and asked for further involvement in existing industry NiCd collection and recycling programs, and began their active involvement in such programs at the OECD level. The Crystal City Workshop then led in rapid succession to the 1997 Lyon Workshop, the 1998 Mexico City Workshop, and the subsequent work to implement the recommendations developed in Mexico City.

### **The 1997 Workshop on Effective Collection and Recycling of NiCd Batteries**

To further implement the third Saltsjobadan recommendation and one of the Crystal City recommendations, the governments of Australia, Canada, Japan, Mexico, and the United States, in conjunction with industry, sponsored a Workshop in Lyon, France on September 23-25, 1997, entitled "The Effective Collection and Recycling of Nickel-Cadmium Batteries." The main objective of this workshop was to provide an opportunity for governments and industry to share a wide range of experiences with NiCd battery collection and recycling programs, and to identify those provisions, including cost-benefit factors, that are most likely to be found in successful programs as well as those most likely to inhibit success. The main focus of the meeting was on improving collection and recycling rates, and not on the risks associated with NiCd batteries or on the substitution for NiCd batteries.

From the more than 20 presentations and discussion groups, the following were judged to be necessary elements for a successful collection and recycling program:

- The program must be easy for a motivated consumer to understand and use;
- Public information programs should:
  - Motivate more consumers to recycle
  - Instruct motivated consumers on how to recycle;
- Environmental regulations might have to be revised to facilitate collection, transport, storage and recovery of materials from NiCd batteries;
- A uniform OECD-wide battery labeling system;
- Improved and cost-effective battery sorting technology;

- Costs of total collection and recycling system should be financed using a pre-payment system built into the cost of the product;
- Consistent and flexible recycling rate calculation methods must be developed and utilized throughout OECD to measure the success of recycling programs.

Based on the success of the Lyon Workshop, OECD's Advisory Group on Risk Management (AGRM) requested that the proceedings of the workshop be published as an OECD report. In addition, some governments reported that the results of the Lyon Workshop had been a catalyst for change in their own countries regarding the establishment or improvement of NiCd battery collection and recycling programs. Mexico offered to host a workshop in 1998 to carry forward the work recommended at Lyon, and Australia, Canada, Mexico, the United States and BIAC agreed to form a steering group to plan out the objectives and logistics of a 1998 OECD Workshop in Mexico City.

### **The 1998 Workshop to Promote the Effective Collection and Recycling of Nickel-Cadmium Batteries**

The OECD Workshop to Promote the Effective Collection and Recycling of Nickel-Cadmium Batteries was convened in Mexico City on December 8-10, 1998 with the government of Mexico acting as the host. The emphasis of this workshop was to develop concrete steps to improve the collection and recycling of NiCd batteries throughout OECD countries. Many on the Workshop Steering Group also felt it was important to take the precedents developed for NiCd batteries in OECD nations and to eventually extend them to all battery chemistries in all nations, particularly developing nations which might not have the expertise to establish collection and recycling systems on their own.

The original recommendations of the OECD Advisory Group on Risk Management in February 1998 had been to advance the four main recommendations from the 1997 Lyon Workshop:

- Guidelines on how to establish a successful recycling program;
- An OECD-wide harmonized label to facilitate NiCd collection;
- OECD-wide recycling rate calculation methodology;
- Information on financing NiCd collection and recycling programs.

A Steering Committee consisting of representatives from the governments of Australia, Canada, Mexico and the United States, and industry representatives from the Battery Association of Japan, the Portable Rechargeable Battery Association, and the International Cadmium Association developed the program and the proposals to

implement each of these four recommendations. These four proposals were subsequently condensed into three documents when an overall Guidance Document, later dubbed an “Experiences Document,” was developed which incorporated both the first and fourth recommendations into one proposal. The OECD-wide battery label was developed based on existing battery labels in use by industry in Japan, Europe and North America and consistency with existing international regulations. The proposed recycling rate calculation methodology was based essentially upon methods proposed by PRBA and BAJ, but at that time did not include the “hoarding” or “home storage” factors which are now recognized by everyone as necessary to establish accurate recycling rates.

In addition, a number of case studies were presented for the workshop to consider as background for the modification and adoption of these three proposals. These included presentations by Ken Money from INMETCO, Francois Linck of SNAM, Kinya Fujimoto of BAJ, Norm England of PRBA, Martin Hake of EPBA, Ray Sempels of ICdA and Jean-Pol Wiaux of Titalyse.

**Experiences Document** - The proposed Experiences Document contained three major sections and two annexes:

- Collection Systems
- Recycling Systems
- Financing Arrangements
- Annex I – Technical Details of Recycling Systems
- Annex II – Bibliography on NiCd Battery Recycling

Discussion on the Experiences Document during the workshop led to an increased emphasis on the importance of international regulations (i.e. the Basel Convention) governing the transboundary movement of battery wastes intended for recycling. Accordingly, the workshop included a recommendation for regulatory relaxation or exemption from some transboundary requirements in order to facilitate NiCd battery recycling.

**OECD-Wide NiCd Label** - One of the most interesting and more contentious discussions was on the type of OECD-wide label to adopt for NiCd and possibly other types of rechargeable batteries. The initial recommendation of the Steering Committee was to adopt a recycling symbol, but not the Mobius Loop because of conflicting regulations within different international organizations, confusion over what the symbol actually meant, and a general concern amongst some regulators over false “green” claims. After considerable debate, a label was approved by the workshop which identified the battery chemistry, indicated the recycling program under which the battery would be

collected, provided the necessary contact information, and complied with applicable national or regional (e.g. EU) regulation. The proposed OECD battery label is shown in Figure 5.



**Figure 5. Proposed OECD-Wide NiCd Battery Label**

The Mobius Loop was adopted as the most universally and consistently well-known symbol to indicate recyclability. A crossed-through roll-out trash container was added to comply with EU regulation and to advise consumers that NiCd batteries should not be disposed of in ordinary municipal solid waste. A lime-yellow (Pantone 389C or equivalent) color along with the symbol "Ni-Cd" were chosen to be consistent with the BAJ and RBRC schemes to identify battery chemistry. In discussions amongst

the Steering Committee subsequent to the Workshop, it was decided to recommend the Mobius Loop and crossed-through roll-out trash container side-by-side rather than placing the three chasing arrows around the trash container.

**Recycling Rate Calculation Methodology** – The recycling rate calculation methodology was based largely on the methods established earlier by PRBA in the United States and BAJ in Japan. It was quickly realized that the service lives of NiCd batteries needed to be increased because of sizeable fraction of these batteries, especially the consumer NiCds, may be retained for many years after their normal service life. This “hoarding factor” is now being utilized in the recycling rate calculations of RBRC in the United States and Canada, BAJ in Japan, and CollectNiCad in Europe. Alternate methodologies were also presented based upon the amounts of cadmium present in NiCd batteries in municipal solid waste compared to the amounts of NiCd batteries recycled rather than the amounts consumed in the past compared to the amounts recycled. Industry has had lengthy discussions on these two methods and no firm consensus has emerged on the most accurate method. OECD developed considerable interest from both governments and industry on serving on a working group in this area, but as yet no formal meetings of this working group have been convened.

**OECD NiCd Battery Recycling Website** – One of the recommendations from the Mexico City workshop was to establish an OECD Information Network, preferably a web site or toll-free telephone numbers, whereby consumers could obtain information on how and where to recycle their spent NiCd batteries. OECD's “Directory of Nickel-Cadmium Battery Collection Facilities” is currently operational and may be accessed at <http://www.oecd.org/ehs/NiCd/index.htm>. Under the flag of each OECD nation, an organization, name, address, phone, facsimile and e-mail are listed from which further information may be obtained. In some cases, e.g. RBRC in the United States, the consumer may link directly into the data base, enter his postal code, and receive the names of all of the nearest NiCd battery collection sites. CollectNiCad in Europe also now has a similar website listing all NiCd battery collection facilities in Europe.

**Transboundary Movement of NiCds for Recycling** – In order to carry forward the concept of easing transboundary regulations within OECD nations to facilitate NiCd battery recycling, the Mexico City workshop recommended that this conclusion be brought to the attention of the OECD Joint Chemicals Committee and Working Party on Chemicals meeting in June 1999 in Paris for further action. At that meeting, it was decided that the NiCd industry would be invited to make a presentation on this issue at the November 1999 meeting of the OECD Working Group on Waste Management Policy (WGWMP) in Cancun, Mexico. Such a presentation was made on behalf of industry at that meeting by David



Weinberg, counsel for the Portable Rechargeable Battery Association. Although well received and subsequently discussed in more detail at later WGWP meetings in Prague and Vienna in 2000, this initiative has not been carried forward as far it might have been, partially because of reorganization within OECD and partially because of governments' desire to extend the scope to more than one battery chemistry.

### **Present Status of the OECD Program to Promote the Collection and Recycling of Nickel-Cadmium Batteries**

At the present time, the five parts of the OECD program on NiCd battery collection and recycling are in various stages of completion, on-going activity or dormancy. The Experiences Document has been through many revisions based upon comments received from OECD member nations, mainly within the European Union. Canada along with the United States is now working to resolve those comments and produce a document acceptable to all. However, there is also a constant need to update and revise the document as more information is developed, and the more time taken to resolve comment necessarily makes the document more out-of-date. The original draft of the Experiences document was drafted in 1998 and revised in 2000. It is now 2002 and additional information will have to be incorporated to ensure that the Experiences Document is still relevant.

The OECD-wide battery label was rejected by the European Commission in spite of general acceptance by almost all other OECD nations, including many within the European Union itself. Thus, the formal position adopted by the OECD was that any OECD nation was free to adopt the agreed-upon label should it wish to do so, and the European Commission was asked to reconsider its position at some time in the future if it were able to do so.

The OECD website on NiCd battery collection sites is operational and is being updated as required. However, the work on recycling rate calculations and transboundary movement of NiCds intended for recycling has not moved forward as hoped. It is expected that the Experiences Document will be issued in the not-too-distant future, and that eventually it may be possible to develop an OECD-wide, even a worldwide, NiCd battery label to improve collection and recycling rates. There is also no doubt that agreement upon OECD-wide recycling rate calculation methodology would be a valuable tool in distinguishing and promoting those collection and recycling systems which work from those that don't. Finally, revisions in the international regulations governing transboundary shipments of NiCds intended for recycling would seem to be absolutely necessary in order to develop a more global approach to worldwide NiCd battery recycling. NiCd batteries are used throughout the world, and therefore must be collected and recycled throughout the

world. Yet, small recycling facilities in every OECD nation is not the most economical system to ensure worldwide recycling. Therefore, regulations must be tailored to allow the shipments from smaller countries to large and economical recycling facilities in other countries.

### **The Future of the OECD NiCd Recycling Program**

The official OECD stance towards nickel-cadmium batteries has changed substantially since the initiation of the Cadmium Risk Reduction Program in 1990. After more than ten years, the program has become one to promote the collection and recycling of NiCd batteries rather than one to ban all cadmium-containing products. It is anticipated that some of the measures proposed and introduced such as the OECD-wide label, uniform recycling rate calculation methodologies, information dissemination, and relaxation of regulations governing transboundary movements of NiCds intended for recycling will all help to improve NiCd battery collection and recycling in the years ahead. One hundred years ago, only a very small percentage of lead was recycled. Today it is over 75% of all uses, and over 90% of the lead used in automotive batteries, its principal use. In the cadmium market which today is dominated by the completely recyclable NiCd battery, a similar growth could be expected in the production of recycled cadmium, and indeed we are already seeing strong growth in the amount of cadmium produced from secondary or recycling sources. The OECD Nickel-Cadmium Battery Collection and Recycling Program is helping to achieve that goal and to help manage any risk from cadmium in nickel-cadmium batteries.

### **References**

IIASA 1992: Elgersma, F., Anderberg, B.S., and Stigliani, W.M., "Emission Factors for Aqueous Industrial Cadmium Emissions in the Rhine River Basin; A Historical Reconstruction for the Period 1970-1988," *Edited Proceedings Seventh International Cadmium Conference – New Orleans*, Cadmium Association (London), Cadmium Council (Reston, VA), International Lead Zinc Research Organization (Research Triangle Park, NC).

Mukunoki and Fujimoto 1996: Mukunoki, J. and Fujimoto, K., "Collection and Recycling of Used Ni-Cd Batteries in Japan," *Sources of Cadmium in the Environment*, Inter-Organization Programme for the Sound Management of Chemicals (IOMC), Organisation for Economic Cooperation and Development (OECD), Paris.

Van Assche 1998: Van Assche, F.J., "A Stepwise Model to Quantify the Relative Contribution of Different Environmental Sources to Human Cadmium Exposure," *Proceedings of the 8<sup>th</sup> International Conference on Nickel-Cadmium Batteries - Prague*, International Cadmium Association, Brussels.

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Van Assche and Ciarletta 1992: Van Assche, F.J. and Ciarletta, P., "Cadmium in the Environment: Levels, Trends and Critical Pathways," *Edited Proceedings Seventh International Cadmium Conference – New Orleans*, Cadmium Association (London), Cadmium Council (Reston, VA), International Lead Zinc Research Organization (Research Triangle Park, NC).

WHO 1992: World Health Organization, *Environmental Health Criteria 134 – Cadmium*, International Programme on Chemical Safety (IPCS) Monograph, Geneva.