Issues Paper —
Dental Amalgam Use, Separation & Recycling In Australia

An overview of dental amalgam safety, pollution, collection and recycling in Australia in the context of the United Nations Environment Program developing a globally binding treaty on the use of mercury.

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Abbreviations in this report

ADA Australian Dental Association
ADIA Australian Dental Industry Association
AiGroup Australian Industry Group
ARTG Australian Register of Therapeutic Goods
EU European Union
EPA Environmental Protection Agency
FDI World Dental Federation (Fr. Fédération Dentaire Internationale)
IDM International Dental Manufacturers (association)
INC Intergovernmental Negotiating Committee (UN)
ISO International Standards Organisation
NHMRC National Health & Medical Research Council
NPI National Pollution Inventory
SCENIHR Scientific Committee on Emerging and Newly Identified Health Risks (EU)
TGA Therapeutic Goods Administration
UNEP United Nations Environment Program
US-ADA American Dental Association
Executive Summary

As negotiations continue under the auspices of the United Nations Environment Program (UNEP) to progress an effective international agreement to reduce and eliminate mercury emissions in the environment, the Australian Dental Industry Association (ADIA) takes this opportunity to highlight current arrangements associated with the continued use, capture, storage and recycling of dental amalgam, a tooth restorative material, that contains approximately one-half mercury.

In noting concerns expressed in some quarters about possible adverse patient outcomes associated with the use of dental amalgam, ADIA notes that it relies upon the expertise and guidance of the relevant professional bodies representing the dental profession. In this respect, ADIA accepts the views of the National Health and Medical Research Council (NHMRC), the Australian Dental Association (ADA) and the World Dental Federation (FDI) which have all issued definitive statements, backed by research, that dental amalgam is a safe and highly effective restorative material.

Notwithstanding the aforementioned position concerning the relative safety of dental amalgam, ADIA acknowledges that dental amalgam waste generated by dental practices represents a real source of mercury pollution in the environment. Accordingly, ADIA supports the rapid installation of equipment that separates dental amalgam waste from wastewater produced by dental practices. The demonstrated ability to collect this waste and recycle the mercury in an environmentally sustainable fashion highlights that it is possible to permit the continued use of dental amalgam without increasing mercury pollution.

Significantly, under the leadership of the ADA Victorian Branch, a program was instituted to encourage dental practices to install amalgam separators. This pioneering initiative demonstrates what can be achieved when the dental industry and dental profession come together and work collaboratively to progress shared objectives.

ADIA supports a closed-loop approach to the continued use of amalgam insofar as its supply should be subject to appropriate controls and optimally, where dental practices install amalgam separators that permit the subsequent recycling of the mercury. It is this position that ADIA has encouraged the Australian Government to progress as it participates in negotiations through the UNEP to develop a global legally binding instrument on mercury.

Troy Williams AFAIM MAICD
Chief Executive Officer
Australian Dental Industry Association

June 2012
Dental Amalgam In Australia

Dental amalgam is a commonly used dental restorative material for dental fillings that was first used in Europe during the early 1800s and continues in use today. Historically, dental amalgam has been used to restore the function and integrity of missing tooth structure that occurs as a result of caries (also known as tooth decay or a cavity) or external trauma. The attractiveness of dental amalgam as a tooth restorative material stems from its low cost, ease of application, strength and durability. Dental amalgam is a mixture of mercury with at least one other metal.

**Constituent components of dental amalgam**

The European Union’s (UN) Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) notes that dental amalgam is an alloy of mercury with one or more other metals. Most dental amalgams are called silver amalgams since silver is the principal constituent that reacts with mercury. The kinetics of reactions between mercury and silver are not appropriate for clinical use, so that the silver is provided as an alloy with other elements. There are several types of dental amalgam alloy, all involving tin and most having some copper and, to a lesser extent, zinc. Some of the dental amalgam alloys themselves contain a little mercury to facilitate the amalgamation reaction. A conventional dental amalgam alloy will contain between 67% and 74% silver, with 25-28% tin, and up to 6% copper, 2% zinc and 3% mercury. The so-called dispersion type amalgam alloys have around 70% silver, 16% tin and 13% copper. A further, quite different, group of amalgam alloys may contain up to 30% copper, and are known as high-copper content amalgam alloys. In addition, again being very different, so-called copper amalgams which contained approximately 30% copper and 70% mercury were once used, but these are no longer recommended.

The amalgam alloys are mixed with mercury before clinical placement at a one to one weight-ratio. The mercury content of a finished dental amalgam restoration is therefore approximately 50% by weight.

**Preparation of dental amalgam**

In the Australian context, dental professionals prepare dental amalgam using “off the shelf” kits in the form of a capsule containing both the powder and the mercury. This capsule is listed on the Australian Register of Therapeutic Goods (ARTG), a register of medical devices maintained by the Therapeutic Goods Administration (TGA), as a Class IIa medical device. The capsule is inserted into a mixer, in itself a Class I medical device, which blends the constituent materials into a paste suitable for application.

In contemporary dental practice it is virtually unheard of for a dental professional to source the materials separately (*i.e.* the mercury and the other alloy materials) then mix the materials by hand. The absence of a separate listing for mercury on the ARTG also suggests that this practice has discontinued. The ADA supports the use of dental amalgam in capsule form, noting:

*The use of bulk elemental mercury also referred to as liquid or raw mercury is not recommended for use in dental clinics. Instead, precapsulated amalgam alloy should be used*

ADA Policy Statement 5.15: Amalgam waste management
Australian Dental Association (November 2007)
It is appropriate to note that the availability of pre-prepared capsules containing all of the ingredients has reduced the demand for mercury in dentistry. This is because the capsules contain the exact ratio of mercury to alloy ingredients in a known quantity, thus reducing wastage (and as a direct consequence mercury waste as a by-product) that once occurred as a result of preparing the amalgam by hand.

**Australian sources of dental amalgam**

Advice available to ADIA indicates that there are two active primary suppliers of dental amalgam in Australia, these being SDI Limited (based in Melbourne) and Kerr Australia (based in Sydney). An Australian manufacturer, SDI produces its own dental amalgam which is reflected on the ARTG entry for their product. Kerr Australia imports its products from the United States of America.

The ARTG lists other suppliers of dental amalgam, and also the alloy powder sans mercury. ADIA has contacted the sponsors associated with these ARTG entries and we are advised that these are historical / legacy entries, with these products no longer supplied to the market and the entries retained simply for regulatory compliance purposes.

It is noted that use of dental amalgam is decreasing in Australia due to the success of dental and oral healthcare programs in addition to the use of alternative restorative materials. In reviewing the use of dental amalgam in dentistry, the NHMRC observed that:

*Dental amalgam restorations are now a minority of all restorations provided (28.0% in 1997/98). Total numbers of dental amalgam restorations or surfaces restored with dental amalgam have decreased dramatically in children and young adults and somewhat less in middle-aged adults. This reduces the total number of years that such restorations could be present in a person's lifetime. However, improvements in oral health in middle-aged adults have been less marked and the number of restorations placed has remained reasonably constant. Increased tooth retention has actually increased the number of restorations present and required in older adults.*

ADIA has considered whether there is an ongoing need for dental amalgam and on this matter relies upon the ADA for expertise. Advice from the ADA is that the use of alternative materials such as resin composites is increasing, in rough proportion to the decrease in the use of amalgam. However, amalgam continues to be the material of choice as there is not a directly comparable, metallic material nor other material available at the same relatively low cost as amalgam.
Safety Of Dental Amalgam

As an industry association, ADIA itself does not provide policy advice or guidance concerning patient treatment options, such issues falling within the purview of representative bodies for dentists and allied oral healthcare professionals. Consistent with this approach, ADIA relies upon advice of the Australian Government, the ADA and other reputable bodies with an interest in dental care for guidance on matters associated with the use of dental amalgam.

Regulation of dental amalgam products

For regulatory purposes, dental amalgam is considered a medical device with ADIA and ADA sharing a common position that it is the role of the regulator for medical devices, the Therapeutic Goods Administration (TGA), to determine the relative safety of dental product. The Therapeutic Goods Act (Cth) 1989 establishes the regulatory framework for the supply of medical devices and the TGA notes that:

Regulatory systems are intended to ensure a high level of protection of public health and safety. Public trust and confidence in medical devices and in the administrative systems by which they are regulated are based on the safety and performance of devices throughout their life cycle.

Australian Regulatory Guidelines For Medical Devices
Therapeutic Goods Administration (May 2011).

In undertaking its regulatory roles, the TGA adopts a risk management approach by identifying, analysing, evaluating and treating the risks posed by medicines, medical devices, chemicals, gene technology, blood, blood products and tissues. In this context it is noted that there are several entries for dental amalgam on the ARTG.

The NHMRC is an agency of the Australian Government and the nation’s leading expert body promoting the development and maintenance of public and individual health standards. In an information brochure entitled Dental Amalgam – Filling You In the NHMRC advises:

In recent years, concerns have been raised about dental amalgam because it contains mercury, a substance that at high levels can be harmful to human health. Media stories and websites have fuelled these concerns, but they are sometimes based on inaccurate information. Repeated worldwide reviews of the scientific evidence have been unable to link the use of dental amalgam directly with ill health.

Dental Amalgam – Filling You In
National Health & Medical Research Council (October 2002)

ADIA also respects the ADA as an authoritative source of professional advice concerning the safety of restorative materials given its commitment to encourage the improvement of the oral and general health of the public, promote the ethics, art and science of dentistry and support members to provide safe, high quality professional oral care. The ADA has noted that dental amalgam has been used as a restorative material for more than one hundred and fifty years and in so doing notes:

It has provided to be a durable, safe and effective material which has been the subject of extensive research over this time.

ADA Policy Statement 6.18: Safety of dental amalgam
Australian Dental Association (November 2010)

At an international level, the relative safety of dental amalgam has been reaffirmed by the FDI which has stated:
Amalgam is a safe and highly effective restorative material. To maintain and protect global public health, a phase down of amalgam will be only appropriate when an alternative and suitable restorative material is available.

FDI General Assembly Resolution
World Dental Federation (September 2010)

In determining its position the FDI has acknowledged because dental amalgam contains mercury, concerns have been raised with respect to its potential effect on the individual patient, the dental surgery personnel and the environment. In its policy statement on the safety of dental amalgam, the FDI recognises that dental amalgam releases very small amounts (nanograms) of mercury, some of which is absorbed by the body and that the the level of urinary mercury is positively correlated with the number of amalgam restorations, but can also be affected by sources other than amalgam. However, the FDI policy also notes that:

There is no evidence to support an association between the presence of amalgam restorations and chronic degenerative diseases, kidney disease, autoimmune disease, cognitive function, adverse pregnancy outcomes or any non-specific symptoms.

FDI Policy Statement: Safety of dental amalgam
World Dental Federation (October 2007)

Notwithstanding that the NHMRC, the ADA and the FDI have asserted the relative safety of dental amalgam as a restorative material, there is a limited public debate asserting that restorations containing dental amalgam should be removed from a patient. The New South Wales State Government has considered this view and determined that:

No conclusive, scientific validated evidence currently exists to justify the removal of dental amalgam restorations to relieve certain systemic symptoms or treat particular medical conditions (other than proven allergy).

NSW Health Protocols: Amalgam clinical use and waste management
New South Wales Department of Health (February 2011)

There is not universal agreement on the relative safety of dental amalgam and there is an active "anti-amalgam" lobby dedicated to achieving an immediate ban on the use of dental amalgam. On balance, ADIA accepts the advice tendered by the NHMRC, ADA and FDI due the reliance of those organisations on scientific and clinical data. It has been observed that this is often not the case when reviewing publications produced by the “anti-amalgam” lobby:

This literature can be generally distinguished from scientific research and reviews because it tends to support a dogmatic and rigid view of the deleterious effects of amalgam restorations on health as an overriding premise and propounds this view in an almost obsessive, even hysterical manner. There is a general condemnation of the dental profession and an almost religious deference to obscure tests and authorities. It is unfortunate that the anti-amalgamists suffer to an even greater degree from the blinkered view which they (with some justification) attribute to the dental and medical scientific establishments.

Amalgam restorations and mercury toxicity
Dr Peter O Sheridan – MDS Candidate, University of Sydney (1991)

It is important to note that as a matter of policy, ADIA itself is agnostic about the continued use of amalgam in contemporary dentistry. However, based upon ADA Policy Statement 6.18 which states that dental amalgam should continue to be available as a dental restorative material, NHMRC research and FDI policy, ADIA accepts its continued use. At such time that the NHMRC and / or the ADA revise their position, ADIA’s policy will be reviewed.
Dental Amalgam As A Pollutant

Although the NHMRC, ADA and the FDI have affirmed and reaffirmed the relative safety of dental amalgam as a restorative material, it is noted that it represents a significant source of pollution, particularly in waterways, when removed from the body as part of dental restorative work. In this respect it is important to note there are two issues; the first is the relative safety associated with dental amalgam in-situ and the second the very real risk of dental amalgam as a pollutant when it is released into the environment, whether via the wastewater system or other means. ADIA recognises that dental amalgam containing mercury is a pollutant:

_The Australian Dental Industry Association (ADIA) notes that the discharge of wastewater containing dental amalgam is a major source of mercury pollution and consequently the dental industry is committed to dental amalgam capture and recycling efforts._

ADIA Policy Statement: Dental amalgam capture and recycling
Australian Dental Industry Association (August 2010)

Although there have been limited Australian studies to determine the amount of mercury pollution nationwide as a result of the release of dental amalgam into the environment, it is possible to provide guidance based upon a study in the state of Victoria. In 2006 the Australian Industry Group (AiGroup) in partnership with the ADA Victorian Branch and water authorities in the Victorian capital of Melbourne, engaged consulting firm URS Australia to review mercury loads to sewers from dental surgeries in Victoria and review amalgam waste management practices. This study acknowledged dental amalgam as a source of mercury pollution:

_Urban sewers receive wastes from a wide range of industrial, commercial and human sources. The dental industry is reported as a significant contributor of mercury sewer loads, eg. 10% to 80% of total mercury received at US and Canadian treatment plants. Dental mercury sewer discharges are considered to contribute to elevated concentrations of mercury and other heavy metals in raw sewage inflows and biosolids produced at sewage treatment plants, with potential to limit the range of beneficial reuse opportunities such as land application and energy recovery._

Reducing amalgam waste and mercury loads to sewer
URS Australia (February 2010)

As noted, there is limited data to determine the amount of mercury released in Australia as a result of dental restorations. It is thought that the Australian Government underestimates the amount of mercury released into the environment:

… dental amalgam waste generated by the Australian dental industry is the single biggest source of mercury pollution of our sewerage and waste water, annually contributing about 4-4.5 tonnes of mercury pollution to our environment. Neither of these mercury pollution sources are currently included on the NPI. These two mercury pollution source omissions from the NPI result in a massive underestimation of the total mercury pollution of our environment. The total annual mercury emission in Australia on the current NPI listing is 25,000kg; however a more accurate figure should be 33,000 kg, reflecting the currently omitted mercury pollution from the lighting waste and from dental amalgam waste.

CMA Corporation comments on the draft framework for a national waste policy
CMA Ecocycle (August 2010)

Notwithstanding the lack of strong data, ADIA acknowledges the release of dental amalgam into the water supply as a preventable source of mercury pollution.
Amalgam Waste Management

There is a growing understanding amongst dental professionals of the environmental risks associated with allowing mercury to be disposed of via waste, however there is no uniform national approach to mercury retention. That said, Australia is a recognised world-leader in mercury retention as a result of the work being undertaken in Victoria, largely as a result of an initiative spearheaded by the ADA Victorian Branch supported by the dental industry, water authorities and the AiGroup (Refer to the case study cited in this report).

Dental amalgam as a waste product from dental practices is typically generated in two ways. The first is during the tooth restoration phase when dental amalgam is used to replace decayed components of a tooth. The second is during subsequent restoration that may include replacement of the dental amalgam or removal of the tooth. In both cases it is possible to capture the waste dental amalgam using side traps, suction filters and / or amalgam separators.

**Amalgam separators**

The dental industry has developed technology that allows dental amalgam waste generated by a dental practice to be separated from the wastewater supply. This piece of equipment separates dental amalgam particles from the wastewater of a dental treatment centre to reduce the number of amalgam particles and, therefore, the amount of amalgam entering the sewage system.

Amalgam separators should meet the design and performance standards set out in the relevant International Standard, this being ISO11143-2008: Dentistry – Amalgam separators. This document specifies the requirements and test methods for amalgam separators used in connection with dental equipment in a dental practice. The standard specifies the efficiency of the amalgam separators in terms of the level of retention of amalgam based on a laboratory test and the test procedure for determining this efficiency. It also includes requirements for the safe functioning of the amalgam separator, for marking, instructions for use, operation and maintenance. The standard addresses the characteristics of three types of dental amalgam separators, these being:

- **Centrifugal System**: These systems use centrifugal force to draw out amalgam particles from the wastewater.
- **Sedimentation System**: These systems reduce the speed of wastewater flow, which allows amalgam particles to settle out of the wastewater.
- **Filter System**: Depending on the type of filter used, these separators remove not only coarser amalgam particles but also some finer and colloidal amalgam particles.

The US-ADA evaluated the amalgam removal efficiency of twelve amalgam separators to verify their performance against ISO11143 which sets out a performance requirement of 95 percent amalgam removal efficiency. Total mercury concentration in the effluent was calculated using the mass of amalgam particles larger than 1.2 micrometers and the volume of effluent, together with the US-EPA method for amalgam particles smaller than 1.2 micrometers. The results show that all twelve amalgam separators exceeded the ISO11143 requirement of nine-five percent amalgam removal efficiency. Indeed, this laboratory evaluation shows that amalgam
separators removed more than ninety-six percent of the dental amalgam in samples with particle-size distribution as specified in ISO11143.

In Australia there are several suppliers of amalgam separators which are predominately supplied by Cattani Australia, CMA Ecocycle, Durr Dental, Gritter Dental and Sirona Dental Systems.

There is no uniform, national policy concerning the mandated installation of amalgam separators. That said, awareness of the advantages of diverting dental amalgam from the wastewater supply is increasing amongst environmental regulators. Similarly, state/territory government health agencies are increasing mandating installation in healthcare facilities they operate. For example, the policy in the State of New South Wales is that:

All public dental clinics in NSW shall be equipped with special systems to trap waste amalgam to control the distribution into the general environment.

NSW Health Protocols: Amalgam clinical use and waste management
New South Wales Department of Health (February 2011)

Naturally, separation is only the first step in reducing mercury pollution arising from the use of dental amalgam. Once separated, the waste product needs to be removed from the dental practice for disposal and, ideally, processing of the waste product with a view to recycling the mercury. In all Australian jurisdictions disposal of waste products containing relatively minor quantities of mercury into the general waste stream is prohibited thus options include long-term storage or recycling.

**Amalgam recycling**

Due to the inability to dispose of dental amalgam in the general waste stream and the consequential high-cost of long-term waste storage, recycling of dental amalgam to extract the mercury has become the preferred option. This is consistent with the policy of the ADA which states:

Dental amalgam waste can be recycled. Following the simple suggestions outlined in this document will help protect the environment. Although mercury in the form of dental amalgam is very stable, amalgam should not be disposed of in the general waste, infectious waste “yellow bag”, pharmaceutical waste or sharps container. Amalgam also should not be rinsed down the drain. These precautions are important because some communities incinerate municipal garbage, medical waste, and sludge from wastewater treatment plants. If amalgam waste ends up in one of these incinerated waste streams, the mercury can be released to the environment due to the extremely high temperatures used in the incineration process. Increasingly, local communities are enacting restrictions on the incineration of wastes containing mercury. The good news is that amalgam waste, kept separate from other waste, can be safely recycled. The mercury can be recovered from amalgam wastes through a distillation process and reused in new products. Recycling is best practice for amalgam waste management for dental clinics.

ADA Policy Statement 5.15: Amalgam waste management
Australian Dental Association (November 2007)

In Australia, the largest recycler of dental amalgam is CMA Ecocycle, an ADIA member business, a specialist recycler of mercury containing wastes that includes, but is not necessarily restricted to: Lights (fluorescent lighting tubes and sodium vapour lamps) medical devices (including oesophageal dilators, gastrointestinal tubes, sphygmomanometers, pyrometers and dental amalgam); and electrical equipment
(LCD screens, switches, thermometers and thermostats and various sensors). At the time of writing CMA Ecocycle is the only EPA licensed mercury recycler in Australia.

Of the waste collected by amalgam separators, approximately thirty percent of the weight is moisture content and tooth residue which, being biological waste, needs to be handled in accordance with state / territory waste management regulation in addition to mandated workplace safety guidelines. Of the remaining content (seventy percent of the waste), approximately one-half is mercury with the balance being a mixture of other metals including silver, copper, zinc and tin.

The case-study in Victoria referenced in this report shows that as a result of dental amalgam collection and waste processing each dental practice collects and recycles approximately 335 grams of mercury per annum. Based upon an estimate of five-thousand dental practices in Australia, if each dental practice was able to collect its dental amalgam waste in a separator and on-forward it for recycling, more than 1,600 kilograms of mercury would be collected from dental practices each year.
UNEPA Global Legally Binding Instrument On Mercury

The UNEP recognises that mercury is a chemical of global concern due to its long-range transport in the atmosphere, its persistence in the environment, its ability to bioaccumulate in ecosystems and its significant negative effect on human health and the environment. To this end, in February 2009 the UNEP Governing Council agreed on the need to develop a global legally binding instrument on mercury.

The work to prepare this instrument is undertaken by an intergovernmental negotiating committee supported by the UNEP Division of Technology, Industry and Economics (Chemicals Branch) as secretariat. The goal is to complete the negotiations before the twenty-seventh regular session of the Governing Council / Global Ministerial Environment Forum in 2013. Participation in the intergovernmental negotiating committee (INC) is open to all Governments. Intergovernmental organizations and community representatives may also take part as observers.

**UNEPA Global Mercury Partnership**

Supporting moves towards a global, legally binding treaty on mercury is the UNEP Global Mercury Partnership. The partnership is designed to build cooperation amongst stakeholders to identify and implement practical measures to protect human health and the global environment from the release of mercury and its compounds by minimizing and, where feasible, ultimately eliminating global, anthropogenic mercury releases to air, water and land. The partnership currently has seven identified Priorities for Action (or partnership areas) that are reflective of the major source categories. These priorities include:

- Reducing mercury in artisanal and small-scale gold mining
- Mercury control from coal combustion
- Mercury reduction in processes
- Mercury reduction in products
- Mercury air transport and fate research
- Mercury waste management
- Mercury supply and storage

Through its membership of the global body for dental industry associations (the International Dental Manufacturers (IDM) association, ADIA is supporting efforts associated with the controlled supply and waste management of mercury. ADA is similarly engaged though its global body, FDI.

The challenge for the intergovernmental negotiating committee is to elaborate a global legally binding instrument on mercury that is fair in terms of expectations and that would progressively reduce the risks arising from the use of mercury while taking into account countries’ differing capacities, resources and uses of mercury.

The provision of mandatory and firm obligations for country specific reduction goals and national action plans are considered by the UNEP as a response to national environmental, social and economic characteristics. It has been acknowledged that the instrument’s implementation should allow for a flexible approach, comprising both binding and voluntary approaches and taking into account countries’ differing capacities. The need to provide support to developing nations to allow them to implement obligations of the treaty has been acknowledged. Other aspects of the instrument supported by several nations include the
restriction of mercury trade and the prohibition of the dumping of mercury waste in developing countries; the application of the polluter pays principle to mercury clean-up programmes; and clear provisions on illegal traffic.

Given the intent of the UNEP to develop an instrument on the use and disposal of mercury, there will be direct consequences on the manufacture, use, collection, storage and recycling of dental amalgam. Following advice from key stakeholders including ADIA and ADA, the Australian Government has argued, so far successfully, for a provision that will allow dental amalgam to be used:

Australia has concerns with the imposition of immediate or short-term restrictions on the use of dental amalgam. Whilst Australia acknowledges the desirability of phasing out the use of dental amalgam over time, Australia would point to the public health advantages of dental amalgam. These are: lower cost; lesser complexity in use than alternative filling materials; and the creation of a better seal in teeth with dental amalgam over alternative filling materials.

At the time of writing negotiations on the instrument are still underway, however international consensus seems to be settling on a protocol that will not allow any party to allow the import or export of mercury [or any mercury compound dental amalgam, except in the form of encapsulated dental amalgam. Notwithstanding this concession, the draft instrument contains a provision that the trans-boundary movement of any mercury (or mercury compounds including dental amalgam) defined as mercury waste shall be subject to the relevant provisions of the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal.

The draft instrument also contains a provision that each ratifying nation shall ensure the installation of amalgam separators at dental practices within its territory at the latest (by an as yet to be determined date).
Case Study: Dentists for cleaner water

Recognising the environmental problems associated with the discharge of waste dental amalgam to the waste water system, a number of stakeholders from the dental industry, dental profession, water supply companies and government came together to address the problem in a collaborative fashion. Spearheaded by the ADA Victorian Branch under the Dentists For Cleaner Water initiative, the partners supported government-subsidised installation of dental amalgam separators.

The program started in 2006 with an $80,000 survey into mercury disposal practices by Victoria’s dental profession. The funding parties for this study were South East Water AUD$40,000 (approximately EUR€32,000 / US$40,000), EPA Victoria AUD$35,000 (approximately EUR€28,000 / US$35,000) and the ADA Victorian Branch AUD$5,000 (approximately EUR€4,000 / US$5,000). The partners engaged consulting firm URS Australia to review mercury loads to sewers from dental surgeries in Victoria and review amalgam waste management practices. The URS Australia determined:

*It was estimated that Victorian sewers received about 210kg/yr of mercury from dental clinics - about 80% of this to Melbourne’s sewers. Significant mercury load reductions to sewer are possible by installing amalgam separators in dental surgeries. This should help to improve biosolids quality produced at wastewater treatment plants, and facilitate the recovery and reuse of mercury and other useful metals used in amalgam alloys.*

Reducing amalgam waste and mercury loads to sewer
URS Australia (February 2010)

This study provided the catalyst for a voluntary program that offered a rebate to the dental profession to install amalgam separators to stop mercury entering the sewerage system from dental practices across the State of Victoria.

Funding the initiative

A total of AUD$1million (approximately EUR€0.8mil / US$1mil) was provided for a voluntary program that offered a rebate to dental professionals to install amalgam separators to stop mercury entering the sewerage system from their surgeries.

The primary source of funding for the Dentists For Cleaner Water initiative came via the Victorian EPA from the Trade Waste partnership program supported by the Victorian State Government between 2004 and 2008. Supplemental funding was provided by the Victorian Water Industry Association and public water corporations (East Water and City West Water). This was a pioneering program as the EPA in the State of Victoria had not previously funded a rebate program and worked with so many small and medium enterprises (SMEs), initially estimated at one thousand dental practices.

The management of the Dentists For Cleaner Water initiative, including disbursement of rebate funds, by the ADA Victorian branch is considered to be a key factor in the successful acquittal of grant funds within approved guidelines and allocated timeframes.

At the time the Dentists For Cleaner Water initiative was launched, industry estimated the costs of installing an amalgam separator at between AUD$2,500 (approximately EUR€2,000 / US$2,500) for a straight-forward installation rising to as much as AUD$30,000 (approximately...
EUR€24,000 / US$24,000) in a dental practice where complex plumbing and electrical work was required.

In the first year of the Dentists For Cleaner Water Initiative, the rebate was a flat AUD$1,000 (approximately EUR€800 / US$1,000) or up to a maximum of 20% of the total costs associated with the purchase and installation of amalgam separators, whichever was the greater amount. From 1 July 2010 the rebate was revised to AUD$500 (approximately EUR€400 / US$500 or up to a maximum of 10% of the total costs associated with the purchase and installation of these items, whichever was the greater amount.

**Number of amalgam separators installed**

The program operated in the State of Victoria over a three year period from 1 July 2008 through to 30 June 2011. The dental profession was made aware of the program as a result of extensive efforts on the part of ADA Victoria and supporting contributions from the state-owned water corporations, AiGroup and other stakeholders including ADIA.

Over the three years of the program, the number of dental practices paid a rebate under the Dentists For Cleaner Water initiative was 682. Over the corresponding period a total of 725 dental amalgam separators were installed.

In reviewing the Dentists For Cleaner Water initiative, it is important to note that it was a voluntary program and that the rebate covered only part of the cost of the amalgam separator.

**Amount of mercury captured and recycled**

The leadership of ADA Victoria in supporting the Dentists For Cleaner Water initiative has significantly reduced the amount of mercury released into the environment.

CMA Ecocycle, an ADIA member business, is the only EPA licensed mercury recycler in Australia and collected the containers containing the waste product. An analysis of the waste product collected from 664 units over the period July 2009 to mid-September 2011 provided the following analysis:

<table>
<thead>
<tr>
<th>Total weight of waste material collected</th>
<th>897 kilograms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture and biological waste</td>
<td>≈ 269 kilograms</td>
</tr>
<tr>
<td>Silver, copper, zinc and tin</td>
<td>≈ 314 kilograms</td>
</tr>
<tr>
<td>Mercury</td>
<td>≈ 314 kilograms</td>
</tr>
</tbody>
</table>

The amount of waste (and therefore mercury recycled) from each dental practice naturally varied dependent upon a number of factors including the type of procedures performed on patients and the patient flow-put.

CMA Ecocycle and the ADA Victorian Branch estimates that as a result of the Dentists For Cleaner Water initiative, the eight hundred dental practices with an amalgam separator installed (this number varies from the number of rebates provided as not all amalgam separators were installed with support from the Dentists For Cleaner Water initiative), each practice reduces the amount or mercury entering the environment by approximately 0.5 kilograms over a twelve to eighteen month period. Over a typical twelve month period, approximately 264 kilograms of mercury is recycled in Victoria.
An interesting point is that the mercury that is processed and recycled by CMA Ecocycle is resold to SDI Limited, a manufacturer of dental amalgam residing in the state of Victoria.

ADA Victoria and the *Dentists For Cleaner Water* initiative was a finalist in the “Sustainable Water Management Award” of the World Environment Day Awards program supported by the United Nations Association of Australia to promote the UNEP World Environment Day. This awards program recognised the innovative and outstanding environmental programs and initiatives from across Australia and the important work of Australian environmental leaders such as the ADA Victorian Branch.
Introduction – Australian Dental Industry Association

Formed in 1925, ADIA is the peak national association representing the suppliers of quality dental product and services to dentists and allied oral healthcare professionals. The ADIA membership represents businesses that supply around more than ninety-five percent of the nation’s purchases of dental product and consumables which are valued at an estimated $860 million per annum.

ADIA members have the opportunity to contribute to the development of not only the Association, but also the broader dental industry, through a number of national committees that address regulatory, technical, skills and industry promotional issues. A national board of seven leading professionals attends to governance matters and sets the strategic direction of the Association.

ADIA supports a regulatory framework for dental products and services that is based upon a risk-management approach designed to ensure public health and safety, while at the same time freeing business from an unnecessary regulatory burden. The Association provides advice to agencies including the TGA and the National eHealth Transition Authority (NeHTA), often nominating industry representatives to government committees and working groups. The Association also supports its members in the development of technical standards for dental products and consumables, nominating industry representatives to committees of both Standards Australia and the International Standards Organisation (ISO).

ADIA builds partnerships between dentists and the suppliers of dental products and services. The Association is the organiser of the nation’s premier dental trade show, the highly acclaimed ADX Dental Exhibition, which attracts more than four thousand dentists and allied oral healthcare professionals every year.

At an international level, ADIA is a founding member of the International Dental Manufacturers (IDM), the Geneva-based global confederation of national dental trade associations. ADIA is also a supporting member of the World Dental Federation (Fr. Federation Dentaire Internationale – FDI).

Working with members to ensure that the dental industry has ongoing access to a workforce of skilled professionals, the Association supports the development of both TAFE and university courses relevant to the dental industry and the Association delivers the widely acclaimed ADIA Introduction To Dentistry Course.

The ADIA national office is based in Sydney and the Association is active in all mainland states.

More information can be found online at www.adia.org.au
References & Further Reading

Title: ADA Policy Statement 5.15: Amalgam waste management
Publisher: Australian Dental Association (November 2007)

Title: ADA Policy Statement 6.18: Safety of dental amalgam
Publisher: Australian Dental Association (November 2012)

Title: Amalgam clinical use and waste management
Publisher: Department of Health, New South Wales (February 2011)

Title: Amalgam restorations and mercury toxicity
Publisher: P.O. Sheridan – Student, University of Sydney (1991)

Title: Dental amalgam and mercury in dentistry
Publisher: National Health & Medical Research Council (1999)

Title: Dental amalgam – filling you in
Publisher: National Health & Medical Research Council (2002)

Title: Dentists self regulation to reduce discharges to sewer
Publisher: Australian Industry Group (August 2010)

Title: FDI Policy Statement: Safety of dental amalgam
Publisher: World Dental Federation (October 2007)

Title: Reducing amalgam waste and mercury loads to sewer
Publisher: URS Australia (February 2010)

Title: The environmental effects of dental amalgam
Publisher: Australian Dental Journal (Number 45: 2000)