IAOMT
International Academy of Oral Medicine and Toxicology

IAOMT Position Paper - Environmental Committee

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For more than a decade, the Environmental Committee of the *IAOMT* has been involved with the issue of the environmental impact of dental amalgam mercury. Although there may be other environmentally related questions relative to the practice of dentistry, the seriousness of this issue has drawn most of our attention.

Mercury is toxic

Mercury is recognized worldwide as a serious environmental pollutant[1,2]. "Mercury is not only a risk factor for the environment" according to *Health Canada's* Luke Trip, " it is a toxin". [3] By definition, a toxin is a substance from the inside or outside environment to which an organism is exposed and that accumulates in its tissues or cells at a sufficient concentration to interfere with normal metabolism [4]. Environmental scientists label it a "Persistent Bioaccumulative Toxin" (PBT) and agencies have been targeting it as an important material to be reduced or eliminated from the environment. This means reducing or eliminating its source, wherever possible.

The extreme toxicity of mercury can be seen from documented effects on wildlife – fish and loon, in particular - by very low levels of mercury exposure [5]. The average amalgam filling contains more than ½ gram of mercury. Because of its extreme toxicity, only ½ gram of this heavy metal is required to contaminate the ecosystem and fish of a 10 acre lake to the extent that a health warning would be issued by the government not to eat the fish[6]. Over half the rivers and lakes in Florida have such health warnings[7]. Multiply that average by the millions of amalgams placed every year in American mouths and there is great cause for concern.

Dental clinics as polluters

Dental offices have been shown by many studies in the United States, Canada and abroad to be significant contributors of mercury entering the environment[8, 9,10]. The process of either placing or removing amalgam fillings generates a slurry of mercury-rich amalgam waste. This is vacuumed up by the chairside suction unit and most of it passes right through the chairside screens or traps, which only capture larger particles. Facing no other obstacles, this amalgam waste passes right through to the dental office wastewater. The discharge per dentist ranges

from 270 to 484 milligrams per day[11,12]. Compare these numbers with the City of Montreal's **maximum** objective of 22 milligrams of mercury per day arriving at its wastewater treatment plant!

In dental offices with air/water separator tanks as part of the central vacuum system, mercury has also been found in air vented to the outside of the dental office. In 1996, Rubin and Ming-Ho[13] were the first to investigate whether this discharged air contained mercury vapour. After sampling eight dental clinics in Seattle, they found average concentrations of 0.092mg Hg/m^3 in exhausted air. Extrapolation of these results to 112,000 U.S. dentists led them to conclude that 'the total quantity of mercury released nationwide each year may exceed more than a ton – cause for some environmental concern'.

It is obvious the levels of mercury measured in dental office wastewater far exceed local limits for discharge by "small quantity generators" of hazardous waste. Wastewater treatment facilities are designed to process or handle human waste, not heavy metals. Most of the mercury settles out into the sludge, or "biosolids" as wastewater is treated. These biosolids are usually incinerated or used as fertilizer - the mercury content again being directly emitted into the environment[14]. Municipalities have estimated that between 14% and 80% or more of all incoming mercury to treatment plants comes from dental offices[8,9,10]. (For further documentation, see http://www.mercurypolicy.org/new/documents/DentistTheMenace.pdf)

The solution: amalgam separators

Technology and commercial products exist to capture 95% to 99% or better of the mercury before the wastewater leaves the dental office. Very few North-American dental offices are equipped with such amalgam separators.

Danish and American studies have shown that, when such devices are installed in dental offices community-wide, there is a significant drop in mercury seen entering the wastewater treatment plant.[11,15,16] Such studies have led to recommendations or regulations in several European countries that all dental offices install mercury separating equipment[14]. Dr. Gordon Christensen's *CRA Newsletter*, in its October 2001 edition, reported that amalgam separators were, at that time, required in Wichita, Kansas, four major Canadian cities and throughout Germany, Sweden and Denmark.

A list of North American amalgam separator vendors appears in Appendix A.

In Canada

In February 2002, the Canadian Dental Association and the Minister of Environment signed a memorandum of understanding to implement a Canada-wide standard on mercury for dental amalgam waste. The objective set by application of *Best Management Practices* is to achieve a 95% national reduction in mercury releases from dental amalgam waste discharges to the environment, by 2005, from the base year 2000. This was a result of the invocation of the precautionary approach, in recognition that mercury is 'persistent, bioacculumative and toxic…'.

The President of the CDA therefore agreed that the Association would make determined efforts to ensure that dental practitioners voluntarily take the requisite steps and action necessary to achieve this goal. Effectiveness of these actions will be reported on in 2007.

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As of February 2003, – one year into the agreement - none of the provincial dental associations have endorsed this commitment and no action, other than reporting of this memorandum of understanding, has been taken by the CDA - as confirmed by the Ministry of Environment.

In the USA

"Dentists are good citizens, concerned about the environment in which we all live and ready to do their fair share," said ADA president Greg Chadwick in the October 10, 2002 *ADA News*. To that end, the ADA commissioned a study by the consulting firm Environ International, Inc., which found, contrary to all the other studies of dental mercury in the environment, that dental office emissions contributed only 0.7% of mercury in the environment "from all sources." It is not clear that They have launched a "National Advocacy Initiative" to encourage dentists to think about the problem, but have called the use of mercury separators "unnecessary and not cost effective."

Health and environmental groups say that the American Dental Association's "National Advocacy Initiative" to reduce dental amalgam in wastewater launched today is a step forward, but nearly toothless. (For more discussion, see : http://www.mercurypolicy.org/new/documents/ADA120202ChicagoRelease.pdf)

Human waste

Believe it or not, the dental amalgam discharge into sewers at homes and offices is superior to that of dental clinics. The average person with amalgam fillings actually excretes over 100 micrograms of mercury per day in body waste![18,19,20] In the United States, this would amount to over eight tons per year in the sewers, streams and lakes compared to a total of about six tons from dental clinics.

Cremation

Cremation of bodies with amalgam fillings adds to air emissions and deposition onto land and waterways. A Swiss study confirmed that cremation released over 65 kilograms of mercury per year as emissions in that small country, often exceeding site air mercury standards[21]. In the United States, in 1991, cremation of 320,372 bodies added an estimated 2800 pounds of mercury into the atmosphere. [22]

Conclusion and recommendations

The *Environmental* Committee of the *IAOMT*, recognizing the scientific validity of the statements above, and recognizing that the dental profession has the opportunity to reduce or eliminate a significant environmental hazard, urges all general dentistry offices to install effective mercury separator equipment. The *Standards of Care* Committee also recommends as 'Approved Protocol' for all Academy members to install such mercury capturing and recycling devices in their dental offices.

As Westman and Tuominen, reporting on the 1992 Duluth voluntary amalgam recycling effort, concluded: " Dentistry has long been shown as a leader of change for the public good.

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Preventive health care was an original dental concept. The profession has shown the way in the area of infection control. And it has the knowledge and the capabilities to initiate meaningful procedures to enhance the environment as well". [23] Since then, 85% of the practices have installed systems that capture over 95% of the amalgam from the vacuum systems. This voluntary approach seems very appropriate for smaller communities (up to 100 general practice dentists). The state of Minnesota will be trying a state-wide voluntary program based on this successful program. The problem with regulatory programs is that you need a "cop" which can be very expensive. If people are properly motivated and educated positive results can occur.

We support efforts by municipal agencies to make this a regulatory requirement, since efforts toward voluntary compliance and cooperation of dental associations in larger communities have failed.

The Committee is aware of a handful of commercially available products and can provide contact information to anyone interested.(see Appendix A)

The Committee is also aware of other potential environmental hazards posed by the operation of a dental office. Some of these, such as spent X-ray fixer solution and lead backing of X-ray films, have been adequately addressed by the dental profession. Others, such as mercury vapor in air discharged from dental offices, have not yet been explored thoroughly, or presently have no available technological solution. We will make every attempt to stay current on all developments in this field and advise Academy members and the dental profession as a whole accordingly.

"Think globally, act locally"

Links:

www.noharm.org

www.mercurypolicy.org

www.chem.unep.ch/mercury

www.amalgam.org

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Appendix A: Vendor List

AMALGAM REMOVAL EQUIPMENT FOR THE TREATMENT OF DENTAL CLINIC VACUUM SYSTEM WASTEWATER: VENDOR LIST

- U.S.A. and Canada -

ARU-10 - Hygenitek, Inc. Markham, Ontario - 1-866-494-3648

Asdex Filter - Avprox Inc. St.Petersburg, Florida :1-800-300-1249

The Amalgam Collector - Design 1, R&D Services, Seattle Washington : 1-206-525-4994

Durr Dental GmbH & Co. KG-System 7800-7801 - Air Techniques, Inc. New York: 1-800-247-8324 ext. 5610 (Mr. Frederick Fischer)

E-Clean - Faraday Technology, Inc. Clayton, Ohio : 1-937-836-7749

ECO II (Economy System Type 2) Pure Water Development LLC-METASYS; Miami, Florida - 1-877-638-2797 and Biodent, Inc. Longueuil, Quebec , Canada: 1-800-211-1200

MSS Model 2000 - TG Group, Inc. Mississauga, Ont. Canada : 1-877-557-4888

Model 2000 - Maximum Separation Systems, Inc. Victoria, B.C. : 1-250-652-5279

Models 2000E & 2000EL (Catch^{Hg}) Rebec Solutions, Seattle, Washington: 1-800-569-1088

Model Hg5 - SolmeteX, Inc. Northborough, Massachusetts : 1-800-216-5505

Rasch 890 - AB Dental Trends (distributed by Servident across Canada)

Sweden Recycling International AB-SRAB99 and BullfroHg models - Dental Recycling North America; New Jersey: 1-800-360-1001

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