

October 8, 2003 Testimony before the  
US Congress House Subcommittee on Human Rights and Wellness

Dental Mercury Loadings to Public Sewers,  
Efficacy of Dental Amalgam Separators,  
Metropolitan Council–Minnesota Dental Association Amalgam Separator Program

Metropolitan Council is the Publicly Owned Treatment Works for the Minneapolis/St. Paul, Minnesota metropolitan area, with the responsibility of treating wastewater. The Metropolitan Council (Council) has studied and identified sources of mercury discharged to the sanitary sewer since the mid 1990's.

Key Points:

- (1) Dental offices are a significant contributor of mercury to sanitary sewers.
- (2) Significant mercury reductions are anticipated at wastewater treatment plants if dental offices install amalgam separators.
- (3) A joint program with the Council and the Minnesota Dental Association is underway to have dental offices install amalgam separators.

Dental offices are a source of mercury to the sanitary sewer due to the dental vacuum systems that collect and discharge amalgam wastes during dental office procedures. (Amalgam contains approximately one-half mercury; plus silver and other metals.) There are approximately 1361 general dentists in the Council's wastewater treatment plant service area. Data published in 1999 (WEF Monograph, co-authored by the Council) indicated that 4790 amalgam fillings are removed and 4870 new amalgam fillings are placed per work day in our service area. Using published data and Council survey findings the Council estimated a rate of mercury release of 255 mg/dentist/operating day, which indicated that approximately 75% of the mercury originated from dental offices (WEF 1999). Other sources were accounted for, thus completing a mass balance calculation.

Based on the initial estimated contribution from dental offices, the Council determined that it should conduct two studies to evaluate loadings from offices and to test "amalgam separators" designed to remove amalgam from office wastewater. To undertake these studies, the Council formed a partnership with the Minnesota Dental Association. Based on the two studies it was learned that the amount of mercury released from dental offices varies widely, with an average of 234 mg/dentist/operating day (Berglund and Diercks, 2001). It was also learned that the Council may be able to realize a 29% - 44% reduction in sludge mercury levels if dental offices install amalgam separators (Anderson, 2001). ("Sludge" refers to the solids generated during the treatment of wastewater.)

Using a four day workweek, and 48 weeks/year, the Council's preliminary calculation of data from the American Dental Association's ENVIRON report indicates a mercury release of 231 mg/dentist/operating day; based on 6.5 tons/year with 133,059 dentists (ENVIRON 2003). Therefore, the mercury loading values of 231–234–255 mg/dentist/operating day agree quite well.

The five amalgam separators that were tested by the Council and the Minnesota Dental Association in dental offices performed well and are cost-effective. There were no operational problems encountered during the test periods that separators were in the offices. The American Dental Association conducted bench-top testing in a laboratory setting, with results indicating that there are many separators that perform well. ADA's testing showed nine separators removing greater than 99% of the amalgam. Three other separators removed over 95% of the amalgam (Fan, et al., JADA 2002).

Therefore, the Council and the Minnesota Dental Association (MDA) have initiated a “Voluntary Dental Office Amalgam Separator Program” to promote the installation of separators that remove 99% of the amalgam present in dental office wastewater. (This is a higher percentage removal than called for in a standardized separator testing procedure.)

The Council-MDA program began in January 2003. Thanks to the efforts of the partnership with the MDA, two-thirds of the dental offices in the Minneapolis/St. Paul metropolitan area have already submitted signed commitments indicating that they will install a separator. MDA is also promoting this program throughout Minnesota, and they have achieved this same level of commitment statewide. Our goal is to have all general practice offices install a separator by February 2005. (Specialty dental offices are not expected to need a separator.)

Many countries in the world have programs that require the installation of amalgam separators, including Scandinavian countries, Germany, Switzerland, Austria, Holland, and Japan (as of approximately 1992). Many Danish sewer service areas have shown a reduction in sludge mercury levels. Approximately half of the service areas saw a reduction ranging from 14-80%. Apart from the one value of 14%, the range of the data was 32-80%. (The other half of the service areas observed no statistically significant changes.) (Arenholt-Bindslev, 1999)

Reductions in mercury levels at wastewater treatment plants have also been shown in Toronto and Wichita Kansas. The subcommittee may wish to contact these communities for more detailed information.

Separators are effective at reducing the amount of amalgam discharged to wastewater treatment plants. The use of separators will reduce the amount of mercury released to the atmosphere via the burning of sludge. For those treatment plants that land apply sludge, there will be less mercury present in the sludge, thereby maximizing the potential beneficial reuse of the sludge and the avoidance of costly alternative sludge disposal methods.

It should also be noted that most dental offices currently use one of two common types of vacuum systems. One type of system includes rudimentary, secondary filtration equipment. However, in some areas of the US, these types of vacuum systems are being phased out in favor of systems that use less water and electricity (so called, “dry” systems). Unfortunately, these “dry” vacuum systems usually do not filter out as much amalgam from the wastewater. If a dental office changes vacuum systems, it would be an ideal opportunity to install a separator. However, if the vacuum system is changed to a “dry” system, and a separator is not installed, there will be an increase in the amount of amalgam discharged to the sewer.

Capturing amalgam at a dental office will maximize recycling of mercury and silver present in amalgam. If these metals end up in wastewater treatment plant sludge, they will not be recovered or reused.

The ADA’s ENVIRON report discusses dental office waste being discharged to septic tanks. The Council’s survey work has also shown that some dental offices discharge to septic tanks (WEF 1999). Septic tank septage may be hauled to wastewater treatment plants adding to their load, or it may be land applied. Since some septic tanks overflow to a drainfield, this could be an environmental release from dental offices.

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