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Managing Wastewater from Dental Offices **King County, Washington's Experience**

Background for testimony presented by David Galvin, King County Department of Natural Resources and Parks, Seattle, Washington at the hearing on “The Environmental Impact of Mercury-Containing Dental Amalgam,” U.S. House of Representatives Subcommittee on Human Rights and Wellness of the Committee on Government Reform, October 8, 2003.

King County’s Wastewater Treatment System: An Overview

King County operates a regional wastewater collection and treatment system with two major treatment plants. The 420-square mile service area includes metropolitan Seattle, most of urbanized King County and parts of south Snohomish County. The wastewater treatment system, with an average flow of 200 million gallons per day, serves approximately 1.4 million people. Ninety-five percent of the flow comes from residential homes and small businesses and five percent from industrial sources. The treatment system serves an estimated 1400 general practice dentists in 900 general practice dental offices.

King County’s wastewater treatment system discharges treated effluent into Puget Sound, a sensitive marine waterway. Residual solids from the two treatment plants, known as biosolids, are land-applied on wheat and hop fields in Eastern Washington and on forestlands in the Cascade Mountains. Some are sold as a composted product available for landscaping.

Wastewater treatment plants aren’t designed to handle toxic metals, like mercury. Heavy metals that enter the treatment system don’t go away, or get magically ‘treated.’ Rather, they collect in the sewer lines, settle out in the solids, or are discharged in the water effluent (to Puget Sound). Most mercury entering King County’s treatment system ends up in the biosolids. King County actively controls contaminants, including mercury, entering the wastewater system by means of a major industrial pretreatment program and extensive work with small businesses and households.

While King County’s biosolids currently meet all federal and state limits for mercury, an ongoing need to protect the future marketability of these solids drives the County’s efforts to continuously make them

cleaner. In addition, the possibility of more stringent mercury effluent limits—such as those imposed in the Great Lakes region—motivates King County’s efforts to remove this contaminant at the source.

1991 – 2000: Attempts to Manage Mercury Discharges from Dental Offices

Attention turned to dentists in the early 1990’s, when the Washington State Department of Ecology noted occasional high levels of mercury in the King County wastewater treatment system and required Metro, the wastewater treatment agency (now King County), to reduce discharges of mercury at the source. Because of their numbers, dentists were considered a potentially significant source of mercury, and a 1991 study confirmed that the dental sector was indeed a “significant and identifiable” source of mercury to the wastewater system.¹ (These findings have subsequently been corroborated in other municipalities.²)

Source control in a dental office means settling or otherwise capturing mercury-bearing amalgam particles from wastewater before discharge to the sewer system. In the early 1990’s, only a few amalgam separation units—manufactured in Europe—were available. During the period 1991-94, Metro (now King County) reviewed available separation units for their effectiveness, developed a set of considerations by which to evaluate separation units, and published a hazardous waste guidebook for dentists.

1994: Proposed ‘Rule’ Mandating Amalgam Separators. In early 1994 Metro/King County proposed a rule requiring dental offices to install amalgam separation equipment to demonstrate compliance with local discharge limits for mercury (that is, 0.2 milligrams per liter [mg/L], or 0.2 parts per million.) Due to a number of factors, including information received during the public comment period and pressure from organized dentistry, Metro/King County decided to forego the rule. Instead, the agency agreed to work cooperatively with the dental community to achieve voluntary compliance.

“ . . . the King County Department of Metropolitan Services (Metro) has decided to postpone promulgating the rule. Rather than establish the mechanisms required for regulatory compliance, Metro will promote voluntary compliance by continuing to work cooperatively with the dental community.

Many dental offices have already installed amalgam separation units and we expect this practice to continue without a formal regulatory requirement. We believe this decision is in our community’s best interest because it is cost effective and protects our environment. If information contradicts this decision in the future, we will reconsider promulgation of a rule at that time.”³

¹ Metro (1991). (Municipality of Metropolitan Seattle) (now King County). Reported titled Dental Office Waste Stream Characterization Study. Contact Cynthia Balogh at 206-263-3075. Cynthia.balogh@metrokc.gov .

² Chapman, P. and McGroddy, S. (nd) Report titled “Bioavailability of mercury from dental amalgam.” Contact: Capital Regional District, 524 Yates St., PO Box 1000, Victoria, British Columbia V8W 2S6 Canada..

³ Grigsby, D. (1995) Director, Water Pollution Control Department, Municipality of Metropolitan Seattle. Memo dated February 3, 1995.

One reason for postponing the rule was that amalgam separators developed in Europe were not readily available on the West Coast. Given more time, it was assumed that separators would become more available: they would be cheaper, more effective, better serviced and more reliable. In addition, dentists expressed interest in voluntarily controlling their mercury discharges—*if given time to do this*. The local dental society expressed a willingness to collaborate on the issue.

1995 – 2000: Outreach, Education and Voluntary Compliance. In collaboration with the local dental society, King County conducted an extensive outreach program to promote voluntary compliance in the management of amalgam wastes and wastewater during the period 1995 - 2000. Specifically, the Seattle-King County Dental Society and the King County Hazardous Waste Management Program worked on a variety of fronts to educate dentists about the need to properly manage amalgam wastes and to install separators. Activities during the six-year period include:

- Articles and paid advertisements in the Seattle-King County Dental Society *Journal*;
- *Handling Dental Wastes Poster* (7 editions), mailed to all members of the Society;
- *Dental Waste Management Guidebook*, developed, published and provided to all dental offices;
- Presentations/workshops at dental conventions, study groups and Society meetings;
- Cash rebates (subsidized by the County) for purchase of amalgam separators;
- Newspaper articles acknowledging ‘green’ dentists;
- Outreach to dental supply companies;
- Curriculum prepared for dental assistant/hygienist training programs;
- Technical assistance visits to dental offices.

Of special note, the County, the dental society, and three hazardous waste service providers collaborated to provide a one-time *free* waste pick up for dental offices in 1999. The County underwrote pick up and disposal costs, the Society promoted the project and screened applicants, and the waste haulers offered a special rate. An ongoing County voucher incentive program provided matching funds (in the form of rebates) to dental offices that purchased amalgam separators and/or contracted with waste management service providers.

As a result of these efforts, the Seattle-King County Dental Society won a “Golden Apple” award from a professional association and a Waste Information Network Environmental Achievement Award.

2000: Evaluation of the Voluntary Program. In 1999-2000, 212 dental offices in several representative zip code areas in King County received visits by King County staff to assess disposal practices for amalgam and other wastes. In addition, manufacturers of amalgam separation equipment provided sales data about installations of separators. These data provide a basis to evaluate whether the voluntary compliance program was effective. Results are summarized in a King County report.⁴

Briefly, the study showed that less than half of King County dentists collected and properly disposed of their waste amalgam solids—38 percent properly handled scrap amalgam, 27 percent properly handled amalgam from chairside traps, and only 13 percent properly handled amalgam in pump filters.

⁴ Local Hazardous Waste Management Program in King County, 2000. “Management of hazardous dental wastes in King County, 1991-2000.” King County Dept. of Natural Resources, Seattle, WA.

More significantly, only 24 of an estimated 900 dental offices had installed amalgam separators—that is, less than 3 percent of offices needing separators had installed them.

In 2001, King County, in consultation with the Seattle-King County Dental Society, concluded that the voluntary program had failed. King County then notified dentists that they would be required to meet local discharge limits of 0.2 parts per million total mercury.

2001 – 2003: King County Dentists Required to Meet Discharge Limits

Because the voluntary program failed to achieve compliance in managing dental wastewater—less than three percent of dental offices had installed separators—King County established a mandatory compliance schedule for dental offices in June 2001. This schedule required dental offices to comply with local discharge limits for mercury by July 1, 2003.

The decision to regulate dental offices was made because King County, as a delegated pretreatment program, is required to enforce regulations mandated under state and federal laws. Additionally, the marketability of biosolids is of critical importance to King County (a mandated goal is “to improve opportunities for recycling and reclamation of wastewater and biosolids” [K.C. Code 28.81.020]). King County land-applies approximately 130,000 wet tons of biosolids each year at a cost of \$32 per wet ton. If biosolids weren’t land-applied, the cost to landfill them would rise to \$90 per wet ton. Public perception and future regulatory uncertainty make it imperative that King County use its resources to continually improve the biosolids quality.

In July 2001, King County informed dental offices served by the King County treatment system that they must comply with local discharge limits for mercury (0.2 mg/L or 0.2 ppm). Letters and fact sheets with instructions on how to meet the limits were sent to all dentists. In addition, the Seattle-King County Dental Society inserted a copy of the fact sheet in their July newsletter.

From August 2001 to July 2003, inspectors from Public Health – Seattle & King County, working as part of the Local Hazardous Waste Management Program, visited King County dental offices to explain the regulations and to assist dentists in getting their practices into compliance. In fall 2003, inspections to determine the compliance status of dental offices will begin; a portion of dental practices will be inspected each year thereafter.

Compliance Requirements. In King County, a dental office can demonstrate compliance with sewer limits if it: a) follows Best Management Practices for amalgam wastes (these are detailed in the fact sheet); b) properly handles used X-ray fixer; and c) installs amalgam separation equipment approved by King County *or* obtains a permit to discharge in King County. (In most cases, dental offices that apply for a permit must sample their wastewater to demonstrate that it meets the local limit for mercury.) Fact sheets, permit applications and other documents are available on the King County Web site.⁵

Exempt Specialties: King County specifically exempts certain specialties from the requirement of installing an amalgam separator or obtaining a permit. These are periodontics, orthodontics, oral

⁵ See King County Web site at <http://dnr.metrokc.gov/wlr/indwaste/dentists.htm>

pathology/oral medicine, oral and maxillofacial surgery, radiology, and prosthodontists and endodontists that do not place and remove amalgam as a courtesy for their clients. Dentists that place or remove amalgam on three days or less each year are also exempt. (This latter exemption most often applies to pediatric dentists that don't place amalgams.) While dental offices that fall under the exemption don't need to install a separator or apply for a permit, they must follow best management practices, and they may be inspected.

Assistance to Dentists: Compliance assistance was provided to the King County dental community in a number of ways. As noted above, inspectors from Public Health – Seattle & King County, working as part of the Local Hazardous Waste Management Program, visited every dental office to explain the regulations and provide other technical assistance. This face-to-face contact appeared to be helpful in promoting proper management of a number of wastes of interest to King County in addition to amalgam wastewater (e.g., X-ray fixer containing silver, amalgam scrap, lead foils and instrument sterilants.)

The Voucher Incentive Program—essentially a matching fund rebate program subsidized by the County—was used to promote the purchase of amalgam separators during the first year of the program (it was discontinued in 2003). Approximately 371 vouchers (totaling \$162,000) were redeemed by dentists to buy amalgam separators.

King County maintained a Web site explaining the regulations and compliance requirements.⁶ Amalgam separators approved by the County were listed on the site, and a list of hazardous waste management firms was provided. A permit application could be downloaded from the site.

The Seattle-King County Dental Association provided regular information about requirements in its monthly newsletter and held two dinner meetings at which separator manufacturers introduced their products. The manufacturers of amalgam separation equipment marketed their products through advertisements, direct mail and dental supply firms.

Results of Mandatory Program: The deadline for dental offices to achieve compliance with King County's local limit for mercury was June 30, 2003. To monitor compliance, King County will perform random compliance inspections with a budget of \$55,000 the first year. The County's goal is to maintain the program with existing staff and at a minimal cost by inspecting a certain percentage of businesses each year, handling these inspections in conjunction with other field work.

Aggregate sales data from manufacturers of amalgam separators indicate that more than 775 dental offices had installed amalgam separators as of June 30, 2003. (This is more than 85 percent of the 900 dental offices estimated to need separators to meet mercury discharge limits.) Purchases of amalgam separators by dental offices rose dramatically after the July 2001 letter requiring compliance with discharge limits was sent (see Table 1).

There was little—if any—resistance from the dental community about compliance requirements. The Seattle-King County Dental Society assumed a role of providing information to member dentists via its newsletter and meetings. The Washington State Dental Association requested clarification about particular legal requirements. Individual dentists, for the most part, were interested in the practical issues of how, where and what type of separators to buy.

⁶ See King County Web site at <http://dnr.metrokc.gov/wlr/indwaste/dentists.htm>

As of the compliance date, King County had received fewer than 20 applications for permits from dental practices that didn't need to install separators. One dentist was issued a permit and the rest will be issued letters of exemption, as they did not readily fit into any category.

Table 1 Dental Offices Installing Separators in King County

1994 – 1999	24
2000	2
Jan – June 2001	5
July – Dec 2001	53*
Jan – June 2002	150
July – Dec 2002	286
Jan – June 2003	259

* Letter mailed in July 2003

Sources

Chapman, P. and McGroddy, S. (nd) Report titled "Bioavailability of mercury from dental amalgam." Contact: Capital Regional District, 524 Yates St., PO Box 1000, Victoria, British Columbia V8W 2S6 Canada.

Grigsby, D. (1995) Director, Water Pollution Control Department, Municipality of Metropolitan Seattle. Memo dated February 3, 1995.

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