DENTAL OFFICE
Environmental Issues

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School of Dentistry
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IN THE NEWS

IN THE NEWS

OVERVIEW
OF CURRENT EVENTS INVOLVING DENTAL Hg

RECYCLING and DENTISTRY

5 lbs / person / day

US 2001 Total Waste
(229 Million Tons)

Paper 33.7 %
Yard Trimmings 12.2 %
Food Scraps 11.4 %
Plastics 11.1 %
Rubber, Leather... 7.1 %
Glass 6.3 %
Wood 5.7 %
Other 3.4 %

Solid Waste Management

Source Reduction and Reuse
Recycling / Composting
Incineration
Landfilling

5 lbs / person / day

"ZERO WASTE"

Recycling
Composting

MOST PREFERRED
LEAST DESIRABLE

US 2001 Total Waste
(229 Million Tons)

Paper 35.7 %
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Glass 6.3 %
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Other 3.4 %

OVERVIEW
OF CURRENT EVENTS INVOLVING DENTAL Hg

F. Sealants, High-Cu Amalgam, Composites, Replacement Criteria
n=150 per 100 patients
n=95
n=55

Hal Huggins
60 Minutes Program

ADA Hg Hygiene Statement

Air, Water, Land, Food

Precoated Dental Amalgam

ADA Hg Hygiene Statement

Air, Water, Land, Food

US-EPA OSHA FDA NAS

AMALGAM DIS-USE

Hg CONTROVERSY

1980 1990 2000 2010

4% Hg in Cotton Rolls / Capsules
15% Trituration Surplus
33% HVAC to Sewer
48% Amalgam Restoration

Hg Contributions to a WWTP

SLUDGE = Heavy Metals; Nitrogen; Phosphate

0.0001 mg/l = 0.1 ppb

DENTAL OFFICE
Waste Water Treatment Plant

Hg Contributions to a WWTP

COMMERCIAL (76%)
Dental Offices (90% / year)
Industries

RESIDENTIAL (24%)
Human Wastes (33%)

INCINERATION

LAND SPREADING
Residual Hg in Capsules

Objective: Measure (1) residual Hg in capsules and (2) potential for leaching in landfill.

Methods: Residual Hg (USEPA Method 7471); Leaching Hg (USEPA Method 1311).

<table>
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<tr>
<th>Capsule:</th>
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<tr>
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<td>0.047 (P)</td>
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<td>0.125 ± 0.063</td>
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Best Management Practices

[Use alternatives / Keep products separate / Recycle everything]

1. Dental Amalgam
   - (a) No PPy in recommendations
   - (b) Spent Amalgam Capsules
   - (c) "Non-Contact" Amalgam (left over from mixing procedures)
   - (d) Chair-side Traps ("contact-amalgam" trapped by medium filter)
   - (e) Vacuum Pump Filter ("contact-amalgam" trapped by medium filter)
   - (f) Separator or Recapture Device (added before vacuum with fine filter)
   - (g) Plumbing and Sink Traps
   - (h) Hg Spill Kits

2. X-ray Wastes
   - (a) Fixer (Ag recovery or recycling processes)
   - (b) Developer (controlled discharge into sanitary sewer)
   - (c) Cleaners (Cr-containing cleaners must be recycled)
   - (d) Lead foil (must be recycled)
   - (e) Lead Shields (e.g., aprons) (must be recycled)

3. Chemical Sterilant Wastes
   - (a) Chemicals/Chemical Sterilant (dilute 4:1 with water before draining)

4. Waste Waters

5. Fluorescent Lamps and Batteries (recycle only)

ADA Hg HYGIENE Recommendations

- Sources of dental mercury in the office.
- General mercury hygiene recommendations.
- Office emergencies.
- Hygiene recommendations during preparation and placement of dental amalgam.
- Management of mercury spills.
- Management of small mercury spills.
- Management of large mercury spills.

- Recommendations are changing – stay current.
- Understand recycling documentation.
- Look for similar recommendations for other office materials.

Residual Hg in Capsules

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Non-Contact Amalgam

Pass-through jar lid
Rubber dam with slit
Spent fixer, glycerine, or water
Unused amalgam and mercury collection

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Hg Spill Kits

Spills = small; medium; large
Spills = accidents; daily micro-spills

Amalgam/Hg Separators

OBJECTIVE: Remove amalgam and/or mercury from air/water stream in HVAC system.

METHODS: ISO 11143 for Amalgam Separators.

<table>
<thead>
<tr>
<th>Amalgam Separator</th>
<th>EMPTY</th>
<th>FULL</th>
<th>Total Effluent Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1000</td>
<td>98.05%</td>
<td>96.24%</td>
<td>98.45%</td>
</tr>
<tr>
<td>Amalgam Collector</td>
<td>99.89</td>
<td>99.56</td>
<td>99.64</td>
</tr>
<tr>
<td>Asdex</td>
<td>99.10</td>
<td>99.36</td>
<td>99.24</td>
</tr>
<tr>
<td>Bulkflow</td>
<td>99.06</td>
<td>97.66</td>
<td>98.36</td>
</tr>
<tr>
<td>Dur 7800/7801</td>
<td>99.17</td>
<td>97.51</td>
<td>98.34</td>
</tr>
<tr>
<td>HgS</td>
<td>99.36</td>
<td>98.20</td>
<td>98.80</td>
</tr>
<tr>
<td>Hg15</td>
<td>99.93</td>
<td>99.95</td>
<td>99.94</td>
</tr>
<tr>
<td>MRU</td>
<td>99.66</td>
<td>98.94</td>
<td>99.30</td>
</tr>
<tr>
<td>MSS 2000</td>
<td>99.66</td>
<td>98.94</td>
<td>99.30</td>
</tr>
<tr>
<td>Rasch 890-4000</td>
<td>99.66</td>
<td>98.94</td>
<td>99.30</td>
</tr>
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<td>RME 2000</td>
<td>99.66</td>
<td>98.94</td>
<td>99.30</td>
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</tbody>
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Current Separator Technologies

Company: SOLMETEX
Location: Northborough, MA
Telephone Number: 978-252-9690

Company: DRNA
Location: Hackensack, NJ
Telephone Number: 201-489-4740 (FAX)

http://www.ncddental.org

Amalgam/Hg Separators

Cost = Separator Unit + Installation + Cartridges
Cost = Rental of unit (with free cartridges)

<table>
<thead>
<tr>
<th>Amalgam Separator</th>
<th>Claimed %</th>
<th>Unit Cost</th>
<th>Filter Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1000</td>
<td>&gt; 95%</td>
<td>$750</td>
<td>$500</td>
</tr>
<tr>
<td>Amalgam Collector</td>
<td>&gt; 95%</td>
<td>$350</td>
<td>$35</td>
</tr>
<tr>
<td>Asdex</td>
<td>&gt; 97.9%</td>
<td>$215</td>
<td>$35</td>
</tr>
<tr>
<td>Bulkflow</td>
<td>&gt; 95%</td>
<td>$100/month</td>
<td></td>
</tr>
<tr>
<td>Dur 7800/7801</td>
<td>&gt; 98%</td>
<td>$4,000</td>
<td>$95</td>
</tr>
<tr>
<td>Eco B</td>
<td>&gt; 95%</td>
<td>$29/month</td>
<td></td>
</tr>
<tr>
<td>HgS</td>
<td>&gt; 98%</td>
<td>$500</td>
<td>$75</td>
</tr>
<tr>
<td>Hg10 (Solmetex)</td>
<td>&gt; 99.9%</td>
<td>$696</td>
<td>$150</td>
</tr>
<tr>
<td>MRU (DRNA)</td>
<td>&gt; 95%</td>
<td>$100/month</td>
<td></td>
</tr>
<tr>
<td>MSS 2000</td>
<td>&gt; 98.8%</td>
<td>$3,000</td>
<td>$296</td>
</tr>
<tr>
<td>Rasch 890-4000</td>
<td>&gt; 95%</td>
<td>$1,650</td>
<td>$750</td>
</tr>
<tr>
<td>RME 2000</td>
<td>&gt; 96.9%</td>
<td>$1,895</td>
<td>$395</td>
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**SOLMETEX**

SOLMETEX
29 Cook Street
Billerica, MA 01821
TEL = 978-262-9690
FAX = 978-262-9889
http://www.solmetex.com

SolmetEX
Air-Water Separator
Filter and Hg Absorber
$695 for installation
$150 per cartridge exchange

99.5% recovery is typical

**Hg ROAD MAP**

Hg ROAD MAP

Safety, Efficacy
FDA

BMPs
Purchase
Storage
Usage
Filters
Training, Spills

OSHA / ADA

Patients
Personnel

Sanitary, Landfill (audits)
Incinerator (audits)

RECYCLING PLANT (audits)

EPA / NCDENR

SANITARY LANDFILL

OFFICE PLUMBING

Chairside Filter
Vacuum System and Trap
Separators
Flushing, Potting Lines

THANK YOU