
Name of Organization: University of Illinois at Chicago

Type of Organization: College or University

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Project Title: Dentist Recycling and Awareness Training Module

Project Category: Pollution Prevention and Reduction - BNS

Rank by Organization (if applicable): 0

Total Funding Requested (\$): 176,320 **Project Duration:** 2 Years

Abstract:

The professional dental community generally accepts that amalgam will remain the major dental restorative material for the foreseeable future. However, amalgam has been shown to be a source of 10 to 40% of the mercury discharged to POTW's. Since mercury has been targeted as one of the two priority pollutants in the Great Lakes, the reduction of amalgam discharge to POTW's, and then to the Great Lakes system should be a significant component of any Great Lakes toxic waste reduction program.

While the small and scattered dental office sources of amalgam make traditional regulatory controls difficult to implement, the high level of silver content (30%) of amalgam provides an economic basis for a voluntary recycling program. Key questions in the design of such a program include:

- 1.) What is the total amount of amalgam generated per dental office?
- 2.) What changes in dental amalgam disposal practices would be necessary in order to institute viable recycling programs?
- 3.) What responses would practicing dentists have to adopting such practices?
- 4.) How can dentists be made aware of both the environmental values of amalgam recycling and the necessary changes in disposal practices?

Concern for amalgam waste disposal has been shown by a number of POTW's in the Great Lakes region (Duluth, Detroit, and St Paul). The establishment of viable recycling programs to assist POTW's will first require a pilot program of amalgam collection and recycling utilizing practicing dentists. Only such a program can establish the feasibility of amalgam recycling in a manner credible to the professional dental community.

The objective of the proposed project is the design and implementation of a pilot amalgam recycling project with 30 to 40 practicing dentists in cooperation with state and local dental associations in the Great Lakes region and the University of Illinois at Chicago Dental School.

Geographic Areas Affected by the Project

States:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Illinois | <input checked="" type="checkbox"/> New York |
| <input checked="" type="checkbox"/> Indiana | <input checked="" type="checkbox"/> Pennsylvania |
| <input checked="" type="checkbox"/> Michigan | <input checked="" type="checkbox"/> Wisconsin |
| <input checked="" type="checkbox"/> Minnesota | <input checked="" type="checkbox"/> Ohio |

Lakes:

- | | |
|-----------------------------------|---|
| <input type="checkbox"/> Superior | <input type="checkbox"/> Erie |
| <input type="checkbox"/> Huron | <input type="checkbox"/> Ontario |
| <input type="checkbox"/> Michigan | <input checked="" type="checkbox"/> All Lakes |

Geographic Initiatives:

- | | | | | |
|---|----------------------------------|-------------------------------------|--------------------------------------|---|
| <input checked="" type="checkbox"/> Greater Chicago | <input type="checkbox"/> NE Ohio | <input type="checkbox"/> NW Indiana | <input type="checkbox"/> SE Michigan | <input type="checkbox"/> Lake St. Clair |
|---|----------------------------------|-------------------------------------|--------------------------------------|---|

Primary Affected Area of Concern: Not Applicable

Other Affected Areas of Concern:

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area: Not Applicable

Other Affected Biodiversity Investment Areas:

Problem Statement:

The disposal of dental wastewater streams into sewage systems from dental offices and clinics is suspected to contribute anywhere from 10% to 40% of the mercury loading to wastewater treatment facilities, based upon studies in Seattle, Washington and Duluth, Minnesota. Given stricter mercury discharge standards, the mercury loading from this and other small sources may influence the ability of treatment facilities to meet NPDES permit requirements. Stricter discharge standards reflect the recognition of the serious impacts of mercury discharges on the aquatic ecosystems.

Our previous research has indicated that over 50% of the mercury and silver can be collected from particles trapped in the in-line trap and the excess materials not placed into the oral cavity. By collecting these two sources of amalgam through a volunteer program utilizing relatively simple changes in dental amalgam disposal practices, a significant reduction in to the amount of silver and mercury entering the sewer system can be eliminated. This program is designed to test the effectiveness of such a program.

The intent is to design a collection system consisting of, three containers to be placed in the 30-40 participating dental offices: (1) to collect the material from the in-line trap, (2) to collect the excess dental amalgam that is not placed into the oral cavity, and (3) to collect the capsules in which the mercury and amalgam powder is packed and sold to the dentist for utilization as a restorative material. The reason to collect these capsules is to determine how much amalgam is being utilized in the respective dental offices. This data along with our previous research will allow us to estimate the amount of amalgam being used and how much passed into the sewer system. We intend to monitor several dental offices (5-10) where the dental office has a single feed into the sewer line and determine how much change occurs with the in place recycling program. Cold vapor atomic absorption will be used to determine total mercury content in the waste stream from the dental office. We expect to collect the containers once a month and to run the project for 2 years.

A second phase of the program involves the investigation of the responses of the dentists in the pilot program to the changes made in amalgam disposal practices and their suggestions regarding the design of the collection system. Since the proposed program does not involve any expensive particle separation devices, the major cost to the dentists relates to the perceived disruption of normal practice patterns. It is imperative to the acceptance of any recycling programs by the professional dental community, that the responses of the practicing dentists in the pilot program be assessed, that the collection systems be designed with respect to their concerns, and that the results of the pilot program be disseminated through professional dental information sources.

A third phase of the program will involve the estimation of the value of the potential yield of silver from a recycling program. Our preliminary assessment of silver yields from such a program seems to indicate that the value of the recovered silver could more than offset collection and processing costs once the amalgam is collected at the dental office.

The final phase of the program would involve the dissemination of the results of the program. A short course on amalgam disposal will be developed as part of the continuing education program of the University of Illinois at Chicago Dental School. The course will cover the environmental impacts of mercury on water quality and a description of proper disposal techniques. The module will then be submitted to the American Association of Dental Schools for their review. In addition descriptions of the recycling program and the responses of the dentists in the program will be presented in publications of the state and local dental associations in the Great Lakes area.

Proposed Work Outcome:

The outcome will be the design and evaluation of amalgam recycling practices with the intent to minimize the discharge of mercury into the public sewer systems in the Great Lakes region. The inclusion of practicing dentists into the process of design and assessment of the program and the cooperation of state and local dental associations in a professional dental education program is key to the acceptance of voluntary recycling efforts to control this source of mercury discharge in the region.

Project Milestones:	Dates:
Project Start	07/2000
Recruitment of Dentists	08/2000
Institute Recycling Project	11/2000
Recycling Collection	01/2001
Training Module for Continuing Education	04/2001
Evaluation	03/2002
Project End	06/2002
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Project Addresses Environmental Justice

If So, Description of How:

Project Addresses Education/Outreach

If So, Description of How:

Project will result in the development of continuing education training modules at the University of Illinois at Chicago School of Dentistry on best recycling practices and awareness of the effect of mercury on the environment. Results of the project will be presented in publications of the state and local dental associations in the Great Lakes region.

Project Budget:

	Federal Share Requested (\$)	Applicant's Share (\$)
Personnel:	78,000	0
Fringe:	18,720	0
Travel:	2,000	0
Equipment:	0	0
Supplies:	5,000	0
Contracts:	0	0
Construction:	0	0
Other:	10,000	0
Total Direct Costs:	113,720	0
Indirect Costs:	62,600	0
Total:	176,320	0
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

None

Description of Collaboration/Community Based Support:

Kevin G. Croke, Professor
Health Policy and Administration
School of Public Health
University of Illinois at Chicago, Chicago Illinois 60612

Michael Cailas, Associate Professor
Environmental and Occupational Health Sciences
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