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**Name of Organization:** Wisconsin Department of Natural Resources

**Type of Organization:** State

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**Project Title:** Glass Aggregate Feasibility Study

**Project Category:** Contaminated Sediments

**Rank by Organization (if applicable):** 1

**Total Funding Requested (\$):** 250,000 **Project Duration:** 1 Years

**Abstract:**

Numerous comments received on WDNR's draft Lower Fox River Remedial Investigation/Feasibility Study (RIFS) encouraged the expanded use of treatment/destruction technologies to cleanup the contaminated river sediments. Many comments also preferred the use of exsitu (remove sediments) options over insitu (in river) alternatives. The availability of a cost effective treatment option would lower the over all cost of sediment cleanups not only on the Lower Fox River and statewide but also throughout the Great Lakes basin. Cost effective treatment (vitrification) and beneficial reuse of the by-product (glass aggregate) would result in an affordable and effective river cleanup alternative while also destroying/immobilizing the contaminants present.

Minergy Corporation submitted comments to the RIFS suggesting that vitrification (glass making technology) is a cost-effective technology to manage the sediments from the Lower Fox River. Minergy Corporation is a subsidiary of Wisconsin Energy Corporation. In response to these comments, department staff have been collaborating with Minergy over the past year to review and determination if vitrification is a feasible option to treat contaminants present in river sediments.

Collaboration to date includes conducting a mineral characterization study and a crucible melt/preliminary engineering study. The results of these two initial studies are very positive. The mineral characterization study confirmed that Lower Fox River sediment heating content was too low for a combustion-based technology and mineral composition is consistent and within an acceptable range throughout the river.

**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 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:** All AOCs

**Other Affected Areas of Concern:** Applicable to all AOCs with contaminated sediments.

***For Habitat Projects Only:***

**Primary Affected Biodiversity Investment Area:**

**Other Affected Biodiversity Investment Areas:**

**Problem Statement:**

Contaminated sediments are a common problem throughout Areas of Concern within the Great Lakes Basin. Contaminated sediments can significantly contribute to the impairment of nearly all identified beneficial uses. Dredging of sediments is frequently done to improve environmental conditions where contaminated sediments pose unacceptable risk to human and ecological health. The Great Lakes ecosystem health depends, among other things, on the elimination of contaminants or, where necessary, a high level of isolation. Removal of the contaminated sediments from the ecosystem is the preferred action because it permanently eliminates the exposure pathway. However, where to place dredge material is a question in search of answers.

Similar points were made in response to WDNR's February 1999 release, for public comment, of a draft Remedial Investigation/Feasibility Study (RI/FS) for addressing the contaminated sediments in the Lower Fox River. Both insitu and exsitu remedial alternatives were evaluated for their ability to break the contaminant exposure pathway. WDNR received numerous comments on the draft RI/FS. Several of the comments requested that the use of PCB destruction technologies be given additional review and wider use in the proposed cleanup alternatives. Also, more comments were received supporting exsitu cleanup options than insitu options.

Beneficial use is the general term that describes alternatives for managing dredge material by focusing on its value as a resource and not as a waste. Converting river sediment into glass aggregate provides effective solutions to both the destruction of contaminants and disposal issues. Eliminating disposal from the cleanup equation removes a significant hurdle from the path of exsitu cleanup options.

One set of RI/FS comments were received from Minergy Corp. who currently operates a glass aggregate facility adjacent to the Lower Fox River. This facility presently burns paper mill sludge into glass aggregate that is subsequently resued primarily as fill material. Minergy Corp.'s comments suggested that a vitrification (melting) technology may be more appropriate for the treatment of sediment contaminants. WDNR contacted Minergy as a follow-up to their comments and Minergy prepared a proposal for a multi-phased study to determine the cost effectiveness of this technology to produce a usable by-product (glass) while destroying organic contaminants (PCB) and immobilization of inorganic contaminants (Hg).

**Proposed Work Outcome:**

This proposal requests funding for Phase III of the Glass Aggregate Feasibility Study. Phase III is the construction and operation of a pilot melting facility that will convert 60 tons of dewatered Fox River sediment into glass aggregate. The Phase III pilot will determine the cost and treatment effectiveness of this technology as a feasible remedial option.

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Phases I and II of this feasibility study have been completed. The first phase (Phase I) was to characterize the mineral composition of river sediments. The results would allow for the prediction of glass quality, durability and melting points. This phase has been completed and concluded that river sediment characteristics are consistent throughout the river and are very favorable for producing a quality glass product. The second phase of the project (Phase II) was the performance of crucible melts of actual Fox River sediment and to develop preliminary engineering specifications for a larger pilot plant test (Phase III). The crucible melts were conducted to determine the melting performance of the sediment alone and when augmented with other materials (flux mixtures). Four test recipes were conducted and the sediment melted successfully into glass in all four tests. Phase II results include a proposed recipe for melting river sediment into glass aggregate and preliminary engineering designs for the pilot test facility proposed in Phase III.

Approximately 70 tons of dewatered sediments have been secured from the pilot dredging project at SMU 56/57 in the Lower Fox River. The pilot melter will be built based on specifications resulting from the Phase II testing. The pilot melter will be constructed to produce approximately 2 tons of glass aggregate per day. The pilot melt will continuously produce glass aggregate for approximately 14 days in order to generate the necessary information to determine cost and treatment effectiveness and for scale-up considerations for Phase IV of the study. Phase IV, if undertaken, is the construction and operation of a full scale facility and is dependent on reaching agreement with the Responsible Parties on the Lower Fox River.

<b>Project Milestones:</b>	<b>Dates:</b>
Phase III Kickoff	01/2000
WDNR Contract Award to Minergy	03/2000
SITE Quality Assurance Project Plan	07/2000
Construction of pilot melter	05/2000
Melt sediments	08/2000
SITE Evaluation Report	03/2001
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Project End	05/2001

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Project Addresses Environmental Justice

**If So, Description of How:**

Project Addresses Education/Outreach

**If So, Description of How:**

WDNR and Minergy will host a web site dedicated to this project. Information including project documents, data (graphical and tabular), pictures and video will be available and updated regularly throughout the project. The SITE program will prepare a detailed report on the cost and treatment effectiveness of this technology. The results will be incorporated into the decision-making process (either the RI/FS or Record of Decision) for the Lower Fox River. Presentations (and/or other forms of information transfer) will be given to local officials in the Lower Fox River valley, Region V's Sediment Team, Great Lakes Dredging Team and the IJC's SEDPAC committee.

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**Project Budget:**

	<b>Federal Share Requested (\$)</b>	<b>Applicant's Share (\$)</b>
<b>Personnel:</b>	0	0
<b>Fringe:</b>	0	0
<b>Travel:</b>	0	0
<b>Equipment:</b>	0	0
<b>Supplies:</b>	0	0
<b>Contracts:</b>	250,000	250,000
<b>Construction:</b>	0	0
<b>Other:</b>	0	0
<b>Total Direct Costs:</b>	250,000	250,000
<b>Indirect Costs:</b>	0	0
<b>Total:</b>	250,000	250,000
<b>Projected Income:</b>	0	0

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

This project will be conducted under a cost share arrangement with Minergy Corp. The WDNR and Minergy portions of the project are 45% and 55%, respectively. Essentially, Minergy Corp. proposes to fund the construction of the melter while WDNR will fund the operation and expendables component (staff, supplies, fuel....) during the pilot melt. The budget for constructing and operating the Phase III pilot melter is estimated to be \$660,000. Beyond WDNR's 45% contribution to the construction and operation of the pilot melter, WDNR is responsible for providing the necessary sediments at <10% water content. The budget for obtaining the sediments and drying is approximately \$160,000. Therefore WDNR's total contribution to this pilot is approximately \$510,000 including a 10% contingency.

The costs outlined above do not include monitoring of the pilot melt. US EPA Superfund Innovative Technology Evaluation (SITE) Program has agreed to fund and conduct the evaluation of cost and treatment effectiveness for this pilot. SITE will be designing the monitoring plan, preparing the Quality Assurance Project Plan (QAPP), sample collection and data analysis. A budget for this activity has not been prepared however it could easily exceed \$500,000.

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**Description of Collaboration/Community Based Support:**

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US EPA Superfund Innovative Technology Evaluation (SITE) program has agreed to evaluate the cost and treatment effectiveness of this pilot. SITE will design the monitoring plan, prepare the Quality Assurance Project Plan (QAPP), collect the necessary samples, data analysis and prepare a report.