

Trust Fund 2009 Work Program Progress Report

Date of Progress Report: April, 2011- Work Program Amendment Request

Date of Next Progress Report: June 30, 2011

Date of Work Program Approval: June 16, 2009

Project Completion Date: June 30, 2011

I. PROJECT TITLE: Ballast Water Technology Testing and Sampling in Freshwater

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Total Trust Fund Project Budget:	Trust Fund Appropriation	\$	300,000
	Great Lakes Protection Acct	\$	66,000
	Minus Amount Spent:	\$	<u>251,423</u>
	Equal Balance:	\$	114,577

Legal Citation: M.L. 2009, Chp. 143, Sec. 2, Subd. 6(a) titled "Ballast Water Sampling Method Development and Treatment Technology".

II. PROJECT SUMMARY AND RESULTS:

Safe and effective shipboard treatment of ballast water is regarded as the best solution to address ballast water as a pathway for the introduction of invasive species. Three ballast treatment systems have received International Maritime Organization (IMO) approval relative to effectiveness and environmental soundness, however, these systems remain largely untested relative to fresh water performance. Moreover, the best technical means of monitoring the effect of treatments installed on ships relative to a given benchmark has yet to be fully developed, trialed and customized to Great Lakes ships. In addition to assessing treatment effectiveness onboard ships, credible monitoring information is essential to understanding the relative contributions of vessel fleets to the introduction and spread of invasive species. This project will advance protection of Minnesota's water resources with respect to ship-mediated introductions of invasive species through: a) fresh water testing in Lake Superior of at least two ballast treatment systems that have received International Maritime Organization approval, and 2) developing, to the extent

necessary, and trialing scientifically credible and operationally feasible ballast water monitoring/sampling mechanisms and procedures for purposes of measuring discharge quality against a treatment performance benchmark. The work will also result in the collection and analysis of information on the contents of ballast discharge associated with a range of ships to assist in further developing the state's environmental and natural resources policies. The project will contribute to environmental protection in the state and region by fully outfitting twelve ships that visit Duluth Harbor for effective and efficient discharge monitoring.

III. PROGRESS SUMMARY AS OF ~~January 29, 2010~~ April, 2011

Progress Summary (March 2011): GSI completed the Participation Agreement with IMO approved technology vendor Alfa Laval for tests on the PureBallast® BWTS to be conducted during the summer of 2010 on the treatment process approved by IMO and a possible improved version. This treatment process employs filtration and an advanced oxidation technology, and does not use or generate active substances of concern. The tests proceeded on schedule, but the treatment process encountered filter performance problems early in the test regime under ambient conditions of Duluth-Superior Harbor (see Appendix A). IMO-relevant testing yielded negative outcomes in the context of freshwater according to the terms of IMO guidelines. In addition to the IMO-relevant trials, in which the treatment system did not perform effectively, a set of research and development trials was undertaken to help determine the nature of the problem. The final report on treatment performance within these trials is now public. However, the fact that the IMO-approved system did not perform to the IMO standard in these land-based tests was a very important finding in support of effective ballast treatment for the Great Lakes. While disappointing, this testing outcome is vital to the avoidance of poorly functioning systems, and successful development of effective treatment processes applicable to the Great Lakes.

GSI developed and will apply a method for ship discharge monitoring under this project that is consistent with efforts through the International Standards Organization, and domestic efforts through linkage to the US Coast Guard and EPA. GSI organized an advisory committee and held conference calls to develop a method for installing ship discharge monitoring equipment that is consistent with USCG and IMO guidelines, and universally applicable to Great Lakes relevant ships. Of the 12 ships to receive sample ports via this project, 9 such installations are underway. These installation required preliminary ship visits, a brief report with computational fluid analysis, and development of detailed installation guidelines. Three additional ships have yet to be identified for installations, but negotiations for same are underway.

Due to the confusion around the insurance issue (see 3/4/10 update) and the inability to plan for the insurance until after the budget was set, NEMWI looked to other sources to pay for errors and omissions insurance and were unable to find other funds. NEMWI respectfully requests a retroactive budget amendment that

allows grant money to be used to cover the cost of the required errors and omissions insurance for year 2010 and year 2011. Please see Result 1 for more details. NEMWI also requests that grant money be used to purchase insurance for the remainder 2.5 required years at a set premium. The estimated amount is included in the amended spreadsheet. If the insurance does not allow NEMWI to purchase the next 2.5 years at one time than the budgeted amount for insurance will be paid to NEMWI at the completion of the project for the remaining insurance payments.

(3/4/10 revision): Explanation of requirement for Errors and Omissions Liability Insurance. In administering the LCCMR grant, MPCA staff decided to use a standard professional services contract template that has different requirements than the LCCMR recommended template. One requirement is the Errors and Omissions Insurance requirement. (contract clause 20.B.4. – page 8 of contract # B32893) LCCMR staff and NEMWI staff questioned the need for this insurance. MPCA staff contacted Marlys Williamson, Risk Assessment Specialist, MN Department of Administration, for advice on this issue. Ms. Williamson recommended, based on the activities described in the Work Program, that it is best to have the insurance in this case. Attached to this Progress Report is additional information provided by NEMWI staff showing the application for coverage submitted to their insurance company.

Progress Summary (1/29/10): GSI acquired Errors and Omissions Liability Insurance for one year. GSI also initiated a Participation Agreement with IMO approved technology vendor Alfa Laval for tests to be conducted this summer on the treatment process approved by IMO and a possible improved version. This treatment process does not use or generate active substances of concern. The testing procedure for these tests is already defined and the test facility is ready. Therefore these tests should proceed on schedule this summer. GSI coordinated ship discharge monitoring apparatus development under this project with international efforts through the US delegation to the International Standards Organization, and domestic efforts through linkage to the US Coast Guard and EPA, GSI organized an advisory committee and first conference call to plan project implementation during 2010. Advisory Committee members include state representatives from MN, NY, and WI, ship owners relevant to the salty, US laker and Canadian laker fleets, relevant US and Canadian regulatory officials, marine engineers and biologists. During the first call, participants will provide their review of current ISO ship discharge monitoring apparatus design and make suggested improvements. Through the call, ships will be identified for installation of the treatment apparatus in the Great Lakes.

Amendment Request (8/13/09): A change of project manager from Mary Jean Fenske to Jeff Stollenwerk ~~is reported~~is requested because Mary Jean Fenske took a new position at the MPCA unrelated to this area of work. ~~Awaiting approval from LCCMR for this Amendment Request.~~LCCMR acknowledged the change in project manager.

IV. OUTLINE OF PROJECT RESULTS:

Result 1: Install and trial inline sampling devices on twelve ships develop a methods guidebook for effective ship discharge monitoring, and categorical data on ballast biological constituents of subject ships.

Description: Results from this part of this study will build the state's capacity to monitor ships' discharges into Minnesota ports (Duluth, Two Harbors, Taconite Harbor, Silver Bay) for invasive species. By leveraging existing funds, benefit will be afforded to this specifically Minnesota-based purpose for the funds required by creating the capacity for the state to monitor ballast discharges from ships traveling its waters. These funds will provide for the development of guidebook-like protocols for use by shipping companies and potential state regulators.

Result 1 Progress (April/2011): Of the 12 ships to receive sample ports via this project, 9 such installations are underway. These installation required preliminary ship visits, a brief report with computational fluid analysis, and development of detailed installation guidelines. Three additional ships have yet to be identified for installations, but negotiations for same are underway.

NEMWI requests that the \$5,868 be retroactively approved to be spent on errors and omissions insurance in January 2010 for insurance through October 2010 and its renewal for \$5,606 in October 2010 covering the project through November 2011. The project ends on June 30, 2011 although the insurance is required until June of 2014. NEMWI also respectfully requests that an additional amount of approximately \$14,949, (as estimated below) is allocated from the budget to cover future errors and insurance costs required in the terms of the contract (contract clause 20.B.4 of contract #B32893), with the State of Minnesota. These are estimated amounts and may be adjusted when premium amounts are set by the insurance company.

E&O insurance - Great Ships Initiative
LCCMR contract

<u>November 2009 - October 2010</u>	<u>\$5,868</u>
<u>November 2010 - October-2011</u>	<u>\$5,606</u>
<u>November 2011 - October-2012</u>	<u>\$5,606</u>
<u>November 2011 - October-2013</u>	<u>\$5,606</u>

November 2013 - June-2014 \$3,737

Total \$26,423

Assumptions:
Premium stays at \$5,606
Able to pro-rate the premium in 2014

The money spent on insurance is subtracted out of the budgeted amount for Result 1, as a result 2 ships will not be outfitted with the technology. 10 ships instead of 12 ships will progress as intended.

Result 1 Progress (1/29/10): Progress on this portion of the grant has been delayed in the interest of coordinating it effectively with other national and international ship discharge monitoring efforts. Two groups internationally, the International Maritime Organization and the International Standards Organization are developing proposed standard approaches to ship discharge monitoring. Meanwhile, the US Coast Guard is undertaking an independent review and development process. Initially, it appeared that the best way to coordinate would be for this project to trial the methods recommended by the USCG, IMO and ISO, which according to those organizations were to be developed imminently. As it turned out, these governmental processes have encountered delays, which in turn delayed progress on this portion of the project by approximately 12 months. Rather than continue to await the output of the design stage of these efforts, GSI, in consultation with these organizations, will undertake design in concert with these groups. This way the GSI project can provide input into the design processes as well as empirical information on how well a particular design approach works in practice.

GSI will seek an optimal design that has critical features that remain standard across ship types, but which can be adapted for effective use by a variety of ships relevant to the Great Lakes fleets.

Summary Budget Information for Result 1:

Trust Fund Budget:	\$ 156,000
Amount Spent:	<u>\$ 77,389</u>
Balance:	\$ 78,611

Result 2: Evaluation of ballast water treatment systems performance in fresh water

Description: The Great Ships Initiative (GSI) has the only fresh water testing facility in the world, located in the Duluth/Superior Harbor. To expedite implementation of treatment systems that are effective and safe in fresh water and to establish the degree to which other testing facilities may be providing findings predictive under the circumstances of Minnesota waters, the project will contract with Northeast Midwest Institute (NEMWI), lead organization for managing the GSI testing facility, to test at least two and up to three treatment systems that have received final approval under international guidelines and agree to be tested at the GSI facility.

Result 2 Progress (April, 2011) GSI completed the Participation Agreement with IMO approved technology vendor Alfa Laval for tests on the PureBallast® BWTS to be conducted during the summer of 2010 on the treatment process approved by IMO and a possible improved version.

Result 2 Progress (3/4/10 Revision) – Last month Hamann announced that it will no longer be pursuing commercial production of the SEDNA ballast water treatment system. This decision is based, at least in part, on new information that identified significant problems with residual toxicity associated with peracetic acid in cold fresh water environments. While Hamann’s withdrawal from testing at GSI last fall delayed progress on this LCCMR funded project, it appears that funds were saved by not testing an ill-fated system.

Result 2 Progress (1/29/10): The IMO approved treatment system lined up for testing in 2009 withdrew as a result of the economic downturn (Sedna System by Hamann). This summer, however, the first treatment system to receive IMO approval is prepared to undertake freshwater testing at our facility. This treatment method, produced by Alfa Laval, utilizes filtration, UV and a catalyst, among other treatment components. It does not employ an active substance, per se, but produced lethal radicals that degenerate after a short period of time. GSI will conduct preliminary trials at the bench scale to assure that the discharge will meet state and federal requirements, and then proceed to land-based testing this summer. Since the tests will not be for IMO approval, which the system already has, we will design them to answer as many questions as we can predict the US authorities might have about the system. In addition, Alfa Laval would like to trial an updated version that optimizes operational conditions.

Summary Budget Information for Result 2:	Trust Fund Budget:	\$ 210,000
	Amount Spent:	<u>\$ 171,033</u>
	Balance:	\$ 35,967

V. TOTAL TRUST FUND PROJECT BUDGET:

Contracts: \$ 366,000 for Northeast Midwest Institute (lead for Great Ships Initiative)

TOTAL TRUST FUND PROJECT BUDGET: \$ 366,000

Explanation of Capital Expenditures Greater Than \$3,500:

3/4/10 Revision: None.

Update (1/29/10):

- ~~1. Errors and Omissions Liability Insurance = \$5868.12~~
- ~~2. Staff hours developing participation agreements = \$4093.05~~

VI. PROJECT STRATEGY:

A. Project Partners:

Rebecca Walter, Minnesota Pollution Control Agency – No money received

Jay Rendall, Minnesota Department of Natural Resources – No money received

Allegra Cangelosi, Northeast Midwest Institute - \$ 366,000 for project oversight and payment for work by AMI Engineering, University of Minnesota- Duluth, and Lake Superior Research Institute

B. Project Impact and Long-term Strategy:

This project will provide necessary research to help prepare for the MPCA's implementation of its new ballast water discharge permit by providing information on sampling methods that is currently lacking. New information gained on treatment technology performance in fresh water will assist the MPCA in approving technologies between 2011 and 2016. In addition, this project will likely influence federal and other Great Lakes states efforts to prevent the introduction and spread of invasive species.

C. Other Funds Proposed to be Spent during the Project Period:

Attachment B contains a list of the additional money and in-kind resources that will be spent on the project.

The Trust funds will be combined with \$350,000 of US DOT Maritime Administration (MARAD) money to make it possible to include as many different kinds of ships that ply the Great Lakes as possible in the analysis for Result 1 of this Project. In so doing, the GSI will generate information that will prepare the full range of ships that ply the Great Lakes for effective ballast discharge monitoring, and assure that Coast Guard guidelines are applicable to the entire range. For Result 1, the MARAD funds will go to the sampling demonstration, drafting of biological design and sampling protocols, results and interpretation of biological ballast water sampling analyses, evaluation and write up (UWS, NEMWI and other scientific expertise).

NEMWI funds will be used for securing the participation of ships, developing a participation agreement contract, assuring all parties have adequate insurance, oversight and management of engineering design and analysis and sampling apparatus installation, peer review of results, and posting of results. The Trust funds also will support a Great Lakes-based engineering firm knowledgeable in Great Lakes fleets and ballast sampling to adapt the USCG proposed design and criteria to detail and implement an installation plan for each test ship.

D. Spending History:

Prior to July 1, 2010, approximately \$25,000 of the \$350,000 MARAD funds will be expended to begin the project, and to contract with engineers for discharge sampling apparatus design.

Prior to July 1, 2010, approximately \$50,000 of the LCCMR money will be expended to organize summer 2010 testing of the IMO approved treatment system, and prepare the facility.

VII. DISSEMINATION: In addition to submittal of the research findings for publication in a peer-reviewed journal for Result 1, findings of the research from this project will be disseminated by the organizations involved in this effort. The MPCA will share the findings to the more than 300 parties on its ballast water program e-mail distribution list and make it available on its vessel discharge program webpage (<http://www.pca.state.mn.us/programs/ballastwater.html>). The MPCA also intends to share project progress and findings with the Great Lakes Panel on Aquatic Nuisance Species at future meetings and request electronic distribution by that group to its members. The Great Ships Initiative webpage (<http://www.nemw.org/GSI/index.htm>) will post research findings and its Board members will be asked to distribute results as well. The audience for this project includes vessel owners and operators, shipping industry association representatives, port authorities, natural resource experts, other Great Lakes states, the US Coast Guard, U.S. Environmental Protection Agency, Transport Canada, Fisheries and Oceans Canada, and other private individuals and organizations interested in addressing the ship-mediated introduction of invasive species via ballast water.

Update (1/29/10): No dissemination actions to report.

Attachment A: Budget Detail for 2009 Projects (April 2011 Progress Report Revision)										
Project Title: Ballast Water Technology Testing and Sampling in Freshwater										
Project Manager Name: Rebecca walter										
Trust Fund Appropriation: \$ 366,000 (\$300,000 from Trust fund/ \$66,000 from Great Lakes Protection Account)										
2009 Trust Fund Budget	Result 1 Budget:	Result 1 Budget Revised 5/3/2011	Amount Spent (12/31/2010)	Balance (March/2011)	Result 2 Budget:	Result 2 Budget	Amount Spent (March 2011)	Balance (March 2011)	TOTAL BUDGET	
	Identify and trial inline sampling devices and methods on ships				Evaluation of ballast water treatment systems performance in fresh water					
BUDGET ITEM										
Contracts										
Professional/technical contract with Northeast Midwest Institute for project management and subcontracts*	\$156,000		\$77,389	\$78,611		\$210,000	\$174,829	-\$174,829	\$156,000	
COLUMN TOTAL	\$156,000		\$77,389	\$78,611		\$210,000	\$174,033	-\$174,033	\$156,000	
DETAILS OF CONTRACT										
*Result 1 Contract with NEMWI:	Budget	Result 1 Budget Revised 5/3/2011	Amount Spent continued:	Balance continued	*Result 2 Contract with NEMWI:		Result 2 Budget	Amount Spent	Balance	
1. In-line sampling apparatus design and installation plans for 42-10 ships from three different classes of vessels consistent with domestic and international guidelines	NEMWI subcontract to AMI Engrg \$35,000	\$35,000	\$35,000	\$0	1. Participation agreements with at least two treatment technology vendors and submittal of applications for discharge permits, if needed	NEMWI	\$10,000	\$10,000	\$0	
2. Outfitting of 42-10 ships in the fleet of ships that travel to Duluth/Superior with in-line sampling devices	NEMWI subcontract to AMI Engrg \$96,000	\$69,577	\$6,033	\$63,544	2. Biological sampling and testing protocols consistent with international and domestic guidelines	NEMWI	\$10,000	\$10,000	\$0	
3. Protocol for ballast discharge sampling and analysis for Minnesota	NEMWI \$25,000		\$25,000	\$0	3. Conduct treatment tests on two and up to three treatment systems at GSI facility	NEMWI Subcontract for biological sampling, analysis and results write-up: UW-Superior: \$90,000; UM-Duluth: \$45,000	\$135,000	\$132,015	\$2,985	
4. Errors and Omissions Insurance	Contract with Insurance Company \$0	\$26,423	\$11,356	\$15,067	4. Report detailing treatment test procedures, biological results of samples collected and analyzed, and results analysis. Includes budget of \$1000 for Travel/ Meetings by NEMWI staff.	NEMWI	\$55,000	\$22,018	\$32,982	
COLUMN TOTAL	\$156,000	\$131,000	\$77,389	\$78,611	COLUMN TOTAL		\$210,000	\$174,033	\$35,967	

Attachment B: Other Funds Budget Detail for 2009 Projects (1/31/10 Progress Report)

SOURCE OF OTHER FUNDS	AMOUNT	Status
Other Non-State \$ Being Leveraged During Project Period: Maritime Administration (Federal Funding). For purchase and installation of ship sampling devices, data analysis and write-up	\$ 350,000	<i>Secured (federal funding)</i>
In-kind Services During Project Period:		
NEMWI/City of Superior for use of land-based test facility site and equipment for treatment testing	\$ 75,000	<i>Secured</i>
UMD and UWS for use of laboratory space and equipment	\$ 5,000	<i>Secured</i>
Duluth Port Authority for marine engineering advice	\$ 25,000	<i>Secured</i>
Carrier companies for access and support during design and implementation of sampling exercises (verbal agreements made)	\$ 25,000	<i>Pending</i>
Treatment system developers for access to prototype systems for testing*	To be determined	<i>Pending</i>
GSI expert advisors from USGS, Cornell University, Old Dominion U, Maritime Environmental Research Center	\$ 10,000	<i>Secured</i>
MPCA for expertise/coordination supplied by Jeff Udd, Mary Jean Fenske	\$ 10,000	<i>Secured</i>
MN DNR for expertise supplied by Jay Rendall's time	\$ 5,000	<i>Secured</i>
TOTAL: Other Funds/ In-Kind Service Value	\$ 505,000	

*One vendor (Hammon) has committed verbally to date.