

2008 Project Abstract

For the Period Ending June 30, 2010

PROJECT TITLE: Testing Pesticides and Degradates in Public Drinking Water

PROJECT MANAGER: John W. Hines

AFFILIATION: Minnesota Department of Agriculture

MAILING ADDRESS: 625 Robert Street North

CITY/STATE/ZIP: Saint Paul, Minnesota, 55155

PHONE: 651-201-6694

E-MAIL: john.w.hines@state.mn.us

WEBSITE: <http://www.mda.state.mn.us/chemicals/pesticides/maace.aspx>

FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2008, Chp. 367, Sec. 2, Subd. 4(c)

APPROPRIATION AMOUNT: \$368,000

Overall Project Outcome and Results

Pesticides are known to impact Minnesota's groundwater and there are new pesticides being developed and registered for use every year. To ensure the safe use of new pesticides it is essential to measure the concentration and frequency of their detection in the state's water resources. In addition it is critically important, for proper pesticide management, to be able to analyze water samples for the compounds parent pesticides break down into. It is only through the precise measurement of extremely small quantities of pesticides in the state's water resources that impacts to human and ecological health may be determined.

Through this project the Minnesota Department of Agriculture (MDA) laboratory acquired the necessary analytical equipment and developed appropriate analytical methods for analyzing water samples for additional new generation pesticides and their degradates in groundwater and drinking water in Minnesota. The new equipment and related methods expanded the spectrum of compounds the MDA is able to detect in water samples, increased precision of water sample analysis, and improved the overall efficiency of water sample analysis at the MDA. Furthermore, the MDA laboratory is now capable of measuring many pesticides to levels of sub parts-per-trillion in a water sample. Measures of such precision will allow the MDA to manage pesticide use to keep concentrations below levels injurious to humans or the environment.

Prior to completion of this project the MDA was able to analyze water samples for 36 pesticide parent compounds and 11 breakdown products. The new methods are able to analyze samples for 88 parent pesticides and 22 breakdown products. Before the new methods were developed the lowest measurable value for a specific pesticide was between 50 and 1000 parts-per-trillion while the laboratory is now able to measure pesticide quantities between 0.8 and 50 parts-per-trillion, depending on the specific pesticide being measured.

Sample results for monitoring conducted by the MDA during winter and spring periods in 2010 are showing interesting results. A small number of pesticides never before discovered have been detected, albeit at very low concentrations. A clearer image of the occurrence of various pesticide breakdown products is also beginning to emerge and ongoing work should provide insight to the balance between pesticide parent and degradate detections in the state's water resources. These results will also allow the MDA to more precisely determine pesticide impacts to the water resources and aid in understanding the effectiveness of recommended BMPs and other pesticide management practices.

To the degree that time and lab resources allow, the equipment purchased and methods developed through this project will also be available for use by any future publicly funded projects at no cost except standard operating expenses.

Project Results Use and Dissemination

Immediately following successful development of the new methods the MDA laboratory analyzed 100 samples from public drinking water wells across the state. These wells were selected and sampled by the Minnesota Department of Health from the available community wells that are not typically included in the US-EPA Safe Drinking Water Act pesticide monitoring requirements. As of this report results are just becoming available. Results of the testing will be made available by the Department of Health following proper notification of the participating communities.

In addition to the one time sampling of the community wells, every sample collected by the MDA monitoring program for both surface water and groundwater will be analyzed with the new methods. The first results from the MDA monitoring program samples will be published in mid 2011 as part of the program's annual water quality monitoring data report. Development of the methods and analysis of samples utilizing the methods will also be reported to the US-EPA as part of the federal reporting requirements enabling the registration of pesticides for use in the state of Minnesota.

Trust Fund 2008 Work Program Final Report

Date of Report: July 2, 2010
Date of Next Status Report: Final Report
Date of Work program Approval: June 10, 2008
Project Completion Date: June 30, 2009

I. PROJECT TITLE: Testing Pesticides and Degradates in Public Drinking Water

Project Manager: John W. Hines
Affiliation: Minnesota Department of Agriculture
Mailing Address: 625 Robert St. North
City / State / Zip : St. Paul, MN, 55155
Telephone Number: 651-201-6694
E-mail Address: John.W.Hines@state.mn.us
Fax Number: 651-201-6117
Web Page address: www.mda.state.mn.us

Location: Statewide

Total Trust Fund Project Budget:	Trust Fund Appropriation:	\$	368,000
	Minus Amount Spent:	\$	367,511
	Equal Balance:	\$	489

Legal Citation: M.L. 2008, Chap. 367, Sec. 2, Subd. 4(c)

Appropriation Language:

\$368,000 is from the trust fund to the commissioner of agriculture, in cooperation with the commissioner of health, to purchase equipment and supplies to accelerate the sampling of public water supplies for the presence and concentration of pesticides and their degradates for health risk assessments.

II and III. FINAL PROJECT SUMMARY:

Pesticides are known to impact Minnesota's groundwater and there are new pesticides being developed and registered for use every year. To ensure the safe use of new pesticides it is essential to measure the concentration and frequency of their detection in the state's water resources. In addition it is critically important, for proper pesticide management, to be able to analyze water samples for the compounds parent pesticides break down into. It is only through the precise measurement of extremely small quantities of pesticides in the state's water resources that impacts to human and ecological health may be determined.

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analytical methods for analyzing water samples for additional new generation pesticides and their degradates in groundwater and drinking water in Minnesota. The new equipment and related methods expanded the spectrum of compounds the MDA is able to detect in water samples, increased precision of water sample analysis, and improved the overall efficiency of water sample analysis at the MDA. Furthermore, the MDA laboratory is now capable of measuring many pesticides to levels of sub parts-per-trillion in a water sample. Measures of such precision will allow the MDA to manage pesticide use to keep concentrations below levels injurious to humans or the environment.

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Sample results just in for monitoring conducted by the MDA during winter and spring periods in 2010 are showing interesting results. A small number of pesticides never before discovered have been detected, albeit at very low concentrations. A clearer image of the occurrence of various pesticide breakdown products is also beginning to emerge and ongoing work should provide insight to the balance between pesticide parent and degradate detections in the state's water resources. These results will also allow the MDA to more precisely determine pesticide impacts to the water resources and aid in understanding the effectiveness of recommended BMPs and other pesticide management practices.

To the degree that time and lab resources allow, the equipment purchased and methods developed through this project will also be available for use by any future publicly funded projects at no cost except standard operating expenses.

IV. OUTLINE OF PROJECT RESULTS:

Result 1:

Develop bid specs, post bid and procure new equipment.

Description: The new analytical equipment provides molecular weight information, chemical structure information, and quantitative information for a wide range of compounds. The equipment consists of a tandem quadrupole mass spectrometer, atmospheric pressure ionization high pressure liquid chromatography interface, a photomultiplier detector, and other associated high level equipment and software needed to complete the analytical package. Exact specifications of the system are available from the MDA.

Summary Budget Information for Result 1: Trust Fund Budget: **\$364,000**
 Amount Spent: **\$364,000**
 Balance: **\$ 0**

Deliverable	Completion Date	Budget	Status
1. Specifications	July 15, 2008	\$0	Complete
2. Posting of bid	July 22, 2008	\$0	Complete
3. Receive bids	August 10, 2008	\$0	Complete
4. Review and select bid proposal	August 17, 2008	\$0	Complete
5. Purchase equipment	September 1, 2008	\$364,000	Complete

Completion Date: *October 1, 2008*

Final Report Summary: Following review of newly available equipment the originally proposed instrument was purchased and delivered. We purchased the originally proposed unit because it was the best we could get with the available funds. The purchased instrument came in at a final cost of \$375,841.62, slightly higher than the project proposal. MDA laboratory operating funds covered the remaining cost of \$11,842.

Result 2:

Set up equipment and develop Montana method in MDA lab.

Description: The Montana method is now available to the MDA. Analyses of pesticide parent materials and breakdown products now require two samples rather than three and many more pesticides are now available for analysis. We were anticipating being able to reduce the number of samples to one and discovered that would be insufficient for the desired number of analytes. Many high priority pesticide

parent compounds and degradation products that were not available in the old methods are in the new method.

Summary Budget Information for Result 1: Trust Fund Budget: \$4,000
Amount Spent: \$3,511
Balance: \$489

Deliverable	Completion Date	Budget	Status
1. Uncrate and setup new analytical equipment	October 14, 2008	\$0	Complete
2. Test and training on new analytical equipment	October 21, 2008	\$0	Complete
3. Method development	January 21, 2009	\$4000	Complete
4. Validate method	April 21, 2009	\$0	Complete
5. Train analysts	May 21, 2009	\$0	Complete
6. Method available	May 22, 2009	\$0	Complete

Completion Date: June 30, 2009

Final Report Summary: The equipment has been set up and is operational. The development of analytical methods is complete. The new methods have been built into the machine's operational software. Validation of all chemical analytes currently available for the method is complete although additional capabilities continue to be discovered. As of August 2010 the method had 83 validated analytes as compared to the previous roughly 30 that were available for analyses of water samples. Chemical analytes are likely to be added to the method for several years as the full power of the instrumentation is realized and staff operational experience and knowledge grows. Ongoing efforts to continuously improve the performance of both the machine and analysts will last as long as the machine is operational.

V. TOTAL TRUST FUND PROJECT BUDGET:

Staff or Contract Services:

Equipment: \$364,000

Development: \$

Restoration: \$

Acquisition, including easements: \$

Other: \$4,000 (analytical supplies)

TOTAL TRUST FUND PROJECT BUDGET: \$368,000.00

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

Expenditure of \$364,000 for laboratory analytical equipment, specifically an HPLC-API-MS-MS (mass spectrometer for analyzing water samples).

VI. OTHER FUNDS & PARTNERS:

A. Project Partners: Minnesota Department of Health

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

Approximately \$50,000 of staff time and supplies for equipment set up and method development.

C. Past Spending:\$ 0

D. Time: 1000 hours of in-kind services by an MDA Environmental Analyst 3 for the set-up of the equipment and development of the Montana method in the MDA lab.

VII. DISSEMINATION: Project outcomes will be disseminated via the MDA Monitoring Program Annual Report and reports to the LCCMR.

VIII. REPORTING REQUIREMENTS:

Periodic work program progress reports have been submitted on the schedule below beginning October 1, 2008. A final work program report and associated products was submitted prior to August 16, 2010.

Progress Reports:

October 1, 2008

March 1, 2009

August 16, 2010 (final)

IX. RESEARCH PROJECTS:

Attachment A: Budget Detail for 2008 Projects - Summary and a Budget page for each partner (if applicable)											
Project Title: <i>Testing Pesticides and Degradates in Public Drinking Water</i>											
Project Manager Name: <i>John W. Hines</i>											
Trust Fund Appropriation: \$ 368,000											
1) See list of non-eligible expenses, do not include any of these items in your budget sheet											
2) Remove any budget item lines not applicable											
2008 Trust Fund Budget	<u>Result 1 Budget:</u>	<u>Amount Spent</u> <i>(03/01/2009)</i>	<u>Balance</u> <i>(03/01/2009)</i>	<u>Result 2 Budget:</u>	<u>Amount Spent</u> <i>(03/01/2009)</i>	<u>Balance</u> <i>(03/01/2009)</i>	<u>Result 3 Budget:</u>	<u>Amount Spent</u> <i>(03/01/2009)</i>	<u>Balance</u> <i>(03/01/2009)</i>	TOTAL BUDGET	TOTAL BALANCE
	<i>Develop bid specs, post bid and procure new equipment</i>			<i>Set up equipment and develop method in MDA lab</i>			<i>Fill in your result title here.</i>				
BUDGET ITEM			0			0			0	0	0
PERSONNEL: wages and benefits			0			0			0	0	0
Contracts			0			0			0	0	0
Professional/technical <i>(with whom?, for what?)</i>			0			0			0	0	0
Other contracts <i>(with whom?, for what?) list out: personnel, equipment, etc.</i>			0			0			0	0	0
Other direct operating costs <i>(for what? – be specific)</i>			0			0			0	0	0
Equipment / Tools <i>(what equipment? Give a general description and cost)</i>	UPLC-MS/MS \$364,000	\$364,000	\$0			0			0	364,000	0
Office equipment & computers - NOT ALLOWED unless unique to the project			0			0			0	0	0
Other Capital equipment <i>(list specific items)</i>			0			0			0	0	0
Land acquisition			0			0			0	0	0
Land rights acquisition <i>(less than fee)</i>			0			0			0	0	0
Professional Services for Acq.			0			0			0	0	0
Printing			0			0			0	0	0
Other Supplies <i>(list specific categories)</i>			0	Lab supplies \$4000	\$3,511	\$489			0	4,000	489
Travel expenses in Minnesota			0			0			0	0	0
Travel outside Minnesota <i>(where?)</i>			0			0			0	0	0
Construction <i>(for what?)</i>			0			0			0	0	0
Other land improvement <i>(for what?)</i>			0			0			0	0	0
Other <i>(Describe the activity and cost) be specific</i>			0			0			0	0	0
COLUMN TOTAL	\$364,000	\$364,000	\$0	\$4,000	\$3,511	\$489	\$0	\$0	\$0	\$368,000	\$489