**Environment and Natural Resources Trust Fund (ENRTF)**

**2020 Main Proposal INSTRUCTIONS**

**PROJECT TITLE:** **Increased sample capacity for analysis of pesticides**

1. **PROJECT STATEMENT**

The Minnesota Department of Agriculture (MDA) is responsible for monitoring and investigating pesticides that may threaten Minnesota’s water resources. This project will provide funding for the MDA Laboratory Services Division (MDA Lab) to acquire the most technologically advanced instrumentation for the analysis of pesticides in water samples. When fully operational with two machines (the second machine secured using other funding sources), this new methodology is anticipated to expand the capacity of the MDA Lab to analyze more samples (up to 267 additional samples per year when fully functional with both instruments) and analyze for more pesticides in each water sample. This method includes the neonicotinoid pesticides (including imidacloprid and its two breakdown products imidacloprid-olefin and imidacloprid-urea). The increased sample capacity will provide additional information about the presence of pesticides (such as breakdown products of atrazine, acetochlor, chlorpyrifos, metolachlor and many others) in groundwater and surface water in Minnesota.

**ACTIVITY 1: Purchase of instrument to increase sample capacity and number of pesticides analyzed.**

The MDA Lab will solicit bids for the purchase of the LC-MS/MS direct inject instrument using the state procurement process to ensure maximum features and quality for the available funding. A five year service warranty, purchased upfront at a large discount, would be included with the instrument purchase and is listed separately on the budget spreadsheet. One Environmental Analyst FTE (unclassified) is proposed to assist the MDA Lab during the one year method development process. It is anticipated that the new instrument and method will:

* Eliminate the lengthy extraction times for the current MDA LC-MS/MS method, improving efficiency and reducing costs;
* Require smaller sample volume from the current 1 liter to 20-30 milliliters, saving costs on bottles and shipping;
* Improve method efficiency by reducing pesticide loss that can occur during extraction process;
* Allow for the addition of new pesticides; and
* Reduce the volume of wastewater that is generated during the extraction process.

Throughout the summer of 2021, this instrument will be run in conjunction with the older LC-MS/MS machines to compare results and evaluate performance. It is anticipated that the instrument will be validated and ready to analyze samples starting in 2022. A summary report detailing the Activity Outcomes will be prepared upon completion of the analytical method development.

**ENRTF BUDGET: $736,079**

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|  **Outcome**  | **Completion Date**  |
| **1.** Solicit, evaluate bids and purchase for LC-MS/MS direct inject purchase and five year service contract | September – November 2020 |
| **2.** Setup of LC-MS/MS direct inject Instrument, software installs and chemist training | Feb – May 2021 |
| **3**. Finalize pesticide analysis list and fine tune instrument  | May 2021 – Dec 2021 |
| **4**. Determine sample increase in capacity | Jan 2022 |
| **5**. Fully operational for 2022 water sampling season | Feb 2022 |

**ACTIVITY 2: Reporting of results on expanded sample capacity and increased pesticide analysis.**

Starting in the spring of 2022, the new instrument and method will be used by MDA for analysis of surface and groundwater samples collected across the state, with an anticipated 917 LC-MS/MS samples to be submitted in 2022, an increase of 267 samples from 2019. This will include coordinating with the Minnesota Department of Health (MDH) on the collection of 100 water samples from Community Public Water Supply systems across Minnesota, similar to past efforts in 2010 and 2015. A summary report providing details on all of the Activity Outcomes will be submitted within 30 days of the completion date.

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| **Outcome**  | **Completion Date**  |
| **1**. Begin routine sample analysis | March 2022 |
| **2**. Community Public Water Supply Reconnaissance with MDH | March 2022 |
| **3.** Expanded capacity and efficiency evaluation final report | June 30, 2022 |

1. **PROJECT PARTNERS AND COLLABORATORS:**

Who are the project partners and collaborators? Only include committed partners and collaborators.

**A. Partners receiving ENRTF funding**

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| **Name** | **Title** | **Affiliation** | **Role** |
| **Kathy Reynolds** | **Analytical Supervisor** | **MDA Lab** | **PI** |
| **Heather Johnson** | **Hydrologist** | **MDA Monitoring Unit** | **Project Manager** |
| **Bill VanRyswyk** | **Hydrologist Supervisor** | **MDA Monitoring Unit** | **Co-PI** |
| **Cathy Villas-Horns** | **Hydrologist Supervisor** | **MDA Incident Response Unit** | **Co-PI** |

**B. Partners NOT receiving ENRTF funding**

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| **Name** | **Title** | **Affiliation** | **Role** |
| **Steve Robertson** | **Hydrologist Supervisor** | **MDH** | **Technical advisor** |

**LONG-TERM IMPLEMENTATION AND FUNDING:**

If the initial LC-MS/MS direct inject method development is successful, the MDA will leverage this success to secure a second instrument from other funding sources. This will allow MDA to fully convert the LC-MS/MS water analysis methods to a direct inject platform. Combined with dedicated funds from MDA and supplemental funds received from the Clean Water Land and Legacy Act for staffing and support, it is anticipated that the equipment purchased through this project will continue to meet Minnesota’s pesticide water monitoring needs for at least a decade. The current LC-MS/MS machines will be transitioned for high level incident response or misuse water samples. Each year the target pesticide list will be reviewed and appropriate adjustment made based upon changing pesticide use, environmental fate and toxicity information and the previous year’s pesticide detection patterns. The successful implementation of this project will allow Minnesota to continue as a national leader in the area of pesticide water quality monitoring. The project is proposed to last 2 years, July 2020 – June 2022.