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MTSU Clean Energy Initiative Project Funding Request

There are five (5) sections of the request to complete before submitting. See <http://www.mtsu.edu/sga/cleanenergy.shtml> for funding guidelines. Save completed form and email to cee@mtsu.edu or mail to MTSU Box 57.

1. General Information	
Name of Person Submitting Request: <u>Ngee Sing Chong</u>	
Department/Office: <u>Chemistry</u>	Phone # (Office): <u>615-898-5487</u>
MTSU Box # : <u>PO Box 68</u>	Phone # (Cell): <u>615-556-5509</u>
E-mail: <u>nchong@mtsu.edu</u>	Submittal Date: <u>October 5, 2018</u>

2. Project Categories (Select One)			
Select the category that best describes the project.			
<input type="checkbox"/>	Energy Conservation/Efficiency	<input checked="" type="checkbox"/>	Sustainable Design
<input type="checkbox"/>	Alternative Fuels	<input type="checkbox"/>	Other
<input type="checkbox"/>	Renewable Energy		

3. Project Information
<p>a. Please provide a brief descriptive title for the project.</p> <p>b. The project cost estimate is the expected cost of the project to be considered by the committee for approval, which may differ from the total project cost in the case of matching funding opportunities. Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</p> <p>c. List the source of project cost estimates.</p> <p>d. Provide a brief explanation in response to question regarding previous funding.</p>
3a. Project Title: <u>Pollution Monitoring of the Middle Point Landfill Facility in Rutherford County-A Partnership between MTSU Chemistry and Geology Departments and Statewide Organization for Community eMpowerment (SOCM)</u>
3b. Project Cost Estimate: <u>The project cost is estimated at \$7990 for a headspace autosampler needed to analyze water pollutants at very low levels.</u>
3c. Source of Estimate: <u>The price quote for the headspace autosampler from the manufacturer (Nutech) is provided.</u>

3d. If previous funding from this source was awarded, explain how this request differs? My last Clean Energy project funding was for the refurbishing of a spectroscopic instrument donated by Tennessee Health Department so that it can be used for laboratory instruction and research. This proposal is for a new citizen science project in monitoring the Middle Point landfill so that Rutherford County Commission and its residents can have objective scientific data to choose a sound waste disposal option.

4. Project Description

(Completed in as much detail as possible.)

- a. The scope of the work to be accomplished is a detailed description of project activities.
- b. The benefit statement describes the advantages of the project as relates to the selected project category.
- c. The location of the project includes the name of the building, department, and/or specific location of where the project will be conducted on campus.
- d. List any departments you anticipate to be involved. Were any departments consulted in preparation of this request? Who? A listing may be attached to this form when submitted.
- e. Provide specific information on anticipated student involvement or benefit.
- f. Provide information for anticipated future operating and/or maintenance requirements occurring as a result of the proposed project.
- g. Provide any additional comments or information that may be pertinent to approval of the project funding request.

4a. Scope: Work to be accomplished

The sampling efforts will be carried out with the assistance of SOCM volunteers. This collaboration will allow for community outreach by MTSU scientists through the process of citizen-science engagement. Initial meetings will be held to discuss and select the appropriate sampling locations. MTSU students and residents living in the vicinity of the Middle Point Landfill will be recruited to assist in the collection of air and water samples. The air samples will be collected with both ground-based 6-liter canisters and air sampling based on sorbent materials using drones and tethered balloons. The environmental monitoring of contaminants leaching out of the landfill will be carried out via the collection of water samples from the Stones River, in addition to samples from nearby residential well water sites. Sample sites will be mapped via GIS software to understand the context of the test results.

The analytes or contaminants present in the air samples will be analyzed by gas chromatography-mass spectrometry (GC-MS) after analyte preconcentration via cryogenic and Tenax traps. The analytes in the water samples will be extracted by solid phase extraction followed by GC-MS and quadrupole/time-of-flight mass spectrometry (q-TOF MS). The volatile

organic compounds in air will be analyzed using a method similar to the USEPA Compendium of Air Toxics TO-15 Method. There are 72 toxic compounds that will be quantified using calibration method previously used for a USEPA-funded project on ambient air monitoring in Shelby County, TN. Metal contaminants in water samples will be analyzed using atomic absorption spectrometry or inductively coupled plasma-mass spectrometry.

4b. Scope: Benefit Statement

Middle Point Landfill sits to the north of Murfreesboro just outside of city limits and presents a public health concern for area residents. Both air quality and water quality for the municipal supply are potentially impacted by the operations at the landfill site and there is little data available on the issue. Additionally, the landfill is close to capacity and discussions of how the city, county, and Middle Tennessee region will deal with solid waste are ongoing amongst stakeholders. The Rutherford County chapter of SOCM has been advocating on the behalf of area citizens on this issue for many years. This project aims to collect data on landfill-related contaminants in ambient air and water in order to understand the potential health risks to residents of the region. The data will be shared with stakeholders including SOCM, the City of Murfreesboro, Rutherford County, and Tennessee Department of Environment and Conservation. The chemical data will be used to make informed decisions about the environmental impact of Middle Point Landfill and help to clarify the full impact of a landfill approach to future waste disposal. This project will have a significant impact on our understanding of public health and will stimulate discussions about options for solid waste disposal.

4. Project Description (continued)

4c. Location of Project (Building, etc.):

The Gas Chromatography Laboratory in Science Building Room 3101 and the Sample Preparation Facility in Room 3070 will be used for the processing and analysis of the water samples from Stones River and the air samples collected from downwind locations of the Middle Point Landfill in Rutherford County.

4d. Participants and Roles

Project Leader-Dr. Ngee Sing Chong (Planning and implementing the project and directing students in the analysis of air and water samples)

SOCM Chair and Geology Professor-Dr. Jeremy Aber (Recruiting student volunteers and directing students in sample collection efforts)

Instrument Support Specialist-Mr. Jessie Weatherly (In charge of the maintenance and repair of instruments throughout the project)

4e. Student participation and/or student benefit

This project provides experiential learning opportunities for students from different departments. Geology majors can apply their knowledge of hydrogeology and geological information system (GIS) in designing the sampling plan for collecting air and water samples. Chemistry majors will learn useful laboratory techniques such as inductively coupled plasma-mass spectrometry (ICP-MS), atomic absorption spectroscopy (AAS), and gas chromatography-mass spectrometry (GC-MS). Humanities majors will learn to communicate environmental issues to the public and influence policy makers in the City of Murfreesboro and Rutherford County.

4f. Future Operating and/or Maintenance Requirements

The project will continue to operate with the support of Chemistry and Geology Departments at MTSU. The cost of consumables for the headspace autosampler will be covered by the departmental operating expenses for student research projects.

4g. Additional Comments or Information Pertinent to the Proposed Project

This project seeks to provide objective scientific data related to the environmental impact of Middle Point Landfill. The environmental data will be conducive to the consideration of the future options for solid waste disposal by the City of Murfreesboro and Rutherford County government. This environmental monitoring project will also highlight MTSU's capability for investigating potential risks of exposure to contaminants via the collaborative efforts of the Chemistry and Geosciences Departments. The ultimate goal is to utilize the scientific data for the protection of environment and human health.

Residents adversely affected by the Middle Point Landfill because of its atmospheric emissions of odorous or harmful compounds or leaching of contaminants into groundwater that may eventually pollute the Stones River. Additionally, there will be benefit to local policymakers in clarifying the impacts of solid waste disposal options.

5. Project Performance Information

Provide information if applicable.

- a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.
- b. Provide information on estimated annual energy cost savings in monetary terms.
- c. Provide information on any annual operating or other cost savings in monetary terms. Be specific.
- d. Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.

5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)

Not Applicable

5b. Annual Energy COST Savings (\$)

Not Applicable

5c. Annual Operating or Other Cost Savings. Specify. (\$)

Not Applicable

5d. Matching or Supplementary Funding (Identify and Explain)

Both Dr. Chong and Dr. Aber each have about \$2000-\$3000 research expenditures that are covered the Chemistry and Geosciences Departments, respectively. Dr. Chong also has Experiential Learning funds of about \$1000 that can be used for this project. It is likely that this project will attract funding from Rutherford County Commission as it grapples with the issue of future options for solid waste disposal.

Quotation OF Products GD Environmental Supplies, Inc.

Quotation Date: Aug. 22, 2018
Quotation to: Dr. Ngee-Sing Chong

MTSU

Tel: 615-898-5487
Fax: 615-898-5182

Table of Quotation Price

Quantity	Description	Unit Price, \$	Total, \$
1	Nutech2800 Headspace Autosampler	7990	7990
	<i>Shipping by ground</i>		
	<i>Sub Total</i>		
Grand Total			7990

Payment: Prepayment or credit card payment
Quotation authorized and signed by:

George Dai, Ph. D.
President of GD Environmental Supplies, Inc.