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May 28, 2010

Ms. Karen E. Feahr
Energy Supply Manager
Traverse City Light & Power
1131 Hastings Street
Traverse City, Michigan 49686

Subject: **Proposal to Conduct a Preliminary Assessment of Potential Public Health Impacts Associated with $PM_{2.5}$ Emissions from Operating a Biomass-fired Combined Heat and Power Plant in Traverse City, Michigan**
MACTEC Proposal Number: PROP10CADI.0010

Dear Mr. Rice:

MACTEC Engineering and Consulting, Inc. (MACTEC) appreciates the opportunity to provide this proposal to Traverse City Light & Power (TCLP) to conduct a preliminary assessment of potential public health impacts associated with $PM_{2.5}$ emissions associated with operating a biomass-fired combined heat and power (CHP) plant in Traverse City, Michigan. We have based our proposal on our meeting with TCLP on May 21, 2010.

The overarching objective of the study is to assess potential $PM_{2.5}$-related public health impacts associated with the proposed biomass-fired CHP plant and to assist TCLP to communicate the findings of the assessment. In particular, the assessment will focus on the potential health impacts of $PM_{2.5}$ that were identified in the recent undated letter authored by Laura Shea, M.D. of Brookside Family Medicine addressed to medical colleagues. $PM_{2.5}$ is designated as fine particles in the (ambient) air $_{2.5}$ micrometers or less in size. MACTEC will focus on the following tasks to complete the assessment:

- Estimate short-term and long-term ambient air quality impacts;
- Evaluate predicted ambient impacts with respect to:
  - Current toxicological models of $PM_{2.5}$ health impacts,
  - Regulatory limits and local background concentrations of $PM_{2.5}$, and
  - Estimated emission rates and/or ambient impacts of other local current and former sources of $PM_{2.5}$ emissions;
- Prepare a technical report, presentation materials and a "Fact Sheet" summarizing the findings of the assessment; and
- Participate in a public meeting to present and discuss the findings.

PROJECT UNDERSTANDING

TCLP proposes to construct and operate a 10 megawatt (MW) biomass-fired CHP in the Traverse City area as an important step towards achieving its stated goal of delivering 30 percent of the utility's power from renewable sources by 2020. The project is in the planning stages and TCLP has not selected a site or finalized the design of the plant. Local physicians and other members of the community have raised

concerns regarding potential public health impacts associated with expected emissions of $PM_{2.5}$ (also referred to as Fine Particulate Matter) from the plant. To date, the expected impact of the proposed plant on ambient concentrations of $PM_{2.5}$ has not been estimated. TCLP is interested in better understanding the expected impact of the plant on ambient $PM_{2.5}$ concentrations as well as assessing these changes in ambient $PM_{2.5}$ concentrations with respect to potential public health effects.

SCOPE OF WORK

TASK: Data Request

MACTEC will prepare a data request for TCLP to obtain the information necessary to estimate ambient $PM_{2.5}$ concentrations associated with emissions from the proposed biomass-fired CHP plant. The data to be requested will include, but not be limited to, the following:

- Predicted emissions rate for biomass plant pounds per million British Thermal Units per hour (lbs/MMBTU) for:
  - $PM_{2.5}$ (particles less than $_{2.5}$ microns in diameter)
  - NOx (oxides of nitrogen)
  - HCl (hydrochloric acid)
  - VOCs (volatile organic compounds)
  - SO_2 (sulfur dioxide)
  - Hg (mercury)
  - Pb (lead)
- Stack height, inside diameter and exhaust temperature
- Exit velocity (feet per second [ft/s]) and volumetric flow rate (cubic feet per second [ft^3/s]) of stack gas
- Heat input of biomass boiler (MMBTU/hour)
- Expected hours of operation for the proposed plant
- A short description of the boiler type and pollution control equipment

TASK 2: Estimate Ambient Air Impacts for $PM_{2.5}$

MACTEC will estimate short-term and annual average ambient $PM_{2.5}$ impacts of the proposed plant using the SCREEN3 model which is the United State Environmental Protection Agency's (USEPA's) current regulatory screening model for New Source Review (NSR) and other air permitting applications. The SCREEN3 model is based on steady-state Gaussian plume algorithms and is applicable for estimating ambient impacts from point, area and volume sources out to a distance of about 50 kilometers.

The original SCREEN model was released by the USEPA in 1988 and was developed by MACTEC meteorologists. MACTEC has continued to support the USEPA's maintenance and further development of the SCREEN3 model including the implementation of an improved area source algorithm.

The SCREEN3 model utilizes a matrix of meteorological conditions covering a range of wind speed and stability categories. The model is designed to estimate the worst-case impact based on the meteorological matrix for use as a conservative screening technique.

TASK 3: Assess Potential Health Effects of Predicted Ambient Impacts

MACTEC will evaluate the predicted ambient $PM_{2.5}$ impacts with respect to:

- Current literature on $PM_{2.5}$ health effects and exposure levels;
- Potential exposure using standard assumptions;
- Regulatory limits and local background concentrations of $PM_{2.5}$; and
- Estimated emission rates and/or ambient impacts of other local current and former sources of $PM_{2.5}$ emissions.

TASK 4: Technical Report and Fact Sheet

MACTEC will prepare a technical draft report documenting the assumptions, data, methods and findings of the assessment. In addition, MACTEC will prepare a two-page "Fact Sheet" summarizing the assessment in a format suitable for distribution to members of the local community. MACTEC will submit these two deliverables to TCLP for review and comment prior to finalizing either deliverable.

TASK 5: Public Meeting

Dr. Deborah Barsotti and Dr. Richard DeCesar will present the findings of the assessment at one of the bi-monthly TCLP Board meetings that are held at the second and fourth Tuesday of the month at 5:15 P.M. As preparation for this meeting, MACTEC's Project Team will participate in a one-half day meeting with TCLP representatives on the day before their board meeting.

QUALIFICATIONS

MACTEC is an industry leader in providing engineering, environmental and construction services to private and public clients worldwide. Based in Atlanta, the MACTEC team includes more than 2,800 employees in 80 locations. MACTEC offers an ever-broadening portfolio of sustainable solutions, from power generation to facility asset management. MACTEC's risk assessment, toxicology, biomass power and other energy project experience are directly applicable to the project.

MACTEC has had a presence in northwest Michigan since 1992. Our Traverse City office, supported by technical experts from other MACTEC offices, can meet TCLP's needs on every step of this project, from site selection, permitting, National Environmental Policy Act (NEPA) studies, greenhouse gas strategy, to geotechnical and construction management.

MACTEC has an exceptional record of providing air quality services to the federal government and private industry. Our accomplishments for the USEPA include:

- The USEPA recently awarded MACTEC its fourth consecutive 5-year contract to operate the Clean Air Status and Trends Network (CASTNET), a long-term, nationwide ambient air monitoring network.
- MACTEC developed and maintains AIRMOD, which is the USEPA's primary dispersion model for estimating ambient air impacts from power plants and other industrial sources.
- MACTEC is currently under contract with the USEPA to conduct extensive emission testing on two biomass-fired power plants located in Wisconsin.

- MACTEC is currently working under contract to the USEPA to improve Conditional Test Method 039 for measuring stack emissions of filterable and condensable particulate matter smaller than $_{2.5}$ micrometers ($PM_{2.5}$)

With respect to utility and industrial clients, MACTEC's air quality track record includes:

- Ranked by Engineering News Record as the 8th largest firm with respect to Clean Air Compliance Services.
- Prepared air permit applications for numerous fossil fuel and biomass-fired power plants.
- Currently permitting one of the first commercial-scale torrefied wood plants in the U.S.

To evaluate the potential threat of toxic air releases and the potential health risks they may pose to workers and adjacent populations, MACTEC conducts air toxin assessments employing advanced air dispersion modeling and risk assessment methodologies. Parameters such as physical and chemical characteristics of the emissions, maximum and average release concentrations, meteorological conditions and demographics information are used to evaluate the human exposure to airborne chemical releases and estimate potential health risks to downwind populations. We have assisted in communication and negotiation with regulators and the public regarding risk assessment and management issues.

PROJECT TEAM

For this project MACTEC has assembled a team of professionals on the basis of specialized experience to provide the required services. The team possesses the capabilities to address any technical or schedule related challenge that the project might pose, including expertise in toxicology and biomass power.

Sandra L. Sroonian will serve as the Project Manager for this project and will be the local single point of contact for TCLP. Ms Sroonian is a Senior Principal Engineer located within MACTEC's Traverse City office. With over 30 years of experience, Ms. Sroonian serves as a Senior Project Manager and client account manager for MACTEC. In this role, she works to match the resources of MACTEC with the demands of local and national clients throughout the US and abroad. Ms. Sroonian works with her customers in multiple capacities including that as a manager, consultant and quality assurance manager for a wide variety of projects, including efforts related to air, water, wastewater, solid waste, environmental liabilities, natural resource management and design/build of a multitude of projects. Ms. Sroonian has been extensively involved with the Boardman River Dams Committee (BRDC) project serving as the Project Coordinator for almost one year. Ms. Sroonian's position within MACTEC has included the management of MACTEC's Chicago office.

Deborah Barsotti, Ph.D. will be responsible for the toxicological aspect of this project. During more than two decades of experience, Dr. Barsotti has focused on risk-based solutions for environmental problems. Dr. Barsotti is responsible for technical consultation and project management of applied toxicology and risk assessment projects. As a Diplomate of the American Board of Toxicology, Dr. Barsotti promotes the use of sound science when conducting human health and ecological risk assessments. She has extensive experience dealing with the toxicological and risk assessment issues surrounding a variety of environmentally relevant substances including ambient air and particulate inhalation. In addition, Dr. Barsotti is a recognized published expert on numerous substances including dioxin/furan toxicity and risk assessment. She has employed risk assessment in a broad spectrum of

projects, including air pollution and power generation projects (Pennsylvania, California, West Virginia, North Carolina, New Jersey, Florida, Wisconsin, Michigan and Ohio), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Reclamation Act (RCRA) remediation, indoor air problems, natural resource damage claims and litigation support and strategy including toxic tort, product liability, class action and workman's compensation claims. She has experience applying risk assessment tools to environmental problems that result in cost-effective strategies

Rick DeCesar, Ph.D. will lead the ambient air impact analysis components of this project. Dr. DeCesar earned a Ph.D. in Environmental Science and Engineering from the Oregon Graduate Institute. He brings more than three decades of environmental consulting experience and has extensive multimedia experience including air quality, NEPA, hazardous waste and water quality. The Renewable/Conventional Energy sector has been his primary focus for past decade. His energy project experience includes carbon sequestration, greenhouse gas emissions lifecycle analysis, site selection, due diligence, feasibility study, permitting and facility design. These projects include power plants, bio-fuel production facilities, combined heat and power plants, biomass, electric transmission lines, natural gas transmission pipelines, solar energy, landfill gas, wind power, natural gas storage fields and liquefied natural gas (LNG) terminals. Recent biomass project experience includes a fuel switching feasibility study of the conversion of a power plant from coal to biomass, Department of Energy (DOE) loan guarantee, NEPA services associated with construction of three 80 MW biomass cogeneration plants in the Midwest, permitting of a torrefaction plant in northwest Pennsylvania and renewable energy credit (REC) certification assistance for biomass co-firing for a power plant located in Ohio. Dr. DeCesar is the co-author of the USEPA's guidance document on PM_{10} modeling for State Implemenation Plan development and is the lead author on several airshed studies of the impact of residential wood combustion on ambient concentrations of particulate matter. He is currently providing assistance to developers of Brownfield-based renewable energy projects in the Midwest and Mid-Atlantic regions. In addition, Dr. DeCesar has participated in numerous public meetings to discuss regulatory and public health impacts of proposed energy projects.

SCHEDULE

The Project Team will begin work on the project within one week of receiving written authorization to proceed. The draft report and "Fact Sheet" will be submitted to TCLP within three weeks of receiving the information requested in the initial data request. We are prepared to participate in a public meeting of TCLP's selection any time after the final report is issued.

COST ESTIMATE AND COMMERCIAL TERMS

MACTEC will perform the above-referenced scope of work on a time-and-materials basis for an estimated cost of $19,348.00 in accordance with MACTEC's attached Proposal/Work Acceptance Sheet (PWAS) and Schedule of Charges. Authorization to proceed can be accomplished by signing and returning both copies of the PWAS. Upon receiving the signed copies, MACTEC will sign and return an original signed contract for your files. Please note that the terms and condition in the PWAS are considered part of the proposal.

CLOSING

MACTEC trusts that this proposal satisfies your requirements at this time. Please do not hesitate to contact Sandra Sroonian at 231-922-9050 or 773-230-6057 (cellular) with any questions.

Respectfully submitted,

MACTEC Engineering and Consulting, Inc.

Sandra L. Sroonian
Senior Principal Engineer

Deborah D. Barsotti, Ph.D. for DDB w/permission
Vice-President

Attachments:

PWAS (2)
Feee Schedule dated May 2010