Perham Resource Recovery Facility Expansion Project

DRAFT ENVIRONMENTAL IMPACT STATEMENT
DECEMBER 2012

Prairie Lakes Municipal Solid Waste Authority

Minnesota Pollution Control Agency
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Cover Sheet

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(5) Draft Environmental Impact Statement (Draft EIS)

(6) **Abstract**

Prairie Lakes Municipal Solid Waste Authority owns and operates the Perham Resource Recovery Facility (PRRF) under MPCA Permit No. 11100036-003. The project site is located within the city limits of Perham, Minnesota in a fully developed portion of the city's industrial park. This 4.2-acre, triangular shaped property has been the site of the PRRF since it was constructed and began operation in 1986. It is compatible with its immediately adjacent land uses. The Prairie Lakes Municipal Solid Waste Authority proposes to modify the Perham Resource Recovery Facility by adding a second heat boiler, as well as a material recovery facility at the site. The expansion would increase the municipal solid waste processing capacity of the facility from 116 to 200 tons per day.

(7) Draft EIS public meeting date: Thursday, January 3, 2012

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Acronyms

(^oF) Degrees Fahrenheit
(AERA) Air Emissions Risk Analysis
(AERMAP) AERMOD Terrain Preprocessor
(AERMET) AERMOD Meteorological Preprocessor
(AERMOD) AMS/USEPA Regulatory Model with Plume Rise Model Enhancements
(AMS) American Meteorological Society
(APC) Air Pollution Control
(AQDMP) Air Quality Dispersion Modeling Protocol
(AQRV) Air Quality Related Values
(AWW) Average Wet Weather
(BMPs) Best Management Practices
(BNSF) Burlington Northern Santa Fe
(BPIP-PRIME) Building Profile Input Program – Plume Rise Model Enhancements
(CAA) Clean Air Act
(CAP) Capital Assistance Program
(CE) Cumulative Effects
(CEQ) Council on Environmental Quality
(CFR) Code of Federal Regulation
(CH_4) Methane
(CI) Cumulative Impacts
(cm) Centimeters
(cm^3) Cubic centimeter
(CO) Carbon Monoxide
(CO_2) Carbon Dioxide
(CO_2-e) Carbon Dioxide Equivalents
(COPIs) Chemicals of Potential Interest
(CPMS) Continuous Parameter Monitoring Systems
(CUP) Conditional Use Permit
(CY) Cubic Yard
(DA) Dry Air
(DATs) Deposition Analysis Thresholds
(dB(A)) decibels (A-weighted)
(DEIS) Draft Environmental Impact Statement
(D/F) Dioxin and Furan (see PCDD/PCDF)
(DISPERSE) Dispersion Information Screening Procedures for Emission Risk Screening Evaluations
(DPM) Diesel Particulate Matter
(DO) Dissolved Oxygen
(dscm) Dry Standard Cubic Meter
(DSDD) Draft Scoping Decision Document
(EAW) Environmental Assessment Worksheet
(EIS) Environmental Impact Statement
(EQB) Environmental Quality Board
(EU) Emission Unit
(FEIS) Final Environmental Impact Statement
(FIP) Federal Implementation Plan
(FPA) Future Projected Actual
(FR) Federal Register
(FSDD) Final Scoping Decision Document
(ft) Foot
(GAQM) Guideline on Air Quality Models (GHG) Greenhouse Gas
(GIS) Geographic Information System
(GPD) Gallons per Day
(gr/dscf) Grains per Dry Standard Cubic Foot
(g/s) Grams per Second
(GWP) Global Warming Potential
(H1H) High First High
(H8H) High Eighth High
(HAP) Hazardous Air Pollutant
(HBV) Health-Based Value
(HCl) Hydrochloric acid
(HDDV) Heavy Duty Diesel Vehicles
(HEAST) Health Effects Assessment Summary Tables
(HFCs) Hydrofluorocarbons
(Hg) Mercury
(HHRA) Human Health Risk Assessment
(HHRAP) Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities
(HI) Hazard Index
(HpCDD) Heptachlorodibenzo-p-dioxin
(HpCDF) Heptachlorodibenzofuran
(HQ) Hazard Quotient
(HRB) Heat Recovery Boiler
(HRV) Health Risk Value
(HxCDD) Hexachlorodibenzo-p-dioxin
(HxCDF) Hexachlorodibenzofuran
(ID) Induced Draft
(IHB) Inhalation Health Benchmark
(IRAP) Industrial Risk Assessment Program
(IRIS) Integrated Risk Information System
(km) Kilometer
(L10) 10^{th} Percentile Level
(L50) 50^{th} Percentile Level
(L90) 90^{th} Percentile Level
(lb/hr) Pounds per Hour
(LEADPOST) Lead Postprocessor for AERMOD
(LGU) Local Government Unit
(MAAQS) Minnesota Ambient Air Quality Standards
(MDH) Minnesota Department of Health
(MEI) Maximally Exposed Individual
(MEPA) Minnesota Environmental Policy Act
(mg) Milligram
(MG) Million Gallons
(Minn.) Minnesota
(MMBtu) Million British Thermal Units
(MMREM) MPCA Mercury Risk Estimation Method
(MNDNR) Minnesota Department of Natural Resources
(MPCA) Minnesota Pollution Control Agency
(MPS) Multi-Pathway Screening Factors
(MRF) Materials Recovery Facility
(MSW) Municipal Solid Waste
(MW) Megawatts
(MWC) Municipal Waste Combustor
(N_2O) Nitrous Oxide
(NAAQS) National Ambient Air Quality Standards
(NAC) Noise Area Classification
(NAD83) North American Datum of 1983
(NAFO) National Alliance of Forest Owners
(NAPAP) National Acid Precipitation Assessment Program
(NASS) National Agricultural Statistics Survey
(NED) National Elevation Dataset
(NEPA) National Environmental Policy Act
(NESHAPs) National Emissions Standards for Hazardous Air Pollutants
(NH_3) Ammonia

Acronyms (Cont.)

(NO_3 -) Nitrate
(NOI) Notice of Intent
(NO_2) Nitrogen Dioxide
(NO_x) Nitrogen Oxides
(NPDES) National Pollutant Discharge Elimination System
(NSPS) New Source Performance Standards
(NSR) New Source Review
(NWS) National Weather Service
(O_3) Ozone
(OCDD) Octachlorodibenzo-p-dioxin
(OCDF) Octachlorodibenzofuran
(OEHHA) Office of Environmental Health Hazard Assessment
(OWEF) Olmstead Waste-to-Energy Facility
(PAHs) Poly Aromatic Hydrocarbons
(Pb) Lead
(PBT) Persistent Bioaccumulative Toxic chemicals
(PCB) Polychlorinated Biphenyls
(PCDD/PCDF) Polychlorinated Dibenzodioxins/ Polychlorinated Dibenzofurans
(PeCDD) Pentachlorodibenzo-p-dioxin
(PeCDF) Pentachlorodibenzofuran
(PFCs) Perfluorocarbons
(PLMSWA) Prairie Lakes Municipal Solid Waste Authority
(PM) Particulate Matter
(PM_{10}) Particulate Matter (less than 10μm)
($PM_{2.5}$) Particulate Matter (less than 2.5 μm)
(PMNR) Problem Materials Not Recycled
(ppm) Parts Per Million
(ppmvd) Parts per Million, volume dry
(PSD) Prevention of Significant Deterioration
(PRRF) Perham Resource Recovery Facility
(PSD) Prevention of Significant Deterioration
(PTE) Potential-To-Emit
(RASS) Risk Assessment Screening Spreadsheet
(RDF) Refuse-Derived Fuel
(RGGI) Regional Greenhouse Gas Initiative
(RGU) Responsible Governmental Unit
(RO) Reverse Osmosis
(ROD) Record of Decision
(RRC) Renewable Resource Consultants
(SCORE) Governor's Select Committee on Recycling and the Environment
(SDS) State Disposal System
(SEAW) Scoping Environmental Assessment Worksheet
(SF_6) Sulfur Hexafluoride
(SILs) Significant Impact Levels
(SIP) State Implementation Plan
(SO_2) Sulfur Dioxide
(SO_4) Sulfate
(SO_x) Sulfur Oxides
(SONAR) Statement of Need and Reasonableness
(SRES) Special Report on Emissions Scenarios
(subp.) Subpart
(SV) Stack Vent
(SWMP) Solid Waste Management Plan
(TCDD) Tetrachlorodibenzo-p-dioxin
(TCDF) Tetrachlorodibenzofuran
(TEF) Toxic Equivalency Factors
(tpd) tons per day
(TPY) tons per year
(UCL) Upper Confidence Limit
(UCL-AM) Upper Confidence Limit of the Arithmetic Mean
(U.S.) United States
(μg/dl) Micrograms per deciliter
(μg/m^3) Micrograms per cubic meter
(μm) Micrometer (or microns)
(USC) U.S. Code
(USGRCP) U. S. Global Climate Change Research Program
(USEPA) U.S. Environmental Protection Agency
(UTM) Universal Transverse Mercator
(VMT) Vehicle Miles Traveled
(VOC) Volatile Organic Compound
(WHO) World Health Organization
(WTE) Waste-to-Energy
(WWTF) Wastewater Treatment Facility

Definitions

1E-6: 1 x 10^{-6}, one in a million. 1/1,000,000.
1E-5: 1 x 10^{-5}, one in a hundred thousand., 1/100,000
1E-4: 1 x 10^{-4}, one in ten thousand., 1/10,000

Acute exposure: Exposure that occurs suddenly or over a short period of time. The exposure period is generally one hour.

Adverse effect: A harmful or undesired effect from the Proposed Project on the environment.

Ash: The solid byproducts of combustion which are collected from grates or hearths in a furnace where combustion takes place and from filters and separators that process combustion gases.

AERMOD air dispersion model: A steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

Ambient Air Quality Standards: An ambient air quality standard sets legal limits on the level of an air pollutant in the outdoor (ambient) air necessary to protect public health. The U.S. Environmental Protection Agency (USEPA) is authorized to set ambient air quality standards. The state of Minnesota has also established ambient air quality standards.

Bioaccumulation: Refers to accumulation of chemicals in an organism.

Biogenic: Produced by living organisms.

Biogenic emissions: Emissions resulting from the combustion of biomass.

Biomass: Plant material, vegetation, or agricultural waste used as a fuel or energy source.

Blowdown water from wet scrubber: The scrubber water rich in solids that is wasted or blown down and replaced with low solids water.

Chemicals of Potential Interest (COPI): For human health risk assessment, COPI are chemicals whose individual risk or hazard quotient are ten percent or more of health risk benchmarks.

Chronic Exposure: Exposure that occurs over a long period of time. The exposure period is generally one year or longer.

Class II Unit: Small municipal waste combustor with a total design capacity of 15 MMBtu/hr or more and less than 93.75 MMBtu/hr, and construction of the unit is commenced after September 20, 1994 or reconstruction is commenced after June 19, 1996. The Modified South Unit is a Class II Unit.

Class C Unit: A class C waste combustor has a total design capacity for all waste combustor units at a stationary source 15 MMBtu/hr or more and less than 93.75 MMBtu/hr, combusts primarily MSW or RDF, and construction of the waste combustor was commenced on or before September 20, 1994. The existing North and South Units are Class C Units.

Criteria Pollutant: Seven Common Pollutants for which USEPA has set primary and/or secondary national air quality standards. These pollutants are: particulate matter less than or equal to 10 microns in size; particulate matter less than or equal to 2.5 microns in size; sulfur dioxide; nitrogen dioxide; carbon monoxide; ozone; and lead. These pollutants can harm health and the environment, and cause property damage. Of these pollutants, particle pollution and ground level ozone are the most widespread health threats. EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health is called primary standards. Another set of limits intended to prevent environmental and property damage is called secondary standards.

Cumulative Potential Effects: Means the effect on the environment that results from incremental effects of the project in addition to other projects in the environmentally relevant area that might be reasonably expected to affect the same environmental resources including future projects actually planned or for which a basis of expectation has been laid, regardless of what person undertakes the other projects or what jurisdictions have authority over the projects.

Decibels (dB(A)): A unit of sound pressure level, weighted for the purpose of determining the human response to sound, abbreviated as dB(A).

Environmental Assessment Worksheet (EAW): Provides information about a project that may have the potential for significant environmental effects. The EAW is prepared by the Responsible Governmental Unit or its agents to determine whether an Environmental Impact Statement should be prepared.

Final Scoping Decision Document (FSDD): Is a companion to the Scoping EAW prepared for the project. The purpose of a Scoping Decision Document is to identify those project alternatives and environmental impact issues that will be addressed in the EIS. A Scoping Decision Document also presents a tentative schedule of the environmental review process.

FIP JJJ: 40 CFR 62 Subp. JJJ: Federal plan requirements for small municipal waste combustion units constructed on or before August 30, 1999. These regulations apply to the existing North and South Units.

Fishable water body: A water body is considered by MPCA to be fishable if it contains water year-round in a year with greater than 75% of normal annual precipitation.

Fugitive Sources: For the EIS, fugitive air emissions are all releases to air that are not released through a confined air stream.

Greenhouse gases: Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, atmosphere, and clouds (IPCC).

Hazardous Air Pollutant (HAP) emissions: Hazardous air pollutant listed in or pursuant to section 112(b) of the Clean Air Act.

Hazard Index: The sum of more than one hazard quotient for multiple substances with the same or similar toxic endpoints. For AERA purposes, at the screening level it is assumed all noncarcinogens have the same or similar toxic endpoint.

Hazard Quotient: The ratio of a single substance exposure level to a health benchmark for that substance derived from a similar exposure period (e.g., Conc/IHB, where Conc is the air concentration for a particular contaminant, and the IHB is the inhalation health benchmark (RfC, HRV, etc.).

Industrial Risk Assessment Program (IRAP): A computer based multi-pathway risk assessment program that was developed to assess the potential human health risks from estimated facility emissions and potential related exposures.

LEADPOST: AERMOD's lead post-processing tool.

L_{10}: The sound level exceeded 10 percent of the time, which is typically the most intrusive, represents short term peaks in noise levels.

L_{50}: The sound level exceeded 50 percent of the time, which typically represents the median noise level.

L_{90}: The sound level exceeded 90 percent of the time, which typically represents the background noise level.

Less than significant effect: An effect that is predicted to be below an identified threshold, and/or an effect that was determined by the lead agencies to not have a great impact based on the context and intensity of that effect.

Lifetime Excess Cancer Risk: The probability of contracting cancer over the course of a lifetime (usually assumed to be 70 years) in excess of the background probability of contracting cancer.

Materials Recovery Facility: A facility for separating non-processibles and recyclables from delivered MSW.

Methylmercury: Is a neurotoxin and the form of mercury that is most easily bioaccumulated in organisms. Methylmercury consists of a methyl group bonded to a single mercury atom, and is formed in the environment primarily by a process called biomethylation. Mercury biomethylation is the transformation of divalent inorganic mercury (Hg(II)) to CH_3Hg^+, and is primarily carried out by sulfate-reducing bacteria that live in anoxic (low dissolved oxygen) environments, such as estuarine and lake bottom sediments. Methylmercury can also be degraded in the environment, either by photodegradation reactions that take place without the help of bacteria or other organisms, or by bacteria through a variety of pathways.

Municipal Solid Waste: Solid waste generated at residences, commercial establishments and institutions; excludes land clearing, construction, and demolition debris.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): A group of emission standards promulgated by USEPA for sources of HAPs.

Noncancer hazard: The risk associated with effects other than cancer, based on the health bench mark which is an estimate, of exposure to the human population (including sensitive populations) that is likely to be without appreciable risks of deleterious effects during a lifetime.

Non-processibles: Non-processibles are waste categories that cannot be processed at PRRF due to size, bulkiness, composition, or regulatory restrictions. Examples include glass, metal, and Styrofoam.

NPDES/SDS Permit: An NPDES/SDS Permit is a document that establishes the terms and conditions that must be met when a facility discharges wastewater to surface or groundwaters of the state. The permit is jointly issued under two programs. The National Pollutant Discharge Elimination System (NPDES) is a federal program established under the Clean Water Act, aimed at protecting the nation's waterways from point and nonpoint sources. In Minnesota, it is administered by the MPCA under a delegation from the USEPA. The State Disposal System (SDS) is a state program established under Minn. Stat. § 115. In Minnesota, when both permits are required they are combined into one NPDES/SDS Permit administered by the state. The permits are issued to permittees discharging to a surface water of the state.

NSPS AAAA: 40 CFR 60 Subp. AAAA: New Source Performance Standards for Small Municipal Waste Combustion Units. These standards apply to the Modified South Unit.

PCDD/PCDF: Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. Commonly referred to as "dioxins" or "dioxins and furans." Class of compounds whose congeners with chlorines in the 2,3,7, and 8 positions can harm human health.

PM_{10}: Particulate matter less than or equal 10 microns in aerodynamic diameter.

$PM_{2.5}$: Particulate matter less than or equal to 2.5 microns in aerodynamic diameter.

Definitions (Cont.)

Problem Materials Not Recycled: In Minnesota, five categories of waste are known as PMNR: major appliances, tires, vehicle batteries, motor oil, and oil filters.

Residual waste: Residual waste is the waste remaining after existing waste abatement, separation, and processing.

Risk assessment: The quantitative and qualitative evaluation of cancer risk and noncancer hazards to humans who may be exposed to contaminated media, now or in the future. Risk assessment typically includes hazard identification, dose-response assessment, exposure assessment, and risk characterization.

Risk driver: Risk driver is any chemical emission substance that has a hazard quotient or cancer risk estimate greater than or equal to 10% of a health benchmark. .

Screening level: A screening level analysis uses overestimations of relevant parameters (also called conservative assumptions) to "screen out" chemicals or sources of chemicals that do not contribute significantly to lifetime excess cancer risk or hazard index estimates.

Sensitive receptor: A sensitive receptor is an individual such as an asthmatic who would be expected to be adversely impacted by airborne irritants at ambient concentrations that would not normally affect the general population. Other types of sensitive receptors are young children, the elderly and hospitalized patients with certain types of clinical diseases.

Significant effect: An effect that is predicted to be above an identified threshold and/or an effect that was determined by the lead agencies to have a magnitude that is great based on the context and intensity of that effect.

Significant Impact Levels: A screening tool used to determine whether a facility's criteria pollutant emissions will have a significant impact on air quality in the area. If an individual facility projects an increase in air quality impacts less than the SIL, its impact is *de minimis* and the facility would not be required to perform a cumulative criteria pollutant modeling analysis.

Subchronic Exposure: Exposures less than a year, but greater than two weeks. Subchronic exposures are typically evaluated with monthly data.

Susceptible population: Populations of people who, due to intrinsic factors (such as developmental stage, strength of immune system, etc.) or external factors (such as behavior patterns that may increase exposure), are more likely to be affected by environmental pollutants than the general population.

Title V: Title V is a federal program to standardize air quality permits. Title V refers to Title V of the 1990 Clean Air Act Amendments. Title V permits are also referred to as Part 70 permits, referring to 40 CFR 70.

Upper Confidence Level 95% (UCL 95%): A statistical tool for acknowledging uncertainties and variability within an environmental data set that defines a value that equals or exceeds the true mean of the data set 95 percent of the time.

Urban Gardener: MPCA defines an urban gardeners receptor as residents who grow and eat their own produce, and raise chickens to consume their eggs. Produce and egg consumption rates are equal to a farmer.

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1.0 Summary

Through a joint powers agreement between Otter Tail, Becker, Todd, and Wadena Counties, the Prairie Lakes Municipal Solid Waste Authority (PLMSWA) owns and operates a waste-to-energy (WTE) facility in Perham, Minnesota. Figures 1 and 2 show the location of the project site, while Figure 3 provides an aerial view of the existing facility and its current and proposed property boundaries. The Facility has two municipal waste combustion (MWC) units (the North Unit and the South Unit) that burn municipal solid waste (MSW) and one auxiliary boiler (Figure 3). Currently, the flue gas from both combustion units are tied together and first flow through a single waste heat boiler to generate steam, and then through air pollution control (APC) equipment. Each combustion unit has the capacity to operate individually at a rate up to 100 tons per day (tpd) expressed as an annual average. However, the existing waste heat boiler and APC equipment limit the total waste combustion capacity of both units to 116 tpd.

PLMSWA is proposing to expand the existing Perham Resource Recovery Facility (PRRF), located in Perham, Minnesota, by adding a second waste heat boiler, a second APC system train, and associated equipment, as well as adding a Materials Recovery Facility (MRF). This would increase the Facility's municipal solid waste (MSW) processing capacity from 116 tons per day (tpd) to 200 tpd. The PRRF currently processes approximately 35,000 tons per year (tpy). The proposed project would have a design capacity of 73,000 tpy, but is anticipated to process approximately 55,000 tpy, which would result in 300,000,000 pounds of steam that is sold to local industries. This Environmental Impact Statement (EIS) was prepared to evaluate and analyze the potential environmental impacts associated with the proposed expansion of this existing facility. Analyses completed were based on the guidance provided in the Scoping Decision Document for the project (see Appendix A) and include air quality, human health, water use, wastewater, traffic, noise, solid waste, and economic and social considerations.

1.1 PROJECT DESCRIPTION

The PRRF consists of four major components: 1) waste receiving, processing, and storage; 2) combustion; 3) energy generation (i.e., steam and electricity); and 4) air pollution control equipment. The Facility receives MSW on a regular basis from incoming trucks that unload in a tipping building. The delivered waste is inspected for removal of bulky waste and other unprocessible materials, as well as unacceptable waste.

The Facility processes approximately 35,000 tons per year (tpy) of MSW, which is burned to produce steam. Approximately 300,000,000 pounds of steam is produced and sold annually by the PRRF using a combination of the waste heat boiler and a natural gas fueled auxiliary boiler.

The PLMSWA is proposing to modify and expand the PRRF by adding a second waste heat boiler, a second APC system train, and associated equipment, as well as adding a MRF, a shown on Figure 4.

By adding a second waste heat boiler and associated APC system to the existing south combustion unit, each combustion unit would have the capacity to combust up to 100 tpd of waste. The APC system would include a lime injection system for sulfur dioxide (SO_2) and hydrogen chloride (HCl) control, activated carbon injection for mercury control, and a fabric filter baghouse for particulate control. The new boiler and APC system would be installed on the west side of the existing facility.

The proposed boiler/baghouse building, approximately 65 feet by 82 feet, would house new equipment including the new waste heat boiler, economizer, acid gas removal equipment, baghouse, and induced draft fan. New refractory lined ducting would be added to direct the flue gas from the existing South Unit to the new equipment.

The stack for the existing MWC units would be replaced with a new combined stack, located approximately 13 feet south of the existing stack location. The existing MWC stack would be removed. The exhaust from the existing MWC stack associated with the existing North Unit would be routed to the new combined stack along with the exhaust flue from the proposed heat recovery boiler (HRB) and APC system for the South Unit. This new combined stack would be located on the north side of the new building, aligned with and adjacent to the location of the existing stack. The dimensions of this stack are proposed to be 125 feet in height with an exit diameter of four feet.

Additionally, the existing powdered lime storage silo would be relocated in the southwest corner of the new boiler/baghouse building. Because the proposed project would increase combustion capacity, additional processed MSW would be burned, which would produce additional ash. The existing ash system would meet the needs of the proposed project, and would not require modifications. However, the existing ash system currently requires extra maintenance to remove fly ash laden water and extra hauling by vacuum trucks to remove ash laden leachate water. The proposed project would include an ash conditioning system to further process the ash with the intent on reducing the amount of maintenance and leachate hauling required.

An ash conditioning system mixes dry, dusty, fly ash residue thoroughly with water to allow the fly ash to be incorporated with bottom ash for disposal. Wet fly ash is discharged onto a conveyor and sent to the roll-off container with the bottom ash for disposal.

The PRRF does not currently have a MRF. The MRF would presort incoming material in an effort to remove certain undesirable waste and recyclable components prior to combustion of the remaining material. The MRF requires new equipment which would be housed in a new building approximately 100 feet by 275 feet in size. The MRF is expected to remove and recycle approximately five to eight percent of the incoming MSW in the form of Old Corrugated Cardboard (OCC), ferrous metal, and aluminum. The fines[1] are separated through a trommel screen and further processed through a screen and classifier to convey organics to the combustors and remaining fines to a dumpster for disposal. The middlings are sent to a belt magnet and the eddy current separator. The belt magnet would remove ferrous material, while the eddy current separator would remove non-ferrous metals, such as aluminum. Manual sorting could be used to recover OCC, and a baler would bail recovered material such as corrugated cardboard and aluminum cans for recycling. A new fence would be installed to the west and south of the proposed MRF building based on surveyed property boundaries.

Overall, the proposed project would increase the amount of steam generated from the combustion of MSW by adding another waste heat boiler and associated air pollution control equipment. However, the total amount of steam exported (i.e., sold to steam customers) would not change, and therefore remain at approximately 300,000,000 pounds per year. The amount of steam sold is driven by the demand of local consumers.

Table 1-1 provides a summary and comparison of the existing facility and the proposed project as it relates to MSW processing capacity, ash production, and steam production from MSW and natural gas.

[1] Fines are considered the small fraction of glass, grit, and other material less than two inches in size.

Table 1-1: Comparison of Existing Facility and Proposed Project

Product	Existing Facility (2010 Actual)	Proposed Project	
		Projected Budgeted	Maximum Potential at 200 tpd
MSW	35,000 tpy	55,000 tpy	73,000 tpy
Ash	8,800 tpy	11,754 tpy (3)	15,600 tpy [3]
Steam Production From MSW From Natural Gas	200,000,000 lbs 100,000,000 lbs	336,600,000 lbs [1] 24,550,000 lbs [2]	411,020,000 lbs. Future amount unknown
Steam Sales/Demand	300,000,000 lbs.	300,000,000 lbs.	Future demand unknown

[1] Excess steam produced from MSW to be condensed by the steam dump condenser.
[2] Steam from the auxiliary boiler required to allow for maintenance downtime of the MWCs assumed at 8.0 percent.
[3] The ratio of ash generation to total MSW is estimated to be approximately 15 percent less with the proposed project compared to the existing facility. This is because the MRF would remove 5-8 percent of the recyclable materials and approximately 10 percent of the fines prior to combustion.

1.2 PROJECT PROPOSER

PLMSWA is a joint powers board composed of Becker, Otter Tail, Todd, and Wadena Counties. In 2010, the joint powers partnership between the four counties was created for the coordinated management of MSW within the four-county region.

The joint powers partnership is based on the State of Minnesota's solid waste management policy, which mandates local governments to plan for the proper management of MSW. PLMSWA provides a forum for discussing regional waste issues and moving toward better coordinated solid waste management in the region.

PLMSWA has owned the PRRF since June 2011 when ownership of the Facility was transferred from the city of Perham. This occurred in response to a Capital Assistance Program (CAP) grant application process initiated by the city of Perham in 2008, in an effort to modify the existing PRRF. Original operation of the Facility began in 1986. It was shut down in 1998 and reopened in 2002 after technology upgrades were completed. Since that time, the PRRF has been processing MSW and using natural gas to produce steam, which is used by two local industries in Perham: Tuffy's Pet Foods and Bongards' Creameries.

1.3 MAJOR FINDINGS

1.3.1 Air Quality

Stationary Source Air Emissions

The construction of the new waste heat boiler requires the Facility to meet emission limits required by New Source Performance Standards (NSPS). The potential to emit (PTE) emission levels are below Prevention of Significant Deterioration (PSD) significance levels.

Air emissions are mitigated at the source with APC equipment. The APC system includes:

- a dry lime injection system or equivalent for acid gas control
- a carbon injection system for mercury control
- a fabric filter baghouse for particulate control

The system ensures that actual emission levels remain below the permitted levels, detailed in Section 3.1.2. The impact of the stationary source emissions was evaluated using air dispersion modeling to estimate air concentrations of emitted substances. Air emissions from the Facility, including the proposed project, were identified and are described in Sections 3.1 and 3.2 of the EIS. Additionally, PLMSWA used MPCA's Air Emissions Risk Analysis (AERA) protocol and human health risk assessment (HHRA) to evaluate the impact of the PRRF on human health, and adverse impacts are unlikely. Results are discussed further in Section 4.0.

Vehicle-Related Air Emissions

The impact of vehicle-related air emissions from the proposed project are discussed in Section 3.2. Emission levels from traffic would change, but the impacts were assessed using the AERA protocol and human health risk assessment. Results show no significant adverse impact and are discussed further in Section 4.0.

Modeling

The modeled concentrations from the proposed project did not exceed the significant impact levels (SILs) for SO_2, CO, PM_{10}, and $PM_{2.5}$ (See Table 3-7). Based on the modeling analyses performed, the contribution from these pollutants is considered to be insignificant.

For NO_2, the total facility modeled concentrations after the proposed project (the existing facility plus proposed project) were above the significance level so a cumulative analysis was performed to assure compliance with the National Ambient Air Quality Standards (NAAQS)/Minnesota Ambient Air Quality Standards (MAAQS). A refined analysis was warranted based on modeled $PM_{2.5}$ concentrations from the total facility to assure compliance with the NAAQS/MAAQS. A cumulative analysis was also performed for lead (Pb) since there is no significance level established for this pollutant. Modeling completed for the proposed project along with results is further discussed in Section 3.3.

Since the predicted concentrations from the NO_2 $PM_{2.5}$ and Pb refined analyses, including background concentrations, were below the NAAQS/MAAQS thresholds, the effects from the proposed project are acceptable and are not expected to have a detrimental effect on public health as discussed in Section 4.0. No mitigation would be necessary for any criteria pollutants.

1.3.2 Water Use and Wastewater

The evaluation of water use and wastewater for the PRRF and the proposed project indicates the proposed project would not exceed existing permit limits for any Facility or City permits. In all cases, the existing and proposed project actual levels would not exceed existing permit limits. Table 5-2 summarizes the City's permit limit for maximum water allowed on an annual basis and compares that to the City's current level of water pumped and the PRRF proposed project. Additional discussion on water use and wastewater at the Facility is provided in Section 5.0.

1.3.3 Traffic

The projected increase in traffic volumes from the proposed project would not require changes to roads or intersection controls within the industrial park, County Highway 80 or the BNSF railway crossing. The proposed project would not significantly affect traffic volumes or patterns within the vicinity of the PRRF, and therefore would not require mitigation. Additional information on traffic at the PRRF is provided in Section 6.0.

1.3.4 Noise

Based on the calculations and evaluation in the Noise Study, the proposed project at the PRRF would not generate additional audible noise in the adjacent residential areas. The proposed project would potentially reduce noise by enclosing four pieces of processing equipment that are currently outside. This would have potential noise reducing benefits. Calculations completed for the Noise Study indicate that the proposed project would not contribute audible increases in noise at the residences to the north, and therefore, would not further contribute to noise levels at these residential receptors.

Additionally, the proposed project would keep noise levels below the industrial standard as do current operations. The PRRF operates under a Part 70 Air Emissions permit administered through the MPCA. This permit regulates state noise standards at the Facility and would enforce these standards with the proposed project through an amended permit for the PRRF. Noise at the PRRF is further discussed in Section 7.0 and Appendix E – Noise Study.

1.3.5 Solid Waste

The proposed project serves the identified needs of the region and provides an alternative solid waste management option for individual counties (i.e., Becker, Otter Tail, Todd and Wadena Counties) that is ranked higher on the *Minnesota Waste Hierarchy* than landfilling. Implementation of the proposed project is also consistent with recommendations in the *2009 Solid Waste Policy Report* by providing continued local leadership and creating strong intergovernmental partnerships and regional governments that can effectively manage solid waste. The proposed project provides these benefits to the region as well as reused solid waste for a beneficial purpose, reduces the amount of MSW disposed of in landfills, and also increases the lifespan of existing landfills in the region.

The operation of the PRRF and the proposed project addresses Minnesota Waste Policy by creating energy from waste. Overall, the five goals listed in Minnesota Statute 115A.02a would all be met by the proposed project in some way. The proposed project would allow greater separation and recovery of materials prior to using the waste to produce steam (i.e., energy) with the use of the MRF. Additionally, the PRRF is a joint effort between four counties, which allows coordination of solid waste management among political subdivisions.

The PRRF operates under both a MPCA approved solid waste permit (116H-85-OT-1) and a Part 70 air emissions permit (AQ Facility ID No. 11100036). As part of the proposed project, the Part 70 air permit for the Facility is being amended and submitted simultaneously with this EIS. The solid waste management plan and permit for the Facility will be updated and amended as necessary. Through these permitting processes and requirements, the PRRF is complying with all applicable state rules. Additional discussion about solid waste management is provided in Section 8.0 and Appendix F – Solid Waste Management Technical Study.

1.3.6 Economic and Social Impacts

The PRRF currently employs 15 full-time and part-time employees that work in shifts, seven days per week, 24 hours per day. Most employees work during the weekdays when the PRRF is receiving loads of MSW. The proposed project would increase the number of employees to 27 in order to operate the MRF and handle the additional MSW loads from the increased processing capacity. Under the proposed project, employees working in the MRF would recover undesirable wastes and fines, including glass and grit, ferrous (magnetic) metals, non-ferrous metals from the MSW at manual and mechanical picking stations.

The proposed project would allow an increased amount of MSW from the four-county area to be hauled to the PRRF while decreasing the distance haul trucks travel to dispose of MSW. Currently, most of the waste from the four-county area is sent to the landfills out of Minnesota at a distance of over 100 miles. Haulers in Northeast Otter Tail County and Wadena County are able to haul directly to the PRRF. Haulers outside of the 25 to 30 mile radius around the PRRF deliver first to a transfer facility, and then the waste is hauled to the PRRF for processing.

Recreational resources for the City were also reviewed. There are no recreational resources in close proximity to the PRRF, and therefore none are anticipated to be effected during construction or operation of the proposed project. Additionally, development of new recreational resources is not planned as of the publication date of this EIS.

1.4 MITIGATION MEASURES

Several studies and analyses were completed for the proposed project. The PRRF is currently and must continue to operate in compliance with state rules and regulations. Although no mitigation is required, the PLMSWA will take measures to further minimize and mitigate potential environmental impacts. These mitigation measures include:

- For additional air emissions reduction, the proposed project would have a lower mercury and polychlorinated dibenzo-p-dioxin/polychlorinated dibenzofuran (PCDD/PCDF) emissions limit in their Air Emissions Permit.
- For aesthetics and air pollution control, the proposed project would include planting trees along the northern property boundary of the PRRF.
- For reducing noise generated by the PRRF, the proposed project would enclose four noise generating sources within the expanded facility design.

PLMSWA will take a long-term mercury limit of 41 μg/dscm which is less than the current long-term standard to which PRRF is subject (60 μg/dscm, Minnesota Rule 7011.1229). This limit was determined using MPCA's Mercury Risk Estimation Method (MMREM), which estimates the increase in hazard from estimations of increased mercury in fish tissue. MMREM assumes that someone eats 4-5 meals per week for 52 weeks per year. The proposed long-term mercury limit is realistic for PRRF to achieve based on a history of lower stack test results and would reduce the hazard quotient from the proposed project to less than 1. Total potential mercury emissions for the modified South Unit are 5 pounds per year, though the expected future actual emissions for the entire facility will be less than 3 pounds per year. The Facility would still also be subject to the short-term limit of 100 μg/dscm (Minnesota Rule 7011.1229), and 0.08 mg/dscm based on New Source Performance Standards. Additional discussion is provided in Section 4.0, and also in Appendix C – Human Health Risk Assessment Report.

PLMSWA will also take a long-term dioxin/furan limit for total PCDD/PCDF of 20 ng/dscm for the North Unit. This is less than the current long-term standard to which this boiler is subject (125 μg/dscm, Federal Rule 40 CFR 62 Subpart JJJ, Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999). This limit is based on results from the HHRA.

PLMSWA intends to plant trees along the northern property boundary between the residences and the Facility. The primary objective is to improve the area aesthetically, but an added benefit of the trees is reduced air pollution at the residences, including dust control. Recent research indicates trees, bushes, and vegetation can reduce street level concentrations of NO_2 and PM in urban areas by enhancing deposition of air pollutants and increasing mixing.

Relocation of the ID fan, drum vent, pulse poppets, and the turbine drive feedwater pump vent to inside of the PRRF would result in a reduction in noise generation from those sources. The net effect of the proposed project creating one new noise source while enclosing four existing noise sources is anticipated to be a decrease in overall noise generated by the Facility from the proposed project compared to existing noise levels.

Additionally, PLMSWA considered the potential environmental impacts of the proposed project, and intends to avoid and minimize those impacts with the project design of the Facility. This includes design and operation measures to reduce potential environmental impacts.

1.5 PERMITS AND APPROVALS

This Draft Environmental Impact Statement (EIS) is being prepared by PLMSWA with oversight, review, and approval by the Minnesota Pollution Control Agency (MPCA) as the responsible government unit (RGU). Minnesota Rules 4410.4400, subps. 1 and 13, Solid Waste, Item C, require that an EIS be prepared for the construction of expansion of a mixed municipal solid waste energy recovery facility or incinerator with a capacity of 250 or more tons per day of input. The proposed project does not meet or exceed this EIS threshold, however, PLMSWA chose to voluntarily prepare an EIS.

The EIS provides information and evaluation on potential environmental impacts resulting from the proposed project, as well as identifies possible need for additional mitigation measures. In this case the EIS examines air emissions and air quality, water use, wastewater, traffic, noise, and solid waste. The EIS is not a decision-making document, but is to be used by governmental units as information for the permitting process. No permits or approvals can be issued until environmental review is completed, including an EIS Determination of Adequacy by the MPCA Citizens' Board. The permits and approvals required for the proposed project are listed in Table 1-2.

Table 1-2: Permits and Approvals for the Proposed Project

Unit of Government	Type of Application	Status
Federal		
Federal Aviation Administration (FAA)	FAA Notification Form 7460-1	To be obtained, if needed
State of Minnesota		
Minnesota Pollution Control Agency (MPCA)	National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Industrial Wastewater Permit	To be amended
	NPDES/SDS Stormwater Construction Permit	To be applied for
	Air Emissions Permit	To be amended
Local		
City of Perham	Building Permit and Zoning Certificate	To be obtained
	Conditional Use Permit	To be obtained

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2.0 No Build Alternative

Minnesota Rules 4410.2300 require that an EIS include at least one alternative of each of the following types, or provide an explanation of why no alternative is included in the EIS: alternative sites; no action/no build; alternative technologies; modified designs or layouts; modified scale or magnitude; and alternatives incorporating reasonable mitigation measures identified through comments received during EIS scoping and draft EIS comment periods.

In the case of the Perham Resource Recovery Facility EIS, the final scoping decision document (FSDD) indicated the build (proposed project) and no build alternatives would be evaluated in the EIS. The following rationale was outlined in the FSDD for development and discussion of alternatives in the EIS.

> *Facility Design Alternatives*
>
> The issue of design alternatives was not discussed in the Scoping EAW (SEAW) because the design of the proposed expansion must meet specific design specifications that are required by both the U.S. Environmental Protection Agency (USEPA) and the MPCA. Therefore, this alternative discussion is not presented in the EIS.
>
> *Location Alternatives*
>
> The issue of location alternatives is not discussed in the EIS as the proposed project is an expansion of an existing facility.
>
> *Alternative Technology*
>
> The issue of alternative technologies was not discussed in the SEAW because the design of the proposed expansion must meet specific design specifications that are required by both the USEPA and the MPCA. The permits to ensure that all required design and operational specifications will be met by the proposed project are listed in Section 1.5 under *Permits and Approvals Required*. Therefore, a discussion of alternative technology is not presented in the EIS.
>
> Since the proposed project would be an expansion of an existing facility, alternatives to the project did not provide significant environmental benefit compared to the proposed project. The FSDD for the EIS for the proposed project indicated that the no-build alternative would be considered. The following evaluation and analysis was completed based on the no-build alternative compared to the proposed project.

2.1 NO BUILD ALTERNATIVE – SOILD WASTE IMPLICATIONS

A *Regional Solid Waste Management Plan Technical Report* (Solid Waste Report) from June 2012 evaluated solid waste management in each of the four counties and is included as Appendix F. The Solid Waste Report also evaluated the no-build/no action alternative for the proposed project, including the potential effects on private MSW landfills, private industrial waste landfills, recycling rates in the four-county region, and solid waste composting in the four-county region.

2.1.1 Private MSW Landfills

There are no county-owned landfills in Becker, Otter Tail, Todd or Wadena Counties. Non-combusted waste generated from these counties is sent to MSW landfills in other counties. In 2010, waste from Becker County was entirely sent to the city of Fargo landfill, which is 50 miles from Detroit Lakes, the Becker County seat. Otter Tail County waste that was not combusted at PRRF was sent to the Dakota Landfill in Gwinner, North Dakota; a distance of approximately of 130 miles from the Facility and 80 miles from Fergus Falls, the Otter Tail County seat. Todd County waste destined for a landfill was sent to the Greater Morrison Sanitary Landfill near Little Falls, Minnesota at a distance of 30 miles. Wadena also sent its landfill waste to Dakota Landfill in North Dakota, which is 140 miles away. Table 2-1 provides information on the distance to disposal facilities currently used by the PLMSWA counties, as well as the distance to the Elk River Sanitary Landfill, which is provided as a potential future MSW disposal option if another facility may become unavailable.

Table 2-1: Distances to Disposal Facilities from Each County Seat

County	County Seat	Distance to PRRF [1] (miles)	Distance to City of Fargo Landfill [2] (miles)	Distance to Dakota Landfill [3] (miles)	Distance to Greater Morrison County Landfill [4] (miles)	Distance to Elk River Sanitary Landfill [5] (miles)
Becker	Detroit Lakes	20	50	120	105	170
Otter Tail	Fergus Falls	50	60	80	110	155
Todd	Long Prairie	65	140	160	30	100
Wadena	Wadena	25	90	140	60	125

[1] Perham Resource Recovery Facility currently receives MSW from Otter Tail, Todd, and Wadena Counties
[2] City of Fargo Landfill currently receives MSW from Becker County
[3] Dakota Landfill currently receives MSW from Otter Tail and Wadena Counties
[4] Greater Morrison County Landfill currently receives MSW from Todd County
[5] Elk River Landfill does not currently receive MSW from any of the PLMSWA counties, but could be used in the future if a need warrants it.

In general, most of the waste from the PLMSWA counties is being sent out of Minnesota at a distance of over 100 miles. The no-build scenario would require more and more waste to be sent outside of the counties as those counties' waste quantities continue to increase over time. This would likely create a greater amount of MSW to be landfilled, which is a lower option on the *Minnesota Waste Hierarchy*. A longer hauling distance also has the potential to have more environmental impacts for solid waste disposal in the region and within Minnesota and North Dakota. Longer hauling distances also raise the cost of disposal to the local consumer. Landfill capacity would potentially be reached sooner, which would necessitate siting and permitting processes for new and expanding facilities.

There are several disposal facilities that may have the potential to be used to dispose of MSW if the no-build alternative was used. The PRRF would continue to be used at its existing rate of 35,000 tons per year. Excess waste would need to be disposed of at other facilities. These are all a greater distance from each of the counties than the PRRF, and therefore would require greater haul distances, maintenance costs, gasoline use, and employee time. All of these factors would increase the overall expense of waste disposal in the four-county region. Table 2-2 summarizes the landfills that are currently or could be used in the future if conditions warranted under the no-build alternative.

Table 2-2: Disposal Facilities That May Accept MSW

Disposal Facility Name	Location	Remaining Permitted Capacity (tons)	Estimated Remaining Site Life (years)	Gate Tipping Fee
Perham Resource Recovery Facility	Perham, Minnesota	42,340	NA	$80
City of Fargo Landfill	Fargo, North Dakota	unknown	11	$30
Dakota Landfill	Gwinner, North Dakota	1,480,768 (remaining design capacity)	12	$39
Greater Morrison Sanitary Landfill	Little Falls, Minnesota	900,805	14	$63
Elk River Sanitary Landfill	Elk River, Minnesota	594,859	6	$93

Source: 2010 SCORE Report, MPCA

Additional information regarding the use of private landfills and its potential effects on the four-county area is discussed in Section 9.0 – Socioeconomics.

2.1.2 Demolition Waste Landfills

Becker, Otter Tail, Todd, and Wadena Counties each have a demolition debris disposal area which allows disposal of demolition debris from within the area. Under the no-build scenario, waste would continue to be hauled, as appropriate, to these facilities. The no-build scenarios would not change those procedures.

2.1.3 Recycling

The recycling rate in the service area counties increased from 34 percent in 1991 to 45 percent in 2010. The 2010 adjusted recycling rate, including the yard waste and source reduction credits applied to each county, is 51.7 percent. Each county participates in the SCORE program and receives funding for recycling programs in addition to waste reduction and HHW management programs.

Under the no-build scenario, there would be no definitive changes in existing recycling measures or efforts. Changes in recycling rates may occur depending on how the individual counties focus on recycling programs. The primary means of recycling in each county is accomplished through individual households; therefore, the main focus of the counties to increase recycling is through educational efforts and county recycling programs. An increase in recycling rates under the no-build scenario cannot be predicted. Any increase would be due to public consumer habits and increased educational efforts by the counties and would likely be insignificant. The proposed project would include a MRF which has the potential to assist the county in increasing commercial recycling, in addition to household recycling, by approximately five to eight percent. The no-build scenario would not include a MRF, and therefore would not include this added recycling benefit.

In order to foster an increase in the regional recycling rate, the counties would likely need to increase funding for their individual recycling programs or find other means to improve recycling rates.

2.1.4 Solid Waste Composting

Becker, Otter Tail, Todd, and Wadena Counties have not been allowed by the MPCA to report organics collected for recycling or reuse in the 2010 SCORE Report. The no-build alternative would not provide any measures to increase solid waste composting or definitively change the amount of organics recycling in the service area.

The counties all provide yard waste management services. In 2010, together the counties spent $7,440 on yard waste programs, or only 0.3 percent of their SCORE funding on yard waste. Under the no-build scenario, these rates are projected to remain the same. All four counties are credited with the full five percent yard waste credit increase to their base recycling rate, as available through the MPCA and SCORE report.

2.2 NO BUILD ALTERNATIVE – AIR QUALITY IMPLICATIONS

The no-build alternative was not quantitatively analyzed for this EIS; however, it is expected that for this scenario, the incremental waste volumes expected by the proposed project would be diverted to a different location for management (either a landfill or another MWC facility). There is a greater net greenhouse gas (GHG) benefit for using a waste-to-energy facility compared to a landfill, because landfills generate higher rates of methane GHG emissions. In addition, due to the increased travel distances to alternative landfill disposal sites primarily located in North Dakota, GHG emissions from mobile sources would increase.

The no-build alternative for the proposed project would allow the PRRF to continue to operate under its current air emissions permit. The emission sources and potential emissions (as represented in Table 3-1) would remain the same and the existing requirements under the current permit would remain in effect. The PRRF would be subject to future rules or regulations as they develop (e.g., regional haze, climate change), which may require revisions to the air emissions permit at that time.

2.3 NO BUILD ALTERNATIVE – ECONOMIC AND SOCIAL IMPLICATIONS

Under the no-build alternative, the PRRF would continue to operate at its existing capacity. This would not require additional employees or MSW haul truck loads. This would also not require construction or new equipment for the Facility. The potential economic benefits of operation of the proposed project, such as job creation, equipment supply, and lower operating costs, would not be realized under the no-build alternative. Additional benefits toward implementation of the 25/25 Renewable Energy Standard would also not be realized under the no-build alternative. Specifically, the proposed project would reduce the use of natural gas and derive more energy from the use of renewable resources. The no-build alternative would not accomplish these goals.

Under the no-build alternative, the auxiliary boiler would be operated in order to meet steam demand. This would require the use of natural gas, and therefore, the potential for operational cost savings and potential savings to the consumer would not be realized. The tipping fees and steam costs would reflect the operational costs of the PRRF.

Increased quantities of waste that cannot be disposed of at the PRRF would continue to be hauled to available landfills. Due to the projected increases in waste generation, this would likely require more trips and likely greater haul distance and tipping fees depending on landfill availability. Ultimately, landfills could fill more quickly and create a need for re-permitting of an existing facility or permitting of a new facility sooner than if waste was hauled to the PRRF with the proposed project upgrades.

2.4 SUMMARY AND CONCLUSIONS

Based on the Solid Waste Report, waste generation is projected to increase in the future, which would result in additional waste disposal needs. The no-build alternative would require this additional MSW to be disposed of at facilities other than the PRRF. Other disposal facilities are greater distances than the PRRF and are outside of the four-county area. This would result in higher disposal costs, due to increased haul distances, potentially higher gate tipping fees, and haul truck maintenance costs.

This would also require MSW disposal at landfills, rather than using the MSW for waste-to-energy and energy production, which ranks higher on the *Minnesota Solid Waste Hierarchy* and state solid waste policy goals. The use of MSW by the PRRF to produce steam and reduce the use of natural gas is a beneficial effect of the proposed project. This would not be realized under the no-build alternative. Instead, landfills would be used for MSW disposal, which would likely result in decreasing the life expectancy of existing landfills and also has the potential to require landfill expansion and possibly new siting of landfills.

The creation of new jobs through construction and operation of the proposed project would not be realized. The ability to produce more steam from MSW by reducing the need for natural gas would have positive air quality benefits, potentially reduce and make the cost of steam consistent for local customers, and have an overall environmental benefit by reducing the need for fossil fuels by using renewable energy sources. These positive benefits would not occur under the no-build alternative.

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3.0 Air Quality Analysis

3.1 STATIONARY SOURCE AIR EMISSIONS

3.1.1 Proposed Project

The proposed project involves the addition of a new waste heat boiler and APC equipment to the South MWC Unit. The North MWC Unit would remain unchanged as part of the proposed project, continuing to be associated with the existing waste heat boiler and APC equipment. The total facility capacity after the proposed project would be 200 tpd (100 tpd each unit). Additional proposed project details are provided in Section 1.1. An air emission permit amendment would be required before commencement of construction for the proposed project. The permit amendment would be issued, by the MPCA, for the construction and operation of the PRRF with both MWCs operating at maximum capacity.

The combustion of MSW produces air emissions including criteria pollutants and hazardous air pollutants (HAP) from both stationary and fugitive dust sources.

The proposed modification of the South Unit includes the addition of a new APC system including:

- a dry lime injection system or equivalent for acid gas control
- a carbon injection system for mercury control
- a fabric filter baghouse for particulate control

Similar existing APC equipment would remain in place for the North Unit.

The existing North MWC Unit would continue to be subject to the 40 CFR (Code of Federal Regulations) Part 62 Federal Implementation Plan (FIP) Subpart JJJ requirements as well as the Minnesota Waste Combustor Rule. The modified South MWC Unit would be subject to the 40 CFR Part 60 New Source Performance Standards (NSPS) Subpart AAAA as well as the Minnesota Waste Combustor Rule. Both Subparts JJJ and AAAA contain emission limits for:

- Dioxins/furans
- Cadmium
- Lead
- Mercury
- Opacity
- Particulate Matter
- Hydrogen chloride
- Nitrogen oxides
- Sulfur dioxide
- Carbon monoxide
- Fugitive ash

Existing Conditions

The PRRF is considered a major stationary source for air emissions under the New Source Review (NSR) Prevention of Significant Deterioration (PSD) permit program, and is also considered an affected source under the NSPS and FIP regulations.

Air emissions from the Facility result from the combustion of municipal solid waste, natural gas combustion, material handling, cooling tower particulates and fugitive emissions from on-site vehicle traffic. The source consists of the following emission units:

- EU001 – South Municipal Solid Waste Combustor
- EU002 – North Municipal Solid Waste Combustor
- EU005 – Auxiliary Boiler

PRRF is one of 28 stationary source categories that is a listed air emission source having a potential to emit (PTE) 100 tons per year (TPY) or more of any single regulated pollutant (except carbon dioxide equivalents (CO_2e)) and is considered a major stationary source. For sources classified as one of the 28 listed, fugitive emissions must be included in the PTE. Therefore, fugitive dust from on-site traffic is included in the total facility PTE for both the current and future potential emissions.

Total facility limited potential emissions for the existing facility are presented in Table 3-1. Criteria pollutants and HAPs are shown. Criteria pollutants include particulate matter (PM), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOCs) and lead (Pb). Fugitive tailpipe emissions, which are not part of stationary source air permitting, are discussed in Section 3.2. This section only discusses sources regulated by the air permit.

Table 3-1: Existing Facility Limited Potential Emissions

Existing Facility	North and South MWCs[1]	Auxiliary Boiler[1]	Fugitive Dust from On-Site Traffic[1]	Totals[1]
CO	22.71	30.12	0.00	52.83
NO_x	186.51	11.47	0.00	198.0
PM	9.54	2.73	0.15	12.42
PM_{10}	10.76	2.73	0.03	13.52
$PM_{2.5}$	10.76	2.73	7.36E-03	13.50
SO_2	40.01	0.22	0.00	40.23
VOC	2.41	1.97	0.00	4.38
Lead	0.31	1.79E-4	0.00	0.31
Single HAP[2]	73.92	0.00	0.00	73.92
Total HAP	74.41	0.69	0.00	75.10

[1] Shown in Tons Per Year (TPY)

[2] The maximum single HAP is provided. For the existing facility, this is hydrochloric acid (HCl). HCl emissions are not expected from the Auxiliary Boiler because it burns natural gas only.

3.1.2 Proposed Project Impacts

The construction of a new waste heat boiler requires the Facility to meet emission limits required by NSPS. The increase in emission levels are below PSD significance thresholds.

The impact of the stationary source emissions was evaluated using air dispersion modeling to estimate air concentrations of emitted substances. Air emissions from the Facility, including the proposed project, were identified and are described in Sections 3.1 and 3.2 of this EIS. Additionally, PLMSWA used MPCA's Air Emissions Risk Analysis (AERA) protocol and human health risk assessment (HHRA) to evaluate the impact of the Facility on human health, and adverse impacts are unlikely. Results are discussed further in Section 4.0.

Air Emissions from Proposed Project

Air emissions from the proposed project result from MSW combustion, natural gas combustion, material handling, cooling tower particulates and fugitive emissions from on-site vehicle traffic. The changes to the Facility associated with the proposed project include the addition of a MRF and additional APC equipment for the modified South Unit, as well as the installation of an additional HRB for the South Unit. The MWCs would continue to emit out of a combined stack. Criteria pollutant and HAP emissions, both controlled and uncontrolled, have been calculated for the proposed project.

Emissions calculations were completed using USEPA's AP-42 emission factors, vendor information, engineering estimates, stack test data from the PRRF and other similar facilities, and regulatory emission limits.

The total facility limited potential emissions for the Facility after the proposed project are presented in Table 3-2. Fugitive tailpipe emissions, which are not part of stationary source air permitting, are discussed in Section 3.2. This section only discusses sources regulated by the air permit.

Table 3-2: Total Facility after Proposed Project Limited Potential Emissions

Total Facility (existing plus proposed)	North Unit MWC[1]	South Unit MWC[1]	Auxiliary Boiler[1]	Fugitive Dust from On-Site Traffic[1]	Totals[1]
CO	21.0	21.0	30.12	0.00	72.12
NO_x	171.8	171.8	11.47	0.00	355.1
PM	8.2	8.2	2.73	0.52	19.65
PM_{10}	10.0	10.0	2.73	0.10	22.83
$PM_{2.5}$	10.0	10.0	2.73	0.03	22.76
SO_2	36.9	14.4	0.22	0.00	51.52
VOC	2.2	2.2	1.97	0.00	6.37
Lead	0.29	3.60E-2	1.79E-4	0.00	0.33
Single HAP[2]	68.44	6.84	0.00	0.00	75.26
Total HAP	69.83	7.98	0.69	0.00	78.50

[1] Shown in Tons per Year (TPY)

[2] The maximum single HAP is provided. For the total facility (existing facility plus Proposed Project) this is Hydrochloric Acid (HCl). HCl emissions are not expected from the Auxiliary Boiler because it burns natural gas only.

The permit for the proposed project would limit emissions from the South Unit in accordance with NSPS AAAA defined emission limits. The North Unit would remain subject to FIP JJJ limits. PSD allows an increase in emissions below the PSD significance thresholds. As shown in Table 3-3 below, all pollutant emissions increases associated with the proposed project were calculated as below the significance thresholds; therefore, the project is not subject to PSD.

Table 3-3: Proposed Project Emissions Increases Compared to PSD Significance Levels

Pollutant	Future Projected Actual (FPA) - Past Actual (PA)[1] (tons/year)	PSD Significance Level (tons/year)	Exceeds PSD Significance Level?
PM (total)	7.11	25	No
PM_{10}	8.47	15	No
$PM_{2.5}$	8.30	10	No

Pollutant	Future Projected Actual (FPA) - Past Actual (PA)[1] (tons/year)	PSD Significance Level (tons/year)	Exceeds PSD Significance Level?
NO_x	31.24	40	No
SO_2	4.84	40	No
CO	19.99	100	No
VOC	1.34	40	No
Sulfuric Acid (H_2SO_4)	0.01	7	No
MWC Acid Gases (SO_2 & HCl)	0.00	40	No
MWC Organics (PCDD/PCDF)	0.00	3.53E-06	No
Lead	0.00	0.6	No
Mercury	2.18E-03	0.1	No
Fluorides as Hydrogen Fluoride	2.95E-02	3	No
Greenhouse Gases as Carbon Dioxide Equivalents (CO_2e)[1]	11,220	75,000	No

[1] Any decreases in emissions were set at zero. Note that the decreases in emissions from the South Unit for MWC Acid Gases (SO2, HCl), MWC Organics (as PCDD/PCDF), and Lead were the result of more stringent emission standards applicable to the unit after the modification.

Emission Limits and Emission Controls

FIP and NSPS requirements for the MWCs require the Facility to operate the equipment in the most efficient manner and within the defined emission limits. The proposed project controls on the South Unit include dry lime injection for acid gas control, carbon injection for mercury control, and a fabric filter baghouse for particulate control. Specific emission limits for the MWCs are listed below:

- Modified South Unit
    - PM_{10} and $PM_{2.5}$ – Minnesota Rule 7011.1229 for Class II Units, 0.020 grains per dry standard cubic feet (gr/dscf)
    - SO_2 – NSPS AAAA, 30 parts per million volume dry (ppmvd)
    - NO_x – NSPS AAAA, 500 ppmvd
    - CO – NSPS AAAA, 100 parts per million (ppm)
    - Lead – FIP JJJ, 1.60 milligrams per dry standard cubic meter (mg/dscm)
    - Cadmium – FIP JJJ, 0.10 mg/dscm
    - Mercury (short term) – Minnesota Rule 7011.1229 for Class II Units, 100 μg/dscm at 7% O_2
    - Mercury (long term) – Minnesota Rule 7011.1229 for Class II Units, 60 μg/dscm at 7% O_2
    - Mercury (long term) – State only based on HHRA, 41 μg/dscm at 7% O_2
    - HCl – Minnesota Rule 7011.1229 for Class II Units, 25 ppmvd
    - Total Dioxins/Furans – NSPS AAAA, 13 nanograms per dry standard cubic meter (ng/dscm)
- Existing North Unit
    - PM_{10} and $PM_{2.5}$ – Minnesota Rule 7011.1227 for Class C Units, 0.020 gr/dscf
    - PM Filterable – FIP JJJ, 70 mg/dscm
    - SO_2 – FIP JJJ, 77 ppmvd

- NO_x – FIP JJJ, 500 ppmvd
- CO – FIP JJJ, 100 ppmvd
- Lead – NSPS AAAA, 0.20 mg/dscm
- Cadmium – NSPS AAAA, 0.02 mg/dscm
- Mercury (short term) – Minnesota Rule 7011.1227 for Class C Units, 100 µg/dscm at 7% O_2
- Mercury (long term) – Minnesota Rule 7011.1227 for Class C Units, 60 µg/dscm at 7% O_2
- Mercury (long term) – State only based on HHRA, 41 µg/dscm at 7% O_2
- HCl – FIP JJJ, 250 ppmvd
- Total Dioxins/Furans – State-only based on HHRA, 20 µg/dscm at 7% O_2
- Total Dioxins/Furans – FIP JJJ, 125 ng/dscm

Stationary Source Greenhouse Gas Emissions

In May 2010, the USEPA added greenhouse gases (GHGs) to permitting regulations for the NSR PSD program, commonly referred to the Tailoring Rule. In January 2011, MPCA incorporated GHG regulations related to the Tailoring Rule into Minnesota Rules. The PSD major source threshold for GHGs was set at 100,000 tpy CO_2e. Facilities were required to calculate their current PTE of GHGs by July 1, 2011, and determine if GHG PTE was less than or greater than the 100,000 tpy CO_2e threshold. In addition to GHG the permitting requirements, on July 1, 2011, USEPA issued an action deferring, for a period of three years, the application of the PSD and Title V permitting requirements to carbon dioxide (CO_2) emissions from bioenergy and other biogenic stationary sources (biogenic CO_2). This action was taken in response to a Petition for Reconsideration filed by the National Alliance of Forest Owners (NAFO) because biomass can be part of a national strategy to reduce dependence on fossil fuels. Efforts are also underway to foster the expansion of renewable resources and promote biomass as ways of addressing climate change and enhancing forest management. This deferral allows the USEPA time to conduct a detailed examination of the science associated with biogenic CO_2 emissions from stationary sources.

Biogenic CO_2 emissions are defined as emissions of CO_2 from a stationary source directly resulting from the combustion or decomposition of biologically-based materials other than fossil fuels and mineral sources of carbon, including municipal solid waste combustion. The MPCA, on July 9, 2012, proposed to make permanent certain amendments to Minnesota Rules associated with USEPA regulations which require air permits to address GHG emissions. The proposed amendments to the Minnesota Rules adopt the biogenic CO_2 exclusion mentioned previously. The proposed Minnesota Rules and federal rules are also clear that biogenic non-CO_2 GHGs (e.g., methane [CH_4] or nitrous oxide [N_2O]) are not excluded/deferred, only biogenic CO_2 is deferred.

GHG emissions were determined for the existing PRRF and the Facility with the proposed project. Emissions were calculated using emission factors from 40 CFR Part 98 (GHG Mandatory Reporting Rule), Subpart C for Combustion Sources, Table C-2-Municipal Solid Waste. Only fossil fuel GHG emissions were used in the PSD analysis and quantified in Table 3-4. Biogenic emissions are not applicable because N_2O and CH_4 are not biogenic in origin.

Table 3-4: Total Facility Potential GHG Emissions

	North and South MWCs[1]	Auxiliary Boiler[1]	Total[1]
Current Facility	20,246	42,775	63,021
Facility With Proposed Project	37,461	42,775	80,236

[1] Shown in Tons Per Year (TPY) of CO_2e.

3.2 VEHICLE-RELATED AIR EMISSIONS

Vehicle-related air emissions primarily consist of fugitive dust and vehicle exhaust. The main source of vehicle exhaust at the PRRF is from diesel engines on haul trucks. Fugitive dust is generated as vehicles travel on-site causing particulate matter to become airborne. The current and proposed project vehicle-related air emissions were analyzed for the proposed project.

3.2.1 Current Traffic

The PRRF receives MSW on a regular basis from incoming trucks that unload on a tipping floor inside the building. The waste haulers schedule their routes so that the trucks arrive at the PRRF during different times of the day. The majority of the time, there are no trucks at the Facility or a single truck arrives, dumps its load, and leaves. It takes about two minutes for a truck to dump its load into the receiving area. During normal operation, when a truck is on-site, there is a short duration of idling time estimated at less than five minutes. However, as a conservative estimate, five minutes of idling time for each truck is assumed for the purposes of the diesel truck NO_x/NO_2 (nitrogen dioxide) and particulate matter emission calculations.

Based on 2010 truck hauling records, 4,146 truckloads (35,000 tons) of MSW were delivered to the PRRF. Auxiliary traffic from Facility operations included 780 truckloads of ash, 147 leachate trucks, 14 miscellaneous trucks, and 55 trucks for the delivery of lime. The Facility also received approximately zero to two deliveries per day.

Figure 5 shows existing traffic routes on site at PRRF. Truck traffic enters the site from 2nd Avenue Northeast and delivers MSW to the tipping floor at the southeast side of the building. Based on a review of the area, the round trip distance a truck travels on site is 130 feet. The ash, leachate, and lime trucks travel around the Facility to the APC equipment and collect their loads at the southwest corner of the building for a round trip distance of 520 feet.

Currently, there are 15 total employees who drive 50 feet on site. The future facility is expected to employ 27 employees, but there would be only 21 employees onsite every 24 hours. The maximum number of daily trips on site was calculated assuming that 21 employees are on site.

3.2.2 Proposed Project Traffic

The modification to the South Unit would increase the capacity of PRRF. The maximum design capacity for the proposed project is 73,000 tpy of MSW. However, the projected operating capacity would be 55,000 tpy of MSW. Future traffic calculations are based on the maximum design capacity rather than the projected actual operating capacity. With the construction of the MRF, recycled materials truck traffic is expected to increase in proportion with the increased amount of MSW processed at the Facility and the ability of the Facility to recycle more materials (aluminum, glass, etc.). The increased total capacity of the Facility to combust processed MSW increases the number of MSW trucks as well as the number of ash trucks (a product of the combustion of processed MSW). Ash trucks, however, would not increase in direct proportion to the amount of processed MSW combusted. Under the proposed project, five to eight percent of MSW would be recycled and approximately 10 percent would fall out as fines in the MRF prior to combustion. This would reduce the amount of ash generated by approximately 15 percent compared to MSW combustion without the MRF. MSW truck loads may increase to 7,468 per year. Truck loads for ash, fines, and non-processibles would increase to 1,546 per year, leachate to 93, and MRF trucks to 96 per year. It is conservatively assumed that lime trucks would double as a second air pollution control train begins operation. The number of deliveries and miscellaneous trucks is not expected to increase.

Once the modified South Unit is constructed and the Facility begins operations, traffic patterns would change. Figure 6 shows future traffic routes on site at PRRF. The on-site distance traveled by MSW trucks and miscellaneous trucks would increase to 288 feet. Leachate and lime trucks would need to travel around the new MRF which would be constructed north of the current facility. Travel distances would increase to 938 feet. Ash would be removed from the same area as at the existing facility. Fines separated through the MRF would be removed from roll-off containers at the MRF and associated trucks would travel 1,175 feet around the Facility. Recycling trucks associated with the MRF would travel 496 feet as MRF shipping would be located on the north side of the Facility. Trucks from Bongards' would need to cross through PLMSWA property to access their scale. The current haul road would move north to go around the MRF. The change in emissions from this new route is insignificant.

The proposed project is expected to require 27 employees who are estimated to each drive 877 feet on site. However, only 21 employees would be on site at any one time.

Vehicle Emission Calculation Methodology

Emissions from on-site vehicle traffic were calculated for fugitive dust, particulate emissions from diesel fired truck engines, as well as NO_2 and NO_x emissions from diesel trucks. It was assumed that truck traffic occurred on site five days per week and 52 weeks per year for a total of 260 days of truck traffic per year. Vehicle weights were calculated based on PRRF 2010 truck data for different truck categories. It was also assumed that employee vehicles weighed an average of 3,590 pounds each based on the USEPA report *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2011.*

Using the calculated mean vehicle weight of trucks traveling on site at PRRF, the vehicle miles traveled on site per day (VMT/day), and methodology as defined in AP-42 Section 13.2.1, particulate emissions from on-site paved roads were calculated. Equation 2 of AP-42 Section 13.2.1 was used to calculate emission factors in pounds per vehicle miles traveled (lb/VMT). The emission factors for PM, PM_{10}, and $PM_{2.5}$ were then multiplied by the VMT/day and converted into units of tons per year to determine the PTE from on-site paved roads.

Diesel particulate, NO_x and NO_2 emission calculations quantify emissions from the tailpipes of on-site vehicles with diesel engines. Diesel NO_x and NO_2 emissions are based on the assumptions mentioned in the previous paragraph, however, emission factors were obtained from AP-42, 5th Edition Section 3.3. NO_x emissions were first quantified. It was then assumed, based on Tang et. al. from Environmental Science & Technology (2004), that 25 percent of NO_x emitted from the diesel engines was present as NO_2. Diesel particulate emissions were calculated using a moving truck factor from USEPA's Mobile 6.2 program for heavy duty diesel vehicles (HDDV) – Slide 13, while the idling emission factors were obtained from the Journal of Air and Waste Management, Idle Emissions from Heavy-Duty Diesel Vehicles: Review and Recent Data (October, 2006). Potential emissions from diesel vehicles were then carried forward to the AERA and are discussed further in Section 4.0.

Vehicle-related Emissions

Air emissions were quantified for use in the AERA and air dispersion modeling in order to assess the expected impacts from on-site vehicle-related air emissions at PRRF and for the proposed project. Emissions from on-site paved roads, particulate emissions from diesel truck engines, as well as NO_2 and NO_x emissions from diesel trucks, were analyzed as part of the proposed project. Projected vehicle-related emissions are shown in Table 3-5 below.

Table 3-5: Vehicle-Related Emissions for the Proposed Project

Source	Fugitive Dust		Diesel		
Pollutant	PM_{10}	$PM_{2.5}$	Diesel PM	NO_x	NO_2
Emissions (ton/year)	0.10	0.03	3E-03	0.14	0.03

All MSW, fines, ash disposal, leachate, lime and employee truck traffic would occur on paved roadways on the site. Truck haul traffic entering and exiting the Facility use existing paved city streets and highways before leaving the city limits of Perham in route to the ash landfill and bypass landfill locations. These existing paved roadways minimize potential dust/particulate matter impacts on air quality from truck hauling. Existing roadways on site would be repaved as part of the proposed project. These repaved roads and newly paved roads would minimize particulate emissions from on-site traffic.

Emission levels from traffic would change, but the impacts were assessed using the AERA protocol and human health risk assessment. Results show no significant adverse impact and are discussed further in Section 4.0.

3.3 AIR DISPERSION MODELING

Dispersion modeling demonstrations were performed for criteria and air toxics pollutants. This section details the procedures followed for these analyses and the methodology used for the criteria pollutant runs. Appendix B provides the *Air Quality Dispersion Modeling Report; Modification of the South Municipal Waste Combustor Unit at the Perham Resource Recovery Facility, Perham, Minnesota*, which details the procedures and protocols used for air dispersion modeling completed for the PRRF. Section 4.0 – AERA and HHRA includes details related to the air toxic dispersion modeling performed for the screening-level risk assessment analysis using MPCA's Risk Assessment Screening Spreadsheet (RASS) and Appendix C contains the procedures followed for the air dispersion modeling runs performed for the refined HHRA using Industrial Risk Assessment Program (IRAP) software.

3.3.1 Model Selection

PLMSWA conducted dispersion modeling analyses with the latest version (12060) of the American Meteorological Society / United States Environmental Protection Agency (AMS/USEPA) Regulatory Model with Plume Rise Model Enhancements (AERMOD), to estimate concentrations at and around the PRRF. AERMOD is a state-of-the-art dispersion model that is capable of computing particle and vapor deposition in addition to air concentrations. Deposition rates were estimated for the HHRA analysis, as discussed in Section 4.0. On November 9, 2005, the USEPA established AERMOD as the preferred air dispersion model in the agency's Guideline on Air Quality Models, 40 CFR 51 Appendix W (GAQM).

3.3.2 Building Downwash

To assess the impact of building downwash, building dimensions used in the AERMOD model were calculated using the USEPA Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME), version 04274. Elevations of stacks and buildings were input into BPIP-PRIME.

Building dimensions, as well as elevation data of stacks and buildings, were determined and this data was used to develop the building downwash data for the Facility.

3.3.3 Receptor Grid

The criteria pollutants were run with a receptor grid that expands to six kilometers (km) from the center of the Facility at a uniform spacing of 100 meters. This same receptor grid was used for the air toxics modeling runs for the RASS. However, the receptor grid was extended to 10 km for the IRAP modeling runs. In addition, receptors were placed every 25 meters along the Facility fence line.

Receptor elevations were determined using the AERMOD Terrain preprocessor (AERMAP), version 11103 and U.S. Geological Survey (USGS) National Elevation Dataset (NED) files. A value of "NADA = 4" was used to reference the North American Datum of 1983 (NAD83) anchor coordinates based on the AERMAP user's manual.

3.3.4 Meteorological Data

For a modeling analysis, USEPA and MPCA guidelines specify the use of either one (1) year of on-site meteorological data, or five (5) years of representative, hourly National Weather Service (NWS) observations. Because no on-site data exists in the format required for the modeling, NWS data was relied upon in this analysis.

The meteorological data was obtained from the MCPA on August 19, 2011. The hourly surface observations are from Park Rapids, Minnesota with upper air sounding data from International Falls, Minnesota for meteorological years 2006 through 2010. The base elevation for the Park Rapids Airport is 440.4 meters. The new version of AERMET (11059) was used for the proposed project. AERMET is a meteorological preprocessor for organizing available meteorological data into a format suitable for use by the AERMOD air quality dispersion model. In choosing meteorological data for a particular project, USEPA and MPCA have indicated that site-specific land use and land cover data from the meteorological station is preferred over the modeled facility's land use data. However, the meteorological station with the most similar land use and land cover to the project site should be selected. MPCA recommendations were followed in selecting the most representative surface station and all available nearby meteorological stations were compared to the land use and land cover characteristics for PRRF.

3.3.5 Emission Sources

The emissions at the Facility are from the two MWC units and the auxiliary boiler.

All roads at the Facility are paved. Paved roads were included in the analysis according to USEPA's March 2, 2012 Haul Road Workgroup Final Report. Additionally, based on the expected traffic and delivery patterns of the Facility, paved road emissions were modeled as occurring between 5AM and 8PM. The only other fugitive sources at the Facility include the lime storage silo and the cooling towers. However, these units' emissions are less than 0.1 lb/hr PM10 and 0.02 lb/hr PM2.5, so they were excluded from the analysis based on section 10 of the October 2004 MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2).

The stack parameters used in the air dispersion modeling demonstrations are shown in Appendix B. Emission rate calculations for the paved roads, auxiliary boiler, existing MWC stack and proposed combined MWC stack can be found in the Air Quality Dispersion Modeling Protocol (AQDMP) submitted to MPCA on June 28, 2012.

3.3.6 Model Input Parameters

All sources, buildings, and receptors were entered using Universal Transverse Mercator (UTM), zone 15 (extended) coordinates in meters, referenced to NAD 83. Facility point sources, fence line receptor locations, and building footprints are shown in Illustration 1.

Illustration 1: Perham Resource Recovery Facility Site Diagram for Proposed Facility Expansion

3.3.7 Criteria Pollutants

AERMOD was used to assess compliance with the National and Minnesota Ambient Air Quality Standards (NAAQS and MAAQS). The NAAQS are based on comprehensive studies of available ambient air monitoring data, health effects data, and material effects studies. The NAAQS/MAAQS were established to provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Table 3-6 includes all criteria pollutants and averaging periods assessed. The air dispersion modeling conducted included: PM_{10} and $PM_{2.5}$ for the 24-hour and annual averaging periods; CO for the 1-hour and 8-hour averaging periods; NO_2 for the 1-hour and annual averaging periods; SO_2 for the 1-hour, 3-hour, 24-hour and annual averaging periods, and Pb for the monthly averaging period.

Highs were predicted for each of the averaging periods for CO, SO_2, $PM_{10,}$ $PM_{2.5}$, and Pb concentrations. The NAAQS for 1-hour SO_2 and NO_2 are set as probabilistic standards. AERMOD version 12060 is able to calculate these percentiles of the maximum daily concentrations for the 1-hour NO_2 and the 1-hour SO_2 averaging periods. The lead ambient air quality standard is in the form of a rolling 3-month average. USEPA's LEADPOST program is also able to identify three month averages from monthly average post files. However, the use of LEADPOST was not necessary to demonstrate compliance with the NAAQS because a one-month high concentration was used as a worst case estimate of the rolling 3-month averaging period.

Table 3-6: Criteria Pollutant Averaging Periods

Pollutant	Averaging Period
PM_{10}	24-hour
	Annual
$PM_{2.5}$	24-hour
	Annual
CO	1-hour
	8-hour
SO2	1-hour
	3-hour
	24-hour
	Annual
NO_2	1-hour
	Annual
Pb	Rolling 3-month average

Air Dispersion Modeling Results for Criteria Pollutants

The dispersion modeling analysis for the proposed project involves two distinct phases. The first phase is the preliminary analysis, or significant impact analysis, which determines if the applicant can forego further air quality analysis for a particular pollutant with respect to the NAAQS/MAAQS. The second phase is the cumulative analysis for the NAAQS/MAAQS.

Significant impact levels (SILs) are numeric values normally derived and published by the USEPA, and adopted in state regulations. SILs play an important role in the dispersion modeling methodology. SILs are used to evaluate the impact of a proposed major source or modification on the NAAQS/MAAQS. The USEPA and MPCA consider a source whose individual impact falls below a SIL to have a *de minimis* impact on air quality concentrations. Consequently, SILs are used in the preliminary phase and are an inherent part of the modeling analysis to determine if the applicant of a proposed project, who wishes to locate in an attainment or unclassifiable area must conduct a cumulative analysis. SILs are used in significant contribution determinations to demonstrate that a proposed project will not cause or contribute to a violation of the NAAQS/MAAQS in the area.

Preliminary Analysis

When the modeled concentration from a proposed project is less than the respective SIL, no further cumulative analysis is required. The USEPA and MPCA consider this to be a sufficient demonstration that a project does not cause or contribute to a violation of the NAAQS/MAAQS.

Table 3-7 shows the results from the SIL analysis completed for the proposed project. The analysis completed for SO_2, CO, PM_{10}, and $PM_{2.5}$ showed that the predicted concentrations for the proposed project did not result in an exceedance of the SIL thresholds, and therefore, no further cumulative analyses were warranted for these criteria pollutants.

The predicted concentrations for NO_2 were above the SIL for the 1-hour and annual averaging periods, and therefore, a cumulative analysis was performed for NO_2 for comparison with the NAAQS and MAAQS. Additionally, since there is no SIL for lead, a cumulative analysis was also performed for this pollutant. These results are discussed in the Cumulative Analysis section below.

Table 3-7: Modeled Criteria Pollutant Concentrations in Comparison to the Significant Impact Levels (SILs)

Pollutant	Averaging Period	SILs (µg/m³)	Modeled Impacts[1] Change from Existing Facility (µg/m³)	Exceeds SILs	Modeled Impacts[1] Total Impacts of New Facility (µg/m³)	Exceeds SILs
PM_{10}	24-hour	5	4.85	NO	7.44	YES
	Annual	1	0.38	NO	2.26	YES
$PM_{2.5}$	24-hour	1.2	0.93	NO	5.95	YES
	Annual	0.3	0.08	NO	1.72	YES
SO_2	1-hour	7.83	1.30	NO	13.01	YES
	3-hour	25.0	0.44	NO	11.85	NO
	24-hour	5	0.11	NO	7.75	YES
	Annual	1	0.00	NO	0.28	NO
NO_2	1-hour[2]	7.52	NA[2]	YES	40.56	YES
	Annual[2]	1	NA[2]	YES	6.48	YES
CO	1-hour	2000	3.28	NO	112.14	NO
	8-hour	500	0.73	NO	95.03	NO

[1] Highest first high (H1H) concentrations.

[2] The change from existing case was not modeled for NO2. The assumption was made that the SIL would be exceeded for NO2 due to the changes from the existing facility.

Cumulative Analysis

If the modeled ambient impacts from a proposed project are equal to or greater than the respective SIL, then the source must conduct a cumulative modeling analysis that includes the Facility's total emissions along with emissions from other nearby sources.

For NO_2 and Pb a cumulative analysis was performed to assess compliance with the NAAQS/MAAQS. MPCA agreed that NO_2 background sources could be represented by the monitoring data from Blaine, MN. Thus, background sources were not explicitly included in the dispersion modeling analysis. Thus, background sources were not explicitly included in the cumulative dispersion modeling analysis for NO_2. In the case of Pb, there are no Pb nearby sources in the area so only the highest reported background concentration statewide was added to the modeled value. The results from this cumulative analysis showed that the proposed project would not cause or contribute to any NAAQS/MAAQS exceedances.

Table 3-8: Modeled Criteria Pollutant Concentrations in Comparison to the Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS/ MAAQS ($\mu g/m^3$)	Back-ground ($\mu g/m^3$)	Modeled Impacts[1] ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	Exceeds NAAQS/ MAAQS?
NO_2	1-hour	188 / NA	86.5	32.37	118.87	NO
	Annual	100 / 100	16.9	6.48	23.38	NO
Lead (Pb)	3-month	0.15 / 1.5	0.034	4.67E-03	3.87E-02	NO
$PM_{2.5}$	24-hour	35 / 65	22.8	5.95	28.75	NO
	Annual	15 / 15	9.5	1.72	11.22	NO

[1] Concentrations are high-eight-high (H8H) for 1-hour NO2, high-first-high (H1H) for annual NO2, and maximum 1-month average for lead. The one-month high concentration for lead is a worst case estim of the rolling 3-month averaging period.

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4.0 AERA, HHRA, and Mercury Analysis

To assess the effect of the proposed project on human health, PLMSWA conducted an AERA and HHRA. Following the requirements of the MPCA permitting process, an AERA was completed to provide a comprehensive review of the area surrounding the Facility and to screen out substances unlikely to adversely affect human health. The AERA process involves conducting a risk analysis of the proposed facility and its related air emission sources. It evaluates the Facility's impacts both quantitatively and qualitatively. The results of the AERA are used to determine what additional analysis is conducted in the HHRA.

4.1 FACILITY AND SURROUNDING AREA DESCRIPTION

The AERA characterizes the area surrounding the proposed project. Sensitive receptors near the PRRF include daycare facilities, schools, and a nursing home. Figure 7 shows nearby sensitive receptors. The city hospital recently moved to the far western side of Perham, outside the 1.5 km radius. There are single-family residences located within 1.5 km of the Facility, the nearest of which are approximately 118 meters away. Recreational fields (e.g., baseball fields) and farming locations are within the 1.5 km radius of the Facility. An MPCA-registered feedlot is at the border of the radius, but is a stockyard and auction facility and does not house animals continuously. Maximum and refined risk and hazard index values were calculated for applicable receptors, including residents and farmers, in the AERA and HHRA. This included evaluating impacts at locations identified as having sensitive populations using the acute hazard index for the chemicals emitted by the Facility.

The population density of Perham is 1,057 persons per square mile, and the total population of the city is less than 3,000 residents. Figure 8 shows the population densities surrounding the Facility. PRRF is located near other facilities with air permits. Figure 9 shows other nearby facilities that have their own air permits. Bongards' Creamery is adjacent to the site, Tuffy's Pet Foods is west of Bongards', and Barrel O' Fun is west of Tuffy's. Industrial Finishing Services is located north of PRRF.

Zoning for the city of Perham near the Facility is Industrial east and west of PRRF, Light Industrial to the south, and Residential to the north. Figure 10 provides the city zoning districts. The Perham Land Use Ordinance allows gardens in the residential districts, provided there is no sale of goods, indicating that MPCA's urban gardener receptor is relevant. Residential areas near PRRF include daycare facilities, elderly care facilities, and recreational areas such as tennis courts and ball fields. Therefore, total exposure was assessed to include children and sensitive subpopulations. No land use map is available for the city of Perham, but the National Agricultural Statistics Survey (NASS) map with a 10 km radius shows the Facility is in an area of low intensity development surrounded by agricultural fields and lakes. Figure 11 shows the NASS land use and land cover for the area. Farms within 15 km of the facility consist of mainly cropland (no livestock) where corn, beans, and potatoes are grown. The open area to the northeast of PRRF has recently been purchased by the city of Perham and while its ultimate use is currently undetermined, it will not become a residential area. Figure 12 shows nearby farming locations.

Persistent bioaccumulative toxic chemicals (PBTs) may be emitted. Therefore, nearby fishable water bodies need to be evaluated. Figure 13 shows fishable water bodies in the area. MPCA considers a water body "fishable" if it contains water year-round in a year receiving at least 75 percent of normal annual precipitation. There are two such water bodies within a 3 km radius of the Facility: the Otter Tail River and Little Pine Lake. The Otter Tail River, while declared fishable due to its open water, is not accessible for sport fishing within 3 km of the facility. Local information is that only carp are targeted in Otter Tail

River near the Facility, and the fish are not eaten. The southernmost tip of Little Pine Lake is within 3 km of PRRF and is fished, especially for walleye. Therefore, mercury effects on Little Pine Lake were evaluated as the potentially most impacted water body.

Currently, there is a fence surrounding the Facility. A new fence would be constructed with the proposed modifications to the South Unit. Access is restricted and the Facility location is such that people without business at PRRF would not likely spend time at the Facility. PRRF does not rent or lease any portion of its property for farming or other uses that could provide exposure to the public. There is no fishable water body on the property.

4.2 DESCRIPTION OF EXPOSURE SCENARIOS

The potential human health impacts associated with the emissions from the proposed project were evaluated in this study in terms of hourly inhalation effects, lifetime excess cancer risk and noncancer hazard quantification. The potential cancer risks/noncancer hazards were assessed for hypothetical residents, subsistence farmers, and subsistence fishers using estimated maximum emissions from the proposed facility based on proposed regulatory limits (PTE).

Under this regulatory project scenario (Scenario 1), the proposed facility significant cancer risks (greater than Minnesota Department of Health's (MDH) threshold of 1E-5) were calculated for the subsistence farmer receptor. Only one chemical group drove these risks for the assessment: PCDD/PCDF.
Farmer cancer risk estimates based on three alternative sets of assumptions were also conducted for context. These alternative scenarios include assumptions based on actual current land use, and actual emissions from the Facility.

- Scenario 2: PTE emissions and actual exposure pathways were evaluated. For example, a location raising cows was evaluated for beef consumption, a dairy was evaluated for milk consumption, a hog operation was evaluated for pig consumption, and a poultry farm was evaluated for egg and poultry consumption.
- Scenario 3: Future projected actual emissions and hypothetical exposure pathways were evaluated.
- Scenario 4: Future projected actual emissions and actual land use and population information were evaluated.

The potential non-cancer human health hazards from ingestion of fish were evaluated using MPCA's MMREM tool. The MMREM spreadsheet incorporates assumptions that someone consumes an amount roughly equivalent to 2.2 pounds of fish (4-5 meals) per week, 52 weeks per year. Detailed data and analyses can be found in the *Human Health Risk Assessment Report* and the *AERA Impact Analysis Summary* provided in Appendix C of this EIS.

4.3 DISPERSION MODELING IN THE AERA, HHRA, AND MMREM

Air dispersion modeling was conducted to estimate air concentrations for use in MPCA's RASS and the AERA to determine the effect the existing and proposed facility have on human health. PLMSWA used the AMS/EPA Regulatory Model with Plume Rise Model Enhancements (AERMOD) to generate dispersion factors for the RASS using one gram per second (1 g/s) emission rates. AERMOD outputs were used in the refined human health risk assessment and to generate mercury air concentrations for the MPCA's Mercury Risk Estimation Method (MMREM) analysis (see form AERA-27 in Appendix C). AERMOD is a preferred air dispersion model in the USEPA's Guideline on Air Quality Models, 40 CFR 51 Appendix W. AERMOD Version 12060 with the regulatory default option, concentration option, and rural option was used.

AERMOD was also used to model NO_2 emissions from vehicles traveling on the south east side of the facility. The RASS used the default Dispersion Information Screening Procedures for Emission Risk

Screening Evaluations (DISPERSE) to generate conservative dispersion rates for vehicle emissions of NO_2 and diesel $PM_{2.5}$ not modeled by AERMOD. It was assumed that vehicles had a stack height of 3.65 meters and a distance to receptors of 21 meters.

4.4 EMISSION CALCULATIONS IN THE AERA AND HHRA

Emissions were calculated for the existing facility and for the proposed project for use in the AERA and HHRA. Emission sources at the Facility included in the RASS were combustion stack/vent point sources, on-site mobile source tailpipe emissions, and idling vehicle tailpipe emissions. Other emission sources, such as small natural gas heating equipment, welding equipment, cooling towers, lime handling, and paved roads are insignificant activities. Their chemical emissions were either less than one percent of the total emission inventory or were not chemicals with inhalation health benchmarks.

Emission calculations were based on the potential to emit for both the existing facility and proposed project calculations. Acute emissions for the existing and future MWC were calculated using a short-term average at 110 percent of the combustor capacity. Only chemicals that have acute inhalation health benchmarks were included in the acute RASS calculations.

PCDD/PCDF emissions for individual congeners with health benchmarks were calculated based on measured ratios and proposed limits.

4.5 COMPOUNDS OF POTENTIAL INTEREST

In human health risk assessment, quantitative and qualitative information and descriptions of uncertainty are all a part of the analysis. This is a process whereby results are estimated at a screening level, then further refined, and finally any remaining uncertainty is described. In the Perham HHRA, several types of refinement were performed including dispersion, deposition and exposure assumptions. The refinement of dispersion and deposition modeling involved moving the quantitative analysis from the MPCA Risk Assessment Spreadsheet (RASS) to a more data-intensive software program, IRAP-h View™, as part of the HHRA. All pollutant emissions were first entered into the RASS. The pollutants that were above risk driver levels (those above 10% of MPCA risk guidelines) were then extracted from the RASS and entered into IRAP h-view modeling for refinement in dispersion and deposition characterization. The pollutants listed below were those that were analyzed by IRAP-h View™.

The RASS can evaluate 328 chemicals. Of these, 89 would be emitted by PRRF and were evaluated in the RASS for chronic effects and 22 for acute effects. A few chemicals, such as phosphorus and thallium, would be emitted by the Facility but do not have an associated IHB. Other chemicals, listed below, are PBTs without an IHB, so were automatically carried forward to the HHRA.

Following are chemicals that were carried forward to the refined HHRA, and thus were not included in the RASS outputs. These chemicals were the compounds of potential interest (COPI) for the project as listed below:

- 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)
- 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
- 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)
- 1,2,3,6,7,8-HxCDF
- 1,2,3,7,8,9-HxCDF
- 2,3,4,6,7,8-HxCDF
- 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)

- 1,2,3,6,7,8-HxCDD
- 1,2,3,7,8,9-HxCDD
- 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)
- 2,3,4,7,8-PeCDF
- 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 2,3,7,8-Tetrachlorodibenzofuran
- Cadmium
- Lead
- Hydrogen chloride
- Nitrogen dioxide (NO_2) for acute evaluation

Six other chemicals have been included in the refined HHRA analysis since they can contribute to the fish consumption pathway but were not included in the RASS:

- Acenaphthene
- Anthracene
- Fluoranthene
- Fluorene
- Phenanthrene
- Pyrene

4.6 FACILITY AERA, HHRA, AND MMREM RESULTS

The areas of maximum modeled impact were along the eastern property boundary of the facility from the hourly (acute) modeling, and north of the facility for the annual (chronic) modeling. Overall risk estimates decreased substantially as a result of the proposal primarily because the new stack will be 125 feet tall instead of 70 feet tall and the proposed mercury and dioxin/furan limits. When the RASS, IRAP and vehicle risk estimates were totaled, maximum risk estimates from the proposed facility were below facility risk guidelines (including urban gardener/fisher pathway), except for the maximum farmer cancer risk estimate. Maximum farmer cancer risk estimates were 2E-5. This is above the risk guideline used for MPCA facility risk assessments (1 in 100,000 or 1E-5) but are consistent with risks from similar facilities and are within EPA's excess cancer risk goal range of 1 in 1,000,000 to 1 in 10,000. The proposal does decrease the maximum farmer cancer risk estimate by an order of magnitude, and it is below MPCA facility risk guidelines if default farming exposure assumptions are used at locations which currently raise animals. Likewise farmer cancer risk estimates from alternative scenarios, such as estimating risk based on actual land use and/or actual land use, were below MPCA risk guidelines.

Risk estimates from PBT pollutants, other than mercury, bioaccumulating in fish in Little Pine Lake were included in the HHRA analysis. When the risks from a subsistent fisher (without Hg) were combined with the urban gardening scenario risk estimates they were still below risk guidelines.

The potential non-cancer human health hazards from ingesting fish bioaccumulating potential mercury emissions from the proposed project were evaluate using MPCA's MMREM tool. The assumptions in the MMREM spreadsheet are chosen to be health protective. Based on the results shown below in Table 4-1, PLMSWA proposes a long-term state-only mercury limit of 41 µg/dscm. This level resulted in a hazard index of less than 1.0, which indicates that adverse human health effects are unlikely.

Table 4-1: MMREM Results Summary for Little Pine Lake

	Hazard Index Results							
	Subsistence Fisher[1]				Recreational Fisher[2]			
Emission Scenario	**Ambient Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**	**Ambient Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**
Existing Potential to Emit [3] (60 µg/dscm)	8.2	1.4	9.6	14%	1.7	0.3	2.0	14%
Post-expansion PTE [4] (41 µg/dscm)	8.2	0.999	9.2	11%	1.7	0.2	1.9	11%
Existing actual (15 µg/dscm)	8.2	0.2	8.4	3%	1.7	0.1	1.8	3%

[1] Subsistence-level fish consumption is roughly equivalent to 2.2 pounds of fish (4-5 meals) consumed per week, 52 weeks per year.

[2] Recreational-level fish consumption is roughly equivalent to 0.5 pounds of fish (1 meal) consumed per week, 52 weeks per year.

[3] The existing PTE limit is based on Minn. Rule 7011.1229 Table 2 for Class II Units.

[4] The limit of 41 µg/dscm reduces the potential hazard from the facility. This limit equates to an incremental decrease relative to the ambient background and a hazard index less than 1.0 for subsistence-level exposure.

This assessment provides the risk managers at MPCA the information and tools necessary to protect human health around the PRRF. Detailed data and analyses can be found in the *Human Health Risk Assessment Report* and the *AERA Impact Analysis Summary* provided in Appendix C of this EIS.

4.7 CUMULATIVE INHALATION AIR TOXICS RESULTS

Cumulative inhalation risks for air toxics were estimated by combining the maximum facility-specific risks and the average of risk estimated from ambient air monitors across the state with similar population densities to the area within 1.5 kilometers of the PRRF. The data from ambient air monitors are intended to represent the non-facility background risk and hazard. As seen in Table 4-2, the total of the non-facility background risk estimates and the facility-specific risk estimates were below facility risk guidelines for acute and chronic hazard, but not for cancer risk. Inhalation cancer risk estimates from ambient air monitors are above facility risk guidelines but within EPA's excess cancer risk goal range of 1 in 1,000,000 to 1 in 10,000. As a result of the modified stack height and proposed limits, the potential risk estimates with the proposed modification to the South Unit are lower than the potential risk estimates for the existing facility.

Table 4-2: Cumulative Inhalation Estimates

	Inhalation Cancer Risk	Inhalation Chronic Non-Cancer Hazard Index	Inhalation Acute Hazard Index
Ambient monitoring data	**3.5 in 100,000**	**0.69 (respiratory 0.44)**	**0.58 (respiratory 0.47)**
Total proposed facility	**0.1 in 100,000**	**0.08**	**0.33**
Total cumulative sum – proposed facility	**3.6 in 100,000**	**0.77**	**0.91**
Change in risk from proposal	**Decrease**	**Decrease**	**Decrease**

4.8 MERCURY TMDL

Minnesota lakes that exceed the MPCA water quality threshold for mercury in fish tissue (0.2 ppm) are subject to fish consumption advisories. Lakes that exceed this threshold are considered "impaired" and are included in Minnesota's Total Maximum Daily Load (TMDL) Pollutant Reduction Plan. The TMDL for mercury allocates reduction requirements for sources contributing mercury to the impaired water bodies in Minnesota. The long-term goal of the mercury TMDL is for the fish to meet water quality standards; the approach for Minnesota's share is mass reductions from state mercury sources (MPCA, 2009b). The proposed modification at PRRF would comply with Minnesota's Mercury TMDL and would not further impair water bodies.

About 90 percent of the mercury deposition in the state originates from outside the state. EPA in its approval of the TMDL has acknowledged the federal government's responsibility for meeting its reduction goal of 90 percent of the total reduction. The remaining 10 percent reduction allocation is Minnesota's, for which the MPCA has the responsibility for developing schedules and meeting reasonable assurance requirements of the Clean Water Act (CWA).

The USEPA approved Minnesota's Statewide Mercury Total Maximum Daily Load Pollutant Reduction Plan in March 2007. Since then, the MPCA has worked with stakeholders representing a broad range of interests to identify strategies and timelines that would be included in an implementation plan. The stakeholders' recommendations, completed in June 2008, are contained in the Implementation Plan for Minnesota's Statewide Mercury TMDL "Mercury Implementation Plan") (available on the MPCA website at http://www.pca.state.mn.us/air/mercury). The PRRF falls into the source category "municipal waste incineration," which has not been targeted for future reductions in the implementation plan because mercury emissions from the industry are already highly controlled.

The Mercury TMDL deals with existing sources separately from new or modified sources. How increases in mercury emissions for new and modified sources are addressed in the TMDL framework can be found in the Mercury Implementation Plan. The plan states that after May 1, 2008, new and expanding air emission sources of mercury will be issued air emission permits provided the following measures are employed to ensure that the new and expanding sources do not result in an eventual exceedance of the TMDL goals:

1. The source is required to use and achieve the best mercury emissions control.
2. The source must complete environmental review as applicable, including evaluation of local and cumulative impacts.
3. The source must submit a plan to the MPCA to account for the proposed emission.

New sources are expected to arrange for reductions equal to the new emissions from existing sources in the state beyond those already required in the reduction strategy for the existing sources. If mercury reductions from an existing facility in Minnesota cannot be identified a new or expanding facility may propose alternative mitigation strategies in lieu of in-state air emission reductions. If an expanding source can demonstrate net increases less than three pounds per year from their proposed project, no additional reductions are required.

Projected mercury emissions from the modified South Unit would be less than three pounds per year based on projected throughput and emissions control technology. PRRF has submitted a strategy document to the MPCA that describes how the facility meets the three measures listed above and the equivalent reductions in mercury emissions that the PRRF would secure should annual emissions from facility changes exceed three pounds. The strategy has been incorporated into a compliance agreement that will be executed by the MPCA with the PLMSWA prior to a permit being issued for the modified South Unit.

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5.0 Water Use and Wastewater

5.1 EXISTING CONDITIONS

5.1.1 Water Use

Water is used at the PRRF for various components of waste processing and steam production. As discussed in Section 1.1, the Facility consists of four major components: 1) waste receiving, processing, and storage; 2) combustion; 3) energy generation (i.e., steam and electricity); and 4) air pollution control (APC) equipment. A *Perham Resource Recovery Facility Water Use and Wastewater Report* (Wastewater Report), June 2012, analyzed water use and wastewater activities at the PRRF. The Wastewater Report took into account water use and wastewater processes under existing conditions, as well as under conditions of the proposed project. See Appendix D for a complete copy of the Water Use and Wastewater Report.

Water used at the PRRF comes from the Perham municipal water supply. The City pumps water in compliance with its Water Appropriations permit issued by the Minnesota Department of Natural Resources (MNDNR). This permit allows the City to pump up to 500 million gallons (MG) per year. Over the past two years (i.e., 2010 and 2011), the average water pumped each year was approximately 410 MG.

Water use at the PRRF is primarily for steam production. Additional water use includes drinking/sanitary/maintenance, boiler make-up, boiler blowdown cooling water, and cooling tower make-up. Additional water is also used to refill the ash drag chain conveyor after it is pumped out to remove the fly ash laden water. A water process flow diagram is provided in Figure 14 and shows the various components of water use at the PRRF.

Boiler make-up water requires purified water. Incoming water from the City of Perham enters a purification system, which includes a reverse osmosis (RO) system and a water softener, before entering the condensate tank for use in the steam production process. The RO system removes 95 percent of the dissolved solids in the municipal water, and the water softener removes any remaining hardness. Purified water from the condensate tank is then sent to the boilers to produce steam for local consumers.

A variable amount of exported steam is returned to the PRRF from its consumers in the form of condensate. This condensate is returned directly back into the condensate tank to use for steam production. The amount of condensate returned to the PRRF affects the quantity of water needed for boiler make-up water.

Municipal water used for boiler blowdown cooling, cooling tower make-up, and refilling the drag chain conveyor is not treated or purified prior to use. For boiler blow down cooling, municipal water is used to cool the boiler water that is continuously removed (i.e., blown down) from the boiler drum prior to it being sent to the sanitary sewer. Continuous blowdown of the boiler drum is required to control the solids build-up in the boiler drum, and to help maintain water chemistry within the boiler. Cooling towers are used to cool the exhaust steam from the steam turbine, and are used to cool any excess steam generated by the waste heat boiler. Municipal water is used to provide make-up to the cooling towers as water is lost through evaporation, tower blowdown, and drift.

Separate from the steam production process and associated with the combustion process, ash quenching also requires water use. This is a typical process for MSW combustion facilities. Ash quenching occurs in the ash drag chain conveyors. Leachate water is hauled from the ash landfill and primarily used as make-up water to maintain the appropriate water level in the drag chain conveyors. The resulting wetted ash from the PRRF is hauled to the ash landfill (i.e., Northeast Otter Tail County Ash Landfill) for disposal. Leachate from the ash landfill is collected and reused at the PRRF in this cyclical process. Additional municipal water is currently used to refill the drag chain conveyors when they are pumped out on a weekly basis for maintenance purposes.

Domestic water use makes up a small annual percentage of the total water used at the PRRF. Currently, 15 employees use water associated with the drinking/sanitary/maintenance water system. Water usage was calculated based on each employee using an average of 25 gallons of water per day (gpd) during a 5-day work week. This equates to approximately 98,000 gallons annually at the existing Facility.

5.1.2 Wastewater Generation

The main sources of wastewater at the PRRF include domestic (sanitary use), process, and ash quenching. Each source of wastewater is handled and treated in a specific manner.

Domestic wastewater is generated from employees and maintenance at the Facility. Approximately 98,000 gallons per year of domestic wastewater is produced. This wastewater is discharged to the City of Perham sanitary sewer system for treatment at the Perham Wastewater Treatment Facility (WWTF). The Perham WWTF currently operates under State Disposal System (SDS) permit MN0024473 to treat wastewater from industrial and domestic sources. The WWTF is currently permitted an average wet weather (AWW) flow of 580,000 gpd. Environmental review and permitting has been completed to expand the City's WWTF. The permit for the expanded WWTF allows up to 720,000 gpd.

Wastewater generated by employee use is discharged directly to the sanitary sewer system. Wastewater produced during maintenance of the Facility is directed to floor drains at the PRRF, which discharge to a sand and oil interceptor prior to entering the sanitary sewer system.

Wastewater is generated and discharged from several points during the steam production process. Municipal water enters the RO system, followed by the water softener where the remaining hardness is removed. Both the RO system and water softener have wastewater discharges. The RO reject water is routed to the City storm water sewer system. Water softener wastewater discharge is sent to the sanitary sewer system. The proposed project may include a bed media filter system upstream of the RO to remove suspended solids in the municipal water. The wastewater generated from back-flushing the filter is sent to the sanitary sewer system. Additional sources of process wastewater include the cooling tower blowdown and the boiler blowdown. Both of these wastewater sources are discharged to the sanitary sewer system.

Additional water, in the form of leachate from the Northeast Otter Tail County Ash Landfill, is used for ash quenching at the PRRF. The ash quenching process results in wet ash that is hauled to the Northeast Otter Tail County Ash Landfill for disposal. Leachate drains by gravity from the disposed ash where it is collected and hauled back to the PRRF for use again in the ash quenching process. Excess leachate collected at the landfill is hauled to the Fergus Falls WWTF, as allowed by an agreement between Otter Tail County and the City of Fergus Falls. The leachate content is not expected to change as a result of the proposed project. The Fergus Falls WWTF has the option to not accept any leachate that has the potential to cause the WWTF to exceed its permit limits. Otter Tail County monitors the leachate for a set of parameters required by the WWTF and submits those reports to the WWTF for review on an annual basis.

5.2 PROPOSED PROJECT

5.2.1 Water Use

On average, the city of Perham pumps approximately 410,000,000 gallons per year. Of the average annual water, the PRRF has used approximately 30,000,000 gallons per year. Under the proposed project's projected budgeted quantities, the PRRF would use an additional 7,000,000 gallons each year. Under the proposed project's maximum waste processing levels, the PRRF would use an additional

50,000,000 gallons. Table 5-1 below summarizes the annual quantities of water used in the various processes for operating the Facility and producing steam at the PRRF under existing conditions and after the proposed project is completed.

Table 5-1: Annual Estimated Water Use at the PRRF

Water Use Source	Existing Quantity (gallons)	Post Project Projected Budgeted Quantity[1] (gallons)	Post Project Maximum[2] (gallons)
Domestic – Drinking and Sanitary	98,000	176,000	176,000
Maintenance/Service Water	788,000	1,051,000	1,051,000
Process Water – TOTAL	28,823,000	36,002,000	78,686,000
Steam Production – Make-up Water Inlet to RO System	28,423,000	28,615,000	78,150,000
Boiler Blowdown Cooling	368,000	434,000	536,000
Cooling Towers	32,000	6,953,000	0
Ash Quenching – TOTAL	693,100	621,600	793,600
Leachate	450,000	524,000	696,000
Municipal Water	243,100	97,600	97,600
Total Municipal Water Use	29,952,100	37,326,600	80,010,600
Total Leachate Use	450,000	524,000	696,000

[1] Based on steam demand of 300,000,000 pounds per year and MSW combustion of 55,000 tpy.
[2] Based on both combustors/waste heat boilers burning 200 tpd of waste 365 days per year with all steam being exported and no condensate returned.

After the proposed project is complete, any excess steam would be condensed by cooling water flowing through the cooling towers, which would require additional make-up water. Therefore, process water usage would increase from the increased cooling tower make-up quantities. It is anticipated that the proposed project would increase process water make-up quantities by approximately 6,900,000 gallons per year.

In the data of Table 5-1, the auxiliary boiler is assumed to operate when the waste heat boilers are down for maintenance or the waste heat boilers cannot meet the export steam demand. This equates to an eight percent capacity factor for the auxiliary boiler. If the auxiliary boiler is operating at maximum capacity along with the waste heat boilers, the proposed make-up water system would have the capability to handle the water volumes as long as at least 50 percent of the condensate is returned. The facility would not be able to operate both the waste heat boilers and the auxiliary boiler at maximum capacity, because it would not have the capability to provide enough make-up water to operate the system.

The proposed project would also produce additional ash; approximately 3,000 tons per year more than existing quantities. This would increase the amount of leachate used to quench the ash at the PRRF. However, the fly ash conditioning system planned as part of the proposed project would reduce the quantity of municipal water needed for ash quenching because fly ash laden water would no longer need to be pumped out of the conveyor each week and replenished. Fly ash would be processed with leachate in the fly ash conditioning system. It is estimated that the amount of municipal water used for ash quenching would be reduced from 243,100 gallons per year to 97,600 gallons per year. The estimated quantity of water needed for ash quenching would not increase if the proposed project was operated at maximum capacity for an entire year. Instead, leachate use would increase by about 172,000 gallons for ash quenching due to increased quantities of ash.

Domestic water use and wastewater quantities would also increase upon completion of the proposed project. The PRRF would employ approximately 12 additional people for a total of 27 employees. This would increase the quantity of domestic wastewater discharge to approximately 176,000 gallons per year. Domestic water use at the Facility would increase by approximately 78,000 gallons per year, for a total estimated water use of 176,000 gallons.

The evaluation of water use and wastewater for the PRRF and the proposed project indicates the proposed project would not impact any facility or city permits. In all cases, the existing and proposed project's projected actual levels would not exceed existing permit limits. Table 5-2 summarizes the City's permit limit for maximum water allowed on an annual basis and compares that to the City's current level of water pumped and the PRRF proposed project.

Table 5-2: Permit Levels Compared to PRRF Annual Water Use

Permit	Permit Limit	City	Perham Resource Recovery Facility		
	Maximum allowable water use	Average Water Use	Existing	Proposed Project Actual	Proposed Project Maximum
MDNR Water Appropriations Permit (gpy)	500,000,000	410,000,000	29,952,100	37,326,600	80,010,600

The proposed project would not cause the City to exceed their allowed maximum under their MNDNR Water Appropriations Permit limits. Additionally, there is no permit required for water use from the City of Perham. The PRRF is billed monthly for its municipal water use. However, the City is required to comply with a MNDNR Water Appropriations Permit, which regulates the maximum amount of water that the City can pump each year for its municipal wells.

5.2.2 Wastewater Generation

The WWTF is currently permitted an AWW flow of 580,000 gpd. The permit for the expanded WWTF allows 720,000 gpd. Table 5-3 summarizes discharges from the PRRF to both the Perham WWTF and the storm sewer system compared to existing permit limits.

Table 5-3: Permit Levels Compared to PRRF Daily Wastewater Generation

	Permit Limit	City	Perham Resource Recovery Facility		
Permit	Maximum Average Wastewater Flow (gpd)	Average Wastewater Flow (gpd)	Existing (gpd)	Proposed Project Actual[1] (gpd)	Proposed Project Maximum[2] (gpd)
MPCA SDS Existing WWTF Permit (City)	580,000	540,000	4,545	9,780	6,641
MPCA SDS Expanded WWTF Permit (City)	720,000	Design capacity of 1,107,000	4,545	9,780	6,641

Permit	Permit Limit Maximum Average Wastewater Flow (gpd)	City Average Wastewater Flow (gpd)	Perham Resource Recovery Facility Existing (gpd)	Proposed Project Actual[1] (gpd)	Proposed Project Maximum[2] (gpd)
MPCA NPDES Permit (PRRF to storm sewer)	200,000	NA	22,562	22,715	64,233

[1] The cooling tower blowdown increases because there may be periods in which more steam is generated than what is sold, and the cooling towers would need to operate more to condense the excess steam.

[2] At the proposed project maximum, wastewater generation would decrease from the proposed project projected actual levels. This is because all steam is assumed to be used by local consumers, and therefore no cooling tower blowdown would be generated.

The proposed project quantities for wastewater discharge to sanitary sewer would increase by about 1.9 million gallons per year. This increase is primarily due to increased cooling tower blowdown. Throughout the year, there may be periods in which more steam is generated than what is sold, and the cooling towers would need to operate more often to condense the excess steam. This would cause a need for make-up water, and therefore, additional cooling tower blowdown wastewater would be generated. At the proposed project maximum wastewater generation levels, discharge to the sanitary sewer system would decrease from the proposed project projected actual levels. This is because all steam is assumed to be used by local consumers, and therefore no cooling tower blowdown would be generated.

Sanitary wastewater from the PRRF makes up a small percentage of the overall wastewater discharged to the city WWTF. Based on existing and new WWTF permit limits, the PRRF would not impact the City's SDS permit. The City is also currently in the process of upgrading their WWTF for a design capacity of 1,107,000 gpd. This increased design capacity, along with an amended City SDS permit to allow for greater AWW flow, would be more than adequate to meet the increase of approximately 5,000 gpd of PRRF wastewater from the proposed project. For sanitary discharge, the PRRF pays a flat rate to the City, and no permit is required for discharge to the City of Perham WWTF. The Perham WWTF operates under SDS permit MN0024473 to treat wastewater from industrial and domestic sources.

RO reject water makes up the majority of wastewater at the PRRF. RO reject water is regulated by an NPDES permit for the Facility, which allows RO reject water discharge to the City storm sewer system. Under the proposed project projected actual quantities, the proposed project would not exceed the existing threshold for the NPDES permit. Operating at 365 days per year under proposed project maximum levels, the PRRF would not exceed the existing permit threshold of 200,000 gpd maximum discharge. Operating at maximum capacity year round is not a realistic scenario due to maintenance requirements and steam demand. The City storm sewer infrastructure from the PRRF to the storm sewer network at 2nd Street was replaced less than 10 years ago, and therefore would not need additional improvements to handle the increased RO reject water discharge from the proposed project.

RO reject water is regulated by an NPDES permit for the Facility for discharge to the City storm sewer system. There are a total of 14 parameters that PRRF monitors and reports to MPCA as part of the NPDES permit. The flow limit is 0.200 million gallons per day (mgd), based on a calendar-quarter average; the pH must be above 6.0 standard units (SU) and below 9.0 SU as instantaneous measured results. The other 12 parameters are "monitor only" requirements. The proposed project is not anticipated to exceed its NPDES discharge limits for flow; however, if that were to occur, the Facility would need to amend its permit to allow greater RO reject water discharge to the storm sewer system. The proposed project is unlikely to cause changes in pH and other parameters.

PRRF is continuously evaluating means and methods related to conservation and reuse of water resources as evidenced by its use of leachate water from the Northeast Otter Tail County Ash Landfill at PRRF as makeup water in the ash quench system.

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6.0 Traffic Analysis

6.1 EXISTING CONDITIONS

The immediate area surrounding the PRRF consists of light industrial-type businesses. Residential-type properties are located about one block north of the PRRF. Roads within the industrial park are paved, two-lane streets. Streets north of the PRRF are used primarily by vehicles accessing residences and haul trucks associated with other industries within the vicinity of the PRRF. Streets east of the PRRF within the industrial park are primarily used by haul trucks and other delivery trucks.

6.1.1 Traffic Route

The majority of traffic associated with facility operations includes haul trucks carrying MSW, ash and fines, and recyclable materials. Haul trucks follow a City designated truck route to the PRRF from County Highway 80 (also known as Old Highway 10). The City has designated a truck route by Ordinance #322 allowing use of public streets for truck travel. Trucks are defined in the ordinance as those weighing greater than 24,000 pounds. An MSW haul truck for the PRRF would be classified as a "Truck" according to the City Ordinance. The haul route to the PRRF begins on County Highway 80, where trucks turn north onto 7th Avenue Northeast (NE). From 7th Avenue NE, trucks cross the Burlington Northern Santa Fe (BNSF) railroad and continue north to a scale to be weighed with a full load. The scale is accessed by an unpaved road on the west side of 7th Avenue NE. After being weighed, haul trucks proceed back onto 7th Avenue NE, turning west on 2nd Street, and enter the PRRF at an entrance west of the intersection of 2nd Street NE and 7th Avenue NE. The City designated haul route continues from the PRRF entrance north to 3rd Street NE past the Facility property boundary. Another existing City-designated haul route along 3rd Street NE is used by Bongards' and Tuffy's trucks, some of which turn south onto 6th Avenue NE, running north/south in front of the PRRF. This route is currently used by Bongards' to access their scale and would not change with the proposed project.

Haul trucks exiting the PRRF head eastbound onto 2nd Street NE, then turn south on 7th Ave NE, returning to the scale to be weighed as an empty load. Due to limited crossings of the BNSF railway, 7th Avenue NE is the only street near the PRRF that intersects with County Highway 80. Other vehicles entering and exiting the industrial park follow a similar route. Figure 15 shows the route used by haul trucks for the PRRF.

6.1.2 Existing Traffic Volumes

In 2010, there were approximately 5,149 trucks, which entered and exited the PRRF as part of operations of the Facility. This generated an average of approximately 40 trips per day (entry and exit of the Facility is considered two trips) along the designated haul route. Based on 2010 truck hauling records, this resulted in 4,146 truckloads of MSW. Auxiliary traffic from facility operations included 780 truckloads of ash, 147 leachate trucks, 14 miscellaneous trucks such as "Adopt A Highway" trucks, and 55 lime trucks for the air pollution control equipment. The Facility also receives approximately zero to two deliveries per day, including supplies and mail. Currently, the Facility has 15 employees, and therefore employee-related vehicle traffic is approximately 30 trips per day (i.e., entry and exit constitute two trips). Table 6-1 below provides a summary of the existing truck traffic for the facility. Additionally, Bongards' also currently has truck traffic entering the PRRF. Approximately 47 trucks per day (i.e., 40 milk trucks and 7 product trucks) cross through the PRRF property to the Bongards' scale. The number of Bongards' trucks would not change with the proposed project.

6.2 PROPOSED PROJECT

6.2.1 Traffic Route

While the PRRF typically operates seven days per week, the majority of traffic associated with the operation of the PRRF occurs on weekdays, and this is expected to continue with the operation of proposed project. MSW, fines, and ash are typically hauled during the Monday through Friday work week. Traffic on Saturdays and Sundays is primarily from employees needed to operate the Facility. Traffic flows from haul trucks and employee vehicles would continue using the current route to the Facility from County Highway 80. Based on conversations with the City of Perham in August 2012, no road construction is planned along the truck route. Haul trucks would continue to use the designated truck route and would not impact residential neighborhoods. County Highway 80 and the city streets located within the industrial park along the route to the PRRF are in good condition.

Currently, there is one main entrance to the PRRF, which is at the intersection of 6th Avenue Northeast and 2nd Street NE. There is also an access driveway just north of the PRRF that is currently owned and used by Bongards' to access their scale and facility. Figure 3 shows the existing facility site, and Figure 4 shows the proposed project site plan. The proposed project would eliminate this Bongards' driveway and move it further north. This access would be owned by the PRRF, but would allow Bongards' access to their scale and facility. The Bongards' trucks would enter the PRRF driveway and cross through to the Bongards' scale, located to the west of the PRRF property boundary. The Bongards' trucks would exit near the Bongards' facility and would only cross the PRRF property for entry and access to their scale. Figure 16 shows the existing and proposed route on the PRRF property that would be used by Bongards' trucks. The main entrance driveway to the PRRF would be moved slightly south. This driveway would be used for ash hauling and fines hauling purposes, and would no longer be used as the main entrance to the PRRF.

6.2.2 Traffic Volumes

Traffic associated with the proposed project would increase over existing levels. Most of the traffic would be generated by haul trucks and additional employees. Table 6-1 compares traffic volumes under current conditions (recorded in the year 2010) with projected traffic volumes related to the proposed project. For this analysis average trips per day were based on entry and exit of the PRRF, which would constitute two trips, as the truck would travel the same route twice for delivery of each load. Vehicles would follow the truck route to and from the PRRF with the exception of some employee trips, which may use other routes.

Once the proposed project is in place, the projected maximum number of annual MSW loads received at the PRRF (based on a maximum design capacity of 73,000 tons of MSW) is estimated to be 7,468. This would result in an average of 58 MSW truck trips per day based on a 5-day per week average schedule as a worst case scenario. The projected actual waste volumes to be processed after the proposed project are approximately 55,000 tpy of MSW. This would average about 44 truck trips per day related to MSW. With the construction of the MRF, traffic related to hauling recyclable materials is expected to increase in proportion with the increased amount of MSW processed at the Facility, as the Facility would have a greater ability to recycle more materials (aluminum, glass, etc.). It is anticipated that truck trips related to hauling recyclable materials would increase from seven loads per year to 72 loads per year under projected actual volumes. This increases the MRF truck trips from an average of less than one per week to an average of about two per week with the proposed project. Of the projected processed MSW at the facility, five to eight percent would be recycled and approximately 10 percent would fall out as fines in the MRF prior to combustion. This would reduce the amount of ash generated by approximately 15 percent compared to MSW combustion without the MRF.

The current total number of full and part-time employees operating the PRRF is 15. An additional 12 employees would be hired as a result of constructing and operating the proposed project. This would result in additional passenger vehicle traffic, but is not expected to significantly impact the Facility or the surrounding area. Employees would work in shifts and would not all be working during the same period of time. It is estimated that 10 new parking spaces would be added to accommodate the increased number of employees at the PRRF.

Table 6-1: Traffic Summary

Truck Type	2010 Truck Loads	2010 Avg. Daily Trips [1,2]	Projected Actual Truck Loads	Projected Actual Avg. Daily Trips [1,2]	Maximum Capacity Truck Loads	Maximum Capacity Avg. Daily Trips [1,2]
MSW Truck [7]	4,146	32	5,746	44	7,468	57
Ash Trucks	780	6	1,042	8	1,383	10.6
Fines and Non-processibles	N/A	N/A	123	1	163	1.26
Leachate Truck [6]	147	1.14	70	0.54	93	0.72
MRF Trucks[4]	7	0.06	72	0.56	96	0.74
Misc. Truck[3]	14	0.1	14	0.1	14	0.1
Lime	55	0.42	55	0.42	110	0.84
Employee Related	15 employees	30	27 employees[5]	42	27 employees[5]	42
Delivery Related	2 Deliveries per Day	4	2 Deliveries per Day	4	2 Deliveries per Day	4

[1] Entry and exit from the Facility are counted as two trips.

[2] Although burner operates continuously, assume 5 days per week with truck traffic (Monday-Friday) for a worst-case scenario, therefore 260 days of truck traffic per year.

[3] Miscellaneous Trucks include "Adopt A Highway" haul loads. These trips are not expected to increase as a result of the Proposed Project.

[4] Material Recovery Facility (MRF) Trucks include any truck traffic due to the proposed MRF related to steel recycling, glass recycling, aluminum recycling, etc.

[5] The current number of full and part-time employees operating the PRRF is 15. An additional 12 employees are to be hired as a result of operation of the Proposed Project. The future facility will have a maximum of 27 employees but only 21 employees onsite every 24 hours. The maximum number of daily trips is calculated assuming that 21 employees are onsite at one time.

[6] Under the Proposed Project, less leachate would be required due to the installation of an ash conditioner. It is conservatively estimated that 70 loads (140 trips), or a 50% reduction in leachate loads, are likely under the Proposed Project scenario for 55,000 tpy of processed waste.

[7] All additional MSW brought to PRRF (any increase in waste volume with the Proposed Project) would arrive in 20 ton trucks and 5 ton trucks after the completion of the Proposed Project. 80% of the additional waste would arrive in the 20 ton trucks while the remaining 20% would arrive in 5 ton trucks.

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7.0 Noise Analysis

7.1 AFFECTED ENVIRONMENT

7.1.1 Environmental Setting

The PRRF is zoned within an industrial park, and the immediate area surrounding the PRRF consists of light industrial-type businesses including a printing shop, vehicle/truck repair, feed mill, pallet making company, and a painting facility. Residential-type properties are located about one block north of the PRRF.

The PRRF is situated west of the intersection of 2nd Street NE and 6th Avenue NE. MSW brought in by haul trucks typically enter from 2nd Street NE. The haul route to the PRRF begins on Old Highway 10, where haul trucks turn north onto 7th Avenue NE. From 7th Avenue NE, haul trucks stop at a scale to be weighed, then proceed north to 2nd Street NE, turning west on 2nd Street towards the PRRF. Haul trucks exiting the PRRF head eastbound onto 2nd Street NE, then turn south on 7th Ave NE, returning to the scaled to be weighed again. Because 7th Avenue NE is the only street that intersects with Old Highway 10 due to limited crossing of the Burlington Northern railway, other vehicles entering and exiting the industrial park follow a similar route.

7.1.2 Noise Standards

The State of Minnesota noise regulations are administered by the MPCA under Minnesota Rules 7030.0040, subp. 2. The statutory limits for noise pollution are determined according to which noise area classification (NAC) is involved. There are three categories of NACs; residential, commercial, and industrial. Noise limits for each NAC distinguish between night time (10:00 p.m. to 7:00 a.m.) and daytime (7:00 a.m. to 10:00 p.m.) noise standards, where less noise is permitted at night. The standards list the maximum allowable noise for each NAC, expressed as decibel – A-weighted (dB(A)), for 10 (L50) and 50 (L50) percent of the time measured in a one-hour time period.

The City of Perham has adopted the state noise standards by reference to Minnesota Rules 7030 in their city zoning ordinance, part 92.18-Public Nuisances Affecting Peace and Safety, subp. D. The ordinance states "all obnoxious noises in violation of Minnesota Rules 7030, as they may be amended from time to time which are hereby incorporated by reference into this code."

The *Perham Resource Recovery Facility Noise Study* (Noise Study), June 2012, assessed noise levels at three residential receptors. Additionally, the Noise Study identified potential noise sources from inside and outside the PRRF during existing working conditions over a twenty-three hour period, and evaluated noise levels with respect to the surrounding environment. In general, noise levels at the residential receptors monitored for the Noise Study exceeded the L50 noise standard with the existing background L90 levels of noise. More information regarding Minnesota noise pollution standards and noise calculations can be found in the Noise Study, which is included as Appendix E.

7.1.3 Noise Monitoring Locations

The Noise Study relied on Quest model 300 dosimeters for taking noise measurements in the project area for a 23-hour period of time. The dosimeters were placed at three locations north of the PRRF along 3rd Street, near residential receptors, which have the most restrictive state noise standards.

Location #1 was at the southwest corner of 3rd Street and 6th Avenue. This monitoring location is immediately adjacent to the Tuffy's Pet Foods truck parking lot and approximately 450 feet north of the PRRF. Location #2 was mid-block along the south side of 3rd Street. This monitoring location is approximately 300 feet north of the scales for Bongards' Creameries and 420 feet north of the PRRF. Location #3 was located at the northeast corner of 3rd Street and 5th Avenue. This monitoring location is approximately 650 feet from the PRRF and also 350 feet from the northeast corner of the Bongards' Creameries facility.

7.2 ENVIRONMENTAL IMPACTS

The PRRF currently operates a number of different pieces of equipment, located both inside and outside of the building, that are a source of noise to varying levels. Table 7-1 identifies the different noise sources with their respective locations at the existing facility.

Table 7-1: Existing Equipment at the PRRF

Source of Noise (Equipment)	Location at Facility
ID Fan	Outside
Drum vent for heat recovery boiler	Outside
Steam muffler	Outside
Drum safety valve vent lines both boilers	Outside
Pulse poppets for baghouse	Outside
Pulse gas fan	Inside
Turbine drive feedwater pump vent	Outside
DA vent	Outside
Stack vent	Outside
Cooling tower fans	Outside

The Noise Study found noise levels are generally high near the residential neighborhood adjacent to the PRRF. Noise measurements taken at each of the three monitoring locations were found to exceed the daytime standards from 50 to 80 percent of the time for both the peak L10 levels and average L50 levels. Nighttime noise levels exceeded both the peak L10 levels and average L50 levels during all hours monitored at each location.

A variety of sources contributing to the noise levels in the neighborhood were identified in the Noise Study. Truck traffic was observed to be quite high along 3rd Street. The trucks accelerating and decelerating along 3rd Street contributed to the observed noise levels measured at all three monitoring locations. Trucks from neighboring businesses typically used 3rd Street as a primary route for travel in the industrial park. Another source that contributed to noise near the residential area was the trains traveling on the BNSF tracks adjacent to Main Street. The trains were observed to typically sound their horn several times when approaching and passing through town, and were observed to pass through town two to four times per hour.

7.2.1 Proposed Project and Potential Noise Impacts

The proposed project would enclose four existing point sources of noise, which are currently located outside. Table 7-2 below shows the locations of noise sources at the PRRF under existing conditions and as well as under the project proposal.

Table 7-2: Existing Equipment Compared to Proposed Project Equipment

Source of Noise (Equipment)	Location at Existing Facility	Location at Facility with Proposed Project
ID Fan	Outside	Inside

Source of Noise (Equipment)	Location at Existing Facility	Location at Facility with Proposed Project
Drum vent for heat recovery boiler	Outside	Inside
Steam muffler	Outside	Outside
Drum safety valve vent lines both boilers	Outside	Outside
Pulse poppets for baghouse	Outside	Inside
Pulse gas fan	Inside	Inside
Turbine drive feedwater pump vent	Outside	Inside
DA vent	Outside	Outside
Stack vent	Outside	Outside
Cooling tower fans	Outside	Outside

The relocation of the ID fan, drum vent, pulse poppets, and the turbine drive feedwater pump vent to inside of the PRRF would result in a reduction in noise generation from those sources. The net effect of the proposed project creating a new noise source while enclosing four existing noise sources is anticipated to be a decrease in overall noise generated by the Facility from the proposed project compared to existing noise levels. Based on this information, the net decrease in noise generated by the proposed project would not impact the noise levels at the residential receptors.

Traffic associated with the proposed project would be an increase over existing levels. Most of the traffic would be generated by haul trucks and additional employees. The primary haul route would not change and remain along 7th Avenue NE and 2nd Street NE. This would create an additional number of line sources of noise from traffic to the area. However, the route that the majority of the vehicles, in particular, the haul trucks would use is through an industrial area and is not anticipated to exceed industrial noise standards.

The businesses within the industrial area may notice additional trucks for the proposed project, and therefore the line source of noise from the trucks would occur a greater number of times throughout the daytime hours during the week on Monday through Friday. However, the noise levels would not increase in decibels from existing conditions, and therefore the impact of this increased traffic on noise levels in the industrial area is not anticipated to be a significant impact.

The proposed reconfiguration of the tipping floor at the PRRF would provide a noise reduction benefit by moving the MSW haul trucks to the south side of the building, which would provide a buffer to the noise generated as these trucks back up to deliver their loads. Approximately two to three trucks per week would pick up recyclables from the MRF on the north side of the Facility. Additionally, an estimated four trucks per week of ash trucks, fines trucks, and leachate trucks would also enter the Facility from 6th Avenue; but the noise impact from these loads is expected to be minimal to nearby receptors.

The noise levels from enclosed sources associated with the proposed project are anticipated to be similar to existing noise levels and remain within the industrial noise standards within the property boundary. Based on noise calculations in the Noise Study, it is estimated that noise levels from the addition of the MRF and proposed project equipment would not increase significantly, and would likely not increase to audible levels at nearby receptors.

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8.0 Solid Waste Management

8.1 AFFECTED ENVIRONMENT

The primary contributors of MSW to the PRRF are the four counties participating in the joint powers agreement with PLMSWA, which serves as a regional solid waste management coordinator and owns the PRRF. Each of the counties in the PLMSWA has its own Solid Waste Management Plan (SWMP) that outlines goals and policies for handling solid waste. The SWMPs expire every 10 years, and therefore each county goes through a plan update and approval process with the MPCA. Each county also operates under its own solid waste ordinance that serves to implement the SWMP. The ordinance typically regulates the disposal of waste, recycling, waste haulers, and other solid waste issues. PLMSWA recently worked to develop a model solid waste ordinance for use by its member counties in an effort to coordinate solid waste management within the region.

The State of Minnesota has a solid waste Policy Plan in place, administered by the MPCA, which guides and regulates solid waste management by local governments. The policy outlines goals for reducing waste, recovery materials, and coordination of solid waste management efforts, as outlined in Minnesota Statute 115.02a. Counties are the local government designated as the solid waste authority and are regulated and monitored by the state. Each of the four counties' SWMP coincides with state requirements and the *Minnesota Waste Management Hierarchy* (Minnesota Statute §115A.02b). The *Minnesota Waste Management Hierarchy* establishes goals and policies from which solid waste management activities are measured. The MPCA is the lead agency that ensures solid waste management decisions are consistent with the goals established in the *Minnesota Waste Management Hierarchy*.

A *Regional Solid Waste Management Plan Technical Report* (Solid Waste Report) from June 2012, evaluated solid waste management in each of the four counties and is included as Appendix F. The report found that in 2010, the four counties generated a combined total of 108,897 tons of MSW. Table 8-1 summarizes data collected from the 2010 SCORE Report for regional waste generation. Of the MSW collected, 34,787 tons were sent to waste processing facilities, such as the PRRF, and 29,491 tons were disposed of in landfills in either the greater Minnesota or North Dakota area. The remaining waste was recycled or not collected. A breakdown of the amounts of MSW generated from each county is discussed below.

Table 8-1: Regional Waste Generation 2010

County	Estimated tons of MSW not collected	Problem materials not collected for recycling	Tons collected for recycling	Tons to MSW - landfill disposal	Tons to MSW - processing facilities	Total tons generated
Becker	252	645	9,645	16,360	0	**26,902**
Otter Tail	831	1,445	9,605	7,250	22,447	**41,579**
Todd	840	550	12,525	3,883	6,174	**23,971**
Wadena	378	343	7,561	1,998	6,166	**16,445**
Total Regional Waste	**2,301**	**2,983**	**39,336**	**29,491**	**34,787**	**108,897**

Source: SCORE Report 2010

Becker County

In 2010, a total of 26,902 tons of MSW was generated in Becker County. Of the MSW collected, 16,360 tons was sent to the City of Fargo, North Dakota landfill, and no waste was processed at the PRRF. Future projected trends in Becker County for the years 2010 to 2030 indicate MSW generation would grow at an estimated rate of one percent each year.

Otter Tail County

In 2010, Otter Tail County generated a total of 41,579 tons of MSW. Approximately 22,447 tons of waste collected in 2010 was delivered to and processed at the PRRF, and 7,250 tons were disposed of in the Dakota Landfill in Gwinner, North Dakota. MSW generation in Otter Tail County is estimated to increase at a rate of one percent per year through 2030.

Todd County

Todd County generated a total of 23,971 tons of MSW in 2010. 6,174 tons of MSW collected was sent to and processed at the PRRF; while 3,883 tons were hauled to the Morrison County Landfill in Little Falls, Minnesota for disposal. MSW generation in Todd County is assumed to increase by one percent per year through 2030.

Wadena County

Wadena County generated 16,445 tons of MSW in 2010. Wadena County delivered 6,166 tons of MSW to the PRRF for processing, and sent 1,998 tons were hauled to the Dakota Landfill in Gwinner for disposal. MSW generation in Wadena County is assumed to increase by one percent per year through 2030.

While operation of the PRRF uses MSW in its incineration process, it also generates some waste as a result of that process. Combustion ash is the byproduct after the processed MSW has been burned. In 2010, approximately 8,800 tons of ash was generated at the PRRF. The ash is disposed of in the Northeast Otter Tail County Ash Landfill (permit SW-544). Based on the 2010 Northeast Otter Tail Phase II Ash and Demolition Landfill Annual Report, the landfill has a remaining ash capacity of 169,363 cubic yards.

Unprocessible waste at the PRRF includes those wastes that cannot be incinerated or recycled, such as tires, mattresses, and other items. Unprocessible waste is transported primarily to the Dakota Landfill located in Gwinner, North Dakota. The Dakota Landfill also serves as the bypass landfill for the PRRF in the event of a shutdown or other reason that waste cannot be handled. In 2010, 7,250 tons of waste was sent from Otter Tail County to the Dakota Landfill.

8.2 ENVIRONMENTAL IMPACTS

Presently, the PRRF receives nearly 35,000 tpy of MSW from Otter Tail, Todd, and Wadena counties. Becker County does not currently haul MSW to the PRRF. MSW was recycled or landfilled. Once the proposed project is in place, agreements have been made between the four counties through PLMSWA, to send additional MSW to the PRRF for processing. A portion of the additional MSW will be from Becker County, which is projected to send approximately 14,000 tpy of MSW upon completion of the project in 2014.

The Solid Waste Report examined the potential impacts of the proposed project on MSW disposal in the four-county region. The report evaluated impacts based on the maximum processing capacity of 73,000 tons per year for the proposed project. This provided a conservative estimate of the potential impacts.

Although the maximum design capacity of the proposed project is 200 tpd, the PRRF would not operate at this rate on a regular basis. The PRRF's level of operation is dependent upon steam demand of its customers, as well as other factors, such as maintenance and MSW available. These factors prevent the PRRF from operating at its maximum capacity for long periods of time. The proposed project would allow the PRRF to operate at levels up to 200 tpd, but the more realistic level of operation would be about 75 to 85 percent of that capacity on a regular basis. This results in a projected actual processing rate of between 55,000 and 62,000 tons per year.

Agreements through the PLMSWA allow each county a percentage of MSW disposal capacity at the PRRF. Since 16 percent of the waste delivered to the PRRF is anticipated to be removed via the proposed MRF (10% fines, 6% recyclables), the total waste that can be delivered to PRRF is actually 86,905 tons per year. Table 8-2 provides the maximum waste quantity allowed for processing at the PRRF for each county based on current and proposed project future capacity.

Table 8-2: Percentages Used to Determine County Waste Contributions to the PRRF

PRRF Current Max Combustible Capacity	42,340	tons per year (tpy)		
PRRF Max Combustible Capacity	73,000	tpy		
PRRF Max Waste to Accept	86,905	tpy		
	Future Max Allowed		**Current Max Allowed**	
	tpy	percent	tpy	percent
Becker County	22,960	26.42%		
Otter Tail County	39,333	45.26%	26,044	61.51%
Todd County	14,070	16.19%	9,316	22.00%
Wadena County	10,542	12.13%	6,980	16.49

The counties are projected to reach maximum capacity of combustible waste by 2025. If waste that is currently directly landfilled is instead combusted, the PRRF would reduce the need for external landfilling with the exception of fines, ash, and other non-combustibles. This would exist until about 2019 at the current rate for steam demand and MSW availability. The Solid Waste Report provides additional detail on existing MSW generation trends, as well as future projected trends with and without proposed project operation.

The impacts of the proposed project were examined in the Solid Waste Report as it related to state, regional and local solid waste management. The current and projected future MSW trends, along with the percentages of waste allowed for each county, as presented in Table 8-2 above, provided the basis for the assessing solid waste management impacts from the proposed project. These impacts are summarized as follows and are also presented in greater detail in the Solid Waste Report.

8.2.1 Proposed Project in State Solid Waste Management

The proposed project serves the identified needs of the region and provides an alternative solid waste management option for individual counties that is ranked higher on the *Minnesota Waste Hierarchy* than landfilling. Implementation of the proposed project is also consistent with recommendations in the *2009 Solid Waste Policy Report* by providing continued local leadership and creating strong intergovernmental partnerships and regional governments that can effectively manage solid waste. The proposed project provides these benefits to the region as well as reuses solid waste for a beneficial purpose, reduces the amount of MSW disposed of in landfills, and also increases the lifespan of existing landfills in the region.

The operation of the PRRF and the proposed project addresses Minnesota Waste Policy by creating energy from waste. Overall, the five goals listed in Minnesota Statute 115A.02a would all be met by the proposed project in some way. The proposed project would allow greater separation and recovery of materials prior to using the waste to produce steam (i.e., energy) with the use of the MRF. Additionally, the PRRF is a joint effort between four counties, which allows coordination of solid waste management among political subdivisions.

8.2.2 Proposed Project in Regional Solid Waste Management

The proposed project has regional benefits similar to those described for state waste management. The proposed project would allow counties within the region to continue to focus on waste reduction and recycling through continued county educational programs for both households and businesses, while receiving the added benefit of increased recycling and waste toxicity reduction as a result of the MRF. The additional MSW diverted to PRRF would otherwise be disposed of at landfills in nearby counties or neighboring states. The effect of processing waste at PRRF would have multiple benefits; including reduced generation of greenhouse gas associated with transporting waste longer distances, utilizing waste (a renewable fuel source) to generate energy that is used by local business and industry, as well as extending the life of the landfills located in the nearby counties and neighboring states. This in theory would help maintain the remaining capacity at these disposal facilities as waste generation increases over time.

Within the next ten to fifteen years, the proposed project at PRRF would allow the PLMSWA to maximize the efficiency of waste management within the region by expanding recycling opportunities and volumes recycled, reducing toxic constituents prior to burning the waste to generate energy; as well as allowing the opportunity for the expansion into the area of the recovery of organics in waste. During this same time period, PLMSWA would maximize the use of PRRF above its initial operating capacity of 55,000 tons per year but less than its maximized design capacity of 73,000 tons per year by continued and expanded regional efforts.

The proposed project would have a beneficial effect on solid waste management within the four counties as well as an expanded region. These benefits include increased public awareness and increased opportunities related to implementation of cooperative solid waste efforts within the region. Ultimately, the proposed project would allow the four-county region to address all of the goals listed in the Minnesota Waste Policy.

8.2.3 Proposed Project in Local Solid Waste Management

For each of the counties individually, the proposed project would provide an alternative means to dispose of MSW and an added benefit of increasing existing recycling rates through use of a MRF. The MRF would complement the existing county recycling efforts, which would still rely primarily on households and businesses to participate in county recycling programs. None of the counties have a county-owned landfill, and therefore county waste is hauled to landfills elsewhere in Minnesota and North Dakota. The PRRF provides a waste disposal option, which is local and county-owned through the PMSWA.

Waste exists in each of the counties that is currently being landfilled. That waste could be hauled to the PRRF instead. The proposed project would provide an alternative waste disposal option for each of the counties to consider. Once operational, the proposed project would begin accepting more MSW from these counties, thus reducing the quantity of landfilled waste. Within about ten years, however, the proposed project is estimated to reach its desired MSW capacity of approximately 55,000 tons per year that balances existing and projected steam demands with MSW availability. Therefore, it would not be able to accept more waste without dealing with excess steam production. At that time, the PRRF could accept additional MSW (up to 73,000 tons per year). However, any waste beyond that would require the counties to revert to landfilling or other disposal methods to manage the projected increases in waste generation over the next 20 years.

The proposed expansion of the PRRF would benefit solid waste management within the four counties by providing an alternative MSW disposal option through a cooperative joint powers agreement that is consistent with state requirements and the goals established in the *Minnesota Waste Management Hierarchy.* The proposed project addresses Minnesota Waste Policy by creating energy from waste. The expanded PRRF would increase recycling opportunities, while decreasing the amount of waste that is currently landfilled.

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9.0 Socioeconomics

9.1 ECONOMIC EFFECTS

9.1.1 Facility Operations

The PRRF or Facility receives and processes up to 116 tons per day (tpd) of MSW from Becker, Otter Tail, Todd, and Wadena Counties. The proposed project would increase the processing capacity of the PRRF and construct a MRF. This would allow the PRRF to burn up to 200 tpd of MSW. It is estimated that the proposed project would process approximately 55,000 ton per year (tpy) of MSW. As available, the PRRF would have the capacity to process additional waste, likely at 85 percent capacity, which is 62,000 tpy. Operating at a higher capacity would allow the PLMSWA to repay debt at a greater rate and/or set additional money aside for future enhancement of the PRRF. This would result in cost benefits to the PRRF's steam customers.

The main purposes of the proposed project are to increase the amount of MSW that can be burned to produce energy, which in turn reduces the use of the auxiliary boiler, and ultimately the consumption of natural gas. The proposed project would also reduce the amount of MSW in the four-county area that is sent to landfills. Greater efficiency of combustion would also occur by removing undesirable waste and some recyclable materials from the MSW in the MRF. It is estimated the MRF would remove 10 percent of the undesirable wastes (e.g., hazardous materials, batteries, and materials not appropriate for combustion, such as glass and metals) and fines and recover 5 to 6 percent of the incoming waste stream, such as recyclables, prior to combustion. This would result in a 15 percent decrease in ash being produced from the combustion process. Any recyclable materials would be sold at market rate.

Each year, the PRRF generates approximately 300,000,000 pounds of steam. In order to meet the demand for steam by its customers, existing operational conditions produce up to 40 percent of the steam sold using a supplementary natural gas-fueled auxiliary boiler. By increasing the amount of MSW incinerated in waste-heat boilers, the same amount of steam can be produced using less natural gas, providing a potential cost savings to both the PRRF and its steam customers. It is anticipated that this potential cost savings would be reflected in the PRRF's tipping fees and steam cost.

Employment

The PRRF currently employs 15 full-time and part-time employees that work in shifts, seven days per week, 24 hours per day. Most employees work during the weekdays when the PRRF is receiving loads of MSW. The proposed project would increase the number of employees to 27 in order to operate the MRF and handle additional MSW loads from the increased processing capacity. Under the proposed project, employees working in the MRF would recover undesirable wastes and fines, including glass and grit, ferrous (magnetic) metals, non-ferrous metals from the MSW at manual and mechanical picking stations.

Equipment

The proposed project would improve overall waste combustion capabilities and improve the characteristics of the MSW that is combusted by processing the MSW through the MRF which would include new processing equipment and capabilities. This serves two main purposes. First the installation of the MRF would reduce operational and maintenance costs associated with waste combustion processes; and secondly, the MRF would capture a portion of the recyclable materials in the MSW, leading to a reduction in ash quantities sent to the landfill. The MRF enhances the efficiency of the waste combustion process, while improving air emissions from removal of undesirable materials prior to combustion.

The proposed MRF building would house a trommel, an eddy current separator, two balers, several magnetic belt conveyors, several manual picking stations, and various conveyors. The equipment used in the MRF would allow the PRRF to recycle approximately five to eight percent of the incoming MSW. A baler would bail recovered materials for recycling.

Haul Trucks and Traffic

The proposed project would allow an increased amount of MSW from the four-county area to be hauled to the Facility while decreasing the distance haul trucks travel to dispose of MSW. Currently, most of the waste from the four-county area is sent to landfills out of Minnesota at a distance of over 100 miles. Haulers in Northeast Otter Tail County and Wadena County are able to haul directly to PRRF. Haulers outside of the 25 to 30 mile radius around the PRRF deliver first to a transfer facility, and then the waste is hauled to the PRRF for processing.

Once the proposed project is completed, it is anticipated that truck trips would increase in order to haul additional MSW. Records from 2010 indicated haul trucks brought in approximately 35,000 tons of MSW and had an estimated average daily traffic rate of 32 trips per day, with an estimated average of 6 trips per day related to hauling ash. Projected actual waste volumes hauled to the PRRF are estimated at 55,000 tons per year (tpy), increasing truck trips related to hauling MSW up to 44 trips per day, and 9.4 trips per day for hauling ash. At a maximum capacity of 73,000 tpy, approximately 57 truck trips per day would be needed to haul MSW and seven trips per day would be needed to haul recyclable materials. Ash and fines hauling would also increase, resulting in approximately 13 truck trips per day.

9.1.2 Waste Disposal Costs

The Solid Waste Report, prepared for this EIS, listed several considerations associated with facility operations and disposal costs pertaining to the proposed project. Once the proposed project is in place, agreements have been made through a partnership established by the PLMSWA to accept additional waste from Becker, Otter Tail, Todd, and Wadena Counties. In turn, disposal costs at the PRRF are anticipated to decrease as a result of reduced operational costs, increased energy production, reduced percentage of ash disposal, and the sale of recyclable materials.

Currently, steam energy produced from the auxiliary boiler costs customers approximately 25 percent more than steam energy produced from MSW fueled boilers. This is because the cost of purchasing natural gas to run the auxiliary boiler is reflected in the sale price of steam to local customers. By increasing the amount of MSW incinerated in waste-heat boilers, less natural gas would be used by the PRRF; thus potentially lowering the price of steam.

Waste Generation and Disposal

Future waste trends in the four-county area are projected to increase due to population and economic factors. Regional disposal options for MSW are limited. There are no county-owned landfills located inside of the four-county area, so MSW is either processed at the PRRF or hauled to landfills throughout Minnesota and North Dakota. Under the No Build scenario, waste not processed at the PRRF would mainly be hauled to a landfill in Gwinner, North Dakota (i.e., Dakota Landfill).

The tipping fee for the Dakota Landfill is currently set at $38.50/ton of MSW. While the tipping fee for MSW at the Dakota Landfill is less than the PRRF ($80/ton), the remaining design capacity for the landfill is estimated at 1,480,769 tons, or approximately 12 years. Additionally, the Elk River Sanitary Landfill, the next likely landfill option, has a tipping fee of $93/ton and remaining permitted capacity of 2,652,240 tons, or approximately 5.8 years. Both of these landfills would likely seek additional permitted capacity in the future; but there is no guarantee that it would be permitted or what fees would cost. These landfills are also both significantly further for hauling MSW than the PRRF.

Hauling MSW outside of the four-county area increases costs for regional and county solid waste systems. At present, Otter Tail Trucking charges Otter Tail County about $536.60 per roundtrip (approximately 180 miles) from the Fergus Falls transfer station to the Dakota Landfill. This equates to $2.98 per mile. If the Dakota Landfill was not an option, the cost to haul MSW to the Elk River Sanitary Landfill would be approximately $894 per roundtrip. Table 9-1 shows the costs associated with hauling MSW to the landfills in Gwinner, North Dakota and Elk River, Minnesota compared to hauling MSW to the PRRF, using haul costs from Otter Tail County.

Table 9-1: MSW Disposal Options and Costs for the PLMSWA Region

Disposal Facility	Capacity (tons)	Tipping Fee ($/ton)	Roundtrip Miles to Disposal Facility (Roundtrip from Fergus Falls)	Transportation Costs (Roundtrip from Fergus Falls) ($/roundtrip)
PRRF Perham, Minnesota	42,340	$80	92	$275
Dakota Landfill Gwinner, North Dakota	1,480,768	$39	180	$537
Elk River Sanitary Landfill Elk River, Minnesota	2,652,240	$93	300	$894

As waste generation increases in the future, additional disposal options will be considered. Additional capacity at the PRRF would accommodate the additional waste and have the potential to keep costs down for consumers by decreasing transportation costs. The proposed project is also anticipated to lower tipping fees at the PRRF due to potential savings in operational costs. The operational cost savings would occur from the decrease in natural gas use due to the increase in MSW used as the primary fuel source and the decreased maintenance costs due to the removal of undesirable waste. The proposed project would also have the capacity to produce additional steam energy using additional MSW, if steam demand is warranted and MSW is available.

9.2 SOCIAL EFFECTS

The proposed project would have minimal impacts on the land use and recreational resources of the city of Perham. According to the city of Perham Official Land Use Map, the PRRF is located in an area zoned as an Industrial District. The current zoning ordinance regulates energy generation as a conditional use. The proposed project would expand toward the north, which would include aesthetic improvements to the exterior of the PRRF. Additionally, the MRF would include an enclosed overlook area that would allow the public the opportunity to view and better understand facility operations. These improvements have a potential benefit to the community by making aesthetic improvements to the building and providing educational opportunities for the public.

Recreational resources for the City were also reviewed. There are no recreational resources in close proximity to the PRRF, and therefore, none are anticipated to be effected during construction or operation of the proposed project. Additionally, development of new recreational resources is not planned as of the publication date of this EIS.

The following provides a list and brief description of the existing recreational facilities located in proximity to the PRRF and the city of Perham. None of these recreational resources would be affected by the proposed project.

- 1,700 feet northeast of the Facility is East Park, which is located on 6th Street NE, and consists of playground equipment, a swing set, and basketball pad.
- 2,000 feet northwest of the Facility is City Hall Park (Turtle Park), which is located next to the City Hall on East Main Street and is used every summer for the Perham International Turtle Races. The park contains a large grassy area, flowers and benches.
- 2,100 feet northwest of the Facility is Library Park, which is located on 3rd Street NE between the Perham Public Library and the East Otter Tail Historical Museum. It contains a sand area, slides, swings and a merry-go-round.
- 2,100 feet southwest of the Facility is East Otter Tail Fairgrounds and Krueger Field. East Otter Tail Fairgrounds has two arenas, two picnic shelters, and a public parking lot. Krueger Field is bordered to the north of East Otter Tail Fairgrounds and has a baseball field, stadium seating for 650 people, concessions and restrooms facility, and a locker room facility.
- 2,800 feet north of the Facility is Angel of Hope Park, which is located at the corner of 3rd Avenue and 6th Avenue NE in Perham. The park has a memorial consisting of granite memory walls circling a statue of an angel.
- 3,000 feet northwest of the Facility is Northern Pacific Park, which is located on West Main Street next to the Post Office. The park contains a large slide for young children, a fountain, picnic tables and benches.
- 3,100 southwest of the Facility is the Perham ice skating facility. The ice skating facility is located south of the Perham Area Community Center by the high school football field and has an ice rink and warming house.
- 4,500 feet west of the Facility is Krauss Park, which is located between 8th and 6th Street SW and 4th & 5th Avenue SW. Krauss Park contains playground equipment, picnic area, and flower gardens.
- 5,600 feet northwest of the Facility is County Pines Park, which is located on County Road 51 to Pine Cone Lane and contains play area and playground equipment.
- 5,800 feet north of the Facility is Arvig Park, which is located on County Road 51. The park is a large recreational complex consisting of softball and soccer fields, volleyball sand courts, tennis courts, Little League fields, bike paths, a disc golf course, and the Kowabunga skateboard park.
- 1.8 miles (9,500 feet) north of the Facility is the Perham Lakeside Golf Club. Lakeside Golf Club is a 27-hole private golf course located on Highway 8, on the south side of Little Pine Lake.

10.0 List of Preparers

10.1 LIST OF PREPARERS

The following Wenck employees were primarily responsible for preparation of the 2012 Perham Resource Recovery Facility Draft Environmental Impact Statement. The list includes names, qualifications, and project responsibilities as follows:

Table 10-1: List of EIS Preparers

Name and Affiliation	EIS Responsibility and Qualifications
Wenck Associates, Inc.	
Luke Taylor	Project Manager B.S. Environmental Engineering 14 years of experience in environmental compliance and permitting
Amy Denz	Environmental Review Manager B.S. Natural Resource Management 14 years in natural resource and environmental planning
Denise Kazmierczak	Air Permitting Manager M.S. Environmental Engineering 21 years of experience in environmental compliance and permitting
Alissa Dienhart	Air Permitting B.S. Atmospheric Sciences M.S. Civil Engineering 2 years of experience in air permitting and consulting
Sergio Guerra	Air Dispersion Modeling M.S. Environmental Engineering 5 years of experience in air quality permitting and air dispersion modeling
Kathryn Swor	Human Health Risk Assessment M.S. Civil Engineering 8 years of experience in environmental consulting and human health risk assessment
Stephanie Kuphal	Air Dispersion Modeling - Technical Review B.S. Chemical Engineering 19 years of experience in air quality permitting and air dispersion modeling
Kristen Bullentini	Environmental Review Assistant B.S. Environmental Science 1 year of experience in environmental assessments and consulting
Minnesota Pollution Control Agency	
Kevin Kain	Project Manager

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11.0 References

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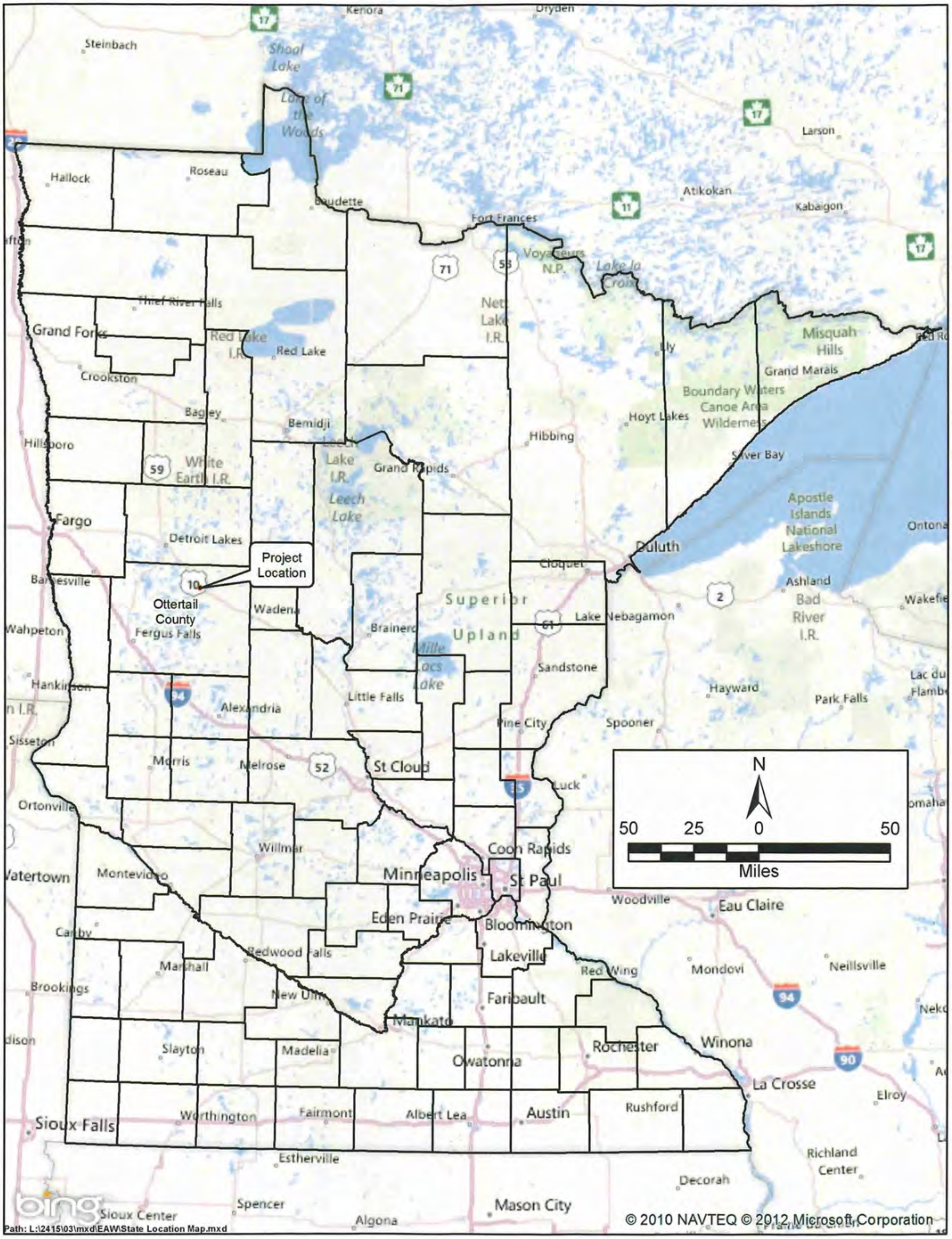
Figures



PERHAM RESOURCE RECOVERY FACILITY

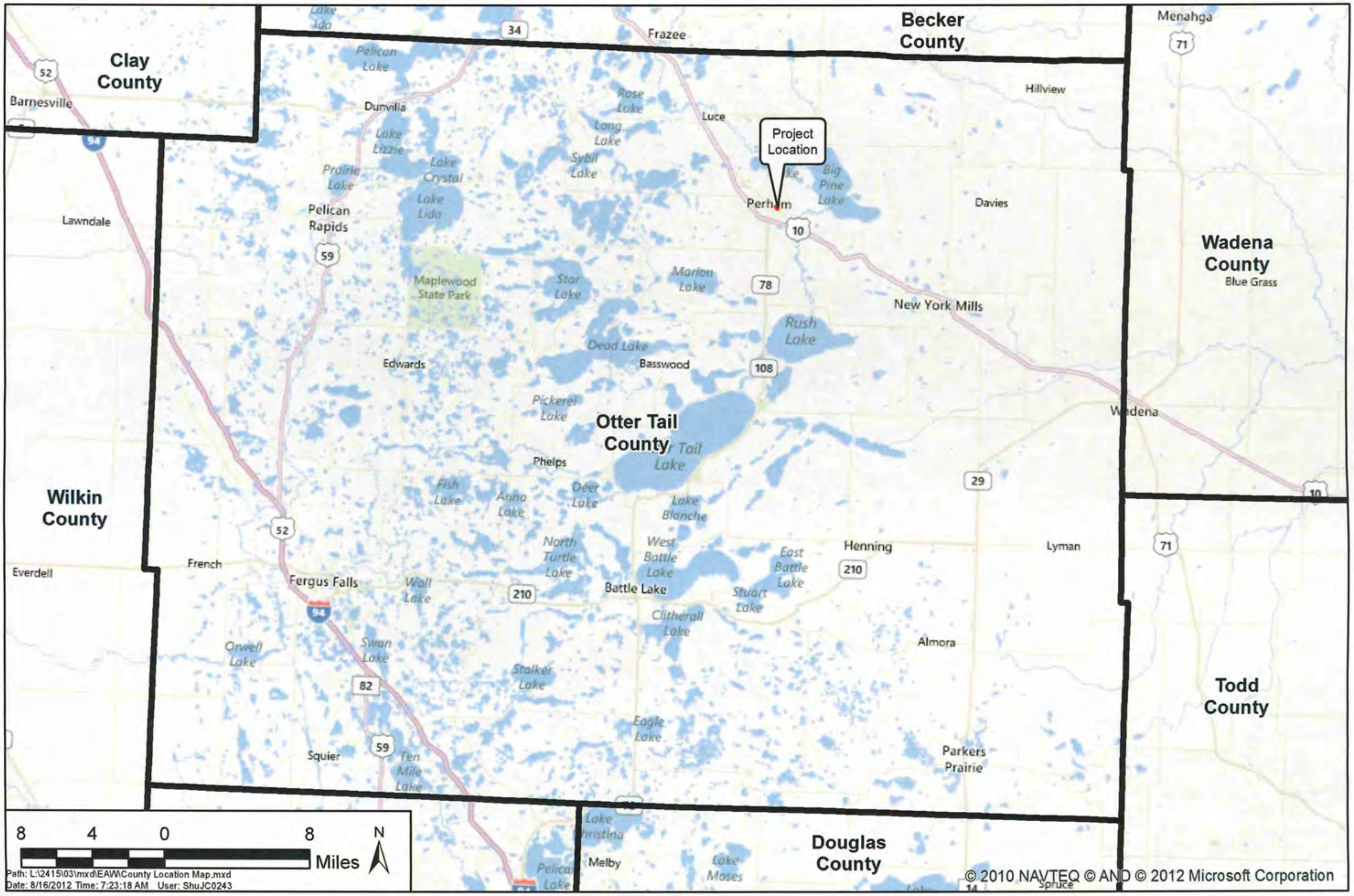
State Location Map

Engineers - Scientists
Business Professionals
www.wenck.com

Wenck
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

AUG 2012

Figure 1



PERHAM RESOURCE RECOVERY FACILITY	Wenck	AUG 2012
County Location Map	Engineers - Scientists Business Professionals www.wenck.com / 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	Figure 2

PERHAM RESOURCE RECOVERY FACILITY

Site Plan

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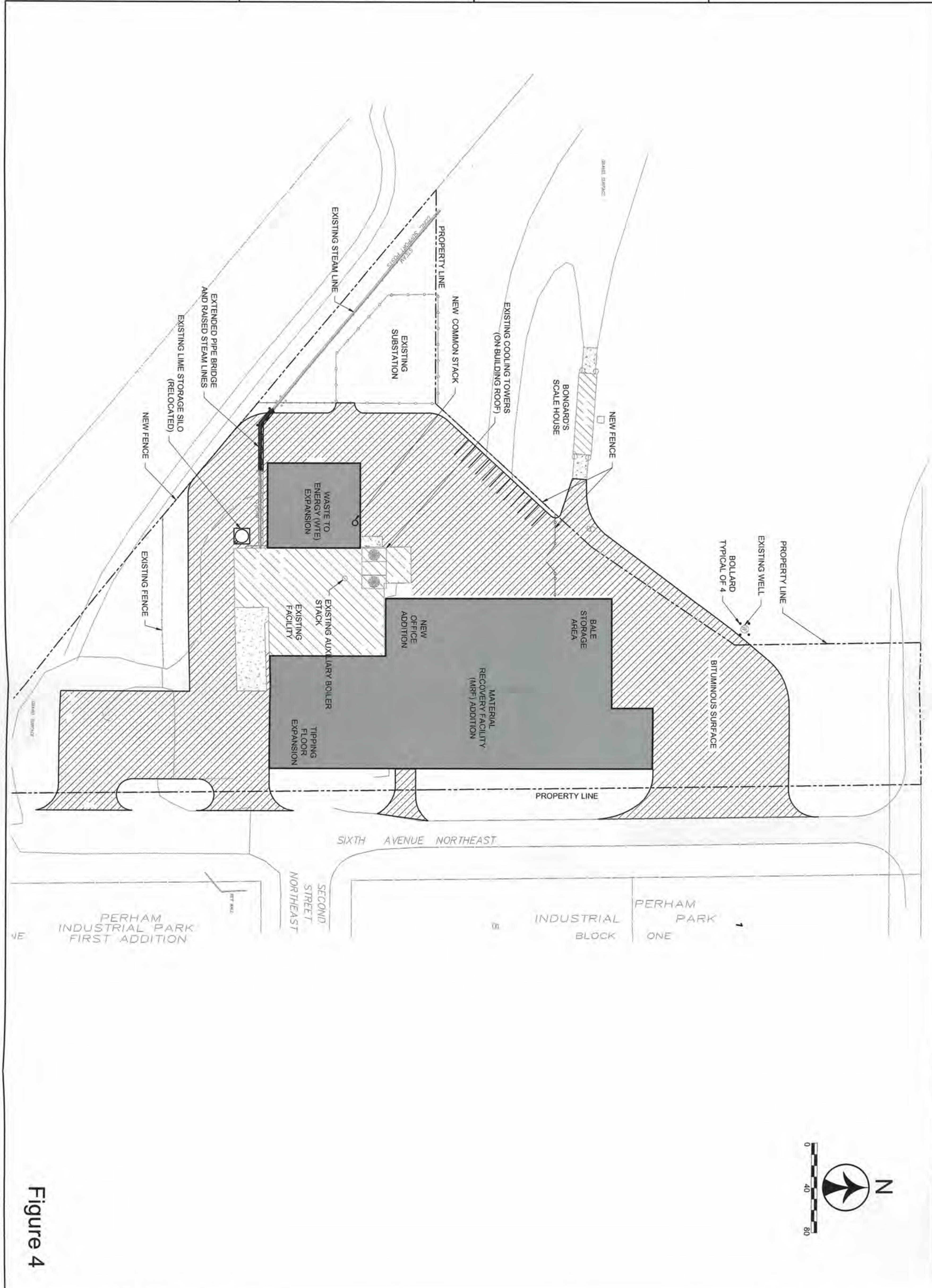
Figure 3



RRC Renewable Resource Consultants

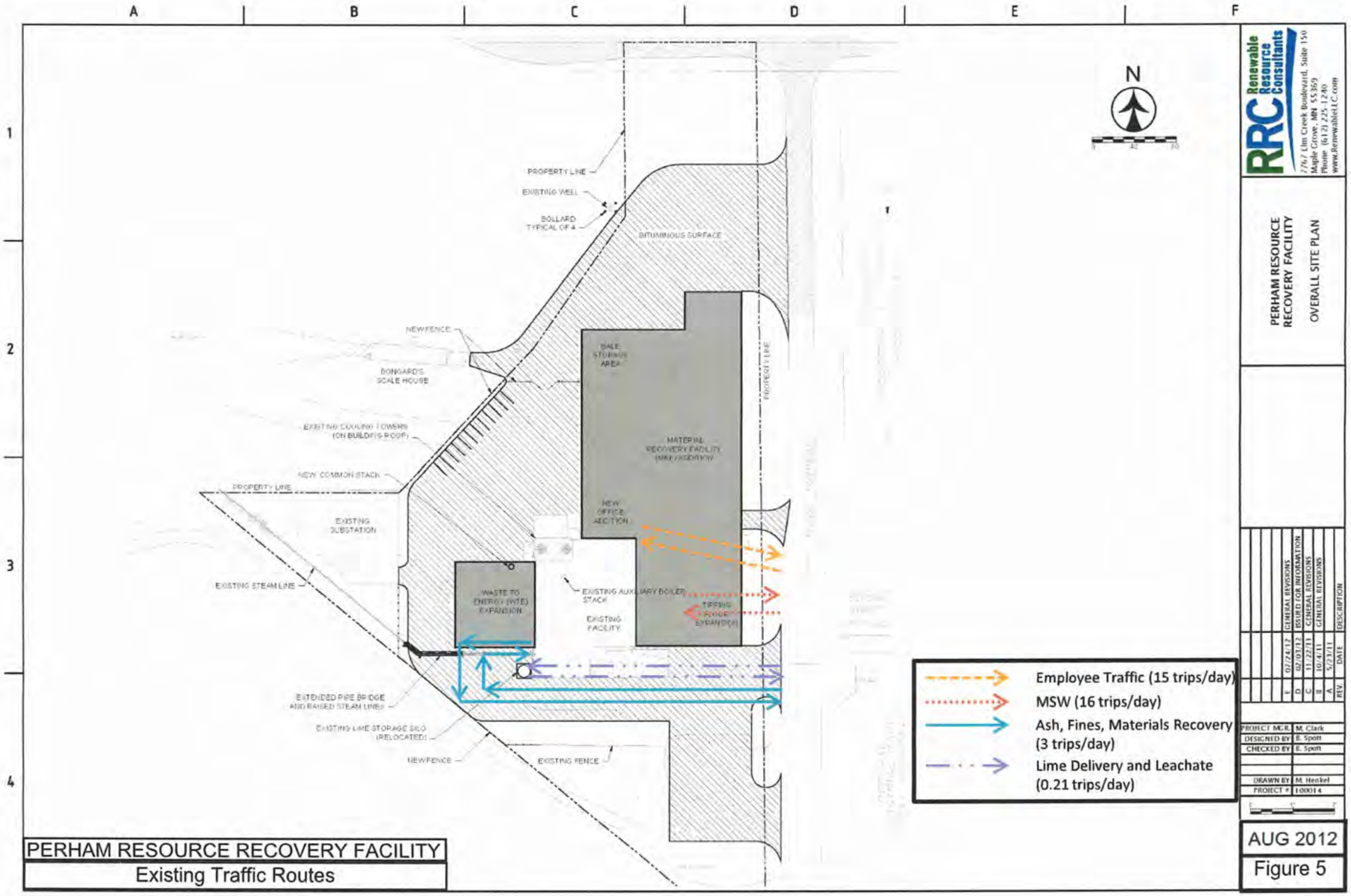
7767 Elm Creek Boulevard, Suite 150
Maple Grove, MN 55369
Phone (612) 225-1240
www.RenewableLLC.com

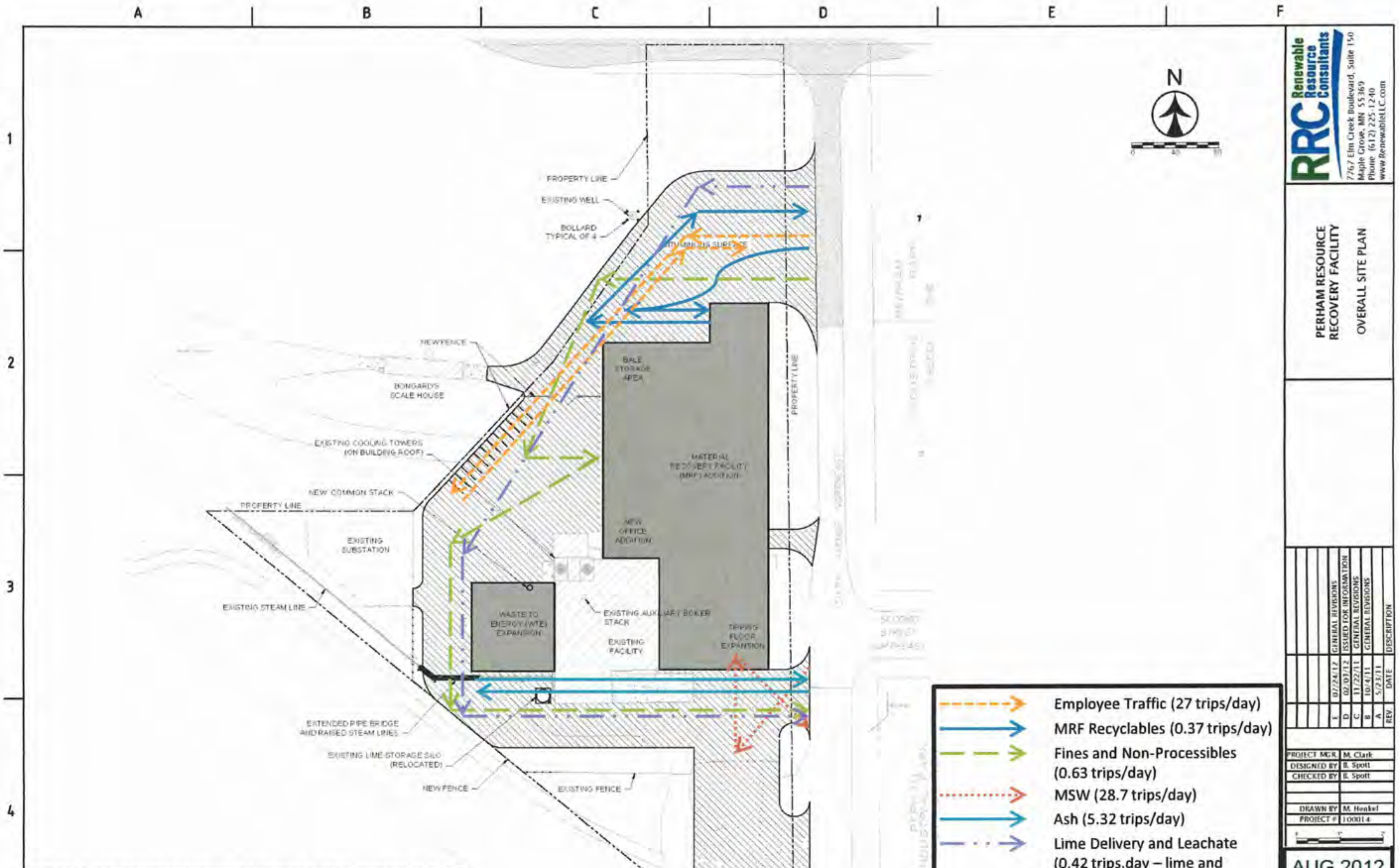
PERHAM RESOURCE RECOVERY FACILITY

OVERALL SITE PLAN

REV.	DATE	DESCRIPTION
E	07/24/12	GENERAL REVISIONS
D	02/03/12	ISSUED FOR INFORMATION
C	11/22/11	GENERAL REVISIONS
B	10/4/11	GENERAL REVISIONS
A	5/23/11	

PROJECT MGR. M. Clark
DESIGNED BY B. Spott
CHECKED BY B. Spott
DRAWN BY M. Henkel
PROJECT # 100014
FILENAME: C-100
SCALE: 1"=40'-0"
SHEET C-100
REV. E


A
B
C
D
E
F
1
2
3
4
N
PROPERTY LINE
EXISTING WELL
BOLLARD TYPICAL OF 4
BITUMINOUS SURFACE
NEW FENCE
BONGARD'S SCALE HOUSE
EXISTING COOLING TOWERS (ON BUILDING ROOF)
NEW COMMON STACK
PROPERTY LINE
EXISTING SUBSTATION
EXISTING STEAM LINE
BALE STORAGE AREA
MATERIAL RECOVERY FACILITY (MRF) ADDITION
NEW OFFICE ADDITION
WASTE TO ENERGY (WTE) EXPANSION
EXISTING AUXILIARY BOILER STACK
EXISTING FACILITY
TIPPING FLOOR EXPANSION
PROPERTY LINE
EXTENDED PIPE BRIDGE AND RAISED STEAM LINE
EXISTING LIME STORAGE SILO (RELOCATED)
NEW FENCE
EXISTING FENCE
Employee Traffic (15 trips/day)
MSW (16 trips/day)
Ash, Fines, Materials Recovery (3 trips/day)
Lime Delivery and Leachate (0.21 trips/day)
Renewable Resource Consultants
RRC
7767 Elm Creek Boulevard, Suite 150
Maple Grove, MN 55369
Phone (612) 225-1240
www.RenewableLLC.com
PERHAM RESOURCE RECOVERY FACILITY
OVERALL SITE PLAN
E 02/24/12 GENERAL REVISIONS
D 02/03/12 ISSUED FOR INFORMATION
C 11/22/11 GENERAL REVISIONS
B 10/4/11 GENERAL REVISIONS
A 5/23/11
REV. DATE DESCRIPTION
PROJECT MGR. M. Clark
DESIGNED BY E. Spott
CHECKED BY E. Spott
DRAWN BY M. Henkel
PROJECT # 100014
AUG 2012
PERHAM RESOURCE RECOVERY FACILITY
Existing Traffic Routes
Figure 5



PERHAM RESOURCE RECOVERY FACILITY

Future Facility Traffic Routes

Figure 6

PERHAM RESOURCE RECOVERY FACILITY

Sensitive Receptors Map

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Figure 7

PERHAM RESOURCE RECOVERY FACILITY

Population Density Map

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Figure 8

•Potentially contaminated sites: Since the early 1980s when major federal and state cleanup programs were created, the MPCA has been aggressively searching for and helping to clean up contaminated properties, from very small to large. This Web site contains a searchable inventory of those properties, as well as sites that have already been cleaned up and those currently being investigated or cleaned up.

•Environmental permits and registrations: This Web site also contains a searchable inventory of businesses that have applied for and received different types of environmental permits and registrations from the MPCA.

Aerial Photograph (Source: Bing Maps)

1,500 750 0 1,500 Feet

N

Path: L:\2415\03\mxd\AERA\Known and Pot Sources of Contam.mxd
Date: 10/1/2012 Time: 1:50:39 PM User: ShuJC0243

Legend

Property Boundary	Feedlot	Multiple Activities
1.5 KM Radius	Hazardous Waste	Unpermitted Dump Site
Air Permit	Industrial Stormwater Permit	Wastewater Discharger
CERCLIS Site	Leak Site	

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MPCA's What's In My Neighborhood Sites

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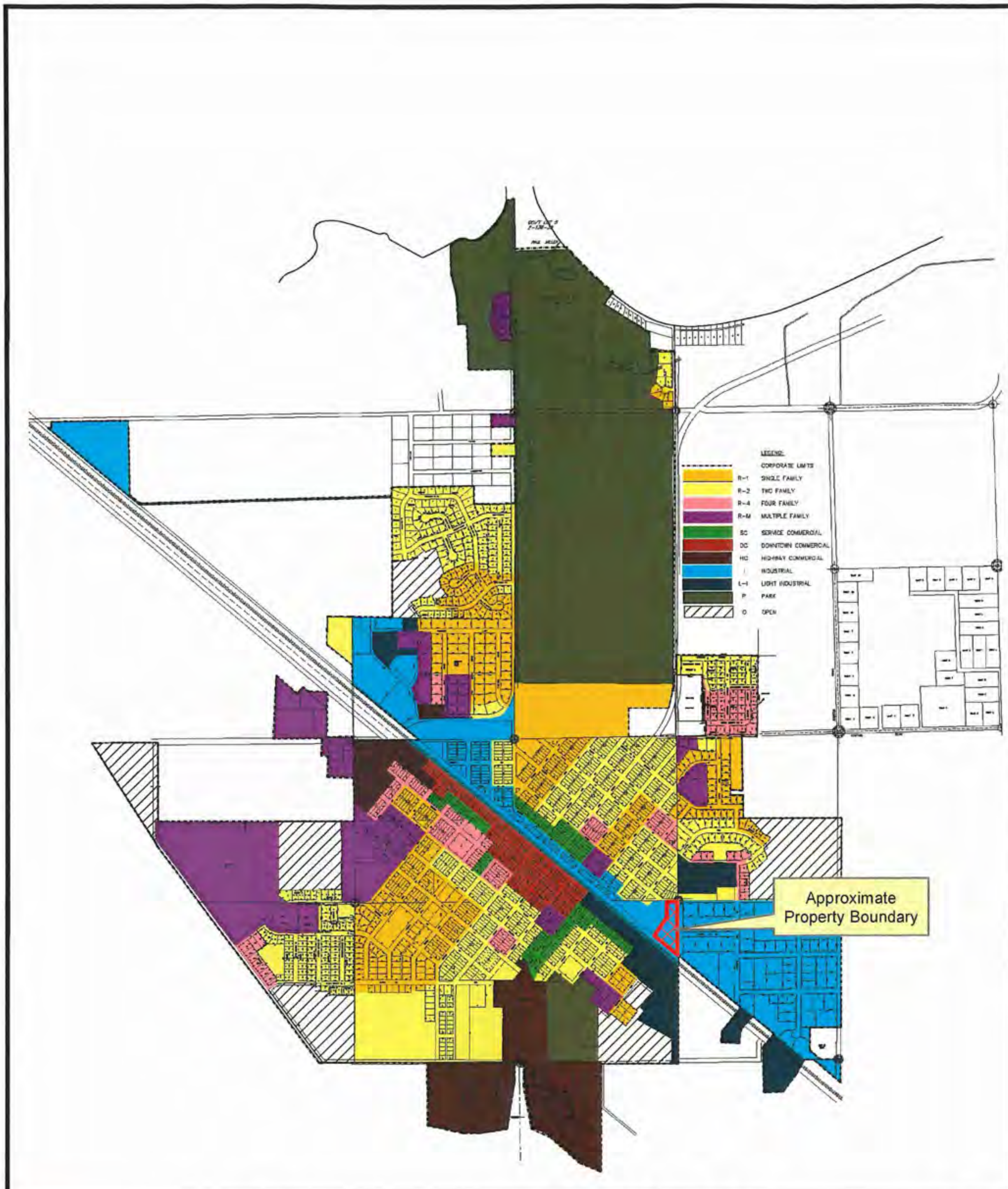
Figure 9



Ulteig

Detroit Lakes - Bismarck - Fargo - Minneapolis - Sioux Falls
1041 Hawk Street, P.O. Box 180
Detroit Lakes, Minnesota 56502-0180
Web: www.ulteig.com
Drawn By: JAB
Checked By: JAB
Approved By: JAB

ZONING MAP

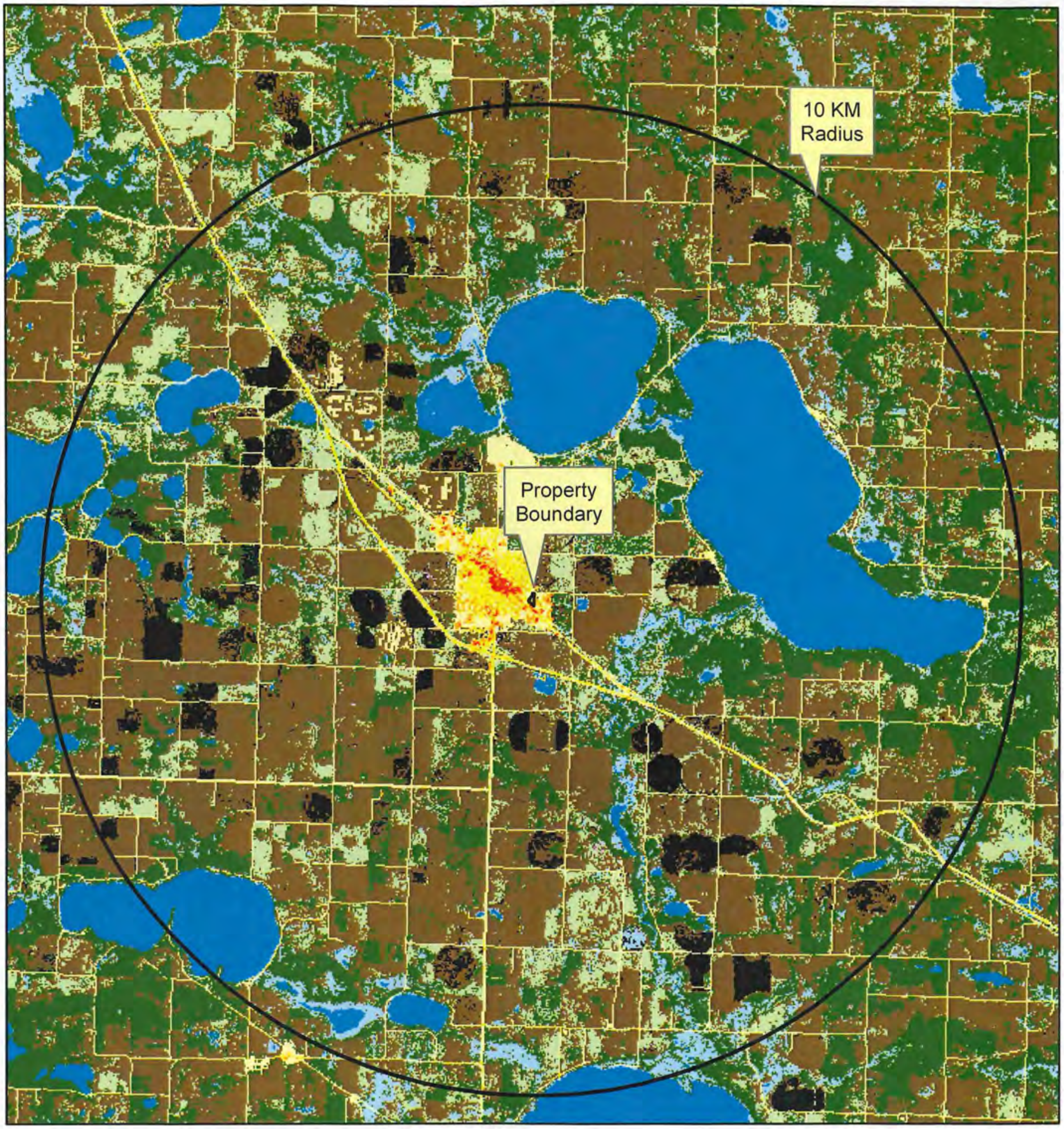
PERHAM, MINNESOTA

1" = 800'

July 21, 2009

Path: L:\2415\03\mxd\AERA\City of Perham Zoning Map.mxd
Date: 11/9/2011 Time: 1:10:51 PM User: shuic0243

PERHAM RESOURCE RECOVERY FACILITY	Engineers - Scientists Business Professionals www.wenck.com	Wenck 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	AUG 2012
CITY OF PERHAM ZONING			Figure 10



Legend

- Property Boundary
- 10 KM Radius

2010 NASS Land Cover

- Agriculture
- Developed/Open Space
- Developed/Low Intensity
- Developed/Medium Intensity
- Developed/High Intensity
- Grassland
- Barren/Idle Cropland
- Shrubland
- Woodland
- Wetlands
- Open Water

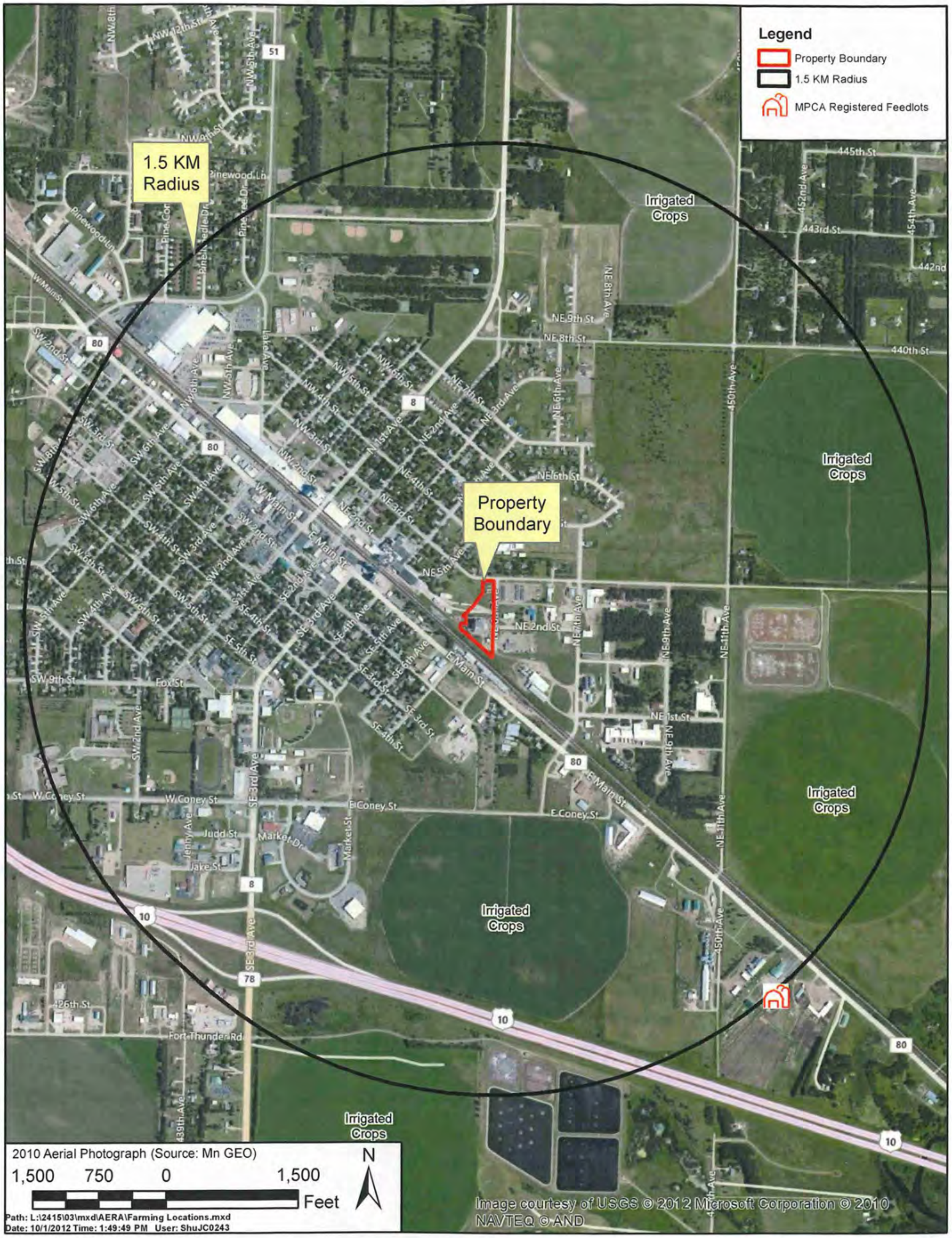
Aerial Photograph (Source: Bing Maps)

10,000 5,000 0 10,000 Feet

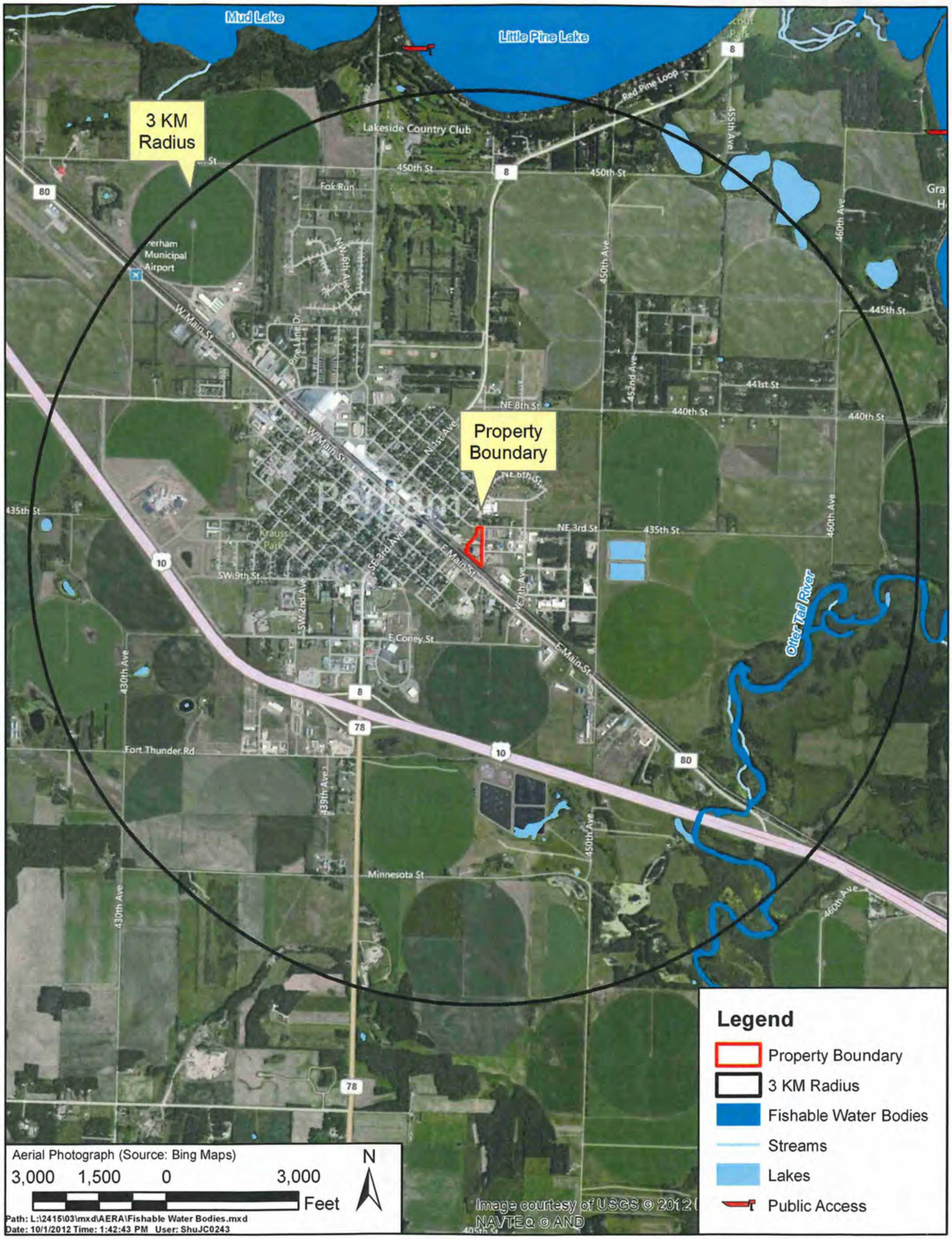
N

Path: L:\2415\03\mxd\AERA\2010 NASS Land Cover.mxd
Date: 10/1/2012 Time: 1:49:06 PM User: ShuJC0243

PERHAM RESOURCE RECOVERY FACILITY	Wenck Engineers - Scientists Business Professionals www.wenck.com 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	AUG 2012
2010 NASS Land Cover		Figure 11



PERHAM RESOURCE RECOVERY FACILITY	Wenck	AUG 2012
Farming Locations	Engineers - Scientists Business Professionals www.wenck.com 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	Figure 12



PERHAM RESOURCE RECOVERY FACILITY

Fishable Water Bodies

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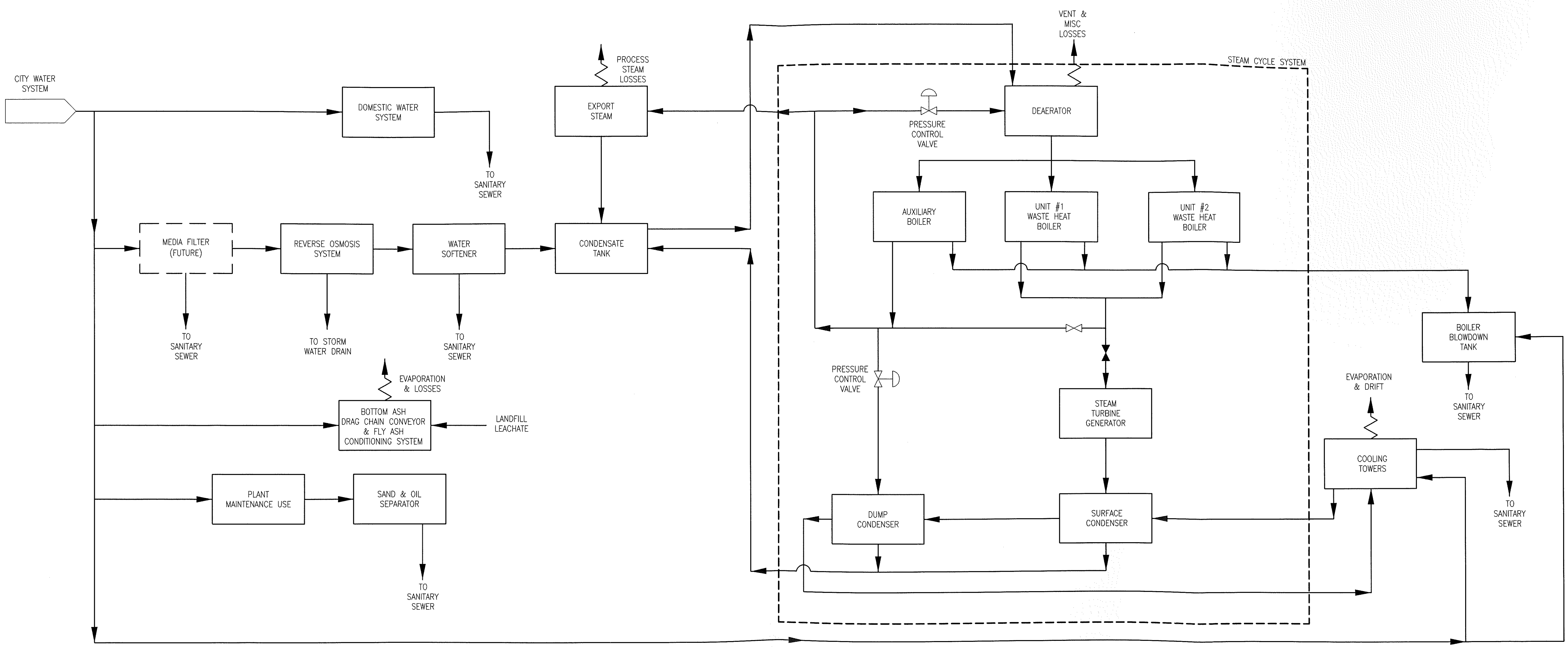
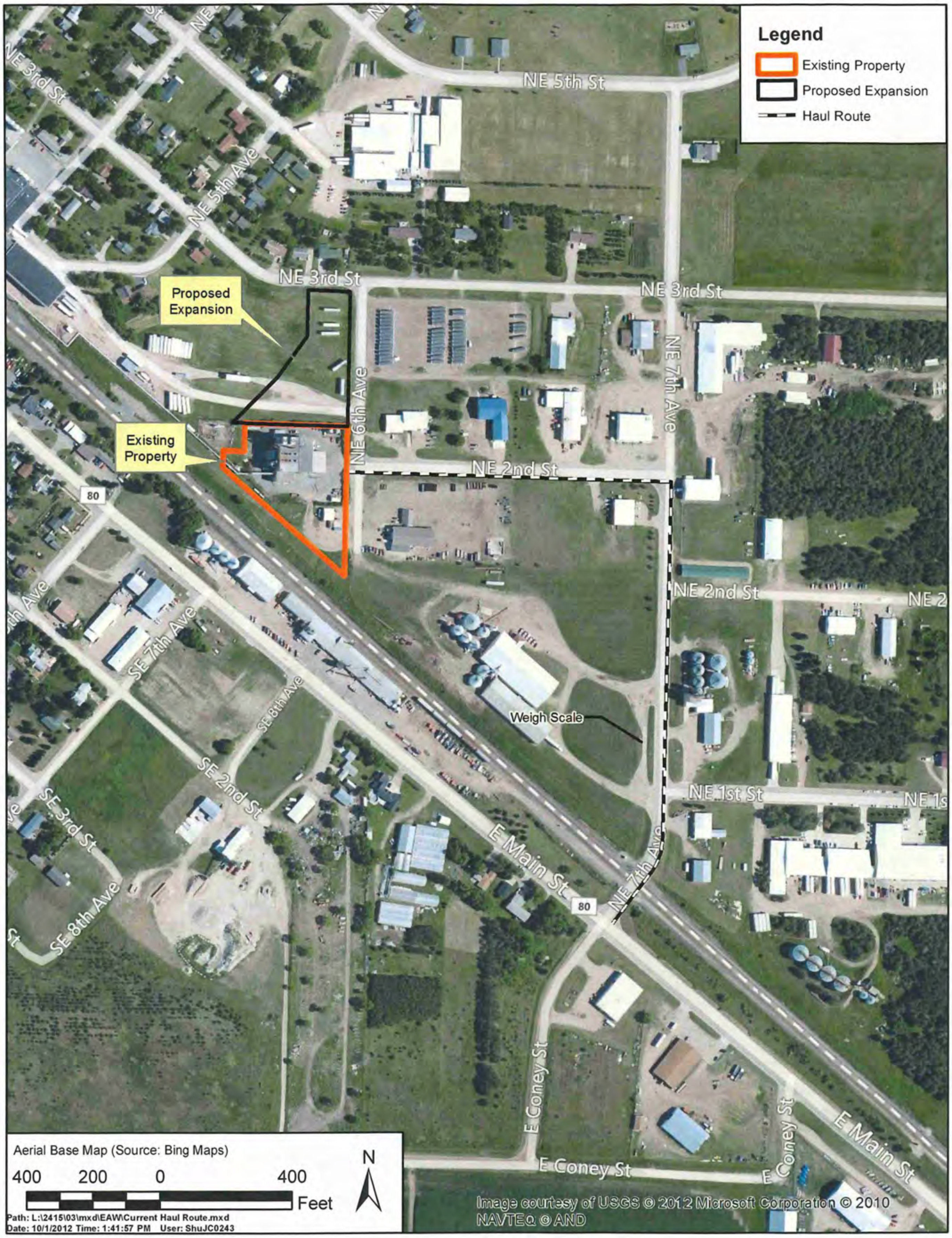
Figure 13

Water Process Flow Diagram



Perham Resource Recovery Facility
Proposed Expansion Project

Figure 14



PERHAM RESOURCE RECOVERY FACILITY

Existing Haul Route

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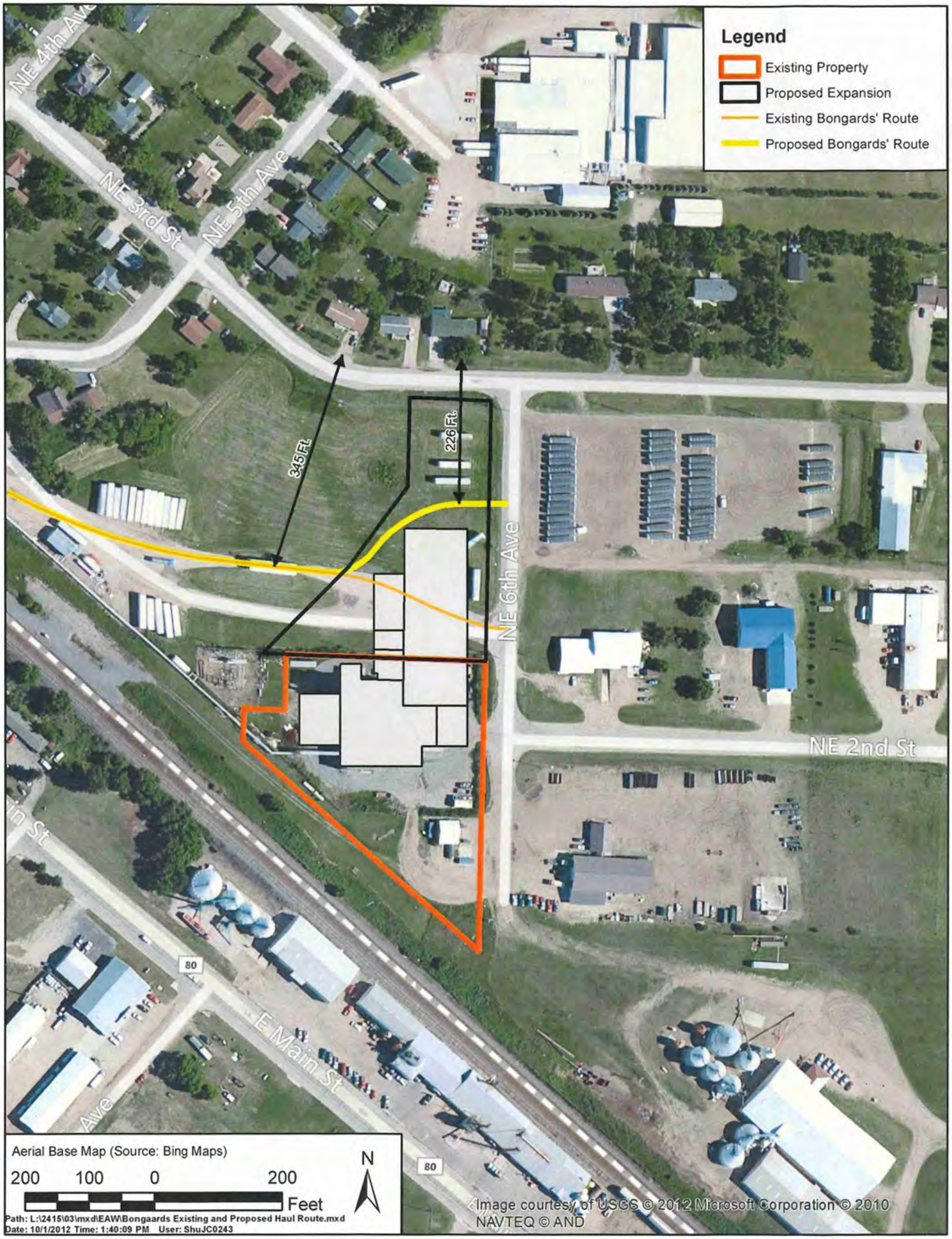
Figure 15



PERHAM RESOURCE RECOVERY FACILITY

Bongards' Existing and Proposed Route

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Figure 16

Appendix A

Scoping Decision Document

Scoping Decision Document
Perham Resource Recovery Facility Expansion Project
Environmental Impact Statement

A discretionary (voluntary) Environmental Impact Statement (EIS) is being prepared by Minnesota Pollution Control Agency (MPCA) for the Prairie Lakes Municipal Solid Waste Authority (PLMSWA) proposal to expand the Perham Resource Recovery Facility (PRRF) located in the in the city of Perham, Minnesota. The project site is bound on the north by 3rd Street NE, on the east by 6th Avenue NE, on the south by the Burlington Northern Santa Fe Railroad line, and on the west by Bongards' Creameries property.

	Responsible Governmental Unit	**Proposer**
Entity	MPCA	PLMSWA
Contact	Kevin Kain	Mike Hanan
Title	Project Manager	Executive Director
Address	520 Lafayette Road North	520 Fir Avenue West
City, State, ZIP	St. Paul, Minnesota 55155-4194	Fergus Falls, Minnesota 56537
Telephone	651-757-2482	218-998-4898
Fax	651-297-2343	
E-mail	kevin.kain@state.mn.us	mhanan@co.otter-tail.mn.us

Purpose

The MPCA distributed a Scoping Environmental Assessment Worksheet (SEAW) and the draft Scoping Decision Document (SDD) as the initial step in the EIS process. The purpose of the scoping process is to identify only those potentially significant issues relevant to the proposed project and define the form, level of detail, content, and alternatives to be evaluated in the EIS. In addition, the EIS Scope identifies the timetable for preparation, the preparers of the EIS, and determines the permits for which information will be developed concurrently with the EIS. The scoping process is described in Minn. R. 4410.2100.

The purpose of an EIS is the evaluation and disclosure of information about the significant environmental effects of the proposed action. The EIS is not intended to justify a project or to recommend approval or denial of future permits. Rather, the information in the EIS is intended to be used by governmental units as a guide in issuing or denying permits or approvals for the project and in identifying measures necessary to avoid or mitigate adverse environmental effects.

The EIS is intended to inform various permitting decisions. The PLMSWA and the PRRF will submit applications and supporting information for all required MPCA permits and MPCA staff will develop the permits during the EIS process.

Preparers

The MPCA will conduct the EIS process and the overall preparation, review, and content of the EIS. A preliminary draft EIS will be prepared by the PLMSWA and submitted to the MPCA. The PLMSWA, assisted by its technical consultants, will be responsible for reviewing the adequacy of the available data and reports, preparing technical information on expected impacts of the project, preparing technical reports identified in the SDD, participating in public meetings, assisting the MPCA in responding to comments received during public comment periods, and preparing the draft and final EIS. Applications and supporting information for all MPCA permits required by the project will be submitted and permit development will occur during the EIS process. The MPCA will provide technical review of all submittals and approve the draft and final EISs prior to distribution. The MPCA Citizens' Board will adopt the SDD for the EIS and make a determination of adequacy of the final EIS.

Schedule

Consistent with Minn. R. 4410.2000, subp. 3.B, the scoping period began with publication of the notice of availability of the SEAW in accordance with Minn. R. 4410.1500, subps. A and B. The responsible governmental unit (RGU) shall provide the opportunity for at least one scoping meeting during the scoping period. The meeting shall be held not less than 15 days, excluding Saturdays, Sundays, and holidays, after the publication of the notice of availability of the SEAW in the Minnesota Environmental Quality Board (EQB) *EQB Monitor*. All meetings shall be open to the public. The MPCA Citizens' Board will adopt the final scoping decision. The scoping period was initially extended to January 5, 2012, in consideration of the holidays.

Tentative EIS Schedule – Perham Resource Recovery Expansion Project

EIS Steps	Tentative Date
SEAW comment period begins	November 28, 2011
Scoping Public Meeting	December 14, 2011
Comment period ends	January 5, 2012
Final Scoping Decision issued	February 2012
EIS Preparation Notice published	April 2012
Release of Draft EIS/public meeting	September 2012
Final EIS issued	January 2013
EIS Adequacy Determination	February 2013

RECORD OF DECISION

Among the objectives for Minnesota's environmental review process are the provision of useable information about the primary environmental effects of a proposed project and the encouragement of accountability in public and private decision making. The SDD is obligated to identify those permit/approval decisions for which a Record of Decision must be maintained to identify how the EIS was considered in reaching the decision.

For the proposed expansion EIS, a Record of Decision shall be maintained for the following governmental approvals.

Agency	Decision
MPCA	Prevention of Significant Deterioration Program Minor Modification and Major Amendment to Part 70 Operating Permit

PROPOSED CONTENT OF THE EIS

This section of the scoping document outlines the items to be contained in the PRRF expansion EIS. In accordance with Minn. R 4410.2300, the EIS will include the following:

Cover Sheet

The cover sheet will include the name of the RGU; the title of the proposed project and project location; name, address, and telephone number of the contact person at the RGU and of the proposers representative; a designation of the statement as a draft, final, or supplement; a one-paragraph abstract of the EIS; the date of the public meeting on the draft EIS; and the date following the meeting by which comments on the draft EIS must be received by the MPCA.

Summary

The summary shall stress the major findings, areas of controversy, and the issues to be resolved, including the project as proposed.

A project description, environmental impacts, mitigation measures, alternatives, a list of governmental approvals, socio-economic impacts, and direct, indirect and adverse or beneficial impacts will be identified.

List of Preparers

The EIS will contain a list that includes the names and qualifications of the persons who were primarily responsible for preparing the EIS or significant background papers.

Project Description

EQB rules explicitly direct that a proposed project be described only in sufficient detail to identify its purpose, size, scope, environmental setting, geographic location, and anticipated phases of development.

Permits and Approvals

The EIS will list the known governmental permits and/or approvals required for the expansion, along with the unit of government responsible for each decision. Information necessary for the development of a proposed MPCA Air Emissions Permit will be gathered and presented in the EIS.

The EIS will provide specific information useful for permitting and approval decisions; however, it will not provide all data and information required for these actions. Some permit applications and information for the project may be developed and submitted independent of the EIS.

Alternatives

No Build

The EIS will assess the consequences of a no action or "no build" decision for the proposed project.

Facility Design Alternatives

The issue of design alternatives was not discussed in the Scoping EAW because the design of the proposed expansion must meet specific design specifications that are required by both the U.S. Environmental Protection Agency (EPA) and the MPCA. Therefore, this alternative discussion will not be presented in the EIS.

Location Alternatives

The issue of location alternatives will not be discussed in the EIS as the proposed project is an expansion of an existing facility.

Alternative Technology

The issue of alternative technologies was not discussed in the SEAW because the design of the proposed expansion must meet specific design specifications that are required by both the EPA and the MPCA. The permits that will ensure that all required design and operations specifications to be met by the proposed project are listed in the SEAW in Item 8, *Permits and Approvals Required*. Therefore, a discussion of alternative technology will not be presented the EIS.

Environmental Impacts and Mitigation

Air Quality Studies

The EIS will provide an analysis of the potential air quality impacts of the project by demonstrating compliance with the National Ambient Air Quality Standards (NAAQS) and Minnesota Ambient Air Quality Standards (MAAQS) and evaluating the potential for human health effects.

Air dispersion modeling will be used to estimate air concentrations of pollutants emitted from the facility. The estimated air concentrations will be compared to applicable air quality standards and health risk benchmark values. The air dispersion modeling will be done in accordance with EPA and MPCA guidance and procedures (http://www.pca.state.mn.us/index.php/air/air-monitoring-and-reporting/air-emissions-and-monitoring/air-dispersion-modeling/air-dispersion-modeling.html). The procedures include submittal of a modeling protocol to be approved before the air dispersion modeling is completed.

The EIS will include a scoping Air Emission Risk Analysis (AERA) and a refined Human Health Risk Assessment (HHRA). The AERA will be performed according to MPCA guidance, found at http://www.pca.state.mn.us/ktqh42a, including the MPCA AERA Guidance (Version 1.1, September 2007). The HHRA will be performed following the EPA HHRA Protocol for Hazardous Waste Combustion Facilities (EPA 2005) and relevant MPCA requirements that either supersede aspects of the HHRA Protocol or supplement the protocol. The AERA and HHRA will evaluate risk from before and after the proposed project. The specific methods and assumptions used in the AERA and HHRA will be submitted to the MPCA for approval, using the AERA forms. Section 2.7.3 of the AERA Guidance will be followed for scoping out emission sources, such as the auxiliary boiler, or pollutants not regulated with pollutant specific limits. Each compound identified in the sources below will be considered for the designation of compounds of potential interest (COPI). The hierarchy below will be used to select emission factors for COPIs. Any air emission rate limit used in the HHRA will be incorporated into the air permit.

1. 40 CFR 62 Subpart JJJ or Minn. R. 7011.1227, as applicable
2. NSPS Subpart AAAA or Minn. R. 7011.1229, as applicable
3. Stack test results performed on the existing municipal waste combustion (MWC) units at the PRRF
4. Continuous Emission Monitoring System data for the existing MWC Units at the PRRF
5. Emission factors provided by the MPCA such as the Olmsted County Waste to Energy Facility, Stanislaus, Huntington or other emission factors from relevant stack testing
6. Chapter 2.1, "Refuse Combustion" in EPA's AP-42, Fifth Edition, "Compilation of Air Pollutant Emission Factors" (October 1996)
7. EPA Factor Information Retrieval System, Version 6.23 for standard classification code 50100104
8. Supplement C, Table 2.1-1, of EPA's AP-42, Fourth Edition, "Compilation of Air Pollutant Emission Factors" (October 1990)

The purpose of the HHRA will be to calculate quantitative estimates of COPI concentrations in air and COPI doses that are used with acute and chronic toxicity factors to estimate excess risks for carcinogens and hazards for noncarcinogens. Air concentrations and doses will be estimated for four exposure scenarios evaluated for specific locations in the areas most impacted by the facility. The specific locations to be evaluated and a description of the method used to select these locations will be included in the AERA forms. The anticipated four scenarios will include acute inhalation, resident and resident child, farmer and farmer child, and fisher and fisher child. Direct depositions to soil, plants, and surface water will be calculated and indirect exposures are calculated for relevant pathways.

If there is the potential for one pound/year or more of mercury emissions and there are fishable water bodies in the area, then the risks associated with ingesting impacted fish will be assessed through the Minnesota Mercury Risk Estimation Method (MMREM), in lieu of the methods in the HHRAP (EPA 2005). If MMREM is used, then an MMREM protocol (AERA form 27) shall be submitted to the MPCA for approval.

For the criteria pollutants, ambient air quality modeling relative to the proposed project (i.e., the two waste heat boilers) will be conducted as part of the EIS to support the HHRA and demonstrate compliance with the NAAQS and MAAQS.

If adverse impacts are determined, mitigating measures will be identified that prevent or mitigate impacts of such exposure, including changes in building and mechanical system design, heights, and placement of buildings.

The EIS will determine potential cumulative effects on ambient air quality from the proposed project by modeling compliance with MAAQS and NAAQS, and by including a Cumulative AERA. The Cumulative AERA will follow the MPCA How to Conduct a Cumulative Air Emission Risk Analysis guidance located at http://www.pca.state.mn.us/lupg42d.

Wastewater Impacts

The EIS will describe and discuss any changes in water use and the generation and disposal of wastewater from the proposed project, including the status of the city of Perham's plans to upgrade and operate its wastewater treatment facility.

Traffic

The EIS will evaluate the expected increase in traffic due to the proposed project and its potential impacts on affected roads in the immediate vicinity of the project.

Vehicle Emissions

The EIS will evaluate the expected impacts from on-site vehicle-related air emissions at the site. The AERA will include nitrogen dioxide and diesel particulate matter emissions from diesel trucks.

Noise

The EIS will evaluate noise emanating from the proposed site and discuss the ability of the proposed project to meet applicable state noise standards.

The impacts of noise from the proposed project on nearby receptors and the potential that noise standards will be exceeded will be evaluated in a qualitative assessment using data collected from the existing facility and information from new project sources. Any potential noise exceedances will be identified and potential mitigation measures discussed.

Solid Waste Management Plans

A technical report will be prepared on the solid waste management programs and practices of the regional and local governing bodies in Otter Tail, Wadena, Todd, and Becker Counties. This report will be based on information from solid waste management plans and the requirements in applicable Minnesota statutes and rules. This information will be presented in the EIS.

Economic and Social Impacts

The EIS will discuss the potential for the project and alternatives to directly and indirectly cause local economic and sociological impacts. The facility's impact on cost to the user of the facility and general public will be identified. The effect of the proposed facility on regional and county solid waste system costs will be evaluated. Inventories will be completed of any nearby existing and planned recreational resources. Any potential impacts resulting from the expansion will be described.

Historical and Archeological Resources
Historical and archeological resources are not known to exist at or near the site, and there will be no analysis of this topic in the EIS.

Mitigation Measures
For those instances where the impact analyses have identified the potential for adverse effects, the EIS will identify reasonably available measures that could lessen or eliminate the adverse effect. The types of measures that may result in significant mitigation of impacts range from facility-specific modifications in design and/or operation or broader policy-based action at all governmental levels.

Appendices
Appendices may be included in the EIS when applicable: (a) material prepared in connection with the EIS, as distinct from material that is so prepared and that is incorporated by reference; (b) material that substantiates any analysis fundamental to the EIS; and (c) permit information that was developed and gathered concurrently with the preparation of the EIS.

Material Incorporated by Reference
Materials may be incorporated by reference to reduce the bulk of the EIS. Such materials will be cited in the EIS, and its content will be briefly described. Generally, these materials will not be distributed for public review, but will be available for inspection at the MPCA office in Saint Paul or be accessible via the MPCA website.

The following topic areas – (a) Air Quality – (b) Solid Waste Management – will be the subject of technical reports separate from the EIS. Discussion within the EIS on each of these primary impact areas will be based on the analyses and findings of the reports, but will likely omit much of the technical aspects of the more focused studies. These reports will be incorporated by reference as part of the EIS. The reports will be available for inspection at the MPCA offices in Saint Paul and libraries on the EQB distribution list, in accordance with the requirements of the EQB rules. Technical reports will also be accessible via the MPCA website.

____
Commissioner Paul Aasen
Chair, Citizens' Board
Minnesota Pollution Control Agency

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Date

Appendix B

Air Quality Dispersion Modeling Report

Air Quality Dispersion Modeling Report

Modification of the South Municipal Waste Combustor Unit at the Perham Resource Recovery Facility, Perham, Minnesota

Wenck File #2415-03

Prepared for:

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August 2012
Revised November 2012

Wenck

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TABLES

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APPENDICES

Executive Summary

The Perham Resource Recovery Facility (PRRF) is a waste-to-energy facility located in the city of Perham, Minnesota that seeks to expand its facility. The air dispersion modeling analysis presented herein was conducted to assess compliance with the National and Minnesota Ambient Air Quality Standards (NAAQS and MAAQS). This analysis was performed for the following pollutants: PM_{10} and $PM_{2.5}$ for the 24-hour and annual averaging periods; CO for the 1-hour and 8-hour averaging periods; NO_2 for the 1-hour and annual averaging periods; SO_2 for the 1-hour, 3-hour, 24-hour and annual averaging periods; and Pb for the monthly averaging period. The Air Quality Dispersion Modeling Protocol (AQDMP) was submitted to MPCA on June 28, 2012. This protocol established the modeling methodology that was followed for the criteria pollutant air dispersion modeling analysis for the proposed expansion project. The criteria pollutant modeling supports the Environmental Impact Statement (EIS) voluntarily being completed by the PLMSWA for the proposed expansion project. MPCA approved the AQDMP for this expansion project on August 14, 2012.

The results from proposed project showed that the significance levels for SO_2, CO, PM_{10}, and $PM_{2.5}$ were not exceeded. Therefore, based on the modeling analyses performed, the contribution from these pollutants is considered to be insignificant. For NO_2, the proposed project exceeded the significance level so a cumulative analysis was performed to assure compliance with the NAAQS/MAAQS. A cumulative analysis was also performed for Pb since there is no significance level established for this pollutant. The results from this cumulative analyses showed that the proposed project would not cause or contribute to any NAAQS/MAAQS exceedances.

1.0 Introduction

The Perham Resource Recovery Facility (PRRF) is a waste-to-energy facility located in the city of Perham, Otter Tail County, Minnesota. The PRRF is owned by the Prairie Lakes Municipal Solid Waste Authority (PLMSWA), which is a joint powers board between Otter Tail, Todd, Wadena, and Becker Counties. The PRRF receives and processes Municipal Solid Waste (MSW) from the four counties.

The facility currently consists of two municipal waste combustion (MWC) units (South Unit and North Unit), one heat recovery boiler (HRB), one air pollution control (APC) system train along with one existing auxiliary boiler. Each of the combustion units is capable of processing 100 tons per day (tpd) of MSW when operating independently of the other utilizing the HRB and APC equipment. However, because the two combustion units are tied to a common HRC and APC system train, the total combined throughput at the facility is limited to 116 tpd when both MWC units are operating simultaneously. The proposed expansion project will include the addition of a new HRB and associated APC equipment. This new equipment will be associated with the South Unit. The North Unit will remain unchanged as part of the expansion project, continuing to be associated with the existing HRB and APC equipment. After the proposed expansion project, the facility will have the capability of operating each MWC unit at up to 100 tpd at the same time, giving the facility a new capacity of 200 tpd.

In addition, the expansion project includes the addition of a Materials Recovery Facility (MRF) at the PRRF. The MRF will presort incoming material in an effort to remove some certain undesirable waste and recyclable components prior to combustion of the remaining material. The MRF system will be designed to recover ferrous metal, non-ferrous metals including aluminum, and old corrugated containers as the primary products. Undesirable waste and fines, including much of the glass and grit in the MSW, will be separated and removed from the fuel supply.

An air permit amendment application is required for the proposed expansion project. This application will be submitted by the PLMSWA accordingly.

The PRRF is located in an area that is currently in attainment for all pollutants. The modeling analysis conducted showed that predicted concentrations for the proposed project are below the significant impact level (SIL) for each pollutant except lead (Pb) and nitrogen dioxide (NO_2). There is no SIL for Pb. Therefore, Pb concentrations and NO_2 concentrations from PRRF emission sources were added to background concentrations from ambient monitoring stations for comparison with the National Ambient Air Quality Standard (NAAQS). The Tier 3 Plume Volume Molar Ratio Method (PVMRM) was used for 1-hour average NO_2 concentrations. EPA describes modeling that estimates conversion of stack nitrogen oxide (NO) emissions to ambient nitrogen dioxide (NO_2) within the air dispersion model as "Tier 3".

The Minnesota Pollution Control Agency (MPCA) has agreed that NO_2 background sources can be represented by the monitoring data from Blaine, MN and that background sources do not need to be explicitly included in the dispersion modeling analysis. Please see the MPCA letter from Jess Richards to Michael Hanan of Prairie Lakes Solid Waste Authority dated June 15, 2012 for additional information.

The MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2: October 20, 2004) was used in the development of the Air Quality Dispersion Modeling Protocol (AQDMP) submitted to MPCA on June 28, 2012. This protocol established the modeling methodology that was followed for the criteria pollutant air dispersion modeling analysis for the proposed expansion project. MPCA approved this AQDMP on August 14, 2012.

Point source emission rates and modeling parameters can be found in Appendix A. Calculations of the area source emission rates and parameters can be found in Appendix B. A CD ROM with the electronic files related to this report can be found in Appendix C. The Air Quality Dispersion Modeling Report Form (AQDMR-01) is also included in Appendix D. On September 25, 2012this form was made available at the following ftp site: ftp://PLMSWA:14Gs6mU1a@ftp2.wenck.com/PLMSWA .

2.0 Model Input Parameters

The air dispersion modeling selection and input parameters that were used to estimate NO_2, SO_2, CO, Pb, PM_{10}, and $PM_{2.5}$ concentrations at and around the PRRF site are described in this section. All sources, buildings, and receptors were entered using Universal Transverse Mercator (UTM), zone 15 (extended) coordinates in meters, referenced to the North American Datum of 1983 (NAD 83). Receptor locations, building footprints and the existing (SV001), proposed combined (SV009) and auxiliary boiler (SV004) stacks are shown in Figure 2-1.

As noted in the introduction, a SIL analysis was completed for SO_2, CO, PM_{10}, and $PM_{2.5}$ and a NAAQS/MAAQS analysis was completed for NO_2 and Pb.

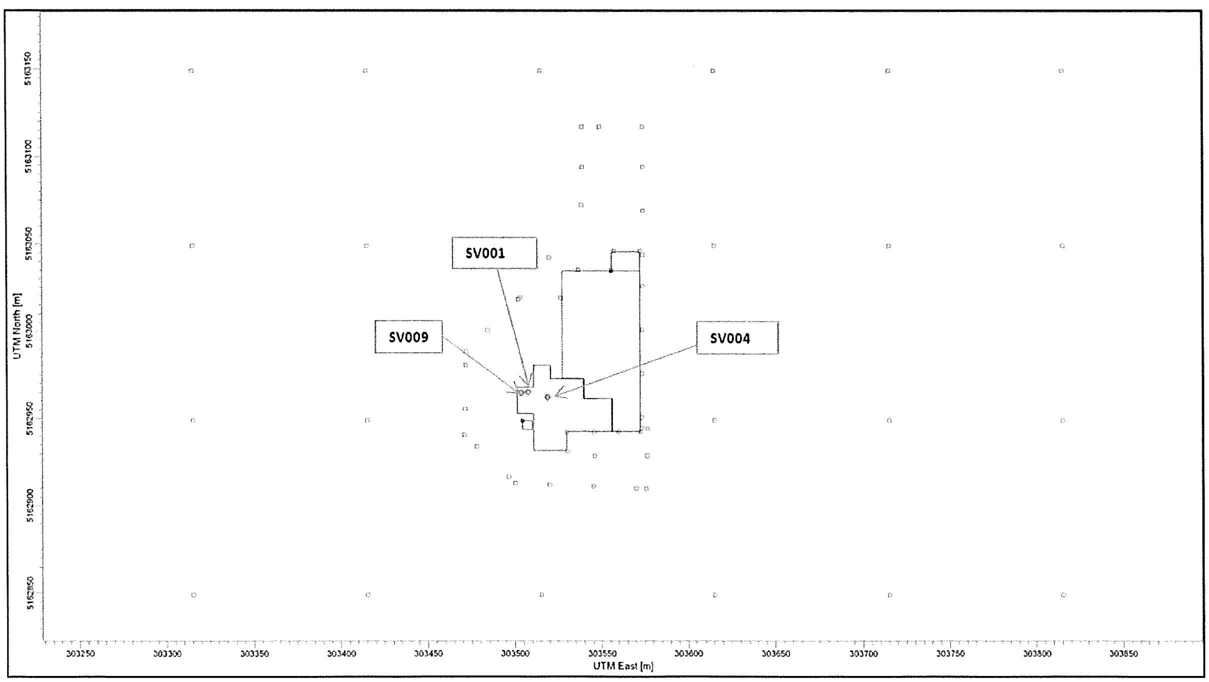

Figure 2-1: Perham Resource Recovery Facility Site Diagram for Proposed Facility Expansion

2.1 MODEL SELECTION

PLMSWA conducted modeling with the American Meteorological Society / United States Environmental Protection Agency (AMS/USEPA) Regulatory Model with Plume Rise Model Enhancements (AERMOD), version 12060 to estimate concentrations at and around the PRRF. On November 9, 2005, the USEPA established AERMOD as the preferred air dispersion model in the agency's Guideline on Air Quality Models, 40 CFR 51 Appendix W (GAQM). The update to the Guideline on Air Quality Models was published in the Federal Register on November 9, 2005 and became effective on December 9, 2005. Facilities are required to use AERMOD for short-range air dispersion modeling analyses.

AERMOD has several features that are superior to the previously used steady-state Gaussian plume dispersion models. These features include AERMOD's ability to treat the vertical inhomogeneity of the planetary boundary layer, special treatment of surface releases, and its treatment of irregularly shaped area sources. Also, AERMOD includes a treatment of intermediate and complex terrain. AERMOD is a state-of-the-art dispersion model that is capable of computing particle and vapor deposition in addition to air concentrations.

AERMOD model runs take significantly longer as compared to its predecessor, the Industrial Source Complex (ISC). Therefore, Lakes Environmental has developed a version of AERMOD that is designed to minimize run times on multi-CPU processor computers such as are now commonly available. The version is called AERMOD MPI. Lakes Environmental has run the EPA "test cases" to demonstrate that the version of AERMOD available from SCRAM provides the same results as run with AERMOD MPI. The Lakes website (http://www.weblakes.com/) contains further information regarding these tests. The criteria modeling runs were completed in this analysis utilizing Lakes's AERMOD MPI software.

AERMOD does include the PRIME algorithm as described in further detail in Section 2.3. The naming convention of "AERMOD" is used throughout this document with the understanding that PRIME is included in the model.

2.2 MODELING OPTIONS

All options within AERMOD recommended by the USEPA as regulatory defaults were used for all criteria pollutant runs with the exception of NO_2. The regulatory options include: 1) using elevated terrain algorithms that require the input of terrain height data; 2) using stack-tip downwash as applicable; 3) using routines to process averages during calm winds; and 4) using algorithms to handle missing meteorological data. In addition, the rural dispersion option was used since the area surrounding the PRRF is best characterized as "rural" given its smaller city characteristics.

Each averaging period for which a SIL has been established was evaluated as summarized in Table 2-1.

Table 2-1: Modeling Standards and Applicable Averaging Periods

Pollutant	SIL ($\mu g/m^3$)	Applicable Averaging Period
PM_{10}	5	24-Hour
	1	Annual
$PM_{2.5}$	1.2	24-Hour
	0.3	Annual
CO	2000	1-hour
	500	8-hour
SO_2	7.83	1-hour
	25	3-hour
	5	24-hour
	1	Annual
NO_2	7.52	1-hour
	1	Annual
Pb[a]	NA	NA

[a] There is no SIL for Pb

2.3 BUILDING DOWNWASH

To assess the impact of building downwash, building dimensions used in the AERMOD model were calculated using the USEPA Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME), version 04274. Elevations of stacks and buildings were input into BPIP-PRIME.

Building dimensions as well as elevation data of stacks and buildings have been determined by PRRF. This data was used to develop the building downwash data for the facility.

2.4 RECEPTOR GRID

A Cartesian grid was used in the modeling analysis to determine ambient air concentrations for PRRF. The criteria pollutants were ran with a receptor grid that expands to 6 kilometers from the center of the facility at a uniform spacing of 100 meters. This same receptor grid was used for the Toxics modeling runs for the RASS. However, the receptor grid was extended to 10 kilometers for the Toxics IRAP modeling runs. In addition, receptors were placed every 25 meters along the facility's fence line.

Receptor elevations were determined using the AERMOD Terrain preprocessor (AERMAP), version 11103 and USGS National Elevation Dataset (NED) files. A value of "NADA = 4" was used to reference the North American Datum of 1983 (NAD83) anchor coordinates based on the AERMAP user's manual.

2.5 METEOROLOGICAL DATA

For a modeling analysis, USEPA and MPCA guidelines specify the use of either one (1) year of on-site meteorological data, or five (5) years of representative, hourly National Weather Service (NWS) observations. Because no on-site data exists for this site, NWS data was relied upon in this analysis.

The meteorological data was obtained from the MCPA on August 19, 2011. The hourly surface observations are from Park Rapids with upper air sounding data from International Falls for meteorological years 2006 through 2010. The base elevation for the Park Rapids Airport is 440.4 meters. The new version of AERMET (11059) was used for the project.

In choosing meteorological data for a particular project, USEPA and MPCA have indicated that site-specific land use and land cover data from the meteorological station is preferred over the modeled facility's land use data. However, the meteorological station with the most similar land use and land cover to the project site should be selected. Following MPCA recommendations, all available nearby meteorological stations were compared to the land use and land cover characteristics for PRRF.

There are 35 available meteorological observation sites across the state of Minnesota for use in AERMOD modeling demonstrations. Of the 35 sites, three sites are located within 100 miles of PRRF: Detroit Lakes, Park Rapids, and Alexandria.

The facility is located in a rural part of northwest Minnesota. All of the three sites listed above are located in smaller towns which could be considered rural. The other 32 sites are not appropriate to represent the PRRF site because they are located in towns and cities which are too far from Perham. Therefore, these data sets may be removed from consideration.

The remaining stations are Alexandria (AXN), Detroit Lakes (DTL), and Park Rapids (PKD). Surface roughness is the most sensitive surface characteristic in AERMOD. The land use and land cover data was compared at these three meteorological stations with land use and land cover data from areas in the vicinity of the PRRF site. The meteorological observation station with surface roughness values most similar to the areas in the vicinity of PRRF was selected as the most appropriate meteorological data set to use in this modeling analysis.

USEPA's AERSURFACE utility was used to calculate the surface characteristics at the project site. The surface roughness values within one kilometer of the facility were identified using USEPA's AERSURFACE program. MPCA provided surface roughness values for the meteorological stations. The land use and land cover data used in MPCA's analyses were obtained from the United States Geological Survey (USGS) National Land Cover Data 1992 (NLCD92) archives.

A simple statistical analysis was performed on the surface roughness values. The statistical analysis consisted of calculating the maximum, minimum, and average surface roughness values across all sectors and all months for each data set. The results of the statistical analysis are shown in Table 2-2.

Table 2-2: Surface Roughness Statistics

Surface Roughness Statistic	PRRF	PKD	DTL	AXN
Average (m)	0.11	0.06	0.04	0.03
Maximum (m)	0.26	0.17	0.09	0.07
Minimum (m)	0.01	0.01	0.01	0.01

The average, maximum, and minimum surface roughness values at Park Rapids, Detroit Lakes, and Alexandria are all less than the values calculated at PRRF. Among the three meteorological data sites, the average, maximum and minimum surface roughness values at PKD are closer to those values at PRRF compared with DTL and AXN.

The appropriateness of the meteorological data sites was next examined by graphing the surface roughness values for each sector. Figure 2-2 shows a comparison of the surface roughness values of the PRRF site and meteorological data sites. The figure shows a graph of surface roughness height as a function of the combination of the twelve sectors and the twelve months for each sector. Each sector corresponds on one of the twelve 30-degree wind sectors set up to determine the land use out to one kilometer from each respective site. The first twelve data points shown in the figure represent the monthly surface roughness values that were calculated for Sector 1.

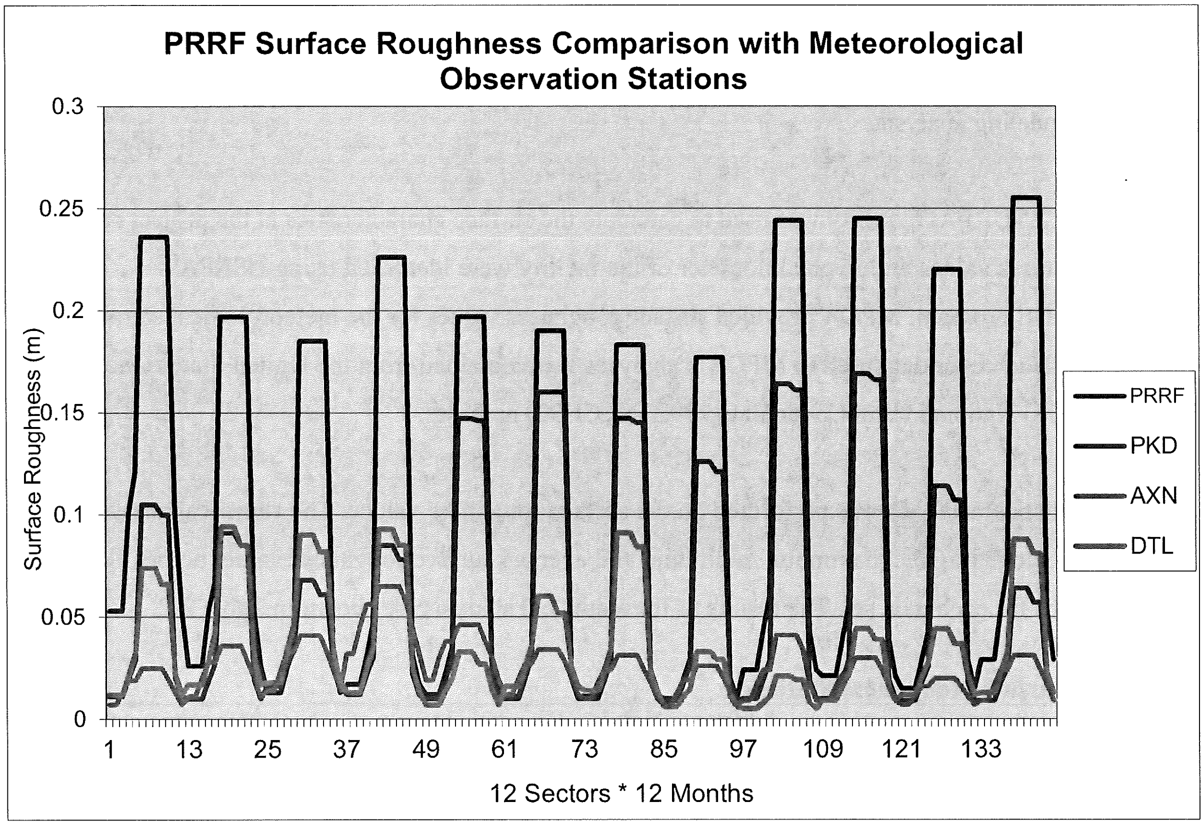

Figure 2-2: Surface Roughness Comparison between PRRF, Detroit Lakes, Park Rapids Airport, and Alexandria Airport

Figure 2-2 highlights the differences in surface roughness for each sector and each month. The plot of PRRF surface roughness values (dark blue line) is greater than the surface roughness values for the three meteorological data stations for nearly all of the sectors. In several of the sectors the DTL and AXN surface values are much less than the PKD or PRRF surface roughness values. Thus, PKD appears to have surface roughness values that represent the facility better than DTL or AXN.

Based on the availability of recent data, surface roughness data statistics, and surface roughness graphing, PKD surface data best represents the PRRF site. The decision to use PKD is based on:

1. PKD has similar land features to PRRF. It is also a rural location and is located within 100 miles of the PRRF facility.
2. The PKD surface roughness better represents the facility surface roughness than the DTL or AXN surface roughness values. The surface roughness statistical analysis showed that PKD maximum, minimum and average surface roughness values were closer to the PRRF site surface roughness than the DTL or AXN surface roughness.
3. A graph of the PKD surface roughness data shows that the site better represents the facility than DTL or AXN.

Therefore, this modeling analysis used surface observation data from the Park Rapids, Minnesota and upper air sounding data from the International Falls, Minnesota NWS sites for meteorological years 2006 through 2010.

3.0 Emission Sources

The methodologies outlined below were used to model emission sources at the PRRF site. A plot showing the location of the proposed combined stack along with the existing auxiliary boiler is provided in Figure 3-1.

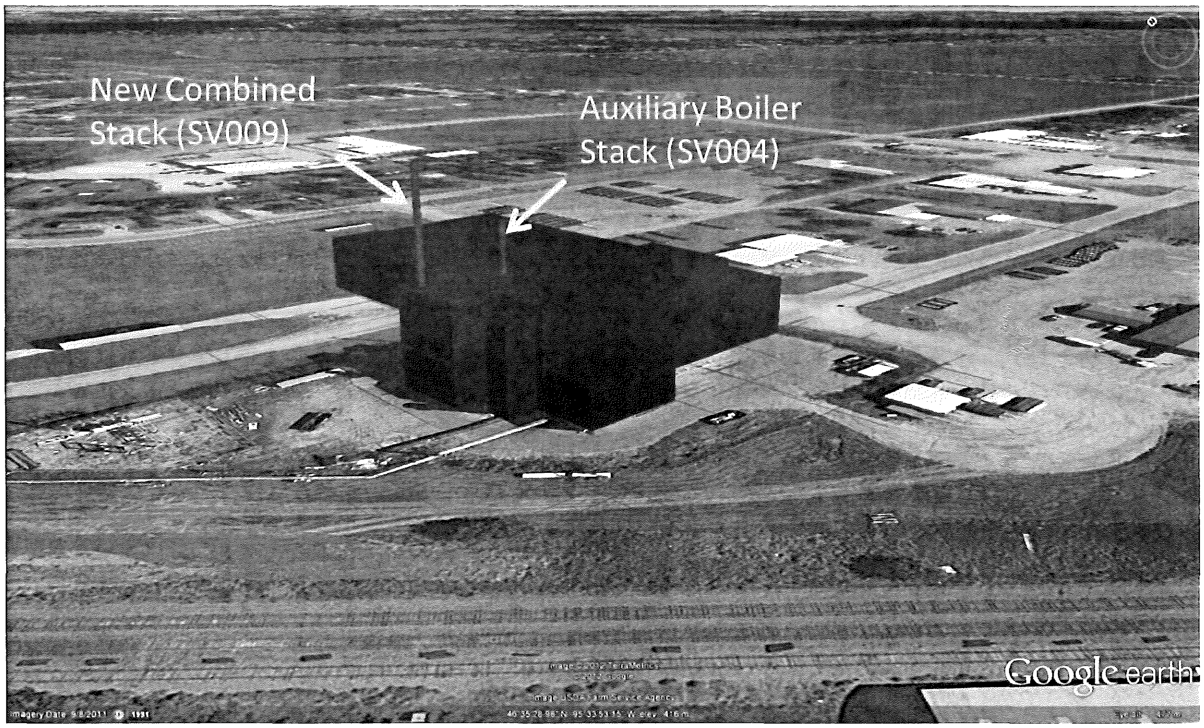

Figure 3-1: Perham Resource Recovery Facility Site Diagram for Proposed Facility Expansion

3.1 POINT SOURCES

Well-defined exhaust stacks are represented as "point" sources in the AERMOD model. The existing emissions at this facility are from the two existing MWC units and the existing auxiliary boiler. This proposed project does not add any additional emission units. The existing facility is limited to a throughput capacity of 116 tpd for the two MWC units, which are tied to the same HRB and APC equipment. The proposed project seeks to add a second HRB and APC equipment (to the South Unit), allowing for both of the MWC units to be used at their capacities of 100 tpd. Each MWC will be equipped with an air pollution control train consisting of a high temperature fabric filter baghouse, dry limestone injection, and activated carbon adsorption. Point source emission rates and modeling parameters can be found in Appendix A. The stack parameters used in the air dispersion modeling demonstrations are also shown in Table 3-1 below.

Table 3-1: Stack Parameters

Description	Stack	UTM Coordinates		Base elevation	Stack height	Exhaust temp.	Exit Diameter	Exhaust velocity
		X (m)	Y (m)	(m)	(m)	(K)	(m)	(m/s)
Existing MWC stack	SV001	303507.80	5162965.20	416.1	22.9	458.2	1.22	14.35
Aux boiler Stack	SV004	303519.20	5162962.20	416.1	27.1	377.6	1.22	9.21
New Combined Stack	SV009	303503.92	5162964.68	416.1	38.1	435.9	1.22	25.26

3.2 AREA SOURCES

All roads at the PRRF site are paved. Paved roads were included in the analysis according to EPA's March 2, 2012 Haul Road Workgroup Final Report. Area sources were used to characterize paved roads at the facility since receptors were located within the exclusion zone of volume sources. Additionally, based on the expected traffic patterns of the facility, paved road emissions were modeled as occurring between 5AM and 8PM. Emission factor (EMISFACT) modeling options in AERMOD allow a user to model emissions only when certain criteria are met. EMISFACT was used to model the road use between 5AM and 8PM. The only other fugitive sources at the facility include the lime storage silo and the cooling towers. However, these units' emissions are less than 0.1 lb/hr PM_{10} and 0.02 lb/hr $PM_{2.5}$, so they were excluded from the analysis. Detailed calculations of the emission rates used for the area sources included in the modeling analysis can be found in Appendix B. A plot showing the location of the paved roads at the proposed facility is provided in Figure 3-2.

Figure 3-2: Perham Resource Recovery Facility Site Diagram for Proposed Paved Roads

3.3 BACKGROUND CONCENTRATIONS

For purposes of demonstrating modeled compliance with ambient standards, "background" values are required in order to estimate the total impact of sources under review. The background value represents the emission concentration resulting from distant sources and smaller regional sources. The total ambient impact for a given pollutant and averaging time is estimated as the sum of the maximum modeled facility impact and the background value selected for that pollutant.

PRRF proposed to use the highest reported concentrations statewide for lead and NO_2 background concentrations. The Eagan monitoring site was excluded from consideration for lead since the location was sited to identify impacts from a local industrial facility. Concentrations for the period of 2009 through 2011 were identified from MPCA's 2013 Annual Air Monitoring Network Plan. The highest NO_2 concentrations for the period occurred at the Blaine site for the 1-hour averaging period and at the FHR 420 monitoring site for the annual averaging period. The Anoka monitoring site (6020) was selected for lead. These values are shown in Table 3-2.

Table 3-2: Background Concentrations

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)
NO_2	1-hour	86
	Annual	17
Pb	Monthly	0.034

Table 3-2 shows that for the NO_2 annual averaging period, the state-highest 2009-2011 average of annual 98th percentile daily maximum 1-hour NO_2 concentrations was 86 $\mu g/m^3$ observed at the Blaine monitoring site (6010). Likewise, the state-highest annual NO_2 concentration was 17 $\mu g/m^3$ observed at the FHR 420 monitoring site. The lead concentration is a rolling 3-month average concentration. The monitoring data for North Dakota and South Dakota were also reviewed but have lower observed concentrations. Therefore, to be conservatively high, the Anoka site background concentration of 0.034 $\mu g/m^3$ listed in Table 3-2 was selected.

Hourly ozone concentrations were provided by MPCA in October 2011, using the rural option. The hourly ozone file was used to estimate conversion of in-stack NO to ambient NO_2. A Tier 3 default ambient equilibrium ratio of 0.9 NO_2/NO_x was used as described in USEPA's March 2011 guidance. A non-default NO_2/NO_x in-stack ratio of 0.0046 for the two MWC units was used based on the results from stack testing of the existing MWC units performed on May 25, 2011. A 0.10 NO_2/NO_x in-stack ratio for the natural gas fired boiler is proposed based on EPA's Review of NO_x Emission Factors for Stationary Combustion Sources and AP-42 Update. Tables 2-4, 3-3. and 5-4 of the EPA report show that an in-stack ratio of 10% is conservatively high for boilers.

4.0 Analysis of Results

The purpose of the modeling analysis is to assess compliance with the National and Minnesota Ambient Air Quality Standards (NAAQS and MAAQS). Table 4-1 includes all criteria pollutants and averaging periods assessed. The air dispersion modeling conducted included: PM_{10} and $PM_{2.5}$ for the 24-hour and annual averaging periods; CO for the 1-hour and 8-hour averaging periods; NO_2 for the 1-hour and annual averaging periods; SO_2 for the 1-hour, 3-hour, 24-hour and annual averaging periods; and Pb for the monthly averaging period. First highs were predicted for each year for CO SO_2, $PM_{10,}$ $PM_{2.5}$, and Pb concentrations. AERMOD version 12060 is able to calculate the 98^{th} percentiles of the maximum daily concentrations for the 1-hour NO_2 averaging periods. The lead ambient air quality standard is in the form of a rolling 3-month average. USEPA's LEADPOST program is able to identify three month averages from monthly average post files to match with the form of the standard. However, the use of LEADPOST was not necessary to demonstrate compliance with the NAAQS because the one-month highest concentration was used as a worst case estimate of the rolling 3-month averaging period.

Table 4-1: Criteria Pollutant Averaging Periods

Pollutant	Averaging Period
PM_{10}	24-hour
	Annual
$PM_{2.5}$	24-hour
	Annual
CO	1-hour
	8-hour
SO2	1-hour
	3-hour
	24-hour
	Annual
NO_2	1-hour
	Annual
Pb[a]	Rolling 3-month average

[a] The one-month highest concentration was used as a worst case estimate of the rolling 3-month averaging period.

4.1 PRELIMINARY ANALYSIS

One way to assess compliance with the NAAQS/MAAQS standards is to show that the change in predicted concentrations as a result of the project is less than the Significant Impact Levels (SILs) for each pollutant and averaging period. Table 4-2 shows the results from the SIL analysis completed. The analysis for SO_2, CO, PM_{10}, and $PM_{2.5}$ showed that the predicted concentrations for the proposed project did not result in an exceedance of the SIL thresholds. Therefore, no further cumulative analyses were warranted for those criteria pollutants.

The predicted concentrations for NO_2 were above the SIL for the 1-hour and annual averaging periods. Therefore, a cumulative analysis was performed for NO_2 for comparison with the NAAQS and MAAQS. Additionally, since there is no SIL for Pb, a cumulative analysis was performed for this pollutant also. These results are discussed in the next section.

Table 4-2: Modeled Criteria Pollutant Concentrations for Proposed Project Compared to the Significant Impact Levels (SILs)

Pollutant	Averaging Period	Modeled Impacts[1] (μg/m³)	SILs (μg/m³)	Exceeds SIL?
PM_{10}	24-hour	4.85	5	NO
	Annual	0.38	1	NO
$PM_{2.5}$	24-hour	0.93	1.2	NO
	Annual	0.08	0.3	NO
SO_2	1-hour	1.30	7.83	NO
	3-hour	0.44	25.0	NO
	24-hour	0.11	5	NO
	Annual	0.00	1	NO
NO_2	1-hour	40.56	7.52	YES
	Annual	6.48	1	YES
CO	1-hour	3.28	2000	NO
	8-hour	0.73	500	NO

[1] High first high (H1H) concentrations. Values show the potential change from the existing facility.

Currently, significance levels are compared to modeled concentrations based on the change from the proposed project and not to the total facility modeled concentrations. However, an additional evaluation was performed by comparing the modeled concentrations from the total proposed facility to the significance levels (Table 4-3). The results showed that more pollutants are above the significance levels; however, none of the pollutant concentrations (including background) threatened the current NAAQS and MAAQS.

Table 4-3: Modeled Criteria Pollutant Concentrations for the Total Proposed Facility Compared to the Significant Impact Levels (SILs)

Pollutant	Averaging Period	SILs ($\mu g/m^3$)	Modeled Impacts[1] from Total Proposed Facility ($\mu g/m^3$)	Exceeds SIL?
PM_{10}	24-hour	5	7.44	YES
	Annual	1	2.26	YES
$PM_{2.5}$	24-hour	1.2	5.95	YES
	Annual	0.3	1.72	YES
SO_2	1-hour	7.83	13.01	YES
	3-hour	25.0	11.85	NO
	24-hour	5	7.75	YES
	Annual	1	0.28	NO
NO_2	1-hour	7.52	40.56	YES
	Annual	1	6.48	YES
CO	1-hour	2000	112.14	NO
	8-hour	500	95.03	NO

4.2 CUMULATIVE ANALYSIS

For purposes of demonstrating modeled compliance with ambient standards, “background” values are required in order to estimate the total impact of sources under review. The background value represents the baseline pollutant concentration in absence of emission sources. The total ambient impact for a given pollutant and averaging time is estimated as the sum of the maximum modeled facility impact and the background value selected for that pollutant.

If the modeled ambient impacts from a proposed project are equal to or greater than the respective SIL, then the source must conduct a cumulative modeling analysis that includes the facility’s total emissions along with emissions from other nearby sources.

For NO_2 and Pb a cumulative analysis was performed to assess compliance with the NAAQS/MAAQS. MPCA agreed that NO_2 background sources could be represented by the monitoring data from Blaine, MN. Thus, background sources were not explicitly included in the cumulative dispersion modeling analysis for NO_2. In the case of Pb, there were no Pb nearby sources in the area so only the highest reported background concentrations statewide was added to the modeled value. The proposed project did not exceed the $PM_{2.5}$ SIL for the 24-hour and annual averaging periods. However, these emissions were also compared to the NAAQS by adding the appropriate background levels. The results from these cumulative analyses showed that the proposed project did not cause or contribute to any NAAQS/MAAQS exceedances as shown in Table 4-4.

Table 4-4: Modeled Criteria Pollutant Concentrations from the Total Proposed Facility in Comparison to the Ambient Air Quality Standards

Pollutant	Averaging Period	Modeled Impacts[1] (μg/m³)	Background (μg/m³)	Total Impact (μg/m³)	NAAQS/ MAAQS (μg/m³)	Exceeds NAAQS/ MAAQS?
NO_2	1-hour	32.38	86.5	118.88	188 / NA	NO
	Annual	6.48	16.9	23.38	100 / 100	NO
Lead	3-month	4.67E-03	0.034	3.87E-02	0.15 / 1.5	NO
$PM_{2.5}$	24-hour	5.95	22.8	28.75	35 / NA	NO
	Annual	1.72	9.5	11.22	15 / NA	NO

[1] Concentrations are high-eight-high (H8H) for 1-hour NO_2, high-first-high (H1H) for annual NO_2, and maximum 1-month average for lead. The one-month high concentration for lead is a worst case estimate of the rolling 3-month averaging period.

Isopleth plots for the NO_2, and Pb analyses are shown as Figures 4-1 through 4-3. The CD-ROM containing all electronic modeling files from the analysis is included in Appendix C.

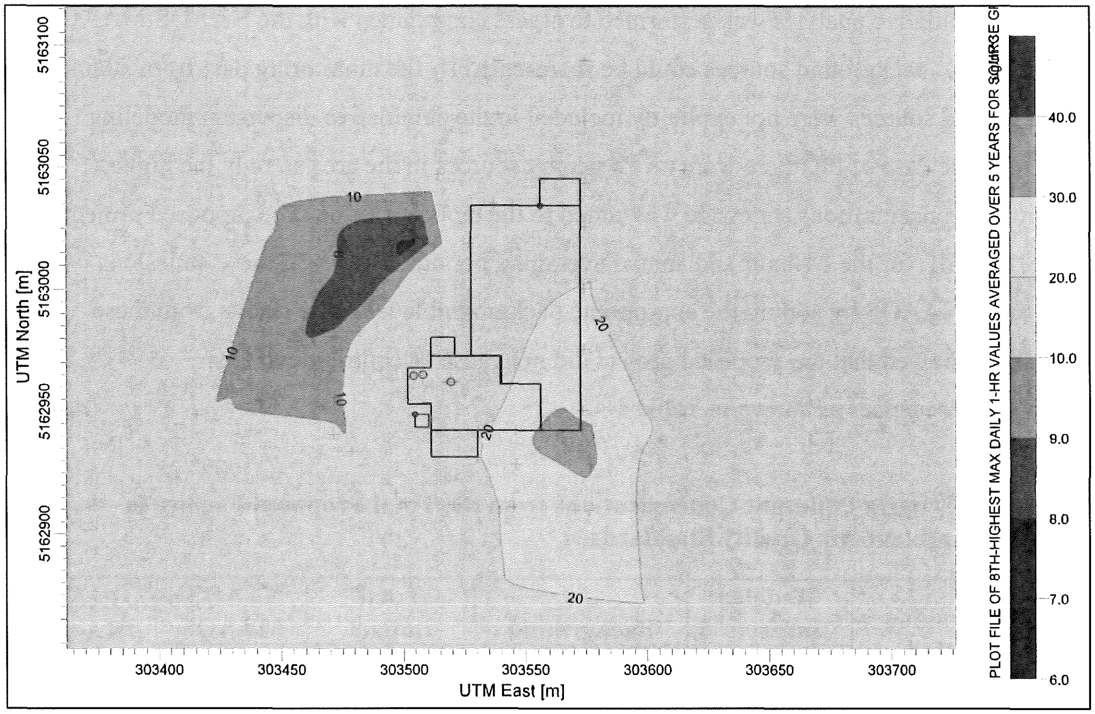

Figure 4-1: 1-hour NO_2 Isopleth Plot for the H8H concentrations for the Perham Resource Recovery Facility Expansion Project

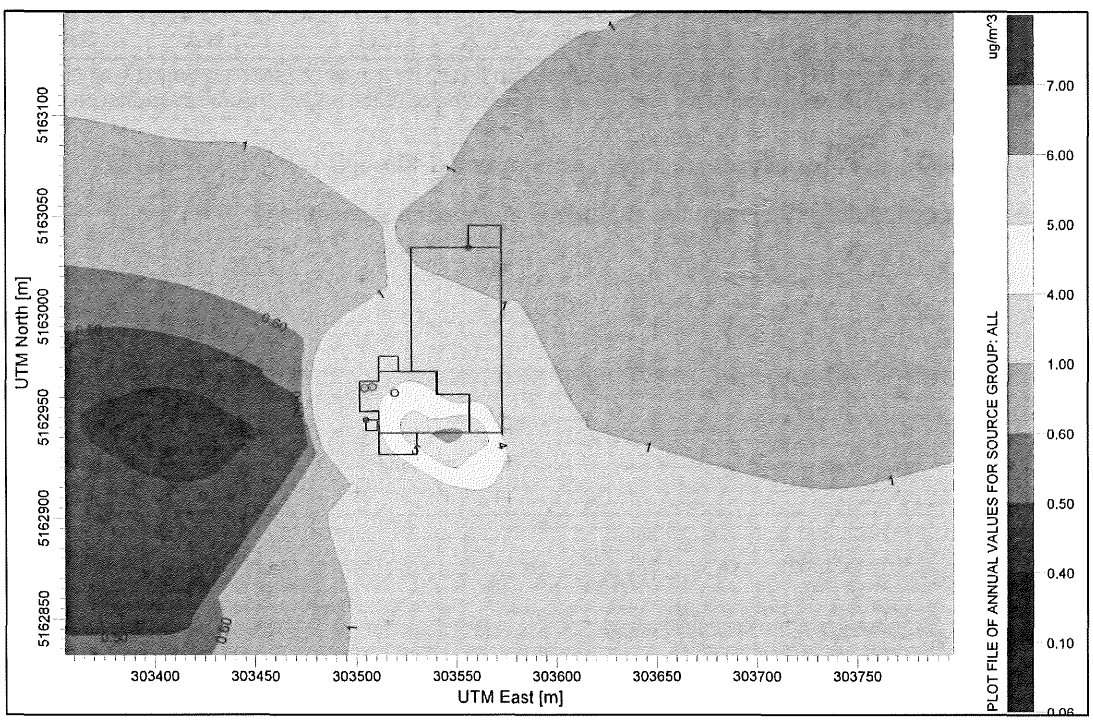

Figure 4-2: Annual NO_2 Isopleth Plot for the highest concentrations for the Perham Resource Recovery Facility Expansion Project

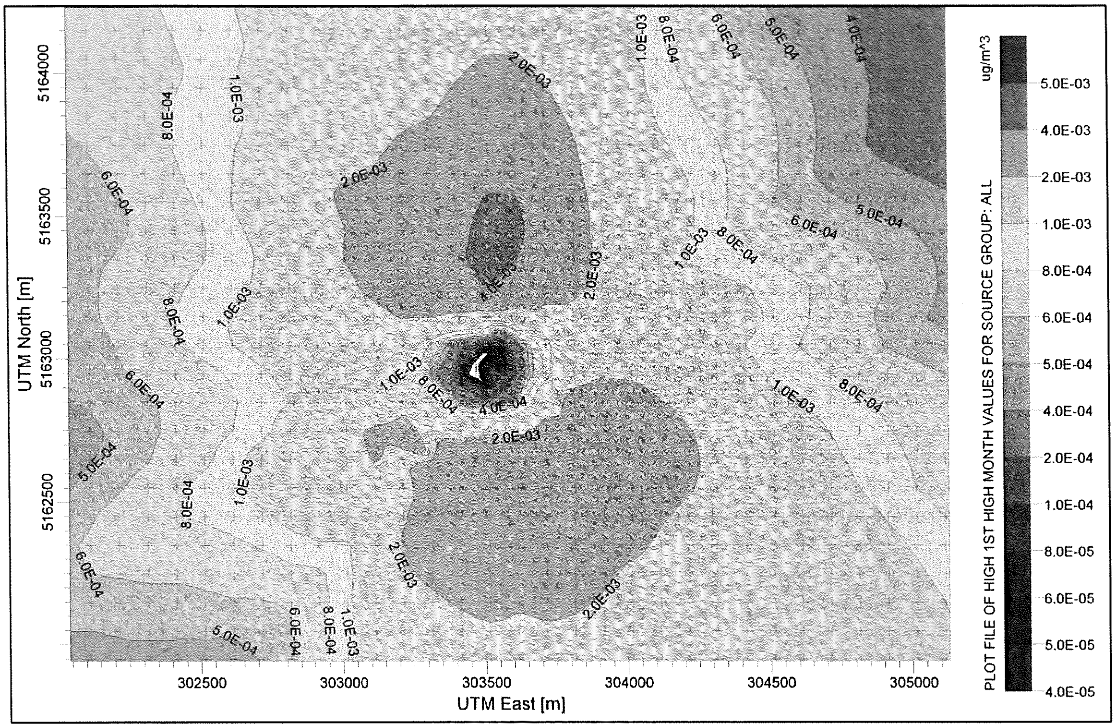

Figure 4-3: 1-month Pb Isopleth Plot for the highest concentrations for the Perham Resource Recovery Facility Expansion Project

5.0 References

MPCA Air Dispersion Modeling Guidance for Minnesota Title V Modeling Requirements and Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2: October 20, 2004). http://www.pca.state.mn.us/index.php/component/option,com_docman/task,doc_view/gid,376

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U.S. Environmental Protection Agency (USEPA), Office of Air Quality Planning and Standards. Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, Air Quality Modeling Group, C439-01, March 1, 2011. http://www.epa.gov/ttn/scram/guidance/clarification/Additional_Clarifications_AppendixW_Hourly-NO2-NAAQS_FINAL_03-01-2011.pdf

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U.S. Environmental Protection Agency (USEPA). November 2005. Appendix W to Part 51—Guideline on Air Quality Models. Federal Register Vol. 70(216):68229. November 2005.

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Appendix A

Point Source Emission Rates and Modeling Parameters

Perham Resource Recovery Facility
Iteration 12
T:\2415\03\04 Air Modeling\Protocol\Protocol v2 (6-27-2012)\[A_3_Stack parameters.xlsx]E-rates

	UTM Coordinates		Base elevation	Stack height		Exhaust temp		Exit Diameter		Exhaust velocity		Description
Stack	X (m)	Y (m)	(m)	(m)	(ft)	(K)	F	(m)	(ft)	(m/s)	acfm	
SV001	303507.800	5162965.200	416.120	22.860	75.0	458.150	365.000	1.2192	4.0	14.3505	35498.8	Existing MWC stack
SV004	303519.200	5162962.200	416.100	27.127	89.0	377.595	220.001	1.2192	4.0	9.2059	22772.6	Aux boiler Stack
SV004N	303519.200	5162962.200	416.100	27.127	89.0	377.595	220.001	1.2192	4.0	9.2059	22772.6	Aux boiler Stack
SV009	303503.922	5162964.682	416.130	38.100	125.0	435.928	325.000	1.2192	4.0	25.2654	62499.0	New Combined Stack

Perham Resource Recovery Facility
Iteration 12
T:\2415\03\04 Air Modeling\Protocol\Protocol v2 (6-27-2012)\[A_3_Stack parameters.xlsx]E-rates

		UTM Coordinates		PM10/PM2.5		CO		CO (1-hour)		SO2		SO2 - 1-hour		NOx		NOx (1-hour)		Pb	
	Stack	X (m)	Y (m)	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr	g/s	lb/hr
Current	SV001 (includes EU001-South MWC and EU002-North MWC) limited to a combined throughput of 116 tpd	303507.800	5162965.200	0.332198	2.6365495	0.699658	5.552963	0.769624	6.108259	1.232217	9.779713	1.355438	10.75768	5.73124	45.48704	6.304364	50.03574	0.001034	0.0082083
	EU002 at 100tpd			0.286378	2.2728875	0.603153	4.787037	0.663469	5.265741	1.062256	8.430787	1.168481	9.273866	4.940724	39.21296	5.434797	43.13426	0.008274	6.5667E-02
	EU001 at 100tpd			0.286378	2.2728875	0.603153	4.787037	0.663469	5.265741	0.413866	3.284722	0.455252	3.613194	4.940724	39.21296	5.434797	43.13426	0.001034	8.2083E-03
	SV004	303519.200	5162962.200	0.078395	0.6222	0.86642	6.8765	0.86642	6.8765	0.006189	0.049118	0.006189	0.049118	0.330062	2.6196	0.330062	2.6196	5.16E-06	4.0931E-05
Proposed	SV004N	303519.200	5162962.200	0.078395	0.6222	0.86642	6.8765	0.86642	6.8765	0.006189	0.049118	0.006189	0.049118	0.330062	2.6196	0.330062	2.6196	5.16E-06	4.0931E-05
	SV009	303503.922	5162964.682	0.572755	4.545775	1.206307	9.574074	1.326937	10.53148	1.476122	11.71551	1.623734	12.88706	9.881449	78.42593	10.86959	86.26852	0.009308	7.3875E-02

Emission rates for 1-hour averaging times based on the acute calculations (110%load).

Perham Resource Recovery Facility
SV001
Airflow Calculations for Modified Facility:

Combustion Data:

Fuel:		MSW	
Max Fuel Rate:		116	ton/day
Heat Content: [1]		5,125	Btu/lb
Heat Input:		49.54	MMBtu/hr
Fuel Factor (Fd):		9,570	dscf/MMBtu at 0% 02 from EPA Method 19
Stack flow rate:		7,902	dscfm using stoichiometric f-factor (Fd)
Oxygen correction:		7	%
Corrected stack flow rate:	11,881		dscfm at 7% O2 = dscfm @ 0% O2 * (20.9 – 0.0)/(20.9 – 7)

Airflow Conversion from dscfm to acfm:

Combined North and South Units Stack (Current Facility)

Temperature:	365	° F	From RRC Rv Tech Memo #1, 10-31-2011
Pressure:	29.92	in Hg	
B_{wo} (volumetric fraction of water vapor):	13.48%		
Oxygen correction:	12.53	% O2 measured during 5/24/11 stack testing for PM	
		Where correction = [dscfm at 7% 02 * (20.9 – 7)/(20.9 – O2 meas)]	
Stack flow rate:	35,499	acfm @ 12.53% O_2	
	21,376	acfm @ 7% O_2	

dscfm =acfm * ((460 + 70)/(460 + T)) * (actual P / 29.92) * (1-B_{wo})

[1] Heat content is the average of testing data from waste sorts completed for the MSW currently received at PRRF.

T:\241˙ 4 Air Modeling\Protocol\Protocol v2 (6-27-2012)\A_3_Stack parameters.xlsx

Perham Resource Recovery Facility
SV009
Airflow Calculations for Modified Facility:

Combustion Data:

Fuel:		RDF	
Max Fuel Rate:		200	ton/day
Heat Content:		5,500	Btu/lb
Heat Input:		91.67	MMBtu/hr
Fuel Factor (Fd):		9,570	dscf/MMBtu at 0% 02 from EPA Method 19
Stack flow rate:		14,621	dscfm using stoichiometric f-factor (Fd)
Oxygen correction:		7	%
Corrected stack flow rate:	21,984		dscfm at 7% O2 = dscfm @ 0% O2 * (20.9 – 0.0)/(20.9 – 7)

Airflow Conversion from dscfm to acfm:

Combined North and South Units Stack

Temperature:	325	° F
Pressure:	29.92	in Hg
B_{wo} (volumetric fraction of water vapor):	13.48%	
Oxygen correction:	12.53	% O2 measured during 5/24/11 stack testing for PM
		Where correction = [dscfm at 7% 02 * (20.9 – 7)/(20.9 – O2 meas)]
Stack flow rate:	62,499	acfm @ 12.53% O_2
	37,634	acfm @ 7% O_2

From RRC Rv Tech Memo #1, 10-31-2011

dscfm =acfm * ((460 + 70)/(460 + T)) * (actual P / 29.92) * (1-B_{wo})

Appendix B

Area Source Emission Rates and Modeling Parameters

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Traffic Summary for Emission Calculations

AQ Facility ID No: 11100036 AQ File No.: 116H
Facility name: Perham Resource Recovery Facility

Weeks	Day/Week	Days/Yr
52	5	260

Comparison of Existing Facility and Proposed Project				
	Existing Facility		Proposed Project	
Product	2010 Actual 116 tpd	2010 Maximum 116 tpd	Projected	Maximum 200 tpd
MSW (tpy)	35,000	42,340	55,000	73,000
Ash (tpy)	8,800	10,645	13,829	18,354
Steam (lbs.)	215,000,000	260,088,571	337,857,143	448,428,571

Truck Weight Summary					
Truck Type	Total Number of Trips	Average Tare (lbs)	Average Gross (lbs)	Average Maximum Gross (lbs.)	Average Vehicle Weight (lbs.)
MSW[3]	4,146	31,129	47,556	53,492	39,342
Ash[4]	780	36,269	58,832	72,760	47,551
Leachate[5]	147	16,745	34,596	41,680	25,671
Material Recovery Facility Trucks [6]	7	27,234	37,343	46,680	32,289
Fines and Non-processibles[4]	NA	NA	NA	NA	32,289
Miscellaneous[7]	14	8,244	8,691	9,620	8,468
Lime [8]	55	NA	NA	NA	47,551
Employee Related[9]	5,850	NA	NA	3,590	3,590
Delivery Related[10]	1,300	NA	NA	8,000	8,000

Truck Traffic Summary							
Truck Type	Current Facility, 2010 Truck Loads	Current Facility, 2010 Average Daily Trips[1,2]	Future Facility Projected Actual Truck Loads	Future Facility Maximum Truck Loads	Future Facility Maximum Daily Trips[1,2]	Round Trip Distance, Current Facility (ft)	Round Trip Distance, Future Facility (ft)
MSW[3]	4,146	16	5,746	7,468	28.7	130	288
Ash[4]	780	3	1,042	1,383	5.32	520	576
Leachate[5]	147	0.57	70	93	0.36	520	938
Material Recovery Facility Trucks [6]	7	0.03	72	96	0.37	130	496
Fines and Non-processibles[4]	NA	NA	123	163	0.63	0	1,175
Miscellaneous[7]	14	0.05	14	14	0.05	130	288
Lime	55	0.21	55	110	0.42	520	938
Employee Related[9]	15 Total Employees	15	21	27 Total Employees	21	50	877
Delivery Related[10]	2 Deliveries per Day	2	2	2 Deliveries per Day	2	50	877

Daily Distance Traveled and Mean Vehicle Weight Summary				
Truck Type	Daily Distance Traveled, Future Facility (VMT/day)	Daily Distance Traveled, Current Facility (VMT/day)	VMT x Weight (VMTxlb) Future Facility	VMT x Weight (VMTxlb) Current Facility
MSW[3]	1.57	0.39	61,641	15,446
Ash and Fines[4]	0.58	0.30	27,589	14,049
Leachate[5]	6.35E-02	5.57E-02	1,630	1,429
Material Recovery Facility Trucks [6]	3.47E-02	6.63E-04	1,119	21
Fines and Non-processibles[4]	1.39E-01	0.00	4,496	0
Miscellaneous[7]	2.94E-03	1.33E-03	25	11
Lime	7.48E-02	2.07E-02	3,558	986
Employee Related[9]	3.49	0.14	12,522	510
Delivery Related[10]	0.33	1.89E-02	2,658	152
	Vehicle Miles Traveled (VMT/day)		Mean Vehicle Weight (tons)	
	6.28	0.93	9.17	17.58

[1] Entry and Exit from the Facility are counted as **one** trip.

[2] Assume 5 days a week with truck traffic (Monday-Friday) for a worst-case scenario though burner operates continuously, therefore 260 days of truck traffic a year.

[3] Assume at all additional MSW brought to PRRF above current waste volumes comes in 20 ton trucks and 5 ton trucks. 80% of the additional waste arrive in the 20 ton trucks while the remaining 20% arrives in 5 ton trucks.

20,000 tons per year of MSW =55000 Proposed Project projected MSW tpy - 35000 Existing Facility MSW tpy

1600 projected additional truck loads =((20000 additional tons MSW per year x (1-80%))/20 tons MSW per truck) + ((20000 additional tons MSW per year x (1-20%))/5 tons MSW per truck)

30,660 tons per year of MSW = Proposed Project projected MSW tpy - 55000 Existing Facility MSW tpy

2453 projected additional truck loads =((30660 additional tons MSW per year x (1-80%))/20 tons MSW per truck) + ((30660 additional tons MSW per year x (1-20%))/5 tons MSW per truck)

[4] Under the Proposed Project, 15% less ash per ton of MSW would be generated with the Proposed Project while 10% of fines are removed prior to combustion. The total number of loads of ash and fines would remain about the same as projected.

[5] Under the proposed Project, less leachate would be required due to the installation of an ash conditioner. It was conservatively estimated that only 70 loads, or a 50% reduction in leachate loads, are likely under the proposed project scenario for 55,000 tpy of processed waste.

[6] Material Recovery Facility Trucks include any truck traffic due to the proposed material recovery facility (steel recycling, glass recycling, aluminum recycling, etc.).

[7] Miscellaneous Trucks include "Adopt A Highway" traffic. These trips are not expected to increase as a result of the proposed project.

[8] The vehicle weight for Lime trucks is unkown, therefore the weight is not used when determining the mean vehicle weight for the fugitive dust emission calculations or was assumed to be equal to the weight of an ash truck.

[9] Employee vehicle weight is assumed to be 3,590 pounds based on the EPA report "Light-Duty Automotive Technology,Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2011", March 2012. The future facility will have a maximum of 27 employees but only 21 employees onsite every 24 hours. The maxiumum number of daily trips is calculated assuming that 21 employees are onsite every day of the week.

[10] It is assumed that 2 deliveries occur per day. Delivery vehicle weight is based on MPCA 2008 data.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Fugitive Particulate On-Site Traffic Emissions

Green- Linked to Data
Blue- Data Input
Red- Note

AQ Facility ID No:	11100036	AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility	
Emission unit ID number:	FS 002 Fugitive Dust Emissions from Paved Roads	

Particulate Emissions from Dust Re-entrainment from On-Site Paved Roadways:
Emission Factor:

E = [k * (sL)^0.91 * (W)^1.02] * (1-P/4N)

Where:

E = Emission factor (lb/VMT, vehicle miles traveled) from AP-42, Section 13.2.1, Equation 2, (1/11).
k = Particle size multiplier (lb/VMT) from AP-42, Table 13.2.1-1.
sL = Road surface silt loading (g/m²) value from the MPCA Standardized Mobile Sources (SMS) Spreadsheet [version 09097], Paved Roads - Stage 3 Guide Tab, IRT6, default for industrial facilities
W = Mean vehicle weight based on the "fleet" average weight of all vehicles traveling the road.
P = Number of days with at least 0.01 in. of precipitation per year from AP-42, Figure 13.2.1-2 (assuming the worst daily conditions the number of precipitation days will be 0).
N = Number of days per year (365 days).

Calculations Summary - Current Potential Emissions:

Fugitivie Dust from On-Site Paved Roads:

Pollutant	Particle Size Multiplier, k (lb/VMT)	Silt Loading sL[1] (g/m²)	Mean Vehicle Weight, W (tons)	Precipitation Days, P[1] (days)	Uncontrolled Emission Factor, E (lb/VMT)	Vehicle Miles Traveled (VMT/day)	Potential Emissions Daily (lb/day)	Potential Emissions Annual (tons/yr)
PM	0.011	5	17.6	0	0.886	0.93	0.82	0.15
PM10	0.0022	5	17.6	0	0.177	0.93	0.16435	0.03
PM2.5	0.00054	5	17.6	0	0.044	0.93	0.04	7.36E-03

[1] Silt loading and precipitation days are worst case assumptions for short term air dispersion modeling emission rates. These are not intended to reflect annual emission rates.

Total Particulate Emissions from On-Site Paved Roads - Current Potential Emissions:

PM10 (g/s)	hours truck traffic per year	PM10 (tpy)	PM10 (g/s/m2)	Hours restriction	PM2.5 (tpy)	hours truck traffic per year	PM2.5 (tpy)	PM2.5 (g/s/m2)
0.0008628	8760	0.02999	5.7127E-07	none	0.0002118	8760	0.00736	1.4024E-07
0.0013805	5475	0.02999	9.1403E-07	5AM-8PM	0.0003389	5475	0.00736	2.2438E-07

Pollutant	Potential Emissions (tpy)
PM	0.15
PM_{10}	3.00E-02
$PM_{2.5}$	7.36E-03

Calculations Summary - Future Potential Emissions:

Modeled PM Emission Rates CURRENT

Total Roadway Source Area: *(31.56 m + 52.32 m + 14.49m + 15.06 m) x 13.315 m width)*	1510.3 m2
PM10 Modeled Emission Rate =	5.713E-07 g/s per m2
PM2.5 Modeled Emission Rate =	1.402E-07 g/s per m2

Fugitivie Dust from On-Site Paved Roads:

Pollutant	Particle Size Multiplier, k (lb/VMT)	Silt Loading sL[1] (g/m²)	Mean Vehicle Weight, W (tons)	Precipitation Days, P[1] (days)	Uncontrolled Emission Factor, E (lb/VMT)	Vehicle Miles Traveled (VMT/day)	Potential Emissions Daily (lb/day)	Potential Emissions Annual (tons/yr)
PM	0.011	5	9.17	0	0.456	6.28	2.87	0.52
PM10	0.0022	5	9.17	0	0.091	6.28	0.57295	0.10
PM2.5	0.00054	5	9.17	0	0.022	6.28	0.14	0.03

[1] Silt loading and precipitation days are worst case assumptions for short term air dispersion modeling emission rates. These are not intended to reflect annual emission rates.

Total Particulate Emissions from On-Site Paved Roads - Future Potential Emissions:

PM10 (g/s)	hours truck traffic per year	PM10 (tpy)	PM10 (g/s/m2)	Hours restriction	PM2.5 (tpy)	hours truck traffic per year	PM2.5 (tpy)	PM2.5 (g/s/m2)
0.0030079	8760	0.10456	7.6761E-07		0.0007388	8760	0.02568	1.8853E-07
0.0048127	5475	0.10456	1.2282E-06	5AM-8PM	0.0011821	5475	0.02568	3.0166E-07

Pollutant	Potential Emissions (tpy)
PM	0.52
PM_{10}	0.10
$PM_{2.5}$	2.57E-02

Modeled PM Emission Rates FUTURE

Total Roadway Source Area: *(279.3 m + 15 m) x 13.315 m width)*	3918.6 m2
PM10 Modeled Emission Rate =	7.676E-07 g/s per m2
PM2.5 Modeled Emission Rate =	1.885E-07 g/s per m2

According to EPA memo guidance on Haul Roads- March 2, 2012 http://www.epa.gov/ttn/scram/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pdf
Vehicle Width = road width + 6 m
Assume a 2-lane road = 24 ft
VW= 13.32 **m**

Vehicle Height = 3 m
Top of plume height = 1.7 * VH
Top of plume heigl 5.1 m
Release height = 0.5 * top of plume height
Release height = 2.55 **m**

Sigma Z = PH/2.15 2.372 m

Appendix C

Electronic Modeling Files

Electronic modeling files are available upon request

Appendix D

Air Quality Dispersion Modeling Report Form

(AQDMR-01)

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AQDMR-01

Air Quality Dispersion Modeling Report(AQDMR)

Protocol Form for Criteria Pollutant Modeling

Doc Type: Air Dispersion Modeling

Acronym Information on Page 6

Instructions: Permit applicants required to conduct air dispersion modeling should submit two paper copies of the completed Air Quality Dispersion Modeling Report form (AQDMR-01) and all accompanying files to:

Air Quality Permit Document Coordinator
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Applicants may also submit an electronic version in addition to the two paper copies.

Electronic copies of the forms and accompanying files should be sent to: AirModeling.PCA@state.mn.us.

Facility Information

AQ tracking number: ______

AQ file no.: 116H AQ facility/permit ID no.: 11100036 Today's date (mm/dd/yyyy): 9/25/2012

Three-letter modeling facility ID (ex., XEK = Xcel Energy Allen S. King, MEC = Mankato Energy Center, etc.): PRF

Facility name: Perham Resource Recovery Facility

Facility street address: 201 6th Avenue East

City: Perham County: Otter Tail

State: MN Zip code: 56573 Elevation at facility: 415.99 m

Facility contact: Brian Schmidt Protocol prepared by: Sergio Guerra

Facility contact phone: 218-346-4404 Preparer phone: 651-395-5225

Facility contact e-mail address: bschmidt@cityofperham.com Preparer e-mail address: sguerra@wenck.com

Latitude, Longitude of facility (Decimal degrees to **four** decimal places): 46.5913 N, 95.5648 W

UTM coordinates of facility (NAD83, zone 15 extended **only**): x = 303,536.20 m East, y = 5,162,960.40 m North

This report is associated with:

- ☒ Permit application
- ☐ Permit requirement
- ☐ Other: ______

Project Description (50 words or less)

The Project is an expansion of the existing facility with the addition of a second waste heat boiler and associated APC system. A materials recovery facility (MRF) capable of pre-processing all of the MSW is also proposed.

Files to Accompany Modeling Report

Include the following files with the completed modeling report form. Use checkbox to indicate that all applicable files are included.

1. ☒ AERMOD input files (*.inp, *.adi, *.ami)
   ☒ AERMOD output files (*.out, *.ado, *.amo)
   ☒ AERMOD plot files (*.plt)
   ☒ AERMOD post files (*.pst) – If applicable

☒ AERMOD event files (*.evi, *.evo) – If applicable
☒ AERMOD miscellaneous/other files (MAXDCONT, ?, ?, etc.) – If applicable

2. AERMET files: ☒ *.sfc ☒*.pfl
3. BPIP-PRIME files: ☒ Input (*.bpi) ☒ Output (*.bpo, *.sum)
4. AERMAP files: ☒ Terrain (*.dem(s), *.tif (NED files)), ☒ Input (*.ami), ☒ Output (*.rou, *.sou, etc.)
5. Background data files: ☐ Background concentrations for applicable pollutants (seasonal, monthly, daily, hourly, etc.)
6. Modeling Results: ☒ Figures (*.jpeg, *.pdf), ☐ GIS Maps (*.shp)
7. AQDMPS-01 spreadsheet*: ☐
8. Other files and supporting documents (SMSv*.xls, Far sources, readme, etc.):

* *Provide the final spreadsheet (i.e. AQDMPS-01) and indicate/highlight changes.*

Section 1. Modeling Protocol

1. The Air Dispersion Modeling presented in this report is based on a Protocol that has been:

   ☒ Approved ☐ Conditionally approved ☐ *MPCA approval date (mm/dd/yyyy): 08/14/2012

   **This is the date given on AQDM PAN-01 form*

2. Does this Modeling submittal **completely** follow the Approved Protocol? ☐ Yes ☒ No

   If yes, proceed to Section 3.
   If no, proceed to Section 2.

Section 2. Changes to Modeling Protocol

Table 1: Protocol Changes (Please indicate which sections in Approved Protocol contain changes.)

Modeling protocol by sections

Section and section name	**Change/No change**
Files to accompany protocol	No Change
Section A *Purpose for Air Dispersion Modeling and Related Information*	No Change
Section B *EPA Pre-Processors and EPA Post-Processors*	Change
Section C *Model Selection and Options (Key CO Pathway Inputs)*	No Change
Section D *Emission Source Characterizations and Parameters (Key SO Pathway Inputs)*	No Change
Section E *Paved Roads Fugitive Dust (as per MPCA April 25, 2011 Policy)*	Change
Section F *Receptors (RE Pathway)*	No Change
Section G *Meteorological Data (ME Pathway)*	No Change
Section H *SIL Analysis and Results*	Change
Section I *Background Values*	No Change
Section J *Nearby Sources*	No Change
Section K *Anticipated Outputs (OU Pathway)*	No Change

Section 2.1: Detailed Changes to Modeling Protocol

Please provide specific information corresponding to those sections in Table 1 where changes are indicated.

Employee and delivery traffic was updated based on EIS refinements.

Section A. Purpose for air dispersion modeling and related information

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section B. EPA pre-processors and EPA post-processors

MPCA approved change: ☐ Yes ☒ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

BPIP file for proposed location was updated to correct the height of the new APC building.

Section C. Model selection and options (Key CO pathway inputs)

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section D. Emission source characterizations and parameters (Key SO pathway inputs)

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section E. Paved roads fugitive dust

MPCA approved change: ☐ Yes ☒ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

2-The employee traffic for the proposed facility was updated to 21 trips per 24-hour period. The delivery truck traffic was updated to 2 deliveries per day. These changes are based on the EIS refinements.

Section F. Receptors (RE pathway)

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section G. Meteorological data (ME pathway)

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section H. SIL analysis and results

MPCA approved change: ☐ Yes ☒ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

3. Table H-01, Slight change in PM10 and PM2.5 modeled concentrations due to refinements in vehicle and delivery truck traffic. 24-hour PM10 is 4.85 µg/m3; 24-hour PM2.5 is 0.94 µg/m3 and Annual PM2.5 is 0.085 µg/m3.

Section I. Background values

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section J. Nearby sources

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section K. Anticipated outputs (OU pathway)

MPCA approved change: ☐ Yes ☐ No Date (mm/dd/yyyy): ____________________

Describe changes and/or indicate section item number(s):

Section 3. Paved Roads Fugitive Dust (Optional)

Facilities that have indicated in AQDMP-01 form the exclusion of paved roads in the air dispersion modeling should provide the results of that modeling in Table 1. (See the AQDMP-01 form for details.)

Table 1: Paved Road Dust modeling results

	Averaging Period	NAAQS (µg/m^3)	Total Modeled NAAQS Concentration (includes Background and Nearby Sources) (ug/m^3)	% of NAAQS	PSD Class II Increments (µg/m^3)	Modeled Class II Increment Impact Concentrations (µg/m^3)	% of Class II Increments
PM_{10}	24-hour	150		0.00%	30		0.00%
	Annual	50		0.00%	17		0.00%
$PM_{2.5}$	24-hour	35		0.00%	9		0.00%
	Annual	15		0.00%	4		0.00%

Section 4. Modeling Results

Table 2: Pollutants and averaging periods (Indicate with an "X" all pollutant and averaging period(s) modeled.)

Pollutant	Averaging Period	Standard NAAQS	Standard MAAQS	Increment
CO	1-hr			
	8-hr			
Lead	Rolling 3 mo. Avg	X	X	
	Quarterly Avg	X	X	
NO_2	1-hr	X	X	
	Annual	X	X	
SO_2	1-hr			
	3-hr			
	24-hr			
	Annual			

PM_{10}	24-hr			
	Annual			
$PM_{2.5}$	24-hr			
	Annual			

Table 3: NAAQS/MAAQS modeling results (Enter modeling results along with the percent of standard.)

Pollutant	Averaging period	NAAQS standard (ug/m^3)	MAAQS standard (ug/m^3)	Total modeled concentration (includes background and nearby sources) (ug/m^3)	Percent of standard (%)	
					NAAQS	MAAQS
CO	1-hr	40,000	35,000			
	8-hr	10,000	10,000			
Lead	Rolling 3 mo. Avg	0.15	***	3.87E-02	25.8	25.8
	Quarterly Avg	1.5	1.5	3.87E-02	2.6	2.6
NO_2	1-hr	188	***	118.88	63.2	***
	Annual	100	100	23.38	23.4	23.4
SO_2	1-hr	196	1300			
	3-hr	***	1300/*915			
	24-hr	365	365			
	Annual	80	60			
PM_{10}	24-hr	150	150			
	Annual	***	50			
$PM_{2.5}$	24-hr	35	65			
	Annual	15	15			

**SO2 3-hr for Northern Minnesota is 915 ug/m3.*

Table 4: Increment modeling results (Provide the increment modeling results along with the percent of standard.)

Pollutant	Averaging Period	Class II Increment (ug/m^3)	Total Modeled Concentration (includes other increment sources) (ug/m^3)	Percent of Standard (%)
NO_2	1-hr	***		
	Annual	25		
SO_2	1-hr	***		
	3-hr	512		
	24-hr	91		
	Annual	20		
PM_{10}	24-hr	30		
	Annual	17		
$PM_{2.5}$	24-hr	9		
	Annual	4		

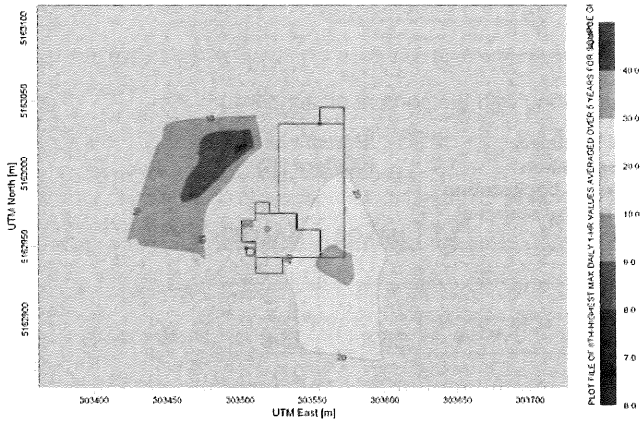
Section 5. Discussion

Enter any discussion comments:

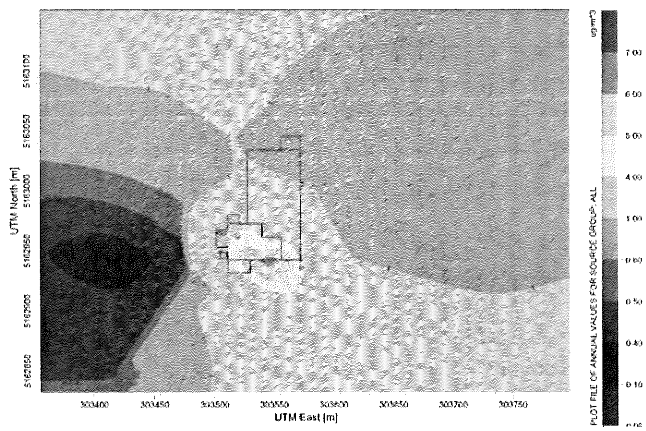
The Minnesota Pollution Control Agency (MPCA) has agreed that NO2 background sources can be represented by the monitoring data from Blaine, MN and that background sources do not need to be explicitly included in the dispersion modeling analysis. Background values of 86 µg/m3 and 17 µg/m3 were used for the 1-hour and annual averaging periods respectively .

Section 6. Modeling Results Figures/Maps

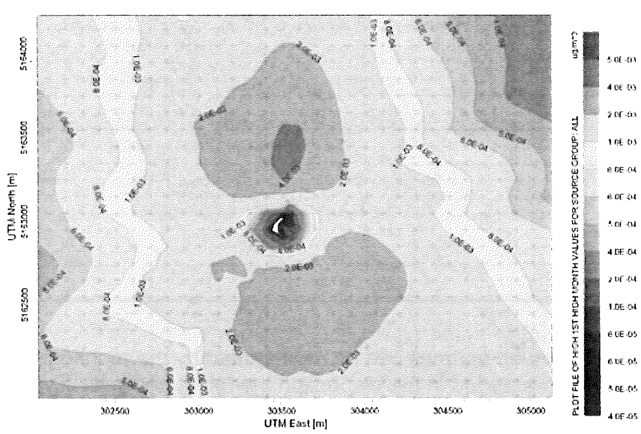
Insert a figure or map showing the facility emission sources, receptors, and the location of the modeled maximum concentration(s) for each applicable pollutant, corresponding averaging periods, and operating scenarios. Figures or maps should correspond to Section 3 NAAQS and Increment results.



1-hour NO_2 Isopleth Plot for the H8H concentrations for the Perham Resource Recovery Facility Expansion Project



Annual NO_2 Isopleth Plot for the highest concentrations for the Perham Resource Recovery Facility Expansion Project



1-month Pb Isopleth Plot for the highest concentrations for the Perham Resource Recovery Facility Expansion Project

Acronyms

$\mu g/m^3$	Micrograms per cubic meter
AERMAP	AERMOD Terrain Preprocessor
AERMET	AERMOD Meteorological Preprocessor
AERMOD	AMS/EPA Regulatory Model
AQ	Air Quality
AQDMP-01	Air Quality Dispersion Modeling Protocol form
AQDMPS-01	Air Quality Dispersion Modeling Protocol Spreadsheet
BPIP-PRIME	Building Profile Input Program for PRIME
CO	Carbon Monoxide
EPA	U.S. Environmental Protection Agency
FAC	3-letter facility ID
MAAQS	Minnesota State Ambient Air Quality Standard
MPCA	Minnesota Pollution Control Agency
NAAQS	National Ambient Air Quality Standard
NO_2	Nitrogen Dioxide
OU	Operable Unit
Pb	Lead
PM_{10}	Particulate Matter less than 10 um in size
$PM_{2.5}$	Particulate Matter less than 2.5 um in size
PRIME	Plume Rise Model Enhancements
PSD	Prevention of Significant Deterioration Program
SIL	Significant Impact Level
SO_2	Sulfur Dioxide
SIP	State Implementation Plan
SMS	Standardized Mobile Source
UG/M3	Micrograms per cubic meter ($\mu g/m^3$)
UTM	Universal Transverse Mercator

Appendix C

Human Health Risk Assessment Report and AERA Impact Analysis Summary

Total Facility Human Health Risk Assessment Report

Modification of the South Municipal Waste Combustor Unit at the Perham Resource Recovery Facility
Perham, Minnesota

Wenck File #2415-03

Prepared for:

PRAIRIE LAKES MUNICIPAL SOLID WASTE AUTHORITY
1115 North Tower Road
Fergus Falls, MN 56537

Prepared by:

WENCK ASSOCIATES, INC.
1800 Pioneer Creek Center
P.O. Box 249
Maple Plain, Minnesota 55359
(765) 472-2232

August 2012
Revised November 2012

Wenck

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APPENDICES

Executive Summary

The potential human health impacts associated with the emissions from the proposed PRRF were evaluated in this study in terms of lifetime excess cancer risk and noncancer hazard quantification. The potential cancer risks/noncancer hazards were assessed for hypothetical residents, subsistence farmers, and subsistence fishers using estimated maximum PTE emissions from the proposed facility. The MPCA's AERA process, including RASS, was used to initially screen all of the emission substances. A refined human health risk assessment was then used to address any remaining chemicals of potential interest.

Under this regulatory project scenario (Scenario 1), the proposed facility:

- Will **not** induce any adverse acute inhalation effects, even to those sensitive individuals that may be present in the area.
- Will **not** cause any chronic inhalation hazards.
- Will **not** present human health concerns (significant cancer risks, noncancer hazards) to the residents of Perham and surrounding areas.
- Will **not** present human health concerns (significant cancer risks, noncancer hazards) to the fisher population in the area.

Significant cancer risks (greater than MDH's *de minimis* threshold of 1E-5) were calculated for the subsistence farmer receptor. Only one chemical group drove these risks for the assessment: PCDD/PCDF.

To more accurately evaluate the potential risks from this facility, three alternative project scenario analyses were conducted.

- Scenario 2: PTE emissions and actual exposure pathways were evaluated. The facility will **not** present any significant cancer risks to the population of Perham, including farmers and their families.
- Scenario 3: Future projected actual emissions and hypothetical exposure pathways were evaluated. The facility will **not** cause any significant cancer risks.
- Scenario 4: Future projected actual emissions and actual land use and population information were evaluated. The facility will **not** cause any significant cancer risks to the any individuals in the population of Perham.

The facility voluntarily proposed a limit for mercury on the total facility and for PCDD/PCDF on the North Unit to reduce the effect of theoretical facility emissions on hypothetical human exposure.

This assessment will provide the risk managers at MPCA the information and tools necessary to protect human health around the Perham Resource Recovery Facility.

1.0 Introduction

Through a joint powers agreement between Otter Tail, Becker, Todd, and Wadena Counties, the Prairie Lakes Municipal Solid Waste Authority (PLMSWA) owns and operates a waste-to-energy (WTE) facility in Perham, Minnesota. The facility has two municipal waste combustion (MWC) units (the North Unit and the South Unit) that burn municipal solid waste (MSW). Currently, the flue gas from both combustion units are tied together and first flow through a single heat recovery boiler (HRB) to generate steam, and then through air pollution control (APC) equipment. Each combustion unit has the capacity to operate individually at a rate up to 100 tpd expressed as an annual average. However, the existing HRB and APC equipment limit the total waste combustion capacity of both units to 116 tons per day (tpd).

The Perham Resource Recovery Facility (PRRF) consists of four major components: 1) waste receiving, processing, and storage; 2) combustion; 3) energy generation (i.e., steam and electricity); and 4) APC equipment. Steam is generated and then sold to two local industries, Tuffy's Pet Foods and Bongards' Creameries, which use the steam as a source of energy in their production processes. Approximately 300,000,000 pounds of steam is produced and sold annually by the PRRF using a combination of the waste heat boiler and a natural gas fueled auxiliary boiler. Of the annual steam produced at the PRRF, approximately 200,000,000 pounds is generated by the waste heat boiler, and 100,000,000 pounds is generated by the auxiliary boiler.

A facility expansion plan has been proposed in order to reduce use of the auxiliary boiler, reduce consumption of fossil fuels, and to provide a more preferable waste destination than MSW landfills. The proposed expansion project includes the addition of new HRB and APC equipment. This new equipment will service the South Unit. The North Unit will be serviced solely by the existing HRB and APC equipment. After this modification has been completed, the units will be able to concurrently process up to 100 tpd each, giving the facility a new capacity of 200 tons per day.

In addition to the new HRB and APC equipment, the expansion project includes the construction of a Materials Recovery Facility (MRF) at the PRRF. The MRF will presort incoming material in an effort to remove various undesirable waste and recyclable components prior to combustion of the remaining material. The MRF system would be designed to recover ferrous (magnetic) metals, non-ferrous metals including aluminum, and old corrugated containers as the primary products. Undesirable waste and fines, including much of the glass and grit in the MSW, would be separated and removed from the fuel supply.

For the proposed expansion, PLMSWA is voluntarily completing an Environmental Impact Statement (EIS), including a human health risk assessment (HHRA) as part of Minnesota Pollution Control Agency's (MPCA's) air quality permitting process.

This submittal presents the final HHRA for the proposed facility, along with all of the Air Emissions Risk Analysis (AERA) forms, documents, and data, and the Risk Assessment Screening Spreadsheet (RASS), as required by MPCA. Section 2 describes the facility, surrounding areas, and provides qualitative information about the project. Air dispersion modeling is discussed in Section 3, and emission calculations are in Section 4. The RASS inputs, methods and results are in Section 5. The refined risk assessment based on the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP) is in Section 6. Methods for assessing the potential mercury hazard through the fish consumption pathway according to the MPCA Mercury Risk Estimation Method (MMREM) are in Section 7. A cumulative air emissions risk analysis is in Section 8. Technical uncertainties in the process are discussed in Section 9, while uncertainties regarding the accuracy of emission estimates and exposure pathways are evaluated in Section 10.

2.0 Facility Description

2.1 FACILITY

Through a joint powers agreement between Otter Tail, Becker, Todd, and Wadena Counties, the PLMSWA owns and operates a WTE facility in Perham, Minnesota. The facility receives and processes municipal waste from the four counties. This facility was previously owned by the City of Perham, which transferred ownership to the PLMSWA in June 2011.

The facility, known as the Perham Resource Recovery Facility (PRRF), was constructed and began operations in 1986. The goal of the PRRF is to combust MSW in order to a) reduce the regional waste volume that needs to be landfilled, and b) produce steam which is used by two local industries as a source of heating and energy. In 1998, the facility was closed by the original owner due to its inability to meet certain permit requirements for air emissions. The City of Perham acquired the facility in 1999. Working together, the City, Otter Tail County, and several surrounding counties obtained state grant funding to reconstruct and retrofit the facility with new APC equipment, new combustion technology, improved ash handling, and the ability to generate electric energy as a revenue source. After the improvements, the facility was reopened in 2002 and has been operating in full compliance with its current air emissions permit since that time.

The facility receives MSW on a regular basis from incoming trucks that unload in a tipping building. The delivered waste is inspected for removal of bulky waste and other unprocessible materials, as well as unacceptable waste. Combustion air is drawn from the tipping building to maintain a negative building pressure to prevent the escape of dust and odors. The facility currently consists of two MWC units (South Unit and North Unit), one heat recovery boiler, and one APC system train. Waste is moved from a hopper onto a grate that travels through a furnace where the waste is incinerated. Combustion is controlled by regulating the amount of waste fed to the grates, along with controlling the amount of combustion air that is provided through and above the grate surface. Once the waste reaches the end of the grate, combustion is complete, and the remaining material is considered bottom ash. The bottom ash is quenched using collected leachate (i.e., seepage water) from the North East Otter Tail Landfill. Ash cooling is necessary before it can be removed for metals recovery and then transported to the North East Otter Tail Landfill. Ferrous metals are recovered from the ash and sold to markets for recycling. The North East Otter Tail Landfill has a dedicated lined ash cell for the PRRF ash.

Currently, there is a fence surrounding the facility, and access to the facility will continue to be restricted once the modifications are made to the South Unit. The facility location is such that people without business at PRRF are not likely to spend time at the facility. PRRF does not rent or lease any portion of its property for farming or other uses that could provide exposure to the public.

Emissions from diesel trucks on the facility property are not expected to be greater than MPCA's criteria of two trucks idling continuously for an hour. The waste haulers schedule their routes so that the trucks arrive at the PRRF during different times of the day. The majority of the time, there are no trucks at the facility or a single truck arrives, dumps its load, and leaves. It takes about two minutes for a truck to dump its load into the receiving area. During normal operation, when a truck is on site, there is a short duration of idling time estimated at less than five minutes. Future calculations are based on the maximum capacity, though it is an overestimation. MSW truck loads may increase to 7,468 per year. Truck loads for ash, fines and non-processibles would increase to 1,546 per year, leachate to 93, and Materials Recovery Facility (MRF) trucks to 96 per year. Lime trucks will double as a second air pollution control train begins operation. The number of deliveries and miscellaneous trucks is not expected to increase.

Once the modified South Unit is constructed and the facility begins operations, traffic patterns will change. The on-site distance traveled by MSW trucks and miscellaneous trucks will increase to 288 feet. Leachate and lime trucks will need to travel around the new MRF which will be constructed north of the current facility. Travel distances will increase to 938 feet. Ash will be removed from the same area as at the existing facility. Fines separated through the MRF will be removed from roll-off containers at the MRF and associated trucks will travel 1,175 feet around the facility. Recycling trucks associated with the MRF will travel 496 feet as MRF shipping will be located on the north side of the facility. The proposed project is expected to require 27 employees who each drive 877 feet on-site. However, only a maximum of 21 employees will be on site in a given 24-hour period.

As the MRF will be constructed north of the existing property, the haul road used by the Bongards' trucks will also move north. The property boundary will narrow north of the facility. The haul road will be on-site for less than 300 feet.

2.2 SURROUNDING AREA

One of the first items for consideration in evaluating the potential health impacts of any permitted air emissions facility is the identification of who could be impacted by the source. Receptor identification is conducted through an examination of the land uses around the facility (usually in a 1.5-3.0 kilometer radius), as well as by locating specific facilities such as hospitals where sensitive individuals[1] may be present. Sensitive receptor locations that were identified near the facility include day care facilities, schools, and a nursing home (see Figure F-1). The city hospital recently moved to the far western side of Perham, outside of a 1.5 kilometer radius around the facility. There are single-family residences located within 1.5 kilometers of the facility, the nearest of which are approximately 118 meters away from the current MWC stack. Recreational fields (e.g., baseball fields) and farming locations are also within the 1.5 kilometer radius of the facility. An MPCA-registered feedlot is at the border of the radius, but is a stockyard and auction facility and does not house animals continuously.

No land use map is available for the City of Perham, but the National Agricultural Statistics Survey (NASS) map with a 10 kilometer radius shows the facility is in an area of low intensity development surrounded by agricultural fields and lakes (see Figure F-2). Farms in the area consist of mainly cropland where corn, beans, and potatoes are grown. However, this risk assessment evaluated possible future land uses as well, so the farmer scenario includes consumption of beef, milk, poultry, eggs, and pork from animals raised on the land. The agricultural exposure analysis assessed both children and adults. The open area to the northeast of PRRF has recently been purchased by the City of Perham, and while its ultimate use is currently undetermined, it will not become a residential area (see Figure F-3).

The city population density of Perham is 1,057 persons per square mile and the total population of the city is less than 3,000 residents. While the zip code population density clearly identifies Perham as a rural area, the location of multiple industries within the city limits means the city is more like a suburban area in terms of air quality. The population density in a 1.5 km radius around the facility is 681 persons per square mile, as determined with 2010 Census data and ArcGIS (see Figure F-4). PRRF is located near

[1] A sensitive receptor is an individual such as an asthmatic who would be expected to be adversely impacted by airborne irritants at ambient concentrations that would not normally affect the general population. Other types of sensitive receptors are young children, the elderly and hospitalized patients with certain types of clinical diseases.

other facilities with air permits (see Figure F-5); Bongards' Creamery is adjacent to the site, Tuffy's Pet Foods is west of Bongards', and Barrel O' Fun is west of Tuffy's. Industrial Finishing Services is located north of PRRF.

Zoning for the City of Perham near the facility is Industrial both east and west of PRRF, Light Industrial south of the facility and Residential to the north (see Figure F-6). The Perham Land Use Ordinance allows gardens in the residential districts, provided there is no sale of goods, indicating that MPCA's urban gardener receptor is relevant. Therefore, the resident exposure scenario will include the produce and egg consumption rates equivalent to a farmer. Going forward, the terms urban gardener and resident refer to the same receptor. The residential area exposure analysis will assess both children and adults.

Persistent bioaccumulative toxic chemicals (PBTs) may be emitted. Therefore, nearby fishable water bodies have also been evaluated (see Figure F-7). MPCA considers a water body "fishable" if it contains water year-round in a year receiving at least 75 percent of normal annual precipitation. There is no fishable water body on the property. There are two such water bodies within a 3 kilometer radius of the site: the Otter Tail River and Little Pine Lake. The Otter Tail River, while declared fishable due to its open water, is not accessible for subsistence fishing within the 3 kilometer radius of the facility. Local information has indicated that carp are the main catch in the Otter Tail River near the facility but are not eaten. No substantial fishing on the river near the facility is known and is unlikely in the future. The Otter Tail River is very difficult to access within three kilometers of the facility. For these reasons, Otter Tail River was not included in the analysis.

The southernmost tip of Little Pine Lake is within three kilometers of PRRF and is fished, especially for walleye. There is a DNR fish advisory on Little Pine Lake, restricting consumption of walleye to less than one meal per month for pregnant women and children under the age of 15, and to less than one meal per week for the general population. This advisory essentially recommends that there be no subsistence fishers on Little Pine Lake. However, the subsistence fisher pathway will be evaluated in this assessment to provide an upper-bound estimate of the potential lifetime excess cancer risk and hazard index from this particular exposure pathway.

2.3 SUMMARY

Based on land use information surrounding the facility, the targeted populations that were chosen for the risk analysis include sensitive individuals (acute exposure), urban gardeners (residents), farmers, and fishers. Locations for the maximally exposed urban gardener were chosen using the IRAP-*h* Risk Receptor Identification tool to bound the residential areas and select the locations with the highest modeled air parameter values. A similar method was used to determine the maximally exposed farmer receptor locations. Acute inhalation exposure was evaluated at those sites where sensitive individuals may be located and at the maximally impacted locations along the facility's fenceline. Fisher risks and hazards were modeled at the all chronic receptor locations; fish were assumed to be caught exclusively from Little Pine Lake. Further receptor and exposure details are contained in Section 5.

Below is the list of receptor types and their exposure pathways that were modeled.

Table 2-1: Exposure Scenario Summary

Receptor Type	Exposure Pathway
Urban gardener (adult, child)	Inhalation of air
	Incidental ingestion of soil
	Consumption of homegrown produce
	Consumption of eggs from home-raised poultry
Farmer (adult, child)	Inhalation of air
	Incidental ingestion of soil
	Consumption of homegrown produce
	Consumption of farm-raised beef
	Consumption of farm-raised poultry
	Consumption of eggs from farm-raised poultry
	Consumption of farm-raised pork
	Consumption of milk from farm-raised cows
Fisher (adult, child)	Inhalation of air
	Incidental ingestion of soil
	Consumption of homegrown produce
	Consumption of eggs from home-raised poultry
	Consumption of fish from Little Pine Lake
Sensitive individuals	Inhalation of air

3.0 Air Dispersion Modeling

Air dispersion modeling was completed in a two-step process. The first step in this process is a chemical screening analysis using the Agency's RASS. All of the identified chemical emissions from the facility are input into this screening step and evaluated for potential risk. Then, those chemicals that could not be "screened out" using this conservatively designed spreadsheet are forwarded to the second step, which is a refined human health risk assessment (HHRA). These chemicals that are the focus of the HHRA are called the "Chemicals of Potential Interest" (COPI).

Air dispersion modeling of the facility's proposed stack emissions was conducted to estimate the ambient air concentrations of the various facility emission chemicals in the vicinity of the facility for use in both MPCA's Risk Assessment Screening Spreadsheet (RASS) and the refined HHRA. This section describes the parameters and assumptions used in the air dispersion modeling analysis for both steps.

Wenck used the AMS/EPA Regulatory Model with Plume Rise Model Enhancements (AERMOD) to generate dispersion factors for the RASS using one gram per second (1 g/s) emission rates. A dispersion factor is the ambient air concentration given a nominal emission rate in units of ($\mu g/m^3$) per (g/s) and represents the atmosphere's ability to dilute and disperse emissions over a given period of time. AERMOD outputs also were used in the refined human health risk assessment and to generate mercury air concentrations for the MPCA's Mercury Risk Estimation Method (MMREM) analysis (see Section 8, AERA form AERA-27, and Appendix G). AERMOD is a preferred air dispersion model in the EPA's Guideline on Air Quality Models, 40 CFR 51 Appendix W. AERMOD Version 12060 with the regulatory default option, concentration option, and rural option was used for the modeling inputs for RASS. For purposes of air dispersion modeling, the area is assumed to be rural. For the refined HHRA modeling, wet and dry deposition with plume depletion was modeled. No plume depletion was assumed for mercury.

All three of the facility stacks were modeled as point sources; the current MWC stack (SV001) is 75 feet high and the auxiliary boiler stack (SV004) is 89 feet high. The proposed MWC stack (SV009) will be 125 feet high.

The RASS used the default Dispersion Information Screening Procedures for Emission Risk Screening Evaluations (DISPERSE) to generate conservative dispersion rates for on-site vehicle emissions. A source height of 3.65 meters corresponding to the height of a truck's tailpipe was placed at the south end of the building, representing a truck idling before dumping MSW. The loading facility is currently 26 meters from the property line. When the proposed project begins operating, loading will occur 21 meters from the property. Though the other truck activities at the site take place at various locations, all driving and idling emissions were assumed to be from this point source. This will overestimate the exposure to the fenceline receptor.

All criteria pollutants were modeled. Dispersion factors for 1-hour (acute exposure) and annual average scenarios were used in the RASS to estimate exposure to and risks from hazardous air pollutants. All criteria pollutants with health benchmarks were included in the summation of hazard indices and excess lifetime cancer risks.

Seasonal categories and land use were specified in AERMOD for gaseous deposition. The seasonal categories for the area of Perham, Minnesota, are shown below.

Table 3-1: Perham Seasonal Categories for Each Month

Months	Season
January, February, March	4 – Winter with snow on the ground
April, May	5 – Transition spring with partial green coverage or short annuals
June, July, August, September	1 – Midsummer with lush vegetation
October	2 – Autumn with unharvested cropland
November	3 – Late autumn after frost and harvest, or winter with no snow
December	4 – Winter with snow on the ground

The land use for the area surrounding PRRF was obtained from review of aerial photographs and AERSURFACE output. Category 2 (agricultural) is used for each 10 degree increment from 10 degrees through 200 degrees, and Category 5 (suburban, forested) for all remaining 10 degree increments. These categories best match the land cover around the facility.

See Figures 3-1 and 3-2 for air dispersion factor isopleths around the facility. Figure 3-1 shows one-hour average air concentrations, which are applicable to acute receptors. Figure 3-2 shows annual average air concentrations, which are applicable to chronic receptors. On each figure, the maximally-impacted receptor based on acute and chronic risk assessment results is highlighted. There is no evidence of areas where pollution would be expected to pool and remain for extended periods of time; instead, the dispersion pattern follows wind direction. The dispersion model isopleths show good dispersion near the facility without any predicted localized peaks of ambient air contamination. Receptor locations show that maximally impacted sites will be evaluated for the appropriate scenario to assess the upper-bound, hypothetical maximum effects of the facility if it were to emit up to its potential.

Particle sizes and distributions used in the refined HHRAP air dispersion modeling are listed in Table 6-3. For gaseous deposition, the parameters such as diffusivities and Henry's Law coefficient are also discussed in Section 6.

4.0 Emission Calculations

Emissions were calculated for the existing facility and for the proposed project for use in both the RASS as part of the AERA and as inputs to IRAP-*h* for the refined HHRA. This section describes parameters, factors, and assumptions used in the emissions calculation process.

The primary emission sources at the facility that were included in the RASS and the refined HHRA were the combustion stack/vent point sources (three sources), on-site mobile source tailpipe emissions, and idling vehicle tailpipe emissions. Other minor emission sources such as small natural gas heating equipment, welding equipment, cooling towers, lime handling, and paved roads are insignificant activities (i.e. less than 1% of the total emission inventory).

Emission calculations for all point sources were based on "potential to emit" for both the existing facility and proposed project modifications. Potential to emit (PTE) is defined as the maximum capacity of an emission unit or source to emit a pollutant under its physical and operational design while operating at the maximum number of hours (usually 8,760 hours per year). For PRRF, PTE calculations are based on the assumption that the facility combusts 200 tons of MSW each day for 365 days a year, or 73,000 tons per year (tpy). Actual emissions are less than PTE emissions. The projected actual amount of MSW combusted is 55,000 tpy.

Acute emissions for the existing and future MWC were calculated using a short-term average at 110% of both the new and the existing facility capacity. Only chemicals which have acute inhalation health benchmarks were addressed with respect to short-term (i.e., one hour) emissions.

Appropriate source-specific emission factors for all annual average modeling included federal and state emission limitations. These emission factors include federal and state limits, AP-42 emission factors, and stack tests from PRRF and similar facilities. While the facility is subject to applicable federal mercury rules[2] with a limit of 80 micrograms of mercury per dry standard cubic meter of air emitted (μg/dscm), annual exposure emissions were estimated using the more restrictive state rule[3] with a limit of 60 μg/dscm. The complete emission factor source summary can be found in AERA form AERA-05 on page 5 (See Appendix A).

Idling vehicle emissions were evaluated in the RASS for diesel particulate matter (DPM) and NO_2. Vehicle emission calculations used the number of trucks and distance spent at the facility as listed above. The emission factor from AP-42 Chapter 3.3: Gasoline and Diesel Industrial Engines of 4.41 lb NOx/MMBtu diesel fuel input was used. The fuel consumption was calculated using fuel consumption estimations of 5.8 miles/gallon for driving conditions and 1 gallon/hour for idling conditions. All trucks are assumed to idle for five minutes, which is an overestimation. Additionally, half the employees are

[2] 40 CFR Part 62 Subpart JJJ, "Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999" for the existing facility and 40 CFR Part 60 Subpart AAAA, "Emission Factors for Municipal Waste Combustors" for the new combustor.
[3] Minnesota Rule 7011.1227 for Class C units for the existing facility and Minnesota Rule 7011.1229 for Class II units for the new combustor.

assumed to drive diesel vehicles getting 13 miles/gallon, which is an overestimation of the amount of employee-related diesel emissions.

Of the NOx emitted by diesel vehicles, 25 percent is assumed to be present as NO_2 as presented in Tang et al., ES&T v. 38 2004. A value in the range of 15 to 25 percent is supported in the text; 25 percent was chosen to be a conservatively high estimate. The resulting calculations yielded a maximum emission rate of 0.024 pounds/hour (lb/hr) for the proposed facility.

Some chemicals required additional emission consideration. At the request of the MPCA, emission estimates for dioxin and furan (D/F) congeners were developed based on the assumption that the South Unit would operate at the NSPS AAAA limit for total D/F congener emissions and the FIP JJJ limit for the North Unit (see limits listed above). For the purposes of multi-pathway risk assessment modeling, these values can be converted to an emission rate of 6.7E 8 grams per second (g/s) that represents operations of the South Unit at a capacity of 100 tpd and 6.5E-7 g/s for the North Unit at 100 tpd. There are 210 individual D/F congeners. Of these 210, most pose no risk to human health; only 17 congeners are routinely assessed because they may have potential health effects. These 17 congeners are evaluated in the multi-pathway risk assessment using toxicity equivalency factors (TEF) that compare the potential toxicity of the congener to that of 2,3,7,8-tetrachlorodibenzodioxin (2,3,7,8-TCDD).

To evaluate potential health risks associated with the MWC operations at the NSPS and FIP limits for total D/F congener emissions, it was necessary to determine what fraction of the D/F emission may be due to the 17 toxic congeners. This was calculated using the following steps:

Measured stack gas emission rates for the 17 toxic congeners and total D/F congeners (reported as total Polychlorinated Dibenzodioxins/Polychlorinated Dibenzofurans or PCDD/PCDF) were obtained from Facility stack test results for tests performed on June 5 to 7, 2007 and May 24 to 26, 2011. All D/F congeners of interest were reported as detected in emissions from the test runs conducted. The laboratory test results, reported in units of pounds per hour (lb/hr) were converted to g/s for use in the risk assessment.

A single upper bound emission rate was developed for each of the toxic congeners and an arithmetic mean emission estimate was developed for total PCDD/PCDF. These emission rate estimates were calculated using each of the available test run measurements for the North and South Units as entered into the USEPA Pro-UCL software (USEPA, 2011, Version 4.1.00). This software is used to implement USEPA's guidance for calculated exposure point concentrations. For the purpose of evaluating potential chronic carcinogenic risks associated with the toxic congeners, the 95 percent upper confidence limit of the arithmetic mean (UCL-AM as calculated using Pro-UCL) was identified as the upper bound emission rate for the toxic congeners. However, for 2,3,7,8-tetrachlorodibenzofuran the 95 percent confidence interval exceeded the maximum emission value, and therefore the recommended 97.5 percent confidence level was used. The 17-congener fraction of totals is based on the UCL fractions. The congener totals are based on the test results average.

All emission factors, stack test results, and calculations that were used in the RASS and HHRA received prior review and approval by the MPCA.

5.0 Risk Assessment Screening Spreadsheet

5.1 FUNCTION OF THE RASS

MPCA has developed the Risk Assessment Screening Spreadsheet to "screen out" emission substances based on their quantitative estimates of potential lifetime excess cancer risks and noncancer hazard indices from a new or modified project. The RASS is typically used as screening tool as it includes many assumptions that overestimate a project's impacts on human health surrounding the facility. Once a list of chemicals emitted from the facility is generated and dispersion factors modeled, ambient concentrations are compared against inhalation health benchmark (IHB) values. Multimedia factors are applied to account for risks from non-inhalation exposure pathways. Individual chemical screening hazard quotients and cancer risks are summed to obtain a total screening hazard index for acute, subchronic, and chronic noncancer inhalation effects and a total screening incremental lifetime excess cancer risk. Chemicals whose estimated lifetime excess cancer risk exceeds one in a million (1E-6), or whose hazard quotient exceeds 0.1, are carried forward to the refined HHRA.

Similar exposure pathways are evaluated in both the RASS and the HHRA. Acute inhalation effects, as well as estimates of cancer risks and noncancer hazard indices for residents, urban gardeners, and farmers are calculated. To account for non-inhalation pathways, multi-pathway screening factors (MPSFactors) are applied. MPSFactors are multipliers applied to inhalation risks and hazard quotients to compute screening level ingestion cancer risks and hazard quotients for PBTs. The multipliers were derived using the Industrial Risk Assessment Program (IRAP-*h*) software, which incorporates the HHRAP. Therefore, the methods used in the RASS are similar to those used in the refined HHRA, though the RASS results represent a higher and less realistic upper-bound estimate. Only adult exposures are evaluated.

5.2 CHEMICALS EVALUATED

The RASS can evaluate 328 chemicals. Of these, 89 are emitted by PRRF and were evaluated in the RASS for chronic effects and 22 for acute effects. A few chemicals, such as phosphorus and thallium, are emitted by the facility but do not have an associated IHB. Other chemicals, listed below, are PBTs without an IHB, so were automatically carried forward to the HHRA.

5.3 RESULTS OF THE RASS

Complete results from the RASS for all pathways are included in Table 5-1 below.

5.3.1 Acute Inhalation

The results of the acute inhalation evaluation for most chemicals came back well below the individual chemical threshold of 0.1. The effect of Bongards' trucks driving across the facility was not formally included in the RASS. However, the impacts from Bongards' truck traffic were evaluated and found to be insignificant (see Section 5.3.4 below).

Two chemicals, nitrogen dioxide and hydrogen chloride, were carried forward to the HHRA. Without those chemicals' results included, the proposed facility's total acute inhalation hazard index is 0.03, which is well below the threshold of 1. This value will be added to the acute results of the refined HHRA to assess the total facility's impact on sensitive populations (see Table 8-1, page 8-2).

5.3.2 Subchronic Inhalation

To evaluate subchronic effects, the annual average emission level was multiplied by a monthly dispersion factor to assess impacts from exposures of less than a year. The total inhalation hazard index from all chemicals with subchronic IHBs was 1E-4 (i.e. 1 x 10^{-4}, or 1 out of 10,000), which is much less than the threshold of 1.

5.3.3 Chronic Inhalation

5.3.3.1 Noncancer

The results of the total chronic noncancer screening analysis for the proposed project is 0.04, which indicates that the 62 chemicals evaluated in the RASS are not expected to adversely affect human health.

5.3.3.2 Cancer

The upper-bound cumulative impact of the proposed project from the chemicals evaluated on the RASS via the inhalation pathway is an excess lifetime cancer risk of 6E-7 (i.e. 6 out of 10,000,000).

5.3.4 Bongards' Vehicle Traffic

The impacts of the traffic from Bongards' moving closer to residences were not quantified. The amount of Bongards' truck traffic will not change when the proposed project is completed. The only change will be that the road will go around the facility to the north to allow Bongards' trucks access to the scale and move closer to residences. Analysis of an aerial photograph of the facility shows that residences are currently 120 m from the haul road. After the construction of the MRF, an additional building which will extend 76 m north of the existing building, residences will be 68 m from the haul road. A screening-level analysis using factors from the RASS is provided here.

Table 5-1: Hazard Estimate of Bongards' Trucks After Expansion

	Distance on Perham Property (miles)	NOx Emission Rate (g/mile/ truck)	Trips by Bongards' Trucks (Trucks/ day)	NO_2 Emissions (g/s)	Dispersion Factor (µg/m3) / (g/s)	Exposure Conc (µg/m3)	Acute NO_2 Criterion (µg/m3)	Acute HQ
NO_2	0.05	37	47	7.55E-04	22426	16.9	470	0.04

In this table, the please note the following:

- The route to the Bongards' scale is on the Perham property for 262 feet, or 0.05 miles.
- The NO_x emission rate was taken from the Tang et al, 2004 article.
- 25 percent of NO_x emitted is assumed to be NO_2, per the same article.
- 47 trucks per 8-hour day use the Bongards' scale.
- The dispersion factor is the default 1-hour DISPERSE factor from MPCA's RASS assuming a truck stack height of 3.65 m and a distance to receptors of 68 m.

As shown, the resulting hazard quotient for NO_2 to residents from the Bongards' trucks is less than 0.04. At this level, emissions of NO_2 from the Bongards' trucks pass Step 1 and it is not necessary to evaluate traffic from Bongards' using IRAP-*h*.

The proposed project includes planting trees between the residences north of the facility and the new haul road. The primary objective is to improve the area aesthetically, but an added benefit of the trees is reduced pollution. Trees have been known to remove pollutants such as NO_2 from the air via internal and external deposition to leaves [4]. Recent research indicates trees, bushes, and vegetation can reduce street level concentrations of NO_2 by as much as 40 percent[5]. Trees also provide an obstacle for an elevated pollutant plume, which increases mixing and reduces pollutant concentrations[6]. Therefore, since the effect of the Bongards' trucks on the acute hazard is very small, and the effect will be further mitigated by trees between the source and receptor, there is no need to further quantify emissions.

5.4 CHEMICALS CARRIED FORWARD TO THE HHRA

Chemicals that were carried forward to the refined HHRA are not included in the RASS outputs. These chemicals are the compounds of potential interest (COPI) for the project and are listed below:

- 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)
- 1,2,3,4,7,8,9-HpCDF
- 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
- 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)
- 1,2,3,6,7,8-HxCDF
- 1,2,3,7,8,9-HxCDF
- 2,3,4,6,7,8-HxCDF
- 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)
- 1,2,3,6,7,8-HxCDD
- 1,2,3,7,8,9-HxCDD
- 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)
- 2,3,4,7,8-PeCDF
- 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
- 2,3,7,8-Tetrachlorodibenzo-p-dioxin
- 2,3,7,8-Tetrachlorodibenzofuran
- Octachlorodibenzo-p-dioxin
- Octachlorodibenzofuran
- Cadmium
- Lead
- Hydrogen chloride
- Nitrogen dioxide (NO_2) for acute evaluation

[4] Lovett, "Atmospheric Deposition of Nutrients and Pollutants in North America: An Ecological Perspective," *Ecological Applications,* 1994, 4 (4), pp 629-650.
[5] Pugh et al, "Effectiveness of Green Infrastructure for Improvement of Air Quality in Urban Street Canyons," *Environ. Sci. Technol.*, 2012, 46 (14), pp 7692-7699.
[6] Bowker et al, "The effects of roadside structures on the transport and dispersion of ultrafine particles from highways," *Atmospheric Environment*, 2007, 41 pp 8128-8139.

Six other chemicals have been included in the refined HHRA analysis since they can contribute to the fish consumption pathway but have not been included in the RASS:

- Acenaphthene
- Anthracene
- Fluoranthene
- Fluorene
- Phenanthrene
- Pyrene

5.5 CUMULATIVE RESULTS

The RASS results for the proposed facility based on potential to emit are in the table below. The threshold for hazard index levels is 1, which indicates that the sum of the ratio of each concentration to its IHB is less than one and the cumulative effect of the chemicals emitted by the project will not adversely impact human health. For comparison, the results of the existing facility are included. The existing facility emissions were calculated the same way as the proposed project emissions, meaning the existing facility's PTE was combined with dispersion factors from the 75-foot stack and ambient concentrations were compared against IHBs. The existing facility results are a high-end estimate not based on actual emissions and therefore do not represent the actual impact of the PRRF.

The chronic results sum the impacts from the 62 chemicals evaluated in the RASS. Since any risk drivers were carried forward to the refined HHRA, the RASS results were not expected to be of concern. The results indicate that there is very little potential for adverse acute or chronic effects on human health from any of the emission substances not evaluated in HHRA. The results for the 62 chemicals are considered upper bound estimates as they were calculated using non-site specific air dispersion results and represent the maximum amount the facility could emit in a year.

5.5.1 Inhalation exposure

Results of the RASS (minus the COPIs) show that for the acutely toxic chemicals emitted from the facility, any health risks would be dominated by background effects (see Table 5-2, Page 5-5). The effect of the proposed facility emissions on acute inhalation risk is three percent of the regulatory threshold.

Similarly, the chronic inhalation risks associated with facility emissions is four percent of the regulatory threshold.

The lifetime excess cancer risk calculated by the RASS for the facility is only six percent of the risk from breathing ambient air without the contribution from the facility (see Table 5-2).

It should also be noted that the results of the RASS are a conservative upper bound and do not accurately reflect the emission levels or operating scenario of the facility. That is to say that PRRF does not emit up to its allowed limits, nor does it run 8,760 hours per year. Actual effects from the facility are much less than shown in Table 5-2.

5.5.2 Farmer

Farmer noncancer effects are two orders of magnitude less than the threshold level of 1. Cumulative lifetime excess cancer risk is 1E-6, or one in a million, which is less than the threshold level of 1E-5 or one in 100,000.

5.5.3 Urban Gardener

The noncancer impacts to an urban gardener are the same as the farmer results of 4E-2. Cumulative lifetime excess cancer risk is 1E-6, or one in a million.

5.5.4 Resident

The noncancer impacts of the proposed facility on a nearby resident are 4E-2. Cumulative lifetime excess cancer risk is 7E-7.

Table 5-2: RASS Results for Inhalation, Indirect, and Multiple Pathways

Result Category	Scenario	Threshold	Proposed Project Results	Existing Facility Results
Inhalation	Acute	1	3E-02	2E-01
	Subchronic Noncancer	1	1E-04	2E-03
	Chronic Noncancer	1	4E-02	9E-02
	Cancer	1E-05	6E-07	2E-06
Indirect Pathway	Farmer Noncancer	1	3E-03	5E-03
	Farmer Cancer	1E-05	5E-07	3E-06
	Urban Gardener Noncancer	1	3E-03	5E-03
	Urban Gardener Cancer	1E-05	4E-07	7E-07
	Resident Noncancer	1	2E-03	2E-03
	Resident Cancer	1E-05	1E-07	2E-07
Total Multipathway	Farmer Noncancer	1	4E-02	1E-01
	Farmer Cancer	1E-05	1E-06	4E-06
	Urban Gardener Noncancer	1	4E-02	1E-01
	Urban Gardener Cancer	1E-05	1E-06	2E-06
	Resident Noncancer	1	4E-02	9E-02
	Resident Cancer	1E-05	7E-07	2E-06

As seen in the results, the proposed project has lower risk and hazard index results than the existing facility. This is mostly due to the lower emission limits that the facility's South Unit will be required to meet. This phenomenon will be discussed further in Section 8.

6.0 Refined Human Health Risk Assessment Analysis

EPA's HHRAP was followed for this risk assessment. Various theoretical (potential to emit emissions) and hypothetical (human exposure scenarios) inputs were required to be evaluated in this program as part of the air quality permitting process. These worst-case estimates that will be derived in this exercise are calculated purposely to determine if a source will require any chemical-specific emission limits. If the worst-case risk estimates from a source indicate no potential adverse health effects, then the regulatory community and the public have an assurance that the facility, as proposed, will **not** present unacceptable risks. If the worst-case analysis indicates the potential for significant risks, then the "risk drivers"[7] are identified and emission limits may be instituted. Therefore, it is very important to understand that these types of analyses are not intended to calculate actual risks to any individual or groups of individuals near a facility; they are designed solely in a regulatory context.

6.1 MODEL INPUTS

Chronic risk results were calculated using IRAP-*h* version 4.5.5 by Lakes Environmental, which is HHRAP-based software. Acute risk results for NO_2 and other chemicals emitted from the facility were calculated in separate model runs from the chronic results since the emission rates are slightly different. Chronic emissions are calculated based on the plant running at full capacity of 200 tpd. Acute emissions assume that over an hour, the plant could run at 110% of capacity.

The hourly (acute) and annual (chronic) emission levels of the COPIs are listed below for the proposed project, existing project, and auxiliary boiler. The auxiliary boiler emissions will not change with the proposed project. As stated in Section 4, emissions have been calculated based on facility potential to emit and represent theoretical maximum emissions. The facility's potential to emit is based on the plant operating at maximum capacity; therefore, the emission levels below are not realistic for the facility.

Table 6-1: Hourly Emission Levels for Acute Analysis (g/s)

CAS	Name	Proposed project (SV009)	Existing project (SV001)	Auxiliary Boiler (SV004)
10102-44-0	Nitrogen dioxide	1.09E+01	5.90E+00	3.30E-01
7647-01-0	Hydrogen chloride	2.38E+00	2.34E+00	N/A
10102-44-0	Nitrogen dioxide from vehicles	2.99E-03	1.93E-03	N/A

[7] Risk driver is any chemical emission substance that individually exceeds a risk criterion or contributes more than 10% to a cumulative value that exceeds a risk criterion.

Table 6-2: Annual Emission Levels of Compounds of Potential Interest (g/s)

CAS	Name	Proposed project (SV009)	Existing project (SV001)	Auxiliary Boiler (SV004)
7647-01-0	Hydrogen chloride	2.17E+00	2.13E+00	N/A
7439-92-1	Lead	9.31E-03	8.94E-03	5.16E-06
7440-43-9	Cadmium	6.21E-04	5.59E-04	1.13E-05
86-73-7	Fluorene	1.28E-05	6.90E-06	2.89E-08
85-01-8	Phenanthrene	8.97E-06	4.85E-06	1.75E-07
120-12-7	Anthracene	1.79E-06	9.69E-07	2.48E-08
83-32-9	Acenaphthene	1.65E-06	8.89E-07	1.86E-08
206-44-0	Fluoranthene	4.44E-07	2.40E-07	3.09E-08
129-00-0	Pyrene	3.22E-07	1.74E-07	5.16E-08
3268-87-9	Total OCDD	9.41E-08	9.22E-08	N/A
35822-46-9	HpCDD, 1,2,3,4,6,7,8-	6.22E-08	6.09E-08	N/A
51207-31-9	TCDF, 2,3,7,8-	5.88E-08	5.75E-08	N/A
67562-39-4	HpCDF, 1,2,3,4,6,7,8-	2.72E-08	2.66E-08	N/A
39001-02-0	Total OCDF	1.60E-08	1.56E-08	N/A
70648-26-9	HxCDF, 1,2,3,4,7,8-	1.10E-08	1.08E-08	N/A
57653-85-7	HxCDD, 1,2,3,6,7,8-	9.32E-09	9.13E-09	N/A
60851-34-5	HxCDF, 2,3,4,6,7,8-	9.27E-09	9.08E-09	N/A
57117-44-9	HxCDF, 1,2,3,6,7,8-	9.17E-09	8.98E-09	N/A
57117-31-4	PeCDF, 2,3,4,7,8-	8.57E-09	8.40E-09	N/A
57117-41-6	PeCDF, 1,2,3,7,8-	6.23E-09	6.10E-09	N/A
19408-74-3	HxCDD, 1,2,3,7,8,9-	4.92E-09	4.82E-09	N/A
55673-89-7	HpCDF, 1,2,3,4,7,8,9-	4.81E-09	4.71E-09	N/A
72918-21-9	HxCDF, 1,2,3,7,8,9-	4.40E-09	4.31E-09	N/A
39227-28-6	HxCDD, 1,2,3,4,7,8-	4.17E-09	4.09E-09	N/A
40321-76-4	PeCDD, 1,2,3,7,8-	3.93E-09	3.84E-09	N/A
1746-01-6	TCDD, 2,3,7,8-	8.20E-10	8.03E-10	N/A
10102-44-0	Nitrogen dioxide	1.09E+01	5.36E+00	3.30E-01

Default options were used for IRAP inputs, except where site-specific or Minnesota-specific data were available or as directed by MPCA. Modeling plot files for the emission substances were created for three phases: vapor phase, particle phase, and particle-bound phase. The vapor phase applies to volatile substances such as hydrogen chloride, the particle phase applies to inorganics such as lead and cadmium, and the particle-bound phase applies to semi-volatiles such as PCDD/PCDF. For the modeling runs, the values for diffusivity in air, pollutant diffusivity in water, cuticular resistance, and Henry's Law for benzo(a)pyrene were used to generate upper-bound gas (or vapor phase) deposition rates.

Particle distribution data were taken from Olmsted Waste-to-Energy Facility (OWEF) Unit 3 EIS and are shown below. The particle phase was modeled using the mass fractions and the particle-bound phase was modeled using the surface area fraction. These data are applicable due to similar waste streams and air pollution control equipment between the two facilities. These are different from the MPCA default values. A particle density of 1 g/cm^3 was used, which is the MPCA default value.

Table 6-3: Particle Size Distributions

Particle Size Diameter (μm)	Mass Fraction	Surface Area Fraction
0.30	0.526	0.95700
0.59	0.010	0.00925
0.91	0.005	0.00300
1.77	0.020	0.00617
2.94	0.036	0.00668
4.35	0.015	0.00188
6.38	0.010	0.000855
13.56	0.378	0.01520

Note: μm = Micrometer

The drinking water pathway was turned off as the people in Perham and surrounding areas do not drink surface water. Receptor exposure data were generally taken from IRAP default values, with a few exceptions. As requested by MPCA, fish ingestion rates for adults were increased from the default of 1.35 pounds of fish per week (or just over two meals of a half-pound of fish) to the Minnesota subsistence fisher level of 2.2 pounds per week (or just over four meals of a half-pound of fish). Fish ingestion rates for children were similarly increased from the default of 0.2 pounds per week to 0.3 pounds per week. Even though, as stated in Section 2, Little Pine Lake has a fish advisory against eating this quantity of fish per week, these ingestion rates were used to provide an upper-bound risk estimate to the population around the facility. Fisher scenarios were evaluated at all receptor locations.

The resident receptor used default rates for most parameters, except those related to eggs and produce. To evaluate the health effects on a residential location with a large garden and where chickens may be kept for eggs, MPCA developed an urban gardener receptor. Default values are used except the aboveground produce consumption rate increased to 0.5 pounds per week for an adult and 0.3 pounds per week for a child. Belowground produce consumption rate increased to 0.2 pounds per week for an adult and 0.06 pounds per week for a child. Protected aboveground produce consumption increased to 0.7 pounds per week for an adult and 0.4 pounds per week for a child. The eggs consumption rate increased to 0.8 pounds per week for an adult and 0.1 pound per week for a child. The IRAP default value can be found on the Site Specific Parameters table in Appendix I.

Toxicity values were chosen according to the MPCA hierarchy to select values in order of preference: Minnesota Department of Health (MDH) health-based values (HBVs), MDH Health Risk Values (HRVs), EPA's Integrated Risk Information System (IRIS) values, California EPA's Office of Environmental Health Hazard Assessment (OEHHA) values, and EPA's Health Effects Assessment Summary Tables (HEAST) values. Inhalation toxicity values from the most recent RASS were used in the IRAP analysis. Most values were consistent with IRAP default health benchmark values. The 2005 World Health Organization (WHO) Toxic Equivalency Factors (TEF) for PCDD/PCDF were updated from the 1998 values. This changed the TEF for four congeners: OCDD, OCDF, 1,2,3,7,8-PeCDF, and 2,3,4,7,8-PeCDF.

EPA updated the IRIS value for 2,3,7,8-TCDD in February, 2012. This changed the oral chronic noncancer value from 1E-9 mg/kg-day to 7E-10 mg/kg-day and therefore affected all other PCDD/PCDF toxicity values. Based on MPCA guidance of hierarchy to use for toxicity values, an oral cancer slope factor from the MDH of 1.4E+6 $(mg/kg\text{-}day)^{-1}$ was used instead of 1.5E+5 $(mg/kg\text{-}day)^{-1}$. The oral ingestion route was extrapolated to inhalation. The inhalation cancer unit risk is 400 $(\mu g/m^3)^{-1}$ based on MDH calculation. An inhalation chronic noncancer reference concentration of 4E-5 $\mu g/m^3$ from OEHHA was also used. The TEFs were applied and toxicity values for the 16 other PCDD/PCDF congeners were calculated and substituted into IRAP-*h*.

No additional adjustments were made to the toxicity values to incorporate early-life sensitivity. As noted in MPCA's AERA-26 form text, when following the hierarchy, early-life sensitivity adjustments are already made when developing the toxicity values.

Other updates to toxicity values included adding the acute criterion for nitrogen dioxide and updating health benchmark values in IRAP-*h* to be consistent with MPCA's hierarchy for cadmium, hydrogen chloride, and lead.

Additional site-specific parameters were used and can be found in Appendix I. These include site-specific precipitation, evapotranspiration, temperature, and wind data. The values used were approved by MPCA.

Fifteen receptor locations were chosen to evaluate acute inhalation risks (see Figure 6-1). These locations were chosen either because of their nearness to the facility or because they are locations where sensitive individuals may be located, such as at schools and child care facilities. Twenty-five receptor locations were chosen as either the resident/resident child, farmer/farmer child, and/or fisher/fisher child locations (see Figure 6-2).

6.2 INHALATION RISKS

6.2.1 Acute Risks

The acute inhalation hazard was evaluated at each receptor point in Figure 6-1, including those locations were sensitive individuals may be located (see Figure F-1), as well as at the property boundary.

Inhalation risks for all of the acutely toxic emission substances from the facility have been evaluated in the RASS spreadsheet or using IRAP-*h*. As discussed in Section 5, the results (predicted ambient air concentrations) for the proposed facility from chemicals evaluated in the RASS are far below threshold levels. IRAP-*h* results show ambient air concentrations for nitrogen dioxide and hydrogen chloride at the highest impacted receptor, located north-northeast of the facility, are less than twenty percent of MDH's regulatory threshold at all sensitive receptor locations. It can therefore be concluded, with some degree of confidence, that this proposed facility will **not** induce any adverse acute inhalation effects, even to those sensitive individuals that may be present in the area.

6.2.2 Chronic Risks

Each receptor location also included an evaluation of an inhalation hazard index (HI) based on the annual average ambient air concentrations of the emission substances. The highest inhalation HI was at the location of Receptor 6 and was 0.03. Similarly, the highest lifetime excess cancer risk via the inhalation pathway was also at the location of Receptor 6 and was 7E-07. Chronic inhalation hazards and risks near the facility are far below the regulatory threshold level of 1 and 1E-5, respectively, so chronic inhalation hazards should **not** be a concern with the proposed project.

6.3 CHRONIC URBAN GARDENER

The receptor locations for the urban gardener were chosen using the IRAP-*h* Risk Receptor Identification tool. The residential area was traced from an ArcGIS shapefile of Perham residential areas and the IRAP-h tool chose the locations of maximum air parameters. Resident receptor locations are in a parcel immediately northwest of the facility and another parcel approximately 1.4 kilometers (km) northwest of the facility (see Figure 6-2). Resident receptors were also added at three residences immediately north of the facility.

The resident and resident child scenarios were evaluated at eleven locations around the facility. The greatest residential lifetime excess cancer risk is 2E-6 at Receptor Location 6, which is located north-

northwest of the facility. The greatest risk is more than an order of magnitude less than the Minnesota Department of Health (MDH) *de minimis* risk level of 1E-5. No individual COPI presented a cancer risk greater than 1E-6.

The highest HI (noncancer effects) is also at Receptor 6. It is for a child and is 0.08, which is only eight percent of the regulatory threshold of 1. Therefore, it can be concluded with some degree of certainty that the proposed project will **not** present human health concern to the population of Perham.

6.4 CHRONIC FARMER SCENARIO

In a similar manner to the selection of urban gardener receptors, the rest of the domain was selected with the IRAP-*h* Receptor Identification tool. The locations of maximum air parameters were also chosen for the farmer exposure scenario. Using a shapefile based on the National Agricultural Statistics Service (NASS) land cover map, farmer receptors were moved to the closest agricultural land. Fourteen (14) farmer receptor locations were identified, both immediately south of the facility and with other locations to the north and east. These locations can be considered the sites of the maximally exposed individual (MEI) for each scenario.

All exposure pathways were evaluated for the COPIs at these locations, even though most meat ingestion pathways do not reflect the current scenario. As stated in Section 2.2, no livestock are raised in within 1.5 km of the facilities. There is, however a farm just 650 meters south of the facility (Receptor Location 13), which represents the maximally exposed farmer. The upper bound risk estimate is 8E-5 (i.e., 8×10^{-5}, or 8 out of 100,000) at this location. Results for other farmer locations with risk levels above MDH's *de minimis* threshold of 1E-5 (1 out of 100,000) are shown below, as are the hazard indices for these same locations. Inhalation-only results are also noted, which do not include the hypothetical subsistence farmer indirect pathway risks.

Table 6-4: Adult Farmer Risks with Current Limit

Receptor Location	Inhalation-Only Cancer Risk	Total Cancer Risk[1]	Chronic HI
RI_13	5E-07	8E-05	0.2
RI_12	5E-07	8E-05	0.2
RI_11	5E-07	8E-05	0.2
RI_9	4E-07	6E-05	0.1
RI_21	4E-07	5E-05	0.1
RI_22	4E-07	5E-05	0.1
RI_19	3E-07	4E-05	0.09
RI_20	3E-07	4E-05	0.09

[1] Total cancer risks include the hypothetical milk and beef consumption. Animals are not currently raised on the farm to the south of the facility.

Receptor Locations 9, 11, 12, and 13 are all very close together and represent the exposure to the environment at one farm south of the facility. Similarly, Receptor Locations 21 and 22 are close together and would represent the impacts of the facility on another farm southeast of the facility. Locations 19 and 20 are just north of the facility and again represent the same farm. All locations are within 1.5 km of the site. These locations are dominated by the exposure to PCDD/PCDF. All adult farmer risk results for a COPI greater than 1E-6 are shown in Appendix J. The high risk levels for the farmer adult and child scenario are driven by the milk consumption pathway. For Receptor Location 13, the risk from the milk pathway alone is 5.9E-5 and for beef consumption is 1.7E-5. Cancer is the outcome of concern for these receptors.

The inhalation-only risks for the adult farmer are much lower; the highest risk is for the adult farmer at Receptor Location 13 with a value of 6E-7. This is a more reasonable estimate of the risk from the project. There are no animals raised on the farm directly south of the facility. The highest farmer HI is for the child receptor at Receptor Location 13 and is 0.3.

The facility voluntarily proposed a total PCDD/PCDF limit of 20 ng/dscm for the North Unit to reduce hypothetical farmer cancer risks calculated using theoretical maximum emissions. Results for the highest exposed receptor locations are shown in Table 6-5. The limit ensures that the facility will not cause adverse effects to human health, even if a subsistence farmer consuming homegrown beef and dairy were to begin farming on any land zoned for agriculture.

Table 6-5: Adult Farmer Risks with Proposed Limit

Receptor Location	Inhalation-Only Cancer Risk	Total Cancer Risk	Chronic HI
RI_13	2E-07	2E-05	0.07
RI_12	2E-07	2E-05	0.07
RI_11	2E-07	2E-05	0.07
RI_9	2E-07	1E-05	0.05
RI_21	1E-07	1E-05	0.04
RI_22	1E-07	1E-05	0.04
RI_19	1E-07	1E-05	0.04
RI_20	1E-07	9E-06	0.03

It can be concluded with some degree of certainty that the proposed project will **not** present noncancer human health concern to the rural population.

6.5 CHRONIC FISHER SCENARIO

All receptor locations were also evaluated for the fisher scenarios, as any resident or farmer could be a subsistence fisher (although, again, Little Pine Lake has a fish consumption advisory which limits the recommended walleye meals from the lake). As MPCA requested, for the default regulatory scenario with hypothetical exposure scenarios, the fisher scenario included the default produce consumption for the urban gardener. This represents a high-end estimate as a subsistence fisher is not likely to also consume the upper-bound levels of produce.

The fisher and fisher child scenarios represent the risk to any subsistence fishers. The difference between the fisher and resident at any location is that the fisher is exposed to PBTs in fish tissue that is consumed. Risks from the PBTs are very small, so the concern for fishers is only mercury, which is analyzed using MMREM (results can be found in Section 7). The greatest fisher lifetime excess cancer risk is 2E-6 at Receptor Location 6, which is below MDH's *de minimis* threshold of 1E-5. The greatest fisher noncancer HI is 0.05 at the same location. This HI is only five percent of the regulatory threshold. Therefore, it can be concluded with some degree of certainty that the proposed project will **not** present human health concern to the subsistence fisher population.

7.0 MPCA Mercury Risk Estimation Method

The Minnesota Pollution Control Agency (MPCA) established guidance in 2006 to evaluate the effects of incremental mercury air emissions on nearby waterbodies and fish. Using the MPCA Mercury Risk Estimation Method (MMREM), the potential non-cancer human health hazards from ingestion of fish containing mercury can be quantified.

The primary guidance document used in this report is the "MPCA Mercury Risk Estimation Method (MMREM) for the Fish Consumption Pathway: Impact Assessment of a Nearby Emission Source," Version 1.0, December 2006. Mercury risk estimates were calculated using, "Calculations of Local Mercury Hazard Quotients from Mercury Emissions from a Project," version 2.0, as downloaded from MPCA's website in November, 2011.

7.1 MPCA MERCURY RISK ESTIMATION METHOD PURPOSE

MMREM seeks to determine how much mercury concentrations in fish tissue will increase, given that fish in a given lake are already exposed to mercury and have a level of mercury in their tissue presently. Mercury is handled differently than other chemicals for two reasons. It is already present in significant levels in Minnesota waters, and it is a persistent bioaccumulative chemical whose levels increase in fish as they grow. The MMREM calculates hazards associated with fish tissue consumption from project-specific mercury deposition to water bodies and watersheds, assuming that the existing mercury concentration in fish tissue is in equilibrium with ambient mercury.

7.2 MMREM METHODOLOGY

According to MPCA's website, MMREM is not a mechanistic model of mercury methylation and bioaccumulation. Instead, it combines empirical fish tissue concentration data with the premise that mercury concentrations in fish will achieve steady-state equilibrium with atmospheric mercury deposition.

As enumerated in the Guidance, the methodology for performing an MMREM assessment is as follows:

1. Characterize mercury air concentration(s) from proposed project;
2. Select one or more water bodies for evaluation;
3. Delineate the watershed;
4. Estimate incremental mercury mass loading to water body due to ambient mercury in the atmosphere;
5. Estimate incremental mercury mass deposited to each evaluated water body and its watershed due to proposed project;
6. Estimate the percent increase in mercury loading in water bodies from the project; and
7. Estimate fish fillet methylmercury concentration from project emissions;
8. Estimate the incremental methylmercury exposure for the fisher scenario; and
9. Estimate the incremental noncancer hazard quotient.

Details of the MMREM methodology are described in more detail in the Guidance; please refer to that document for additional information.

7.3 THE MMREM APPROACH

The MPCA MMREM guidance and modeling guidance have been followed, though the estimated incremental mercury mass deposited to Little Pine Lake and its watershed was estimated based on the total mercury emitted from the facility and not the difference in mercury emissions between the proposed expansion and current facility.

For the PTE scenarios, all mercury emission rates are set equal to the current applicable mercury emission limit, which is a 60 micrograms per dry standard cubic meter (μg/dscm) from Minnesota Rule 7011.1227 Table 1 for Class C units for the current facility and proposed facility North Unit, and the same value from Minnesota Rule 7011.1229 Table 2 for Class II units for the proposed facility South Unit. For the FPA scenario, a value 10 percent higher than latest stack test result of 14.76 μg/dscm (16.24 μg/dscm) is applied with the conversion factor from AP-42 Table 2.1-11 for refuse-derived fuel (RDF) and the capacity of the proposed facility. The RDF heat content is expected to be representative of the PRRF waste after processing in the MRF. The existing facility actual emissions are also based on the May 23, 2011, stack test result. A number of the assumptions, approaches, parameters, and policies specified in the MMREM Guidance were adjusted for this facility and the proposed project. This section addresses the origins and outcomes of the adjustments to the MMREM Guidance; please refer to the Guidance for any topics and/or procedures not covered in this section.

7.4 CHARACTERIZATION OF MERCURY AIR CONCENTRATIONS

The Guidance expects that the divalent (Hg^{2+}), elemental (Hg^0), and particle (Hg_p) forms of mercury emissions from each stack can be derived from existing facility information. While PRRF has stack test results for mercury emissions, the stack tests do *not* contain any information available to calculate or otherwise determine the emissions of speciated mercury.

Based on other WTE facilities in the region and available data, we estimate the emissions of these species using the speciation percentages from OWEF February 7, 2006 stack test results: 14% Hg^0, 82.2% Hg^{2+}, and 3.8% Hg_p, These should be reasonable estimates as the air pollution control for mercury at both facilities is activated carbon adsorption.

7.5 WATER BODY SELECTION & WATERSHED DELINEATION

The Guidance suggests that water body selection should include any water body which typically contains water year-round and is located within a 3 kilometer (km) radius for stack heights less than 100 meters (approximately 330 feet), or is located within a 10 km radius for stack heights greater than 100 meters. Additionally, as suggested by the Guidance, water body selection is typically further limited to those bodies where data exists, usually from the Minnesota Department of Natural Resources (DNR), to extrapolate an ambient fish tissue mercury concentration.

The southern tip of Little Pine Lake (DNR Lake #56-0142) is within a 3 kilometer radius of the facility and is known to be fished. Otter Tail River is also within the radius of influence. However, as confirmed by a site visit, access to Otter Tail River near the facility is restricted by steep banks and foliage. There is little fishing on the river near the site. Therefore, the MMREM analysis was restricted to Little Pine Lake.

Lakeshed and flow patterns were gathered from available DNR information. The area of the lake is 2,080 acres, and area of the watershed is 4,826 acres. The watershed area excluding the lake is entered in

MMREM (2,746 acres). The watershed area was calculated using ArcView, a geographic information system (GIS).

7.6 FISH TISSUE MERCURY CONCENTRATION VALUE SELECTION

On May 7, 2012, Wenck received the spreadsheet "MPCA plus 2011 D-2 Perham_all_fish_lakes_rivers.xlsx" from Heather Magee-Hill. Using 2011 data for mercury concentrations in walleye, and ProUCL software from the U.S. Environmental Protection Agency (EPA), Wenck calculated an existing ambient fish concentration of 0.38 parts per million (ppm). Eight total walleye data points were available from 2011 so no older data were included.

7.7 MERCURY DEPOSITION MODELING & ESTIMATION

Mercury concentrations were modeled using dispersion information from the modeling software AERMOD. This is the same methodology used in the Air Emissions Risk Analysis (AERA) to screen out chemicals from further analysis using the Risk Assessment Screening Spreadsheet (RASS). The total mercury emissions from the main waste combustor stack (SV001 for the existing project and SV009 for the proposed project) were inputs to the RASS and a one gram per second (1 g/s) dispersion factor applied to calculate the average mercury concentration over the lake.

The dispersion factor used over the lake is the average of all 1 g/s factors over the lake, calculated using ArcGIS 9.3. Wenck created the lake shore outline, selected all the receptors within the outline, and calculated the statistics using data in the attribute table for the shapefile. The dispersion factor used over the watershed was calculated similarly.

Table 7-1: Modeling Results Summary

Scenario	Dispersion value over lake ($\mu g/m^3$)/(g/s)	Dispersion value over watershed ($\mu g/m^3$)/(g/s)
Existing: SV001	.022271	.01996
Proposed: SV009	.012808	.01182

7.8 MMREM OUTCOME SUMMARY

As discussed in Section 2.1, the MMREM analysis was performed for four scenarios. The results of the four scenarios using the Olmsted speciation percentages are summarized in Table 7-2. The results represent a non-cancer hazard quotient for mercury from fish consumption for the listed scenario. For either subsistence or recreational fishers, the default (acceptable) hazard threshold is a quotient of 1.

Table 7-2: MMREM Results Summary for Little Pine Lake

	Subsistence Fisher[1]				Recreational Fisher[2]			
Emission Scenario	**Ambient Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**	**Non-facility Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**
Existing Potential to Emit[3] (60 µg/dscm)	8.2	1.4	9.6	14%	1.7	0.3	2.0	14%
Post-expansion Potential to Emit[4] (60 µg/dscm)	8.2	1.5	9.7	15%	1.7	0.3	2.0	15%
Potential change due to expansion				0.9%				0.9%
Post-expansion Potential to emit[5] (41 µg/dscm)	8.2	1.0	9.2	11%	1.7	0.2	1.9	11%
Potential change due to expansion				-3%				-3%
Existing actual (15 µg/dscm per 2011 stack test)	8.2	0.2	8.4	3%	1.7	0.1	1.8	3%

[1] Subsistence-level fish consumption is roughly equivalent to 2.2 pounds of fish (4-5 meals) consumed per week, 52 weeks per year.

[2] Recreational-level fish consmption is roughly equivalent to 0.5 pounds of fish (1 meal) consumed per week, 52 weeks per year.

[3] The existing PTE limit is based on Minn. Rule 7011.1229 Table 2 for Class II Units.

[4] The post-expansion PTE limit is based on Minn. Rule 7011.1229 Table 2 for Class II Units (North Unit) and 7011.1227 Table 1 for Class C Units (South Unit).

[5] The limit of 44 µg/dscm reduces the potential hazard from the facility. This limit equates to an incremental increase of 10% or less relative to the current background and a hazard index of 1 or less for subsistence-level exposure.

PLMSWA is considering proposing a long-term mercury limit of 41 μg/dscm, which is less than the current long-term standard to which PRRF is subject (60 μg/dscm per Minn. Rule 7011.1229). This limit is realistic for PRRF to achieve based on a history of lower stack test results and would reduce the hazard quotients from the proposed facility to less than 1. The facility would still also be subject to the short-term limit of 100 μg/dscm from Minn. Rule 7011.1229, and 0.08 mg/dscm based on New Source Performance Standards.

7.9 OTHER MITIGATING FACTORS

As mentioned in Section 2.1, the proposed project includes the construction and operation of a MRF. This facility is designed to pull undesirable and recyclable material out of the waste stream. An ancillary benefit will be that less mercury-containing material will likely be combusted; therefore, mercury emissions will likely be lower once the proposed project is completed. This reduction in emissions cannot be quantified at this early stage, but should be considered qualitatively.

The MMREM model does not account for mercury lost to the global cycle. From HHRAP, the default assumption is that a total of 51.8 percent of the mercury exiting a stack will enter the global cycle and not deposit near the facility. The effects of the global cycle were not quantified in MMREM. Also, the MMREM model assumes that the total mercury emissions contribute to the methylmercury concentrations in fish; however, elemental mercury (Hg^0) is not readily converted to methylmercury. Therefore, the results overestimate the impact of the facility on nearby waterbodies.

8.0 Cumulative Air Emissions Risk Analysis

8.1 NEARBY SOURCES

A cumulative air emissions risk analysis is intended to provide information about risks from other regional sources of air toxics that may interact with the project emissions in such a way as to cause cumulative impacts (AERA Form 19). As described in Section 2, there are several industries within 10 km of the facility that have air permits. Most of these sources have Option D State Registration Permits for which potential emission information is not available, however.

From MPCA's request at the meeting October 18, 2011, nearby sources were to be evaluated in this submittal. These sources include Tuffy's Pet Foods, Bongards' Creamery, and Barrel O' Fun Snack Foods Company.

Tuffy's Pet Foods is located approximately one kilometer west of the facility and has a registration permit. The source is believed to have only natural gas fired combustion equipment and shows relatively low levels of emissions in MPCA's Air Emissions Inventory (i.e., highest-ranking pollutant for 2009 is PM with a rank of 301 statewide for reported emissions of 2.9 tons/year). For these reasons, no further characterization for the risk assessment is necessary for Tuffy's.

Bongards' Creameries is located adjacent to the facility to the west and also has a registration permit. Bongards' also has low levels of emissions (i.e., highest ranking pollutant for 2009 is PM with rank of 39 statewide for emissions of 26 tons/yr). To further put the reported PM emissions in perspective, this is about one-half of the applicable Option D Registration Permit threshold, or approximately 1/4 of the federal Part 70 permit threshold. Low levels of emissions were verified for this facility with data found in the toxics release inventory (TRI). For these reasons, no further characterization for the risk assessment is necessary for Bongards' Creameries.

The following additional facilities are located within 3 km of the site but were not modeled: Barrel O' Fun Snack Foods Company, Industrial Finishing Services, and Kenny's Candy Company. These facilities have either applied for or have been issued a state or registration permit (i.e., Barrel O' Fun Snack Foods Company and Industrial Finishing Services) or are not required to have any air permit (i.e., Kenny's Candy Company). For these facilities, there are no specific air toxics data listed in MPCA's public databases. Due to their distance and likely low level of emissions, no further characterization for the risk assessment is necessary for these facilities.

As discussed above, there are four industries within a 3 km radius of the facility that were qualitatively evaluated in this section. The conclusion from the analysis was that the effect of the WTE facility would **not** have sufficient emissions to affect the cumulative analysis.

8.2 GENERAL BACKGROUND

A second method of estimating ambient background risks is to use site-specific ambient air monitoring data. If data do not exist for a specific area, such as in the case of this facility, MPCA staff select monitoring data from the state's network that they believe might be representative of the project site. These data reflect off-site mobile, area, point, and background sources.

For this facility, available data from 2008-2011 from the following monitoring locations were selected by MPCA: Apple Valley, Bayport, Blaine, Duluth, Flint Hills, Newport, Rosemount, St. Paul Park, and St. Paul Vandalia. The total acute inhalation hazard index was calculated as the average from either the second highest result or the 95% upper confidence limit (UCL) for chemicals detected at these monitors. This acute HI is 0.58. The total non-cancer chronic hazard quotient similarly averaged from results from these monitors is 0.69. The total excess lifetime cancer risk based on the data similarly averaged from four monitors is 3.4 out of 100,000. Since these risk estimates are generic estimates, i.e., not specific to the Perham area, these background risk estimates were used in a comparative analysis to put the facility's calculated risks in perspective. See Table 8-1, below.

Table 8-1: Total Facility Inhalation Results along with MPCA Background

Result Category	Scenario	IRAP-*h* Results	RASS Results[1]	Total Facility Results[2]	Background
Inhalation	Acute	2E-01	3E-02	2E-02	6E-1
Inhalation	Chronic Noncancer	3E-02	4E-02	7E-02	7E-1
Inhalation	Cancer	7E-07	6E-07	1E-06	3E-5

[1] RASS results are the screening-level values for substances that are not carried into the refined HHRA in IRAP.

[2] Total Facility results represent the cumulative impact of the facility from all emitted substances. They are the sum of the IRAP-*h* results and the RASS results.

9.0 Technical Uncertainty Analysis

There are many sources of uncertainty associated with the risk analysis. There is uncertainty regarding the future quantities of waste accepted and burned, which will affect future emissions. Other sources include uncertainty in the toxicity values, modeling parameters, exposure pathways including the fish consumption pathway, effects of the MRF on emissions, auxiliary boiler emissions in the future, and PCDD/PCDF production.

9.1 EMISSION UNCERTAINTY

9.1.1 Waste Combustion

As required by the MPCA's air permitting process, the proposed project's maximum emission quantities are presented and evaluated in this report. At this point in time, there is no intention by Prairie Lakes Municipal Solid Waste Authority (PLMSWA) nor the PRRF to operate at maximum capacity. The level of operation is dependent upon steam demand, availability of fuel, and capability of the facility. None of these three factors facilitate the need or ability for the proposed project to operate at maximum capacity at this time or in the foreseeable future.

9.1.2 Vehicle Emissions

The actual traffic is more likely to be 75 percent of what was assumed in this evaluation (a future projected operating level of 55,000 tpy instead of the maximum capacity 73,000 tpy). Not every truck is expected to idle at the facility; idling happens very rarely as the trucks will pick up and drop off from different locations around the facility and the MSW trucks are purposely staggered to avoid idling. A person is unlikely to stand at the facility fenceline for an entire hour. The emission points are not all located so close to the fenceline. These assumptions all overestimate the hazard.

9.1.3 Facility Stack Data

When emissions are calculated based on potential-to-emit and do not consider levels of control, they are overestimated. The most recent stack test for the facility, in May 2011, showed that PCDD/PCDF emission levels were 3 ng/dscm, two orders of magnitude less than the current permissible emission level of 125 ng/dscm for the current facility. The modified South Unit, which will be subject to a lower limit (13 ng/dscm), will operate with the same air pollution control equipment as the existing North Unit. PCDD/PCDF emissions are expected to be much lower than the acceptable limit. This is a particularly important point since PCDD/PCDF are the only risk drivers identified in this analysis.

9.1.4 Effect of MRF

One of the main goals of the MRF is to reduce the amount of noncombustibles in the waste stream and to recycle metals. One ancillary benefit of this is that the amount of mercury in the waste and thus the amount emitted would decrease. This is difficult or impossible to quantify, but should be noted as future scenarios are evaluated. The mercury emissions level and effects on Little Pine Lake are likely overestimated in this assessment.

9.1.5 Auxiliary Boilers

Emissions from the auxiliary boiler (SV004) are projected to remain the same in the proposed scenario as they are in the existing facility. However, the auxiliary boiler runs to generate the steam demand that

MSW firing cannot meet. In the future, with a higher MWC capacity, the auxiliary boiler will not be used as much and its actual emissions will decrease. This equipment use reduction has not been quantified in this assessment. However, this issue is not likely to be significant since the risk drivers in this assessment, PCDD/PCDF, are not emitted by the auxiliary boiler. However, it should be noted that future emissions will be less than shown here.

9.1.6 PCDD/PCDF

According to the Human Health Risk Assessment Protocol (September 2005), the total concentration of chlorine in waste is important in the amount of PCDD/PCDF that will form in combustion. PCDD/PCDF emission rates varied by more than 28-fold between different facilities according to a 1996 study cited in the HHRAP. Also, HHRAP notes that fly ash can catalyze the reactions to form PCDD/PCDF. The projected project will feature a MRF that is designed to remove fines, which could reduce the amount of fly ash produced per ton of MSW burned. This would further reduce PCDD/PCDF production at the facility. The production mechanisms of PCDD/PCDF are uncertain so estimating future emissions is difficult.

9.2 AIR DISPERSION MODELING

There are so many parameters involved in modeling air emissions from a facility that there is also a great deal of uncertainty in the results. The five year meteorological data set attempts to characterize future weather conditions. The surface characteristics are estimations, as are particle size distributions. This assessment is not designed to fully characterize the uncertainty in a complex air dispersion model, and the effect of any errors is unknown.

9.3 EXPOSURE PATHWAY UNCERTAINTY

The assessment evaluated hypothetical worst-case exposure scenarios. There are no livestock raised near the facility, and risks are driven almost exclusively by milk and beef consumption pathways. The results of the inhalation assessment show levels below the criteria. The consumption rates for milk, beef, produce, pork, etc. are upper-bound estimates that overestimate risks from these pathways, even when they exist. A more realistic evaluation considering the crops grown on the farms near the facility would consider only the produce and inhalation pathways, which result in levels below the regulatory thresholds.

9.4 TOXICITY UNCERTAINTY

There is great uncertainty in the toxicity values used. The recent IRIS update of a noncancer oral reference dose for 2,3,7,8-TCDD was evaluated with high certainty. However, the MDH oral cancer slope factor was derived from the same study that led others to derive a value of 1.5E+5 $(mg/kg\text{-}d)^{-1}$, an order of magnitude lower than the slope factor used in this assessment. Additionally, route-to-route extrapolation was performed to derive an inhalation unit risk since no ambient air criterion existed. Any overestimation would therefore be compounded by adding a second route of exposure. The MDH Guidance for Dioxins describes situations where extrapolation from an oral exposure to an inhalation exposure is inappropriate in the Statement of Need and Reasonableness (SONAR) for the HRV. It specifically states that extrapolation will not be used if the liver is the target organ, which it is for PCDD/PCDF. Nevertheless, to be conservative in this analysis, route-to-route extrapolation was performed.

Toxicity of PCDD/PCDF is based on the most studied and most toxic congener, 2,3,7,8-TCDD, and these values are then derived. There are few specific data points for the other congeners, and values are estimated based on orders of magnitude of potency compared with 2,3,7,8-TCDD. As seen in the table in

Section 8, most of the cancer risk is attributed to congeners other than 2,3,7,8-TCDD. Therefore, the risk estimates are uncertain and may be overestimated.

9.5 FISHER PATHWAY UNCERTAINTY

There is a fish advisory on Little Pine Lake. Consumption is likely to be much closer to the recreational fisher scenario than to the subsistence fisher scenario. While not an issue for the IRAP-*h* View ™ analysis, results of the MMREM show a small contribution to the overall HQ. Additionally, the assumptions in MMREM are uncertain, such as 26% of water from the watershed reaching the lake and the deposition rates of the three mercury species. Further uncertainty is caused by using the speciation of mercury from an OWEF stack test which likely overestimates the impact of mercury on Little Pine Lake. While PRRF has tested for mercury in the past, there are no specific speciation data.

10.0 Scenario Uncertainty Analysis Summary

As discussed in Section 6, this risk assessment evaluated a single project scenario (Scenario 1) – the regulatory requirement to evaluate the proposed facility with a) theoretical maximum emission levels, and b) hypothetical exposure scenarios, i.e., subsistence farmers, subsistence fishers, etc. To put those results in context, other project scenarios were quantified. Scenario 2 represents the proposed facility's impacts to human health given the same theoretical emission levels as used in the text, but with actual exposure pathways from the Perham area. Scenario 3 represents the proposed facility's impacts to human health using estimated actual emissions (as calculated from the facility's stack test data and facility's capacity) and hypothetical exposure scenarios. Scenario 4 represents the most realistic near future scenario, with future projected actual emission estimates and actual exposure scenarios.

Only the lifetime excess cancer risks for the farmer receptor were evaluated in these alternative scenarios, because only these receptors were associated with significant cancer risks (above the regulatory threshold) in the main project scenario. Table 10-1 presents the summary data (maximum total risk) for these receptors.

10.1 RESULTS OF SCENARIO 2

In Scenario 2, actual exposure pathways were evaluated; PTE emissions were still used, however. As there are no farms with livestock within a 1.5 km radius of the facility, the farmer receptors identified as the maximally exposed individuals in Scenario 1 were evaluated with produce consumption levels the same, but without home-grown meat or milk consumption.

New receptors were added for Scenario 2 to represent those feedlots and farms where livestock are raised. Receptors were determined using MPCA's What's in my Neighborhood tool with the associated attributes listing the animals kept at each location. In this way, a location raising cows was evaluated for beef consumption, a dairy was evaluated for milk consumption, a hog operation was evaluated for pig consumption, and a poultry farm was evaluated for egg and poultry consumption. These receptors represent the more likely case near the facility where only one type of animal is raised. These results represent a more likely scenario than the theoretical and hypothetical scenario presented earlier in this report where a single farm is assumed to conduct all of these activities. These results are also all below MDH's *de minimis* risk threshold levels of 1E-5 (see Table 10-1), with the highest location being 8E-6 at Receptor Location 23 (Perham Stockyards), just 1.5 km southeast of the facility. This location is an auction house and not a location where bovine are actually raised, so even this estimate represents a very conservative upper-bound risk estimate. The highest cancer risk result from this analysis was at Receptor 27 (Ruther Dairy) with a lifetime excess cancer risk of 3E-6, which is less than MDH's *de minimis* cancer threshold of 1E-5. It is also less than ten percent of the ambient background cancer risk. Thus, it can be concluded that the proposed facility will **<u>not</u>** present any significant cancer risks to the population of Perham and the surrounding area under the existing land use conditions.

10.2 RESULTS OF SCENARIO 3

Another more realistic assessment scenario is to use future projected actual emissions for the facility instead of PTE emissions. These were calculated using the most recent stack test results at the facility, which was conducted in May, 2011. The emissions were scaled up to 200 tons per day and the conversion factor applicable for refuse-derived fuel (RDF) from AP-42 was used. Using past stack tests to predict future emissions is relevant because the same type of APC equipment will be used for the modified South Unit as is currently used for both units. In this project scenario, all of the hypothetical exposure pathways were still used.

Receptor locations were the same as Scenario 1. Since the recent stack test showed emissions of PCDD/PCDF around 3 ng/dscm instead of the PTE emissions limit of 125 ng/dscm for the North Unit and 13 ng/dscm for the South Unit, risk estimates are understandably lower. The maximum cancer risk associated with a PCDD/PCDF emission rate of 3 ng/dscm is at Receptor 12 with risk estimates of 3E-6. This value is also less than (30 percent of) MDH's *de minimis* risk threshold, indicating that the proposed facility will **not** present any significant cancer risks to the population of Perham and the surrounding area under the existing facility operating conditions.

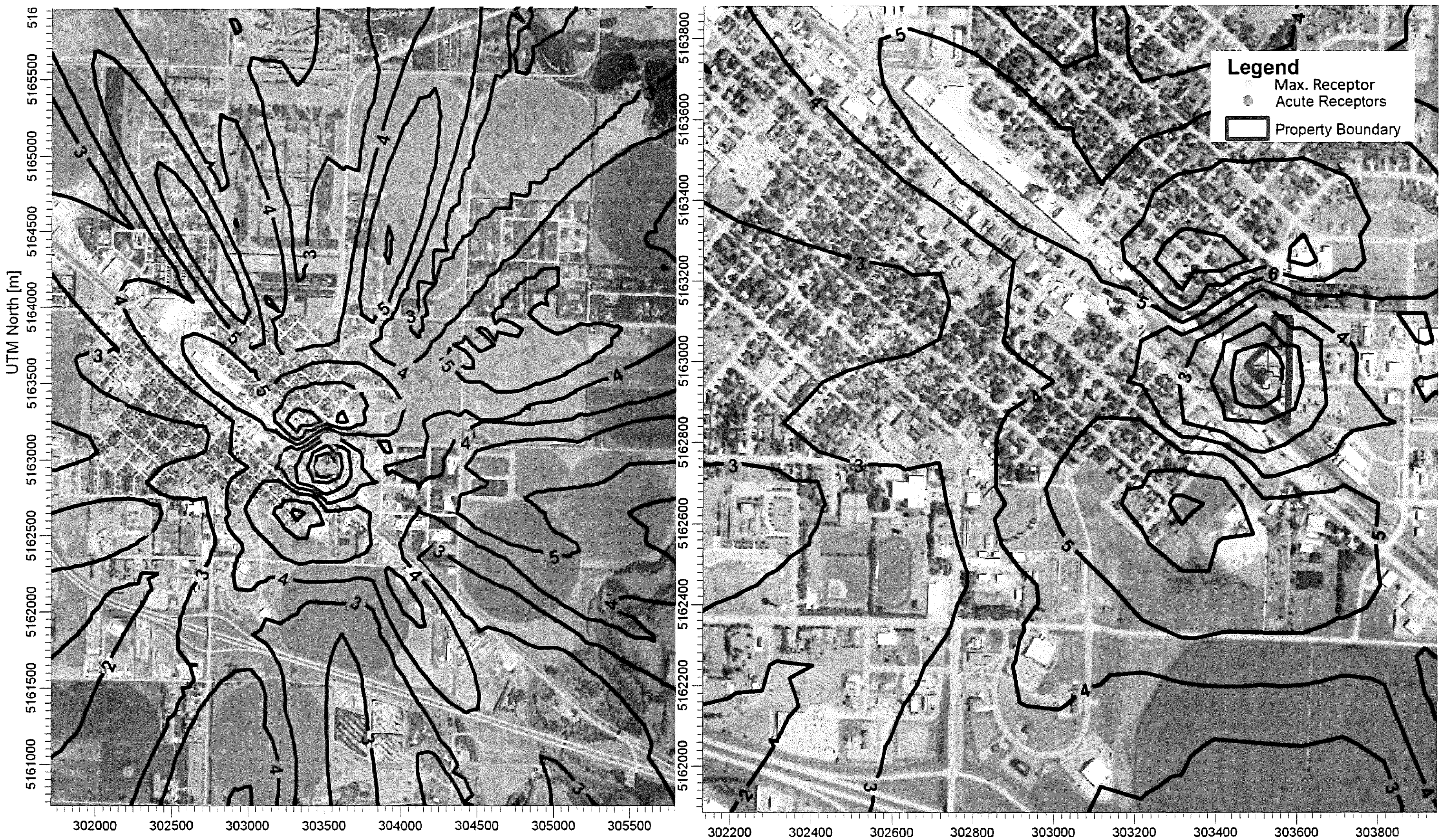
10.3 RESULTS OF SCENARIO 4

The most realistic scenario for the near future utilizes actual land use and receptor information along with future projected actual emissions. Results are very low, with only the receptors at the Perham Stockyards, where beef is assumed to be consumed, and the Ruther Dairy, where milk is assumed to be consumed, having lifetime excess cancer risk estimates higher than 1E-7 (one percent of MDH's *de minimis* risk threshold).

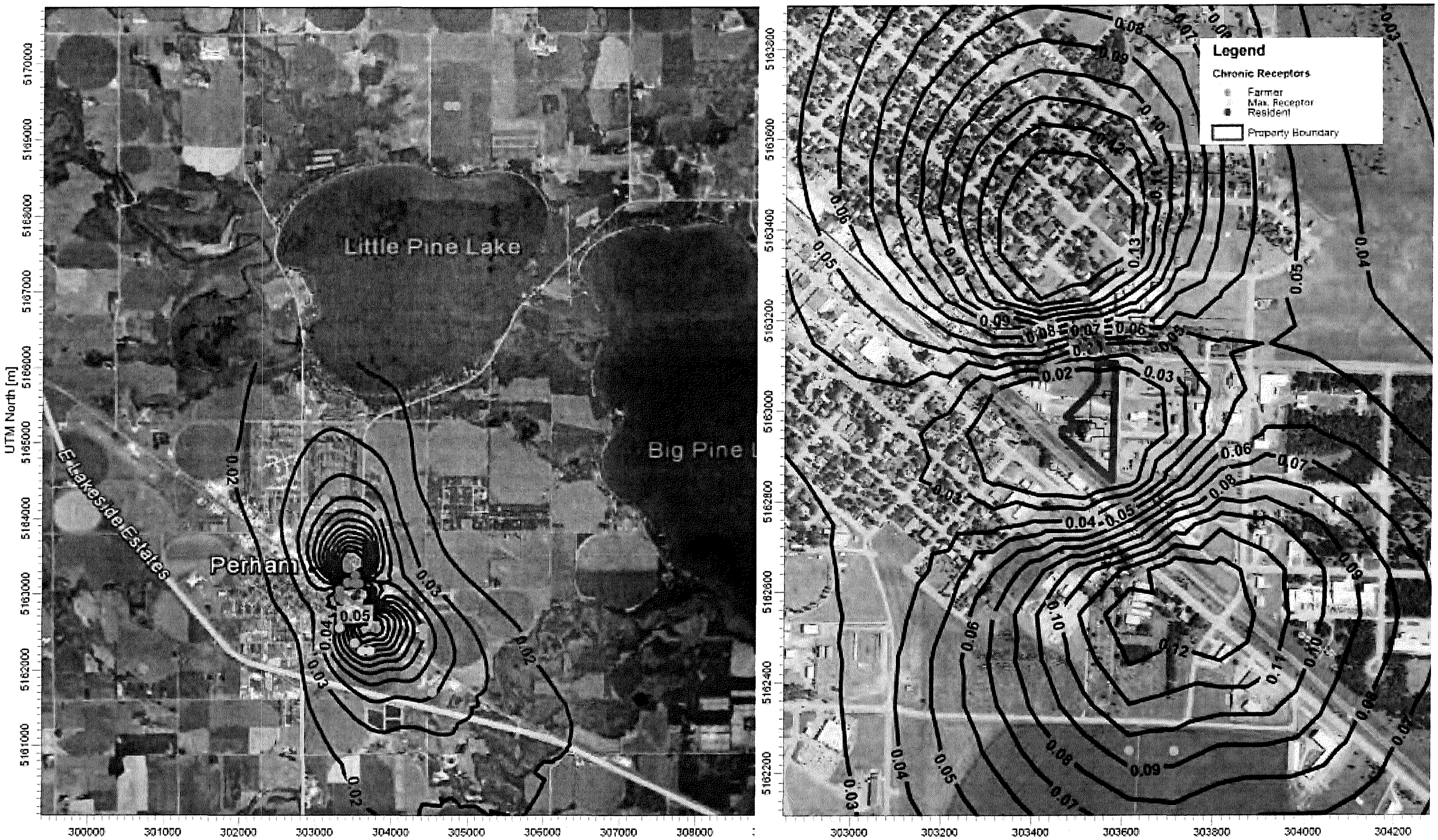
Table 10-1: Lifetime Excess Cancer Risk for Farmers

Receptor Name	Scenario 1 Risk	Scenario 2 Risk	Scenario 3 Risk	Scenario 4 Risk
RI_12	7E-05	2E-06	3E-06	7E-08
RI_23 (Perham Stockyards)		8E-06		3E-07
RI_24 (Loerzel Farm) (bovines)		2E-06		9E-08
RI_27 (Ruther Dairy)		3E-06		1E-07

Figures



PERHAM RESOURCE RECOVERY FACILITY	Wenck	OCT 2012
Modeled 1-hour Concentration Isopleths with Acute Receptor Locations	Wenck Associates, Inc. Environmental Engineers — 1800 Pioneer Creek Center Maple Plain, MN 55359-0249	Figure 3-1



PERHAM RESOURCE RECOVERY FACILITY

Modeled Annual Concentration Isopleths with Chronic Receptor Locations

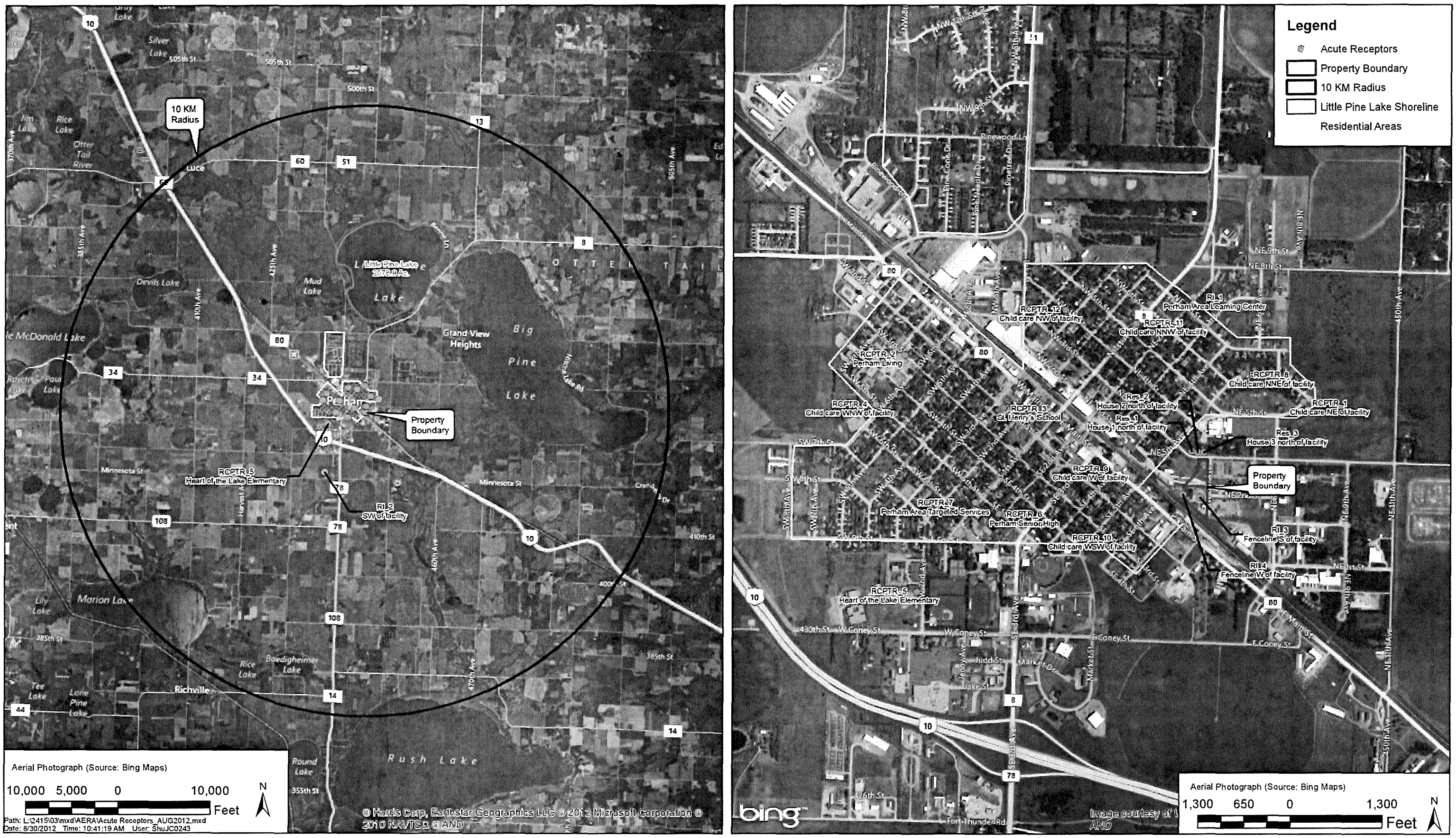
Wenck

Wenck Associates, Inc.
Environmental Engineers

1800 Pioneer Creek Center
Maple Plain, MN 55359-0249

OCT 2012

Figure 3-2



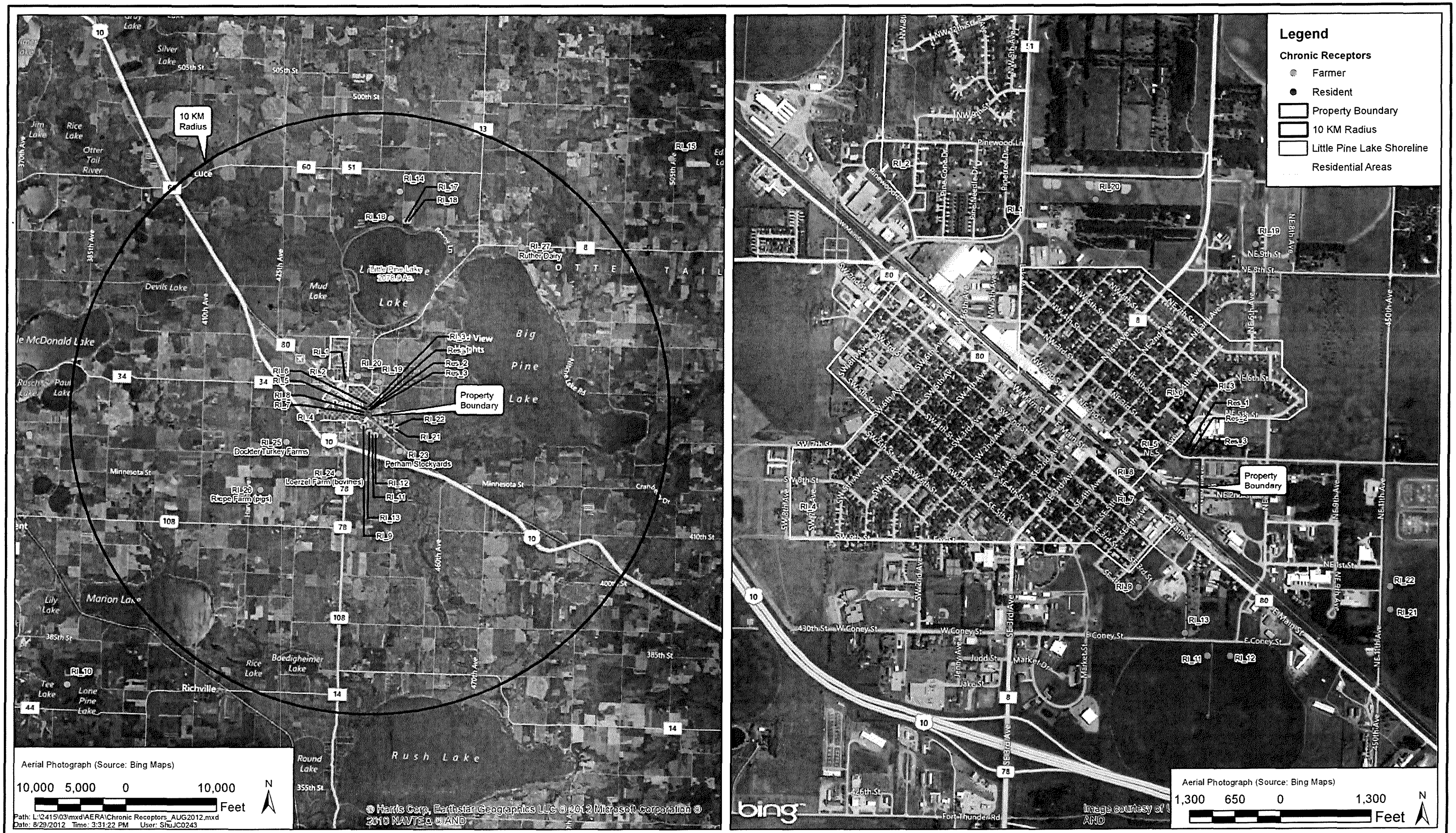
PERHAM RESOURCE RECOVERY FACILITY

Acute Receptor Locations

Wenck
Engineers - Scientists
Business Professionals
www.wenck.com
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

AUG 2012

Figure 6-1



PERHAM RESOURCE RECOVERY FACILITY

Chronic Receptor Locations

Wenck
Engineers - Scientists
Business Professionals
www.wenck.com
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

AUG 2012

Figure 6-2

Appendix A

AERA Forms

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-01

Deliverable Checklist

Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 5

Purpose: This form serves as a checklist for submitting all necessary AERA materials prior to submitting an air permit application (pre-app) or with an air permit application (post-app). This form also documents the Minnesota Pollution Control Agency (MPCA) AERA completeness review. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. For more information on the AERA process see the "AERA Guidance" on the MPCA website at http://www.pca.state.mn.us/ktqh42a. All AERA documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in hard copy. An AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Submitting AERA materials for review prior to submitting an air permit application is highly recommended** so that site specific suggestions from MPCA staff can be included in AERA materials submitted with an air permit application.

Facility Information

1. AQ Facility ID No.: **11100036**
2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **4/11/2012, 5/10/12, 5/17/12, 6/13/2012, 7/20/12** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **09/05/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: MN Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: (218) 998-4898 E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the AERA materials submitted pre-app and those submitted post-app? ☒ Yes ☐ No ☐ NA
If yes, please explain the differences: **All updates have been documented and sent to MPCA as they occurred. This September 5, 2012, submittal includes complete IRAP-h project files that reflect all changes and updates made since this initial submittal. AERA forms document the background information and inputs to the RASS and HHRA.**

MPCA review question: *Are there differences between the AERA materials submitted pre-app and those submitted post-app?*
☐ *Yes* ☐ *No* ☐ *NA* *If yes, please explain the differences:*

Summary of What the AERA Supports (Mark all that apply)

Is this a pre-application submittal? ☐ Yes ☒ No DQPre-app #3831?

☒ An air permit application.
☐ Compliance with an existing permit requirement.
☐ A mandatory Environmental Impact Statement (EIS), required by Minn. R. 4410.4400. Please indicate which subpart was met:
☒ A voluntary or discretionary EIS. If the AERA was requested by the MPCA, please indicate the request date (mm/dd/yyyy): **2/29/2012 as part of the final Scoping Decision Document**
☐ A mandatory Environmental Assessment Worksheet (EAW), required by Minn. R. 4410.4300 subpart 15 (air emissions trigger) or subpart 5 (fuel conversion trigger).
☒ A mandatory Environmental Assessment Worksheet (EAW) required by a subpart of Minn. R. 4410.4300 other than 15 or 5. Please indicate which subpart was met:
Minn. R. 4410.4300 Subpart 17D, Solid Waste
If the AERA was requested by the MPCA please indicate the request date (mm/dd/yyyy): **2/29/2012 as part of the final Scoping Decision Document**

☐ A voluntary or discretionary EAW. If the AERA was requested by the MPCA, please indicate the request date (mm/dd/yyyy): __________

☐ Pre-authorized change to a facility with a "flexible air permit", where a facility owner is seeking to increase toxic emissions, which may be allowed to be changed without additional permitting.

☐ Other: Please explain: ______________________________

MPCA Overall Summary of AERA Review

Names of MPCA AERA reviewer(s): *Heather Magee-Hill HMH, Bruce Braaton BB, Greg Pratt GP*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app AERA submittal determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app AERA submittal completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*
4/11/12	*5/7/12*	☐ *Yes* ☒ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
5/10/12	*5/11/12*	☐ *Yes* ☒ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
5/17/12	*6/5/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
6/13/12 & 7/20/12	*8/20/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*

MPCA overall pre-app review notes including comments on deficiencies and how they can be remedied:

See 5/7/12 and 5/10/12 and 5/21/12 e-mails for initial comments and 8/23/12 e-mail for subsequent comments.

MPCA overall post-app review notes including comments on deficiencies and how they can be remedied:

The proposer/AERA preparer should fill out the first three columns in the following tables. *In the italicized columns, MPCA staff will mark **pre-app sections** with "Yes" for adequate, "No" for deficient, and enter their initials; and will mark **post-app sections** with "Yes" for substantially complete, "No" for incomplete, and enter their initials.*

Required AERA Forms

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**AERA forms are located at http://www.pca.state.mn.us/gp0r42f**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**AERA-01** Deliverable Checklist (this form)	*6/5/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012 5/10/12 5/17/12, 6/13/2012, 9/5/2012**	**AERA-02** Qualitative Information Checklist	*6/4/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012 5/10/12, 6/13/2012, 9/5/2012**	**AERA-03** Air Dispersion Modeling Analysis Form	*6/4/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
☐ Electronic ☐ Hard copy ☒ NA		**AERA-04** Emergency Internal Combustion Engine Certification (if applicable)		☐ *Yes* ☐ *No Init: _____*		☐ *Yes* ☐ *No Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012 5/10/12 5/17/12, 6/13/2012, 9/5/2012**	**AERA-05** Emissions Form	*5/21/12*	☒ *Yes* ☐ *No Init: HMH*		☐ *Yes* ☐ *No Init: _____*
☐ Electronic ☐ Hard copy ☒ NA		**AERA-13** Determination Checklist for Proposed Ethanol Facilities (if applicable)		☐ *Yes* ☐ *No Init: _____*		☐ *Yes* ☐ *No Init: _____*

☒ Electronic ☐ Hard copy ☐ NA	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	**AERA-19** Cumulative Air Emissions Risk Analysis Form (NA only if no environmental review is being done)	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☒ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**AERA-24** AERA Certification	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy ☐ NA	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	***AERA-26** Refined HHRAP-based Analysis Form (if applicable)	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy ☐ NA	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	***AERA-27** MPCA Mercury Risk Estimation Method (MMREM) Protocol Form (if applicable)	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*

**For an AERA with a refined analysis based on EPA's Human Health Risk Assessment Protocol (HHRAP) or an analysis using the MPCA Mercury Risk Estimation Method (MMREM) a MPCA protocol (AERA-26 form or AERA-27 form) and the other forms must be submitted pre-app.

Required Permit Forms

When the above AERA forms are submitted electronically please submit electronic versions of the following permitting forms with them.

Submitted	Submittal date(s) (mm/dd/yyyy)	Permit forms are located at http://www.pca.state.mn.us/nwqh472	*Pre-app review date(s)* *(mm/dd/yyyy)*	*Pre-app adequacy determination*	*Post-app review date(s)* *(mm/dd/yyyy)*	*Post-app completeness*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**GI-01:** Facility Information	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**GI-02:** Process Flow Diagram	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy	4/11/2012, **6/13/2012, 9/5/2012**	**GI-03:** Facility and Stack/Vent Diagram	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**GI-04:** Stack/Vent Information	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy ☐ NA	**4/11/2012, 6/13/2012**	**GI-05D:** Fugitive Emission Source Information (if applicable)	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	**MI-01:** Building and Structure Information	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy ☐ NA	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	**HG-01:** Mercury Releases to Ambient Air (NA if Hg PTE is less than 1 lb/year)	*5/7/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*

Required Supporting Submittals

AERA emissions

Submitted	Submittal date(s) (mm/dd/yyyy)	An example spreadsheet is at http://www.pca.state.mn.us/index.php/view-document.html?gid=140	*Pre-app review date(s)* *(mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app review date(s)* *(mm/dd/yyyy)*	*Post-app completeness*
☒ Electronic	**4/11/2012**	Emissions calculations in	*5/21/12*	☒ *Yes* ☐ *No*		☐ *Yes* ☐ *No*

☐ Hard copy	**5/10/12** **5/17/12, 6/13/2012, 9/5/2012**	Excel spreadsheet named: PLMSWA Emission Calcs		*Init: HMH*		*Init: _____*

Mercury (Hg) submittals – ☐ NA - if facility mercury PTE emissions are less than 1 lb/yr

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**Mercury forms are at http://www.pca.state.mn.us/yhiz431**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☒ Electronic ☐ Hard copy	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	MMREM spreadsheet(s)	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	Spreadsheet with fish tissue concentration calculations	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	Spreadsheet or modeling file showing MMREM Hg air concentration calculations	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*

AERA dispersion modeling

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**Dispersion modeling guidance is at http://www.pca.state.mn.us/jsri427**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☐ Electronic (optional) ☐ Hard copy		SAM spreadsheet (optional)		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	Base maps (e.g., aerial photos, digital raster graphs, CAD files, etc.)	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	Dispersion modeling input/output files and required support files (check all that apply) ☐ DISPERSE summary report and summary ☒ AERMOD input/output files with unitized emission rates for RASS ☐ AERMOD input/output files with Q/CHI ☐ AERMOD input/output files for HHRAP based risk modeling	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	Map or Plot files (check all that apply) ☒ Showing the dispersion of unitized emissions from AERMOD for RASS ☐ Showing Q/CHI risks from AERMOD ☐ Showing rationale for HHRAP-based analysis	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*

		receptor location ☐ Showing HHRAP-based analysis risks				
☒ Electronic ☐ Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	Remainder of files indicated on AERA-form 03 (e.g. meteorological data files, BPIP, AERMAP)	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*

Required Supporting Risk Submittals

Qualitative information

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**Documents**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☒ Electronic ☐ Hard copy	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	Maps indicated in AERA-form 02	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*
☐ Electronic ☐ Hard copy ☒ NA		Additional documents indicated in AERA-form 02		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

Risk results for the entire facility as proposed (check one)

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**RASS and Q/CHI spreadsheets are at http://www.pca.state.mn.us/zihy434**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☐ Electronic ☐ Hard copy		RASS spreadsheet(s) including all emitted chemicals		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
☐ Electronic ☐ Hard copy		Q/CHI spreadsheet including all emitted chemicals		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
☐ Electronic ☐ Hard copy		HHRAP-based analysis files that include all emitted chemicals		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
☐ Electronic ☐ Hard copy		Q/CHI spreadsheet with select chemicals and a RASS that includes chemicals screened out		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
☒ Electronic ☐ Hard copy	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	HHRAP-based analysis files with select chemicals and a RASS that includes chemicals screened out	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*

Risk results for entire pre-existing facility (check one)

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**RASS and Q/CHI spreadsheets are at http://www.pca.state.mn.us/zihy434**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☐ Electronic ☐ Hard copy		RASS spreadsheet(s) including all emitted chemicals		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
☐ Electronic ☐ Hard copy		Q/CHI spreadsheet including all emitted chemicals		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

☐ Electronic ☐ Hard copy		HHRAP-based analysis, files that include all emitted chemicals.		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____
☐ Electronic ☐ Hard copy		Q/CHI spreadsheet with select chemicals and a RASS that includes chemicals screened out		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____
☒ Electronic ☐ Hard copy	**4/11/2012** **5/10/12, 6/13/2012, 9/5/2012**	HHRAP-based analysis files with select chemicals and a RASS that includes chemicals screened out	*5/10/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init:* _____

Additional Information In the table below, please describe any additional attachments

Attachment reference number (or other identifier)	Title	Purpose/Description
7/20/12 and 8/13/2012 updated vehicle materials	Vehicle NO_2 Emissions for PRRF Expansion Project	Describe vehicle emissions, existing and future projected on-site traffic, and show the change to the Bongards' haul road is insignificant.

Proposer/Preparer Instructions

Boxes can be checked by clicking on them. Response areas will expand as necessary to include the complete response. Multiple dates can be added by using the "Enter key" (return key) after you type the first date. All Air Emission Risk Analysis (AERA) documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

If **all** of the requested forms and support documents **are not included** with an air permit application needing an AERA the air permit application **will be deemed incomplete**. This includes risk estimates for pre-existing facilities. MPCA staff will return this AERA form plus any other incomplete AERA forms to the applicant with deficiencies and remedies indicated in the *italicized* MPCA review areas. If forms were submitted pre-app they should be updated and re-submitted post-app with any *italicized* MPCA comments left in and changes summarized in the appropriate areas.

Facility information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

AERA forms: Instructions accompany each of the AERA forms. Contact MPCA for further clarification.

MPCA air permit forms: Instructions for completing these forms may be found on MPCA's website. Contact the MPCA for further clarification.

Additional information: These forms are designed to include all of the essential information for an AERA, replacing the need for a separate report. If the applicant feels that additional information is necessary to further describe the facility, the processes, the method of generating emissions estimates, the assumptions used in generating dispersion factors or risk estimates, etc. this information can be attached to the AERA forms with the reference, title, and purpose/description indicated in the additional information section of this form.

MPCA Review Instructions

Specific forms/support documents

MPCA staff will summarize their review of specific forms/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals.

Overall adequacy/completeness summary

*This form should summarize the results of the reviews conducted in other sections and on other forms. If **all** of the necessary forms/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA* *staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. If this form is being submitted as a protocol indicate in the MPCA overall review notes whether the protocol is approved or has deficiencies. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, **and MPCA staff have determined that appropriate methods have been used.** Post-app results from this form and any other forms showing deficiencies should be shared with the permit engineer conducting the permit application completeness review who will then share it with the applicant.*

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-02

Qualitative Information Checklist

Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on AERA Form 02b

Purpose: This form serves as a checklist for submitting all necessary qualitative AERA materials prior to submitting an air permit application (pre-app) or with an air permit application (post-app). This form also documents the Minnesota Pollution Control Agency (MPCA) AERA qualitative review. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form and example maps are in the AERA-02b form. For more information on the AERA process, see the "AERA Guidance" on the MPCA website at http://www.pca.state.mn.us/ktqh42a. An AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted and MPCA staff have determined that appropriate methods have been used. **Submitting AERA materials for review prior to submitting an air permit application is highly recommended** so that site specific suggestions from MPCA staff can be included in AERA materials submitted with an air permit application.

Facility Information

1. AQ Facility ID No.: **11100036**
2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **4/11/2012, rev. 5/10/2012, rev. 5/17/2012, rev. 6/13/2012** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location

   Street address: **201 6th Avenue Northeast**

   City: **Perham** State: **MN** Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4898** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the qualitative AERA materials submitted pre-app and those submitted post-app?

☒ Yes ☐ No ☐ NA If yes, please explain the differences: **Text describing the receptors was updated (see Page 4). Site specific uncertainties are addressed in the HHRA Report (see Page 5). – 6/13/2012 submittal**

Additional receptors were added to Figure 6-1 and 6-2 of the HHRA Report. These represented the 3 residences immediately north of the facility and the farms added to the Scenarios 2 and 4 IRAP-h projects. Text clarifying that the fisher scenario is evaluated at all receptors was added (see Page 4) – 9/5/2012 submittal

MPCA Review Question: *Are there differences between the qualitative AERA materials submitted pre-app and those submitted post-app? ☐ Yes ☐ No ☐ NA If yes, please explain the differences:*

MPCA Overall Summary of Qualitative AERA Review

Names of MPCA AERA reviewer(s): *Heather Magee-Hill HMH*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app qualitative determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app qualitative completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	*****Technical accuracy review date*** *(mm/dd/yyyy)*	*****Technical accuracy determination and reviewer's initials***
5/17/12	*6/4/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12* *With the changes indicated*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA overall pre-app qualitative AERA review notes including comments on deficiencies and how they can be remedied:

Any additional residential receptors added to IRAP should be indicated in figure 6-1 as well as any farms referred to by name in the text.

MPCA overall post-app qualitative AERA review notes including comments on deficiencies and how they can be remedied:

*****MPCA overall qualitative AERA technical accuracy review notes including comments on deficiencies and how they can be remedied:***

Project Description

Please describe existing conditions, proposed facility changes, and any past AERA, permitting or environmental review. Include information about types of air permits, types of environmental review and other pertinent information.

The Perham Resource Recovery Facility (PRRF) is an existing waste to energy facility operating under federal Part 70 operating Air Permit No. 11100036-003, issued January 26, 2006 by MPCA. There are two municipal waste combustion units. Currently, the hot flue gas from the combustion units are tied together and flow through a single heat recovery boiler (HRB) to generate steam, continuing through the air pollution control (APC) equipment. The existing HRB and APC equipment limit the total waste combustion capacity of both units combined to 116 tons per day (tpd) expressed as an annual average. Each combustion unit can operate individually up to 100 tpd when the other unit is not operating. The proposed expansion will add a new HRB and associated APC equipment to the South Unit. After the project, each unit will be able to operate at the same time up to 100 tpd each. The expansion project also includes a materials recovery facility (MRF), which will presort incoming material to remove undesirable waste and recyclable components prior to combustion of the remaining material.

An administrative amendment was submitted on June 20, 2011, requesting a name change to the air permit. This amendment is pending with the Agency. The original total facility operating permit (11100036-001) was granted in 1995. The major amendment (11100035-03) incorporated operating limits on the Facility.

Has the facility had past compliance issues, complaints or community concerns? ☒ Yes ☐ No

If yes, please summarize:

The facility closed in 1998 due to air quality noncompliance. The City of Perham acquired the facility, with surrounding counties, reconstructed and retrofit the facility with new air pollution control technology, new combustion technology, improved ash handling, and the ability to generate electricity. The facility reopened in 2002 and has operated in compliance with its air emission permit since that time.

Citizens complained about vibration/humming noise in 2003. A noise study was conducted and the steam vent silencer, which had failed, was replaced. There have been no recent complaints.

Maps

Maps provide a pictorial representation of information and allow for significant abbreviation of text submittals. **Each of the following required maps should be standardized with a title, reference, date, legend, scale north arrow, and appropriate radius.** Additional information can be added to clarify the maps or facility surroundings. A site visit is recommended to verify information.

What is the minimum stack height modeled? **22.9** meters

What is the maximum stack height modeled? **38.1** meters

Sensitive receptors:

☒ Provide a map with the appropriate radius (see below, instructions in form AERA-02b and AERA guidance) around the facility and surrounding area with the following features: facility, nearby residents, schools, daycares, public recreation areas (e.g., playgrounds, swimming pools, tennis courts, city parks, etc.), nursing homes, hospitals, and other locations where sensitive receptors congregate.

Stack height less than 50 meters:	1.5 kilometers (approximately one mile) radius
Stack height between 50 and 100 meters:	3 kilometers (approximately two miles) radius
Stack height greater than 100 meters:	10 kilometers (approximately six miles) radius

☒ How close are the nearest residents? 118 meters

General neighborhood information:

☒ What is the population density surrounding the facility? **681** persons/square mile

☒ Provide a map of census and demographic information, such as population density if there is considerable variation within the appropriate radius (see sensitive receptor map criteria above).

☒ Additional information about the surrounding community: **Perham has a population of less than 3,000 and has several industries that contribute to there being more jobs in town than people.**

☒ Is the facility located in an area described by Minn. Stat. §116.07, subd. 4a? ☐ Yes ☒ No

Check the map of South Minneapolis at (http://www.pca.state.mn.us/index.php/view-document.html?gid=14029) to determine if the facility is in the described area. If yes, contact a MPCA supervisor or manager for a pre-app meeting/call.

Nearby permitted air emission facilities:

Provide a map and/or list below, of the permitted air emission facilities and following information, within the proper radius (below) of the facility.

List of nearby permitted air emission facilities within…

Stack height less than 50 meters:	1.5 kilometers (approximately one mile) radius
Stack height between 50 and 100 meters:	3 kilometers (approximately two miles) radius
Stack height greater than 100 meters:	10 kilometers (approximately six miles) radius

Nearby facility name	Type of permit (registration, state, Title V)	Approximate distance from project to nearby facility	Reference
Tuffy's Pet Foods	**registration**	**1 km**	**11100014**
Bongards' Creameries	**registration**	**< 1 km**	**11100021**
Barrel O' Fun	**state***	**1.5 km**	**11100057**
Industrial Finishing Services	**registration**	**1 km**	**11100076**
	*** - Not yet issued**		

Zoning:

☒ Provide a zoning map of the area within ten kilometers of the facility. Supplemental maps with relevant ordinances informing potential exposures (e.g. raising chickens in town or prohibitions of livestock, etc.) may be helpful. If this information is not provided, the MPCA cannot make assumptions regarding zoning restrictions. If land is not zoned and ordinances are not available, a detailed land use map is sufficient.

or

☐ Describe zoning within ten kilometers of the facility, if a zoning map is not available: _____

Land use:

☒ Provide a map showing current land use within ten kilometers of the facility. Land use maps include information such as areas of residential, commercial, and industrial use, farms, forests and waterways. If no map is provided, the most restrictive land use will be assumed. It is also helpful to know if the land is used for other purposes than those designated on the land use maps. If farms are currently located within ten kilometers of the facility, indicate what type of farming occurs (e.g. beef farming, dairy cows, chickens, urban gardening).The MPCA considers "reasonable potential future land use." According to U.S. Environmental Protection Agency's (EPA) Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP), three examples of reasonable potential future land use are:

- Rural area characterized as undeveloped open fields could reasonably be expected to become farmland if it can support agricultural activities.
- Rural area currently characterized by open fields and intermittent housing could reasonably be expected to become a residential subdivision.
- An area currently characterized as an industrial area would **not** reasonably be expected to become farmland.

Risk receptor information and isopleths:

☐ No risk isopleth map was included because neither an Emission Rate/Chemical Health Index (Q/CHI) nor a receptor grid-based HHRAP-type analysis was done.

☐ If conducting a more refined analysis such as the Q/CHI analysis or HHRAP-based analysis, provide a map showing a risk isopleth for each exposure scenario with a risk result above 0.1 (0.1 in 100,000 for cancer estimates). Locations of all receptors for whom risks are estimated should be indicated on the map, including the maximum acute (hourly) receptor and the maximum chronic (annual).

☒ If additional risk receptor scenario(s) were included please explain them and how they were chosen:

Exposure scenarios for acute inhalation, urban gardener and farmer receptors will be run at the highest impacted appropriate receptor. For urban gardener and farmer, the highest impacted location will be used. The fisher will be evaluated at all locations. To evaluate mercury effects to fish the MMREM will use the average concentration over Little Pine Lake and the Little Pine Lake Watershed to determine exposure impacts.

The farms surrounding the facility, as shown on Figure F-7, grow irrigated crops. Per responses from Perham residents, these fields typically grow potatoes and soybeans. No livestock are raised on these farms, and the feedlot depicted at the southeast edge of the 1.5 km radius is an auction house that does not raise livestock on4site. The farmer exposure pathway is being evaluated at the highest impacted location. Refined Scenarios which reflect actual land use (Scenarios 2 and 4) add receptors at the registered feedlots closest to the facility for poultry, pigs, dairy and beef cattle.

Persistent Bioaccumulative Toxic chemicals (PBTs):

Facilities emitting PBTs should provide a map showing the following features:

☐ No PBTs are emitted thus none of the following maps were provided.

☒ Fishable water bodies

A water body may be considered "fishable" if it typically contains water year-round in a year that receives at least 75 percent of the normal annual precipitation for that area. Provide a map showing lakes, rivers and streams within the following appropriate radius depending on the stack height. For facilities with stack heights less than 100 meters, a map should be provided showing lakes, rivers and streams within a 3 km radius (approximately 2 miles). For facilities with stack heights greater than 100 meters, show lakes, rivers and streams for the area within a 10 km radius (6 miles). Also, show water bodies outside the specified area that may be fed by rivers and streams lying within the radius of interest. It is also useful to know if the water body has public access.

☐ No fishable water bodies are within the appropriate radius thus no map was provided. If water bodies are present within the appropriate radius, please explain why they would not be considered fishable:

☒ **Farming locations**

While land use maps provide the MPCA with general information, it is recognized that agricultural land use does not equate to actually having farms present. Provide a map showing the specific locations of farms within the specified area.

Stack height less than 50 meters:	1.5 kilometers (approximately one mile)
Stack height between 50 and 100 meters:	3 kilometers (approximately two miles)
Stack height greater than 100 meters:	10 kilometers (approximately six miles)

If no information is available regarding land use, the default assumption will be that a farmer could be impacted by facility emissions, and the farmer's risks will be used as a basis for decisions. If land use indicates that farms do not exist within the appropriate radius, only resident risks will be assessed. Resident exposures could include ingesting chickens, eggs, or other livestock that are raised on the property if allowed by ordinances. Additional exposure guidance is provided in the instructions provided in Form 2b.

When available, provide additional information about farms surrounding the facility. For example:

☒ What crops are grown on the farm?
☐ What animals are raised?
☐ Is it a small family farm?
☐ Is it a large commercial farm?
☐ No farms are within the appropriate radius thus no map was provided.

Exposure Information

1. Is there a fence surrounding the facility? ☒ Yes ☐ No
2. Is access to the property restricted? ☒ Yes ☐ No

   Describe: **The facility is in the industrial area of Perham where it is unlikely people without business at the Facility would spend time.**
3. Does the facility rent or lease portions of property for farming or other purposes that could provide exposure to public? ☐ Yes ☒ No

   If yes, describe:
4. Is there a fishable water body on farming property? ☐ Yes ☒ No
5. Describe access to the water bodies (within appropriate radius)? ☒ Public ☐ Private property

   Describe: **The Otter Tail River is approximately 1.25 miles from the facility, which is close to the appropriate**

radius. There is no fishing access to the River near the facility. The southern edge of Little Pine Lake is within the radius and is considered a fishable water body, although the public boat access to the lake is not within the radius.

6. Is it possible for emissions from diesel trucks idling on the facility property to be equivalent or greater than 2 or more trucks idling continuously for an hour or longer? ☐ Yes ☒ No

   If yes please briefly describe the conditions under which trucks idle on the property, the maximum number of trucks expected to be idling on the property at the same time, for how long, and approximate distance to the maximally impacted receptor. Also, describe any proposed diesel emission reduction steps, such as steps described in an idling prevention plan or the use of retrofitted equipment. A "yes" response serves as a prompt for further consideration but does not automatically imply the need for further quantitative analysis.

   Describe:

Please describe any additional site specific uncertainties related to the emissions, dispersion modeling, toxicity benchmarks or exposure assumptions used in the AERA:

See Sections 9 and 10 of the HHRA Report for Uncertainty Analyses.

Please describe any additional analysis (e.g. a mineral fibers analysis) performed beyond what is described in the guidance:

Quick Reference Table (See AERA-02b Instructions for additional information)

Qualitative section	What to include	Resources
Receptors and sensitive populations	Schools, daycares, recreation centers/playgrounds, nursing homes, hospitals, and residence locations	Aerial photos from sites referenced above or local records, databases.
General neighborhood information	Population and nearest residents if not addressed under Receptors and Sensitive Populations.	U.S. Census Bureau: http://www.census.gov/ Minnesota Census Quick Facts: http://quickfacts.census.gov/qfd/maps/minnesota_map.html and http://www.census.gov/census2000/states/mn.html
Nearby facilities	Map and/or list of permitted facilities with air emissions; not limited to facilities with air permits	Minnesota Environmental Data Access: http://www.pca.state.mn.us/data/edaAir/ What's In My Neighborhood?: http://www.pca.state.mn.us/backyard/neighborhood.html
Zoning	Description of zoning within a 10 km radius where available	Zoning maps are searchable on the internet for most counties in Minnesota – use your preferred search engine to find "MN zoning maps"
Land use	Provide map showing land use within a 10 km radius including farming, forests, residential and industrial areas. It is recommended to verify information with a site visit.	Minnesota County Land Use Maps: http://www.mnplan.state.mn.us/maps/LandUse/ Minnesota Land Use and Cover: http://www.mngeo.state.mn.us/landuse/
Risk receptor information and isopleths	Maps can be generated using AERMOD when using the Q/CHI methodology. Maps can be produced for each exposure time and scenario, e.g. acute inhalation, by overlaying the risk isopleths with an aerial photograph of the area.	AERMOD software http://www.lakes-environmental.com/ISCAERMOD/ISCAERFeatures.html Aerial photographs obtained from either the Agency or other GIS-based source.
Fishable water bodies	Provide map with labels of fishable water bodies. Information on accessibility to water body should be provided when available.	Lake Finder: http://www.dnr.state.mn.us/lakefind/index.html
Farming locations	Provide map showing farming locations surrounding facility. Additional information regarding crop types, animals raised,	Minnesota County Land Use Maps: http://www.mnplan.state.mn.us/maps/LandUse/

Qualitative section	What to include	Resources
	number of animals, farm size, and other qualitative information about the farm may be provided.	

MPCA Review Instructions

Specific section/document review

MPCA staff will summarize their review of specific sections/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals.

Overall adequacy/completeness summary

*If **all** of the necessary sections/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Please summarize these results in the AERA-01 form.** The AERA-01 form will be shared with the permit engineer conducting the permit application completeness review. If deficiencies are noted in this form during the completeness review then this form should also be shared with the permit engineer who will share it with the applicant.*

MPCA qualitative review summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*	*Information*
4/11/12	*4/27/12*	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init:	*8/23/12*	☒ Yes ☐ No Init: HMH	*Project description*
4/11/12	*4/27/12*	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init:	*8/23/12*	☒ Yes ☐ No Init: HMH	*Summary of compliance, complaints, and/or community concerns*
4/11/12	*4/27/12*	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init:	*8/23/12* *Additional residential receptors will be added to IRAP so update figure 6.1*	☐ Yes ☒ No Init: HMH	*Sensitive receptors map and nearby residences*
4/11/12 *5/10/12*	*4/27/12* *5/11/12*	☒ Yes ☐ No Init: HMH Updated with2010		☐ Yes ☐ No Init:	*8/23/12 Inconsistencies are acceptable between forms because of different uses and calculation methods.*	☒ Yes ☐ No Init: HMH	*Census data/population density map or information*
4/11/12	*4/27/12*	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init:	*8/23/12*	☒ Yes ☐ No Init: HMH	*Determination on whether the facility is subject to Minn. Stat. 116.07, Subd4a (the Phillips neighborhood)*

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*	*Information*
4/11/12	4/27/12	☒ Yes ☐ No		☐ Yes ☐ No	8/23/12	☒ Yes ☐ No	Map or list of permitted air emission facilities at

		Init: HMH		Init: _____	MNRisks and NATA were consulted	Init: HMH	proper radius
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: _____	8/23/12	☒ Yes ☐ No Init: HMH	Map or description of zoning within 10km of the facility
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: _____	8/23/12	☒ Yes ☐ No Init: HMH	Map showing current land use within 10km
4/11/12 5/10/12	4/27/12 5/11/12	☒ Yes ☐ No Init: HMH Description Added.		☐ Yes ☐ No Init: _____	8/23/12 **Additional residential receptors will be added to IRAP so figure 6.1 needs to be updated.**	☐ Yes ☒ No Init: HMH	Risk receptor information and isopleth maps if applicable (check NA only if a RASS was used)
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: _____	8/23/12	☒ Yes ☐ No Init: HMH	Map of fishable water bodies
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: _____	8/23/12 **Please label any farms discussed in the text on a map.**	☐ Yes ☒ No Init: HMH	Map of farming locations
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: _____	8/23/12	☒ Yes ☐ No Init: HMH	Exposure information
4/11/12	4/27/12	☒ Yes ☐ No Init: HMH N/A		☐ Yes ☐ No Init: _____		☐ Yes ☐ No Init:	Description of additional site specific uncertainty or additional analysis

MPCA qualitative review questions:

Is all the necessary information present? ☒ *Yes* ☐ *No*

Based on the modeled stack heights, do the maps show the appropriate radius? ☒ *Yes* ☐ *No*

Did they follow the guidance in presenting this information? ☒ *Yes* ☐ *No*

Is the information correct? ☒ *Yes* ☐ *No*

☒ *Yes, a site visit was conducted by the following MPCA staff on (mm/dd/yyyy): 11/17/2011*

MPCA qualitative review notes:

The following additional language was provided: The farms surrounding the facility, as shown on Figure F47, grow irrigated crops. Per responses from Perham residents, these fields typically grow potatoes and soybeans. No livestock are raised on these farms, and the feedlot depicted at the southeast edge of the 1.5 km radius is an auction house that does not raise livestock on4site. The farmer exposure pathway is being evaluated at the highest impacted location.

MPCA staff confirmed that the complaints tracker has no recent complaints for the facility.

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-03

Air Dispersion Modeling Analysis Form to Support
Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 10

Purpose: This form describes the modeling assumptions and methods that will be/were used in an AERA submitted prior to submitting an air permit application (pre-app) or with an air permit application (post-app). It can function as a protocol, submittal checklist and Minnesota Pollution Control Agency (MPCA) review document. There are different forms for criteria pollutant modeling. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. Please consult the AERA guidance at http://www.pca.state.mn.us/index.php/view-document.html?gid=146 and modeling guidance at http://www.pca.state.mn.us/nwqh421 for instructions on modeling for an AERA. An AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted and MPCA staff have determined the appropriate methods have been used. **Submitting AERA materials for review prior to submitting an air permit application is highly recommended** so that site specific suggestions from MPCA staff can be included in AERA materials submitted with an air permit application.

Facility Information

1. AQ Facility ID No.: **11100036**
2. Three-letter modeling facility ID (ex., ACE): **PRF**
3. Date(s) of pre-application submittal: **4/11/2012, rev. 5/10/2012, rev. 6/13/2012** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: MN Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4898** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the AERA air dispersion modeling materials submitted pre-app and those submitted post-app?
☒ Yes ☐ No ☐ NA
If yes, please explain the differences:

Answers have been clarified based on comments and discussion with PCA. The seasonal category for April is 5 (transition spring), not 3 (winter without snow). The land cover justification was updated (see Page 6). – 6/13/2012 submittal

Text regarding the NO_2 and vehicle discussion has been simplified (see Page 4). Concentration isopleths with receptor locations are included in the HHRA Report document. – 9/5/2012 submittal.

MPCA review question: *Are there differences between the AERA air dispersion modeling materials submitted pre-app and those submitted post-app?* ☐ *Yes* ☐ *No* ☐ *NA*
If yes, please explain the differences:

MPCA Summary of Overall AERA Air Dispersion Modeling Review

Names of MPCA AERA reviewers: *Heather Magee-Hill, HMH, Gregory Pratt, GP*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app AERA air dispersion modeling determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app AERA air dispersion modeling completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	*****Technical accuracy review date*** *(mm/dd/yyyy)*	*****Technical accuracy determination and reviewer's initials***
04/11/12	*05/10/12*	☐ *Yes* ☒ *No* *Init: HMH, GP*		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____

5/10/12	*6/4/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____

MPCA overall AERA air dispersion modeling review questions:

Are differences in methodologies between the approved protocol and modeled results acceptable? ☐ *Yes* ☐ *No*

Why:

MPCA overall AERA air dispersion modeling pre-app review notes including comments on deficiencies and how they can be remedied:

See 5/7/12 and 5/17/12 e-mail. Protocol approved with the understanding that:

1. The modeling for the AERA for criteria pollutants such as NO2 and possibly lead will be refined using a method that will be described in more detail with the criteria pollutant protocol. This includes using the H1H results from the more refined method should be used to calculate a risk estimate using the health benchmarks in the risk assessment, not the H8H. If the H1H monthly concentration exceeds the lead standard then more refined IEUBK modeling should be done to supplement the risk assessment.

2. The following seasonal categories, which are identical to the categories used in the Pope/Douglas Solid Waste Management Facility HRA: 4,4,4,5,5,1,1,1,1,2,3,4. Based on review of aerial photographs and AERSURFACE output, the following land use are proposed: Category 2 (agricultural) for each 10 degree increment from 10 degrees through 200 degrees, and Category 5 (suburban, forested) for all remaining 10 degree increments.

3. If mercury deposition is directly modeled instead of using default deposition velocity estimates over the water body and terrestrial watershed, the MPCA will need to approve the protocol.

4. The subsistence fisher exposure scenario will be evaluated with an explanation.

5. The distance from the driveway to the property line was re-evaluated. The current facility distance from the driveway to property line is 26 m while the proposed facility distance is 21 m. The RASS spreadsheets have been updated accordingly. Results do not change: diesel PM still screens out based on RASS results and NO2 will be further evaluated in the HRA.

6. The NAAQS modeling is yet to be finalized and may impact the AERA discussion of the criteria pollutants.

-The above issues were resolved by 8/23/12 review.- HMH The AERA included modeling for NO2 from the stacks, like the other air toxic pollutants, assuming 100% Permitted NOx was NO2 no refined NO2 modeling of the stack was submitted. The criteria pollutant screening from the RASS did not trigger additional lead or IEUBK modeling. No direct Hg deposition modeling was submitted. The NAAQS modeling protocol was approved.

MPCA overall AERA air dispersion modeling post-app review notes including comments on deficiencies and how they can be remedied:

*****MPCA overall AERA air dispersion modeling technical accuracy review notes including comments on deficiencies and how they can be remedied:***

Additional receptors need to be added for the residences just north of the facility.

General Information

This form is being submitted: **(mark the box that is relevant to the current submittal but keep dates of other submittals in the chart as a log)**	Submittal date(s) (mm/dd/yyyy)
☐ As part of a HHRAP-based analysis protocol (AERA-26)	**4/11/2012, rev. 5/10/2012,**
☐ As a non-HHRAP-based analysis protocol	
☐ To explain results in a pre-app submittal*	**rev. 6/13/2012, vehicle modeling submitted 7/12**
☒ To explain results in an air permit application*	**9/5/2012**

*If applicable, please explain any differences in methodologies between the approved protocol and the modeled results:

Please select all of the modeling methods that will be/were used.

☒ RASS "look-up" table dispersion factors

☐ DISPERSE (Dispersion Information Screening Procedures for Emission Risk Screening Evaluations)
☒ AERMOD to generate dispersion factors for the RASS (using 1 g/sec emission rates)
☐ AERMOD to generate individual pollutant concentrations for the RASS
☐ AERMOD to generate risk estimates by modeling Q/CHI sums instead of emission rates
☒ AERMOD to conduct deposition modeling for input into a HHRAP-based analysis (e.g., IRAP)
☒ AERMOD to generate unitized dispersion factors for MMREM
☐ AERMOD to generate mercury air concentrations for MMREM
☐ Other (explain): ______

Please indicate why the specified modeling method was selected.

☐ AERMOD modeling will **not** be/was **not** done because:
- ☐ RASS lookup tables showed results below risk guidelines
- ☐ DISPERSE modeling showed results below risk guidelines

☐ AERMOD modeling will be/was done after conservative screening modeling results were submitted
☒ AERMOD modeling will be/was done without submitting conservative screening modeling results
☐ Other (explain): ______

Please indicate what support documents are being submitted. If this form is being submitted as a protocol, please include at least one sample of each of the appropriate files listed below. A sample represents the framework of how the model will generally be set up and may not include, for example, facility specific source inputs. If this form is being submitted to describe results, please submit all of the following files which were used in the analysis:

AERMOD input: *(Input file should include buildings and receptor grid(s))*	☐ sample ☒ complete set (*.inp, *.adi, *.ami)
AERMOD output:	☐ sample ☒ complete set (*.ado, *.plt)
BPIP-PRIME Input files:	☐ sample ☒ complete set (*.bpi)
AERMAP files:	☐ sample ☒ complete set (*.dem(s), *.tif [NED files])
Meteorological files:	☐ sample ☒ complete set (*.pfl, *.sfc)
Q/CHI plot files if using Q/CHI method:	☐ sample ☐ complete set
Modeled emissions file/s	☐ sample ☒ complete set (*.txt, *.xls)
Other:	☐ sample ☐ complete set

How were the above supporting files (AERMOD, BPIP-PRIME, AERMAP files) submitted?

☒ CD-ROM included with AERA submittal
☐ SAMS spreadsheet (indicate name of file): ______
☐ E-mailed separately
☒ Downloaded from a FTP site
☐ Other (explain): ______

Please note any additional information for the General Summary section (e.g., hourly and annual modeling was conducted differently).

MPCA general information review summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
04/11/2012	*05/10/2012*	☒ *Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init: ____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

Detailed Modeling Descriptions

1. **Criteria pollutant modeling summary:** Please identify how the Criteria Pollutants will be/were modeled.

☒ NAAQS/MAAQS air dispersion modeling will be/was conducted for the following pollutants, and the analysis/protocol is: contained in the general file named: **Criteria Protocol approved**

☒ NO_2 ☒ PM_{10} ☒ $PM_{2.5}$ ☒ SO_2 ☒ CO ☒ Pb ☐ H_2S

☒ Other (explain): **NAAQS modeling was conducted for NO_2 and lead. PM_{10}, $PM_{2.5}$, SO_2, and CO were modeled in comparison to the Significant Impact Levels (SIL). H_2S will not be modeled as it is not an emitted pollutant.**

☐ The remaining Criteria Pollutants were compared to NAAQS/MAAQS in the RASS (Risk Assessment Screening Spreadsheet) using high-first-high (H1H) modeled concentrations as a screening step.

☐ All Criteria air pollutants were compared to NAAQS/MAAQS in the RASS (Risk Assessment Screening Spreadsheet) using high-first-high (H1H) modeled concentrations as a screening step.

☒ Criteria pollutants with health benchmarks were also included in the summation of hazard indices and cancer risks (e.g., NO_2 and lead).

☐ Except for using H1H values, inclusion/exclusion of different sources and different emission estimates, the AERA dispersion modeling will be /was the same as the criteria pollutant modeling.

Give any additional information about the Criteria Pollutant Modeling (list any deviations from EPA or MPCA guidance)?

The modeling for the AERA for NO_2 includes vehicle emissions from on-site traffic in addition to stack emissions.

The criteria pollutant modeling used a receptor grid extending 3 km from the facility in each direction, following EPA guidance. The AERMOD deposition modeling used for the IRAP analysis has receptors extending 10 km from the facility.

MPCA criteria modeling review summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
04/11/2012	*05/10/12*	☒ *Yes* ☐ *No* *Init: HMH with understanding that criteria pollutant modeling protocol still needs finalizing*		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:*
05/10/12		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*

MPCA criteria modeling summary review questions:

Is there/will there be sufficient information about the criteria pollutants for the AERA? ☒ *Yes* ☐ *No*

MPCA criteria modeling summary review notes:

*There are still issues with the background and other source concentrations of NO2 in the criteria pollutant modeling, but that should not affect the AERA analysis. This statement doesn't make sense: "***NAAQS modeling is only conducted for NO_2 and lead. PM_{10}, $PM_{2.5}$, SO_2, and CO modeled less than the Significant Impact Levels (SIL).**" All of the listed pollutants need to be modeled. The modeling showing that the concentrations are below the SILs must be submitted and must be done following the same NAAQS modeling guidance as the other pollutants except that background and other sources need not be included. –GP

-The criteria pollutant protocol was approved on 8/14/12 clarifying the criteria pollutant modeling. -HMH

2. **Air dispersion model specifics** (mark all that apply):

☒ Only High-first-high (H1H) values will be/were specified in the model output setup ☒ Yes ☐ No

If no, explain:

☒ AERMOD Version **12060** (e.g., 09292) will be/was used
☒ AERMOD Regulatory Default Option will be/was used
☒ AERMOD Concentration option will be/was used
☒ AERMOD Rural item will be/was used
☐ AERMOD URBANOPT item will be/was used
☒ AERMOD Non-Regulatory Default Option will be/was used
☐ Some non-default AERMOD items will be/was used (requires MPCA written approval)*

*FASTALL, FASTAREA, FLAT, POINTCAP, POINTHOR, etc., explain:

Deposition parameters are also included in AERMOD to support IRAP.

Please give any additional information for the Air Dispersion Model Summary (list any deviations from EPA or MPCA guidance)?

MPCA air dispersion model specifics summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
04/11/2012	05/10/2012			☐ Yes ☐ No Init: ____		☐ Yes ☐ No Init: ____
5/10/12	5/11/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: ____	8/23/12	☒ Yes ☐ No Init: HMH

MPCA air dispersion model specifics review questions:

Do you approve of the methods described above? ☒ *Yes* ☐ *No*

MPCA air dispersion model specifics review notes:

The criteria pollutant modeling will be finalized after the criteria pollutant modeling protocol is submitted and approved.

-The criteria pollutant protocol was approved on 8/14/12 clarifying the criteria pollutant modeling. -HMH

3. Meteorological data summary:

Does the modeling use five years of meteorological data? ☒ Yes ☐ No

☒ Was the latest version of MPCA pre-processed meteorological data used (06341 or 11059)?

If checked, enter the MPCA ZIP file name: **PKDINL5Y_20062010**

Please indicate the three letter call sign, station name and the state the meteorological surface station is located in. (Ex.: MSP: Minneapolis/St. Paul, MN)

Pre-processed AERMET version 06341 or earlier files: ____

Pre-processed AERMET version 11059, with or without AERMINUTE version 11059 processing, files: **PKD: Park Rapids, MN**

What meteorological upper air station was used? Station/Site: **INL: International Falls, MN**

SITEDATA Facility/Site: **International Falls, MN**

PROFBASE elevation (meters): **439.0**

What consecutive 5-year period will be used (e.g. 1986 - 1990 w/o AERSURFACE; 2001 - 2005 w/AERSURFACE):

2006-2010

Note: If site-specific meteorological data will be collected and used, please follow the federal guidance (EPA's), as specified in section 8.3 and section 8.3.3.2 (QA/QC) of 40 CFR Part 51 dated 11/09/2005 (Appendix W).

☐ If site-specific meteorological data will be collected and used, where will the **location** of the meteorological tower be set (city and state, coordinates, etc.)? ____

☐ If site-specific meteorological data will be collected and used, what **year** of data is proposed to be used? ____

What justification(s) applies for the proposed surface and upper air stations identified above? (Check all that apply)

☒ Similar surface characteristics as meteorological tower

☒ Proximity to surface and/or upper air station(s)

☒ Similar land use characteristics

☐ Similar wind patterns/characteristics

☐ Other – Please describe: ____

☒ AERSURFACE version: **08009**

☒ (Land Cover) LULC data source: **1992 LULC**

☒ Explain how LULC was parameterized: **LULC from Park Rapids was used due to similar land features and the best available surface roughness for available LULC files.**

☒ A 10km by 10km domain for albedo and Bowen ratio will be/was used

☒ A 1km radius domain for roughness height will be/was used

☒ Yearly-averaged moisture conditions (wet, dry, or average) based on historical ranks will be/were accounted for in AERSURFACE (for the Bowen Ratio)? ____

☒ Cultivated land (a.k.a. row crops or cropland; z_o~0.01m to 0.2m)

☐ 50/50 mix of cultivated land and deciduous forest (z_o~0.3m to 0.8m)

☐ Deciduous forest (and major urban downtown areas) (z_o~0.5m to 1.3m)

☐ Unknown land use

☒ Other criteria will be/were considered (explain): **The land use surrounding PRRF was obtained from a review of aerial photographs and AERSURFACE. Categories chosen best match the land cover around the facility.**

☐ **EPA** post-processors (such as LEADPOST) are proposed to be used.
Please list: ______

☒ Topography at the project site and potential NWS sites was considered.
☒ Prevailing wind conditions at several potential NWS sites were considered.
☒ Frequency of calm hours at several potential NWS sites were considered.
☒ Frequency of missing data at several potential NWS sites were considered.

If urban (URBANOPT), please indicate:

Population: ______ Roughness height (meters): ______

Population rationale:

☐ Full Metropolitan Statistical Area (MSA) ☐ Full Micropolitan Statistical Area (MSA)
☐ Partial Metropolitan Statistical Area ☐ Partial Micropolitan Statistical Area (MSA)
☐ Other (specify): ______

Roughness height rationale (e.g., project site estimated via National Land Cover Data (NLCD) with MPCA Land Use.

☐ The wind speed categories in the ME WINDCATS pathway will be set to default wind speeds in conjunction with no wind speed emission factors? ☐ Yes ☐ No

a. If no, please list the user-specified wind speed categories as proposed: _____, _____, _____, _____, _____
b. Will these be used in conjunction with the SO EMISFACT WSPEED pathway? ☐ Yes ☐ No
c. If yes, please list the user-specified wind speed emission factors as proposed: _____, _____, _____, _____, _____, _____

Please add additional information for the Meteorological Data Summary (list any deviations from EPA or MPCA guidance)?

MPCA meteorological data summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
04/11/2012	*05/10/2012*	☒*Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA meteorological data review questions:

Do you approve of the methods described above? ☒ *Yes* ☐ *No*

MPCA meteorological data review notes:

4. Terrain and geospatial summary (AERMAP 09040: generally use NED data)

☒ AERMAP will be/was used. If not please explain: ______
Please write the AERMAP Version (e.g. 09040): **11103**
USGS DEM Data will be/was used: Check the appropriate specification: ☐ None ☐ 1-degree ☐ 7.5 minute ☐ mix
☐ Other (specify): ______

☒ National Elevation Dataset NED: **1/3 arc second**

☒ UTM coordinates (NAD83, zone15 extended) will be/were used.
Note: All UTM coordinates must be in NAD83, **not** NAD27.
☐ If other please explain: ______

Check the maximum terrain variation (meters [m] – as applicable):

☐ Within 10m of shortest stack ☐ Within 10m of lowest fugitive source
☒ Within 100m of shortest stack ☐ Within 100m of lowest fugitive source

☒ Within 1000m of shortest stack ☐ Within 1000m of lowest fugitive source

Additional information for the Terrain and Geospatial Summary (list any deviations from EPA or MPCA guidance)?

The maximum terrain variation within 100 or 1000 meters of the shortest stack is small and will not affect dispersion modeling.

MPCA terrain and geospatial summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
04/11/2012	*05/10/2012*	☒*Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init:*
		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

MPCA terrain and geospatial review questions:

Do you approve of the methods described above? ☒ *Yes* ☐ *No*

MPCA terrain and geospatial review notes:

5. **Building summary** (BPIPRIME 04274: please use UTM coordinates and CSS approach):

☒ BPIP-Prime will be/was used.

If not please explain: ____

☐ BPIP option 1: MPCA defined "square" structure

☐ BPIP option 2: User defined "rectangular" structure

☒ BPIP option 3: pre-existing BPIP file; Filename

☒ All buildings will be/were included.

If not please explain: ____

☒ Composite single structures with multiple tiers will be/were used.

Note: Tiering of buildings must follow guidance from section 6 of the Oct. 2004 "*MPCA Air Dispersion Modeling Guidance For Minnesota Title V Modeling Requirements And Federal Prevention of Significant Deterioration (PSD) Requirements (Version 2.2).*"

Is the tallest modeled building height greater than or equal to the tallest height on Form MI-01? ☐ Yes ☒ No

Are all DISPERSE stack locations at the "building" center? ☐ Yes ☐ No ☒ Not Applicable

Additional information for the building summary (list any deviations from EPA or MPCA guidance)?

See the BPIP for modeled building parameters.

MPCA building summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
04/11/2012	05/10/2012	☒ *Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*
		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

MPCA building review questions:

Do you approve of the methods described above? ☒ *Yes* ☐ *No*

MPCA building geospatial review notes:

6. Receptor summary:

☒ Receptors will be/were placed along the owned and controlled property boundary.
☒ The modeling followed MPCA Guidance for Ambient Receptors (http://www.pca.state.mn.us/nwqh421).
☐ If not, will/was a polar grid used?

	Spacing	Dimension	Number
a. Inside the property boundary(s):	meters		
b. On the fenceline(s):	25 meters	25 m	29
c. On the property line(s):	25 meters	25 m	29
d. Beyond the property line(s):	100 meters	6 km x 6 km	3968
Total area		36 square kilometers	3997

☒ Additional air dispersion modeling receptors will be/were placed at locations of additional risk receptors. Please describe these receptors:

In the refined HHRA additional receptors were added inside the property line to address the unfenced areas of the facility. Furthermore, the receptor grid was extended 10 km from the facility per HHRAP guidance. This resulted in a total of 41,248 receptors including 27 fenceline and 14 property line receptors.

☐ Flag pole receptors will be/were included. Please describe the flag pole receptors and how/why they were chosen:

Additional information for the receptor summary? (list any deviations from EPA or MPCA guidance)

Receptors are placed along the fenceline, within the property boundary, and also along the property boundary where paved road sources operate outside the fenceline.

For the refined IRAP analysis, a receptor grid following HHRAP will be used. The HHRAP guidance lists a grid extending 10 km from the facility. Modeling to support MMREM included receptors across Little Pine Lake and its watershed.

MPCA receptor summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
04/11/2012	05/10/2012	☒ *Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____
		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____

MPCA receptor review questions:

Do you approve of the methods described above? ☒ *Yes* ☐ *No*

Is there a reason to consider that the presence of "flagpole" receptors which may experience higher concentrations than the maximum ground level concentrations? ☐ *Yes* ☒ *No* *Why?*

MPCA receptor review notes:

Additional receptors need to be added for the residences just north of the facility.

AERA Emission Source Summary

What will be/is the minimum stack height modeled (in meters)? **22.9 m**

What will be/is the maximum stack height modeled (in meters)? **38.1 m**

Will/is the shortest modeled stack height equal to the shortest height on Form GI-04? ☒ Yes ☐ No

Will/were any stacks (be) merged? ☐ Yes ☒ No

If yes, which stacks will be/were merged? ______________________________

If stacks will be/were merged will they be/were stacks merged per MPCA DISPERSE guidance? ☐ Yes ☐ No

If no explain how the stacks will be/were merged:

MPCA example of merged stacks

Model ID & Form GI-04 SV_ID_No.	RASS Stack ID number	Stack Height (meters)	Stack Temperature (Kelvin)	Stack Velocity (m/sec)	Stack Diameter (meters)
1 (3 merged stacks from Form GI-04): SV001 SV002 SV003		10.0 (lowest of 3 values below) 10.0 11.0 12.0	293 (lowest of 3 values below) 300 310 293	2.5 (lowest of 3 values below) 3.3 2.5 2.7	1.0 (lowest of 3 values below) 1.1 1.1 1.0
2 (SV004 only)		20	400	3.3	1.0
3 (SV005 only)		15	350	11.1	3.2
4 (Coal Pile)		1	293	0.001	20

MPCA review questions:

Did the insignificant source characterization follow the AERA guidance? ☒ *Yes* ☐ *No*

Were stacks merged appropriately? ☐ *Yes* ☐ *No* ☒*N/A*

Do the stack parameters in the modeling correctly characterize the emission sources? ☒ *Yes* ☐ *No*
See the AERA-03 form for a summary of the source parameters used in the modeling.

Is the characterization technically correct? ☒ *Yes* ☐ *No*

MPCA emission sources review notes:

☐ An operating scenario of less than 8760 hrs/day will be/was used and it is reflected in a permit limit or physical limit.

Are any of the point sources capped and/or have horizontal stacks (see guidance in section 6.1, AERMOD Implementation Guide (03/19/2009)) and accounted for in the following? ☒ No ☐ Yes → exit velocity(s) = 0.001 m/s

☐ Non-Default POINTCAP/POINTHOR*

*Please provide justification for use of non-default option in question b, below.

b. Additional information for this subsection:

Volume sources:

☐ Yes ☐ N/A ☒ No – Please explain:

Area sources were used to characterize the paved roads in the facility for PM10 and PM2.5 criteria pollutant modeling. Volume sources were not used since the nearby receptors would be within their exclusion zone. EPA's Haul Road Workgroup Final Report was followed (http://www.epa.gov/ttn/scram/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pdf).

Please refer to the modeling guidance on calculating the lateral and vertical dimensions.

a. Will there be any volume source(s) overlapping or within 1.0 meters of any receptors? ☒ No ☐ Yes*

*Volume source should be converted to an area source of commensurate size (per section 6.2 of the latest AERMOD Implementation Guide (03/19/2009)) or be further refined.

b. Additional information for this subsection:

Area sources are modeled for PM10 and PM2.5 criteria pollutant modeling only. A truck point source was modeled on the south side of the facility in AERMOD and traffic on the northside of the facility was characterized using the RASS.

Open pit sources:

☐ Yes ☒ N/A ☐ No – Please explain:

Stack parameters details Information about insignificant sources can be found in the AERA-05 form.

Please fill out the table below or indicate a file where this information can be found (modeled values should match Form GI-04 values unless merged): **See GI-04 and AERMOD files**

*** These column headings are for point sources and will change with different source types**
*For area sources the column headings are: height (m), XINIT, YINIT, ANGLE, SZINIT
*For volume sources the column headings are: height (m), SYINIT, SZINIT
*For area circle the column headings are: height (m), Radius, Nvert, SZinit
*For area poly the column headings are: height (m), Nvert, SZinit

RASS ID#	Source ID	Source type (point, volume, area, etc.)	*Stack height (meters)	*Stack temperature (Kelvin)	*Stack exit velocity (m/sec)	*Stack diameter (meters)	*	Facility descriptions
1	**SV 001**	**Point**	**22.9**	**458**	**13.3**	**1.2**		**Current MWC Stack**
2	**SV 004**	**Point**	**27.1**	**378**	**9.2**	**1.2**		**Auxiliary Boiler Stack**
3	**SV 009 but modeled SV010 and MWC**	**Point**	**38.1**	**436**	**25.9**	**1.2**		**Proposed Combined MWC Stack**
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

Additional information for the Emission Source Summary (list any deviations from EPA or MPCA guidance):

None

Explain any site specific uncertainty that might be associated with the modeling:

None

MPCA Stack Parameters Review Summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
04/11/2012	05/10/2012	☒*Yes* ☐ *No* *Init: gcp*		☐ *Yes* ☐ *No* *Init:* ____	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____

MPCA stack parameters review questions:

Do the stack parameters correctly characterize the emission sources? ☒ *Yes* ☐ *No*
Is the characterization technically correct? ☒ *Yes* ☐ *No*

MPCA stack parameters review notes:

MPCA additional air dispersion modeling review questions:

1. *How accurate is the dispersion model to the actual site dispersion? What are the factors impacting the accuracy:*

2. *Please explain any site specific uncertainty related to the modeling:*

3. *If possible, describe the location of the maximum concentration for annual and hourly modeling (Note: In general air dispersion modeling analyses are designed not to underestimate concentrations. The exact locations of maximum risk may vary due to the exact time of emission releases, or actual dispersion which depends on weather conditions):*

4. *Describe any additional modeling or modeling validation conducted by MPCA staff:*

Proposer/Preparer Instructions

Boxes can be checked by clicking on them. Response areas will expand as necessary to include the complete response. Multiple dates can be added by using the "Enter key" (return key) after you type the first date. All Air Emission Risk Analysis (AERA) documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

If **all** of the requested forms and support documents **are not included** with an air permit application needing an AERA the air permit application **will be deemed incomplete**. This includes risk estimates for pre-existing facilities. MPCA staff will return this AERA form plus any other incomplete AERA forms to the applicant with deficiencies and remedies indicated in the *italicized* MPCA review areas. If forms were submitted pre-app they should be updated and re-submitted post-app with any *italicized* MPCA comments left in and changes summarized in the appropriate areas.

Facility Information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

MPCA Review Instructions

Specific section/document review

MPCA staff will summarize their review of specific sections/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals.

Overall adequacy/completeness summary

*If **all** of the necessary sections/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. If this form is being submitted as a protocol indicate in the MPCA overall review notes whether the protocol is approved or has deficiencies. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Please summarize these results in the AERA-01 form.** The AERA-01 form will be shared with the permit engineer conducting the permit application completeness review. If deficiencies are noted in this form during the completeness review then this form should also be shared with the permit engineer who will share it with the applicant.*

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-05

Emissions Form
Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 8

Purpose: This form describes emission rates used in an AERA submitted prior to submitting an air permit application (pre-app) or with an air permit application (post-app). This form also documents the Minnesota Pollution Control Agency (MPCA) AERA emissions review. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. For general information on estimating emissions for an AERA, please refer to the "AERA Guidance" on the MPCA website at http://www.pca.state.mn.us/ktqh42a and the "Guidance on Estimating Emissions for an AERA" at http://www.pca.state.mn.us/udgx42e. An AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted and MPCA staff have determined that appropriate methods have been used. **Submitting AERA materials for review prior to submitting an air permit application is highly recommended** so that site specific suggestions from MPCA staff can be included in AERA materials submitted with an air permit application.

Facility Information

1. AQ Facility ID No.: **111100036**
2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **04/11/2012, rev. 5/10/2012, rev. 5/16/2012, rev. 6/13/2012 7/20/12 vehicle emissions submitted** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: MN Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4898** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the AERA emission estimates submitted pre-app and post-app?

☒ Yes ☐ No ☐ NA If yes please explain what and why:

Names of HHRAP-based analysis files have been included on Page 2. Future projected actual emissions used for other future scenarios are explained on Page 4. Uncertainty is discussed on page 10 and in the HHRA Report. –pre app submittal. Based on MPCA's reviews and comments, AERA-05 has been updated to clarify the acute emissions from vehicles. IRAP Projects have been updated per MPCA comments.– 9/5/2012

MPCA review question: *Are there differences between the AERA emission estimates submitted pre-app and post-app?*

☐ *Yes* ☐ *No* ☐ *NA* *If yes please explain what and why:*

MPCA Overall Summary of AERA Emissions Review

Names of MPCA AERA reviewers: *Heather Magee-Hill*

Submittal date (mm/dd/yyyy)	*Pre-app review date (mm/dd/yyyy)*	*Overall pre-app AERA emissions determination (Select Yes for adequate, No for deficient, and enter reviewer's initials)*	*Post-app completeness review date (mm/dd/yyyy)*	*Overall post-app AERA emissions completeness determination (Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	***Technical accuracy review date (mm/dd/yyyy)*	***Technical accuracy determination and reviewer's initials*
5/17/12	5/21/12	☒ Yes ☐ No Init: HMH		☐ Yes ☐ No Init: ____		☐ Yes ☐ No Init: ____
		☐ Yes ☐ No Init: ____		☐ Yes ☐ No Init: ____		☐ Yes ☐ No Init: ____

MPCA overall AERA emissions review questions:

Do the emissions in the spreadsheet match the emissions in the risk modeling input? ☒ *Yes* ☐ *No* *If the emissions used in the modeling do not match the spreadsheet, do the emissions in the risk modeling overestimate air concentrations (are the assumptions health protective)?* ☐ *Yes* ☐ *No*

Do the emissions in the permit application match the emissions in the risk modeling input? ☐ *Yes* ☐ *No* *If the emissions used in the permit application do not match the risk modeling input, do the emissions in the risk modeling overestimate air concentrations (are the assumptions health protective)?* ☐ *Yes* ☐ *No*

Do the stack parameters in the risk modeling input match the air permit? ☒ *Yes* ☐ *No* *If the stack parameters used in the risk modeling do not match the air permit, do the stack parameters in the risk modeling overestimate air concentrations (are the assumptions health protective)?* ☐ *Yes* ☐ *No*

MPCA overall AERA emissions pre-app review notes including comments on deficiencies and how they can be remedied:

The protocol is approved with the following understanding:

NO_2 will be carried forward to the refined risk analysis and will be evaluated based on the results of the H1H criteria pollutant modeling. The RASS no longer includes any NO_2/NOx ratio. Proposed NO_2/NOx in-stack ratios, as well as ambient ratio, will be discussed in criteria pollutant modeling discussions. MPCA's suggested 2004 study will be reviewed.

-7/12 vehicle emissions included the 2004 NO2/NOx ratio. 100% of the NOx from the stack was assumed to be NO2 in the AERA analysis.

MPCA overall AERA emissions post-app review notes including comments on deficiencies and how they can be remedied:

*****MPCA overall AERA emissions technical accuracy review notes including comments on deficiencies and how they can be remedied:***

Hg emissions used in the analysis should be consistent with what is being proposed in the permit and what is summarized in the Hg-01 form.

General Submittal Information (Provide answers below).

This form covers emission calculations on Excel spreadsheet(s) named: PLMSWA Emission Calcs.xlsx

Used in:

☐ Protocol named:

☒ RASS(s) named: **PLMSWA_RASS_existing.xlsx, PLMSWA_RASS_proposed.xlsx**

☐ Q/CHI spreadsheet(s) named: **N/A**

☒ AERMOD modeling in/output file(s) named: **Contained in folder "IRAPandMMREM files for CD"**

☒ HHRAP based refined analysis file(s) named: **Pr10k821 (proposed scenario), Ex10k830 (existing scenario), PrScen2, PrScen3, PrScen4, Pr_ac_v2 (proposed MWC acute), PNO2_v2 (proposed vehicle acute), ENO2_v2 (existing vehicle acute), E_ac_v2 (Existing MWC acute)**

Will there be/have there been deviations from the general "AERA Guidance" on the MPCA website at http://www.pca.state.mn.us/ktqh42a and the "Guidance on Estimating Emissions for an AERA" at http://www.pca.state.mn.us/udgx42e?

☒ Yes ☐ No If yes please explain what and why:

- **Chemicals that are known to be carried through to the refined risk assessment will not be included in the RASS with a note that they are still a part of the risk assessment and will be quantitatively evaluated in the refined HHRA. These chemicals include 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,7,8- HxCDF; 1,2,3,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,4,5,6-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,7,8-PeCDD; 2,3,7,8-TeCDD; 2,3,7,8-TeCDF. For completeness and to fully utilize the IRAP dioxin/furan reporting functions, 1,2,3,4,7,8,9-HpCDF, OCDD, and OCDF will be included in the refined HHRA. Cadmium, lead, and hydrogen chloride will also be included in the refined HHRA. For acute analysis, NO_2 will be carried forward to the refined HHRA.**
- **Three chemicals have been added to the refined risk analysis: cadmium, hydrogen chloride, and lead. The acute emissions of HCl and lead are still shown on the RASS to show their acute risks are far below thresholds and only the chronic pathways will be evaluated in the HRA.**

The following pollutants with emission estimates from the facility should also be included in the refined HHRAP analysis, since they can contribute to the fish pathway (they have fish biotransfer factors in HHRAP), are not included in either MMREM or the RASS, and cannot be screened out of the RASS since there are no inhalation benchmarks: Acenaphthene, Anthracene, Fluoranthene, Fluorene, Phenanthrene, Pyrene.

MPCA review questions:

Are the changes between pre-app and post-app acceptable? ☐ *Yes* ☐ *No* ☐ *NA Please explain why:*

Are the deviations from the guidance acceptable? ☐ *Yes* ☐ *No* ☐ *NA Please explain why:*

Emission Source Summary (See the AERA-03 Form for a summary of the source parameters used in the AERA modeling)

There are…	**All will be/were quantified in the AERA**	***Some will not be/were not quantified in the AERA**	***None will be/were quantified in the AERA**
☒ Combustion stack/vent point sources	☒	☐	☐
☐ Non-combustion stack/vent point sources	☐	☐	☐
☒ Onsite mobile source tail pipe emissions	☒	☐	☐
☒ Idling vehicle tail pipe emissions	☒	☐	☐
☒ Onsite fugitive emission sources	☐	☐	☒
☒ paved roads	☐	☐	☒
☐ unpaved roads	☐	☐	☐
☐ storage/surge piles	☐	☐	☐
☐ material handling operations	☐	☐	☐
☐ valve, tanks, equipment leaks	☐	☐	☐
☐ other, describe below	☐	☐	☐

Examples of fugitive emissions include but are not limited to traffic on paved and/or unpaved roads, stockpiles of various materials, wind erosion, loadout, etc. Please describe any other fugitive emissions:

Other sources are insignificant activities and not sources of air toxics. Paved roads produce PM and do not have health risk levels.

☒ Yes ☐No ***Some emission sources at the facility will not be/ were not quantified in the AERA per AERA guide section 2.3. In the table below describe the emission source(s) not quantified next to the appropriate explanation.**

Source description:	**The sources not quantified will be/are:**
furnace	"Insignificant activities" defined in Minn. R. 7007.1300 (and its associated emissions) and only emits chemicals

equipment, welding equipment, space heaters, 2 cooling towers, lime handling, tipping floor waste handling, spray paint equipment	that are also emitted by sources/units already included in the emission inventory, and the contribution of the individual activity is less than 1% of the total emission inventory for a chemical (hourly for acute and annual for chronic). ☒ Demonstration calculations included. **(Lime Handling and Cooling Towers)**
Paved roads	Emitters of chemicals that do not have inhalation health benchmarks listed in the RASS.
	Internal combustion engines associated with an emergency generator and/or fire pump and is described in AERA-04 Emergency Internal Combustion Engine Certification Form.
	Associated only with startup, shutdown, and/or emergency situations.
	Screened out because it had total risks below risk driver levels (0.1 for non-carcinogens or 10-6 for carcinogens) using the RASS(s) named:
	Other (e.g., case by case determination on vehicle emissions):

MPCA emission source review summary:

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	*****Technical accuracy review date(s)*** *(mm/dd/yyyy)*	*****Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA emission source review questions:

Did the insignificant source characterization follow the AERA guidance? ☒ *Yes* ☐ *No*

Do the stack parameters in the modeling correctly characterize the emission sources? ☒ *Yes* ☐ *No*
(See the AERA-03 form for a summary of the source parameters used in the AERA modeling.)

***Are the stack parameter characterizations technically correct?* ☒ *Yes* ☐ *No*

MPCA emission sources review notes:

Operating Scenario Summary

The project proposer may choose to assess emissions at the facility's potential to emit (PTE) as defined by state and federal rules. Alternatively or in addition, the project proposer may estimate another future operating scenario, defined in the AERA guidance as "future estimated actual emissions". Please indicate what type of emissions will be/were assessed:

☒ Potential to emit ☒ Future estimated actual

If future estimated actual emissions will be/are used, provide business case description to support future case, three years of Toxic Release Inventory (TRI) information for existing facilities, and propose production-based permit limits *(AERA Guide section 2.3.7)*:

Future projected actual emissions were calculated and can be found in the FPA tab of PLMSWA Emission Calcs.xlsx. Values are based on stack tests from the facility and maximum capacity operating scenario (200 tpd). These emissions were used for Scenarios 2 and 4, which are explained further in the HHRA Report and AERA-26.

☐ An operating scenario of less than 8760 hrs/day will be/was used and is reflected in a permit limit or physical limit.

Explain:

☐ Emission calculations will include/included capture and control efficiencies.

☒ Will/were different methods (be) used for the emissions that will be/were calculated for the proposed and pre-existing project calculations?

Explain: **No**

MPCA operating scenario summary review summary:

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	*****Technical accuracy review date(s)*** *(mm/dd/yyyy)*	*****Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA operating scenario summary review questions:

Was there adequate support for using future estimated actual emissions? ☐ *Yes* ☐ *No*

Does the limited operating scenario reflect a permit limit or physical limit? ☐ *Yes* ☐ *No*

Are the emissions estimates for the facility before and after the project comparable? ☒ *Yes* ☐ *No*

If no, explain:

Are the capture and control efficiencies assumed appropriate and do they correspond to the permit application information?

☐ *Yes* ☐ *No*

MPCA operating scenario summary review notes:

Emission Factor Summary

Indicate which emission factors were generated using each of the sources listed below:

Chemical(s), source type(s) or emission unit(s) (e.g. NO2, natural gas heaters, EU001)	**Emission factor reference**	**Table number or specific reference identifier**	**Publication or report date**	**Rationale for selecting data source**
	Permit Limit:			
EU005	AP-42 Natural gas emissions factors (except those with E rated emission factors based on detection limits).	**1.4-1** **1.4-2** **1.4-3** **1.4-4**	**7/98**	**EF for Natural Gas combustion**
VOC-EU001, EU002	**AP-42: 4th edition supplement C**	**Table 2.1-1**	**Sept 1990**	**Applicable EF for Municipal Waste Combustors**
Lime Handling	**AP-42: Chapter 11.19.2**	**Table 11.19.2-2**	**Aug 2004**	**Applicable EF for Lime Handling**
Fugitive Dust	**AP-42: Chapter 12.2.1**	**Equation 2, Table 13.2.1-1**	**Jan 2011**	**Paved Roads Emission Factor Calculation**
Vehicle Exhaust NO_x	**AP-42: Chapter 3.3**	**Table 3.3-1**	**Oct 1996**	**Applicable EF for Mobile Diesel Engines**
	FIRE:			
	CaTEF:			
	Material Safety Data Sheets:			

Chemical(s), source type(s) or emission unit(s) (e.g. NO2, natural gas heaters, EU001)	Emission factor reference	Table number or specific reference identifier	Publication or report date	Rationale for selecting data source
	EPA emission models ☐ TANKS ☐ MOVES ☐ LandGEM			
	Chemical analyses of feedstocks and products (conservation of mass calculations):			
	Trade or industry organization Emission Factor Database, reports, publications:			
Cooling Tower	**Peer-Reviewed technical literature: "Calculating Realistic PM10 Emissions from Cooling Towers", Environmental Progress Vol. 21 No. 2**		**July 2002**	**Used for similar facilities to calculate cooling tower particulate emissions**
	Toxic Release Inventories:			
	Vendor provided data			
☒ Fill out table below	Facility stack tests: **PRRF**	**See below**	**May 23-26, 2011**	**Site-specific stack test**
☒ Fill out table below	Similar facility stack tests: **Huntington, Stanislaus, OWEF**	**See below**	**See below**	**Provided by MPCA**
PM total, PM filterable, long-term Mercury, HCl- EU 001	Other (explain): **Minn Rule 7011.1229, Class II**	**Table 2**	**May 11, 1998**	**Applicable Regulation**
SO_2, NO_x, CO, Lead, Cadmium, Mercury, HCl, Total D/F- EU001	Other (explain): **40 CFR Part 60, Subpart AAAA**	**Table 1, 2**	**Dec 6, 2000**	**Applicable Regulation**
PM filterable, SO_2, NO_x, CO, Lead, Cadmium, Mercury, HCl, total D/F- EU002	Other (explain): **40 CFR Part 62, Subpart JJJ**	**Table 4, 5**	**Jan 31, 2003**	**Applicable Regulation**
PM total, long-term Mercury- EU002	Other (explain): **Minn. Rule 7011.1127, Class C**	**Table 1**	**May 11, 1998**	**Applicable Regulation**
PM_{10}, $PM_{2.5}$ EU001	Other (explain): **Potential emissions based on Minn Rule 7011.1229 and PRRF stack test**	**See text**		
PM_{10}, $PM_{2.5}$ EU002	Other (explain): **Potential emissions based on Minn Rule 7011.1127 and PRRF stack test**	**See text**		**Applicable Regulation**
Vehicle Exhaust Particulates-Moving Truck	Other (explain): **EPA's Mobile 6.2 program for HDDV**			**Provided by MPCA**
Vehicle Exhaust Particulates-Idling Truck	Other (explain): **Journal of Air and Waste Management, "Idle Emissions from Heavy-Duty Diesel Vehicles: Review and Recent Data"**		**Oct. 2006**	**Provided by MPCA**

Was a reasonable level of effort made to identify all COPI, i.e., was readily available information considered? ☒ Yes ☐ No

Was there conflicting information between different sources? ☒ Yes ☐ No If yes, explain why these sources were chosen:

MPCA provided a list of emission factors from similar waste-to-energy facilities from recently conducted stack. These updated emission factors were used instead of emission factors from FIRE or other stack test results. The most conservative option or the emission factor deemed most appropriate by the MPCA was used.

Were additional potential sources of emissions information considered and rejected? ☐ Yes ☒ No If yes, explain why:

MPCA emission factors summary review:

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	*****Technical accuracy review date(s)*** *(mm/dd/yyyy)*	*****Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH with the understanding that the NO2 emissions will be finalized with the criteria pollutant protocol.*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA emission factors review questions:

Do you know of better emission factor sources? ☐ *Yes* ☒ *No*

If yes, how were conflicting or alternative emission sources considered:

Did the emission estimates follow the AERA guidance? ☒ *Yes* ☐ *No*

Are all of the pollutants expected from a source accounted for? ☒ *Yes* ☐ *No*

MPCA emission factors review notes:

Summary of Emission Factors Developed from Stack Tests

Has the facility done air toxics stack testing? ☒ Yes ☐ No

If yes please list the chemicals, unit(s) or source(s) tested and test report date(s) in the table below. In addition, if stack testing results will be/were used in the AERA, indicate (by letter) which of the following preferred calculation methods will be/were used?

Calculation methods

Method A: The ProUCL recommended 95% upper confidence limit of the arithmetic mean (UCL-AM) will be/was used for annual (tons/yr) estimates.

☒ A copy of the ProUCL runs is/will be included.

Method B: The **highest** measured value of stack test data will be/was used for annual (tons/yr) estimates because there were not enough data points for ProUCL to recommended 95% UCL -AM.

Method C: The **highest** measured value will be/ was used for hourly (lb/hr) estimates.

☐ A copy of the ProUCL runs will be/is included.

Method D: Instrument measured values will be/were included even if below the method detection limit.

Method E: Instrument detection limit for data with no measured values will be/were used.

Method F: One-half the instrument detection limit will be/was used for acrolein.

Method G: If a chemical was not expected to be present but was tested for and assigned a zero for the risk assessment justification will be/was provided.

Method H: Other, Please describe:

Chemical(s)	Emission source type or emission unit(s)	Test report reference including date	Calculation method(s) A-H
Dioxins and Furans	**EU 001, EU 002**	**PRRF, 2011**	**A**
H_2SO_4	**EU 001, EU 002**	**Huntington RRF, 2007**	**E**

Acenaphthene **Acenaphthylene** **Anthracene** **Benzo (a) anthracene** **Benzo (a) pyrene** **Benzo (e) pyrene** **Benzo(g,h,i)perylene** **Benzo (b) fluoranthene** **Benzo (k) fluoranthene** **Indeno (1,2,3 -cd) pyrene** **2-MethylNaphthalene** **Napthalene** **Fluorene** **Fluoranthene** **Chrysene** **Dibenz (a,h) anthracene** **Phenanthrene** **Pyrene** **Ammonia** **Arsenic** **Antimony** **Beryllium** **Total Chromium (Cr)** **Hexavalent Chromium** **Copper** **Manganese** **Nickel** **HF** **PCB - Total Mass**	**EU 001, EU 002**	**Covanta Stanislaus, 2007-2009**	**A**
bis (2 -Ethylhexyl) phthalate **Dibenzofuran** **1,4 - Dichlorobenzene** **1,2 - Dichlorobenzene** **2,4 - Dinitrotoluene** **Hexachlorobenzene** **Hexachlorobutadiene** **Hexachlorocyclopentadiene** **Hexachloroethane** **Isophorone** **Nitrobenzene** **N-Nitrosodiphenylamine** **N-Nitroso-di-n-propylamine**	**EU 001, EU 002**	**OWEF, 2004**	**A**

Pentachlorophenol			
Phenol			
1,2,4 - Trichlorobenzene			
2,4,6 - Trichlorophenol			
Acetaldehyde			
Acrolein			
Barium			
Cobalt			
Formaldehyde			
Phosphorus			
Selenium			
Thallium			
Zinc			

MPCA review of emission factors developed from stack tests

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH_____*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA emission factors developed from stack tests review questions:

Was the AERA guidance on using stack testing data followed? ☒ *Yes* ☐ *No*

Emission factors developed from stack tests review notes:

Summary of Chemicals with Additional Considerations (AERA Guidance Section 2.6)

Which of the following calculations will be/were done:

- ☒ Dioxins/furans will be/were estimated as individual congeners, with individual congeners/total mass ratios from submitted stack tests.
- ☐ Dioxins/furans will be/were estimated as Toxic Equivalents of 2,3,7,8 TCDD using the 2005 WHO potency factors.
- ☒ PCBs will be/were expressed as a total mass.
- ☐ PCBs will be/were expressed as Toxic Equivalents of 2,3,7,8 TCDD using the 2005 WHO potency factors.
- ☐ Aldehydes will be/were estimated as a total mass.
- ☒ Individual aldehydes will be/were estimated.
- ☐ Petroleum Hydrocarbons-Alipatic (C7-C11) will be/were estimated as a total mass.
- ☐ Hexavalent Chromium will be/was assumed to be equal to total Chromium.
- ☒ Hexavalent Chromium will be/was assumed to be 10 % of total Chromium.
- ☐ Hexavalent Chromium will be/was assumed to be a site specific _____ % of total Chromium and the stack testing used to derive this ratio was submitted or some other reference.
- ☐ Glycol ethers will be/were estimated as a total mass.
- ☐ Individual glycol ethers will be/were estimated.
- ☒ Individual PAHs will be/were estimated.
- ☐ PAHs will be/were estimated as a total mass (and will therefore be assessed as benzo(a)pyrene)
- ☒ Individual Polycyclic Organic Matter chemicals will be/were estimated.
- ☐ Polycyclic Organic Matter will be/was estimated as a total mass.
- ☒ All NOx will be/were assumed to be NO_2.
- ☐ 80% of the NOx will be/was assumed to be NO_2 (based on EPA's ambient or equilibrium ratio)

☐ Asbestos-like fiber emission estimates will be/were given, modeled and compared to the current IRIS value.
☒ Mercury will be emitted above 1 lb/year and a Hg-01 form will be/ was submitted.

☐ None of the calculations listed above will be/were used.

MPCA review of chemicals with additional considerations summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA chemicals with additional considerations review questions:

Was the special emission factor guidance for these pollutants followed? ☒ *Yes* ☐ *No*

MPCA chemicals with additional considerations review notes:

Additional Emissions Information

Is there additional site specific uncertainty related to the emissions beyond what is captured in the emission factor development?

☒ Yes ☐ No If yes, please explain:

The NO_2/NO_x ratio used for the evaluation of traffic effects was 0.25, per email exchange with MPCA and literature (Tang 2004). The NO_2/NO_x ratio for the evaluation of the MWC stacks was 1.

Refer to Section 9 of the HHRA Report for a discussion of technical uncertainty.

Are there applicable control standards and/or NESHAPs related to toxics controls? ☒ Yes ☐ No If yes, list them:

- **40 CFR Part 62, Federal Implementation Plan (FIP), Subpart JJJ for the North Unit**
- **40 CFR Part 60, New Source Performance Standards (NSPS), Subpart AAAA for the South Unit (being modified)**

☐ Determination of Technical and Economic Feasibility will be/was prepared because risk estimates were above risk guidelines (AERA Guide Section 3.9) Explain:

MPCA additional emissions information review summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
5/17/12	*5/21/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA additional emissions information review questions:

Describe qualitatively the uncertainty related to these emission estimates. Include how close the emission estimates are to what the facility will actually emit. What are the factors that impact this?

If risk estimates are above risk guidelines was feasible and reasonable control used? ☐ *Yes* ☐ *No*

MPCA additional emissions information review notes:

Proposer/Preparer Instructions

Boxes can be checked by clicking on them. Response areas will expand as necessary to include the complete response. Multiple dates can be added by using the "Enter key" (return key) after you type the first date. All Air Emission Risk Analysis (AERA) documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

If **all** of the requested forms and support documents **are not included** with an air permit application needing an AERA the air permit application **will be deemed incomplete**. This includes risk estimates for pre-existing facilities. MPCA staff will return this AERA form plus any other incomplete AERA forms to the applicant with deficiencies and remedies indicated in the *italicized* MPCA review areas. If forms were submitted pre-app they should be updated and re-submitted post-app with any *italicized* MPCA comments left in and changes summarized in the appropriate areas.

Facility Information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

MPCA Review Instructions

Specific section/document review

*MPCA staff will summarize their review of specific sections/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals. **Questions with two asterisks are part of the technical accuracy review.*

Overall adequacy/completeness summary

*If **all** of the necessary sections/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Please summarize these results in the AERA-01 form.** The AERA-01 form will be shared with the permit engineer conducting the permit application completeness review. If deficiencies are noted in this form during the completeness review then this form should also be shared with the permit engineer who will share it with the applicant.*

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-19

Cumulative Air Emissions Risk Analysis Form

Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 5

Purpose: This form describes the cumulative analysis in an AERA submitted either prior to submitting an air permit application (pre-app) or with an air permit application (post-app) and the Minnesota Pollution Control Agency (MPCA) review of these materials. Cumulative air emissions risk analyses are intended to provide information about risks from sources of air toxics that may interact with the project in such a way as to cause cumulative impacts. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. For background information and guidance on "How to Conduct a Cumulative Air Emission Risk Analysis" visit http://www.pca.state.mn.us/lupg42d. An AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted and MPCA staff have determined the appropriate methods have been used. **Submitting AERA materials for review prior to submitting an air permit application is highly recommended so that** site specific suggestions from MPCA staff can be included in AERA materials submitted with an air permit application.

Facility Information

1. AQ Facility ID No.: **11100036**
2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **4/11/2012, rev. 5/10/2012, rev. 6/13/2012** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: MN Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4898** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the Cumulative Analysis AERA materials submitted pre-app and those submitted post-app?
☒ Yes ☐ No ☐ NA

If yes, please explain the differences: **Acute results have been updated per comments received by MPCA in July, 2012 – 7/20/2012 documents. Tox values in IRAP were updated and results on AERA-19 updated accordingly. – 9/5/2012.**

MPCA review question: *Are there differences between the Cumulative Analysis AERA materials submitted pre-app and those submitted post-app?* ☐ *Yes* ☐ *No* ☐ NA

If yes, please explain the differences:

MPCA Overall Summary of Cumulative Analysis Review

Name(s) of MPCA reviewer(s): *Heather Magee-Hill*

Submittal date(s) (mm/dd/yyyy)	***Pre-app review date(s)*** *(mm/dd/yyyy)*	**Overall pre-app AERA cumulative determination** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	**Overall post-app AERA cumulative completeness determination and reviewer's initials**	****Technical accuracy review date** *(mm/dd/yyyy)*	****Technical accuracy determination and reviewer's initials**
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init:* ____	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____		☐ *Yes* ☐ *No* *Init:* ____

MPCA overall pre-app cumulative review notes including comments on deficiencies and how they can be remedied:

Approved with the updated Intermediate population density risk estimates e-mailed by MPCA on 5/31/12.

MPCA overall post-app cumulative review notes including comments on deficiencies and how they can be remedied:

*****MPCA overall cumulative technical accuracy review notes including comments on deficiencies and how they can be remedied:***

With figure 3-1 updated to show the maximum risk receptors for each exposure pathway.

Qualitative Cumulative Analysis Information

The proposer/AERA preparer should fill out the first two columns in the following tables. *In the italicized columns, MPCA staff will mark* ***pre-app sections*** *with "Yes" for adequate, "No" for deficient, and enter their initials; and will mark* ***post-app sections*** *with "Yes" for substantially complete, "No" for incomplete, and enter their initials.*

Submitted	**Submittal date(s)** (mm/dd/yyyy)	**Information**	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***
☒Electronic ☐Hard copy	**4/11/2012, 6/13/2012, 9/5/2012**	A map with locations and/or coordinates of potential air emission sources within 10 km. Potential maps can be found on the "What's In My Neighborhood" at http://www.pca.state.mn.us/backyard/neighborhood.html and "Environmental Data Access" http://www.pca.state.mn.us/data/edaAir/index.cfm		☐ *Yes* ☐ *No* *Init:* _____	8/23/12	☒ *Yes* ☐ *No* *Init:* HMH
☐Electronic ☐Hard copy ☒NA		A map with locations and/or coordinates of nearby monitoring stations of customized data.		☐ *Yes* ☐ *No* *Init:* _____		☐ *Yes* ☐ *No* *Init:* _____
☒Electronic ☐Hard copy	**6/13/2012, 9/5/2012**	A map with locations of maximum risks.and/or coordinates and descriptions (e.g. along eastern fence)		☐ *Yes* ☐ *No* *Init:* _____	8/23/12 With figure 3-1 updated to show the maximum risk receptors for each exposure pathway.	☒ *Yes* ☐ *No* *Init:* HMH

9. **Zip code population density of the most impacted area from the project/modification (can be found at http://www.city-data.com/)** **Zip Code 56573: 45 persons/square mile (the density from 2010 census data in the 1.5 km radius around the facility is 681 persons/square mile as calculated by consultant using GIS tools)**

10. **What type of ambient monitoring data will be/was used?**

    ☐ MPCA generated low population density data(see item 14) ☒ MPCA generated intermediate population density data (see item 14) ☐ Customized

11. **If data will be/was customized, briefly explain how and why?**

12. **Please indicate all of the off-site sources this data set is being used to reflect:**

    ☒ Mobile ☒ Area ☒ Point ☒ Background sources

13. **What off-site sources were modeled?**

    For each off-site point source within 10 kilometers, briefly (one page or less) discuss why it was or was not modeled. In addition, for off-site point sources of potential concern that are not modeled but emit pollutants not reflected in the monitoring data set (see "How to Conduct a Cumulative Air Emissions Risk Analysis"), include any available information about distance to the potentially most impacted area, emissions profile, process and fuel type, historical regulatory compliance, public complaints, dispersion characteristics (stack height, prevailing wind direction), etc.

    Per MPCA's request at the meeting 10/18/2011, nearby sources were evaluated. These sources include Tuffy's Pet Foods, Bongards' Creamery, and potentially Kenny's Candy and Barrel O' Fun Snack Foods Company.

    Tuffy's Pet Foods is located approximately one kilometer west of the facility and has a registration permit. The source is believed to have only natural gas fired combustion equipment and shows relatively low levels of emissions in MPCA's Air Emissions Inventory (e.g., highest-ranking pollutant for 2009 is Particulate Matter with rank of 301 statewide for reported emissions of 2.9 tons/yr, Tuffy's is not expected to cause any cumulative effects beyond what would be captured with representative monitoring data.

Bongards' Creameries is located adjacent to the facility to the west and also has a registration permit. With low levels of emissions (e.g., highest ranking pollutant for 2009 is Particulate Matter with rank of 39 statewide for emissions of 26 tons/yr). To further put the reported PM emissions in perspective, this is about one-half of the applicable Option D Registration Permit threshold, or approximately 1/4 of the federal Part 70 permit threshold. Low levels of emissions were also verified with data found from the TRI. For these reasons, no further characterization for the risk assessment is believed to be necessary for Bongards' Creameries.

The following facilities are within 3 km of the site but were not modeled: Barrel O' Fun Snack Foods Company, Industrial Finishing Services and Kenny's Candy Company. These facilities have either applied for or have been issued a state or registration permit (i.e., Barrel O' Fun Snack Foods Company and Industrial Finishing Services) or are not required to have any air permit (i.e., Kenny's Candy Company). For these facilities, there are no specific air toxics data listed in MPCA's public databases. Due to their distance and level of emissions, they are not expected to cause any cumulative effects beyond what would be captured with representative monitoring data.

For the aforementioned reasons, Wenck does not believe that any of these neighboring sources need to be explicitly included in the cumulative effects analysis.

MPCA qualitative cumulative information review summary

Submittal date(s) *(mm/dd/yyyy)*	***Pre-app review date(s)*** *(mm/dd/yyyy)*	***Pre-app adequacy***	***Post-app completeness review date(s)*** *(mm/dd/yyyy)*	***Post-app completeness***	***Technical accuracy review date(s)*** *(mm/dd/yyyy)*	***Technical accuracy***
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA qualitative cumulative information review questions:

Is all the required information present? ☒ *Yes* ☐ *No*

Was MNRisks used to confirm the information? ☒ *Yes* ☐ *No* *If yes, use the MPCA internal nearby sources review form.*

MPCA qualitative cumulative review notes:

Quantitative Results

Summary table of cumulative quantitative risk results

	Inhalation Cancer risk	**Inhalation Chronic non-cancer hazard index ***	**Inhalation Acute hazard index ***
Ambient monitoring data	**3.4 in 100,000**	**0.69 (respiratory 0.44)**	**0.58 (respiratory 0.47)**
Modeled off-site sources (separated by source)	**NA**	**NA**	**NA**
Total proposed facility	**.1 in 100,000**	**.06**	**.03**
Total cumulative sum – proposed facility	**3.5 in 100,000**	**0.75**	**0.61**
Change in risk from proposal	**NA**	**NA**	**NA**
% contribution from proposal of total cumulative sum	**2.9%**	**8.0%**	**4.9%**

*If hazard indices are above one, separate by health endpoints.

14. The following risk estimates from ambient monitoring data may be used in typical assessments. Within the population density category, risks are separated by health end point, pollutant families and risk driver pollutants.

Zip code population densities of less than 500 people per square mile (Average estimates 2008-2010)

Risks by target health endpoints

	Respiratory	**Nervous system**	**Eyes**	**Reproductive**	**Developmental**	**Hematopoietic**
Chronic	0.48					

Acute	0.53		0.19			

Risks by pollutant families

Pollutant Group Name	Cancer risk in 100,000	Chronic non-cancer	Acute non-cancer
Metals	0.07	0.15	0.11
VOCs	0.99	0.08	0.01
Carbonyls	0.84	0.25	0.17
NO_2			0.23
Sum	1.9	0.48	0.53

VOCs = Volatile Organic Compounds (VOCs) Nitrogen Dioxide (NO2)

Risk-driver pollutants: 1,3 Butadiene, Carbon tetrachloride, benzene, Formaldehyde, Acetaldehyde, Chromium, Manganese, N02

Zip code population densities between 500 and 2,999 people per square mile

Risks by target health endpoints

	Respiratory	Nervous system	Eyes	Reproductive	Developmental	Hematopoietic
Chronic	0.44	0.13				
Acute	0.47		0.23		0.1	

Risks by pollutant families

Pollutant group name	Cancer risk in 100,000	Chronic non-cancer	Acute non-cancer
Metals	0.31	0.14	0.09
VOCs	1.86	0.14	0.04
Carbonyls	1.28	0.40	0.27
NO_2 (Respiratory)			0.19
Sum	3.5	0.69	0.58

VOCs = Volatile Organic Compounds (VOCs) Nitrogen Dioxide (NO2)

Risk-driver pollutant risks: 1,3 Butadiene, Carbon tetrachloride, benzene, Formaldehyde, Acetaldehyde, Chromium, Manganese, N02, p-dichlorobenzene, Arsenic, Nickel

MPCA quantitative cumulative review summary

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA quantitative cumulative review questions:

Is all the required information present? ☒ *Yes* ☐ *No*

Are the assumptions presented in this section appropriate? ☒ *Yes* ☐ *No*

MPCA quantitative cumulative review notes:

The tables above have

15. Briefly (one page or less) discuss uncertainties specific to the cumulative analysis for this project.

We do not anticipate expansions or other activities at neighboring facilities to impact the results of the cumulative analysis.

The cumulative quantitative risks presented above show that inhalation cancer risk, noncancer hazard index, and acute inhalation hazard are well below regulatory threshold levels. The impact of the facility, estimated using

maximum PTE and hypothetical exposure scenarios, is less than 10% of the total impact. The proposed project's estimated lifetime excess cancer risk and noncancer hazard index are less than the current facility's estimates due to the modified unit being subject to more stringent state and federal emission limitations. For more information, see the HHRA Report.

As there are no recent monitoring data for the area surrounding the facility, MPCA staff selected monitoring data from the state's network that they believe might be representative of the project site. These data reflect off-site mobile, area, point, and background sources. These risk estimates are generic estimates, i.e., not specific to the Perham area; these background risk estimates were used in a comparative analysis to put the facility's calculated risks in perspective.

Proposer/Preparer Instructions

Boxes can be checked by clicking on them. Response areas will expand as necessary to include the complete response. Multiple dates can be added by using the "Enter key" (return key) after you type the first date. All Air Emission Risk Analysis (AERA) documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

If **all** of the requested forms and support documents **are not included** with an air permit application needing an AERA the air permit application **will be deemed incomplete**. This includes risk estimates for pre-existing facilities. MPCA staff will return this AERA form plus any other incomplete AERA forms to the applicant with deficiencies and remedies indicated in the italicized MPCA review areas. If forms were submitted pre-app they should be updated and re-submitted post-app with any italicized MPCA comments left in and changes summarized in the appropriate areas.

Facility Information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

MPCA Review Instructions

Specific section/document review

MPCA staff will summarize their review of specific sections/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals.

Overall adequacy/completeness summary

*If **all** of the necessary sections/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Please summarize these results in the AERA-01 form.** The AERA-01 form will be shared with the permit engineer conducting the permit application completeness review. If deficiencies are noted in this form during the completeness review then this form should also be shared with the permit engineer who will share it with the applicant.*

Minnesota Pollution
Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-24

AERA Certification

Doc Type: Air Emissions Risk Assessment – External Documentation

Facility Information

1a) AQ Facility ID No.: 11100036

2) Facility Name: Perham Resource Recovery Facility

Certification

I certify under penalty of law that the enclosed documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Permittee Responsible Official:		**Co-Permittee Responsible Official (if applicable)**	
Name (Print):	Mr. Michael Hanan	Name (Print):	
Title:	Prairie Lakes Municipal Solid Waste Authority Executive Director	Title:	
Signature:	Michael Hanan	Signature:	
Date:	September 4, 2012	Date:	

Instructions for Form AERA-24

1a) **AQ Facility ID No.** -- Fill in your Air Quality (AQ) Facility Identification (ID) Number (No.). This is the first eight digits of the permit number for all new permits issued under the operating permit program. If your facility has never been issued a permit under this program, leave this line blank.

2) **Facility Name** -- Enter your facility name.

This certification is required under Minn. R. 7007.0500, subp. 3. The certification must be signed by a "responsible official" (defined in Minn. R. 7007.0100, subp. 21), which is the person who performs policy or decision making functions for the company. (A delegate may be allowed in some cases. Please refer to the rule section listed above.) The certification also must be signed by a responsible official for each co-permittee. A co-permittee is a corporation, partnership, sole proprietorship, municipality, state, federal or other public agency other than the permittee that is either a owner or operator of the facility. If the permittee is the owner and a co-permittee is the operator (or vice-versa), then the responsible officials for both the permittee and the co-permittee must sign the certification.

It is recommended that you not sign the certification until you have completed your AERA and are ready to submit it. Do not modify or add to this form.

Minnesota Pollution Control Agency

520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-26

Refined HHRAP-Based Analysis Form

Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 8

Purpose: This form is **required** for AERAs that include an analysis based on U. S. Environmental Protection Agency's (EPA) Human Health Risk Analysis Protocol (HHRAP e.g. IRAP). This form serves both as the HHRAP-based AERA analysis protocol and later describes the HHRAP-based analysis. This form also documents the Minnesota Pollution Control Agency (MPCA) AERA HHRAP-based protocol and analysis review. It must be submitted pre-app with the other AERA forms and supporting documents list on the AERA-01 form, electronically, and must be approved before an air permit application is submitted. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. Please consult the AERA website http://www.pca.state.mn.us/tchy42b and air dispersion modeling website http://www.pca.state.mn.us/nwqh421 when filling out this form.

Facility Information

1. AQ Facility ID No.: **11100036** 2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **4/11/2012, rev. 5/10/2012, rev. 6/13/2012** (mm/dd/yyyy) 4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: **MN** Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4898** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the Refined HHRAP-based Analysis materials submitted pre-app and those submitted post-app?

☒ Yes ☐ No ☐ NA

If yes, please explain the differences (especially changes in methodology):

On Page 2, the Urban Gardener exposure pathways are explained. – 6/13/2012 submittal. Three residential receptors are added just north of the property. The fisher scenario is evaluated at all receptor locations and includes urban gardening consumption assumptions. Toxicity values for lead, cadmium, hydrogen chloride, and all PCDD/PCDF congeners were updated from the IRAP default values to reflect the MPCA Hierarchy. – 9/5/2012 submittal.

MPCA Review Question: Are there differences between the Refined HHRAP-based Analysis materials submitted pre-app and those submitted post-app?

☐ *Yes* ☐ *No* ☐ *NA*

If yes, please explain the differences (especially changes in methodology):

MPCA Overall Summary of Refined HHRAP-Based Analysis Review

Names of MPCA AERA reviewer(s): *Heather Magee-Hill*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app HHRAP-based analysis determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app HHRAP-based analysis completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	*****Technical accuracy review date*** *(mm/dd/yyyy)*	*****Technical accuracy determination and reviewer's initials***
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12* *With the following changes*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA overall pre-app refined HHRAP-based analysis review notes including comments on deficiencies and how they can be remedied:

Protocol is approved with the following assumptions:
-For the pollutants not carried forward the RASS results will be added together with the refined results.
-AERA hierarchy will be followed for tox values.
-The following pollutants with emission estimates from the facility should also be included in the refined HHRAP analysis, since they can contribute to the fish pathway (they have fish biotransfer factors in HHRAP), are not included in either MMREM or the RASS, and cannot be screened out of the RASS since there are no inhalation benchmarks: Acenaphthene, Anthracene, Fluoranthene, Fluorene, Phenanthrene, Pyrene. And cadmium, hydrogen chloride, and lead
- Benzo(a)pyrene Henry's law etc. will be used.

MPCA overall post-app refined HHRAP-based analysis review notes including comments on deficiencies and how they can be remedied:

*****MPCA overall refined HHRAP-based analysis technical accuracy review notes including comments on deficiencies and how they can be remedied:***

Receptors should be added to represent the residences just north of the facility.
The Fisher scenario, like the residential scenario, should be adjusted for the urban gardening assumptions.
The toxicity values used in IRAP will follow the AERA hierarchy (from the RASS) paying special attention to cadmium, lead, HCl and NO2.

General Submittal Information

This form is being submitted as: **(mark as many as are relevant to this submittal; keep dates of other submittals in the chart as a log)**	Submittal date (mm/dd/yyyy)
☐ HHRAP-based analysis protocol	**4/11/2012, rev. 5/10/2012,**
☐ Explanation of HHRAP-based analysis results in a pre-air permit application submittal (pre-app)*	**6/13/2012**
☒ Explanation of HHRAP-based analysis results in an air permit application (post-app)*	**9/5/2012**

*If applicable, please explain any differences in methodologies between the approved protocol and the modeled results:

The MPCA AERA and modeling guidance will be/was followed? ☒ Yes ☐ No

If no, describe any deviations from the MPCA recommended guidance:

The MPCA recommends some deviations from the HHRAP guidance (e.g. different fish ingestion rates). Will there be/are there additional deviations from the HHRAP guidance that are not included the MPCA AERA guidance? ☒ Yes ☐ No

If yes, describe these deviations:

The aboveground produce, belowground produce, protected aboveground produce, and egg consumption rates for the Resident and Fisher are the same as the Farmer. This means the Resident scenario in IRAP-h is the same as the Urban Gardener scenario in the RASS.

Will there be/are there any additional analysis (e.g., analysis using MPCA-suggested central tendency human exposure factors)? ☐ Yes ☒ No

If yes, describe additional analyses:

HHRAP-based analysis tools

☐ IEUBK model will be/was used for lead if greater than 10% of the lead standard

☒ AERMOD version: **12060**

☒ IRAP version: **4.5.5**

☒ MMREM if Hg emissions are above 1 lb/year, and there are fishable water bodies within 3km of a stack under 100m high or within 10km of a stack that is 100m high or higher. If mercury is not found to be a risk driver for the inhalation or other non-fish ingestion pathways, then it can be excluded from the HHRAP-based software modeling as long as MMREM is used.

☐ Other tools - please explain: ______

MPCA general submittal information review questions:

Do you know of other tools that should be or should have been used? ☐ *Yes* ☐ *No*

MPCA general submittal information review notes:

AERA Emissions

Did emissions estimating methods follow the MPCA "Emission Estimating Guidance" at http://www.pca.state.mn.us/index.php/view-document.html?gid=138 and general AERA guidance? ☒ *Yes* ☐ *No*

If no, please explain:

☒ The required separate AERA-05 forms were submitted for the HHRAP-based analysis and associated RASS(s).

MPCA summary of AERA emissions review from AERA-05 form

Names of MPCA AERA reviewers: *Heather Magee-Hill (HMH)*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app AERA emissions determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app AERA emissions completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	***Technical accuracy review date*** *(mm/dd/yyyy)*	***Technical accuracy determination and reviewer's initials***
5/10/12	*6/4/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: ____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*		☐ *Yes* ☐ *No* *Init: ____*

MPCA AERA-05 emission review notes:

AERA AERMOD Modeling Settings

☒ The required separate AERA-03 forms were submitted for each type of modeling associated with this protocol (i.e., a different form for any screening RASS(s), Q/CHI runs, or refined modeling used in HHRAP-based software).

Note: Projects using HHRAP-based software should follow up-to-date MPCA Modeling Guidance, especially when choosing building parameters, flag pole receptors, downwash parameters, meteorological data etc. The following practices will be/were followed:

☒ Will/has submitted all files necessary to recreate AERMOD and HHRAP-based software runs (input files), output files and plot files
☒ Consulted MPCA modeling staff on what meteorological data to use. Updates are on-going and the web site may not contain the latest data
☒ Will/has calculated chronic risk results using HHRAP-based software
☒ Will/has calculated acute risk results in a separate run from the chronic HHRAP-based software run
☒ Will/has calculated acute risk results in a RASS or Q/CHI spreadsheet
☒ Will/has used HHRAP-based software default options unless specifically stated otherwise below

The MPCA has done some sensitivity analyses in the past suggesting that the properties for benzo(a)pyrene will result in "conservative" (i.e., upper bound) estimates of gas deposition if applied across a range of volatile and semivolatile substances. Thus the MPCA generally suggests using the following benzo(a)pyrene characteristics:

Property	Benzo(a)pyrene default	Property	Benzo(a)pyrene default
Diffusivity in Air (cm2/s)	5.13E-02	Cuticular Resistance (s/cm)	4.41E-01
Pollutant Diffusivity in Water (cm2/s)	4.44E-06	Henry's Law Constant (Pa m3 mol-1)	4.60E-02

Will they be or have the benzo(a)pyrene gas deposition properties listed above been used? ☒ Yes ☐ No

If no, please explain what gas deposition properties will be/have been used and why:

The following particle distributions should be used unless more site specific data are appropriate.

Particle ranges (Use Method 1)		
Particle Diameter	Composition	Particle Density
1	0.25	1
2.5	0.25	1
10	0.5	1

Will they be or have the particle distributions listed above been used? ☐ Yes ☒ No

If no, please explain what other particle distributions will be/were used and why:

Particle distribution values used will be those used for the Pope/Douglas Solid Waste management EAW. A particle density of 1 g/cm^3 will be used.

Has exponential decay been used or will it be used (not recommended)? ☐ Yes ☒ No

If yes, please explain why:

MPCA summary of air dispersion modeling review from AERA-03 Form

Names of MPCA AERA reviewers: *Heather Magee-Hill*

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app air dispersion modeling determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app air dispersion modeling completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	***Technical accuracy review date*** *(mm/dd/yyyy)*	***Technical accuracy determination and reviewer's initials***
5/10/12	6/5/12	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	8/23/12	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA AERA-03 air dispersion modeling review notes:

HHRAP-Based Software (e.g., IRAP) Settings

Other than those exceptions specifically stated below, will any or have any non-default HHRAP-based software options been used?

☐ Yes ☒ No

If yes, explain any additional changes to default HHRAP-based software options:

a) Will or has the drinking water pathway been turned off? ☒ Yes ☐ No Unless there are site specific conditions indicating that people in the area are expected to drink surface water instead of well water the MPCA recommends turning off the drinking water pathway.

If no, explain the site specific conditions that indicate that people in the area are expected to drink surface water instead of well water:

While the drinking water consumption is listed in the IRAP exposure parameters as 1.4 L/day, all receptors' watersheds and water bodies are listed as "none", so the drinking water pathway is not evaluated.

b) **In addition** to risk estimates based on HHRAP default farmer assumptions, will or have they been or will risk estimates been made using more site-specific exposure assumptions, depending on the land use of the area (e.g., a non-dairy farmer or MPCA central tendency assumptions)? ☒ Yes ☐ No

If yes, explain what exposure assumptions will be /were used in the additional risk estimates and why. In either case, in order to be more easily understood by the general public, reporting ingestion rates in pounds per week is recommended:

In addition the default farmer assumptions (Scenario 1), three other scenarios were evaluated. Scenario 2 represents the proposed facility's impacts to human health given the same theoretical emission levels as used in the text, but with actual exposure pathways from the Perham area. Scenario 3 represents the proposed facility's impacts to human health using estimated actual emissions (as calculated from the facility's stack test data and facility's capacity) and hypothetical exposure scenarios. Scenario 4 represents the most realistic near future scenario, with future projected actual emission estimates and actual exposure scenarios.

c) Will or have the following ingestion rates been used instead of the default HHRAP Fisher ingestion rates? ☒ Yes ☐ No

Fish ingestion rates for the Minnesota subsistence fisher are 0.00203 kg/kg day for an adult (assuming an adult body weight of 70 kg) and 0.00143 kg/kg day for a child (assuming a child body weight of 15 kg). For an adult, this is equal to a raw fish tissue ingestion rate of 142 grams per day (g/day), as listed in the EPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (EPA, 2000). This would equate to eating about a half-pound of fish 4 to 5 times a week. The adult fish ingestion rate listed in HHRAP is 0.00125 kg/kg day, which equates to 87.5 g/day assuming an adult body weight of 70 kg. The child fish ingestion rate listed in HHRAP is 0.00088 kg/kg day, which equates to 13.2 g/day assuming a child body weight of 15 kg. The child fish ingestion rate is based on the following: ratio of adult/child fish ingestion rates (87.5 g/day for adults/13.2 g/day for children) of 6.63. The EPA (2000) adult fish ingestion rate of 142 g/day was divided by 6.63 to derive a child ingestion rate of 21.4 g/day.

Fish ingestion rates for the Minnesota recreational fisher are 0.00043 kg/kg day for an adult (assuming an adult body weight of 70 kg) and 0.00030 kg/kg day for a child (assuming a child body weight of 15 kg). For an adult, this is equal to a raw fish tissue ingestion rate of 30 g/day, which is consistent with MDH fish consumption advice. Thirty grams per day is equivalent to an average of a half-pound meal of freshwater fish per week. The child ingestion rate is calculated using the HHRAP ratio of adult/child fish ingestion rates (87.5 g/day for adults/13.2 g/day for children) of 6.63. The adult fish ingestion rate of 30 g/day was divided by 6.63 to derive a child ingestion rate of 4.5 g/day. In order to be more easily understood by the general public, reporting ingestion rates in pounds per week is recommended.

If no, please explain what assumptions will be/were used and why:

MPCA review of HHRAP-based settings

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*	*8/23/12*	☒ *Yes* ☐ *No* *Init: HMH*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA HHRAP-based settings review questions:

Are the assumptions presented in this section appropriate? ☒ *Yes* ☐ *No*

MPCA HHRAP-based settings review notes:

Receptor assumptions: Drinking water appears to be 1.4 L/day, consumption rate of belowground produce .00061 instead of 0.00017 (both more conservative estimates). Subsistence fisher rates used in fisher exposure but not urban gardener rates with fisher. (default resident levels used).

Toxicity Values

Please check the following practices that will be/were used. If a box is not checked, please provide an explanation here:

☒ Inhalation toxicity values from the most recent RASS will be/were used in the HHRAP-based analysis.

☒ Acute analysis will be/was conducted using the RASS rather than the HHRAP-based tool.

☒ If the acute analysis will not be conducted using the RASS, please explain the methods:

The acute analysis for NO_2 will be conducted using refined modeling results. The RASS is inadequate to deal with the complexities of NO_2 at the Facility. NO_2 from vehicle emissions was modeled separately; there is a separate vehicle NO_2 IRAP project. As a conservative measure, 25% of NOx from vehicles was evaluated as NO2 in IRAP-h and resulting concentrations were compared with the health based standard of 470 µg/m3. Acute results from the facility's stacks (which assumed 100% of NO_x was NO_2) were added to the results from vehicles. Results showed no further refinement of methods was necessary.

Note: The acute analysis should use the acute toxicity values from the RASS. Most of the HHRAP-based software acute values that are not in the RASS are emergency levels issued by DOE as part of their Temporary Emergency Exposure Limits, Revision 20 (http://www.eh.doe.gov/chem_safety//teel.html) or U.S. EPA Acute Inhalation Exposure Guideline Levels - Level 1 (AEGL 1s) Database. These sources are not part of the AERA hierarchy of toxicity information sources.

☒ MPCA non-inhalation toxicity values will be/were used following the AERA hierarchy.

☒ No additional adjustments will be/were made to the toxicity values to incorporate early-life sensitivity. MPCA's current practice when conducting AERAs is to use toxicity values from the following sources listed in order of preference: specific MDH health-based values (hbvs) at http://www.health.state.mn.us/divs/eh/risk/guidance/air/table.html, MDH Health Risk Values (HRVs) at http://www.health.state.mn.us/divs/eh/risk/guidance/air/table.html, EPA's IRIS database at http://www.epa.gov/iris/, CalEPA's Office of Environmental Health Hazard Assessment (OEHHA) at http://www.arb.ca.gov/toxics/healthval/healthval.htm, EPA's HEAST database. This practice automatically results in quantitative AERA risk results that have incorporated early-life sensitivity adjustments when the toxicity values developed by MDH, EPA, or CalEPA include such an adjustment.

If AERA risk results for a pollutant are estimated to be above 1 in a million (i.e., the pollutant is considered a risk driver) and the pollutant is a linear carcinogen with a toxicity value developed *without* considering early-life sensitivity, then the MPCA will include a qualitative discussion on what incorporating an adjustment could mean for the project and will request guidance from MDH on the adjustment. This approach is consistent with other situations where there is uncertainty associated with the toxicity information used in an AERA.

MPCA review of toxicity values

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*
5/10/12	*6/5/12*	☒ *Yes* ☐ *No* *Init: HMH*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*
		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*		☐ *Yes* ☐ *No* *Init: _____*

MPCA toxicity review questions:

Are the assumptions presented in this section appropriate? ☒ *Yes* ☐ *No*

MPCA toxicity review notes:

Changes were needed to NO2 and resolved. Changes needed to lead, cadmium. Dioxin/furans correctly updated.

Watershed and Water Body Parameters

Please check the practices below that will be/were followed:

☒ MMREM and general AERA guidance will be/were followed in choosing the most impacted water bodies for evaluation. Those water bodies are: ***Little Pine Lake***

☒ Minnesota and site specific parameters from the sources listed in the table on the next page or others generated by the MPCA will be/were used. The parameters for an example water body are listed in the table on the next page. If these parameters were not chosen, give an example of the value to be used/used in the column titled "Site Specific Value".

Please explain how these values were selected or calculated and why:

MPCA provided parameters specific to Little Pine Lake on 4/30/12 which were incorporated in the analysis. Site specific values are provided in the table below.

MPCA review of watershed and water body parameters

Submittal date(s) (mm/dd/yyyy)	*Pre-app review date(s) (mm/dd/yyyy)*	*Pre-app adequacy*	*Post-app completeness review date(s) (mm/dd/yyyy)*	*Post-app completeness*	*Technical accuracy review date(s) (mm/dd/yyyy)*	*Technical accuracy*

5/10/12	*6/5/12*	*☒ Yes ☐ No* *Init: HMH*		*☐ Yes ☐ No* *Init: _____*		*☐ Yes ☐ No* *Init: _____*
		☐ Yes ☐ No *Init: _____*		*☐ Yes ☐ No* *Init: _____*		*☐ Yes ☐ No* *Init: _____*

MPCA Watershed and Water Body Parameters Review Questions:

Are the assumptions presented in this section appropriate? ☒ Yes ☐ No

MPCA watershed and water body parameters review notes:

Watershed parameters look reasonable. Do you have calculations or sources for depth of water column, average volumetric flow rate through water body? Is what is submitted more conservative? Median 8.5 meters so 13.49 reasonable max19 meters. Waterbody acres close 8417397 m2 vs. 8444539. 4826 acres DNR – 2080 acres =2746 acres which is what is being used, reasonable (both in IRAP and MMREM).

Examples of watershed and water body parameters

Variable name	Site specific value	MN specific value	Units	Variable name	Location for quick HHRAP input	Source
MN state specific values						
Average annual wind speed		4.80	m/s	W	Risk receptor site parameters	Professional judgment. Based on meteorological data from the MSP airport. Wind speeds found at other locations around the state do not have high variability.
Fraction (percentage) of watershed that is impervious		0.05	unitless	A_I_Frac	Watershed site parameters	Professional judgment. Represents the fraction of the watershed that is impervious, such as roadways, pavement, etc. The default value is 5%, which would be appropriate for most applications. This value underestimates the amount of water delivered by watersheds located in urban areas. http://land.umn.edu/index.html
USLE erodibility factor		0.39	ton/acre	K_erode	Watershed site parameters	Value of 0.39 is typical/conservative of average soil types. Used in Universal Soil Loss Equation. Consistent with HHRAP-based software (NC DEHNR 1997, EPA 1994). This default value is based on a soil organic content of 1%.
USLE length slope factor		0.50	unitless	LS	Watershed site parameters	Value of 1.5 appropriate for moderately steep slopes; lower values likely for mildly steep slopes. Dependent on the nature of the watershed. HHRAP-based software suggests a default value consistent with NC DEHNR 1997 and EPA 1994. However, they recommend "using current guidance (U.S. Department of Agriculture 1997; U.S. EPA 1985) in determining watershed specific values for this variable based on site specific information."
Air viscosity (temp corrected)		1.72E 04	g/cm s		Risk receptor site parameters	Used in gas phase transfer coefficient. The air viscosity was calculated for a temperature of 6 °C, the estimated average air temperature of Minnesota.
Water viscosity (temp corrected)		1.31E 02	g/cm s		Watershed site parameters	Used in liquid phase transfer coefficient. The value provided is 10 °C and 1 atm, as approximately 10 °C is average temperature of water bodies in Minnesota.
Sediment delivery empirical slope coefficient		0.125	unitless	SD_X_e	Risk receptor site parameters	Vanoni 1975 Used in calculating the sediment delivery to the water body.
Dry particle deposition velocity		0.15	cm/s		Risk receptor site parameters	Greg Pratt @ MPCA. Upper range of values reported by Pratt, et al (1986) for semivolatile substances. Only use in previous versions of HHRAP-based software. Current HHRAP-based software version uses AERMOD, which calculates deposition.
Dry vapor depositional velocity		1.50	cm/s			Greg Pratt @ MPCA. Upper range of measured values for nitric acid vapor as reported by Pratt, et al (1986). Only use in previous versions of HHRAP-based software. Current HHRAP-based software version uses AERMOD, which calculates deposition.

Examples of water shed and water body parameters - *continued*

Ecoregion, county or food web specific values	Site specific value	Driftless area ecoregion value	Units	Variable name	Location for quick HHRAP input	Source
Average annual precipitation	***66.04***	83.82	cm/yr	P	Risk receptor site parameters	County specific values from the MN Climatology Working Group 2003 at http://climate.umn.edu/img/normals/precip/precip_norm_annual.htm
Average annual temperature	***278.15***	280.93	K	T_A	Risk receptor site parameters	County specific values from the MN Climatology Working Group 2003 at http://climate.umn.edu/ .
Average annual irrigation	***0.67 calculated in F-Pass***	0.01	cm/yr	I	Risk receptor site parameters	USGS 2000. County specific. Part of the water balance. Data was retrieved for the amount of irrigated land per county (acres) and the total amount of irrigation water used from the USGS, at http://water.usgs.gov/watuse/data/2000/index.html. Based on the number of gallons used each year, acres of farmland, and acres of each county (from 2000 US Census Data).
Average surface runoff from pervious areas	***13.76 calculated in F-PASS***	16.61	cm/yr	RO	Not directly input into HHRAP-based software – calculated from % pervious	Calculated average surface runoff from pervious areas. Values for surface runoff vary throughout the state. Default values for different regions were provided in Geraghty et al. (1973) – Water Atlas of the United States.
Water body temperature	***12.5***	14.5	°C	T_wk	Watershed site parameters	Estimated from Hondzo and Stefan (1993) study, "Regional Water Temperature Characteristics of Lakes Subjected to Climate Change. *Climatic Change*. 24:187 211." Based on the type of water body assessed and the species of fish that might be found in a similar water body.
Total suspended solids	***4***	13	mg/L	TSS	Watershed site parameters	MPCA 2005, calculated Ecoregion values for TSS were taken from the Minnesota Lake Water Quality Assessment Report: Developing Nutrient Criteria (2005). TSS values for rivers are four times the particulate organic carbon content for lakes in the same ecoregion.
Cover Management Factor (for USLE)	***0.3***	0.3	unit less	C_var	Watershed site parameters	MN Agricultural Statistics (2002). County specific.
USLE rainfall (erosivity) factor	***150***	175	yr^ 1	RF	Watershed site parameters	Determined by rainfall characteristics of ecoregion. From Wischmeier, W.H. and D.D. Smith. 1978. Predicting Rainfall Erosion Losses – A Guide to Conservation Planning. USDA Handbook 537. Washington, D.C.: U.S. GPO.
Average evapotranspiration	***52.96***	67.22	cm/yr	E_v	Risk receptor site parameters	USGS National Water Summary 1987. Calculated by multiplying the total precipitation for a given county by the fraction of precipitation that is evapotranspirated.

Proposer/Preparer Instructions

Boxes can be checked by clicking on them. Response areas will expand as necessary to include the complete response. Multiple dates can be added by using the "Enter key" (return key) after you type the first date. All Air Emission Risk Analysis (AERA) documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

If **all** of the requested forms and support documents **are not included** with an air permit application needing an AERA the air permit application **will be deemed incomplete**. This includes risk estimates for pre-existing facilities. MPCA staff will return this AERA form plus any other incomplete AERA forms to the applicant with deficiencies and remedies indicated in the italicized MPCA review areas. If forms were submitted pre-app they should be updated and re-submitted post-app with any italicized MPCA comments left in and changes summarized in the appropriate areas.

Facility information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

MPCA Review Instructions

Specific section/document review

MPCA staff will summarize their review of specific sections/support documents by marking either "Yes" for adequate or "No" for deficient in the pre-app sections, or "Yes" for substantially complete or "No" for incomplete in the post-app sections, along with their initials. They will add comments on deficiencies and how they can be remedied in the summary section. When there are multiple submittals, include each new submittal date in the table with the corresponding review dates and comments, thus keeping a log of submittals.

Overall adequacy/completeness summary

*If **all** of the necessary sections/documents are present and follow the appropriate methods (i.e., follows the AERA, emissions and modeling guidance) MPCA staff will mark the appropriate overall summary section with either "Yes" for adequate in the pre-app section, or "Yes" for substantially complete in the post-app section. Otherwise they will mark "No" for deficient in the pre-app AERA submittal determination section or "No" for incomplete in the post-app AERA determination section. They will add comments on deficiencies and how they can be remedied in the overall summary section. If this form is being submitted as a protocol indicate in the MPCA overall review notes whether the protocol is approved or has deficiencies. Remember an AERA submitted with an air permit application is not considered "substantially complete" until **all** necessary quantitative and qualitative information has been submitted, and MPCA staff have determined that appropriate methods have been used. **Please summarize these results in the AERA-01 form.** The AERA-01 form will be shared with the permit engineer conducting the permit application completeness review. If deficiencies are noted in this form during the completeness review then this form should also be shared with the permit engineer who will share it with the applicant.*

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

AERA-27

MPCA Mercury Risk Estimation Method (MMREM) Protocol Form

Air Emissions Risk Analysis (AERA)

Doc Type: Air Emissions Risk Assessment – External Documentation

Instructions on Page 4

Purpose: This form is **required** for AERAs that include a Minnesota Pollution Control Agency (MPCA) Mercury Risk Estimation Method (MMREM) analysis. This form serves both as the MMREM analysis protocol and later describes the MMREM analysis. This form also documents the MMREM protocol and analysis review. It must be submitted electronically, with the other AERA forms and supporting documents listed on the AERA-01 form, and be approved before an air permit application is submitted. ***MPCA staff will fill out areas in italics during their review, indicating deficiencies and advising the applicant on how they can be remedied.*** Instructions on how to fill out this form are at the end of the form. Please consult the MMREM guidance at http://www.pca.state.mn.us/yhiz431, AERA website http://www.pca.state.mn.us/tchy42b, and Air Dispersion Modeling website http://www.pca.state.mn.us/nwqh421 when filling out this form.

Facility Information

1. AQ Facility ID No.: **11100036**
2. SIC Code: **4953**
3. Date(s) of pre-application submittal: **4/11/2012, rev. 5/10/2012, rev. 6/13/2012** (mm/dd/yyyy)
4. Date(s) of permit application submittal: **9/5/2012** (mm/dd/yyyy)
5. Facility name: **Perham Resource Recovery Facility**
6. Facility location
   Street address: **201 6th Avenue Northeast**
   City: **Perham** State: **MN** Zip code: **56573** County: **Otter Tail**
7. Proposer: **Mr. Michael Hanan** Phone: **(218) 998-4989** E-mail: **MHanan@co.ottertail.mn.us**
8. AERA Preparer: **Ms. Kathryn Swor** Phone: **(763) 479-4281** E-mail: **KSwor@wenck.com**

Are there differences between the MMREM analysis materials submitted pre-app and those submitted post-app?

☒ Yes ☐ No ☐ NA

If yes, please explain the differences (especially changes in methodology):

A mercury limit of 41 µg/dscm for the MWCs of the expanded facility was proposed; the MMREM analyses including that limit are included in the submittal. – 9/5/2012

MPCA Review Question: Are there differences between the MMREM Analysis materials submitted pre-app and those submitted post-app?

☐ *Yes* ☐ *No* ☐ *NA*

If yes, please explain the differences (especially changes in methodology):

MPCA Overall Summary of MMREM Analysis Review

Names of MPCA AERA reviewer(s):

Submittal date *(mm/dd/yyyy)*	***Pre-app review date*** *(mm/dd/yyyy)*	***Overall pre-app MMREM analysis determination*** *(Select Yes for adequate, No for deficient, and enter reviewer's initials)*	***Post-app completeness review date*** *(mm/dd/yyyy)*	***Overall post-app MMREM analysis completeness determination*** *(Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	***Technical accuracy review date*** *(mm/dd/yyyy)*	***Technical accuracy determination and reviewer's initials***
6/13/12	*8/23/12*	☒ *Yes* ☐ *No* *Int: HMH*		☐ *Yes* ☐ *No* *Int:* ____	*8/23/12*	☒ *Yes* ☐ *No* *Int: HMH*

	☐ *Yes* ☐ *No* *Int:* _____		☐ *Yes* ☐ *No* *Int:* _____		☐ *Yes* ☐ *No* *Int:* _____

MPCA Overall pre-app MMREM analysis review notes including comments on deficiencies and how they can be remedied:
It would be helpful if the MMREM Hg results were summarized like Pope Douglas EAW (see example below) and should reflect what is being proposed as a Hg limit in the revised permit application (which should be consistent with the Hg-01 form submitted).

MPCA Overall post-app MMREM analysis review notes including comments on deficiencies and how they can be remedied:

MPCA overall MMREM analysis technical accuracy review notes including comments on deficiencies and how they can be remedied:

General Submittal Information

This form is being submitted as: **(mark as many as are relevant to this submittal; keep dates of other submittals in the chart as a log)**

	Submittal date (mm/dd/yyyy)
☐ MMREM analysis protocol	**4/11/2012,**
☐ Explanation of MMREM analysis results in a pre-air permit application submittal (pre-app)*	**6/13/2012**
☒ Explanation of MMREM analysis results in an air permit application (post-app)*	**9/5/2012**

*If applicable, please explain any differences in methodologies between the approved protocol and the modeled results:

The MPCA MMREM guidance at http://www.pca.state.mn.us/yhiz431 and modeling guidance will be/was followed?
☒ Yes ☐ No

If no, describe any deviations from the MPCA recommended guidance:

MMREM Spreadsheet Inputs

1. What will be/were the percent of each Mercury species (e.g., gaseous divalent mercury (HgII), elemental mercury (Hg0), and particle-bound divalent mercury (Hgp)) used in form Hg-01 and in the MMREM spreadsheet?

Hg species	Percent of total Hg
Hg(II)	**82.2%**
Hg(0)	**14.0%**
Hg-p	**3.8%**

2. Where did the percent of each Hg species come from?

   ☐ EPA 's National Emission Inventory Hg speciation factors. What year (e.g., 2005): _____

   ☒ Stack testing, if so please provide a copy of the test(s) or indicate the facility and year if in Minnesota**: Olmsted Waste-to-Energy facility, February 7, 2006. (Percent was provided by MPCA. Therefore, test report is not included.)**

   ☐ Control efficiencies. Explain:

   ☐ Other. Explain:

3. Which of the following emission factors will be/were used in calculating the modeled increment to mean air concentration over the water body and watershed?

   ☐ Long term permit emission limits.

☐ AP-42 emission factors.

☐ Stack testing, if so please provide a copy of the test(s) or indicate the facility and year if in Minnesota: _____

☒ Other. Explain: **40 CFR Part 60 Subpart AAAA**

4. Which of the following modeling methods will be/were used in calculating the modeled increment to mean air concentration over the water body and watershed?

   ☐ The same unitized emissions modeling used in other parts of the AERA.

   ☒ MMREM specific AERMOD modeling. Explain: **AERMOD was used to determine the 1 g/s dispersion factor at the highest impacted location over Little Pine Lake for the existing and proposed facilities. The RASS was used to calculate the air concentration of mercury at that location, and the difference (Proposed – Existing) was used as the Modeled Increment to Mean Air Conc in µg/m3. (0.00008977 µg/m3– 0.00003256 µg/m3 = 0.00005721 µg/m3)**

   ☐ Other. Explain:

5. Which water bodies will be/ were analyzed? Please include Minnesota Department of Natural Resources (DNR) lake numbers if available.

   Little Pine Lake, DNR #56-0142

   Please note that any fishable water body[2] occurring at the area of maximum deposition should be evaluated. If the area of maximum deposition does not fall on a fishable waterbody, consider all water bodies in the specified range around the facility to determine which water body is nearest the area of maximum deposition. This may be the water body to evaluate for worst-case impacts at the screening level. However, it may not be clear whether the water body nearest the site of maximum deposition is the water body that is most highly impacted. There may be a water body with more impact because it has less dilution from its watershed, more fishing, etc. If it is not clear which water bodies should be evaluated, MPCA staff should be contacted.

   [2] The AERA definition of a fishable water body is: "A water body may be considered "fishable" if it typically contains water year-round in a year that receives at least 75 percent of the normal annual precipitation for that area. For facilities with stack heights less than 100 meters, a map should be provided showing lakes, rivers and streams within a 3 km radius (approx. 2 miles). For facilities with stack heights greater than 100 meters, show lakes, rivers and streams for the area within a 10 km radius (6 miles). Also show water bodies outside the specified area that may be fed by rivers and streams lying within the radius of interest. The length of the reach of river or stream (or extent of a lake) outside the radius that must be shown will be determined case-by-case based on local data and conditions."

6. Please describe any additional selection methods or criteria used to select the water bodies other than what was described above? ☐ NA

   The southern tip of Little Pine Lake is within a 3 kilometer radius of the facility and is known to be fished. Otter Tail River is also within the radius of influence listed on the AERA-02 form. However, as confirmed by a site visit, access to Otter Tail River is restricted by steep banks and foliage and there is little fishing on the river near the site (and effectively no fishing for food fish). Therefore, the analysis will be restricted to Little Pine Lake.

7. What will be/was the source of the watershed information (e.g., DNR catchment tool, Total Maximum Daily Load [TMDL] report, DNR Lakefinder, MPCA map)?

   The lakeshed and flow patterns are from DNR.

8. Which existing ambient fish tissue concentration(s) will be/were used:

   Little Pine Lake ProUCL 95% Student's t UCL for walleye = 0.305 ppm. Updated information from MPCA yields a ProUCL result of 0.376 ppm.

   Which fish species:

   Walleye, as 95% UCL concentrations are higher for walleye than for northern pike and Little Pine Lake is known as a prime walleye fishing lake in Otter Tail County, according to DNR.

   What is the source of this fish tissue value:

   Walleye and northern pike mercury concentrations from Little Pine Lake in Otter Tail County from MPCA-provided spreadsheets.

   Is it the 95 percent upper confidence limit of the arithmetic mean (UCL-AM)? ☒ Yes ☐ No ☐ NA

Please note the MPCA risk assessors can provide Minnesota specific fish tissue data from U. S. Environmental Protection Agency's (EPA) 2002-2006 National Fish Survey.

Due to the uncertainty associated with estimating the true average mercury fish tissue concentration, the 95 percent UCL of the arithmetic mean should be used because it provides reasonable confidence that the true average fish tissue concentration will not be underestimated. For purposes of cancer and chronic noncancer risk assessment, the 95 percent UCL-AM of fish tissue data should be used. The EPA has formulated guidance for calculating the UCL-AM: USEPA, OSWER, 2002, *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites* (http://www.hanford.gov/dqo/training/ucl.pdf). The guidance has been implemented in the EPA ProUCL software (http://www.epa.gov/nerlesd1/tsc/form.htm). This software may be downloaded and run to obtain UCL-AM values from fish tissue data.

9. Will/were any additional refinements or additional scenarios used beyond assuming the standard MPCA fish consumption rates for both a recreational and subsistence fisher (e.g., Native American consumption rates)? ☐ Yes ☒ No

   Explain: **It should be noted that Little Pine Lake has a Fish Advisory from MN DNR, restricting walleye fish consumption for the general population to one meal per week, which is the rate used for the recreational fisher. Exposure at the level of the subsistence fisher is therefore unlikely.**

MPCA Summary of MMREM Review

Names of MPCA AERA reviewers: ______

Question #	*Submittal date (mm/dd/yyyy)*	*Pre-app review date (mm/dd/yyyy)*	*Overall pre-app Hg emissions determination (Select Yes for adequate, No for deficient, and enter reviewer's initials)*	*Post-app completeness review date (mm/dd/yyyy)*	*Overall post-app Hg emissions completeness determination (Select Yes for substantially complete, No for incomplete, and enter reviewer's initials)*	*Technical accuracy review date (mm/dd/yyyy)*	*Technical accuracy determination and reviewer's initials*
1	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
2	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
3	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
4	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
5	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
6	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
7	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
8	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH
9	6/13/12	8/23/12	☒ Yes ☐ No Int: HMH		☐ Yes ☐ No Int: ____	8/23/12	☒ Yes ☐ No Int: HMH

MPCA MMREM review notes:

Proposer/Preparer Instructions

Boxes can be checked by right clicking on them, selecting properties, and selecting the desired choice. Response areas may be expanded as necessary to include the complete response. All AERA documents must be submitted electronically whether submitted with an air permit application or alone. AERA documents submitted with an air permit application must also be submitted in a hard copy. Hard copies of spreadsheets, like the Risk Assessment Screening Spreadsheet (RASS) and lengthy modeling files should include the first summary page of the document but do not need to include subsequent pages since the electronic version will be available for review.

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Facility Information: Fill in the Air Quality (AQ) Facility identification (ID) No. (Number), which is the first eight digits of the permit number for all new permits issued under the new operating permit program, Standard Industrial Classification (SIC) code, facility name and location, and submittal dates. The project proposer and AERA preparer should be people that MPCA staff can contact with general and technical questions about the AERA submittal.

Appendix B

General Permit Forms

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

CH-GI-01

Facility Information for Permit Changes

Air Quality Permit Program

Doc Type: Permit Application

Instructions on Page 3

1a) AQ Facility ID No.: 11100036 **1b)** AQ File No.: 116H

2) Facility Name: Perham Resource Recovery Facility

3) Facility Location

Street Address: 201 6th Ave Northeast

City: Perham County: Otter Tail Zip code: 56573

Note: If the facility is or will be located within the city limits of Minneapolis, attach a map showing the exact location.

Mailing Address: PO Box 130

City: Perham State: Minnesota Zip code: 56573

4) Corporate/Company Owner

Name: Prairie Lakes Municipal Solid Waste Authority

Mailing Address: 1115 North Tower Road

City: Fergus Falls State: Minnesota Zip code: 56537

Owner Classification: ☐ Private ☒ Local Govt. ☐ State Govt. ☐ Federal Govt. ☐ Utility

5) Corporate/Company Operator (if different than owner)

Name: Not Applicable

Mailing Address:

City: State: Zip code:

6) Co-permittee (if applicable)

Name: Not Applicable

Mailing Address:

City: State: Zip code:

7) Legally responsible official for this permit/facility

Mr/Ms: Mr. Michael Hanan Phone: (218) 998-4898

Title: Prairie Lake Municipal Solid Waste Authority Executive Director Fax: (218) 998-4899

At (check one): ☒ Owner Address ☐ Operator Address ☐ Emission Facility Address

☐ Other (specify): MHanan@co.ottertail.mn.us

8) Contact person for this permit

Mr/Ms: Mr. Brian Schmidt Phone: (218) 346-4404

Title: Facility Manager Fax: (218) 346-4434

At (check one): ☐ Owner Address ☐ Operator Address ☒ Emission Facility Address

☐ Other (specify):

E-mail address: bschmidt@cityofperham.com

9) All billings for annual fees should be addressed to:

Mr/Ms: Mr. Brian Schmidt Phone: (218) 346-4404

Title: Facility Manager Fax: (218) 346-4434

At (check one): ☐ Owner Address ☐ Operator Address ☒ Emission Facility Address

☐ Other (specify) ______

10) Standard Industrial Classification (SIC) Code and description for the facility:

Primary: 4953 / Municipal Solid Waste Incineration

Secondary (if applicable): ______ / ______

Tertiary (if applicable): ______ / ______

11) Primary product produced (or activity performed) at the facility is:

Steam from the combustion of processed municipal solid waste

12) Facility is: ☒ Stationary ☐ Portable

13) (reserved for future use)

14) Is environmental review required (either an Environmental Assessment Worksheet (EAW) or an Environmental Impact Statement (EIS)) for this facility?

☐ No ☒ Yes -- you may also be required to perform a state air toxics review for your facility. Please call 1-800-657-3864 or locally 651-296-6300.

15) Are you (or will you be, if this is a new facility) required to submit a Toxics Release Inventory (Form R) under SARA Title 313 for this facility? Contact the Minnesota Emergency Planning and Community Right-to-Know Act (EPCRA) Program for more information, at 651-201-7400.

☐ Yes – Answer Question 15a ☒ No – Go on to Question 16

15a) Are you required to submit a Pollution Prevention Plan Progress Report in accordance with Minn. Stat. § 115D.08?

☒ No ☐ Yes, and the most recently required progress report has been submitted

☐ Yes, but a progress report has not been submitted because: (fill in reason below)

______

______

16) Is this facility within 50 miles of another state or the Canadian border?:

☐ Yes (specify which ones) ______ ☒ No

17) Are you proposing any alternative operating or emissions trading scenarios in this application? (see Minn. R. 7007.0800, subp. 10 and 11)

☒ No ☐ Yes - attach a description of your proposal, including a statement on how the proposal will meet all applicable requirements (specifically, please address any applicable New Source Review requirements - see Form CH-04).

18) Person preparing this permit application:

Mr. / Ms. Mr. Luke Taylor, P.E., Wenck Associates, Inc.

Title: Project Manager

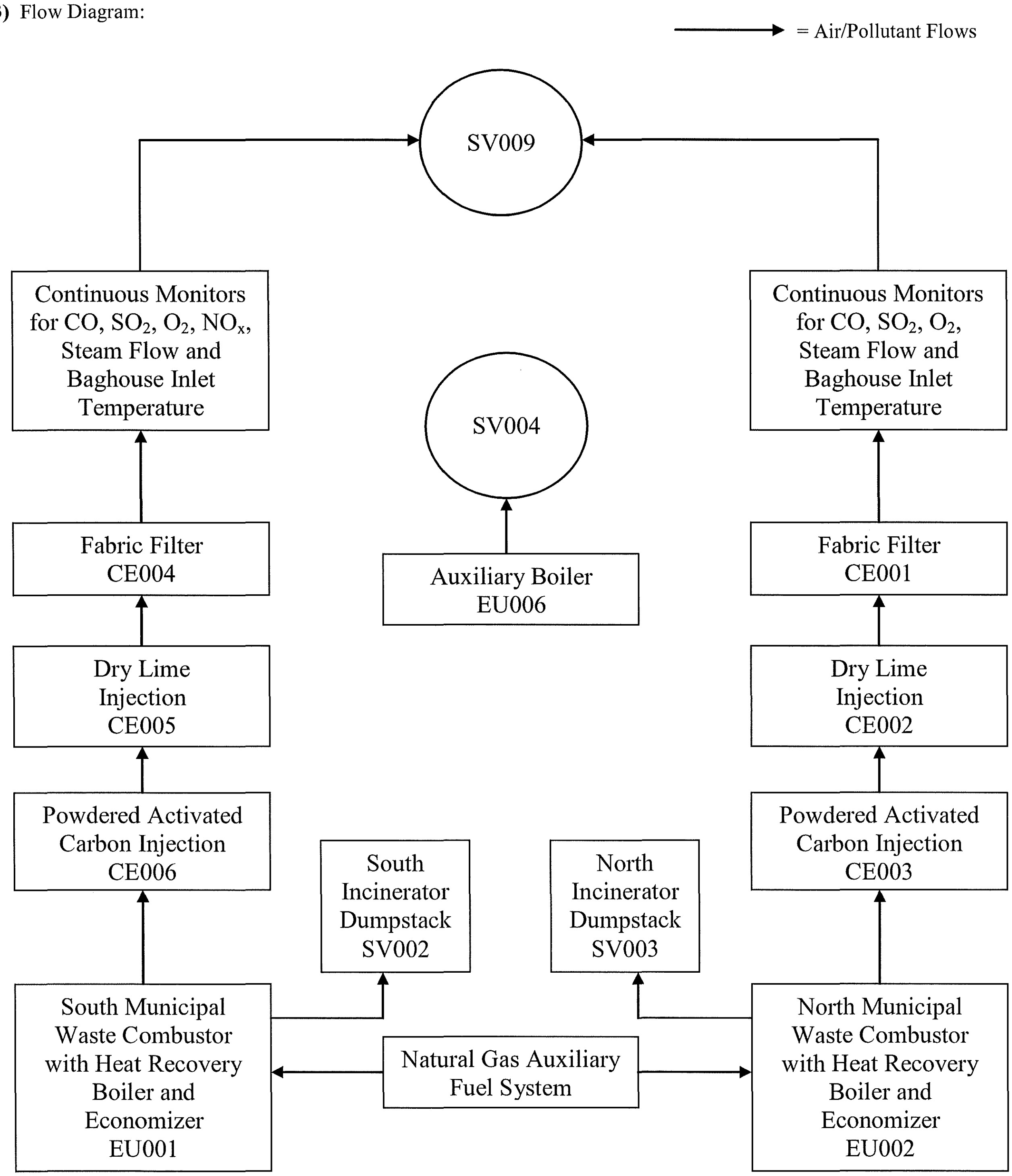
Phone: (763) 479-4291 Fax: (763) 479-4242 Date: September 5, 2012

E-mail address ltaylor@wenck.com

1) AQ Facility ID No.: **11100036**

2) Facility Name: **Perham Resource Recovery Facility**

3) Flow Diagram:



Municipal solid waste is transferred via crane to feed hoppers of the combustors.

Minnesota Pollution Control Agency

AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

PERMIT APPLICATION FORM **GI-03**

FACILITY AND STACK/VENT DIAGRAM

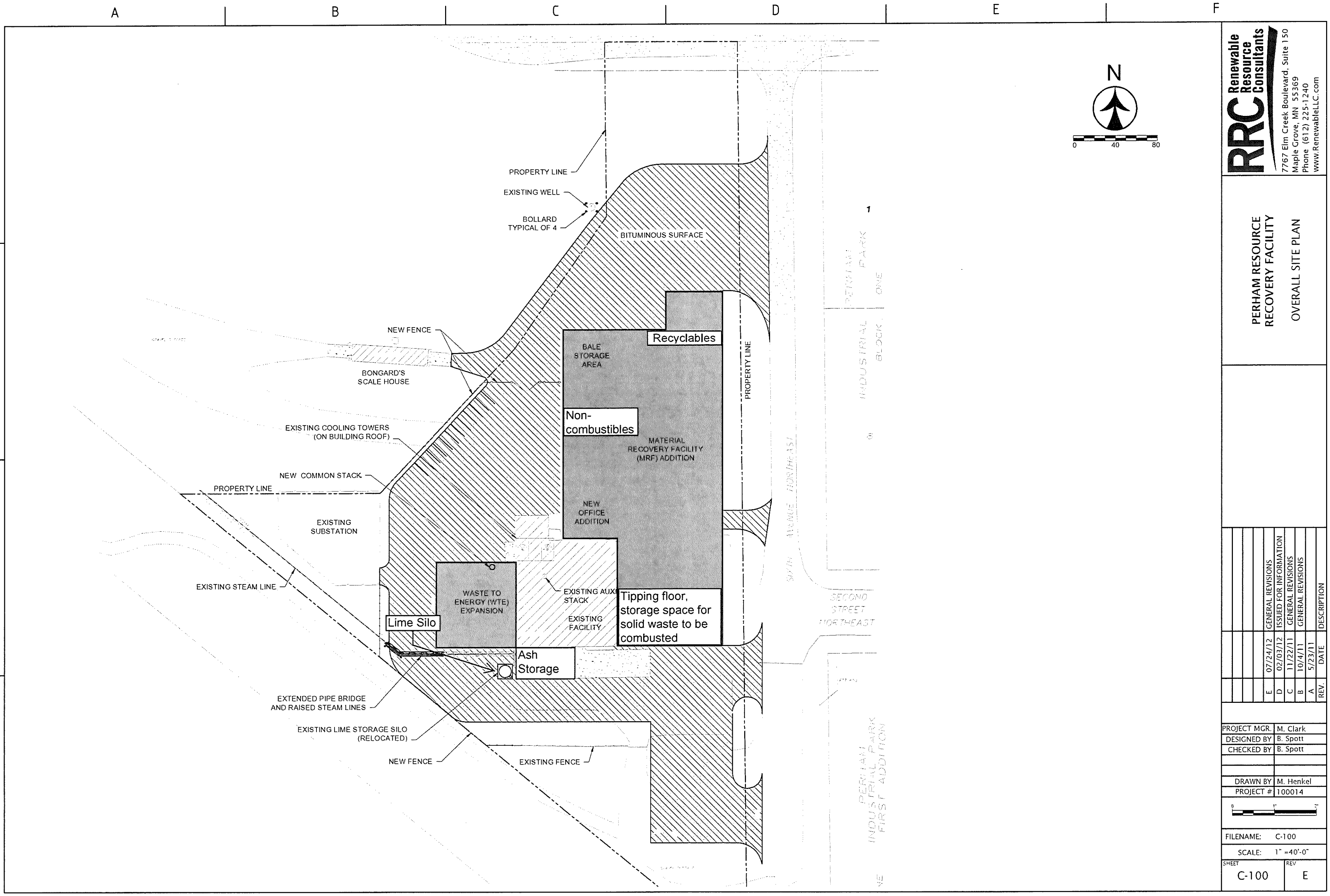
2/16/05

1) AQ Facility ID No.: **11100036**

2) Facility Name: **Perham Resource Recovery Facility**

3) Facility and Stack/Vent Diagram:

SEE STACK/VENT DIAGRAM ON NEXT PAGE


A
B
C
D
E
F
1
2
3
4
N
0
40
80
PROPERTY LINE
EXISTING WELL
BOLLARD TYPICAL OF 4
BITUMINOUS SURFACE
NEW FENCE
BONGARD'S SCALE HOUSE
Recyclables
BALE STORAGE AREA
Non-combustibles
MATERIAL RECOVERY FACILITY (MRF) ADDITION
NEW OFFICE ADDITION
PROPERTY LINE
EXISTING COOLING TOWERS (ON BUILDING ROOF)
NEW COMMON STACK
PROPERTY LINE
EXISTING SUBSTATION
EXISTING STEAM LINE
WASTE TO ENERGY (WTE) EXPANSION
EXISTING AUX STACK
EXISTING FACILITY
Tipping floor, storage space for solid waste to be combusted
Lime Silo
Ash Storage
EXTENDED PIPE BRIDGE AND RAISED STEAM LINES
EXISTING LIME STORAGE SILO (RELOCATED)
NEW FENCE
EXISTING FENCE
PERHAM INDUSTRIAL PARK BLOCK ONE
SECOND STREET NORTHEAST
PERHAM INDUSTRIAL PARK FIRST ADDITION
RRC Renewable Resource Consultants
7767 Elm Creek Boulevard, Suite 150
Maple Grove, MN 55369
Phone (612) 225-1240
www.RenewableLLC.com
PERHAM RESOURCE RECOVERY FACILITY
OVERALL SITE PLAN
E 07/24/12 GENERAL REVISIONS
D 02/03/12 ISSUED FOR INFORMATION
C 11/22/11 GENERAL REVISIONS
B 10/4/11 GENERAL REVISIONS
A 5/23/11
REV. DATE DESCRIPTION
PROJECT MGR. M. Clark
DESIGNED BY B. Spott
CHECKED BY B. Spott
DRAWN BY M. Henkel
PROJECT # 100014
FILENAME: C-100
SCALE: 1" =40'-0"
SHEET C-100
REV E

Minnesota Pollution Control Agency

AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

PERMIT APPLICATION FORM **GI-04**
STACK/VENT INFORMATION
7/25/05

1) AQ Facility ID No.: 11100036 2) Facility Name: Perham Resource Recovery Facility

3a) SV ID No.	3b) Operator's Description	3c) Height of Opening From Ground (ft.)	3d) Inside Diameter in ft. (left column only) or Length x Width in ft. (both columns)		3e) Design Flow Rate at Exit (acfm)	3f) Exit Gas Temperature (° F)	3g) Rate/Temp Information Source	3h) Discharge Direction
~~SV001~~	~~Main Stack~~	~~70~~	4	——	~~32000~~	~~220~~	~~Manufacturer~~	~~Error~~
SV002	~~Unit 1~~ Dump Stack – **EU001**	65	5		40800	1800	Estimate	Up, No Cap
SV003	~~Unit 2~~ Dump Stack – **EU002**	65	5		40800	1800	Estimate	Up, No Cap
SV004	Auxiliary Boiler Stack	~~65~~ **89**	4		~~34500~~ **22780**	~~575~~ **220**	Estimate	~~Error~~ **Up, No Cap**
SV009	**Combined MWC Stack**	**125.0**	**TBD**		**62,499**	**325**	**Estimate**	**Up, No Cap**

Minnesota Pollution Control Agency

AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

PERMIT APPLICATION FORM **GI-05D**

FUGITIVE EMISSION SOURCE INFORMATION

07/25/05

1) AQ Facility ID No.: 11100036 2) Facility Name: Perham Resource Recovery Facility

3a) Fugitive Source ID No.	3b) Pollutant Emitted (particulate matter (PM) or VOC)	3c) Control Equip ID No.	3d) Description of Fugitive Emission Source
~~FS001~~	~~PM~~		~~MSW Pile~~
FS002	**PM**		**Traffic and Paved Roads**

Minnesota Pollution Control Agency

AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

PERMIT APPLICATION FORM **ME-01**
CONTINUOUS MONITORING SYSTEM INFORMATION
3/07/06

1) AQ Facility ID No.: 11100036 2) Facility Name: Perham Resource Recovery Facility

Table A. Data Acquisition System (DA)

A1) DAS ID No.	A2) Primary or Backup? (P or B)	A3) Description	A4) Manufacturer	A5) Model No.	A6) Serial No.	A7) Data Storage Medium	A8) Installation Date
~~001~~	~~P~~	~~DeltaV Version 7.3~~	~~Emerson~~	~~Perham #1~~	~~N/A~~	~~E~~	~~3/02~~
002	**P**	**TBD**	**TBD**	**TBD**	**TBD**	**E**	**TBD**

Table B: Continuous Monitors (MR)

B1) Mon-itor ID No.	B2) Moni-tored Item ID No.	B3) Monitor Description	B4) Manufacturer	B5) Model No.	B6) Serial No.	B7) Parameter(s) Monitored	B8) Span Value (PPM)	B9) System Full-Scale Value (PPM)	B10) Bypass Capa-bility? (Y/N)	B11) Optical Path Length Ratio (opacity monitors only)	B12) Installation Date
001	~~GP001~~ EU002	**North Unit** ~~Incin.~~ Opacity	Phoenix	OPAC 20/20	OPAC-1103	Opacity	100	100	Yes	.500	
005	EU002	**North Unit** ~~Incin. 2~~ Temperature - **Primary**	**MikRon**	Infared	MG75	Temp		3000	No		
006	EU001	**South Unit** ~~Incin. 1~~ Temperature - **Primary**	**MikRon**	Infared	MG75	Temp		3000	No		

Table B: Continuous Monitors (MR)											
B1) Mon-itor ID No.	B2) Moni-tored Item ID No.	B3) Monitor Description	B4) Manufacturer	B5) Model No.	B6) Serial No.	B7) Parameter(s) Monitored	B8) Span Value (PPM)	B9) System Full-Scale Value (PPM)	B10) Bypass Capa-bility? (Y/N)	B11) Optical Path Length Ratio (opacity monitors only)	B12) Installation Date
007	EU002	**North Unit** ~~Incin. 2~~ Temperature **- Secondary**	Thermowell	Type K		Temp		2400	No		
008	EU001	**South Unit** ~~Incin. 1~~ Temperature **- Secondary**	Thermowell	Type K		Temp		2400	No		
~~009~~	~~EU002~~	~~Incin. 2 Temperature~~	~~Thermowell~~	~~Type K~~	———	~~Temp~~	———	~~2400~~	~~No~~	———	———
010	EU001	**South Unit** ~~Incin. 1~~ Pressure	~~Leeds & Northrup~~ Yokogawa	~~2610~~ EJA110A	86-54892-3-1	Pressure Drop		~~0~~ **1**	No		
011	EU002	**North Unit** ~~Incin. 2~~ Pressure	~~Leeds & Northrup~~ Yokogawa	~~2610~~ EJA110A	86-54892-3-2	Pressure Drop		~~0~~ **1**	No		
~~012~~	~~EU001~~	~~Incin. 1 Temperature~~	~~Thermowell~~	~~Type K~~	———	~~Temp~~	———	~~2400~~	~~No~~	———	———
013	CE001	Baghouse Temp	Thermowell	Type K		Temp		~~2400~~ **500**	Yes		
014	~~CE001~~	Economizer Pressure	~~Leeds and Northrup~~ Dwyer	2610	86-54892-2-1	PressDrop		6	Yes		
016	**EU002**	**North Unit O_2/CO/SO_2 Monitor**	**Horiba**	**ENDA-E4345**	**420342700**	O_2	**16**	**22**	**Y**		**9/02**

Table B: Continuous Monitors (MR)

B1) Monitor ID No.	B2) Monitored Item ID No.	B3) Monitor Description	B4) Manufacturer	B5) Model No.	B6) Serial No.	B7) Parameter(s) Monitored	B8) Span Value (PPM)	B9) System Full-Scale Value (PPM)	B10) Bypass Capability? (Y/N)	B11) Optical Path Length Ratio (opacity monitors only)	B12) Installation Date
017	**EU002**	**North Unit Steam Flow**	**Yokogawa**	**DYA**	**N/A**	**Steam Flow**	**N/A**	**50,000 lb/hr**	**N**		**3/02**
018	**CE001**	**Baghouse Pressure Drop**	**Dwyer**	**Photohelic**	**N/A**	**Pressure Drop**	**N/A**	**10" W.C.**	**N**		**3/02**
019	**EU001**	**South Unit $O_2/CO/SO_2$ Monitor**	**TBD**	**TBD**	**TBD**	**O_2**	**TBD**	**TBD**	**Y**		**TBD**
019	**EU001**	**South Unit $O_2/CO/SO_2$ Monitor**	**TBD**	**TBD**	**TBD**	**CO**	**TBD**	**TBD**	**Y**		**TBD**
019	**EU001**	**South Unit $O_2/CO/SO_2$ Monitor**	**TBD**	**TBD**	**TBD**	**SO_2**	**TBD**	**TBD**	**Y**		**TBD**
020	**EU001**	**South Unit Steam Flow**	**TBD**	**TBD**	**TBD**	**Steam Flow**	**TBD**	**TBD**	**N**		**TBD**
021	**CE004**	**Baghouse Pressure Drop**	**TBD**	**TBD**	**TBD**	**Pressure Drop**	**TBD**	**TBD**	**N**		**TBD**
022	EU001	South Unit NO_2 Monitor	TBD	TBD	TBD	NO_2	TBD	TBD	Y		TBD
023	**EU001**	**South Opacity**	**TBD**	**TBD**	**TBD**	**Opacity**	**TBD**	**TBD**	**Y**		**TBD**

Table C. Continuous Monitoring Systems (CM)							
C1) CMS ID No.	C2) Monitor ID No.	C3) DAS ID No.	C4) Description	C5) Parameter(s) Monitored	C6) Month/Year Installed	C7) Certification Date	C8) Certification Basis
001	001	001	~~Unit1 and 2~~**EU002**:10% Opacity, SV001, 6 min avg.	Opacity	**3/02**	**6/05**	40 CFR 60
~~002~~	~~MR002 MR003~~	~~DA001~~	~~Unit 1: 50 ppm CO @7% 02, EU001, 4 hr average~~	~~Carbon Monoxide~~	———	———	~~40 CFR 60~~
~~003~~	~~MR004 MR005~~	~~DA001~~	~~Unit 2: 50 ppm CO @ 7% 02, EU002, 4 hr ave~~	~~Carbon Monoxide~~	———	———	———
004	~~MR006~~ **MR013**	DA001	~~Unit 1~~ **EU002**: CE Inlet temperature x degrees Fahrenheit, EU001, 4-hr ave.	Temperature	**3/02**		
~~005~~	~~MR007~~	~~DA001~~	~~Unit 2: CE Inlet temperature x degrees Fahrenheit, EU002, 4-hr ave.~~	~~Temperature~~			
006	~~MR008~~ **MR017**	DA001	~~Units 1 and 2~~**EU002**: Steam Flow x lbs/hr, ~~EU001 and~~ EU002, 4-hr ave.	Steam Flow	**3/02**		
007	**016**	**001**	**EU002:CO @ 7% O2, 4 hr avg.**	**O_2**	**9/02**	**10/02**	**40 CFR 60**
007	**016**	**001**	**EU002:CO @ 7% O2, 4 hr avg.**	**CO**	**9/02**	**10/02**	**40 CFR 60**
007	**016**	**001**	**EU002:SO_2 @ 7% O2, 24 hr geometric avg.**	**SO_2**	**9/02**	**5/04**	**40 CFR 60**
007	**016**	**001**	**EU002: SO_2 @ 7% O2, 4 hr avg.**	**O_2**	**9/02**	**5/04**	**40 CFR 60**
008	**019**	**002**	**EU001:CO @ 7% O2, 4 hr avg.**	**O_2**	**TBD**	**TBD**	**40 CFR 60**
008	**019**	**002**	**EU001:CO @ 7% O2, 4 hr avg.**	**CO**	**TBD**	**TBD**	**40 CFR 60**
008	**019**	**002**	**EU002:SO_2 @ 7% O2, 24 hr geometric avg.**	**SO_2**	**TBD**	**TBD**	**40 CFR 60**
008	**019**	**002**	**EU001: SO_2 @ 7% O2, 4 hr avg.**	**O_2**	**TBD**	**TBD**	**40 CFR 60**

Minnesota Pollution Control Agency

520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

AIR QUALITY FORM **HG-01**

MERCURY RELEASES TO AMBIENT AIR

October 25, 2006

1a) AQ Facility ID No.: 11100036

1b) AQ File No.: 116H

2) Facility Name: Perham Resource Recovery Facility

3) Use this table to summarize changes in mercury emissions associated with a new or expanded facility or a changed or modified operation at an existing facility.

3a) Emission Unit (EU) ID number	3b) potential to emit after the change (pounds per year)				3c) current actual emissions (pounds per year)				3d) future estimated actual emissions (pounds per year)			
	particulate-bound (Hg-p)	reactive gaseous (HgII)	Elemental (Hg0)	Total (HgT)	particulate-bound (Hg-p)	reactive gaseous (HgII)	Elemental (Hg0)	Total (HgT)	particulate-bound (Hg-p)	reactive gaseous (HgII)	Elemental (Hg0)	Total (HgT)
EU 001	0.56	12.12	2.06	14.74	0.09	1.93	0.33	2.35	0.20	4.36	0.74	5.31

Note: Particulate-bound, reactive gaseous, and elemental mercury are calculated from the total values based on speciation values of 3.8%, 82.2%, and 14.0%, respectively. Mercury speciation taken from the Pope/Douglas Solid Waste Management Major Permit Amendment Application submitted October 30, 2009.

4) Calculation Data.

4a) Where are the calculations summarized in item 3? Please list where in the permit application (section and/or pages) we can find mercury emission calculations for each of the emission units listed in item 3.

Appendix D to the application with the potential to emit calculations.

4b) What is the source of the data used to determine the mercury emissions in item 3 (e.g., published emission factors, site specific test data, mass balance, etc.) ?

South Unit (EU 001) potential emissions are calculated from the proposed HHRA based state-only limit of 41 µg/dscm. Current acutal and future actual emissions are calculated based on the 2011 PRRF Air Emissions Compliance Test, May 23-36, 2011 for Mercury. All calculations use AP-42 conversion factors. Potential and future actual emissions use the potential daily throughput of 100 tons MSW for the South Unit, while current actual emissions use historical waste throughput information from Unit 1.

5) Attach a diagram that shows the flow of mercury through the facility. See the example in the instructions.

☐ Attached **NOT APPLICABLE – ANY MERCURY RELEASED RECEIVED AS PART OF THE FUEL SOURCE**

6) Use this table to summarize available alternative methods to reduce mercury emissions from the facility. Complete a separate table for each emission unit.

EU 001

6a) Description	6b) Total Mercury Emitted (lb/yr)	6c) Reduction Potential (lb/yr)	6d) Annualized Cost ($)	6e) Cost Effectiveness ($ per lb Hg)
☒ Baseline/Uncontrolled emissions	Unknown			
☒ Mercury Removal (Activated Carbon) Additive Injection	5.31	See #7 Below		
☐				
☐				

EU

6a) Description	6b) Total Mercury Emitted (lb/yr)	6c) Reduction Potential (lb/yr)	6d) Annualized Cost ($)	6e) Cost Effectiveness ($ per lb Hg)
☐ Baseline/Uncontrolled emissions				
☐				
☐				
☐				

EU

6a) Description	6b) Total Mercury Emitted (lb/yr)	6c) Reduction Potential (lb/yr)	6d) Annualized Cost ($)	6e) Cost Effectiveness ($ per lb Hg)
☐ Baseline/Uncontrolled emissions				
☐				
☐				
☐				

7) For each emission unit, if the alternative in use or selected for implementation is not the lowest in mercury emissions, describe why the lowest mercury emitting alternative is not in use or selected for use.

The South Unit will employ the best technically & economically feasible mercury control technology & procedures, including fuel sorting and mercury removal additive injection.

Appendix C

Facility Emissions

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWC Units Emissions Summary

Emissions Summary: MWC Combustion Emissions

AQ Facility ID No.:	11100036 AQ File No.: 116H	
Facility name:	Perham Resource Recovery Facility	
Emission Unit Identification No.:	EU002 - North MWC	EU001 - South MWC
Stack/Vent Designation No.:	SV009	SV009
Pollution Control Equipment No.(s):	CE001, CE002, CE003	CE004, CE005, CE006

100 % Capacity	North Unit	South Unit	
Maximum Fuel Consumption Rate	4.17	4.17	ton/hr
Annual Average Basis (@ 5,500 Btu/lb)	100	100	ton/day

		Chronic Annual Average at 100% Capacity						Acute Short Term at 110% Capacity			
Pollutant	CAS Number	Emission Rate				Emissions		Emission Rate			
		(lb/hr)		(g/s)		(tpy)		(lb/hr)		(g/s)	
		EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002
PM (total) - State only limit		1.88	1.88	0.237	0.237	8.23	8.23				
PM (filterable)		1.41	2.87	0.178	0.362	6.17	12.58	2.066	2.066	0.260	0.260
PM_{10}		2.27	2.27	0.286	0.286	9.96	9.96	2.500	2.500	0.315	0.315
$PM_{2.5}$		2.27	2.27	0.286	0.286	9.96	9.96	2.500	2.500	0.315	0.315
SO_2	7446-09-5	3.28	8.43	0.414	1.062	14.39	36.93	3.613	9.274	0.455	1.168
NOx	10102-44-0	39.21	39.21	4.941	4.941	171.75	171.75	43.134	43.134	5.435	5.435
VOC		0.51	0.51	0.064	0.064	2.23	2.23				
CO	7440-48-4	4.79	4.79	0.603	0.603	20.97	20.97				
H_2SO_4	7664-93-9	0.01	0.01	0.001	0.001	0.03	0.03	0.007	0.007	0.001	0.001
MWC Acid Gases (SO_2 and HCl)		4.85	24.06	0.611	3.031	21.23	105.36	5.332	26.461	0.672	3.334
HAPS											
Lead	7439-92-1	8.21E-03	6.57E-02	1.03E-03	8.27E-03	3.60E-02	2.88E-01				
Cadmium	7440-43-9	8.21E-04	4.10E-03	1.03E-04	5.17E-04	3.60E-03	1.80E-02				
Mercury	7439-97-6	3.28E-03	3.28E-03	4.14E-04	4.14E-04	1.44E-02	1.44E-02				
Mercury - State only limit	7439-97-6	2.46E-03	2.46E-03	3.10E-04	3.10E-04	1.08E-02	1.08E-02	4.51E-03	4.51E-03	5.69E-04	5.69E-04
HCl	9004-54-0	1.56E+00	1.56E+01	0.20	1.97	6.84E+00	6.84E+01	1.72	17.19	0.22	2.17
HF	7782-41-4	1.30E-02	1.30E-02	1.63E-03	1.63E-03	5.68E-02	5.68E-02	0.01	1.43E-02	1.80E-03	1.80E-03

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWC Units Emissions Summary

Pollutant	CAS Number	Chronic Annual Average at 100% Capacity						Acute Short Term at 110% Capacity			
		Emission Rate				Emissions		Emission Rate			
		(lb/hr)		(g/s)		(tpy)		(lb/hr)		(g/s)	
		EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002
Dioxins/Furans											
Total Dioxins/Furans		5.34E-07	5.13E-06	6.72E-08	6.46E-07	2.34E-06	2.25E-05				
Total OCDF		1.19E-08	1.15E-07	1.50E-09	1.45E-08	5.23E-08	5.03E-07				
Total OCDD		7.04E-08	6.77E-07	8.87E-09	8.53E-08	3.08E-07	2.96E-06				
TCDF, 2,3,7,8-		4.39E-08	4.22E-07	5.53E-09	5.32E-08	1.92E-07	1.85E-06				
TCDD, 2,3,7,8-		6.13E-10	5.90E-09	7.73E-11	7.43E-10	2.69E-09	2.58E-08				
PeCDF, 1,2,3,7,8-		4.66E-09	4.48E-08	5.87E-10	5.65E-09	2.04E-08	1.96E-07				
PeCDF, 2,3,4,6,8-		6.41E-09	6.16E-08	8.08E-10	7.77E-09	2.81E-08	2.70E-07				
PeCDD, 1,2,3,7,8-		2.93E-09	2.82E-08	3.70E-10	3.56E-09	1.29E-08	1.24E-07				
HxCDF, 1,2,3,4,7,8-		8.22E-09	7.90E-08	1.04E-09	9.96E-09	3.60E-08	3.46E-07				
HxCDF, 1,2,3,6,7,8-		6.86E-09	6.59E-08	8.64E-10	8.31E-09	3.00E-08	2.89E-07				
HxCDF, 1,2,3,7,8,9-		3.29E-09	3.17E-08	4.15E-10	3.99E-09	1.44E-08	1.39E-07				
HxCDF, 2,3,4,6,7,8-		6.93E-09	6.66E-08	8.73E-10	8.40E-09	3.04E-08	2.92E-07				
HxCDD, 1,2,3,4,7,8-		3.12E-09	3.00E-08	3.93E-10	3.78E-09	1.37E-08	1.31E-07				
HxCDD, 1,2,3,6,7,8-		6.97E-09	6.70E-08	8.78E-10	8.44E-09	3.05E-08	2.94E-07				
HxCDD, 1,2,3,7,8,9-		3.68E-09	3.54E-08	4.64E-10	4.46E-09	1.61E-08	1.55E-07				
HpCDF, 1,2,3,4,6,7,8-		2.03E-08	1.95E-07	2.56E-09	2.46E-08	8.90E-08	8.55E-07				
HpCDF, 1,2,3,4,7,8,9-		3.59E-09	3.45E-08	4.53E-10	4.35E-09	1.57E-08	1.51E-07				
HpCDD, 1,2,3,4,6,7,8-		4.65E-08	4.47E-07	5.86E-09	5.63E-08	2.04E-07	1.96E-06				

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWC Units Emissions Summary

Pollutant	CAS Number	Chronic Annual Average at 100% Capacity						Acute Short Term at 110% Capacity			
		Emission Rate				Emissions		Emission Rate			
		(lb/hr)		(g/s)		(tpy)		(lb/hr)		(g/s)	
		EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002
Individual PAHs											
Acenaphthene	83-32-9	6.53E-06	6.53E-06	8.23E-07	8.23E-07	2.86E-05	2.86E-05				
Acenaphthylene	208-96-8	1.12E-06	1.12E-06	1.42E-07	1.42E-07	4.92E-06	4.92E-06				
Anthracene	120-12-7	7.11E-06	7.11E-06	8.96E-07	8.96E-07	3.12E-05	3.12E-05				
Benzo (a) anthracene	56-55-3	1.34E-07	1.34E-07	1.69E-08	1.69E-08	5.88E-07	5.88E-07				
Benzo (a) pyrene	50-32-8	7.64E-07	7.64E-07	9.63E-08	9.63E-08	3.35E-06	3.35E-06				
Benzo (e) pyrene	192-97-2	2.76E-07	2.76E-07	3.48E-08	3.48E-08	1.21E-06	1.21E-06				
Benzo(g,h,i)perylene	191-24-2	1.33E-06	1.33E-06	1.68E-07	1.68E-07	5.83E-06	5.83E-06				
Benzo (b) fluoranthene	205-99-2	1.42E-07	1.42E-07	1.79E-08	1.79E-08	6.23E-07	6.23E-07				
Benzo (k) fluoranthene	207-08-9	1.34E-07	1.34E-07	1.69E-08	1.69E-08	5.88E-07	5.88E-07				
bis (2 -Ethylhexyl) phthalate	117-81-7	3.70E-05	3.70E-05	4.66E-06	4.66E-06	1.62E-04	1.62E-04				
Chrysene	218-01-9	2.26E-07	2.26E-07	2.85E-08	2.85E-08	9.92E-07	9.92E-07				
Dibenz (a,h) anthracene	53-70-3	1.34E-07	1.34E-07	1.69E-08	1.69E-08	5.88E-07	5.88E-07				
Dibenzofuran	132-64-9	2.38E-06	2.38E-06	3.00E-07	3.00E-07	1.04E-05	1.04E-05				
1,4 - Dichlorobenzene	106-46-7	8.25E-06	8.25E-06	1.04E-06	1.04E-06	3.61E-05	3.61E-05				
1,2 - Dichlorobenzene	95-50-1	1.45E-05	1.45E-05	1.83E-06	1.83E-06	6.35E-05	6.35E-05				
2,4 - Dinitrotoluene	121-14-2	9.11E-06	9.11E-06	1.15E-06	1.15E-06	3.99E-05	3.99E-05				

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWC Units Emissions Summary

Pollutant	CAS Number	Chronic Annual Average at 100% Capacity						Acute Short Term at 110% Capacity			
		Emission Rate				Emissions		Emission Rate			
		(lb/hr)		(g/s)		(tpy)		(lb/hr)		(g/s)	
		EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002
Individual PAHs											
Fluorene	86-73-7	5.06E-05	5.06E-05	6.38E-06	6.38E-06	2.22E-04	2.22E-04				
Fluoranthene	206-44-0	1.76E-06	1.76E-06	2.22E-07	2.22E-07	7.71E-06	7.71E-06				
Hexachlorobenzene	118-74-1	5.38E-06	5.38E-06	6.77E-07	6.77E-07	2.35E-05	2.35E-05				
Hexachlorobutadiene	87-68-3	8.17E-06	8.17E-06	1.03E-06	1.03E-06	3.58E-05	3.58E-05				
Hexachlorocyclopentadiene	77-47-4	7.55E-06	7.55E-06	9.51E-07	9.51E-07	3.31E-05	3.31E-05				
Hexachloroethane	67-72-1	1.56E-05	1.56E-05	1.96E-06	1.96E-06	6.81E-05	6.81E-05				
Isophorone	78-59-1	3.72E-06	3.72E-06	4.69E-07	4.69E-07	1.63E-05	1.63E-05				
Indeno (1,2,3 -cd) pyrene	193-39-5	2.37E-07	2.37E-07	2.98E-08	2.98E-08	1.04E-06	1.04E-06				
2-MethylNaphthalene	91-57-6	2.93E-04	2.93E-04	3.69E-05	3.69E-05	1.28E-03	1.28E-03				
Napthalene	91-20-3	1.50E-03	1.50E-03	1.89E-04	1.89E-04	6.56E-03	6.56E-03				
Nitrobenzene	98-95-3	7.18E-06	7.18E-06	9.05E-07	9.05E-07	3.15E-05	3.15E-05				
N-Nitrosodiphenylamine	86-30-6	5.79E-06	5.79E-06	7.29E-07	7.29E-07	2.53E-05	2.53E-05				
N-Nitroso-di-n-propylamine	621-64-7	6.14E-05	6.14E-05	7.74E-06	7.74E-06	2.69E-04	2.69E-04				
Pentachlorophenol	87-86-5	1.06E-05	1.06E-05	1.33E-06	1.33E-06	4.64E-05	4.64E-05				
Phenanthrene	85-01-8	3.56E-05	3.56E-05			1.56E-04	1.56E-04				
Phenol	108-95-2	4.17E-04	4.17E-04	5.25E-05	5.25E-05	1.83E-03	1.83E-03				
Pyrene	129-00-0	1.28E-06	1.28E-06	1.61E-07	1.61E-07	5.59E-06	5.59E-06				
1,2,4 - Trichlorobenzene	120-82-1	5.99E-06	5.99E-06	7.55E-07	7.55E-07	2.62E-05	2.62E-05				
2,4,6 - Trichlorophenol	88-06-2	8.45E-06	8.45E-06	1.07E-06	1.07E-06	3.70E-05	3.70E-05				

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWC Units Emissions Summary

Pollutant	CAS Number	Chronic Annual Average at 100% Capacity						Acute Short Term at 110% Capacity			
		Emission Rate				Emissions		Emission Rate			
		(lb/hr)		(g/s)		(tpy)		(lb/hr)		(g/s)	
		EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002	EU001	EU002
Other HAPs											
Acetaldehyde	75-07-0	1.93E-04	1.93E-04	2.43E-05	2.43E-05	8.45E-04	8.45E-04	2.59E-04	2.59E-04	3.26E-05	3.26E-05
Acrolein	107-02-8	1.63E-04	1.63E-04	2.05E-05	2.05E-05	7.12E-04	7.12E-04				
Ammonia	7664-41-7	2.18E-01	2.18E-01	2.74E-02	2.74E-02	9.53E-01	9.53E-01	6.48E-01	6.48E-01	8.16E-02	8.16E-02
Arsenic	7440-38-2	1.32E-05	1.32E-05	1.66E-06	1.66E-06	5.77E-05	5.77E-05	3.08E-05	3.08E-05	3.88E-06	3.88E-06
Antimony	7440-36-0	1.43E-04	1.43E-04	1.80E-05	1.80E-05	6.24E-04	6.24E-04				
Barium	7440-39-3	1.53E-04	1.53E-04	1.93E-05	1.93E-05	6.72E-04	6.72E-04				
Beryllium	7440-41-7	1.13E-05	1.13E-05	1.42E-06	1.42E-06	4.93E-05	4.93E-05				
Total Chromium (Cr)	7440-47-3	1.25E-04	1.25E-04	1.58E-05	1.58E-05	5.48E-04	5.48E-04				
Hexavalent Chromium	18540-29-9	1.25E-05	1.25E-05	1.58E-06	1.58E-06	5.48E-05	5.48E-05				
Copper	7440-50-8	1.81E-04	1.81E-04	2.27E-05	2.27E-05	7.91E-04	7.91E-04	3.10E-04	3.10E-04	3.91E-05	3.91E-05
Cobalt	7440-48-4	4.43E-05	4.43E-05	5.58E-06	5.58E-06	1.94E-04	1.94E-04				
Formaldehyde	50-00-0	5.62E-04	5.62E-04	7.08E-05	7.08E-05	2.46E-03	2.46E-03	6.80E-04	6.80E-04	8.57E-05	8.57E-05
Manganese	7439-96-5	2.88E-03	2.88E-03	3.62E-04	3.62E-04	1.26E-02	1.26E-02				
Nickel	7440-02-0	2.37E-04	2.37E-04	2.98E-05	2.98E-05	1.04E-03	1.04E-03	7.31E-04	7.31E-04	9.21E-05	9.21E-05
Phosphorus	7723-14-0	6.77E-03	6.77E-03	8.53E-04	8.53E-04	2.97E-02	2.97E-02				
PCB - Total Mass	1336-36-3	1.68E-07	1.68E-07	2.12E-08	2.12E-08	7.37E-07	7.37E-07				
Selenium	7784-49-2	3.10E-05	3.10E-05	3.91E-06	3.91E-06	1.36E-04	1.36E-04				
Thallium	82870-81-3	1.01E-05	1.01E-05	1.27E-06	1.27E-06	4.42E-05	4.42E-05				
Zinc	7440-66-6	2.99E-03	2.99E-03	3.77E-04	3.77E-04	1.31E-02	1.31E-02				
	HAP Total	**1.82**	**15.95**	**0.23**	**2.01**	**7.98**	**69.84**				

* Dioxin congeners, hexavalent chromium and Mercury are not double counted in HAP Total.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Chronic Future Potential Emissions at 100 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001 - South MWC
Stack/Vent Designation No.:	SV009
Pollution Control Equipment No(s):	CE004, CE005, CE006

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]		Maximum Fuel Consumption Rate Annual Average Basis		Fuel Consumption Annual Average Basis	
					Maximum	Units
RDF	5,500	Btu/lb	4.17	ton/hr	100	ton/day

[1] Heat content of RDF from AP-42 Section 2.1 "Refuse Combustion".

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [6]		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
PM (total) - State only limit	0.020	gr/dscf	State, See Note 2	See Note 2		0.451	1.88	8.2	0%	1.88	8.2	8.2
PM (filterable) - State only limit	0.015	gr/dscf	State, See Note 2	See Note 2		0.338	1.41	6.2	0%	1.41	6.2	6.2
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	10.0	10.0
$PM_{2.5}$	55.4	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	10.0	10.0
SO_2	30	ppmvd	AAAA, See Note 3	2.63E-02	(lb/ton)/ppmvd	0.788	3.28	14.4	0%	3.28	14.4	14.4
NO_x	500	ppmvd		1.88E-02	(lb/ton)/ppmvd	9.411	39.21	171.8	0%	39.21	171.8	171.8
VOC	0.10	lb/ton	AP-42, See Note 5	1.22	(5500Btu/lb/4,500Btu/lb)	0.122	0.51	2.2	0%	0.51	2.2	2.2
CO	100	ppm	AAAA, See Note 4	1.15E-02	(lb/ton)/ppmvd	1.149	4.79	21.0	0%	4.79	21.0	21.0
H_2SO_4	0.16	mg/dscm	Huntington, See Note 9	9.85E-03	(lb/ton)/(mg/dscm)	1.58E-03	6.57E-03	2.88E-02	0%	6.57E-03	2.88E-02	2.88E-02
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	1.16	4.85	21.2	0%	4.85	21.2	21.2

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Chronic Future Potential Emissions at 100 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [6]		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
HAPS												
Lead	0.20	mg/dscm	AAAA, See Note 3	9.85E-03	(lb/ton)/(mg/dscm)	1.97E-03	8.21E-03	3.60E-02	0%	8.21E-03	3.60E-02	3.60E-02
Cadmium	0.02	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	1.97E-04	8.21E-04	3.60E-03	0%	8.21E-04	3.60E-03	3.60E-03
Mercury	0.08	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.88E-04	3.28E-03	1.44E-02	0%	3.28E-03	1.44E-02	1.44E-02
Mercury	41	µg/dscm	State Only, See Note 12	9.85E-06	(lb/ton)/(µg/dscm)	4.04E-04	1.68E-03	7.37E-03	0%	1.68E-03	7.37E-03	7.37E-03
Mercury	60	µg/dscm	State, See Note 11	9.85E-06	(lb/ton)/(µg/dscm)	5.91E-04	2.46E-03	1.08E-02	0%	2.46E-03	1.08E-02	1.08E-02
HCl	25	ppmvd		1.50E-02	(lb/ton)/ppmvd	0.375	1.56	6.8	0%	1.56	6.84	6.84
HF	0.32	mg/dscm	Stanislaus, See Note 10	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	1.30E-02	5.68E-02	0%	1.30E-02	5.68E-02	5.68E-02
Dioxins/Furans												
Total Dioxins/Furans	13	ng/dscm	AAAA, See Note 3	9.85E-09	(lb/ton)/(ng/dscm)	1.28E-07	5.34E-07	2.34E-06	0%	5.34E-07	2.34E-06	2.34E-06
Total OCDF	0.29	ng/dscm	Stack Test, See Note 7	9.85E-09	(lb/ton)/(ng/dscm)	2.87E-09	1.19E-08	5.23E-08	0%	1.19E-08	5.23E-08	5.23E-08
Total OCDD	1.71	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.69E-08	7.04E-08	3.08E-07	0%	7.04E-08	3.08E-07	3.08E-07
TCDF, 2,3,7,8-	1.07	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.05E-08	4.39E-08	1.92E-07	0%	4.39E-08	1.92E-07	1.92E-07
TCDD, 2,3,7,8-	0.01	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.47E-10	6.13E-10	2.69E-09	0%	6.13E-10	2.69E-09	2.69E-09
PeCDF, 1,2,3,7,8-	0.11	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.12E-09	4.66E-09	2.04E-08	0%	4.66E-09	2.04E-08	2.04E-08
PeCDF, 2,3,4,6,8-	0.16	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.54E-09	6.41E-09	2.81E-08	0%	6.41E-09	2.81E-08	2.81E-08
PeCDD, 1,2,3,7,8-	0.07	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.04E-10	2.93E-09	1.29E-08	0%	2.93E-09	1.29E-08	1.29E-08
HxCDF, 1,2,3,4,7,8-	0.20	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.97E-09	8.22E-09	3.60E-08	0%	8.22E-09	3.60E-08	3.60E-08
HxCDF, 1,2,3,6,7,8-	0.17	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.65E-09	6.86E-09	3.00E-08	0%	6.86E-09	3.00E-08	3.00E-08
HxCDF, 1,2,3,7,8,9-	0.08	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.90E-10	3.29E-09	1.44E-08	0%	3.29E-09	1.44E-08	1.44E-08
HxCDF, 2,3,4,6,7,8-	0.17	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.66E-09	6.93E-09	3.04E-08	0%	6.93E-09	3.04E-08	3.04E-08
HxCDD, 1,2,3,4,7,8-	0.08	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.49E-10	3.12E-09	1.37E-08	0%	3.12E-09	1.37E-08	1.37E-08
HxCDD, 1,2,3,6,7,8-	0.17	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.67E-09	6.97E-09	3.05E-08	0%	6.97E-09	3.05E-08	3.05E-08
HxCDD, 1,2,3,7,8,9-	0.09	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	8.83E-10	3.68E-09	1.61E-08	0%	3.68E-09	1.61E-08	1.61E-08
HpCDF, 1,2,3,4,6,7,8-	0.49	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	4.87E-09	2.03E-08	8.90E-08	0%	2.03E-08	8.90E-08	8.90E-08
HpCDF, 1,2,3,4,7,8,9-	0.09	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	8.62E-10	3.59E-09	1.57E-08	0%	3.59E-09	1.57E-08	1.57E-08
HpCDD, 1,2,3,4,6,7,8-	1.13	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.12E-08	4.65E-08	2.04E-07	0%	4.65E-08	2.04E-07	2.04E-07

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Chronic Future Potential Emissions at 100 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [6]		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
Individual PAHs												
Acenaphthene	1.59E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	1.57E-06	6.53E-06	2.86E-05	0%	6.53E-06	2.86E-05	2.86E-05
Acenaphthylene	2.74E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.70E-07	1.12E-06	4.92E-06	0%	1.12E-06	4.92E-06	4.92E-06
Anthracene	1.73E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.71E-06	7.11E-06	3.12E-05	0%	7.11E-06	3.12E-05	3.12E-05
Benzo (a) anthracene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Benzo (a) pyrene	1.86E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.83E-07	7.64E-07	3.35E-06	0%	7.64E-07	3.35E-06	3.35E-06
Benzo (e) pyrene	6.72E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	6.62E-08	2.76E-07	1.21E-06	0%	2.76E-07	1.21E-06	1.21E-06
Benzo(g,h,i)perylene	3.24E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.20E-07	1.33E-06	5.83E-06	0%	1.33E-06	5.83E-06	5.83E-06
Benzo (b) fluoranthene	3.47E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.41E-08	1.42E-07	6.23E-07	0%	1.42E-07	6.23E-07	6.23E-07
Benzo (k) fluoranthene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
bis (2 -Ethylhexyl) phthalate	9.02E-01	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	8.88E-06	3.70E-05	1.62E-04	0%	3.70E-05	1.62E-04	1.62E-04
Chrysene	5.52E-03	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	5.43E-08	2.26E-07	9.92E-07	0%	2.26E-07	9.92E-07	9.92E-07
Dibenz (a,h) anthracene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Dibenzofuran	5.81E-02	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	5.72E-07	2.38E-06	1.04E-05	0%	2.38E-06	1.04E-05	1.04E-05
1,4 - Dichlorobenzene	2.01E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.98E-06	8.25E-06	3.61E-05	0%	8.25E-06	3.61E-05	3.61E-05
1,2 - Dichlorobenzene	3.53E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.48E-06	1.45E-05	6.35E-05	0%	1.45E-05	6.35E-05	6.35E-05
2,4 - Dinitrotoluene	2.22E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.19E-06	9.11E-06	3.99E-05	0%	9.11E-06	3.99E-05	3.99E-05
Fluorene	1.23	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	1.22E-05	5.06E-05	2.22E-04	0%	5.06E-05	2.22E-04	2.22E-04
Fluoranthene	4.29E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	4.23E-07	1.76E-06	7.71E-06	0%	1.76E-06	7.71E-06	7.71E-06
Hexachlorobenzene	1.31E-01	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.29E-06	5.38E-06	2.35E-05	0%	5.38E-06	2.35E-05	2.35E-05
Hexachlorobutadiene	1.99E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.96E-06	8.17E-06	3.58E-05	0%	8.17E-06	3.58E-05	3.58E-05
Hexachlorocyclopentadiene	1.84E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.81E-06	7.55E-06	3.31E-05	0%	7.55E-06	3.31E-05	3.31E-05
Hexachloroethane	3.79E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.73E-06	1.56E-05	6.81E-05	0%	1.56E-05	6.81E-05	6.81E-05
Isophorone	9.07E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	8.93E-07	3.72E-06	1.63E-05	0%	3.72E-06	1.63E-05	1.63E-05
Indeno (1,2,3 -cd) pyrene	5.77E-03	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	5.68E-08	2.37E-07	1.04E-06	0%	2.37E-07	1.04E-06	1.04E-06
2-MethylNaphthalene	7.14	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	7.03E-05	2.93E-04	1.28E-03	0%	2.93E-04	1.28E-03	1.28E-03
Naphthalene	36.50	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.59E-04	1.50E-03	6.56E-03	0%	1.50E-03	6.56E-03	6.56E-03
Nitrobenzene	1.75E-01	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.72E-06	7.18E-06	3.15E-05	0%	7.18E-06	3.15E-05	3.15E-05
N-Nitrosodiphenylamine	0.14	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.39E-06	5.79E-06	2.53E-05	0%	5.79E-06	2.53E-05	2.53E-05
N-Nitroso-di-n-propylamine	1.50	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.47E-05	6.14E-05	2.69E-04	0%	6.14E-05	2.69E-04	2.69E-04
Pentachlorophenol	2.58E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.54E-06	1.06E-05	4.64E-05	0%	1.06E-05	4.64E-05	4.64E-05
Phenanthrene	8.67E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	8.54E-06	3.56E-05	1.56E-04	0%	3.56E-05	1.56E-04	1.56E-04
Phenol	10.16	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.00E-04	4.17E-04	1.83E-03	0%	4.17E-04	1.83E-03	1.83E-03
Pyrene	3.11E-02	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	3.06E-07	1.28E-06	5.59E-06	0%	1.28E-06	5.59E-06	5.59E-06
1,2,4 - Trichlorobenzene	1.46E-01	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.44E-06	5.99E-06	2.62E-05	0%	5.99E-06	2.62E-05	2.62E-05
2,4,6 - Trichlorophenol	2.06E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.03E-06	8.45E-06	3.70E-05	0%	8.45E-06	3.70E-05	3.70E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Chronic Future Potential Emissions at 100 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [6]		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
Other HAPS												
Acetaldehyde	4.70	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	4.63E-05	1.93E-04	8.45E-04	0%	1.93E-04	8.45E-04	8.45E-04
Acrolein	3.96	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.90E-05	1.63E-04	7.12E-04	0%	1.63E-04	7.12E-04	7.12E-04
Ammonia	5.30	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	5.22E-02	2.18E-01	9.53E-01	0%	2.18E-01	9.53E-01	9.53E-01
Arsenic	3.21E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	3.16E-06	1.32E-05	5.77E-05	0%	1.32E-05	5.77E-05	5.77E-05
Antimony	3.47E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	3.42E-05	1.43E-04	6.24E-04	0%	1.43E-04	6.24E-04	6.24E-04
Barium	3.74E-03	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	3.68E-05	1.53E-04	6.72E-04	0%	1.53E-04	6.72E-04	6.72E-04
Beryllium	2.75E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	2.70E-06	1.13E-05	4.93E-05	0%	1.13E-05	4.93E-05	4.93E-05
Total Chromium (Cr)	3.05	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.00E-05	1.25E-04	5.48E-04	0%	1.25E-04	5.48E-04	5.48E-04
Hexavalent Chromium	0.30	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	3.00E-06	1.25E-05	5.48E-05	0%	1.25E-05	5.48E-05	5.48E-05
Copper	4.40E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	4.33E-05	1.81E-04	7.91E-04	0%	1.81E-04	7.91E-04	7.91E-04
Cobalt	1.08E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	1.06E-05	4.43E-05	1.94E-04	0%	4.43E-05	1.94E-04	1.94E-04
Formaldehyde	13.7	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.35E-04	5.62E-04	2.46E-03	0%	5.62E-04	2.46E-03	2.46E-03
Manganese	70.10	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	6.90E-04	2.88E-03	1.26E-02	0%	2.88E-03	1.26E-02	1.26E-02
Nickel	5.76	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.68E-05	2.37E-04	1.04E-03	0%	2.37E-04	1.04E-03	1.04E-03
Phosphorus	1.65E-01	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	1.63E-03	6.77E-03	2.97E-02	0%	6.77E-03	2.97E-02	2.97E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 10	9.85E-09	(lb/ton)/(ng/dscm)	4.04E-08	1.68E-07	7.37E-07	0%	1.68E-07	7.37E-07	7.37E-07
Selenium	7.56E-04	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.45E-06	3.10E-05	1.36E-04	0%	3.10E-05	1.36E-04	1.36E-04
Thallium	2.46E-04	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	2.42E-06	1.01E-05	4.42E-05	0%	1.01E-05	4.42E-05	4.42E-05
Zinc	7.29E-02	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.18E-04	2.99E-03	1.31E-02	0%	2.99E-03	1.31E-02	1.31E-02
					HAP Total	0.44	1.82	7.98		1.82	7.98	7.98

[2] PM (total or filterable) is State only limit for Class II Units from Minn. Rule 7011.1229, Table 2:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm =	45.77 mg/dscm
45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) =	0.451 lb/ton
0.015 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm =	34.33 mg/dscm
34.33 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) =	0.338 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF high historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EFs for D/F, Cd, Pb, Hg, HCl, NOx and SO2 from 40 CFR Part 60 Subpart AAAA Table 1 "Emission Limits for New Small Municipal Waste Combustion Units".

[4] CO EF limit from NSPS, Table 2 "Carbon Monoxide Emission Limits for New Small Municipal Waste Combustion Units", Mass burn rotary refractory.

[5] VOC EF from AP-42, 4th Edition Supplement C , Sept 1990, Table 2.1-1 "Emission Factors for Municipal Waste Combustors".

[6] For all EF (lb/ton) the correction factor is adjusting for heat content based on AP-42 Section 2.1 "Refuse Combustion", Table 2.1-11 "Conversion Factors For Refuse-Derived Fuel Combustors", (Oct 1996).

NOx (lb/ton) = NOx (ppm) * 1.89 * 10^-2 (from Table 2.1-11 Assuming ideal gas at STP conditions)

[7] EFs based on facility stack test results scaled to NSPS total "dioxins" limit of 13 ng/dscm @ 7% O2 based on 17-Congener UCL fraction of total (other dioxins based on test results average fraction of total) from tests (See South Unit Dioxin Limit).

[8] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[9] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[10] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

11 EF for Class II Units from Minn. Rule 7011.1229 Table 2 (60 µg/dscm @ 7% O2).

[12] PLMSWA proposes a state only long-term Mercury limit of 41 µg/dscm @ 7% O_2 based on the Facility's HHRA.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU002 - North MWC
Stack/Vent Designation No.:	SV009
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Maximum Fuel Consumption Rate Annual Average Basis	Fuel Consumption Annual Average Basis	
			Maximum	Units
RDF	5,500 Btu/lb	4.17 ton/hr	100	ton/day

[1] Heat content of RDF from AP-42 Section 2.1 "Refuse Combustion".

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor	Units	Emission Factor Source	Conversion Factor [6]		Emission Factor	Annual Average (at 100% Capacity) Emission Rate	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions	Pollution Control Efficiency	Annual Average (at 100% Capacity) Maximum Controlled Emissions	Annual Average (at 100% Capacity) Maximum Controlled Emissions	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions
	(EF)	(@ 7% O_2)		(5500 Btu/lb basis)		(lb/ton)	(lbs/hr)	(tons/yr)	(%)	(lb/hr)	(tons/yr)	(tons/yr)
PM (total) - State only limit	0.020	gr/dscf	State, See Note 2	See Note 2		0.451	1.88	8.2	0%	1.88	8.23	8.2
PM (filterable)	70	mg/dscm	JJJ, See Note 3	9.85E-03	(lb/ton)/(mg/dscm)	0.690	2.87	12.6	0%	2.87	12.58	12.6
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	9.96	10.0
$PM_{2.5}$	55.4	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	9.96	10.0
SO_2	77	ppmvd	JJJ, See Note 3	2.63E-02	(lb/ton)/ppmvd	2.023	8.43	36.9	0%	8.43	36.93	36.9
NO_x	500	ppmvd		1.88E-02	(lb/ton)/ppmvd	9.411	39.21	171.8	0%	39.21	171.75	171.8
VOC	0.10	lb/ton	AP-42, See Note 5	1.22	(5500Btu/lb/4,500Btu/lb)	0.122	0.51	2.2	0%	0.51	2.23	2.2
CO	100	ppmvd	JJJ, See Note 4	1.15E-02	(lb/ton)/ppmvd	1.149	4.79	21.0	0%	4.79	20.97	21.0
H_2SO_4	0.16	mg/dscm	Huntington, See Note 9	9.85E-03	(lb/ton)/(mg/dscm)	1.58E-03	6.57E-03	2.88E-02	0%	6.57E-03	2.88E-02	2.88E-02
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	5.77	24.06	105.4	0%	24.06	105.36	105.4

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor	Units	Emission Factor Source	Conversion Factor [6]		Emission Factor	Annual Average (at 100% Capacity)		Pollution Control Efficiency	Annual Average (at 100% Capacity)		
							Emission Rate	Maximum Uncontrolled Emissions		Maximum Controlled Emissions	Maximum Controlled Emissions	Maximum Controlled/ Limited Emissions
	(EF)	(@ 7% O_2)		(5,500 Btu/lb basis)		(lb/ton)	(lbs/hr)	(tons/yr)	(%)	(lb/hr)	(tons/yr)	(tons/yr)
HAPS												
Lead	1.60	mg/dscm	JJJ, See Note 3	9.85E-03	(lb/ton)/(mg/dscm)	1.58E-02	0.07	0.3	0%	0.07	0.29	0.29
Cadmium	0.10	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	9.85E-04	4.10E-03	1.80E-02	0%	4.10E-03	1.80E-02	1.80E-02
Mercury	0.08	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.88E-04	3.28E-03	1.44E-02	0%	3.28E-03	1.44E-02	1.44E-02
Mercury	41	μg/dscm	State Only, See Note 12	9.85E-06	(lb/ton)/(μg/dscm)	4.04E-04	1.68E-03	7.37E-03	0%	1.68E-03	7.37E-03	7.37E-03
Mercury	60	μg/dscm	State, See Note 11	9.85E-06	(lb/ton)/(μg/dscm)	5.91E-04	2.46E-03	1.08E-02	0%	2.46E-03	1.08E-02	1.08E-02
HCl	250	ppmvd	JJJ, See Note 3	1.50E-02	(lb/ton)/ppmvd	3.750	15.63	68.4	0%	15.63	68.44	68.44
HF	0.32	mg/dscm	Stanislaus, See Note 10	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	0.01	0.1	0%	1.30E-02	5.68E-02	5.68E-02
Dioxins/Furans												
Total Dioxins/Furans	125	ng/dscm	JJJ, See Note 3	9.85E-09	(lb/ton)/(ng/dscm)	1.23E-06	5.13E-06	2.25E-05	0%	5.13E-06	2.25E-05	2.25E-05
Total OCDF	2.797	ng/dscm	Stack Test, See Note 7	9.85E-09	(lb/ton)/(ng/dscm)	2.75E-08	1.15E-07	5.03E-07	0%	1.15E-07	5.03E-07	5.03E-07
Total OCDD	16.489	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.62E-07	6.77E-07	2.96E-06	0%	6.77E-07	2.96E-06	2.96E-06
TCDF, 2,3,7,8-	10.291	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.01E-07	4.22E-07	1.85E-06	0%	4.22E-07	1.85E-06	1.85E-06
TCDD, 2,3,7,8-	0.144	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.42E-09	5.90E-09	2.58E-08	0%	5.90E-09	2.58E-08	2.58E-08
PeCDF, 1,2,3,7,8-	1.092	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.08E-08	4.48E-08	1.96E-07	0%	4.48E-08	1.96E-07	1.96E-07
PeCDF, 2,3,4,6,8-	1.502	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.48E-08	6.16E-08	2.70E-07	0%	6.16E-08	2.70E-07	2.70E-07
PeCDD, 1,2,3,7,8-	0.688	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	6.77E-09	2.82E-08	1.24E-07	0%	2.82E-08	1.24E-07	1.24E-07
HxCDF, 1,2,3,4,7,8-	1.926	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.90E-08	7.90E-08	3.46E-07	0%	7.90E-08	3.46E-07	3.46E-07
HxCDF, 1,2,3,6,7,8-	1.607	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.58E-08	6.59E-08	2.89E-07	0%	6.59E-08	2.89E-07	2.89E-07
HxCDF, 1,2,3,7,8,9-	0.771	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.60E-09	3.17E-08	1.39E-07	0%	3.17E-08	1.39E-07	1.39E-07
HxCDF, 2,3,4,6,7,8-	1.624	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.60E-08	6.66E-08	2.92E-07	0%	6.66E-08	2.92E-07	2.92E-07
HxCDD, 1,2,3,4,7,8-	0.731	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.20E-09	3.00E-08	1.31E-07	0%	3.00E-08	1.31E-07	1.31E-07
HxCDD, 1,2,3,6,7,8-	1.633	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.61E-08	6.70E-08	2.94E-07	0%	6.70E-08	2.94E-07	2.94E-07
HxCDD, 1,2,3,7,8,9-	0.862	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	8.49E-09	3.54E-08	1.55E-07	0%	3.54E-08	1.55E-07	1.55E-07
HpCDF, 1,2,3,4,6,7,8-	4.759	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	4.69E-08	1.95E-07	8.55E-07	0%	1.95E-07	8.55E-07	8.55E-07
HpCDF, 1,2,3,4,7,8,9-	0.842	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	8.29E-09	3.45E-08	1.51E-07	0%	3.45E-08	1.51E-07	1.51E-07
HpCDD, 1,2,3,4,6,7,8-	10.890	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.07E-07	4.47E-07	1.96E-06	0%	4.47E-07	1.96E-06	1.96E-06

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5,500 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
Individual PAHs												
Acenaphthene	1.59E-01	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.57E-06	6.53E-06	2.86E-05	0%	6.53E-06	2.86E-05	2.86E-05
Acenaphthylene	2.74E-02	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	2.70E-07	1.12E-06	4.92E-06	0%	1.12E-06	4.92E-06	4.92E-06
Anthracene	1.73E-01	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.71E-06	7.11E-06	3.12E-05	0%	7.11E-06	3.12E-05	3.12E-05
Benzo (a) anthracene	3.27E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Benzo (a) pyrene	1.86E-02	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	1.83E-07	7.64E-07	3.35E-06	0%	7.64E-07	3.35E-06	3.35E-06
Benzo (e) pyrene	6.72E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	6.62E-08	2.76E-07	1.21E-06	0%	2.76E-07	1.21E-06	1.21E-06
Benzo(g,h,i)perylene	3.24E-02	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.20E-07	1.33E-06	5.83E-06	0%	1.33E-06	5.83E-06	5.83E-06
Benzo (b) fluoranthene	3.47E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.41E-08	1.42E-07	6.23E-07	0%	1.42E-07	6.23E-07	6.23E-07
Benzo (k) fluoranthene	3.27E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
bis (2 -Ethylhexyl) phthalate	0.90	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	8.88E-06	3.70E-05	1.62E-04	0%	3.70E-05	1.62E-04	1.62E-04
Chrysene	5.52E-03	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	5.43E-08	2.26E-07	9.92E-07	0%	2.26E-07	9.92E-07	9.92E-07
Dibenz (a,h) anthracene	3.27E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Dibenzofuran	5.81E-02	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	5.72E-07	2.38E-06	1.04E-05	0%	2.38E-06	1.04E-05	1.04E-05
1,4 - Dichlorobenzene	0.20	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	1.98E-06	8.25E-06	3.61E-05	0%	8.25E-06	3.61E-05	3.61E-05
1,2 - Dichlorobenzene	3.53E-01	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.48E-06	1.45E-05	6.35E-05	0%	1.45E-05	6.35E-05	6.35E-05
2,4 - Dinitrotoluene	0.22	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	2.19E-06	9.11E-06	3.99E-05	0%	9.11E-06	3.99E-05	3.99E-05
Fluorene	1.23	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	1.22E-05	5.06E-05	2.22E-04	0%	5.06E-05	2.22E-04	2.22E-04
Fluoranthene	4.29E-02	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	4.23E-07	1.76E-06	7.71E-06	0%	1.76E-06	7.71E-06	7.71E-06
Hexachlorobenzene	0.13	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.29E-06	5.38E-06	2.35E-05	0%	5.38E-06	2.35E-05	2.35E-05
Hexachlorobutadiene	0.20	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.96E-06	8.17E-06	3.58E-05	0%	8.17E-06	3.58E-05	3.58E-05
Hexachlorocyclopentadiene	0.18	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	1.81E-06	7.55E-06	3.31E-05	0%	7.55E-06	3.31E-05	3.31E-05
Hexachloroethane	0.38	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.73E-06	1.56E-05	6.81E-05	0%	1.56E-05	6.81E-05	6.81E-05
Isophorone	0.0907	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	8.93E-07	3.72E-06	1.63E-05	0%	3.72E-06	1.63E-05	1.63E-05
Indeno (1,2,3 -cd) pyrene	5.77E-03	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	5.68E-08	2.37E-07	1.04E-06	0%	2.37E-07	1.04E-06	1.04E-06
2-MethylNaphthalene	7.14	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	7.03E-05	2.93E-04	1.28E-03	0%	2.93E-04	1.28E-03	1.28E-03
Napthalene	36.50	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.59E-04	1.50E-03	6.56E-03	0%	1.50E-03	6.56E-03	6.56E-03
Nitrobenzene	0.18	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.72E-06	7.18E-06	3.15E-05	0%	7.18E-06	3.15E-05	3.15E-05
N-Nitrosodiphenylamine	0.14	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.39E-06	5.79E-06	2.53E-05	0%	5.79E-06	2.53E-05	2.53E-05
N-Nitroso-di-n-propylamine	1.50	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	1.47E-05	6.14E-05	2.69E-04	0%	6.14E-05	2.69E-04	2.69E-04
Pentachlorophenol	0.26	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	2.54E-06	1.06E-05	4.64E-05	0%	1.06E-05	4.64E-05	4.64E-05
Phenanthrene	8.67E-01	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	8.54E-06	3.56E-05	1.56E-04	0%	3.56E-05	1.56E-04	1.56E-04
Phenol	10.16	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	1.00E-04	4.17E-04	1.83E-03	0%	4.17E-04	1.83E-03	1.83E-03
Pyrene	3.11E-02	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	3.06E-07	1.28E-06	5.59E-06	0%	1.28E-06	5.59E-06	5.59E-06
1,2,4 - Trichlorobenzene	0.146	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	1.44E-06	5.99E-06	2.62E-05	0%	5.99E-06	2.62E-05	2.62E-05
2,4,6 - Trichlorophenol	0.21	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	2.03E-06	8.45E-06	3.70E-05	0%	8.45E-06	3.70E-05	3.70E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5,500 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
Other HAPS												
Acetaldehyde	4.7	μg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(μg/dscm)	4.63E-05	1.93E-04	8.45E-04	0%	1.93E-04	8.45E-04	8.45E-04
Acrolein	3.96	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.90E-05	1.63E-04	7.12E-04	0%	1.63E-04	7.12E-04	7.12E-04
Ammonia	5.30	mg/dscm	Stanislaus, See Note 10	9.85E-03	(lb/ton)/(mg/dscm)	5.22E-02	2.18E-01	9.53E-01	0%	2.18E-01	9.53E-01	9.53E-01
Arsenic	3.21E-01	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.16E-06	1.32E-05	5.77E-05	0%	1.32E-05	5.77E-05	5.77E-05
Antimony	3.47E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	3.42E-05	1.43E-04	6.24E-04	0%	1.43E-04	6.24E-04	6.24E-04
Barium	3.74E-03	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	3.68E-05	1.53E-04	6.72E-04	0%	1.53E-04	6.72E-04	6.72E-04
Beryllium	2.75E-01	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	2.70E-06	1.13E-05	4.93E-05	0%	1.13E-05	4.93E-05	4.93E-05
Total Chromium (Cr)	3.049	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.00E-05	1.25E-04	5.48E-04	0%	1.25E-04	5.48E-04	5.48E-04
Hexavalent Chromium	0.3049	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	3.00E-06	1.25E-05	5.48E-05	0%	1.25E-05	5.48E-05	5.48E-05
Copper	4.40E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	4.33E-05	1.81E-04	7.91E-04	0%	1.81E-04	7.91E-04	7.91E-04
Cobalt	0.00108	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	1.06E-05	4.43E-05	1.94E-04	0%	4.43E-05	1.94E-04	1.94E-04
Formaldehyde	13.7	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	1.35E-04	5.62E-04	2.46E-03	0%	5.62E-04	2.46E-03	2.46E-03
Manganese	70.100	μg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(μg/dscm)	6.90E-04	2.88E-03	1.26E-02	0%	2.88E-03	1.26E-02	1.26E-02
Nickel	5.76	μg/dscm		9.85E-06	(lb/ton)/(μg/dscm)	5.68E-05	2.37E-04	1.04E-03	0%	2.37E-04	1.04E-03	1.04E-03
Phosphorus	0.165	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	1.63E-03	6.77E-03	2.97E-02	0%	6.77E-03	2.97E-02	2.97E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 10	9.85E-09	(lb/ton)/(ng/dscm)	4.04E-08	1.68E-07	7.37E-07	0%	1.68E-07	7.37E-07	7.37E-07
Selenium	7.56E-04	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	7.45E-06	3.10E-05	1.36E-04	0%	3.10E-05	1.36E-04	1.36E-04
Thallium	2.46E-04	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	2.42E-06	1.01E-05	4.42E-05	0%	1.01E-05	4.42E-05	4.42E-05
Zinc	7.29E-02	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.18E-04	2.99E-03	1.31E-02	0%	2.99E-03	1.31E-02	1.31E-02
					HAP Total	3.83	15.94	69.83		15.94	69.83	69.83

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

[2] PM (total or filterable) is State only limit for Class C Units from Minn. Rule 7011.1227, Table 1:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EF for D/F, Cd, Pb, Hg, PM, PM_{10}, HCl, NO_x, and SO_2 from 40 CFR 62 Subpart JJJ, Table 4, Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999.

[4] CO EF from 40 CFR 62, Subpart JJJ, Table 5 "Carbon Monoxide Emission Limits for Existing Small Municipal Waste Combustion Units", 4-hr block average.

[5] VOC EF from AP-42, 4th Edition Supplement C , Sept 1990, Table 2.1-1 "Emission Factors for Municipal Waste Combustors".

[6] For all EF (lb/ton) the correction factor is adjusting for heat content based on AP-42 Section 2.1 "Refuse Combustion", Table 2.1-11 "Conversion Factors For Refuse-Derived Fuel Combustors", (Oct 1996).

NOx (lb/ton) = NOx (ppm) * 1.89 * 10^-2 (from Table 2.1-11 Assuming ideal gas at STP conditions)

[7] EFs based on facility stack test results scaled to NSPS total "dioxins" limit of 125 ng/dscm @ 7% O2 based on the 17-Congener UCL fraction of total (other dioxins based on test results average fraction of total) from tests (See North Unit Dioxin Limit).

[8] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[9] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[10] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[11] EF for Class C Units from Minn. Rule 7011.1227 Table 1 (60 µg/dscm @ 7% O2).

[12] PLMSWA proposes a state only long-term Mercury limit of 41 µg/dscm @ 7% O_2 based on the Facility's HHRA.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU002 - North MWC
Stack/Vent Designation No.:	SV009
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Maximum Fuel Consumption Rate Annual Average Basis	Fuel Consumption Annual Average Basis	
			Maximum	Units
RDF	5,500 Btu/lb	4.17 ton/hr	100	ton/day

[1] Heat content of RDF from AP-42 Section 2.1 "Refuse Combustion".

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5500 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
PM (total) - State only limit	0.020	gr/dscf	State, See Note 2	See Note 2		0.451	1.88	8.2	0%	1.88	8.23	8.2
PM (filterable)	70	mg/dscm	JJJ, See Note 3	9.85E-03	(lb/ton)/(mg/dscm)	0.690	2.87	12.6	0%	2.87	12.58	12.6
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	9.96	10.0
$PM_{2.5}$	55.4	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.27	10.0	0%	2.27	9.96	10.0
SO_2	77	ppmvd	JJJ, See Note 3	2.63E-02	(lb/ton)/ppmvd	2.023	8.43	36.9	0%	8.43	36.93	36.9
NO_x	500	ppmvd		1.88E-02	(lb/ton)/ppmvd	9.411	39.21	171.8	0%	39.21	171.75	171.8
VOC	0.10	lb/ton	AP-42, See Note 5	1.22	(5500Btu/lb/4,500Btu/lb)	0.122	0.51	2.2	0%	0.51	2.23	2.2
CO	100	ppmvd	JJJ, See Note 4	1.15E-02	(lb/ton)/ppmvd	1.149	4.79	21.0	0%	4.79	20.97	21.0
H_2SO_4	0.16	mg/dscm	Huntington, See Note 9	9.85E-03	(lb/ton)/(mg/dscm)	1.58E-03	6.57E-03	2.88E-02	0%	6.57E-03	2.88E-02	2.88E-02
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	5.77	24.06	105.4	0%	24.06	105.36	105.4

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5,500 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
HAPS												
Lead	1.60	mg/dscm	JJJ, See Note 3	9.85E-03	(lb/ton)/(mg/dscm)	1.58E-02	0.07	0.3	0%	0.07	0.29	0.29
Cadmium	0.10	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	9.85E-04	4.10E-03	1.80E-02	0%	4.10E-03	1.80E-02	1.80E-02
Mercury	0.08	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.88E-04	3.28E-03	1.44E-02	0%	3.28E-03	1.44E-02	1.44E-02
Mercury	41	μg/dscm	State Only, See Note 12	9.85E-06	(lb/ton)/(μg/dscm)	4.04E-04	1.68E-03	7.37E-03	0%	1.68E-03	7.37E-03	7.37E-03
Mercury	60	μg/dscm	State, See Note 11	9.85E-06	(lb/ton)/(μg/dscm)	5.91E-04	2.46E-03	1.08E-02	0%	2.46E-03	1.08E-02	1.08E-02
HCl	250	ppmvd	JJJ, See Note 3	1.50E-02	(lb/ton)/ppmvd	3.750	15.63	68.4	0%	15.63	68.44	68.44
HF	0.32	mg/dscm	Stanislaus, See Note 10	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	0.01	0.1	0%	1.30E-02	5.68E-02	5.68E-02
Dioxins/Furans												
Total Dioxins/Furans	20	ng/dscm	State Only, See Note 13	9.85E-09	(lb/ton)/(ng/dscm)	1.97E-07	8.21E-07	3.60E-06	0%	8.21E-07	3.60E-06	3.60E-06
Total OCDF	0.447	ng/dscm	Stack Test, See Note 7	9.85E-09	(lb/ton)/(ng/dscm)	4.41E-09	1.84E-08	8.04E-08	0%	1.84E-08	8.04E-08	8.04E-08
Total OCDD	2.638	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.60E-08	1.08E-07	4.74E-07	0%	1.08E-07	4.74E-07	4.74E-07
TCDF, 2,3,7,8-	1.647	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.62E-08	6.76E-08	2.96E-07	0%	6.76E-08	2.96E-07	2.96E-07
TCDD, 2,3,7,8-	0.023	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.26E-10	9.44E-10	4.13E-09	0%	9.44E-10	4.13E-09	4.13E-09
PeCDF, 1,2,3,7,8-	0.175	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.72E-09	7.17E-09	3.14E-08	0%	7.17E-09	3.14E-08	3.14E-08
PeCDF, 2,3,4,6,8-	0.240	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.37E-09	9.86E-09	4.32E-08	0%	9.86E-09	4.32E-08	4.32E-08
PeCDD, 1,2,3,7,8-	0.110	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.08E-09	4.51E-09	1.98E-08	0%	4.51E-09	1.98E-08	1.98E-08
HxCDF, 1,2,3,4,7,8-	0.308	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	3.04E-09	1.26E-08	5.54E-08	0%	1.26E-08	5.54E-08	5.54E-08
HxCDF, 1,2,3,6,7,8-	0.257	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.53E-09	1.05E-08	4.62E-08	0%	1.05E-08	4.62E-08	4.62E-08
HxCDF, 1,2,3,7,8,9-	0.123	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.22E-09	5.07E-09	2.22E-08	0%	5.07E-09	2.22E-08	2.22E-08
HxCDF, 2,3,4,6,7,8-	0.260	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.56E-09	1.07E-08	4.67E-08	0%	1.07E-08	4.67E-08	4.67E-08
HxCDD, 1,2,3,4,7,8-	0.117	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.15E-09	4.80E-09	2.10E-08	0%	4.80E-09	2.10E-08	2.10E-08
HxCDD, 1,2,3,6,7,8-	0.261	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	2.57E-09	1.07E-08	4.70E-08	0%	1.07E-08	4.70E-08	4.70E-08
HxCDD, 1,2,3,7,8,9-	0.138	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.36E-09	5.66E-09	2.48E-08	0%	5.66E-09	2.48E-08	2.48E-08
HpCDF, 1,2,3,4,6,7,8-	0.761	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	7.50E-09	3.12E-08	1.37E-07	0%	3.12E-08	1.37E-07	1.37E-07
HpCDF, 1,2,3,4,7,8,9-	0.135	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.33E-09	5.53E-09	2.42E-08	0%	5.53E-09	2.42E-08	2.42E-08
HpCDD, 1,2,3,4,6,7,8-	1.742	ng/dscm		9.85E-09	(lb/ton)/(ng/dscm)	1.72E-08	7.15E-08	3.13E-07	0%	7.15E-08	3.13E-07	3.13E-07

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5,500 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
Individual PAHs												
Acenaphthene	1.59E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	1.57E-06	6.53E-06	2.86E-05	0%	6.53E-06	2.86E-05	2.86E-05
Acenaphthylene	2.74E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.70E-07	1.12E-06	4.92E-06	0%	1.12E-06	4.92E-06	4.92E-06
Anthracene	1.73E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.71E-06	7.11E-06	3.12E-05	0%	7.11E-06	3.12E-05	3.12E-05
Benzo (a) anthracene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Benzo (a) pyrene	1.86E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.83E-07	7.64E-07	3.35E-06	0%	7.64E-07	3.35E-06	3.35E-06
Benzo (e) pyrene	6.72E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	6.62E-08	2.76E-07	1.21E-06	0%	2.76E-07	1.21E-06	1.21E-06
Benzo(g,h,i)perylene	3.24E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.20E-07	1.33E-06	5.83E-06	0%	1.33E-06	5.83E-06	5.83E-06
Benzo (b) fluoranthene	3.47E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.41E-08	1.42E-07	6.23E-07	0%	1.42E-07	6.23E-07	6.23E-07
Benzo (k) fluoranthene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
bis (2 -Ethylhexyl) phthalate	0.90	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	8.88E-06	3.70E-05	1.62E-04	0%	3.70E-05	1.62E-04	1.62E-04
Chrysene	5.52E-03	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	5.43E-08	2.26E-07	9.92E-07	0%	2.26E-07	9.92E-07	9.92E-07
Dibenz (a,h) anthracene	3.27E-03	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.34E-07	5.88E-07	0%	1.34E-07	5.88E-07	5.88E-07
Dibenzofuran	5.81E-02	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	5.72E-07	2.38E-06	1.04E-05	0%	2.38E-06	1.04E-05	1.04E-05
1,4 - Dichlorobenzene	0.20	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.98E-06	8.25E-06	3.61E-05	0%	8.25E-06	3.61E-05	3.61E-05
1,2 - Dichlorobenzene	3.53E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.48E-06	1.45E-05	6.35E-05	0%	1.45E-05	6.35E-05	6.35E-05
2,4 - Dinitrotoluene	0.22	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.19E-06	9.11E-06	3.99E-05	0%	9.11E-06	3.99E-05	3.99E-05
Fluorene	1.23	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	1.22E-05	5.06E-05	2.22E-04	0%	5.06E-05	2.22E-04	2.22E-04
Fluoranthene	4.29E-02	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	4.23E-07	1.76E-06	7.71E-06	0%	1.76E-06	7.71E-06	7.71E-06
Hexachlorobenzene	0.13	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.29E-06	5.38E-06	2.35E-05	0%	5.38E-06	2.35E-05	2.35E-05
Hexachlorobutadiene	0.20	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.96E-06	8.17E-06	3.58E-05	0%	8.17E-06	3.58E-05	3.58E-05
Hexachlorocyclopentadiene	0.18	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.81E-06	7.55E-06	3.31E-05	0%	7.55E-06	3.31E-05	3.31E-05
Hexachloroethane	0.38	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.73E-06	1.56E-05	6.81E-05	0%	1.56E-05	6.81E-05	6.81E-05
Isophorone	0.0907	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	8.93E-07	3.72E-06	1.63E-05	0%	3.72E-06	1.63E-05	1.63E-05
Indeno (1,2,3 -cd) pyrene	5.77E-03	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	5.68E-08	2.37E-07	1.04E-06	0%	2.37E-07	1.04E-06	1.04E-06
2-MethylNaphthalene	7.14	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	7.03E-05	2.93E-04	1.28E-03	0%	2.93E-04	1.28E-03	1.28E-03
Napthalene	36.50	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.59E-04	1.50E-03	6.56E-03	0%	1.50E-03	6.56E-03	6.56E-03
Nitrobenzene	0.18	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.72E-06	7.18E-06	3.15E-05	0%	7.18E-06	3.15E-05	3.15E-05
N-Nitrosodiphenylamine	0.14	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.39E-06	5.79E-06	2.53E-05	0%	5.79E-06	2.53E-05	2.53E-05
N-Nitroso-di-n-propylamine	1.50	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.47E-05	6.14E-05	2.69E-04	0%	6.14E-05	2.69E-04	2.69E-04
Pentachlorophenol	0.26	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.54E-06	1.06E-05	4.64E-05	0%	1.06E-05	4.64E-05	4.64E-05
Phenanthrene	8.67E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	8.54E-06	3.56E-05	1.56E-04	0%	3.56E-05	1.56E-04	1.56E-04
Phenol	10.16	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.00E-04	4.17E-04	1.83E-03	0%	4.17E-04	1.83E-03	1.83E-03
Pyrene	3.11E-02	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	3.06E-07	1.28E-06	5.59E-06	0%	1.28E-06	5.59E-06	5.59E-06
1,2,4 - Trichlorobenzene	0.146	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.44E-06	5.99E-06	2.62E-05	0%	5.99E-06	2.62E-05	2.62E-05
2,4,6 - Trichlorophenol	0.21	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	2.03E-06	8.45E-06	3.70E-05	0%	8.45E-06	3.70E-05	3.70E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North MWC Chronic Future Potential Emissions at 100 ton/day

							Annual Average (at 100% Capacity)			Annual Average (at 100% Capacity)		
Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5,500 Btu/lb basis)		Emission Factor (lb/ton)	Emission Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions (lb/hr)	Maximum Controlled Emissions (tons/yr)	Maximum Controlled/ Limited Emissions (tons/yr)
Other HAPS												
Acetaldehyde	4.7	µg/dscm	OWEF, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	4.63E-05	1.93E-04	8.45E-04	0%	1.93E-04	8.45E-04	8.45E-04
Acrolein	3.96	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.90E-05	1.63E-04	7.12E-04	0%	1.63E-04	7.12E-04	7.12E-04
Ammonia	5.30	mg/dscm	Stanislaus, See Note 10	9.85E-03	(lb/ton)/(mg/dscm)	5.22E-02	2.18E-01	9.53E-01	0%	2.18E-01	9.53E-01	9.53E-01
Arsenic	3.21E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.16E-06	1.32E-05	5.77E-05	0%	1.32E-05	5.77E-05	5.77E-05
Antimony	3.47E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	3.42E-05	1.43E-04	6.24E-04	0%	1.43E-04	6.24E-04	6.24E-04
Barium	3.74E-03	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	3.68E-05	1.53E-04	6.72E-04	0%	1.53E-04	6.72E-04	6.72E-04
Beryllium	2.75E-01	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	2.70E-06	1.13E-05	4.93E-05	0%	1.13E-05	4.93E-05	4.93E-05
Total Chromium (Cr)	3.049	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.00E-05	1.25E-04	5.48E-04	0%	1.25E-04	5.48E-04	5.48E-04
Hexavalent Chromium	0.3049	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	3.00E-06	1.25E-05	5.48E-05	0%	1.25E-05	5.48E-05	5.48E-05
Copper	4.40E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	4.33E-05	1.81E-04	7.91E-04	0%	1.81E-04	7.91E-04	7.91E-04
Cobalt	0.00108	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	1.06E-05	4.43E-05	1.94E-04	0%	4.43E-05	1.94E-04	1.94E-04
Formaldehyde	13.7	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	1.35E-04	5.62E-04	2.46E-03	0%	5.62E-04	2.46E-03	2.46E-03
Manganese	70.100	µg/dscm	Stanislaus, See Note 10	9.85E-06	(lb/ton)/(µg/dscm)	6.90E-04	2.88E-03	1.26E-02	0%	2.88E-03	1.26E-02	1.26E-02
Nickel	5.76	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.68E-05	2.37E-04	1.04E-03	0%	2.37E-04	1.04E-03	1.04E-03
Phosphorus	0.165	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	1.63E-03	6.77E-03	2.97E-02	0%	6.77E-03	2.97E-02	2.97E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 10	9.85E-09	(lb/ton)/(ng/dscm)	4.04E-08	1.68E-07	7.37E-07	0%	1.68E-07	7.37E-07	7.37E-07
Selenium	7.56E-04	mg/dscm	OWEF, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	7.45E-06	3.10E-05	1.36E-04	0%	3.10E-05	1.36E-04	1.36E-04
Thallium	2.46E-04	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	2.42E-06	1.01E-05	4.42E-05	0%	1.01E-05	4.42E-05	4.42E-05
Zinc	7.29E-02	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	7.18E-04	2.99E-03	1.31E-02	0%	2.99E-03	1.31E-02	1.31E-02
					HAP Total	3.83	15.94	69.83		15.94	69.83	69.83

[2] PM (total or filterable) is State only limit for Class C Units from Minn. Rule 7011.1227, Table 1:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EF for D/F, Cd, Pb, Hg, PM, PM_{10}, HCl, NO_x, and SO_2 from 40 CFR 62 Subpart JJJ, Table 4, Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999.

[4] CO EF from 40 CFR 62, Subpart JJJ, Table 5 "Carbon Monoxide Emission Limits for Existing Small Municipal Waste Combustion Units", 4-hr block average.

[5] VOC EF from AP-42, 4th Edition Supplement C , Sept 1990, Table 2.1-1 “Emission Factors for Municipal Waste Combustors”.

[6] For all EF (lb/ton) the correction factor is adjusting for heat content based on AP-42 Section 2.1 "Refuse Combustion", Table 2.1-11 "Conversion Factors For Refuse-Derived Fuel Combustors", (Oct 1996).

NOx (lb/ton) = NOx (ppm) * 1.89 * 10^-2 (from Table 2.1-11 Assuming ideal gas at STP conditions)

[7] EFs based on facility stack test results scaled to NSPS total "dioxins" limit of 125 ng/dscm @ 7% O2 based on the 17-Congener UCL fraction of total (other dioxins based on test results average fraction of total) from tests (See North Unit Dioxin Limit).

[8] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[9] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[10] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[11] EF for Class C Units from Minn. Rule 7011.1227 Table 1 (60 µg/dscm @ 7% O2).

[12] PLMSWA proposes a state-only long-term Mercury limit of 41 µg/dscm @ 7% O_2 based on the Facility's HHRA.

[13] PLMSWA proposes a state-only long-term PCDD/PCDF limit of 20 ng/dscm @ 7% O2 based on the Facility's HHRA.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Acute Future Potential Emissions at 100 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001 - South MWC
Stack/Vent Designation No.:	SV009
Pollution Control Equipment No(s):	CE004, CE005, CE006

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]		Maximum Fuel Consumption Rate Annual Average Basis		Fuel Consumption Annual Average Basis	
					Maximum	Units
RDF	5,500	Btu/lb	4.17	ton/hr	100	ton/day
			Maximum Fuel Consumption Rate Short Term Average Basis			
			4.58	ton/hr		

[1] Heat content of RDF from AP-42 Section 2.1 "Refuse Combustion".

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [4]		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
PM (filterable) - State only limit	0.020	gr/dscf	State, See Note	See Note		0.451	2.07	0%	2.07
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.50	0%	2.50
$PM_{2.5}$	55.4	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.50	0%	2.50
SO_2	30	ppmvd	AAAA, See Note 3	2.63E-02	(lb/ton)/ppmvd	0.788	3.61	0%	3.61
NO_x	500	ppmvd		1.88E-02	(lb/ton)/ppmvd	9.411	43.13	0%	43.13
CO	100	ppm		1.15E-02	(lb/ton)/ppmvd	1.149	5.27	0%	5.27
H_2SO_4	0.16	mg/dscm	Huntington, See Note 6	9.85E-03	(lb/ton)/(mg/dscm)	0.0016	0.01	0%	0.01
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	1.16	5.33	0%	5.33

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Acute Future Potential Emissions at 100 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [4]		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
HAPS									
Mercury	100	µg/dscm	State, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	9.85E-04	4.51E-03	0%	4.51E-03
HCl	25	ppmvd		1.50E-02	(lb/ton)/ppmvd	0.375	1.72	0%	1.72
HF	0.32	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	1.43E-02	0%	1.43E-02
Naphthalene	52.28	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.15E-04	2.36E-03	0%	2.36E-03
Phenol	13.68	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.35E-04	6.17E-04	0%	6.17E-04
Acetaldehyde	5.73	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.64E-05	2.59E-04	0%	2.59E-04
Acrolein	4.523	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	4.46E-05	2.04E-04	0%	2.04E-04
Ammonia	14.35	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	1.41E-01	6.48E-01	0%	6.48E-01
Arsenic	6.82E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	6.72E-06	3.08E-05	0%	3.08E-05
Copper	6.87E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	6.77E-05	3.10E-04	0%	3.10E-04
Formaldehyde	15.07	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.48E-04	6.80E-04	0%	6.80E-04
Nickel	16.20	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.60E-04	7.31E-04	0%	7.31E-04

2 PM (total or filterable) is State only limit for Class II Units from Minn. Rule 7011.1229, Table 2:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF high historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

3 EFs from 40 CFR Part 60 Subpart JJJ Table 1 "Emission Limits for New Small Municipal Waste Combustion Units".

4 For all EF (lb/ton) the correction factor is adjusting for heat content based on AP-42 Section 2.1 "Refuse Combustion", Table 2.1-10 "Conversion Factors For All Combustors Except RDF", (Oct 1996).

NOx (lb/ton) = NOx (ppm) * 1.54 * 10^-2 (from Table 2.1-10 Assuming ideal gas at STP conditions) @ 4,500 Btu/lb

NOx (lb/ton) @ 5,500 But/lb = NOx (lb/ton) * 5,500 Btu/lb / 4,500 Btu/lb = 1.54 * 10^-2 *5,500/4,500 = 1.88 * 10^2

5 OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

6 Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

7 Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

8 EF for Class II Units from Minn. Rule 7011.1229 Table 2 (100 µg/dscm @ 7% O2).

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Acute Future Potential Emissions at 100 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU002 - North MWC
Stack/Vent Designation No.:	SV009
Pollution Control Equipment No(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]		Maximum Fuel Consumption Rate Annual Average Basis		Fuel Consumption Annual Average Basis	
					Maximum	Units
RDF	5,500	Btu/lb	4.17	ton/hr	100	ton/day
			Maximum Fuel Consumption Rate Short Term Average Basis			
			4.58	ton/hr		

[1] Heat content of RDF from AP-42 Section 2.1 "Refuse Combustion".

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [4]		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
PM (filterable) - State only limit	0.020	gr/dscf	State, See Note 2	See Note 2		0.451	2.07	0%	2.07
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.50	0%	2.50
$PM_{2.5}$	55.4	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	0.545	2.50	0%	2.50
SO_2	77	ppmvd	JJJ, See Note 3	2.63E-02	(lb/ton)/ppmvd	2.023	9.27	0%	9.27
NO_x	500	ppmvd		1.88E-02	(lb/ton)/ppmvd	9.411	43.13	0%	43.13
CO	100	ppmvd		1.15E-02	(lb/ton)/ppmvd	1.149	5.27	0%	5.27
H_2SO_4	0.16	mg/dscm	Huntington, See Note 6	9.85E-03	(lb/ton)/(mg/dscm)	0.0016	0.01	0%	0.01
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	5.77	26.46	0%	26.46

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
South MWC Acute Future Potential Emissions at 100 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5500 Btu/lb basis) [4]		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
HAPS									
Mercury	100	µg/dscm	State, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	9.85E-04	4.51E-03	0%	4.51E-03
HCl	250	ppmvd	JJJ, See Note 3	1.50E-02	(lb/ton)/ppmvd	3.750	17.19	0%	17.19
HF	0.3157	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	1.43E-02	0%	1.43E-02
Naphthalene	52.28	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.15E-04	2.36E-03	0%	2.36E-03
Phenol	13.68	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.35E-04	6.17E-04	0%	6.17E-04
Acetaldehyde	5.73	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	5.64E-05	2.59E-04	0%	2.59E-04
Acrolein	4.523	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	4.46E-05	2.04E-04	0%	2.04E-04
Ammonia	14.35	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	1.41E-01	6.48E-01	0%	6.48E-01
Arsenic	6.82E-01	µg/dscm		9.85E-06	(lb/ton)/(µg/dscm)	6.72E-06	3.08E-05	0%	3.08E-05
Copper	6.87E-03	mg/dscm		9.85E-03	(lb/ton)/(mg/dscm)	6.77E-05	3.10E-04	0%	3.10E-04
Formaldehyde	15.07	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.48E-04	6.80E-04	0%	6.80E-04
Nickel	16.20	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.60E-04	7.31E-04	0%	7.31E-04

[2] PM (total or filterable) is State only limit for Class II Units from Minn. Rule 7011.1229, Table 2:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF high historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EFs from 40 CFR Part 60 Subpart JJJ Table 1 "Emission Limits for New Small Municipal Waste Combustion Units".

[4] For all EF (lb/ton) the correction factor is adjusting for heat content based on AP-42 Section 2.1 "Refuse Combustion", Table 2.1-10 "Conversion Factors For All Combustors Except RDF", (Oct 1996).

NOx (lb/ton) = NOx (ppm) * 1.54 * 10^-2 (from Table 2.1-10 Assuming ideal gas at STP conditions) @ 4,500 Btu/lb

NOx (lb/ton) @ 5,500 But/lb = NOx (lb/ton) * 5,500 Btu/lb / 4,500 Btu/lb = 1.54 * 10^-2 *5,500/4,500 = 1.88 * 10^2

[5] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[6] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[7] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[8] EF for Class C Units from Minn. Rule 7011.1227 Table 1 (100 µg/dscm @ 7% O2).

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

Future Projected Actual Emissions Summ

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001 - South MWC EU002 - North MWC
Stack/Vent Designation No.:	SV001
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Actual Fuel Consumption Rate (EU001 and EU002)		Actual Fuel Consumption Rate (EU001 and EU002)	
MSW	5,500 Btu/lb	803,000	MMBtu/yr	73,000	ton/yr

[1] Heat content is the average of testing data from waste sorts completed for the MSW currently received at PRRF.

Calculations Summary - MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5500 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions North and South Units (tons/yr)
NO_2	0.61	ppmvd	Stack Test, See Note 10	1.88E-02	(lb/ton)/ppmvd	1.15E-02	0.42	0%	0.42

Calculations Summary - MSW Combustion, HAPs :

HAPS									
Lead	0.022	mg/dscm	Stack test, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	2.17E-04	0.01	79%	7.91E-03
Cadmium	2.60E-03	mg/dscm	Stack test, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	2.56E-05	9.35E-04	79%	9.35E-04
Mercury	14.76	µg/dscm	Stack test, See Note 8	9.85E-06	(lb/ton)/(µg/dscm)	1.45E-04	0.01	85%	5.31E-03
HCl	252	ppmvd	Stack test, See Note 8	1.50E-02	(lb/ton)/ppmvd	3.785	138.13	50%	138.13
HF	0.316	mg/dscm	Stanislaus, See Note 8	9.85E-03	(lb/ton)/(mg/dscm)	3.11E-03	0.11	0%	0.11

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (4500 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)
Dioxins/Furans									
Total Dioxins/Furans	2.88	ng/dscm	Stack test, See Note 8	9.85E-09	(lb/ton)/(ng/dscm)	2.84E-08	1.04E-06	50%	5.18E-07
Total OCDF	0.06	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	6.35E-10	2.32E-08	0%	2.32E-08
Total OCDD	0.38	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.74E-09	1.37E-07	0%	1.37E-07
TCDF, 2,3,7,8-	0.24	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.34E-09	8.52E-08	0%	8.52E-08
TCDD, 2,3,7,8-	0.00	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.26E-11	1.19E-09	0%	1.19E-09
PeCDF, 1,2,3,7,8-	0.03	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.48E-10	9.04E-09	0%	9.04E-09
PeCDF, 2,3,4,6,8-	0.03	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.41E-10	1.24E-08	0%	1.24E-08
PeCDD, 1,2,3,7,8-	0.02	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.56E-10	5.70E-09	0%	5.70E-09
HxCDF, 1,2,3,4,7,8-	0.04	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	4.37E-10	1.60E-08	0%	1.60E-08
HxCDF, 1,2,3,6,7,8-	0.04	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.65E-10	1.33E-08	0%	1.33E-08
HxCDF, 1,2,3,7,8,9-	0.02	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.75E-10	6.39E-09	0%	6.39E-09
HxCDF, 2,3,4,6,7,8-	0.04	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.68E-10	1.35E-08	0%	1.35E-08
HxCDD, 1,2,3,4,7,8-	0.02	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.66E-10	6.05E-09	0%	6.05E-09
HxCDD, 1,2,3,6,7,8-	0.04	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.71E-10	1.35E-08	0%	1.35E-08
HxCDD, 1,2,3,7,8,9-	0.02	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.96E-10	7.14E-09	0%	7.14E-09
HpCDF, 1,2,3,4,6,7,8-	0.11	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.08E-09	3.94E-08	0%	3.94E-08
HpCDF, 1,2,3,4,7,8,9-	0.02	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.91E-10	6.97E-09	0%	6.97E-09
HpCDD, 1,2,3,4,6,7,8-	0.25	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.47E-09	9.02E-08	0%	9.02E-08
TCDF, Total	0.30	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.98E-09	1.09E-07	0%	1.09E-07
TCDD, Total	0.28	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.77E-09	1.01E-07	0%	1.01E-07
PeCDF, Total	0.25	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.50E-09	9.13E-08	0%	9.13E-08
PeCDD, Total	0.38	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.74E-09	1.36E-07	0%	1.36E-07
HxCDF, Total	0.21	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	2.11E-09	7.70E-08	0%	7.70E-08
HxCDD, Total	0.53	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	5.24E-09	1.91E-07	0%	1.91E-07
HpCDF, Total	0.11	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	1.07E-09	3.91E-08	0%	3.91E-08
HpCDD, Total	0.43	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	4.26E-09	1.56E-07	0%	1.56E-07
OCDF, Total	0.05	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	4.73E-10	1.73E-08	0%	1.73E-08
OCDD, Total	0.33	ng/dscm	Stack Test, See Note 2	9.85E-09	(lb/ton)/(ng/dscm)	3.22E-09	1.18E-07	0%	1.18E-07

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (4500 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)
Individual PAHs									
Acenaphthene	1.59E-01	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.57E-06	5.72E-05	0%	5.72E-05
Acenaphthylene	2.74E-02	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	2.70E-07	9.84E-06	0%	9.84E-06
Anthracene	1.73E-01	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.71E-06	6.23E-05	0%	6.23E-05
Benzo (a) anthracene	3.27E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.18E-06	0%	1.18E-06
Benzo (a) pyrene	1.86E-02	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.83E-07	6.69E-06	0%	6.69E-06
Benzo (e) pyrene	6.72E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	6.62E-08	2.42E-06	0%	2.42E-06
Benzo(g,h,i)perylene	3.24E-02	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.20E-07	1.17E-05	0%	1.17E-05
Benzo (b) fluoranthene	3.47E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.41E-08	1.25E-06	0%	1.25E-06
Benzo (k) fluoranthene	3.27E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.18E-06	0%	1.18E-06
bis (2 -Ethylhexyl) phthalate	0.902	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	8.88E-06	3.24E-04	0%	3.24E-04
Chrysene	5.52E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	5.43E-08	1.98E-06	0%	1.98E-06
Dibenz (a,h) anthracene	3.27E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.22E-08	1.18E-06	0%	1.18E-06
Dibenzofuran	5.81E-02	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	5.72E-07	2.09E-05	0%	2.09E-05
1,4 - Dichlorobenzene	0.201	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.98E-06	7.23E-05	0%	7.23E-05
1,2 - Dichlorobenzene	3.53E-01	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	3.48E-06	1.27E-04	0%	1.27E-04
2,4 - Dinitrotoluene	0.222	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	2.19E-06	7.98E-05	0%	7.98E-05
Fluorene	1.234	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	1.22E-05	4.44E-04	0%	4.44E-04
Fluoranthene	0.0429	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	4.23E-07	1.54E-05	0%	1.54E-05
Hexachlorobenzene	0.131	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.29E-06	4.71E-05	0%	4.71E-05
Hexachlorobutadiene	0.199	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.96E-06	7.15E-05	0%	7.15E-05
Hexachlorocyclopentadiene	0.184	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.81E-06	6.62E-05	0%	6.62E-05
Hexachloroethane	0.379	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	3.73E-06	1.36E-04	0%	1.36E-04
Isophorone	9.07E-02	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	8.93E-07	3.26E-05	0%	3.26E-05
Indeno (1,2,3 -cd) pyrene	5.77E-03	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	5.68E-08	2.07E-06	0%	2.07E-06
2-MethylNaphthalene	7.14E+00	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	7.03E-05	2.57E-03	0%	2.57E-03
Napthalene	3.65E+01	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.59E-04	1.31E-02	0%	1.31E-02
Nitrobenzene	0.175	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.72E-06	6.29E-05	0%	6.29E-05
N-Nitrosodiphenylamine	0.141	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.39E-06	5.07E-05	0%	5.07E-05
N-Nitroso-di-n-propylamine	1.50	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.47E-05	5.38E-04	0%	5.38E-04
Pentachlorophenol	0.258	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	2.54E-06	9.28E-05	0%	9.28E-05
Phenanthrene	8.67E-01	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	8.54E-06	3.12E-04	0%	3.12E-04
Phenol	1.02E+01	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.00E-04	3.65E-03	0%	3.65E-03
Pyrene	3.11E-02	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.06E-07	1.12E-05	0%	1.12E-05
1,2,4 - Trichlorobenzene	1.46E-01	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.44E-06	5.25E-05	0%	5.25E-05
2,4,6 - Trichlorophenol	2.06E-01	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	2.03E-06	7.41E-05	0%	7.41E-05

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (4500 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)
Other HAPS									
Acetaldehyde	4.7	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	4.63E-05	1.69E-03	0%	1.69E-03
Acrolein	3.96	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	3.90E-05	1.42E-03	0%	1.42E-03
Ammonia	5.302	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	5.22E-02	1.91E+00	0%	1.91E+00
Arsenic	0.321	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.16E-06	1.15E-04	0%	1.15E-04
Antimony	3.47E-03	mg/dscm	Stanislaus, See Note 7	8.06E-03	(lb/ton)/(mg/dscm)	2.80E-05	1.02E-03	0%	1.02E-03
Barium	3.74E-03	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	3.68E-05	1.34E-03	0%	1.34E-03
Beryllium	0.27	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	2.70E-06	9.87E-05	0%	9.87E-05
Total Chromium (Cr)	3.05	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.00E-05	1.10E-03	0%	1.10E-03
Hexavalent Chromium	0.30	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	3.00E-06	1.10E-04	0%	1.10E-04
Copper	4.40E-03	mg/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(mg/dscm)	4.33E-05	1.58E-03	0%	1.58E-03
Cobalt	1.08E-03	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	1.06E-05	3.88E-04	0%	3.88E-04
Formaldehyde	13.7	µg/dscm	OWEF, See Note 5	9.85E-06	(lb/ton)/(µg/dscm)	1.35E-04	4.93E-03	0%	4.93E-03
Manganese	70.1	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	6.90E-04	2.52E-02	0%	2.52E-02
Nickel	5.76	µg/dscm	Stanislaus, See Note 7	9.85E-06	(lb/ton)/(µg/dscm)	5.68E-05	2.07E-03	0%	2.07E-03
Phosphorus	0.17	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	1.63E-03	5.93E-02	0%	5.93E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 7	9.85E-03	(lb/ton)/(ng/dscm)	4.04E-02	1.47E+00	0%	1.47E+00
Selenium	7.56E-04	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	7.45E-06	2.72E-04	0%	2.72E-04
Thallium	2.46E-04	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	2.42E-06	8.84E-05	0%	8.84E-05
Zinc	7.29E-02	mg/dscm	OWEF, See Note 5	9.85E-03	(lb/ton)/(mg/dscm)	7.18E-04	2.62E-02	0%	2.62E-02
HAP Total						3.88	1.42E+02		141.79

[2] EFs based on facility stack test results @ 7% O2 based on congener fraction of total from tests.

3 Hg long-term EF for Class C Units from Minn. Rule 7011.1227 Table 1 (60 µg/dscm @ 7% O2).

[4] For all EF (lb/ton) the correction factor is adjusting for heat content. All other EFs from AP-42 Section 2.1 "Refuse Combustion", Table 2.1-11 "Conversion Factors For Municipal Solid Waste

[5] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[6] Huntington - Covanta Huntington Resource Recovery Facility, MPCA apporved emission factors from 2007-2009 test data.

[7] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA apporved emission factors from 2007-2009 test data.

[8] 2011 PRRF Air Emissions Compliance Test, May 23-36, 2011.

Control Equipment	Pollutants Controlled[10]	Capture Efficiency[10]	Destruction/ Collection Efficiency[10]
Fabric Filter (High Temperature)	Cadmium	100%	79%
	Lead	100%	79%
	PM	100%	99%
	PM_{10}	100%	90%
Dry Limestone Injection	HCl	100%	50%
	SO_2	100%	40%
Activated Carbon Adsorption	Mercury	100%	85%
	Municipal Waste Organics	100%	50%

9 Control Equipment information obtained from the PRRF Part 70 Air Permit Reissuance Application (Oct. 30, 2008).

[10] NO/NO_2 Stack Test, May 25, 2011.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001 - South MWC EU002 - North MWC
Stack/Vent Designation No.:	SV001
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Fuel Consumption South Unit 2010 (EU001)		Fuel Consumption North Unit 2010 (EU001)		Actual Fuel Consumption Rate (EU001 and EU002)	
		Maximum	Units	Maximum	Units		
MSW	5,125 Btu/lb	17,334	ton/yr	17,334	ton/yr	355,341	MMBtu/yr

[1] Heat content is the average of testing data from waste sorts completed for the MSW currently received at PRRF.

Calculations Summary - MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)	Actual Controlled Emissions North Unit (tons/yr)
PM (total) - State only limit	SEE 2010 PRRF AEIR								1.25	1.25
PM_{10}	SEE 2010 PRRF AEIR								1.25	1.25
$PM_{2.5}$	SEE 2010 PRRF AEIR								1.25	1.25
SO_2	SEE 2010 PRRF AEIR								9.66	9.67
NO_x[2]	SEE 2010 PRRF AEIR								21.36	21.36
VOC	SEE 2010 PRRF AEIR								0.13	0.13
CO	SEE 2010 PRRF AEIR								1.01	1.01
H_2SO_4	0.16	mg/dscm	Huntington, See Note 7	9.18E-03	(lb/ton)/(mg/dscm)	1.47E-03	1.27E-02	0%	1.27E-02	1.27E-02
MWC Acid Gases (SO_2 and HCl)[2]	---	---	SO_2 + HCl	---	---	3.49	30.3	0%	24.79	24.79

Calculations Summary - MSW Combustion, GHG Fossil Fuel Portion :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5125 Btu/lb basis)		Global Warming Potential (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions CO_2e South Unit (tons/yr)	Actual Controlled Emissions CO_2e North Unit (tons/yr)
CO_2e (total)			40 CFR Part 98, Subpart C for Combustion Sources, Table C-2-Municipal Solid Waste						8,289	8,289
CO_2	88.95	lb/MMBtu		2.2046	(lb/kg)/(kg/MMBtu)	1	15,804	0%	7,902	7,902
CH_4	3.2E-02	kg/MMBtu		2.2046	(lb/kg)/(kg/MMBtu)	21	12.5	0%	132	132
N_2O	4.2E-03	kg/MMBtu		2.2046	(lb/kg)/(kg/MMBtu)	310	1.6	0%	255	255

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

Calculations Summary - MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)	Actual Controlled Emissions North Unit (tons/yr)
HAPS										
Lead	SEE 2010 PRRF AEIR								2.97E-03	2.97E-03
Cadmium	2.60E-03	mg/dscm	Stack test, See Note 9	9.18E-03	(lb/ton)/(mg/dscm)	2.39E-05	2.07E-04	79%	2.07E-04	2.07E-04
Mercury	0.02	mg/dscm	Stack test, See Note 9	9.18E-03	(lb/ton)/(mg/dscm)	1.38E-04	1.19E-03	85%	1.19E-03	1.19E-03
HCl	250	ppmvd	JJJ, See Note 2	1.40E-02	(lb/ton)/ppmvd	3.492	30.3	50%	15.13	15.13
HF	0.316	mg/dscm	Stanislaus, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	2.90E-03	2.51E-02	0%	0.03	0.03
Dioxins/Furans										
Total Dioxins/Furans	125	ng/dscm	JJJ, See Note 2	9.18E-09	(lb/ton)/(ng/dscm)	1.15E-06	9.94E-06	50%	4.97E-06	4.97E-06
Total OCDF	2.797	ng/dscm	Stack Test, See Note 2	9.18E-09	(lb/ton)/(ng/dscm)	2.57E-08	2.23E-07	0%	2.23E-07	2.23E-07
Total OCDD	16.489	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.51E-07	1.31E-06	0%	1.31E-06	1.31E-06
TCDF, 2,3,7,8-	10.291	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	9.45E-08	8.19E-07	0%	8.19E-07	8.19E-07
TCDD, 2,3,7,8-	0.144	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.32E-09	1.14E-08	0%	1.14E-08	1.14E-08
PeCDF, 1,2,3,7,8-	1.092	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.00E-08	8.69E-08	0%	8.69E-08	8.69E-08
PeCDF, 2,3,4,6,8-	1.502	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.38E-08	1.19E-07	0%	1.19E-07	1.19E-07
PeCDD, 1,2,3,7,8-	0.688	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	6.31E-09	5.47E-08	0%	5.47E-08	5.47E-08
HxCDF, 1,2,3,4,7,8-	1.926	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.77E-08	1.53E-07	0%	1.53E-07	1.53E-07
HxCDF, 1,2,3,6,7,8-	1.607	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.47E-08	1.28E-07	0%	1.28E-07	1.28E-07
HxCDF, 1,2,3,7,8,9-	0.771	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.08E-09	6.14E-08	0%	6.14E-08	6.14E-08
HxCDF, 2,3,4,6,7,8-	1.624	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.49E-08	1.29E-07	0%	1.29E-07	1.29E-07
HxCDD, 1,2,3,4,7,8-	0.731	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	6.71E-09	5.81E-08	0%	5.81E-08	5.81E-08
HxCDD, 1,2,3,6,7,8-	1.633	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.50E-08	1.30E-07	0%	1.30E-07	1.30E-07
HxCDD, 1,2,3,7,8,9-	0.862	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.91E-09	6.86E-08	0%	6.86E-08	6.86E-08
HpCDF, 1,2,3,4,6,7,8-	4.759	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	4.37E-08	3.79E-07	0%	3.79E-07	3.79E-07
HpCDF, 1,2,3,4,7,8,9-	0.842	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.73E-09	6.70E-08	0%	6.70E-08	6.70E-08
HpCDD, 1,2,3,4,6,7,8-	10.890	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.00E-07	8.66E-07	0%	8.66E-07	8.66E-07

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)	Actual Controlled Emissions North Unit (tons/yr)
Individual PAHs										
Acenaphthene	1.59E-01	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	1.46E-06	1.27E-05	0%	1.27E-05	1.27E-05
Acenaphthylene	2.74E-02	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	2.51E-07	2.18E-06	0%	2.18E-06	2.18E-06
Anthracene	1.73E-01	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.59E-06	1.38E-05	0%	1.38E-05	1.38E-05
Benzo (a) anthracene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.00E-08	2.60E-07	0%	2.60E-07	2.60E-07
Benzo (a) pyrene	1.86E-02	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.71E-07	1.48E-06	0%	1.48E-06	1.48E-06
Benzo (e) pyrene	6.72E-03	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	6.17E-08	5.35E-07	0%	5.35E-07	5.35E-07
Benzo(g,h,i)perylene	3.24E-02	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	2.98E-07	2.58E-06	0%	2.58E-06	2.58E-06
Benzo (b) fluoranthene	3.47E-03	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.18E-08	2.76E-07	0%	2.76E-07	2.76E-07
Benzo (k) fluoranthene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.00E-08	2.60E-07	0%	2.60E-07	2.60E-07
bis (2 -Ethylhexyl) phthalate	0.902	µg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(µg/dscm)	8.28E-06	7.18E-05	0%	7.18E-05	7.18E-05
Chrysene	5.52E-03	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	5.06E-08	4.39E-07	0%	4.39E-07	4.39E-07
Dibenz (a,h) anthracene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.00E-08	2.60E-07	0%	2.60E-07	2.60E-07
Dibenzofuran	5.81E-02	µg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(µg/dscm)	5.33E-07	4.62E-06	0%	4.62E-06	4.62E-06
1,4 - Dichlorobenzene	0.201	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.85E-06	1.60E-05	0%	1.60E-05	1.60E-05
1,2 - Dichlorobenzene	3.53E-01	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.24E-06	2.81E-05	0%	2.81E-05	2.81E-05
2,4 - Dinitrotoluene	0.222	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	2.04E-06	1.77E-05	0%	1.77E-05	1.77E-05
Fluorene	1.234	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	1.13E-05	9.82E-05	0%	9.82E-05	9.82E-05
Fluoranthene	0.0429	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.94E-07	3.41E-06	0%	3.41E-06	3.41E-06
Hexachlorobenzene	0.131	µg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(µg/dscm)	1.20E-06	1.04E-05	0%	1.04E-05	1.04E-05
Hexachlorobutadiene	0.199	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.83E-06	1.58E-05	0%	1.58E-05	1.58E-05
Hexachlorocyclopentadiene	0.184	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.69E-06	1.46E-05	0%	1.46E-05	1.46E-05
Hexachloroethane	0.379	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.48E-06	3.02E-05	0%	3.02E-05	3.02E-05
Isophorone	9.07E-02	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	8.33E-07	7.22E-06	0%	7.22E-06	7.22E-06
Indeno (1,2,3 -cd) pyrene	5.77E-03	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	5.30E-08	4.59E-07	0%	4.59E-07	4.59E-07
2-MethylNaphthalene	7.14E+00	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	6.55E-05	5.68E-04	0%	5.68E-04	5.68E-04
Napthalene	3.65E+01	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	3.35E-04	2.90E-03	0%	2.90E-03	2.90E-03
Nitrobenzene	0.175	µg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(µg/dscm)	1.61E-06	1.39E-05	0%	1.39E-05	1.39E-05
N-Nitrosodiphenylamine	0.141	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.29E-06	1.12E-05	0%	1.12E-05	1.12E-05
N-Nitroso-di-n-propylamine	1.50	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.37E-05	1.19E-04	0%	1.19E-04	1.19E-04
Pentachlorophenol	0.258	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	2.37E-06	2.05E-05	0%	2.05E-05	2.05E-05
Phenanthrene	8.67E-01	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	7.96E-06	6.90E-05	0%	6.90E-05	6.90E-05
Phenol	10.16	µg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(µg/dscm)	9.33E-05	8.08E-04	0%	8.08E-04	8.08E-04
Pyrene	0.03109	µg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	2.85E-07	2.47E-06	0%	2.47E-06	2.47E-06
1,2,4 - Trichlorobenzene	0.146	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	1.34E-06	1.16E-05	0%	1.16E-05	1.16E-05
2,4,6 - Trichlorophenol	0.206	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	1.89E-06	1.64E-05	0%	1.64E-05	1.64E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[5] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency[10] (%)	Actual Controlled Emissions South Unit (tons/yr)	Actual Controlled Emissions North Unit (tons/yr)
Other HAPS										
Acetaldehyde	4.7	μg/dscm	OWEF, See Note 6	9.18E-06	(lb/ton)/(μg/dscm)	4.31E-05	3.74E-04	0%	3.74E-04	3.74E-04
Acrolein	3.96	μg/dscm		9.18E-06	(lb/ton)/(μg/dscm)	3.64E-05	3.15E-04	0%	3.15E-04	3.15E-04
Ammonia	5.302	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	4.87E-02	4.22E-01	0%	4.22E-01	4.22E-01
Arsenic	0.321	μg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(μg/dscm)	2.95E-06	2.55E-05	0%	2.55E-05	2.55E-05
Antimony	3.47E-03	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	3.19E-05	2.76E-04	0%	2.76E-04	2.76E-04
Barium	3.74E-03	mg/dscm	OWEF, See Note 6	9.18E-03	(lb/ton)/(mg/dscm)	3.43E-05	2.98E-04	0%	2.98E-04	2.98E-04
Beryllium	0.27	μg/dscm		9.18E-06	(lb/ton)/(μg/dscm)	2.52E-06	2.18E-05	0%	2.18E-05	2.18E-05
Total Chromium (Cr)	3.05	μg/dscm		9.18E-06	(lb/ton)/(μg/dscm)	2.80E-05	2.43E-04	0%	2.43E-04	2.43E-04
Hexavalent Chromium	0.30	μg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(μg/dscm)	2.80E-06	2.43E-05	0%	2.43E-05	2.43E-05
Copper	4.40E-03	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	4.04E-05	3.50E-04	0%	3.50E-04	3.50E-04
Cobalt	1.08E-03	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	9.91E-06	8.59E-05	0%	8.59E-05	8.59E-05
Formaldehyde	13.7	μg/dscm		9.18E-06	(lb/ton)/(μg/dscm)	1.26E-04	1.09E-03	0%	1.09E-03	1.09E-03
Manganese	70.1	μg/dscm	Stanislaus, See Note 8	9.18E-06	(lb/ton)/(μg/dscm)	6.44E-04	5.58E-03	0%	5.58E-03	5.58E-03
Nickel	5.76	μg/dscm		9.18E-06	(lb/ton)/(μg/dscm)	5.29E-05	4.59E-04	0%	4.59E-04	4.59E-04
Phosphorus	0.17	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	1.51E-03	1.31E-02	0%	1.31E-02	1.31E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 8	9.18E-09	(lb/ton)/(ng/dscm)	3.76E-08	3.26E-07	0%	3.26E-07	3.26E-07
Selenium	7.56E-04	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	6.94E-06	6.01E-05	0%	6.01E-05	6.01E-05
Thallium	2.46E-04	mg/dscm	OWEF, See Note 6	9.18E-03	(lb/ton)/(mg/dscm)	2.26E-06	1.96E-05	0%	1.96E-05	1.96E-05
Zinc	7.29E-02	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	6.69E-04	5.80E-03	0%	5.80E-03	5.80E-03
HAP Total						3.55	30.74		15.61	15.61

[2] EFs based on facility stack test results scaled to FIP JJJ total "dioxins" limit of 125 ng/dscm @ 7% O2 based on congener fraction of total from tests (See North Unit Dioxin Limit).

3 Hg long-term EF for Class C Units from Minn. Rule 7011.1227 Table 1 (60 μg/dscm @ 7% O2).

[4] For all EF (lb/ton) the correction factor is adjusting for heat content. All other EFs from AP-42 Section 2.1 "Refuse Combustion", Table 2.1-11 "Conversion Factors For Municipal Solid Waste

[5] EF for D/F, Cd, Pb, Hg, and HCl from 40 CFR 62 Subpart JJJ, Table 4, Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999.

NOx (lb/ton) = NOx (ppm) * 1.89 * 10^-2 (from Table 2.1-11 Assuming ideal gas at STP conditions)

[6] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[7] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[8] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[9] 2011 PRRF Air Emissions Compliance Test, May 23-36, 2011.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

South and North MWC Actual Emissions

Control Equipment	Pollutants Controlled [10]	Capture Efficiency [10]	Destruction/ Collection Efficiency [10]
Fabric Filter (High Temperature)	Cadmium	100%	79%
	Lead	100%	79%
	PM	100%	99%
	PM_{10}	100%	90%
Dry Limestone Injection	HCl	100%	50%
	SO_2	100%	40%
Activated Carbon Adsorption	Mercury	100%	85%
	Municipal Waste Organics	100%	50%

10 Control Equipment information obtained from the PRRF Part 70 Air Permit Reissuance Application (Oct. 30, 2008).

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Aux Boiler Potential Emissions

AQ Facility ID No.:	11100036	AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility	
Emission Unit Identification No.:	EU 005	Auxiliary Boiler
Stack/Vent Designation No.:	SV 004	Auxiliary Boiler Stack
Pollution Control Equipment No(s):	**83.5**	MMBtu/hr

Fuel parameters:

Fuel Type	% Sulfur	% Ash	Heat Value [1]	Units	Fuel Consumption Rate Annual Average Basis	Units
Natural Gas	**0.20**	negligible	**1,020**	Btu/scf	717.1	MMscf/yr

[1] Average gross heating value of natural gas from AP-42 Section 1.4 "Natural Gas Combustion" and Sulfur content from Section1.4 Table 1.4-2 (July 1998).

Calculations Summary - Fuel: Natural Gas

Pollutant	Emission Factor [2,3] (lb/MMscf)	Emission Factor (lb/MMBtu)	Emission Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Controlled Emission Rate (lbs/hr)	Controlled Emission Rate (g/s)	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)
PM	7.60	7.5E-03	0.62	2.73	0.0%	0.62	7.84E-02	2.73	2.73
PM (filterable)	1.90	1.9E-03	0.16	0.68	0.0%	0.16	1.96E-02	0.68	0.68
PM_{10}	7.60	7.5E-03	0.62	2.73	0.0%	0.62	7.84E-02	2.73	2.73
$PM_{2.5}$	7.60	7.5E-03	0.62	2.73	0.0%	0.62	7.84E-02	2.73	2.73
NO_x	32	3.1E-02	2.62	11.47	0.0%	2.62	0.33	11.47	11.47
SO_2	0.60	5.9E-04	4.91E-02	0.22	0.0%	4.91E-02	6.19E-03	0.22	0.22
CO	84	8.2E-02	6.88	30.12	0.0%	6.88	0.87	30.12	30.12
VOC	5.50	5.4E-03	0.45	1.97	0.0%	0.45	5.67E-02	1.97	1.97
Lead	0.0005	4.9E-07	4.09E-05	1.79E-04	0.0%	4.09E-05	5.16E-06	1.79E-04	1.79E-04
H_2SO_4	---	---	---	---	---	---	---	---	---
Fluorides	---	---	---	---	---	---	---	---	---

[2] EF from AP-42 Section 1.4 "Natural Gas Combustion", Table 1.4-1 (NO_x, CO) < 100 MMBtu/hr Natural gas fired boilers (Controlled - Low NO_x burners/Flue gas recirculation) (July 1998).

[3] EF from AP-42 Section 1.4 "Natural Gas Combustion", Table 1.4-2 (PM, PM(filterable),SO_2, VOC, Lead) (July 1998).

Note: EF converted from $lb/10^6$ scf to lb/MMBtu by dividing by 1,020.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility

Aux Boiler HAP Emissions

AQ Facility ID No.: 11100036 AQ File No.: 116H

Facility name: Perham Resource Recovery Facility

Emission Unit Identification No.: EU 005 Auxiliary Boiler

Stack/Vent Designation No.: SV 004 Auxiliary Boiler Stack

Pollution Control Equipment No(s 83.5 MMBtu/hr

Fuel Parameters

Fuel Type	% Sulfur	% Ash	Heat Value[1]	Units	Fuel Consumption Rate Annual Average Basis	Units
Natural Gas	0.20	negligible	1,020	Btu/scf	717.1	MMscf/yr

[1] Average gross heating value of natural gas from AP-42 Section 1.4 "Natural Gas Combustion" and Sulfur content from Section1.4 Table 1.4-2 (July 1998).

Calculations Summary - Primary Fuel: Natural Gas

HAP Name (CAS)		Emission Factor[2]	Emission Rate	Maximum Uncontrolled Emissions	Pollution Control Efficiency	Controlled Emission Factor	Maximum Controlled Emissions	Limited Controlled Emissions
		(lbs/MMscf)	(lbs/hr)	(tons/yr)	(%)	(lbs/MMscf)	(tons/yr)	(tons/yr)
Arsenic	7440-38-2	2.00E-04	1.64E-05	7.17E-05	0.00%	NA	7.17E-05	7.17E-05
Barium	7440-39-3	4.40E-03	3.60E-04	1.58E-03	0.00%	NA	1.58E-03	1.58E-03
Benzene	71-43-2	2.10E-03	1.72E-04	7.53E-04	0.00%	NA	7.53E-04	7.53E-04
Beryllium	7440-41-7	1.20E-05	9.82E-07	4.30E-06	0.00%	NA	4.30E-06	4.30E-06
Cadmium	7440-43-9	1.10E-03	9.00E-05	3.94E-04	0.00%	NA	3.94E-04	3.94E-04
Chromium	7440-47-3	1.40E-03	1.15E-04	5.02E-04	0.00%	NA	5.02E-04	5.02E-04
Copper	7440-50-8	8.50E-04	6.96E-05	3.05E-04	0.00%	NA	3.05E-04	3.05E-04
Cobalt	7440-48-4	8.40E-05	6.88E-06	3.01E-05	0.00%	NA	3.01E-05	3.01E-05
Dichlorobenzene	25321-22-6	1.20E-03	9.82E-05	4.30E-04	0.00%	NA	4.30E-04	4.30E-04
Hexane	110-54-3	1.80E+00	1.47E-01	6.45E-01	0.00%	NA	6.45E-01	6.45E-01
Manganese	7439-96-5	3.80E-04	3.11E-05	1.36E-04	0.00%	NA	1.36E-04	1.36E-04
Mercury	7439-97-6	2.60E-04	2.13E-05	9.32E-05	0.00%	NA	9.32E-05	9.32E-05
Molybdenum	7439-98-7	1.10E-03	9.00E-05	3.94E-04	0.00%	NA	3.94E-04	3.94E-04
Nickel	7440-02-0	2.10E-03	1.72E-04	7.53E-04	0.00%	NA	7.53E-04	7.53E-04
Selenium	7782-49-2	2.40E-05	1.96E-06	8.61E-06	0.00%	NA	8.61E-06	8.61E-06
Toluene	108-88-3	3.40E-03	2.78E-04	1.22E-03	0.00%	NA	1.22E-03	1.22E-03
Vanadium	7440-62-2	2.30E-03	1.88E-04	8.25E-04	0.00%	NA	8.25E-04	8.25E-04
Zinc	7440-66-6	2.90E-02	2.37E-03	1.04E-02	0.00%	NA	1.04E-02	1.04E-02

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Aux Boiler HAP Emissions

HAP Name (CAS)		Emission Factor[2]	Emission Rate	Maximum Uncontrolled Emissions	Pollution Control Efficiency	Controlled Emission Factor	Maximum Controlled Emissions	Limited Controlled Emissions
		(lbs/MMscf)	(lbs/hr)	(tons/yr)	(%)	(lbs/MMscf)	(tons/yr)	(tons/yr)
POM								
Acenaphthene	83-32-9	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Acenaphthylene	208-96-8	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Anthracene	120-12-7	2.40E-06	1.96E-07	8.61E-07	0.00%	NA	8.61E-07	8.61E-07
Benzo (a) anthracene	56-55-3	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Benzo(g,h,i)perylene	191-24-2	1.20E-06	9.82E-08	4.30E-07	0.00%	NA	4.30E-07	4.30E-07
Benzo (b) fluoranthene	205-99-2	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Benzo (k) fluoranthene	207-08-9	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Chrysene	218-01-9	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
Dibenz (a,h) anthracene	53-70-3	1.20E-06	9.82E-08	4.30E-07	0.00%	NA	4.30E-07	4.30E-07
Fluorene	86-73-7	2.80E-06	2.29E-07	1.00E-06	0.00%	NA	1.00E-06	1.00E-06
Fluoranthene	206-44-0	3.00E-06	2.46E-07	1.08E-06	0.00%	NA	1.08E-06	1.08E-06
Formaldehyde	50-00-0	7.50E-02	6.14E-03	2.69E-02	0.00%	NA	2.69E-02	2.69E-02
Indeno (1,2,3 -cd) pyrene	193-39-5	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
2-MethylNaphthalene	91-57-6	2.40E-05	1.96E-06	8.61E-06	0.00%	NA	8.61E-06	8.61E-06
Naphthalene	91-20-3	6.10E-04	4.99E-05	2.19E-04	0.00%	NA	2.19E-04	2.19E-04
Pyrene	129-00-0	5.00E-06	4.09E-07	1.79E-06	0.00%	NA	1.79E-06	1.79E-06
Phenanathrene	85-01-8	1.70E-05	1.39E-06	6.10E-06	0.00%	NA	6.10E-06	6.10E-06
Toluene	108-88-3	3.40E-03	2.78E-04	1.22E-03	0.00%	NA	1.22E-03	1.22E-03
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	1.31E-06	5.74E-06	0.00%	NA	5.74E-06	5.74E-06
Methylchloranthrene	56-49-5 3	1.80E-06	1.47E-07	6.45E-07	0.00%	NA	6.45E-07	6.45E-07
POM[3]			6.48E-03	2.84E-02	0.00%	NA	2.84E-02	2.84E-02
Total HAPs			0.16	0.69			0.69	0.69

[2] Emission factors from AP-42, Section 1.4 "Natural Gas Combustion", Tables 1.4-3 and 1.4-4 (July 1998).

[3] Total POM emission factor is equal to the sum of the individual POM compounds, includes Naphthalene.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Auxiliary Boiler Actual Emissions Summary

AQ Facility ID No.:	11100036	AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility	
Emission unit ID number:	EU 005	Auxiliary Boiler
Stack/Vent designation number:	SV 004	Auxiliary Boiler Stack
Maximum rated boiler capacity:	**159,506** MMBtu/yr	

Fuel parameters:

Fuel Type	% Sulfur	% Ash	Heat Value [1]	Units	Fuel Consumption Rate Annual Average Basis	Units
Natural Gas	0.20	negligible	**1,020**	Btu/scf	156.4	MMscf/yr

[1] Average gross heating value of natural gas from AP-42 Section 1.4 "Natural Gas Combustion" and Sulfur content from Section1.4 Table 1.4-2 (July 1998).

Calculations Summary - Natural Gas Combustion, Criteria Pollutants :

Pollutant	Emission Factor [2] (lb/MMscf)	Actual Uncontrolled Emissions (tpy)	Pollution Control Efficiency (%)	Actual Controlled Emissions (tpy)
PM	SEE 2010 PRRF AEIR			0.59
PM_{10}	SEE 2010 PRRF AEIR			0.59
$PM_{2.5}$	7.60	0.59	0.0%	0.59
NO_x	SEE 2010 PRRF AEIR			2.48
SO_2	SEE 2010 PRRF AEIR			4.64E-02
CO	SEE 2010 PRRF AEIR			6.50
VOC	SEE 2010 PRRF AEIR			0.43
Lead	SEE 2010 PRRF AEIR			3.87E-05
H_2SO_4	---	---	---	---
Fluorides	---	---	---	---

[2] $PM_{2.5}$ is equal to PM_{10} calculated based on AP-42 Section 1.4 "Natural Gas Combustion", Table 1.4-2 (PM, PM(filterable)) (July 1998)

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Auxiliary Boiler Actual Emissions Summary
Calculations Summary - Natural Gas Combustion, HAPs :

HAP Name (CAS)		Emission Factor [3] (lb/MMscf)	Actual Uncontrolled Emissions (tpy)	Pollution Control Efficiency (%)	Actual Controlled Emissions (tpy)
Arsenic	7440-38-2	2.00E-04	1.56E-05	0.00%	1.56E-05
Barium	7440-39-3	4.40E-03	3.44E-04	0.00%	3.44E-04
Benzene	71-43-2	2.10E-03	1.64E-04	0.00%	1.64E-04
Beryllium	7440-41-7	1.20E-05	9.38E-07	0.00%	9.38E-07
Cadmium	7440-43-9	1.10E-03	8.60E-05	0.00%	8.60E-05
Chromium	7440-47-3	1.40E-03	1.09E-04	0.00%	1.09E-04
Copper	7440-50-8	8.50E-04	6.65E-05	0.00%	6.65E-05
Cobalt	7440-48-4	8.40E-05	6.57E-06	0.00%	6.57E-06
Dichlorobenzene	25321-22-6	1.20E-03	9.38E-05	0.00%	9.38E-05
Hexane	110-54-3	1.80E+00	1.41E-01	0.00%	1.41E-01
Manganese	7439-96-5	3.80E-04	2.97E-05	0.00%	2.97E-05
Mercury	7439-97-6	2.60E-04	2.03E-05	0.00%	2.03E-05
Molybdenum	7439-98-7	1.10E-03	8.60E-05	0.00%	8.60E-05
Nickel	7440-02-0	2.10E-03	1.64E-04	0.00%	1.64E-04
Selenium	7782-49-2	2.40E-05	1.88E-06	0.00%	1.88E-06
Vanadium	7440-62-2	2.30E-03	1.80E-04	0.00%	1.80E-04
Zinc	7440-66-6	2.90E-02	2.27E-03	0.00%	2.27E-03
		POM			
Acenaphthene	83-32-9	1.80E-06	1.41E-07	0.00%	1.41E-07
Acenaphthylene	208-96-8	1.80E-06	1.41E-07	0.00%	1.41E-07
Anthracene	120-12-7	2.40E-06	1.88E-07	0.00%	1.88E-07
Benzo (a) anthracen	56-55-3	1.80E-06	1.41E-07	0.00%	1.41E-07
Benzo(g,h,i)perylen	191-24-2	1.20E-06	9.38E-08	0.00%	9.38E-08
Benzo (b) fluoranth	205-99-2	1.80E-06	1.41E-07	0.00%	1.41E-07
Benzo (k) fluoranth	207-08-9	1.80E-06	1.41E-07	0.00%	1.41E-07
Chrysene	218-01-9	1.80E-06	1.41E-07	0.00%	1.41E-07
Dibenz (a,h) anthra	53-70-3	1.20E-06	9.38E-08	0.00%	9.38E-08
Fluorene	86-73-7	2.80E-06	2.19E-07	0.00%	2.19E-07
Fluoranthene	206-44-0	3.00E-06	2.35E-07	0.00%	2.35E-07
Formaldehyde	50-00-0	7.50E-02	5.86E-03	0.00%	5.86E-03
Indeno (1,2,3 -cd) p	193-39-5	1.80E-06	1.41E-07	0.00%	1.41E-07
2-MethylNaphthale	91-57-6	2.40E-05	1.88E-06	0.00%	1.88E-06
Naphthalene	91-20-3	6.10E-04	4.77E-05	0.00%	4.77E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Auxiliary Boiler Actual Emissions Summary

HAP Name (CAS)		Emission Factor [3] (lb/MMscf)	Actual Uncontrolled Emissions (tpy)	Pollution Control Efficiency (%)	Actual Controlled Emissions (tpy)
Pyrene	129-00-0	5.00E-06	3.91E-07	0.00%	3.91E-07
Phenanathrene	85-01-8	1.70E-05	1.33E-06	0.00%	1.33E-06
Toluene	108-88-3	3.40E-03	2.66E-04	0.00%	2.66E-04
7,12-Dimethylbenz(a)anthracene		1.60E-05	1.25E-06	0.00%	1.25E-06
Methylchloranthren	56-49-5 3	1.80E-06	1.41E-07	0.00%	1.41E-07
	POM[4]		6.18E-03	0.00%	6.18E-03
	Totals		0.15		0.15

[3] Emission factors from AP-42, Section 1.4 "Natural Gas Combustion", Tables 1.4-3 and 1.4-4 (July 1998).

[4] Total POM emission factor is equal to the sum of the individual POM compounds, includes Naphthalene.

Calculations Summary - Natural Gas Combustion, GHG :

GHG Pollutant	GWP	Emission Factor (lb/MMbtu)[5]	Actual Emissions (tpy)	Actual Emissions CO_2e (tpy)
CO_2	1	116.84	9,319	9,319
CH_4	21	2.20E-03	0.18	3.7
N_2O	310	2.20E-04	0.02	5.5
HFCs		N/A	--	--
PFCs		N/A	--	--
SF_6	23,900	N/A	--	--
Total GHG (CO_2e)				9,328

[5] Emission Factors based on 40 CFR Part 98 (GHG Mandatory Reporting Rule), Subpart C for combustion sources. Converted from kg to lbs as follows:

	EF (kg/MMBtu)	Conversion Factor (lb/kg)	EF (lb/MMBtu)
CO_2	53.00	2.2046	116.84
CH_4	1.00E-03	2.2046	2.20E-03
N_2O	1.00E-04	2.2046	2.20E-04

Note: EF converted from lb/10^6 scf to lb/MMBtu by dividing by 1,020.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Traffic Summary for Emission Calculations

AQ Facility ID No: 11100036 AQ File No.: 116H
Facility name: Perham Resource Recovery Facility

Weeks	Day/Week	Days/Yr
52	5	260

Comparison of Existing Facility and Proposed Project				
	Existing Facility		Proposed Project	
Product	2010 Actual 116 tpd	2010 Maximum 116 tpd	Projected	Maximum 200 tpd
MSW (tpy)	35,000	42,340	55,000	73,000
Ash (tpy)	8,800	10,645	13,829	18,354
Steam (lbs.)	215,000,000	260,088,571	337,857,143	448,428,571

Truck Weight Summary					
Truck Type	Total Number of Trips	Average Tare (lbs)	Average Gross (lbs)	Average Maximum Gross (lbs.)	Average Vehicle Weight (lbs.)
MSW[3]	4,146	31,129	47,556	53,492	39,342
Ash[4]	780	36,269	58,832	72,760	47,551
Leachate[5]	147	16,745	34,596	41,680	25,671
Material Recovery Facility Trucks [6]	7	27,234	37,343	46,680	32,289
Fines and Non-processibles[4]	NA	NA	NA	NA	32,289
Miscellaneous[7]	14	8,244	8,691	9,620	8,468
Lime [8]	55	NA	NA	NA	47,551
Employee Related[9]	5,850	NA	NA	3,590	3,590
Delivery Related[10]	1,300	NA	NA	8,000	8,000

Truck Traffic Summary						
Truck Type	2010 Truck Loads	2010 Average Daily Trips[1,2]	Projected Truck Loads	Maximum Truck Loads	Maximum Daily Trips[1,2]	Round Trip Distance, Future Facility (ft)
MSW[3]	4,146	16	5,746	7,468	28.7	288
Ash[4]	780	3	1,042	1,383	5.32	576
Leachate[5]	147	0.57	70	93	0.36	938
Material Recovery Facility Trucks [6]	7	0.03	72	96	0.37	496
Fines and Non-processibles[4]	NA	NA	123	163	0.63	1,175
Miscellaneous[7]	14	0.05	14	14	0.05	288
Lime	55	0.21	55	110	0.42	938
Employee Related[9]	15 Employees	15	21	27 Total Employees	21	877
Delivery Related[10]	2 Deliveries per Day	2	2	2 Deliveries per Day	2	877

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
Traffic Summary for Emission Calculations

Daily Distance Traveled and Mean Vehicle Weight Summary		
Truck Type	Average Vehicle Weight x VMT	Daily Distance Traveled, Future Facility (VMT/day)
MSW[3]	61,641	1.57
Ash[4]	27,589	0.58
Leachate[5]	1,630	0.06
Material Recovery Facility Trucks [6]	1,119	3.47E-02
Fines and Non-processibles[4]	4,496	1.39E-01
Miscellaneous[7]	25	2.94E-03
Lime [8]	3,558	7.48E-02
Employee Related[9]	12,522	3.49
Delivery Related[10]	2,658	0.33
	Mean Vehicle Weight (tons)	Vehicle Miles Traveled (VMT/day)
	9.17	6.28

[1] Entry and Exit from the Facility are counted as **one** trip. 2010 Ash Truck information includes fines disposal, as fines are not removed from the MSW waste stream without the MRF.

[2] Assume 5 days a week with truck traffic (Monday-Friday) for a worst-case scenario though burner operates continuously, therefore 260 days of truck traffic a year.

[3] Assume at all additional MSW brought to PRRF above current waste volumes comes in 20 ton trucks and 5 ton trucks. 80% of the additional waste arrive in the 20 ton trucks while the remaining 20% arrives in 5 ton trucks.

20,000 tons per year of MSW =55000 Proposed Project projected MSW tpy - 35000 Existing Facility MSW tpy

1600 projected additional truck loads =((20000 additional tons MSW per year x (1-80%))/20 tons MSW per truck) + ((20000 additional tons MSW per year x (1-20%))/5 tons MSW per truck)

30,660 tons per year of MSW = Proposed Project projected MSW tpy - 55000 Existing Facility MSW tpy

2453 projected additional truck loads =((30660 additional tons MSW per year x (1-80%))/20 tons MSW per truck) + ((30660 additional tons MSW per year x (1-20%))/5 tons MSW per truck)

[4] Under the Proposed Project, 15% less ash per ton of MSW would be generated with the Proposed Project, while 5-8% of recyclables and 10% of fines are removed prior to combustion. The total number of loads of ash and fines would remain about the same as the current facility. It is assumed that the average vehicle weight a of fines and non-processibles truck is the same as that of a MRF truck.

[5] Under the proposed Project, less leachate would be required due to the installation of an ash conditioner. It was conservatively estimated that only 70 loads, or a 50% reduction in leachate loads, are likely under the proposed project scenario for 55,000 tpy of processed waste.

[6] Material Recovery Facility Trucks include any truck traffic due to the proposed material recovery facility (steel recycling, glass recycling, aluminum recycling, etc.).

[7] Miscellaneous Trucks include "Adopt A Highway" traffic. These trips are not expected to increase as a result of the proposed project.

[8] The vehicle weight for Lime trucks is unknown, therefore the weight was assumed to be equal to that of an ash truck.

[9] Employee vehicle weight is assumed to be 3,590 pounds based on the EPA report "Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2011", March 2012. The future facility will have a maximum of 27 employees but only 21 employees onsite every 24 hours. The maximum number of daily trips is calculated assuming that 21 employees are onsite every day of the

[10] It is assumed that 2 deliveries occur per day. Delivery vehicle weight is based on MPCA 2008 data.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Chronic Current Facility Potential Emissions at 116 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001, EU002 - South MWC, North MWC
Stack/Vent Designation No.:	SV001
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Maximum Fuel Consumption Rate Annual Average Basis	Fuel Consumption Annual Average Basis	
			Maximum	Units
MSW	5,125 Btu/lb	4.83 ton/hr	116	ton/day

[1] Heat content is the average of testing data from waste sorts completed for the MSW currently received at PRRF.

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor [6] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
PM (total) - State only limit	0.020	gr/dscf	State, See Note 2	See Note 2		0.451	2.18	9.5	0%	2.18	9.54	9.54
PM (filterable)	70	mg/dscm	JJJ, See Note 3	9.18E-03	(lb/ton)/(mg/dscm)	0.643	3.11	13.6	0%	3.11	13.60	13.60
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.18E-03	(lb/ton)/(mg/dscm)	0.508	2.46	10.76	0%	2.46	10.76	10.76
$PM_{2.5}$	55.4	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	0.508	2.46	10.76	0%	2.46	10.76	10.76
SO_2	77	ppmvd	JJJ, See Note 3	2.45E-02	(lb/ton)/ppmvd	1.890	9.13	40.01	0%	9.13	40.01	40.01
NO_x	500	ppmvd		1.76E-02	(lb/ton)/ppmvd	8.810	42.58	186.5	0%	42.58	186.51	186.51
VOC	0.10	lb/ton	AP-42, See Note 5	1.14	(5,125Btu/lb/4,500Btu/lb)	0.114	0.55	2.41	0%	0.55	2.41	2.41
CO	100	ppmvd	JJJ, See Note 4	1.07E-02	(lb/ton)/ppmvd	1.073	5.19	22.7	0%	5.19	22.71	22.71
H_2SO_4	0.16	mg/dscm	Huntington, See Note 9	9.18E-03	(lb/ton)/(mg/dscm)	1.47E-03	7.10E-03	3.11E-02	0%	7.10E-03	3.11E-02	3.11E-02
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO2 + HCl	---	---	5.38	26.01	113.9	0%	26.01	113.92	113.92

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Chronic Current Facility Potential Emissions at 116 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[6] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
HAPS												
Lead	1.60	mg/dscm	JJJ, See Note 3	9.18E-03	(lb/ton)/(mg/dscm)	1.47E-02	0.07	0.31	0%	0.07	0.31	0.31
Cadmium	0.10	mg/dscm	JJJ, See Note 3	9.18E-03	(lb/ton)/(mg/dscm)	9.18E-04	4.44E-03	1.94E-02	0%	4.44E-03	1.94E-02	1.94E-02
Mercury	0.08	mg/dscm	JJJ, See Note 3	9.18E-03	(lb/ton)/(mg/dscm)	7.34E-04	3.55E-03	1.55E-02	0%	3.55E-03	1.55E-02	1.55E-02
Mercury	60.00	μg/dscm	State, See Note 11	9.18E-06	(lb/ton)/(μg/dscm)	5.51E-04	2.66E-03	1.17E-02	0%	2.66E-03	1.17E-02	1.17E-02
HCl	250	ppmvd	JJJ, See Note 3	1.40E-02	(lb/ton)/ppmvd	3.492	16.88	73.9	0%	16.88	73.92	73.92
HF	0.32	mg/dscm	Stanislaus, See Note 10	9.18E-03	(lb/ton)/(mg/dscm)	2.90E-03	0.014	0.061	0%	1.40E-02	6.14E-02	6.14E-02
Dioxins/Furans												
Total Dioxins/Furans	125	ng/dscm	JJJ, See Note 3	9.18E-09	(lb/ton)/(ng/dscm)	1.15E-06	5.55E-06	2.43E-05	0%	5.55E-06	2.43E-05	2.43E-05
Total OCDF	2.797	ng/dscm	Stack Test, See Note 7	9.18E-09	(lb/ton)/(ng/dscm)	2.57E-08	1.24E-07	5.43E-07	0%	1.24E-07	5.43E-07	5.43E-07
Total OCDD	16.489	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.51E-07	7.32E-07	3.20E-06	0%	7.32E-07	3.20E-06	3.20E-06
TCDF, 2,3,7,8-	10.291	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	9.45E-08	4.57E-07	2.00E-06	0%	4.57E-07	2.00E-06	2.00E-06
TCDD, 2,3,7,8-	0.144	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.32E-09	6.37E-09	2.79E-08	0%	6.37E-09	2.79E-08	2.79E-08
PeCDF, 1,2,3,7,8-	1.092	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.00E-08	4.84E-08	2.12E-07	0%	4.84E-08	2.12E-07	2.12E-07
PeCDF, 2,3,4,6,8-	1.502	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.38E-08	6.66E-08	2.92E-07	0%	6.66E-08	2.92E-07	2.92E-07
PeCDD, 1,2,3,7,8-	0.688	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	6.31E-09	3.05E-08	1.34E-07	0%	3.05E-08	1.34E-07	1.34E-07
HxCDF, 1,2,3,4,7,8-	1.926	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.77E-08	8.54E-08	3.74E-07	0%	8.54E-08	3.74E-07	3.74E-07
HxCDF, 1,2,3,6,7,8-	1.607	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.47E-08	7.13E-08	3.12E-07	0%	7.13E-08	3.12E-07	3.12E-07
HxCDF, 1,2,3,7,8,9-	0.771	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.08E-09	3.42E-08	1.50E-07	0%	3.42E-08	1.50E-07	1.50E-07
HxCDF, 2,3,4,6,7,8-	1.624	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.49E-08	7.20E-08	3.16E-07	0%	7.20E-08	3.16E-07	3.16E-07
HxCDD, 1,2,3,4,7,8-	0.731	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	6.71E-09	3.24E-08	1.42E-07	0%	3.24E-08	1.42E-07	1.42E-07
HxCDD, 1,2,3,6,7,8-	1.633	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.50E-08	7.25E-08	3.17E-07	0%	7.25E-08	3.17E-07	3.17E-07
HxCDD, 1,2,3,7,8,9-	0.862	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.91E-09	3.82E-08	1.68E-07	0%	3.82E-08	1.68E-07	1.68E-07
HpCDF, 1,2,3,4,6,7,8-	4.759	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	4.37E-08	2.11E-07	9.25E-07	0%	2.11E-07	9.25E-07	9.25E-07
HpCDF, 1,2,3,4,7,8,9-	0.842	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	7.73E-09	3.73E-08	1.64E-07	0%	3.73E-08	1.64E-07	1.64E-07
HpCDD, 1,2,3,4,6,7,8-	10.890	ng/dscm		9.18E-09	(lb/ton)/(ng/dscm)	1.00E-07	4.83E-07	2.12E-06	0%	4.83E-07	2.12E-06	2.12E-06

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Chronic Current Facility Potential Emissions at 116 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[6] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
Individual PAHs												
Acenaphthene	1.59E-01	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	1.46E-06	7.06E-06	3.09E-05	0%	7.06E-06	3.09E-05	3.09E-05
Acenaphthylene	2.74E-02	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.51E-07	1.21E-06	5.32E-06	0%	1.21E-06	5.32E-06	5.32E-06
Anthracene	1.73E-01	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.59E-06	7.69E-06	3.37E-05	0%	7.69E-06	3.37E-05	3.37E-05
Benzo (a) anthracene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.00E-08	1.45E-07	6.35E-07	0%	1.45E-07	6.35E-07	6.35E-07
Benzo (a) pyrene	1.86E-02	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.71E-07	8.26E-07	3.62E-06	0%	8.26E-07	3.62E-06	3.62E-06
Benzo (e) pyrene	6.72E-03	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	6.17E-08	2.98E-07	1.31E-06	0%	2.98E-07	1.31E-06	1.31E-06
Benzo(g,h,i)perylene	3.24E-02	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.98E-07	1.44E-06	6.30E-06	0%	1.44E-06	6.30E-06	6.30E-06
Benzo (b) fluoranthene	3.47E-03	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.18E-08	1.54E-07	6.74E-07	0%	1.54E-07	6.74E-07	6.74E-07
Benzo (k) fluoranthene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.00E-08	1.45E-07	6.35E-07	0%	1.45E-07	6.35E-07	6.35E-07
bis (2 -Ethylhexyl) phthalate	0.90	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	8.28E-06	4.00E-05	1.75E-04	0%	4.00E-05	1.75E-04	1.75E-04
Chrysene	5.52E-03	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	5.06E-08	2.45E-07	1.07E-06	0%	2.45E-07	1.07E-06	1.07E-06
Dibenz (a,h) anthracene	3.27E-03	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.00E-08	1.45E-07	6.35E-07	0%	1.45E-07	6.35E-07	6.35E-07
Dibenzofuran	5.81E-02	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	5.33E-07	2.58E-06	1.13E-05	0%	2.58E-06	1.13E-05	1.13E-05
1,4 - Dichlorobenzene	0.20	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.85E-06	8.92E-06	3.91E-05	0%	8.92E-06	3.91E-05	3.91E-05
1,2 - Dichlorobenzene	3.53E-01	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.24E-06	1.57E-05	6.86E-05	0%	1.57E-05	6.86E-05	6.86E-05
2,4 - Dinitrotoluene	0.22	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.04E-06	9.85E-06	4.31E-05	0%	9.85E-06	4.31E-05	4.31E-05
Fluorene	1.23	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	1.13E-05	5.48E-05	2.40E-04	0%	5.48E-05	2.40E-04	2.40E-04
Fluoranthene	4.29E-02	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.94E-07	1.90E-06	8.34E-06	0%	1.90E-06	8.34E-06	8.34E-06
Hexachlorobenzene	0.13	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	1.20E-06	5.81E-06	2.55E-05	0%	5.81E-06	2.55E-05	2.55E-05
Hexachlorobutadiene	0.20	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.83E-06	8.83E-06	3.87E-05	0%	8.83E-06	3.87E-05	3.87E-05
Hexachlorocyclopentadiene	0.18	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.69E-06	8.16E-06	3.58E-05	0%	8.16E-06	3.58E-05	3.58E-05
Hexachloroethane	0.38	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.48E-06	1.68E-05	7.37E-05	0%	1.68E-05	7.37E-05	7.37E-05
Isophorone	9.07E-02	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	8.33E-07	4.02E-06	1.76E-05	0%	4.02E-06	1.76E-05	1.76E-05
Indeno (1,2,3 -cd) pyrene	5.77E-03	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	5.30E-08	2.56E-07	1.12E-06	0%	2.56E-07	1.12E-06	1.12E-06
2-MethylNaphthalene	7.14	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	6.55E-05	3.17E-04	1.39E-03	0%	3.17E-04	1.39E-03	1.39E-03
Napthalene	36.50	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.35E-04	1.62E-03	7.09E-03	0%	1.62E-03	7.09E-03	7.09E-03
Nitrobenzene	0.18	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	1.61E-06	7.76E-06	3.40E-05	0%	7.76E-06	3.40E-05	3.40E-05
N-Nitrosodiphenylamine	0.14	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.29E-06	6.26E-06	2.74E-05	0%	6.26E-06	2.74E-05	2.74E-05
N-Nitroso-di-n-propylamine	1.50	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.37E-05	6.64E-05	2.91E-04	0%	6.64E-05	2.91E-04	2.91E-04
Pentachlorophenol	0.26	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.37E-06	1.14E-05	5.01E-05	0%	1.14E-05	5.01E-05	5.01E-05
Phenanthrene	8.67E-01	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	7.96E-06	3.85E-05	1.69E-04	0%	3.85E-05	1.69E-04	1.69E-04
Phenol	1.02E+01	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	9.33E-05	4.51E-04	1.97E-03	0%	4.51E-04	1.97E-03	1.97E-03
Pyrene	3.11E-02	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	2.85E-07	1.38E-06	6.04E-06	0%	1.38E-06	6.04E-06	6.04E-06
1,2,4 - Trichlorobenzene	1.46E-01	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	1.34E-06	6.48E-06	2.84E-05	0%	6.48E-06	2.84E-05	2.84E-05
2,4,6 - Trichlorophenol	0.21	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.89E-06	9.14E-06	4.00E-05	0%	9.14E-06	4.00E-05	4.00E-05

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Chronic Current Facility Potential Emissions at 116 ton/day

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor[6] (5125 Btu/lb basis)		Emission Factor (lb/ton)	Annual Average (at 100% Capacity) Emission Rate (lbs/hr)	Annual Average (at 100% Capacity) Maximum Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (lb/hr)	Annual Average (at 100% Capacity) Maximum Controlled Emissions (tons/yr)	Annual Average (at 100% Capacity) Maximum Controlled/ Limited Emissions (tons/yr)
Other HAPS												
Acetaldehyde	4.7	µg/dscm	OWEF, See Note 8	9.18E-06	(lb/ton)/(ug/dscm)	4.31E-05	2.09E-04	9.13E-04	0%	2.09E-04	9.13E-04	9.13E-04
Acrolein	3.96	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	3.64E-05	1.76E-04	7.70E-04	0%	1.76E-04	7.70E-04	7.70E-04
Ammonia	5.30	mg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(mg/dscm)	4.87E-05	2.35E-04	1.03E-03	0%	2.35E-04	1.03E-03	1.03E-03
Arsenic	3.21E-01	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.95E-06	1.42E-05	6.24E-05	0%	1.42E-05	6.24E-05	6.24E-05
Antimony	3.47E-03	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	3.19E-05	1.54E-04	6.75E-04	0%	1.54E-04	6.75E-04	6.75E-04
Barium	3.74E-03	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	3.43E-05	1.66E-04	7.27E-04	0%	1.66E-04	7.27E-04	7.27E-04
Beryllium	2.75E-01	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	2.52E-06	1.22E-05	5.33E-05	0%	1.22E-05	5.33E-05	5.33E-05
Total Chromium (Cr)	3.049	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.80E-05	1.35E-04	5.93E-04	0%	1.35E-04	5.93E-04	5.93E-04
Hexavalent Chromium	0.3049	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	2.80E-06	1.35E-05	5.93E-05	0%	1.35E-05	5.93E-05	5.93E-05
Copper	4.40E-03	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	4.04E-05	1.95E-04	8.55E-04	0%	1.95E-04	8.55E-04	8.55E-04
Cobalt	0.00108	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	9.91E-06	4.79E-05	2.10E-04	0%	4.79E-05	2.10E-04	2.10E-04
Formaldehyde	13.7	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	1.26E-04	6.08E-04	2.66E-03	0%	6.08E-04	2.66E-03	2.66E-03
Manganese	70.100	µg/dscm	Stanislaus, See Note 10	9.18E-06	(lb/ton)/(ug/dscm)	6.44E-04	3.11E-03	1.36E-02	0%	3.11E-03	1.36E-02	1.36E-02
Nickel	5.76	µg/dscm		9.18E-06	(lb/ton)/(ug/dscm)	5.29E-05	2.56E-04	1.12E-03	0%	2.56E-04	1.12E-03	1.12E-03
Phosphorus	0.165	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	1.51E-03	7.32E-03	3.21E-02	0%	7.32E-03	3.21E-02	3.21E-02
PCB - Total Mass	4.10	ng/dscm	Stanislaus, See Note 10	9.18E-09	(lb/ton)/(ng/dscm)	3.76E-08	1.82E-07	7.97E-07	0%	1.82E-07	7.97E-07	7.97E-07
Selenium	7.56E-04	mg/dscm	OWEF, See Note 8	9.18E-03	(lb/ton)/(mg/dscm)	6.94E-06	3.35E-05	1.47E-04	0%	3.35E-05	1.47E-04	1.47E-04
Thallium	2.46E-04	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	2.26E-06	1.09E-05	4.78E-05	0%	1.09E-05	4.78E-05	4.78E-05
Zinc	7.29E-02	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	6.69E-04	3.24E-03	1.42E-02	0%	3.24E-03	1.42E-02	1.42E-02
HAP Total						3.51	16.99	74.41		16.99	74.41	74.41

[2] PM (total or filterable) is State only limit for Class C Units from Minn. Rule 7011.1227, Table 1:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EF for D/F, Cd, Pb, Hg, PM, PM_{10}, HCl, NO_x, and SO_2 from 40 CFR 62 Subpart JJJ, Table 4, Federal Plan Requirements for Small Municipal Waste Combustion Units Constructed on or Before August 30, 1999.

[4] CO EF from 40 CFR 62, Subpart JJJ, Table 5 "Carbon Monoxide Emission Limits for Existing Small Municipal Waste Combustion Units", 4-hr block average.

[5] VOC EF from AP-42, 4th Edition Supplement C , Sept 1990, Table 2.1-1 "Emission Factors for Municipal Waste Combustors".

[6] For all EF (lb/ton) the correction factor is adjusting for heat content based on the average heat value of the waste received at PRRF.

[7] EFs based on facility stack test results scaled to NSPS total "dioxins" limit of 125 ng/dscm @ 7% O2 based on congener fraction of total from tests (See North Unit Dioxin Limit).

[8] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[9] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[10] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[11] EF for Class C Units from Minn. Rule 7011.1227 Table 1.

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Acute Current Facility Potential Emissions at 116 ton/day

AQ Facility ID No.:	11100036 AQ File No.: 116H
Facility name:	Perham Resource Recovery Facility
Emission Unit Identification No.:	EU001, EU002 - South MWC, North MWC
Stack/Vent Designation No.:	SV001
Pollution Control Equipment No.(s):	CE001, CE002, CE003

Maximum Operating Capacity:

Fuel Type	Heat Value (HV) [1]	Maximum Fuel Consumption Rate Annual Average Basis	Fuel Consumption Annual Average Basis	
			Maximum	Units
MSW	5,125 Btu/lb	4.83 ton/hr	116	ton/day
		Maximum Fuel Consumption Rate Short Term Average Basis		
		5.32 ton/hr		

[1] Heat content is the average of testing data from waste sorts completed for the MSW currently received at PRRF.

Calculations Summary - Processed MSW Combustion, Criteria Pollutants :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5125 Btu/lb basis)		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
PM (filterable) - State only limit	0.02	gr/dscf	State, See Note 2	See Note 2		0.451	2.40	0%	2.40
PM_{10}	55.4	mg/dscm	Potential Emissions, See Note 2	9.18E-03	(lb/ton)/(mg/dscm)	0.508	2.70	0%	2.70
$PM_{2.5}$	55.4	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	0.508	2.70	0%	2.70
SO_2	77	ppmvd	JJJ, See Note 3	2.45E-02	(lb/ton)/ppmvd	1.890	10.0	0%	10.05
NO_x	500	ppmvd		1.76E-02	(lb/ton)/ppmvd	8.810	46.8	0%	46.84
H_2SO_4	0	mg/dscm	Huntington, See Note 6	9.18E-03	(lb/ton)/(mg/dscm)	1.47E-03	7.81E-03	0%	7.81E-03
MWC Acid Gases (SO_2 and HCl)[3]	---	---	SO_2 + HCl	---	---	5.38	28.6	0%	28.61

Prairie Lakes Municipal Solid Waste Authority/Perham Resource Recovery Facility
North and South MWCs Acute Current Facility Potential Emissions at 116 ton/day

Calculations Summary - Processed MSW Combustion, HAPs :

Pollutant	Emission Limit or Factor (EF)	Units (@ 7% O_2)	Emission Factor Source	Conversion Factor (5125 Btu/lb basis)		Emission Factor (lb/ton)	Short Term Average (at 110% Capacity) Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Short Term Average (at 110% Capacity) Maximum Controlled Emissions (lb/hr)
HAPS									
Mercury	100	µg/dscm	State, See Note 8	9.18E-06	(lb/ton)/(µg/dscm)	9.18E-04	4.88E-03	0%	4.88E-03
HCl	250	ppmvd	JJJ, See Note	1.40E-02	(lb/ton)/ppmvd	3.492	18.56	0%	18.56
HF	3.16E-01	mg/dscm	Stanislaus, See Note 7	9.18E-03	(lb/ton)/(mg/dscm)	2.90E-03	1.54E-02	0%	1.54E-02
Naphthalene	52.3	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	4.80E-04	2.55E-03	0%	2.55E-03
Phenol	13.7	µg/dscm	OWEF, See Note 5	9.18E-06	(lb/ton)/(µg/dscm)	1.26E-04	6.68E-04	0%	6.68E-04
Acetaldehyde	5.73	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	5.26E-05	2.80E-04	0%	2.80E-04
Acrolein	4.52	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	4.15E-05	2.21E-04	0%	2.21E-04
Ammonia	14.4	mg/dscm	Stanislaus, See Note 7	9.18E-06	(lb/ton)/(mg/dscm)	1.32E-04	0.00	0%	7.00E-04
Arsenic	0.68	µg/dscm		9.18E-06	(lb/ton)/(µg/dscm)	6.26E-06	3.33E-05	0%	3.33E-05
Copper	6.87E-03	mg/dscm		9.18E-03	(lb/ton)/(mg/dscm)	6.31E-05	3.35E-04	0%	3.35E-04
Formaldehyde	15.1	µg/dscm	OWEF, See Note 5	9.18E-06	(lb/ton)/(µg/dscm)	1.38E-04	7.36E-04	0%	7.36E-04
Nickel	16.2	µg/dscm	Stanislaus, See Note 7	9.18E-06	(lb/ton)/(µg/dscm)	1.49E-04	7.91E-04	0%	7.91E-04

[2] PM (total or filterable) is State only limit for Class II Units from Minn. Rule 7011.1229, Table 2:

0.020 gr/dscf * lb/7,000 gr * 453,593 mg/lb * 35.3145 dscf/dscm = 45.77 mg/dscm

45.77 mg/dscm * 9.85E-3 (lb/ton)/(mg/dscm) = 0.451 lb/ton

Potential PM_{10} and $PM_{2.5}$ emissions are based on the State PM (filterable + organic) limit of 0.020 gr/dscf (45.77 mg/dscm) plus the PRRF high historic inorganic condensible stack test result of 9.61 mg/dscm ; PM (filterable + all condensible) = 55.38 mg/dscm.

[3] EFs from 40 CFR Part 60 Subpart JJJ Table 1 "Emission Limits for New Small Municipal Waste Combustion Units".

[4] For all EF (lb/ton) the correction factor is adjusting for heat content based on the average heat value of the waste received at PRRF.

[5] OWEF - Olmsted Waste to Energy Facility MPCA approved emission factors.

[6] Huntington - Covanta Huntington Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[7] Stanislaus - Covanta Stanislaus Resource Recovery Facility, MPCA approved emission factors from 2007-2009 test data.

[8] EF for Class C Units from Minn. Rule 7011.1227 Table 1 (100 µg/dscm @ 7% O2).

Appendix D

Mercury Submittal

MMREM Results for Perham Resource Recovery Facility
Perham, Minnesota

	Hazard Index Results							
	Subsistence Fisher [1]				Recreational Fisher [2]			
Emission Scenario	**Ambient Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**	**Non-facility Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**
Existing Potential to Emit [3] (60 µg/dscm)	8.2	1.4	9.6	14%	1.7	0.3	2.0	14%
Post-expansion Potential to Emit [4] (60 µg/dscm)	8.2	1.5	9.7	15%	1.7	0.3	2.0	15%
Potential change due to expansion				0.9%				0.9%
Post-expansion Potential to emit [5] (41 µg/dscm)	8.2	0.999	9.2	11%	1.7	0.2	1.9	11%
Potential change due to expansion				-3%				-3%
Existing actual (15 µg/dscm per 2011 stack test)	8.2	0.2	8.4	3%	1.7	0.1	1.8	3%

Notes:

[1] Subsistence-level fish consumption is roughly equivalent to 2.2 pounds of fish (4-5 meals) consumed per week, 52 weeks per year.

[2] Recreational-level fish consmption is roughly equivalent to 0.5 pounds of fish (1 meal) consumed per week, 52 weeks per year.

[3] The existing PTE limit is based on Minn. Rule 7011.1229 Table 2 for Class II Units.

[4] The post-expansion PTE limit is based on Minn. Rule 7011.1229 Table 2 for Class II Units (North Unit) and 7011.1227 Table 1 for Class C Units (South Unit).

[5] The limit of 44 µg/dscm reduces the potential hazard from the facility. This limit equates to an incremental increase of 10% or less relative to the current background and a hazard index of 1 or less for subsistence-level exposure.

MMREM: Minnesota Mercury Risk Estimation Method

Calculation of Local Mercury Hazard Quotients (HQ), due to fish contamination, from Mercury Emissions from a project.

version 2.0 November 24, 2008

Increment from the existing facility's potential to emit mercury

Direct any comments to Ed Swain edward.swain@pca.state.mn.us

Inputs are in blue and bold | Calculated Outputs are in yellow | Fixed assumptions are not colored

Facility Name: Perham Resource Recovery Facility

Information on the water body for which these calculations are made:

Water body name	County Name	MN DNR lake # (if available) (xx-yyyy)	Existing Ambient Fish Concentration (mg/kg Hg)	Area of fishable waterbody (acres)	Area of rest of watershed (acres)
Little Pine Lake	Otter Tail	56-0142	0.38	2,080	2,746

Mercury calculations for the increment due to the project:

Hg Species	Modeled Increment to Mean Air Conc. μg/m³	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) μg/m²-yr	Area (acres)	Conversion factor (m² / acre)	Annual Mass deposited (μg)	Annual Mass deposited (grams)	Fraction Reaching Waterbody	Annual Mass reaching waterbody (grams)
Average concentration over the lake										
Hg(II)	6.14E-06	82.2%	1.10	2.1	2,080	4046.9	1.8E+07	17.93	1.00	17.93
Hg(0)	1.05E-06	14.0%	0.01	0.0	2,080	4046.9	2.8E+04	0.03	1.00	0.03
Hg-p	2.84E-07	3.8%	0.05	0.0	2,080	4046.9	3.8E+04	0.04	1.00	0.04
Total	7.47E-06	100.0%		2.1						
Average concentration over the rest of the watershed (excluding the lake)										
Hg(II)	5.50E-06	82.2%	1.10	1.9	2,746	4046.9	2.1E+07	21.22	0.26	5.52
Hg(0)	9.37E-07	14.0%	0.01	0.0	2,746	4046.9	3.3E+04	0.03	0.26	0.01
Hg-p	2.54E-07	3.8%	0.05	0.0	2,746	4046.9	4.5E+04	0.04	0.26	0.01
Total	6.70E-06	100.0%		1.9						
Total Hg Mass Modeled to the Waterbody from Project Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =										23.53

Mercury calculations for ambient condition (background), assuming no significant local source*:

	Deposition rate (flux) μg/m²-yr	Area (acres)	Conversion factor (m² / acre)	Annual mass deposited (μg)	Annual mass deposited (grams)	Fraction reaching waterbody	Annual mass reaching waterbody (grams)
Total deposition for the fishable waterbody	12.5	2,080	4046.9	1.1E+08	105.22	1.00	105.22
Total deposition for the rest of the watershed	12.5	2,746	4046.9	1.4E+08	138.91	0.26	36.12
Total Hg Mass Modeled to the Waterbody from Ambient Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =							141.34

Mercury Loading Summary

Grams Hg to water body from project	Grams Hg to water body from background
23.5	141.3

Fish Increment

Incremental Hg in fish from project (mg/kg)
0.06

Water Quality Standard Comparison

Ratio of: Ambient fish Hg conc. relative to WQ STD (0.2 mg/kg)	Ratio of: Incremental fish Hg conc. from project relative to WQ STD	% increase
1.880	0.313	16.7%

Subsistence Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.142	0.0089	0.0096	70	8.20E-04	1.37E-04	1.00E-04

Subsistence Fisher Hazard Quotient

Ambient Subsistence Fisher HQ	Incremental Subsistence Fisher HQ	% increase
8.20	1.365	16.7%

Recreational Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.03	0.0019	0.0020	70	1.73E-04	2.88E-05	1.00E-04

Recreational Fisher Hazard Quotient

Ambient Recreational Fisher HQ	Incremental Recreational Fisher HQ	% increase
1.732	0.2884	16.7%

***The ambient condition is assumed to result from the following background air concentrations and deposition velocities:**

Hg Species	Modeled Increment to Mean Air Conc. μg/m3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) μg/m2-yr
Fishable Waterbody				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5
Rest-of-Watershed (excluding waterbody)				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5

MMREM: Minnesota Mercury Risk Estimation Method

Calculation of Local Mercury Hazard Quotients (HQ), due to fish contamination, from Mercury Emissions from a project.
version 2.0 November 24, 2008
Increment from the existing facility's actual mercury emissions
Direct any comments to Ed Swain edward.swain@pca.state.mn.us

Inputs are in blue and bold	Calculated Outputs are in yellow	Fixed assumptions are not colored

Facility Name: Perham Resource Recovery Facility

Information on the water body for which these calculations are made:

Water body name	County Name	MN DNR lake # (if available) (xx-yyyy)	Existing Ambient Fish Concentration (mg/kg Hg)	Area of fishable waterbody (acres)	Area of rest of watershed (acres)
Little Pine Lake	Otter Tail	56-0142	0.38	2,080	2,746

Mercury calculations for the increment due to the project:

Hg Species	Modeled Increment to Mean Air Conc. µg/m^3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) µg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual Mass deposited (µg)	Annual Mass deposited (grams)	Fraction Reaching Waterbody	Annual Mass reaching waterbody (grams)
Average concentration over the lake										
Hg(II)	1.10E-06	82.2%	1.10	0.4	2,080	4046.9	3.2E+06	3.22	1.00	3.22
Hg(0)	1.88E-07	14.0%	0.01	0.0	2,080	4046.9	5.0E+03	0.00	1.00	0.00
Hg-p	5.10E-08	3.8%	0.05	0.0	2,080	4046.9	6.8E+03	0.01	1.00	0.01
Total	1.34E-06	100.0%		0.4						
Average concentration over the rest of the watershed (excluding the lake)										
Hg(II)	9.89E-07	82.2%	1.10	0.3	2,746	4046.9	3.8E+06	3.81	0.26	0.99
Hg(0)	1.68E-07	14.0%	0.01	0.0	2,746	4046.9	5.9E+03	0.01	0.26	0.00
Hg-p	4.57E-08	3.8%	0.05	0.0	2,746	4046.9	8.0E+03	0.01	0.26	0.00
Total	1.20E-06	100.0%		0.3						
Total Hg Mass Modeled to the Waterbody from Project Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =										4.23

Mercury calculations for ambient condition (background), assuming no significant local source*:

	Deposition rate (flux) µg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual mass deposited (µg)	Annual mass deposited (grams)	Fraction reaching waterbody	Annual mass reaching waterbody (grams)
Total deposition for the fishable waterbody	12.5	2,080	4046.9	1.1E+08	105.22	1.00	105.22
Total deposition for the rest of the watershed	12.5	2,746	4046.9	1.4E+08	138.91	0.26	36.12
Total Hg Mass Modeled to the Waterbody from Ambient Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =							141.34

Mercury Loading Summary

Grams Hg to water body from project	Grams Hg to water body from background
4.2	141.3

Fish Increment

Incremental Hg in fish from project (mg/kg)
0.01

Water Quality Standard Comparison

Ratio of: Ambient fish Hg conc. relative to WQ STD (0.2 mg/kg)	Ratio of: Incremental fish Hg conc. from project relative to WQ STD	% increase
1.880	0.056	3.0%

Subsistence Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.142	0.0016	0.0017	70	8.20E-04	2.45E-05	1.00E-04

Subsistence Fisher Hazard Quotient

Ambient Subsistence Fisher HQ	Incremental Subsistence Fisher HQ	% increase
8.20	0.2453	3.0%

Recreational Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.03	0.0003	0.0004	70	1.73E-04	5.18E-06	1.00E-04

Recreational Fisher Hazard Quotient

Ambient Recreational Fisher HQ	Incremental Recreational Fisher HQ	% increase
1.732	0.0518	3.0%

***The ambient condition is assumed to result from the following background air concentrations and deposition velocities:**

Hg Species	Modeled Increment to Mean Air Conc. µg/m3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) µg/m2-yr
Fishable Waterbody				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5
Rest-of-Watershed (excluding waterbody)				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5

MMREM: Minnesota Mercury Risk Estimation Method

Calculation of Local Mercury Hazard Quotients (HQ), due to fish contamination, from Mercury Emissions from a project.
version 2.0 November 24, 2008
Increment from the proposed facility's potential to emit mercury
Direct any comments to Ed Swain edward.swain@pca.state.mn.us

Inputs are in blue and bold	Calculated Outputs are in yellow	Fixed assumptions are not colored

Facility Name: **Perham Resource Recovery Facility**

Information on the water body for which these calculations are made:

Water body name	County Name	MN DNR lake # (if available) (xx-yyyy)	Existing Ambient Fish Concentration (mg/kg Hg)	Area of fishable waterbody (acres)	Area of rest of watershed (acres)
Little Pine Lake	**Otter Tail**	**56-0142**	**0.38**	**2,080**	**2,746**

Mercury calculations for the increment due to the project:

Hg Species	Modeled Increment to Mean Air Conc. μg/m^3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) μg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual Mass deposited (μg)	Annual Mass deposited (grams)	Fraction Reaching Waterbody	Annual Mass reaching waterbody (grams)
Average concentration over the lake										
Hg(II)	4.46E-06	**82.2%**	1.10	1.5	2,080	4046.9	1.3E+07	13.04	1.00	13.04
Hg(0)	7.60E-07	**14.0%**	0.01	0.0	2,080	4046.9	2.0E+04	0.02	1.00	0.02
Hg-p	2.06E-07	**3.8%**	0.05	0.0	2,080	4046.9	2.7E+04	0.03	1.00	0.03
Total	**5.43E-06**	100.0%		1.6						
Average concentration over the rest of the watershed (excluding the lake)										
Hg(II)	4.12E-06	**82.2%**	1.10	1.4	2,746	4046.9	1.6E+07	15.88	0.26	4.13
Hg(0)	7.02E-07	**14.0%**	0.01	0.0	2,746	4046.9	2.5E+04	0.02	0.26	0.01
Hg-p	1.90E-07	**3.8%**	0.05	0.0	2,746	4046.9	3.3E+04	0.03	0.26	0.01
Total	**5.01E-06**	100.0%		1.4						
Total Hg Mass Modeled to the Waterbody from Project Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =										17.23

Mercury calculations for ambient condition (background), assuming no significant local source*:

	Deposition rate (flux) μg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual mass deposited (μg)	Annual mass deposited (grams)	Fraction reaching waterbody	Annual mass reaching waterbody (grams)
Total deposition for the fishable waterbody	12.5	2,080	4046.9	1.1E+08	105.22	1.00	105.22
Total deposition for the rest of the watershed	12.5	2,746	4046.9	1.4E+08	138.91	0.26	36.12
Total Hg Mass Modeled to the Waterbody from Ambient Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =							141.34

Mercury Loading Summary

Grams Hg to water body from project	Grams Hg to water body from background
17.2	141.3

Fish Increment

Incremental Hg in fish from project (mg/kg)
0.05

Water Quality Standard Comparison

Ratio of: Ambient fish Hg conc. relative to WQ STD (0.2 mg/kg)	Ratio of: Incremental fish Hg conc. from project relative to WQ STD	% increase
1.880	0.229	12.2%

Subsistence Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.142	0.0065	0.0070	70	8.20E-04	9.99E-05	1.00E-04

Subsistence Fisher Hazard Quotient

Ambient Subsistence Fisher HQ	Incremental Subsistence Fisher HQ	% increase
8.20	0.999	12.2%

Recreational Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.03	0.0014	0.0015	70	1.73E-04	2.11E-05	1.00E-04

Recreational Fisher Hazard Quotient

Ambient Recreational Fisher HQ	Incremental Recreational Fisher HQ	% increase
1.732	0.2111	12.2%

***The ambient condition is assumed to result from the following background air concentrations and deposition velocities:**

Hg Species	Modeled Increment to Mean Air Conc. μg/m3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) μg/m2-yr
Fishable Waterbody				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5
Rest-of-Watershed (excluding waterbody)				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5

MMREM: Minnesota Mercury Risk Estimation Method

Calculation of Local Mercury Hazard Quotients (HQ), due to fish contamination, from Mercury Emissions from a project.

version 2.0 November 24, 2008

Increment from the proposed facility's potential to emit mercury

Direct any comments to Ed Swain edward.swain@pca.state.mn.us

Inputs are in blue and bold	Calculated Outputs are in yellow	Fixed assumptions are not colored

Facility Name: **Perham Resource Recovery Facility**

Information on the water body for which these calculations are made:

Water body name	County Name	MN DNR lake # (if available) (xx-yyyy)	Existing Ambient Fish Concentration (mg/kg Hg)	Area of fishable waterbody (acres)	Area of rest of watershed (acres)
Little Pine Lake	**Otter Tail**	**56-0142**	**0.38**	**2,080**	**2,746**

Mercury calculations for the increment due to the project:

Hg Species	Modeled Increment to Mean Air Conc. µg/m^3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) µg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual Mass deposited (µg)	Annual Mass deposited (grams)	Fraction Reaching Waterbody	Annual Mass reaching waterbody (grams)
Average concentration over the lake										
Hg(II)	6.53E-06	**82.2%**	1.10	2.3	2,080	4046.9	1.9E+07	19.08	1.00	19.08
Hg(0)	1.11E-06	**14.0%**	0.01	0.0	2,080	4046.9	3.0E+04	0.03	1.00	0.03
Hg-p	3.02E-07	**3.8%**	0.05	0.0	2,080	4046.9	4.0E+04	0.04	1.00	0.04
Total	7.95E-06	100.0%		2.3						
Average concentration over the rest of the watershed (excluding the lake)										
Hg(II)	6.03E-06	**82.2%**	1.10	2.1	2,746	4046.9	2.3E+07	23.24	0.26	6.04
Hg(0)	1.03E-06	**14.0%**	0.01	0.0	2,746	4046.9	3.6E+04	0.04	0.26	0.01
Hg-p	2.79E-07	**3.8%**	0.05	0.0	2,746	4046.9	4.9E+04	0.05	0.26	0.01
Total	7.33E-06	100.0%		2.1						
Total Hg Mass Modeled to the Waterbody from Project Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =										25.21

Mercury calculations for ambient condition (background), assuming no significant local source*:

	Deposition rate (flux) µg/m^2-yr	Area (acres)	Conversion factor (m^2 / acre)	Annual mass deposited (µg)	Annual mass deposited (grams)	Fraction reaching waterbody	Annual mass reaching waterbody (grams)
Total deposition for the fishable waterbody	12.5	2,080	4046.9	1.1E+08	105.22	1.00	105.22
Total deposition for the rest of the watershed	12.5	2,746	4046.9	1.4E+08	138.91	0.26	36.12
Total Hg Mass Modeled to the Waterbody from Ambient Air Concentrations (Direct to Waterbody, plus 26% from Rest-of-Watershed) =							141.34

Mercury Loading Summary

Grams Hg to water body from project	Grams Hg to water body from background
25.2	141.3

Fish Increment

Incremental Hg in fish from project (mg/kg)
0.07

Water Quality Standard Comparison

Ratio of: Ambient fish Hg conc. relative to WQ STD (0.2 mg/kg)	Ratio of: Incremental fish Hg conc. from project relative to WQ STD	% increase
1.880	0.335	17.8%

Subsistence Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.142	0.0095	0.0102	70	8.20E-04	1.46E-04	1.00E-04

Subsistence Fisher Hazard Quotient

Ambient Subsistence Fisher HQ	Incremental Subsistence Fisher HQ	% increase
8.20	1.46	17.8%

Recreational Fisher Methylmercury Intake Calculations

Assumed daily fish consumed (kg)	Incremental daily Hg consumed (mg)	Incremental daily $HgCH_3$ consumed (mg)	Body weight (kg)	Ambient $HgCH_3$ Exposure mg/kg BW-day	Incremental $HgCH_3$ Exposure mg/kg BW-day	RfD (mg $HgCH_3$/kg bw-day)
0.03	0.0020	0.0022	70	1.73E-04	3.09E-05	1.00E-04

Recreational Fisher Hazard Quotient

Ambient Recreational Fisher HQ	Incremental Recreational Fisher HQ	% increase
1.732	0.3090	17.8%

***The ambient condition is assumed to result from the following background air concentrations and deposition velocities:**

Hg Species	Modeled Increment to Mean Air Conc. µg/m3	Percent of each Mercury species (%)	Dep Velocity (cm/sec)	Calculated Deposition Rate (flux) µg/m2-yr
Fishable Waterbody				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5
Rest-of-Watershed (excluding waterbody)				
Hg(II)	2.00E-05	1.2%	1.10	6.9
Hg(0)	1.65E-03	97.6%	0.01	5.2
Hg-p	2.00E-05	1.2%	0.05	0.3
Total	1.69E-03	100.0%		12.5

Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable C19 (spec) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

C19 (we)

General Statistics			
Number of Valid Observations	8	Number of Distinct Observations	8
Raw Statistics		Log-transformed Statistics	
Minimum	0.181	Minimum of Log Data	-1.709
Maximum	0.511	Maximum of Log Data	-0.671
Mean	0.296	Mean of log Data	-1.284
Median	0.253	SD of log Data	0.384
SD	0.119		
Coefficient of Variation	0.402		
Skewness	0.862		

Warning: There are only 8 Values in this data
Note: It should be noted that even though bootstrap methods may be performed on this data set,
the resulting calculations may not be reliable enough to draw conclusions

The literature suggests to use bootstrap methods on data sets having more than 10-15 observations.

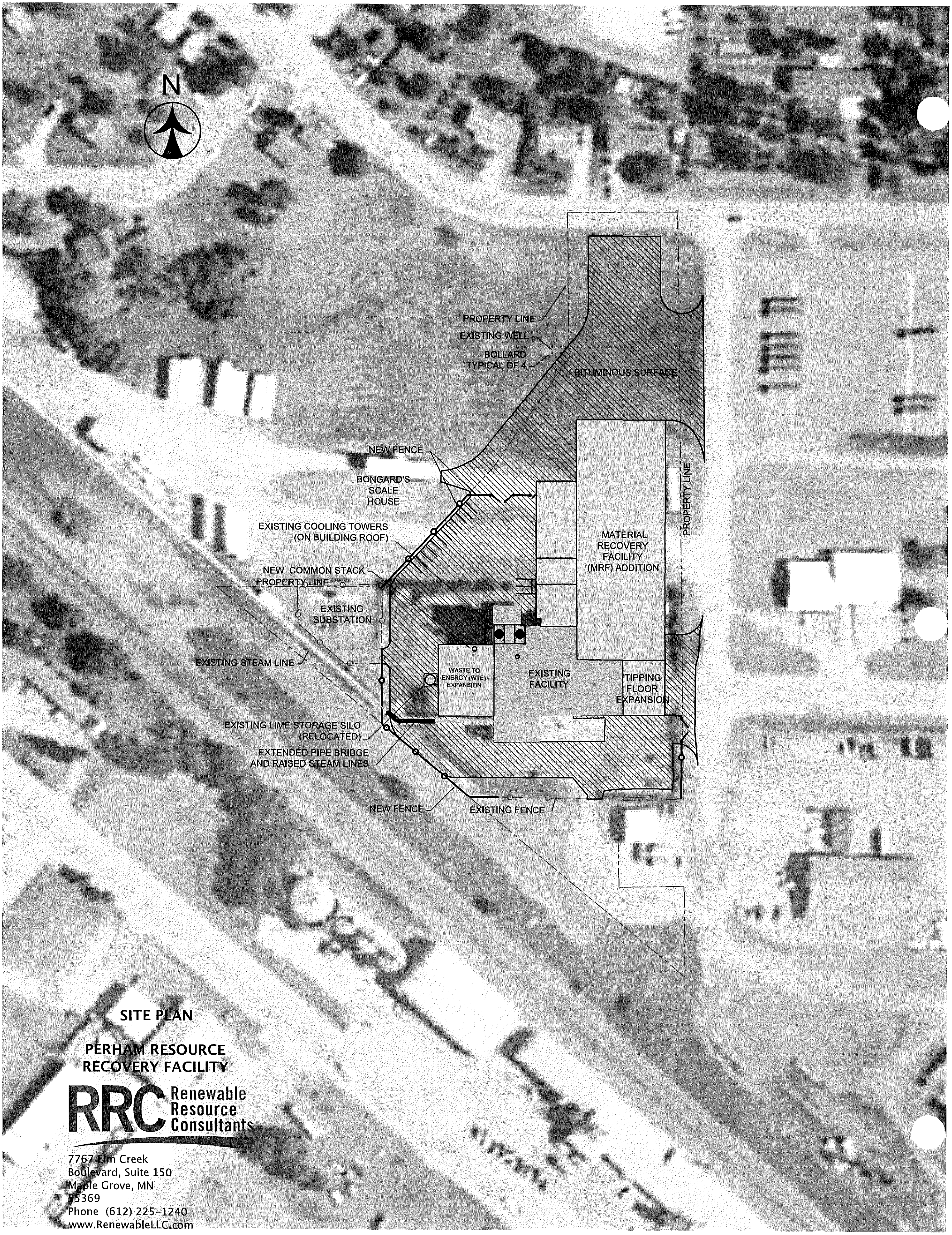
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.878	Shapiro Wilk Test Statistic	0.907
Shapiro Wilk Critical Value	0.818	Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	0.376	95% H-UCL	0.409
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.471
95% Adjusted-CLT UCL (Chen-1995)	0.379	97.5% Chebyshev (MVUE) UCL	0.547
95% Modified-t UCL (Johnson-1978)	0.378	99% Chebyshev (MVUE) UCL	0.697
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	4.881	Data appear Normal at 5% Significance Level	
Theta Star	0.0606		
MLE of Mean	0.296		
MLE of Standard Deviation	0.134		
nu star	78.09		
Approximate Chi Square Value (.05)	58.73	Nonparametric Statistics	
Adjusted Level of Significance	0.0195	95% CLT UCL	0.365
Adjusted Chi Square Value	54.5	95% Jackknife UCL	0.376
		95% Standard Bootstrap UCL	0.361
Anderson-Darling Test Statistic	0.445	95% Bootstrap-t UCL	0.4
Anderson-Darling 5% Critical Value	0.717	95% Hall's Bootstrap UCL	0.363
Kolmogorov-Smirnov Test Statistic	0.242	95% Percentile Bootstrap UCL	0.361
Kolmogorov-Smirnov 5% Critical Value	0.295	95% BCA Bootstrap UCL	0.376
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.479
		97.5% Chebyshev(Mean, Sd) UCL	0.559
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.715
95% Approximate Gamma UCL	0.394		
95% Adjusted Gamma UCL	0.424		
Potential UCL to Use		Use 95% Student's-t UCL	0.376

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

Appendix E

Dispersion Modeling

Electronic files available upon request



SITE PLAN

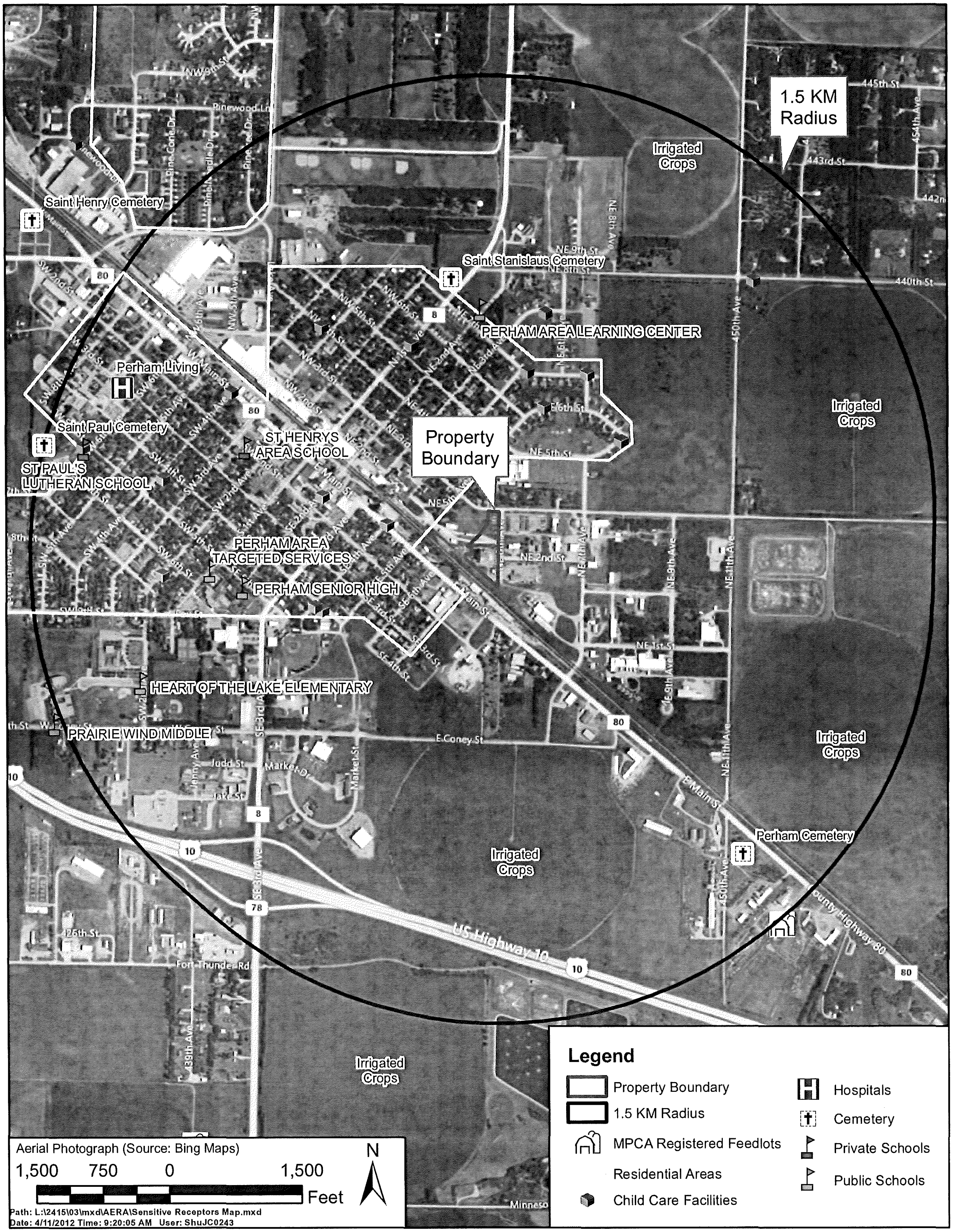
PERHAM RESOURCE RECOVERY FACILITY

RRC Renewable Resource Consultants

7767 Elm Creek
Boulevard, Suite 150
Maple Grove, MN
55369
Phone (612) 225-1240
www.RenewableLLC.com

Appendix F

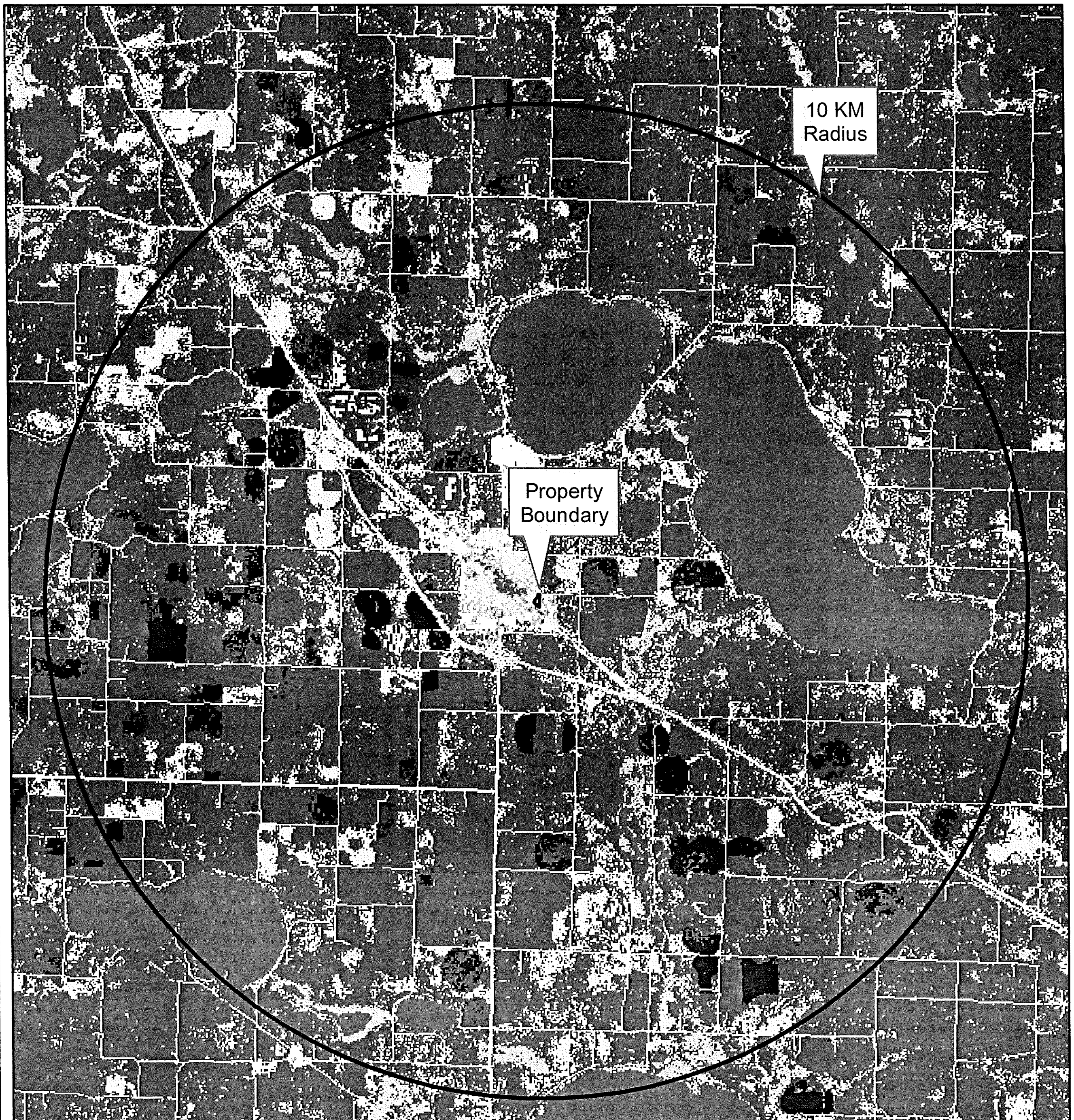
Supporting Risk Submittals



Legend

- Property Boundary
- 1.5 KM Radius
- MPCA Registered Feedlots
- Residential Areas
- Child Care Facilities
- Hospitals
- Cemetery
- Private Schools
- Public Schools

PERHAM RESOURCE RECOVERY FACILITY	Wenck	NOV 2011
Sensitive Receptors Map	Engineers - Scientists Business Professionals www.wenck.com 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	Figure F-1



Legend

- Property Boundary
- 10 KM Radius

2010 NASS Land Cover

- Agriculture
- Developed/Open Space
- Developed/Low Intensity
- Developed/Medium Intensity
- Developed/High Intensity
- Grassland
- Barren/Idle Cropland
- Shrubland
- Woodland
- Wetlands
- Open Water

Aerial Photograph (Source: Bing Maps)

10,000 5,000 0 10,000 Feet

N

Path: L:\2415\03\mxd\AERA\2010 NASS Land Cover.mxd
Date: 11/9/2011 Time: 4:31:41 PM User: shujc0243

PERHAM RESOURCE RECOVERY FACILITY

2010 NASS Land Cover

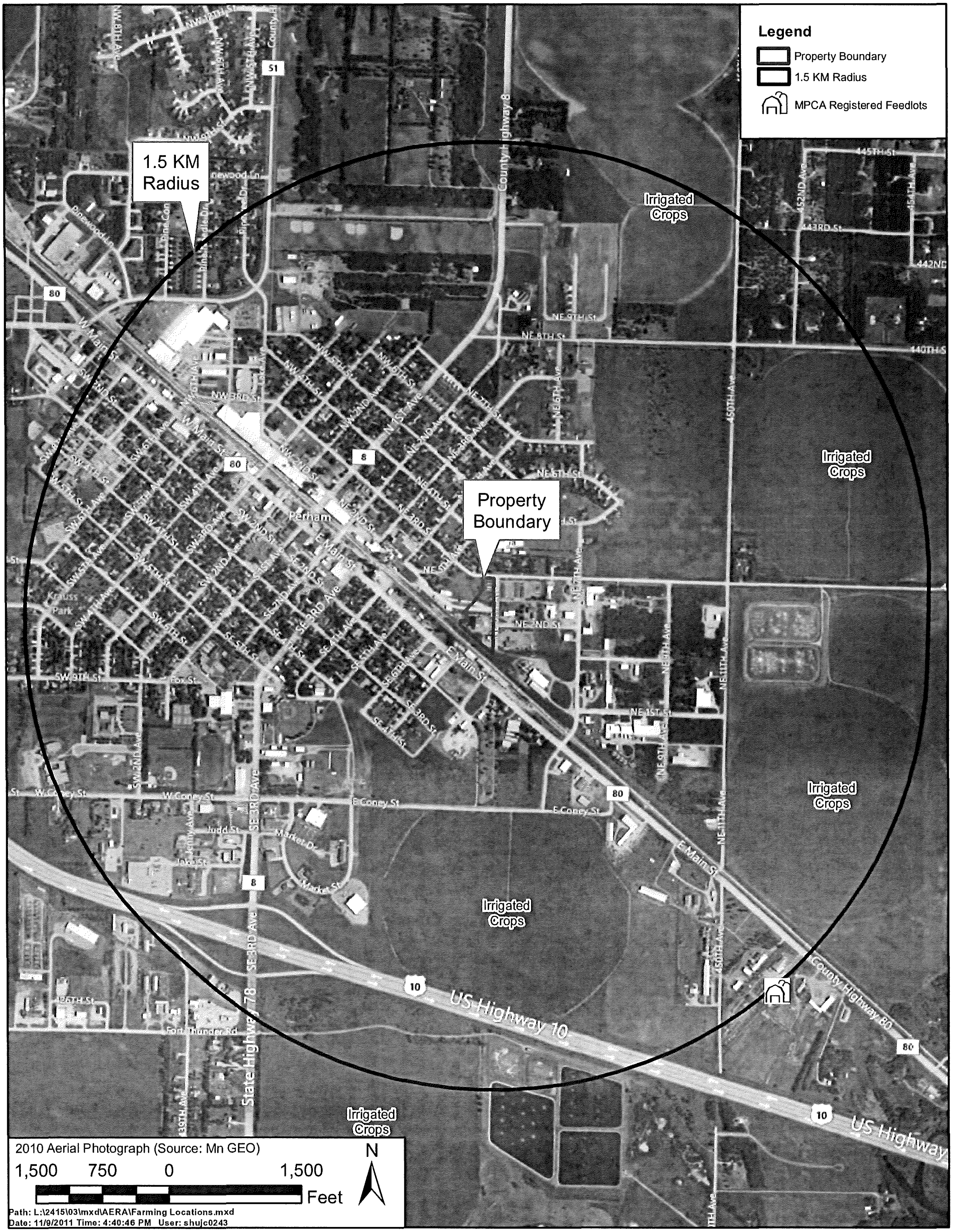
Wenck

Engineers - Scientists
Business Professionals
www.wenck.com

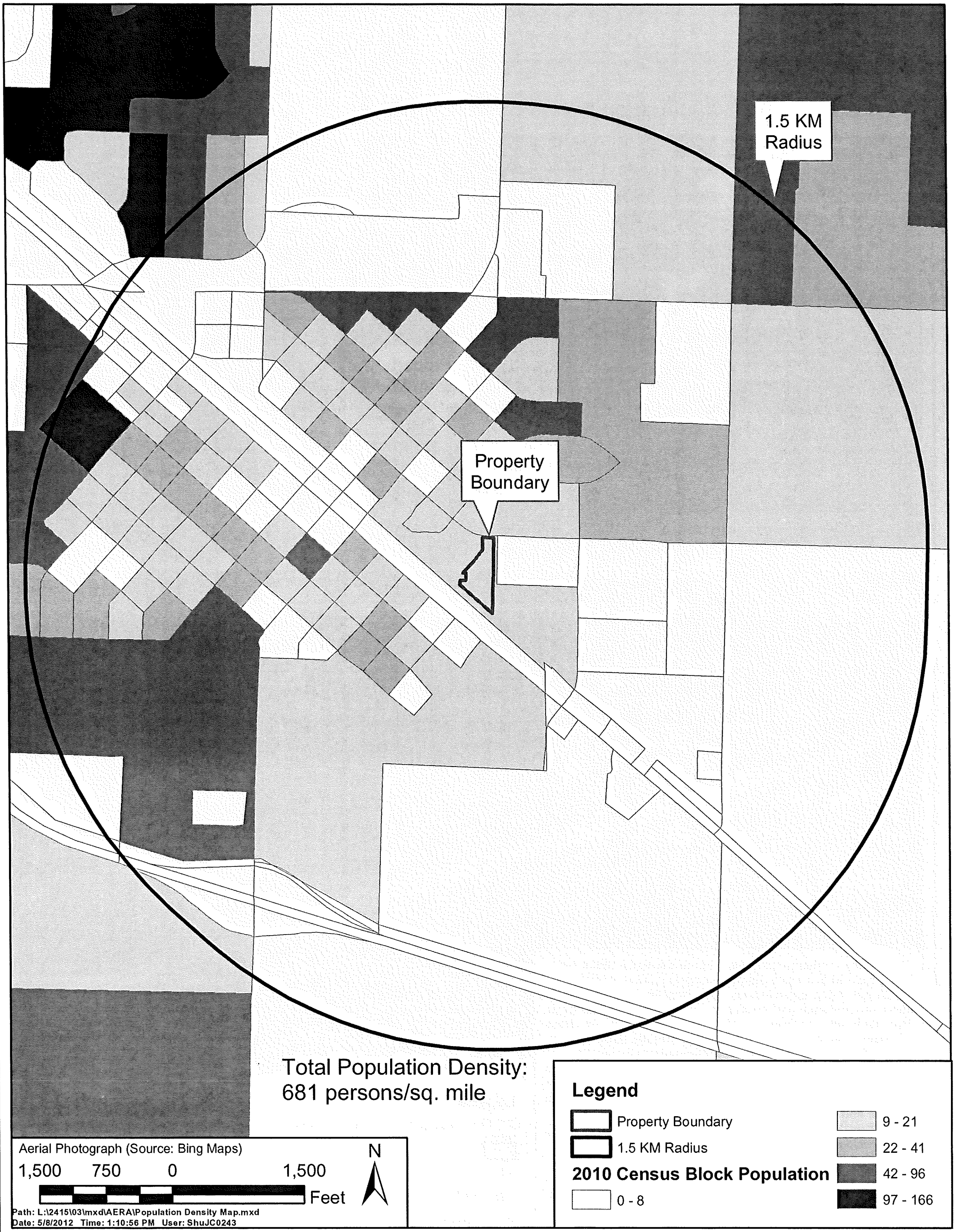
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

NOV 2011

Figure F-2



PERHAM RESOURCE RECOVERY FACILITY	Wenck Engineers - Scientists Business Professionals www.wenck.com 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	NOV 2011
Farming Locations		Figure F-3



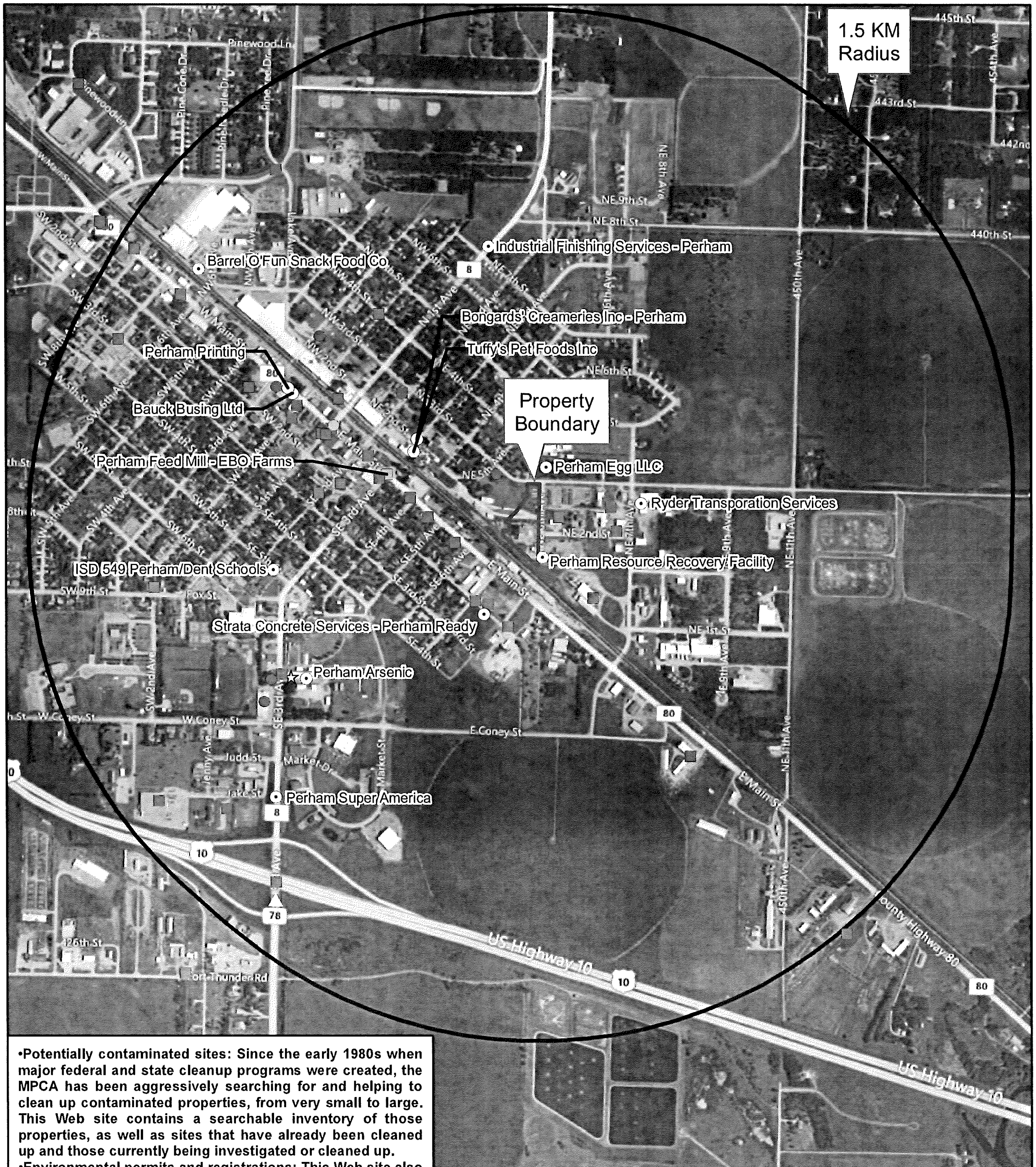
PERHAM RESOURCE RECOVERY FACILITY

Population Density Map

Wenck
Engineers - Scientists
Business Professionals
www.wenck.com
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

MAY 2012

Figure F-4



•Potentially contaminated sites: Since the early 1980s when major federal and state cleanup programs were created, the MPCA has been aggressively searching for and helping to clean up contaminated properties, from very small to large. This Web site contains a searchable inventory of those properties, as well as sites that have already been cleaned up and those currently being investigated or cleaned up.

•Environmental permits and registrations: This Web site also contains a searchable inventory of businesses that have applied for and received different types of environmental permits and registrations from the MPCA.

Aerial Photograph (Source: Bing Maps)

1,500 750 0 1,500 Feet

N

Path: L:\2415\03\mxd\AERA\Known and Pot Sources of Contam.mxd
Date: 5/8/2012 Time: 11:46:53 AM User: ShuJC0243

Legend

- Property Boundary
- 1.5 KM Radius
- Air Permit
- CERCLIS Site
- Feedlot
- Hazardous Waste
- Industrial Stormwater Permit
- Leak Site
- Multiple Activities
- Unpermitted Dump Site
- Wastewater Discharger

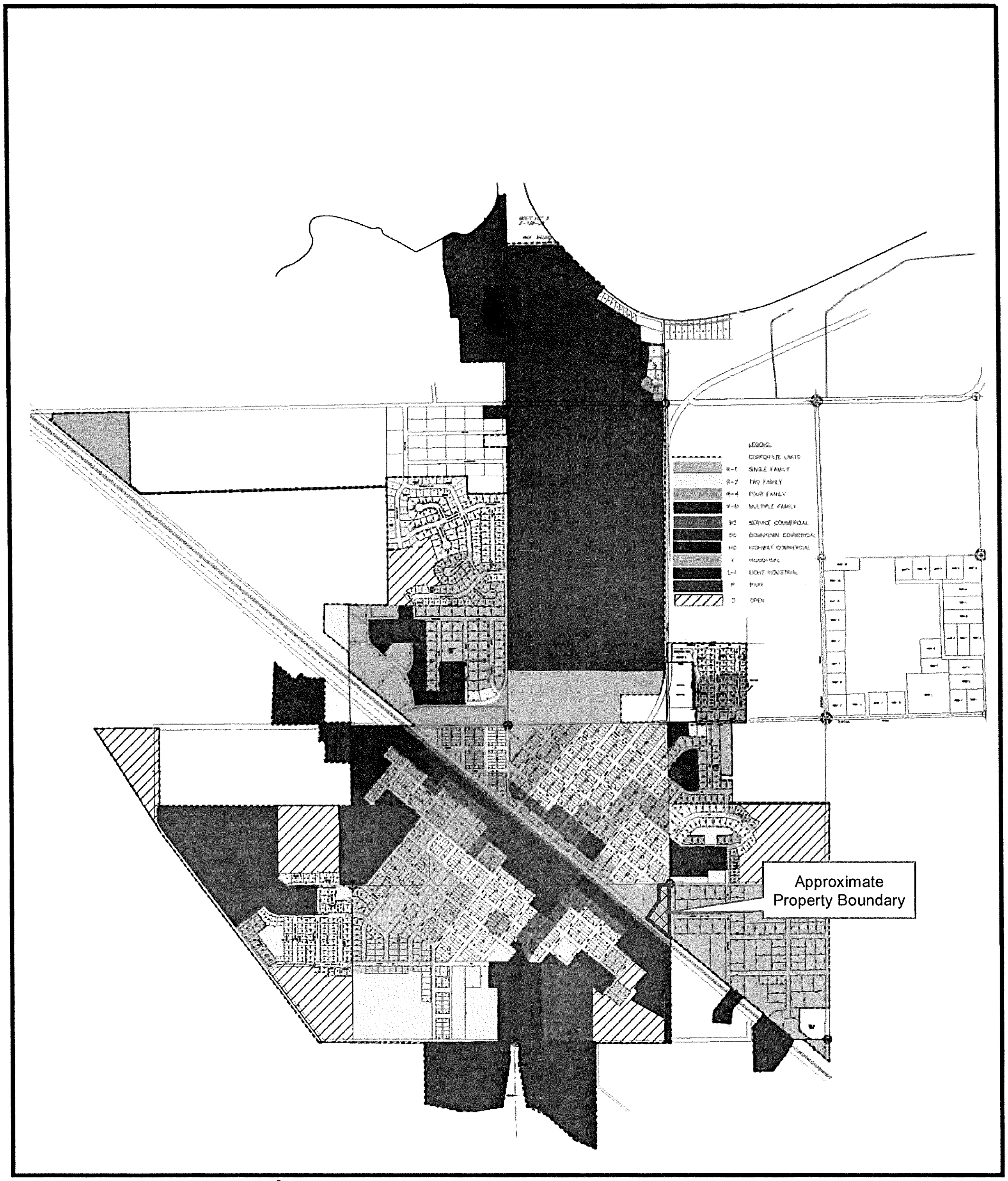
PERHAM RESOURCE RECOVERY FACILITY

MPCA's What's In My Neighborhood Sites

Wenck
Engineers - Scientists
Business Professionals
www.wenck.com
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

MAY 2012

Figure F-5



Ulteig

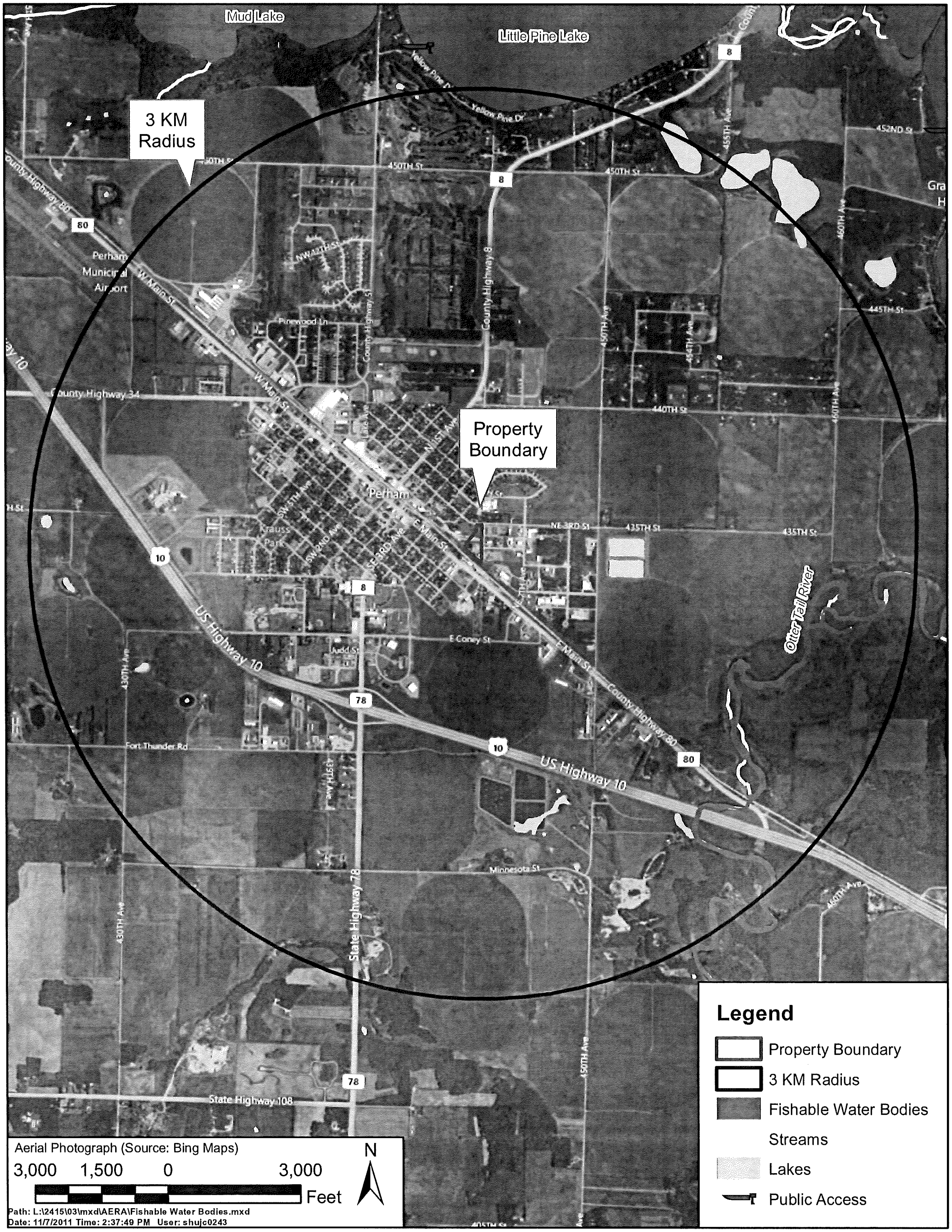
ZONING MAP

PERHAM, MINNESOTA

July 21, 2009

Path: L:\2415\03\mxd\AERA\City of Perham Zoning Map.mxd
Date: 11/9/2011 Time: 1:10:51 PM User: shuic0243

PERHAM RESOURCE RECOVERY FACILITY	Wenck Engineers - Scientists Business Professionals www.wenck.com 1800 Pioneer Creek Center Maple Plain, MN 55359-0429 1-800-472-2232	NOV 2011
CITY OF PERHAM ZONING		Figure F-6



PERHAM RESOURCE RECOVERY FACILITY

Fishable Water Bodies

Wenck
Engineers - Scientists
Business Professionals
www.wenck.com
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

NOV 2011

Figure F-7

Appendix G

Proposed Facility Risk Results

RASS version number = 20120302- 25 stacks
No Inputs Allowed on this Page

Screening Date:	5/14/2012
AQ Facility ID No.:	11100036
AQ File No.:	116H
Facility Name:	Perham Resource Recovery Facility
Facility Location:	Perham, Minnesota
SIC Code (Required):	4953
Emissions type (PTE, Future Actual):	Proposed facility PTE

Air Toxics Screen									
Total Inhalation Screening Hazard Indices and Cancer Risks				**Total Indirect Pathway Screening Hazard Indices and Cancer Risks**					
Acute	**Subchronic Noncancer**	**Chronic Noncancer**	**Cancer**	**Farmer Noncancer**	**Farmer Cancer**	**Urban Gardener Noncancer**	**Urban Gardener Cancer**	**Resident Noncancer**	**Resident Cancer**
2.E-02	9.E-05	3.E-02	5.E-07	3.E-03	4.E-07	3.E-03	4.E-07	1.E-03	9.E-08
1.E+00	1.E+00	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
2.3E-02	9.3E-05	3.4E-02	5.0E-07	2.7E-03	4.0E-07	2.7E-03	3.5E-07	1.4E-03	8.8E-08

Total Multipathway Screening Hazard Indices and Cancer Risks					
Farmer Noncancer	Farmer Cancer	Urban Gardener Noncancer	Urban Gardener Cancer	Resident Noncancer	Resident Cancer
4.E-02	9.E-07	4.E-02	9.E-07	4.E-02	6.E-07
1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05
OK	OK	OK	OK	OK	OK
3.7E-02	9.0E-07	3.7E-02	8.6E-07	3.6E-02	5.9E-07

Electronic files available upon request

Appendix H

Pre-existing Facility Risk Results

RASS version number = 20120302- 25 stacks
No Inputs Allowed on this Page

Screening Date:	5/14/2012
AQ Facility ID No.:	11100036
AQ File No.:	116H
Facility Name:	Perham Resource Recovery Facility
Facility Location:	Perham, Minnesota
SIC Code (Required):	4953
Emissions type (PTE, Future Actual):	Existing facility PTE

Air Toxics Screen

Total Inhalation Screening Hazard Indices and Cancer Risks				Total Indirect Pathway Screening Hazard Indices and Cancer Risks						Total Multipathway Screening Hazard Indices and Cancer Risks					
Acute	Subchronic Noncancer	Chronic Noncancer	Cancer	Farmer Noncancer	Farmer Cancer	Urban Gardener Noncancer	Urban Gardener Cancer	Resident Noncancer	Resident Cancer	Farmer Noncancer	Farmer Cancer	Urban Gardener Noncancer	Urban Gardener Cancer	Resident Noncancer	Resident Cancer
2.E-01	2.E-03	9.E-02	2.E-06	5.E-03	3.E-06	5.E-03	7.E-07	2.E-03	2.E-07	1.E-01	4.E-06	1.E-01	2.E-06	9.E-02	2.E-06
1.E+00	1.E+00	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05	1.E+00	1.E-05
OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
1.8E-01	1.9E-03	9.0E-02	1.7E-06	5.0E-03	2.7E-06	5.0E-03	7.2E-07	2.5E-03	1.7E-07	9.5E-02	4.4E-06	9.5E-02	2.4E-06	9.3E-02	1.9E-06

Electronic files available upon request

Appendix I

IRAP-h Non Default Input Parameters

Appendix I:
IRAP-h Non-Default Input Parameters
Perham Resource Recovery Facility
Prairie Lakes Municipal Solid Waste Authority, Fergus Falls, MN

Input	Variable Name	Abbreviation	Site-specific value	MN-specific value	IRAP default value	Units
Watershed Parameters	Empirical slope coefficient	sd_b		0.125	0.125	unitless
	USLE cover management factor	usle_c	0.3	0.3		unitless
	USLE erodibility factor	usle_k		0.39	0.36	ton/acre
	USLE length-slope factor	usle_ls		0.5	1.5	unitless
	USLE rainfall (or erosivity) factor	usle_rf	150	175		yr^-1
	Impervious watershed area receiving pollutant depos	wa_i		0.05		unitless
	Watershed area receiving fallout	wa_l		1		unitless
Waterbody Parameters	Bed sediment concentration	bs			1	g/cm3
	Drag coefficient	c_d			0.0011	unitless
	Depth of upper benthic layer	d_b			0.03	m
	Depth of water column	d_w	13.49			m
	Dimensionless viscous sublayer thickness	gamma_z			4	unitless
	von Karman's constant	k			0.4	unitless
	Fraction of mercury speciated into methyl mercury in drinking water	mercmethyl_dw			0.15	unitless
	Fraction of mercury speciated into methyl mercury in dissolved phase water	mercmethyl_pdw			0.15	unitless
	Viscosity of water corresponding to water temp	mu_w	1.31E-02		1.69E-02	gm/cm-s
	Fraction organic carbon in bottom sediment	oc_sed			0.04	unitless
	Density of water corresponding to water temp.	rho_w			1	g/cm3
	Water body temperature	t_k	285.65	287.65	298	K
	Bed sediment porosity	theta_bs			0.6	Lwater/Lsediment
	Total suspended solids concentration	tss	4	13	10	mg/L
	Average volumetric flow rate through water body	vf_x	7,760,553			m3/yr
	Water body surface area	wa_w	8,444,539.91			m2
Global site-specific parameters	Average annual evapotranspiration	e_v	52.96	67.22		cm/yr
	Average annual irrigation	i	0.67	0.01		cm/yr
	Average annual precipitation	p	66.04	83.82		cm/yr
	Average annual runoff	rho_w	13.75			cm/yr
	Average annual wind speed	W		4.8		m/s
Risk receptor parameters	Viscosity of air corresponding to air temp	mu_a		1.72E-04	1.81E-04	g/cm-s
	Ambient air temperature	t	278.15	280.93	298	K
	Dry deposition velocity	vdv		0.15	0.5	cm/s
	Dry deposition velocity for mercury	vdv_hg		1.5	2.9	cm/s
Scenario parameters	Consumption rate of fish for Fisher Adult	fish_cr		0.00203	0.00125	kg/kg-day FW
	Consumption rate of fish for Fisher Child	fish_cr		0.00143	0.00088	kg/kg-day FW
	Consumption rate of aboveground produce for Resident Adult	cr_ag		0.00047	0.00032	kg/kg-day DW
	Consumption rate of aboveground produce for Resident Child	cr_ag		0.00113	0.00077	kg/kg-day DW
	Consumption rate of belowground produce for Resident Adult	cr_bg		0.00017	0.00014	kg/kg-day DW
	Consumption rate of belowground produce for Resident Child	cr_bg		0.00028	0.00023	kg/kg-day DW
	Consumption rate of protected aboveground produce for Resident Adult	cr_pp		0.00064	0.00061	kg/kg-day DW
	Consumption rate of protected aboveground produce for Resident Child	cr_pp		0.00157	0.0015	kg/kg-day DW
	Consumption rate of eggs for Resident Adult	eggs_cr		0.00075	0	kg/kg-day FW
	Consumption rate of eggs for Resident Child	eggs_cr		0.00054	0	kg/kg-day FW

Appendix J

IRAP-h Risk and Hazard Index Results

Inhalation-only Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_1	fisher_adult	1.60E-07	7.12E-03
RI_1	fisher_child	3.20E-08	7.12E-03
RI_1	resident_adult	1.60E-07	7.12E-03
RI_1	resident_child	3.20E-08	7.12E-03
RI_10	farmer_adult	1.55E-08	6.49E-04
RI_10	farmer_child	2.32E-09	6.49E-04
RI_10	fisher_adult	1.16E-08	6.49E-04
RI_10	fisher_child	2.32E-09	6.49E-04
RI_11	farmer_adult	6.08E-07	2.04E-02
RI_11	farmer_child	9.13E-08	2.04E-02
RI_11	fisher_adult	4.56E-07	2.04E-02
RI_11	fisher_child	9.13E-08	2.04E-02
RI_12	farmer_adult	6.00E-07	2.01E-02
RI_12	farmer_child	9.00E-08	2.01E-02
RI_12	fisher_adult	4.50E-07	2.01E-02
RI_12	fisher_child	9.00E-08	2.01E-02
RI_13	farmer_adult	6.28E-07	2.10E-02
RI_13	farmer_child	9.42E-08	2.10E-02
RI_13	fisher_adult	4.71E-07	2.10E-02
RI_13	fisher_child	9.42E-08	2.10E-02
RI_14	farmer_adult	5.67E-08	1.99E-03
RI_14	farmer_child	8.50E-09	1.99E-03
RI_14	fisher_adult	4.25E-08	1.99E-03
RI_14	fisher_child	8.50E-09	1.99E-03
RI_15	farmer_adult	2.76E-08	1.03E-03
RI_15	farmer_child	4.14E-09	1.03E-03
RI_15	fisher_adult	2.07E-08	1.03E-03
RI_15	fisher_child	4.14E-09	1.03E-03
RI_16	farmer_adult	6.19E-08	2.10E-03
RI_16	farmer_child	9.29E-09	2.10E-03
RI_16	fisher_adult	4.65E-08	2.10E-03
RI_16	fisher_child	9.29E-09	2.10E-03
RI_17	farmer_adult	6.00E-08	2.04E-03
RI_17	farmer_child	9.00E-09	2.04E-03
RI_17	fisher_adult	4.50E-08	2.04E-03
RI_17	fisher_child	9.00E-09	2.04E-03
RI_18	farmer_adult	5.95E-08	2.02E-03
RI_18	farmer_child	8.92E-09	2.02E-03
RI_18	fisher_adult	4.46E-08	2.02E-03
RI_18	fisher_child	8.92E-09	2.02E-03
RI_19	farmer_adult	3.12E-07	1.04E-02
RI_19	farmer_child	4.68E-08	1.04E-02
RI_19	fisher_adult	2.34E-07	1.04E-02
RI_19	fisher_child	4.68E-08	1.04E-02
RI_2	fisher_adult	1.09E-07	4.86E-03
RI_2	fisher_child	2.19E-08	4.86E-03
RI_2	resident_adult	1.09E-07	4.86E-03
RI_2	resident_child	2.19E-08	4.86E-03
RI_20	farmer_adult	2.88E-07	9.60E-03
RI_20	farmer_child	4.31E-08	9.60E-03
RI_20	fisher_adult	2.16E-07	9.60E-03
RI_20	fisher_child	4.31E-08	9.60E-03
RI_21	farmer_adult	3.72E-07	1.24E-02

RI_21	farmer_child	5.58E-08	1.24E-02
RI_21	fisher_adult	2.79E-07	1.24E-02
RI_21	fisher_child	5.58E-08	1.24E-02
RI_22	farmer_adult	3.63E-07	1.21E-02
RI_22	farmer_child	5.45E-08	1.21E-02
RI_22	fisher_adult	2.72E-07	1.21E-02
RI_22	fisher_child	5.45E-08	1.21E-02
RI_3	fisher_adult	5.89E-07	2.66E-02
RI_3	fisher_child	1.18E-07	2.66E-02
RI_3	resident_adult	5.89E-07	2.66E-02
RI_3	resident_child	1.18E-07	2.66E-02
RI_4	fisher_adult	5.98E-08	2.65E-03
RI_4	fisher_child	1.20E-08	2.65E-03
RI_4	resident_adult	5.98E-08	2.65E-03
RI_4	resident_child	1.20E-08	2.65E-03
RI_5	fisher_adult	3.17E-07	1.45E-02
RI_5	fisher_child	6.34E-08	1.45E-02
RI_5	resident_adult	3.17E-07	1.45E-02
RI_5	resident_child	6.34E-08	1.45E-02
RI_6	fisher_adult	7.46E-07	3.35E-02
RI_6	fisher_child	1.49E-07	3.35E-02
RI_6	resident_adult	7.46E-07	3.35E-02
RI_6	resident_child	1.49E-07	3.35E-02
RI_7	fisher_adult	6.26E-08	2.96E-03
RI_7	fisher_child	1.25E-08	2.96E-03
RI_7	resident_adult	6.26E-08	2.96E-03
RI_7	resident_child	1.25E-08	2.96E-03
RI_8	fisher_adult	1.08E-07	5.05E-03
RI_8	fisher_child	2.16E-08	5.05E-03
RI_8	resident_adult	1.08E-07	5.05E-03
RI_8	resident_child	2.16E-08	5.05E-03
RI_9	farmer_adult	4.56E-07	1.53E-02
RI_9	farmer_child	6.84E-08	1.53E-02
RI_9	fisher_adult	3.42E-07	1.53E-02
RI_9	fisher_child	6.84E-08	1.53E-02
Res1	fisher_adult	2.30E-07	1.08E-02
Res1	fisher_child	4.60E-08	1.08E-02
Res1	resident_adult	2.30E-07	1.08E-02
Res1	resident_child	4.60E-08	1.08E-02
Res2	fisher_adult	1.27E-07	6.20E-03
Res2	fisher_child	2.53E-08	6.20E-03
Res2	resident_adult	1.27E-07	6.20E-03
Res2	resident_child	2.53E-08	6.20E-03
Res3	fisher_adult	1.24E-07	5.98E-03
Res3	fisher_child	2.48E-08	5.98E-03
Res3	resident_adult	1.24E-07	5.98E-03
Res3	resident_child	2.48E-08	5.98E-03
	Max	**7.46E-07**	**3.35E-02**

Total Pathway Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_1	fisher_adult	4.87E-07	1.05E-02
RI_1	fisher_child	2.17E-07	1.59E-02
RI_1	resident_adult	4.87E-07	1.05E-02
RI_1	resident_child	2.17E-07	1.59E-02
RI_10	farmer_adult	1.60E-06	3.74E-03
RI_10	farmer_child	3.41E-07	5.18E-03
RI_10	fisher_adult	2.50E-08	7.73E-04
RI_10	fisher_child	9.79E-09	9.69E-04
RI_11	farmer_adult	**7.58E-05**	1.72E-01
RI_11	farmer_child	**1.62E-05**	2.44E-01
RI_11	fisher_adult	1.24E-06	2.84E-02
RI_11	fisher_child	5.29E-07	4.10E-02
RI_12	farmer_adult	**7.51E-05**	1.71E-01
RI_12	farmer_child	**1.60E-05**	2.43E-01
RI_12	fisher_adult	1.24E-06	2.84E-02
RI_12	fisher_child	5.32E-07	4.13E-02
RI_13	farmer_adult	**7.92E-05**	1.80E-01
RI_13	farmer_child	**1.69E-05**	2.57E-01
RI_13	fisher_adult	1.32E-06	2.98E-02
RI_13	fisher_child	5.73E-07	4.36E-02
RI_14	farmer_adult	6.56E-06	1.47E-02
RI_14	farmer_child	1.40E-06	2.06E-02
RI_14	fisher_adult	9.98E-08	2.51E-03
RI_14	fisher_child	4.05E-08	3.33E-03
RI_15	farmer_adult	2.93E-06	6.54E-03
RI_15	farmer_child	6.26E-07	9.04E-03
RI_15	fisher_adult	3.95E-08	1.19E-03
RI_15	fisher_child	1.45E-08	1.44E-03
RI_16	farmer_adult	7.31E-06	1.63E-02
RI_16	farmer_child	1.56E-06	2.29E-02
RI_16	fisher_adult	1.12E-07	2.70E-03
RI_16	fisher_child	4.59E-08	3.64E-03
RI_17	farmer_adult	7.08E-06	1.58E-02
RI_17	farmer_child	1.51E-06	2.22E-02
RI_17	fisher_adult	1.08E-07	2.61E-03
RI_17	fisher_child	4.43E-08	3.52E-03
RI_18	farmer_adult	7.01E-06	1.56E-02
RI_18	farmer_child	1.50E-06	2.20E-02
RI_18	fisher_adult	1.07E-07	2.59E-03
RI_18	fisher_child	4.40E-08	3.49E-03
RI_19	farmer_adult	**4.04E-05**	9.36E-02
RI_19	farmer_child	8.63E-06	1.35E-01
RI_19	fisher_adult	7.18E-07	1.58E-02
RI_19	fisher_child	3.19E-07	2.42E-02
RI_2	fisher_adult	3.22E-07	6.97E-03
RI_2	fisher_child	1.42E-07	1.03E-02
RI_2	resident_adult	3.22E-07	6.97E-03
RI_2	resident_child	1.42E-07	1.03E-02
RI_20	farmer_adult	**3.70E-05**	8.53E-02
RI_20	farmer_child	7.89E-06	1.23E-01
RI_20	fisher_adult	6.50E-07	1.44E-02
RI_20	fisher_child	2.88E-07	2.19E-02
RI_21	farmer_adult	**4.86E-05**	1.13E-01

Total Pathway Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_21	farmer_child	**1.04E-05**	1.63E-01
RI_21	fisher_adult	8.65E-07	1.92E-02
RI_21	fisher_child	3.85E-07	2.97E-02
RI_22	farmer_adult	**4.77E-05**	1.11E-01
RI_22	farmer_child	**1.02E-05**	1.60E-01
RI_22	fisher_adult	8.54E-07	1.89E-02
RI_22	fisher_child	3.81E-07	2.95E-02
RI_3	fisher_adult	1.94E-06	4.24E-02
RI_3	fisher_child	8.77E-07	6.71E-02
RI_3	resident_adult	1.94E-06	4.24E-02
RI_3	resident_child	8.77E-07	6.71E-02
RI_4	fisher_adult	1.76E-07	3.63E-03
RI_4	fisher_child	7.79E-08	5.21E-03
RI_4	resident_adult	1.76E-07	3.63E-03
RI_4	resident_child	7.79E-08	5.21E-03
RI_5	fisher_adult	1.13E-06	2.32E-02
RI_5	fisher_child	5.23E-07	3.68E-02
RI_5	resident_adult	1.13E-06	2.32E-02
RI_5	resident_child	5.23E-07	3.68E-02
RI_6	fisher_adult	2.30E-06	5.14E-02
RI_6	fisher_child	1.02E-06	7.92E-02
RI_6	resident_adult	2.30E-06	5.14E-02
RI_6	resident_child	1.02E-06	7.92E-02
RI_7	fisher_adult	3.80E-07	5.42E-03
RI_7	fisher_child	1.97E-07	9.53E-03
RI_7	resident_adult	3.80E-07	5.42E-03
RI_7	resident_child	1.97E-07	9.53E-03
RI_8	fisher_adult	5.19E-07	8.49E-03
RI_8	fisher_child	2.59E-07	1.42E-02
RI_8	resident_adult	5.19E-07	8.49E-03
RI_8	resident_child	2.59E-07	1.42E-02
RI_9	farmer_adult	**5.77E-05**	1.31E-01
RI_9	farmer_child	**1.23E-05**	1.87E-01
RI_9	fisher_adult	9.78E-07	2.17E-02
RI_9	fisher_child	4.26E-07	3.17E-02
Res1	fisher_adult	8.15E-07	1.72E-02
Res1	fisher_child	3.78E-07	2.74E-02
Res1	resident_adult	8.15E-07	1.72E-02
Res1	resident_child	3.78E-07	2.74E-02
Res2	fisher_adult	4.90E-07	9.89E-03
Res2	fisher_child	2.33E-07	1.58E-02
Res2	resident_adult	4.90E-07	9.89E-03
Res2	resident_child	2.33E-07	1.58E-02
Res3	fisher_adult	4.26E-07	9.16E-03
Res3	fisher_child	1.96E-07	1.42E-02
Res3	resident_adult	4.26E-07	9.16E-03
Res3	resident_child	1.96E-07	1.42E-02
	Max	**7.92E-05**	**2.57E-01**

Scenario 2 Total Pathway Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected; actual exposure scenarios, PTE
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_1	fisher_adult	4.87E-07	1.05E-02
RI_1	fisher_child	2.17E-07	1.59E-02
RI_1	resident_adult	4.87E-07	1.05E-02
RI_1	resident_child	2.17E-07	1.59E-02
RI_10	farmer_adult	3.49E-08	7.74E-04
RI_10	farmer_child	9.82E-09	9.70E-04
RI_10	fisher_adult	2.50E-08	7.73E-04
RI_10	fisher_child	9.79E-09	9.69E-04
RI_11	farmer_adult	1.75E-06	2.84E-02
RI_11	farmer_child	5.31E-07	4.10E-02
RI_11	fisher_adult	1.24E-06	2.84E-02
RI_11	fisher_child	5.29E-07	4.10E-02
RI_12	farmer_adult	1.75E-06	2.84E-02
RI_12	farmer_child	5.34E-07	4.14E-02
RI_12	fisher_adult	1.24E-06	2.84E-02
RI_12	fisher_child	5.32E-07	4.13E-02
RI_13	farmer_adult	1.87E-06	2.99E-02
RI_13	farmer_child	5.75E-07	4.36E-02
RI_13	fisher_adult	1.32E-06	2.98E-02
RI_13	fisher_child	5.73E-07	4.36E-02
RI_14	farmer_adult	1.40E-07	2.51E-03
RI_14	farmer_child	4.07E-08	3.33E-03
RI_14	fisher_adult	9.98E-08	2.51E-03
RI_14	fisher_child	4.05E-08	3.33E-03
RI_15	farmer_adult	5.47E-08	1.19E-03
RI_15	farmer_child	1.45E-08	1.44E-03
RI_15	fisher_adult	3.95E-08	1.19E-03
RI_15	fisher_child	1.45E-08	1.44E-03
RI_16	farmer_adult	1.57E-07	2.70E-03
RI_16	farmer_child	4.60E-08	3.64E-03
RI_16	fisher_adult	1.12E-07	2.70E-03
RI_16	fisher_child	4.59E-08	3.64E-03
RI_17	farmer_adult	1.52E-07	2.62E-03
RI_17	farmer_child	4.44E-08	3.52E-03
RI_17	fisher_adult	1.08E-07	2.61E-03
RI_17	fisher_child	4.43E-08	3.52E-03
RI_18	farmer_adult	1.51E-07	2.59E-03
RI_18	farmer_child	4.41E-08	3.49E-03
RI_18	fisher_adult	1.07E-07	2.59E-03
RI_18	fisher_child	4.40E-08	3.49E-03
RI_19	farmer_adult	1.02E-06	1.58E-02
RI_19	farmer_child	3.20E-07	2.42E-02
RI_19	fisher_adult	7.18E-07	1.58E-02
RI_19	fisher_child	3.19E-07	2.42E-02
RI_2	fisher_adult	3.22E-07	6.97E-03
RI_2	fisher_child	1.42E-07	1.03E-02
RI_2	resident_adult	3.22E-07	6.97E-03
RI_2	resident_child	1.42E-07	1.03E-02
RI_20	farmer_adult	9.22E-07	1.44E-02
RI_20	farmer_child	2.89E-07	2.19E-02
RI_20	fisher_adult	6.50E-07	1.44E-02
RI_20	fisher_child	2.88E-07	2.19E-02
RI_21	farmer_adult	1.23E-06	1.92E-02

RI_21	farmer_child	3.87E-07	2.98E-02
RI_21	fisher_adult	8.65E-07	1.92E-02
RI_21	fisher_child	3.85E-07	2.97E-02
RI_22	farmer_adult	1.21E-06	1.90E-02
RI_22	farmer_child	3.83E-07	2.95E-02
RI_22	fisher_adult	8.54E-07	1.89E-02
RI_22	fisher_child	3.81E-07	2.95E-02
RI_23	farmer_adult	7.94E-06	2.64E-02
RI_23	farmer_child	8.99E-07	2.76E-02
RI_23	fisher_adult	5.64E-07	1.28E-02
RI_23	fisher_child	2.46E-07	1.92E-02
RI_24	farmer_adult	2.23E-06	7.23E-03
RI_24	farmer_child	2.49E-07	7.14E-03
RI_24	fisher_adult	1.51E-07	3.42E-03
RI_24	fisher_child	6.39E-08	4.80E-03
RI_25	farmer_adult	1.30E-07	1.94E-03
RI_25	farmer_child	1.17E-06	1.72E-02
RI_25	fisher_adult	9.19E-08	1.93E-03
RI_25	fisher_child	3.98E-08	2.68E-03
RI_26	farmer_adult	1.27E-07	1.36E-03
RI_26	farmer_child	2.93E-08	1.78E-03
RI_26	fisher_adult	5.68E-08	1.25E-03
RI_26	fisher_child	2.41E-08	1.70E-03
RI_27	farmer_adult	2.54E-06	5.94E-03
RI_27	farmer_child	6.33E-07	9.38E-03
RI_27	fisher_adult	4.89E-08	1.27E-03
RI_27	fisher_child	1.94E-08	1.64E-03
RI_3	fisher_adult	1.94E-06	4.24E-02
RI_3	fisher_child	8.77E-07	6.71E-02
RI_3	resident_adult	1.94E-06	4.24E-02
RI_3	resident_child	8.77E-07	6.71E-02
RI_4	fisher_adult	1.76E-07	3.63E-03
RI_4	fisher_child	7.79E-08	5.21E-03
RI_4	resident_adult	1.76E-07	3.63E-03
RI_4	resident_child	7.79E-08	5.21E-03
RI_5	fisher_adult	1.13E-06	2.32E-02
RI_5	fisher_child	5.23E-07	3.68E-02
RI_5	resident_adult	1.13E-06	2.32E-02
RI_5	resident_child	5.23E-07	3.68E-02
RI_6	fisher_adult	2.30E-06	5.14E-02
RI_6	fisher_child	1.02E-06	7.92E-02
RI_6	resident_adult	2.30E-06	5.14E-02
RI_6	resident_child	1.02E-06	7.92E-02
RI_7	fisher_adult	3.80E-07	5.42E-03
RI_7	fisher_child	1.97E-07	9.53E-03
RI_7	resident_adult	3.80E-07	5.42E-03
RI_7	resident_child	1.97E-07	9.53E-03
RI_8	fisher_adult	5.19E-07	8.49E-03
RI_8	fisher_child	2.59E-07	1.42E-02
RI_8	resident_adult	5.19E-07	8.49E-03
RI_8	resident_child	2.59E-07	1.42E-02
RI_9	farmer_adult	1.38E-06	2.17E-02
RI_9	farmer_child	4.27E-07	3.18E-02
RI_9	fisher_adult	9.78E-07	2.17E-02
RI_9	fisher_child	4.26E-07	3.17E-02
Res_1	fisher_adult	8.15E-07	1.72E-02
Res_1	fisher_child	3.78E-07	2.74E-02
Res_1	resident_adult	8.15E-07	1.72E-02

Res_1	resident_child	3.78E-07	2.74E-02
Res_2	fisher_adult	4.90E-07	9.89E-03
Res_2	fisher_child	2.33E-07	1.58E-02
Res_2	resident_adult	4.90E-07	9.89E-03
Res_2	resident_child	2.33E-07	1.58E-02
Res_3	fisher_adult	4.26E-07	9.16E-03
Res_3	fisher_child	1.96E-07	1.42E-02
Res_3	resident_adult	4.26E-07	9.16E-03
Res_3	resident_child	1.96E-07	1.42E-02

Scenario 3 Total Pathway Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected; hypothetical exposure scenarios, FPA
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_1	fisher_adult	2.19E-08	7.16E-03
RI_1	fisher_child	9.32E-09	7.38E-03
RI_1	resident_adult	2.19E-08	7.16E-03
RI_1	resident_child	9.32E-09	7.38E-03
RI_10	farmer_adult	6.68E-08	5.78E-04
RI_10	farmer_child	1.42E-08	6.37E-04
RI_10	fisher_adult	1.08E-09	4.56E-04
RI_10	fisher_child	4.16E-10	4.64E-04
RI_11	farmer_adult	2.55E-06	2.11E-02
RI_11	farmer_child	5.43E-07	2.35E-02
RI_11	fisher_adult	4.88E-08	1.64E-02
RI_11	fisher_child	1.98E-08	1.68E-02
RI_12	farmer_adult	2.78E-06	2.30E-02
RI_12	farmer_child	5.92E-07	2.57E-02
RI_12	fisher_adult	5.24E-08	1.79E-02
RI_12	fisher_child	2.14E-08	1.84E-02
RI_13	farmer_adult	2.44E-06	2.01E-02
RI_13	farmer_child	5.21E-07	2.24E-02
RI_13	fisher_adult	4.83E-08	1.55E-02
RI_13	fisher_child	1.99E-08	1.60E-02
RI_14	farmer_adult	2.74E-07	2.34E-03
RI_14	farmer_child	5.84E-08	2.59E-03
RI_14	fisher_adult	4.31E-09	1.84E-03
RI_14	fisher_child	1.72E-09	1.88E-03
RI_15	farmer_adult	1.23E-07	1.09E-03
RI_15	farmer_child	2.61E-08	1.19E-03
RI_15	fisher_adult	1.75E-09	8.65E-04
RI_15	fisher_child	6.24E-10	8.75E-04
RI_16	farmer_adult	3.05E-07	2.60E-03
RI_16	farmer_child	6.51E-08	2.88E-03
RI_16	fisher_adult	4.83E-09	2.04E-03
RI_16	fisher_child	1.95E-09	2.08E-03
RI_17	farmer_adult	2.96E-07	2.52E-03
RI_17	farmer_child	6.30E-08	2.79E-03
RI_17	fisher_adult	4.67E-09	1.98E-03
RI_17	fisher_child	1.88E-09	2.02E-03
RI_18	farmer_adult	2.93E-07	2.50E-03
RI_18	farmer_child	6.25E-08	2.76E-03
RI_18	fisher_adult	4.63E-09	1.96E-03
RI_18	fisher_child	1.87E-09	2.00E-03
RI_19	farmer_adult	1.54E-06	1.24E-02
RI_19	farmer_child	3.28E-07	1.39E-02
RI_19	fisher_adult	3.01E-08	9.51E-03
RI_19	fisher_child	1.30E-08	9.84E-03
RI_2	fisher_adult	1.44E-08	4.93E-03
RI_2	fisher_child	6.09E-09	5.07E-03
RI_2	resident_adult	1.44E-08	4.93E-03
RI_2	resident_child	6.09E-09	5.07E-03
RI_20	farmer_adult	1.50E-06	1.22E-02
RI_20	farmer_child	3.19E-07	1.37E-02
RI_20	fisher_adult	2.87E-08	9.40E-03
RI_20	fisher_child	1.22E-08	9.69E-03
RI_21	farmer_adult	2.02E-06	1.64E-02

RI_21	farmer_child	4.31E-07	1.84E-02
RI_21	fisher_adult	3.92E-08	1.26E-02
RI_21	fisher_child	1.67E-08	1.30E-02
RI_22	farmer_adult	1.98E-06	1.60E-02
RI_22	farmer_child	4.23E-07	1.80E-02
RI_22	fisher_adult	3.86E-08	1.23E-02
RI_22	fisher_child	1.65E-08	1.27E-02
RI_3	fisher_adult	6.42E-08	1.52E-02
RI_3	fisher_child	2.49E-08	1.57E-02
RI_3	resident_adult	6.42E-08	1.52E-02
RI_3	resident_child	2.49E-08	1.57E-02
RI_4	fisher_adult	7.83E-09	2.69E-03
RI_4	fisher_child	3.34E-09	2.76E-03
RI_4	resident_adult	7.83E-09	2.69E-03
RI_4	resident_child	3.34E-09	2.76E-03
RI_5	fisher_adult	5.79E-08	1.21E-02
RI_5	fisher_child	2.22E-08	1.26E-02
RI_5	resident_adult	5.79E-08	1.21E-02
RI_5	resident_child	2.22E-08	1.26E-02
RI_6	fisher_adult	8.89E-08	2.56E-02
RI_6	fisher_child	3.65E-08	2.65E-02
RI_6	resident_adult	8.89E-08	2.56E-02
RI_6	resident_child	3.65E-08	2.65E-02
RI_7	fisher_adult	2.30E-08	3.03E-03
RI_7	fisher_child	9.63E-09	3.22E-03
RI_7	resident_adult	2.30E-08	3.03E-03
RI_7	resident_child	9.63E-09	3.22E-03
RI_8	fisher_adult	3.17E-08	5.02E-03
RI_8	fisher_child	1.27E-08	5.28E-03
RI_8	resident_adult	3.17E-08	5.02E-03
RI_8	resident_child	1.27E-08	5.28E-03
RI_9	farmer_adult	1.94E-06	1.59E-02
RI_9	farmer_child	4.13E-07	1.78E-02
RI_9	fisher_adult	3.94E-08	1.23E-02
RI_9	fisher_child	1.61E-08	1.26E-02
Res_1	fisher_adult	2.23E-09	1.00E-03
Res_1	fisher_child	8.54E-10	1.02E-03
Res_1	resident_adult	2.23E-09	1.00E-03
Res_1	resident_child	8.54E-10	1.02E-03
Res_2	fisher_adult	3.62E-08	4.07E-03
Res_2	fisher_child	1.10E-08	4.22E-03
Res_2	resident_adult	3.62E-08	4.07E-03
Res_2	resident_child	1.10E-08	4.22E-03
Res_3	fisher_adult	3.13E-08	4.43E-03
Res_3	fisher_child	9.55E-09	4.57E-03
Res_3	resident_adult	3.13E-08	4.43E-03
Res_3	resident_child	9.55E-09	4.57E-03

Scenario 4 Total Pathway Results for Lifetime Excess Cancer Risk and Chronic Hazard
Building-Corrected; actual exposure scenarios, FPA
Perham Resource Recovery Facility

Receptor	Scenario	Risk	HI
RI_1	fisher_adult	2.20E-08	7.24E-03
RI_1	fisher_child	9.36E-09	7.46E-03
RI_1	resident_adult	2.20E-08	7.24E-03
RI_1	resident_child	9.36E-09	7.46E-03
RI_10	farmer_adult	1.51E-09	4.56E-04
RI_10	farmer_child	4.17E-10	4.64E-04
RI_10	fisher_adult	1.08E-09	4.56E-04
RI_10	fisher_child	4.16E-10	4.64E-04
RI_11	farmer_adult	8.07E-08	2.06E-02
RI_11	farmer_child	2.33E-08	2.11E-02
RI_11	fisher_adult	5.75E-08	2.06E-02
RI_11	fisher_child	2.32E-08	2.11E-02
RI_12	farmer_adult	8.07E-08	2.03E-02
RI_12	farmer_child	2.34E-08	2.08E-02
RI_12	fisher_adult	5.75E-08	2.03E-02
RI_12	fisher_child	2.34E-08	2.08E-02
RI_13	farmer_adult	8.57E-08	2.13E-02
RI_13	farmer_child	2.51E-08	2.19E-02
RI_13	fisher_adult	6.10E-08	2.13E-02
RI_13	fisher_child	2.50E-08	2.18E-02
RI_14	farmer_adult	6.04E-09	1.84E-03
RI_14	farmer_child	1.72E-09	1.88E-03
RI_14	fisher_adult	4.31E-09	1.84E-03
RI_14	fisher_child	1.72E-09	1.88E-03
RI_15	farmer_adult	2.42E-09	8.65E-04
RI_15	farmer_child	6.25E-10	8.76E-04
RI_15	fisher_adult	1.75E-09	8.65E-04
RI_15	fisher_child	6.24E-10	8.75E-04
RI_16	farmer_adult	6.78E-09	2.04E-03
RI_16	farmer_child	1.95E-09	2.08E-03
RI_16	fisher_adult	4.83E-09	2.04E-03
RI_16	fisher_child	1.95E-09	2.08E-03
RI_17	farmer_adult	6.55E-09	1.98E-03
RI_17	farmer_child	1.88E-09	2.02E-03
RI_17	fisher_adult	4.67E-09	1.98E-03
RI_17	fisher_child	1.88E-09	2.02E-03
RI_18	farmer_adult	6.50E-09	1.96E-03
RI_18	farmer_child	1.87E-09	2.00E-03
RI_18	fisher_adult	4.63E-09	1.96E-03
RI_18	fisher_child	1.87E-09	2.00E-03
RI_19	farmer_adult	4.55E-08	1.06E-02
RI_19	farmer_child	1.38E-08	1.09E-02
RI_19	fisher_adult	3.22E-08	1.06E-02
RI_19	fisher_child	1.38E-08	1.09E-02
RI_2	fisher_adult	1.44E-08	4.93E-03
RI_2	fisher_child	6.10E-09	5.08E-03
RI_2	resident_adult	1.44E-08	4.93E-03
RI_2	resident_child	6.10E-09	5.08E-03
RI_20	farmer_adult	4.14E-08	9.75E-03
RI_20	farmer_child	1.25E-08	1.01E-02
RI_20	fisher_adult	2.93E-08	9.75E-03
RI_20	fisher_child	1.24E-08	1.00E-02
RI_21	farmer_adult	5.54E-08	1.26E-02

RI_21	farmer_child	1.68E-08	1.31E-02
RI_21	fisher_adult	3.93E-08	1.26E-02
RI_21	fisher_child	1.67E-08	1.31E-02
RI_22	farmer_adult	5.47E-08	1.24E-02
RI_22	farmer_child	1.66E-08	1.28E-02
RI_22	fisher_adult	3.88E-08	1.24E-02
RI_22	fisher_child	1.65E-08	1.28E-02
RI_23	farmer_adult	3.34E-07	9.40E-03
RI_23	farmer_child	3.79E-08	9.44E-03
RI_23	fisher_adult	2.54E-08	8.84E-03
RI_23	fisher_child	1.06E-08	9.09E-03
RI_24	farmer_adult	9.39E-08	2.73E-03
RI_24	farmer_child	1.05E-08	2.73E-03
RI_24	fisher_adult	6.76E-09	2.57E-03
RI_24	fisher_child	2.76E-09	2.63E-03
RI_25	farmer_adult	5.73E-09	1.49E-03
RI_25	farmer_child	4.89E-08	2.12E-03
RI_25	fisher_adult	4.05E-09	1.49E-03
RI_25	fisher_child	1.70E-09	1.53E-03
RI_26	farmer_adult	5.46E-09	9.68E-04
RI_26	farmer_child	1.25E-09	9.88E-04
RI_26	fisher_adult	2.48E-09	9.64E-04
RI_26	fisher_child	1.03E-09	9.84E-04
RI_27	farmer_adult	1.06E-07	1.13E-03
RI_27	farmer_child	2.64E-08	1.27E-03
RI_27	fisher_adult	2.12E-09	9.35E-04
RI_27	fisher_child	8.26E-10	9.52E-04
RI_3	fisher_adult	9.82E-08	2.70E-02
RI_3	fisher_child	4.01E-08	2.80E-02
RI_3	resident_adult	9.82E-08	2.70E-02
RI_3	resident_child	4.01E-08	2.80E-02
RI_4	fisher_adult	7.83E-09	2.69E-03
RI_4	fisher_child	3.34E-09	2.76E-03
RI_4	resident_adult	7.83E-09	2.69E-03
RI_4	resident_child	3.34E-09	2.76E-03
RI_5	fisher_adult	6.53E-08	1.48E-02
RI_5	fisher_child	2.55E-08	1.53E-02
RI_5	resident_adult	6.53E-08	1.48E-02
RI_5	resident_child	2.55E-08	1.53E-02
RI_6	fisher_adult	1.10E-07	3.39E-02
RI_6	fisher_child	4.53E-08	3.50E-02
RI_6	resident_adult	1.10E-07	3.39E-02
RI_6	resident_child	4.53E-08	3.50E-02
RI_7	fisher_adult	2.30E-08	3.04E-03
RI_7	fisher_child	9.64E-09	3.23E-03
RI_7	resident_adult	2.30E-08	3.04E-03
RI_7	resident_child	9.64E-09	3.23E-03
RI_8	fisher_adult	3.20E-08	5.16E-03
RI_8	fisher_child	1.29E-08	5.41E-03
RI_8	resident_adult	3.20E-08	5.16E-03
RI_8	resident_child	1.29E-08	5.41E-03
RI_9	farmer_adult	6.48E-08	1.55E-02
RI_9	farmer_child	1.89E-08	1.59E-02
RI_9	fisher_adult	4.62E-08	1.55E-02
RI_9	fisher_child	1.88E-08	1.59E-02
Res_1	fisher_adult	5.69E-08	1.10E-02
Res_1	fisher_child	2.04E-08	1.14E-02
Res_1	resident_adult	5.69E-08	1.10E-02

Res_1	resident_child	2.04E-08	1.14E-02
Res_2	fisher_adult	4.36E-08	6.31E-03
Res_2	fisher_child	1.44E-08	6.56E-03
Res_2	resident_adult	4.36E-08	6.31E-03
Res_2	resident_child	1.44E-08	6.56E-03
Res_3	fisher_adult	3.66E-08	6.07E-03
Res_3	fisher_child	1.20E-08	6.28E-03
Res_3	resident_adult	3.66E-08	6.07E-03
Res_3	resident_child	1.20E-08	6.28E-03

Proposed facility chronic risk and hazard results
Potential-to-emit with voluntary permit limits
Perham Resource Recovery Faciliy, Perham, Minnesota

Receptor	Scenario	Lifetime Excess Cancer Risk	Hazard Index
RI_1	fisher_adult	1.42E-07	9.70E-03
RI_1	fisher_child	5.98E-08	1.35E-02
RI_1	resident_adult	1.42E-07	9.70E-03
RI_1	resident_child	5.98E-08	1.35E-02
RI_10	farmer_adult	3.85E-07	1.52E-03
RI_10	farmer_child	8.21E-08	1.99E-03
RI_10	fisher_adult	8.12E-09	7.39E-04
RI_10	fisher_child	2.87E-09	8.71E-04
RI_11	farmer_adult	1.82E-05	6.55E-02
RI_11	farmer_child	3.89E-06	9.16E-02
RI_11	fisher_adult	3.65E-07	2.64E-02
RI_11	fisher_child	1.47E-07	3.52E-02
RI_12	farmer_adult	1.81E-05	6.55E-02
RI_12	farmer_child	3.86E-06	9.20E-02
RI_12	fisher_adult	3.66E-07	2.64E-02
RI_12	fisher_child	1.48E-07	3.55E-02
RI_13	farmer_adult	1.90E-05	6.89E-02
RI_13	farmer_child	4.06E-06	9.67E-02
RI_13	fisher_adult	3.89E-07	2.76E-02
RI_13	fisher_child	1.59E-07	3.73E-02
RI_14	farmer_adult	1.58E-06	5.57E-03
RI_14	farmer_child	3.36E-07	7.52E-03
RI_14	fisher_adult	2.98E-08	2.36E-03
RI_14	fisher_child	1.13E-08	2.91E-03
RI_15	farmer_adult	7.05E-07	2.51E-03
RI_15	farmer_child	1.50E-07	3.26E-03
RI_15	fisher_adult	1.24E-08	1.14E-03
RI_15	fisher_child	4.17E-09	1.30E-03
RI_16	farmer_adult	1.76E-06	6.12E-03
RI_16	farmer_child	3.75E-07	8.31E-03
RI_16	fisher_adult	3.29E-08	2.53E-03
RI_16	fisher_child	1.27E-08	3.16E-03
RI_17	farmer_adult	1.70E-06	5.92E-03
RI_17	farmer_child	3.63E-07	8.04E-03
RI_17	fisher_adult	3.18E-08	2.45E-03
RI_17	fisher_child	1.22E-08	3.06E-03
RI_18	farmer_adult	1.69E-06	5.87E-03
RI_18	farmer_child	3.60E-07	7.96E-03
RI_18	fisher_adult	3.16E-08	2.43E-03
RI_18	fisher_child	1.21E-08	3.03E-03
RI_19	farmer_adult	9.73E-06	3.66E-02
RI_19	farmer_child	2.08E-06	5.24E-02
RI_19	fisher_adult	2.11E-07	1.46E-02
RI_19	fisher_child	8.88E-08	2.06E-02

Proposed facility chronic risk and hazard results
Potential-to-emit with voluntary permit limits
Perham Resource Recovery Faciliy, Perham, Minnesota

Receptor	Scenario	Lifetime Excess Cancer Risk	Hazard Index
RI_2	fisher_adult	9.34E-08	6.42E-03
RI_2	fisher_child	3.89E-08	8.71E-03
RI_2	resident_adult	9.34E-08	6.42E-03
RI_2	resident_child	3.89E-08	8.71E-03
RI_20	farmer_adult	8.90E-06	3.33E-02
RI_20	farmer_child	1.90E-06	4.75E-02
RI_20	fisher_adult	1.91E-07	1.33E-02
RI_20	fisher_child	8.00E-08	1.87E-02
RI_21	farmer_adult	1.17E-05	4.45E-02
RI_21	farmer_child	2.50E-06	6.42E-02
RI_21	fisher_adult	2.55E-07	1.77E-02
RI_21	fisher_child	1.08E-07	2.54E-02
RI_22	farmer_adult	1.15E-05	4.39E-02
RI_22	farmer_child	2.45E-06	6.36E-02
RI_22	fisher_adult	2.52E-07	1.75E-02
RI_22	fisher_child	1.07E-07	2.52E-02
RI_3	fisher_adult	5.78E-07	3.90E-02
RI_3	fisher_child	2.47E-07	5.71E-02
RI_3	resident_adult	5.78E-07	3.90E-02
RI_3	resident_child	2.47E-07	5.71E-02
RI_4	fisher_adult	5.03E-08	3.32E-03
RI_4	fisher_child	2.10E-08	4.32E-03
RI_4	resident_adult	5.03E-08	3.32E-03
RI_4	resident_child	2.10E-08	4.32E-03
RI_5	fisher_adult	3.37E-07	2.11E-02
RI_5	fisher_child	1.46E-07	3.07E-02
RI_5	resident_adult	3.37E-07	2.11E-02
RI_5	resident_child	1.46E-07	3.07E-02
RI_6	fisher_adult	6.82E-07	4.75E-02
RI_6	fisher_child	2.87E-07	6.78E-02
RI_6	resident_adult	6.82E-07	4.75E-02
RI_6	resident_child	2.87E-07	6.78E-02
RI_7	fisher_adult	1.07E-07	4.55E-03
RI_7	fisher_child	5.20E-08	6.96E-03
RI_7	resident_adult	1.07E-07	4.55E-03
RI_7	resident_child	5.20E-08	6.96E-03
RI_8	fisher_adult	1.50E-07	7.38E-03
RI_8	fisher_child	6.95E-08	1.09E-02
RI_8	resident_adult	1.50E-07	7.38E-03
RI_8	resident_child	6.95E-08	1.09E-02
RI_9	farmer_adult	1.39E-05	5.01E-02
RI_9	farmer_child	2.96E-06	7.02E-02
RI_9	fisher_adult	2.87E-07	2.01E-02
RI_9	fisher_child	1.18E-07	2.70E-02

Proposed facility chronic risk and hazard results
Potential-to-emit with voluntary permit limits
Perham Resource Recovery Faciliy, Perham, Minnesota

Receptor	Scenario	Lifetime Excess Cancer Risk	Hazard Index
Res1	fisher_adult	2.51E-07	1.57E-02
Res1	fisher_child	1.07E-07	2.30E-02
Res1	resident_adult	2.51E-07	1.57E-02
Res1	resident_child	1.07E-07	2.30E-02
Res2	fisher_adult	1.56E-07	8.94E-03
Res2	fisher_child	6.65E-08	1.30E-02
Res2	resident_adult	1.56E-07	8.94E-03
Res2	resident_child	6.65E-08	1.30E-02
Res3	fisher_adult	1.36E-07	8.38E-03
Res3	fisher_child	5.65E-08	1.19E-02
Res3	resident_adult	1.36E-07	8.38E-03
Res3	resident_child	5.65E-08	1.19E-02

Existing Scenario Results
Perham Resource Recovery Facility, Perham, MN

Receptor	Scenario	Lifetime Excess Cancer Risk	Hazard Index
RI_1	fisher_adult	1.22E-06	3.03E-02
RI_1	fisher_child	4.86E-07	4.02E-02
RI_1	resident_adult	1.22E-06	3.03E-02
RI_1	resident_child	4.86E-07	4.02E-02
RI_10	farmer_adult	2.55E-06	5.94E-03
RI_10	farmer_child	5.43E-07	8.19E-03
RI_10	fisher_adult	3.76E-08	1.25E-03
RI_10	fisher_child	1.42E-08	1.53E-03
RI_11	farmer_adult	3.83E-04	8.30E-01
RI_11	farmer_child	8.17E-05	1.16E+00
RI_11	fisher_adult	4.96E-06	1.30E-01
RI_11	fisher_child	1.86E-06	1.64E-01
RI_12	farmer_adult	3.82E-04	8.30E-01
RI_12	farmer_child	8.16E-05	1.16E+00
RI_12	fisher_adult	4.95E-06	1.31E-01
RI_12	fisher_child	1.86E-06	1.65E-01
RI_13	farmer_adult	3.57E-04	7.82E-01
RI_13	farmer_child	7.63E-05	1.10E+00
RI_13	fisher_adult	4.90E-06	1.23E-01
RI_13	fisher_child	1.91E-06	1.61E-01
RI_14	farmer_adult	9.96E-06	2.22E-02
RI_14	farmer_child	2.12E-06	3.10E-02
RI_14	fisher_adult	1.43E-07	3.87E-03
RI_14	fisher_child	5.59E-08	4.93E-03
RI_15	farmer_adult	6.58E-06	1.39E-02
RI_15	farmer_child	1.41E-06	1.92E-02
RI_15	fisher_adult	7.58E-08	2.10E-03
RI_15	fisher_child	2.57E-08	2.40E-03
RI_16	farmer_adult	1.12E-05	2.50E-02
RI_16	farmer_child	2.40E-06	3.50E-02
RI_16	fisher_adult	1.63E-07	4.27E-03
RI_16	fisher_child	6.44E-08	5.51E-03
RI_17	farmer_adult	1.10E-05	2.45E-02
RI_17	farmer_child	2.34E-06	3.42E-02
RI_17	fisher_adult	1.60E-07	4.20E-03
RI_17	fisher_child	6.32E-08	5.41E-03
RI_18	farmer_adult	1.09E-05	2.42E-02
RI_18	farmer_child	2.32E-06	3.39E-02
RI_18	fisher_adult	1.58E-07	4.17E-03
RI_18	fisher_child	6.23E-08	5.37E-03
RI_19	farmer_adult	1.29E-04	2.83E-01
RI_19	farmer_child	2.74E-05	3.98E-01
RI_19	fisher_adult	1.79E-06	4.54E-02
RI_19	fisher_child	7.03E-07	5.99E-02
RI_2	fisher_adult	7.47E-07	1.82E-02
RI_2	fisher_child	3.01E-07	2.43E-02
RI_2	resident_adult	7.47E-07	1.82E-02
RI_2	resident_child	3.01E-07	2.43E-02

RI_20	farmer_adult	1.14E-04	2.53E-01
RI_20	farmer_child	2.44E-05	3.55E-01
RI_20	fisher_adult	1.62E-06	4.08E-02
RI_20	fisher_child	6.44E-07	5.43E-02
RI_21	farmer_adult	1.88E-04	4.13E-01
RI_21	farmer_child	4.02E-05	5.80E-01
RI_21	fisher_adult	2.51E-06	6.63E-02
RI_21	fisher_child	9.62E-07	8.64E-02
RI_22	farmer_adult	1.78E-04	3.92E-01
RI_22	farmer_child	3.81E-05	5.51E-01
RI_22	fisher_adult	2.41E-06	6.30E-02
RI_22	fisher_child	9.33E-07	8.29E-02
RI_3	fisher_adult	1.33E-05	3.08E-01
RI_3	fisher_child	5.65E-06	4.49E-01
RI_3	resident_adult	1.33E-05	3.08E-01
RI_3	resident_child	5.65E-06	4.49E-01
RI_4	fisher_adult	3.40E-07	7.76E-03
RI_4	fisher_child	1.41E-07	1.04E-02
RI_4	resident_adult	3.40E-07	7.76E-03
RI_4	resident_child	1.41E-07	1.04E-02
RI_5	fisher_adult	1.56E-06	3.89E-02
RI_5	fisher_child	6.22E-07	5.17E-02
RI_5	resident_adult	1.56E-06	3.89E-02
RI_5	resident_child	6.22E-07	5.17E-02
RI_6	fisher_adult	1.11E-05	2.66E-01
RI_6	fisher_child	4.54E-06	3.70E-01
RI_6	resident_adult	1.11E-05	2.66E-01
RI_6	resident_child	4.54E-06	3.70E-01
RI_7	fisher_adult	2.49E-06	5.33E-02
RI_7	fisher_child	1.08E-06	7.57E-02
RI_7	resident_adult	2.49E-06	5.33E-02
RI_7	resident_child	1.08E-06	7.57E-02
RI_8	fisher_adult	3.90E-06	8.71E-02
RI_8	fisher_child	1.66E-06	1.23E-01
RI_8	resident_adult	3.90E-06	8.71E-02
RI_8	resident_child	1.66E-06	1.23E-01
RI_9	farmer_adult	3.25E-04	7.11E-01
RI_9	farmer_child	6.94E-05	9.96E-01
RI_9	fisher_adult	4.45E-06	1.12E-01
RI_9	fisher_child	1.73E-06	1.46E-01
Res_1	fisher_adult	1.80E-05	4.13E-01
Res_1	fisher_child	7.80E-06	6.16E-01
Res_1	resident_adult	1.80E-05	4.13E-01
Res_1	resident_child	7.80E-06	6.16E-01
Res_2	fisher_adult	1.95E-05	4.48E-01
Res_2	fisher_child	8.41E-06	6.65E-01
Res_2	resident_adult	1.95E-05	4.48E-01
Res_2	resident_child	8.41E-06	6.65E-01
Res_3	fisher_adult	1.66E-05	3.87E-01
Res_3	fisher_child	7.01E-06	5.57E-01
Res_3	resident_adult	1.66E-05	3.87E-01
Res_3	resident_child	7.01E-06	5.57E-01

Existing Facility acute inhalation hazard results
Perham Resource Recovery Facility, Perham, Minnesota

Receptor	Location Name	Coordinates	HQ from MWC stack	HQ from vehicle emissions	Total Acute HQ
RCPTR_1	Child care NE of facility	303994.28 / 5163355.28	0.11	0.003	0.11
RCPTR_2	Perham Living	302274.80 / 5163555.25	0.06	0.002	0.07
RCPTR_3	St. Henry's School	302701.46 / 5163330.45	0.07	0.002	0.08
RCPTR_4	Child care WNW of facility	302151.77 / 5163342.66	0.06	0.002	0.06
RCPTR_5	Heart of the Lake Elementary	302328.90 / 5162536.45	0.07	0.001	0.07
RCPTR_6	Perham Senior High	302683.14 / 5162872.37	0.07	0.002	0.08
RCPTR_7	Perham Area Targeted Services	302579.31 / 5162921.23	0.07	0.002	0.07
RCPTR_8	Child care NNE of facility	303733.62 / 5163474.69	0.11	0.002	0.11
RCPTR_9	Child care W of facility	303190.43 / 5163069.76	0.09	0.003	0.09
RCPTR_10	Child care WSW of facility	302960.80 / 5162773.47	0.09	0.002	0.10
RCPTR_11	Child care NNW of facility	303271.91 / 5163691.96	0.09	0.002	0.09
RCPTR_12	Child care NW of facility	302965.74 / 5163748.75	0.10	0.002	0.10
RI_1	Perham Area Learning Center	303518.64 / 5163804.22	0.08	0.002	0.08
RI_2	SW of facility	302215.30 / 5160948.80	0.05	0.001	0.05
RI_3	Fenceline S of facility	303545.85 / 5162942.28	0.07	0.007	0.07
RI_4	Fenceline W of facility	303471.50 / 5162955.60	0.02	0.012	0.03
Res_1	House 1 north of facility	303511.46 / 5163141.23	0.09	0.004	0.09
Res_2	House 2 north of facility	303536.00 / 5163136.00	0.08	0.005	0.08
Res_3	House 3 north of facility	303563.00 / 5163136.00	0.08	0.004	0.09

Appendix K

MPCA Impact Analysis Summary

MINNESOTA POLLUTION CONTROL
AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

1. **AQ Facility ID No.:** 11100036 **AQ File No.:**
2. **Facility Name:** Perham Resource Recovery Facility
3. **Date of Initial Submittal** (and major revisions)**:** 4/11/12, 5/10/12, 5/17/12, 6/13/12, 9/5/12, 9/25/12, 10/16/12 (new dioxin/furan limit proposed)
4. **Date of Risk Manager Meeting:** 10/16/12 team meeting
5. **Project Team Members:** Heather Magee-Hill, Greg Pratt, Bruce Braaton, Kevin Kain
6. **Assigned Section Manager:** Frank Kohlasch, Don Smith
7. **Standard Industrial Classification (SIC):** 4953

8. **General Summary**

a. Facility and Project Description

The Perham Resource Recovery Facility (PRRF) is an existing waste to energy facility with two municipal waste combustion (MWC) units, one waste heat boiler, one air pollution control (APC) system train, and one auxiliary boiler. It is capable of combusting 116 tons of municipal waste per day.

The facility is proposing to add a second heat recovery boiler, second set of air pollution control equipment, lower mercury and dioxin limits, a new higher combined stack (at 125ft instead of 70ft), and a materials recovery facility. This would allow the proposer to remove recyclable and undesirable materials before combusting a total of 200 tons of pre-sorted municipal waste per day. The proposal includes annexing new land, constructing a new wing, re-routing truck traffic, and re-fencing and landscaping the property.

b. General Site Setting Description

The facility is located in an industrially zoned area in the City of Perham. See Appendix A Figure 1 and 2 for maps of the area. There are residents just north of the facility boundary. Within 1.5 km there are several other industries, schools, daycare facilities, a nursing home, but no farms raising animals. Within 3 km is the Little Pine Lake and Otter Tail River. Within 10 km there are livestock farms.

c. Emissions Summary

The facility emission estimates were based on potential emission rates calculated from existing and proposed permit limits (including a lower dioxin/furan limit on the North Unit from 125 ng/dscm to 20 ng/dscm and taking a lower whole facility limit on mercury from 60 ug/dscm to 41 ug/dscm), stack testing conducted at the facility and similar facilities, and EPA AP-42 emission factors. The vehicle emission estimates were based on EPA AP-42 emission factors and published studies. With the exception of the PAH emissions (which are from stack tests from a similar facility) the supplemental analysis of farmer cancer risks were based on stack test data from the facility.

d. Dispersion Summary

Unitized dispersion factors were generated by AERMOD for the RASS and MMREM analyses. AERMOD was also used to calculate dispersion, deposition, and plume depletion for the refined IRAP analysis used to calculate multi-pathway risk estimates.

e. Facility Risk Summary

Overall risk estimates decreased substantially as a result of the proposed permit changes. This is primarily because of the stack height increase from 70ft to 125ft tall, a lower proposed mercury limit and a lower proposed dioxin/furan limit. The areas of highest modeled risk estimates were along the eastern property boundary of the facility from the hourly modeling; and north of the facility for the annual modeling.

Maximum risk estimates from the proposed facility were below MPCA facility risk guidelines for all hypothetical exposure pathways except the farmer cancer exposure pathway. Maximum farmer cancer risk estimates were above the risk guideline used for MPCA facility risk assessments (1 in 100,000 or 1E-5) but were consistent with risks from similar facilities and were within EPA's excess cancer risk goal range of 1 in 1,000,000 to 1 in 10,000 (see Appendix A Figure 3).

This exposure scenario includes a summation of the following exposure pathways: inhalation and consumption of pork, beef, milk, produce, and soil. The main pollutants contributing to this potential estimated risk (i.e. risk drivers) were dioxins/furans from the consumption of animal products.
MPCA risk assessment results are considered in the context of current and potential future land use or zoning classifications. Farmer cancer risks for areas zoned for agriculture were consistent with similar facilities (less than 2E-5) and were based on emission limits similar to other facilities. Additional farmer cancer results were calculated for land use areas that currently include animal husbandry included: a location raising cows for beef consumption, a dairy for milk consumption, a hog operation for pig consumption and a poultry farm for egg and poultry consumption. All of the results of these single pathway analyses were below facility risk guidelines.

MPCA risk assessment results are based on potential or allowable emissions. Sometimes it is useful to consider a facility's likely actual emissions in comparison to the permit limited and potential emission. Additional analyses incorporating actual emission estimates resulted in cancer risk estimates less than 4E-7.

MMREM was used to estimate the potential risks of mercury exposure from fish consumption. The facility hazard quotients (long-term, non-cancer risk estimates) with the new proposed Hg limit were just below facility risk guidelines for the subsistence fisher. Risks estimates, for a subsistence fisher pathway, based on PBT pollutants *other* than Hg, were included in the urban gardener pathway and found to be below facility risk guidelines when added to the other non-Hg pollutant risk estimates.

f. Cumulative Inhalation Risk Summary

A cumulative air emissions risk analysis was completed for environmental review projects, and at the agency's discretion. This analysis combines facility results and risk results estimated from ambient monitoring data that is relevant to Perham's population density. Due to data limitations, the cumulative air emissions risk analysis consists of a summation of risk results for the inhalation pathway. The facility results used in the summation were the maximum modeled facility-specific risks. Risk results were estimated for ambient monitor data using an upper bound average for chronic risks and a maximal value for acute risk estimates. The cumulative risk results were compared to the risk guidelines for informational purposes, as there is no cumulative risk guideline on the state or federal level. The cumulative air emission risk analysis results were below facility risk guidelines for acute non-cancer and chronic non-cancer. These summed results are above facility risk guidelines for cancer based risk estimates. Inhalation cancer risk estimates from ambient air monitoring data are above facility risk guidelines throughout the state, but lie within EPA's excess cancer risk goal range of 1 in 1,000,000 to 1 in 10,000. Due to a change in stack height and lower Hg and dioxin/furan limits the potential risk estimates with the proposed changes are lower.

Quantitative Summary

In human health risk assessment, quantitative and qualitative information, and descriptions of uncertainty, are all a part of the analysis. This is a process whereby results are estimated at a screening level, then further refined, and finally any remaining uncertainty is described. In the Perham HHRA several types of refinement were performed including dispersion, deposition and exposure assumptions. The refinement of dispersion and deposition modeling involved switching from the MPCA Risk Assessment Spreadsheet (RASS) to a more data intensive software program named IRAP h-view. All pollutant emissions were first entered into the RASS. The pollutants that were above risk driver levels (those above 10% of MPCA risk guidelines) were then extracted from the RASS and entered into IRAP h-view modeling for a refinement in dispersion and deposition characterization. The pollutants in the tables below were those that were analyzed by IRAP h-view. Total risk results reported in Tables a, b and c below are a summation of the non-risk driver pollutants from the RASS and the results from IRAP h-view.

Summary of Potential Changes in Emission Rates

(The Total Facility emissions are a summation of the Proposed Project and the Auxiliary Boiler. The emissions from the Auxiliary Boiler are so low as to render them as an inconsequential portion of the Total Facility.)

Hourly Emission Levels for Acute Analysis (g/s)

CAS	Name	Existing project (SV001)	Proposed project (SV009)	Auxiliary Boiler (SV004)
10102-44-0	Nitrogen dioxide	5.90E+00	1.09E+01	3.30E-01
7647-01-0	Hydrogen chloride	2.34E+00	2.38E+00	N/A
10102-44-0	Nitrogen dioxide from vehicles	1.93E-03	2.99E-03	N/A

Annual Emission Levels of Compounds of Potential Interest (g/s)

CAS	Name	Existing project (SV001)	Proposed Project (SV009)	Auxiliary Boiler (SV004)
7647-01-0	Hydrogen chloride	2.13E+00	2.17E+00	N/A
7439-92-1	Lead	8.94E-03	9.31E-03	5.16E-06
7440-43-9	Cadmium	5.59E-04	6.21E-04	1.13E-05
86-73-7	Fluorene	6.90E-06	1.28E-05	2.89E-08
85-01-8	Phenanthrene	4.85E-06	8.97E-06	1.75E-07
120-12-7	Anthracene	9.69E-07	1.79E-06	2.48E-08
83-32-9	Acenaphthene	8.89E-07	1.65E-06	1.86E-08
206-44-0	Fluoranthene	2.40E-07	4.44E-07	3.09E-08
129-00-0	Pyrene	1.74E-07	3.22E-07	5.16E-08
3268-87-9	Total OCDD	9.22E-08	2.25E-08	N/A
35822-46-9	HpCDD, 1,2,3,4,6,7,8-	6.09E-08	1.48E-08	N/A

CAS	Name	Existing project (SV001)	Proposed Project (SV009)	Auxiliary Boiler (SV004)
51207-31-9	TCDF, 2,3,7,8-	5.75E-08	1.40E-08	N/A
67562-39-4	HpCDF, 1,2,3,4,6,7,8-	2.66E-08	6.48E-09	N/A
39001-02-0	Total OCDF	1.56E-08	3.81E-09	N/A
70648-26-9	HxCDF, 1,2,3,4,7,8-	1.08E-08	2.62E-09	N/A
57653-85-7	HxCDD, 1,2,3,6,7,8-	9.13E-09	2.22E-09	N/A
60851-34-5	HxCDF, 2,3,4,6,7,8-	9.08E-09	2.21E-09	N/A
57117-44-9	HxCDF, 1,2,3,6,7,8-	8.98E-09	2.19E-09	N/A
57117-31-4	PeCDF, 2,3,4,7,8-	8.40E-09	2.05E-09	N/A
57117-41-6	PeCDF, 1,2,3,7,8-	6.10E-09	1.49E-09	N/A
19408-74-3	HxCDD, 1,2,3,7,8,9-	4.82E-09	1.17E-09	N/A
55673-89-7	HpCDF, 1,2,3,4,7,8,9-	4.71E-09	1.15E-09	N/A
72918-21-9	HxCDF, 1,2,3,7,8,9-	4.31E-09	1.05E-09	N/A
39227-28-6	HxCDD, 1,2,3,4,7,8-	4.09E-09	9.95E-10	N/A
40321-76-4	PeCDD, 1,2,3,7,8-	3.84E-09	9.36E-10	N/A
1746-01-6	TCDD, 2,3,7,8-	8.03E-10	1.96E-10	N/A
10102-44-0	Nitrogen dioxide	5.36E+00	1.09E+01	3.30E-01

9. **What is the source of the following summaries?** RASS spreadsheets PLMSWA_RASS_existing.xlsx, PLMSWA_RASS_proposed.xlsx and IRAP modeling files 20PcaPr921, ex10k830, AcTrk921, AcFac921. MPCA staff added a uniform risk receptor grid to the IRAP modeling in order to verify the maximum risk estimates. The maximum estimates summarized below maybe different than what is reported in the HHRA report because of differences in receptor location, changes in how the buildings were modeled, and changes in dioxin/furan limits, which was submitted after the HHRA report.

Note: The hazard index (HI) against which facility risks are compared for acute, sub-chronic and chronic non-cancer risks is 1. The cancer risk against which facility risks are compared is 1 E-5 (or 1 chance in 100,000). These facility risk guidelines are risk management-based. They are not discrete indicators of observed adverse effect. If a risk estimate falls below facility risk guidelines, the MPCA may conclude that the assessed health effects from the proposed action are unlikely to occur or will be negligible. A risk estimate that is higher than a guideline may trigger further consideration. Although the risk guidelines are compared to results given in one significant figure some results are summarized below in two significant figures because they were used in additional cumulative calculations.

a. **Total Maximum Facility Risk Estimates with Existing Permit Requirements including RASS and IRAP**

	Total Inhalation Screening Hazard Indices and Cancer Risks	Total Multi-pathway Screening Hazard Indices and Cancer Risks

	Acute	Sub-chronic Noncancer	Chronic Noncancer	Cancer	Urban Gardener Noncancer	Urban Gardener Cancer	Farmer Noncancer	Farmer Cancer
RASS	0.18	1.9E-3	9.0E-2	1.7E-6	9.5E-2	2.4E-6	9.5E-2	4.4E-6
IRAP	0.66		0.31	7.0E-6	0.45	1.95E-5	2.71	1.19E-3
Total	**0.84**	**1.9E-3**	**0.4**	**8.7E-6**	**0.55**	**2.19E-5**	**2.81**	**1.2E-3**

b. Maximum Facility Risk Estimates with Proposed Permit Changes including RASS, IRAP and Vehicle emissions

	Total Inhalation Screening Hazard Indices and Cancer Risks				Total Multi-pathway Screening Hazard Indices and Cancer Risks			
	Acute	Sub-chronic Noncancer	Chronic Noncancer	Cancer	Urban Gardener Noncancer	Urban Gardener Cancer	Farmer Noncancer	Farmer Cancer
RASS	0.03	1.4E-4	4.3E-2	1.0E-6	0.05	1.7E-6	0.05	1.8E-6
IRAP	0.23		3.4E-2	2.5E-7	0.05**	1.8E-6**	0.11	3.1E-5 (**1.9E-5** max in agriculturally zoned areas)
Vehicles	0.07*			Diesel included in RASS above				
Total	**0.33**	**1.4E-4**	**7.7E-2**	**1.3E-6**	**0.10**	**3.5E-6**	**0.16**	**3.3E-5**

* Includes refined IRAP modeling for NO2 for vehicles on the south side 0.03 and screening modeling for Bongards (a nearby creamery) and incinerator vehicles on the northside 0.04.
**Includes results from subsistence fisher exposure pathway for all pollutants except Hg.

Note:

- Risk results assuming current animal husbandry were below facility risk guidelines at a location raising cows for beef consumption, a dairy for milk consumption, a hog operation for pig consumption and a poultry farm for egg and poultry consumption.
- Risk analyses based on actual emissions estimates were also below facility risk guidelines, with the highest being a farmer cancer risk estimate of less than 4E-7 (assuming current animal husbandry).

c. Incremental Change in Maximum Risk Estimates from Proposed Permit Changes

Total Inhalation Screening Hazard Indices and Cancer Risks				Total Multi-pathway Screening Hazard Indices and Cancer Risks			
Acute	**Sub-chronic Noncancer**	**Chronic Noncancer**	**Cancer**	**Urban Gardener Noncancer**	**Urban Gardener Cancer**	**Farmer Noncancer**	**Farmer Cancer**
-0.51	-1.8E-3	-0.32	-7.4E-6	-0.44	-1.3E-5	-2.65	-1.2E-3

10. For each exposure pathway below, list the risk drivers and their percent contribution to the hazard indices or cancer risks.

Acute Exposure Pathway after proposed permit changes

Chemical	**Acute risk**	**% contribution**	**Exposure/Health End Point**
NO_2	0.29	~92%	Acute inhalation/respiratory system

a. **Inhalation Exposure Pathway** after proposed permit changes All individual pollutants below risk driver levels

b. **Total Risks** after proposed permit changes

Chemical		**% contributi on**	**Exposure**
Dioxins/F urans	**Cancer risk** 1.6E -6 **Cancer risk** 3.0E-5 **Non-cancer** 0.06	46% 91% 54%	Urban gardener and subsistence fisher, exposed mostly through animal product consumption, including fish. Fish alone contributed 67%. Farmer cancer and non-cancer risk mostly through animal product consumption.

11. Were surrogate inhalation health benchmarks used for risk drivers? No **Which ones and what further analysis might better inform the risks?** N/A

12. Are the criteria pollutants compared to the AAQS using "high first high" modeled concentrations (rather than the regulatory standard)?

A full criteria pollutant modeling effort (NAAQS) was conducted for the PRRF as a part of the environmental review and permit application. Criteria pollutant modeling results and methodology descriptions are discussed in the following report: "Ambient Air Dispersion Modeling Report; Modification of the South Municipal Waste Combustor Unit at the Perham Resource Recovery Facility, Perham, Minnesota". The summarized results are in the tables below. Criteria pollutant modeling is conducted according to methodologies approved by EPA, and compared to standards that are developed to be health protective.

Although they are single pollutant, NAAQS analyses are considered cumulative in that they the concentrations from background and/or emissions from nearby sources.

The AERA results directly reflect two criteria pollutants including; potential health effects of short- term exposure to nitrogen dioxide, and potential carcinogenic impacts from lead. Particulate matter is not directly incorporated into risk results, however the toxic components on or within particles is a portion of the risk results presented in this summary and other PRRF reports.

Pollutant	Averaging Period	SILs (µg/m3)	Modeled Impacts* Change from Existing Facility (µg/m3)	Exceeds SILs	Modeled Impacts* Total Impacts of New Facility (µg/m3)	Exceeds SILs
PM_{10}	24-hour	5	4.85	NO	7.44	YES
	Annual	1	0.38	NO	2.26	YES
$PM_{2.5}$	24-hour	1.2	0.93	NO	5.95	YES
	Annual	0.3	0.08	NO	1.72	YES
SO_2	1-hour	7.83	1.30	NO	13.01	YES
	3-hour	25.0	0.44	NO	11.85	NO
	24-hour	5	0.11	NO	7.75	YES
	Annual	1	0.00	NO	0.28	NO
NO_2	1-hour	7.52	NA	YES	40.56	YES
	Annual	1	NA	YES	6.48	YES
CO	1-hour	2000	3.28	NO	112.14	NO
	8-hour	500	0.73	NO	95.03	NO
* highest first high			The change from existing case was not modeled for NO_2. The assumption was made that the SIL would be exceeded for NO_2 due to the changes from existing.			

Modeled Criteria Pollutant Concentrations in Comparison to the Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS/ MAAQS (µg/m3)	Back-ground (µg/m3)	Modeled Impact (µg/m3)	Total Impact (µg/m3)	Exceeds NAAQS/ MAAQS?
NO_2	1-hour	188 / NA	86.5	32.37	118.87	NO
	Annual	100 / 100	16.9	6.48	23.38	NO
Lead (Pb)	3-month	0.15 / 1.5	0.034	4.67E-03	3.87E-02	NO
$PM_{2.5}$	24-hour	35 / 65	22.8	5.95	28.75	NO
	Annual	15 / 15	9.5	1.72	11.22	NO

13. **Mercury (Hg) Analysis:** The draft permit contains a proposal to decrease the permit limit for mercury from 60 ug/dscm to 41 ug/dscm for the entire facility. The southern tip of Little Pine Lake and the Otter Tail River are within 3km of the facility boundary. Little Pine Lake is potentially the most impacted water body in the area, and is a known fishing location. MMREM results are reported in the Table below.

MMREM Results Summary for Little Pine Lake

Subsistence Fisher Subsistence-level fish consumption is roughly equivalent to 2.2 pounds of fish (4-5 meals) consumed per week, 52 weeks per year.				
Emission Scenario	**Ambient Background**	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**
Existing Potential to Emit (60 μg/dscm)	8.2	1.4	9.6	14%
Post-expansion Potential to emit (41 μg/dscm)	8.2	0.999	9.2	12%
Potential change due to expansion				-2%
Existing actual (15 μg/dscm per 2011 stack test)	8.2	0.2	8.4	3%
Recreational Fisher Recreational-level fish consumption is roughly equivalent to 0.5 pounds of fish (1 meal) consumed per week, 52 weeks per year.				
	Non-facility Background	**Total Facility Contribution at PTE**	**Total**	**Percent Expanded Facility Contributes to Total**
Existing Potential to Emit (60 μg/dscm)	1.7	0.3	2.0	14%
Post-expansion Potential to emit (41 μg/dscm)	1.7	0.2	1.9	11%
Potential change due to expansion				-3%
Existing actual (15 μg/dscm per 2011 stack test)	1.7	0.1	1.8	3%

Qualitative Evaluation

Exposure Setting The facility is located in an industrially zoned area in the City of Perham. See Appendix A, Figures 1 and 2 for maps of the area. There are residents just north of the facility boundary. The following areas of interest or potential susceptible populations lie within the following boundaries around the facility:

- Within 1.5 km: there are several other industries, schools, daycare facilities, a nursing home, but no farms raising animals.
- Within 3 km: Little Pine Lake and Otter Tail River.
- Within 10 km: There are farms raising animals.

14. Describe multimedia issues that may be relevant to this facility.
PBT's such as PCB's, dioxins and furans are emitted from this facility. Thus, ingestion and multi-pathway related exposure issues are relevant to this facility.

15. Describe current or future exposure based on zoning and land use information. The facility is located in an industrially zoned area with residents and farms within 1.5km (animal husbandry within 10km).

16. Describe the types of sensitive receptors within 1.5 kilometers from the facility. There are several schools, daycare facilities, and a nursing home within 1.5km, but none in the industrial park. See Appendix A Figure 1.

Summarize evidence that land in the area of impact will or will not be used for agriculture. Describe agricultural setting. The land within 10km of the facility boundary is currently being used for multiple types of agriculture. A survey of the local agriculture was conducted and discussed in the HHRA. There are no farms raising animals within 1.5km of the facility. There are, however, fields where potatoes and soybeans are typically grown. Livestock farms, and the respective risks, were identified in Figure 3 in Appendix A. The land is zoned such that residents may garden and raise chickens for eggs within 3 km. Thus, an urban gardener exposure was assessed assuming the residential inhalation, consumption of produce, incidental soil ingestion, the consumption of 7 eggs per week and a recreational level of fish (See Appendix B, Table 2).

17. If PBTs are emitted, list and describe fishable water bodies within appropriate radius [3 km] from facility/property boundary.
The southern tip of Little Pine Lake and the Otter Tail River are within 3km of the facility boundary. Little Pine Lake is potentially the most impacted water body in the area, and is a known fish location.

Cumulative Analysis

What other permitted facilities that have air emissions are located within a 1.5 kilometer radius of the facility? The only facility located within 3km with a Title V permit is Barrel O' Fun Snack Foods Company. The MPCA is not aware of any facility-specific risks analysis completed for air permitting or environmental review. The following facilities with registration permits are located within 1.5 km of the facility boundary: Tuffy's Pet food, Bongard's Creamery, Industrial Finishing Services, and Kenny's Candy Company, Perham Feed Mill-EBO Farms, Strata Concrete Services. Perham Egg is located very close to the facility but does not have an air permit.

Describe general statewide monitoring data and how it relates to the chemicals emitted at this facility. If monitor is within vicinity, provide data. Statewide ambient air monitoring data collected between 2008-2010 at sites with population densities between 500 and 2,999 were used to estimate background inhalation risks. These risk estimates use upper estimates of averages for long-term risk estimates and maximal values for acute risk estimations. These risk estimates are summarized below:

Risks by target health endpoints

	Respiratory	Nervous system	Eyes	Reproductive	Developmental	Hematopoietic
Chronic	0.44	0.13				
Acute	0.47		0.23		0.1	

Risks by pollutant families

Pollutant group name	Cancer risk in 100,000	Chronic non-cancer	Acute non-cancer
Metals	0.31	0.14	0.09
VOCs	1.86	0.14	0.04
Carbonyls	1.28	0.40	0.27
NO_2 (Respiratory)			0.19
Sum	3	0.7	0.6

VOCs = Volatile Organic Compounds (VOCs)   Nitrogen Dioxide (NO2)

Risk-driver pollutant risks: 1,3 Butadiene, Carbon tetrachloride, benzene, Formaldehyde, Acetaldehyde, Chromium, Manganese, N02, p-dichlorobenzene, Arsenic, Nickel

Note: Two significant figures do not characterize the correct degree of uncertainty in these estimations of risk; however two significant figures are shown for transparency of the risk summation. Rounding performed after summation of pollutant based risks.

Cumulative Inhalation Risk Estimates

	Inhalation Cancer risk	Inhalation Chronic non-cancer hazard index *	Inhalation Acute hazard index *
Ambient monitoring data	**3.5 in 100,000**	**0.69 (respiratory 0.44)**	**0.58 (respiratory 0.47)**
Modeled off-site sources (separated by source)	**NA**	**NA**	**NA**
Total proposed facility	**0.1 in 100,000**	**0.08**	**0.33**
Total cumulative sum – proposed facility	**3.6 in 100,000**	**0.77**	**0.91**
Change in risk from proposal	**Decrease**	**Decrease**	**Decrease**
% contribution from proposal of total cumulative sum	**N/A Decrease**	**N/A Decrease**	**N/A Decrease**

ADDITIONAL INFORMATION

a. **Missing chemicals or sources:** *We assume a reasonable effort was made to find all pollutant emissions and sources. We have included all reported pollutant emissions in the quantitative and qualitative information of the AERA.*
b. **Are there any potentially missing sources from the emission list not included in the RASS or IRAP?** Not to our knowledge.

   c. **Is there information suggesting additional chemicals are emitted (e.g., based on experience at similar facilities)?** No, emissions data from similar incinerators were included.

18. List chemicals emitted but lacking inhalation health benchmarks.

Phosphorus	Pyrene
2-Methylnapthalene	Acenaphthylene
Acenaphthene	Benzo(e)pyrene
Anthracene	Benzo(g,h,i)perylene
Fluoranthene	Thallium Molybdenum Vanadium
Fluorene	
Phenanthrene	

19. List known respiratory sensitizers emitted: Beryllium, cobalt, and nickel.

20. List developmental toxicants emitted: Arsenic, benzene, and mercury, none of which exceeded ceiling values.

21. **Where is the maximum modeled concentration (risk) for acute? Chronic?** Annual emission dispersion factors were highest north of the facility. See Appendix A Figure 3 for a map of annual farmer cancer results. Unitized hourly emission dispersion factors were highest along the eastern boundary of the facility. As with all air dispersion modeling, the exact locations of maximum risk carry some uncertainty because the actual dispersion depends on weather conditions at the time of emission. The location of the hourly maximum is as variable as the hourly wind directions over a 5 year period of time.

Incident Management System data on facility reports of SSM events from the last 5 years. The facility closed in 1998 due to air quality noncompliance. The City of Perham acquired the facility, with surrounding counties, reconstructed and retrofit the facility with new air pollution control technology, new combustion technology, improved ash handling, and the ability to generate electricity. The facility reopened in 2002 and has operated in compliance with its air emission permit since that time.

Citizens complained about vibration/humming noise in 2003. A noise study was conducted and the steam vent silencer, which had failed, was replaced. There have been no recent complaints. MPCA staff confirmed that the complaints tracker has no recent complaints for the facility and found the following information about compliance:

2003 Late deviation report, CEMs downtime, Fabric filter
2006 HCl and Hg both tested noncompliant , Possibly EPA NOV for Hg noncompliant
2006 Notice of Violation, Late test report and late waste composition study
2009 Letter of Warning, Not doing periodic baghouse inspections, Excess CO emissions

22. **Internal Combustion Engines. (AERA-04 Certification for Emergency Internal Combustion Engines)** There are no emergency generators. This form is not applicable.

23. **Describe known community concerns as they relate to health risks associated with this facility.** None.

Is there the possibility that emissions from diesel trucks idling on the facility property maybe equivalent or greater than 2 or more trucks idling continuously for an hour or longer on the facility property? Describe idling truck patterns. Is an idling truck prevention plan recommended?

Two or more idling trucks are not expected to idle continuously for an hour or longer on the facility property. With respect to idling trucks, the waste haulers schedule their routes so trucks arrive at the PRRF during different times of the day. The majority of the time, there are no trucks at the facility or a single truck arrives, dumps its load, and leaves. It takes about two minutes for a truck to dump its load into the receiving area. During normal operation, when a truck is on site, there is a short duration of idling time estimated at less than five minutes. Since the project includes rerouting approximately 50 diesel trucks closer to nearby residences, (see Appendix A Figure 4 for a map) the expected impacts from on-site vehicle-related air emissions were included in the AERA.

24. **Should a risk recalculation requirement be included in the permit? Summary of rationale.** The permit contains requirements that trigger the need for a permit application review upon subsequent changes at the facility, thus no additional risk recalculation requirement was deemed necessary.

25. **Additional Considerations:** Additional zoning information gathered by MPCA staff from telephone conversations with city, county and township zoning authorities. As indicated in the Farmer Cancer Risk Estimate Map in Appendix A (Figure 3) and Zoning Map (Figure 4) there are areas outside of the City of Perham Zoning Plan, near the stock yards, which are agricultural but are not currently being used to raise animals. In order to raise animals in these locations odor nuisance ordinances would need to be met, and regular conditional use and building permits would need to be met from the township. However, there does not appear to be any specific prohibition against using the agricultural land for animal husbandry.
.

26. **These additional information topics weren't considered applicable or noteworthy for this facility:** Additional IEUBK modeling for lead was not considered, since the RASS indicated that the modeled highest monthly concentration did not approach the current NAAQS 3-month rolling average of 0.15 ug/m3.

Uncertainty Analysis Summary

27. **How close are the emission estimates to what the facility will actually emit? What are the factors that impact this?**

- The emission estimates were based on the maximum capacity of the equipment and permit limits. Emissions estimates are likely overestimated, since the facility does not operate at its maximum capacity at all times, nor at the levels of the permit limits. For example, dioxin/furan emissions were the main risk driver in this analysis, and are also expected to be emitted at levels much lower than the permit limit. In this regard, risks are likely overestimated.
- Some emission estimates are from a limited number of stack test results and thus could contribute to over or underestimating risks.
- The substitution of detection limits for undetected pollutants (such as specific dioxin/furan congeners) likely contribute to an overestimation of risks.
- As with all facilities, there may be other pollutants emitted from the facility that have not been identified. This may contribute to an underestimation of risk.
- One of the main goals of the MRF is to reduce the amount of non-combustibles in the waste stream and to recycle metals. One ancillary benefit of this action is a decrease in the amount of mercury in the waste and therefore a decrease in the amount emitted to the air through combustion. Due to the heterogeneity in the waste stream, the actual reduction is difficult to quantify. This likely contributes to an overestimate of risk.
- Due to a higher MWC capacity, the auxiliary boiler use will decrease thereby decreasing the actual emissions. This equipment use reduction has not been quantified in this

assessment. However, this issue is not likely to be significant since the risk drivers in this assessment, dioxins/furans, are not emitted by the auxiliary boiler.

- The production mechanisms of dioxins/furans are uncertain so estimating future emissions is difficult and could contribute to an over or under estimating of risk. However it is more likely that risks have been overestimated due to the following information. According to the Human Health Risk Assessment Protocol (September 2005), the total concentration of chlorine in waste drives the formation of dioxins/furans in the combustion reaction. Dioxins/furans emission rates varied by more than 28-fold between different facilities according to a 1996 study cited in the HHRAP. Furthermore, the HHRAP notes that fly ash can catalyze the dioxin/furans formation reactions. The projected project will feature a MRF that is designed to remove fine particulates. This is likely to reduce the amount of fly ash produced per ton of MSW combusted. This would further reduce dioxins/furans production at the facility.

28. How accurate is the dispersion model to the actual site dispersion? What are the factors impacting the accuracy?

- In general, air dispersion modeling analyses are designed not to underestimate air concentrations. The most refined modeling methods currently available were used to model facility emissions. As with all air dispersion modeling, the exact locations of maximum risk carry some uncertainty because the actual dispersion depends on weather conditions at the time of emission.

29. What is the impact of the toxicity values on the risk analysis? What are the factors impacting the analysis?

- Toxicity values may contribute to an over or under estimate of risk, although uncertainty factors are included in the derivation of toxicity values in order to minimize the likelihood of underestimating risk.
- Using older toxicity values that were developed without consideration of early childhood exposures could contribute to underestimating risk. The MPCA incorporates toxicity values that consider early childhood exposure as they are updated by MDH, EPA and CalEPA. A default screening level multiplier of 1.6 is applied to risk results that are a result of toxicity values where early childhood exposure was not incorporated. The toxicity values used for dioxins and furans include an incorporation of early childhood exposure, and therefore the 1.6 scalar is not appropriate. However, if the 1.6 scalar were applied to the risk results of all non-dioxin/furan carcinogens, none of the individual pollutants result in estimates above health benchmarks. The overall facility risk characterizations would be the same, however, since dioxin/furans were the risk drivers.
- Generally, dioxin/furan congener toxicity is assessed based on relative potencies with respect to 2,3,7,8-TCDD. The 2,3,7,8-TCDD congener is the most studied dioxin/furan congener. The MDH derived an inhalation health benchmarks for dioxin/furans from an oral cancer slope factor that MPCA incorporates into facility risk assessments. There have been several recent updates to the oral cancer slope factor for 2,3,7,8-TCDD using

the same studies that MDH used for their toxicity assessment. The recent updates to the cancer slope factor for 2,3,7,8-TCDD are less stringent than the MDH-derived cancer slope factor. The MDH used route-to-route_extrapolation to develop an inhalation unit risk factor. In route-to-route extrapolation, uncertainty is compounded by incorporating the second route of exposure. The MDH_Guidance for Dioxins and the SONAR identify route-to-route extrapolation as inappropriate when liver is the target organ. The target organ for dioxins/furans is the liver. Nevertheless, to be conservative in this analysis, route-to-route extrapolation was_performed to derive the inhalation health benchmarks for dioxins/furans. Without this extrapolation, there would be no health benchmark, and risk estimates would not be estimated._Therefore, the risk_estimates for dioxins/furans are uncertain and may be overestimated due to the following reasons: route to route extrapolation, relative potency factors for the non 2,3,7,8-TCDD congeners that are emitted from this facility, and updated oral cancer slope factors that are less stringent toxicity value.

- A lack of health benchmarks for at least 14 potentially emitted chemicals could result in an under-prediction of risks.
- RASS multi-pathway screening factors were developed to result in protective upper estimates of ingestion risks.

30. What is the impact of the exposure assumptions on the risk analysis? What are the factors impacting the analysis?

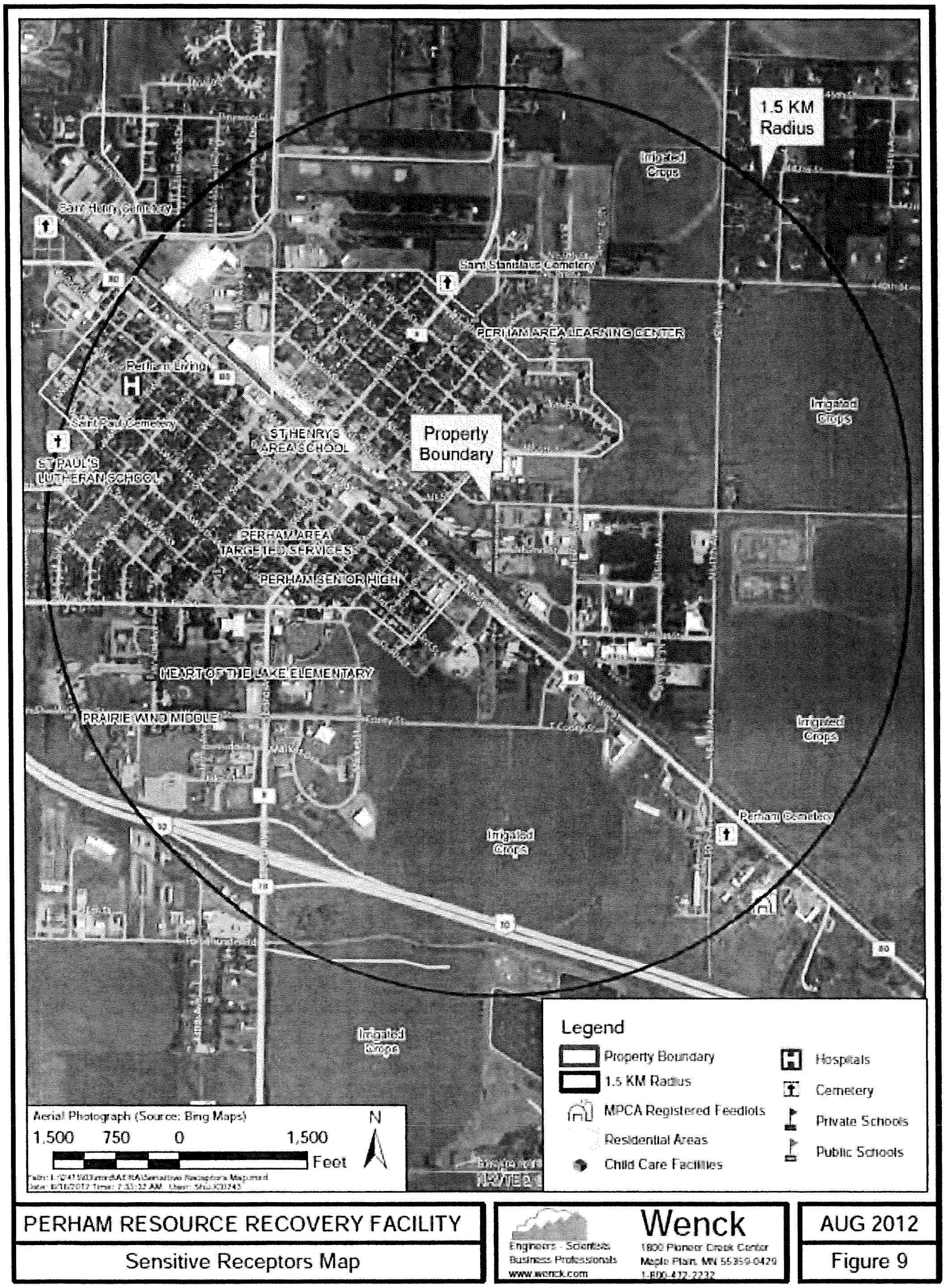
- The exposure assumptions may over or under predict actual exposures (e.g., this depends on the applicability of the exposure scenario assumptions with respect to individuals actual ingestion rates of homegrown products grown at the locations of maximum impact locations). With the exception of the most refined farmer cancer risk estimates, the exposure assumptions are chosen to be protective of actual exposures. For example the cancer and chronic non-cancer inhalation risk estimates are based on the assumption of 70 years of exposure to the given ambient air concentration.
- Since there is a fish advisory on Little Pine Lake, people are informed to keep consumption rates much closer to the recreational fisher scenario than to the subsistence fisher scenario.

31. What is the impact of other factors on underestimating and/or overestimating risks in the analysis?

- The AERA assumes that pollutants with the same endpoint act additively. MDH and EPA guidance indicates that the assumption of additivity for interactions of chemicals is protective. Since pollutant interaction may result in greater (synergistic) or lesser (antagonistic) effects than the summation of the effects of each individual chemical, the exclusion of synergism/antagonism from the analysis may result in over- or underestimation of risk.

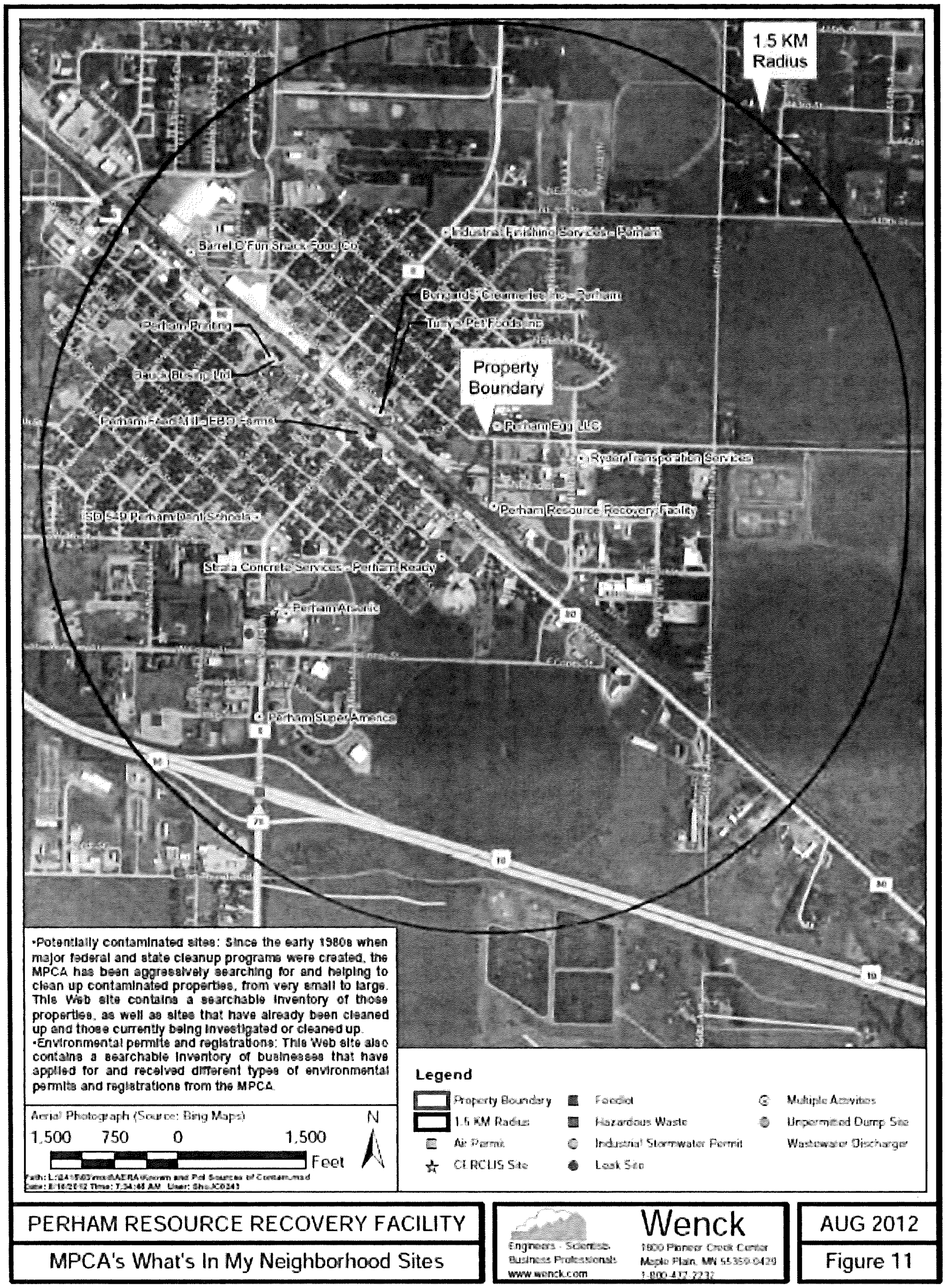
MDH Coordination: MDH was not asked to provide comments and did not provide comments.

Appendix A Figure 1 Sensitive Receptor Locations



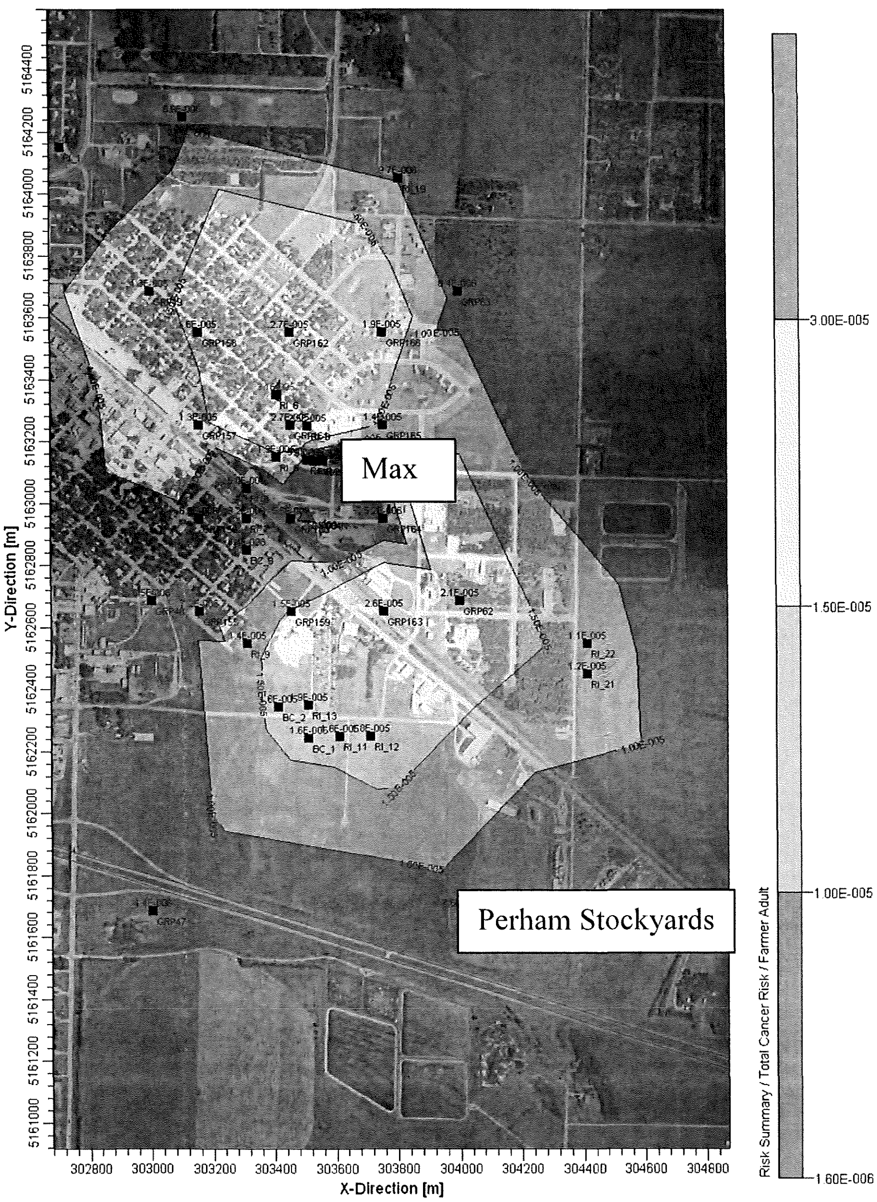
MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Appendix A Figure 2 Other Facilities in the Area

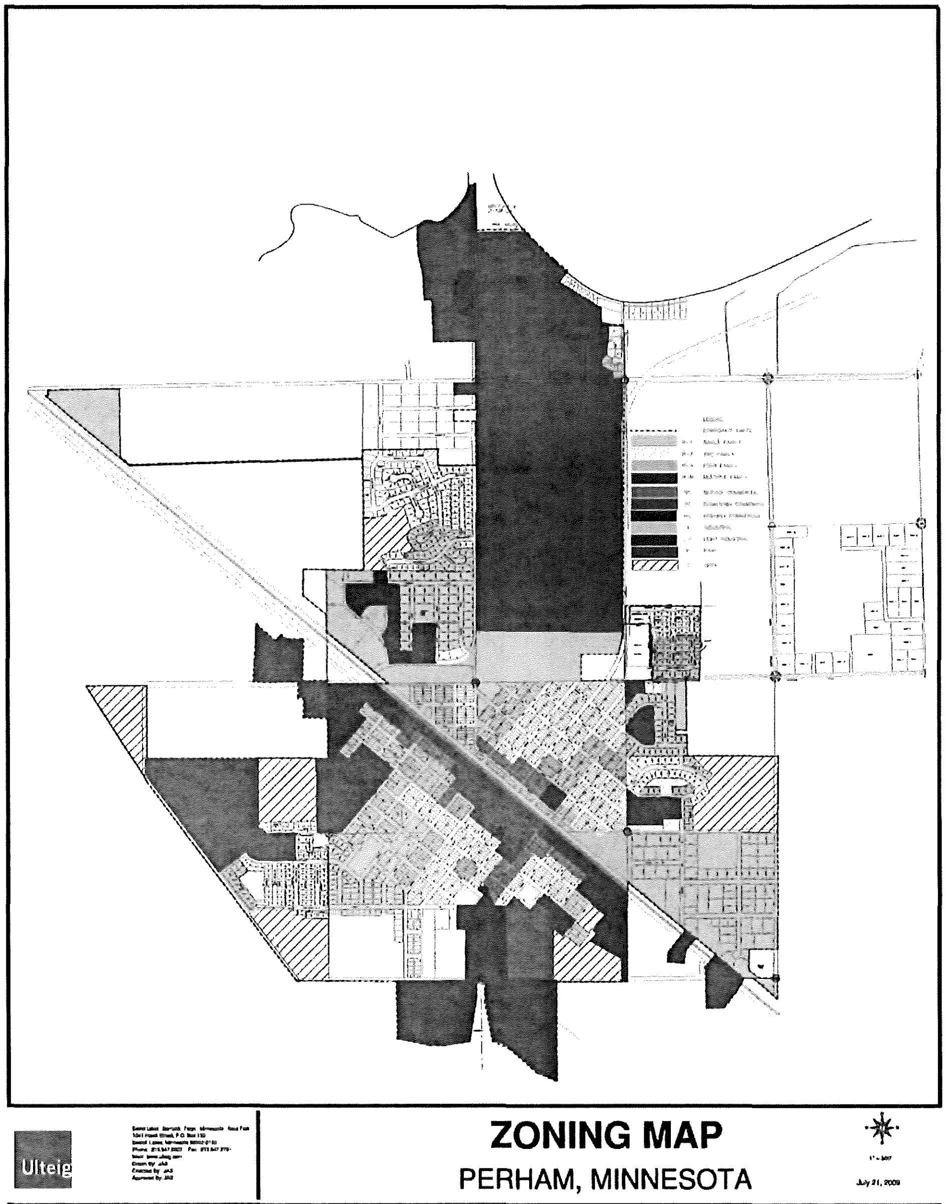


Appendix A Figure 3: Total Multi-pathway Exposure Farmer Cancer Risk Estimates

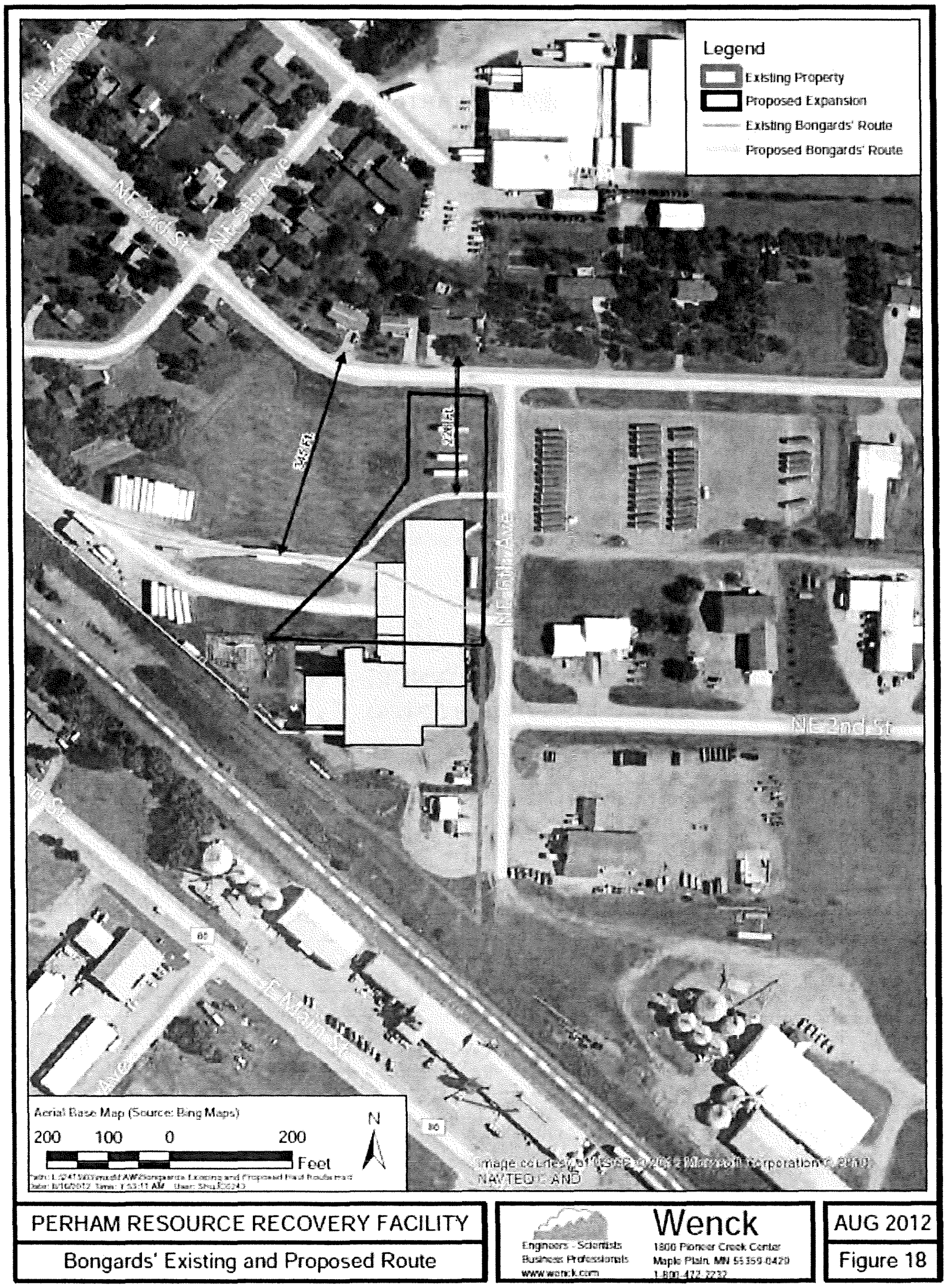
Farmer cancer risk estimates are within EPA's guidance level of between 1E-4 (1 in 10,000) and 1E-6 (1 in 1,000,000). Areas indicated in yellow are above MPCA's facility risk guideline of 1E-5 (1 in 100,000). Estimates for areas zoned for agriculture are less than 2E-5 and are consistent with risk estimates from similar facilities.



Appendix A Figure 4 Zoning Map



Appendix A Figure 5 Traffic Reroute



Appendix B. Farmer Scenario Information

The farmer scenario that is used by MPCA for AERA processes is based on the EPA Human Health Assessment Protocol (September 2005). The farmer scenario assumes some fraction of their diet is grown on the property of the farm, and assumes that no other ingested food is contaminated. According to EPA guidance, chicken and egg consumption should only be included to assess risk from dioxins and furans. This exposure pathway (chickens and eggs) is not suggested for other chemicals. Also according to EPA guidance, if site-specific information is available, and farmers in that area of impact do not raise one type of animal or livestock, that exposure pathway could be eliminated. This is provided that both ***current and all future*** use is considered in this action. The consumption rates are included below, and again only represent the food ingested from home-grown vegetables or animals, with the assumption that some fraction of their diet is obtained elsewhere, and that food products obtained elsewhere are un-contaminated. These consumption rates are based on national surveys and studies of exposure patterns for US citizens from the 1987-1988 USDA Food Consumption Survey.

"***Please Note***: these rates do not represent the entire dietary intake of the individual, but only that portion of the diet produced at home. For example, the beef consumption rate represents only the amount of beef consumed each day which was raised on the farm property.

TABLE 6-1
MEAN CONSUMPTION RATES[a] FOR RECOMMENDED EXPOSURE SCENARIOS
(number of servings per week)

Contaminated food	**Exposure Scenario**					
	Farmer [b]	**Farmer Child[b]**	**Resident**	**Resident Child**	**Fisher**	**Fisher Child**
Produce (8 oz servings)	2.8	1.4	2.3	1.2	2.3	1.2
Beef (1/4 lb servings)	5.3	0.7	N/A	N/A	N/A	N/A
Milk (8 oz servings)	29.5	10.5	N/A	N/A	N/A	N/A
Chicken (1/4 lb servings)	2.8	0.4	N/A	N/A	N/A	N/A
Eggs (number[c])	4.3	0.7	N/A	N/A	N/A	N/A
Pork (1/4 lb servings)	2.4	0.4	N/A	N/A	N/A	N/A
Fish (1/4 lb servings)	N/A	N/A	N/A	N/A	5.4	0.8

Notes:
[a] Values derived from the U.S. EPA Exposure Factors Handbook (1997).
[b] Values based on consumption rates of a 154 lb adult and a 33 lb child.
[c] Values based on an assumed egg weight of 3.0 ounces."

Table and Guidance taken from Human Health Risk Assessment Protocol Chapter 4: Exposure Scenario Identification (pgs. 4-16 and 4-17) and Chapter 6 Quantifying Exposure (pgs 6-6 and 6-7). Multimedia Planning and Permitting Division. Center for Combustion Science and Engineering. Office of Solid Waste. U.S. EPA. September 2005.

Appendix D

Water Use and Wastewater Technical Memorandum

Perham Resource Recovery Facility Water Use and Wastewater Report

Wenck File #2415-03-09

Prepared for:

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Revised November 2012

Wenck

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TABLES

FIGURES

1.0 Introduction

This report provides information on the water use and wastewater activities at the Perham Resource Recovery Facility (PRRF or Facility). Information regarding both the existing Facility and the proposed project is provided. Water and wastewater quantities for the existing Facility are based on 2010 and 2011 data and provide a baseline from which to compare the proposed project. This report was written prior to completion of final designs of the proposed project; therefore, the design information and quantities for future water and wastewater are best estimates because aspects of the project design are still evolving at this time.

The proposed project projected actual quantities and the proposed project maximum quantities are presented in this report. However, it should be noted that the proposed project maximum capacity operation is not sustainable, and therefore, not realistic for the Facility. For the purposes of evaluation, these quantities have been shown and compared to existing and proposed project projected actual quantities. However, at this point in time, there is no intention by Prairie Lakes Municipal Solid Waste Authority (PLMSWA) nor the PRRF to operate at maximum capacity. The level of operation is dependent upon steam demand, availability of fuel, and capability of the Facility. None of these three factors facilitate the need or ability for the proposed project to operate at maximum capacity at this time or in the foreseeable future. If future conditions warrant, the PRRF could increase its capacity; at which time, issues associated with significantly increasing steam production, such as resource use and permitting, will be evaluated.

1.1 FACILITY PROCESS OVERVIEW

The PRRF consists of four major components: 1) waste receiving, processing, and storage; 2) combustion; 3) energy generation (i.e., steam and electricity); and 4) air pollution control (APC) equipment. Water is used at the PRRF in a variety of ways for the various components of the facility. The primary use of water at the facility is for steam generation. Steam is generated and then sold to two local industries, Tuffy's Pet Foods and Bongards' Creameries, which use the steam as a source of energy in their production processes.

The general waste-to-energy (WTE) process at the existing PRRF begins with waste receiving in the tipping floor area where haul trucks deliver municipal solid waste (MSW). The proposed project would include a materials recovery facility (MRF), which would improve the characteristics of the MSW by removing non-combustibles and undesirable waste items from the trash before burning it in the existing plant combustors.

Once the waste reaches the end of the grate, combustion is complete, and the remaining material is bottom ash. The bottom ash is collected and cooled using a submerged drag chain conveyor that is essentially a trough filled with water. Water in the drag chain conveyor is depleted by evaporation from the hot ash and with the wet ash ejected from the conveyor. (Wet ash contains approximately 16 percent moisture by weight.) The water used for make-up to the drag chain conveyor is primarily leachate collected from the Northeast Otter Tail Landfill. Currently, fly ash is also sent to the drag chain conveyor for disposal. However, because fly ash tends to float on top of the water, it does not get removed from the conveyor and builds up causing operational problems for the drag chain conveyor. Therefore, each week, the fly ash laden water is pumped from the conveyors and sprayed at the Northeast Otter Tail Landfill. Both municipal water and leachate are used to refill the drag chain conveyors after they are pumped out. Prior to disposal of the ash, ferrous metals are recovered and sold to markets for recycling. The Northeast Otter Tail Landfill has a dedicated lined ash cell where the PRRF ash is disposed of, and leachate is collected to replenish the conveyor water and reused in the ash quenching process.

Approximately 35,000 tons per year (tpy) of MSW is processed at the PRRF, where it is burned to produce steam. The steam is produced as hot flue gases leaving the combustion units are cooled as it flows through the waste heat boiler, where heat is transferred from the gases to water flowing through tubes located in the hot flue gas path within the boiler.

Approximately 300,000,000 pounds of steam is produced and sold annually by the PRRF using a combination of the waste heat boiler and a natural gas fueled auxiliary boiler. Of the annual steam produced at the PRRF, approximately 200,000,000 pounds is generated by the waste heat boiler, and 100,000,000 pounds is generated by the auxiliary boiler. Currently the steam turbine generator is operated only for a short duration each year to determine its condition and ability to generate electricity, if the need arises.

The proposed project would increase the amount of steam generated from the combustion of MSW by adding another waste heat boiler and associated air pollution control equipment. However, the total amount of steam exported (i.e., sold to steam customers) would not change. This is because the existing and new waste heat boilers would be used to a greater extent to burn additional MSW, while the natural gas fired auxiliary boiler would be used less than its current levels. The amount of steam sold is driven by the demand of local consumers. Table 1 summarizes the existing and projected MSW processing, ash generation, and steam production.

Table 1: Comparison of Existing Facility and Proposed Project

Product	Existing Facility (2010 Actual)	Proposed Project: Projected Actual	Proposed Project: Maximum Potential at 200 tpd
MSW	35,000 tpy	55,000 tpy	73,000 tpy
Ash	8,800 tpy	11,754 tpy [(3)]	15,600 tpy [(3)]
Steam Production From MSW From Natural Gas	 200,000,000 lbs 100,000,000 lbs	 336,600,000 lbs [(1)] 24,550,000 lbs [(2)]	 411,020,000 lbs Future amount unknown
Steam Sales/Demand	300,000,000 lbs	300,000,000 lbs	Future demand unknown

Notes:

(1) Excess steam produced from MSW to be condensed by the steam dump condenser.

(2) Steam from the auxiliary boiler required to allow for maintenance downtime of the MWCs assumed at 8 percent.

(3) The ratio of ash generation to total MSW is estimated to be approximately 15 percent less with the Proposed Project compared to the existing facility. This is because the MRF would remove 5-8 percent of the recyclable materials and approximately 10 percent of the fines prior to combustion.

Source: Perham Resource Recovery Facility Expansion Project EAW November 2011

The combustion of additional waste from the proposed project would result in greater quantities of ash. The existing ash system currently requires extra maintenance to remove fly ash laden water and extra hauling by leachate trucks to remove and replenish leachate water, and therefore, an ash conditioning system would be installed as part of the proposed project that would allow for more efficient treatment of fly ash. The ash conditioning system would eliminate the need to clean out the water trough on a weekly basis.

An ash conditioning system mixes dry, dusty, fly ash residue thoroughly with water to allow the fly ash to meet the requirements for safe ash disposal. In the ash conditioning system, fly ash residue from the waste heat boiler, acid gas control equipment, and fabric filter hoppers is conveyed in fully enclosed conveyors to an enclosed holding hopper. When the holding hopper is full, it empties into a paddle mixer where the dry ash residue is mixed with water. The wet fly ash is then discharged onto a conveyor and sent to the roll-off container with the bottom ash for disposal. The paddle mixer will have a control system to assure proper mixing ratios of water to fly ash.

2.0 Water Use

2.1 PROCESS

The Perham municipal water supply is used at the PRRF for several purposes, but primarily for steam production. These uses include drinking/sanitary/maintenance, boiler make-up, boiler blowdown cooling water, and cooling tower make-up. Additional water is also used to refill the ash drag chain conveyor after it is pumped out to remove the fly ash laden water. Figure 1 is a process flow diagram showing the general water use and water treatment systems at the PRRF.

Boiler make-up water requires purified water. Incoming water from the city of Perham enters a purification system, which includes a reverse osmosis (RO) system and a water softener, before entering the condensate tank for use in the steam production process. The RO system removes 95 percent of the dissolved solids in the municipal water, and the water softener removes any remaining hardness. Purified water from the condensate tank is then sent to the boilers to produce steam for local consumers.

A variable amount of exported steam is returned to the PRRF from its consumers in the form of condensate. This condensate is returned directly back into the condensate tank to use for steam production. The amount of condensate returned to the PRRF affects the quantity of water needed for boiler make-up water.

Municipal water used for boiler blowdown cooling, cooling tower make-up, and refilling the drag chain conveyor is not treated or purified prior to use. For boiler blow down cooling, municipal water is used to cool the boiler water that is continuously removed (i.e., blown down) from the boiler drum prior to it being sent to the sanitary sewer. Continuous blowdown of the boiler drum is required to control the solids build-up in the boiler drum, and to help maintain water chemistry within the boiler. Cooling towers are used to cool the exhaust steam from the steam turbine, and will be used to cool the excess steam generated by the waste heat boilers. Municipal water is used to provide make-up to the cooling towers as water is lost through evaporation, tower blowdown, and drift.

Separate from the steam production process and associated with the combustion process, ash quenching is a significant water use process typical for MSW combustion facilities. Ash quenching occurs in the ash drag chain conveyors. Ash leachate water hauled in from the ash landfill is primarily used as make-up water to maintain the appropriate water level in the drag chain conveyors. The resulting wetted ash from the PRRF is hauled to the ash landfill (i.e., Northeast Otter Tail Landfill) for disposal. Leachate from the ash landfill is collected and reused at the PRRF in this cyclical process. Municipal water is currently used to refill the drag chain conveyors whey they are pumped out on a weekly basis for maintenance purposes.

2.2 QUANTITY USED

Domestic Water Use

The PRRF currently has 15 employees, and therefore, drinking/sanitary/maintenance water makes up a small annual percentage of the total water used at the PRRF. Water usage was calculated based on each employee using an average of 25 gallons of water per day during a 5-day work week. This equates to approximately 98,000 gallons annually at the existing Facility.

The proposed project would require an additional 12 employees to operate the Facility. This would increase the domestic water use at the Facility by approximately 78,000 gallons per year for a total estimated water use of 176,000 gallons once the proposed project is at full operation.

Process Water Use

Water is used at the PRRF to generate 300,000,000 pounds of steam that is exported to local consumers on an annual basis. Approximately 28,000,000 gallons of municipal water is filtered through the RO system with about 70 percent (i.e., 20,000,000 gallons) of that water used directly for steam production and the remaining 30 percent (i.e., 8,200,000 gallons) becomes RO reject water that is discharged to the city storm water sewer system. Table 2 summarizes the annual quantities of water used at the PRRF for the various processes for running the facility and producing steam.

Table 2: Annual Estimated Water Use at the PRRF

Water Use Source	Existing Quantity (gallons)	Post Project Projected Actual Quantity$^{(1)}$ (gallons)	Post Project Maximum$^{(2)}$ (gallons)
Domestic – Drinking and Sanitary	**98,000**	**176,000**	**176,000**
Maintenance/Service Water	**788,000**	**1,051,000**	**1,051,000**
Process Water – TOTAL	**28,823,000**	**36,002,000**	**78,686,000**
Steam Production – Make-up Water Inlet to RO System	28,423,000	28,615,000	78,150,000
Boiler Blowdown Cooling	368,000	434,000	536,000
Cooling Towers	32,000	6,953,000	0
Ash Quenching – TOTAL	**693,100**	**621,600**	**793,600**
Leachate	450,000	524,000	696,000
Municipal Water	243,100	97,600	97,600
Total Municipal Water Use	**29,952,100**	**37,326,600**	**80,010,600**
Total Leachate Use	**450,000**	**524,000**	**696,000**

(1) Based on steam demand of 300,000,000 pounds per year and MSW combustion of 55,000 tpy.
(2) Based on both combustors/waste heat boilers burning 200 tpd of waste 365 days per year with all steam being exported and no condensate returned.

Boiler make-up quantities are largely affected by the quantities of export steam (i.e., steam demand by consumers) from the PRRF, and the condensate (i.e., condensed steam) returned to the PRRF. If more export steam is sent out from the PRRF, and less of the condensate is returned for reuse, then boiler make-up water quantities increase to make up the difference. The quantities of export steam demand (from Tuffy's and Bongards') and condensate return are not anticipated to change for the proposed project.

However, after the proposed project is complete, the waste heat boilers would be generating more steam from the combustion of 55,000 tons per year of MSW than is demanded (see Table 1 in Section 1.0). The excess steam would be condensed by cooling water flowing through the cooling towers, which would require additional make-up water. Therefore, process water usage would increase from the increased cooling tower make-up quantities. It is anticipated that the proposed project would increase process water make-up quantities by approximately 6,900,000 gallons per year.

Per Table 1, the proposed project operating at maximum capacity would produce more steam, approximately 111,000,000 pounds per year, than what is demanded by the steam customers. This scenario illustrates an extreme case, as it is not realistic for the PRRF to operate at maximum capacity year round. The production of steam is dependent on the quantity of the MSW combusted at the facility. Additionally, the PRRF would not be able to operate continuously at maximum capacity, as there is routine and other maintenance performed which requires the facility to shut down the combustion equipment.

Regardless of the constraints, maximum water consumption was calculated to determine the quantity of water that would be needed if the PRRF were to operate at maximum steam generation capacity. At maximum steam production, the proposed project would require approximately 50,000,000 gallons of additional water annually compared to the existing facility. This assumes that the waste heat combustors operate 365 day per year at maximum capacity, all steam generated is exported from the plant, and no condensate is returned to the plant. As described in Section 3.0, additional water usage is not directly proportional to quantity of wastewater discharge.

Ash Quenching

The proposed project would produce additional ash; approximately three tons per year more than existing quantities. This would increase the amount of leachate used to quench the ash at the PRRF. However, the fly ash conditioning system planned as part of the proposed project would reduce the quantity of municipal water needed for ash quenching because fly ash laden water would no longer need to be pumped out of the conveyor each week and replenished. Fly ash would be processed with leachate in the fly ash conditioning system. As summarized in Table 2 above, it is estimated that the amount of municipal water used for ash quenching would be reduced from 243,100 gallons per year to 97,600 gallons per year. The estimated quantity of water needed for ash quenching would not increase if the proposed project was operated at maximum capacity for an entire year. Instead, leachate use would increase by about 172,000 gallons for ash quenching due to increased quantities of ash.

2.3 PERMITS

The PRRF does not require permits for water use. Water is purchased directly from the city of Perham, and the PRRF pays for what is used by the gallon on a monthly basis. The quantity of steam demand by local consumers is not anticipated to change significantly. However, the proposed project would include a new waste heat boiler, which means there would be times when more steam is produced than what is needed by the two industrial users, Tuffy's and Bongards'. Excess steam would either be vented or condensed; but in either case, additional make-up water would be needed. Maintenance at the facility may also require more water use. These two processes would cause an overall increase in municipal water use after completion of the proposed project.

3.0 Wastewater

3.1 PROCESS

The water use process was described in Section 2.0 and is the basis for generation of wastewater at the facility. The Water Process Flow Diagram (Figure 1) also shows the source of wastewater generated at the PRRF. Similar to the water use process, there are three main sources of wastewater at the PRRF: domestic (sanitary use), process, and ash quenching. Each source of wastewater is handled and treated in a specific manner.

Domestic wastewater is generated from employees and maintenance at the facility. This wastewater is discharged to the city of Perham sanitary sewer system for treatment at the Perham Wastewater Treatment Facility (WWTF). Wastewater generated by employee use is discharged directly to the sanitary sewer system. Wastewater produced during maintenance of the facility is directed to floor drains at the PRRF, which discharge to a sand and oil interceptor prior to entering the sanitary sewer system. The sand and oil interceptor captures most of the grit (i.e., ash, sand, etc.) and oil that could potentially flow into the floor drain. Wastewater from the sand and oil interceptor is discharged to the sanitary sewer system.

Wastewater is generated and discharged from several points during the steam production process. Currently municipal water enters the RO system, the initial step in the treatment process for purifying water for steam production. The RO system removes 95 percent of the dissolved solids in the municipal water. The treated RO water then enters a water softener where the remaining hardness is removed. Both the RO system and water softener have wastewater discharges. The RO reject water is routed to the city storm water sewer system. The water softener regeneration wastewater discharge is sent to the sanitary sewer system. The proposed project may include a bed media filter system upstream of the RO to remove suspended solids in the municipal water. The wastewater generated from back-flushing the filter would be sent to the sanitary sewer system.

Additional sources of process wastewater include the cooling tower blowdown and the boiler blowdown. Both of these wastewater sources are discharged to the sanitary sewer system. Boiler blowdown water consists of treated municipal water used in the steam production process, along with additional municipal water used to cool down the blowdown wastewater to a maximum of 120 degrees prior to discharge to the sanitary sewer system.

As described in Section 2.0, additional water, in the form of leachate, is used for ash quenching at the PRRF. The ash quenching process results in wet ash that is hauled to the Northeast Otter Tail County Landfill for disposal. Leachate gravity drains from the disposed ash where it is collected and hauled back to the PRRF for use again in the ash quenching process. Excess leachate collected at the landfill is hauled to the Fergus Falls WWTF.

3.2 QUANTITY GENERATED

Wastewater has been estimated based on a number of factors that can vary, including sanitary and maintenance water use, quantity of steam demanded and produced, and condensate returned from steam customers. Table 3 summarizes the estimates for industrial wastewater at the existing Facility, the proposed project actual operating capacity, and the proposed project maximum operational capacity. As previously noted in Section 1.0, the proposed project maximum is not a sustainable operating level and is therefore not realistic. However, the proposed project actual projected and maximum levels are presented in this report to evaluate whether or not permits would be affected if the PRRF operated at these design capacities.

Domestic Wastewater

The existing PRRF produces domestic wastewater from the 15 employees working at the plant, which is about 98,000 gallons per year. Upon completion of the Proposed Project, the facility would employ approximately 12 additional people for a total of 27 employees. This would increase the quantity of domestic wastewater discharge to approximately 176,000 gallons per year, as summarized in Table 3.

Process Wastewater

RO reject water is the only wastewater discharge from the PRRF that enters the city of Perham's (City) storm water sewer system. All other sources of wastewater are discharged to the City WWTF in the municipal sanitary sewer system. Actual wastewater discharge to the sanitary sewer system is not known because the PRRF and city of Perham do not measure the quantity of wastewater from the PRRF. The City bills the PRRF at a flat rate for sanitary discharge. Estimates of wastewater discharge to the WWTF were derived based on the quantity of water use.

Incoming water processed by the RO system results in roughly 30 percent RO reject water. This means if 28,000,000 gallons of municipal water are used annually for steam production, roughly 8,200,000 annually becomes RO reject water that is discharged from the facility into the storm water sewer. RO reject water makes up the majority of the wastewater discharge at the facility. A new pipe was installed less than 10 years ago that connects the RO reject water discharge to the City storm water sewer system network at 2nd Street. RO reject water discharge is not expected to change significantly between the existing quantities and the proposed project projected actual quantities.

Table 3: Annual Wastewater Generation at the PRRF

Wastewater Source	Existing Quantity (gallons)	Post Project Projected Actual Quantity[1] (gallons)	Post Project Maximum [2] (gallons)
Sanitary wastewater[3] (employee use)	**97,875** (15 employees)	**176,175** (27 employees)	**176,175** (27 employees)
Maintenance/Service Water	**788,000**	**1,051,000**	**1,051,000**
Process wastewater	**9,008,000**	**10,634,000**	**24,642,000**
• RO reject	8,235,000	8,291,000	23,445,000
• Media filter	NA	79,000	105,000
• Soft water discharge[4]	29,000	14,000	19,000
• Boiler blowdown	736,000	868,000	1,073,000
• Cooling tower blowdown[5]	8,000	1,382,000	0
Ash Quench/Leachate	**384,500**	**97,600**	**97,600**
TOTAL Wastewater	**10,278,375**	**11,958,775**	**25,966,775**
Wastewater to Sanitary Sewer	1,659,000	3,570,000	2,424,000
RO Reject Water to Storm Water System	8,235,000	8,291,000	23,445,000
Ash Quench/Leachate to Landfill	384,500	97,600	97,600

(1) Based on steam demand remaining at 300,000,000 pounds per year and MSW combustion of 55,000 tpy.
(2) Based on both combustors/waste heat boilers burning 200 tpd of waste 365 days per year with all steam being exported and no condensate returned (i.e. 100 percent make-up).
(3) Employee wastewater was estimated based on 25 gallons of water used per day per employee during the 5-day work week.
(4) The softener "upstream" of the RO units would be eliminated for the proposed project, and replaced with a media filter which requires more water to backwash. The softener "downstream" of the RO units would remain.
(5) The cooling tower blowdown increases because there may be periods in which more steam is generated than what is sold, and the cooling towers would need to operate more to condense the excess steam.

As summarized in Table 3 above, the proposed project would change the quantities of wastewater from certain sources at the facility. Overall, the proposed project quantities for wastewater discharge to sanitary sewer would increase by about 1.9 million gallons per year. This increase is primarily due to increased cooling tower blowdown. Throughout the year, there may be periods in which more steam is generated than what is sold, and the cooling towers would need to operate more often to condense the excess steam. This would cause a need for make-up water, and therefore, additional cooling tower blowdown wastewater would be generated. This increase is estimated to approximately 1,375,000 gallons per year.

At the proposed project maximum wastewater generation levels, discharge to the sanitary sewer system would decrease from the proposed project projected actual levels. This is because all steam is assumed to be used by local consumers, and therefore no cooling tower blowdown would be generated. However, RO reject water would increase significantly by about 15 million gallons per year. This water would be discharged to the storm water sewer system.

Ash Quenching

Overall, the amount of ash water/leachate sent to the landfill each year would decrease from 384,500 gallons to 97,000 gallons due to the installation of an ash conditioning system. None of this water would be discharged to the municipal sanitary or storm water sewer systems. Instead, this water would be part of the wet ash that is disposed of at the Northeast Otter Tail County ash landfill. Once at the ash landfill, the leachate is collected and hauled back to the PRRF for use in the ash quenching process. Excess leachate collected at the landfill is hauled to the Fergus Falls WWTF.

3.3 PERMITS

The permit required at the PRRF for wastewater discharge is the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) permit for the discharge of RO reject water to the storm sewer system. The storm sewer eventually discharges to the Otter Tail River. There are no other permits required for wastewater discharge from the Facility.

The PRRF NPDES/SDS permit (#MN0067415) regulates wastewater discharge from the Facility and would be amended for operation of the proposed project to reflect the Facility changes. The existing PRRF NPDES/SDS permit indicates that the wastewater currently discharged consists of reject waters from the RO system at an average rate of 32,500 gallons per day (gpd) and a maximum daily discharge of 60,000 gpd. The PRRF NPDES/SDS permit authorizes up to 200,000 gallons per day for RO reject water discharge.

The proposed project would discharge similar quantities of RO reject water as the existing conditions, and therefore the proposed project actual quantities would not exceed existing permit limits. If operating at the proposed project maximum 365 days per year, the PRRF would discharge RO reject water at greater quantities, approximately 64,000 gpd. The NPDES permit would not need to be amended for increased RO reject discharge because the Facility discharge would remain significantly below the permit discharge limit.

4.0 Connected Actions – Public Infrastructure

4.1 CITY OF PERHAM WATER SUPPLY

The City of Perham Public Works Department maintains the city's water supply system. The City's system has seven wells from which to pump water. The wells vary in depth from 80-105 feet and are located in three different areas of the City. The newest wells were installed and began operating in 2009. The City currently does not have any plans to upgrade their existing water system.

The system has two water towers. The oldest tower holds 500,000 gallons of water and the newer well, erected in 2009, holds 1,000,000 gallons of water for a total storage capacity of 1,500,000 gallons. The average flow through the system in the winter months is approximately 800,000 to 900,000 gallons per day (gpd). In the summer months, the water flow averages approximately 1,100,000 to 1,500,000 gpd. The water is treated with chlorine and fluoride at each well house. This is required by the Minnesota State Department of Health for compliance with the Safe Drinking Water Standards.

The City pumps water in compliance with its Water Appropriations permit issued by the Minnesota Department of Natural Resources (MDNR). This permit allows the City to pump up to 500 million gallons (MG) per year. Over the past two years (i.e., 2010 and 2011), the average water pumped each year was approximately 410 MG.

4.2 CITY OF PERHAM WASTEWATER TREATMENT FACILITY

According to an environmental assessment worksheet (EAW) completed in June 2011, the city of Perham's Wastewater Treatment Facility (WWTF) serves four significant industrial users: Barrel O' Fun Snack Foods, Kenny's Candy Company, Primera Foods Corp., and Tuffy's Pet Foods. The average 2010 inflow to the WWTF maximized the system's design capacity and exceeded daily permitted flows during peak production days. Domestic flow into the City's WWTF makes up slightly half of the total flow into the facility.

The city of Perham is expanding their existing WWTF for which the June 2011 EAW was completed. Currently AWW flow is approximately 540,000 gpd. The City plans to expand the WWTF to a 20-year design capacity of 1,107,000 gpd and loading capacity of 11,555 pounds per day of 5-day carbonaceous biochemical oxygen demand ($CBOD_5$). This is the anticipated 2030 level needed to ensure that the facility meets the permit requirements and accommodate future city growth. Construction of this project is scheduled to begin in the summer of 2012. Table 4 provides a summary of annual average influent flows to the Perham WWTF.

Table 4: Annual Average Influent Flows to the Perham WWTF

Year	Domestic Flow (gpd)	Industrial Flow (gpd)	Total Flow (gpd)
2010 (observed)	308,000	325,000	633,000
2030 (planned)	415,700	578,300	994,000

Source: Perham WWTF Expansion EAW 2011

The Perham WWTF currently operates under State Disposal System (SDS) permit MN0024473 to treat wastewater from industrial and domestic sources. The WWTF is currently permitted an AWW flow of 580,000 gpd. The permit for the expanded WWTF allows 720,000 gpd.

5.0 Environmental Impacts and Mitigation

The evaluation of water use and wastewater for the PRRF and the proposed project indicates that the proposed project would not impact any Facility or City permits. In all cases, the existing and proposed project projected actual levels would not exceed existing permit thresholds.

There is no permit required for water use from the city of Perham. The PRRF is billed monthly for its municipal water use. However, the City is required to comply with a MDNR Water Appropriations Permit, which regulates the maximum amount of water that the City can pump each year for its municipal wells. Table 5 summarizes the City's permit limit for maximum water allowed on an annual basis and compares that to the City's current level of water pumped and the PRRF proposed project.

On average, the City has pumped approximately 410,000,000 gallons per year. Of the average annual water, the PRRF has used approximately 30,000,000 gallons per year. Under the proposed project's projected actual quantities, the PRRF would use an additional 7,000,000 gallons each year. Under the proposed project's maximum levels, the PRRF would use an additional 50,000,000 gallons. In either case, the proposed project would not cause the City to exceed their allowed maximum under their MDNR Water Appropriations Permit requirements.

Table 5: Permit Levels Compared to PRRF Annual Water Use (gpy)

Permit	Permit Limit	City	Perham Resource Recovery Facility		
	Maximum allowable water use	Average Water Use	Existing	Proposed Project Actual	Proposed Project Maximum
MDNR Water Appropriations Permit	500,000,000	410,000,000	29,952,100	37,326,600	80,010,600

For sanitary discharge, the PRRF pays a flat rate to the City, and no permit is required for discharge to the city of Perham WWTF. The Perham WWTF operates under SDS permit MN0024473 to treat wastewater from industrial and domestic sources. The WWTF is currently permitted an AWW flow of 580,000 gpd. The permit for the expanded WWTF allows 720,000 gpd. Table 6 summarizes discharges from the PRRF to both the Perham WWTF and the storm sewer system compared to existing permit limits.

Table 6: Permit Levels Compared to PRRF Daily Wastewater Generation (gpd)

Permit	Permit Limit	City	Perham Resource Recovery Facility		
	Maximum Average Wastewater Flow	Average Wastewater Flow	Existing	Proposed Project Actual	Proposed Project Maximum
MPCA SDS Existing WWTF Permit (City)	580,000	540,000	4,545	9,780	6,641
MPCA SDS Expanded WWTF Permit (City)	720,000	Design capacity of 1,107,000	4,545	9,780	6,641
MPCA NPDES Permit (PRRF to storm sewer)	200,000	NA	22,562	22,715	64,233

Sanitary wastewater from the PRRF makes up a small percentage of the overall wastewater discharged to the city WWTF. Based on existing and new WWTF permit limits, the PRRF would not impact the City's SDS permit. The City is also currently in the process of upgrading their WWTF for a design capacity of 1,107,000 gpd. This increased design capacity, along with an amended city SDS permit to allow for greater AWW flow, would be more than adequate to meet the increase of approximately 5,000 gpd of PRRF wastewater from the proposed project.

RO reject water makes up the majority of wastewater at the PRRF. RO reject water is regulated by an NPDES permit for the Facility, which allows RO reject water discharge to the City storm sewer system. Under the proposed project projected actual quantities, the proposed project would not exceed the existing threshold for the NPDES permit. Operating at 365 days per year under proposed project maximum levels, the PRRF would not exceed the existing permit threshold of 200,000 gpd maximum discharge. Operating at maximum capacity year round is not a realistic scenario due to maintenance requirements and steam demand. The City storm sewer infrastructure from the PRRF to the storm sewer network at 2nd Street was replaced less than 10 years ago, and therefore would not need additional improvements to handle the increased RO reject water discharge from the proposed project.

Figures

Figure 1: Water Process Flow Diagram

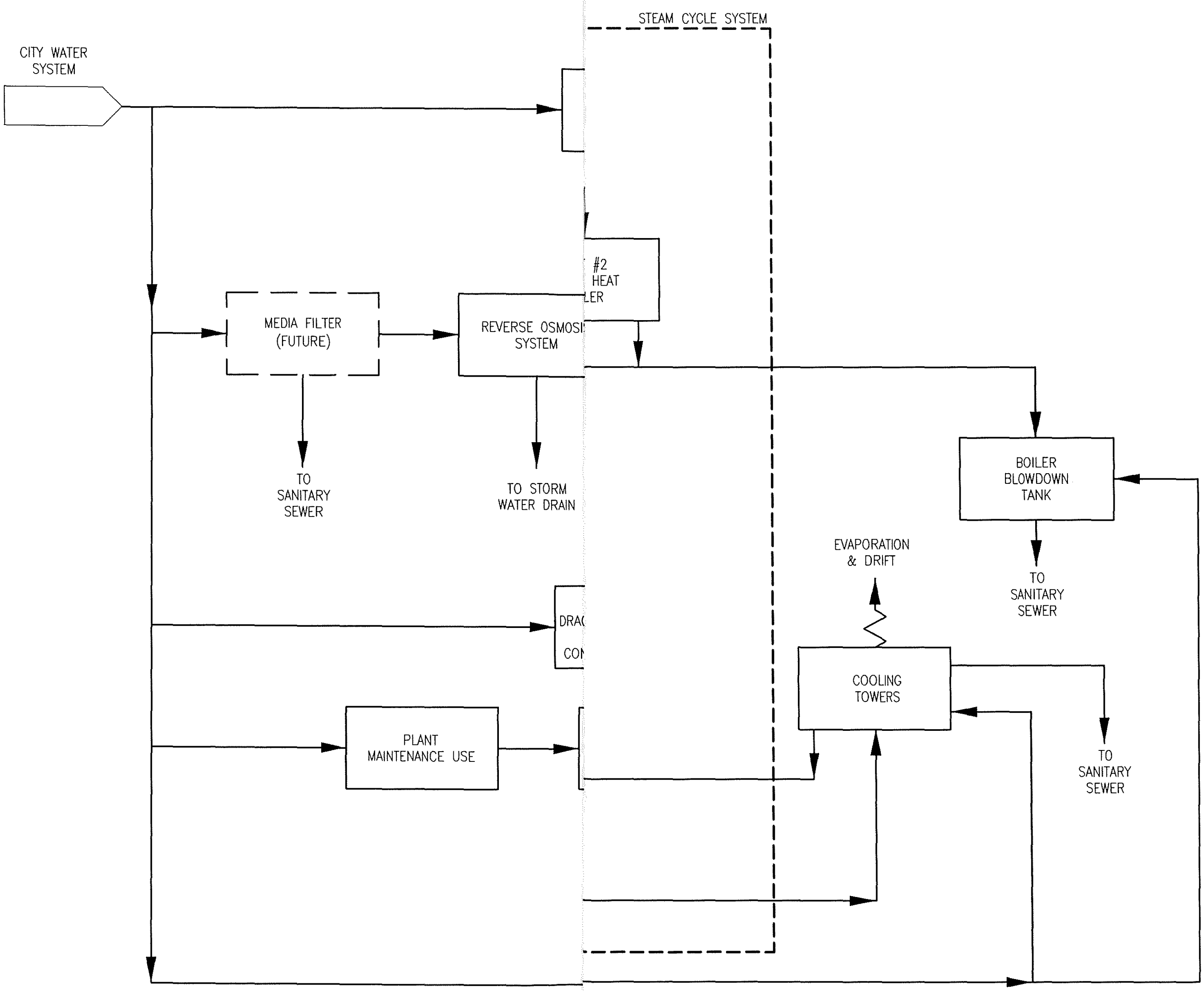
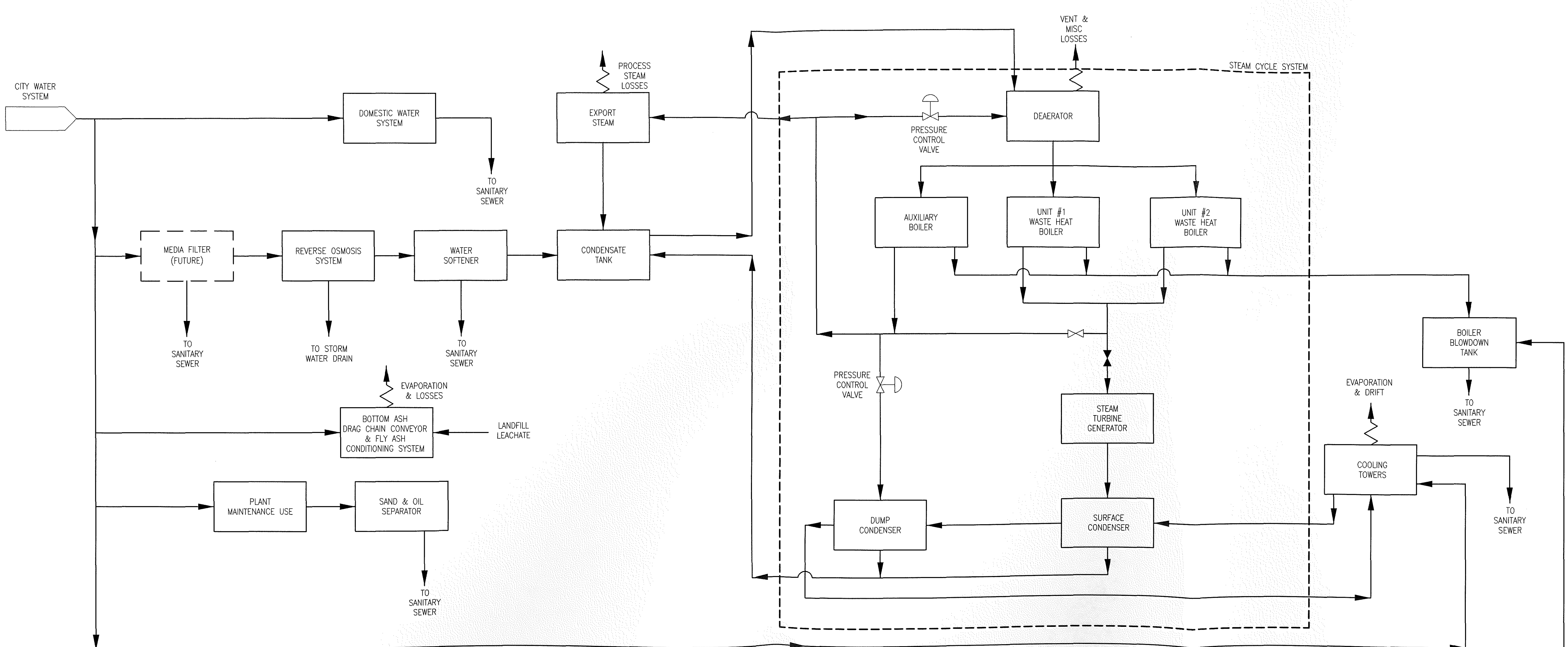

CITY WATER SYSTEM
STEAM CYCLE SYSTEM
#2
HEAT
MEDIA FILTER (FUTURE)
REVERSE OSMOSI
SYSTEM
TO SANITARY SEWER
TO STORM WATER DRAIN
BOILER BLOWDOWN TANK
EVAPORATION & DRIFT
TO SANITARY SEWER
COOLING TOWERS
PLANT MAINTENANCE USE
TO SANITARY SEWER

Figure 1

Water Process Flow Diagram



Perham Resource Recovery Facility
Proposed Expansion Project

Figure 1

Appendix E

Noise Study

Perham Resource Recovery Facility Noise Study

Wenck File #2415-03-09

Prepared for:

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1.0 Introduction

1.1 PURPOSE AND BACKGROUND

Purpose of the Study

This noise study is a follow up to the noise study that was conducted for the Perham Resource Recovery Facility (PRRF or Facility) in 2003. The purpose of this study is to measure the noise levels at the three residential receptors previously measured to determine if noise levels are within the Minnesota Noise Standards. Based on the results of this study, noise levels associated with the proposed project will also be qualitatively assessed to determine if there would be potential for noise impacts to nearby receptors.

Background

Noise levels at the existing facility were studied in 2003 (SBP Associates, 2003). The study monitored noise around the perimeter of the PRRF in six different locations to determine if noise levels are occurring above the Minnesota Noise Standards. The six monitoring sites included both residential and industrial sites. The results of the study determined that noise levels at the three sites near the Facility were below noise area classification (NAC-3) levels for industrial facilities with measured L50 values ranging from 54.5 and 73 dB(A). Of the three sites located near a residential neighborhood within 500 to 600 feet from the PRRF, the study found that noise levels were within the daytime standard, but exceeded the nighttime standard. The results of the noise monitoring in the sites near the residential area ranged between 56 to 58.5 dB(A).

The 2003 study determined that the main sources of noise generation at the PRRF are from the steam valve, cooling tower, stack, ID fan, Facility doors, and general Facility noise. The study recommended that noise be reduced by making modifications to the steam valve, stack, and cooling tower. Based on the recommendations in the noise study, the PRRF replaced internal equipment on the steam valve line. This reduced the noise generated at the Facility. A follow up noise study was not conducted to ensure that the improvements have reduced noise levels to within Minnesota Noise Standards.

The Prairie Lakes Municipal Solid Waste Authority (PLMSWA) is proposing to expand the existing Facility. This would involve adding a second waste heat boiler and a materials recovery facility (MRF) to process the waste prior to combustion. The proposed project would increase the municipal solid waste (MSW) processing capacity of the facility from 116 to 200 tons per day (tpd). Figure 1 shows the location of the PRRF in the city of Perham.

1.2 MEASUREMENT OF NOISE

Noise is typically defined as "unwanted sound." It may be as mild as a general nuisance, such as a noise causing distraction or masking desired sounds; or severe enough to impede communication, affect behavior, and cause temporary or permanent hearing loss. Prior to the 1960s, noise was not officially recognized or regulated in the United States. In the National Environmental Policy Act in 1969 and the Noise Control Act in the early 1970s, the issue of noise abatement was addressed at the federal level. Today, many state, county, and local municipalities have also adopted noise ordinances to minimize noise issues at the local level.

Sound travels in wave motion and produces a sound pressure level. This sound pressure level is commonly measured in decibels. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted decibel (dB(A)) scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in dB(A). Decibels represent the logarithmic increase in sound energy relative to a reference energy level.

A sound increase of 3 dB(A) is barely perceptible to the human ear. A 5 dB(A) increase is clearly noticeable and a 10 dB(A) increase is heard as twice as loud. Noise levels change depending upon the distance from a point or stationary source (e.g., factory operation). In general, for every doubling of the distance away from the stationary source of noise, the sound level decreases by 6 decibels. Thus, a source of noise measured at 80 decibels from a distance of 50 feet would produce a sound level of 74 decibels from 100 feet away. Table 1-1 provides a rough comparison of the noise levels of some common noise sources. These noise sources are from *A Guide to Noise Control in Minnesota* – Minnesota Pollution Control Agency, 2008 (MPCA, 2008).

Table 1-1: Decibel Levels of Common Noise Sources

dB(A)	Noise Source
140	Jet Engine (at 25 meters)
130	Jet Aircraft (at 100 meters)
120	Rock and Roll Concert
110	Pneumatic Chipper
100	Joiner/Planer
90	Chainsaw
80	Heavy Truck Traffic
70	Business Office
60	Conversational Speech
50	Library
40	Bedroom
30	Secluded Woods
20	Whisper

Source: *A Guide to Noise Control in Minnesota* - MPCA, 2008

Additionally, a doubling of energy, or doubling of identical sources, yields an increase of three decibels. For example, if a noise source, such large fan at an industrial facility, is generating 85 dB(A) of noise; adding an additional fan that generates 85 dB(A) of noise would not double the noise. It would rather increase the overall noise levels by three dB(A) for a total of 88 dB(A).

Noise assessment also takes into account background, or ambient, noise which is present in any environmental noise-monitoring situation. According to *A Guide to Noise Control in Minnesota* – MPCA, 2008, background noise is considered to be all noise sources other than the noise source being monitored. This can include traffic, animals, machinery, voices, and other sounds (MPCA, 2008). Background levels of noise are typically those levels that are exceeded 90 percent of the time in a given location. This is also known as the L90 noise level. The L90 noise level is determined by filtering out short-term periods of high noise levels, such as a passing train, to give a better measure of the overall background noise level at a particular location. The L90 is used to help determine a baseline for comparison. There is no state noise standard set for background noise.

1.3 MINNESOTA NOISE STANDARDS

The State of Minnesota noise regulations are administered by the MPCA under Minn. R. 7030.0040, subp. 2. The rules for permissible noise vary according to which noise area classification (NAC) is involved. In a residential setting, for example, the noise restrictions are more stringent than in an industrial setting. The rules also distinguish between night time (10:00 p.m.to 7:00 a.m.) and daytime (7:00 a.m.to 10:00 p.m.) noise; less noise is permitted at night. The standards list the sound levels, expressed as dB(A) (decibel – A-weighted), not to be exceeded for 10 and 50 percent of the time in a one-hour time period (L_{10} and L_{50}) for each noise area classification, as listed in Table 1-2.

Table 1-2: Applicable Minnesota Noise Standards

Noise Area Classification		Noise Standard, dB(A)			
		Daytime (7 am to 10 pm)		Night time (10 pm to 7 am)	
		L_{50}	L_{10}	L_{50}	L_{10}
1	Residential	60	65	50	55
2	Commercial	65	70	65	70
3	Industrial	75	80	75	80

Source: *A Guide to Noise Control in Minnesota* - MPCA, 2008

The standards are given in terms of the percent of time during a measurement period (typically one hour) during which a particular decibel dB(A) level may not be exceeded. A daytime L_{50} of 60 dB(A), for example, means that during the daytime, noise levels may not exceed 60 dB(A) more than 50 percent of the time (i.e., 30 minutes of an hour).

The city of Perham has adopted the state noise standards by reference to Minn. R. 7030 in their city zoning ordinance, part 92.18-Public Nuisances Affecting Peace and Safety, subp. D. The ordinance states "all obnoxious noises in violation of Minnesota Rules 7030, as they may be amended from time to time which are hereby incorporated by reference into this code."

2.0 Methodology

2.1 DATA COLLECTION

MPCA guidance on measuring noise levels was used during monitoring and data collection for this noise study. The equipment used complies with the specifications for ANSI S1.4-1983 Type 0, 1, 2, or S, and was calibrated prior to data collection. Measures were taken to factor in wind, precipitation, and other weather conditions, and data collection was adjusted accordingly. Monitoring locations were chosen based on the proximity to the PRRF and on the previous noise study, since the MPCA requested follow up on the previous study.

Noise measurements were made using Quest model 300 dosimeters. The dosimeters were placed on tri-pods approximately six feet off the ground to simulate the average height of a person's ear. Each dosimeter had its own microphone with a wind screen. The dosimeters were placed at three locations north of the PRRF along 3rd Street, near the residential receptors (Figure 2). Location #1 was at the southwest corner of 3rd Street and 6th Avenue. Location #2 was mid-block along the south side of 3rd Street, and Location #3 was located at the northeast corner of 3rd Street and 5th Avenue. These locations match monitoring locations from a previous noise study conducted in 2003 near the PRRF facility.

Prior to deployment in the field, each meter was calibrated to the 114 dB(A) noise source meter that is designed for the Quest meters. All meters successfully passed calibration. The meters were deployed in the early afternoon on Monday May 7, between the hours of 12:00 PM and 1:00 PM. The meters were placed on the tripod and then set to "run," meaning the meter was reading instantaneous noise and recording data. When running, the Quest 300 dosimeters measure instantaneous noise readings every second. The meters then store an average noise value for each minute that is generated from all of the instantaneous measurements taken during that minute. The meters were left running the remainder of the day on May 7. Periodic visits were made to each meter throughout the day and night while the meters were running and recording noise levels. The field visits were to check to ensure the meters were running and recording data; that the battery levels of the meters were sufficient; and to observe field conditions that could potentially influence noise levels in the study area.

In addition to the noise meters deployed near the residential receptors, an additional Quest dosimeter was used inside the PRRF facility to record noise inside the building. This meter was also used to document noise levels outside of the PRRF at the property fence line. The readings collected outside were used to compare the noise generated at PRRF to the industrial noise standards and also to document the reduction of noise from the equipment inside the facility to the levels outside.

During a field visit, it was determined the meters should be covered during the night to prevent damage from moisture or precipitation. Each meter and microphone was covered with 1 mil plastic wrap between 11:45 p.m. May 7 and 12:10 a.m. May 8. Instantaneous noise readings were checked before adding the plastic and were found to be the same as after the plastic was added. Meters were deployed collecting data until 12:00 p.m. on Tuesday, May 8 with all meters retrieved between 12:00 and 12:30 p.m.

2.2 ANALYSIS AND EVALUATION

The noise data was downloaded and organized for analysis using Microsoft Excel. For each location the individual readings for each minute were grouped for each hour, resulting in 60 individual measurements. The L10 and L50 noise levels were then determined for each hour and compared to the respective MPCA noise standards for residential receptors.

The L10 value is the noise level which is exceeded only ten percent of the hour and is generally considered the peak noise level for a location. The L50 value is the noise level which is exceeded fifty percent of the time. This value is essentially the average noise for a location. The L90 noise values were also calculated for each hour and for each location. The L90 value is the noise level which is exceeded 90 percent of the time and is generally considered the background noise level for a location. There is no state noise standard for L90 background noise levels.

Graphs and tables were developed to summarize the noise monitoring data and show the comparisons to the state noise standards. Section 3.2 provides additional information on the noise data results for each of the monitoring locations.

3.0 Existing Conditions

3.1 ENVIRONMENTAL SETTING

The environmental setting of the PRRF has a number of noise sources and land uses that contribute to the background noise levels (i.e., L90 level), as well as sources that can be evaluated using the Minnesota Noise Standards. The PRRF is located in an industrial area in the city of Perham, Minnesota. For the most part, the Facility has been in operation since the late 1980s. The area surrounding the PRRF is a mixture of industrial, light industrial, and residential uses. Figure 3 provides a zoning map showing the PRRF relative to adjacent land use zones.

The industrial park that the PRRF is located in consists of light industrial-type businesses. These include a printing shop, vehicle/truck repair, feed mill, pallet making company, and painting facility. The haul route for the PRRF enters from the Old Highway 10 onto 7th Avenue NE, southeast of the PRRF. From 7th Avenue NE, haul trucks for PRRF stop at the scale to be weighed, then proceed west on 2nd Street NE to the PRRF. Other vehicles entering the industrial park follow a similar route.

In proximity to the PRRF are two other large industrial facilities, Tuffy's Pet Foods and Bongards' Creameries, to which the PRRF supplies steam. These industries are located to the west of the PRRF. Bongards' has been in operation since 1946 when it first opened as Land O' Lakes. Tuffy's began operation in 1964, but was first operated as Pine Lake Feed beginning in the mid-1950s. Additionally, the Perham Egg facility was constructed and began operation in 1972. This facility is located directly north of the residences along 3rd Street NE.

During the daytime hours, Tuffy's and Bongards' have a number of trucks that travel a route along the north side of the PRRF. Tuffy's trucks, which are typically semi-trucks with trailers; proceed along 3rd Street NE to a parking lot on the corner of 3rd Street NE and 6th Avenue NE, as shown on Figure 2. Bongards' milk tanker trucks also follow a route along 3rd Street NE, turning onto 6th Avenue NE and proceeding to a scale by crossing the north side of the PRRF property. Bongards' trucks enter from 6th Avenue NE and exit the scale from the Bongards' property to the west, along 2nd Street NE. Additionally, Perham Egg trucks travel primarily along 3rd Street NE and 5th Avenue NE to their facility.

Directly adjacent on the south side of the PRRF is the Burlington Northern Santa Fe (BNSF) Railroad line. The number of trains passing the PRRF on a daily basis varies. At times there are several per hour, while at other times, there may be only one or two. There is a railroad track crossing located approximately one-quarter mile southeast of the PRRF. As the train approaches the crossing, a loud horn is sounded from the locomotive.

Approximately 500 feet north of the PRRF is a residential area, beyond which is the Perham Egg plant. The average age of homes in this neighborhood is approximately 50 years; mostly built around the mid-1960s. This time period follows the start of operation of what are now Bongards' Creameries and Tuffy's Pet Foods. The Perham Egg plant was constructed after this time period. The city of Perham serves as a rail station for the BNSF Railroad, which was also built many years prior to the neighborhood. In addition to industrial-type noise, the residential neighborhood also generates noise, which contribute to background noise levels. These noise sources include vehicle traffic, barking dogs, and other common residential activities.

3.2 EXISTING FACILITY NOISE SOURCES

The PRRF operates a number of different pieces of equipment, which are located both inside and outside of the building within the facility's property boundary. Table 3-1 provides a summary of the equipment and its location relative to the Facility.

Table 3-1: Noise Sources at the Existing Facility

Source of Noise (Equipment)	Location at Facility
ID Fan	Outside
Drum vent for heat recovery boiler	Outside
Steam muffler	Outside
Drum safety valve vent lines both boilers	Outside
Pulse poppets for baghouse	Outside
Pulse gas fan	Inside
Turbine drive feedwater pump vent	Outside
DA vent	Outside
Stack vent	Outside
Cooling tower fans	Outside

Instantaneous noise levels were recorded inside and outside of the PRRF building. These readings were taken with a Quest 300 noise dosimeter that was not deployed at one of the continuous monitoring locations. The Facility was operational; incinerating waste and generating steam at the time the readings were taken. Noise levels varied between 85 to 91 dB(A) inside the Facility near the boiler and feed area. Outside of the Facility noise levels varied between 70 to 73 dB(A), with some doors to the facility partially or completely open during operations.

Table 3-2: Instantaneous Noise Levels Measured at the PRRF

Location	Mean Noise Levels
Adjacent to control room inside plant	85 dB(A)
Boiler deck inside plant	88 to 91 dB(A)
Feed area inside plant	87 dB(A)
North parking lot fence line (40 feet from facility wall)	70 dB(A)
East Parking lot 70 feet from tipping floor (one door open)	70 dB(A)
Lime silo on west side of facility (50 feet from silo; door to ash area partly open)	72 dB(A)
South side of facility with vent fan running (30 feet from fan)	73 dB(A)

3.3 DATA RESULTS

Data results from the noise monitoring indicate that noise levels are variable throughout the 23-hour measurement period. Higher noise levels were observed during the day, and lower noise levels were observed at night. The L10, L50 and L90 values for each location are provided in Table 3-3. In general, noise levels were relatively high at all three monitoring locations and often exceeded the residential noise standards. A discussion of the observed noise levels from each monitoring location is provided.

Table 3-3: L10, L50 and L90 Noise Levels Measured at Three Residential Locations

Date	Hour	L10 Standard	L50 Standard	Location #1			Location #2			Location #3		
				L10	L50	L90	L10	L50	L90	L10	L50	L90
Monday May 7, 2012	1:00 PM	65	60	68.4	62.1	57.1	69.2	63.4	59.7	68.5	64.6	61.2
	2:00 PM	65	60	66.1	61.5	57.1	66.9	62.3	59.7	70	63.4	60.3
	3:00 PM	65	60	64.8	60.6	56	66.9	62	58.9	66.5	62.4	59.5
	4:00 PM	65	60	63.5	58	55.3	67.8	63.3	60.1	65.6	60.7	56.9
	5:00 PM	65	60	67.1	59.3	54.6	70.9	63.9	59.4	68	63.3	58.8
	6:00 PM	65	60	60.3	55.2	52.5	64.9	60.4	57.2	65.8	60	55.6
	7:00 PM	65	60	66.8	60.6	54	66.8	61.2	55.3	68.8	62.7	55.4
	8:00 PM	65	60	57.7	55.4	54.3	58.9	57.4	56.3	61.3	58.5	57.1
	9:00 PM	65	60	61	54.5	53	63.1	56.8	55.9	64.4	56.5	54.8
	10:00 PM	55	50	63.6	54.4	52.4	65.5	56.6	55.7	62.8	57.2	55.5
	11:00 PM	55	50	59.9	54	52.8	66.9	56.5	55.4	59	56.7	55.3
Tuesday May 8, 2012	12:00 AM	55	50	64.2	55.9	53	62.5	57.5	55.7	62.8	57.2	55.9
	1:00 AM	55	50	61.4	56	53.7	62.2	57.9	56.6	61	57	56.2
	2:00 AM	55	50	68.3	56.5	53.2	68.1	58.4	56.2	63.3	56.8	55.6
	3:00 AM	55	50	66.8	54.1	51.6	65.8	57.2	56.2	60.5	56.5	55.5
	4:00 AM	55	50	69.3	58.1	54.3	67.8	58.5	56.6	62.7	58.3	56.2
	5:00 AM	55	50	59.4	56.7	55.5	60.2	57.9	56.9	62.1	58.3	56.9
	6:00 AM	55	50	66.2	59.5	55.8	65.3	63.2	57.8	63.5	58.7	56.9
	7:00 AM	65	60	66.2	59.6	55.4	66	60.6	58.1	65.3	59.3	57.3

Date	Hour	L10 Standard	L50 Standard	Location #1			Location #2			Location #3		
				L10	L50	L90	L10	L50	L90	L10	L50	L90
	8:00 AM	65	60	66.8	58.8	56.3	67.1	59.4	57.5	67.2	59.3	57.4
	9:00 AM	65	60	65.1	60.3	56.5	63.8	61.1	58.4	62.5	59.4	57.6
	10:00 AM	65	60	67.4	61	56.2	67.2	62.2	59	65.1	59.7	57.7
	11:00 AM	65	60	66.9	60.4	56.5	65.2	61.6	58.4	64.2	58.5	56.2

Location #1
The meter at monitoring Location #1 was placed at the southwest corner of 3rd Street and 6th Avenue (Figure 2). This monitoring location is immediately adjacent to the Tuffy's truck parking lot and approximately 450 feet north of the PRRF (Photo 1). The noise data revealed that the peak noise levels exceeded the residential L10 daytime standard of 65 dB(A) during nine of the 14 hours monitored, and exceeded the residential L10 nighttime standard of 55 dB(A) during all nine of the hours monitored. At Location #1 the average noise levels exceeded the residential L50 daytime standard of 60 dB(A) seven of the 14 hours monitored, and exceeded the residential L50 nighttime standard of 50 dB(A) during all nine of the hours monitored.

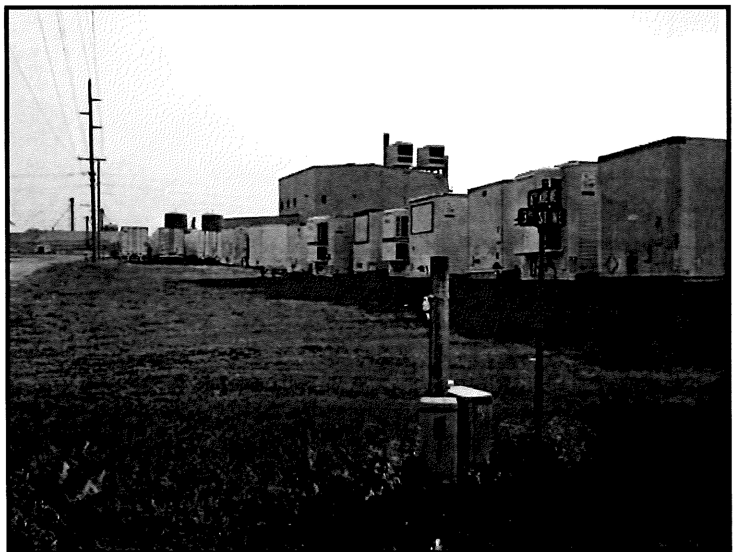


Photo 1: Facing south from monitoring Location #1

Location #2
The meter at monitoring Location #2 was placed mid-block along the south side of 3rd Street (Figure 2). This monitoring location is approximately 300 feet north of the scales for Bongards' Creameries and 420 feet north of the PRRF (Photos 2 and 3). The noise data revealed that the peak noise levels exceeded the residential L10 daytime standard of 65 dB(A) during 10 of the 14 hours monitored, and exceeded the residential L10 nighttime standard of 55 dB(A) during all nine of the hours monitored. At Location #2 the average noise levels exceeded the residential L50 daytime standard of 60 dB(A) 11 of the 14 hours monitored, and exceeded the residential L50 nighttime standard of 50 dB(A) during all nine of the hours monitored.

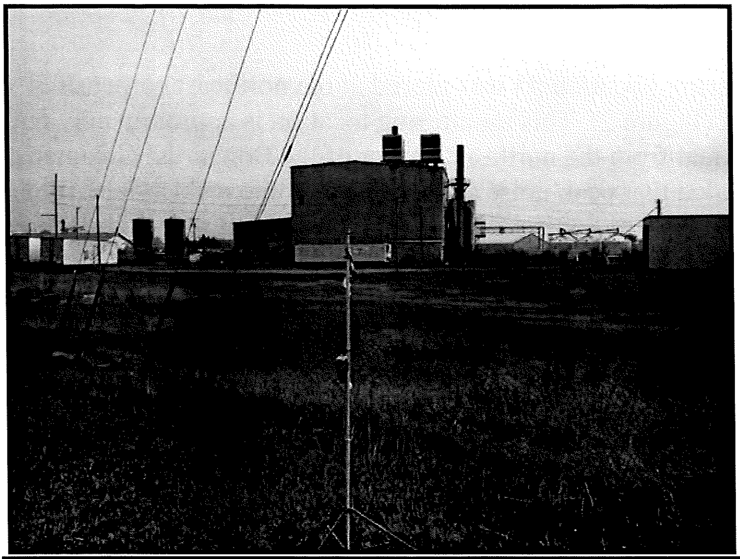


Photo 2: Facing southeast from monitoring Location #2
Quest 300 dosimeter in foreground, PRRF in background

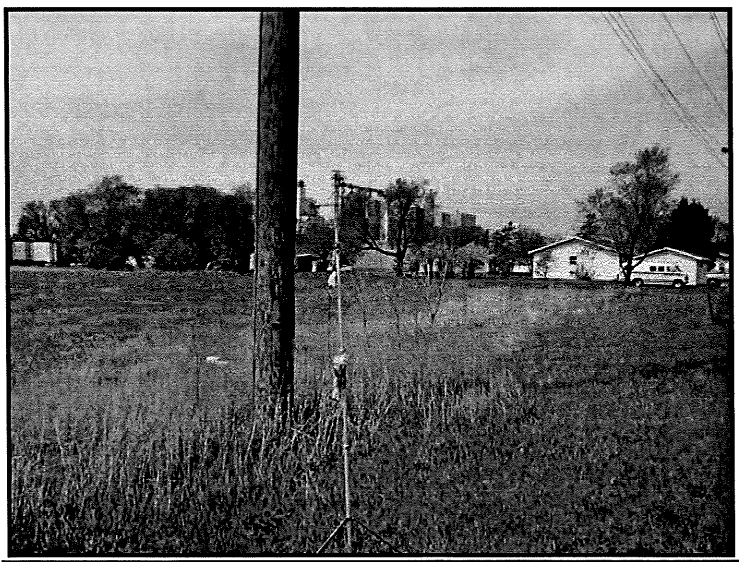


Photo 3: Facing west from monitoring Location #2
Tuffy's Pet Foods in background

Location #3

The meter at monitoring Location #3 was placed at the northeast corner of 3rd Street and 5th Avenue intersection (Figure 2). This monitoring location is approximately 650 feet from the PRRF and also 350 feet from the northeast corner of the Bongards' Creameries facility (Photo 4). The noise data revealed that peak noise levels exceeded the residential L10 daytime standard of 65 dB(A) during 10 of the 14 hours monitored, and exceeded the residential L10 nighttime standard of 55 dB(A) during all nine of the hours monitored. At Location #3 the average noise levels exceeded the residential L50 daytime standard of 60 dB(A) seven of the 14 hours monitored, and exceeded the residential L50 nighttime standard of 50 dB(A) during all nine of the hours monitored.

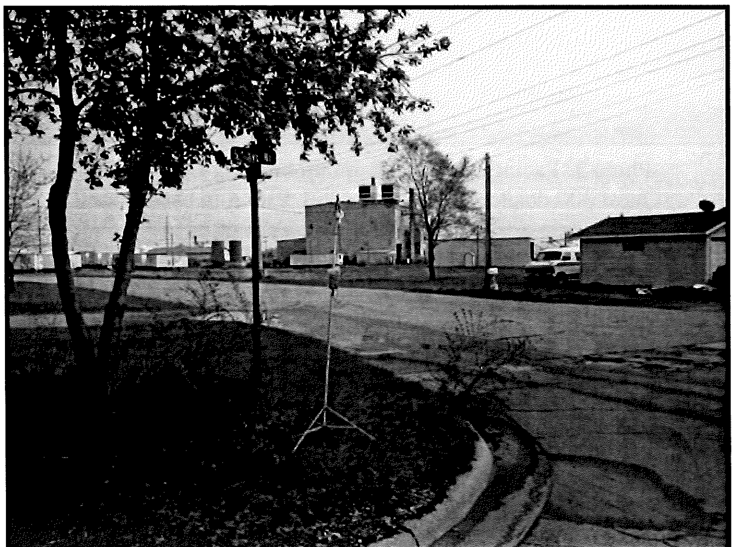


Photo 4: Facing southeast from monitoring Location #3
PRRF in background

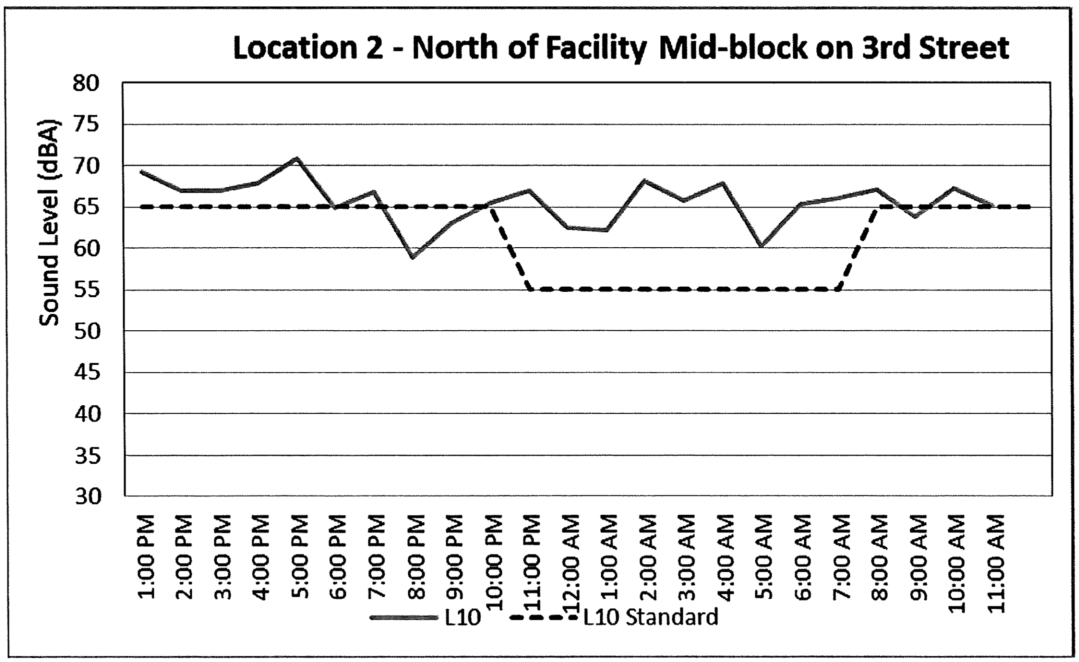
3.4 ASSESSMENT AND CONCLUSIONS

There are multiple sources that are contributing to noise levels within the study area, near both the residential and industrial areas where noise was monitored. Noise levels were monitored at three locations adjacent to the residential neighborhood north of the PRRF (Figure 2). The monitoring locations were in relative close proximity to one another and as a result the observed noise levels were very similar between the three locations. In general, noise levels were found to exceed the daytime standards from 50 to 80 percent of the time for both the peak L10 levels and average L50 levels. Nighttime noise levels exceeded both the peak L10 levels and average L50 levels during all hours monitored at all locations.

Monitoring Results Compared to Noise Standards

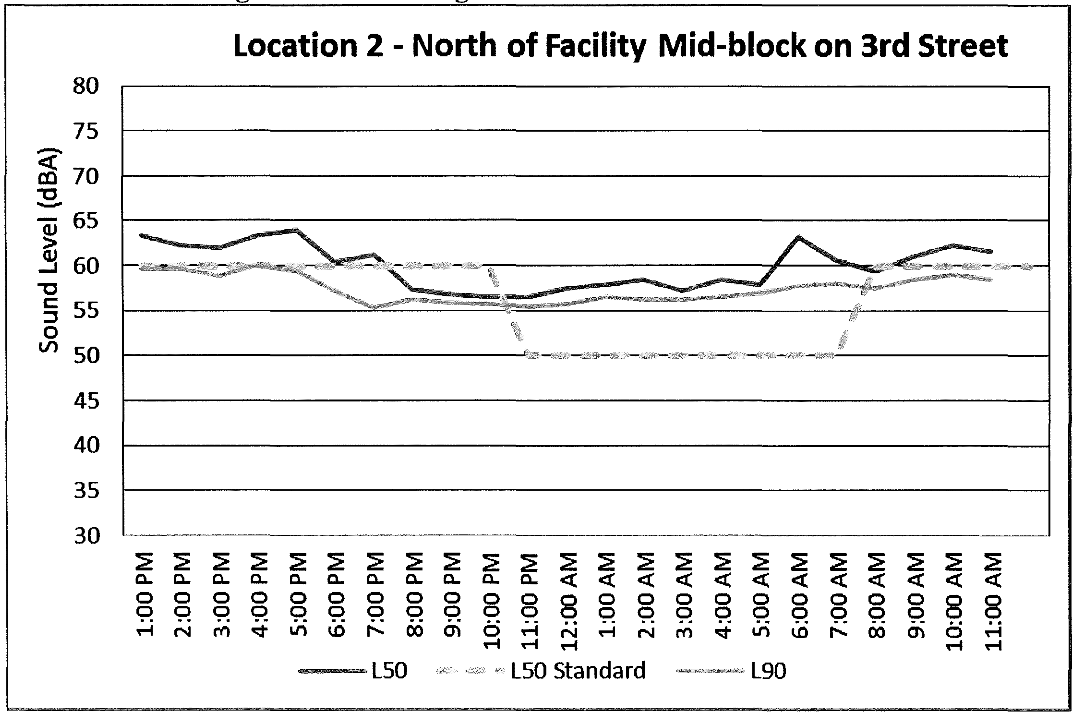
The L10 and L50 noise levels observed during the study are presented in Charts 3-1 and 3-2 for Location #2 and compared to the residential noise standards. The trend line for the peak L10 noise in Chart 3-1 shows that the noise levels rarely drop below the standard during the day and never fall below the standard at night. There is some observed variation between hours but it is interesting to note that the peak noise levels during the day are similar to the peak levels during the nighttime hours. This indicates that the sources contributing to the peak noise levels are occurring throughout the day.

Chart 3-1: Peak L10 Noise Levels Observed at Location #2



The average noise levels at Location #2 are presented in Chart 3-2 and are compared to the residential L50 standards as well as the L90 or background noise levels for the location. The L50 average noise levels generally exceed the daytime standards until the late evening hours and then were below the daytime standards for several hours. The L50 noise levels never fell below the nighttime standards during the monitoring period. The trend line for the L90 background noise levels on Chart 3-2 reveal that during the daytime hours, the back noise levels approaches but does not exceed the daytime standard and the background levels are two to five decibels lower than the L50 average noise levels. However, during the nighttime hours, the background L90 noise levels exceed the residential nighttime standards during all hours monitored. Additionally, the background L90 noise levels are only one to two decibels less than the average noise levels during the late evening and nighttime hours. This suggests that there are multiple sources contributing to noise in the area that that these sources are producing a relatively constant amount of noise throughout the late evening and nighttime periods.

Chart 3-2: Average L50 and Background L90 Noise Levels Observed at Location #2.



Sources of Noise and Noise Data

While the noise meters were deployed and recording noise levels near the residential neighborhood, field observations noted several sources that were directly contributing to the noise levels. Truck traffic was observed to be quite high along 3rd Street. This street is used by milk trucks that are traveling east on 3rd Street and then turn south at 6th Avenue to access the scales prior to entering Bongards' Creameries facility. Trucks also travel along 3rd Street to access the Tuffy's truck trailer parking lot. The trucks accelerating and decelerating along 3rd

Street contributed to the high observed noise levels at all three monitoring locations. Trucks entering the PRRF typically accessed the facility from the east along 2nd Street after using the scales on 7th Avenue. The waste hauler trucks did not typically use 3rd Street to access or leave the PRRF and were not driving past the three noise monitoring locations.

Another source that contributed to noise near the residential area was the trains traveling on the BNSF tracks adjacent to Main Street. The trains were observed to typically sound their horn several times when approaching and passing through town, and were observed to pass through town two to four times per hour. The noise meters were located 650 to 750 feet northeast of the train track and the passing trains did increase the noise level within the study area. Train traffic was not extensively documented during the study, but examination of the individual noise readings at times trains were noted passing through town revealed that the two to three of the highest noise readings for an individual hour occurred when a train was passing. This indicates that the train traffic is directly contributing to the peak L10 noise levels observed during the study at the residential monitoring locations.

Field observations also confirmed that in addition to the train and truck traffic, the industrial facilities in the area, including Bongards' Creameries, PRRF, and Tuffy's Pet Foods, are contributing to the noise levels near the residential neighborhoods; as they are all within an audible distance from the noise meters. Fans, vents, and other operations-related sounds are audible within the neighborhood at the monitoring locations. However, it is difficult to distinguish how much each facility is contributing to the overall noise at each monitoring location.

Noise Relative to the PRRF

Noise travels away from its source and the noise level decreases as the distance from the source increases. When traveling over hard surfaces, such as pavement, noise generally decreases 3 dB(A) for each doubling of distance. When traveling over soft surfaces, such as grass or vegetation, noise generally decreases 6 dB(A) for each doubling of distance.

The area between the PRRF and the noise monitoring locations is an open grassy field. Short-term noise measurements were taken outside of the PRRF along the north, east and west fence lines. On the north side of the building, the noise level was 70 dB(A) at 40 feet from the Facility. The noise generated by the PRRF and reaching the residential receptors north of the Facility can be calculated using the following equation:

$$dB(A)_2 = dB(A)_1 - 20 \log_{10} (D2/D1)$$

[Where dBA_1 is the known noise level at distance one, dBA_2 is the noise level at the new distance two; D1 is distance one and D2 is distance two.]

The monitoring locations during the study were approximately 450 feet to 650 feet away from the PRRF and the nearest residential receptors are approximately 525 feet away from the PRRF. Using the equation above, noise levels generated by the PRRF would be at the following level when they reach noise monitoring Locations #1 or #2, which are approximately 450 feet from the PRRF:

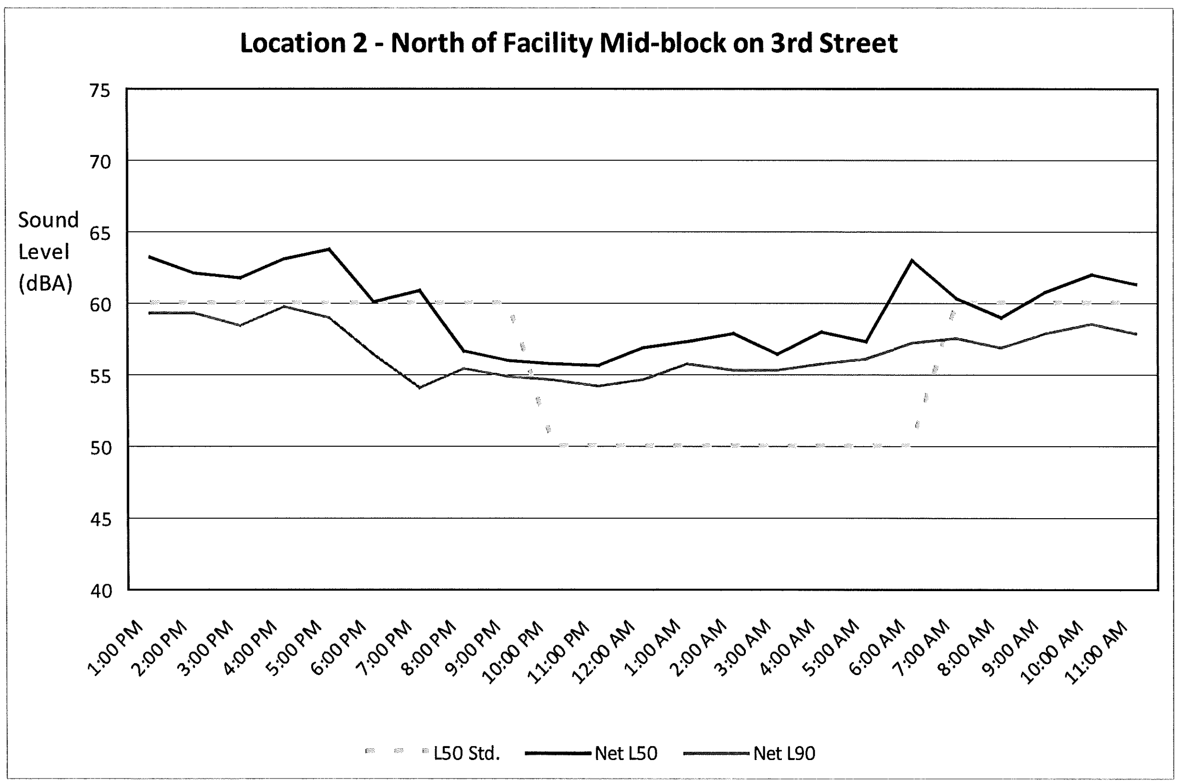
$$70\ d(BA) - (20*(Log\ 10\ (450\ feet/40\ feet)) = \mathbf{49\ dB(A)}$$

The above calculation reveals that the noise level generated by the PRRF is a minor contributor to the noise levels near the residential neighborhood adjacent to the Facility. Noise levels were not recorded outside of the Bongards' or Tuffy's locations, but similar contributing noise levels from these sources can be assumed as contributing to the noise levels in the study area.

Additional calculations were completed to determine what noise contribution the PRRF may have on the L90 background noise levels at the residential monitoring locations. Using the results of the calculations above, which show the expected noise levels based on distance attenuation at Location #2, the PRRF's noise contribution (i.e., 49 dB(A)) was subtracted from the L90 noise level and compared to the L50 standard.

Overall, the calculation indicated that removing the PRRF from the area would not reduce the noise levels enough to bring the residential area into compliance with the L50 noise standard. The net effect would reduce L90 background noise levels by approximately 0.2 decibels, which is inaudible to the human ear, and therefore would not be noticeable. Chart 3-3 shows the recorded noise monitoring results for the net L50 (blue line) and net L90 (green line) compared to the L50 standard (yellow dashed line).

Chart 3-3: Net L50 and Net L90 Noise Levels Excluding the PRRF at Location #2.



The net effect on the L50 standard would be virtually no change, as background L90 noise levels that currently exceed the L50 standard, particularly during nighttime hours, would continue to exceed that standard without operation of the PRRF at Location #2. During the nighttime hours, the L90 levels exceed the L50 standard during nine of the nine nighttime hours at Location #2.

Conclusions

Overall the review of the monitoring data and the observations made in the field during the time of the study reveal that noise levels are generally high near the residential neighborhood adjacent to the PRRF. Additionally, there are a variety of sources contributing to the noise levels in the neighborhood. In general, the neighborhood along 3rd Street NE exceeds the L50 standards with its L90 noise levels, especially during nighttime hours. No known source or activity associated with the PRRF could be reduced or eliminated to reduce noise levels significantly enough to keep the area consistently below the residential L10 and L50 noise standards.

4.0 Proposed Project Conditions – Noise Sources

4.1 CONSTRUCTION

Construction of the proposed project would require some heavy equipment typical of building construction projects, such as front end loaders, haul trucks, and bobcats. Site grading would be minimal. This equipment would be equipped with noise reduction devices, such as mufflers. Once construction of the new building was completed, the remaining construction associated with the proposed project would occur indoors. Construction of the proposed project is anticipated to take approximately 12-18 months and would occur during daytime hours as seasonal conditions allow.

4.2 EXISTING SOURCES TO BE ENCLOSED

The proposed project would utilize the existing equipment at the PRRF. A number of the existing pieces of equipment that are currently outside would be enclosed by the proposed project. Table 4-1 provides a summary of the existing sources of equipment that are also a source of noise at the Facility, along with a comparison of which pieces of the existing equipment would be enclosed by the proposed project. Some pieces of equipment, due to functionality and regulation, are not capable of being enclosed. These include some vents and the steam muffler.

Table 4-1: Noise Sources At Facility With Proposed Project

Source of Noise (Equipment)	Location at Existing Facility	Location at Facility with Proposed Project
ID Fan	Outside	Inside
Drum vent for heat recovery boiler	Outside	Inside
Steam muffler	Outside	Outside
Drum safety valve vent lines both boilers	Outside	Outside
Pulse poppets for baghouse	Outside	Inside
Pulse gas fan	Inside	Inside
Turbine drive feedwater pump vent	Outside	Inside
DA vent	Outside	Outside
Stack vent	Outside	Outside
Cooling tower fans	Outside	Outside

4.3 NEW SOURCES

4.3.1 To Be Enclosed

The materials recovery facility (MRF) would require a new building and new equipment; including trommel, conveyors, and balers. All of the new equipment would be enclosed within the MRF building.

4.3.2 Outdoor

The proposed project would not require an additional stack vent or other exterior exhaust-type equipment for operation. but the project would instead increase the height of the existing stack vent, and therefore, no new sources of exhaust-type equipment would be added. Additionally, four noise point sources at the existing Facility (i.e., ID fan, drum vent, pulse poppets, and turbine drive feedwater pump vent) that were previously located outside, would be enclosed by the proposed project. This would result in a decrease of outdoor vents and equipment that have the potential to create noise.

Additionally, the proposed project would use additional waste and require additional employees for operations, and therefore additional vehicle trips would occur into and out of the Facility. Traffic information from the Environmental Assessment Worksheet (EAW) for the proposed project was used to determine the increase in vehicle traffic. The EAW examined traffic based on vehicle type and number of trips. Each trip was considered an entry or an exit, and therefore a truck entering and then exiting the Facility is considered two trips.

Most of the truck traffic will occur during daytime hours on weekdays, Monday through Friday. The Facility runs 24 hours per day, seven days per week. However, truck traffic mainly occurs during the weekday. The proposed project is anticipated to result in an increase of 12 employees for a total of 27, making approximately 91 trips per day. It is projected that an additional 12 loads per day of waste would be hauled to the Facility for a total of 44 by waste haul trucks. Other trucks necessary for Facility operations include leachate trucks, ash and fines trucks, MRF trucks, and miscellaneous trucks. For all vehicles, total trips per day for Facility operations with the proposed project are estimated to be 150 trips, which is an increase of approximately 55 trips per day from current operations.

The proposed project would reconfigure the tipping floor of the existing Facility by expanding the existing tipping floor to the east and north, where it would connect with the proposed MRF building. MSW haul trucks would deliver their loads to the south side of the PRRF, rather than the east side, which is the current entrance to the tipping floor. Trucks would enter at the existing entrance, and proceed to the south side of the building, where they would back up to deliver their load. They would exit at the same entrance location. There would be approximately two to three MRF trucks per day entering the PRRF from the east and proceeding to the north side of the MRF building to pick up recyclable materials. For the proposed project, an estimated four trucks per week of ash trucks, fines trucks, and leachate trucks would also enter the Facility from 6th Avenue and proceed along the north side of the proposed MRF; continuing counterclockwise around the Facility, past the tipping floor, and exiting where they entered.

5.0 Qualitative Assessment of Proposed Project Impacts

5.1 IMPACT OF CONSTRUCTION TO NEARBY RECEPTORS

The potential noise impact from construction of the proposed project on nearby receptors in the residential neighborhood would be of a temporary nature. Construction is anticipated to last approximately 12 to 18 months and occur during daytime hours as seasonal conditions allow. Building construction would occur within the first half of construction, which would produce noises that could be audible at times to nearby receptors. Once building construction is complete, the majority of the remaining construction would occur indoors. This would produce minimal, if any, noise impacts to nearby receptors.

5.2 IMPACT OF OUTDOOR SOURCES TO NEARBY RECEPTORS

The proposed project would enclose four existing point sources of noise, which are currently located outside. Placing these noise sources inside would result in a reduction in noise generation from those sources. The net effect of the proposed project creating a new noise source while enclosing four existing noise sources is anticipated to be a decrease in noise generated by the Facility from the proposed project compared to existing noise levels. Based on this information, the net decrease in noise generated by the proposed project would not impact the noise levels at the residential receptors.

Traffic associated with the proposed project would be an increase over existing levels. Most of the traffic would be generated by haul trucks and additional employees. The primary haul route would be along 7th Avenue NE and 2nd Street NE. This would create an additional number of line sources of noise from traffic to the area. However, the route that the majority of the vehicles, in particular, the haul trucks would use is through an industrial area.

The number of haul truck trips would be less than double what is occurring for the existing Facility operations. The businesses within the industrial area may notice additional trucks, and therefore the line source of noise from the trucks would occur a greater number of times throughout the daytime hours during the week on Monday through Friday. However, the noise levels would not increase in decibels from existing conditions, and therefore the impact of this increased traffic on noise levels in the industrial area is anticipated to a significant impact.

The proposed reconfiguration of the tipping floor at the PRRF would provide a noise reduction benefit by moving the MSW haul trucks to the south side of the building, which would provide a buffer to the noise generated as these trucks back up to deliver their loads. Approximately two to three trucks per day would pick up recyclables from the MRF on the north side of the Facility.

Additionally, an estimated four trucks per week of ash trucks, fines trucks, and leachate trucks would also enter the Facility from 6th Avenue; but the noise impact from these loads is expected to be minimal to nearby receptors.

5.3 IMPACT OF ENCLOSED SOURCES TO NEARBY RECEPTORS

Four existing pieces of noise generating equipment would be enclosed as part of the proposed project. This would have a potentially beneficial effect on noise levels at nearby receptors. Additionally, a MRF would be constructed and operated at the PRRF. The equipment inside the MRF would generate new point sources of noise. However, based on noise level measurements taken inside the existing PRRF compared to noise level measurements taken outside of the PRRF, it is anticipated that noise levels from the proposed project would not increase significantly on the property. Additionally, the MRF building could provide some buffering of noise between the incinerator portion of the Facility and the neighborhood to the north.

The noise levels from enclosed sources associated with the proposed project are anticipated to be similar to existing noise levels and remain within the industrial noise standards within the property boundary. Based on noise calculations made in Section 3.4, it is estimated that noise levels from the addition of the MRF and proposed project equipment would not increase significantly, and would likely not increase to audible levels at nearby receptors.

6.0 Summary and Conclusions

The PRRF generates noise from a number of sources, both internal and outside. This includes various operating equipment, such as vents and fans. There are also a few sources of outside noise generated from external vents and fans, as well as haul trucks.

Overall noise monitoring data indicated that noise levels are generally high near the residential neighborhood adjacent to the PRRF. In general, the neighborhood exceeds the L50 standards with its L90 background noise levels, especially during nighttime hours. There are a variety of sources contributing to the noise levels in the neighborhood; therefore, no known source or activity associated with the PRRF could be identified that could be reduced or eliminated to significantly reduce noise levels enough to keep the area consistently below the residential L10 and L50 noise standards.

The proposed project would generate additional truck traffic, which is not anticipated to exceed industrial noise standards as this traffic would continue to use the existing route through the industrial park rather than a route through the residential neighborhood. The proposed reconfiguration of the tipping floor at the PRRF would provide a noise reduction benefit by moving the MSW haul trucks to the south side of the building, providing a buffer to the noise generated as these trucks back up to deliver their loads. Approximately two to three trucks per day would pick up recyclables from the MRF on the north side of the Facility. Additionally, an estimated four trucks per week of ash trucks, fines trucks, and leachate trucks would also enter the Facility from 6th Avenue; however, the noise impact from these loads is expected to be minimal to nearby receptors.

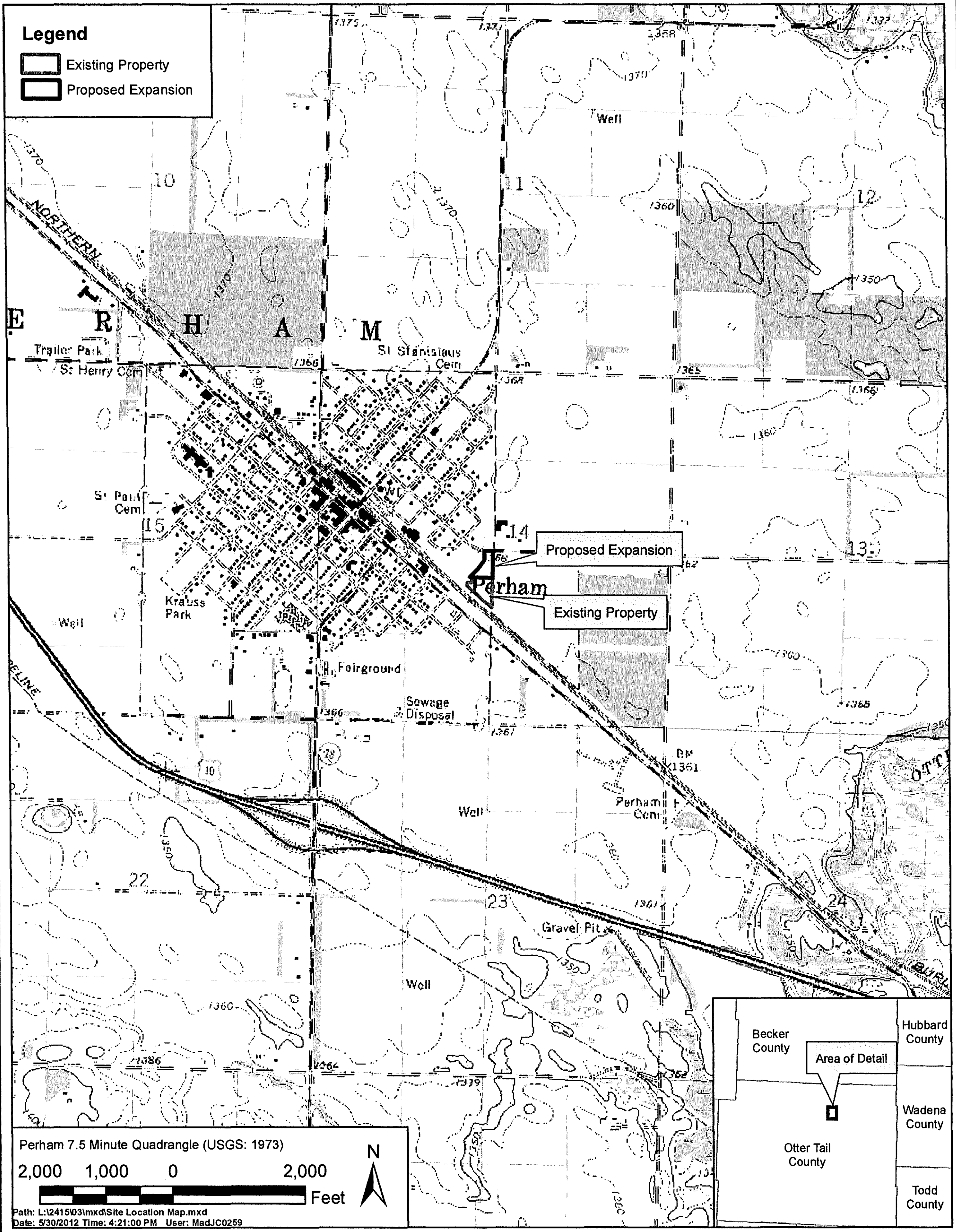
Additionally, the noise levels from enclosed sources associated with the proposed project are anticipated to be similar to existing noise levels and remain within the industrial noise standards. This includes enclosing four existing pieces of equipment, which would also help reduce noise.

There are measured noise standard exceedances near the neighborhood to the north of the PRRF. However, the study seems to indicate a number of noise sources in the area that are contributing to the L90 noise levels. Therefore, pinpointing a sole source of noise that is causing the noise levels would be difficult. The nature of the area includes an industrial zone directly adjacent to a residential zone, separated by 3rd Street NE, which is also a truck route for some of the facilities. The industrial zone includes several facilities that generate noise and have been in operation for a number of decades.

Based on calculations and evaluation in this study, the proposed project at the PRRF would not generate additional audible noise in the adjacent residential areas. The proposed project would further mitigate noise by enclosing four pieces of process equipment that are currently outside.

This would have potential noise reducing benefits. Additionally, the proposed project would keep noise levels below the industrial standard as do current operations. Calculations for the noise study indicate that the proposed project would not contribute audible increases in noise at the residences to the north; and therefore, would not further contribute to the noise levels which already exceed the L50 noise standard with the existing background L90 levels of noise.

Figures



PERHAM RESOURCE RECOVERY FACILITY

Site Location Map

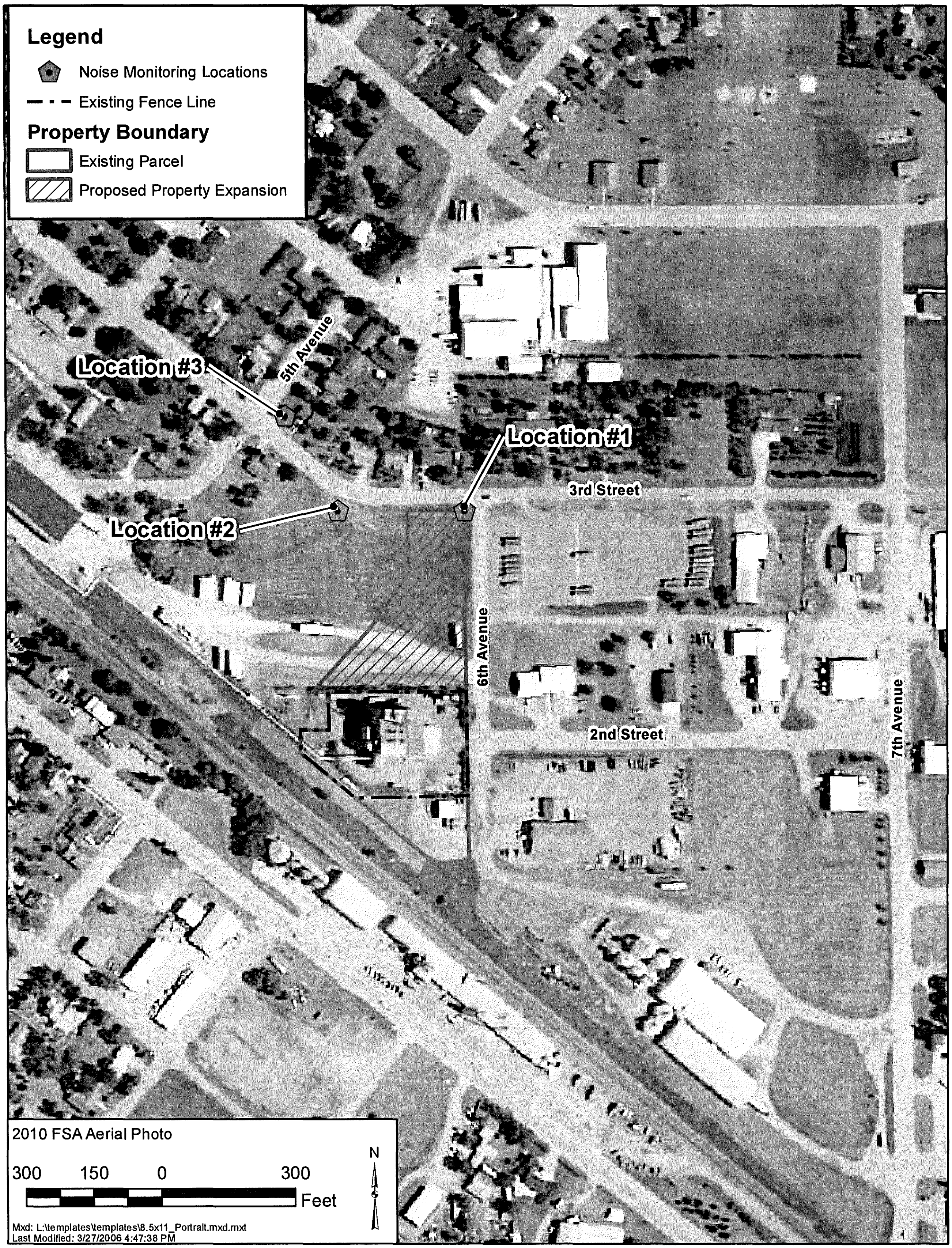
Wenck

Engineers - Scientists
Business Professionals
www.wenck.com

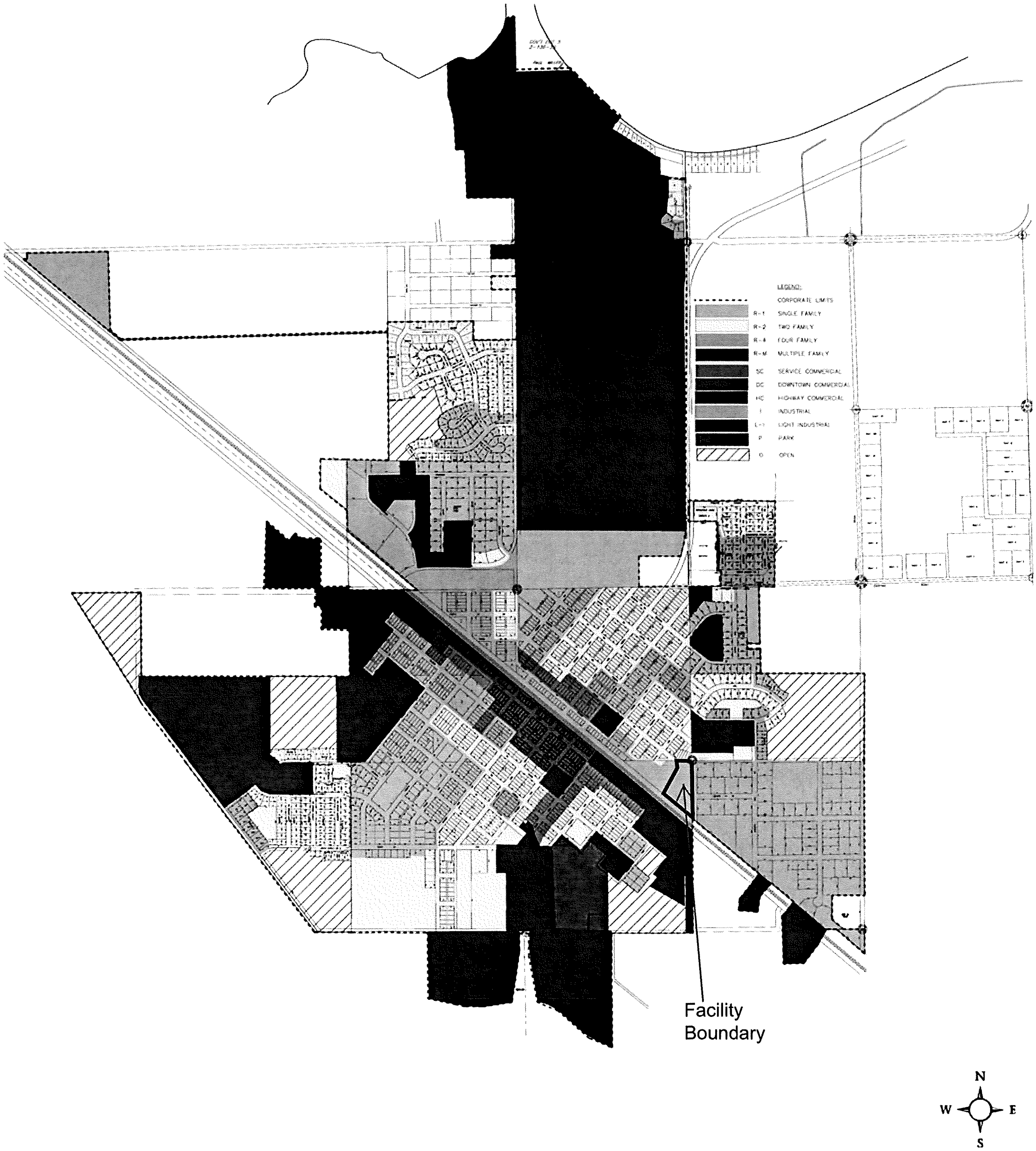
1800 Pioneer Creek Center
Maple Plain, MN 55359-0429
1-800-472-2232

JUNE 2012

Figure 1



PERHAM RESOURCE RECOVERY FACILITY	Wenck	JUNE 2011
Noise Monitoring Locations	Wenck Associates, Inc. Environmental Engineers 1800 Pioneer Creek Center Maple Plain, MN 55359-0429	Figure 2



Perham Resource Recovery Facility	Wenck Engineers • Scientists 1800 Pioneer Creek Center Maple Plain, MN 55359	JUN 2012
Zoning Map for City of Perham		FIGURE 3

Appendix F

Solid Waste Management Technical Study

Regional Solid Waste Management Plan Technical Report

Becker, Otter Tail, Todd, and Wadena Counties

Wenck File #2415-03-09

Prepared for:

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June 2012
Revised August 2012

Wenck

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TABLES

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1.0 Introduction

1.1 PERHAM RESOURCE RECOVERY FACILITY OPERATIONAL HISTORY

Through a joint powers agreement between Becker, Otter Tail, Todd, and Wadena Counties, the Prairie Lakes Municipal Solid Waste Authority (PLMSWA) owns and operates a waste-to-energy (WTE) facility located in Perham, Minnesota (Otter Tail County), which receives and processes municipal solid waste (MSW) from the four counties. This facility, known as the Perham Resource Recovery Facility (PRRF), was previously owned by the city of Perham, which transferred ownership to the PLMSWA in June 2011.

Original operation of the WTE facility began in 1986. It was shutdown in 1998, then reopened in 2002 after technology upgrades were completed. Since that time, the PRRF has been burning municipal solid waste (MSW) and natural gas to produce steam: which is used by two local industries in Perham, Tuffy's Pet Foods and Bongards' Creameries.

1.2 EXISTING FACILITY DESCRIPTION

The PRRF (Facility) processes approximately 35,000 tons per year (tpy) of MSW, which is burned to produce steam. MSW burned at the Facility is hauled from the counties participating in the PLMSWA. The PRRF has been able to meet the steam demand from local customers through the combination of MSW and natural gas as fuel sources for the operation of the facility.

1.2.1 Facility Operation

The PRRF consists of four major components: 1) waste receiving, processing, and storage; 2) combustion; 3) energy generation (i.e., steam and electricity); and 4) air pollution control (APC) equipment.

1. **Waste receiving, and processing and storage**
   The Facility receives MSW on a regular basis from incoming trucks that unload inside a tipping building. The delivered waste is inspected and bulky waste and other unprocessable materials, as well as unacceptable waste are removed. Once removed, these items are processed separately according to type of waste.

   Some items are recycled, such as steel, while other items that cannot be combusted are hauled to a landfill for disposal. Waste that cannot be combusted or landfilled is removed and handled separately. The majority of the delivered MSW is placed on a grate and fed into a waste heat boiler for combustion, which reduces MSW that would otherwise be landfilled. Resulting ash is landfilled at a dedicated ash cell at the Northeast Otter Tail County Landfill.

2. **Combustion**
The Facility currently consists of two municipal waste combustion (MWC) units (South Unit and North Unit), one waste heat boiler, and one APC system. The Facility is capable of combusting up to 116 tons per day (tpd) of MSW. The PRRF burns MSW as fuel for generating steam used by the Facility and local industries. Once combustion is complete, the remaining material is bottom ash. The bottom ash is quenched using collected leachate (i.e., seepage water from the Northeast Otter Tail Landfill), which cools the ash before it is removed for transport to the Northeast Otter Tail Landfill where it is disposed in the dedicated lined ash cell. Prior to disposal, ferrous metals are recovered from the ash and sold to markets for recycling.

3. **Energy generation**
PRRF also has a steam turbine generator used to produce electricity, and a natural gas fired boiler that is used to supplement the production of steam to meet the demand of the customers. Approximately 300,000,000 pounds of steam are produced and sold annually by the PRRF using a combination of the waste heat boiler and natural gas-fueled auxiliary boiler. Of the annual steam produced at the PRRF, approximately 200,000,000 pounds is generated by the waste heat boiler, and 100,000,000 pounds is generated by the auxiliary boiler. Currently, the steam turbine generator is only operated for a short duration each year to determine its condition and ability to generate electricity if the need arises.

4. **APC equipment**
After leaving the waste heat boiler, the flue gas generated by the combustion of MSW enters into an APC system before being dispersed into the atmosphere through a stack.

1.2.2 Waste Processing

PRRF currently processes approximately 35,000 tpy of MSW. The PRRF is able to process almost all of the waste it receives. Of the 35,000 tpy of MSW processed in 2010, Otter Tail County sent approximately 22,450 tons, and Todd and Wadena Counties each sent approximately 6,175 tons. Table 1 provides a summary of the MSW that was processed at the PRRF in 2010, which only included Otter Tail, Todd, and Wadena Counties. Becker County is discussed under the Proposed Project, but did not dispose of MSW at the PRRF in 2010. Becker County began delivering MSW to the PRRF in mid-2011, but not on a regular basis.

Table 1: MSW Processed at PRRF in 2010 and Projected Becker County MSW

	Otter Tail, Todd, and Wadena Counties	Becker County (Projected) (1)	Total
Total tons per year	34,805	14,000	48,805
Average tons per day (based on a 7-day week)	101	35	136
Average tons per day (based on a 5-day work week)	141	50	190

Source: Wilson, March 2011

(1) Becker County MSW was included in this table to illustrate the quantity of waste that would be available for the Proposed Project. Becker County did not deliver MSW to the PRRF in 2010.

1.2.3 Waste Generation

Operation of the PRRF uses MSW in its incineration process, but also generates some waste as a result of that process. Combustion ash is the byproduct after the processed MSW has been burned. In 2010, approximately 8,800 tons of ash was generated at the PRRF. Combustion ash is temporarily stored at the PRRF in 20 cubic yard (cy) roll-off containers until disposal. The ash is disposed of in the Northeast Otter Tail Landfill (permit SW-544). This landfill is owned and operated by Otter Tail County. In addition to ash from the PRRF, the landfill also accepts demolition debris.

Based on the 2010 Northeast Otter Tail Phase II Ash and Demolition Landfill Annual Report, the landfill has a remaining ash capacity of 169,363 cubic yards. At the current disposal rate of approximately 8,800 tons of ash per year, the life expectancy of the ash landfill is approximately 21 years. This calculation is based on an average of 1.1 tons (i.e., 2,200 pounds) of ash being equivalent to one cubic yard.

Additionally, unprocessable waste arrives at the PRRF mixed in with the MSW haul loads. Unprocessable waste at the PRRF includes those wastes that cannot be incinerated or recycled, such as tires, mattresses, and other items. Unprocessable waste is transported primarily to the Dakota Landfill located in Gwinner, North Dakota. The Dakota Landfill also serves as the bypass landfill for the PRRF in the event of a shutdown or other reason that waste cannot be handled. In 2010, 7,250 tons of waste was sent from Otter Tail County to the Dakota Landfill.

2.0 Minnesota Solid Waste Policy

2.1 MINNESOTA WASTE MANAGEMENT POLICY

The State of Minnesota has a solid waste policy in place which guides and regulates solid waste management by local governments. Counties are the local government designated as the solid waste authority and are regulated and monitored by the state. The Minnesota Pollution Control Agency (MPCA) is the lead agency for the administration and implementation of solid waste policy in Minnesota (Minnesota Statute 115A.02a – Legislative Declaration of Policy). The policy outlines goals for reducing waste, recovery materials, and coordination of solid waste management efforts. Minnesota Statute 115.02a is as follows:

> (a) It is the goal of this chapter to protect the state's land, air, water, and other natural resources and the public health by improving waste management in the state to serve the following purposes:
>
> (1) reduction in the amount and toxicity of waste generated;
>
> (2) separation and recovery of materials and energy from waste;
>
> (3) reduction in indiscriminate dependence on disposal of waste;
>
> (4) coordination of solid waste management among political subdivisions; and
>
> (5) orderly and deliberate development and financial security of waste facilities including disposal facilities.

The MPCA also ensures that the *Minnesota Waste Management Hierarchy* (Minn. Stat. § 115A.02b) is carried out in solid waste management decisions across the state. The *Minnesota Waste Management Hierarchy* sets the goals and policies from which solid waste management activities are measured. Waste management activities closer to the top of the hierarchy are viewed as having a greater environmental benefit, such as reducing greenhouse gas and consumption of resources. Based on the hierarchy, landfilling waste has the least environmental benefit, while the overall reduction of waste has the greatest environmental benefit.

> *Minnesota Waste Management Hierarchy* (Minn. Stat. § 115A.02b)
>
> The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream and thereby protect the state's land, air, water, and other natural resources and the public health. The following waste management practices are in order of preference:
> (1) waste reduction and reuse;
> (2) waste recycling;
> (3) composting of yard waste and food waste;

(4) resource recovery through mixed MSW composting or incineration;
(5) land disposal which produces no measurable methane gas or which involves the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale; and
(6) land disposal which produces measurable methane and which does not involve the retrieval of methane gas as a fuel for the production of energy to be used on-site or for sale.

2.2 25/25 RENEWABLE ENERGY STANDARD

In 2007, Minnesota passed legislation (Minnesota Statutes 2006, Section 216B.1691) that requires utilities to produce at least 25 percent of their total energy from new, renewable resources by the year 2025. These sources include energy recovery facility, wind, solar, hydroelectric, geothermal, and other innovative renewable energy sources. The legislation is known as the 25/25 Renewable Energy Standard. At the time, Minnesota was one of the first in the United States to pass this type of legislation with the goal of reducing state's contribution to global warming and support the renewable energy industry. Additionally, the 25/25 Renewable Energy Standard contained several other goals, which include reduce use of fossil fuel as an energy input by 15 percent by 2015; derive 25 percent of the total energy used in the state from renewable energy resources by 2025; reduce Utility Conservation Improvement Program electricity and natural gas consumption by 1.5 percent per year; and reduce greenhouse gases by 15 percent below 2005 emission levels by 2015, 30 percent by 2025, and 80 percent by 2050.

Since implementation of the 25/25 Plan, Minnesota has created a number of incentive programs and implementation policies for both residential and business interests. Some of the financial incentives include the Minnesota Renewable Energy Production Incentive: Solar Energy Legacy Grants for local governments: and other state rebate, loan, and grant programs. The MPCA has a large role in implementation of the 25/25 Plan. The MPCA monitors, provides financial and technical assistance, enforces regulations, and issues permits.

2.3 SOLID WASTE POLICY REPORT

The MPCA is required by Minn. Stat. § 115A.411 to prepare a solid waste policy report in odd-numbered years. The purpose of the report is to review the current status of solid waste management, to evaluate the state's progress toward accomplishing state policies and goals, and to make recommendations for changes relative to solid waste management in Minnesota.

In 2007, following the 25/25 Renewable Energy Standard legislation, the *2007 Solid Waste Policy Report* focused on renewable energy, energy conservation, and the need for cuts in greenhouse gas emissions. In reviewing the *Minnesota Waste Hierarchy*, the *2007 Solid Waste Policy Report* concluded that the recycling and waste-to-energy industry are comparatively mature, with much investment and infrastructure already in place to handle larger tonnages of material, indicating that Minnesota recovers about 47 trillion BTUs of energy from its municipal waste through recycling, organics recovery, combustion in WTE plants, and landfill gas-to-energy. It further indicated, however, that more energy could be saved through solid waste source reduction and reuse, which are both higher on the hierarchy.

The *2007 Solid Waste Policy Report* provided the MPCA's position on waste-to-energy (WTE), stating that it "plays an important role in large-scale waste management" and that "WTE should keep its status as a renewable energy under state statutes." It states further that MPCA "does not find an inherent conflict between WTE and recycling."

The *2009 Solid Waste Policy Report* discussed the Integrated Solid Waste Management Stakeholder work group, which was formed based on recommendations from the *2007 Solid Waste Policy Report* and the Minnesota Climate Change Advisory Group (MCCAG). Through the 2007 Next Generation Energy Act, greenhouse gas emissions goals were set in Minnesota to reduce 2005 levels by 30 percent by 2025 and by 80 percent by 2050. The MCCAG determined this is feasible through improving waste management practices.

Additionally, the *2009 Solid Waste Policy Report* concluded that "continued local leadership is important." It went on to state that, "In particular, stronger intergovernmental partnerships and regional governments can be effective and efficient in providing waste management services in accordance with the hierarchy and corresponding environmental benefits to their constituents."

The PRRF waste management practices are consistent with state policies and regulations. The goals of the PRRF are not only to create energy from a renewable source, but also to recycle materials that are delivered to the facility. These goals move toward achieving the overall goals set forth by the state in Minnesota Waste Management Policy, the *Minnesota Waste Management Hierarchy*, the 25/25 Renewable Energy Standard, and the Solid Waste Policy Reports. Further, state permitting and environmental review processes ensure that these policies are being met or exceeded for overall waste management as well as for air quality and other environmental factors.

2.4 SOLID WASTE PERMITTING

The MPCA administers the state's solid waste management through regulations and compliance enforcement. A key component of this is the permitting process, which all solid waste disposal facilities are required to go through in order to operate their facility.

The permitting process requires the facility to address a number of issues as outlined in Minnesota Rules Chapter 7001. A detailed description of the facility, including the types of waste that will be handled, is required. The permit application is also required to include detailed site studies and engineering plans, contingency plans, inspection and monitoring plans, facility operational plans, and closure and post-closure plans.

Once a facility receives permit approval, an annual report is submitted to the MPCA each year. The annual report is required to contain certain information, such as waste quantities and general composition, monitoring results, and facility fees.

Once approved, a facility's solid waste management permit is good for five years, unless changes to the facility are proposed that require a permit amendment or modification. Changes could include operational changes, physical changes to the facility or changes in waste capacity.

The PRRF operates under air emission permit (AQ Facility ID No. 11100036); however, the counties that deliver waste to the PRRF each have a solid waste management program. Discussion on the individual counties' permits and solid waste management programs is provided in Section 5.

3.0 Prairie Lakes Solid Waste Management Authority

3.1 JOINT POWERS AGREEMENT

The PLMSWA is a joint powers partnership between Becker, Otter Tail, Todd, and Wadena Counties for the management of municipal solid waste within that four-county region. In 2009, during the Capital Assistance Grant (CAP Grant) process, the four counties signed letters of intent to form a joint powers board. The rationale was that counties are mandated by state law to plan and provide management of proper handling of solid waste generated within each county's boundaries. This also served as the rationale for the PLMSWA to acquire the PRRF from the city of Perham, which at the time of the CAP Grant application, still owned the PRRF. More information on the CAP Grant is provided in Section 3.3.

Each of the counties in the PLMSWA has its own Solid Waste Management Plan that outlines goals and policies for handling solid waste. These plans coincide with state requirements and the *Minnesota Waste Management Hierarchy* (Minn. Stat. §115A.02b). Each county also operates under its own solid waste ordinance. The PLMSWA provides a forum for discussing regional waste issues and moving toward better coordinated solid management in the region.

3.2 PLSWMA MASTER PLAN

A draft Master Plan was completed by PLMSWA in 2010. The purpose of the plan is "to determine if synergy and efficiency can be gained through further collaboration, in a multi-county MSW authority." The intent of the plan can be summarized as follows:

- Inventory solid waste generation and disposal practices of residential, commercial and industrial sectors;
- Inventory recycling practices in the region;
- Strategize procedures and policies to encourage additional recycling;
- Identify existing educational programs and foster reuse and reduction in the waste stream;
- Determine waste disposal capacity and location of waste to energy plants, transfer stations, and landfills; and
- Outline the role and function of the PLMSWA in regional solid waste management.

The Master Plan sets goals and a timeline from 2010 to 2029. This includes three phases. Part of Phase 1 of the timeline was to finalize the Master Plan and form the MSW Authority, which is now known as the Prairie Lakes Municipal Solid Waste Authority. Phase 1 also includes overseeing the construction of the proposed expansion project at the PRRF. Phase 2 of the Master Plan commences with construction completion and seeks to standardize solid waste management in the region. Currently, the region is the four counties of Becker, Otter Tail, Todd and Wadena. Phase 3 would begin once the goals of Phase 2 are completed. Phase 3 seeks to amalgamate MSW functions and processes into the PLMSWA and develop regional synergy.

The Master Plan goals are as follows and include strategies outlined in detail in the plan.

- In accordance with the solid waste hierarchy, the PLMSWA will maximize the use and capacity of waste to energy facilities to process waste.
- Acknowledge that landfills are necessary and that landfill capacity is needed for waste that cannot be reduced, reused, recycled or processed.
- Maximize performance and efficiency at all transfer stations.
- Increase proper handling of toxic/hazardous waste and reduce the toxic/hazardous character of MSW.
- Incorporate regional recycling management that standardizes collection and processing and identified efficiencies while maximizing marketing of recycled products.
- Implement programs, policies, and procedures that encourage citizens and businesses to reduce and reuse waste.
- Educate residents on the hierarchy of waste management practices: reduce, reuse, recycle, composting resource recovery, land disposal with methane gas retrieval, and land disposal without methane retrieval; and
- Measure the results of the Master Plan implementation.

The draft Master Plan has not been finalized or formally adopted by the PLMSWA and its associated counties. However, it provides a regional framework and vision for solid waste management that can be used to more effectively coordinate regional efforts. The proposed project at the PRRF is part of this draft Master Plan.

Additionally, the PLSMWA is currently in the process of developing a model solid waste ordinance for each county to adopt. This model ordinance will provide a template from which each county can customize to their individual needs, but offer some regional consistency in how solid waste management is enforced among the four counties. Anticipated completion and county adoption of the new ordinances is in the summer of 2012.

3.3 CAPITAL ASSISTANCE GRANT

In 2008, the city of Perham applied for and received a CAP Grant from the state of Minnesota to expand the PRRF, which would allow the capability of processing up to 200 tons per day of MSW. The grant application provided background information about the PRRF and waste trends in the surrounding region, as well as information on the proposed project. The application indicated an ongoing increase in annual waste production and that waste for operation of the PRRF was available from a number of surrounding counties; including the four that participate in the PLMSWA and additional counties, such as Cass, Clay, Grant, Hubbard, and Stevens. It was also noted that soil conditions in the region are prohibitive of siting new landfills to accommodate the ongoing increase in annual waste. The CAP grant was ultimately awarded in 2012 for the proposed project, pending proper environmental review and permitting.

3.4 PRRF SOLID WASTE MANAGEMENT

The PRRF operates under a Part 70 Air Emissions permit as well as an Industrial Solid Waste Management Plan in accordance with Minn. R. 7011.1250. The most recent version of the Facility's solid waste management plan is dated January 2003. The plan sets procedures for qualifying waste for incineration and determining controlled feed rates to assure that net emission increases from the incineration of wastes do not exceed the insignificant thresholds.

In accordance with Minn. R. 7035.2535, the PRRF outlines specific categories of waste that will not be accepted at the PRRF, including certain problem materials. The PRRF will not accept hazardous wastes or wastes that cannot be incinerated safely or which may result in a violation of the Facility's Air Permit or other state rules affecting the facility. Some of the problem materials not accepted at the PRRF include asbestos, certain types of batteries, electronics, major appliances, medical and infectious wastes, and non-combustibles.

The PRRF plan also outlines waste management at the Facility. All waste is inspected when it arrives with an attempt by the PRRF to burn all waste within five working days of arrival. The wastes are inspected and compared with the *Application for Incineration of Non-Hazardous Industrial Wastes* form to assure the waste in the containers is the waste type specified.

If waste management practices change or need to change at the PRRF, the facility's solid waste management plan will be updated to reflect current waste management practices. This update would include any forms used to process the waste, scheduling procedures, emissions factors, and other forms included in the plan. Eventually, the PRRF plan would become part of an expanded PLMSWA Master Plan for regional waste management and PRRF operations.

4.0 Regional Solid Waste Management

The counties in the PRRF region have examined different ways to manage solid waste beyond the MSW regulations, including forming partnerships like the PLMSWA. Some of these partnerships have examined alternative sites, technologies, and other methods to find better ways of managing solid waste in a given region. Otter Tail County and Becker County both participated on the Red River Valley and Lakes Region Solid Waste Panel. Through the work on this panel, the *Alternative Waste Feasibility Study* was completed in March 2007, examining disposal options for MSW in the region. The study estimated that the waste composition in the Red River and Lakes Region is most likely similar to the 2000 Greater Metro Sites Composition Study, which showed a decrease in paper and an increase in plastics. Specifically in 2000, the Greater Metro MSW consisted of 34.2 percent paper, 11.7 percent plastic, 6 percent metal, 3 percent glass, 22.9 percent organic waste, 1 percent hazardous waste, and 19.1 percent other waste.

4.1 SOLID WASTE GENERATION

Minn. Stat. § 115A.03, subd. 21, defines MSW as garbage, refuse, and other solid waste from residential, commercial, industrial, and community activities that the generator of the waste aggregates for collection.

MSW does not include auto hulks, street sweepings, ash, construction debris, mining waste, sludge, tree and agricultural wastes, tires, lead acid batteries, motor and vehicle fluids and filters; and other materials collected, processed, and disposed of as separate waste streams.

The 2010 SCORE Report (explained below) further defines MSW as including wastes recycled and discarded (including tons sent to disposal and resource recovery facilities), tons disposed of on-site (e.g., burn barrels or farm dumps), and problem materials not recycled (PMNR).

Each year the MPCA collects survey data from all 87 counties in Minnesota and the Western Lake Superior Sanitary District on waste management efforts. This includes information regarding waste reduction activities, recycling, household hazardous waste programs, and problem materials collection. The annual report that is compiled as a result of these surveys is known as the SCORE Report.

The SCORE Report was a result of legislation passed in 1989. At that time, the Governor's Select Committee on Recycling and the Environment (SCORE), recommended to the Legislature to adopt a comprehensive set of laws, commonly referred to as SCORE. This act initiated a state funding source for recycling programs, as well as waste reduction, management of household hazardous wastes, and problem materials.

The 2010 SCORE Report provided MSW information for the four counties within the PRRF service area. This information was used to determine solid waste generation and availability in the region.

4.1.1 Regional Solid Waste

The primary contributors of MSW to the PRRF are the four counties under the joint powers agreement with PLMSWA. Each operates under a solid waste management plan as required by state regulations. Further discussion on state and county policy is provided in Sections 2 and 5.

This region is the location of many lakes and seasonal homes and residents, and therefore seasonal variations in waste quantities normally occur. During summer months, waste generation is typically greater than during the winter season. However, each county's waste generation is recorded on an annual basis as required for annual reporting to the MPCA.

Data provided by Otter Tail County indicates that in 2010 the County generated a total of 29,718 tons of MSW. A large percentage of this waste was delivered to and processed at the PRRF (22,447 tons), while 7,271 tons were disposed of in the Dakota Landfill in Gwinner, North Dakota.

In 2010, Todd County sent 6,174 tons of MSW to the PRRF; while 3,883 tons were hauled to the Morrison County Landfill in Little Falls, Minnesota for disposal. In 2009, Wadena County delivered 6,165 tons of MSW to the PRRF for processing; while 1,998 tons were hauled to the Dakota Landfill in Gwinner for disposal.

Table 2: Regional Waste Generation 2010

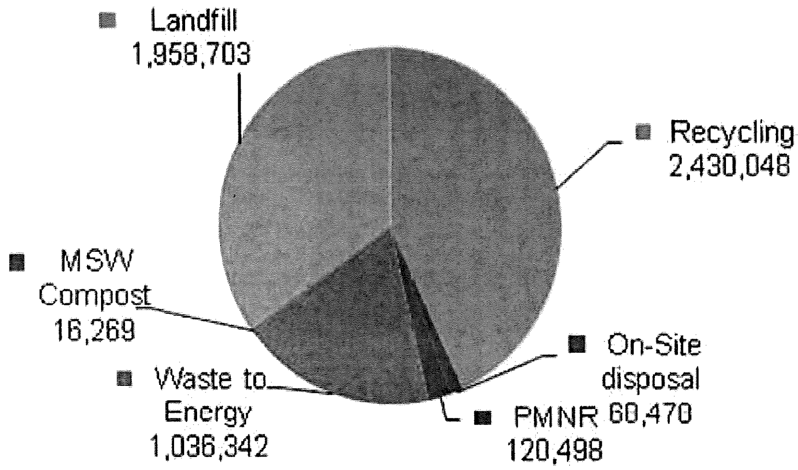
County	Estimated tons of MSW not collected	Problem materials not collected for recycling	Tons collected for recycling	Tons to MSW - landfill disposal	Tons to MSW - processing facilities	Total tons generated
Becker	252	645	9,645	16,360	0	**26,902**
Otter Tail	831	1,445	9,605	7,250	22,447	**41,579**
Todd	840	550	12,525	3,883	6,174	**23,971**
Wadena	378	343	7,561	1,998	6,166	**16,445**
Total Regional Waste	**2,301**	**2,983**	**39,336**	**29,491**	**34,787**	**108,897**

Source: SCORE Report 2010

4.1.2 Statewide Waste

The 2010 SCORE Report states that Minnesota's MSW generation totaled 5.63 million tons in 2010; a 0.4 percent decrease from 2009. The seven Metro counties generated 57 percent of the waste; with the Greater Minnesota counties, including the PLMSWA counties, generating the remaining 43 percent. The following graphic illustrates the statewide distribution of MSW disposal in Minnesota.

Figure 1: Total 2010 MSW Disposal Quantities in Minnesota



Source: 2010 SCORE Report

Approximately 43 percent of the MSW generated is recycled, while approximately 35 percent is landfilled. These two methods of disposal are the most common with waste-to-energy being third most common at approximately 18 percent. On-site disposal, PMNR, and MSW composting, account for less than five percent of total MSW disposal.

4.2 RECYCLABLE MATERIALS

Each of the four counties that bring MSW to the PRRF has county-operated recycling programs. Table 3 summarizes the amount of MSW and recyclables generated by each of the four counties in the region. The information presented in the table was obtained from the 2010 SCORE Report published by the MPCA in December 2011, which collected data and information from counties throughout Minnesota. Additional information on county recycling efforts is provided in Section 5.1 for each of the counties.

Table 3: Summary of MSW and Recyclables Generated by Each County in 2010

County	Total MSW Collected (tons)	Total Recyclables Collected (tons)	Percent of MSW Collected for Recycling	Recycling Rate With Credits [1]
Becker	26,902	9,645	35.9%	43.9%
Otter Tail	41,579	9,605	23.1%	31.1%
Todd	23,971	12,525	52.2%	60.2%
Wadena	16,445	7,561	46.0%	52.0%
4-County Region	108,897	39,336	39.3% (avg)	46.8% (avg)
Minnesota	5,630,340	2,430,048	43.2%	50.3%
Greater Minnesota	2,448,639	1,020,927	41.7%	48.7%

Source: SCORE Report (MPCA, 2010)

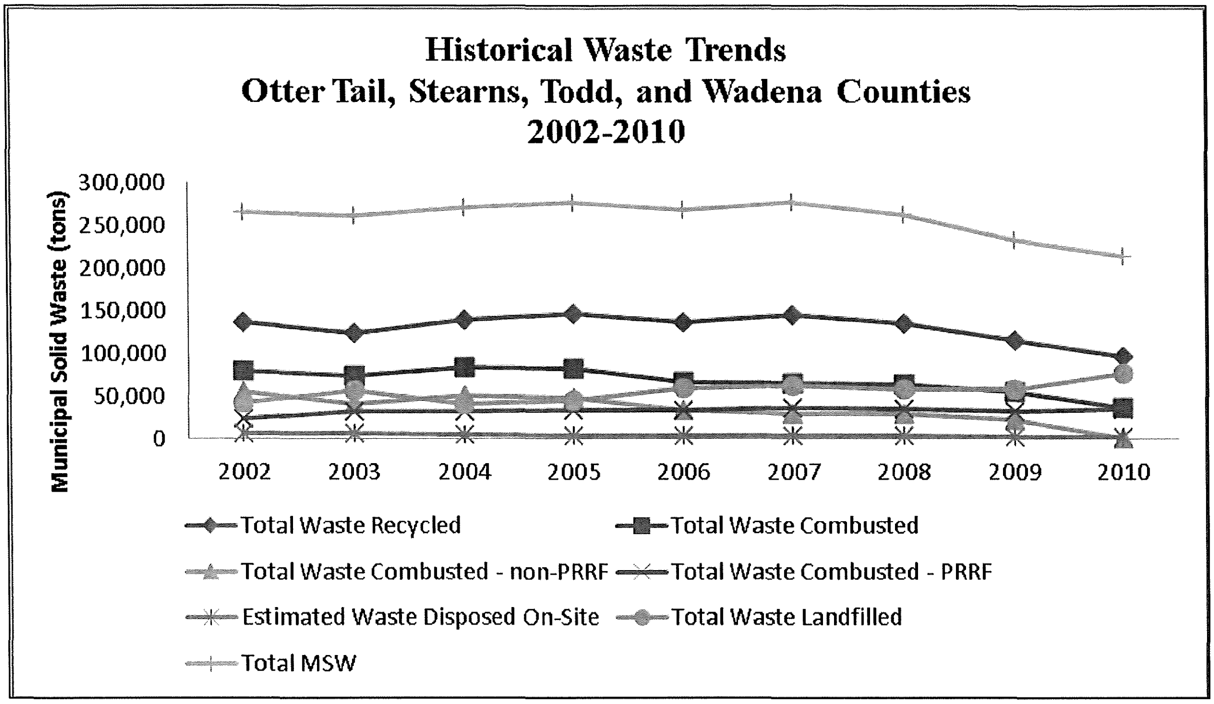
[1] The recycling rate with credits includes a source reduction credit and a yard waste credit.

4.3 SOLID WASTE MANAGEMENT

4.3.1 Existing Trends

Past SCORE Report data were used to determine historical trends for waste disposal in the region. The historical waste disposal trends from 2002, when PRRF re-opened, through 2010 are shown in Figure 3. Historically, Otter Tail, Stearns, Todd, and Wadena Counties have sent MSW to the PRRF. Historical waste trends have indicated a relatively stable waste stream between 2002 and 2010. The PRRF has continued to combust similar quantities from year to year, while the overall waste stream and recycling has decreased slightly beginning in about 2007.

Figure 2: Historical Waste Trends – Otter Tail, Stearns, Todd, and Wadena Counties (2002–2010)



4.3.2 Projected Future Trends

Projected future waste trends under current conditions are shown in Figure 4. The data are based on the 2010 actual U.S. Census populations for each county. The projected growth rates per county come from *Minnesota Population Projections 2005-2035,* the June 2007 report from the Minnesota State Demographer's Office. The annual growth rate from 2010-2015 was calculated and applied to the 2010 population to estimate county populations through 2015. The 2015-2020 annual growth rate was calculated and used to estimate county populations from 2016-2030. Projected future waste trends were determined using a one percent waste generation increase consistently over the time period. This percentage was based on recent MPCA policy plans that estimated the combination of population increase with the increase in waste generation per capita. The Minnesota State Demographer's Office population projections for the individual counties in this region are not anticipated to experience a significant growth in population, as summarized in Table 4.

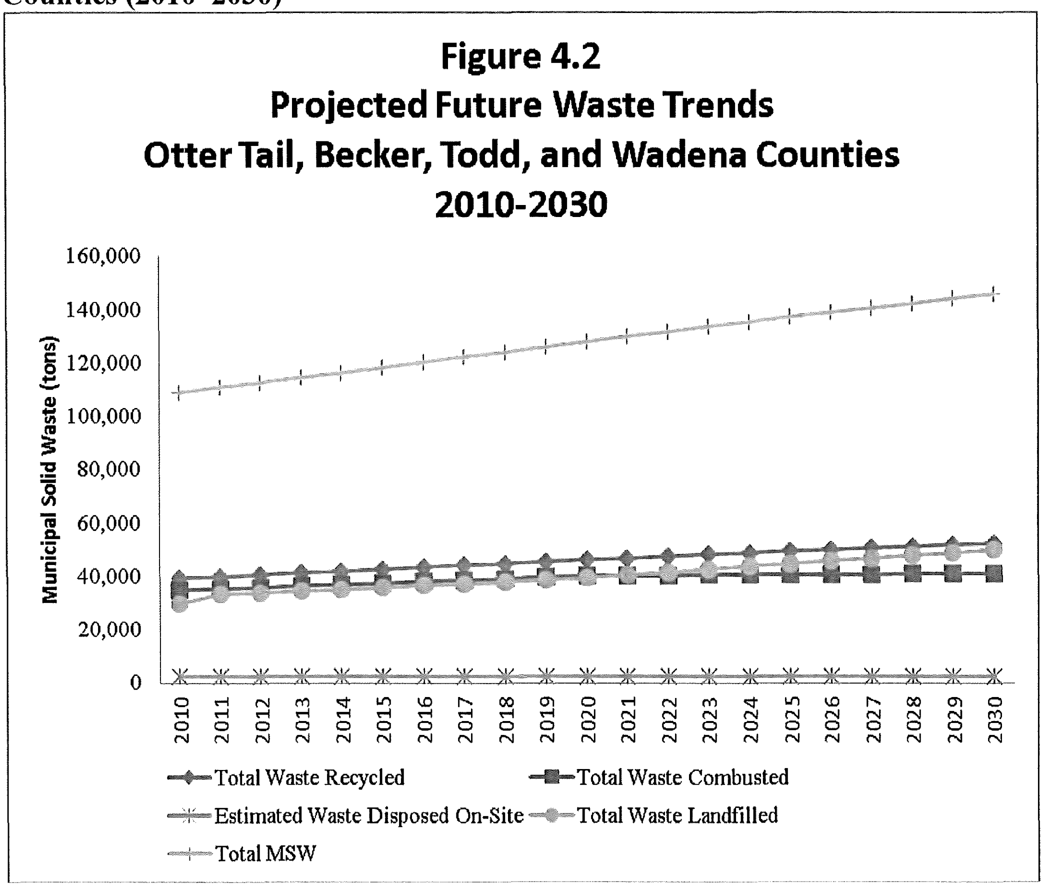
Table 4: Population Estimates for the Four-County Region

County	2010 population	2015 population	2020 population	2025 population	2030 population
Becker	34,300	36,380	38,210	38,840	39,860
Otter Tail	59,040	60,470	61,930	63,250	63,700
Todd	25,200	25,720	26,230	26,620	26,630
Wadena	14,110	14,470	14,830	15,210	15,300
Total - 4-County Region	132,650	137,040	141,200	143,920	145,490

Source: State Demographer's Office

Future trends indicate that MSW generation will increase at a slightly greater rate than recycling and landfilling. This indicates a potential need for additional capacity and waste disposal options. Under existing conditions, waste combustion at the PRRF is anticipated to be at a constant rate over the years to come, which is partially a function of design capacity and steam demand. Additionally, Becker County will send their waste to the PRRF. This balances the PRRF's need for MSW.

Figure 3: Projected Future Waste Trends – Otter Tail, Becker, Todd, and Wadena Counties (2010–2030)



5.0 Local Solid Waste Management

5.1 COUNTY DESCRIPTION

5.1.1 Becker County

Becker County is a rural county located in west central Minnesota about 40 miles east from the Minnesota - North Dakota border. The largest city in Becker County is the city of Detroit Lakes with a population of approximately 7,600 permanent residents. The total County population in 2010 was approximately 34,000. The land use in the County varies between agricultural and a lake region that supports tourism and recreation, which brings seasonal residents and visitors to the area.

Becker County has an integrated solid waste management system that includes waste reduction, waste education, recycling, and yard waste management. The programs and goals associated with each of these management areas are outlined in the County's solid waste management plan. The County also has a solid waste ordinance and licensing program. Becker County has two transfer stations, but no county landfill.

Becker County maintains a permanent HHW collection facility and provides a mobile collection unit to provide HHW services to a larger area. The primary focus of the HHW program is to reduce the toxicity of the incoming waste by removing certain materials, such as lead (e.g., batteries) and mercury (e.g., fluorescent light bulbs, thermostats, and mercury switches). The County also maintains a composting facility for yard waste. Becker County imposes volume-based pricing and service fees for the collection of waste, which may contribute to the low per capita MSW generation in Becker County (0.83 tons/person, based on 2010 Census population and 2010 MSW values).

There are various recycling collection sites in Becker County to facilitate residential recycling. Becker County accepts plastic, metal, glass, cardboard, and paper for recycling. There are 47 recycling drop-off locations and one central recycling center. Curbside recycling is offered in the city of Detroit Lakes on a weekly basis. Other curbside recycling is provided by individual waste haulers on an as needed basis. The Becker County Environmental Services website includes educational information on increasing recycling; how, and where to recycle materials. Materials collected from the Demolition Landfill; such as shingles, clean wood waste, and concrete, are separated and collected for recycling or reuse by residents. The 2010 Becker County recycling rate is 35.9 percent. With the yard waste and source reduction credit, the recycling rate is 43.9 percent.

5.1.2 Otter Tail County

Otter Tail County is located in west-central Minnesota in an area known for rolling hills and over 1,000 lakes, along with rivers and many wetland areas. The city of Fergus Falls is the county seat and also the largest city in the County with a population of approximately 14,000. The population of Otter Tail County is approximately 59,000 with development occurring mainly around the lakes and in the cities of Perham, Pelican Rapids, Otter Tail and New York Mills. Cultivated agricultural land is a dominant land use in the County with the lakes and other recreational areas offering activities for seasonal residents and visitors.

Otter Tail County's integrated waste management system includes six transfer stations and three landfills: Henning, the Northeast Otter Tail County Landfill, and the Fergus Falls City Landfill. All landfills accept construction & demolition (C&D) debris. The County also owns the Fergus Falls, Perham, and Pelican Rapids Recycling Redemption Centers. The recycling program accepts glass, plastic bottles, aluminum, tin, magazines, newspaper and phone books, corrugated cardboard, and office paper.

Otter Tail County implements a county-wide, household and business recycling program in which the household consumer and business owners each play a key role. The program provides recycling canisters throughout Otter Tail County at 25 different locations where residents can drop off their recyclables at no charge. These canisters are maintained by the Youth in Action Recycling Teams. Otter Tail County partners with these youth teams not only to maintain the canisters, but to promote recycling in the community through awareness and education. Curbside recycling is also offered to residential customers on a weekly basis in the cities of Fergus Falls and Perham. Other curbside recycling is available through individual waste haulers on an as needed basis.

The Otter County Regional HHW Collection Facility in Fergus Falls accepts and manages Household Hazardous Waste. The primary focus of the Otter Tail County HHW program is to reduce the toxicity of the incoming waste by removing certain materials, such as lead (e.g., batteries) and mercury (e.g., fluorescent light bulbs, thermostats, and mercury switches). The hazardous waste program in Otter Tail County, for example, includes education, a product exchange, and a regional mobile collection unit.

Otter Tail County has education programs to encourage the public to reduce solid waste. The Otter Tail County Solid Waste webpage encourages waste reduction by providing information and educational materials. The 2010 Otter Tail County recycling rate is 23.1 percent. With the yard waste and source reduction credit, the recycling rate is 31.1 percent.

5.1.3 Todd County

Todd County is approximately 110 miles northwest of the Twin Cities Metropolitan Area. The County has a lakes region, which is experiencing the majority of the County's growth, while the remainder of the county is dominated by agricultural and recreational land uses.

Within Todd County, there are 11 incorporated cities and 28 townships. The county seat is in Long Prairie. There are three cities that straddle the County line: Swanville, Staples and Osakis. Motley comes to the County line, but in Morrison County. Current projections from the state demographer's office suggest that by the year 2015 the population of the County will grow to about 26,000 and hold relatively steady until 2035.

The Todd County Transfer Station and Recycling Center in Browerville, Minnesota hosts a household hazardous waste facility that accepts HHW from its residents. The primary focus of the Todd County HHW program is to reduce the toxicity of the incoming waste by removing certain materials, such as lead (e.g., batteries) and mercury (e.g., fluorescent light bulbs, thermostats, and mercury switches). It accepts garbage, furniture, brown goods (electronics), white goods (large appliances), tires, and demolition debris. The County also provides free disposal for yard waste and compost, auto batteries, scrap iron, and household hazardous waste. The Todd County Transfer Station encourages waste reduction by charging consumers for waste disposal by volume. Also located at the transfer station is the Todd County Recycling Center. The Todd County Board of Commissioners adopted a resolution on June 21, 2011, to offset the cost of hauling recyclables at residential sites. Recycling is provided for all residents by licensed haulers on an as needed basis, and recyclables are hauled to the Todd County Recycling Center. The 2010 Todd County recycling rate is 52.2 percent without added credits and is 60.2 percent with them.

5.1.4 Wadena County

Wadena County is located approximately 160 miles northwest of the Twin Cities Metropolitan Area. The County seat is the city of Wadena with a population of approximately 4,000. The overall County population is approximately 14,000. Growth in the County is anticipated to grow slowly over the coming years.

Wadena County's solid waste management system includes the operation of a transfer station. The transfer station also includes a demolition debris landfill and a recycling center. The recycling program accepts aerosol cans, aluminum, paper products, glass, tin, and plastic. Wadena County provides compartmentalized recycling containers for nine of the major cities and townships. Curbside collection is provided by licensed local waste haulers on an as needed basis.

Wadena County accepts HHW at its solid waste facility in Wadena, Minnesota. The primary focus of the Wadena County HHW program is to reduce the toxicity of the incoming waste by removing certain materials, such as lead (e.g., batteries) and mercury (e.g., fluorescent light bulbs, thermostats, and mercury switches). During the summer months when the population increases, the County also conducts mobile collections. Additionally, Wadena County provides free disposal of residential yard waste at transfer stations. Wadena County owns and operates a demolition landfill for use by Wadena County residents.

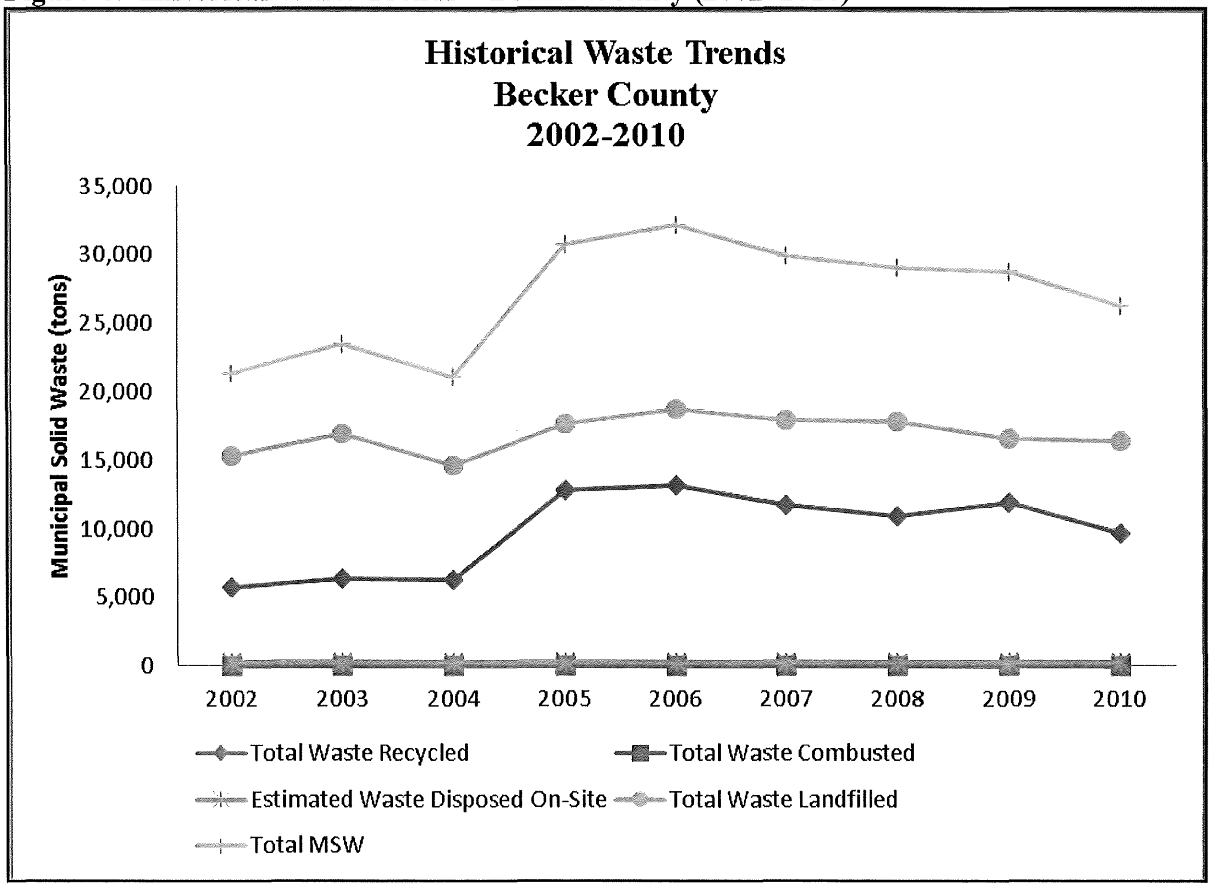
The Wadena County Solid Waste website provides links to educational sites to increase the amount and ease of recycling for residents. The 2010 Wadena County recycling rate is 46 percent, but is 52 percent with the yard waste and source reduction credits.

5.2 EXISTING TRENDS

5.2.1 Becker County

Prior to 2011, Becker County either landfilled or recycled its waste, and did not haul waste to the PRRF. The historic trend from Becker County waste disposal from 2002-2010 is shown in Figure 5. Waste levels have remained relatively constant since 2005.

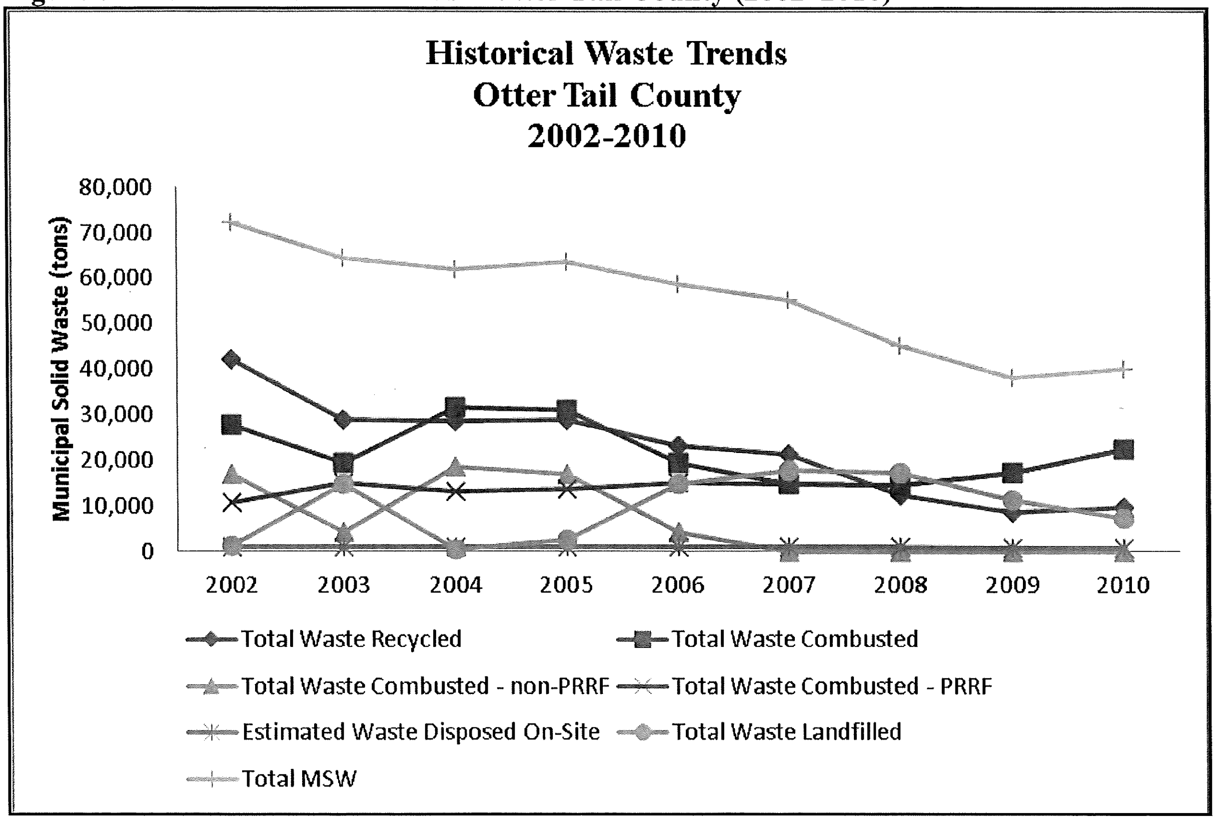
Figure 4: Historical Waste Trends – Becker County (2002–2010)



5.2.2 Otter Tail County

The historical trend from Otter Tail County waste disposal from 2002-2010 is shown in Figure 6. Trends indicate an overall decrease in waste between 2002 and 2010. Prior to 2006, Otter Tail County sent waste to the Fergus Falls Incinerator; which closed, causing a shift in waste disposal to landfills. In 2009, waste disposal by landfill began to decline, while the disposal of Otter Tail County waste at the PRRF began to increase; due to the fact that Stearns County did not renew its contract with the PRRF, which created additional capacity for Otter Tail County.

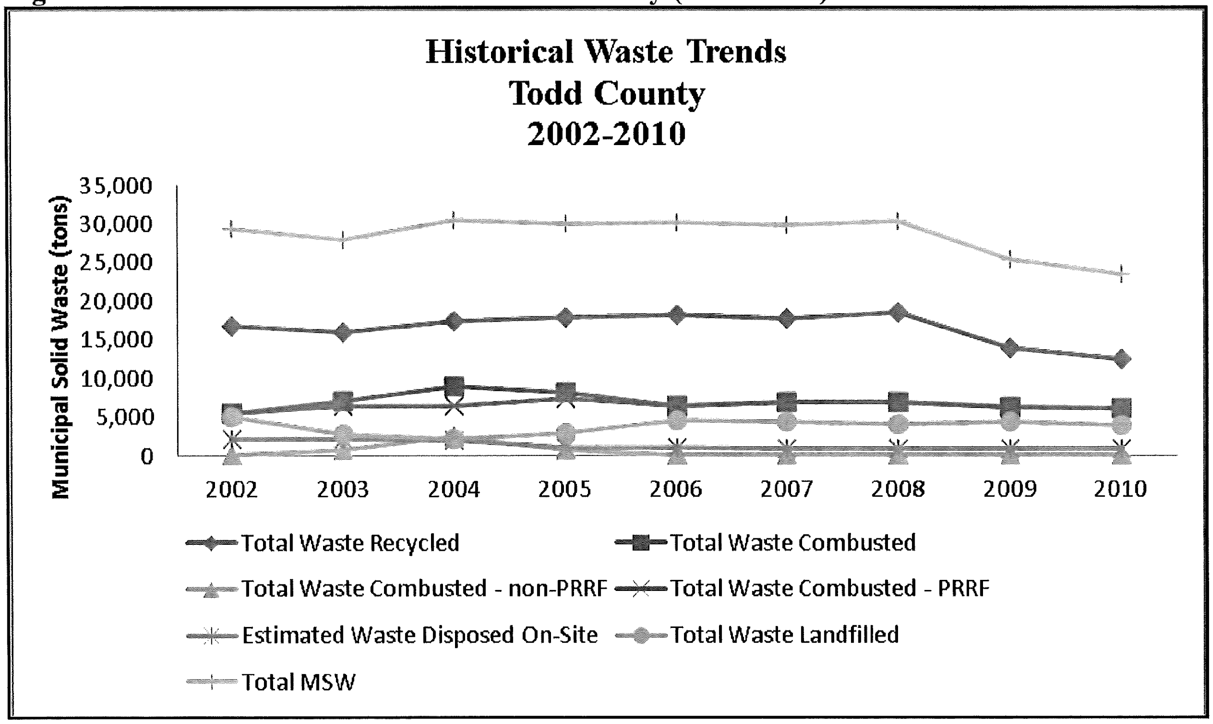
Figure 5: Historical Waste Trends – Otter Tail County (2002–2010)



5.2.3 Todd County

The historical trend for waste disposal for Todd County is shown below in Figure 7. Trends indicate a relatively consistent generation and disposal rate over the time period without much fluctuation; until 2008 when MSW quantities and the corresponding recycling rates began to decline.

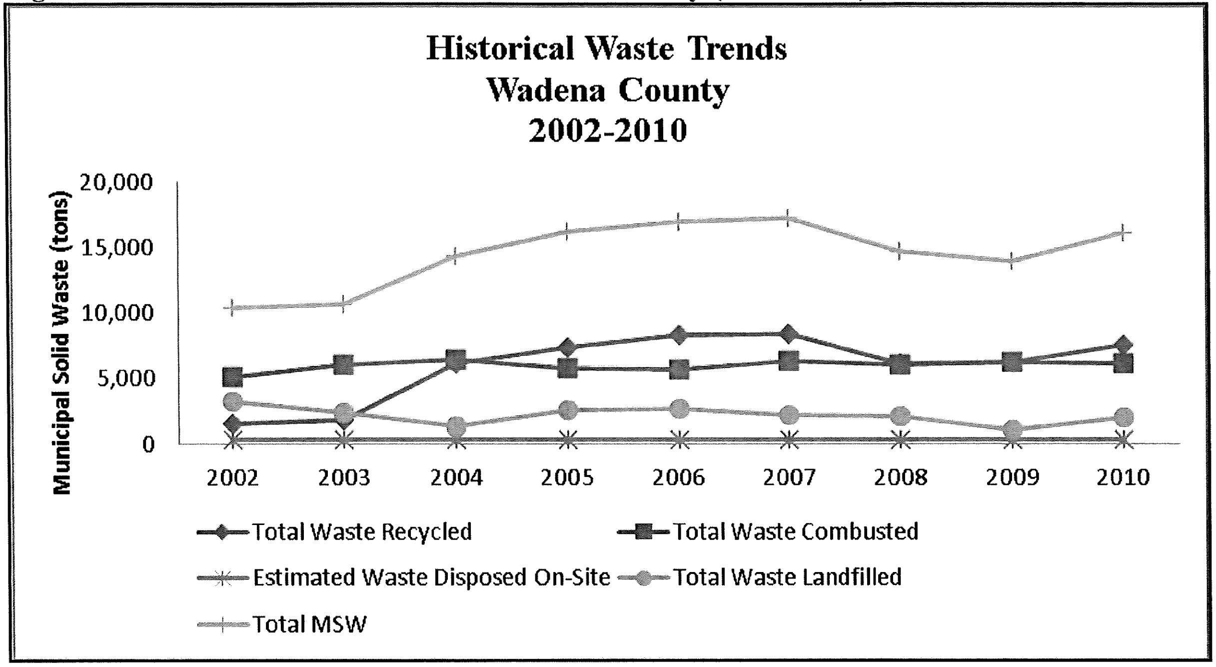
Figure 6: Historical Waste Trends – Todd County (2002–2010)



5.2.4 Wadena County

The historical waste trend for waste disposal from Wadena County from 2002-2010 is shown in Figure 8. Unlike other counties in the four-county region, Wadena County has experienced a slight increase in waste quantities in the past two years, after a small decrease from 2007 to 2008. Quantities of waste landfilled, recycled, or hauled to the PRRF have remained relatively consistent during this time period.

Figure 7: Historical Waste Trends – Wadena County (2002–2010)



5.3 PROJECTED FUTURE

Future waste trends for each county were projected based on 2010 waste destinations and county-specific demographic information. To ensure the projections for each county do not total a greater amount than the facility can handle, waste amounts level out at 23,000 for Becker County, 39,000 for Otter Tail County, 14,000 for Todd County, and 10,500 for Wadena County. These levels correspond to the percent of total fees each county contributed to the project: 26 percent for Becker, 45 percent for Otter Tail, 16 percent for Todd County and 12 percent for Wadena County (see Table 5). A value from the regional waste is assigned to the local level. This value is meant to ensure that the total projected waste from all four counties never exceeds the waste combustion capacity at the PRRF.

The Future Max Waste Allowed in tons per year is based on the maximum design capacity of the proposed project, which is 73,000 tons MSW combusted per year (200 tons per day (tpd), 365 days a year). Since 16 percent of the waste delivered to the PRRF is anticipated to be removed via the proposed material recovery facility (MRF) (10% fines, 6% recyclables), the total waste that can be delivered to PRRF is actually 86,905 tons per year. Additional information about the proposed project is provided in Section 6. Although the maximum design capacity of the proposed project is 200 tpd, the PRRF would not operate at this rate on a regular basis. The PRRF's level of operation is dependent upon steam demand of its customers, as well as other factors, such as maintenance and MSW available. These factors prevent the PRRF from operating at its maximum capacity for long periods of time. The proposed project would allow the PRRF to operate at levels up to 200 tpd, but the more realistic level of operation would be about 85 to 90 percent of that capacity on a regular basis.

The four counties, in a draft solid waste plan, used percentages to divide waste allotments and costs as presented in Table 5. As an estimate, the same percentages were used to determine the maximum allowable amount of waste from each county. For example, Becker County gets 26.42 percent (i.e., 22, 960 tons) of the total delivered MSW capacity of 86,905 tons.

Table 5: Percentages Used to Determine County Waste Contributions to the PRRF

PRRF Current Max	42,340	tons per year (tpy)		
PRRF Max combustible capacity	73,000	tpy		
PRRF Max waste to accept	86,905	tpy		
	Future Max Allowed		**Current Max allowed**	
	tpy	percent	tpy	percent
Becker County	22,960	26.42%		
Otter Tail County	39,333	45.26%	26,044	61.51%
Todd County	14,070	16.19%	9,316	22.00%
Wadena County	10,542	12.13%	6,980	16.49

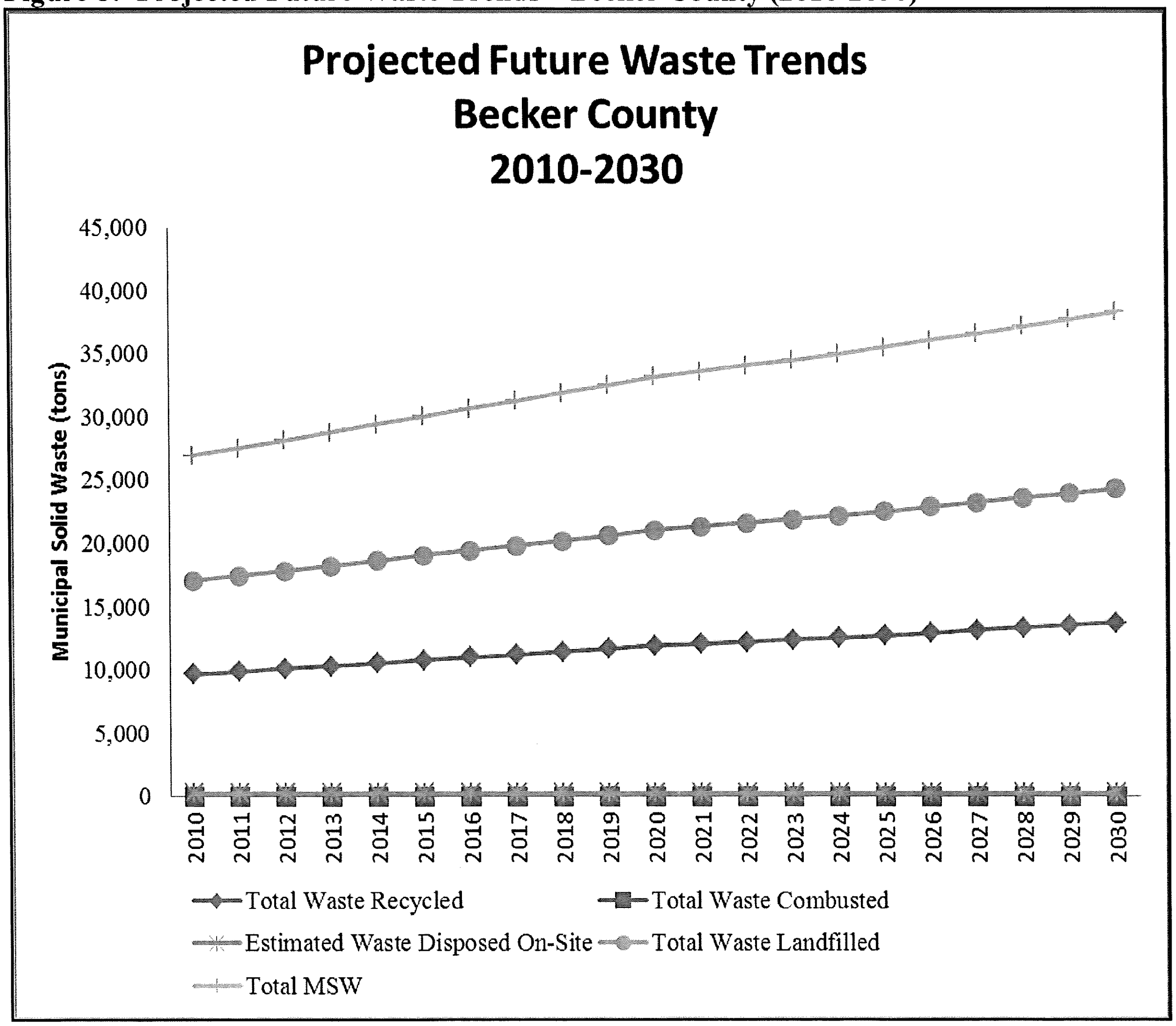
Source: PLMSWA August 2011 Meeting Packet

The Current Max uses percentages if the waste were simply divided among Otter Tail, Todd, and Wadena Counties, as Becker did not deliver waste to PRRF in the past. The current PRRF capacity is 42,340 tons per year (116 tons per day, 365 days per year). For example, Todd County is allotted 16.19 percent of the four counties' waste for a future maximum; but 22 percent of the three counties' waste, for a current max allotment of 9,316 tons per year. In the following projected trends tables, county-specific waste combusted increases until reaching the quota where waste combusted would level off and landfilling would accommodate the excess waste.

5.3.1 Becker County

Projected future waste disposal for Becker County from 2010 – 2030 is shown in Figure 9. This scenario assumes that as Becker County had not sent waste to PRRF for combustion in the past. Under status quo conditions, they would not send waste there in the future but continue to recycle and landfill most of the MSW generated by residents. This is shown in Figure 9 as no waste combusted by Becker County.

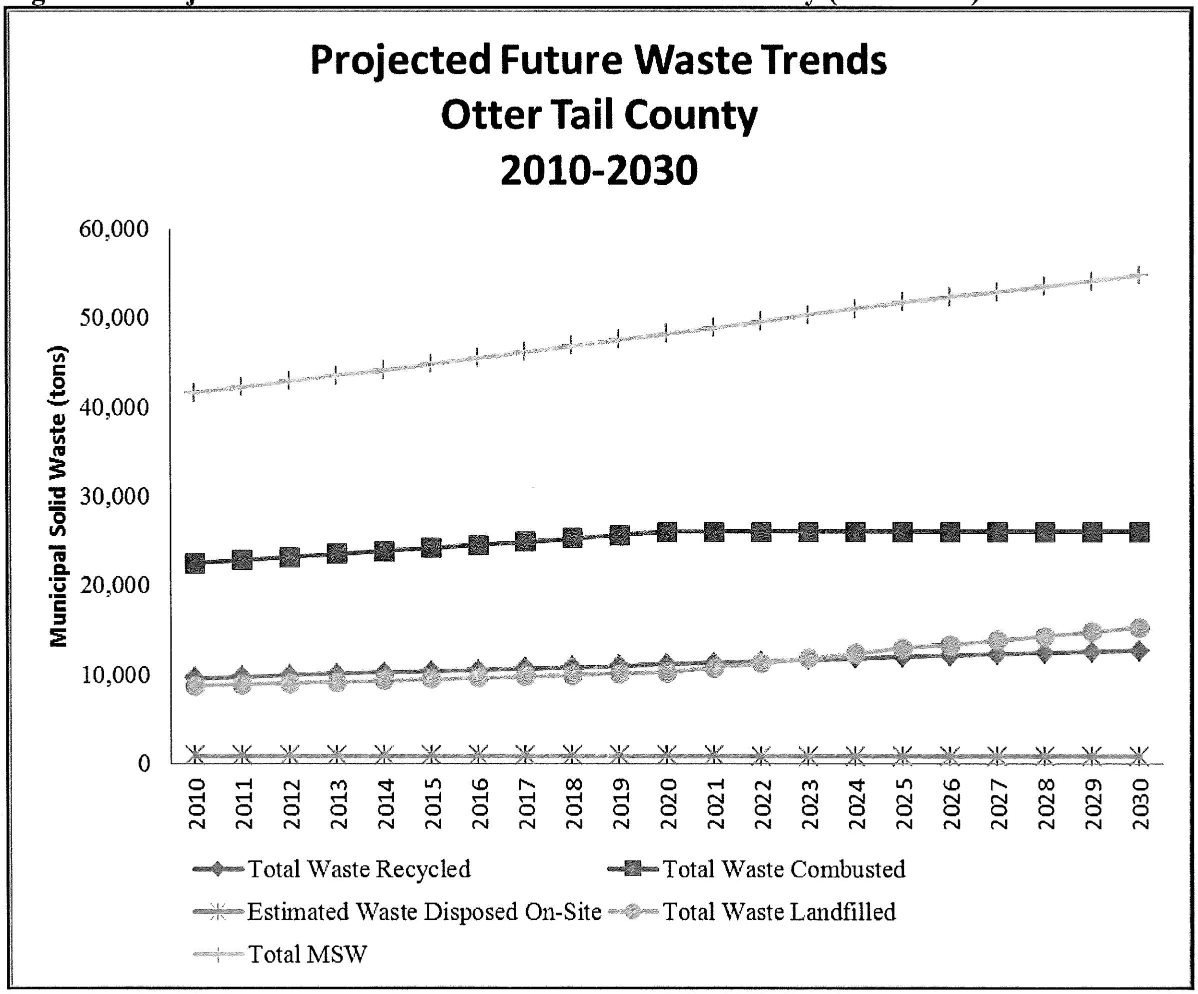
Figure 8: Projected Future Waste Trends – Becker County (2010-2030)



5.3.2 Otter Tail County

Future waste trends for Otter Tail County projected from 2010-2030 are shown in Figure 10. The project trend assumes recycling rates would remain constant at 2010 levels, and that Otter Tail would continue to send waste to the PRRF until full facility operating capacity is reached. Otter Tail County's waste capacity is 61.5 percent of PRRF's operating capacity, or 26,044 tons. This is estimated to occur in 2021, and any additional waste generated in the future would need to be landfilled.

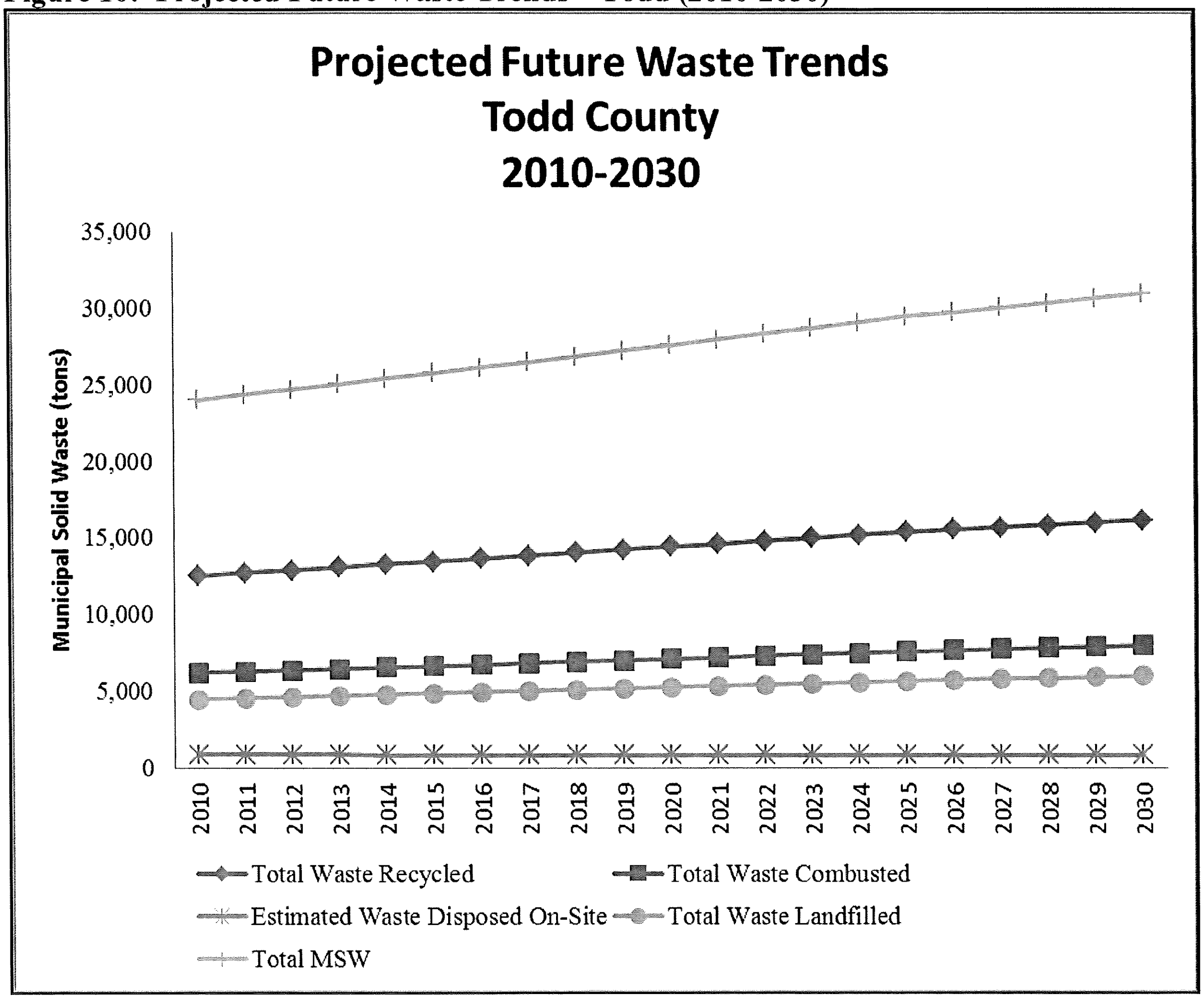
Figure 9: Projected Future Waste Trends – Otter Tail County (2010-2030)



5.3.3 Todd County

Future projected waste projected from 2010-2030 in Todd County is shown below in Figure 11. The waste trend assumes recycling rates would remain constant at 2010 levels, and that Todd County would continue to send waste to PRRF until full facility operating capacity is reached. To determine Todd County's full capacity, the total capacity of PRRF was pro-rated based on Todd County's past contributions. Todd County's capacity is 22 percent of PRRF's operating capacity, or 9,316 tons. Based on current, estimated MSW growth rates, Todd County could send waste to the PRRF beyond 2030.

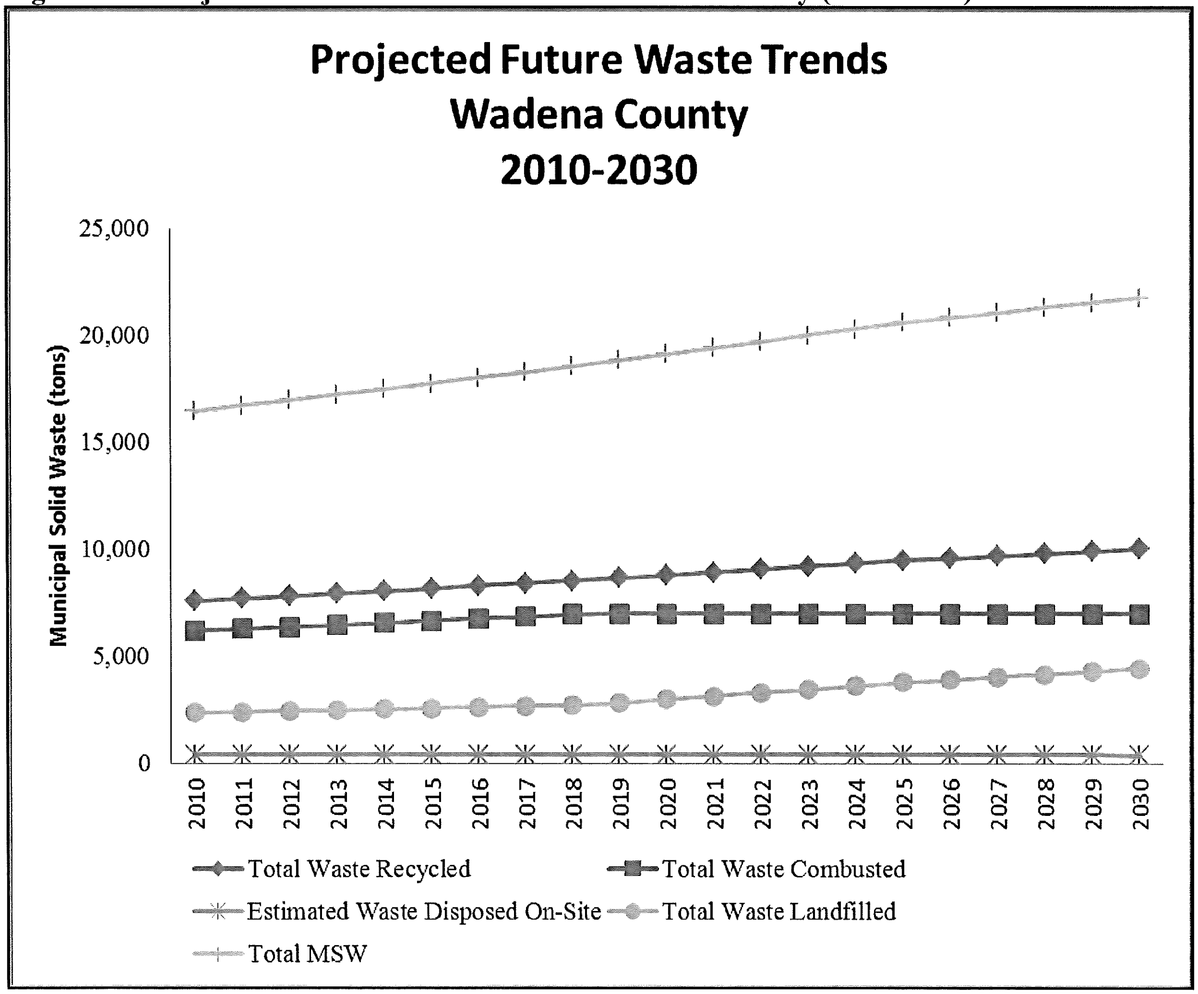
Figure 10: Projected Future Waste Trends – Todd (2010-2030)



5.3.4 Wadena County

Future projected waste projected from 2010-2030 in Wadena County is shown below in Figure 12. The trend assumes recycling rates would remain constant at 2010 levels, and that Wadena would continue to send waste to PRRF until full operating capacity is reached. To determine Wadena County's full capacity, the total capacity of PRRF was pro-rated based on Wadena County's past contributions. Wadena County's capacity is 16.5 percent of PRRF's operating capacity, or 6,980 tons. This would occur in 2019 and any additional waste generated in the future would need to be landfilled.

Figure 11: Projected Future Waste Trends – Wadena County (2010-2030)



5.4 SOLID WASTE MANAGEMENT AND ORDINANCES

Each of the four counties that participate in the PLMSWA has a solid waste management plan and ordinance. The management plans are required under Minnesota Statutes 115A.46. The ordinances provide a means to implement the plans. Of the four counties, Todd County has the most recent plan which was completed in 2009. Table 6 provides the dates when each county's solid waste management plan update is due to MPCA.

Table 6: County Solid Waste Management Plan Expiration Dates

County	Management Plan Expiration Date
Becker	March 12, 2013
Otter Tail	April 18, 2012
Todd	May 21, 2019
Wadena	March 16, 2012

5.4.1 Becker County

Becker County manages solid waste through a solid waste management plan and solid waste ordinance, in accordance with Minn. R. Statutes Chapter 400. The county solid waste management plan was last updated in 2003. The county solid waste management ordinance was written in November, 2001. The ordinance is in place to promote health, protect the environment, and preserve the economic land value of Becker County; and governs the collection, transportation, and disposal of solid waste for the County. Solid waste must be disposed of at a site or facility licensed by MPCA. Solid waste collection and transportation operators must be licensed by the Becker County Board. This ensures that vehicles and containers used for solid waste will prevent nuisances, pollution or insect breeding, and any spillage that occurs will be picked up and cleaned immediately.

Required practices for the operation and maintenance of transfer stations include measures to maintain security, cleanliness, and to ensure that solid waste does not remain in the transfer station for more than 48 hours before ultimately being disposed at a permitted solid waste facility.

Special wastes including tires, white goods, yard waste, batteries, waste motor oil, waste motor oil filters, and motor vehicle fluids; are specifically addressed in the Becker County Solid Waste Ordinance to maintain compliance with Federal Law, Minnesota Statute, and MPCA rules and regulations.

Becker County participates in the Regional Household Hazardous Waste Program and promotes waste reduction and recycling. All cities and townships in Becker County participate in recycling. Becker County also works with two municipalities on commingled recycling programs. Per the Becker County Solid Waste Ordinance, all solid waste haulers must provide education and incentives to recycle. More information about Becker County recycling can be found in the Becker County Solid Waste Plan Update.

5.4.2 Otter Tail County

The Otter Tail County Solid Waste Management Plan required an update as of April 2012, which has been submitted to the MPCA for review. The County Solid Waste Ordinance was written in 2003 to protect the public's health and prevent contamination of the groundwater and other environments of Otter Tail County from solid waste.

Otter Tail County has implemented a system of solid waste management that includes readily accessible solid waste collection and disposal services. All solid waste must be managed at an operation for which a permit has been granted by the County Board. The County of Otter Tail can participate in solid waste management without obtaining a license, and any incorporated city may continue or expand existing solid waste facilities and operations without obtaining a permit if the facility or operation existed prior to November 1988.

Any land disposal, resource recovery, composting, recycling and transfer stations, and any other method of solid waste management must be permitted by the County Board. The permit application must include maps, an ultimate land plan for the site showing finished contour lines and elevations, and a report describing the facility's operations. The application is reviewed by the County Board and requires a public hearing process.

Burning solid waste is expressly prohibited by the Otter Tail County Solid Waste Ordinance, except as allowed a licensed solid waste facility or as allowed by the terms of the "Permit for Open Burning" issued by the MPCA or Minnesota Department of Natural Resources (MDNR). Unauthorized or open dumping are also forbidden under the ordinance.

Disposal requirements for special waste, such as waste tires, yard waste, and unacceptable waste are described by the ordinance. The ordinance also describes standards for collection and transportation of solid waste which requires cleanliness and safety. Solid waste is not allowed to remain or be stored in any collection or transportation vehicle longer than 48 hours, except in an emergency.

Any person, firm, corporation, or commercial hauler that collects or disposes of solid waste or source-separated recyclable materials in Otter Tail County must annually obtain a solid waste collection, transportation, and disposal license and a permit for each vehicle used. There are exemptions provided from the license and vehicle permit requirement for single households, Otter Tail County municipal vehicles, and vehicles from a county within the joint powers agreement.

Yard waste has been banned from landfills and waste-to-energy facilities since 1992. County education programs encourage home management of yard waste through back yard composting and mulching. Residents who elect not to compost in their own yard, may bring yard waste to any of the Otter Tail County transfer stations or landfills.

5.4.3 Todd County

Todd County manages solid waste through a solid waste management plan and solid waste ordinance. The County most recently updated their solid waste management plan in 2009. Todd County contracts with Otter Tail County to provide solid waste management services. This includes directing programs and updating the solid waste management plan and ordinance with approval from the County Board.

Through its management plan and ordinance, the County regulates the disposal of solid waste. New solid waste facilities require a county permit, which includes a county application, County Board review, and public hearing. A disposal license and permit is required for waste haulers to operate within the County. These permits are renewed on an annual basis with the county.

Todd County also conducts a recycling program as part its solid waste management plan, which includes education and drop off locations within the County. Overall, the county solid waste program promotes waste reduction and recycling to its residents and businesses. This is reflected in the county programs and operating plans.

5.4.4 Wadena County

Wadena County, in accordance with Minnesota Statutes Chapter 400, also manages their solid waste through a solid waste management plan and solid waste ordinance. Wadena County contracts with Otter Tail County to provide solid waste management services. This includes directing programs and updating the solid waste management plan and ordinance with approval from the County Board.

Wadena County's programs provide options for disposal and recycling of cardboard, glass, plastic, tin, and aluminum. The County also provides composting options for yard waste, as well as recycling of electronics and appliances, and tire collection. The county provides these services through a Solid Waste Assessment Fee that is part of the property taxes, and small fees for collection of larger items, such as appliances and tires.

Wadena County also uses a process similar to the other counties to ensure that waste haulers within the county are licensed each year and have the appropriate permit to haul and dispose of waste. These haulers offer curbside pick to customers within the County, including some curbside recycling on certain days of the month. Through its solid management plan, Wadena County encourages recycling and waste reduction. Its solid waste ordinance prohibits disposal of certain materials and methods.

6.0 Proposed Project Description

6.1 WASTE PROCESSING CAPABILITY

The proposed project would continue to use the existing PRRF, but would burn processed MSW and have the potential to produce steam or electricity at an increased rate. The proposed project would allow the PRRF to process up to 200 tpd of MSW. Although the maximum design capacity of the proposed project is 200 tpd, the PRRF would not operate at this rate on a regular basis. The PRRF's level of operation is dependent upon steam demand of its customers, as well as other factors, such as maintenance and MSW available. These factors prevent the PRRF from operating at its maximum capacity for long periods of time. The proposed project would allow the PRRF to operate at levels up to 200 tpd, but the more realistic level of operation would be about 85 to 90 percent of that capacity on a regular basis.

The proposed project would make improvements to and expand the existing PRRF. It would also include the addition of a materials recovery facility (MRF). Installation of the MRF would improve the characteristics of the MSW by removing non-combustibles and undesirable waste items from the trash before burning it in the existing plant combustors. This in turn reduces the percentage of ash generated per ton of MSW processed. It would also remove recyclable materials.

MSW

Through the partnership established by the PLMSWA with Becker, Otter Tail, Todd, and Wadena Counties, agreements have been made to accept additional waste for incineration at the PRRF once the proposed project is in place. Becker County has recently begun delivering MSW to the PRRF. Previously, MSW generated in Becker County was landfilled via transfer station in Detroit Lakes to the city of Fargo landfill for disposal.

Table 2 above provides a summary of the annual MSW produced in each of the partnering counties. Additionally, Table 1 shows the projected quantity of MSW that Becker County will deliver to the PRRF for processing after the proposed project is in operation. The proposed project is currently projected to begin operations by processing approximately 55,000 tpy of MSW, and would have the capacity to handle more MSW if the need arises. The maximum capacity of the PRRF with the proposed project would be up to 73,000 tpy MSW.

Recyclable materials

As part of the proposed project, the MRF could potentially result in a small increase in the quantity of recyclables. MRFs typically recover approximately six percent by weight of the MSW processed as recyclables, but the actual recovery and disposal rates of materials is dependent on the characteristics of the waste stream delivered to the facility. Large cardboard (OCC), ferrous and non-ferrous metals would be recovered from the waste stream in the MRF for recycling. If operating at maximum capacity, up to 280 tpd of MSW could be processed through the MRF. The PRRF would seek appropriate market vendors for any recyclable materials.

The purpose of the MRF is not to change the existing county recycling programs, but to compliment the programs. The public has developed a key role in successful implementation of those programs. The MRF has two main purposes. The first is to improve the characteristics of the MSW by removing non-combustibles and undesirable waste items from the MSW prior to burning it in the PRRF combustors, reducing operational and maintenance costs. The second objective is to capture a portion of the recyclables in the MSW, leading to a reduction in ash quantities sent to the landfill while providing a means to recycle more materials.

6.2 WASTE DISPOSAL PROCEDURES

Although the purpose of the PRRF is to process waste, it also produces some waste. The two primary wastes that are disposed of from the PRRF are unprocessable waste and incinerator ash, a byproduct of the combustion process.

Unprocessable waste

The process for handling unprocessable waste at the PRRF would remain the same under the proposed project. Because the quantities of MSW processed by the PRRF would increase under the proposed project, a proportionate amount of unprocessable and undesireable waste is also likely to increase. Those wastes would be removed and handled appropriately.

Waste generation

Under the proposed project, incinerator ash would be produced at a rate slightly less than is currently produced for the total amount of MSW. This is because five to eight percent of recyclables and 10 percent of fines would be removed from the MSW in the MRF prior to combustion. This means approximately 15 percent less ash is produced for the same total amount of MSW using the MRF. Because the proposed project would process more MSW, it is estimated that the projected operational rate would be approximately 12,000 tpy of ash, compared to approximately 9,000 tpy with the existing PRRF. A maximum estimated quantity of ash produced with the proposed project would be up to 15,500 tpy based. Based on the 2010 Northeast Otter Tail Phase II Ash and Demolition Landfill Annual Report, the remaining ash capacity is 169,363 cubic yards. At the proposed disposal rate of approximately 11,700 tons of ash per year, the life expectancy of the ash landfill is approximately 16 years. The life expectancy of the landfill could be decreased if the PRRF operated at maximum capacity. Additionally, the PRRF intends to implement ash utilization as an ash reduction program, which could utilize as much as 50 percent or more of the ash generated for beneficial use rather than disposal. This would extend the life expectancy of the landfill.

Construction of the proposed project would produce solid waste, which would be disposed of off-site. The contractor would be responsible for solid waste disposal. The solid waste would include normal construction debris such as scrap wood, plastics, wallboard, packing material, cardboard, scrap metals, and electrical wires. Some of these materials would likely be disposed of in the Northeast Otter Tail Landfill, which is a demolition landfill located toward the east between the city of Perham and the city of New York Mills. Recycling of construction waste material would be the responsibility of the contractor. No hazardous waste is expected to be encountered during construction; however, if hazardous material is encountered during the construction, it would be the responsibility of the contractor to dispose of such material according to all applicable rules and regulations.

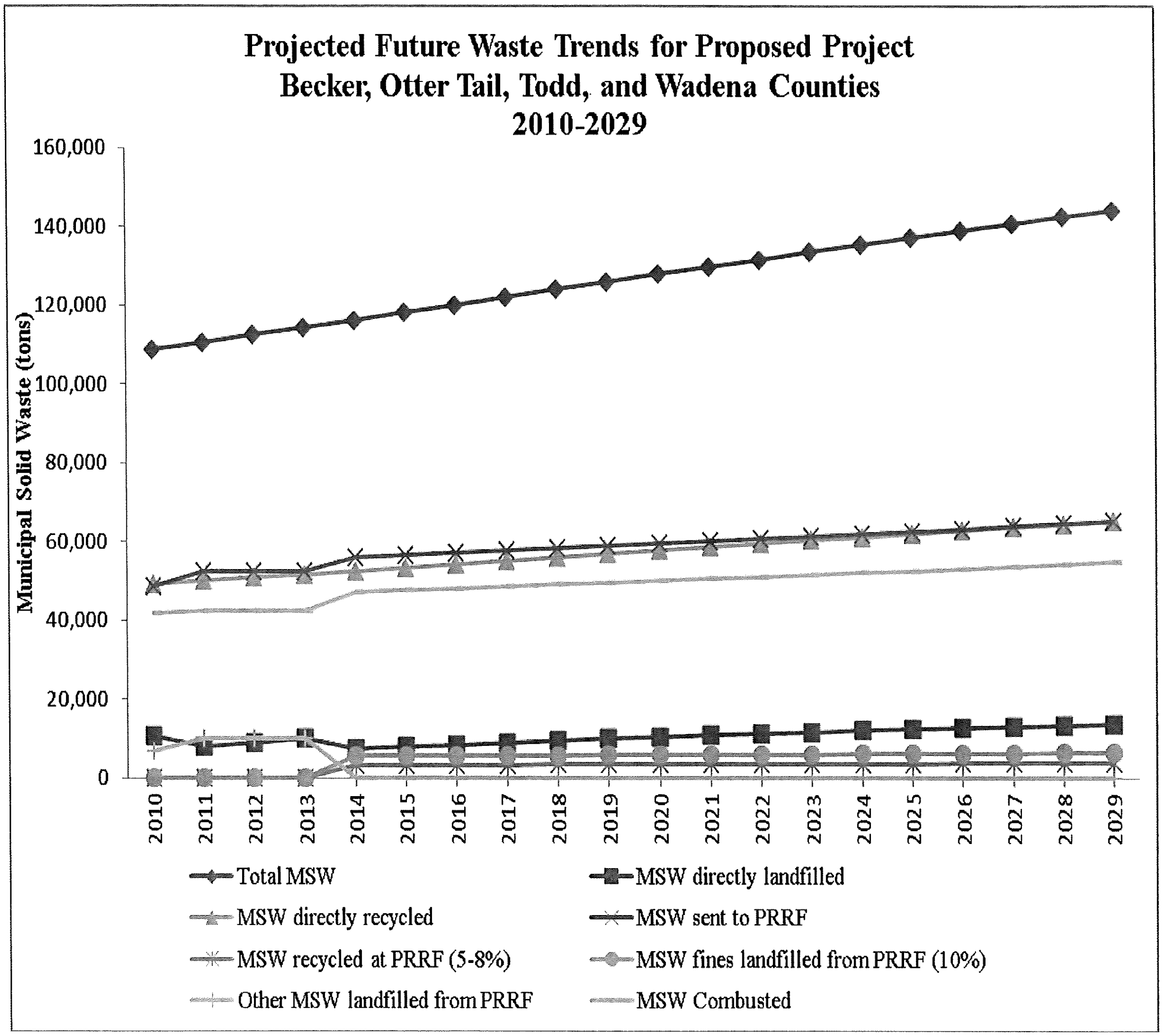
6.3 REGIONAL EFFECT OF PROPOSED PROJECT

The proposed project would affect the way waste is handled in the region. Future waste trends once the project is operational are shown in Figure 13. Upon the anticipated facility opening date in 2014, waste from the four counties that is currently sent to the PRRF would first be sent through the MRF for further processing prior to combustion. Approximatley six percent of the waste sent to the PRRF would likely be captured in the MRF, while 10 percent of the waste sent to the PRRF would be fine material that would be used as landfill alternative daily cover as it is not quality combustible material. This would also contribute to a greater recycling rate in the region due to PRRF recycling.

Under the proposed project, total waste would continue to increase at a rate of about one percent, as previously explained in Section 4.3. Recycling rates are assumed to remain constant at 2010 levels for each county until 2014, when the MRF would provide an additional recyling benefit with the potential to increase the recycling rate by six percent for each county. However, the primary method of recycling would remain household recycling.

The maximum processing capacity after completion of the proposed project modification is 73,000 tons per year, although the projected actual processing rate is likely to be around 55,000 tons per year. The counties are projected to reach 55,000 tons of combustible waste by 2030. If waste that is currently directly landfilled is instead combusted, the PRRF would greatly reduce the need for external landfilling (beyond fines, ash, and other non-combustibles) until about 2019 at project actual rates.

Figure 12: Projected Future Waste Trends for Proposed Project

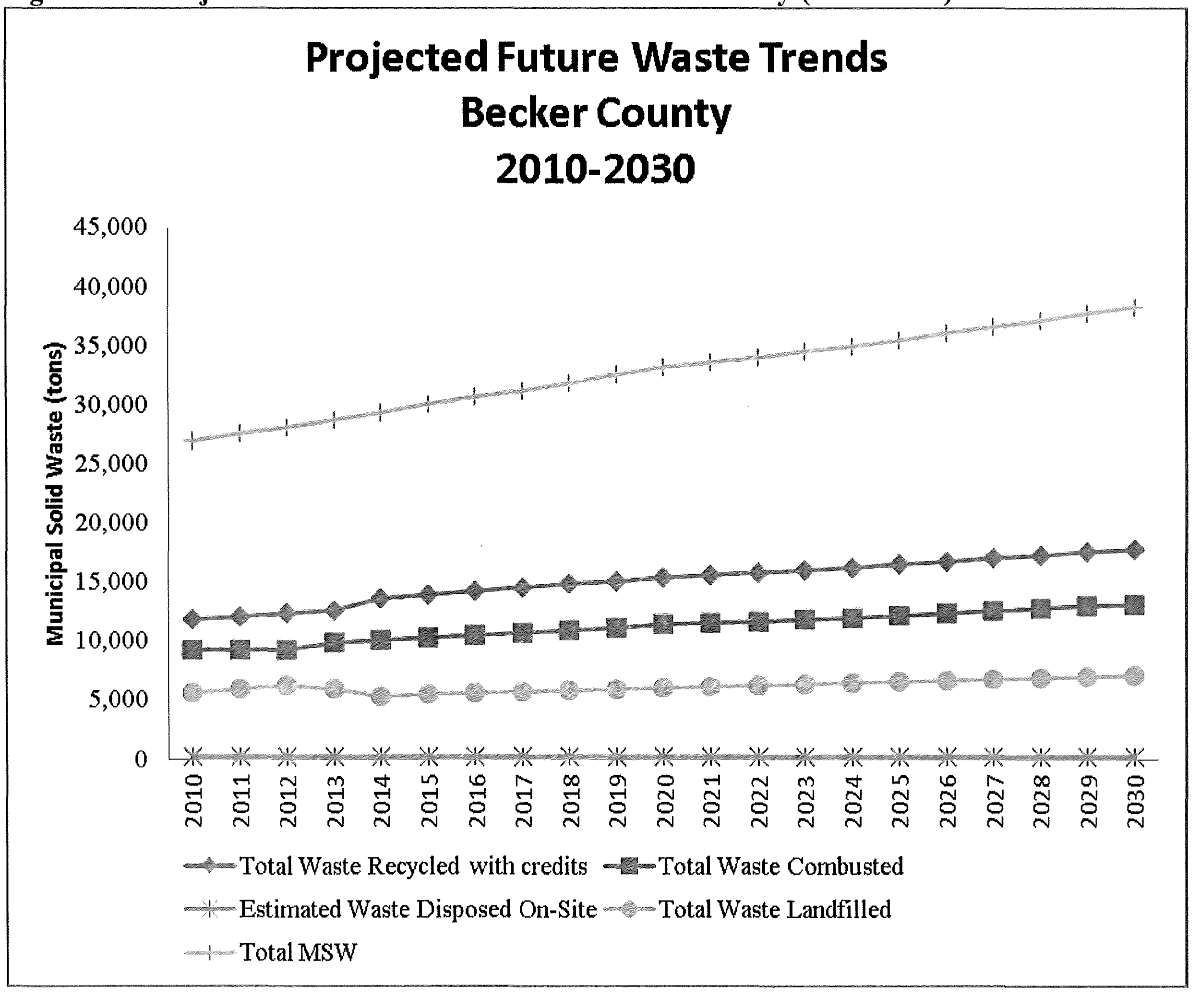


6.4 LOCAL EFFECT OF PROPOSED PROJECT

6.4.1 Becker County

Solid waste management would change in Becker County with the addition of the proposed project. The future projected trend from 2010-2030 is shown in Figure 14. Municipal solid waste generation would grow at an estimated rate of one percent per year. Waste disposed on-site through burning or open dumping is assumed to decline at 0.1 percent per year. When the MRF opens at the PRRF, the recycling rate for Becker County MSW would increase slightly.

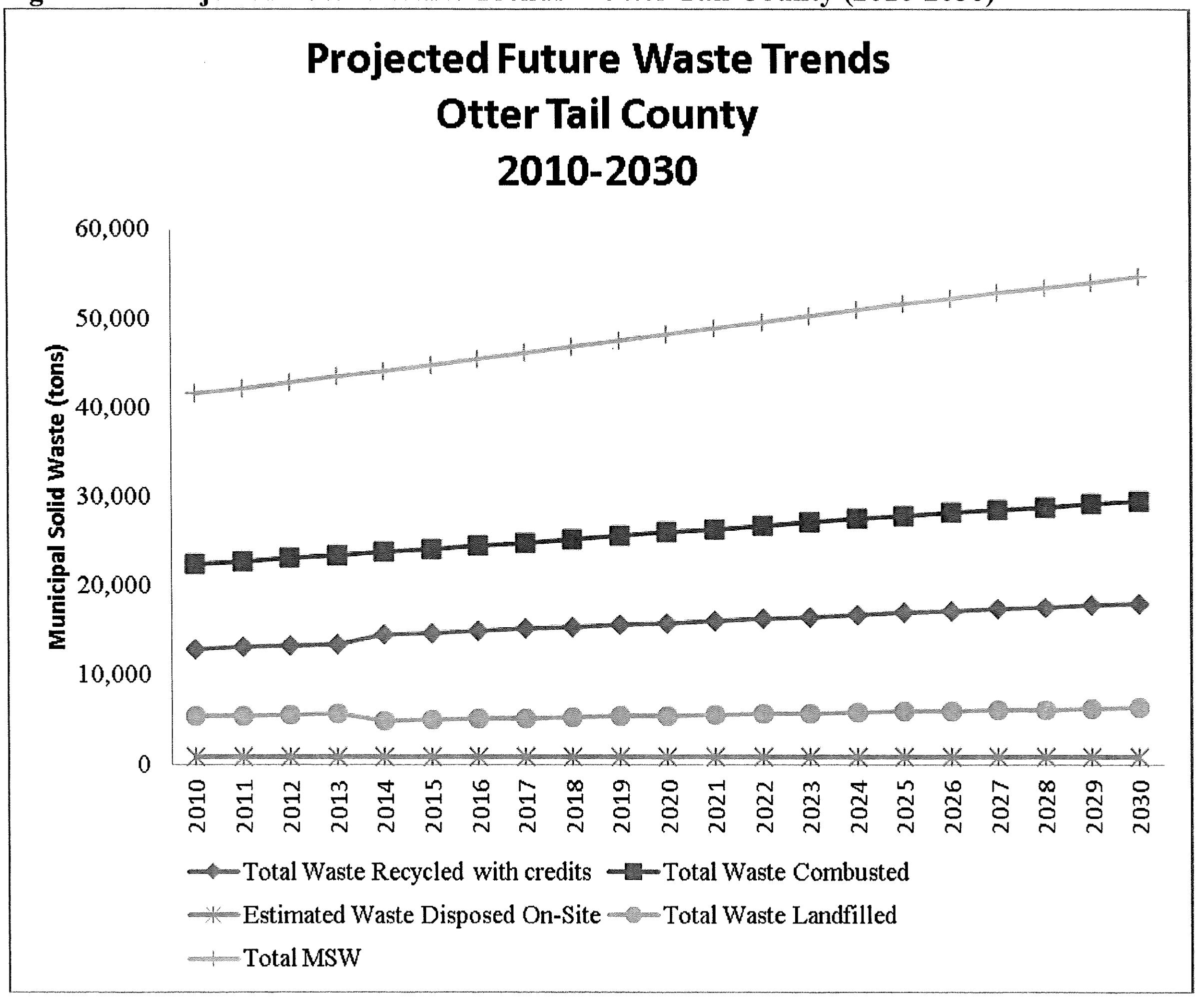
Figure 13: Projected Future Waste Trends – Becker County (2010-2030)



6.4.2 Otter Tail County

Solid waste management in Otter Tail County would largely remain the same with the addition of the proposed project. However, more waste would likely be combusted due to the increased capacity of PRRF. The future projected trend from 2010-2030 is shown in Figure 15. Municipal solid waste generation would grow at an estimated rate of one percent per year. Waste disposed on-site through burning or open dumping is assumed to decline at 0.1 percent per year. When the MRF opens at the PRRF, the recycling rate for Otter Tail County MSW would increase slightly.

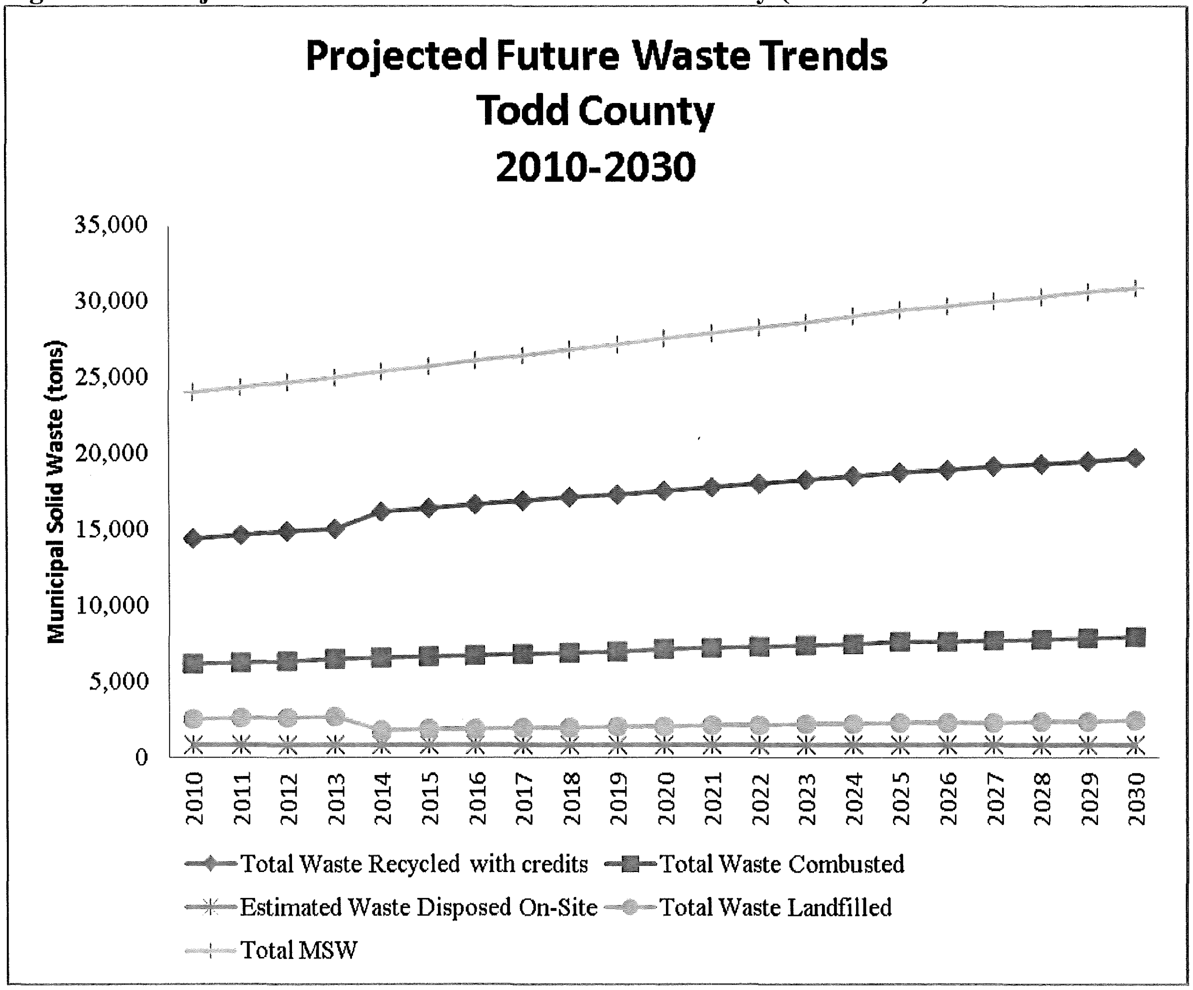
Figure 14: Projected Future Waste Trends – Otter Tail County (2010-2030)



6.4.3 Todd County

The projected future MSW trends for Todd County from 2010-2030 are shown in Figure 16. Projections are based on 2010 data from the SCORE Report. The recycling rate is assumed to be constant from the 2010 rate until 2014 when the PRRF MRF opens, which would slightly increase recycling. MSW generation is assumed to increase by one percent per year. Waste disposed on-site will decrease by 0.1 percent per year.

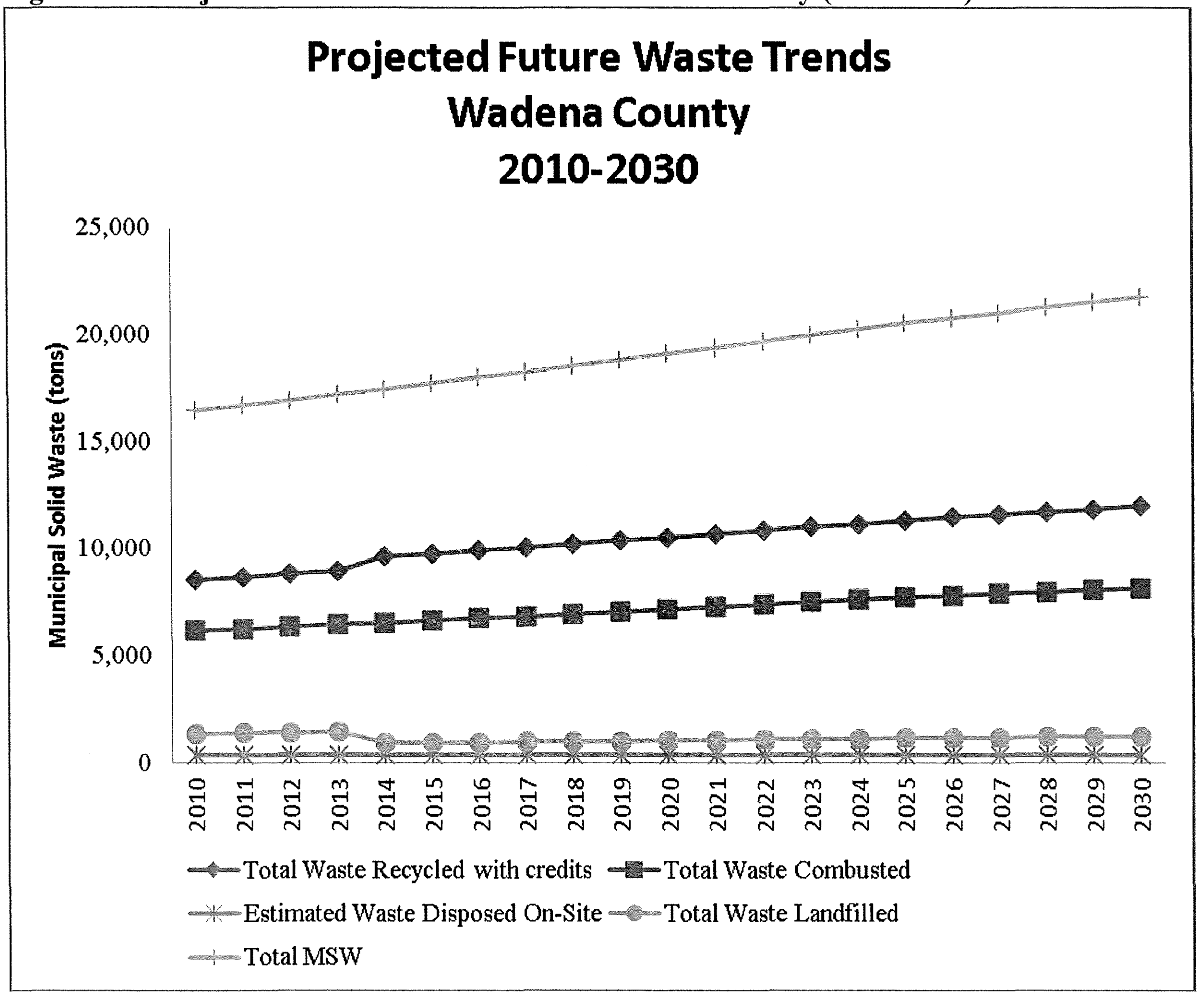
Figure 15: Projected Future Waste Trends – Todd County (2010-2030)



6.4.4 Wadena County

The projected future MSW trends for Wadena County from 2010-2030 are shown in Figure 17. Projections are based on 2010 data from the SCORE Report. The recycling rate is assumed to be constant from the 2010 rate until 2014 when the PRRF MRF opens and recycling increases slightly. MSW generation is assumed to increase by one percent per year. Waste disposed on-site would decrease by 0.1 percent per year.

Figure 16: Projected Future Waste Trends – Wadena County (2010-2030)



7.0 No-Build Alternative

Over the course of several years, various discussions regarding the handling of regional solid waste have occurred in the Otter Tail County area. In 2006, Becker, Cass, Clay, and Otter Tail Counties, and the cities of Fargo, Grand Forks, Moorhead, and West Fargo; in partnership with the MPCA, formed the Red River Valley and Lakes Region Solid Waste Panel. This Panel reviewed the existing conditions of solid waste in the region; including remaining life expectancy of the region's landfills, current quantities of MSW, and handing of MSW. The Panel contracted with a consultant to complete a technical assessment of alternative waste disposal options for the region.

In March 2007, a technical assessment, *Alternative Waste Feasibility Study*, was completed. This study reviewed a variety of options for handling MSW in the region, including different commercially demonstrated technologies and locations within the region that were feasible for implementation. Some of the options included MSW combustion, landfill with baler, plasma gasification, composting, and hydrolysis. From the study, the Panel narrowed the most feasible alternatives down to a MSW combustor and landfill.

Following completion of the *Alternative Waste Feasibility Study*, some members of the Panel decided to continue handling waste outside of the Red River Valley and Lakes Region partnership. Otter Tail County, along with Becker, Todd, and Wadena Counties, formed a new partnership known as the Prairie Lakes Municipal Solid Waste Authority to handle MSW on a more coordinated regional basis. The PLMSWA considered the findings of the *Alternative Waste Feasibility Study* along with the specific circumstances in their four-county area. There is one operating MSW combustor located in the city of Perham. There is MSW in the region that is currently being hauled outside of the region that could be used at the PRRF if it had more capacity. There is steam demand from existing customers that could be satisfied through increased processed MSW combustion. This was the basis for developing the proposed project, as previously described in Section 6.

Alternative sites for a new MSW combustor were not considered to have significant environmental benefit compared to the proposed project, which would use an existing site and make modifications to an existing facility. PLMSWA also considered alternative designs and layouts for the project. These included not constructing the MRF, where to locate the MRF on the existing site, emissions stack placement, haul routes, facility access, and location of existing customers. Additionally, an adjacent parcel to the north would be purchased as part of the proposed project. The scale and magnitude of the proposed project were determined based on the characteristics of the existing site and the infrastructure in place. Changes in scale or magnitude would not meet the underlying need for or purpose of the proposed project.

Given the circumstances and evaluation of the proposed project, it was determined that the alternatives did not provide significant environmental benefits compared to the proposed project. However, the Final Scoping Decision Document for the environmental impact statement (EIS) for the proposed project indicated that the no-build alternative would be considered. The following evaluation and analysis was completed based on the no-build alternative compared to the proposed project.

7.1 RECYCLING

The recycling rate in the service area counties increased from 34 percent in 1991 to 45 percent in 2010. The 2010 adjusted recycling rate, including the yard waste and source reduction credits applied to each county, is 51.7 percent. Each county participates in the SCORE program and receives funding for recycling programs in addition to waste reduction and HHW management programs.

Under the no-build scenario, recycling rates may change depending on how the counties focus on recycling programs. The primary means of recycling in each county is accomplished through individual households; therefore, the main focus of the counties to increase recycling is through educational efforts and county recycling programs. An increase in recycling rates under the no-build scenario cannot be predicted. Any increase would be due to public consumer habits and increased educational efforts by the counties. The proposed project would include a MRF which has the potential to assist the county in increasing recycling, in addition to household recycling, by approximately six percent. The no-build scenario would not include a MRF, and therefore would not include this added recycling benefit.

In order to foster an increase in the regional recycling rate, the counties would likely need to increase funding for their individual recycling programs or find other means to improve recycling rates.

7.2 SOLID WASTE COMPOSTING

Becker, Otter Tail, Todd, and Wadena Counties have not reported any organics collected for recycling in the 2010 SCORE Report. The no-build alternative would not provide any alternative to increase solid waste composting or definitively change the amount of organics recycling in the service area.

The counties all provide yard waste management services. In 2010, together the counties spent $7,440 on yard waste programs, or only 0.3 percent of their SCORE funding on yard waste. Under the no-build scenario, these rates are projected to remain the same. All four counties are credited with the full five percent yard waste credit increase to their base recycling rate, as available through the MPCA and SCORE report.

7.3 PRIVATE MSW LANDFILLS

There are no county-owned landfills in Becker, Otter Tail, Todd or Wadena Counties. Waste generated from these counties that is not combusted is sent to MSW landfills in other counties. In 2010, waste from Becker County was entirely sent to the city of Fargo landfill, which is 50 miles from the Becker County seat. Otter Tail County waste that was not combusted at PRRF was sent to the Dakota Landfill in Gwinner, North Dakota; a distance of approximately of 130 miles from the facility and 83 miles from Fergus Falls, the Otter Tail County seat. Todd County waste destined for a landfill was sent to the Greater Morrison Sanitary Landfill near Little Falls, Minnesota at a distance of 30 miles. Wadena also sent its landfilled waste to Dakota Landfill in North Dakota, which is 138 miles away.

In general, most of the waste from the PLMSWA counties is being sent out of Minnesota at a distance of over 100 miles. The no-build scenario would require more and more waste to be sent outside of the counties as those counties' waste quantities continue to increase over time. This would likely create a greater amount of MSW to be landfilled, which is a lower option on the *Minnesota Waste Hierarchy*. A longer hauling distance also has the potential to have more environmental impacts for solid waste disposal in the region and within Minnesota and North Dakota. Landfill capacity would potentially be reached sooner, which would necessitate siting and permitting processes for new and expanding facilities.

7.4 PRIVATE INDUSTRIAL WASTE LANDFILLS

Becker, Otter Tail, and Wadena Counties each have a demolition debris disposal area which landfills debris from the area. Under the no-build scenario, waste would continue to be hauled, as appropriate, to these facilities. The no-build scenarios would not change those procedures.

8.0 Conclusions and Summary

8.1 PROPOSED PROJECT IN STATE WASTE MANAGEMENT

The PLMSWA proposed project serves the identified needs of the region and provides an alternative solid waste management option for individual counties that is ranked higher on the *Minnesota Waste Hierarchy* than landfilling. Implementation of the proposed project is also consistent with recommendations in the *2009 Solid Waste Policy Report* by providing continued local leadership and creating strong intergovernmental partnerships and regional governments that can effectively manage solid waste. The proposed project provides these benefits to the region as well as reuses solid waste for a beneficial purpose, reduces the amount of MSW disposed of in landfills, and also increases the lifespan of existing landfills in the region.

The operation of the PRRF and the proposed project addresses Minnesota Waste Policy by creating energy from waste. Overall, the five goals listed in Minnesota Statute 115A.02a would all be met by the proposed project in some way. The proposed project would allow greater separation and recovery of materials prior to using the waste to produce steam (i.e., energy) with the use of the MRF. Additionally, the PRRF is a joint effort between four counties, which allows coordination of solid waste management among political subdivisions.

8.2 PROPOSED PROJECT IN LOCAL SOLID WASTE PLANNING

For each of the counties individually, the proposed project would provide an alternative means to dispose of MSW and an added benefit of increasing existing recycling rates through use of a MRF. The MRF would complement the existing county recycling efforts, which would still rely primarily on households and businesses to participate in county recycling programs. None of the counties have a county-owned landfill, and therefore county waste is hauled to landfills elsewhere in Minnesota and North Dakota. The PRRF provides a waste disposal option, which is local and county-owned through the PMSWA.

Waste exists in each of the counties that is currently being landfilled that could be hauled to the PRRF instead. The proposed project would provide an alternative waste disposal option for each of the counties to consider. Once operational, the proposed project would begin accepting more MSW from these counties, thus reducing the quantity of landfilled waste. Within about ten years, however, the proposed project is estimated to reach its desired MSW capacity of 55,000 tons per year that balances existing and project steam demands with MSW availability. Therefore, it would not be able to accept more waste without dealing with excess steam production. At that time, the PRRF could accept additional MSW (up to 73,000 tons per year).Any waste beyond that would require the counties to revert to landfilling or other disposal methods to manage the projected increases in waste generation over the next 20 years.

Overall, the proposed project would have a beneficial effect on solid waste management for the individual four counties by providing additional MSW disposal capacity for each county through the cooperative joint powers agreement.

8.3 PROPOSED PROJECT IN REGIONAL SOLID WASTE MANAGEMENT

The proposed project has regional benefits similar to those described for state waste management. The proposed project would allow counties within the region to continue to focus on waste reduction and recycling through continued county educational programs for both households and businesses, while receiving the added benefit of increased recycling and waste toxicity reduction as a result of the MRF. The additional MSW diverted to PRRF would otherwise be disposed of at landfills in nearby counties or neighboring states. The effect of processing waste at PRRF would have multiple benefits; including reduced generation of greenhouse gas associated with transporting waste longer distances, utilizing waste (a renewable fuel source) to generate energy that is used by local business and industry, as well as extending the life of the landfills located in the nearby counties and neighboring states. This in theory would help maintain the remaining capacity at these disposal facilities as waste generation increases over time.

Within the next ten to fifteen years, the proposed project at PRRF would allow the PLMSWA to maximize the efficiency of waste management within the region by expanding recycling opportunities and volumes recycled, reducing toxic constituents prior to burning the waste to generate energy; as well as allowing the opportunity for the expansion into the area of the recovery of organics in waste. During this same time period, PLMSWA would maximize the use of PRRF from its initial operating capacity of 55,000 tons per year to its maximized operating capacity of 73,000 tons per year by continued and expanded regional efforts.

The proposed project would have a beneficial effect on solid waste management within the four counties as well as an expanded region. These benefits include increased public awareness and increased opportunities related to implementation of cooperative solid waste efforts within the region. Ultimately, the proposed project would allow the four-county region to address all of the goals listed in the Minnesota Waste Policy, as previously described in Section 2.