



Memorandum

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TO: Zack Hansen and Judy Hunter, Ramsey/Washington Recycling & Energy Board
(R&E) Joint Leadership Team (JLT)

CC: Curt Hartog, Foth Infrastructure & Environment, LLC (Foth)

FR: Nathan Klett, Foth
Jennefer Klennert, Foth

RE: Options for Scope of Work for Alternative Technology at the Recycling & Energy
Center (R&E Center)

This memorandum is intended to provide a proposed scope of work for development of alternative technology strategy implementation at the R&E Center. The R&E Board has been undertaking a process called *Scope for Resource Management* which graphically examines future uses and technology upgrades to the R&E Center; as well as uses for the products produced at the R&E Center.

Foth is providing a proposed timeline and recommended steps needed to determine proposed changes to the R&E Center, which may include some form of mixed waste processing (MWP).

Previously, MWP was proposed to be implemented in 2018 at the R&E Center. The specific details and necessary decisions points for implementing MWP have not yet been determined. Many steps are needed prior to a final decisions being made on MWP at the R&E Center. Foth proposes a timely and methodical process that includes the following:

- ◆ Determination of the specific materials to be recovered using MWP (metals, organics, plastics, cardboard).
- ◆ Completion of waste sorts targeting specific materials and accounting for seasonality and with or without bag breaker.
- ◆ Conduct biological methane potential (BMP) tests on process residue to examine potential uses for residue in an AD system.
- ◆ Research what equipment will separate the specific target materials for future procurement; including estimated recovery rates based on waste sort.
- ◆ What changes to the R&E Center may be necessary to accommodate installation of MWP equipment.

A tentative timeline has been proposed for your review and consideration of the steps needed and is provided as Attachment 1.

Mixed Waste Processing

The description of MWP is intended to refer to a system of equipment and labor utilized to remove specific products (organics, metals, plastics, cardboard or a combination of all) from the waste stream that can be recycled or digested, or removal of materials from the waste stream that results in refuse derived fuel (RDF) that can be used as a feedstock for gasification. MWP is proposed to be added at the front end of the R&E Center and separation of materials would occur prior to traditional RDF production.

Types of MWP

Foth understands that the R&E Board desires to examine modifications at the R&E Center to target one or all of the following materials.

- ◆ MWP to remove organics only;
- ◆ MWP to remove organics, metals, and plastics and potentially cardboard;
- ◆ MWP to remove Blue Bags.

A decision on the extent of MWP is part of the proposed process. Each material to be removed prior to producing RDF needs to add economic, process and/or environmental value. Ongoing discussions with the R&E Board are recommended as decisions are made to determine the final system.

Waste Sorts

Foth on behalf of the R&E Board completed a comprehensive waste sort analysis *Waste Composition Study* in September, 2014. This comprehensive waste sort looked at what items were specifically in the waste stream. This analysis determined waste composition by manually sorting waste into predetermined categories. However, for implementing MWP, it is important to correlate waste composition with the equipment's ability to effectively sort the desired material from the waste stream. That is to say, actual material recovered is dependent on the equipment being utilized. The waste sort was conducted at a single point in time (July, 2014) and therefore does not take into account the seasonality of material received at the Facility.

Foth recommends a series of waste sorts occur quarterly starting 2nd Quarter of 2016 and ending 1st Quarter of 2017. The waste sorts will be completed with two (2) primary goals:

- ◆ Determination of what can be removed from the waste stream utilizing currently available processing technology. (With and without a bag breaker).
- ◆ Determination of seasonal change on the composition of the waste.

The waste sorts will be instrumental in helping the R&E Board determine the appropriate materials to recover as well as the amount of materials that are recoverable.

Evaluation of the Separation Process

The equipment used for sorting material is dependent on the targeted materials. When targeting organics, metals, and plastics (and potential cardboard) the technology used in a MWP system is similar to the technology used in a Material Recovery Facility (MRF), which is a mature technology and can be utilized as a good comparison for the R&E Board's study of equipment for use in MWP. However, there is some question if the MRF equipment is robust enough to handle MSW at the volumes anticipated.

Foth proposes a systematic approach to determining the equipment necessary in a MWP system. The individual pieces of equipment will depend on the targeted materials. If organics from Blue Bags are the only target a simple inclined conveyor to a flat conveyor with hand sorting is generally the only equipment necessary. If organics (not in Blue Bags), metals and plastics are targeted additional equipment is necessary to provide a complete MWP system. Furthermore, if cardboard is targeted, machine and manual sorting equipment may be required.

A list of equipment that may be in the MWP and should be researched further is listed below.

- ◆ Bag Breaker (to liberate materials)
- ◆ Trommel screen or disc screens (size separation)
- ◆ Optical Sorter (if plastics are targeted)
- ◆ Air classifiers (density separation)
- ◆ Eddy Currents (nonferrous)
- ◆ Magnets (ferrous material)
- ◆ Cardboard

Foth recommends R&E representatives undertake tours of other facilities in the Minnesota, Wisconsin, and Iowa to observe various types of equipment. These tours should be scheduled during 2nd and 3rd quarter 2016.

Throughput Evaluation of MWP

Part of the process to be undertaken as the R&E Board explores MWP is the size of the system. Previous work, by Foth pertaining to MWP system design assumed 2 separate MWP lines capable of 35 ton per hour or approximately 335,000 tons of incoming MSW annually. The system also assumed the commercial and residential MSW would be handled on separate lines.

Based on Ramsey and Washington MSW generation data, 500,000 tons of MSW are produced and could potentially be managed at the R&E Center after 2018. The ultimate through put of a separation technology (i.e. MWP system) will depend on the materials targeted.

Systematic Approach to MWP Vendor Technology

Current vendors of sorting equipment believed to be capable of adapting to manage mixed waste at volumes anticipated at the R&E Center include:

- ◆ Bulk Handling Systems
- ◆ CP Group
- ◆ Machinex
- ◆ VecoPlan

After the MWP system design is further determined, Foth recommends a Request for Expressions of Interest (RFEI) or Request for Proposal (RFP) to narrow down the respondents to the equipment procurement request. Foth recommends the RFEI occur 4th quarter of 2016 through 1st quarter of 2017. The RFEI will be to narrow the respondents to the MWP procurement. A follow-up RFP with the narrowed respondents for the MWP system will be completed in 3rd and 4th quarter of 2017. This RFP would be to receive designs of the proposed MWP as well as guaranteed performance of the equipment. Actual procurement and ordering of the MWP equipment would occur in 2018 with installation and operation startup to begin in 2019. This would also provide sufficient lead time to initiate any building improvements prior to receiving the MWP system. This is further discussed below.

Other Needed Steps

R&E Center Facility Scoping Improvements

As part of the installation of the MWP system Foth anticipates improvements and potentially an expansion needed to the R&E Center to accommodate the equipment and process change. Foth has recommended R&E Center scoping of the needed improvements or expansions occur in 1st and 2nd quarters of 2017 to design the approach for the building. The type of procurement and method of determining the building changes is not proposed in this memo. Based on the building improvements needed, a cost estimate for the improvements and concept development will be done in 3rd quarter 2017. In 4th quarter 2017 and 1st quarter 2018 the concept should be selected with building improvements occurring in 3rd and 4th quarter of 2018. Permitting the expansion by the MPCA would occur in the second or third quarter of 2018. Further discussion should occur with the R&E Board on building improvements.

Anaerobic Digestion Markets

In order to successfully implement MWP, an Anaerobic Digestion (AD) market should be procured. Currently there are limited opportunities for AD in the Twin Cities market. Markets must be encouraged and evaluated throughout 2016 with a plan for an AD procurement prior to 2019. An end market will need additional information on the product available. Waste sorts, MWP technology vendors, and continued exploration of this market should lead to a long-term solution for organics processing. Alternatives to AD may also be explored as a backup option for organics processing.

Permitting

If the R&E is to install MWP that targets organic materials and make changes to the processes at the R&E Center the permits must be updated. Timelines will be dependent on the individual permit. It is anticipated that at a minimum the following permit modifications must be completed to install MWP at the R&E Center:

- ◆ Major Modification to the MPCA SW-286 Permit
- ◆ Conditional Use Permit
- ◆ Watershed District Permit
- ◆ (Potential) Air Permit
- ◆ Stormwater Pollution Prevention Plan (SWPPP) Update
- ◆ Building Permit (Contractor would acquire)

RDF use in Alternative Technologies

The R&E Board is considering other alternative technologies, including gasification, in lieu of combustion. In considering this it is important to understand the composition of the RDF produced at Newport. During the waste sorts described previously, Foth will also collect samples of the RDF for analysis of particle size, bulk density, BTU content, moisture content, carbon content, metal content and ash content of the samples.

This analysis would be conducted to provide seasonal data on RDF composition and its ability to meet specifications for alternative technologies like gasification. Additionally, Foth is recommending RDF samples from GRE also be obtained and tested at the same time as the Newport samples are collected. This would provide a comparison of the RDF waste streams and the composition of each RDF processing plant for use in alternative technologies. Additionally, the RDF testing results will be evaluated to determine if MWP is implemented, the potential composition changes to the RDF and if the changes to the RDF composition would still meet the requirements for alternative technology applications.

Financing Facility Improvements

As the technology evaluation moves ahead, it will be important to evaluate financing options for improvements to the Newport Facility. This is beyond the scope of Foth's work, but Foth will work with the JLT as it examines financing options. Once the scope of the work is known, a financing plan will be prepared. The Joint Powers Agreement provides that the R&E Board could issue bonds, or one of the counties could issue bonds on behalf of the R&E Board, with permission of the other county. Such bonds or obligations must be connected with the Facility, and are repaid using revenue from the Facility. Because of this, any bonding would occur after waste designation has been implemented, so that there is assurance of waste supply. Previous research and reports on financing have discussed financing options, such as Short Term financing, Long Term financing, and pursuing State of Minnesota assistance, either through a Capital Assistance Program grant, or special legislation.

Attachment 1: Scope of Work for the Future
The Alternative Technology Pathway

2016 - 2019
(Q1-Q4)

Task	2016				2017				2018				2019			
	Q1	Q2	Q3	Q4												
Waste Sorts																
Waste sorts based on targeted items and seasonality		■	■	■	■											
Processing Equipment																
Processing equipment components review		■	■	■	■											
RFEI for MWP																
RFEI for equipment manufacturers		■	■	■	■											
RFP for MWP																
Targeted RFP for equipment manufacturers						■	■	■								
Equipment procurement and manufacture										■	■	■	■			
Installation and start of operations for MWP																■
Facility Improvements																
Design approach for building					■	■	■	■								
Facility scoping improvements					■	■	■	■								
Cost estimate for improvements							■	■								
Concept development							■	■								
Concept selection								■	■	■						
Building improvements and upgrades											■	■	■	■		
Organics																
Determine organics market					■	■	■	■								
Permits																
Solid waste permit						■	■	■	■	■						
All other permits						■	■	■	■	■						
Financing																
Secure financing for improvements										■	■	■				