Standardizing Compost by Defining Properties, Products and Systems in Minnesota: A MNCC White Paper

As modified on October 9, 2023 (per committee review)

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Executive Summary

Minnesota has a rich and storied history of composting with the various types of composting facilities that manufacture these products. Collection and processing of organic materials has received renewed attention and government resources given the large fraction of organic materials in the solid waste stream. A commensurate level of investment is needed for development of effective compost end use markets.

This White Paper is intended to focus on the finished end product of "compost". It is entitled *"Standardizing Compost by Defining Properties, Products and Systems in Minnesota"* to emphasize this is a process involving many state agencies, non-profit organizations, and private interests (compost community). This White Paper and related workshops sponsored by the Minnesota Composting Council (MNCC) is intended to strengthen the complex relationships within the compost community to move collectively towards enhanced compost quality and more strategic market development.

Inferior compost and improper use can be harmful to the environment and be counter-productive to plant growth. Efforts to enhance compost market development will be hampered if compost is proven to be detrimental to soil health and sustainable plant growth. This problem is due in part to the lack of consensus about modern standards for defining "compost". One cause is that the term "compost" has been used for decades in our every-day common language to describe any product of organic origin that may be reused.

Five different state agencies regulate or have a certain level of influence on the quality or characteristics of compost in Minnesota (in alphabetical order):

- Minnesota Department of Administration (MN Dept. of Admin.)
- Minnesota Department of Agriculture (MDA)
- Minnesota Department of Natural Resources (MN DNR)
- Minnesota Department of Transportation (MnDOT)
- Minnesota Pollution Control Agency (MPCA).

MNCC is a chapter of the United States Composting Council (USCC). USCC is affiliated with the Compost Research and Education Foundation (CREF). Each of these non-profit organizations have a critical role in the development of compost standards and educational services.

The University of Minnesota (U of MN) also has several departments, offices, programs, and services that enhance basic and applied compost research in the State:

- Department of Soil Science
- Soil Testing and Research Analytical Laboratory (STRAL)
- Minnesota Office of Soil Health (MOSH)
- U of MN Extension
- St. Anthony Falls Laboratory (on stormwater research)

There is little to no collective agreement on a definition and quality standards for "compost" in Minnesota. In August 2019, the most recent definition for compost was adopted by the American Association of Plant and Food Control Officials (AAFPCO) in collaboration with the USCC and states:

> ***Compost*** *is the product manufactured through the controlled aerobic, biological decomposition of biodegradable materials. The product has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilizes the carbon such that it is beneficial to plant growth. Compost is typically used as a soil amendment, but may also contribute plant nutrients….*

This new definition of compost replaces the prior AAFPCO definition (1997). MNCC recommends this AAFPCO/USCC definition be officially recognized by Minnesota State agencies if not adopted via state statute.

A statewide definition being adopted or in statute is an important step, but not the final goal. The next generation of quality assurance/quality control (QA/QC) systems must also be developed and effectively implemented in practice in the field by compost manufacturers and users alike. This White Paper identifies multiple options to accomplish this goal. One key recommendation is to develop a third-party compost certification program that would be recognized and accepted by MnDOT or other agencies and thereby the entire compost community. The preferred implementing organization for this new compost certification program may be the Minnesota Crop Improvement Association (MCIA), who already certifies several similar products for use in MN.

This proposal for a third-party compost certification system must be preceded by a consensus – based decision making process of further classifying the various levels of compost quality. A more rigorous, science-based approach is also needed to classify various compost products that are based on current industry standards. This new classification system should go beyond and modify the current "Grade 1"/"Grade 2" MnDOT specifications and "Class 1"/"Class 2" MPCA compost rule. Ultimately, if accepted by these agencies, amendments to MnDOT specifications and modifications to the MPCA compost rule may be needed. MNCC is considering legislation to require such specification amendments and rules changes.

Ideally, a consensus will emerge that can be accepted by the entire compost community. Such consensus may also require negotiations, concessions, etc. MNCC recommends the formation of an ad hoc industry and government agency work group. MNCC intends to use this White Paper to initiate discussions with the compost community including an invitation to join this work group. The charge to the work group will be clearly defined and adhered to; a firm sunset date for the work group will be agreed upon by all participants.

The goals of creating these standards across the State would be designed to protect the environment and consumers who use or purchase the end products while the State attempts to increase organic diversion and reuse of a resource.

MNCC does not have the resources alone to staff and convene the proposed work group. MNCC intends to submit proposals to the primary state agencies to provide grants and/or in-kind staff support to make such a work group feasible.

Introduction

The MNCC is the Minnesota state chapter of the USCC. As a state affiliate of the USCC, the MNCC is dedicated to the development, expansion, and promotion of the composting industry based upon sound science, principles of sustainability, and economic viability.

The MNCC's Compost Site Operations Committee (Committee) has conducted an extensive research and self-education project to gather information about how Minnesota state agencies and other organizations regulate compost properties, products, and quality control systems. As one part of this research, the Committee produced a preliminary draft annotated bibliography, of *"Compost Definitions and Regulations in Minnesota and Other Organizations: A Preliminary Catalogue"*[1]. Then in 2022, a series of meetings were held with Minnesota state agency staff and other organizations to discuss the status, challenges, and opportunities for improvement in the regulation of compost properties, products, and quality control systems. As another part of the Committee's research, a half-day workshop on compost quality systems was held and co-sponsored by MnDOT on Thursday, October 13, 2022.[2]

The MNCC Committee started drafting this White Paper earlier this year, but soon realized the scope of the project needed additional resources beyond volunteers. On October 6, 2022, the MNCC Board decided to request this proposal from Foth Infrastructure & Environment, LLC (Foth) to finish the draft White Paper. On November 3, 2022, the MNCC Board approved Foth's proposal and executed the consultant agreement on November 8, 2022.

This version of the White Paper was presented to the Committee by Foth on November 28, 2022 and discussed at its meeting held on November 30, 2022. Committee comments were addressed, and a revised draft White Paper was submitted back to MNCC on December 5, 2022. The MNCC is scheduled to further consider this draft White Paper and release it as a draft for public comment. MNCC is considering a second workshop to be scheduled as the final public engagement step in soliciting comments on the draft White Paper. The exact date and agenda for this second workshop has not yet been determined. MNCC will coordinate workshop planning.

The Committee found that currently there is a lack of consistent regulations on the quality standards of compost and/or composting facilities and end use of compost products in Minnesota. While there are numerous state laws, rules and guidance documents, there is no single, consensus-based definition used by all parties to describe what constitutes a quality "compost" product. Additionally, there is no enforcement of non-permitted composting facilities that claim to sell compost to end users.

The goal of this paper is to recommend a standardized set of specifications, definitions, terminology, and potential new regulations that can be shared across agencies wishing to purchase and monitor the quality of compost products and/or composting facilities to help assure these materials are safe, mature, and stable. Enhanced standards of compost product definitions, feedstock specifications, and composting process requirements should help move the Minnesota composting industry to the next generation of professionalism.

Recommendations in this White Paper are intended for both external audiences (e.g., state agencies, local units of government, waste management organizations [WMO], engineering firms) and internal to MNCC. It is recognized that there will be both long-term strategies (e.g., changes in state legislation or rules) and short-term strategies (e.g., updated guidance documents; MNCC tactics).

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[1] MNCC "Compost Definitions and Regulations in Minnesota And Other Organizations: A Preliminary Catalogue"; A preliminary draft as of November 28, 2022 (in progress; not yet finalized or approved by the Committee).

[2] MNCC + MnDOT Workshop on Compost Quality Control Systems in Minnesota was held in Shoreview, MN on Thursday, October 13, 2022. To view the MnDOT recording of the event, link here.

Objectives of this White Paper

The result of the White Paper provides MNCC with recommendations to establish clear guidelines for compost producers and government agencies to understand when a product can be labeled and marketed as compost in the State of Minnesota.

One objective is to provide compost buyers and users with the consistent information needed to help assure that they are getting comparable quotes on similar compost products that have been processed through centralized composting facilities. Another objective is to help assure that finished compost products are beneficial to the soil for the intended purpose and safe for the environment.

In addition, the White Paper:

- Includes recommendations for standardizing policies and guidelines to be used by government entities in Minnesota to ensure the compost product produced is safe, mature, stable, and appropriate for the specific application.
- Documents current compost regulations and programs and the differences, deficiencies, and opportunities for improving the current system of approving compost for use.
- Recommends a standardized set of definitions and terminology as guidelines agencies can adopt to help specify compost products and systems of production along with testing requirements that should be used to verify the compost is safe for the environment and appropriate for the intended application.
- Help to advance markets for finished compost by working towards a more level playing field for all compost producers and provide consistency for consumers expecting a quality, reliable, and consistent product.

The White Paper does not include technical specifications on the various end use applications of compost or the most appropriate grades and blends for each application. This type of information has already been published by CREF[3] and in the MPCA Minnesota Stormwater Manual[4]. However, this MNCC White Paper includes recommendations for future research like the CREF factsheets that are more specific to the needs of Minnesota agencies, contractors, and soil conditions.

Background: Agencies that Regulate Compost in MN

"Compost" is an age-old material that (depending on definition) has been present on the planet since plants first inhabited land. Some might even say that it was a critical part of life evolving on the planet. In ecology, "compost" is very broadly defined as partially decomposed detritus material that builds up at the soil surface. This ecological definition can cause confusion when compared to the definition of compost in the waste processing industry, where the level of decomposition of that detritus material in a controlled system differentiates "compost" from the raw feedstocks from which it is created. People use compost throughout the world, and it comes in a wide variety of forms derived from many sources (e.g., yard waste, food waste, manure, biosolids from wastewater treatment plants, etc.).

Commercially, the term "compost" is defined and used in many ways by composters, producers of compost, industry, and government agencies. The composting profession and multiple organizations have attempted to develop and implement a uniform set of definitions and standards, but there are still a wide variety of confusing terms. For example, some companies have been reported to sell "compost" even though the product was not proven to meet the USCC's definition of finished compost which can be accomplished via testing and certification.

[3] The CREF posted a series of 10 Factsheets in January 2022 entitled *"Compost Use Applications – A Return on Investment (ROI)"*. The CREF contracted with Ron Alexander Associates, Inc. to compile the factsheets.
[4] MPCA's Minnesota Stormwater Manual (in Wiki format) has a wealth of information on compost uses, including how to use in a soil management plan.

The MNCC Legislative Committee is in the process of drafting revisions to the MNCC Legislative Platform. The following excerpt of the draft 2023 MNCC Legislative Platform & Priorities[5] helps inform the intent of this White Paper:

> ***Defining compost***
>
> A definition of finished compost and the process of composting is needed in Minnesota statutes. Defining compost, and what is required to produce or sell products utilizing the term compost, will create consistency among State agencies (MPCA, MnDOT, MDA, DNR, etc.), local units of government and all compost users, and level the playing field for those manufacturing compost and those looking to use compost for various applications. The current lack of consistency among State organizations and private industry is leading to the sale of an inferior product that, in some instances, is having detrimental effects on projects and turning customers away from using properly manufactured compost.

Specifications for compost in projects should be based on market standards, meeting regulatory and health standards and project needs, such as nutrient content, inert standards, and particle size. In addition, all compost should be tested for maturity, pathogens, particle size (gradation), and contaminants while coming from a certified compost producer following the requirements instituted and regulated by the State and designed to protect the environment. A recipient should verify specific qualities of the compost, as received, relevant to the project's design intent."

Additional problems that provided impetus for this White Paper include:[6]

- *Lack of adequate (monitoring), enforcement, and (commonly understood) standards*
- *Negative perceptions about compost have been lingering for decades. E.g., from past bad experiences with immature, unfinished, or contaminated products sold as "compost" or picked up for free from a facility or site that is just stockpiling organic waste.*

A goal of this White Paper is to help standardize "compost" products and/or compost facilities by defining properties, products, feedstocks, and quality assurance / quality control (QA/QC) systems. In Minnesota, collectively among the various state agencies and in the industry, we have the tools today to modernize our compost standards.

William Brinton stated in the Journal of Woods End Research Lab:[7]

> *Composts vary widely in quality and may exert potentially drastic effects on soil-plant environments when used at typical rates. Inappropriate standards that assert that a material is adequately composted provide a false sense of safety. Uses of compost in many applications such as restoration, grow-media and soil reconstruction require that standards suitable and sufficiently sensitive for these applications be used. Test methods not designed for this purpose should be rejected. Industry may continue to emphasize tests reflecting a minimalist approach to compost quality, but this approach does not sufficiently protect the interests of using composts in the horticultural landscape.*
>
> *In contrast, scientists working independently in horticulture and as advisors in compost quality have been, for some time, describing methods that may be very appropriate to these applications, but are yet to be nationally adopted. The great potential future of compost products may depend on it.*

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[5] MNCC 2023-2024 Platform & Priorities – DRAFT 11.23.22 as downloaded on 12-2-2022 from the MNCC's Legislative Committee's Google 2023-2024 Platform & Priorities sub-folder.

[6] Chuck Joswiak's first presentation at the Thur Oct 13, 2022 MNCC + MnDOT Workshop on Compost Quality: MNCC White Paper on Compost Standards in Minnesota

[7] William F. Brinton article, Significance of Stability-Maturity Testing and Plant Bioassays to Assess Composts for Inclusion in Soil Restoration; (April 2012); Journal of the Woods End Research Lab (Vol 1-1, 2012)

Minnesota Department of Administration (MN Dept. of Admin.)

> [NOTE: THE MN DEPT. OF ADMIN IS IN THE MIDDLE OF AN RFP PROCESS TO SEEK PROPOSALS FROM COMPOSTERS TO SUPPLY FOOD-DERIVED COMPOST.[8] THIS MN DEPT. OF ADMIN. SECTION WILL BE DRAFTED AFTER CONTRACTS ARE FULLY EXECUTED. PROPOSALS WERE DUE ON TUESDAY, NOVEMBER 22, 2022 (PER RFP ADDENDUM 2).]

The Request for Proposals (RFP) states:

> *PURPOSE: The purpose of this Request for Proposals (RFP) solicitation is to solicit a contract(s) to provide food-derived compost for State agencies and Cooperative Purchasing Venture (CPV) Members. Composted material is derived from source separated organic materials, tested to meet MPCA class 1 safety standards pursuant to MN Rule 7035.2836. Compost must come from a facility granted a permit from the Minnesota Pollution Control Agency, or a permit granted by a Tribal authority, and meet Class 1 standards specified in Minnesota Rule 7035.2836, which can be found at the following website: 7035.2836 - MN Rules Part.*

Minnesota Department of Agriculture (MDA)

The MDA manages the distribution of compost and competing products through the "Minnesota Fertilizer, Soil Amendment, and Plant Amendment Law," Minnesota Statutes (M.S.) 18C.[9,10] MDA promulgated Minnesota Rules 1510.0430-1510.0434 Soil and Plant Amendment Labels, which covers all pertinent labeling regulation.[11,12]

The Committee met with Michelle Dobbratz, MDA State Program Administrator, on February 16, 2022. Ms. Dobbratz presented on the MDA's fertilizer and soil amendment registration program including the basis from current state law, rules, and guidance documents.[13] There was an open and honest exchange of information and ideas about how the MDA's program currently regulates soil amendments, including compost.[14]

Minnesota's "Fertilizer, Soil Amendment and Plant Amendment Law"[15] states in part that:

> *Subd. 6. **Compost**. "Compost" is a biologically stable material derived from the composting process.*
>
> *Subd. 6a. **Composting**. "Composting" is the biological decomposition of organic matter. It is accomplished by mixing and piling in such a way as to promote aerobic or anaerobic decay or both. The process inhibits pathogens, viable weed seeds, and odors.*

These are legacy definitions in State statutes that were originally adopted by the Minnesota Legislature into law in 1989[16] and later amended in 1996[17]. There is a need for these statutory definitions to be revisited within the context of today's industry standards.

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[8] MN Dept. of Admin RFP for purchase of food-scraps derived "Compost for State and CPV Members" (Event ID G0210-2000013201).

[9] Factsheet published by MDA based on a report submitted by Ron Alexander (R. Alexander Associates, Inc.): *Overview of Laws and Regulations Related to the Distribution of Compost in Minnesota*; June 2003

[10] Minnesota's "Fertilizer, Soil Amendment and Plant Amendment Law", Minnesota Statutes (M.S. 18C.001).

[11] MDA's Minnesota Administrative rules on Labelling and Labels, 1510.0433.

[12] MDA's Minnesota Administrative rules on Enforcement, 1510.0434

[13] Michelle Dobbratz PPT presented on 2-16-2022: "Compost Registration in Minnesota"

[14] MNCC Compost Operators Committee Feb 16, 2022 meeting notes: *Michelle Dobbratz, MDA*. (Draft notes).

[15] Definitions of "Compost" and "Composting" within the Minnesota's "Fertilizer, Soil Amendment and Plant Amendment Law", (M.S. 18C.005).

[16] Minnesota Session Laws – 1989, Regular Session (Chapter 326)

[17] Minnesota Session Laws – 1996, Regular Session (Chapter 330)

Jeppe Kjaersgaard (MDA presented at the MNCC + MnDOT Compost Quality Workshop on October 13, 2022.[18] Further discussion provided insights into the MDA program implementation. Highlights of his presentation include:

- Exemption for compost registration and labeling if the product is given away.
- Exemption for recycled feedstocks (e.g., yard waste, food waste, etc.). Intent was to encourage composting of these materials.
- Only six compost products are registered in MN (as of April 2022).
- Enforcement, in general (including fertilizer and other soil amendment products), conducted by MDA specialists inspecting facilities.
- A complaint form is available online.[19] MDA would prefer to start with a conversation with the complainant about a compost product before a formal complaint is submitted.

Minnesota Department of Natural Resources (MN DNR)

MN DNR is responsible for managing invasive species that have the potential to harm the environment. Recently, MN DNR proposed to amend their prohibited invasive species rule to add jumping worms to the list. The FAQs document posted on the MN DNR's website about their proposed rule change states:

> ***Jumping worms: Frequently asked questions about proposed rule change***
>
> ***Yard waste facilities***
>
> ***Q: Will yard waste facilities need to change their practices if this rule change goes into effect?***
>
> ***A:*** *Yard waste facilities are regulated under the Minnesota Pollution Control Agency. The Minnesota Department of Natural Resources cannot mandate yard waste facility practices. There may be cases where homeowners bring yard waste with jumping worms to yard waste facilities. There are best practices that yard waste facilities can follow, but are not required to follow when composting to prevent jumping worms from contaminating finished compost and then being spread throughout the community. Actions yard waste facilities can take include:*
>
> > *When composting, following the process for further reducing pathogens (PFRP) should be effective at killing jumping worms and their cocoons. The PFRP involves heating materials to 131°F and maintaining the temperature over time according to one of the three methods of PRFP described in Minnesota Rule 7035.2836 (link is external), Subp. 5, letter I.*
> >
> > *Keep finished compost separated from unfinished compost, so that worms cannot move to the finished compost.*
> >
> > *Each facility can do outreach to your customers. For example, after jumping worms were found at the Olmsted county compost site, they added information on jumping worms to their webpage (link is external) PDF and placed informational signage at the entrance to the compost site and by the finished compost.*
> >
> > *Wood that is chipped and used for mulch does not go through the high heat process used for compost. To prevent jumping worms from moving into piles of wood mulch, wood mulch should be stored in areas where jumping worms are not present, on pavement, and separated from areas where people are dropping off fresh yard waste. Regularly inspect mulch for jumping worms.*

MN DNR owns, operates, and manages State parks and other public lands that often use soil amendment for construction projects. The use of compost could be a part of these projects and MN DNR 's leadership to purchase premium, certified quality of compost could greatly assist in moving the market forward.

[18] Jeppe Kjaesgaard's PPT presented on 10-13-2022: "MDA's "Fertilizer & Soil Amendment Labeling Program"

[19] MDA has an online complaint form that can be used for compost complaints: MDA Pesticide & Fertilizer Misuse Complaint Form

Until a third – party certification program is developed and adopted by the State, compost suppliers could "self – certify" that their product sold to MN DNR is free of invasive species to the best of their knowledge. In this way, MN DNR could use the power of their purchasing dollars to help increase the demand for compost that is produced using recommended best practices in the composting process at compost facilities.

Minnesota Department of Transportation (MnDOT)

Standard Specifications for Construction[20]

MnDOT's Specification 3890 for "Compost" provides for "Grade 1", "Grade 2" and "Grade 3". (See Appendix A for excerpts of the MnDOT Compost Specifications.)

MnDOT's Grade 1 compost spec allows material from the decomposition of animal material and animal byproducts as a feedstock but prohibits source separated organic material (SSOM) as a feedstock which typically has material derived from animals fed to humans.

MnDOT's Grade 2 compost spec allows for materials derived from decomposition of leaves, yard wastes, SSOM, or a blend. MnDOT's compost spec references the MPCA definition of SSOM[21] and includes such items as food scraps and other compostable materials. Other compostable materials include compostable paper and plastic service ware if certified by the Biodegradable Products Institute (BPI).

MnDOT's Grade 3 compost spec allows a blend of Grade 1 and Grade 2 finished compost products. As stated on the MnDOT Approved Products List (APL) for compost vendors, Grade 3 compost can be custom blended by any of the above listed compost vendors.

Approved Vendors

MnDOT requires all material purchases to be from pre-approved vendors. The list of current MnDOT-approved compost vendors currently has a total 18 vendors pre-approved to supply compost[22] including:

- 3 vendors that supply MnDOT Grade 1 compost; and
- 16 vendors that supply MnDOT Grade 2 compost (including one vendor that supplies both Grade 1 and Grade 2).

MnDOT is hoping to increase the number of approved compost vendors on its APL and is conducting outreach similar to the October 13, 2022 Workshop co-sponsored by MNCC. MnDOT also understands that the best practices for quality assurance and monitoring of compost are evolving and intends to work with the composting industry in Minnesota to stay as current as possible.

For example, the MPCA requested that MnDOT amend its specification to allow for compost derived from SSOM such as food scraps. MnDOT responded by adding the term SSOM to the "Grade 2" scheme. MnDOT staff have stated that there are no current plans for *major* changes to the MnDOT compost spec; although they welcome comments on how to improve threshold standards for specific compost testing parameters (e.g., carbon to nitrogen ratio, organic content, etc.).

MnDOT requires documentation of lab tests to verify the vendor's compost products meet MnDOT specs and the United States Composting Council's (USCC) Seal of Testing Assurance (STA) requirements. However, it is important to note that MnDOT approves compost *vendors*, not their compost products. Test data is required to be submitted at the time of the original application to become an approved vendor. However, it is recognized that compost is highly variable such that it is very difficult to use one sample to

[20] MnDOT's Standard Specifications for Construction (2020 Edition, Volume 1)
https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=12292450
[21] MPCA Rule 7035.0300, Subpart 105a.

[22] MnDOT's pre-approved list of compost vendors as viewed on November 22, 2022

represent the entire production in a year. No other samples are required. The variability of compost from one batch to another is driving the impetus for enhanced quality assurance / quality control (QA/QC) procedures.

The MnDOT online form details the information needed for a new vendor to submit an application to be approved by MnDOT as a compost supplier.[23] This online application form requires the vendor to detail whether they are a distributor of compost or an original compost manufacturer.

Third-Party Certification Systems for Other Products

MnDOT currently partners with the MCIA (Minnesota Crop Improvement Association) to provide third-party review and certification of mulch, seed, and salt-tolerant sod.[24] These other products must have an official MCIA tag to verify the material has passed inspection. It is possible that a similar system for certification of compost could be developed by MnDOT in partnership with MCIA and MNCC.

The MCIA web page on Certification Services[25] states:

> *MCIA offers several programs to certify seeds and other agricultural products. These programs have been developed in cooperation with state, U.S., and international organizations to enhance the domestic and international marketability of our clients' products.*
>
> *All MCIA programs operate according to policies and procedures designed to ensure that defined standards have been met through a thorough, unbiased certification process.*
>
> *MCIA members involved in the production of certified products can participate in MCIA's various committees to provide input and review of certification programs.*
>
> *All program standards and fees are approved by the MCIA Board of Directors.*
>
> *MCIA's well-trained staff performs program inspections and evaluations according to Association policies and procedures, which are designed to protect the program's integrity, avoid conflicts of interest, and ensure proper certification decisions.*

[23] MnDOT "New Product Preliminary Information" online form to be submitted to MnDOT's Erosion Control and Landscape Products unit.
[24] MnDOT's Certified Vendors web page: *Certified/approved vendors*
[25] MCIA web page: *Certification Services - MCIA (mncia.org)*

Minnesota Pollution Control Agency (MPCA)

Solid Waste and Recycling Programs

Tim Farnan presented at the MNCC + MnDOT Workshop on compost quality on Thursday, October 13, 2022 about MPCA's solid waste and recycling programs.[26] There are three types of composting facilities permitted by MPCA:

- Yard Waste Composting: For over 30 years, MPCA's regulation of yard waste sites has been through a "permit by rule" (PBR) system which is effectively a "registration" program. There are currently about 125 yard waste PBR sites. These are often smaller public and private facilities and may not have full-time professional compost operators.
- SSOM Composting: Since 2015, for processing SSOM, MPCA requires a full permit. There are currently nine composting sites with a full SSOM permit. These are generally larger facilities with full-time trained composting professionals. Typically, these SSOM facilities also compost yard waste which is an essential feedstock to attain proper carbon to nitrogen (C/N) ratios in the composting process.
- MSW Composting: Regulation of mixed municipal solid waste (MSW) composting facilities has *a* storied history. Over 20 years ago, there were eight MSW composting facilities in Minnesota. Some of these facilities evolved into SSOM composting operations, but still have their legacy MSW permit. This system of attempting to compost mixed trash proved to be unsuccessful because the "finished" compost produced was too contaminated to be readily marketable.

MPCA's compost rule (7035.2836, Subp 3)[27] states that annual reports are required for SSOM and MSW composting facility permits. As an example, for "Class 1" compost, the finished compost must contain less than 3% inerts. As an environmental standard, this is a "floor" and may not be an appropriate marketing standard; MnDOT may want to specify compost with much less inert contaminants for selected applications.

For yard waste facilities, MPCA does not require the use of PFRP. Rather, PRFP is encouraged as the best means to kill jumping worms and other invasives. Increased enforcement and monitoring of yard waste facilities could be discussed as a legislative initiative, but there would need to be commensurate budget allocated to enable MPCA to hire and train adequate staff resources.

MPCA's compost rule (7035.2836) provides for a variety of compost maturity test options. MPCA could consider adding The Solvita® Compost Maturity Test to this list.

> *The Solvita® compost test is a widely recognized and easy-to-perform procedure to measure evolution of carbon-dioxide (CO2) and volatile ammonia (NH3), the two most prominent gaseous emissions of active composts. These indicators are use together to gauge stability and maturity, important co-dependent traits relating to compost quality.*
>
> Compost Quality
>
> *Solvita® is designed to readily enable practical, on-site compost quality testing. Chemistry skills are not necessary to conduct an accurate Solvita® Compost Maturity Test. Results are obtained in less than a day and provide both a useful guide to how far along compost is and a realistic interpretation of composting quality. Many composters worldwide employ Solvita® to monitor and ensure compost quality during the course of the entire composting process and report end-product quality.*

[26] Tim Farnan's presentation to the MNCC + MnDOT Workshop on Compost Quality Systems in Minnesota held on October 13, 2022: *MPCA Compost Regulatory Programs Overview and the Solid Waste Compost Rule*.
[27] Minnesota Administrative Rules: 7035.2836 Compost Facilities.

Stormwater Management Program

The Committee also met with Mike Trojan, MPCA Stormwater Program Supervisor, on March 16, 2022. Mr. Trojan presented on MPCA's Stormwater Manual including discussion of compost use guidelines.[28] There was an open and honest exchange of information and ideas about how the MPCA's Stormwater Manual in Wiki format currently guides the use of compost.[29]

Mr. Trojan stated that the original Stormwater Manual was published in 2005, including a section on best management practices (BMPs) to minimize runoff volume. In 2019, with the help of leadership from MNCC, MPCA staff updated the compost section[30] of the Manual including:

- Additional sections on applications for compost (e.g., soil amendments, engineered media, compost socks, etc.)
- Product parameters tables were updated – specific to an application
- Enhanced discussion of compost characteristics, benefits, and limitations
- Recommendations regarding phosphorus management
- Additional links and images

Compost is defined in the Stormwater Manual as follows:

> *Compost is the product resulting from the controlled biological decomposition of organic materials that have been sanitized (pathogens removed) through the generation of heat and stabilized to the point that it is beneficial to plant growth. It is an organic matter resource that can improve the chemical, physical, and biological characteristics of soil. It is derived from several sources, including composted yard waste, food waste, manure, leaves, grass clippings, straw, or biosolids.*

Under the section, "Compost," the Manual states:

> *Minnesota has about 8 large-scale compost sites that actively accept food waste and are permitted. There are also over 100 yard waste compost sites that have a permit by rule to compost yard-waste only. All of these permitted sites annually report to the MPCA. They are required to test their compost products for pathogens and for maturity to prove their compost meets "Class 1" standards as described by the compost rule.*
>
> *If a site does not meet class 1 standards, they must seek commissioner approval from MPCA in order to distribute their material. Compost from permitted compost sites must meet the following criteria:*
>
> - *Maturity Standards – Mature Compost must be tested for pH; moisture content; particle size; NPK ratio; soluble salt content*
> - *Testing for exceedances of criteria for arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, PCB, zinc*
> - *Less than 3% inert material (most have 1% or less)*
> - *More information can be found in the compost rule. Class I compost should not be confused with Grade 2 compost for MnDOT which is compost derived from yard waste or food waste.*

Under the section, "Compost," the Manual states:

> *…To facilitate the creation of consistent compost products throughout the United States, the U.S. Composting Council (USCC) created the Seal of Testing Assurance Program (STA). This voluntary*

[28] Presentation by Mike Trojan at the March 16, 2022 MNCC Compost Site Operations Committee: What is the Minnesota Stormwater Manual

[29] MNCC Compost Operators Committee Mar 16, 2022 meeting notes: *Mike Trojan (MPCA).* (Preliminary draft notes; in progress; not yet approved by the Committee).

[30] MPCA Stormwater Manual sections on "Compost and stormwater management" and "Product parameters for compost used for soil amendment and turf establishment" (Via the MPCA Stormwater Manual, online Wiki document as accessed on 4-11-2022)

> *program, while not a compost product certification program, requires participating compost facilities to perform a uniform set of tests on their compost products. Composters who are STA participants are required to furnish test information to compost buyers. This gives the compost purchaser the agronomic information needed (such as pH, particle size and test results from a number of other parameters) to successfully use the compost. If a compost site in Minnesota accepts food waste, they are also required to have a permit from the MPCA. This permit requires the compost site to comply with the compost rule thereby meeting the process to further reduce pathogens (PFRP) and for the compost to spend time "curing" until it reaches maturity which is documented by Solvita testing. Compost operators are required to submit annual reports to the MPCA to ensure they are meeting these health and safety standards. For more information on compost maturity, link here.*

Footnote 1 under the "Product parameters for compost used for soil amendment and turf establishment" of the Manual states in

> *1. MnDOT Grade 1 compost is derived from animal material; Grade 2 compost is derived from leaves and yard wastes, and/or SSOM compost with STA certification (STA is not a certification program, rather a testing program to supply the purchaser with the agronomic information to use properly in their project. See MnDOT Specification 3890.)*

Mr. Trojan also presented at the MNCC + MnDOT Workshop on Compost Quality held on October 13, 2022.[31] Similar to the content discussed with the Committee in March, Mr. Trojan covered a variety of issues pertaining to compost quality and end use applications as part of stormwater management systems. One of the important operating and maintenance (O&M) performance standards footnotes he presented including a warning about immature compost:

> *Immature compost will not provide the benefits of mature compost. When immature compost is applied to soils it will continue to decompose. During the process of decomposition demands nutrients and may produce byproducts, both of which may be harmful to plants growing in the soil.[32] These effects may be eliminated by adding additional fertilizer, thereby supplying the nitrogen needed for the continued decomposition of the compost and plant needs. You can ensure that you are receiving a mature compost if the composter is permitted as a solid waste or source-separated organics facility by the MPCA and/or if they have submitted their Seal of Testing Assurance (STA) testing. You can always ask a composter to see their data sheets from their Solvita testing for compost maturity.*

These resources indicate MPCA has a wealth of technical knowledge and resources about the best means to help assure mature compost is produced and specified by purchasing agencies. MPCA solid waste and stormwater management staff could be providing more proactive education, technical assistance and training to compost facility operators and their end use customers to help assure quality compost is produced and utilized.

MPCA's stormwater program has often partnered with the U of MN St. Anthony Falls Laboratory on stormwater research. For example, the St. Anthony Lab, has ongoing studies about optimizing biofiltration media for phosphate release.[33]

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[31] Mike Trojan's Presentation at the MNCC + MnDOT Workshop on October 13, 2022: Stormwater Management and the Role of Compost

[32] Garland, G. and Grist, T.1995. The compost story: From soil enrichment to pollution remediation. Bio-Cycle 36(10): 53-56: *Defines compost as "a recycled product made from the organic portion of municipal solid waste" (p. 2). Compost is NOT peat or mulch. As organic wood mulch decays it tends to use the nitrogen already in the soil, reducing the amount available for plants. This lack of available nitrogen can retard the growth of young plants. Immature compost is nothing more than an organic mulch and does not provide the benefits of mature compost.*

[33] U of MN St. Anthony Falls Laboratory, February 2021 newsletter update.

Feedlots / Manure Composting

George Schwint (MPCA) presented at the MNCC + MnDOT Workshop on Compost Quality on October 13, 2022.[34] He stated that MPCA does not promote or encourage composting of manure, and there would likely be no support from MPCA to require composting of manure instead of direct land application.

Contention from composters has been significant due to the lack of regulation if manure products are sold to MNDot or consumers without concern for pathogens and other contaminants. Products which are shipped in from other States in bags or picked up from farmers or others taking in this material then returning it to the public for a fee are not regulated or permitted thus allowing potential spread of invasive weed seeds or other pests and pathogens. This puts a strain on public perception of compost and the environment, not to mention competes with permitted facilities designed to protect our resources.

Currently there are rules for manure compost sites revisor.mn.gov/rules/7020.2150/ but only one facility in the State operates under this rule.

[34] George Schwint (MPCA) presentation at the MNCC + MnDOT Workshop on Compost Quality on October 13, 2022: Feedlots and Manure Compost Regulation.

Future Research Needs and Opportunities

MnDOT Sponsored Research

At the October 13, 2022, MNCC + MnDOT Compost Quality Workshop, Warren Tuel mentioned two research projects that MnDOT is involved in:

- *A current research project with the University of Maryland and Michigan State using compost as a soil amendment. Started in early 2022, this is a 2-year research project including greenhouse growth studies using different mix ratios, plans to do pilot growth studies ("growth plots"). Spring of 2023 at the "MnROAD" test facility near St. Michael and Albertville. This research project Includes a cost/benefit analysis to look at whether compost aids in more rapid vegetation growth that could potentially help MnDOT close-out our stormwater construction projects earlier.*

- *A second pilot project is planned for the I-94 corridor in the east Metro Area (i.e., St. Paul to Wisconsin) planned for the spring of 2023. This project may include up to about 10 miles of roadside revegetation and use about 7,000 cubic yards of a compost/soil amendment blend.*

MNCC could benefit from continued and enhanced communications with MnDOT about these and other potential future compost research projects.

University of Minnesota (U of MN)

The U of MN has a wide variety of departments, offices, programs, and services that relate to compost and composting facilities.

The U of MN maintains a STRAL (Soil Testing Research Analytical Laboratory)on the St. Paul Campus.[35] The STRAL web page states:

> *Soil testing takes the guesswork out of fertilizer recommendations, ensures fertile soil without pollution of the environment, and makes good economic sense. Our recommendations are based on laboratory results, soil characteristics, crop history, crop nutrient requirements and are specific to Minnesota locations and conditions.*
>
> *For inorganic elemental analytical chemistry, please visit the Research Analytical Laboratory's website.[36] The Research Analytical Laboratory serves university researchers, government agencies, and public service groups.*

The U of MN Research Analytical Laboratory web page states in part:

> *The Research Analytical Laboratory serves:*
> - *university researchers*
> - *government agencies*
> - *public service groups*
> - *private companies*
>
> *For soil fertility analysis of lawn, garden, and farm field soil samples, as well as greenhouse and florist testing, please visit the Soil Testing Laboratory's website. The services of the Soil Testing Laboratory are available to the general public as well as to researchers.*
>
> *We provide inorganic chemical analysis for:*
> - *soil*
> - *water*
> - *feeds*

[35] U of MN, Soil Testing and Research Analytical Laboratory, in the College of Food, Agricultural and Natural Resource Sciences (CFANS).
[36] U of MN, Welcome to the Research Analytical Laboratory web site, About US web page

- *foods*
- *compost*
- *plant or animal tissue*
- *many other types of materials*

We can do all of the work necessary to prepare your samples for analysis.

The U of MN Water Resources Center and Agricultural Experiment Station together with the Minnesota Board of Water and Soil Resources (BWSR) are co-sponsors of MOSH.[37] U of MN Extension[38] has a wide variety of educational factsheets and informational resources on compost. The U of MN St. Anthony Falls research lab has ongoing research on soil amendments and the impacts of potential phosphorus release into stormwater.[39] MNCC may find it fruitful to further engage with the U of MN's STRAL, MOSH, Extension, St. Anthony Falls Lab, and the Department of Soil Science.

[37] Minnesota Office for Soil Health – MOSH, web site, including the About MOSH web page, and the MOSH Factsheet (February 2019)

[38] U of MN Extension compost resources, including the following examples (many more are available):

- Compost and soil organic matter: The more, the merrier? (April 8, 2021)
- Why you should test your compost (March 23, 2022)
- Aged manure is not composted manure: Four factors for successful manure composting (February 3, 2022)
- You might be over-fertilizing your garden (August 24, 2022)

[39]. Erickson, AJ, Kozarek, JL, Kramarczuk, KA, and Lewis, L. (2021). "Biofiltration Media Optimization – Phase 1 Final Report." Project Report No. 593, St. Anthony Falls Laboratory, University of Minnesota, Minneapolis, MN. January 2021: https://hdl.handle.net/11299/218193

USCC and AAFPCO

In August 2019, the USCC announced a new definition for "compost" resulting from extensive collaboration with the American Association of Plant and Food Control Officials (AAFPCO). The August 28, 2019 USCC news release states:

> *Savannah, GA–The American Association of Plant and Food Control Officials (AAFPCO)[40] has approved a new definition for compost that emphasizes the pathogen-removing thermophilic process, differentiating it from many products often confused as compost.*
>
> *"This definition more completely defines what our products are so that people out there wanting to call their products compost cannot do that without meeting this definition," said Ron Alexander of R. Alexander Associates, the USCC's liaison to the AAFPCO, who has labored for years on the updated definition language. The new definition was adopted at the group's winter meeting held in Savannah, GA last week.*
>
> *The official definition is:*
>
> > *Compost – is the product manufactured through the controlled aerobic, biological decomposition of biodegradable materials. The product has undergone mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilizes the carbon such that it is beneficial to plant growth. Compost is typically used as a soil amendment, but may also contribute plant nutrients. Finished compost is typically screened to reduce its particle size, to improve soil incorporation.*

This new definition of compost, adopted in 2018, replaces the prior AAFPCO definition (1997).[41]

[40] AAPCO web site home page: www.AAPFCO.org

[41] USCC article: *"New Compost Definition – Results from USCC Work with AAPFCO"* (August 28, 2019) New Compost Definition – Results From USCC Work with AAPFCO - US Composting Council which contains a link to the *AAFPCO Product Label Guide* (2019): Introduction (aapfco.org).

Funding Options

There are a wide variety of funding programs that may relate to the initiatives proposed within this White Paper.

Minnesota Department of Agriculture (MDA)

MDA administers several grant and loan programs that may be relevant to compost research and development efforts.[42]

MPCA

MPCA administers recycling market development grants that MNCC should reconsider for this type of compost market development research.[43] MNCC submitted a grant application in May 2022 to MPCA for a variety of compost market development activities, but the grant was not approved.

Minnesota Legislative-Citizen Commission on Minnesota Resources (LCCMR):

LCCMR funds a variety of environmental research and development projects.[44]

U of MN

The U of MN may be a research partner with MNCC in moving forward with grant proposal opportunities.

[42] MDA – administered grant and loan programs* that *may* be relevant to MNCC's compost quality development efforts:
- AGRI Sustainable Agriculture Demonstration Grant | Minnesota Department of Agriculture (state.mn.us)
- AGRI Urban Agriculture Grant | Minnesota Department of Agriculture (state.mn.us)
- Agricultural Fertilizer Research and Education Council (AFREC) | Minnesota Department of Agriculture (state.mn.us)
- Agricultural Growth, Research, and Innovation (AGRI) Program | Minnesota Department of Agriculture (state.mn.us)
- Developing Markets for CLC Crops | Minnesota Department of Agriculture (state.mn.us)
- Nutrient Management Initiative (NMI) | Minnesota Department of Agriculture (state.mn.us)
- Noxious Weed and Invasive Plant Grant | Minnesota Department of Agriculture (state.mn.us)

[43] MPCA's Recycling Market Development Grants are administered through a competitive RFP process scheduled periodically based on budget and MPCA staff resource allocations. Future grant rounds may be announced by MPCA. MNCC submitted a market development grant application to MPCA in May 2022; Later, MPCA decided not to award the grant. Once all current round grant agreements are executed, MPCA staff have stated they would be willing to meet with MNCC to discuss the May 2022 submittal and how such an application could be enhanced to be more competitive in any future grant rounds. (Personal communication with Susan Heffron, MPCA staff, Monday, October 31, 2022.)

[44] LCCMR has information at: Proposal & Funding Process and
2023 Proposal & Funding Process - Environment and Natural Resources Trust Fund (mn.gov)

Conclusions

Minnesota Department of Administration (MN Dept. of Admin.)

[NOTE: THE MN DEPT. OF ADMIN IS IN THE MIDDLE OF AN RFP PROCESS TO SEEK PROPOSALS FROM COMPOSTERS TO SUPPLY FOOD-DERIVED COMPOST. THIS MN DEPT. OF ADMIN. SECTION TO BE DRAFTED AFTER PROPOSALS ARE DUE ON TUESDAY, NOVEMBER 22, 2022 (PER RFP ADDENDUM 2). MNCC COMMENTS MAY ADDRESS THE NEED FOR ENHANCED COMPOST QUALITY SPECIFICATIONS.]

Minnesota Department of Agriculture (MDA)

1. The MDA definition of compost and composting are in Minnesota Statutes (M.S. 18C.005). It is now an outdated definition (e.g., reference to "…anaerobic decay…"). The soil amendment registration program is further guided by MDA rules. These statutes and rules would be very hard to change to adopt a new definition of composting and compost.

2. MDA's compost registration program is administered within the context of other program priorities designed to protect health, safety, and the environment. MDA does not currently regulate the quality parameters of "compost". MDA field testing of compost is not feasible at this time given resource and policy constraints.

3. Compost that is given away is not required to register.

4. MDA regards compost manufactured from "yard trimmings", "food waste" and "municipal solid waste" as exempt feedstocks. Compost using these feedstocks are not required to be registered with MDA as a soil amendment. Composters may voluntarily register such exempt compost products. The intent of the exemption was to allow these "recycled products" to be distributed without being encumbered by MDA regulatory requirements.

5. Composts manufactured from manure or biosolids (or those containing them) may not be exempted from MDA laws and regulation.

6. Some composters in Minnesota have elected to register their compost product with MDA even though it is not required due to MDA's yard waste or food waste "recycled feedstock" exemption. Other composters in Minnesota that use yard waste and food scraps have elected not to register their compost product with MDA.

7. The acceptable claims about the benefits of compost as published on product labels (e.g., bags, or separate factsheet flyers accompanying bulk sales) are regulated by MDA. The following are the acceptable compost claims that have been pre-approved by MDA[45]:

    - Improves soil structure and porosity, creating a better plant root environment.
    - Increases moisture infiltration and permeability, and reduces bulk density of heavy soils, improving moisture infiltration rates and reducing erosion and runoff.
    - Improves the moisture holding capacity of light soils, reducing water loss and nutrient leaching and improving moisture retention.
    - Improves cation exchange capacity of soils.
    - Supplies organic matter.
    - Aids the proliferation of soil microorganisms.
    - Allows plants to more effectively utilize nutrients while reducing nutrient loss by leaching.
    - Enables soils to retain nutrients longer.

[45] PowerPoint presentation by Michelle Dobbratz, MDA to the MNCC Compost Operators Committee on February 16, 2022. (Based on a MDA guidance document similar to the factsheet published by MDA: *Overview of Laws and Regulations Related to the Distribution of Compost in Minnesota*; June 2003).

- Contains humus, assisting in soil aggregation and making nutrients more available for plant uptake.
- Buffers soil pH.

The above claims are pre-approved by MDA and are allowed without additional evidence. Other claims not listed above must be accompanied by adequate scientific evidence. "In house" research by compost suppliers may be allowed if deemed adequate by MDA.

8. MDA has recognized and referenced other third-party certification programs such as the Organics Materials Review Institute (OMRI) system for listing certified organic fertilizers and soil amendments.[46] MDA staff expressed a willingness to discuss the potential to recognize similar third-party certification program(s) for compost products.

9. MDA must respond to all complaints. MNCC could encourage its members and others to report potential violations of statutory requirements.

10. MDA staff have stated a willingness to participate in further discussions with MNCC about further standardization of compost regulations in Minnesota. One concept discussed is to call an ad hoc inter-agency work group, including composting industry representatives, to review and discuss the recommendations in this White Paper.

Minnesota Department of Natural Resources (MN DNR)

11. MN DNR has proposed a new amendment to their invasive species rule, in part to add jumping worms to this prohibited species list. But the FAQs advisory document appears to take a voluntary approach using outreach and advisory resources like the FAQs, jumping worms info on the MN DNR web page, etc.

12. MN DNR's FAQs state that "Yard waste facilities are regulated under the Minnesota Pollution Control Agency. The Minnesota Department of Natural Resources cannot mandate yard waste facility practices." There is need for a more formal process to integrate MN DNR's jumping worms advice with MPCA's compost facility regulatory program.

13. MN DNR purchases soil amendments for construction projects at state parks and other facilities. This provides MN DNR an opportunity to lead by example and require compost suppliers to self-certify that the compost is free of invasives and that the compost is from manufacturers or distributors that use best management practices to reduce the threat of spreading invasives.

Minnesota Department of Transportation (MnDOT)

14. MnDOT's APL application for new compost vendors requires lab data to be submitted that documents that the proposed compost products meet MnDOT specs and STA parameters. It may be helpful for MNCC to review the compost test data submitted by the vendors.

15. Sample frequency and sample selection methods for testing compost quality are not reported or independently verified. There is little to no information publicly available about the variability of compost quality from MnDOT APL vendors.

16. MNCC could consider inviting USCC to co-sponsor a training workshop on the STA program.

17. MnDOT's APL application for new compost vendors allows information to be supplied about references of government agencies that have purchased their compost product. This information may be helpful to MNCC in examining previous compost RFPs or RFBs as released by

[46] The *OMRI Products List©* is a directory of all products OMRI has determined are allowed for use in organic production, processing, and handling according to the USDA National Organic Program. For more information, link to the OMRI Products List web page:
https://www.omri.org/about-products-list.

government agencies. MNCC may wish to request all MnDOT APL compost applications under the Minnesota Government Data Practices Act (M.S. Chapter 13).

18. MnDOT currently partners with MCIA to provide third-party product inspection and quality certification for three other products: mulch, seed, and salt-tolerant sod. It is possible that a similar system for certification of compost and/or composting facilities could be developed by MnDOT in partnership with MCIA and MNCC. An alternative, intermediate step could be to request that MnDOT require all compost suppliers to receive compost from STA-tested composting facilities.

Minnesota Pollution Control Agency (MPCA)

Solid Waste and Recycling Programs

19. MPCA is in the process of drafting their next Metropolitan Solid Waste Management Policy Plan and soon the statewide Solid Waste Policy Report. These plans and reports could be opportunities for MNCC to comment on the need for legislation to enhance compost standards and quality control systems in Minnesota. These plans and reports could provide opportunities to educate and advocate for formal recognition of the USCC definition of "compost".

20. MPCA does not fully "regulate" yard waste composting facilities other than to require registration (essentially a letter) with MPCA as part of the PBR requirements. PBR yard waste composting sites are not required to follow industry composting process standards such as PFRP to help assure compost piles have reached minimum time and temperature requirements. MPCA lacks adequate resources to inspect all PBR yard waste sites. Lack of adequate regulatory requirements, education, outreach, operator training, and enforcement efforts may lead to increased spread of jumping worms and other invasive species through sub-standard compost.

21. MPCA staff have indicated increased requirements, enforcement and monitoring of yard waste facilities could be discussed as a legislative initiative, but there would need to be commensurate budget allocated to enable MPCA to hire and train adequate staff resources.

22. There is increasing confusion about the role of aerobic composting facilities to further process digestate from anaerobic digestion (AD) facilities. The USCC definition of compost does not include AD digestate. To help develop the market for compost produced using AD digestate, compost products should explicitly identify all feedstocks. Depending on the composition of AD digestate, AD digestate – derived compost may need a new classification by MPCA and MnDOT.

23. MPCA could consider adding the Solivita® Compost Maturity Test to the list of compost maturity tests in its Compost Rule (7035.2836). A Solvita reading of 6 or above could be considered as a minimum maturity level for Grade 1 or Grade 2 compost.

24. MPCA solid waste and stormwater management staff could be providing more proactive education, technical assistance and training to compost facility operators and their end use customers to help assure quality compost is produced and utilized.

Stormwater Management

25. The MPCA Stormwater Manual is currently packed with good information about the application of compost in various stormwater BMPs.

26. MPCA is in the process of reorganizing the information in their Stormwater Manual as published in online Wiki format.

27. The Stormwater Manual refers to MnDOT compost materials specifications 3890 as part of the large MnDOT Standard Specifications for Construction (2020 edition, Volume 1).

28. MPCA's Stormwater Manual states: *"Class I compost should not be confused with Grade 2 compost for MnDOT which is compost derived from yard waste or food waste."* This confusion was

discussed with Mr. Trojan and the MNCC Compost Operators Committee on March 16, 2022. Cross – referencing MPCA Compost Rule with MnDOT compost specification 3890 can be challenging, especially for some compost users. Additional education and outreach may help address this confusion.

Feedlots / Manure Compost

29. MPCA does not promote or encourage composting of manure and there would likely be no support from MPCA to require composting of manure instead of direct land application.

Future Research Needs and Opportunities

30. This White Paper should be considered a beginning of the conversation about future compost research needs and opportunities. Minnesota composters, through the MNCC's Compost Site Operations Committee, could discuss the need for and scope of any future research proposed by MNCC. "Future Research Needs" could be a session topic at the second Workshop that could be held in approximately April 2023.

31. Building on the concept of MPCA's "Class 1" and "Class 2" system of classifying different quality levels of compost, there may be a need to further classify composts by:

    a. Contaminant levels

    b. Feedstocks

    c. End use applications as indicated by compost particle size / gradation (e.g., fine, medium, and coarse)

    This more comprehensive compost quality classification scheme could be a consideration in the development of any third-party certification system developed in collaboration with MCIA.[47]

32. It is recognized that compost quality test parameters and minimum quality standards should vary by the end use application. USCC's ROI factsheets and MPCA's Stormwater Manual provide specific examples of this variation in compost quality levels and testing specifications.

33. Specific compost quality parameters need additional research and facilitated discussion among Minnesota composters. These parameters could include (but are not limited to):

    a. Maximum allowable levels of physical contaminants
    b. Carbon to nitrogen ratio
    c. Soluble salts
    d. Bulk density as a function of feedstock blend ratios

34. MNCC could discuss with the U of MN the concept of a "Compost Research Center" to continue and expand applied research about the benefits and limitations of compost use in Minnesota.

Funding Options

35. MNCC submitted a recycling market development grant application to MPCA in May 2022 that was subsequently not awarded. MPCA staff have stated they are willing to meet with MNCC to debrief about the strengths and weaknesses of the MNCC grant application once all current grant round recipients have executed agreements.

36. MNCC Board could consider all funding needs related to the issues raised in this White Paper within the context of all MNCC priorities and future strategic plans.

[47] One example of such additional specifications is the King County, Washington compost RFP and contract. See Appendix D for excerpts from this case study.

Recommendations

Minnesota Department of Administration (MN Dept. of Admin.)

[NOTE: THE MN DEPT. OF ADMIN IS IN THE MIDDLE OF AN RFP PROCESS TO SEEK PROPOSALS FROM COMPOSTERS TO SUPPLY FOOD-DERIVED COMPOST. THIS MN DEPT. OF ADMIN. SECTION TO BE DRAFTED AFTER PROPOSALS ARE DUE ON TUESDAY, NOVEMBER 22, 2022 (PER RFP ADDENDUM 2). MNCC COMMENTS MAY ADDRESS THE NEED FOR ENHANCED COMPOST QUALITY SPECIFICATIONS.]

Minnesota Department of Agriculture (MDA)

1. MNCC should request MDA officially recognize the USCC definition of compost.

2. MNCC should discuss MDA rules and program guidance to suggest alternative means to implement modern compost quality QA/QC without legislation. This discussion should be conducted as part of an ad hoc, inter-agency work group on compost including representatives of the composting industry.

3. MNCC should encourage compost producers and distributors in Minnesota to register their compost products with MDA on a voluntary basis even if the compost is produced from yard waste or food waste or if the compost is given away.

4. MNCC should encourage Minnesota composters to utilize the allowed, pre-approved claims about the benefits of compost if their compost meets standards (e.g., STA).

5. MNCC should begin to plan a new compost certification and labeling program (e.g., in partnership with MCIA?).

6. MNCC could consider submitting complaints to MDA for sub-standard products that do not meet minimum standards (e.g., STA parameters).

Minnesota Department of Natural Resources (MN DNR):

Proposed rule change re: Jumping Worms

7. MNCC should submit comments to MN DNR before the deadline of Friday, December 9, 2022.

8. MN DNR should participate in a compost work group. Initial discussion between MN DNR and MPCA should include how MPCA's regulation of yard waste composting facilities can be upgraded to address MN DNR's best practices guidelines for the prevention of the spread of jumping worms.

9. Beyond the term of any compost work group, MNCC should advocate for a more formal, ongoing inter-agency communication protocol to allow MN DNR resources (e.g., fact sheets and related public education documents on preventing the spread of jumping worms) to be more fully integrated into MPCA's regulatory program for compost facilities.

10. At this time, MN DNR and MPCA should strongly *"encourage"* yard waste compost sites located in jumping work zones to use a PFRP process, including temperature monitoring.

11. Later, MNCC could advocate for the Minnesota legislature to upgrade the requirements of yard waste (only) composting facilities to monitor composting pile temperatures, either following PFRP standards, or a suitable alternative per MPCA's composting rule.

12. MN DNR should develop its own specification for purchase of premium quality compost that is certified to be free of invasive species. Until a third – party certification program is developed and adopted by the State, compost suppliers could "self – certify" that their product sold to MN DNR

is free of invasive species to the best of their knowledge and was produced based on MN DNR and MPCA – recommended best practices (e.g., use of PFRP, etc.).

Minnesota Department of Transportation (MnDOT)

13. MNCC should continue its discussions with MCIA about developing a proposal to MnDOT to add compost to the list of MCIA third-party certification services for compost and/or composting facilities

14. As a part of the MNCC/MCIA proposal to MnDOT, the compost quality test parameters should be discussed. If MNCC can attain consensus, specific changes to the MnDOT spec for compost testing should be formally recommended to MnDOT. If consensus cannot be attained, MNCC should encourage individual members to submit their own comments directly to MnDOT without representing MNCC.

15. Because of the variability of compost from one batch to the next, sampling of compost should be required prior to use on MNDOT projects.

16. MNCC should consider producing a workshop for Minnesota composting facilities co-sponsored by USCC on the STA program.

Minnesota Pollution Control Agency (MPCA)

Solid Waste and Recycling Programs

17. MNCC should use multiple opportunities to discuss the need for legislation to enhance compost quality standards in Minnesota. These opportunities include this MNCC White Paper, the second MNCC compost quality workshop in April 2024, the MPCA's upcoming Metropolitan Area Solid Waste Management Policy Plan; and MPCA's upcoming statewide Solid Waste Policy Report.

18. MNCC should continue to discuss a proposed compost legislative initiative with MPCA to upgrade the requirements for yard waste facilities to meet PFRP and provide adequate resources to MPCA to provide related education, outreach, operator training, and enforcement. (and vice versa - the MPCA should also reach out to the MNCC when new or proposed legislation or rule making is considered. Same could be said of all other named state agencies to have an open/transparent relationship)

19. MNCC should advocate for an update to MPCA's Compost Facility Permit Rules (MAR 7035.2836) to upgrade the QA/QC requirements for all types of composting facilities. PFRP should be considered for all composting facilities regardless if SSOM is used or not.

20. The specific requirements for "Class 1" compost should be re-evaluated and confirmed if still appropriate or modified if more modern test methods warrant (e.g., use of SOLVITA as an additional test method for maturity).

21. MPCA solid waste and stormwater management staff should be providing more proactive education, technical assistance and training to compost facility operators and their end use customers to help assure quality compost is produced and utilized.

Stormwater Management

22. Members of the MNCC Compost Site Operations Committee should carefully review the MPCA Stormwater Manual on an (annual?) basis and, if needed, suggest improvements to MPCA staff. (or the MPCA should communicate directly with MNCC if and when any changes are made to ensure needs are met)

23. Members of the MNCC Compost Site Operations Committee and any future ad hoc work group should further discuss how best to manage the confusion between MPCA's Class 1 compost and MnDOT's Grade 2 compost. The Stormwater Manual should include a table providing comparison

of the different compost quality standards in Minnesota, this type of table could also be hosted by MNCC and linked to in the Stormwater Manual.

Feedlots / Manure Composting

24. MNCC should consider reaching out to Holden Farms and their Sustane Natural Fertilizer to further discuss MPCA's feedlot manure policy of not encouraging composting as a preference over direct land spreading of manure.

Certified Compost in Minnesota

25. MNCC should request a follow-up meeting with MCIA to discuss the scope and schedule of a proposal to MnDOT to develop a third-party certification service for compost and/or compost facilities. MNCC should be a full collaborator and partner in the development of this proposal.

26. MNCC's responsibilities in the implementation of the third-party certification system should include public education, training, and outreach to Minnesota composters.

27. If any such third-party certification service is developed, MNCC should be compensated through any fee-based revenues.

Future Research Needs and Opportunities

28. Minnesota composters should discuss the need for, and scope of, any future research proposed by MNCC.

29. Minnesota composters should discuss the need for a more comprehensive compost quality classification system. This new compost products classification system should be the basis for future discussions with MCIA about a third-party certification system.

30. MNCC should meet with the U of MN Department of Soil Science and other representatives to discuss the key issues raised within this White Paper and the opportunities for grant funding to continue applied research related to compost market development.

31. One potential topic that should be discussed with the U of MN is the concept of a "Compost Research Center" to continue and expand applied research about the benefits and limitations of compost use in Minnesota.

Funding Options

32. MNCC should request a meeting with MPCA staff to debrief about the strengths and weaknesses of the May 2022 MNCC grant application once all current grant round recipients have executed agreements.

33. MNCC Board should consider all funding needs related to the issues raised in this White Paper within the context of all MNCC priorities and future strategic plans.

Appendices

Appendix A
MnDOT Specification 3890

(Selected excerpts)

3890.1 SCOPE: *Provide compost material for soil amendment for landscape planting or turf establishment.*

3890.2 REQUIREMENTS: *Provide material from vendors listed on the Approved/Qualified Products List.*

Provide compost meeting one of the following sets of requirements:

Option 1: *The US Composting Council Seal of Testing Assurance (STA) Program requirements for animal or plant-based feedstocks. Facilities accepting SSOM for composting are required to comply with the US Composting Council Seal of Testing Assurance Program. STA testing is optional for facilities accepting only leaves or yard waste.*

SSOM means compostable materials in accordance with Minnesota Rule 7035.0300, Subpart 105a."

Option 2: *(Not Available for facilities accepting SSOM):*

Provide compost that is registered for sale with the State of Minnesota. ….

MnDOT's Grade 1 Compost Spec

Provide Grade 1 compost for use in turf establishment meeting the following requirements and characteristics

1. *Nutrient rich type,*
2. *Derived from the decomposition of animal material and animal byproducts*
3. *Texture similar to a highly organic soil, and*

Meeting the requirements of Table 3890-1.

Table 3890-1
Grade 1 Compost Requirements

Requirement	Range
Organic matter content (dry weight)	≥ 30%
C/N ratio	6:1 – 20:1
NPK ratios* (% dry weight)	2:2:1 – 4:4:2
pH	5.5 – 8.0
Moisture content	35% – 55%
Bulk density	700 lb per cu. yd – 1,600 lb per cu. yd
Inert material	≤ 3% at 0.15 in
Soluble salts	≤ 10 mmho per cm
Germination test ‖	80% – 100%
Screened particle size	≤ ¾ in

* To obtain the nitrogen, phosphorus, or potassium levels specified, the compost may be fortified with commercial fertilizer.
‖ Germination test must list the species of Cress or lettuce or cucumber seed used.

MnDOT's Grade 2 Compost Spec

Provide Grade 2 compost as a landscape planting medium and meeting the following requirements:

(1) Derived from the decomposition of leaves, yard wastes, or SSOM or a blend.

(2) Texture similar to a shredded peat, and

(3) Meeting the requirements of Table 3890-2:

Table 3890-2
Grade 2 Compost Requirements

Requirement	Range
Organic matter content (dry weight)	≥ 30 %
C/N ratio	6:1 – 20:1
NPK ratios (Max. % dry weight)	1:1:1
pH	5.5 – 8.5
Moisture content	35% – 55%
Bulk density	700 lb per cu. yd – 1,600 lb per cu. yd
Inert material *	< 3% at 0.15 in
Soluble salts	≤ 10 mmho per cm
Germination test ‖	80% – 100%
Screened particle size	≤ ¾ in.

* Includes plastic bag shreds.
‖ Germination test must list the species of Cress, cucumber, or lettuce seed used.

MnDOT's Grade 3 Compost Spec

Provide Grade 3 as a blend of Grade 2 compost and no greater than 10 percent Grade 1 compost.

Appendix B
MPCA's Compost Rule
(Selected excerpts)

MPCA's Rule – Definition of source-separated organic material.

(MPCA Administrative Rule 7035.0300)

Subp. 105a – Definition of SSOM

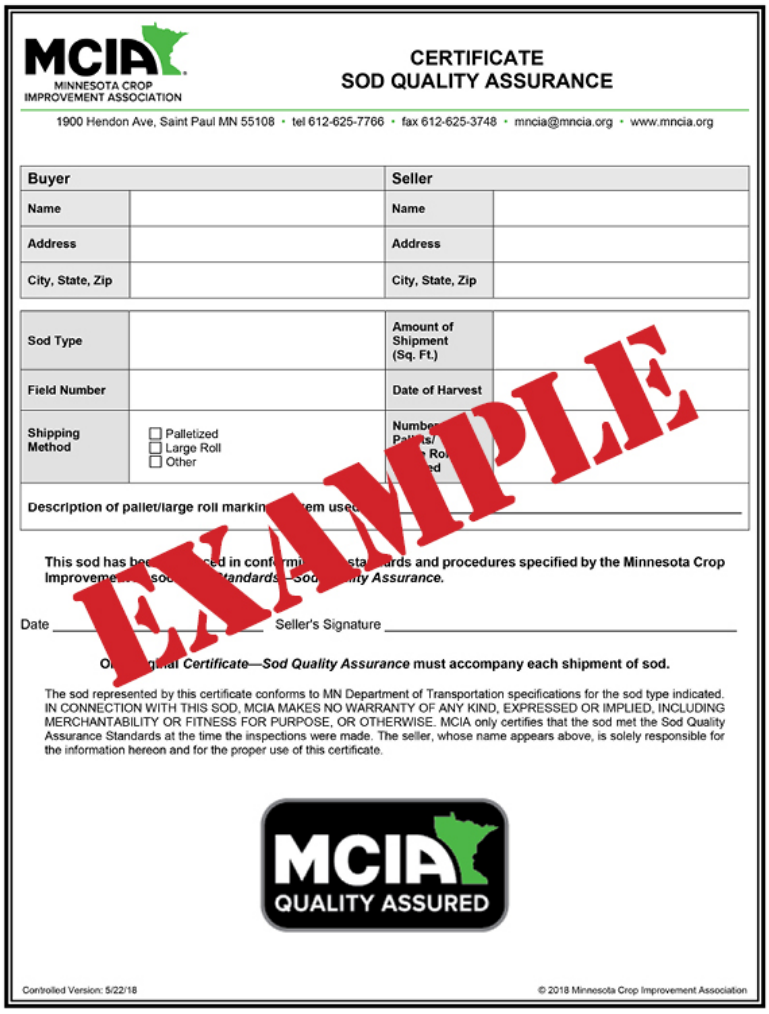
A. "Source-separated organic material" means:
(1) source-separated compostable materials and yard waste, as defined under Minnesota Statutes, section 115A.03, except sanitary products and diapers;
(2) vegetative wastes generated from industrial or manufacturing processes that prepare food for human consumption; and
(3) compostable materials that meet the standards in ASTM D6400 and ASTM D6868, incorporated by reference under part 7035.0605.
B. Unless specifically permitted by the commissioner under part 7001.0150, source-separated organic material does not include:
(1) animal wastes such as manure or carcasses;
(2) fish wastes generated from industrial or manufacturing processes;
(3) meat by-products generated from industrial or manufacturing processes;
(4) sanitary products; or
(5) diapers.
C. Source-separated organic material does not include:
(1) septage; or
(2) sewage sludge, as defined in part 7041.0100, subpart 49.

Subp. 105b – Definition of SSOM Compost Facility

"Source-separated organic material compost facility" means:
A. a site used to compost source-separated organic material;
B. all structures or processing equipment used to compost source-separated organic material; and
C. all structures or equipment used to:
(1) control drainage;
(2) manage contact water;
(3) manage storm water;
(4) manage incoming material;
(5) manage the finished product; or
(6) manage rejects and residuals resulting from the composting process.

Appendix C
MCIA Certificates of Quality Assurance for Other Products

MCIA provides third-party product quality inspection and certification services in a partnership with MnDOT. MCIA provides certification for mulch, seed and salt-tolerant sod. Below is an example of the MCIA sod quality assurance certificate:



MCIA
MINNESOTA CROP IMPROVEMENT ASSOCIATION

CERTIFICATE
SOD QUALITY ASSURANCE

1900 Hendon Ave, Saint Paul MN 55108 • tel 612-625-7766 • fax 612-625-3748 • mncia@mncia.org • www.mncia.org

Buyer		Seller	
Name		Name	
Address		Address	
City, State, Zip		City, State, Zip	

Sod Type		Amount of Shipment (Sq. Ft.)	
Field Number		Date of Harvest	
Shipping Method	☐ Palletized ☐ Large Roll ☐ Other	Number Pallets/ Ro…	
Description of pallet/large roll markin… em used			

EXAMPLE

This sod has be… ed in conf… sta… rds and procedures specified by the Minnesota Crop Improveme… soc… *Standards—Sod… ity Assurance.*

Date _____ Seller's Signature _____

O… *…al Certificate—Sod Quality Assurance* must accompany each shipment of sod.

The sod represented by this certificate conforms to MN Department of Transportation specifications for the sod type indicated. IN CONNECTION WITH THIS SOD, MCIA MAKES NO WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR PURPOSE, OR OTHERWISE. MCIA only certifies that the sod met the Sod Quality Assurance Standards at the time the inspections were made. The seller, whose name appears above, is solely responsible for the information hereon and for the proper use of this certificate.

MCIA QUALITY ASSURED

Controlled Version: 5/22/18

It is possible that a similar system for certification of compost could be developed by MnDOT in partnership with MCIA and MNCC.

Appendix D
Case Study: King County, Washington

Foth interviewed **King County**, **Washington** staff in the spring 2021 about their compost market development program and their contract for purchase of compost from **Cedar Grove**. King County released an invitation to bid (ITB) on January 21, 2020 for purchase of "Compost, Applications Services and Related Material". Section 5.4 of the RFP body lists the detailed "Material Specifications" for

A -"General Compost" (pages 28 - 30);

B - "Bioretention Compost" (pages 30 – 33); and

C – "Biosolid Compost" (pages 32 – 35).

Parameters in the specs include:

- *pH (6.0 to 8.5)*
- *Physical Contaminants (both inerts at a max. of 1 percent; and film plastics at 0.1 percent, by dry weight)*
- *Minimum Organic Matter (40 percent by dry weight)*
- *Maturity*
  (greater than 80 percent by USCC TMECC 0.505-A "Germination …"; or
  5 or above on the Solvita test)
- *Stability (7-mg CO2-C/g OM/day or below by USCC TMECC 0.508-B "CO2 Evolution Rate")*
- *Feedstocks:*
  - *Minimum of 65 percent by volume of yard debris, crop residues, and bulking agents (as defined by WAC 173-350-100…)*
    Maximum of 35 percent by volume of "post-consumer food waste" (as defined by WAC 173-350-100…)
  - *Minimum of 51 percent by volume of the feedstock shall originate from an organic waste system within King County, ….*
- *Carbon to Nitrogen Ratio:*
  - *"Fine compost" shall have a C:N ration of less than 25:1 (by TMECC 0401A and 04.02D)*
  - *"Medium compost" shall have a C:N between 18:1 and 35:1*
  - *"Coarse compost" shall have a C:N between 25:1 and 35:1*
- *Soluble Salt (less than 4.0 mmhos/cm by TMECC 04.10 "Electrical Conductivity"*
- *Gradations for:*
  - *"Fine Compost" (generally 100% under 1");*
  - *"Medium Compost" (at least 70% passing a ¼-inch screen, with a maximum particle length of 4 inches); and*
  - *"Coarse Compost" (at least 40% passing the ¼-inch screen, with a maximum particle length of 6 inches)*

  (See gradation / sieve size charts; for A – General Compost, on pages 28 and 29)
- *Must have a WA Dept. of Ecology "Solid Waste Handling Permit" (by WAC 173-350 or WAC 173-308 for biosolids)*